

BUSINESS JET TRAVELER

2023-24 Buyers' Guide



BJT **20**
ANNIVERSARY

SPECIAL SECTION:
TWO DECADES OF
BIZAV CHANGES
AND INNOVATION



- JET BUYERS' SIX BIGGEST MISTAKES
- FINANCING A JET TODAY
- AIRCRAFT & AIRFRAMER DIRECTORIES
- READERS' CHOICE SURVEY RESULTS
- THE BEST FBOS

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UP FRONT



Jennifer Leach English
Editorial Director

Whether you're just beginning to contemplate a switch from airline travel to business aviation or are thinking about adding a fifth jet to your personal fleet, the magazine you're holding can help. It includes information on the latest offerings from service providers (*page 14*), expert advice for aircraft buyers (*page 8*), an update on financing (*page 22*), and a directory (*page 56*) of all popular models of jets, turboprops, and rotorcraft. (Go to BJTonline.com for an interactive version of this directory that offers additional details.) In addition, we've included a guide to major aircraft manufacturers (*page 50*) and a report on airport service providers, or FBOs (*page 46*)

This year is **Business Jet Traveler's** 20th anniversary and, to mark the occasion, the magazine also features two special reports on how bizav has changed since we began publishing. One looks at how offerings from service providers have evolved (*page 33*) since 2003; the other covers advancements in aircraft technology and design (*page 26*).

Make sure you're signed up (at bjtonline.com/subscribe) to receive **BJT Waypoints**, our free twice-weekly newsletter. It is the best way to ensure you're among the first to see all our latest content and videos, including interviews with notable business jet travelers, aircraft reviews, news about flight providers and their programs, and more.

Thank you to the nearly 1,300 readers who participated in our 13th annual Readers' Choice Survey (*page 38*). Your feedback about how and why you fly privately and what you think of various service providers and aircraft will be invaluable to your fellow travelers and will surely be noticed by the bizav companies you patronize. **BJT's** goal has always been to provide you with unbiased, insightful information to help maximize your investment in business aviation, and we look forward to doing so for many years to come.

We also look forward to hearing from you! Please connect with me on LinkedIn or X (aka Twitter) at [@LeachEnglish](https://twitter.com/LeachEnglish), or contact me directly at jenglish@bjtoline.com.

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James Wynbrandt covers preowned aircraft and lift providers for **BJT** and has won 16 editorial prizes, including the National Business Aviation Association's Gold Wing Award in 2019 and 2021.

Special thanks to **BJT's** production manager, Martha Jercinovich, without whose attention to detail and extraordinary talents there would be no **Buyers' Guide**, and Grzegorz Rzekos, **BJT's** lead graphic designer, whose beautiful work is seen on the cover and throughout this issue.

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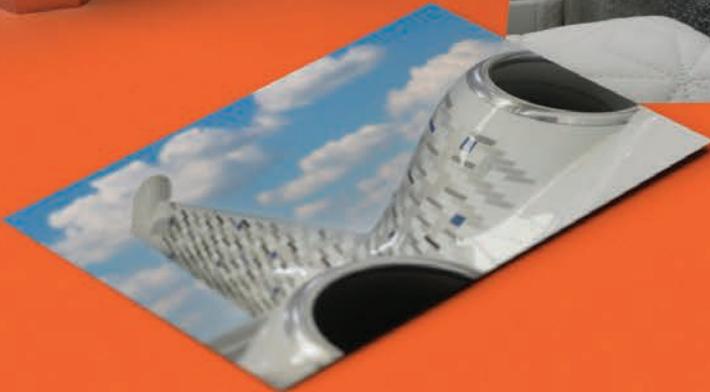
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Business Jet Buyers' Six Biggest Mistakes

Read this before you start shopping for an aircraft.

by Jeff Wieand

Opportunities for mistakes abound when you're buying a business jet. Here are six common ones that can have expensive consequences.

1. Simply Buying a Jet

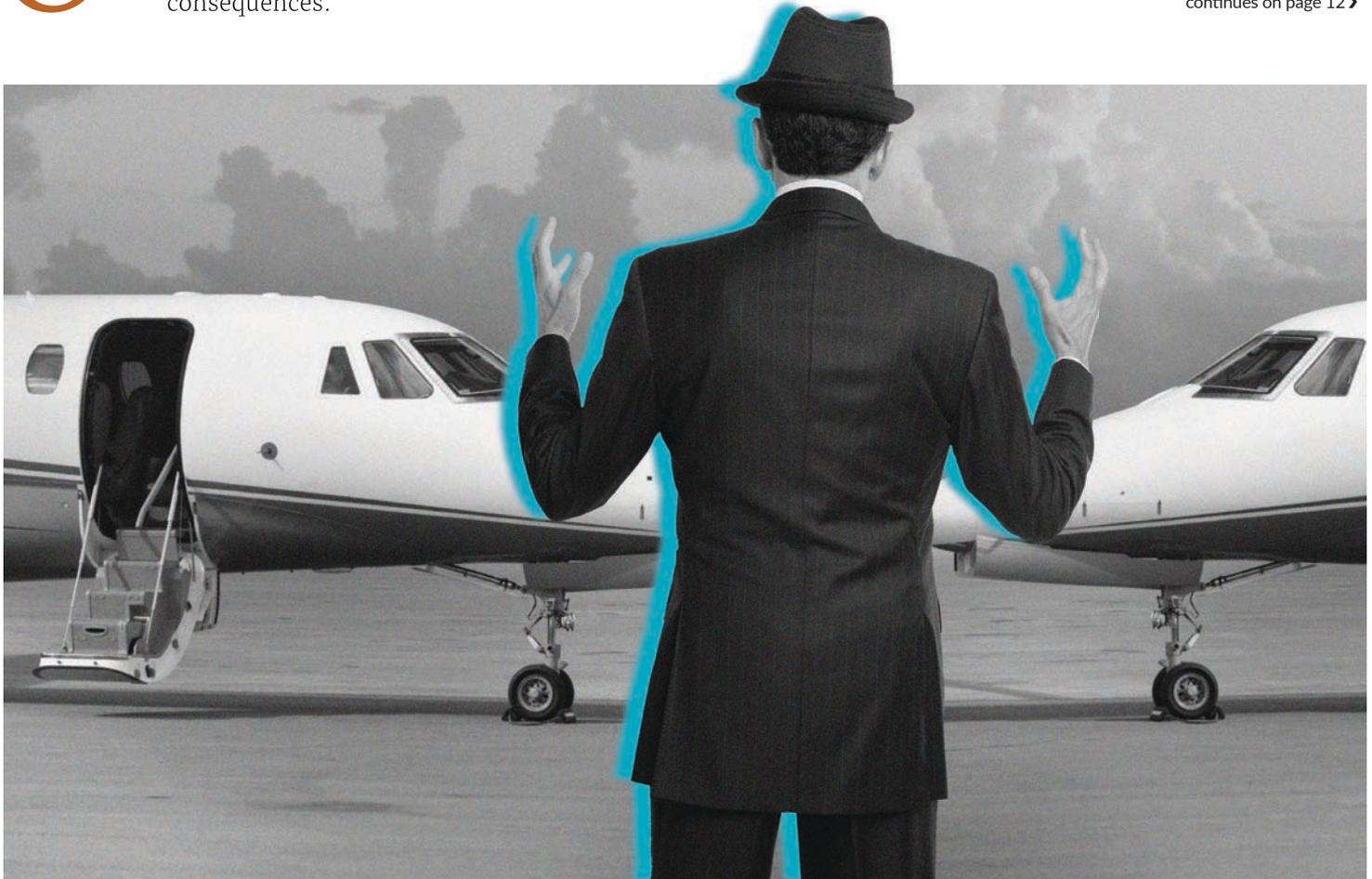
One mistake that some people make is simply buying a business jet.

Aircraft ownership is obviously not for everyone. First, business jets are expensive, not only to acquire but to operate. If you fly a lot, you may be tempted to buy your own aircraft, but if you don't figure out in advance how much that will cost, you may discover that it is more than you can afford. A heavy jet can cost \$20 million or more to acquire, but that's just the start. Other expenses include flight crew, scheduled and unscheduled maintenance, insurance, hangar, and fuel, all of which can easily come to \$3 million a year even if you fly only 400 hours per annum.

A professionally prepared annual budget that estimates all expenses (including depreciation and opportunity cost) can help you avoid unwelcome surprises. Have it in hand well before you purchase the aircraft.

Of course, many jet buyers are wealthy enough to be untroubled by seven- or eight-figure expenses. Nevertheless, there is a big difference between what you can afford and what makes economic sense. Owning and operating a \$30 million jet to fly 50 hours a year is like buying a 30-room mansion to live in by yourself.

continues on page 12 >





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►continued from page 8 It's difficult to justify buying a jet if you have less than 200 hours of annual usage, and the more hours you fly beyond that, the better. If your usage is less, you'd be better off purchasing a fractional share in a program like Net-Jets', chartering an aircraft when needed, or even sharing one with someone else.

2. Thinking Charter Can Pay for a Jet

A persistent myth is that a business jet can pay for itself if you charter it out. Here again, obtaining an independent budget that includes charter expenses and revenue prior to buying the aircraft is critical. For charter revenue to cover all your costs, the jet itself must be relatively inexpensive to purchase and maintain and must be flown a great deal, which of course will rapidly reduce its value as it accumulates hours and cycles. In fact, it may have to be flown so much for charter that there will be no time for you to use it. Even then, it is difficult to make the math work.

The best way to think about charter profits is that they can help defray some fixed expenses of owning the jet, like crew salaries and hangar rent.

3. Buying a Jet for Tax Write-offs

Bonus depreciation for federal tax purposes has proved to be a major incentive for purchasing business jets. The ability to write off 100 percent of the purchase price, which is still possible in 2023, has caused many people for whom aircraft ownership makes little sense to consider it. This includes people who are anticipating a major income event and want to purchase the jet so they can write off the price to reduce or eliminate the associated income tax.

For buyers who can use a jet for transportation in an established business, that may be fine. On the other hand, if they need to create a business, it may not be. A typical proposal is to use the aircraft in a charter business, which as we have just noted, will almost certainly not come close to covering its costs. Further, the losses (including depreciation) generated by the charter business will likely be passive and usable only to offset passive income.

Finally, the recapture of tax benefits is often totally ignored in the planning. Say you buy a \$10 million aircraft in 2023 and write off 100 percent of the purchase price. If you sell the jet in 2028 for \$7 million, you will have an income tax bill for that amount in that year.

4. Buying the Wrong Jet

Business jet options range from single-pilot aircraft with a few passenger seats like the HondaJet Elite to modified airliners like a Boeing Business Jet outfitted like a condo in the sky. Even if your missions vary in terms of range and number of passengers,

there is likely a jet model that makes sense for you, assuming you can afford it. Nevertheless, many people buy more or less aircraft than they need. Do you really require a Bombardier Global 6500 if 90 percent of your missions carry only one or two passengers? Is a Gulfstream G280 right for you if most of your flights are from Denver to Europe?

5. Failing to Complete Adequate Due Diligence

One fallout from the pandemic and the desire to qualify for bonus depreciation at the right time has been the decline of adequate prepurchase due diligence. Sellers have been able to talk shoppers into purchasing business jets that have been in service for years with little or no prebuy inspection. Longer waiting times for service centers to begin prepurchase inspections have only exacerbated the situation.

No one should commit to buying a preowned aircraft without an in-person review by technical experts of both the aircraft and its records. The buyer or a trusted representative should also view the aircraft inside and out and preferably take a demo flight. Such due diligence can uncover discrepancies that cost hundreds of thousands of dollars to repair and in some cases can cause a buyer not to want to acquire the aircraft. Even a factory-new jet should be carefully reviewed for damage history, production discrepancies, and other issues.

6. Failing to Retain Knowledgeable Independent Advisors

As the foregoing mistakes should suggest, obtaining professional and independent advice when buying a business jet is crucial. Buyers who fail to do this run significant economic risks, but they also risk simply doing the wrong thing. This applies not only to purchasing the aircraft but to structuring its ownership and operation, including with regard to tax planning. Many jet buyers make the mistake of using their regular business attorneys for the transaction instead of hiring aviation counsel that are familiar with FAA regulations and the special legal and tax issues that pertain to aircraft. **BJT**



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What's New from Flight Providers

With demand slightly down and business aircraft providers facing challenges, prices are dropping and offerings are expanding.

by James Wynbrandt

Business aviation flight activity is a few points off the red-hot readings seen at the end of last summer, and the decreased demand has brought lower prices and program enhance-

ments to the now more competitive market. The past year has also toted casualties, as several providers have shut or scaled back operations, leaving some customers grounded. Here's a look at some of the changes we've witnessed.

Charter, Card, and Membership Access

Travelers in the U.S., Europe, the Middle East, and Africa with flexible schedules who fly 25 to 49 hours per year can take advantage of VistaJet's new VJ25 program, providing guaranteed on-demand access to the Vista fleet of more than 360 aircraft worldwide, including the flagship ultra-long-range Bombardier Global 7500. The three-year subscription provides type-specific fixed hourly rates 325 days per year, and dynamic rates on 40 high-demand days. Customers can interchange among the models in the fleet. Dubai, U.A.E.-based parent company Vista Global also overhauled XO, its U.S. on-demand mobile app-based brokerage, replacing fixed-rate Signature and Select membership options with the dynamically priced XO membership, while top-tier Elite Access members will retain their fixed-rate access as the company develops an updated offering.

Wheels Up Experience downscaled its national footprint, creating two primary service areas: east of the Mississippi River and parts of Texas; and the Western region. And, in anticipation of reduced operating costs, the company lowered prices "across virtually all cabin classes." Eighty percent of customers are based within the two regions, according to Wheels Up, and access outside these areas will be dynamically priced and brokered through the company's Air Partner subsidiary. In the Eastern region, newly introduced UP King Air 50, 100, and 200 cards provide guaranteed access at fixed rates to Wheels Up's Beechcraft King Air fleet. Meanwhile, the New York-based



company's market cap declined from \$2.8 billion in 2021 to about \$30 million as of early July; founder and CEO Kenny Dichter stepped down in May.

Boston's Magellan Jets lowered hourly rates across all jet card and membership programs, and reduced initiation and renewal dues on the latter. Europe-bound clients can use the jet card for dynamically priced rates on transatlantic flights, and fixed rates within the Continent. The brokerage also reintroduced its entry-level Light Jet Card, added Wi-Fi connectivity for its Embraer Phenom 300 Jet Card, and opened a private terminal at its home airport in Bedford, Massachusetts.

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For a deposit of \$250,000 or \$500,000, North Carolina operator flyExclusive's new Platinum Jet Club offers fixed-price access to light, midsize, and super-midsize jets, with hourly and daily rates set for 12 months. Unlike its standard Jet Club membership, which offers the same rates, Platinum has no peak days or monthly fees. Daily usage rates start at \$8,000 on a light jet including a Cessna Citation CJ3 or Citation Encore, and \$4,170 per hour flown.

Atlanta-based HondaJet fleet operator Volato introduced fixed pricing on key routes, including Los Angeles to Las Vegas for \$6,000, and New York to Miami for \$12,000, for up to four passengers. Its upgraded online booking app now provides instant pricing information on its floating fleet, with availability confirmed after the customer's quote signoff; Plans call for adding instant availability information to the app, as well.

On-demand charter provider FXAir, a Directional Aviation subsidiary, expanded its previously all dynamically priced Aviator jet card, adding Aviator +, providing fixed rates and non-peak guaranteed access to Bombardier Challenger 300 and Phenom 300 jets, and tier-plan rates as low as \$10,500 and \$8,250 per

hour, respectively. The program is aimed at fliers with greater travel flexibility than Sentient or Flexjet clients can afford and requires 120-hour advance booking.

Washington, D.C.-based brokerage Paramount Business Jets launched Corporate Wing Solutions, a supplemental-lift program for corporate operators, blending elements of Paramount's tiered jet card membership with benefits and rates tailored to each flight department's requirements, routes, usage, and budget.

Tradewind Aviation, a Connecticut-based per-seat and Part 135 charter operator, sees growth for its Goodspeed charter card after recently ordering 20 new Pilatus PC-12 turboprops. Tradewind is also opening a base near Palm Beach, Florida, and at Hudson Valley Regional Airport in Poughkeepsie, New York, the former to service the Southeast and flights between the U.S. and the Bahamas. In Poughkeepsie, the new hangar facility will accommodate aircraft management clients in the area, complementing current bases at the Waterbury-Oxford and Westchester County airports. The new Pilatus PC-12 deliveries commenced last December, with at least four adds per year slated.

Per Seat/Shared/Private Airline Charter

Private airline/public charter operator JSX expanded from its West Coast network east to Colorado, Texas, and Florida, while tripling capacity on its per-seat flights between New York and South Florida, now including a Farmingdale-Palm Beach route. JSX has equipped its fleet of Embraer regional jets with SpaceX's Starlink low-earth-orbit airborne connectivity system on its 30-seat Embraer ERJ aircraft and provides scheduled charters from more than a score of cities.



Publicly traded Blade Air Mobility expanded its BladeOne fixed-wing shared flights aboard executive-configured jets, complementing its helicopter transport offerings, booked via its mobile app. Seasonal routes connect Blade's own terminal at New York's Westchester County Airport and Miami-Opa locka or Palm Beach, Florida; or Aspen, Colorado. The Bombardier CRJ 200 and Challenger 850 deployed for service are equipped with "preloaded iPads with first-run movies," and fares include helicopter shuttle from Manhattan to Westchester. A season pass (\$9,750) provides \$900 off all flights, and members can launch or join crowd-sourced flights.

Vista's XO also expanded its per-seat shared offerings, adding a New York-Florida route between Farmingdale and Palm Beach International on CRJ-200s. XO also has per-seat flights between South Florida and the New York metro area's Westchester County and Teterboro airports, as well as to Aspen and Los Angeles from both areas.

Arizona-based Set Jet offers per-seat service on Challenger 850 large-cabin and Bombardier CRJ200 regional jets outfitted in "an ultra-VIP configuration" on routes linking Los Angeles, Orange County, San Diego, and Van Nuys in Southern

California; and Las Vegas, Salt Lake City, and Cabo San Lucas, Mexico. Members' monthly fees are \$100, and regional one-way flights start at \$750, including taxes and fees; flights between Cabo San Lucas and Los Angeles or Scottsdale, Arizona, start at \$1,330. Elite memberships (\$1,000 per month) provide transcontinental and Westchester Country–South Florida service, with one-way transcontinental fares from \$4,500.

Positioned as an “elevated luxury experience,” Aero operates Embraer Legacy 600 super-midsize and E135 regional

airliners in 13- and 16-seat configurations, respectively, featuring customized interiors outfitted with hand-stitched Italian leather seats. With a branded terminal at Van Nuys, routes link Los Angeles; Aspen, Colorado; Dallas; San Francisco; Sun Valley, Idaho; and Los Cabos, Mexico. Fares had been listed on the company's site in the \$1,200 to \$2,500 range per seat, depending on date, but in July Aero announced that it was lowering U.S. prices, while also suspending its international per-seat service, which previously linked London with Geneva; Ibiza, Spain; and Nice, France.

