Aviation International News

AIN PUBLICATIONS

Vol.50 | No.5

$9.00

MAY 2021 | ainonline.com

The 1,000th Cessna Citation 560XL will be managed and operated by Part 135 operator Custom Jet Charters.

Textron Aviation delivers 1,000th Citation 560XL

by Jerry Siebenmark

For a second time, Textron Aviation has accomplished what only two other airframers have: delivering more than 1,000 copies of a business jet model.

On March 31, the Wichita, Kansas airframer announced it had handed over the 1,000th Cessna Citation 560XL series business jet. The milestone Citation XLS+ was delivered to a customer in the northeastern U.S. and will be managed and operated by Custom Jet Charters, a Part 135 operator with locations at Palm Beach (Florida) International and Westchester County (New York) airports.

Comprising three variants—Excel, XLS, and XLS+—the 560XL has accumulated more than five million flight hours since receiving FAA type certification in April 1998. "Every two minutes, a 560XL jet takes off or lands somewhere in the world," said Textron Aviation senior v-p of global sales and flight operations Lannie O'Bannion. "This milestone delivery is a direct reflection of our customers' trust and the dedication of our employees who continue to build and support the Citation 560XL family of aircraft."

Additionally, the company's joint venture in China, Cessna-AVIC Aircraft (Zhuhai), is expected to deliver this year its 300th XLS+, which will go to the Civil Aviation Administration of China's flight inspection center. It will be the sixth of eight XLS+s acquired through a purchase agreement signed in December 2018, according to the company.

Only three other series of business jets have reached or surpassed the 1,000th delivery mark, according to JetNet: the Bombardier Challenger 600-650 family at 1,122 aircraft, the Citation 550 family (II, S/II, II/SP, and Bravo) at 1,185 aircraft, and the Hawker 750-900 family at 1,102 aircraft.

Rolland Vincent, JetNet iQ creator and director, told **AIN** the 560XL's combination of short-field capability, cabin, speed, and price point has made it a popular jet. "It was a very nice response to the Lear 45," Vincent said, referring to Citation's cross-field competitor, Bombardier Learjet. "Citation came in with a very nice response, taking this and that off the shelf and then making a very capable airplane."

The 560XL was developed under then-Cessna chairman and CEO Russ Meyer's watch. Meyer, now Cessna chairman emeritus, told **AIN** the company's long-range

› continues on page 44

Read Our **SPECIAL REPORT**

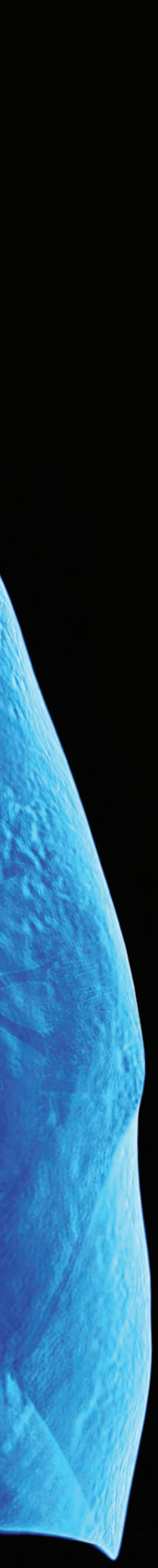
FBO Survey ROW

The results are in from the AIN FBO Survey 2021: Rest of the World. Readers rate FBOs outside of the Americas in five categories: line service, passenger amenities, pilot amenities, facilities, and customer service representatives.

› page 20

EMBRAER

PRAETOR 600
BY EMBRAER



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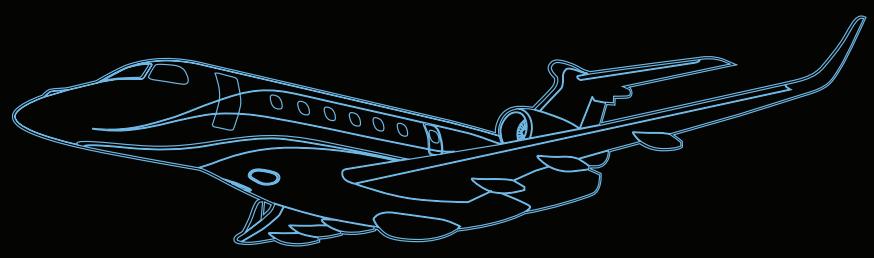

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INSIDE this issue

SPECIAL REPORT

FBO Survey 2021 Part 2: Rest of the World results

AIRPLANES and ENGINES

AIR TRANSPORT

AIRSHOWS and EVENTS

AVIONICS and TECHNOLOGY

CHARTER and FRACTIONAL

ENVIRONMENT

FBOS AND AIRPORTS

INDUSTRY and MANAGEMENT

MAINTENANCE, MODs, and COMPLETIONS

REGULATIONS and GOVERNMENT

ROTORCRAFT and UNMANNED SYSTEMS

PEOPLE

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Aviation International News (ISSN 0887-9877) is published thirteen times per year (monthly plus a special NBAA Convention News issue in November). Periodicals postage paid at Midland Park, N.J., and additional mailing offices. **Postmaster:** Send address changes to Aviation International News, P.O. Box 8059, Lowell, MA 01853 USA. Allow at least eight weeks for processing. Include old address as well as new, and an address label from a recent issue if possible. Subscription inquiries: +1 (201) 345-0085 or email: subscriptions@ainonline.com.

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BLADE TO ADD 20 BETA EVTOLS TO UAM FLEET

Blade Urban Air Mobility plans to add up to 20 of Beta Technologies' $4 million Alia 250 eVTOL aircraft to its passenger transportation network, with deliveries due to start in 2024, followed by operations from 2025. According to Blade, the aircraft will be acquired through its "third-party financing relationships" with its operating partners, and Jet Linx Aviation is set to be the first to start operating an initial batch of five aircraft. On a full charge, the Alia will be able to operate on routes of up to 250 nm, carrying five passengers or three standard cargo pallets at speeds of up to 170 mph.

WILLIAMS PROVES 100 PERCENT SAF ON FJ44

Turbine engine maker Williams International has successfully completed a 3.5-hour test flight of its FJ44-4 engine running on 100 percent sustainable aviation fuel (SAF) from its flight operations center in Pontiac, Michigan. This followed extensive material compatibility and endurance ground testing that validated engine performance and reliability using SAF. Chief test pilot Robert Lambert noted the flight over northern Michigan was "uneventful and the engine performed flawlessly." The aircraft reached a cruise altitude of 45,000 feet. This flight marked another step in the engine maker's Blue Planet initiative.

NBAA CAUTIONS FAA ON PART 135 SMS PROPOSAL

NBAA is appealing to the FAA to ensure that its upcoming rulemaking requiring safety management systems (SMS) for Part 135 operators does not disrupt safety measures already in place, is scalable, and does not impose additional mandates such as for flight data monitoring. The FAA is anticipating releasing a proposal next year to require SMS for Part 135 operators, repair stations, and manufacturers. In a recent letter to Rick Domingo, the executive director of the FAA's Flight Standards Service, NBAA said it supports the core existing regulatory framework of SMS for business aviation operators, but "we remain concerned with support for existing safety cultures, scalability, and oversight."

ALPHABET ORGANIZATIONS LAUNCH SAF OVERSIGHT BODY

With the availability and adoption of sustainable aviation fuel (SAF) slowly but steadily increasing, and more and more companies becoming involved in its sale, distribution, and ultimate use, several aviation organizations launched the Council on Sustainable Aviation Fuels Accountability (CoSAFA) on April 15. The group—which includes NATA, NBAA, EBAA, IBAC, GAMA, and Airlines for America as members—aims to provide clarity, transparency, and accuracy to the accounting practices documenting the use of SAF in multi-party transactions. They launched the council to ensure the scale-up of SAF production will be enabled by well-designed protocols for SAF chain of custody through the supply chain life cycle.

EBAA AMBASSADOR PROGRAM TO ELEVATE BIZAV

EBAA has launched a peer-networking program—dubbed EBAA Ambassadors—that brings industry leaders together in closed workshops and forums to address the biggest challenges and opportunities facing the business aviation industry. According to EBAA, these leaders will come together several times each year to reflect on the industry's most pressing issues. "Ambassadors will be briefed on political and public policy developments that impact the sector, and are committed to giving back in the areas of sustainability, diversity, innovation, and responsible business practices," the group said. EBAA has also created a virtual platform to share stories about EBAA Ambassadors, celebrate their achievements, and allow space for discourse on making a change for the better. So far, 15 business aviation companies have signed up to the program.

NETJETS UPDATES GLOBAL SUSTAINABILITY EFFORTS

NetJets' U.S. fleet flew 750,000 nm with sustainable aviation fuel (SAF) and offset 38,543 tonnes of CO_2 in the six months ending March 31, according to the fractional aircraft provider in its first biannual report on its global sustainability program launched in October. Also during the period, 7,650 carbon-neutral flight hours were purchased. NetJets Europe, which has been carbon neutral since 2012, also offset 4,724 tonnes of carbon in the same period. The report follows NetJets' February purchase of a 20 percent stake in WasteFuel, which aims to convert landfill waste into SAF by 2025. NetJets plans to purchase 100 million gallons of SAF in the next decade.

FLEXJET ADDS VNY TERMINAL

Flexjet expanded its private terminal network with a facility in the Clay Lacy executive complex at Van Nuys Airport in California. The facility is one of four private terminals that Flexjet now has for its customer base, also including at White Plains, New York; Naples, Florida; and West Palm Beach, Florida. In addition, Flexjet is planning to open two more this year—at Dallas Love Field around the third quarter and at Teterboro Airport in New Jersey later in the year.

CHAD TRAUTVETTER

Wheels Up and Bell are collaborating to bring urban air mobility (UAM) operations to fruition. Under the partnership, Wheels Up would likely use Bell 429 helicopters in the short term and the Nexus eVTOL (pictured) in the longer term to provide intra-city VTOL lift using existing helipads and airports. Service is expected to start in 2021.

Wheels Up, Bell collaborate on first step toward UAM

by Chad Trautvetter

Wheels Up is collaborating with Bell to usher in what the companies claim will be the first step toward urban air mobility (UAM) operations. "This is the next evolution of private aircraft expansion," said Wheels Up CEO Kenny Dichter. "We're in the first inning of vertical lift."

The partnership leverages the large customer base and Avianis flight scheduling software at Wheels Up and Bell's VTOL aircraft—likely Bell 429 helicopters in the near term and Nexus eVTOLs in the longer term—to provide intra-urban travel from/to city centers using existing airports and helipads. The initial list of high-demand markets is under review, but service launch is expected later this year. Wheels Up also plans to provide this last-mile connectivity option to customers of Delta Air Lines, an existing partner.

"Introduction of VTOL transportation in these select markets will add to the seamless travel experience along the entire travel journey for the Wheels Up members and customers," Wheels Up said. "This initiative will also enhance air travel flexibility and reduce vehicular congestion."

The collaboration between Wheels Up and Bell will build on the former's partnership with HeliFlite that was established in 2013. Under that deal, HeliFlite provides transfers for Wheels Up customers between Manhattan and local airports such as Teterboro, White Plains, and Farmingdale using Bell 430s and Sikorsky S-76s. ■

Avidyne to certify first AI avionics in 2022

Avidyne has partnered with Daedalean, a Zurich-based company focused on artificial intelligence (AI) applications for the aerospace industry, to develop AI-based avionics to assist pilots and eventually lead to autonomous operations. Dan Schwinn, Avidyne president and CEO, told **AIN** that the company's, and perhaps the industry's, first AI-based avionics product—a see-and-avoid system—will gain FAA certification next year.

Schwinn said Avidyne chose to develop a non-flight-critical avionics system to ease certification with the FAA, which will certainly have to draft numerous special conditions to allow for certifying AI-based systems. The see-and-avoid system will employ 360-degree cameras that the AI avionics system will use to detect other aircraft.

"Right now, our focus is on autonomy building blocks and developing systems that assist—not replace—pilots. We want to make flying safer and are interested in manned aircraft and making it simpler to fly," Schwinn said. "Over the next decade, we see AI as augmentation, not pilot replacement."

He said Avidyne's second AI avionics product could likely be a pilot landing assistance system, though Schwinn said the Melbourne, Florida-based company is exploring many AI applications for manned aircraft.

Meanwhile, Avidyne expects to increase its employment ranks by 20 percent this year as it ramps up R&D efforts. It also plans to launch more general aviation avionics products this year. **C.T.**

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1Q sees major decrease in bizjet accident fatalities

by Gordon Gilbert

Fatalities from business jet accidents worldwide decreased significantly in the first three months of 2021 versus the same period last year, in spite of increased flying hours in the first quarter of this year compared to the fewer hours logged in the pandemic-induced first quarter of 2020.

Non-fatal accidents involving U.S. business jets fell from six in the first three months to three in the corresponding months in 2020, according to statistics compiled by **AIN**. There was one fatal crash in each of the comparable first quarters (both occurring under Part 91 personal flights), but the number of fatalities decreased from four last year to one this year.

The single fatality involving a business jet accident in the first quarter occurred on January 9, 2021 and involved a Cessna Citation 560 on a Part 91 personal flight. The sole pilot aboard was killed after the twinjet spiraled down to the ground from FL310. Before the accident, the pilot had committed several errors, including initially failing to read back his taxi clearance, missing several critical calls from ATC, and drifting off his assigned course for an extended time.

Preliminary NTSB information reported that the pilot had a private pilot certificate, and although he held type ratings for the Grumman G-111 Albatross and Learjet, FAA records did not indicate that he held a type rating for the Citation 560. He had taken Citation 560 training toward the end of 2020, however the owner of the flight school stated that the pilot had not performed to a level sufficient to be issued a type rating or single pilot exemption. Also, this was likely the first time he had flown the airplane on his own.

N-numbered business turboprops were involved in four non-fatal accidents in the initial three months of 2021 versus five in 2020. There was one fatal turboprop accident in both first quarters (both while under Part 91), but the number of fatalities declined from three last year to two this year.

A Cessna Conquest 441 crashed while maneuvering for the approach to Winchester Municipal Airport, Tennessee, on Feb. 7, 2021. The airline transport pilot and a commercial pilot-rated passenger were killed. The twin turboprop was on a Part 91 IFR personal flight in day IMC at the time of the accident.

The NTSB reported that the flight was cleared for the RNAV Runway 36 approach and as the aircraft descended through 2,300 feet msl, radar contact disappeared, which was normal due to the radar coverage in the area. About three minutes later, ATC repeatedly attempted to contact the pilot with no response. The wreckage was found some six miles south of the airport.

Non-U.S. Jets: Only One Non-fatal Accident

In the first quarter of this year there were no fatal accidents to non-U.S. registered business jets and only one non-fatal accident. Last year, two mishaps claimed the lives of 11 people: eight on a charter flight and three on a navaid calibration mission.

The downward accident trend in the first quarter, however, was dramatically reversed by accidents of non-U.S. registered turboprops. This segment had just one non-fatal accident in the first quarter of 2020. In the first quarter of this year, 17 people were killed in three fatal accidents.

Not included in our statistics were three fatal crashes involving military versions of turbine business airplanes. The two accidents in this year's first quarter both occurred on February 21, 2021. Seven people were killed when a Nigerian Air Force King Air 350i crashed trying to return to the airport after reporting an engine failure. On the same day, six people aboard a Mexican Air Force Learjet 45XR crashed under unknown circumstances.

Meanwhile, the U.S. Air Force concluded that the January 27, 2020 crash in Afghanistan of a special missions version of the Bombardier Global Express was caused by the flight crew's error in determining which engine had failed and subsequently shutting down the working powerplant. The two pilots were killed. ■

AIN tables show "incidents" as well as "accidents" to distinguish mishaps based on their degree of severity. Investigators often draw fine distinctions between the two events, but, typically, incidents result in minor or no damage and their investigations are sometimes delegated to local officials.

Accidents are events that range from minor damage to destruction and/or injuries. Also, some incidents ultimately get upgraded to accident status during the investigative process.

Accidents/Incidents Worldwide

(first quarter 2021 vs. first quarter 2020)

U.S.-registered Business Jets and Turboprops

Business jets	Total		Part 91		Part 91K		Part 135		Public/Gov't		Mfr.	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Total accidents	**4**	**7**	**4**	**6**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
Nonfatal accidents	3	6	3	5	0	0	0	1	0	0	0	0
Fatal accidents	1	1	1	1	0	0	0	0	0	0	0	0
Fatalities	1	4	1	4	0	0	0	0	0	0	0	0
Incidents	14	23	6	13	0	0	7	10	0	0	1	0

Business turboprops	Total		Part 91		Part 91K		Part 135		Public/Gov't		Mfr.	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Total accidents	**5**	**6**	**4**	**3**	**0**	**0**	**1**	**3**	**0**	**0**	**0**	**0**
Nonfatal accidents	4	5	3	2	0	0	1	3	0	0	0	0
Fatal accidents	1	1	1	1	0	0	0	0	0	0	0	0
Fatalities	2	3	2	3	0	0	0	0	0	0	0	0
Incidents	19	11	11	6	0	0	7	5	1	0	0	0

All data preliminary. Sources: FAA, NTSB, Aviation Safety Network, AIN research

Non-U.S.-registered Business Jets and Turboprops

Business jets	Total		Private		Charter		Other*		Unknown	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Total accidents	**1**	**5**	**0**	**1**	**1**	**2**	**0**	**1**	**0**	**1**
Nonfatal accidents	1	3	0	1	1	1	0	0	0	1
Fatal accidents	0	2	0	0	0	1	0	1	0	0
Fatalities	0	11	0	0	0	8	0	3	0	0
Incidents	9	2	0	1	5	0	1	0	3	0

Business turboprops	Total		Private		Charter		Other*		Unknown	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Total accidents	**5**	**1**	**1**	**0**	**1**	**0**	**3**	**1**	**0**	**0**
Nonfatal accidents	2	1	1	0	0	0	1	1	0	0
Fatal accidents	3	0	0	0	1	0	2	0	0	0
Fatalities	17	0	0	0	10	0	7	0	0	0
Incidents	4	4	1	0	1	4	2	0	0	0

**For example: ambulance, survey, ferry, training, testing, manufacturer, government (non-military), and head of state.*

News Briefs

Aerion Targets Mach 4 and 7,000-nm for 50-pax AS3

Aerion revealed the initial details for its second supersonic aircraft—the 50-passenger, Mach 4-plus AS3. The company sketched out a goal of near-hypersonic speeds and a 7,000-nm range for the AS3 and said it expects to provide further details later this year about this airliner companion to its AS2 Mach 1.4 business jet. Aerion anticipates that the AS3 will fly before the end of the decade and said that it will build on the AS2, which it anticipates will be in service by then.

Gulfstream Enhances Capabilities at F'boro Center

Gulfstream Aerospace has made further improvements—aimed at reducing downtime of customer aircraft—to its Farnborough service center. Among the enhancements is a paint facility that allows the company to perform touchups and rework on relatively small areas of an aircraft up to the size of a G650 flap. It also has added fuel storage capability for defueling and refueling of customers' aircraft, which eliminates the possibility of wasting excess fuel while also providing safe storage during maintenance. Additional work areas and back shops will offer wheel, brake, and battery service, and an avionics room will facilitate faster testing and fault diagnosis.

JSfirm Survey Sees Optimism for Growth, Hiring Plans

JSfirm's Aviation Hiring Trends Survey for 2021 found that half of the respondents are projecting growth this year and two-thirds did not cut jobs despite the impact of the Covid-19 pandemic. Of those responding, 50.84 percent said they anticipated moderate growth in 2021 and 32.93 percent said they expect to hire in the second quarter. Demand was greatest for pilots and maintenance, and avionics technicians, JSfirm said. Looking at 2020, 34.95 percent of the respondents said they hired between one and five individuals, while another 17.74 percent hired between six and 10 people.

Embraer Offers Tips on Covid Vaccine Transport

Embraer has released technical information to help operators of its Phenom, Legacy, Praetor, and Lineage business jets safely transport Covid-19 vaccines. In developing this technical guidance, Embraer conducted tests to define characteristics and payload requirements in relation to the technical specifications of vaccine transportation, considering the differences among each aircraft. The transport of many of these vaccines also requires low temperatures, which are achieved using dry ice. More recently, Embraer released guidance to apply UV-C lights for cockpit sanitization, as well as disinfectants and coatings—including MicroShield360 and Bacoban—for aircraft interiors.

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VistaJet expects most of its Bombardier Challenger 350s to be delivered in 2022.

VistaJet revealed as buyer for 10 Challenger 350s

by Jerry Siebenmark

VistaJet has identified itself as the unnamed customer behind a firm order for 10 super-midsize Challenger 350s, one of Bombardier's biggest fleet orders in 2020. Additionally, VistaJet announced it has taken delivery of two Global 7500s from the Canadian airframer, part of an order for up to 12 of Bombardier's flagship business jet over the next two years.

Most of the Challenger 350s are expected to be delivered in 2022, VistaJet said, at a time when the charter provider has noted a 50 percent increase in interest in the aircraft by corporations globally. Super-midsize business jets are driving higher demand among new and existing customers, VistaJet added.

"It is an incredibly exciting time as VistaJet transforms the architecture of how companies and individuals fly," said VistaJet founder and chairman Thomas Flohr. "We continue to see rapid acceleration in new members, which is driven by corporate and executive demand for our business mobility offerings."

In the first quarter, VistaJet saw 23 percent year-over-year growth in hours sold and a 90 percent increase in program members. "We remain committed to providing critical support to businesses in this new world—we kept our business steady during 2020 and we are seeing much-increased demand for VistaJet's asset-free solutions in 2021 and beyond," Flohr added.

The two Global 7500s delivered in April will be for use by all VistaJet members, a spokeswoman told **AIN**. She explained that all of the hours of a Global 7500 delivered to VistaJet in 2019 were purchased by one member, and thus that aircraft was not available for use by others.

This year, VistaJet said it will complete the upgrade of its entire Challenger 850 fleet, including the installation of Ku-band airborne connectivity and enhancing the type's cabin.

Also getting Ku-band connectivity and a cabin refresh by the end of this year will be all of its Challenger 605s, as well as 95 percent of its Global 6000s. VistaJet's current Challenger 350 fleet will receive the same updates by the end of 2022.

The additional Global 7500s and Challenger 350s will push VistaJet's fleet to more than 90 aircraft operating in 187 countries. ■

Bombardier delivers 50th Global 7500

Bombardier has handed over the 50th Global 7500, marking a maturation in the production of the ultra-long-range jet that is a cornerstone for the company's future. The milestone delivery comes a little more than two years after the aircraft entered service in late 2018 and follows a year in which Bombardier had delivered 35 of the model, including 16 in the fourth quarter alone.

Bombardier president and CEO Éric Martel called the Global 7500 an "industry flagship and a key driver of our growth strategy." He added, "The caliber of workmanship and technology found in each aircraft continues to drive strong market demand and industry-wide recognition."

Bombardier said worldwide interest and market activity have remained strong for the 7,700-nm aircraft. The in-service fleet has achieved a dispatch reliability rate of 99.7 percent and has marked various speed and distance records, including the longest city-pair flown by a purpose-built business aircraft, linking Sydney, Australia, and Detroit.