Fractional Ownership

NetJets' fleet is expected to reach 1,000 aircraft in 2023 and should continue expanding following its May order for up to 250 Embraer Praetor 500s, with deliveries starting this year. The nine-passenger, flat-floor twinjet has 3,450-nautical-mile range, a Mach 0.83 maximum operating speed, and a vacuum lavatory. The order is valued at up to \$5 billion.

Miami-based Iris Jets has launched a fractional leasing service, CustomShare, with Miami Jet Club as the first customer. The jet club's program will offer one-eighth-share fractional leases providing 30 days of access per year on midsize business jets, the first a Beechcraft Hawker 750.

Mesa, Arizona's Paradise Jets launched Destination Club, a days-based fractional program for one-sixth jet shares guaranteeing 16 days of usage annually, with no restrictions other

than crew duty time, in addition to providing a return on investment through charter revenue.



International Access

Following trial service in a dozen countries last year, Finland's Lygg launched door-to-door transportation solutions using King Air 200, Pilatus PC-12, and Piper PA-31 turboprops for the air portion, initially linking Helsinki with Örebro and Linköping in Sweden, and Tallinn in Estonia. Lygg aims to serve corporate clients needing regular transportation between underserved points throughout Europe.

European charter management firm Elit'Avia has taken a “significant step toward increasing its presence in the North American market” with its acquisition of Millbrook Air in Newburgh, New York, now rebranded Elit'Avia Americas, and moved its headquarters to Malta.

Geneva-based brokerage Luna Jets has opened a station in Dubai, its first outside Europe, having recently added offices in London, Paris, Monte Carlo, and Riga, Latvia. Offices in Zurich and Madrid are also scheduled to open this year.

Zurich's Nomad Aviation has added five long-range, large-cabin Bombardier, Dassault Falcon, and Gulfstream jets to its managed charter rolls, which include an Airbus ACJ319 executive airliner.

Switzerland's Luxaviation Group reports significant expansion of its Asia-Pacific charter fleet, including a Dassault Falcon 2000LX and Bombardier Global 6000 in Australia, a Dassault Falcon 7X and 8X in Malaysia, and a Hawker Beechcraft 900XP and Global 6000 in Singapore.

Geneva-based charter broker Climate JetClub has an empty-legs Android app that allows potential passengers to see available flights in real time on a live map, making them easier to find and book. The brokerage is also developing an iOS version of the app, and the empty-leg data is available on its website.

Music tour charter specialist Premier Aviation reports a post-COVID surge in live entertainment, with the company handling 30 band tours in the second half of last year. The U.K. division of Hunt & Palmer notes a seasonal cadence to the business: European music tours typically peak in summer through October, while the Middle East is “prolific” in winter. Southeast Asia is also a growing market.



Rotorcraft Access

Wings Air Helicopters offers commuter flights from Westchester County Airport in White Plains, New York, to Manhattan East 34th Street Heliport on a six-passenger Airbus AS350. Seats on the 15-minute flights cost \$499, with discounts available for frequent fliers.

Blade flight-tested a piloted, all-electric Beta Technologies eVTOL at Westchester County Airport, demonstrating its nearly silent operation. Meanwhile, its seasonal helicopter transportation to the Hamptons from the New York metro area expanded with the introduction this summer of seasonal passes.

Flexjet’s helicopter service, launched last year, will provide “last mile” transport aboard Sikorsky S-76 helicopters for clients arriving at its forthcoming private terminal at Miami-Opa locka (see below). The Cleveland-based company has also added Sikorsky S-76s in Europe to support its new Gulfstream

G650 program, providing complementary helicopter transfers in some locations.



Start-ups and Shutdowns

After demonstrating last year its proof-of-concept for a planned Southern Plains region per-seat charter network on routes of 100 to 400 nautical miles, start-up WingTips acquired a charter operator early this year, has a mobile app in the works, and plans to commence service in the third quarter. WingTips also formed a leasing company to manage aircraft it plans to lease for the service. Haven Aero of Amarillo, Texas, will provide surge backup via its jet fleet.

Miami Beach-based start-up Fleet Clubs offers limited memberships in a “boutique collection of private flying clubs,” each

with a dedicated aircraft and route, providing direct air service on scheduled shared-luxury all-first-class 60-passenger airliners. Management has operated private flying clubs that link Hawaii and California for over 15 years.

Last fall, AeroVanti debuted its Piaggio P.180 Avanti membership club, operating the twin turboprops under Part 91L, which regulate aircraft time-share arrangements, and subsequently added yacht access to the program. But in June the company reportedly grounded its fleet due to maintenance and lien issues, even as members have filed multiple

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lawsuits against it, alleging fraud and misappropriation of funds.

North Carolina-based fractional and charter operator Jet It ceased operations in May. The largest HondaJet operator in the U.S. with some 21 of the over-the-wing-engine-mounted

twin jets in its fleet, the company reportedly had stopped paying Honda Aircraft Company for aircraft or engine maintenance coverage. Jet It advised shareowners to consider options including transferring their aircraft to a different operator or selling them. The company also operated Phenom 300s and Gulfstream G150s.

Consolidations

Charter management firms Northern Jet Management of Grand Rapids, Michigan, merged this year with Speedbird of Orlando, Florida, creating a fleet of some 40 aircraft, including light and midsize Cessna Citations, Learjets, and Challengers, and an EC130 helicopter. The company, not yet renamed, also has a base in Naples, Florida.

After acquiring Mayo Aviation late last year and adding five aircraft in February, Chicago's Priester Aviation now has a managed fleet of some 80 aircraft. The company has added bases in the Rocky Mountain region.

In a pairing of Long Island-based charter operators, Executive Fliteways purchased ExcelAire. Executive Fliteways has been in expansion mode since its manager mortgaged his house to buy the company during the pandemic.

Mobile, Alabama-based Southern Sky Aviation established a facility at Northwest Florida Beaches International Airport



Priester Aviation

in Panama City, Florida, complementing its FBO at Trent Lott International Airport in Pascagoula, and expanded its midsize jet charter fleet with a Beechcraft Premier I.

Expanding Organically

Five years after bowing as a charter fleet owner/operator, Los Angeles-based Planet 9 has transitioned into a traditional charter management operator, abetted by an increase of owners new to business aviation needing aircraft management services. The charter fleet has more than 30 large-cabin Bombardier, Gulfstream, and Dassault Falcon jets, half available without owner approval, for fast dispatch, with additional bases at Teterboro, New Jersey; Miami-Opa locka; and London Stansted.

Miami-Opa locka-based SF50 Vision Jet charter fleet operator Verijet has taken delivery of three new SF50 G2+ jets, bringing its fleet to some 19 aircraft. Meanwhile, a plan to go public via a special-purpose acquisition company has been shelved, as it seeks private capital for expansion.



Planet 9

For owners seeking “greater value from their aircraft investment,” Farmingdale, New York operator Ventura Air Services’ lease management program absorbs all fixed costs

while providing financial benefits. A trio of midsize jets the program has attracted has expanded Ventura’s floating fleet to 11 aircraft.

New on the Ground

With traffic increases making FBOs in popular destinations “more hectic than in the past,” fractional share provider Flexjet is opening Flexjet-only terminals at Miami-Opa locka Executive Airport, Bozeman Yellowstone International Airport in Montana, and Scottsdale Airport in Arizona.

Charter management firm Summit Aviation is building a complex at Bozeman Yellowstone that includes a departure lounge, two hangars, and—as flight training provider for Gallatin College/Montana State University’s Aviation Program—the flight school’s simulation lab and an FAA testing lab. Completion is slated for mid-2024.

Making “an investment in technology and amenities,” charter operator Thrive Aviation has expanded its Henderson, Nevada headquarters, adding a training and development lab, conference rooms, and private executive offices.



Apps and Platforms

Access program information specialist Private Jet Card Comparisons added fractional ownership integration and long flight discounts to its service, allowing subscribers to directly compare fractional ownership and lease programs with jet card and membership programs. In addition, they can also now calculate all-in hourly flight costs, including acquisition expenses, management fees, hourly rates, and taxes and accounting for variables including changing residual values, fuel prices, and hours flown.

Subscription-based online booking platform JetAsap enhanced its commission-free service to include TripMatch, providing email notifications based on route preferences for available flights, including empty legs and one-ways. More than 700 charter operators provide live bookable quotes, and the empty legs and one-ways average 40 percent off standard hourly rates, according to the Boca Raton, Florida firm. The platform also provides search and book functions for more than 2,000 trips per day, and a cost-estimate tool.

BJT





PHOTO COLLAGE: GRZEGORZ RZEKOS

Financing a Business Jet Today

Expect challenges, as some banks have stopped making aircraft loans while others are becoming more selective.

by Jeff Wieand

Banks enjoyed another exceptional period of financing business jets in 2022. Ford von Weise at Citi Private Bank, for example, reports that last year was one of its strongest for aircraft finance. But so far, the banks say that 2023 has been downright slow.

For many reasons, the ravenous appetite for business jets in the past few years is now somewhat satiated. The pandemic has diminished, so travelers appear more comfortable flying commercially, even if airline service has frequently proved disappointing. Talk of a recession persists, and bonus depreciation—a major incentive for buying or upgrading business jets since Congress passed the Tax Cuts and Jobs Act in 2017—is on the way out. Because of inflation, interest rates have in-

creased, making business jet loans and leases more expensive.

The results are evident in the market. Fewer aircraft are available for purchase and, despite expectations that prices will decline, those that are for sale still have high price tags, a reflection of the surge in values over the past few years. Aircraft remain on the market longer. Some lenders I spoke to say their clients have a wait-and-see attitude toward buying a new jet.

Banks have their own issues, and some have put the brakes on aircraft financing altogether. Bank deposits have plummeted as customers have moved funds to other investments like Treasuries, causing the ratio of loans to deposits to suffer and making financing more expensive for banks. Together with the fear that the Federal Reserve may increase capital requirements, this has caused banks to be more selective about where they

deploy their capital. Further, the Basel Committee on Banking Supervision regards jets as relatively risky assets requiring more capital to be held against them. Not surprisingly, banks are frequently limiting their funding for aircraft purchases to existing clients who maintain significant deposits with them.

Thus, Steve Altman, now at Wintrust, notes a flight to quality by banks seeking to improve jet loan profit margins. That said, larger, more expensive aircraft financings may come under greater scrutiny given the higher cost of deposits, and some banks are now focusing more on light, midsize, and super-midsize jets. Refinancings of jet loans, which were popular in 2021, have virtually disappeared, since most existing loans are at lower rates than are available today.

Preowned Market Concerns

Preowned aircraft are especially problematic. As Craig Hannon, director of aviation finance at Truist, notes, the rise in the cost of preowned aircraft in the last few years has caused many buyers to order factory-new jets. Most of the purchase price of such aircraft is payable to the manufacturer far in advance of delivery, which works out well for banks with lots of business jet loan experience that can finance the progress payments for their clients.

Nevertheless, the preowned jet market may be starting to come back. For some aircraft models, especially ones that are no longer manufactured, availability is increasing. Some of these are being sold by owners who learned that they couldn't pay for a jet by chartering it. Corporations that often got by on virtual meetings during the pandemic are reportedly returning to bizav. Steve Day at Global Jet Capital finds more interest of late among corporate clients for operating leases, and Craig Hannon at Truist reports having more talks with corporate owners that are evaluating their replacement plans.

The debt-ceiling crisis was averted, and in June, the Fed declined to raise its key interest rate for the first time in over a year. The inflation rate is declining, and while interest rates will remain higher than they were a few years ago, some bankers report a greater acceptance of higher rates among jet buyers. And many buyers who have been waiting for a while are simply tired of sitting on the sidelines.

But once again, bonus depreciation is causing some potential jet buyers to wait until later in the year to start the acquisition process for preowned aircraft. Purchasers of "certain aircraft" can still benefit from 100 percent bonus depreciation this year, assuming all flights in 2023 constitute qualified business use. So, buyers are again hoping to place a

new aircraft in service close to the year's end when it is easier to resist temptation and avoid non-business flights.

Allow Plenty of Time

Unfortunately, service centers are extremely busy, and prebuy slots are less readily available, so additional time is required to arrange for due diligence on aircraft being purchased. As one banker suggested, buyers interested in maximizing bonus depreciation this year should begin the acquisition process this summer instead of waiting until fall.

An alternative is to save time by forgoing a prebuy inspection, but in addition to being inadvisable, this will be unacceptable to most banks. Extra time may be required for financing as well. One lender recently said it would need as much as two months to provide financing on a preowned business jet, though most lenders can offer funding in a few weeks, especially for existing clients.

Though rates have climbed steadily this year, one banker suggested that they remain low relative to the last 30 years. As of this writing, the 30-day Secured Overnight Financing Rate (SOFR), the popular alternative to LIBOR, and the U.S. Treasury yield curve are just over 5 percent, resulting in jet financing interest rates in the 7 or even 8 percent range, with floating rates about 100 basis points higher than fixed. As a result, most jet buyers are focused on locking in a fixed rate. Nevertheless, there are hopes that rates won't rise further and may soon fall. Though business jet lenders are generally looking for a 15 to 25 percent deposit and a 75 to 85 percent advance, 100 percent financing remains available for buyers with outstanding credits and good banking relationships.

Most lenders are taking a relatively conservative approach to loan amortization and the principal repayment schedule. Years ago, a schedule based on 18- to 20-year amortization was not unusual, but today, with aircraft values seemingly poised to fall, unless the principal is repaid more rapidly, the sale of the jet in five or 10 years may not generate sufficient cash to pay off the loan balance—never a popular situation for the borrower (or the bank).

Consequently, most banks today are looking for 10- to 15-year amortization, with the age of the aircraft and the percentage of the acquisition cost financed being key factors in determining the rate of principal repayment. On the other hand, though lenders now often want to see principal repaid more quickly, they continue to require prepayment penalties for the first few years of the loan term. They may also require loan-to-value covenants that can neces-



sitate partial prepayments during the loan period if the aircraft's value declines rapidly.

Lenders Frequently Specialize

Business jet lenders often look to specialize. PNC Aviation Finance, which was incredibly active last year, remains the leader in asset-based financing, while offering traditional credit-based financing as well. Veteran aircraft financier James Crowley, now at Florida's Cogent Bank, has been cultivating a reputation for financing older aircraft, a market many banks avoid.

Cogent offers six- to 12-month bridge loans and is working on a model for short-term (e.g., one-year) leases, an often-ignored segment of the lease market. Meanwhile, Global Jet Capital continues to specialize in leases, mostly in the seven- to 10-year range. Not being a bank, Global Jet is able to take more aggressive residual positions and has considerable flexibility in creating lease structures to address the special needs of lessees.

One main advantage of lease financing for the lessee is the ability to walk away from the aircraft when the lease terminates. For buyers who are concerned about paying too much or about the aircraft's value holding up, a lease may be an attractive solution. Lease rate factors may be relatively high these days, but if nothing else, lease financing can protect the lessee from a catastrophic loss of capital when the aircraft is sold. The same concerns, however, have caused many banks to stop leasing business jets altogether.

Leases raise another interesting issue: the willingness of banks to warrant title when they eventually sell the aircraft. Business jets are generally delivered on an "as is" basis, which is why comprehensive due diligence prior to buying an aircraft is so important. An exception, however, is the warranty of title; even though they won't guarantee the aircraft's condition when sold, it is standard for sellers to provide a warranty of good title, free of liens and encumbrances, the terms of which are set forth in a "warranty bill of sale" provided to the buyer at closing in addition to the FAA bill of sale filed for recording on the FAA registry.

That's often not the case, however, when a jet comes off a lease by a bank or financial institution. Unlike the typical seller, the bank/lessor did not have possession of the aircraft for the last five to 10 years and is often unwilling to warrant the title, even if it obtains a similar warranty from the former lessee. Buyers interested in acquiring an aircraft coming off a bank lease should accordingly be prepared to purchase title insurance, if necessary.

As always, but especially today, buyers looking to finance an aircraft purchase should reach out to banks where they already have a relationship. As Donald Synborski, Avpro's director of finance, points out, to finance a business jet, the bank may expect you to make deposits and become your primary lender. It is always prudent to obtain proposals from several banks, including ones that specialize in jet finance. It's also important to seek professional acquisition assistance to help you buy the right aircraft at the best price. **BJT**



“Buyers looking to finance a business jet purchase should reach out to banks with which they already have a relationship.”

A list of banks and finance companies offering business aircraft loans is available in the company directory at BJTonline.com.

WHAT BUYERS SEE FIRST

Blended Winglets catch the attention of jet buyers and are among the most desired business aircraft upgrades. The range-extending, performance-boosting, fuel-saving, and emissions-reducing mods turn heads for buyers, and seal the deal for sellers. Increase future resale value for Dassault Falcon or Hawker business jets and enjoy the benefits now.



SEE HOW THIS MOD MAKES THE AIRCRAFT

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Two Decades of Innovation

Here's a look at some of the biggest advances in business aircraft design and technology since **BJT** began publishing.

by Mark Huber

Dramatic advances in avionics, flight controls, communications equipment, cabin amenities, propellers, rotors, fuel, engines, and safety systems have contributed to the growing popularity of business aircraft over the 20 years since **Business Jet Traveler** debuted. Here's a look at some key innovations and what they mean to you.

SAFETY MANAGEMENT SYSTEMS

Starting this year, the FAA is mandating the adoption of safety management systems for all charter and fractional ownership programs for fixed-wing aircraft and rotorcraft. These systems formally structure and further ingrain a safety culture within any organization. Combined with new technologies, they promise to make business aviation as close to accident-free as possible.

AVIONICS

Glass cockpits: Cockpit display screens in place of individual gauges are now common in business aircraft, and the technology has been greatly refined over the last two decades with touchscreen integrated glass display systems such as Collins Pro Line Fusion, Garmin G5000, and Honeywell Anthem. These screens combine information about critical aircraft performance, situational awareness, and navigation for pilots in a more recognizable and faster way, reducing workload and stress. The displays also have a lower failure rate, require less maintenance, and weigh less than traditional electromechanical and pressure gauges. The technology is now standard equipment for new business aircraft from virtually every avionics manufacturer and is available as retrofits for legacy models.

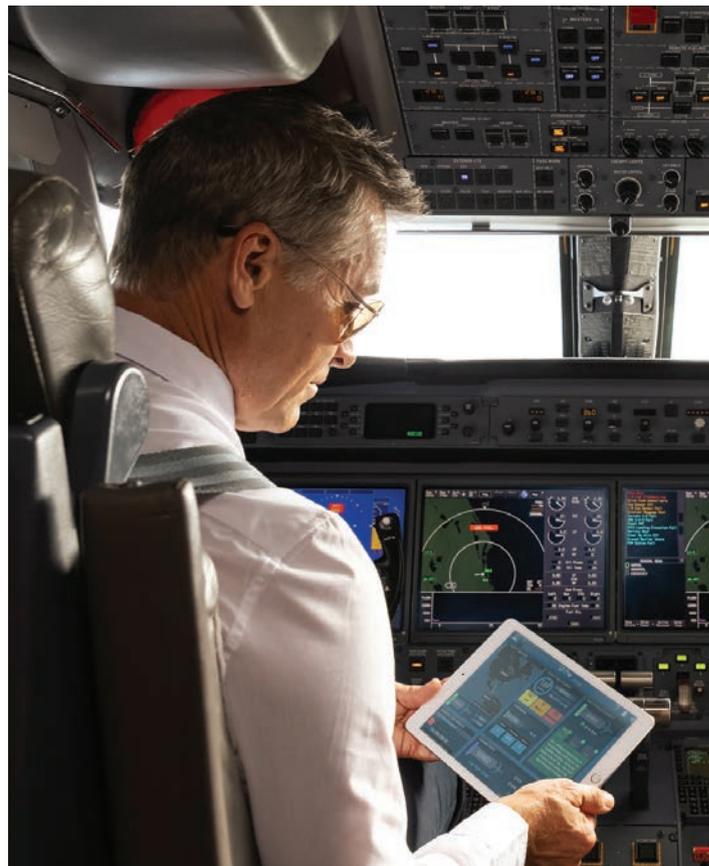


Electronic flight bags and apps: Beginning in 2003, laptops and tablet computers have made the days of pilots lugging big map cases into the cockpit a thing of the past. Electronic Flight Bags (EFBs) contain programs and data that enable pilots to safely and quickly access navigational charts and plan routes; reference aircraft flight manuals and other critical documents; complete checklists; compute aircraft weight, balance, and performance; display real-time weather; and even interface with other cockpit systems such as the flight management system. A variety of apps further enhance the utility of EFBs. Today's pilots would no more be without their EFB than you would be without a cell phone.

Synthetic/enhanced/augmented/combined vision systems: Advances in computerized mapping, terrain, and obstacle databases—overlapped with global-positioning-system and inertial-navigation-system data and images from nose-mounted infrared, multi-sensor cameras—are enabling more aircraft operations in adverse weather, with some allowing landings with cloud ceilings as low as zero feet with extremely low visibility. This technology began finding its way onto business jets as early as 2007 and can be added to a variety of glass cockpit avionics systems.

Head-up displays (HUD): A HUD is typically a glass visor that flips down between the pilot's eyes and the windshield. First developed for the military, it displays critical flight data and imagery, including runways and runway lighting, so the pilot needn't shift attention from the instrument panel to the windshield or vice versa when landing or taking off in low-visibility conditions. Initially very expensive, this technology has been finding its way onto smaller and smaller business aircraft and is even now available for single-engine, piston-powered airplanes. New head-wearable models make this technology easily adaptable for virtually any aircraft. It was first offered as standard equipment on a business jet on the Gulfstream G550 in 2003.

Automatic Dependent Surveillance-Broadcast: ADS-B has been required on most aircraft operating within the U.S. since 2020. An ADS-B-enabled aircraft uses satellite navigation such as GPS to determine its position, altitude, heading, and speed and then broadcasts it, enabling tracking in real-time without the use of surveillance radar. This is invaluable for air traffic control in areas that have poor or no radar coverage. However, it also allows any snoop with a cell phone, via various apps, to track just about any airplane worldwide. Aircraft equipped with ADS-B Out can only transmit this data, but those with ADS-B In can also receive it, providing pilots with situational awareness of all the traffic around them.





Satellite aircraft tracking: Satellite-based aircraft tracking services, originally developed for helicopter operators, are now on more business aircraft of all kinds. Over the years, they've added voice, text, and aircraft diagnostics, features that are particularly useful for operations in remote areas and offshore. Within the last decade, the services have matured to include web-based tools that display aircraft engine and airframe subsystem status, monitoring any caution and warning they generate along with the geospatial movements of the aircraft, and then automatically sending this information in real-time to appropriate ground personnel.

Autoland: Avionics manufacturer Garmin has developed a system that allows the pilot or any passenger to push a button that will land the aircraft at the closest suitable airport, stop it on the runway, and shut down the engine if the pilot becomes incapacitated. Certified in 2020 and currently available for select turboprops and light jets under a variety of names, Autoland manages speed, altitude, flight-control configuration, landing gear, and navigation, and even automatically makes the appropriate transponder settings and radio broadcasts to enable a safe touchdown.

Health usage and monitoring systems: HUMS use sensors to monitor key aircraft system parameters and data to assure continued safe operation of critical components and flag indicators that could suggest unusual wear or a potential failure. Originally developed for the military, these systems began finding their way onto business jets and civil helicopters over the last 15 years. Newer systems transmit this data in real-time (older ones could have data downloaded after each landing) to the aircraft manufacturers' and owners' operations centers. Armed with this information, HUMS can order parts and schedule maintenance quickly—often when you're still in the air—before a small problem becomes a big one and grounds the aircraft for an extended period. The systems save money and time, increase reliability, and can even save lives.

FLIGHT CONTROLS

Autothrottles: This is another technology that is progressively scaling down to smaller aircraft. Pilots once had to make sometimes constant power-setting adjustments based on winds, altitude, outside air temperature, barometric pressure, and phase of flight. Autothrottles put this all in the hands of a computer, reducing pilot workload, eliminating the need to constantly adjust throttles while monitoring airspace and aircraft speed restrictions, improving fuel economy, and yielding a smoother ride. The pilot merely selects the phase of flight and the sys-

tem does the rest—sort of like adaptive cruise control in your car, only better. While the technology has been on airliners for more than 50 years and large business jets for almost as long, it became available for light jets—often as a retrofit—only within the last decade and for turboprops in 2017.

Fly-by-wire flight controls: Originally developed for fighter jets, fly-by-wire (FBW) is another technology scaling downward on the aircraft size scale. For bizjets, it first found its way onto the Dassault Falcon 7X, which was certified in 2007, but it is now on a variety of business aircraft, the new Bell 525 helicopter, and even some electric vertical takeoff and landing (eVTOL) models. FBW replaces mechanical linkages between the cockpit and the aircraft’s control surfaces, such as the rudder and ailerons, with pilot inputs fed into a triple-redundant computer and then sent to electronic actuators that control these aircraft surfaces. The technology prevents pilots from flying outside an approved flight envelope, all but eliminating loss-of-control accidents. In an emergency, the flight computer can think faster than the pilot, making the situation easier to deal with. Guided by the computer, flight control inputs are also smoother and more precise, making for a more comfortable ride.

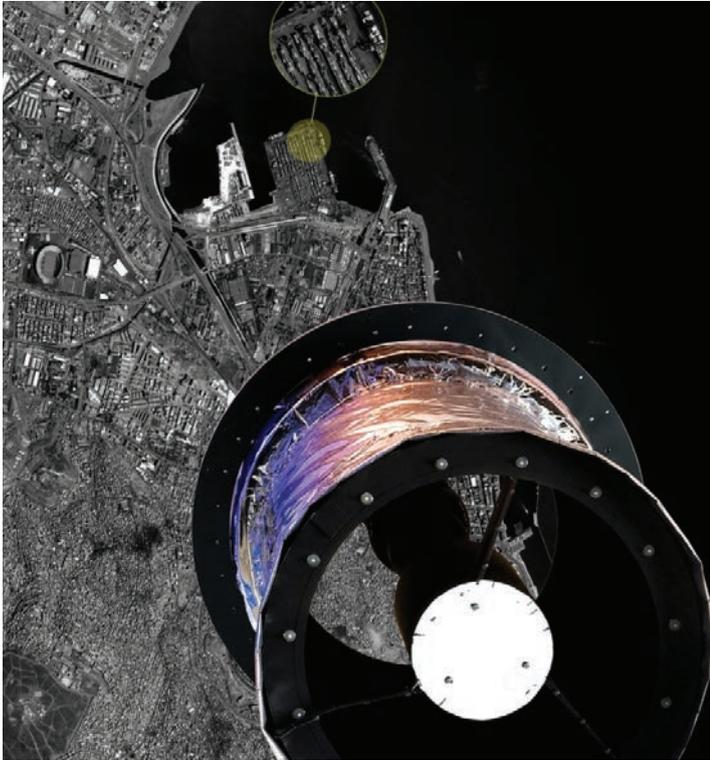
CONTROL SURFACES AND EXTERIOR STRUCTURES

Aviation Partners (API) winglets: API’s team of former Boeing and Lockheed engineers developed a series of winglets for airliners and business aircraft that can reduce fuel consumption by 4 to 10 percent, increase range, cut climb times, and improve runway performance. First offered as retrofits over the last 20 years for business jets including Falcons, Gulfstreams, and Hawkers, these winglets are now standard equipment on a variety of new business aircraft.

Tamarack Aerospace Smartwing active winglets: Tamarack’s design, which was certified in 2016, differs from API’s in that its winglet system features an “active” component, relying on computerized load sensors that automatically mitigate wing bending during turbulence and high-load events without the need to add more wing structure. Installed on several models of light jets and being developed for business and commercial turboprops, the system can increase range by up to 25 percent.

Honda over-the-wing engine mount (OTWEM): A unique design for the HondaJet, first certified in 2015, is its patented over-the-wing engine mounting. By locating the engines atop the wings as opposed to bolting them onto the back of the air-





craft—as on most business jets—Honda eliminates the need for a fuselage to be tapered toward the aft of the aircraft to allow for engine support structure that runs inside the aircraft. This provides for a constant-ruled fuselage that yields up to 20 percent more cabin space than in comparable light business jets.

CABIN COMMUNICATIONS AND COMFORT

Better connectivity: Airborne satellite communications and internet access have improved significantly over the last 20 years in terms of cost, hardware miniaturization, speed, reliability, and range. The advances have been fueled in part by the refinement of Ka- and Ku-band technology, the deployment of new global networks of low-earth-orbit satellites, and the rollout of high-speed air-to-ground systems that can be accessed by aircraft.

Lower cabin altitudes: For decades, “cabin altitude” was stuck at about 8,000 feet in most bizjets, producing the same lovely jetlag you got on the airlines. Granted, the 1970s Learjet 35 light jet would give you a sea-level cabin up to 25,700 feet, but for that luxury you got a fuel burn that conjured up what might happen if you handed an overheated child a Big Gulp. Today, it’s a different story. Uber-lux barges from Gulfstream, such as the G700 that likely will be certified later this year, have a maximum cabin altitude under 3,000 feet while cruising at 41,000 feet. Even relatively small airplanes—such as Embraer’s midsize Praetor line, which was certified in 2019—offer cabin altitudes below 6,000 feet.

Electrochromatic window shades: These windows use an electrical charge to regulate clarity—from clear to opaque to nearly blacked out. The beauty of this technology is that it allows passengers at their seats and flight crews from a control panel or app to adjust shading, making it easier to cool cabins sitting on hot ramps. These windows have become popular on business aircraft over the last 15 years, including for King Air 350 series turboprops beginning in 2010.

Transducers: Small, lightweight transducers mounted on the back of aircraft cabin interior panels, combined with custom-tuned advanced signal-processing technology, produce vibrations that turn the cabin into an immersive sound chamber. This is accomplished without the necessity for often high-maintenance traditional components such as loudspeakers, and it eliminates the need to chop speaker holes into cabin sidewalls and overhead panels. The Bombardier Challenger 300 was the first serial-production business jet to incorporate this technology, via the Lufthansa nice in-flight entertainment system, in 2004.

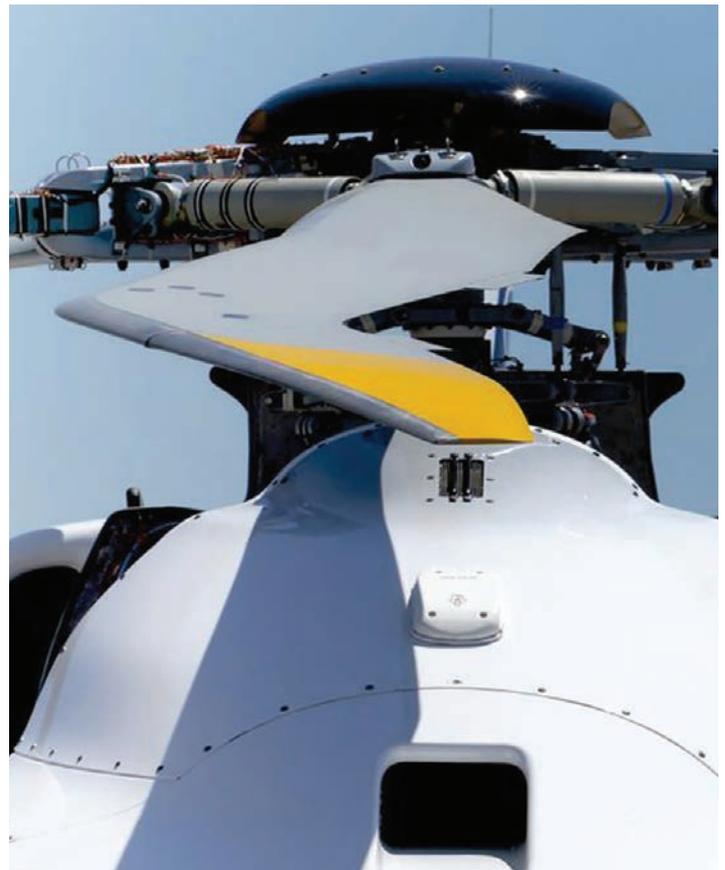
PROPELLERS, ROTOR BLADES, ENGINES, AND FUEL

Quiet propellers: Over the last 15 years, several manufacturers have developed composite, shaped, and swept propellers for turboprop aircraft that produce more thrust with less power. This allows them to turn slower and therefore produce less noise inside and outside the cabin and generate less vibration. They also deliver better take-off, climb, and cruise performance. Some designs, such as MT's Quiet Fan, integrate small winglets into the propeller blades, while Hartzell's five-bladed composite propeller can run at 10 percent reduced rpms and reduce takeoff distances in the process.

“Blue Edge” rotor blades: The new “Blue Edge” main rotor blades on the Airbus H160 helicopter that was certified earlier this year feature a double sweep design. The blades have tips with a bend that resembles the business end of a hockey stick. With traditional designs, when rotor blades spin, the tips emit vortices. Bending the tips disrupts the “blade vortex interaction” from one blade to the next, delivering a smooth ride and reducing noise by as much as 5 dB, or 50 percent, compared with legacy helicopters.

Rotorcraft icing protection: Rotorcraft are more susceptible to icing than fixed-wing aircraft as they operate at the lower altitudes where icing is more likely to form. Ice on engine inlets and rotor blades not only can cause loss of lift but also engine failure and severe vibration that, left unchecked, can have catastrophic consequences. It also prevents helicopters from accomplishing critical medevac and search-and-rescue missions. Leonardo was the first manufacturer to introduce rotorblade icing protection, in 2010, on intermediate and super-medium-class helicopters used for these types of missions. The system features automatic ice detectors and activation and employs improved circulation of hot air from the engine, vents, windshields, and main and tail rotor blades. Leonardo is also developing a system for tiltrotors that uses friction to remove ice on leading-edge surfaces.

Engines: Turboprop and turbofan jet engines for business aircraft of all sizes have made great strides over the last two decades with regard to improved efficiency and lower emissions in models including the GE Honda HF120, Pratt & Whitney PW800, Honeywell HTF7500, GE Passport, and Rolls-Royce Pearl. These new engines reduce fuel burn by up to 20 percent compared with legacy technology and feature innovative designs, materials, and production techniques. The efficiency gains come largely in the form of engines that deliver more thrust—and therefore faster times to climb and overall ranges—with nearly the same amount of fuel. Unlike next-generation engines developed for airliners, which can gain efficiency by increasing fan size, new bizjet





engines rely on operating at higher temperatures and greater thermal efficiency with redesigned low-pressure turbines, exhaust nozzles, and shaped fan blades made together in a single forging called a blisk to save weight and reduce maintenance.

Sustainable aviation fuel: SAF development began 13 years ago in Europe as an environmentally friendly, drop-in solution in jet fuel, much like ethanol is in gasoline. Like alcohol, SAF can be made from almost anything—used cooking oils, biostocks, and waste from forest floors, for example. Most of today’s jet engines can run on 100 percent SAF, although due to the nascent nature of refining capacity, that eventuality is decades away. Right now, most commercially available SAF is up to a 30 percent blend. Thanks to various government credits and incentives recently enacted worldwide, the price of SAF is becoming more comparable to that of dirtier jet-A kerosene. Still, when it comes to reducing jet emissions, it will be some time before SAF produces gains that are larger than those gleaned from continued improvement in engine technology. Overall, aviation accounts for just 2.5 percent of the world’s CO₂ emissions.

AIRCRAFT

Very light jets: The mid-1990s birthed the very light jet investment pyre—a new generation of small, single-pilot jet aircraft weighing less than 10,000 pounds. There was no shortage of dreamers willing to join the fray: Comp Air, Diamond, Eclipse Aviation, Epic Air, Flaris, Maverick, Piper, Sport Jet, and Stratos among them. Most of these programs either never got to market or, once certified, did a dirt nap (such as Eclipse’s \$1 billion bankruptcy in 2008 after producing 260 aircraft), but they did drive innovation in terms of avionics and engine development. An exception to the class’s attrition is Cirrus’s SF50 Vision Jet, a slower, single-engine jet that was certified in 2015 and remains wildly popular with owner pilots. From 2016 through the first quarter of 2023, Cirrus delivered nearly 400 of them.

Fast large-cabin, ultra-long-range jets: The big three large-cabin bizjet manufacturers—Bombardier, Dassault, and Gulfstream—have all jumped into the deeper end of this pool with new offerings with exterior dimensions and maximum weights that more closely resemble a Boeing 727 airliner, but with maximum speeds approaching supersonic—up to Mach 0.925—and very long legs. New models such as the Bombardier Global 8000, Gulfstream 800, and Dassault Falcon 10X in some cases will have ranges of up to 8,000 nautical miles. The in-production Bombardier Global 7500, certified in 2018, already comes close at 7,700 nautical miles. But is 16-plus hours too long for a single business jet flight? We’re about to find out. **BJT**



THE RIGHT TRAINING FOR TURBULENT TIMES

Whether you're an aircraft owner or charter client, these turbulent times have likely affected your ability to travel on your terms. Higher fuel and maintenance prices, long lead times on parts and service, increased demand for private aviation, the shortage of pilots and other aviation workers, and perhaps even climate change protesters may have all impacted your travel plans.

With all this uncertainty likely affecting your wallet in either ownership costs or higher charter fees, you want to be sure that your flight crews are getting the most effective training in the most efficient way possible. If your crews are still training exclusively in the aircraft, it's time to explore the benefits of simulator versus in-aircraft training, as we do in the first article of this insert.

Speaking of turbulent times, you've likely experienced physical turbulence in the aircraft as well. Perhaps you've wondered what causes turbulence, what the pilots can do to detect and avoid it, and what you as a passenger can do to keep yourself safe if it hits. If so, be sure to read the second article of this insert. [Enjoy!](#)

FlightSafety
INTERNATIONAL



COMPARING SIMULATOR VS. IN-AIRCRAFT TRAINING

Pie vs. cake. Tastes great vs. less filling. Nature vs. nurture. These are all great debates that can divide a room. But pilots and aircraft owners often engage in another debate that can have serious consequences: simulator vs. in-aircraft training.

On one side, there's no question that you can do things in a simulator that you can't or shouldn't do in an aircraft. On the other side, there's no substitute for the feel of an actual aircraft and accompanying forces during certain maneuvers or the pucker factor of seeing terra firma rising to smite you to drive home certain procedures.