DAVID McINTOSH

Importantly for Bombardier, Global 7500 deliveries are reaching a steady run-rate, the company said, adding it is progressing swiftly through the program's learning curve. The aircraft is integral to the company's plan to improve profitability long-term. As the Global 7500 reached its 50th delivery, it was turning "from negatively impacting earnings to being the biggest EBITDA contributor over the next five years," Bombardier executives told analysts during a recent investors day.

The executives expect that costs of production will drop by 20 percent over the next 50 aircraft. "We've already achieved a 40 percent reduction" in the first 50 aircraft, the bulk derived from labor costs involved with the learning curve of the build, Martel said. "The program continues to mature as planned. Many of the typical early growing pains and ramp-up risks are now in the rearview mirror." **K.L.**

News Briefs

Cessna SkyCourier Begins Final Phase of Flight Testing

The certification flight test phase of the Cessna SkyCourier development program has begun after the twin-turboprop checked off a number of milestones and continues its march toward FAA type approval and first deliveries later this year. As of early February, Textron Aviation's fleet of three SkyCourier flight test vehicles (FTV) had accumulated more than 700 hours since the first flight of the high-wing airplane in May 2020. Other milestones completed since the third SkyCourier FTV entered testing late last year are extreme hot and cold weather testing; bird-strike testing; Transport Canada certification of the Pratt & Whitney PT6A-65SC engine, with FAA approval pending; and natural icing certification. Poduction final assembly of the SkyCourier has also started at the airframer's east Wichita campus.

Daher Unveils More Upgrades for Kodiak 100

Daher announced the Series III version of the Kodiak 100 that adds more enhancements and standard features. It also delivered the first copy. Flight deck upgrades on the Series III include the Garmin GWX 75 color weather radar, G1000 NXi, GFC 700 autopilot, SurfaceWatch runway monitoring, ChartView, and synthetic vision. Also new is an eight-seat executive edition cabin layout, zone-adjustable air conditioning, and increased oxygen capacity. Other improvements include 29-inch tires as standard, a higher landing weight (7,255 pounds), and a lower zero-fuel weight that allows more payload.

Luxaviation Expanding to U.S.

Luxaviation Group is "doubling down" on the U.S. market with the establishment of an office in Miami. This new office allows the Luxembourg-based aircraft management and charter provider to offer charter services to high-net-worth clients for domestic U.S. charters as well as international flights to and from locations in the U.S. The company also plans to open a new office in New York City and determine plans for a larger base of operations that would include flight crews and aircraft. As part of its entry into the U.S. charter market, Luxaviation plans to operate all U.S. flights using sustainable aviation fuel.

NBAA Supports GAO SAF Study

NBAA applauded a bipartisan congressional request for the Government Accountability Office (GAO) to launch a study on policy measures required to foster the awareness, production, and demand for sustainable aviation fuel (SAF). Reps. Peter DeFazio (D-Oregon), Sam Graves (R-Missouri), Rick Larsen (D-Washington), and Garret Graves (R-Louisiana) urged the GAO to examine government policies that could help or hinder "the development, certification, production, deployment, and use of SAF."

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NBAA: full steam ahead on live BACE in Vegas

by Kerry Lynch

NBAA will be moving into the Las Vegas Convention Center's new West Hall expansion for the 2021 BACE that will be held in person on October 12-14.

NBAA is ramping up on preparations for its first live in-person convention to be held since the pandemic took hold last year, the 2021 NBAA-BACE. The exhibitor application priority deadline was on April 16 and 60 percent of space was already booked about a week before that deadline, association executives said during a show preparation webinar held in early April.

Chris Strong, senior vice president of conventions and membership for NBAA, said the feedback NBAA is getting for the October 12 to 14 event in Las Vegas is "the timing is right" and that "we are optimistic we will be in a position to have a very safe show."

While Las Vegas has become a biennial location for the association's hallmark event, it will have a new look this year because the convention will be housed in the $980 million West Hall expansion that added 1.4 million sq ft of convention space, including 600,000 sq ft of exhibit floor space that will enable the entire show to be housed in a single hall.

Previously, NBAA exhibitors had been split between the North and Central Halls in Las Vegas. This year, that space concurrently will be occupied by a different convention staged by the National Association of Broadcasters.

Strong was encouraged by the early responses to this year's convention following the toll that the pandemic has taken on in-person events. All the major exhibitors are returning, he said, adding that a handful of OEMs are preparing to "make a big splash," including with mockups that will be brought to the convention center displays.

As in past years, the static display is planned for Henderson Executive Airport about 13 miles south of Las Vegas.

Meanwhile, some 87 percent of those responding to an earlier attendees survey said they would return to live events when the pandemic eases, 75 percent said they do not anticipate travel restrictions at that time, and 90 percent said the rollout of vaccinations was giving them confidence. NBAA plans to follow up with a subsequent survey in upcoming weeks.

Also new this year is a sustainability pledge that is in the works. Strong noted that trade shows are "notoriously not sustainable" but that NBAA was hoping to take a leadership role by creating a pledge for participants to meet certain sustainable goals. Certain initiatives surrounding that are still being ironed out but could include reduction in the use of paper, use of recycling, or managing food to eliminate waste. Strong said such a program would not be mandatory and he expected that exhibitors might meet some of the goals initially but build on that in future years.

NBAA is planning the event in accordance with prevailing health and safety guidelines and expects more details on those as the event nears. Given that "It's a bit of a moving target at this point," Strong expects that some of those guidelines will be posted about 100 days out. The biggest challenge, he said, is on the international side and working through issues to help enable attendees from outside the U.S.

Dr. Matt Friedman, the medical director for CrowdRx, which is helping NBAA manage the health and safety protocols, said no decision has been made at this point about related guidelines for show attendees. Strong indicated that health and safety guidelines are likely to be released in the July timeframe. ■

Gulfstream's G500/G600 family achieves 100-aircraft delivery milestone

Gulfstream Aerospace marked the delivery of the 100th customer aircraft in the G500/G600 program. The delivery of the milestone business jet, a G500, was announced March 25 by the Savannah, Georgia-based aircraft manufacturer. This news comes 2.5 years after the first of the family, the 5,300-nm G500, entered service in September 2018. Service entry of Gulfstream's 6,600-nm G600 followed in August 2019.

Collectively, the fleet has flown more than 25,000 hours, made 13,600 landings, and achieved more than 60 speed records. Leading up to service entry, the G500 completed a world tour that spanned 130,000 nm and amassed 22 city-pair records.

"Gulfstream saw great demand for the all-new G500 and G600 right out of the gate," said Gulfstream president Mark Burns. "Reaching 100 deliveries at this stage in the program is remarkable and a clear reflection of the advantages the G500 and G600 give our customers."

The ultra-long-range, fly-by-wire business jet family, which features the Symmetry Flight Deck, has brought to market technologies such as active-control sidesticks, extensive use of touchscreen technology, and a data concentration network. **K.L.**

News Briefs

Study Predicts Pilot Shortage Will Return by 2022

While the pandemic alleviated the pilot shortage almost overnight last March, the shortage could soon reemerge and grow worse over the decade, according to a study by global management consulting firm Oliver Wyman. In fact, the study estimates that the global demand for pilots on Jan. 1, 2022, will be 326,594 versus a supply of 316,435. By 2029, those numbers could be 416,709 and 357,214, respectively—a nearly 60,000-pilot shortfall. "The most important question is not whether a pilot shortage will reemerge, but when it will occur and how large the gap will be between supply and demand," the study concluded.

Bell To Fly on SAF

Bell will begin incorporating sustainable aviation fuel (SAF) in all operations at its helicopter training academy and for use by its customer demonstration fleet. The renewable drop-in blended fuel has previously not received much attention from the rotorcraft industry, and the OEM is the first helicopter operator to receive SAF shipments from global fuel distributor Avfuel. The company's 20-strong demonstration and training fleet will run the fuel—a blend of 70 percent conventional jet-A and 30 percent SAF.

FlightSafety Adds First Falcon 8X Sim for N. America

FlightSafety International has received FAA certification for its second level-D simulator for the Dassault Falcon 8X, which has been installed at the company's Teterboro, New Jersey learning center. Pilot training in FlightSafety's first 8X simulator in North America began in late March. Its only other sim for the large-cabin trijet is at Paris Le Bourget, where it offers Falcon 8X EASy III EASA- and FAA-approved pilot courses, as well as 8X LiveLearning EASA recurrent pilot training. Other 8X pilot courses provided at Le Bourget include FalconEye HUD and Falcon 8X EFVS initial.

ICAO Campaign Aims To Improve Notam Quality

ICAO launched a global campaign to improve Notams on April 8, citing the crushing amount of Notams pilots can receive during flight planning. In fact, ICAO said more than 1.7 million Notams are filed annually, with an average of 35,000 active Notams daily—about 7,000 of which violate international standards because they are more than three months old. Thus, Phase 1 of ICAO's new Notam 2021 campaign seeks to improve Notam quality by pushing nations to purge older ones. To keep track of the campaign's progress, ICAO's web-based NotaMeter will provide an estimate of the absolute and relative numbers of current, old, and very old Notams. ICAO will also hold progress webinars on June 16, August 31, October 28, and December 15.

NTSB: close pax revenue loopholes in Part 91 | by Mark Huber

At a hearing on March 23, the National Transportation Safety Board (NTSB) proposed recommendations to address loopholes and shortcomings in Part 91 passenger-carrying revenue operations. "The FAA must do everything in its power to ensure the safety of every revenue passenger in every revenue passenger-carrying operation, regardless of the operating rules. Acting upon these recommendations will be a giant step forward to that goal," said NTSB Chairman Robert Sumwalt. "This is an opportunity to increase safety for paying passengers on Part 91 commercial operations."

The Board's action follows aanalysis of eight fatal crashes of sightseeing/air tour, heritage, parachute jump, and aerobatic flights conducted under Part 91 in gliders, warbirds, aerobatic airplanes, helicopters, and hot-air balloons that killed 45 and injured 12. Accidents examined by the NTSB in this context included a March 2018 FlyNYON "doors off" helitour crash in New York, a June 2019 King Air jump plane crash in Hawaii, and an October 2019 Boeing B-17 World War II bomber accident in Windsor Locks, Connecticut.

Eliott Simpson, NTSB senior accident investigator, said Board staff identified common safety shortcomings in the Part 91 passenger operations it studied, including "lack of FAA oversight, lack of structured pilot training, deficiencies in pilot skills and decision-making, and inadequate aircraft maintenance."

Draft recommendations proposed by the NTSB include developing national safety standards, or equivalent regulations, for revenue passenger-carrying operations that are currently conducted under Part 91 including, but not limited to, sightseeing flights in a hot-air balloon, intentional parachute jump flights, living history flight experiences, and other vintage aircraft flights. The Board also said these standards or equivalent regulations should include at a minimum for each operation type requirements for initial and recurrent training and maintenance and management policies and procedures. Additionally, it said, they should cover identifying shortcomings in FAR 119.1(e) covering revenue passengers operations that include, but are not limited to, extreme aerobatic experience flights and tour flights operating as student instruction, tour flights operating as photography flights, and glider sightseeing flights.

After the shortcomings are identified, the Board recommended that information should be used to add other types of flight operations to the national safety standard or equivalent regulations requested in recommendation #1; to revise the flight standards information management system to include guidance for FAA inspectors who oversee operations conducted under living history flight experience exemptions to identify potential hazards and ensure that operators are appropriately managing the associated risks; to develop and continuously update a database that includes all revenue passenger-carrying operators addressed in safety recommendations #1 and #2; and to require safety management systems (SMS) for the revenue passenger-carrying operations addressed in recommendation #1 and #2 and requiring ongoing oversight of operator SMS once established. ■

Signature Flight Support pumps 1M gal of SAF at SFO

by Chad Trautvetter

Signature Flight Support has pumped more than one million gallons of sustainable aviation fuel (SAF) through its Signature Renew program at San Francisco International Airport (SFO), resulting in a more than 10,000-tonne reduction in aircraft CO_2 emissions. "This marks the first time a single FBO location globally has delivered such a substantial and consistent supply of SAF to business aircraft operators," said Signature Flight Support COO Tony Lefebvre.

"The one million gallon milestone is a significant achievement that, together with our ongoing expansion of SAF, continues to propel the business aviation industry towards adopting sustainable fuels on a consistent basis," he added. "Last September, we promised a permanent supply of sustainable jet fuel at SFO, and we delivered on that promise in December. Now in April, we've demonstrated that critical mass with SAF is possible."

Signature has also expanded availability of Signature Renew SAF at the nearby Oakland International Airport (OAK), as well as at Seattle Boeing Field/King County International Airport (BFI). With these additions, Signature is now providing a consistent source of SAF at six locations globally—more than any other FBO operator.

Signature Renew SAF uses a 30/70 blend of renewable feedstock and conventional jet-A that yields a 25 percent reduction in direct carbon output from aircraft versus traditional jet fuel. Last year, Signature facilitated the uplift of 90 percent of publicly announced SAF gallons and continues to leverage its worldwide network of FBO locations to introduce more SAF supplies. ■

An Embraer Phenom 300 uplifts sustainable aviation fuel at the Signature Flight Support FBO in San Francisco. The Signature Renew fuel is a 30/70 blend of renewable feedstock and conventional jet-A that yields a 25 percent reduction in direct carbon output from aircraft versus traditional jet fuel.

Bombardier completes 100th Global 7500 wing shipset at Red Oak

Bombardier is continuing the ramp-up of its Global 7500 flagship with the completion of the 100th wing shipset for the model. The milestone follows the recent delivery of the 50th of the ultra-long-range model.

"This is an important milestone for our Global 7500 program," said Paul Sislian, executive v-p of operations and operational excellence for Bombardier. He added that the wing is what helps make the Global 7500 a flagship model, delivering the "smooth ride" and performance of the 7,700-nm aircraft that can fly up to Mach 0.925.

The wing is produced in Bombardier's Red Oak, Texas facility, which the company acquired from Triumph in early 2019. Bombardier has since built up a talent base at the location, which now employs more than 600. In 2019, the Montreal-headquartered company established a Bombardier Aviation Apprenticeship Program (BAAP) in association with Texas State Technical College to provide a source for future growth and support of the wing. "The BAAP program is critical in keeping up with increased customer demand," Bombardier said.

As it works through the Global 7500 backlog that extends to 2023, Bombardier executives say the program is continuing to attract steady market interest. **K.L.**

Employees at Bombardier's Red Oak, Texas facility celebrate the 100th wing produced for the Global 7500.

News Briefs

SAF from Food Waste Promises Net-zero Emissions

A team of researchers at the U.S. National Renewable Energy Laboratory have developed a type of sustainable aviation fuel (SAF) derived from food waste that promises to result in net-zero or even negative net emissions from aircraft. The process avoids the organic waste fermenting into methane, which is harmful to the environment. Life cycle analysis shows that by diverting methane-producing waste from landfills, VFA-SAF could cut greenhouse emissions by 165 percent and soot by 34 percent compared with fossil fuel, according to a paper published in the Proceedings of the National Academy of Sciences.

New Hotel at Biggin Hill Airport

London's Biggin Hill Airport has broken ground on The Landing, an on-site luxury boutique hotel. Much like the Aviator Hotel at nearby Farnborough Airport, it is expected to primarily serve crews that frequently fly in and out of the airport, as well as customers and employees of the numerous resident aerospace businesses based at Biggin Hill. With completion slated for next year, it will offer 56 rooms with a bar, restaurant, lounge area, and gym. Meanwhile, on-the-field construction work is continuing to build Bombardier's new 250,000-sq-ft service center, which is slated to open in first-quarter 2022.

Garmin Adds FANS to G5000 Excel/XLS Upgrade

Garmin's G5000 flight deck upgrade for the Citation Excel and XLS has newly certified capabilities, including support for FANS 1/A+ and ACARS. These features meet requirements for flying in NATS airspace and also participation in the FAA's Data Comm program. The upgrade uses Garmin's GSR 56 Iridium satcom for over-ocean communications and the GDR 66 radio for VHF datalink communications. The Data Comm service in the U.S. gives pilots access to CPDLC departure clearances (DCL) at more than 60 airports. With DCL, clearances are sent directly to the aircraft and then automatically loaded into the G5000. With ACARS capability, pilots can send and receive datalink messages via an ACARS host and access weather information and digital ATIS.

ATR Deliveries Drop in 2020

ATR executives are upbeat on the company's long-term future and the resilience of the market segment it serves despite delivering just 10 aircraft in 2020 and ending the year with net orders for three airplanes after one customer canceled a three-unit deal. In 2019, the company reported 68 deliveries and net orders for 48 airplanes. "It has been a very difficult year," chief executive Stefano Bortoli conceded. "[But] I believe ATR has reached its bottom. For 2021 we are looking at doubling our deliveries to 20 and improving our financial performance."

Data breach affects Solarius Aviation, Jet Aviation client information | by Jerry Siebenmark

Charter provider and aircraft management firm Solairus Aviation in late March disclosed that some employee and client information had been accessed in a security breach of the Microsoft Azure cloud hosting platform of flight management systems provider Avianis, certain assets of which were acquired in 2019 by Wheels Up.

Solarius is the second business aviation company to report a breach of its data through Avianis, with Jet Aviation experiencing a similar compromise of employee and customer information during the same period as Solairus.

Both companies reported they were notified by Avianis of the breach in December. Avianis hosted Solairus's flight scheduling and tracking system.

"This incident impacted a subset of customers that use this storage system connected with the Avianis platform, but all other Wheels Up and Avianis systems and databases were not affected," Wheels Up said in a statement provided to **AIN**.

Information potentially accessed in the Solairus Aviation breach included employee and client names, Social Security numbers (SSN), passport numbers, driver's license numbers, dates of birth, and/or financial account numbers.

Ben Rothke, a private pilot and information security and cloud security expert, told **AIN** that the breach appears to be a targeted attack and that charter companies are likely more susceptible to these events because of the high-net-worth clientele they serve. "There is a lot of juicy data there," he said, "a lot of crown jewel information."

As a general rule, it's incumbent for charter providers to do their due diligence to make sure an applications vendor is using a well-qualified third-party provider of cloud-based services and not just go with the least expensive option. "You can always find someone cheaper but there's a risk in doing that," Rothke said.

The due-diligence assessment should include determining what kind of security architecture a cloud provider has put in place, what certifications does it hold, where is its principal place of business because information security regulations can vary between states and countries. "It's very easy to create a very flashy-looking web page," he explained. "You really have to sort of kick the tires."

Solairus said it is offering a complimentary membership to Equifax ID Patrol credit monitoring for individuals whose SSN and driver's license numbers were involved in the breach. However, the company said it doesn't have current addresses for all of those individuals and is encouraging them to call (855) 515-1652.

Based in Petaluma, California, Solairus Aviation employs 1,500 flight crew and support staff operating from more than 65 bases. Aircraft under management totals 220, including light, midsize, and large-cabin jets, and turboprops. ■

NBAA promotes Damato and Carr, brings Broom on board

by Kerry Lynch

NBAA has reinforced its leadership team with the addition of industry veteran Andrew Broom as senior v-p of strategy, marketing, and innovation and the promotions of long-time employees Jo Damato and Doug Carr to senior v-p roles. The appointment of Broom follows the announced planned departure of Mike Nichols, who is senior v-p of strategy and innovation but is retiring from the association at the end of April following a nearly 20-year career there.

Jo Damato, NBAA v-p of education, training, and workforce development

Broom brings a background of business aviation association experience including with the General Aviation Manufacturers Association and the Aircraft Owners and Pilots Association, and, most recently, as CEO of the Citation Jet Pilots Association (CJP). During his tenure with CJP, the association's membership doubled and industry partnership, member benefits, and advocacy initiatives were expanded. Also under Broom's leadership, CJP formed a safety committee and launched the CJP Safety and Education Foundation. Along with his association experience, Broom has held roles with business jet makers Hawker Beechcraft, Eclipse Aviation, and Honda Aircraft.

"We are excited to have the benefit of his experience, relationship-building skills, marketing savvy, and passion for aviation," NBAA president and CEO Ed Bolen said of the addition of Broom. "His role at NBAA will be important as we continue to expand the business aviation industry, unlock opportunities, and move forward."

Meanwhile, Damato was promoted to senior v-p of education, training, and workforce development. Damato, who joined NBAA in 2001 to manage the association's Air Traffic Services desk at the FAA Air Traffic Control System Command Center, most recently was v-p of educational strategy and workforce development. Appointed last year to the Department of Transportation's Youth Access to American Jobs in Aviation Task Force, she has remained involved in Women in Aviation International and Women in Corporate Aviation.

Doug Carr, NBAA v-p of safety, security, sustainability, and international affairs

, "Jo is extraordinary in attracting a diversity of individuals into our industry, creating the kinds of tools and training they need to succeed, and generating a sense of community that is meaningful at a personal and professional level," said Bolen. "I'm excited that Jo and her team will build on the progress being made in online learning, certification, and community building."

Carr, who joined NBAA in 1998 as manager of domestic operations and most recently was vice president of regulatory and international affairs, takes on the expanded role of senior v-p of safety, security, sustainability, and international affairs.

A U.S. Navy veteran who also has served with the National Air Transportation Association, Carr has represented business aviation interests before the International Civil Aviation Organization and the European Union Aviation Safety Agency and serves as the corporate secretary for the International Business Aviation Council. He also remains active with the U.S.-China Asian Cooperation Program.

"Doug is well-known in the U.S. and around the world for his expertise in business aviation safety, security, and international operations," Bolen said, citing his his industry advocacy before the FAA, Transportation Security Administration, and Customs and Border Protection. ■

Bell opens Manufacturing Technology Center in Texas

by Mark Huber

Bell is not just developing new aircraft, it is changing how they are made.

The company cut the ribbon on its Manufacturing Technology Center (MTC) in Fort Worth, Texas, in March, ahead of a formal grand opening later this year. The MTC is located in a 140,000-sq-ft building 15 minutes away from Bell's main campus and was established to lower lead time, cost, and variability from components for Bell's future vertical lift (FVL) aircraft, including the V-280 Valor and 360 Invictus.

The MTC "is the way we are reinventing our manufacturing process at Bell for all of our next-generation products," said Glenn Isbell, Bell v-p of rapid prototyping and manufacturing innovation. It offers a digitally connected space for collaboration between Bell teams in an environment that promotes smart risk-taking, he said. New systems will be tested and vetted for production suitability before being introduced to Bell's future factories.

Bell will use the MTC to "showcase how we will deliver the most affordable, capable, and reliable aircraft for the warfighter," said Bell CEO and president Mitch Snyder.

Since starting operations, the facility already has born fruit toward significantly cutting lead times and costs of critical V-280 components, said Isbell, noting that the lead time for the aircraft's rotor masts was shrunk from 18 months to 90 days and costs were reduced by 40 percent. "In the vertical lift space, the manufacturing process hasn't changed that much in the last 30 years," he said. "We developed a significant amount of manufacturing technology when we developed the V-22 [tiltrotor] 30 to 40 years ago but the industry hasn't had a different shift in how aircraft are made."

Bell's new Manufacturing Technology Center near its Fort Worth, Texas headquarters, is designed to lower lead times for new designs and showcase new manufacturing techniques.

Besides cutting lead times and costs, digital controls eliminate variability and the possibility of an entire bad batch of parts being manufactured, he added. "Variation has caused struggles for low-volume aircraft production for a long time. This is a dedicated space to do step-function advances in manufacturing. We will be able to build things in such a different way."

Isbell said the MTC will develop manufacturing processes for both Bell factories and those of its suppliers, but added that Bell plans to keep the manufacture of critical components in-house to assure quality control.

The MTC will be home to design and manufacturing engineers, programmers, materials specialists, and others, recruited from both inside and outside of Bell. Equipment will include digitally connected heat treating, additive-manufactured tooling, advanced composites manufacturing, bonding, high-speed machining, and robotics with an emphasis on critical vehicle components such as gears, gearboxes, main rotor blades, yokes, wings, and assembly-intensive components.

Besides serving as a manufacturing laboratory, the MTC is also a demonstration center aimed at dissuading uninformed skeptics wary of industry claims of better, faster, cheaper. "Disbelief is sort of the natural tendency when we say we can cut lead times by 80 percent or cost by 40 percent," said Isbell. "Part of the reason we developed this center is that we can show it and prove it." ■

NEWS note

Long-time CFO John Calcagno has stepped in as acting president and CEO of Vero Beach, Florida-based Piper Aircraft. Simon Caldecott retired on April 2 after leading Piper for more than 10 years.

Calcagno brings a background in finance, operations, distribution, and sales to his new role. He served with Piper for 11 years, steering all financial reporting, treasury, and company cash management functions, as well as IT and enterprise resource planning.

"I know that I speak for everyone at Piper Aircraft in thanking Simon for his leadership and tireless dedication to the company," said Calcagno, adding he was "incredibly excited" about the future of the company.

"We have an exceptionally talented team at Piper Aircraft that is focused on taking decisive actions to transform the business, continuing to innovate our products in new and diverse ways, and unlocking future growth opportunities," he said. ■

Gulfstream's G280 is undergoing a number of enhancements, ranging from new external LED lighting to advanced technologies designed to improve landing and airport operations.

Gulfstream reveals G280 safety and tech upgrades

by Kerry Lynch

Reiterating its commitment to the 3,600-nm G280, Gulfstream Aerospace outlined a number of enhancements in the works for the super-midsize twinjet, ranging from reducing the cabin altitude to new flight deck capabilities and quieting technologies.

Speaking to reporters during an online presentation in April, Gulfstream president Mark Burns, however, sought to dispel any discussion that Gulfstream is moving on beyond the G280. "There is certainly investment going forward in all our product lines but our commitment to the G280 remains strong," he said.

He noted a report in 2018 of investment in a new product that followed a board meeting of its partner in the G280 program, Israel Aircraft Industries. The Israel business news organization *Globes* had reported that the IAI board had signed off on a project called P32, believed to be an upgraded G280, and committed $80 million to that effort, matching a Gulfstream investment.

Speaking to that report, Burns did not outright deny such a possibility, but he said, "Our commitment is not to be episodic in our investment. It is to make sure that we continuously invest to bring the right product to market at the right time. It's why we're still committed to the 280 because we believe it is the right product at this point."

As for upgrades in the works, they run the gamut from safety and operational improvements to passenger experience upgrades. In the shorter-term, Gulfstream is looking at a surface management system designed to reduce the risk of runway incursion by providing aural and visual cues to alert pilots of unsafe ground and arrival operations, the company said. In addition, the company is working on adding access to vertical weather and predictive wind shear information, incorporating external LED lighting, using a de-ionization fresh air system, increasing RVSM validation intervals to 96 months, and providing for a 360-degree HD camera.

> **"Our commitment is not to be episodic in our investment. It is to make sure that we continuously invest to bring the right product to market at the right time. It's why we're still committed to the 280 because we believe it is the right product at this point."**
>
> – Gulfstream president Mark Burns

Gulfstream is looking at technologies to make the aircraft CPDLC FANS-E compliant (FANS En Route), a capability that will enable priority treatment by air traffic control and improve communications, the company said. Not yet fully implemented in business aviation, the G280, has actively participated in the testing of these capabilities. Gulfstream also is adding a predictive landing performance system that already is on its new G700 flagship and can warn pilots of possible runway overrun, reducing cabin altitude beyond the current 7,000 feet at 45,000

› continues on page 19

Stuart "Kipp" Lau, pilot, safety expert and consultant

Runway excursions and crosswind takeoffs

The rate and number of runway excursions around the world have been holding steady for the last decade. To curb these accidents, industry groups such as the Flight Safety Foundation (FSF) are renewing efforts to tackle this threat to flight safety. Runway excursions account for nearly a quarter of all accidents for both large and small aircraft.

Earlier this month, FSF and its international partners published the "Global Action Plan for the Prevention of Runway Excursions" (GAPPRE). This document is the foundation's latest effort to reduce the number of accidents during takeoff and landing.

Based on years of research, GAPPRE offers recommendations to individual segments of the industry such as air navigation service providers, aircraft operators, manufacturers, and regulators. Understanding the complexities, interrelationships, and cumulative nature of the problem, GAPPRE is a coordinated effort to improve runway excursion risk and resilience management.

According to FSF president and CEO Dr. Hassan Shahidi, "Reducing runway excursions and continuing to improve the overall safety of the approach and landing phases of flight continue to be a primary area of focus for the foundation. We are gratified by the efforts of the many safety professionals who gave of their time and expertise to make the GAPPRE a reality."

While GAPPRE is all-encompassing, I will focus on areas related to aircraft handling; specifically, runway excursions during takeoff with strong or gusty crosswinds. Next month's blog will explore circumstances that affect runway excursions during landing with crosswinds. Breaking down runway excursions by phase of flight, roughly 20 percent occur during takeoff, while the remainder are in the landing phase.

There have been some significant events involving runway excursions during takeoff. On Dec. 20, 2008, a Boeing 737-500 crashed during an attempted takeoff in Denver during a period of mountain wave conditions that produced extraordinarily strong surface winds. ATC cleared the 737 for takeoff from Runway 34R and advised the crew of reported winds of 270 degrees at 27 knots. Based on the reported winds, the crosswind component was calculated to be 27 knots—the AFM limit is 33 knots.

The accident report noted that during the takeoff roll, unexpected strong gusts up to 45 knots made maintaining directional control difficult. The aircraft departed the left side of the runway at 110 knots and traveled an additional 2,400 feet across moderately rough terrain—crossing a taxiway and service road—before coming to a stop with the fuselage broken in two pieces. Six of the 115 passengers were seriously injured, with another 41 sustaining minor injuries.

Performance calculations made during the investigation indicated that the aircraft rudder could produce enough aerodynamic force to offset the weathervaning tendencies created by the strongest winds encountered during the takeoff.

The investigation concluded that the strong winds encountered as the aircraft accelerated were more difficult than what the captain had experienced in prior line flights or simulator training. Moments before the excursion, the captain—because of stress—eased right rudder inputs, applied full right control wheel input, and used the steering tiller to regain control.

Those actions were ineffective and delayed the initiation of the rejected takeoff by three to four seconds. Furthermore, the investigation revealed that had the captain reapplied "significant right rudder," the aircraft would not have departed the runway.

Another runway excursion event occurred on Jan. 2, 2015, in Stornoway, UK. This crash involved a Saab 340B attempting to take off from Runway 18. ATC provided a spot wind check of 270 degrees at 28 knots when the aircraft was cleared for takeoff. Recorded winds at the time of the accident varied from 261 to 291 degrees, with speeds ranging from 14 to 27 knots.

The Saab 340 does not have a takeoff crosswind limitation listed in the AFM, but the max demonstrated crosswind for landing is listed at 35 knots. Most operators use this as the limit for takeoff based on a return to the departure airport.

Investigators determined that during the initial part of the takeoff roll, the captain (the pilot flying) held the ailerons into the wind, maintained directional control with the nose wheel steering (NWS) tiller, and kept the rudders in the neutral position. At approximately 60 to 80 knots, directional control was lost when the captain removed his left hand from the NWS tiller. Flight data indicated the rudder remained in the neutral position and the right aileron remained into the wind.

The aircraft departed the runway surface at roughly 80 knots—the power levers were never reduced, nor was there a call to reject the takeoff—and traveled another 800 feet before coming to a stop. Once the aircraft departed the runway, it entered soft grass and crossed over a closed runway; there was substantial damage to the nose gear, both engines and propellers, and the underside of the aircraft. One passenger was seriously injured.

According to the accident report, "had the rudder been applied as directed in the operations manual, there would have been a reduced NWS requirement at any given speed and therefore there would have been a reduced likelihood of a changed directional effect when the NWS control (tiller) was released."

The report also suggested that the rudder would have become aerodynamically effective at around 40 knots. It was also noted that the rudder never moved from the neutral position.

Inappropriate flight crew aircraft handling was a factor in each of the accidents described above. This factor has been identified in several other runway excursions during takeoff rolls in windy conditions. Much of this can be attributed directly to poor skills related to training in simulators that cannot realistically replicate low-level wind velocity. Likewise, there may also be an insufficient understanding of the basic theory of directional control or poor techniques (unapproved) used for control during acceleration to takeoff speed.

A crosswind takeoff is a difficult maneuver. This maneuver requires a lot of "rudder and stick" skills (note: more rudder than stick). Directional control during the takeoff roll is maintained by the aerodynamic forces generated by the primary flight controls.

Regardless of aircraft size, configuration, or number of engines, the rudder, ailerons, and elevator are used to maintain control once there is a minimum amount of airflow to make each control surface effective. On most large aircraft, the elevator is used to maintain a downward force on the nosewheel to maximize its effectiveness up to around 80 knots.

Many of the skills learned during primary training are applicable here. Keep in mind, during the initial part of the takeoff roll (below 80 knots) directional control inputs are dependent on the aircraft systems. Options include NWS through tiller only, such as on the Saab 340, Hawker 700/800, and C-130 Hercules; NWS through tiller and rudder pedals, which includes most jet transports; or a non-steerable nosewheel such as those on Cirrus SR-series and older aircraft.

Regardless of the type, once the rudder becomes effective, the maneuver is the same. As the speed of the aircraft increases, each control surface becomes more effective, thus less input is required.

On aircraft equipped with roll spoilers, it is important to understand how much control wheel deflection can be applied without the spoilers extending. In most aircraft, it is around 10-degrees of aileron deflection. Too much spoiler deployment can exacerbate the tendency for the aircraft to turn into the wind.

Likewise, excessive roll control—causing roll spoiler extension—will compromise takeoff performance. As an example, V1 may be compromised by the reduced lift and increased drag potentially invalidating accelerate/stop distances and second-segment climb performance.

The FSF and its partners identified 35 recommendations for flight ops organizations in the GAPPRE publication; aircraft handling—improved training and higher fidelity simulators, among others—is just one of those recommendations.

From a global view, runway excursions continue to be a serious threat, GAPPRE charts a course for every organization involved in the safe movement of aircraft to mitigate the risk of a runway excursion. For pilots—as operators—the best way to mitigate the runway incursion risk is improved aircraft handling through training, great and timely briefings, and attention to detail when calculating takeoff performance data ■

The opinions expressed in this column are those of the author and not necessarily endorsed by ***AIN****.*

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NEWS note

New FAA Advisory Circular AC 91-92 offers detailed guidance intended for establishing highly effective preflight briefings. The guidance in this 20-page circular goes far beyond the minimum preflight requirements outlined in FAR 91.103. The FAA said information in the circular serves as an "educational roadmap for the development and implementation of preflight self-briefings, including flight planning, weather interpretation, and risk identification/mitigation skills."

The FAA believes that following these guidelines will better prepare pilots to properly "interpret and utilize real-time weather information before departure and en route, in the cockpit, via technology like ADS-B, and via third-party non-government providers, as well as Flight Service Stations. Despite their consolidation over the last few years, the FAA maintains FSSs "remain an important source of comprehensive weather and aeronautical information."

Two appendices that follow the 15-page main section of the circular might be the most valuable takeaways. The first appendix contains a thorough list of preflight briefing elements, their specific value to the pilot, and the website links to the government resources for each of the elements. The second is a sample preflight checklist presented in a single-page format similar to that for other standard checklists familiar to pilots. ■

› continued from page 17

G280 upgrades

feet, employing thrust reverser and inlet modifications to reduce noise, and adding new airspeed data probes to help in icing condition operations.

As far as when these capabilities will come online, Gulfstream is planning to have the ionization and RVSM validation increase available in the first half of this year, with the 360-degree HD camera later in 2021. Meanwhile, other targeted timelines specified by the manufacturer included cabin altitude improvements and external LED lights next year.

Some of these efforts, such as predictive landing, come from lessons that Gulfstream has gained from its newer ultra-long-range products, and Burns expressed the belief that technology transfer would continue over time and could see exploration in areas such as fly-by-wire.

This effort comes after recent investments that have included an international supplemental flight package designed to add redundancy for international trips and include items such as an inertial reference system —"making sure we've got all of the back-up systems [for] operating in an international environment," Burns said. Gulfstream further has developed options for SiriusXM high-resolution graphical weather and dual electronic charts and recently secured recognition that the G280 is Stage 5 noise compliant.

This comes as the fleet of G280s has continued to grow with 212 now in service—surpassing the 200-aircraft milestone in June. The fleet has amassed 250,000 hours and accrued more than 160,000 landings, Gulfstream said, while achieving a 99.78 percent dispatch reliability. The fleet leaders have put 4,400 hours on the aircraft and 3,620 landings.

Entering service in 2012, the G280 also has racked up some 80 city-pair records, including involving operations using sustainable alternative fuel, an area of emphasis for Gulfstream.

At the same time, Derek Zimmerman, president of product support for Gulfstream, noted the substantial investment the company has made throughout its support network as the G280 fleet has been certified in 19 countries and based on five continents. This includes more than 20 Gulfstream centers on four continents that can service those and other Gulfstream models and $1.6 billion in spares inventory, including for the G280, that Zimmerman said has ensured 100 percent availability of mission-critical parts.

As for the market, Burns said the company is seeing "good customer interest." While conceding that "obviously the pandemic changed a lot of things" and noting that the first three or four months raised concerns, he added that, "I think the market is pretty strong right now."

As markets have started to open and optimism grows with the vaccine, "I see a changing dynamic among customers," Burns said. "I actually see a broader customer base right now for all our product lines, including the G280, as more people see the value of business aviation." He reiterated that Gulfstream sales were stronger in the fourth quarter and that has carried over into the first quarter. ■

Gulfstream's G280 remains an important part of the company's product line.

PART 2

FBO Survey 2021: Rest of the World

Report by Curt Epstein, charts and data by Dave Leach

While business aviation levels in the U.S. have rebounded to near-normal levels in the wake of the Covid pandemic, that traffic still isn't going very far afield, amid continued international restrictions aimed at curbing the spread of the virus, even as vaccination programs slowly ramp up around the world. As evidence, according to JetNet, large-cabin jet activity was down 36 percent between 2020 and 2019, while in the second quarter of 2020 those levels plunged by 65 percent.

"It is disappointing to see the Covid relapse in Europe as 2021 has progressed, which has dampened the positive expectations that we had about the recovery," explained John-Angus Smith, Signature Flight Support's managing director for EMEA (Europe, Middle East, Africa). "We continue to see little traffic from outside of EMEA which is reflected in more resilience from the light and mid-size charter aircraft traffic, with our expectation that heavy jet traffic will return when trans-Atlantic travel opens up."

That decline in international traffic has affected FBOs from Amsterdam to Australia, which have had to adapt to the situation. "We carried out a review of the staffing levels and operational hours worked," noted Carly Swetman, general manager of the London Jet Centre at London Stansted Airport. "We decided to decrease the fixed operational hours for the FBO, but increased [our] short-notice flexibility to accommodate the ever-changing demands of our aircraft clients and operators," a move she added, that has been appreciated during these unprecedented times.

Jaiyavat Navaraj, chairman of Thailand-based MJets FBO was faced with an 80 percent drop in traffic year over year at Bangkok's Don Mueang International Airport. "We managed to cut off all frills and become leaner to sustain the drastic drop of revenue," he told **AIN**. One of the first facilities last year to institute temperature screenings of everyone entering the facility, it has, like most, focused on hygene and disinfection, with Navaraj noting he believes the wearing of surgical masks will be a part of the operation for years to come.

As borders began to reopen after the initial phase of the pandemic, some areas that were relatively sheltered from it began to notice trends. "Due to the fact that Sardinia was by far better off in terms of Covid-19 cases versus any other location in Italy, many owners of prestigious properties in Sardinia preferred to stay longer than ever before," said Francesco Cossu, general manager of Eccelsa Aviation at Olbia Costa Smeralda Airport. Likewise the loosening of regulations "attracted a lot of European passengers willing to spend some safe holidays in Portugal, one of the most spared countries during the pandemic," explained Omni Handling CEO Ricardo Periera.

"One trend we noticed was a definite pickup of both charter and FBO business every time a border was opened" said ExecuJet Asia-Pacific v-p Darren McGoldrick. "It was interesting to see clients who had never regularly traveled to remote destinations jump at the chance to get out and fly, seemingly just because they were now allowed to." ■

MOST IMPROVED FBOS OVER THE PAST 12 MONTHS

FBO	AIRPORT CODE	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
JET AVIATION	OMDB	DUBAI INTERNATIONAL	4.18	0.11
EXECUJET AUSTRALIA	YSSY	SYDNEY KINGSFORD SMITH	4.50	0.10
HARRODS AVIATION	EGSS	LONDON STANSTED	4.40	0.09
ECCELSA AVIATION	LIEO	OLBIA COSTA SMERALDA	4.41	0.08
HONG KONG BUSINESS AVIATION CENTER	VHHH	HONG KONG INTERNATIONAL	4.24	0.06
VIENNA AIRCRAFT HANDLING	LOWW	VIENNA INTERNATIONAL	3.92	0.06
UNIVERSAL AVIATION	LFPB	PARIS LE BOURGET	4.23	0.05
JET AVIATION	LSGG	GENEVA INTERNATIONAL	4.38	0.05

**FBOs with same change are listed in alphabetical order*

FBO SURVEY RULES AND METHODOLOGY

This report on **AIN**'s FBO survey covers fixed-base operations in the Rest of the World.

History

AIN has been conducting surveys since 1981, asking about the service that FBOs provide their customers and reporting the results from these annual surveys. Initially, we sent out a paper survey questionnaire by mail to qualified subscribers in the U.S.–pilots, flight attendants, and dispatchers–the people who use or make arrangements with FBOs. In later years, qualified subscribers in the remainder of North America and the rest of the world were added to the survey.

In 2006 we moved the FBO survey online. We have continued to add FBOs each year and now offer respondents a comprehensive list of 4,500 FBOs worldwide.

The Survey

The FBO Survey site allows subscribers to keep a list of personalized FBOs and from this list they can easily change or affirm a prior rating and leave an updated comment.

The scores in this report and on our website reflect the cumulative average of scores from 2014 through today. Only the most recent rating of an FBO is counted on a per-user basis and only FBOs that have received 20 or more ratings are eligible for their scores to be published. We did see slightly reduced feedback this year due to the COVID-19 pandemic as many readers informed us they had not flown nearly as much as they had during the prior survey period. Partly because of this we moved the rating threshold from 30 to 20 after confirming that the results are still statistically significant.

From April 1, 2020, until Feb. 10, 2021, we asked subscribers to update and give new ratings for FBOs they had visited in the preceding 12 months. We contacted readers via email and announcements in our e-newsletters. The bulk of this promotion took place from Dec. 1, 2020 through Feb. 10, 2021.

The FBO survey site asks readers to evaluate FBOs they visited the previous year in five categories: line service; passenger amenities; pilot amenities; facilities; and customer service representatives (CSRs). For each of these categories, the participant is asked to assign a number from 1 to 5, 1 being the lowest and 5 being the highest.

Observations

Each year we review ratings to ensure their accuracy. On our new site we have a system to flag, review, and, if necessary, remove ratings identified as dubious by factors such as email address, IP address, and concentration of scores.

Score Calculations

An FBO's overall average is calculated by adding all the individual category ratings received by that FBO and dividing the resulting sum by the total number of all category ratings received by the FBO. In other words, if a particular FBO was evaluated by 50 people (and assuming that all 50 evaluators gave that FBO a rating in each of the five categories), then the FBO would receive a total of 250 category ratings. These 250 category ratings are added together and then the sum is divided by 250 to arrive at the overall average for this particular FBO.

Overall averages are calculated using the cumulative average of all ratings given from 2014 through the present. This year's results will show an FBO's increase or decrease versus that FBO's cumulative rating from one year ago.

REMINDER

DON'T WAIT—AIN's FBO survey is now open for year-round feedback. It takes only a minute, and you can do it while waiting for passengers, on the shuttle bus to/from the hotel, or any other time that is convenient for you. Log on to www.ainonline.com/fbosurvey to rate your experiences at the FBOs you visit.

4.66 Farnborough Airport (EGLF)

UK

Of course, the 60 percent dip in 2020 aircraft movements compared with the 32,000 recorded in 2019 was a shock to the system, but overall the UK's Farnborough Airport has shown resilience throughout the ongoing Covid crisis and continued its more than decade-long reign as the most highly ranked FBO outside of the Americas in the **AIN** survey.

While FBOs outside North America tend to lag in terms of scores, Farnborough's overall rating is high enough that the FBO, which was ranked second-highest in the world by our readers this year in the facilities category (4.85), would place among the top 10 percent of North American service providers.

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

CEO Simon Geere, who succeeded Brandon O'Reilly in July 2020 following the September 2019 purchase of the property by Macquarie Infrastructure and Real Assets, now feels able to anticipate a resurgence in activity as travel restrictions start to lift.

Geere told **AIN** that he anticipates a "sharp recovery" with business aircraft operators better placed to respond to demand for flights than airlines that face ongoing struggles to manage yield and profitability from their less-flexible scheduled services. While acknowledging that business aviation has suffered with "expensive assets parked on the ground," he said that it has been encouraging to see new customers gravitating to private charter services in the months between the UK's three national lockdowns when travel was permitted.

Evidence of this glass-half-full perspective can be seen in plans to add a third hangar to the pair of three-bay units already onsite that offer 240,000 sq ft of climate-controlled shelter. The company will seek approval for this construction later this year, as part of a process in which it works closely with local authorities to manage growth within the currently agreed confines of 50,000 annual movements.

Farnborough is also proud of its standing as the first purpose-built business aviation airport to be certified as carbon-neutral.

"Our main focus now is on further improving the customer experience and we have an incredible canvas to build on," he commented. In addition to initiatives such as new electric ground power units, Farnborough aims to make sustainable aviation fuel available to operators within 12 to 18 months.