Is there a correct answer to the simulator vs. in-aircraft debate? According to Richard Meikle, Executive Vice President of Operations and Safety for FlightSafety International, the safest pilots tend to train both ways, but there is a caveat.

PREPARED PILOTS MAKE SAFER PILOTS

An operator focused on safety is going to send its pilots to simulator training because you can do things in the sim that you cannot do in the airplane safely or without risking damage to the aircraft, said Meikle. No one is going to shut off the fuel during takeoff to introduce an engine failure in the aircraft, but you can do that all day long in the simulator.

Other examples of emergency situations that can be practiced in the simulator include partial and full avionics failures, hydraulics failures, and even total electrical failures, which are rare but have happened. Some of these situations require an emergency descent from altitude which could be as high as 51,000 feet in some bizjets that would require substantial coordination with ATC to obtain authorization to practice

this type of emergency procedure in an aircraft. The request might not be granted or might be just partially granted depending on flight activity in that ATC sector. In the simulator, not only will the requests be granted every time, but the emergency ATC calls can be practiced with realistic ATC responses.

Dealing with a medical condition on board can also be practiced more effectively in the simulator. While an instructor could tell a student to pretend a passenger or another crewmember is having a heart attack in the air and would field the pretend ATC calls, the ruse is not as effective as pulling aside a pilot before a sim session and asking him or her to suddenly become incapacitated during the flight.

In the simulator, the workload can be modulated to be very high if needed to simulate the level of effort required in

a real world emergency, the calls to ATC are more real, and the pilot may even practice coordinating with a cabin attendant or a company's medical provider, all while flying the sim in challenging weather or diverting to an unfamiliar airport, said Meikle. Sometimes you have to make a mistake to learn a lesson well, and it's better to make that mistake in the simulator than in the aircraft.

Another situation best practiced in the simulator is an aerodynamic stall in the traffic pattern, where the aircraft is between 1,500 and 500 feet above the ground and recovery is difficult.

You can practice recovery from a traffic pattern stall in the aircraft by setting a specific altitude as a floor, but it's not as effective as in sim where you see the ground only 700 feet below, said Meikle.

One place that in aircraft training shines is during upset training, where the startle factor may be high and the pucker factor even higher. Upset training teaches the pilot how to recognize and recover from unusual attitudes, such as in an unintended extreme climb or descent, often caused by distractions or emergencies in the cockpit. These can be practiced in a simulator, but the absence of g forces and the fear factor means the skills are learned, but the visceral experience is not transferred as readily.

When you're pulling out of an upset recovery in an airplane and you're looking up at the ground with a whole canopy view of nothing but dirt, it's highly motivating, Meikle said. The simulator technology is really effective at creating an environment that feels so real that many pilots come out of sim sessions sweating, but feeling the g forces add to the efficacy of the training. FlightSafety has partnered with Flight Research International, based in Mojave, California, to provide the in aircraft training to supplement simulator training.

ECONOMICS OFTEN PLAY A PART

For some aircraft operators, these are tough times. Inflation can mean higher costs for fuel, insurance, wages, and maintenance, and simulator training is often perceived to cost more than in aircraft training. Depending on the type of aircraft and its fuel burn, conducting a single flight to meet the checkmarks of government required recurrent training may be cheaper than sending the pilot to simulator training, especially when factoring in travel, lodging, and meals during off site training.



Richard Meikle

Executive Vice President of Operations and Safety for FlightSafety International

Sometimes you have to make a mistake to learn a lesson well, and it's better to make that mistake in the simulator than in the aircraft.

However, some of these costs can be minimized by taking the ground school portion of the course online. FlightSafety, for example, offers several instructor led LiveLearning classes in a videoconferencing format that allows students to interact with the instructor and other students before they arrive at a FlightSafety Learning Center for their simulator sessions. The benefits of interaction with the instructor and

other students whether online or in the classroom can often offset the hard costs of attending simulator training.

There's a benefit in seeing other pilots executing the same procedure, said Meikle. If you're training in the aircraft, you usually don't get to watch somebody else go through the same activity to observe their thought process. In the simulator, you might pick up something as simple as a method for getting ATC to stop peppering you with questions while you're trying to deal with an emergency.

Simulator training is also more efficient since there is little time spent flying from one spot to another to perform specific procedures, such as various approaches to landing, which require a trip around the pattern, or even to another airport for each landing. In the simulator, the instructor simply resets the program at a distance and altitude configuration that allows the student to concentrate on the next landing scenario.

There are also insurance considerations. Many insurance companies either require or provide discount incentives for simulator training, and some policies prohibit flight training in the covered aircraft.

Insurance companies in general are risk averse, Meikle said. If you conduct advanced training in your aircraft and damage occurs, the potential consequences range from out of service costs such as replacement aircraft during repairs, or out of pocket costs for deductibles and items not covered by the insurance carrier or manufacturer maintenance programs. These costs could be significant and could easily exceed the cost of the training event in the simulator.

Another concern with in aircraft training is that it doesn't always correspond to standard operating procedures, which can affect both how the learning is transferred and the safety of the flight. For example, if an instructor turns off engine

synchronization because he knows he is going to fail an engine (and doesn't want to lose power altogether by having the other engine match the lower rpm), the student now knows an engine failure scenario is imminent. Not only is the startle factor gone, but the turn-off engine sync step has already been accomplished, so the student doesn't do it in training and may not transfer that step to a real life situation. The aircraft may also behave differently during an actual engine out when engine sync is not disengaged. In the simulator, the instructor can fail the engine with engine sync on, so the step transfer and the experience are closer to reality.

WEATHER IS A FACTOR, TOO

One of the biggest benefits of simulator training is the ability to control the weather. Training days aren't cancelled for extreme weather; instead, simulator instructors can increase the severity of the weather gradually throughout a session, adding wind and rain as distractions or

providing low visibility for more realistic instrument flying scenarios. Wet and icy runway conditions can be simulated, as can turbulence at high and low altitudes.

We can replicate any weather in the simulator that pilots might see in real life but that you would never deliberately train for in the aircraft, Meikle said. We can run wind shear replications based on actual wind shear accidents to train pilots how to recognize shear and fly through it.

Night flying also presents challenges, and the sim can be set for night flying at any time. Not only can pilots use the simulator to fly into a particular airport at night, thus getting a good sight picture of the facility and surrounding lights, but night vision goggle (NVG) training is also available for operators like helicopter medevacs.

The simulator visuals are just amazing, said Meikle. You can realistically train for everything from an off-airport medical evacuation to landing on an oil rig in a helicopter. Some simulators have night vision technology available

so when pilots look through the NVG, they see exactly what they would see in the actual aircraft.

SOME SCENARIOS ARE BEST EXPERIENCED ON THE GROUND

While it's true that simulator training has some limitations, countless scenarios are simply safer to experience on the ground before they happen in the air. And while rare, emergencies do occur. In 2016, a fluid spill in an Embraer ERJ 190-100 regional jet caused near total loss of electrical power in flight; the prepared crew was able to restore enough electrical power to safely land the aircraft.

There's a perception by some that since these abnormalities don't happen often, pilots can get by with just receiving a checkride, said Meikle. But there are plenty of examples where pilots have done the training and checking in the aircraft and had a catastrophic event because they couldn't effectively simulate or evaluate the situation in the aircraft.



The simulator visuals are just amazing. You can realistically train for everything from an off-airport medical evacuation to landing on an oil rig in a helicopter. Some simulators have night vision technology available so when pilots look through the NVG, they see exactly what they would see in the actual aircraft.



THE CLICK OF A SEAT BELT

Bizjet Passenger's Guide to Turbulence

Ah, the freedom of flying privately. No standing in line at TSA, no boarding pass or luggage claim tickets, and no announcements selling airline branded credit cards just as you're drifting off to sleep. And except during takeoff and landings, you can spend the entire flight with your seat belt off if you want to...but do you really want to?

If you've spent a lot of time in the air, you know that turbulence can occur without warning. Sometimes it's just a little ripple, and sometimes the aircraft can drop significantly. But what causes turbulence? And how can you keep yourself and your loved ones safe while still enjoying the luxury of flying privately?

IT'S A WEATHER THING USUALLY

According to weather.gov, turbulence is the most unpredictable of all the weather phenomena that are of significance to pilots. And while your flight

crew likely has access to turbulence predicting weather information in the cockpit, it might not always be able to warn you when turbulence could hit.

Turbulence generally occurs when atmospheric imbalances try to return to a steady state. Perhaps thermal activity from the sun is warming the ground, causing some pockets of air to rise faster than others. Perhaps there is great variability in wind speed and direction due to a line of thunderstorms in the area. Or perhaps the airflow is impeded by buildings or mountains or disturbed from a passing airplane.

At lower altitudes (below 15,000 feet), most turbulence falls into one of four categories: mechanical, thermal, frontal, and wind shear. Some of these are highly predictable and can appear on weather charts or on cockpit radar screens. For example, mechanical turbulence occurs due to friction between fast-moving air and the ground or objects on the ground, so if the wind speed is 20 knots or higher

and you're flying over hilly or mountainous terrain, expect a bumpy ride. If the sun has been shining for a while and warm ground is causing thermal activity, expect the ride to be even bumpier. If there is a line of thunderstorms within a 20-mile radius indicating frontal activity (though this is not the only indication of frontal activity), your flight crew will likely turn on the fasten seat belt sign as the updrafts and downdrafts associated with thunderstorms can make the aircraft drop significantly.

Wind shear, however, can be a tougher nut to crack, though the technology for detecting it near airports has improved over the years. By definition, wind shear is a change in wind direction or speed over a specific distance; the more extreme the change over a short vertical or horizontal distance, the more severe the turbulence. Temperature inversions (where the air gets warmer as altitude increases, instead of getting colder) can create wind

shear at the top of the inversion layer, which can be anywhere from just above the surface to several thousand feet up. Often, inversions occur at night when the ground surface is cooling, and hence the air immediately above the surface is cool while the air above that is still warm. Temperature inversions and the low level wind shear they produce comprise one reason the fasten seat belt sign is illuminated during takeoffs and landings.

Above 15,000 feet, wind shear can be created by a jet stream—a narrow band of fast-moving air generated by a significant difference in air temperature passing through slower-moving air masses. This is the most common cause of clear air turbulence (CAT), a phenomenon that often occurs without warning when jets are cruising at high altitudes in cloudless skies. During CAT, the aircraft may drop as much as a few hundred feet in a single jolt, with no warning whatsoever. CAT is undetectable by onboard weather radar, so it is extremely hard to avoid, though its shallow nature means that a climb or descent of as little as 2,000 feet can get the aircraft out of the turbulence.

At any altitude, vortices from passing aircraft can create wake turbulence. Like a water skier passing over the speedboat's

wake, an aircraft passing through another aircraft's wake can produce a bump. Unlike the boat's wake, which spreads outward on the water's surface, an aircraft's wake spreads out and falls downward, affecting aircraft passing behind and below. And while air traffic controllers may call out caution for wake turbulence if a larger, heavier aircraft (producing larger wakes) takes off or lands in front of a smaller aircraft, at altitude wake turbulence is extremely difficult to detect.

Often wake turbulence is just an inconvenient bump, but occasionally it can result in significant injuries, especially for occupants who are not wearing a seat belt. In 2017, the crew of a Bombardier Challenger 604 business jet lost control of the aircraft over the Arabian Sea after it passed through wake turbulence from an Airbus A380 traveling 1,000 feet above in the opposite direction. About 48 seconds and nearly 15 nautical miles after the aircraft passed each other, the Challenger began a sharp roll to the right, and crew inputs could not stop it. According to one account, the jet rolled three times while it lost 9,000 feet of altitude and flamed out one engine before the crew recovered the aircraft and diverted to the nearest airport. Four of the six passengers and the

cabin attendant were standing when the incident occurred; all sustained injuries and the airframe itself was no longer airworthy.

AIRCRAFT ARE BUILT TO WITHSTAND TURBULENCE

The good news is that aircraft are built to withstand most types of turbulence. Even the aforementioned Bombardier Challenger with wake turbulence damage landed safely, though it never flew again. Turbulence also factors into your flight crew's training, from using the onboard avionics to detect and avoid turbulence to the procedures once turbulence has beset the aircraft.

As part of the discussion on the avionics, if the aircraft has the functionality to detect wind shear or turbulence, we cover it during ground school, said Richard Meikle, Executive Vice President of Operations and Safety at FlightSafety International.

At FlightSafety, turbulence is also factored into the simulator training, triggered either by the weather phenomena already occurring in the scenario or as a separate focus item initiated by the instructor.

FlightSafety's current turbulence modeling approach is broken out into



No one is immune to the laws of physics, and your net worth doesn't change that... Since clear air turbulence can happen unexpectedly, it's a really good idea to keep standing to a minimum and fasten your seat belt whenever you're seated in any aircraft.

separate segments that handle different portions of the overall turbulence phenomena, said Meikle. These consist of modules that handle wind gusts, low level wind shear, microburst, wake vortices, rough air turbulence, clear air turbulence, and low altitude terrain turbulence due to topography and buildings.

Many of the turbulence models at FlightSafety were derived by industry experts such as NASA, FAA, Boeing, and other national research institutes based on real life data and events and were validated for realism by comparing 3D modeling of the simulator flights with the actual data. For example, the rough air model accurately mimics the randomly chaotic nature of this type of turbulence; when pilots encounter rough air or other types of moderate to severe turbulence, they may ask air traffic control for permission to climb or descend to another altitude to seek smoother air.

In addition to procedures for handling the aircraft during various types of turbulence, the crew also rehearses procedures for working with cabin crew (if any) and providing safety notices to passengers. FAA regulations (specifically Part 91.107 for business aircraft) put the onus on the pilot to ensure that everyone on board (including crewmembers) is provided with and uses a seat belt or safety harness during aircraft movement, takeoff, and landing. On large aircraft, the cabin attendants assist with this duty, but it's still the pilot's responsibility to ensure the safety of the aircraft's occupants.

When the crew experiences turbulence in the simulator, the instructor notes whether the pilot turned the fasten seat belt sign on or not, and what kind of communication they simulate making to passengers and cabin crew, said Meikle. Ensuring passenger safety is core to a pilot's job.



PREVENT INJURY—SIT DOWN AND BUCKLE UP!

A 2021 report from the National Transportation Safety Board (NTSB) shows the effectiveness of keeping your seat belt fastened. Of the 111 turbulence related airline incidents studied, nearly 79 percent resulted in serious injury to just the unbelted flight attendant. Only one of the 123 people seriously injured during these incidents was documented as wearing a seat belt.

No one is immune to the laws of physics, and your net worth doesn't change that, said Meikle. Since clear air turbulence can happen unexpectedly, it's a really good idea to keep standing to a minimum and fasten your seat belt whenever you're seated in any aircraft.

For comfort, Meikle recommends loosening the seat belt but by no more than a few inches. The point of the seat belt is to ensure you don't strike an immovable object like the cabin ceiling, Meikle said.

Securing children in an approved safety seat is also important. While FAA regulations allow children under the age of two to be held on an adult's lap, this is more a nod to airline economics than safety. The NTSB noted that there have been incidents in which caregivers have been unable to hold the infants securely

during the turbulence encounter, though no serious injuries to those infants were recorded during the study timeframe.

If you fly a lot, purchase a car seat approved for airplane use and let your broker or flight department know you'll be bringing it along on the flight, so the crew is prepared to help you install it on the airplane.

Keep Fifi or Fido safe during turbulence by bringing a pet carrier or kennel, especially if it can be strapped in or fit under a seat. Consider a safety harness or restraint for larger animals.

BOTTOM LINE—TURBULENCE CAN BE UNCOMFORTABLE BUT SHOULDN'T BE SCARY

Turbulence is a normal occurrence on nearly every flight. Sometimes the turbulence is so slight you don't notice it; usually, it's an uncomfortable bumpiness, and on rare occasions it could be severe enough to cause injury. But your flight crew is trained to deal with turbulence, and you can take steps to keep yourself and your loved ones safe if unexpected turbulence occurs. All it takes is the click of a seat belt.



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20 Years of Access

Here are some of the key changes we've witnessed in the private aviation field in the two decades since **Business Jet Traveler** began publishing.

by James Wynbrandt

When **Business Jet Traveler** debuted in 2003, its readers already enjoyed a range of access options.

Executive Jet Airways had pioneered management services for owners and jet charter for on-demand customers in the 1960s, and in 1987, after changing its name to NetJets, it introduced fractional-share ownerships. That segment powered business aviation forward. By 2000, you could buy a share in a new jet directly from Bombardier (Flexjet), Cessna (CitationShares), or Raytheon, manufacturer of the Hawker, Beechjet, and Premier (Travel Air); you could also choose a private program such as Nicholas Air, Executive Air-

share (now Airshare), or Directional Aviation's Flight Options. Meanwhile, investor Warren Buffett had bought NetJets through his publicly traded Berkshire Hathaway.

The rapid expansion of the business jet fleet resulting from demand and production spurred the access market's evolution. The jet card, a gussied-up form of block charter that Sentient Jet first brought to market, also dates from the turn of the century.

Many programs and access options have appeared in the two decades since **BJT** began publishing, however, and there have been notable start-ups and shutdowns. Here's a look at some key developments over the period.

2003



-Avantair launches a fractional-share ownership program around the roomy and economical Piaggio Aero Avanti P.180 twin turboprop, "lowering the cost of private aviation to a broader range of consumers." The Nasdaq-listed, Clearwater, Florida firm would become the world's largest Piaggio Avanti operator.

2004



-Swiss financier Thomas Flohr founds charter operator VistaJet (née Air Executive). The following year, the company would launch service in Europe with three owned and operated business jets under Maltese registry.

2005



-The Teterboro, New Jersey takeoff crash of a Bombardier Challenger 600 operated by Platinum Jet Management injures 20 and reveals criminal violations of FAA Part 135 rules, prompting calls for more oversight and regulation of the charter industry and leading to prison sentences for the company's principals.

2006



-Intent on taking advantage of economies of scale, JetDirect Aviation launches its plan to create a nationally recognized charter brand and quickly acquires nearly a dozen well-known charter operators and some 300 managed aircraft.

2007



-DayJet, the would-be shared-flight pioneer, inaugurates regional service with a fleet of Eclipse 500 very light jets from its Gainesville, Florida headquarters, harnessing both the revolutionary VLJ and proprietary software developed to coordinate customer demand and schedule DayJet's flights. Facing operating and financial problems, it would close less than a year later.

2008

- The Air Charter Association of North America is established by five charter brokerages with the goal of promoting best practices, ethics, and transparency within the unregulated air charter industry, and staving off greater federal regulation.
- Sir Richard Branson's Virgin USA launches brokerage Virgin Charter. It would close late in 2009, citing insufficient sales.

-California-based XOJet introduces transcontinental one-way fixed-price fares—\$19,000 coast-to-coast and \$12,000 between the Northeast and South Florida—aboard its owned and operated Cessna Citation X fleet, upending an industry accustomed to providing customers with opaque and costlier charter pricing. XOJet would later admit that its point-to-point fares were priced below cost until about 2013—something competitors had long said and grumbled about.