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

FBO	AIRPORT CODE	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR	
FARNBOROUGH AIRPORT	EGLF	FARNBOROUGH	4.66	-0.01	Top 20%
UNIVERSAL AVIATION	EGSS	LONDON STANSTED	4.61	0.04	Top 20%
EXECUJET AUSTRALIA	YSSY	SYDNEY KINGSFORD SMITH	4.50	0.10	Top 20%
JET AVIATION	EHAM	AMSTERDAM SCHIPHOL	4.48	0.02	Top 20%
SIGNATURE FLIGHT SUPPORT	EDDM	MUNICH	4.48	N/A	Top 20%
MJETS	VTBD	DON MUEANG INTERNATIONAL	4.46	0.04	Top 20%
LONDON JET CENTRE	EGSS	LONDON STANSTED	4.42	-0.04	Top 20%
ECCELSA AVIATON	LIEO	OLBIA COSTA SMERALDA	4.41	0.08	Top 20%
OMNI HANDLING	LPPT	LISBON INTERNATIONAL PORTELA	4.41	N/A	Top 20%
SIGNATURE FLIGHT SUPPORT (Formerly TAG Aviation)	LSGG	GENEVA INTERNATIONAL	4.41	-0.02	Top 20%
HARRODS AVIATION	EGSS	LONDON STANSTED	4.40	0.09	
GRAFAIR JET CENTER	ESSB	STOCKHOLM CITY/BROMMA	4.38	-0.08	
JET AVIATION	LSGG	GENEVA INTERNATIONAL	4.38	0.05	
JET AVIATION	EDDL	DUSSELDORF	4.38	N/A	
EXECUJET EUROPE	LSZH	ZURICH	4.33	-0.03	
MALLORCAIR	LEPA	PALMA DE MALLORCA	4.32	N/A	
HARRODS AVIATION	EGGW	LONDON LUTON	4.31	0.01	
JET AVIATION	YSSY	SYDNEY KINGSFORD SMITH	4.27	-0.02	
EXECUJET MIDDLE EAST	OMDB	DUBAI INTERNATIONAL	4.25	0.03	
HONG KONG BUSINESS AVIATION CENTER	VHHH	HONG KONG INTERNATIONAL	4.24	0.06	
UNIVERSAL AVIATION	WSSL	SINGAPORE/SELETAR	4.24	N/A	
UNIVERSAL AVIATION	LFPB	PARIS LE BOURGET	4.23	0.05	
SIGNATURE FLIGHT SUPPORT - TERMINAL 3	LFPB	PARIS LE BOURGET	4.22	-0.02	
ADVANCED AIR SUPPORT	LFPB	PARIS LE BOURGET	4.21	0.01	
JET AVIATION	OMDB	DUBAI INTERNATIONAL	4.18	0.11	
SIGNATURE FLIGHT SUPPORT	LFMN	NICE COTE D'AZUR INTERNATIONAL	4.18	-0.06	
BIGGIN HILL EXECUTIVE HANDLING	EGKB	BIGGIN HILL	4.14	-0.12	
EXECUJET BRUSSELS	EBBR	BRUSSELS NATIONAL	4.11	-0.02	
DASSAULT FALCON SERVICE	LFPB	PARIS LE BOURGET	4.07	-0.11	
SIGNATURE FLIGHT SUPPORT - TERMINAL 1	LFPB	PARIS LE BOURGET	4.07	-0.06	
SKY VALET CANNES	LFMD	CANNES-MANDELIEU	4.05	-0.02	
SWISSPORT EXEC	LFMN	NICE COTE D'AZUR INTERNATIONAL	4.01	-0.02	
SIGNATURE FLIGHT SUPPORT - TERMINAL 1	EGGW	LONDON LUTON	4.00	0.00	
BUSINESS FLIGHT CENTER	EFHK	HELSINKI-VANTAA	3.99	N/A	
AVIAPARTNER EXECUTIVE	LFMN	NICE COTE D'AZUR INTERNATIONAL	3.97	-0.04	
JET AVIATION	LSZH	ZURICH	3.95	0.01	
JETEX PARIS FBO	LFPB	PARIS LE BOURGET	3.94	0.01	
VIENNA AIRCRAFT HANDLING	LOWW	VIENNA INTERNATIONAL	3.92	0.06	
JET AVIATION	WSSL	SINGAPORE/SELETAR	3.89	-0.04	
SKY VALET	LEMD	MADRID BARAJAS	3.89	N/A	
VIPPORT VNUKOVO-3	UUWW	MOSCOW/VNUKOVO	3.31	0.03	
UNIVERSAL AVIATION / CJET	ZBAA	BEIJING/CAPITAL	3.30	0.01	

FBOs with same overall average are listed in alphabetical order

4.61 Universal Aviation

London Stansted Airport (EGSS), UK

Universal Aviation, the ground handling arm of Texas-based Universal Weather and Aviation, operates FBOs and general aviation terminals around the world, from Beijing to Barcelona and from Singapore to Toluca, but its facility at London Stansted Airport continually earns its highest accolades according to **AIN**'s readers. Home

to the company's European operations center, and its flight planning and trip support services, the two-story 11,000-sq-ft facility offers a wide variety of amenities and services, including VIP arrival and departure lounges, conference rooms, crew lounge and crew business center, shower facilities, dedicated in-house security screening, customs and immigration areas, and catering preparation kitchens. "Our facility is often likened to a boutique hotel," said Sean Raftery, Universal's senior director of international business for Northern Europe and Africa. "That is probably as much about the team and the attention given to our customers as it is about the fixtures and fittings." Indeed, the location, which has a staff of 60 and is normally open from 7 a.m. until 10 p.m., received its highest score (4.79) this year in the CSR category.

The facility, which has obtained Stage 2 registration in the International Business Aviation Council's IS-BAH program, has been in operation since 1984. "Our in-depth local knowledge and our long-established relationships with the regulatory and government authorities help take the pressure off the customer," Raftery told **AIN**. "Passengers arriving at London-Stansted can be on the road within minutes of landing and are able to concentrate on their purpose for coming to the UK and not be distracted by complications."

With 40,000 sq ft of private ramp, the facility has the ground equipment to handle the largest passenger aircraft. While the UK has been severely impacted by the Covid pandemic, Raftery noted the demand to fly remains. "Customers need borders to be open, but also hotels and restaurants, and while lockdown is necessary, it has of course made travel difficult." He added that the company has worked ceaselessly with its clients to help them navigate the ever-changing regulations and requirements.

4.50 ExecuJet Australia

Sydney Kingsford Smith Airport (YSSY), Sydney, Australia

Earning its spot among the top-rated international service providers in **AIN**'s FBO Survey for the second straight year is ExecuJet's location at Australia's Sydney Kingsford Smith Airport. Over the past year the facility, which serves the country's largest city, underwent a refreshment, including a complete interior repaint of its 3,230 sq ft of passenger and crew lounges as well as its trio of A/V-equipped conference rooms and catering preparation kitchen. The FBO also includes onsite customs, immigration and quarantine services, valet parking, and crew concierge. Other improvements were made to the ramp, with new lines drawn to extend the parking area and the maximum span of the apron increased to cater to the wingspan of the latest ultra-long-range business jets such as the Bombardier Global 7500 and the Gulfstream G700. "This is an important step in future-proofing our service offering, as new aircraft types are added to the industry, and means that the ExecuJet ramp is now the only private, direct-access bay on the airfield that can cater for aircraft this size," said Darren McGoldrick, the company's v-p for Asia-Pacific. The FBO has access to two hangars, one occupied by its collocated MRO facility, as well the largest hangar on the field, which it manages. The latter can accommodate four large-cabin business jets, with room to spare for a midsize.

In operation for 35 years and part of the global ExecuJet chain since 2017, the IS-BAH stage 2-registered location received its highest scores this year in the customer-facing Line Service (4.72) and CSR (4.69) categories. "The relaxed and comfortable nature of traditional Australian customer service seeps into every conversation with the ramp and customer service agents, where clients are welcomed and the team's combined 170 years of experience bolsters confidence in decisions and planning," McGoldrick, told **AIN**.

The Sydney location—like all of the company's FBOs—participates in the FlySkills Hygiene Certification Program, with Socotec-approved Covid control processes.

4.48 Jet Aviation

Schiphol Airport (EHAM), Amsterdam, Netherlands

In operation for more than three decades as the KLM Jet Center and from 2018 when it was acquired by Jet Aviation along with its sister location in Rotterdam, the FBO at Amsterdam's Schiphol Airport has long been an outstanding performer among our readers.

Located just off the airport's Runway 22-04, which is primarily used for general and business aviation, Jet Aviation's nearly 5,000-sq-ft facility occupies approximately 60 percent of the airport's general aviation terminal and includes two passenger lounges, two crew lounges with a pool table, beverage bar featuring everything from soft drinks to wine and beer, computer workstations, international television channels, and onsite immigration and customs clearance.

Open daily from 6 a.m. until 11 p.m., with a staff of 22, it offers dedicated refueling and deicing services on the ramp. "This setup allows us to perform quick turnarounds and fuel stops for all types of customers," explained Edwin Niemöller, the company's senior director of FBO operations for the Netherlands. As a result, the facility tallied its highest category total this year in Line Service (4.62). While the location does not possess hangar space of its own, it can, depending on availability, accommodate aircraft all the way up to ACJ/BBJ size.

Over the past year, like other FBOs in the world, the location worked to establish protections and social distancing during the pandemic. "We had to rapidly adjust to the challenges of Covid and do everything in our power to ensure the health and safety of everybody visiting our facilities and using our services," Niemöller, told **AIN**. "Despite the uncertainties and ongoing challenges posed by Covid, I'm very proud of how our teams are supporting customers and flight operations in this environment."

The FBO earned its IS-BAH Stage 1 registration in 2020 and, according to Niemöller, it is currently preparing for its Stage 2 certification audit, which will take place in October.

Top-rated FBOs by Region

EUROPE

FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
AMSTERDAM			
JET AVIATION	LSGG	4.48	0.02
DÜSSELDORF			
JET AVIATION	EDDL	4.38	N/A
GENEVA			
SIGNATURE FLIGHT SUPPORT (Formerly TAG Aviation)	LSGG	4.41	-0.02
JET AVIATION	LSGG	4.38	0.05
LISBON			
OMNI HANDLING	LPPT	4.41	N/A
LONDON			
FARNBOROUGH AIRPORT	EGLF	4.66	-0.01
UNIVERSAL AVIATION	EGSS	4.61	0.04
LONDON JET CENTRE	EGSS	4.42	-0.04
HARRODS AVIATION	EGSS	4.40	0.09
HARRODS AVIATION	EGGW	4.31	0.01
MUNICH			
SIGNATURE FLIGHT SUPPORT	EDDM	4.48	N/A
PARIS			
UNIVERSAL AVIATION	LFPB	4.23	0.05
SIGNATURE FLIGHT SUPPORT - TERMINAL 3	LFPB	4.22	-0.02
ADVANCED AIR SUPPORT	LFPB	4.21	0.01
DASSAULT FALCON SERVICES	LFPB	4.07	-0.11
SIGNATURE FLIGHT SUPPORT - TERMINAL 1	LFPB	4.07	-0.06
JETEX	LFPB	3.94	0.01
SARDINIA			
ECCELSA AVIATON	LIEO	4.41	0.08
SOUTHERN FRANCE			
SIGNATURE FLIGHT SUPPORT	LFMN	4.18	-0.06
SKY VALET CANNES	LFMD	4.05	-0.02
SWISSPORT EXECUTIVE	LFMN	4.01	-0.02
AVIAPARTNER EXECUTIVE	LFMN	3.97	-0.04
STOCKHOLM			
GRAFAIR JET CENTER	ESSB	4.38	-0.08
ZURICH			
EXECUJET EUROPE	LSZH	4.33	-0.03
JET AVIATION	LSZH	3.95	0.01

Top Rated FBOs by Region

ASIA PACIFIC

FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
BANGKOK			
MJETS	VTBD	4.46	0.04
SYDNEY			
EXECUJET AUSTRALIA	YSSY	4.50	0.1
JET AVIATION	YSSY	4.27	-0.02
BEIJING			
UNIVERSAL AVIATION / CJET	ZBAA	3.30	0.01
HONG KONG			
HONG KONG BUSINESS AVIATION CENTER	VHHH	4.24	0.06
SINGAPORE			
UNIVERSAL AVIATION	WSSL	4.24	N/A
JET AVIATION	WSSL	3.89	-0.04

4.48 Signature Flight Support

Munich International Airport (EDDM), Munich, Germany

As the world's largest FBO operator with more than 200 locations worldwide, Signature Flight Support is likely the most-recognized name in the business aviation service industry. Its location at Munich International Airport, a part of the Signature brand since 2008, this year earned the highest score for any of its facilities outside of the Americas.

Located in the airport's GA terminal, the 5,400-sq-ft facility provides a refreshment bar, offering Germany's renowned local beer (but for those not operating aircraft, noted general manager Oliver Trono), soft drinks, hot beverages and local snacks; crew lounge with shower facilities and snooze room; onsite customs and immigration clearance; two conference rooms; business center; and for recreation, a foosball table and a pool table. Trono told **AIN** pool cues and billiard balls are among the items added to the enhanced cleaning checklist in the Covid era.

The location which is open during the normal airport operation hours of 6 a.m. to 10 p.m. has a staff of nine, and it was its CSRs that earned the FBO its highest score this year (4.78). "All our team members have been working together for many years, and this has helped us develop relationships with our visiting crews," explained Trono, adding it is nice for customers to see the same friendly faces each time they visit the facility. "Our job is to anticipate their needs and make their life easy and their journey through us stress-free."

While not new, the location was finally able to reclaim a substantial portion of its main GA ramp, which was blocked for a decade, first due to construction and then to its reassignment for commercial aircraft parking, giving it nearby parking for up to 10 large-cabin jets. All hangar space at EDDM is managed by the airport authority and is assigned on a "first come, first served" basis. For passenger and crew ground transfers, the facility just acquired a luxury Audi A8 limousine.

As with many locations worldwide, the FBO felt the sting of major events canceled due to the pandemic, including the region's most popular gathering, Oktoberfest, which typically draws large amounts of international and domestic traffic.

4.46 MJets FBO

Don Mueang International Airport (VTBD), Bangkok, Thailand

MJets FBO, which serves Thailand's capital city's private traffic aviation at Don Mueang International Airport, has been in operation for more than a decade and its new facility has impressed **AIN**'s readers since its debut in

2016, resulting in it being the highest-rated FBO in Asia.

The 26,000-sq-ft, two-story terminal celebrates its fifth anniversary this year and is open 24/7. It features onsite customs, immigration, and quarantine clearance with visa availability on arrival, a crew suite with three sofa beds and shower facilities, a 3,400-sq-ft executive lounge, which can accommodate up to 75 guests at a time, private passenger lounge, conference rooms, and concierge, all of which helped the FBO receive its highest scores (4.62) in the Passenger Amenities and Facilities categories. Those amenities are certainly there for those who want them, but the facility is known for its quick-turn capabilities. "Normally a passenger will spend less than seven minutes in the terminal for formality and screening process before boarding the aircraft for an international trip," said company chairman Jaiyavat Navaraj. "For domestic trips it takes a much shorter time."

Customers can even arrange security services through the FBO ahead of arrival.

The location, which was the first in Southeast Asia to earn accreditation under IBAC's voluntary International Standard for Business Aviation Handling (IS-BAH), has now reached Stage 2 in the program and is currently in the process to obtain Stage 3.

A full-service FBO with a staff of 176, the location offers aircraft charter and management services, operates its own Part 145 repair station with AOG service, and has more than 86,000 sq ft of hangar space, which is currently home to 14 jets and turboprops.

4.42 London Jet Centre

London Stansted Airport (EGSS), UK

Operators heading to London Stansted Airport have their pick of quality FBOs with two of them there earning high recognition this year from **AIN** readers. London Jet Centre, now more than a year removed from its sale and rebranding, is known for its 94,000-sq-ft, climate-controlled Diamond Hangar. One of the largest in Europe, it can accommodate two Boeing 747-400s parked wingtip to wingtip, not to mention newer widebodies such as the 787-900 or the Airbus A330-900neo. Over the past year it received an upgrade to its internal ground power system to provide flexible support for both 28- and 115-volt aircraft needs. The hangar is undergoing a lighting upgrade, which will improve illumination for the MRO providers operating in the structure, as well as reduce the consumption of electricity for the entire complex.

Top-rated FBOs by Region
MIDDLE EAST

FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
EXECUJET MIDDLE EAST	OMDB	4.25	0.03
JET AVIATION	OMDB	4.18	0.11

Established in 2014, the IS-BAH Stage 1-registered location changed hands early last year while establishing a revised security protocol and a proactive marketing of the large-capacity site.

"The hangar and FBO facility offers unrivaled space and secure accommodation for large, widebody aircraft visiting the UK, with excellent road links to Central and developing Eastern districts of London," explained business development director Adrian Munday. The location, which has a full-time staff of nine, also has 3.5 acres of ramp and its own ground service equipment to handle head-of-state and VIP aircraft

Open from 6 a.m. until 10 p.m. with after-hours call-out available, the 20,000-sq-ft terminal was designed to handle large-capacity private flights and features a large passenger lounge with a pair of VIP suites, each with direct private access and ensuite bathroom for those most discrete clients; both a cocktail bar and an espresso bar; an aviation-themed pilot lounge with a two snooze rooms; private security screening area; and an 18-seat A/V-equipped conference room.

4.41 Eccelsa Aviation

Olbia Costa Smeralda Airport (LIEO), Olbia, Italy

Serving as the lone FBO at Olbia Costa Smeralda Airport on the Italian island of Sardinia, Eccelsa Aviation, owned by the same company that manages the airport, has been operating in its current 48,400-sq-ft terminal since 2009.

In addition to the normal slate of FBO amenities, such as passenger lounge, pilot lounge and snooze room, porte cochere, and 12-seat A/V-equipped conference room, the facility also offers a VIP lounge with private entrance, lounge bar, indoor summer patio, and a restaurant that serves up local dishes operated by sister company Cortesa Catering. "Having the in-flight catering facility within the terminal significantly helps the quality, as this avoids all transportation issues," noted general manager Francesco Cossu, as well as eliminates the associated food-temperature control risks.

If that isn't enough, there is also a coffee shop and a market selling the best produce from Sardinia and the Italian mainland as well as luxury comestibles such as caviar, champagne, rare wines, and liquors. Specialty shops offer eyewear and vintage luxury goods, and as an indication of the clientele that transits the location, Bombardier operates a priate jet sales office there, along with the San Marino Aircraft Registry and a high-end Italian boat builder.

› continues on page 37

Cessna Citation Longitude

by Matt Thurber

Textron Aviation's largest jet—the Longitude—is gaining ground in the super-midsize market. As of the end of 2020, the company had delivered 31 Longitudes, following certification in September 2019.

Although it shares the flat-floor cabin width and height dimensions of the Latitude, the Longitude is a fairly big step up from its smaller sibling. With a maximum takeoff weight (mtow) of 39,500 pounds, the Longitude is longer, by 3 feet, 5 inches in cabin length and 10 feet 11 inches in overall length.

The Longitude's extra 8,700 pounds in mtow enables it to carry another 3,706 pounds of useful load, most of that fuel (14,500 pounds total, or an extra 3,106 pounds compared with the Latitude). And that translates into significantly added range, enabling the Longitude to carry a full-fuel payload of 1,600 pounds (1,000 more than the Latitude) and fly 3,500 nm, compared with the Latitude's 2,700 nm (each with four passengers).

Powered by two 7,665-pound thrust Honeywell HFT7700L turbofans, the Longitude's maximum cruise speed is 483 ktas and maximum operating limit speed Mach 0.84, putting it way ahead of the Latitude's 446 ktas and Mach .80.

Although some buyers might upgrade from a Latitude to a Longitude, most are likely comparing the biggest Citation to its super-midsize competitors, which include the Bombardier Challenger 350, Dassault Falcon 2000S, Embraer Praetor 600, and Gulfstream G280.

While slower than the Longitude (by 12 knots at high-speed cruise), the Praetor can fly about 500 nm further (but at a long-range cruise speed that is 16 knots slower). Both share the same six-foot cabin height, but the Praetor is wider at 6.8 feet versus the Longitude's 6.4 feet and its cabin is a little more than 2.5 feet longer.

The Longitude and Challenger 350 are fairly close in performance, but the Longitude is slightly faster and has greater range (3,500 nm with four passengers versus the Challenger 350's 3,200 nm with eight passengers), while the 350 has a wider cabin by about 9.5 inches.

Compared to the Falcon 2000S, a larger difference in cabin width is apparent, 7.7 feet in the Falcon versus the Longitude's 6.4 feet, and the Falcon has two inches more height. Both offer about the same high-speed cruise over 480 ktas, but the Falcon's maximum speed is higher at Mach .862. The Falcon's range with six passengers is 3,350 nm compared with the Longitude's four-passenger 3,500 nm.

Gulfstream's G280 has slightly more height than the Longitude, but the G280's cabin has a dropped floor instead of the flat floor of the rest of these airplanes. Its cabin is wider by half a foot and length just over half a foot longer. With a maximum operating speed of Mach .85, the G280 is slightly faster than the Longitude at Mach .84, and its range is also 100 nm longer.

Unique Design

When Textron Aviation announced the Longitude program at the EBACE show in 2012, many assumed that engineers took a shortcut by grafting the wing of the Hawker 4000 onto a longer Latitude fuselage. The Longitude wing does owe some heritage to the Hawker 4000, but only in the shape of the wing's airfoil. The wing design itself is the product of optimized design not only aerodynamically but for manufacturing. In the Citation factory in Wichita, new vertical jigs and robotic manufacturing technology and machining processes are combined to create the Longitude's new light and strong wing. The machined wing skins' contours are peen-formed. Wing spars and ribs are also machined, and this contributes to a total wing part count 17 percent lower than earlier designs.

For this class of business jet, the cabin is the attraction for the buyer, and the Longitude designers took care to deliver a quiet and comfortable travel experience.

From the start of the design process, acoustics engineers applied the latest acoustic treatments to eliminating sources of noise in the cabin, something that potential customers had been seeking. These included careful placement of duct fans to minimize noise.

The low noise, a full two decibels lower in the aft cabin than the quietest of its competitors, according to Textron Aviation, combined with the low cabin altitude and high pressurization differential of 9.66 psi for an improved cabin experience. At the maximum operating altitude of 45,000 feet, cabin altitude is 5,950 feet. At FL410, cabin altitude drops below 5,000 feet.

The Longitude has one air-cycle machine that works with an inline heat exchanger to condition cabin air. Either system can handle the cabin's air needs by itself, and if the air-cycle machine fails, the heat exchanger acts as a capable backup, although maximum altitude is then limited to FL400.

The Longitude's spacious flight deck features Garmin's G5000 avionics suite with four touchscreen controllers.

Two double-club seating areas are standard, but buyers can opt to replace the two pedestal seats on the left rear with a three-place couch. A single side-facing seat can be fitted opposite the main entry door, but this cuts into the galley space. The Longitude's seats are new, one of the benefits of Textron Aviation's purchase of Wichita-based furniture manufacturing assets from UTC Aerospace Systems in 2015. Textron Aviation now makes its own interior furnishings, which improves quality control and allows it to respond better to customer feedback.

The pairs of opposing seats can fold flat to create a bed, so that means four beds for the double-club configuration or three plus the couch, which unfolds into a larger bed. The couch has seatbelts for three passengers, which can be used for takeoff and landing, but it is wide enough to fit four while in flight. Opening the couch into a bed is a simple matter, with just a single point to grab to make the move.

Just forward of the main door on the left side is a 14-cu-ft closet with hanging storage and removable shelves. Another option is a stowable jumpseat at the forward side of the closet. The lightweight (40 pounds) jumpseat can be removed when not needed, and then that space can be used to store items that can fit into that vertical space, about 4 cu ft. The jumpseat can face forward or aft and is useable during takeoff and landing.

The extra length of the Longitude allowed for a larger galley with plenty of workspace and dedicated crystal storage, including space for long-stemmed wineglasses. Two hot water tanks are standard. An optional high-power electrical outlet allows for use of standard appliances like coffee makers, eliminating the need to spend tens of thousands of dollars on approved installed appliances. The outlet is mounted inside a stainless-steel surround to protect the galley from fire risk. This option allows use of appliances

that draw up to 15 amps of AC power. A convection or microwave oven are also optional. Both the galley and cabin are available with optional stone flooring.

For passenger utility, there are two USB ports at each pedestal seat. Universal power outlets are available at seats 5 and 6, in the flight deck, and in the lavatory vanity. Gogo's Avance L5 air-to-ground domestic U.S. airborne connectivity system is standard, and for travel outside the U.S., optional dual-channel Iridium or Inmarsat SwiftBroadband satcoms are available.

The cabin management system (CMS) is controlled wirelessly from a smart device app, with surround-sound provided by Alto Aviation. The app also controls temperature, lighting, and window shades, but separate controls for the latter two are also available at each seat. Textron Aviation has moved away from dedicated physical CMS controls, relying on app-based controls, to eliminate the problem of CMS obsolescence.

The audio/video system stores up to 400 GB of content, which can be sent via Bluetooth to smart devices. Updating of audio/video content is via a USB input port at seat 6. An HDMI and auxiliary audio input port are also located at seat 6. SiriusXM satellite radio is available as an option. For display of moving maps and other content, an optional 22-inch monitor can be mounted on the aft divider.

The lavatory can be used as a seat, but not for takeoff and landing. Added natural lighting comes from a window in the lavatory. An externally serviced vacuum-assist freshwater toilet was the result of customer input, and this is a first for a Citation. Its 6.4-gallon heated holding tank is located outside the pressure vessel, which keeps odors away from the cabin.

Behind the full-length mirror is access to the 98-cu-ft, 1,000-pound capacity baggage compartment. Up to two people at a time can access the baggage compartment in flight, with no altitude limits. Exterior access to the baggage compartment is easier with a low threshold at about 4.5 feet from the ground. For overseas operations, the optional life raft has a dedicated storage space in the baggage area.

Systems Details

The Garmin G5000 avionics in the Longitude are the latest iteration of the G3000/G5000 suite that Textron Aviation has adopted for most of its Citation business jets. Although not yet available, the Longitude is slated for an optional Garmin GHD 2100 head-up display (HUD), which will show imagery from an Elbit enhanced flight vision system (EFVS) and also Garmin's synthetic vision system. The HUD will be a $284,000 option, while the EFVS will add another $550,000, according to the Longitude optional equipment guide.

"The big thing we're working on right now is HUD and EFVS," said Kevin Steiner, director of engineering for the Longitude program. "That's an ongoing program to finish the development and certification activity, which will be a first for us as a company." Two of Textron Aviation's flight test Longitudes are equipped with HUD/EFVS, and certification activities are targeted for completion this year.

The Longitude flight deck has four touchscreen controllers used to operate the avionics and many of the jet's systems. Synthetic vision, ADS-B In and Out, Class A TAWS, and TCAS II Change 7.1 are standard features. Dual Honeywell Laseref VI ring-laser gyro-based inertial reference systems are available to replace the standard dual Litef AHRS. For authorization-required precision GPS approaches, RNP 0.3 is available. An Iridium-based satcom for the flight deck is standard and allows voice calls, text messaging, access to Garmin Connext weather, position reporting, and transmission of maintenance diagnostic data. A two-year subscription to the diagnostic data service comes with the purchase of a Longitude.

Garmin's SurfaceWatch runway safety system is an optional feature, as are FANS 1/A+ and LINK 2000+/ATN B1 controller-pilot data link communications.

Also standard in the Longitude is Garmin's solid-state GWX 80 weather radar with a larger 14-inch antenna. Radar features include turbulence detection, predictive windshear, and other automatic weather-detection capabilities.

The interior for the Longitude flown for this report included the optional three-place couch in the rear seating area.

The Longitude is a relatively large airplane, and the Garmin autothrottle system helps lower the pilot workload, especially in busy terminal airspace. Autothrottles also enable other functionality, such as the emergency descent mode, low- and high-speed envelope protection, and coupled go-arounds after a missed approach.

With a predominately DC electrical system, the Longitude shares electrical architecture with the Latitude and Sovereign. The split-bus design has the left engine generator running the left electrical system and the right generator the righthand system independently, unless there is a failure requiring the systems be tied together. For backup, the Honeywell 36-150 APU has its own 500-amp DC generator and can run at up to FL350. The APU can also be operated unattended on the ground, a first for a Citation model. If something happens such as a fire or fuel leak while running unattended, the APU shuts itself down.

Two lightweight True Blue Power TB44 lithium-ion batteries are standard in the Longitude, but buyers can opt for NiCad batteries, which would add another 54 pounds. Buyers haven't been selecting that option, according to Steiner.

There is one system that uses AC power on the Longitude, and that is the heated windshields, which are powered by inverters. This is the same system on the Latitude.

A unique feature on the Longitude is fly-by-wire control of the rudder and spoilers, which save weight and allow finer control of yaw, bank, and ground spoilers. The ailerons and elevators remain controlled with pushrods and cables, while the flaps and horizontal stabilizer trim are electrically actuated. The rudder is controlled electronically but actuated hydraulically. With fly-by-wire control, rudder deflection is scheduled against airspeed, limiting rudder travel at higher speeds. "It's full-time yaw damping and turn coordination," said Steiner.

For maximum redundancy, the rudder has two independent control systems, either of which can operate the rudder, and a rudder standby system in case those fail.

The fly-by-wire spoilers feature three panels on each wing. The inner panels are a ground spoiler only, while the outer two panels are speed brakes and also aid roll control. All of the panels deploy automatically as ground spoilers once the airplane senses weight on wheels.

Honeywell Power

The two Honeywell HTF7700L engines each deliver 7,665 pounds of thrust, flat-rated to 34 deg C. Honeywell delivers the engine integrated with the nacelle and thrust reversers, which makes hanging the engine on the airframe much simpler.

On-condition maintenance means there is no formal time-between-overhaul requirement for the engine. Some of its features include a wide-chord damperless fan, SLE compressor airfoil technology, low-emissions effusion-cooled combustor, and transpiration-cooled high-pressure turbine blades. Thrust reversers automatically reduce power starting at 85 knots after landing.

The HTF7000 series engine powers most of the Longitude's competitors. "We focused on making sure we had good hot-high performance," Steiner explained. "I think we have great performance compared to some of the other [aircraft] in this category."

The single-point refueling panel is new, providing for complete control of the fueling process from outside the airplane. This allows selection of the fuel load at the panel and not relying on the truck's automatic dispensing system. A remote oil-level sensor for the engines shows engine and APU oil levels at the fuel panel, although pilots can also check oil levels with traditional sight glasses.

Another aspect of simplified systems are the two ice detectors mounted just below the windshield. Instead of watching for ice buildup somewhere vulnerable on the airframe, now pilots simply wait for the icing CAS message then switch on the ice-protection systems. Pitot-static heat turns on automatically when needed, another feature that pilots don't have to worry about.

Empennage deicing is a Cox & Company electro-mechanical expulsion deicing system. "The beauty of that is I'm not stealing bleed air off the engines," Steiner said. "The wing leading edges use bleed air, but instead of pumping the warm out the wingtips, the Longitude system reroutes the warm air back through the leading edges to prevent melted ice from refreezing.

"We tried to focus on not just great performance, but let's also try and make the airplane very simple and easy to operate for both the crew," he said.

The trailing-link landing gear is designed and manufactured by Textron Aviation using a special blend of corrosion-resistant stainless steel. "We're trying to take lessons learned throughout the history of our fleet and do as much as we can to help in the corrosion environment," said Steiner.

The design changes extend into the emergency landing gear system, which is entirely mechanical with no nitrogen-driven pneumatic backup system. This saves a lot of time during maintenance of the landing gear and while testing the emergency gear-down system, Steiner explained.

Anti-skid carbon brakes are electronically controlled and powered by dual hydraulic sources, each of which can power the brakes by itself. Emergency braking is from a hydraulic accumulator.

The airplane's hydraulic systems feature a new power transfer and conversion unit (PTCU) developed by the Textron Aviation engineering team. The PTCU serves as either an electrical generator, powered by the hydraulic systems, or as

an electric motor that can run one hydraulic system, or it can use one hydraulic system to run the other failed hydraulic system. The big benefit of the PTCU is its ability to provide backup electrical power in case of failure of the two engine-driven generators and the APU-driven generator. "As long as I have a hydraulic system functioning, with this device I can generate hydraulic or electric power using the hydraulic systems," Steiner explained. "It's a great way to provide that extra layer of redundancy in the electrical system."

Flying the Longitude

With a full-fuel payload of 1,600 pounds, the Longitude can fly with eight passenger seats occupied and still fly a long way with a sea level balanced field length takeoff distance of 4,810 feet. After taking off at maximum weight, the Longitude can climb to FL430 in 20 minutes. Some of the long-distance flights that have been done in the Longitude include Denver to Hawaii, Singapore to Sydney, and Columbus, Ohio, to Paris.

Textron Aviation demo pilots Alan Pitcher and David Bodiak conveniently flew the Longitude to Hillsboro Airport near Portland, Oregon, so I didn't have to travel for this report.

The Longitude had 8,340 pounds of fuel onboard, and our ramp weight was 32,265 pounds. Weather was nearly clear with light winds, but we would have a 5-knot tailwind for takeoff on runway 31L. The rolling takeoff distance calculated by the G5000 avionics was 3,799 feet, plenty of margin on Hillsboro's 6,600-foot runway.

Plugging in the crew weights and flight plan is so simple with the G5000 touchscreen controllers, it's hardly even worth mentioning. With flaps 2 selected, V_1 was calculated at 106 knots, VR 112 knots, and V_2 124 knots.

Pitcher, in the right seat, set up the Longitude for a climb to FL410 for a speed check, departing on the BERNI3 SID south to Newport and Roseburg then east to Redmond before returning to land at Hillsboro. Bodiak sat in the cabin.

The hydraulically steered nose wheel is controlled by a tiller, which can move the nose wheel up to 80.5 degrees. The steering is smooth and precise and when combined with the 7.5 degrees of rudder steering allows a turn radius of 81 feet.

Cleared for takeoff, I lined up the Longitude on 31L and moved my left hand from the tiller to the yoke while advancing the power until the autothrottles took over. The HTF7700L turbofans spooled up quickly and accelerated the Longitude with a noticeable push, and it seemed as if Pitcher's "rotate" call came especially promptly. I lifted the nose into the flight director V bars and the Longitude rose quickly, and it was a short time until we neared our 4,000-foot clearance level. Luckily, the approach controller cleared us to climb to FL270 so we didn't have to stop down low. After a brief halt, we resumed the climb. Passing through FL380, the Longitude was still climbing at 2,600 fpm.

At FL410, we sped up to Mach .84 and at ISA -3 deg C, true airspeed settled at 479 knots. Fuel flow was 980 pph for each engine. Cabin altitude was just 4,900 feet. Slowing to a long-range cruise speed, Mach .739, dropped the true airspeed to 421 knots and 700 pph per engine. But typical long-range cruise is at Mach .80, which would deliver 457 ktas at FL410 and fuel burn not too much lower than maximum cruise; the Longitude likes to go fast.

Before reaching Redmond, we turned back towards Newport so the controller could give us some airspace to work in clear of traffic.

One new G5000 feature that I couldn't help noticing is heading sync. This is a new Garmin feature in G3000/G5000 avionics, where when the autopilot is on and in NAV mode, a push of the HDG button keeps the heading bug synchronized. The words SYNC MODE show up under the heading box, indicating that the heading bug will move to new headings as the airplane changes heading while following navigation guidance. This cuts down on having to repeatedly push the heading button to sync the heading after turns while in NAV mode.

During the descent, I let the speed build up to see how the overspeed protection worked. As the airspeed turned red and started into the barberpole on the speed tape, the autothrottle pulled the power back to reduce speed, then the autopilot eased the nose higher. I pulled out the speed brakes during the descent and while at top speed and they deployed smoothly with little rumble and no pitch change.

MATT THURBER

On final for the Runway 31L RNAV approach to KHIO with autothrottles and autopilot engaged, ready for the test of the coupled go-around capability.

Continuing the descent, I leveled off at 10,000 feet for some airwork. I slowed to 220 knots for some steep turns, a 180-degree turn to the left followed immediately by a turn to the right. I probably should have slowed to 200 or 180 knots; the Longitude is somewhat heavy on the controls, but they do get lighter at slower speeds, and the steep turns were a good handling exercise.

I tried the low-speed protection by slowing the Longitude in level flight all the way to stick shaker, and once again the autothrottles intervened, bringing the speed back up to keep us safe. With gear and flaps down, I flew around for a few minutes to get a feel for how the Longitude would handle at landing speeds. The controls did feel lighter at slower speeds, but the Longitude is a large airplane and sprightly handling isn't a feature in larger jets with conventional elevator and aileron controls.

To put the autopilot through another of its paces, I flew the first approach at Hillsboro, the RNAV 31L, fully coupled and planned to try a coupled go-around. The Longitude's G5000 avionics have another useful new feature, the ability to set a VREF+ speed, so if you want the flight director to command VRef plus a gust factor, you can dial that in. We didn't need any factor, so left it at VREF +0.

The Garmin autopilot did a perfect job flying the glidepath and upon reaching minimums I pushed the TO/GA button on the left power lever and the Longitude transitioned smoothly back into a climb. I didn't want to leave the traffic pattern, so shut the autopilot off with the yoke master disconnect switch and turned left to shoot another approach, this time hand-flown but with autothrottles on.

With the flight director guidance and vectors from the approach controller, I turned back onto the final approach course then with landing gear and flaps down, slowed to VREF.

Landing the Longitude smoothly was easy with the trailing-beam main gear, leaving no temptation to try to massage the flare to touch down gently. As the Longitude neared the runway, the autothrottles brought the power back and I backed them up by making sure the levers were at idle, then pulled the yoke back just a bit to level the nose. The main wheels touched just right, then I lowered the nose and stepped on the brakes while adding reverse thrust. By that time, however, we already had slowed below 85 knots and the reverse thrust was dialing back automatically so wasn't really needed.

The Longitude is a capable airplane with excellent performance, a pilot-friendly flight deck, and a cabin that is optimized for passenger convenience and comfort. That the Longitude is one of NetJets' most popular fractional-share options underscores its overall utility. ■

Cessna Citation Longitude Specifications and Performance

Price:
(typically completed and equipped)
$29.765 million

Engines:
(2) Honeywell HTF7700L, 7,665 lbs

Avionics: Garmin G5000

Passengers: (typical)
2 crew + 9 pax

Range:
(NBAA reserves, 4 pax, 200-nm alternate)
3,500 nm at Mach 0.80

High-speed cruise:
483 ktas/Mach 0.84

Long-range cruise speed:
457 ktas/Mach 0.80

Fuel capacity:
14,500 lbs

Max payload w/full fuel:
1,600 lbs

Maximum altitude: 45,000 ft

Cabin altitude at ceiling:
5,950 ft

Max takeoff weight:
39,500 lbs

Balanced field length at mtow: (sea level, standard)
4,810 ft

Landing distance: 3,170 ft

Length: 73.1 ft

Wingspan: 68.9 ft

Height: 19.4 ft

Cabin:
Volume: 755 cu ft
Width: 6.4 ft
Height: 6 ft
Length: (seating area) 25.2 ft

Baggage capacity:
98 cu ft/1,000 lbs

FAA certification:
FAR Part 25

Number built:
31 (Dec. 31, 2020)

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Airbus has firmly committed to a hydrogen-powered future and is now advancing three different concepts for new airliners that could enter service from around 2035.

Hydrogen-powered aircraft gaining momentum for sustainability benefits

by Charles Alcock

While much of the discussion about how to reduce aviation's carbon footprint has focused on the availability of sustainable aviation fuel (SAF) and when and how electric aircraft may be unshackled from the limits of battery technology, hydrogen has been quietly moving up the future propulsion agenda. Hydrogen has in fact been gaining momentum for some time in other sectors of transportation, such as road, rail, and marine vehicles, and is increasingly being viewed as a viable longer-term alternative to fossil fuel. Some of the more bullish pioneers in the field are claiming they could have hydrogen-powered aircraft approved for service as soon as 2025 or 2026.

As recently as early 2020, the use of hydrogen in aviation seemed like something of a fringe research activity. The broad consensus seemed to be that all-electric or hybrid-electric propulsion should be the primary focus for smaller aircraft, but that for anything with more than 20 or so seats the green priority should be making existing turbofans, turboprops, and piston engines less gas-guzzling and pressing for the widespread availability of sustainable aviation fuels to burn in existing powerplants.

While it certainly doesn't merit all the credit for changing this outlook, Airbus's September 2020 announcement that it is actively pursuing plans to bring hydrogen-powered airliners into commercial service around 2035 undoubtedly raised the profile of the technology. The European aerospace group is considering three design options under a project designated ZeroE and intends to choose which technology platform to advance in 2024.

The most novel of the three designs shows a blended-wing airframe that Airbus indicated would be able to carry up to 200 passengers on flights of around 2,000 nm. The exceptionally wide fuselage, in which the wing merges with the main section of the aircraft, would provide space for a cabin as well as for hydrogen storage and distribution. The design builds on the Maveric model that Airbus has been working on in stealth mode since June 2019.

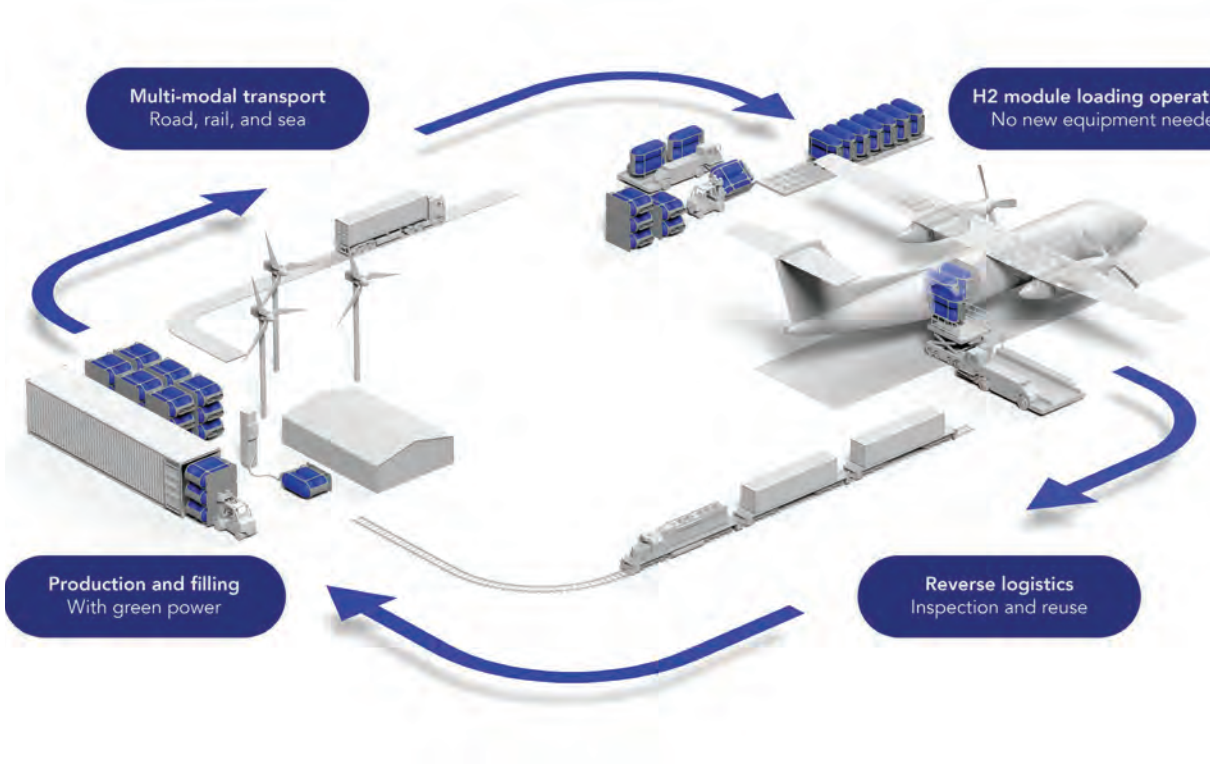
Airbus also presented a more conventional narrowbody model that would carry between 120 and 200 passengers on sectors of around 2,000 nm. The propulsion system would be based on a pair of modified gas turbine engines powered by liquid hydrogen that would be stored and distributed via tanks located behind the rear pressure bulkhead. The design features swept-back outer wing surfaces.

The third design is a 100-seat twin turboprop. It too would feature modified gas turbines fueled by hydrogen and would fly to a range of up to around 1,000 nm.

According to chief technology officer Grazia Vittadini, her engineering team expects to have a hydrogen ground demonstrator ready by 2021 to help it to address complex technology risks around the ecosystem for hydrogen power, such as the fuel's volume and cryogenic (low temperature) characteristics. Addressing a March 30 webinar, Airbus CEO Guillaume Faury reiterated the company's commitment to hydrogen, while acknowledging the challenges in ensuring adequate supplies and infrastructure for the new fuel, which he said was akin to those already being faced by the industry for sustainable aviation fuel.

In fact, Paul Eremenko, former Airbus chief technology officer and CEO of its ACubed innovation division, believes that he has a solution to the logistical challenges associated with hydrogen fueling of aircraft. He formed Universal Hydrogen in early 2020 with a concept of operations that involves delivering refillable hydrogen capsules directly from fuel production facilities to aircraft.

The hydrogen capsules, which Eremenko has compared to Nespresso coffee pods, will be loaded into the rear of the aircraft and installed in a compartment that would replace the last two rows of passenger seats. Plumbing lines will run from the capsules through the aircraft's dorsal fins into each of the two nacelles where fuel cells and electric motors



The complete hydrogen refueling process as planned by Universal Hydrogen involves modular hydrogen capsules that would be refilled off-airport then returned for re-insertion into the aircraft.

ZeroAvia's hydrogen propulsion system installed in a Piper M Series single-engine aircraft.

would be installed to power the aircraft's existing propellers.

Initially, the California-based company is looking to convert existing 40- to 60-seat regional airliners such as the Bombardier Dash 8 or ATR 42 under a supplemental type certificate. It believes that its propulsion system would be able to support scheduled services for routes of up to 550 nm. Test flights are due to begin in 2023, with a target date for initial commercial operations in 2025.

Universal Hydrogen is partnered with energy distribution group Plug Power, which is already providing hydrogen fuel cell stack technology for ground-based e-mobility applications, including forklift trucks and other vehicles. In March, the company made an initial $1 million investment in Universal Hydrogen and the partners expanded their alliance with a global supply agreement for Plug Power to distribute hydrogen supplies to aircraft.