- VistaJet acquires Skyjet International, Bombardier's charter program, with bases in Farnborough, U.K.; Dubai, U.A.E.; and Hong Kong, to support global service, and orders 35 Bombardier business jets worth \$1.2 billion, the airframer's largest single order to that date.
- The first flight-sharing websites debut, among them JetCharterPool, Jet-It-Together, and Cogo Jets—the latter founded by moonlighting Jet Linx Aviation CEO Jamie Walker—aiming to let members propose and arrange shared charter flights. Organizers acknowledge the challenge of creating the critical customer mass needed for viability.

2009

- Following the collapse of DayJet, its largest client, Eclipse Aviation, on whose wings the VLJ revolution rode, is liquidated and its assets auctioned in a Chapter 7 bankruptcy.
- Unable to consolidate and manage its newly acquired aircraft—and reeling from the Great Recession's impact on business aviation—JetDirect declares bankruptcy, leaving large sums owed to unsecured creditors and broken charter operators in its wake.
- The National Business Aviation Association, General Aviation Manufacturers Association, and International Business Aviation Council unveil the Business Aviation Commitment on Climate Change, whose goals include reducing the industry's carbon emissions by 50 percent by 2050. The reduction target would be raised to 100 percent in 2021.
- JetSuite (née Magnum) launches the industry's first all-light-jet charter service centered in Southern California aboard Embraer Phenom 100s, offering low-cost access, with an airplane—not just a seat—priced as low as \$999 from Van Nuys to Las Vegas, and flight time at about \$3,000 per hour.



- Per-seat pioneer Greenjets launches “more environmentally, socially, and fiscally responsible” shared charter flights linking New York, Chicago, South Florida, and Boston. Memberships cost about \$7,000 annually, providing access at about \$3,500 between New York and South Florida.

2010



- Delta Air Lines rebrands Delta Air Elite, its charter arm, as Delta Private Jets and introduces a jet card, stamping commercial aviation's imprimatur of approval on business aviation's mass-market potential.
- OurPlane, a program for the Cirrus SR-22 piston single that launched in 2000 with hopes of attracting private pilots to fractional ownership, shuts down, citing economic conditions.

2011



-Presaging the industry's post-recession revival, NetJets places a \$6.7 billion order for Bombardier Challengers and Globals. It would double down the following year with a \$9.6 billion order for up to 275 more Challengers.

2012



-Shanghai hosts the first Asian Business Aviation Convention and Exhibition, co-sponsored by the Asian Business Aviation Association and the U.S.-based National Business Aviation Association, heralding the opening of the People's Republic to general and business aviation.

-Hawker Beechcraft declares bankruptcy. Pursuant to restructuring, it rebrands as Beechcraft Corporation and ceases production of Premier and Hawker business jets, though the latter platform would remain a staple of the world's charter fleet.

-JetSmarter introduces a mobile booking app, providing pricing and direct links to providers, and memberships offering perks including free shuttle (shared) flights and empty legs, and helicopter transfers in select cities.

2013



-Aiming to "democratize" private aviation, Marquis Jet Card co-founder Kenny Dichter launches Wheels Up and introduces a membership-based program that charges an initiation fee and annual dues and provides fixed-hourly-rate access to its fleet. The company commences operations with regional service aboard King Air 350i twin turboprops.

-Directional Aviation, whose Flight Options fractional program fleet features refurbished rather than new aircraft and lags the industry leaders, buys Flexjet, Bombardier's fractional ownership program, and orders \$2.4 billion worth of its Challengers and Learjets.

-Operating a fleet of Pilatus PC-12 single-engine turboprops, California's Surf Air introduces the subscription-based "all you can fly" shared-flight charter model, with access to its network of California-centric locations limited only by the number of reservations each of the tiered membership programs provides, with inclusive monthly fees starting at about \$1,650.

-Amid shareowner lawsuits and incidents that included an aircraft shedding parts in flight, Piaggio Avanti fractional ownership program Avantair declares bankruptcy and ends operations.

-NetJets unveils its Signature Cabin Series, incorporating customized design and outfitting features, as the new standard for all its future deliveries. Bombardier's Global 6000, launch platform for the cabin, boasts ostrich-embossed leather upholstery, African Sapele wood surfaces, brushed steel metallic trim, and a stateroom.

2014



-Having already exited the fractional market, CitationAir by Cessna (née Citation-Shares), the manufacturer's one-time fractional/charter program, ceases operations.

2015



-Wheels Up takes private aviation to the mass market, selling jet cards through Costco and sponsoring winning racehorse American Pharoah in the Triple Crown's Belmont Stakes.

-Magellan Jets introduces the "design your own" jet card, choosing perks and add-ons such as waived peak charges or category interchange fees, free category upgrades, flight-charge minimums, and fuel-surcharge discounts.

-Flexjet launches its premium Red Label LXi aircraft, with more than 25 custom cabin designs, and each aircraft flown by its own dedicated crew.

2016



- JetSuite launches JetSuiteX (now JSX), a new “public charter operator” model, offering scheduled shared flights aboard airline style, all-first-class 30-seat Embraer 135 jets from general aviation terminals. Fares on its West Coast route network are as low as \$109 from Los Angeles to San Francisco, with no membership required.
- Flexjet opens its first private terminal, in Naples, Florida, reflecting growing industry focus and investment in upgraded ground services and improved customer experience.

2017



- Amid a global uptick in demand, several charter operators, including Priester Aviation, Wheels Up, JetSuite, and XOJet, establish or expand their charter brokerage arms, more than one calling it the “fastest growing, year-over-year” part of their business.

2018



- The Department of Transportation issues regulations (Part 295 Air Charter Brokers) designed to increase transparency and strengthen consumer protections. The rules were developed partly in response to NTSB safety recommendations arising from the 2006 Platinum Jet accident.
- Three years after Honda Aircraft certified the HA-420 HondaJet, with its distinctive over-the-wing-mounted engines, Jet It—based, like the manufacturer, in Greensboro, North Carolina—launches a days-based fractional ownership program for the light twinjet.
- An onboard video of an unruly JetSmarter shuttle flight passenger threatening the crew and other passengers, forcing an emergency landing, goes viral. It heaps negative attention on shared flights as JetSmarter itself faces multiplying customer lawsuits alleging deceptive sales practices and unmet obligations.
- As the launch customer for the Pilatus PC-24, a highly anticipated light twinjet, Boston-based fractional program PlaneSense adds the model to its previously all-Pilatus PC-12 single-engine turboprop fleet.
- VistaJet’s parent company, Dubai-based Vista Group, acquires XOJet and its fleet of midsize and super-midsize jets.

2019



- Boeing announces that it is partnering with Aerion Supersonic, developer of the AS2, which aims to be the world’s first supersonic (Mach 1.4) business jet, with its first flight slated for 2023. The partnership would end and Aerion would close in 2021.
- Vista Group buys reputationally damaged flight booking app JetSmarter, merges it with XOJet, and transforms the former midsize-jet operator into a mobile device-based on-demand charter brokerage, rebranded as XO.

2020



- The World Health Organization’s COVID-19 pandemic declaration in March craters aviation activity and threatens the bizav industry’s survival. The Coronavirus Aid, Relief, and Economic Security Act and Paycheck Protection Program, passed that same month, provides some \$666 million to business aviation and “helped avert an economic catastrophe,” says NBAA CEO Ed Bolen.
- With flight activity decimated by the pandemic, JetSuite files for bankruptcy, declaring it had never been profitable, and ceases operations.
- Focused on sustainable travel, Florida-based operator VeriJet launches charter service using only single-engine Cirrus SF50 Vision Jets for efficient, low-carbon-footprint access.

2021



- Wheels Up goes public on the New York Stock Exchange in July under the UP ticker, the first private jet company to get a listing on the exchange.
- Preparing for an expected urban mobility revolution, Directional Aviation's One Sky Flight orders 200 eVTOL aircraft from Embraer-backed Eve, to create door-to-door travel solutions for Flexjet and other Directional Aviation customers.

2022



- Shaking off COVID, business aviation records its highest annual number of charter and fractional flight hours—2,949,189, 5.5 percent above the figure for 2021, the previous record year.

2023



- Facing economic headwinds after rapid expansion, Wheels Up downscales its operations, and founder and CEO Kenny Dichter leaves the executive suite.
- Unable to pay for its aircraft or their maintenance, HondaJet fractional program operator Jet It, operator of the largest U.S. fleet of the distinctive twinjets, ceases operations.

BJT

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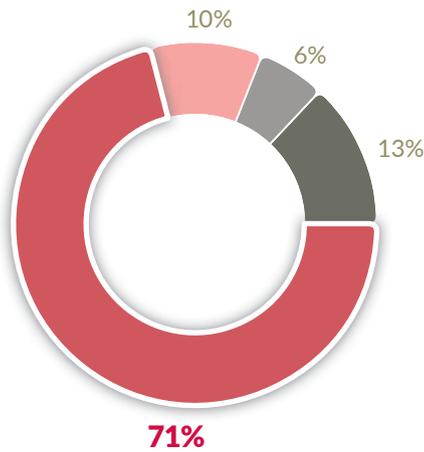
Readers' Choice Survey

Here are the results of our 2023 Readers' Choice survey, which attracted nearly 1,300 respondents and incorporated many questions that we didn't ask in previous years. As promised, we have made a contribution for every completed survey to Corporate Angel Network, which arranges free 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 two questions.

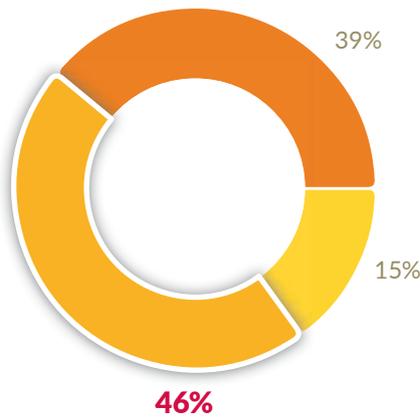
FLYING PRIVATELY

How long have you been flying privately?*



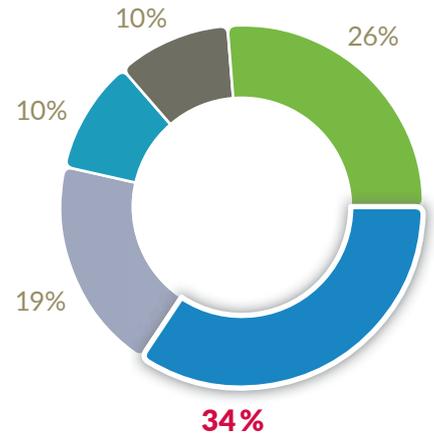
- More than 10 years
- 3-10 years
- Less than 3 years
- I haven't flown privately but am considering it

What best describes the main reason you're not yet flying privately? (asked of those said they haven't flown privately but are considering it)



- I'm not sure how to get started or what companies to contact
- I haven't seen the need, though I might in the future
- I'm hesitant to pay the price

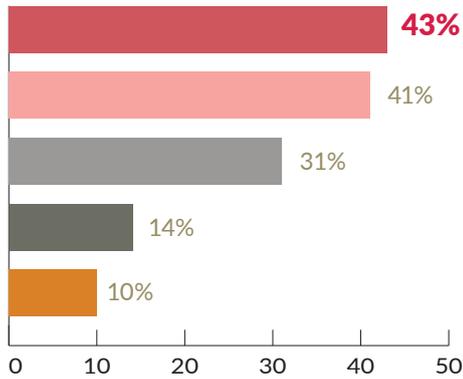
About how much do you fly privately in a typical year?



- Less than 25 hours
- 25-50 hours
- 51-75 hours
- 76-100 hours
- More than 100 hours

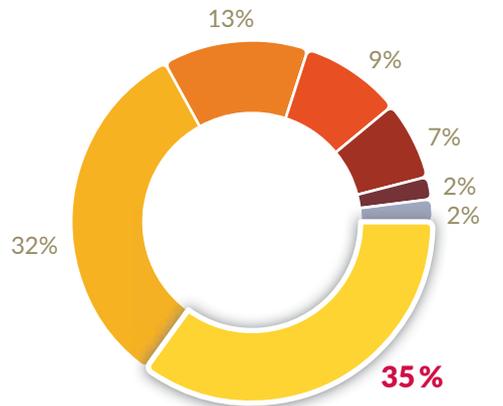
*Respondents who indicated that they had no plans to fly privately are excluded from these stats and were not asked any of the questions that follow.

Which of the following have you done in the past two years or plan to do within the next two years? (select all that apply)



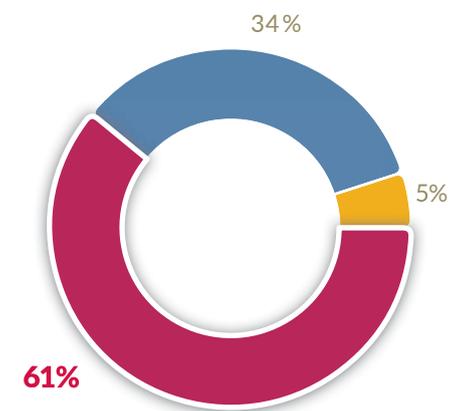
- Fly via a corporate-owned aircraft
- Fly in my own aircraft
- Fly via charter
- Fly via a jet card or membership club
- Fly via a fractional-aircraft share you purchased

The first time you ever flew privately was...



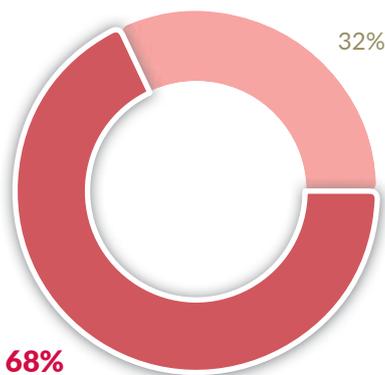
- On a friend's aircraft
- On your company's aircraft
- On an aircraft you wholly owned
- On a charter flight you booked
- On a colleague's aircraft
- On an aircraft you fractionally owned
- Via a jet card you purchased

Are you a licensed pilot?



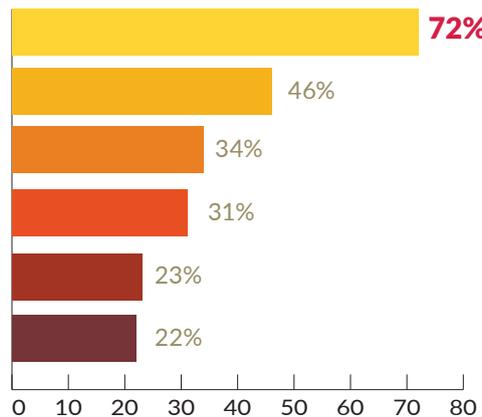
- Yes
- No
- No, but I'm taking flying lessons

Have you ever taken an international private flight?



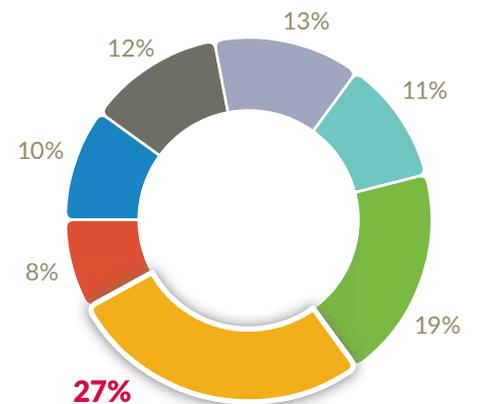
- Yes
- No

Which of the following do you least like about airline travel? (select all that apply)



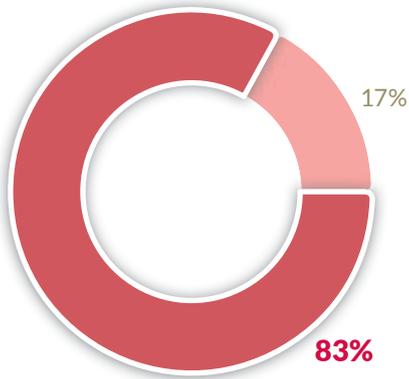
- Wait times in airports
- Unreliability of flight schedules
- Lack of privacy
- Lack of airports near my departure points and/or destinations
- Inadequate onboard amenities/comforts
- Inability to conduct business onboard

How much do you expect to personally spend on flying private in 2023?



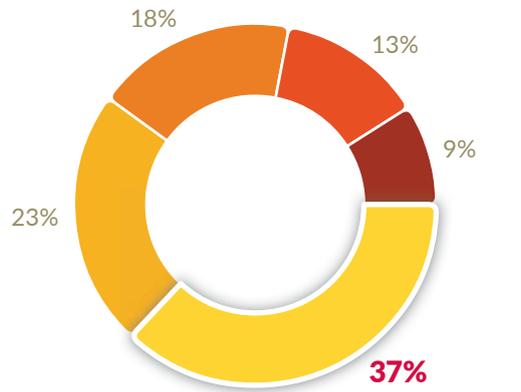
- More than \$500,000
- \$250,000-\$500,000
- \$100,000-\$249,000
- \$50,000-\$99,000
- Less than \$50,000
- Nothing, because my company covers the cost
- Nothing, because I don't expect to fly privately this year

If you fly via charter, how do you prefer to book flights?



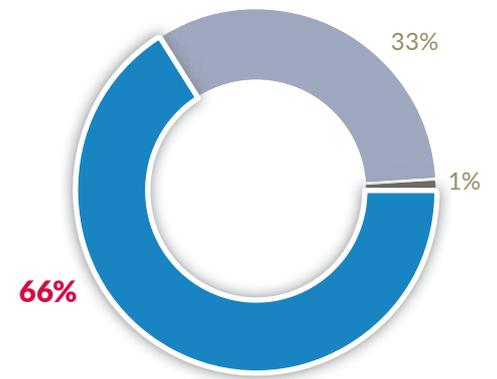
- Directly via the flight operator
- Via a charter broker

If you fly via charter, do you plan to...



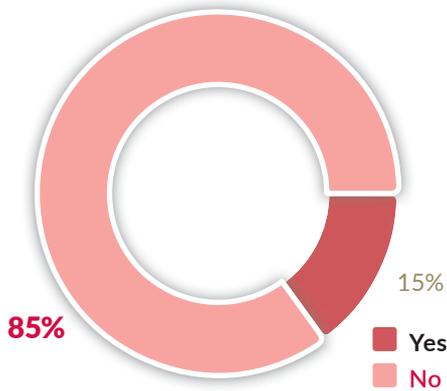
- Continue chartering indefinitely
- Move up to whole ownership of an aircraft
- Return to the airlines at some point
- Move up to a fractional jet share
- Move up to a jet card

Do you try to use favored FBOs when booking flights?



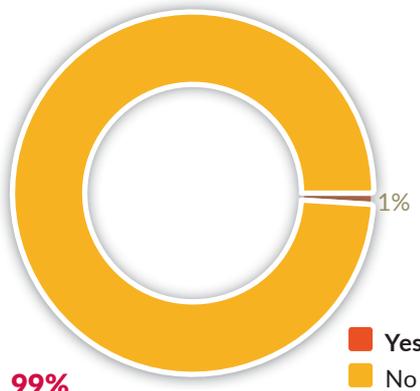
- Yes, I try to select airports that have FBOs I favor, or, at airports with multiple FBOs, use ones I prefer
- No, I don't
- I don't know what an FBO is

Have you ever used an app to book a charter flight?