The agreement calls for the supply of around 500 tons of hydrogen each day from five distribution points across the U.S. by 2024. This volume is roughly equivalent to a million gallons of Jet-A fuel.

Plug Power says that hydrogen will enter the aviation market on a more affordable basis than existing sustainable aviation fuels, which are still considered to be too costly and hard to source by many aircraft operators. "When you think about [the price of] renewable fuels at four cents per kilowatt-hour, it's clear that green hydrogen can be produced at prices equivalent to or below fossil fuel in the near term," Plug Power's CEO Andy Price told **AIN**. "Universal Hydrogen's approach is a pragmatic, near-term plan to bring green hydrogen to one of the hardest-to-decarbonize sectors—air travel."

ZeroAvia is another from the new breed of hydrogen pioneers and, based on the scale of development work already completed, it is arguably the front-runner. On March 31, the California-based start-up announced plans to develop a 50-seat airliner to be powered by hydrogen. Its work will be supported by a $24.3 million capital injection with new investors including British Airways, along with Horizons Ventures and existing backers Breakthrough Energy Ventures, Ecosystem Integrity Fund, Summa Equity, Shell Ventures, and Systemiq. British Airways has not made a specific commitment to including hydrogen-powered aircraft in its fleet, but ZeroAvia claims to already have letters of intent from 15 undisclosed airlines.

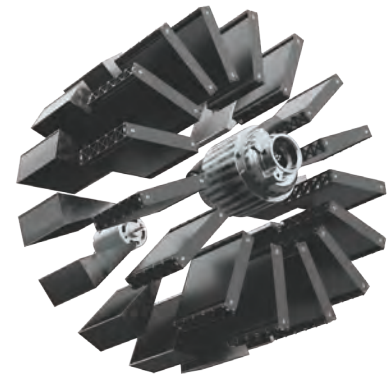
According to ZeroAvia, which has now raised nearly $74 million, including $53 million in private investment and a UK government grant of around $16.3 million, it is aiming to get a 50-seat aircraft into commercial service by 2026, using its 2 MW powerplant to convert existing regional airliners, such as the ATR42 and Dash 8. It believes that by 2030, a 100-seat airliner could be run on a more powerful version of its technology.

Currently, ZeroAvia is working on integrating a 600 kW hydrogen-electric powertrain with an aircraft seating up to 19 passengers, such as the Dornier Do228 twin-turboprop model that it is using as a testbed. The company is aiming to bring this to market by 2024 with a range of around 435 nm.

Based on its grant from the UK government's Department for Business, Energy and Industrial Strategy (BEIS), issued through the Aerospace Technology Institute and Innovate UK, ZeroAvia is basing its development work at Cranfield in England. Its efforts to date have been founded on converting smaller aircraft, such as the six-seat Piper M Series, which it has already flown. Now the company is preparing to conduct a flight of around 70 miles from Cranfield to Kemble airfield in southern England.

Later this year, it aims to conduct a flight of around 250 miles from the Orkney Islands to the Scottish mainland. In the Orkney Islands, the European Marine Energy Centre has developed a process for making hydrogen fuel to support aviation applications. Working with its partner Fuel Cell Systems, it intends to distribute hydrogen with a mobile system consisting of a re-deployable modular electrolyzer, a trailer-mounted air compressor, and a 305-bar refueling truck.

Meanwhile, another California-based start-up called HyPoint has built the first working prototype of its turbo air-cooled hydrogen fuel cell system for aircraft. The company says it will begin delivering full-scale versions of the technology to partners in 2022, supporting plans for both new eVTOL aircraft and the conversion of existing models to hydrogen power.



Detail showing the composition of HyPoint's hydrogen fuel cell system.

According to HyPoint, its system's performance will outstrip existing fuel cells by delivering 2,000 watts per kilogram of specific power and an energy density of

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Dubai conference considers hydrogen's pros and cons

Hydrogen's potential as a primary aviation fuel makes it one of the most promising prospects for sustainable aviation, Tarsus F&E's Aviation Sustainability conference in Dubai in late 2020 heard.

Nikhil Sachdeva, project manager at consultancy Roland Berger, who chaired the session on hydrogen, said three broad areas needed to be tackled for the fuel to progress as an alternative propulsion source: technology and technological challenges, perception, largely related to safety concerns, and paradigms, which today involved similar modes of fuel-burn, whether for regional or long-haul aircraft, something that the establishment of hydrogen's feasibility for jet propulsion would likely change.

Hydrogen's low viscosity, high buoyancy, diffusivity, and volume, but with lower weight per unit than traditional kerosene, poses several technical challenges. The implications for airliner design are that aircraft will have to have much bigger fuel tanks to cater to hydrogen's higher volumes.

"That has an impact on the aircraft structure itself as a whole," said Gabriel Godfrey, product owner sustainable aircraft at industrial risk control outfit Apsys, which in 2001 became 99.2 percent Airbus-owned.

"If we look at the Airbus ZEROe project as an example, it gives us a hint of what hydrogen aircraft may look like. Some [prototypes] look similar to what we have today—they'll probably be the first ones—but even for those, the location of [fuel] storage is quite different to existing aircraft—and they're also working on some ground-breaking new concepts."

Sami Alawneh, chief of the Safety and Environment Unit at King Hussein International Airport in Aqaba, Jordan, saw a number of obstacles to the practical implementation of hydrogen solutions at airports.

Airports already face a lack of space, and hydrogen is likely to be a major issue when it comes to creating new fuel facilities or retrofitting existing ones. On the aircraft, stresses on tanks, piping, and handling pumps, as well as refueling hydrants, would mean higher impacts on materials than with current systems. Aqaba faces a dramatic range in temperature, from zero degrees C at night in winter to 50 deg C in summer, likely to increase stresses on materials and procedures.

"I'm expecting a lot of difficulties and challenges," Alawneh told the panel.

It would make little sense to tackle hydrogen in a silo approach, where airframers focused on the aircraft, airports on airports, and oil and gas firms on producing the fuel and nothing else, said Godfrey. "Aviation has a history of actually being pretty good at working together, but we will have to take this a notch higher. There will have to be a holistic and collaborative approach across the industry," he said.

Multiple aircraft concepts will emerge under hydrogen, depending on missions and markets addressed. "We will not be able to sustain the 20, 50, or 100 concepts that you see when you Google 'sustainable aircraft' or 'new mobility' today," Godfrey said. "There will be some level of convergence. The downside of that opportunity is that there's a lot of uncertainty. At this point, [it's too early to discern] the winning concepts.

"We cannot afford, as an industry, to have multiple solutions. Those risks will not be manageable, both logistically and economically. That means that there is a core foundation of topics on which the industry will have to agree, and that is typically best done through standardization." **P.S.S.**

Engine makers are mostly agnostic on hydrogen

by Charles Alcock

Much of the energy behind the growing momentum for hydrogen propulsion in aviation is now coming from start-up companies. Many of these have assembled small teams of well-educated, generally young engineers as they scramble to secure the investment they need to fuel their ambitious business plans. As their own cheerleaders, these companies generally are pre-disposed to emphasizing the positives around hydrogen, while portraying the potential negatives as solutions waiting to happen.

So where does this leave the much larger and more established existing aircraft engine manufacturers, when it comes to offering aviation a path to carbon neutrality? In April, Qatar Airways CEO Akbar Al Baker challenged GE Aviation to accelerate the development of a completely new engine that would support industry targets of achieving net-zero carbon emissions by 2050.

GE has indicated its plan calls for an incremental approach based on factors such as increased use of sustainable aviation fuel (SAF). The company also expects to be ready to demonstrate a new hybrid-electric propulsion system on a regional airliner by the mid-2020s.

> **"Hydrogen is three times the energy density of kerosene but takes between three and four times the volume..."**
>
> – Michael Winter, Pratt & Whitney senior fellow advanced technology

Rolls-Royce is taking a similar approach, having made a significant investment in electric propulsion with the acquisition of Siemens's eAircraft division. At the same time, it has continued efforts to make its existing turbofans burn less jet-A fuel, while also supporting the expansion of SAF usage.

Pratt & Whitney has been considering the case for hydrogen since the late 1950s when it was involved in Project Suntan with Lockheed Martin in trying to develop an alternative to the Blackbird SR71 military surveillance aircraft that needed to operate at altitudes of 100,000 feet. Michael Winter, the U.S. group's senior fellow advanced technology, said that this experience made it all too conscious of the challenges the fuel posed, despite being a very effective propellant.

"Hydrogen is three times the energy density of kerosene but takes between three and four times the volume," Winter explained to **AIN**. "When you store it, there is great pressure and also minus 253 centigrade temperatures. For commercial airliners, there is less room for passengers. To put it in a liquid state [for more convenient use] takes 15 percent of the energy stored in the fuel, so you want to recover that energy." That could involve the use of a heat exchanger, which is what was done for Project Suntan, along with hundreds of miles of pipes.

"Pratt & Whitney sees potential in hydrogen, but there are plenty of technical challenges and limitations," Winter said. "It's just one path in an array of solutions to make aviation more energy-efficient and environmentally sustainable and [we] will be ready to support any of these with [our] technology."

Other more immediate solutions include making existing gas turbine engines more efficient, and Pratt & Whitney claims to have achieved a 16 percent fuel burn reduction with its geared turbofan (GTF) technology, largely based on propulsive efficiency. It believes there are more improvements to come as, in collaboration with NASA, it has recently tested engine designs with up to an 18:1 bypass ratio (compared with the 12 to 13 bypass ratio of current GTF engines).

That apart, Pratt & Whitney is also working on ground-based applications for hydrogen, such as electricity generation. In Asia for example, the company has been developing dual-fuel approaches involving natural gas and hydrogen. It also is involved in a project with the U.S. Department of Energy's ARPA-E program to explore ways to store hydrogen with ammonia.

The method for hydrogen production is a critical element in assessing the overall environmental sustainability of the fuel. Today, most hydrogen produced is designated as "brown" because it takes electricity to produce and so to produce so-called 'green' hydrogen requires assured sources of "green" electricity, produced through methods such as solar, tidal, or wind energy.

Nonetheless, Pratt & Whitney can see a path to directly burning hydrogen in existing engines with some changes to the fuel handling system, combustors, and injector nozzles. In the company's view, this should be viewed as a longer-term transition for aviation, while further efficiencies are squeezed from existing propulsion technology through methods that could also include the more widespread use of SAF.

MTU Aero Engines is working with German aerospace research agency DLR to develop a technology demonstrator to power a Dornier 228 with hydrogen.

For its part, Germany's MTU Aero Engines wants to play a leading role in supporting the adoption of hydrogen. Last year it launched a partnership with the DLR Aerospace Research Center to convert a Dornier 228 regional airliner to run on direct combustion of liquid hydrogen. The partners expect to be ready to start ground testing subsystems for the project before the end of June 2021 as they prepare for the first flight of a technology demonstrator in 2026.

The 19-seat aircraft will have one of its two Honeywell TPE331 turboprop engines replaced by a 500 kW electric motor, powered by electricity produced by hydrogen fuel cells and driving a propeller. MTU is providing the propulsion system while DLR is responsible for systems integration and certification. ■

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Hydrogen gains as sustainable option

1,500 watt-hours per kilogram. The company says that its competitive edge over rival approaches is based on a decision to use compressed air for both cooling and oxygen supplies for a high-temperature fuel cell system that it says weighs just a third as much as comparable liquid-cooled systems.

In January, GKN Aerospace announced that it is leading a collaboration between industry and academia to develop a hydrogen propulsion system for what it calls "sub-regional" aircraft. Initially, the H2GEAR system would power new and existing aircraft seating up to 19 passengers, but the company says it could subsequently be scaled up for use on larger airliners.

The UK-based project is backed by a £54 million ($73 million) investment evenly shared between GKN, the government's BEIS department, and partners including fuel cell specialist Intelligent Energy, electric motors and control systems group Aeristech, Newcastle University, the University of Manchester, and the University of Birmingham.

The proposed system will convert liquid hydrogen to electricity in fuel cells. This will power electric motors that will drive either ducted fans or propellers.

According to GKN, the first hydrogen-powered aircraft could be ready to enter service in 2026. The company, which is a tier-one supplier to several leading airframers, including Airbus, says it has had contact with several unnamed aircraft manufacturers, as well as start-ups and also airlines.

In France, the government is also strongly backing a switch to hydrogen power and has established a new council as the basis for work with various industries. In February, Airbus, Air France-KLM, airports group ADP, and the Choose Paris Region development agency has called for expressions of interest to create so-called hydrogen hubs at Paris airports to fuel future hydrogen-powered aircraft. The partners say the initiative is a response to the European Commission's goal to create the conditions for hydrogen-powered airliners to enter commercial service from 2035.

In February, the French government awarded a grant of almost $1 million to Avions Mauboussin, which is developing a new eSTOL aircraft. The start-up is developing what it calls its Zephyr hybrid hydrogen propulsion system to power a two-seat light aircraft called the Alerion M1h and the six-seater Alcyon M3c, which it aims to bring to the market by 2026 and 2028, respectively. It also intends to offer the technology to other aircraft developers. ■

FutureFlight
THE FUTURE OF ADVANCED AIR MOBILITY

This story is from FutureFlight.aero, a news and information resource developed by **AIN** to provide objective, independent coverage and analysis of cutting-edge aviation technology, including electric aircraft developments and advanced air mobility.

At Leonardo's new Philadelphia training center, pilot training has already begun in the AW139 simulator that was relocated from New Jersey.

Leonardo adds Philadelphia training center, 609 home

by Kerry Lynch

Despite the complexities involved with the Covid-19 pandemic, Leonardo Helicopters' U.S. operations have progressed on multiple fronts with plans for the addition of a new facility for the AW609 program, the opening of its new training center, and the formal delivery of the first TH-73A single-engine trainers to the U.S. Navy shortly.

"It's been a tough year, but we've continued moving the business forward," said William Hunt, CEO of Leonardo's AgustaWestland Philadelphia Corp. "We continued being successful with our customers and especially around the customer support training."

A hallmark of Leonardo's activities over the past year has been the completion of a customer training center in Philadelphia. Set to open potentially at the end of April, the center represents the bulk of an $80 million investment Leonardo is making in its Philadelphia operations.

Hunt noted how customer support training "has continued to be a growing part of our business in a lot of different ways" and said having its range of activities on one campus in Philadelphia has been part of its strategy for some time.

Leonardo moved its AW139 simulator from Whippany, New Jersey, to Philadelphia and brought in a new AW609/AW169 trainer that features roll-on/roll-off capabilities for quick interchange between the AW609 and AW169 cockpit.

The company also made space available and provisions for a third trainer down the road. As for that spot, Hunt said, "It really depends on what the market is driving." He noted that the AW109 Trekker is frequently asked about from operators in the Americas, he noted, but added, "No decision has been made about that. We're just staying flexible."

Training at the new Philadelphia center has already begun with the U.S. Air Force on the MH-139, which is based on the AW139.

At the same time, Leonardo is continuing to progress through the certification effort of the AW609 tiltrotor, Hunt said. "We've been focusing heavily on the industrialization of that program." This involves looking beyond the flight-test program and to the point where the company can deliver production-ready aircraft, he said. As part of that effort, the company recently leased an additional 32,000-sq-ft hangar at its Philadelphia campus that will serve as the future home for the tiltrotor program.

Near the current development program, the new hangar "is perfect for the 609 program," in that it is conducive for a winged aircraft, Hunt said. "We've been building a wing aircraft inside of a helicopter factory, which has its challenges at times."

He expects the program to transition over the next month to its new home as certain improvements to the hangar are completed to ensure it can handle the power requirements for the AW609 program.

Meanwhile, the company has continued with the test program with two AW609s (aircraft one and four) flying in Italy and one (aircraft three) flying in Philadelphia. Leonardo plans shortly to add aircraft five into the flight-test program and aircraft six, the production version that will be destined for customer Bristow, is in production.

As for certification, he wasn't ready yet to lay out an adjusted timeline. Leonardo is "still working on some sensitive pieces that we want to get cleared up with [the FAA] in terms of finalization," Hunt said and estimated that the company would have more of a line of sight on that timeline in the next few months. "The program continues to move forward. We're still very excited about the opportunity to get to the end of the test program. We continue to work with the FAA every single day."

In addition, Leonardo's Philadelphia site has been busy ramping up on production of the TH-73A as it prepares to deliver the first of 32 of the model scheduled for this year. In January 2020, the Navy selected the aircraft, based on the civil AW119 that is solely produced in Philadelphia, to replace the existing fleet of Bell TH-57s.

The initial contract award was for 32 aircraft, with future contracts anticipated to cumulatively bring the order to 130 aircraft valued at $648.1 million by 2024. Leonard also is under contract for spares, support, and training.

Leonardo was coordinating with the service last month on the timing of that delivery, as well as the location, given the pandemic. But the anticipation in mid-April was deliveries would begin "sometime right around the corner."

In the meantime, Leonardo has stationed two TH-73As at Vertex Aerospace in Crestview, Florida, near the future home of the helicopters at Naval Air Station Whiting Field, to provide instructor training in preparation for the induction of the aircraft into service.

With the training already ongoing, the Navy has had the opportunity to begin to familiarize and fly the helicopter, he noted. "We are receiving very, very good feedback."

As this is going on, Leonardo is moving forward with customer support plans, including for a new facility at Whiting Aviation Park that is to be completed in 2022 and will encompass 100,000 sq ft. This will give Leonardo an on-site customer support service center for the Navy program. ■

News Update

Textron Powers Up New eAviation Division

Textron is formalizing its presence in the electric aircraft market with the formation of a new division called eAviation. The company confirmed to **AIN** that long-time senior executive Rob Scholl has been named to head the unit in a senior v-p role that reports directly to Textron chairman and CEO Scott Donnelly. Scholl previously was the senior v-p of sales and marketing at Textron Aviation.

Scholl's new role was described by Textron as leveraging "the work across our aerospace and defense businesses to develop new opportunities and take advantage of our fixed-wing and rotorcraft expertise in emerging technologies."

Airbus Offering H175 to NYPD

Airbus is offering its H175 super-medium twin helicopter in the competition to replace the New York City Police Department's (NYPD) pair of Bell 412s currently used for tactical and search and rescue missions. NYPD's request for proposal (RFP) was released earlier this month and a decision is expected later this year.

Airbus noted that the H175 is Stage 3 noise level compliant as it is equipped with a variable rotor speed control system. This works to adjust the helicopter's blade rpm to reduce sound levels when it is flying over densely populated areas like New York City, where helicopter noise continues to be a hot button political issue.

EASA Recommends Fuel Lever Mods for Airbus Helo Singles

EASA is recommending that operators of Airbus AS350 and EC130 series turbine single helicopters install an Airbus Helicopters modification as an additional means to protect against external influences and keep the floor-mounted fuel shut-off lever (FSOL) in the stowed position.

The modification is now available for retrofit on AS350B2 and -B3 helicopters. A similar modification is under development for the other models of the AS350/EC130 legacy fleet.

Airbus developed the modification following an NTSB safety recommendation after the fatal ditching of a FlyNYON AS350B2 in New York in 2018 that killed five.

HAI Salutes Michael Hynes for Lifetime Achievement

As a child nearly 80 years ago, Michael Hynes experienced his first aircraft ride. That sparked a passion for aviation and a 65-year career that has included amassing some 16,500 hours in 314 aircraft types, administering 800 pilot exams, running multiple aviation businesses including Hynes Aviation Industries, and, now, being honored with the Helicopter Association International (HAI) Lifetime Achievement Award.

Airbus expanding HCare customer support program

by Mark Huber

Airbus Helicopters sees continuing demand for its HCare customer support programs from helicopter operators such as Air Methods and its fleet of EC145s and EC135s.

Airbus Helicopters has grown its HCare Smart and HCare Infinite customer support program enrollments to 2,400 helicopters, representing 20 percent of its installed worldwide fleet. The contracts cover 250 operators in more than 70 countries, according to Christoph Zammert, executive vice president of customer support and services.

Customers are evenly split between civil and government users, he said. "What is important for our military operators is to have the ability to predict their budgets. HCare is a very good tool for that and provides a good level of cost control."

At present, HCare contracts skew to customers with medium to heavy helicopters, but "it is becoming more frequent on our light twins—the H135 and the H145," said Zammert. He pointed to recent HCare contracts signed with air ambulance provider Air Methods, covering 111 of its H135 and H145 aircraft.

Zammert added that multiple factors make HCare an attractive option for both military and civil customers. "With cost pressures increasing, customers tend to want to have cost protection and that is what HCare is about," he said.

HCare was a large contributor to Airbus Helicopters' overall revenues in pandemic-ravaged 2020, which increased by 4 percent compared with 2019, though new helicopter deliveries fell 10 percent. "HCare played an important role in that," Zammert said. "We've seen overall growth in our services and support revenue while at the same time flying hours during the pandemic have been reduced by about 10 percent compared with 2019."

HCare spans five domains: material management, helicopter maintenance, technical support, training and flight operations, and connected services. The program starts out with Easy on-request catalog services and Smart, with four by-the-hour options, before building up to Infinite, with full availability commitments. HCare Infinite requires the company to guarantee the customer's full fleet operational availability, including maintenance, technical support, and the supply of spare parts, tools, and consumables.

All the services are accessible via the AirbusWorld online customer portal. The portal is home to the Airbus customer marketplace that went live for U.S. and European customers in 2020. Canadian customers will be added in 2021. With the marketplace, customers can access an array of parts and supplies from third-party vendors.

Four categories of purchase are on offer—chemicals, shelving and storage, tools and ground support equipment, and hardware—chosen for their high degree of demand, particularly for maintenance operations. "We are connecting customers with other vendors and suppliers, giving them a one-stop solution to all their support needs," said Zammert.

Airbus plans to expand HCare to cover legacy aircraft such as several models of the Puma series and the EC120B light single. A program for these aircraft will be launched later this year. Legacy aircraft represent 20 percent of all hours flown by Airbus helicopters. "We will have specific supply-chain solutions for parts no longer in production. We see an increasing need for those sort of material support contracts," he said.

While HCare does not have the ability to incorporate live health usage and monitoring systems (HUMS) data, that is an area Airbus is investigating, Zammert said. HCare also is increasing its training offerings to include more remote training and the increased use of online and virtual reality technology. "We are applying the lessons we learned during the pandemic to VR and online training," he said. An H145D3 simulator will be installed in the company's Grand Prairie, Texas training center this May.

Overall, Zammert said that Airbus is refining HCare to make the program "more modular. Customers need more tailor-made solutions and the ability to pick and choose what reflects their needs the most," he said. ■

Honeywell adds upgrades to helo avionics

Honeywell avionics engineers have been busy developing new products for helicopters, primarily Leonardo's AW139. The medium-twin helicopter's Honeywell Epic avionics suite is now upgradeable to the latest standard—Phase 8—and operators soon will be able to add Honeywell's RDR-7000 weather radar and the -036 enhanced ground proximity warning system (EGPWS) upgrade.

For AW139 operators that already have Phase 7, Phase 8 is a relatively easy upgrade. Available now in new-build AW139s, Phase 8, which includes the Inav 2.0 interface, was certified in September 2020 by EASA and should soon be approved by the FAA. Leonardo will offer a service bulletin to upgrade in-service AW139s, according to Adam Gavrich, Honeywell senior technical sales manager, defense and helicopter platforms, and this work can be done by Honeywell dealers.