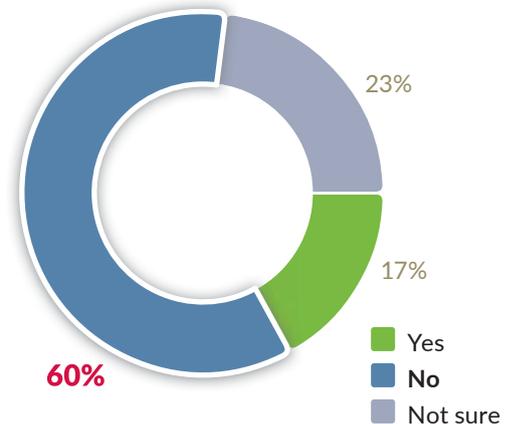
- Yes
- No

Have you ever paid for a private flight with cryptocurrency?



- Yes
- No

Once the technology is a proven success, would you consider flying on a pilotless aircraft?

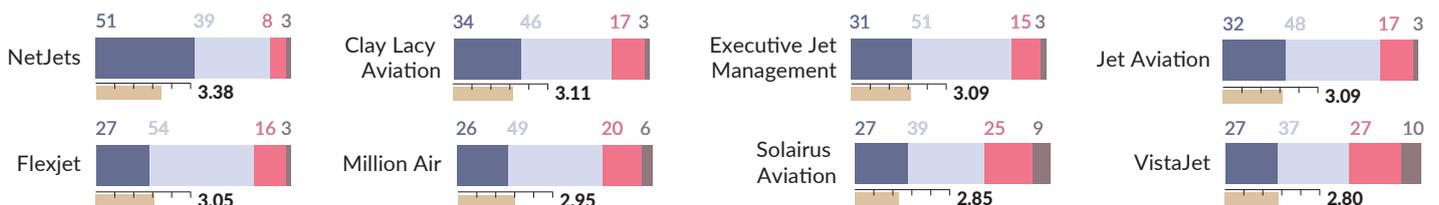


- Yes
- No
- Not sure

LIFT PROVIDERS

What is your overall impression of the following business aviation charter, jet card, and fractional-share operators?*

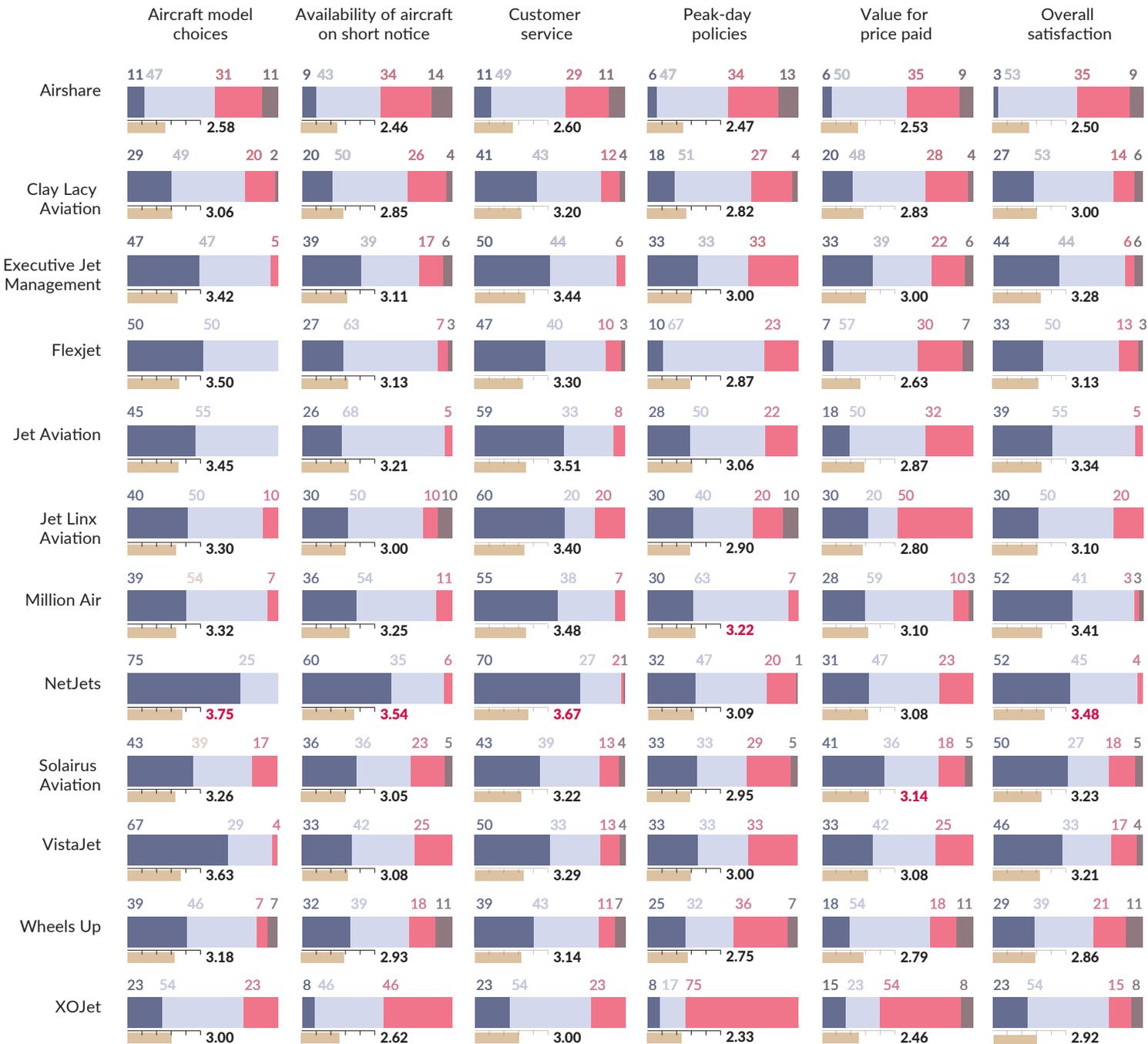
■ Excellent
 ■ Good
 ■ Fair
 ■ Poor
 ■ Weighted Average**



*Respondents who indicated "Don't know/not sure" are excluded from the results **Determined by assigning points to ratings: Excellent (4), Good (3), Fair (2), Poor (1)



Please rate the flight provider you have most experience with on each of these factors:*

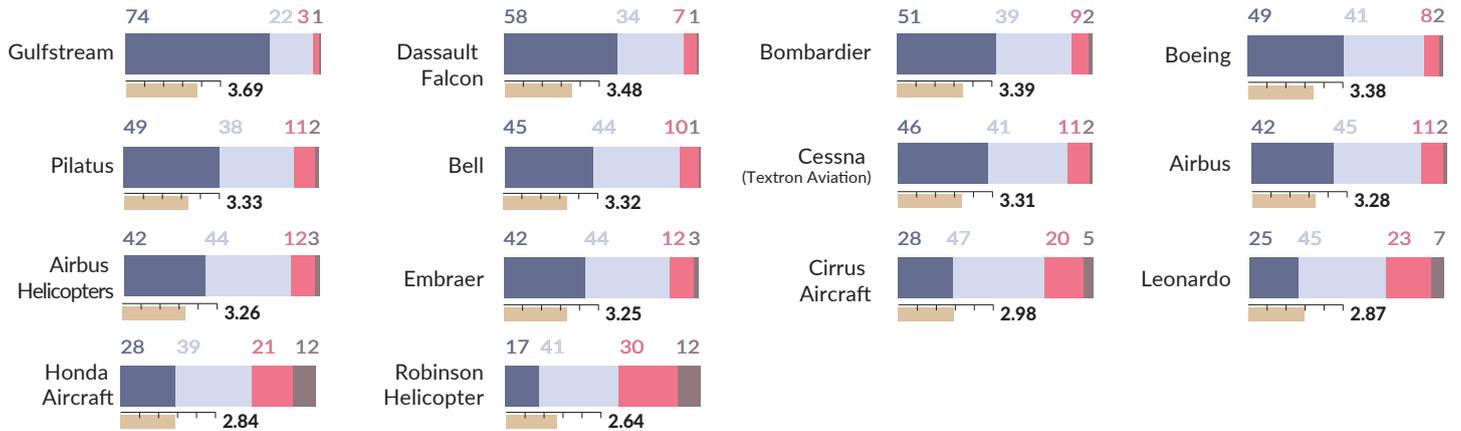


* Companies listed are the ones for which we received sufficient response to allow for meaningful results. **Determined by assigning points to ratings: Excellent (4), Good (3), Fair (2), Poor (1)

AIRPLANE MANUFACTURERS

■ Excellent
 ■ Good
 ■ Fair
 ■ Poor
 ■ Weighted Average**

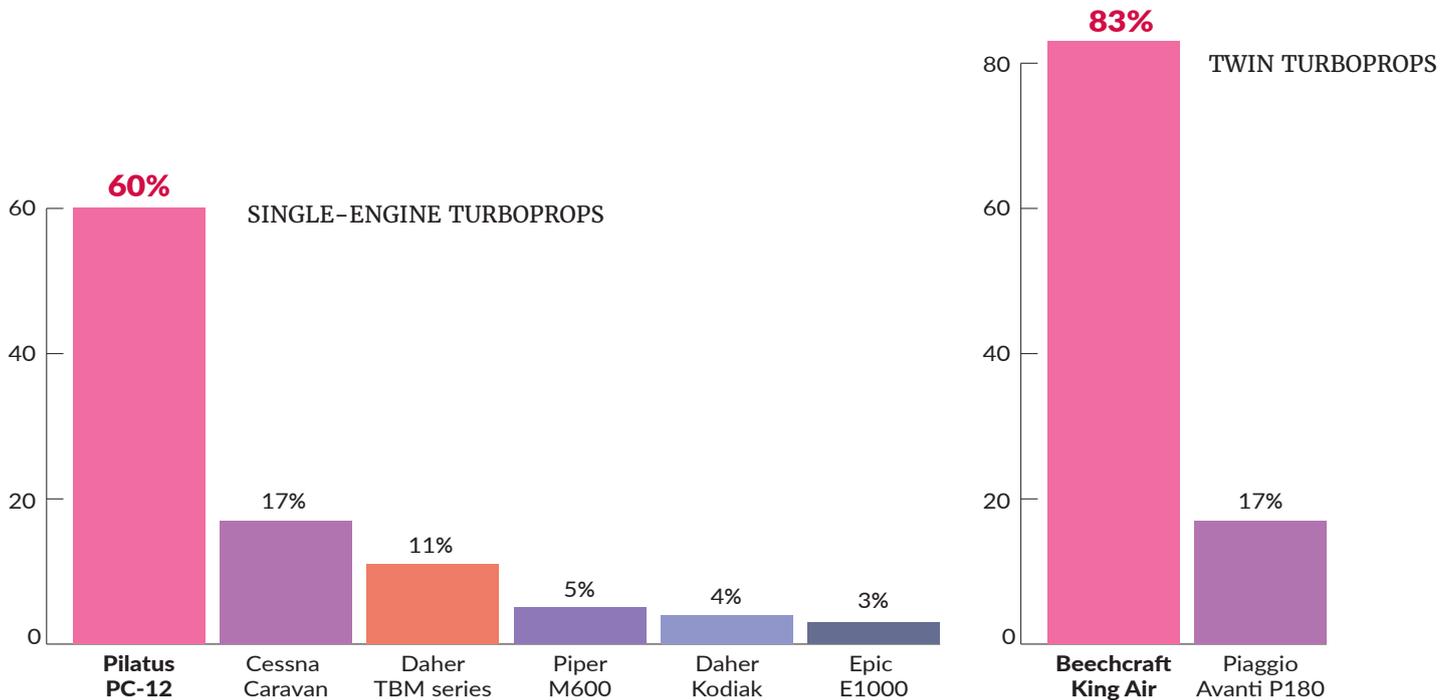
Please indicate your overall impression of each of these aircraft manufacturers.*

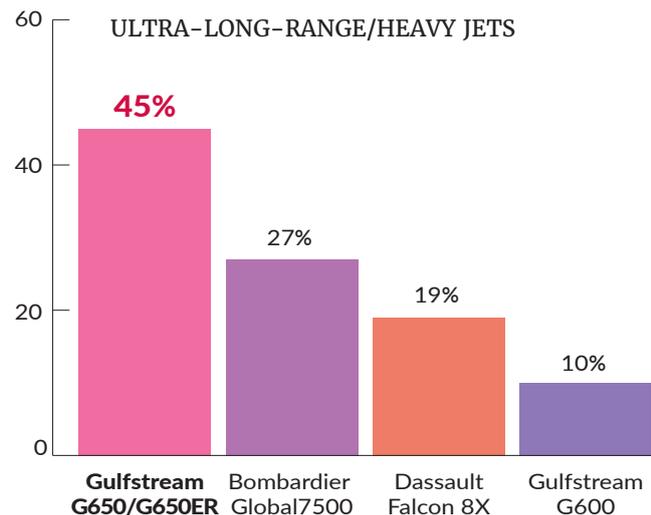
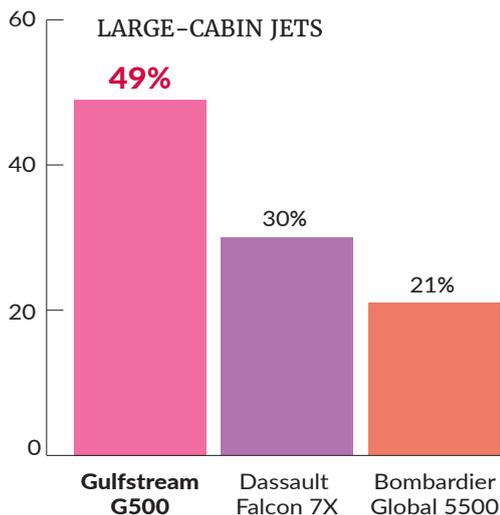
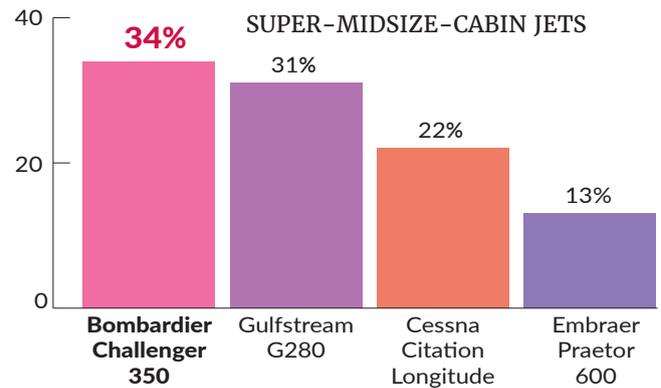
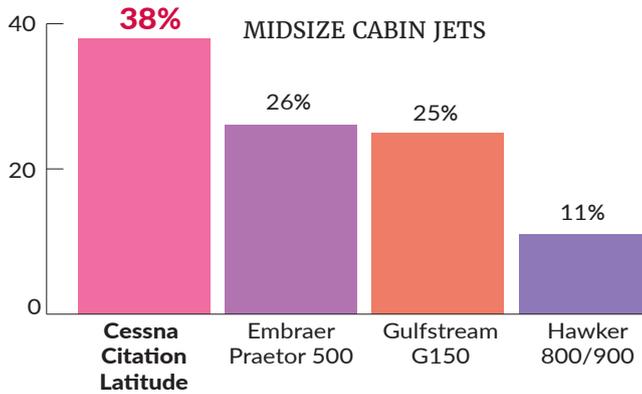
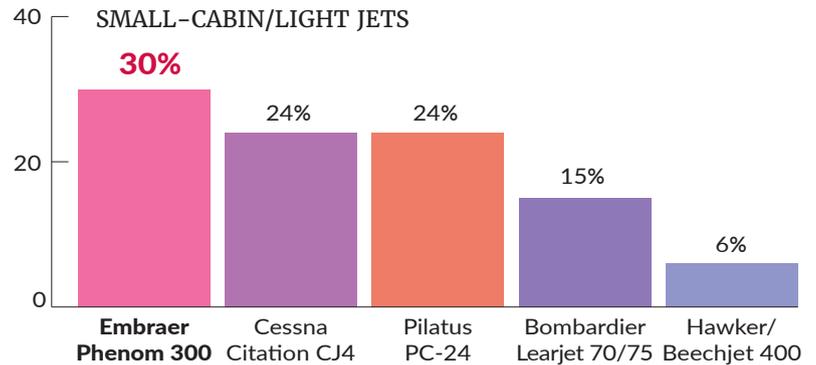
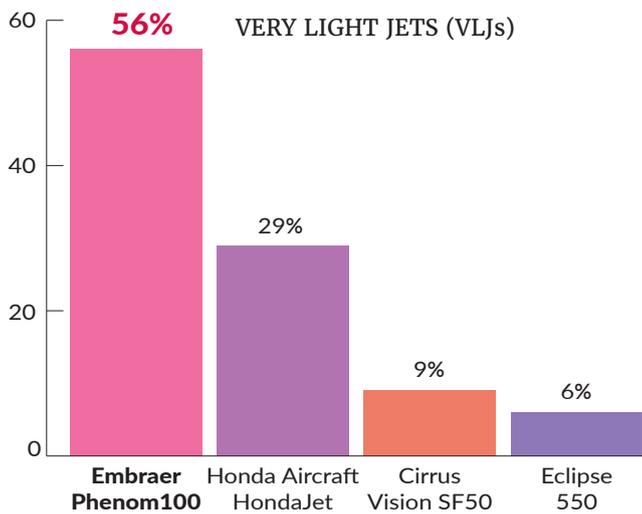


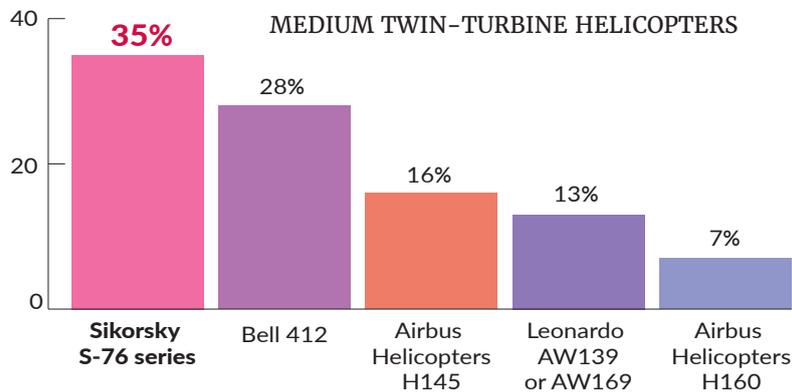
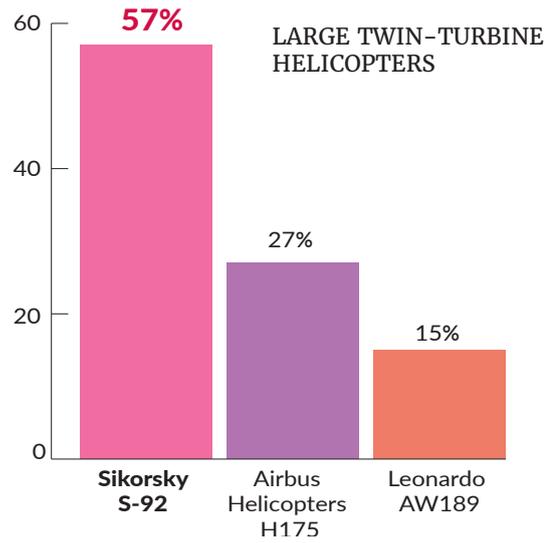
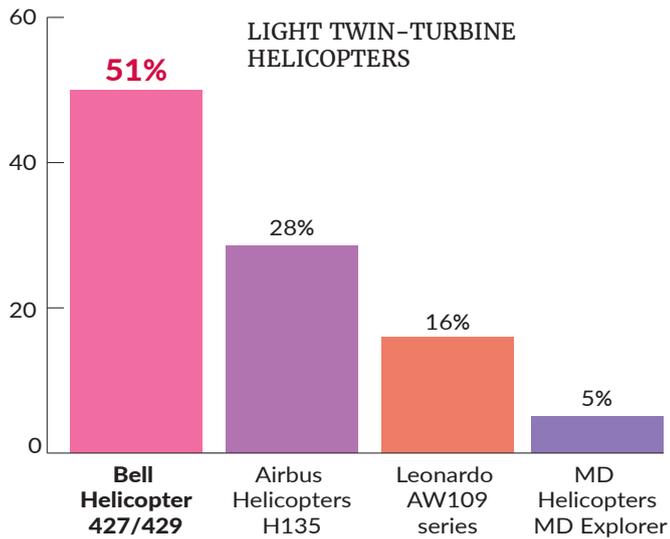
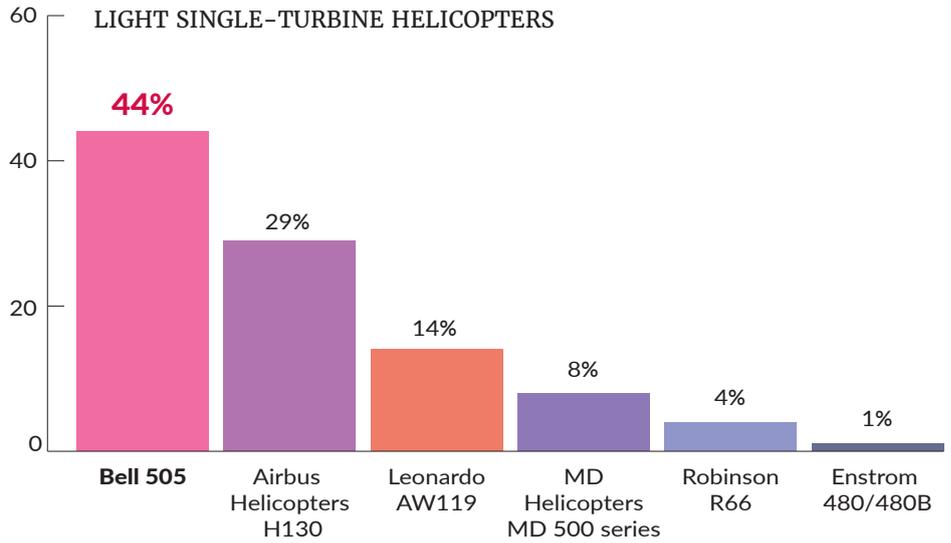
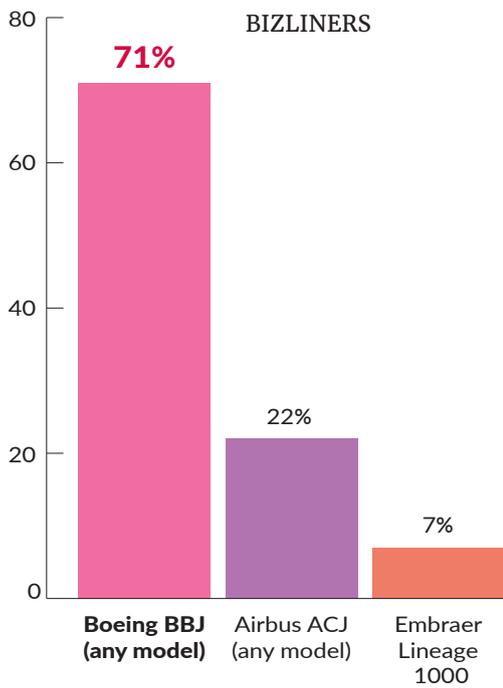
*Results exclude respondents who answered "Don't know/not sure" **Determined by assigning points to ratings: Excellent (4), Good (3), Fair (2), Poor (1)

PREFERRED AIRCRAFT

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









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Farnborough Airport

The World's Best FBOs

Survey results from one of our sister publications show which airport facilities offer the best services and amenities.

by Curt Epstein

FBOs are a key cog in business aviation’s airport system. Often touted as offering the first impression visitors arriving by air have of a destination, they provide ground handling, parking, hangar space, towing, and in most cases fuel for aircraft. For passengers, they offer amenities that typically include comfortable lobbies and waiting areas, refreshment bars, business centers, and customer-service agents or concierges. For pilots and crew, there are lounges, snooze rooms, flight-planning areas, and courtesy cars.

To determine which FBOs provide the best overall experiences, **BJT** sister publication *Aviation International News* has conducted an annual survey since 1981. *AIN* polls a select subset of its readers, including pilots, flight schedulers, and dispatchers—those who can evaluate FBOs most knowledgeably. These subscribers now have access to a website that allows them to rate FBOs at any time during the year, with their latest rating of a location replacing any previous one.

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

FBO	AIRPORT CODE	AIRPORT	COUNTRY	OVERALL AVERAGE
FARNBOROUGH AIRPORT	EGLF	FARNBOROUGH	ENGLAND	4.69
UNIVERSAL AVIATION	EGSS	LONDON STANSTED	ENGLAND	4.61
EXECUJET AUSTRALIA	YSSY	SYDNEY KINGSFORD SMITH	AUSTRALIA	4.52
ECCELSA AVIATION	LIEO	OLBIA COSTA SMERALDA	ITALY	4.48
SIGNATURE FLIGHT SUPPORT	EDDM	MUNICH	GERMANY	4.48
JET AVIATION	EHAM	AMSTERDAM SCHIPHOL	HOLLAND	4.47
MJETS FBO	VTBD	DON MUEANG INTL.	THAILAND	4.45
HARRODS AVIATION	EGSS	LONDON STANSTED	ENGLAND	4.42
JET AVIATION	LSGG	GENEVA INTL.	SWITZERLAND	4.42

AIN culled through thousands of responses from the past five years (2018–22) to compile cumulative average scores for its latest annual lists of the best FBOs in the Americas and the rest of the world.

The magazine asked survey respondents to rate facilities they'd used over the past year 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, conference rooms, and refreshments, as well as availability of ground transportation.

Pilot amenities—the availability and quality of pilot lounges, flight-planning facilities, snooze rooms, crew showers, entertainment and recreation offerings, and complimentary crew cars.

Facilities—cleanliness, comfort, upkeep, and convenience of the location.

Customer service—professionalism of customer-service representatives, their familiarity with the local area, and their assistance with reservations and catering.

The survey responses show that to be a top-scoring FBO, it is not enough to excel in only one of these categories. Facilities must demonstrate excellence across the board.

The highest-rated FBO in the Americas last year, for the third consecutive year, was Pentastar Aviation, one of six FBOs at Oakland County International Airport in Pontiac, Michigan. It garnered an average score of 4.78, placing it among the top 10 in all five survey categories in AIN's latest ranking, the only location to achieve this distinction.

The company, which will celebrate its 60th anniversary next year, offers a variety of uncommon services, including what is likely the only FBO-operated jetway in the U.S. It is attached to the Stargate, a two-story, 10,000-square-foot terminal with its own baggage carousel that is used for big charter groups such as sports teams as well as for large government aircraft. Another feature that sets the Pentastar operation apart is its FiveStar Gourmet division, which provides in-flight catering for aircraft operators as well as meals for FBO customers and airport workers. Due to its popularity,

it has even expanded its service to other airports in the area.

Open and staffed 24/7, the complex includes 155,000 square feet of hangar space and 10 acres of reinforced ramp space. The company has acquired one of the last remaining parcels of undeveloped land at its airport and will soon begin work on an \$11 million expansion project that will add a pair of 25,000-square-foot hangars and 8,000 square feet of passenger lounges and office space.

The 2023 AIN FBO survey turned out to be a close contest, with Pentastar just edging out American Aero at Fort Worth Meacham International Airport and Sheltair at Florida's Tampa International, which tied for second place with a score of 4.74.

Outside the Americas, European locations dominated the highest rungs on the list, taking seven of the top nine positions. London-area Farnborough Airport earned a 4.69, good enough to place it among the top 5 percent of FBOs worldwide. It ranked third overall this year in pilot amenities, second in passenger amenities, and first in facilities.

Its three-story, 52,000-square-foot terminal features VIP customer lounges that can accommodate up to 60 people for high-capacity flights, plus conference rooms, crew lounge and snooze rooms, a work area, passenger and crew shower facilities.



SHELTAIR
#2 FBO IN THE AMERICAS | TPA | TAMPA, FL

THANK YOU FOR RANKING SHELTAIR AS ONE OF THE
BEST FBO NETWORKS IN THE AMERICAS!

TOP 5% BJC | FLL TOP 10% ORL | JAX
TOP 20% DAB | SAV | PIE | ECP

ABOVE & BEYOND Marc Joseph - PMP | Johanna Echeto - ORL
Jessica Blakeman - OCF | Denise Ortiz - LAL | Ciara Read - FLL
Christina Sanders - JAX | Sebastian Rose - DAB
Hannah Branda - TPA | Ashley Rainer - BJC

sheltairaviation.com

ties, and laundry service. It even has a fully equipped gym attached to one of its hangars.

Drive-through customs and immigration clearance and ramp-side vehicle access are available along with an on-airport hotel. With 240,000 square feet of hangar space capable of sheltering aircraft up to the size of an Airbus A220, the facility is home to 64 jets.

Second place (4.61) went to another London FBO, Universal Aviation at Stansted Airport, while Execujet Australia (4.52) at Sydney Kingsford Smith Airport occupied the third position. **BJT**



TOP-RATED FBOS IN THE AMERICAS

FBO	AIRPORT CODE	AIRPORT	LOCATION	OVERALL AVERAGE	
PENTASTAR AVIATION	KPTK	OAKLAND COUNTY INTL.	MICHIGAN	4.78	Top 5%
AMERICAN AERO	KFTW	FORT WORTH MEACHAM INTL.	TEXAS	4.77	
SHELTAIR	KTPA	TAMPA INTL.	FLORIDA	4.77	
BANYAN AIR SERVICE	KFXE	FORT LAUDERDALE EXECUTIVE	FLORIDA	4.73	
WILSON AIR CENTER	KMEM	MEMPHIS INTL.	TENNESSEE	4.73	
HENRIKSEN JET CENTER	KTME	HOUSTON EXECUTIVE	TEXAS	4.72	
JET AVIATION	KPBI	PALM BEACH INTL.	FLORIDA	4.72	
HENRIKSEN JET CENTER	KEDC	AUSTIN EXECUTIVE	TEXAS	4.71	
SHELTAIR	KFLL	FORT LAUDERDALE/HOLLYWOOD INTL.	FLORIDA	4.71	
SHELTAIR	KBJC	ROCKY MOUNTAIN METROPOLITAN	COLORADO	4.71	
AERO-ONE AVIATION	KDHN	DOTHAN REGIONAL	ALABAMA	4.69	
BUSINESS JET CENTER	KDAL	DALLAS LOVE FIELD	TEXAS	4.69	
WESTERN AIRCRAFT	KBOI	BOISE AIR TERMINAL/GOWEN FLD	IDAHO	4.69	
BASE OPERATIONS AT PAGE FIELD	KFMY	PAGE FIELD	FLORIDA	4.68	
FARGO JET CENTER	KFAR	HECTOR INTL.	NORTH DAKOTA	4.68	
GLOBAL SELECT	KSGR	SUGAR LAND REGIONAL	TEXAS	4.67	
HAWTHORNE GLOBAL AVIATION SERVICES	KPWK	CHICAGO EXECUTIVE	ILLINOIS	4.67	
MERIDIAN TETERBORO	KTEB	TETERBORO	NEW JERSEY	4.67	
SHELTAIR	KORL	ORLANDO EXECUTIVE	FLORIDA	4.67	
MCKINNEY AIR CENTER	KTKI	MCKINNEY NATIONAL AIRPORT	TEXAS	4.66	
SHELTAIR	KJAX	JACKSONVILLE INTL.	FLORIDA	4.66	
WILSON AIR CENTER	KCHA	LOVELL FIELD	TENNESSEE	4.66	
DEL MONTE AVIATION	KMRY	MONTEREY PENINSULA	CALIFORNIA	4.65	
JET CENTER AT SANTA FE	KSAF	SANTA FE MUNICIPAL	NEW MEXICO	4.65	
TEXAS JET	KFTW	FORT WORTH MEACHAM INTL.	TEXAS	4.65	
ATLANTIC AVIATION	KMKC	CHARLES B. WHEELER DOWNTOWN	MISSOURI	4.64	
ATLANTIC AVIATION	KOKC	WILL ROGERS WORLD	OKLAHOMA	4.64	
LUX FBO	CYHU	ST-HUBERT	MONTREAL	4.64	
ATLANTIC AVIATION - STUART JET CENTER	KSUA	WITHAM FIELD	FLORIDA	4.64	



Cancer Patients Fly Free

Can You Spare a Seat?

Corporate Angel Network (CAN) is a 501(c)(3) nonprofit organization whose mission is to provide cancer patients with free transportation to treatment centers throughout the United States.

CAN works with corporate flight departments to match scheduled business trips with patient requests. Thanks to the generous support of over 500 partners, CAN has coordinated more than 67,000 flights.

Contact CAN to learn more about becoming a partner or to make a personal or corporate donation to support the mission.

corpangelnetwork.org



It's wonderful that organizations like the Corporate Angel Network are able to help connect those most in need of flights to those who are flying.

-Henry Maier, President and CEO, FedEx Ground

Major Business Aircraft Manufacturers at a Glance

Shopping for an airplane or helicopter? Start by reading the key facts about the airframers whose products you're considering.



AIRBUS

Founded: 1970

HQ: Toulouse, France

CEO: Guillaume Faury

Employees: 131,000

Info: airbus.com, +33 (0) 4 42 85 85 85

Airbus is a multinational aerospace conglomerate that launched its first passenger jet, the A300, in 1972. The model was the world's first wide-body, twin-engine passenger jet and marked the initial offering from what would become Europe's largest aerospace and defense company.

Airbus forayed into the corporate jet market in 1997, and today the Airbus Corporate Jets business unit offers the ACJ TwoTwenty, ACJ319neo, ACJ320neo, ACJ330neo, and ACJ350 XWB.

The company, which maintains roughly 180 global locations, has delivered close to 13,000 aircraft since the launch of the A300.

AIRBUS HELICOPTERS

Founded: 1992

HQ: Marignane, France

CEO: Bruno Even

Employees: 20,000

Info: airbus.com, +33 (0) 4 42 85 85 85

Airbus Helicopters is the rotorcraft wing of Airbus. It was founded as Eurocopter Group and was re-branded as Airbus Helicopters in 2014. The company and its predecessor firms have been pioneers in rotorcraft development for decades. In both civil and military applications, Airbus's helicopters have been bestsellers with a reputation for ruggedness and durability.

The product line includes entries in the intermediate-single, light-twin, medium, super-medium, and heavy segments. In 2017, Airbus Helicopters launched the Airbus Corporate Helicopters business unit, a luxury corporate helicopter development wing, positioning an offering in every segment from intermediate single to super-medium.

BELL

Founded: 1935

HQ: Fort Worth

President and CEO: Lisa Atherton

Employees: 7,000

Info: bellflight.com, (817) 280-2011

Bell, a subsidiary of Textron since 1960, is an aerospace manufacturer that has developed civilian and military aircraft and rotorcraft since 1935.

In 1976, Textron rebranded the Bell Helicopter division as Bell Helicopter Textron. This designation remained until 2018 when the company was renamed Bell.

Currently, it manufactures the 505, 407, 429, 412, and 525 rotorcraft for the civilian market. Maximum passenger counts range from four in the 505 to 16 in the 525, which is expected to receive FAA certification this year. The company is also developing unmanned aerial vehicles called Autonomous Pod Transports for cargo delivery.



BOEING

Founded: 1916

HQ: Arlington, Virginia

President and CEO: Dave Calhoun

Employees: 141,000

Info: boeing.com, (312) 544-2000

The Boeing Company operates in 65 countries and maintains offerings across the aerospace realm, manufacturing aircraft, rotorcraft, rockets, satellites, and communications equipment for civilian and military clients.

Boeing—which lumber industrialist William Boeing founded in 1916—became one of the world’s largest aerospace companies after its merger with McDonnell Douglas in 1997. Its civilian aircraft offerings include the 737, 747, 767, 777, and 787. The 737 has been a bestseller since its first flight in 1967, with more than 10,500 deliveries to date.

The company’s civilian aircraft division, Boeing Commercial Airplanes, also produces the Boeing Business Jet series. Narrowbody models of the BBJ are based on variants of the 737, while widebody models include offerings based on the 747, 777, and 787 platforms. These aircraft compete primarily with the Airbus Corporate Jets line.



BOMBARDIER

Founded: 1942

HQ: Montreal

President and CEO: Éric Martel

Employees: 15,800

Info: bombardier.com, (514) 861-9481

A standalone business jet manufacturer since 2021, Bombardier makes and supports Challengers and Globals, spanning the super-midsize to ultra-long-range jet categories.

In 1942 Joseph-Armand Bombardier, a Canadian inventor and entrepreneur, established a company to market his “snow vehicle,” or snowmobile. Four decades later, in 1986, Bombardier expanded into aerospace, acquiring Canadair, which had developed the Challenger 600 series business jet. In 1990, it acquired Learjet Corporation, whose midsize Learjet 60 first flew later that year; and in 1992, it purchased a majority stake in De Havilland Aircraft of Canada. The first member of its ultra-long-range Global family, the Express, flew in 1996, followed by the Challenger 300 in 2001.

In 2014, Bombardier Business Aircraft became a Bombardier Aerospace division and, in 2018, the flagship Global 7500 entered service. More than 4,700 Bombardier business aircraft are now in operation worldwide.



CIRRUS

Founded: 1984

HQ: Duluth, Minnesota

CEO: Zean Nielsen

Employees: 2,100

Info: cirrusaircraft.com, (218) 529-7200

Cirrus manufactures the SR line of piston-powered, single-engine aircraft and the SF50 Vision Jet series of single-engine fanjet aircraft. The company is owned by the China Aviation Industries General Aircraft (CAIGA) division of state-owned AVIC.

This year, Cirrus delivered its 9,000th aircraft, and the number of Vision Jets in customer hands now is nearing 500.