The Phase 8 upgrade adds track-centered capability to the SmartView synthetic vision system (SVS), which aids pilot situational awareness. Track-centered SVS is available at speeds higher than 30 knots; below that it reverts to heading-centered.

Terrain cautions and warnings are now displayed in the SVS, rather than just textual and audible warnings.

New approach capability has been added to the FMS, allowing pilots to add custom offshore standard approach procedures (and visual approaches) to any waypoint. These can be added to the flight plan and coupled to the autopilot.


Honeywell's Phase 8 upgrade adds track-centered synthetic vision system and new offshore instrument approach capabilities to the Leonardo AW139.

The Honeywell upgrade allows pilots to enter the wind information and desired approach to the waypoint, and then the avionics build the lateral and vertical profile automatically.

The RDR-7000 weather radar brings features introduced with the RDR-4000 fixed-wing radar to rotorcraft. The new radar, the first solid-state radar for the rotorcraft market, weighs 15 pounds and has a 12-inch antenna.

The RDR-7000 is a volumetric radar that scans constantly and stores returns in a buffer, then it displays the most significant information to the pilot. Other features include hazard alerting such as turbulence detection to 60 nm, and predictive hail and lightning.

For improved search and rescue operations, the RDR-7000 has a maritime ground mapping mode, which eliminates noise from radar returns of water in high sea states.

The AW139 STC will be available soon, and Honeywell is working on other platforms for RDR-7000 upgrades.

Honeywell worked with helicopter safety organization HeliOffshore, the UK CAA, and EASA to develop safety and situational awareness enhancements that are included in the -036 upgrade for the EGPWS MK XXII HTAWS.

For offshore flying, -036 adds new modes optimized for oil rig operations, according to Vamsi Gundluru, senior director for Epic integrated avionics systems. For example, the new 3D mode warns pilots of a drop in airspeed during takeoff, he said, especially in heavy winds.

The upgrade is available for AW139s with Phase 7 and higher avionics and it has already been EASA approved, with FAA approval imminent. **M.T.**

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Aviation's hydrogen goals tied to 'green' ecosystem

by Gregory Polek

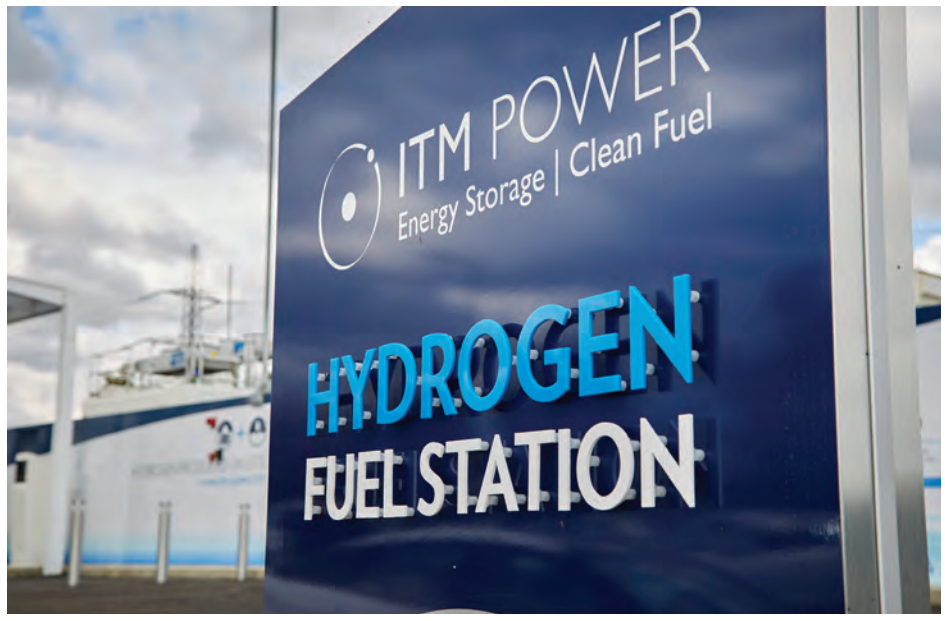
Last year's commitment by Airbus to introduce a hydrogen-powered airliner by 2035 has met with a host of questions and some skepticism, but not necessarily related to the development of the actual airplane technology. Rather, according to a March 24 panel assembled by Eurocontrol on the challenges associated with the conversion to hydrogen power, policymakers' commitment to global standards for the use and production of the ubiquitous element and the need for a so-called green ecosystem remain the most pressing concerns.

Speaking during one of a series of online Eurocontrol Stakeholder Forums, Ron van Manen, head of strategic development for the Clean Sky Joint Undertaking, characterized the massive need for renewable energy to create hydrogen in an environmentally sustainable way as "the elephant in the room." Noting that one needs to use hydrogen to make both synthetic fuels and hydrogen itself, van Manen raised what he called the taboo subject of nuclear power as the basis for creating those fuels.

"We often say in aviation, there is no silver bullet toward decarbonizing, but hydrogen does seem to be a golden key," he said. "With the level of renewable energy that will be required for hydrogen production or, if you permit me to [raise] something that in some circles is considered a taboo, I think the nuclear option is going to be back on the table. But [demand for] non-carbon-producing energy sources on the ground for the creation of hydrogen will grow...Meeting that growth is going to be a challenge."

In fact, aviation will be a relatively small user of hydrogen power given all the industries that can benefit from its use, which, said Airbus vice president of zero-emissions technology Glenn Llewellyn, stands to create a scale of demand that could lower its cost—a "hugely important" part of making climate-neutral flying a reality.

"We all want to eliminate our climate impact, and other industries are, in fact, going to be much bigger users of hydrogen than aviation [will]," said Llewellyn. "It's also going to have an effect in making hydrogen much more ubiquitous."



Governments must better align their priorities and agree on a long-term plan to create a sustainable energy "ecosystem" across various industries.

Still, the airline industry's transition to hydrogen will require sorely needed infrastructure at airports to make operating a hydrogen-powered narrowbody airliner in 2035 feasible. "No infrastructure means no aircraft," added Llewellyn. "I think there's going to be lots of momentum through other sectors' adoption of hydrogen. The trucking industry is going very fast in that direction."

Speaking from an airport operator's perspective, Groupe ADP environment director Amelie Lummaux named four major issues related to ground operations, starting with ensuring compatibility between the airplanes and the airports. Requirements for hydrogen storage, liquefaction supply, and distribution systems all raise challenges related to airport-airplane compatibility. Authorities must put in place regulations to allow for hydrogen manipulation at airports, she added. Finally, airports will need a robust hydrogen supply chain to allow for sufficient production and distribution.

"From our point of view, not only is hydrogen a technical challenge, but it is also an economic challenge and a political challenge," said Lummaux...Obviously, the political challenge...is to make sure the local population, the local communities nearby the airport, are willing to have hydrogen and liquid hydrogen stored at airports. And that's not that easy either."

At the same time, the aviation industry must address the fact that its rapid growth will mean its current 3 to 4 percent contribution to climate change would increase exponentially if it does not begin to take mitigation measures now, said van Manen. "We can afford, if you like, to be that 3 percent, but we cannot afford to be 20, 30, or 50 percent of the carbon budget in the 2040s," he explained.

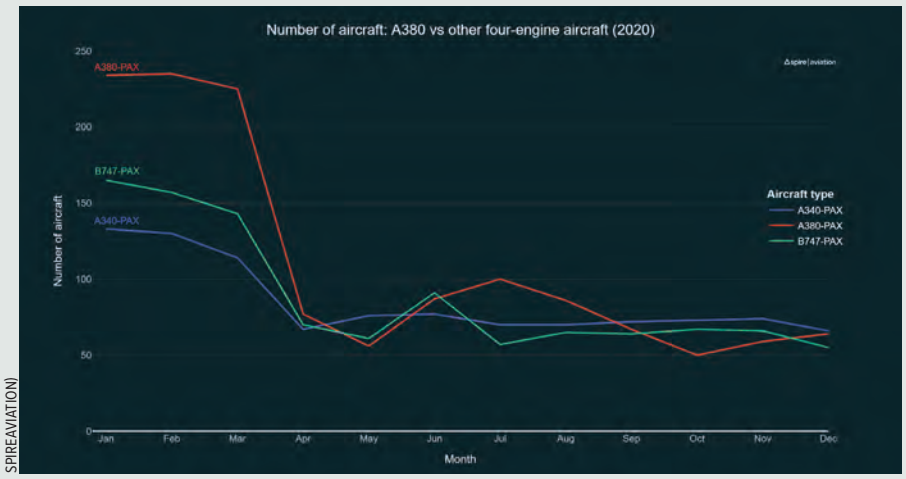
For a start, aviation needs to use more sustainable aviation fuel (SAF), stressed Llewellyn. Airbus's aircraft can all carry up to 50 percent SAF, but the industry hasn't exploited the full potential of those products, he added. Llewellyn called it "a real shame" that governments haven't put in place the necessary policies and incentives to encourage more use of SAF, given that hydrogen in its early application in the 2030s will power mainly regional airplanes and small narrowbodies. At that point, long-range aircraft will need to rely on SAF to do their part in cutting greenhouse gas emissions. Furthermore, given producers use hydrogen as an ingredient in synthetic fuel, SAF's increased use will create more effective economies of scale for both. ■

New data tracks steep descent of the A380

Lufthansa's announcement last month that it has converted one of its flagship Airbus A350-900 widebody airliners into a flying laboratory for climate change research provided a fresh snapshot of how radically airlines have had to rethink the best use of their equipment in the continued wake of the Covid pandemic. But the wider redundancy of more established aircraft like the A380 is even more starkly illustrated by new data from Spire Aviation, which tracks the decline in utilization of the high-capacity double-decker since the end of March 2020.

The data, gathered from Spire's own satellite constellation, tracks the steep decline in flights in the A380, alongside that of two other four-engine, long-haul transports, the A340 and Boeing 747. It highlights how the number of A380s in commercial operation dropped from 234 at the start of 2020 to just 64 by the end of the year. Over the same period, the number of flights performed by the type plummeted from more than 28,000 in January 2020 to just 1,600 in December.

According to Spire, the dependence of the A380 business case on economies of scale put it "directly in the coronavirus firing line, as airlines struggle to fill even their smallest planes due to pandemic lockdown measures and weak consumer demand."



SPIREAVIATION)

Using its satellite constellation, Spire Aviation tracked the rapid decline in the number of flights by Airbus A380s and rival widebody types.

Emirates remains the largest operator of the A380, but by late December it retained only 24 of the aircraft in active service out of a total of 115 that it operated in March 2020. Lufthansa, which had reportedly seen occupancy on its A380s fall to as low as 35 percent of seats, had to ground all 14 aircraft in its fleets, as did Air France, Qantas, Korean Air, and Asiana Airlines. More recently Qatar Airways confirmed that it will retire half of its 10-strong A380 contingent.

Airline planning now calls for newer, more fuel-efficient widebodies, like the A350 and Boeing's 787, to replace the gap left by the A380. That, of course, assumes flight demand patterns haven't shifted permanently away from needing that much capacity on a single aircraft.

Spire Aviation is part of data and analytics company Spire Global, which aims to help businesses and governments make decisions by identifying, tracking, and predicting the movement of resources and weather systems from its own constellation of more than 110 satellites. Spire produced an animation to illustrate the data for the A380's decline in 2020. **C.A.**

Faury pushes for coherent sustainability efforts

by Gregory Polek

Covid-19 has accelerated trends already underway in the airline business before the crisis struck, particularly those toward smaller, longer-range airplanes that could aid carriers' efforts to boost versatility and flexibility at a lower cost, according to Airbus CEO Guillaume Faury. But one trend that needed no exogenous shock to manifest itself—that of efforts toward environmental sustainability—will need to continue far beyond the point at which Covid-19 no longer influences fleet decisions or network strategies.

Airbus CEO Guillaume Faury

Speaking early last month during one of a series of interview sessions held by Eurocontrol, Faury lamented the minimal use of sustainable aviation fuel (SAF) by airlines and stressed the importance of a coordinated effort toward meeting targets for carbon neutrality by 2050. All of Airbus's airplanes have gained certification to fly on a 50-percent blend of SAF to conventional jet fuel, explained Faury, but airlines collectively use less than 1 percent SAF in their operations. However, he also expressed optimism in recent developments outside the European Union including the return of the U.S. to the Paris climate accords and China's public commitment to meeting its own goal for net-zero carbon emissions by 2060.

"What we need...is not only a good airplane, [but] a regulatory framework," said Faury. "So we need to work with regulators to define new rules for those kinds of planes."

Airbus, of course, has gotten attention for its goal of introducing a hydrogen-powered airplane by 2035; but Faury emphasized the need to set the conditions for a ready supply of hydrogen to meet its target.

"Obviously, we are far from being there, but we have five years to get there," he said, referring to his timeline for developing the technology needed for efficient distribution of hydrogen to allow for a 2035 entry-into-service (EIS) of one of Airbus's concept airplanes. "And when we see big momentum in hydrogen in many industries, we think that's very encouraging."

Faury further expressed high confidence in Airbus meeting its 2035 target, assuming it would need two more years to find suppliers, locate a production site, and fund the program before launch followed by seven to eight years of development before EIS.

"Now that doesn't mean all solutions are on the table," he noted. "Obviously, hydrogen is not a new technology, but hydrogen on planes means a lot of development, a lot of engineering where we test a lot of different solutions to select the best one."

For Airbus, a blended-wing architecture appears particularly appealing, said Faury, because of its ability to store large volumes of hydrogen within its confines.

But apart from considerations such as deciding what type of airplane design would most effectively use hydrogen, Airbus also recognizes the importance of SAF development because its "drop-in" nature requires far less infrastructure development at airports, stressed Faury.

"So the infrastructure would be very, very different from what it is today, and there will be the need for infrastructure investments," he explained. "That's why it would not be something that will happen very quickly. That's why we believe it's such a big deal that we start small before going bigger at a later stage because we need to see this transformation of infrastructure and the airports."

Meanwhile, Airbus also needs to consider what sort of physical changes airports might need to effect to accommodate something like a blended wing airplane. "That's something we're looking at and weighing the benefits and the downsides of playing with a very different architecture," said Faury, who further noted considerations such as boarding times, evacuation times, and the speed at which luggage gets loaded and unloaded.

"So these kinds of architecture come with more challenges when it comes to those kinds of questions," said Faury. "That's why we are looking as well at conventional airframes." ■

Rolls-Royce starts work on first UltraFan engine

by Gregory Polek

Rolls-Royce has begun work on the first UltraFan engine at its dedicated DemoWorks facility in Derby in the UK, the company confirmed in late March. To become the largest aero engine in the world, the UltraFan features a 140-inch fan diameter and forms the basis for a potential new family of engines capable of delivering a 25 percent fuel efficiency improvement over the first-generation Trent turbofan. Rolls-Royce expects to complete work on the UltraFan's demonstrator engine by the end of the year.

Notwithstanding recent talk of hydrogen and electrically powered aircraft, gas turbines will continue to power long-haul airplanes for many years, according to Rolls-Royce. The UltraFan's efficiency will help improve the economics of an industry transition to more sustainable fuels, which will likely prove more expensive in the short-term than traditional jet fuel, added Rolls. The company plans to run the first test of the engine on 100 percent sustainable aviation fuel (SAF).

"Our first engine demonstrator, UF001, is now coming together and I'm really looking forward to seeing it built and ready for test," said Rolls-Royce Civil Aerospace president Chris Cholerton. "It is arriving at a time when the world is seeking ever more sustainable ways to travel in a post-COVID 19 world, and it makes me and all our team very proud to know we are part of the solution."

Several parties have contributed funding for the development of the UltraFan demonstrator and associated technologies by Rolls-Royce and a variety of funding agencies, including the Aerospace Technology Institute and Innovate UK (United Kingdom), LuFo (Germany), and the Clean Sky Joint Undertaking (European Union). "The UltraFan project is a perfect example of how we are working with industry to deliver green, sustainable flight for decades to come," said UK business secretary Kwasi Kwarteng. "Backed with significant government support, this project represents the scale of ambition for Britain's crucial aerospace sector."

The Rolls-Royce UltraFan will feature a 140-inch-diameter fan.

As engine build starts, suppliers continue to make other key parts for delivery to Derby. Work has started on the UltraFan's carbon titanium fan system in Bristol, UK, and its 50 MW power gearbox in Dahlewitz, Germany. Rolls considers the UltraFan part of what it calls its IntelligentEngine vision; for example, each fan blade has a digital twin that stores real-life test data, allowing engineers to predict in-service performance. When on test at Rolls-Royce's new £90 million Testbed 80 facility, engineers can take data from more than 10,000 parameters, detecting the tiniest of vibrations at a rate of up to 200,000 samples per second.

Key engineering features of the engine include an Advance 3 core architecture and the company's ALECSys lean-burn combustion system, meant to deliver maximum fuel burn efficiency and low emissions. Carbon titanium fan blades and a composite casing reduce weight by up to 1,500 pounds per aircraft, while advanced ceramic matrix composite (CMC) components operate more effectively in high-pressure turbine temperatures. Finally, it features a geared design that delivers efficient power for future high-thrust, high bypass ratio engines.

Rolls-Royce expects to continue testing UltraFan engines into at least 2023 as it commits to the market availability of a new product by the turn of the decade, the company told **AIN** in January after the Financial Times published quotes from CEO Warren East indicating it would shelve post-testing development until the launch of a new airframe model.

"We have always said that the eventual timing of UltraFan's entry into service will be dependent on aircraft manufacturers' requirements," the company said in a statement. "We remain committed to having a product available to the market at the turn of the decade, but in the post-testing phase, we will continue to monitor customer requirements going forward, particularly given the impact of Covid-19. If this requires us to re-phase the program then we would do so." ■

Collins STCs Pro Line Fusion for Citation CJ2+

by Matt Thurber

The Pro Line Fusion upgrade for the CJ2+ adds new features that include integrated V-speeds, fuel sensing, predictive performance, and controller-pilot datalink communications.

The FAA has approved installation of Collins Aerospace's touchscreen Pro Line Fusion avionics suite in the Cessna Citation CJ2+, with approval for the CJ1+ expected shortly. This will be followed by Transport Canada Civil Aviation and EASA approvals for the light jets by year-end, Collins added.

In 2017, Collins received STC approval for the Pro Line Fusion upgrade in the CJ3, and the CJ1+/CJ2+ STCs are follow-ons to that. However, the follow-on modification includes new features such as integrated V-speeds, fuel sensing, predictive performance, and controller-pilot datalink communications (CPDLC).

The Pro Line Fusion upgrade replaces the original Pro Line 21 avionics and its portrait displays with three 14.1-inch touchscreen displays in landscape format. Like most modern displays, pilots can configure windows as desired. While synthetic vision system (SVS) isn't available for the Pro Line 21 avionics in the CJs, the Pro Line Fusion upgrade includes SVS with Collins's airport dome and extended runway centerline features, which highlight the destination airport on the terrain imagery.

Pilots can fly localizer performance with vertical guidance (LPV) approaches and radius-to-fix legs with Fusion's SBAS-capable flight management system, which includes performance-based navigation and FANS 1/A capabilities. Moving-maps are touch-interactive and can show high-resolution topography, weather, obstacles, and georeferenced charts. Relevant charts for the flight plan are automatically staged with Collins's ChartLink feature. ■

Garmin adds power, Type-C connectors to USB ports

by Matt Thurber

At last month's Sun 'n Fun Expo, Garmin demonstrated new versions of its GSB 15 USB chargers. The chargers offer both dual Type-C USB ports or a combination of Type-C and Type-A with up to 27 watts of output per port, simultaneously. Other electrical features include optimized power output to match the device being charged and short-circuit and over-temperature protection.

To help mark their locations, the new charging ports have dimmable halo lighting, which helps users find them at night. The lights can be connected to the aircraft's lighting bus for brightness control. Side or rear power input connectors facilitate more flexible installation in space-constrained areas, according to Garmin, including near armrests or cabin sidewalls.

When installed alongside Garmin GI 275 electronic flight instruments, the GSB 15 can be used to transfer databases into the instruments with a flash drive. Users can also download data from the instruments such as flight and engine indication system information for later analysis.

The GSB 15 is compatible with earlier versions, using the same connector and fitting into a one-inch cutout. Garmin offers optional accessories such as mounting kits and decorative covers. The dual USB Type-C and the Type-C/Type-A variant each retail for $399. ■

Garmin's GSB 15 chargers come with new features that include increased power output up to 27 watts per port and either dual Type-C or combined Type-C and Type A USB ports as well as short-circuit and over-temperature protection.

FlightAware fuses ADS-B view with SkyAware service

Owners of FlightAware-compatible ground-based ADS-B receivers can now view all traffic seen by their receivers in a fused view on the new and free SkyAware Anywhere service. The SkyAware Anywhere view is available from any internet connection, according to FlightAware.

With SkyAware, hosts can view real-time traffic from multiple ADS-B receivers and using various filters. These include speed and altitude as well as aircraft type and identification.

FlightAware offers free FlightFeeder ADS-B receivers for locations where more coverage is needed, with priority given to airports and FBOs. Those interested in joining the network can build their own PiAware receiver, which combines a Raspberry Pi computer with a FlightAware ADS-B device and antenna.

Once a FlightFeeder or PiAware ADS-B receiver is switched on, the host can get a free FlightAware Enterprise account, which includes eight months of historical flight data, unlimited flight alerts, registration numbers for flights that go by call signs, ATC call signs, and full-screen maps without advertisements. The host can see traffic via ADS-B and multilateration, including performance statistics for the host's own receivers and which aircraft those receivers tracked. **M.T.**

News Update

Boeing Selects ACR Artex ELT

To meet new distress beacon recommendations from ICAO, Boeing has chosen the Artex ELT 5000 (DT-distress tracking) from ACR Electronics. Although ICAO recommendations are not mandatory, many countries adopt them and require compliance.

The ELT 5000 can meet ICAO's Global Aeronautical Distress and Safety System (GADSS) standards. As a 406 MHz emergency locator transmitter, the ELT 5000 (DT) can also help searchers locate a downed aircraft using GPS position information transmitted by the ELT to the International Cospas-Sarsat program satellite network.

While still in flight, when certain distress conditions occur, the ELT 5000 (DT) can automatically start transmitting distress messages with the aircraft's location. This is "triggered by a potential distress condition from independent aircraft monitoring," according to ACR.

Genesys Virtual EFIS Enables Integration Testing

To help aircraft manufacturers and avionics integrators evaluate Genesys Aerosystems products, the company has developed a software tool that emulates its IDU-680 or -450 displays. The Virtual IDU (VIDU) tool runs on a Windows PC, using the same code that drives the physical displays.

The advantage of the VIDU lies with its ability to help lower development costs for integration of IDUs in an aircraft. It also allows development of IDU replications in flight simulators and training devices.

VIDUs can be connected virtually to each other or to sensors or peripheral driver software. For testing or system familiarization, the user can click on simulated buttons and knobs using a mouse.