Recent refinements to the Vision Jet include Garmin’s Auto Radar, which automatically scans the skies and builds a 3D view composite real-time depiction of atmospheric conditions, and Cirrus IQ connectivity. This enables pilots to check on aircraft readiness from anywhere via Cirrus IQ’s LTE cellular telephone connectivity. Items that can be viewed include status of fuel and oxygen levels, aircraft location, flight hours, engine cycles, and other parameters.



DAHER

Founded: 1863

HQ: Orly, France

CEO: Didier Kayat

Employees: 9,500

Info: daher.com, 33 (0) 1 49 75 98 00

Daher is a diversified aircraft manufacturing, aerospace equipment and systems, and logistics and supply-chain-services company whose roots date back to 1911 with the founding of the Morane-Saulnier Aircraft Company. It produces the Kodiak and TBM lines of single-engine turboprops and manufactures components for other airframers.

To meet growing demand for its Kodiak and TBM aircraft, Daher plans to open production lines in Stuart, Florida, in about two or three years. This will supplement Kodiak manufacturing in Sandpoint, Idaho, and TBM production in Tarbes, France.

In July, Daher delivered the 80th TBM 960, its latest model and also the 488th of the 900 series to enter service. The 960 is equipped with Hartzell's Raptor composite five-blade propeller, which enables quieter operation and improved performance, and Garmin's Autoland system.

More than 325 Kodiaks have been delivered to date. Two versions are available, the Series III, which can be equipped with floats, and the 900, which has a more powerful Pratt & Whitney Canada PT6 engine and flies more than 30 knots faster.



DASSAULT

Founded: 1929

HQ: Paris

Chairman and CEO: Éric Trappier

Employees: 12,400

Info: dassault-aviation.com,
+33 (0) 1 47 11 40 00

Founded in 1929, this company had a rich history of military and civil aircraft production before it entered the business aviation market.

FedEx launched its delivery service in 1972 with a Falcon 20 fleet, and Dassault and Pan Am jointly formed Falcon Jet Corp. to service and sell Falcons that same year. The Falcon 50, Dassault's first production trijet, was certified in 1979. The 900 trijet series entered service in 1986, and the Falcon 2000 midsize twinjet joined the fleet in 1995.

The ultra-long-range Falcon 7X trijet, the first fly-by-wire business jet, entered service in 2007. The longer-range 8X entered service in 2016. In 2018, the airframer debuted the Falcon 6X, slated for service entry in 2023. The company introduced a new flagship, the large-cabin, long-range Falcon 10X twinjet, in 2021. Deliveries of that aircraft are expected to begin in 2025.

Dassault's product line includes the Falcon 2000LXS super-mid twinjet, Falcon 900LX large-cabin trijet, and Falcon 7X and 8X ultra-long-range trijets.



EMBRAER EXECUTIVE JETS

Founded: 1969

HQ: Sao Paulo

President and CEO: Francisco Gomes Neto

Employees: 18,000

Info: embraer.com, +55 12 3927 1000

A division of Brazilian aircraft manufacturer Embraer, Embraer Executive Jets (EEJ) produces business aircraft spanning the light-jet to large-cabin categories.

Established in 2005, it introduced the clean-sheet Phenom 100 VLJ and Phenom 300 light jets that same year. The flagship Lineage 1000, a 19-passenger derivative of its E190 airliner, debuted in 2006.

EEJ brought fly-by-wire to mid-size jets with the Legacy 450 and 500 in 2008. The Legacy 650, an upgraded derivative of the Legacy 600, debuted in 2009. A vote of confidence came in 2010 with a firm order from fractional fleet operator NetJets for 50 Phenom 300s and options on an additional 75—a deal worth more than \$1 billion.

A fleet-refreshment program began the Lineage 1000E; the Phenom 100E, and 100EV; the Legacy 650E; and the Phenom 300E. In 2020, Embraer announced that it was discontinuing its Legacy 450, 500, and 650, as well as the Lineage 1000.

Current production business aircraft include the 100EV, the 300E, the midsize Praetor 500, and the super-midsize Praetor 600.



GULFSTREAM

Founded: 1958

HQ: Savannah, Georgia

President: Mark Burns

Employees: 13,000

Info: gulfstream.com, (800) 810-4853

A division of U.S. defense contractor General Dynamics, Gulfstream Aerospace focuses on the large-cabin market. It was established in 1958 as an outgrowth of Grumman Aircraft Engineering. In 1966, it moved its civil-aircraft production to Savannah, Georgia; and in 1978, the Gulfstream line was purchased by American Jet Industries, headed by Allen Paulson.

In the 1980s, the GIII came to market, as did the Gulfstream IV. Chrysler bought the company and then Paulson repurchased it with a private equity firm. The 1990s brought Gulfstream's first sales contract with NetJets, the debut of the GV, and in 1999, the company's purchase by General Dynamics.

In the 2000s, Gulfstream bought Galaxy Aerospace, developing its midsize jets into the G100 and G200. It also introduced the G550, G650, 650ER, G500 and G600.

The product line now includes the super-midsize G280; the G500/600 long-range jets; and the 650ER, the current flagship ultra-long-range jet, with 7,500-nautical-mile range.

In 2021, Gulfstream revealed two additions to its family of large-cabin jets: the G800 and the G400.



HONDA AIRCRAFT

Founded: 2006

HQ: Greensboro, North Carolina

President and CEO: Hideto Yamasaki

Employees: 1,500

Info: hondajet.com, (336) 662-0246

Honda Aircraft Company manufactures the HA-420 HondaJet. The model was first delivered in 2015 and by 2017 was the world's most-delivered light jet. The current iteration of the aircraft is the HondaJet Elite S. The twinjet features a patented over-the-wing engine mount as well as turbfans that the airframer's parent, Japan's Honda Motor Company, developed in partnership with General Electric.

In 2021, Honda unveiled a concept for its next aircraft. The HondaJet 2600 would be a larger light jet with a transcontinental range of 2,625 nautical miles and a midsize-jet cabin that seats up to 11 passengers.

The design is similar to that of the original HondaJet HA-420, with the over-the-wing engine mounts. Performance goals include a maximum cruise speed of 450 knots and a maximum altitude of 47,000 feet. For the HondaJet 2600, the fuselage will be more oval-shaped, increasing headroom and shoulder space at seats.

Besides producing the HA-420 HondaJet, the company offers HondaJet maintenance and upgrades at its North Carolina factory's maintenance facility.



LEONARDO

Founded: 1948

HQ: Rome

CEO: Alessandro Profumo

Employees: 50,400

Info: leonardo.com, +39 06 324731

Leonardo is a multinational aerospace and defense organization. It is one of the world's largest defense contractors and manufactures a wide variety of rotorcraft and fixed-wing aircraft for civil and military applications.

Formerly Finmeccanica, Leonardo was founded in 1948. Agusta represented the rotorcraft branch of the business, which began developing and manufacturing helicopters in 1952 under license from Bell.

Agusta first flew the A109 in 1976. A lightweight, twin-engine utility helicopter, the A109 has proven to be the company's bestseller and is still manufactured today.

Leonardo's legacy companies underwent frequent reorganizations, mergers, and divestments from 1960 through the 1980s. The venture was originally a 50/50 merger, but Finmeccanica became the sole owner of the AgustaWestland brand in 2004.

Leonardo produces the AW109S, AW119Kx, AW139, AW169, AW189, and AW101 for civilian applications. It operates from more than 150 global locations and has a large helicopter assembly, support, engineering, and training facility in Philadelphia.



MD HELICOPTERS

Founded: 1955

HQ: Mesa, Arizona

Sole director: Alan Carr

Employees: 250

Info: mdhelicopters.com, (480) 346-6300

MD Helicopters traces its roots back to 1955 when the Hughes Tool Company's Aircraft Division began developing light helicopters. After more than six decades and a series of mergers and divestments, it was recapitalized as an independent company in 2005. Since then, it has grown its global fleet presence to more than 2,500 aircraft.

After successes with the civil and military rotorcraft, Hughes sold its helicopter division to McDonnell Douglas in 1984. In 1997, McDonnell Douglas and Boeing merged, becoming the Boeing Company.

In 1999, Boeing sold the commercial rotorcraft lines formerly produced by McDonnell Douglas to MD Helicopter Holdings. MD now owned production of the MD 500E, 530F, 520N, and 600N, as well as the MD Explorer series of twin-engine rotorcraft.

Lynn Tilton acquired MD in 2005, but in 2020 she relinquished control of the company following rulings by a bankruptcy court. MD filed for Chapter 11 bankruptcy in 2022.

Civilian rotorcraft currently in production include the single-engine MD 500E and 530F. The 500 series is sold to both military and civilian customers.



PIAGGIO AEROSPACE

Founded: 1884

HQ: Villanova d'Albenga (Savona), Italy

Extraordinary commissioner: Vincenzo

Nicastro

Employees: 950

Info: piaggioaerospace.it, (561) 253-0104

Piaggio began producing aircraft engines and airframes in 1915.

It entered into a partnership with Gates Learjet in 1983 to begin the development of the twin-engine pusher-propeller turboprop P.180 Avanti. Learjet withdrew from the project in 1986, and the aircraft received FAA certification in 1990. As of December 2020, Piaggio had built approximately 250 copies of the model. The aircraft is on its third iteration, which is called the EVO. It has a maximum speed of 402 knots at 41,000 feet. With a three-lifting surface design (canard, wing, and horizontal stabilizer) the Avanti sports a timeless modern appearance while providing superior performance compared with competing aircraft, including many types of light jets. The Avanti's spacious cabin is also a key selling point.

The company was declared insolvent in 2018 and currently operates under special administration while it attempts to find a buyer.



PILATUS AIRCRAFT

Founded: 1939

HQ: Stans, Switzerland

CEO: Markus Bucher

Employees: 2,000

Info: pilatus-aircraft.com,
(800) 745-2887 (U.S.), +41 41 619 65 80

Pilatus Aircraft began manufacturing military training airplanes in the 1940s and launched the legendary PC-6 Porter short-takeoff-and-landing aircraft in 1960. Today, the company is best known for its turboprop military trainers and its PC-12 single-engine business and utility turboprop, which entered service in 1994. Pilatus has since delivered 1,900 of the aircraft, whose newest iteration, the PC-12 NGX, features a more powerful Pratt & Whitney PT6E-67XP engine, single-lever power control, and larger cabin windows.

In 2018, the company began deliveries of its twin-engine PC-24 Super Versatile Jet, an aircraft capable of takeoff and landing on unimproved, rough airfields and hauling oversized cargo, thanks to an oversized rear cargo door and flexible cabin layout. The single-pilot PC-24 can fly 2,000 nautical miles and at cruise speeds up to 440 knots.

Pilatus expects to deliver its 200th PC-24 this year, a remarkable rate of production for a new clean-sheet business jet design.



PIPER AIRCRAFT

Founded: 1927

HQ: Vero Beach, Florida

President and CEO: John Calcagno

Employees: 562

Info: piper.com, (877) 879-0275

Piper is still perhaps best known for building more than 25,000 of its simple and inexpensive piston single-engine, two-seat Cubs between 1936 and 1947. The iconic yellow fabric, “tail-dragger” landing gear aircraft distills the essence of pure “stick and rudder” flying in its most basic form.

Today, the company builds a full line of piston single and twin-engine aircraft. Those models include piston singles Pilot 100i, Archer, and pressurized M350 and piston twins Seminole and Seneca. Piper also builds two models of turboprop singles based on the M350 fuselage, the M500 and M600/SLS. The six-seat M600/SLS cruises at 274 knots and is equipped with advanced avionics including the Garmin Autoland system, called HALO, which can automatically land the aircraft in the event of pilot incapacitation.

The company is currently owned by the Brunei Ministry of Finance. Hassanal Bolkhiah, the Sultan of Brunei, is an accomplished pilot who flies his own Boeing 747.



SIKORSKY

Founded: 1925

HQ: Stratford, Connecticut

President: Paul Lemmo

Employees: 15,000

Info: lockheedmartin.com/en-us/capabilities/sikorsky.html, (203) 386-4000

Lockheed Martin acquired Sikorsky for \$9 billion in 2015. Production of its civil models, the S-76D medium twin and the S-92A heavy twin, has languished due to a combination of corporate re-sourcing priorities, U.S. regulatory changes, and market forces.

Sikorsky made the strategic decision not to bring the S-76D into compliance with new FAA crashworthy fuel tank standards, essentially ending its ability to sell that aircraft in the U.S. market and effectively ending its production.

Meanwhile, long-promised upgrades for the S-92A have been slow in coming because of the recent weakness of the offshore energy market, which reduced customer demand. Sikorsky delivered just four new S-92As in 2021 and announced the closure of its Coatesville, Pennsylvania plant, which had been the hub of its civil helicopter production.



TEXTRON AVIATION

Founded: 2014

HQ: Wichita, Kansas

CEO: Ron Draper

Employees: 9,500

Info: txtav.com, (316) 517-6000

Textron Aviation was created in 2014 when parent company Textron, Cessna’s owner, acquired the Beechcraft and Hawker brands.

Cessna’s first business jet, the Citation I (Cessna 500), first flew in 1969. A decade later, Citations were the world’s bestselling business jets. In the 1980s, Cessna pioneered aircraft leasing and fleet sales.

Cessna sells seven models, ranging from the small-cabin Citation M2 to the super-midsize Citation Longitude. Since they entered service in 1973, more than 7,000 Citations have been produced. The Citation X/X+, which ended production in 2018, held the distinction of being the world’s fastest civilian production aircraft.

Beechcraft manufactures the G36 Bonanza single-engine piston aircraft, the piston twin-engine G58 Baron, and the twin-engine King Air model 260 and 360 turboprops. Certification of its Denali single-engine turboprop is expected in 2023.

In 2022, Textron bought European electric aircraft maker Pipistrel for a newly created business unit called Textron eAviation, which will focus on the development of electric and hybrid-powered aircraft.



GRAPHIC ILLUSTRATION: GRZEGORZ RZEKOS

Aircraft Directory

As soon as its first owner departs from the manufacturer’s delivery center, a new airplane technically becomes used (or pre-owned). 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 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 most of the 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

	\$ Price (\$ millions)	 Production		 Cabin					 Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
AIRBUS									
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 TwoTwenty	\$81.0	2021	In Production	18	5,210	6.9	10.9	77.9	5,650
BEECHCRAFT (TEXTRON AVIATION)									
Beechjet 400A	\$6.7	1990	2003	7	305	4.8	4.9	15.6	1,318
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 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
Hawker 4000	\$22.9	2008	2012	8	746	6.0	6.5	25.0	3,177
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
BOEING									
BBJ	\$71.4	1998	2021	19	5,396	7.0	11.5	79.2	6,230
BBJ 2	\$88.8	2001	2021	19	6,525	7.0	11.5	98.5	5,722
BBJ 3	\$96.5	2006	2021	19	7,290	7.0	11.5	107.3	5,722
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

Pilatus PC 24



	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
BOMBARDIER									
Challenger 300	\$21.0	2003	2014	8	930	6.1	7.2	23.7	3,220
Challenger 350	\$26.7	2014	2022	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
Challenger 3500	\$26.7	2022	In Production	8	N.A.	6.0	7.2	25.2	3,400
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)
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



\$
Price
(\$ millions)


Production


Cabin


Range
(nm)

Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)
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CESSNA (TEXTRON AVIATION)

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 2021	7	293	4.8	4.8	17.3	2,022
Citation CJ4 Gen 2	\$10.75	2021	In Production	10 (max)	293	4.8	4.8	17.3	2,165
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 Gen 2	\$15.5	2022	In Production	12 (max)	422	5.7	5.5	18.5	2,100
Citation XLS+	\$13.0	2008	2021	8	422	5.7	5.5	18.5	1,896

CIRRUS

SF50 Vision G2	\$2.75 (loaded)	2016	2021	4	170	4.1	5.1	11.5	1,200
SF50 Vision G2+	\$2.98 (loaded)	2021	In Production	4	170	4.1	5.1	11.5	1,200

DASSAULT

Falcon 6X	\$47.0	2023	In Production	16	1,845	8.5	6.5	40.0	5,500
Falcon 7X	\$53.8	2007	2022	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

ECLIPSE AEROSPACE

Eclipse 500	N.A.	2006	2008	3	109	4.2	4.7	7.6	574
Eclipse 550	\$2.9	2013	In Production	3	109	4.2	4.7	7.6	1,125



\$
Price
(\$ millions)


Production


Cabin


Range
(nm)

		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
EMBRAER									
Legacy 450	\$16.6	2015	2020	7	705	6.0	6.8	24.0	2,844
Legacy 500	\$20.0	2014	2020	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

		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
GULFSTREAM									
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	(now all G650ER)	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	2023	In Production	19	2,603	6.3	8.2	57.0	7,500

		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
HONDA AIRCRAFT									
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	2022	5	N.A.	4.8	5.0	17.8	422
HondaJet Elite II	\$7.0	2023	In Production	5	N.A.	4.8	5.0	17.8	1,547

		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
PILATUS									
PC-24	\$10.1	2017	In Production	8	501	5.1	5.6	23	2,000

		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
SYBERJET									
SJ30	\$7.3	2006	2010	5	210	4.3	4.7	12.5	1,876



TURBOPROPS

	\$ Price (\$ millions)	 Production		 Cabin			 Range (nm)		
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
BEECHCRAFT (TEXTRON AVIATION)									
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
CESSNA (TEXTRON AVIATION)									
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
DAHER									
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



\$
Price
(\$ millions)


Production


Cabin


Range
(nm)

DAHER (continued)									
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
TBM 930	\$3.9	2016	2019	5	143	4.1	4.0	10.0	1,730
TBM 940	\$4.1	2019	2022	5	143	4.1	4.0	10.0	1,730
TBM 960	\$4.5	2022	In Production	5	123	4.0	4.0	13.3	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
Kodiak 900	\$3.5	2022	In Production	8	309	4.8	4.5	18.9	1,129

EXTRA AIRCRAFT									
Extra 500	\$1.7	2002	2015	5		4.1	4.6	13.6	1,588

PIAGGIO									
Avanti Evo	\$7.4	2015	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

PILATUS									
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

PIPER									
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

VIKING AIR									
DHC-6-400 Twin Otter	\$5.9	2010	In Production	19	581	4.9	5.3	18.5	485

ROTORCRAFT



\$
Price
(\$ millions)


Production


Cabin


Range
(nm)

AIRBUS HELICOPTERS									
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
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



	Price (\$ millions)	 Production		 Cabin			 Range (nm)		
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
AIRBUS HELICOPTERS (continued)									
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
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
H160	\$13.5	2021	In Production	12 (max)	257.8	N.A.	N.A.	N.A.	475
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 AVIATION)									
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



	\$ Price (\$ millions)	 Production		 Cabin					 Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
BELL (TEXTRON AVIATION) (continued)									
407GXl	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

MD HELICOPTERS									
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	N.A.	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	N.A.	5	92	4.4	4.5	6.0	235
MD902 Explorer	\$7.2	1998	N.A.	4	113	4.1	4.8	6.3	205

ROBINSON									
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

SIKORSKY									
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	N.A.	6	205	4.5	6.3	8.8	329
S-92	\$27.0	2002	N.A.	10	685	6.0	6.4	19.2	439

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