CCX Tech AP-250 STC'd on GV

The CCX Technologies AP-250 cybersecurity router has received an STC for installation on a Canadian-registered GV. Although it can be configured as either a secure router or in-line cybersecurity device, for this STC the AP-250 also serves as the router for the GV's airborne connectivity system. The certification was done by Mid-Canada Mod Center based in Toronto.

Featuring two dual-band Wi-Fi radios with encryption, the AP-250 includes a 1 TB solid-state drive "with all data encrypted at-rest," according to CCX. It is also equipped with Advanced LTE to connect to cellular networks on the ground for remote technical support.

In router configuration, the AP-250 supports end-to-end encryption for all types of airborne connectivity systems. For use as an inline appliance, the AP-250 works with the aircraft's router "to provide a more robust onboard cyber security posture," CCX said.

› continued from page 23

With the region very much a leisure destination, traffic reaches a peak during the summer, at which time the FBO operates 24/7, according to Cossu, and its staff swells from 15 to approximately 50. Concierge services can arrange anything from renting an Italian sports car, to booking a helicopter flight, to chartering a yacht. "Within the legal, common sense, and the decency domain, we basically try to satisfy all the customer's requests," explained Cossu. "Our problem-solving approach and culture is nothing less than crucial in delivering what our clients expect from us, which is simply service excellence."

The airport itself is currently refurbishing and expanding its 8,021-foot runway, which will add another 800 feet to its overall length before the start of the busy summer season. Also in the works is an expansion of the ramp, which has seen near full capacity at peak times.

4.41 Omni Handling

Lisbon Portela International Airport (LPPT), Lisbon, Portugal

Founded in 1998, Portugal-based Omni Handling is the largest private aviation handler in the country, with a more than 50 percent market share. It has FBOs in Porto, Faro, Cascais, Funchal, and Santa Maria in the Azores, but its facility at Lisbon's Portela International Airport, the largest in the company's network, earned the highest recognition this year from **AIN**'s readers. A complete refurbishment of the location in 2018, part of a company-wide renovation of all its FBOs, added a new façade with illuminated signage, increasing its visibility from the airside. Inside it offers a passenger lounge overlooking the ramp, crew lounge with workstations and multiple televisions, shower facilities, and offices.

"We are always trying to offer the best and renovated facilities, with state-of-the-art entertainment for our crew and clients," CEO Ricardo Pereira told **AIN**. "We are always innovating and proposing useful extra services they might like: guided tours of the area, concierge services on demand, and negotiated rates with our suppliers for our clients."

The location, Omni's first, has a full-time staff of 13, and its CSRs this year received a world-class score of 4.83. As part of a welcoming package, they offer arriving customers products specific to Portugal such as pasteis de nata (egg-custard tarts).

The company transitioned to the Myairops operations software platform at all of its bases over the past year helping to streamline the reservation and billing processes for its customers. ISO 9001:2015-certified since 2012, with an annually-audited safety management system in place, the facility is open 24/7 to handle flights or requests.

While no private aircraft are based at the airport, Pereira said for those operators wishing to overnight, his company has special agreements negotiated with third-party hangar owners to shelter aircraft up to an ACJ321.

Omni Handling also provides exclusive handling services in Cape Verde since 2011 as well as in Angola, Mozambique, and São Tomé e Principe since 2019.

4.41 Signature Flight Support

Geneva International Airport (LSGG), Geneva, Switzerland

Under its former TAG Aviation ownership and the leadership of manager Erturk Yildiz, the company's FBO at Geneva Airport was a perennial top finisher in **AIN**'s annual FBO Survey in the Rest of World category. That hasn't changed with the location's acquisition by Signature Flight Support last summer. The facility occupies 7,000 sq ft in the airport's general aviation terminal (GAT) and includes three private passenger lounges; refreshments such as local snacks, artisanal ice cream in the summer, and breakfast items; three crew rest areas (lounge, relaxation room, snooze room); a private shower; kitchen; conference room; and valet parking. The entrance hall displays contemporary paintings and other artwork that are changed regularly. The airport sits astride the border between Switzerland and France, so both Swiss and French customs clearance are available onsite. As Geneva is truly an international city, among the FBO's staff of 30 no fewer than 10 languages are spoken, virtually ensuring ease of communication with all customers.

The location is open seven days a week from 5:30 a.m. until 9:59 p.m., in accordance with the airport's operating hours, but as Yildiz told **AIN**, noise-compliant aircraft can arrive or depart until 11:59 p.m.

"We own and operate our ground service equipment (GSE) and can perform deicing and fueling in house as opposed to waiting for shared airline GSE," said Yildiz who will soon be taking on a new role in the Signature organization. "This is a rarity among European FBOs and gives Signature Geneva a distinct advantage in performing quick turns. We can also handle widebody transport category aircraft with our own equipment and staff."

The facility believes in "going-the-extra-mile" for its clients, sometimes literally. A customer who arrived for his flight in a vintage German car was concerned about leaving the valuable vehicle at the GAT. One of the Signature staff who was well-versed in operating such an automobile was able to demonstrate this and drove it off to a secure storage facility, thus easing the customer's mind. ■

Above & Beyond

The below FBO staff members were recognized multiple times for going "Above & Beyond" in the field of customer service.

PERSON	FBO	AIRPORT CODE
Francesco Cossu	ECCELSA AVIATON	LIEO
Jenny Wong	HONG KONG BUSINESS AVIATION CENTER	VHHH
Kathya Botelho	OMNI HANDLING	LPCS
Liam Murphy	UNIVERSAL AVIATION	EINN
Matthew Guy	EXECUJET AUSTRALIA	YSSY
Oliver Trono	SIGNATURE FLIGHT SUPPORT	EDDM
Rahmi Rahmioglu	GOZEN AIR FBO	LTBA
Stone Chau	TAG AVIATION	VMMC

HondaJet POC debuts in Japan aviation museum

by Matt Thurber

On April 20, the Misawa Aviation & Science Museum in Aomori Prefecture in Japan reopened with a unique new display—the original proof-of-concept (POC) prototype HondaJet. Aomori is Honda Aircraft president and CEO Michimasa Fujino's hometown.

During remodeling two years ago, the museum asked if Honda Aircraft would help with a plan to design a hangar dedicated to the HondaJet. The possibility of educating visitors about the HondaJet was a "great opportunity," according to the company. "As a result, we've decided to donate the POC and have it permanently displayed in the museum."

The POC first flew on Dec. 3, 2003, powered by Honda-designed and -built HF118 engines mounted in an unusual configuration—over the wings instead of on the aft fuselage. The over-the-wing-engine-mount

(OTWEM) design wasn't intended to make the HondaJet look unusual, which it certainly did, but took advantage of aerodynamic optimization that delays drag rise at high speeds. Although this was confirmed in a Boeing wind tunnel, the POC flight testing proved that the concept worked. Another key benefit of OTWEM is the larger space available in the cabin by moving engine structure and systems out of the fuselage.

The highly secret HondaJet, built in a hangar at Greensboro Airport in North Carolina, became wildly popular during the POC's 2005 debut at EAA AirVenture in Oshkosh, Wisconsin. Early the following year Honda Aircraft announced that the HondaJet would become a commercial program.

Teaming with GE to create a joint venture for the design and manufacture of a more powerful version of the engine, the HF120-powered HondaJet received FAA certification on Dec. 9, 2015. Honda Aircraft also worked with Garmin to develop the G3000 avionics suite.

The POC was retired in 2013, but now it has a new home at the Misawa museum. Inside the HondaJet hangar, the POC is surrounded by three walls displaying historical documents, components, and explanations in Japanese and English.

"It is our great pleasure to have the HondaJet proof-of-concept on permanent display at Misawa Aviation & Science Museum in Japan," Fujino said. "With this aircraft we proved the innovative OTWEM configuration and other advanced technology unique to the HondaJet, and achieved the best performance, fuel efficiency, and cabin comfort in our class. We hope to have many people visit the museum and view the HondaJet in person and wish that the story of the HondaJet can inspire the next generation of aircraft designers." ■

FBO and Airport news by Curt Epstein

ACI Jet's new 28,000-sq-ft terminal at San Luis Obispo County Airport is a significant upgrade from its previous home of 16 years.

ACI Opens New Digs at San Luis Obispo

ACI Jet, the lone FBO at California's San Luis Obispo County Airport, has begun operations at its newly-built facility at 4751Aviadores Way. The company had occupied its previous 6,000-sq-ft facility on Airport Drive for 16 years and it began construction on the new $20 million facility in 2018. The new 28,000-sq-ft, two-story terminal features an expansive lobby; mezzanine seating overlooking the ramp; pilot suite with two large snooze rooms, shower facilities, and flight-planning area; a trio of conference rooms seating four, eight, and 18, respectively; and a refreshment bar. An adjoining new 28,500-sq-ft hangar with glass wall panels can accommodate ultra-long-range business jets and has 3,000 sq ft of adjoining shop/office space.

The new facility caps an expansion plan that was derailed for more than a decade by the global economic downturn. ACI Jet had planned the complex and begun construction before the Great Recession, but only a 30,000-sq-ft hangar with an adjoining 3,000 sq ft of offices was built at the new location before the remainder of the project was put on hold. According to company v-p Andrew Robillard, the former facility will be retained for general aviation use, possibly by the company's Part 145 repair center or leased out to a third-party flight school.

Sky Harbour Plans Colorado Facility

Continuing the growth of its boutique hangar complex model, New York-based Sky Harbour expects to break ground at its latest location—Denver Centennial Airport—in the third quarter. Intended to occupy 22 acres on the south side of the field, on the Centennial Interport leasehold, the first phase of the facility that is scheduled to open in mid-2022 will consist of 13 privately-leaseable hangars totaling 128,000 sq ft and capable of sheltering the latest ultra-long-range business jets. A second phase of development will include nine more hangars, for an additional 97,600 sq ft of aircraft storage.

As with the company's existing locations at Nashville International Airport, Miami Opa-Locka Executive Airport, and Sugar Land Regional Airport in Houston, each hangar houses one tenant, eliminating the need for aircraft stacking by expected use and subsequent extraneous movements, thus lessening the risk of hangar rash incidents. Each hangar includes indoor and outdoor vehicle parking, and a customizable interior office suite with private lounges, kitchens, bathrooms, showers, and laundry. Ground handling is performed by the facility's own dedicated line staff.

"We aim to be the best home-base in aviation, bar none, maximizing the value that owners derive from their aircraft," said CEO Tal Keinan. "Sky Harbour is excited to be at Centennial, among the most active and best-managed airports in the United States."

Fort Lauderdale FBO Breaks Ground on New Home

Jetscape, one of four service providers at Florida's Fort Lauderdale-Hollywood International Airport (FLL), has broken ground on a new FBO/hangar complex. The $30 million greenfield project on the west side of the field will consist of a three-story 27,000-sq-ft terminal and an 80,000-sq-ft hangar capable of sheltering ultra-long-range business jets. "In terms of people moving their operations to South Florida, the number of large aircraft coming into the market is unbelievable," said Emlyn David, former CEO of Skyservice Business Aviation, who was brought on as a strategic consultant for the development. The terminal will include built-to-suit office space for tenants, and the company noted it is in final negotiations with one client for a large portion of space.

"A lot of the conversations happening today are with large fleet operators that want and need a presence in the south Florida market and in particular FLL because FLL is 24/7, it can take larger aircraft, and there is a real shortage of hangar space," David said. "We are going to specifically cater to those type operators, and what we are seeing is the demand that these operators also have for office space."

According to Jetscape president Troy Menken, the project is expected to take 18 months, which would put it on track for a third-quarter 2022 opening. The company currently operates out of a 5,000-sq-ft terminal on the northern side of the field in a complex with a trio of 10,000-sq-ft hangars. Menken told **AIN** that the facility will be returned to the county once the new complex is completed. Three years ago, the company acquired a separate hangar facility on the airport's northern side that includes a 32,000-sq-ft hangar with 45-foot-high doors and a pair of 20,000-sq-ft hangars. It will retain this complex, giving it 152,000 sq ft of total aircraft shelter space once the new FBO is completed.

San Francisco-area FBO Adding More Hangar Space

Five Rivers Aviation, the sole business aviation ground handling provider at San Francisco-area Livermore Municipal Airport (LVK), has started its second phase of construction, which consists of a 43,000-sq-ft hangar. The $9 million project at the six-year-old FBO is expected to be completed early in the fourth quarter.

This expansion will accommodate the latest ultra-long-range business jets and bring the Avfuel-branded facility's overall aircraft storage space to 68,000 sq ft. Planned third and fourth phases of development will more than double that total.

"The Tri-Valley business community has long been basing more offices and employees within arm's reach of Livermore Airport," said FBO owner Pete Sandhu, who added that many Silicon Valley companies have developed their own flight departments to facilitate long-distance management. "This development will meet some of their demand and reduce the amount of repositioning flights necessary to conduct business in Livermore and the Tri-Valley area." Situated outside the region's fog belt, pilots heading to LVK and its 5,253-foot main runway often experience VMC when the rest of the San Francisco Bay area is socked in, Sandhu said.

Tampa's GA Airports See Strong Business Rebound

For Florida's Hillsborough County, general aviation is proving resurgent after a Covid-19-induced dip starting early last year. FBO operators at Peter O. Knight, Plant City, Tampa Executive, and Tampa International airports reported just a 12 percent year-over-year drop in business in 2020, which they attributed to a weak spring that saw the entrenchment of the Covid-19 coronavirus in the U.S. By summer, the operational tempo and fuel flowage had rebounded, it noted.

According to Brett Fay, the county's director of general aviation and overseer of its reliever airports, the lull was used to make significant improvements at the local fields.

At Tampa Executive, the 20-year-old terminal saw a $1.2 million renovation including everything from critical repairs to new bathrooms and flooring. "We've got a beautiful new terminal building," said Fay. "These changes and improvements put [it] right up there with the nicest facilities you will find in general aviation." In addition, a $7.7 million airport improvement project—including new runway pavement, lighting, and navigational aids—just wrapped up.

Plant City Airport recently received a new fuel farm and ramp aimed at improving service, while Sheltair, one of the two service providers at Tampa International, started construction next month on a $20 million expansion project that will add 110,000 sq ft of hangar and office space to its campus.

"The future for general aviation is bright," said Fay. "What we're seeing in the trends is that general aviation is going to play a major part in our local economy and that building this infrastructure now is hugely important." ■

Pavement work on the runways was part of a $7.7 million airfield improvement project at Tampa Executive Airport that was completed in April.

AIN EVENTS

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Maintenance news by Jerry Siebenmark

AMAC Opens Fifth Hangar for Bizjet Servicing

MRO provider AMAC Aerospace has completed a year-long project that added a fifth hangar for business jet maintenance to its site at EuroAirport in Basel, Switzerland. The primarily wood-construction hangar measures 52,205 sq ft (4,850 sq m), with six doors spanning 394 feet (120 m). Included in the new hangar is a component and calibration shop, Bombardier maintenance supervisor's office, Bombardier maintenance planning office, window repair shop, and sound testing shop.

Texas-based Gulf Avionics Eyes More Business with Move

After a year-long site selection process, Gulf Avionics has relocated from Harlingen, Texas, to Kerrville/Kerr County Airport (ERV) in Texas's Hill Country region, where it now occupies a 7,000-sq-ft hangar. It also plans to create 50 avionics and aerospace jobs in the next five years.

A dealer for OEMs such as Garmin, Honeywell, Trans-Cal, and PS Engineering, Gulf Avionics is looking to tap into the business from 1,500 aircraft owners and operators within an hour flight of ERV. It's in a corridor that encompasses the cities of Austin and San Antonio.

Sage-Popovich Plans MRO Acquisition

Global aviation consulting and asset management firm Sage-Popovich plans to acquire Togs Aircraft, a Michigan-based FAA Part 145 repair station for heavy turboprops, business jets, and helicopters. The acquisition, expected to close in the first half of the year, will expand Sage-Popovich's capabilities in pre-purchase inspections, scheduled and unscheduled maintenance, AOG and mobile services, aircraft importing and exporting, and logbook reviews.

West Star Expanding Aircraft Mx Second Shifts

In addition to its move to equip maintenance technicians with iPads to improve efficiency, West Star Aviation is expanding second shifts at its four full-service MRO locations. The expanded second shift effort thus far has reduced turn-times by as much as 25 to 30 percent in certain instances. The shift expansions have already occurred or will be implemented at West Star sites in East Alton, Illinois; Grand Junction, Colorado; Chattanooga, Tennessee; and Perryville, Missouri.

Enhancements Coming to Corridor Service

Continuum Applied Technology has enhanced its cloud-based Corridor aviation service center software with additional integration and mobility capabilities, the Austin, Texas-based Camp Systems company announced.

Under the v12.4 release of Corridor released in April, Corridor users will see improved usability and workflows through Camp Connect maintenance tracking; an ILS Bridge solution enabling them to automatically list all or partial inventory on Camp's digital aerospace parts, equipment, and services marketplace; and new warehouse controls and receiving functions on Corridor Go's mobility suite. Additionally, the upgrade provides for the integration of Microsoft Office 365 email.

Duncan, Elliott Latest To Offer CL604 Fusion Upgrade

Duncan Aviation and Elliott Aviation are the latest MROs to offer Collins Aerospace Pro Line Fusion avionics installations in the Bombardier Challenger 604. They join MRO providers Constant Aviation and West Star Aviation to offer the upgraded avionics that feature 14.1-inch touchscreens, ADS-B Out and FANS 1/A, synthetic vision, LPV/RNP approaches, and improved FMS.

A Collins Aerospace Pro Line Fusion avionics upgrade will solve upcoming obsolescence issues facing Pro Line 4 displays and other key components on Bombardier Challenger 604s.

Duncan Wins Europe, Canada Approvals for ACA Installs

Duncan Aviation recently obtained supplemental type certificate (STC) approvals from Transport Canada Civil Aviation and EASA for an installation package for the Aviation Clean Air (ACA) ionization system aboard Bombardier Globals and Challenger 300/350s.

Duncan customers in Europe and Canada can now have the ACA ionizer system installed on their Global and Challenger 300/350 aircraft.

The approvals clear the way for Duncan customers in Canada and the European Union to buy the ACA packages for their aircraft, including the STCs, ionizers, and PMA parts kits.

Des Moines Flying Service Opens New Facility

As a result of airport master plan developments at Iowa's Des Moines International Airport, long-time aircraft sales, parts, and maintenance provider Des Moines Flying Service relocated to a new facility at the field. Located on the airport's south cargo ramp, the newly opened building offers a 35 percent size advantage over DMFS's former location. Earlier this year, DMFS was acquired by Muncie Aviation, the world's oldest Piper dealer.

Stevens Aerospace Named Authorized Prizm LED Installer

Stevens Aerospace's MRO facilities in Georgia, Ohio, South Carolina, and Tennessee have been designated as authorized installation centers for Prizm LED cabin lighting systems. The full-color lighting system can be used throughout an aircraft cabin—including in the galley, lavatory, and cupholders—and controlled in several ways, such as through a mobile app or existing cabin lighting controls.

Honeywell Recognizes Gulfstream's APU Repair Facility

Gulfstream Aerospace's auxiliary power unit (APU) repair facility at the company's Savannah, Georgia headquarters service center has been recognized as a center of excellence by Honeywell Aerospace. Established in June 2008, this facility features a maintenance shop and a 300-sq-ft test cell where technicians can repair and test APUs installed on jets made by Gulfstream and other business aircraft OEMs.

Gulfstream is authorized to perform heavy repairs and overhauls, as well as warranty and manufacturer service program work, on a wide range of Honeywell APUs, including the 36-100, 36-150, RE100, RE220 series, and HGT400. The facility has also received nearly 30 foreign authority approvals.

MRO Insider, Portside Announce Partnership

MRO Insider has entered a partnership with Portside that will allow Portside customers to quickly hail AOG services and scheduled maintenance requests for quotes through MRO Insider's platform. Portside is a provider of billing, reporting and analytics, and fleetwide planning tools that support more than 150 operators in 25 countries with more than 2,000 aircraft.

According to MRO Insider, the partnership also will provide users with maintenance budgeting that is easier, faster, and more accurate as well as dynamic budgets that adjust based on flight activity and comprehensive owner reports that are generated automatically.

XOJet Aviation Enrolls CL300s in JSSI Engine Program

XOJet Aviation is enrolling its 15 Bombardier Challenger 300s in a 10-year, hourly engine maintenance program with Jet Support Services (JSSI). As a result, JSSI will assign a technical and client services support team to support the 30 Honeywell AS907-1-1A engines that power these super-midsize jets that XOJet operates in the U.S., Bahamas, and Mexico.

Textron Aviation Unveils King Air Ground Cooling STC

A new STC from Textron Aviation enables Beechcraft King Air 200 and 300-series owners and operators to provide flood cooling into the cabin before departure without using power from the twin turboprop's engines. Cooling is provided by a vapor-cycle system using an evaporator/blower unit mounted to the forward side of the aft pressure bulkhead, a compressor/condenser installed in the aft fuselage, and a dedicated ground power unit (GPU) receptacle installed on the belly of the aft fuselage.

Seamech International is the supplier of the system, which weighs about 60 pounds and is isolated from the aircraft electrical and environmental control systems. Specific pricing is less than $50,000 fly-away and depends on aircraft configuration. It is available for installation exclusively at Textron Aviation service centers. ■

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3rd ANNUAL

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by David Jack Kenny

PRELIMINARY REPORTS

Phenom 100 Stalls onto Runway

EMBRAER EMB-500, FEB. 8, 2021, LE BOURGET AIRPORT, PARIS, FRANCE

The three occupants suffered minor injuries when the Maltese-registered charter jet stalled onto Paris-Le Bourget Airport's Runway 27, collapsing all three legs of the landing gear. The light jet slid off the left side of the runway, igniting a fire that was quickly suppressed by the airport rescue and firefighting crew. The flight had arrived from Venice's Marco Polo Airport.

No Injuries after Falcon Aborts Takeoff

FALCON 900EX, FEB. 13, 2021, MONTGOMERY-GIBBS EXECUTIVE AIRPORT, SAN DIEGO, CALIFORNIA

Two passengers and three crew members evacuated the aircraft without injury after it ran off the end of the runway following an aborted takeoff. The Part 91 flight was intended to proceed to Hawaii's Kona Airport, but the pilots reported that the flight controls failed to raise the nose when the jet reached rotation speed. The crew immediately aborted the takeoff, but the airplane continued off the runway, coming to rest about 560 feet beyond.

Seven Fatalities in Nigerian King Air Crash

BEECHCRAFT B300 KING AIR 350I, FEB. 21, 2021, ABUJA INTERNATIONAL AIRPORT, NIGERIA

A King Air 350i operated by the Nigerian Air Force crashed while attempting to return to the Abuja Airport following a reported engine failure after takeoff. Much of the aircraft was destroyed by a post-crash fire, and none of the seven persons on board survived. As of this writing, the identities of the victims had not been released.

The flight was bound for Minna, 68 miles to the northwest, to help rescue 42 victims of a mass kidnapping. Nine minutes after the initial report of an engine failure, the King Air went down in scrubland just outside the airport's perimeter fence under the final approach course to Runway 22, narrowly missing warehouses and makeshift settlements in the vicinity. Textron Aviation and the NTSB have been enlisted as parties to the investigation.

R66 Lost Off Kodiak Island

ROBINSON R66, MARCH 2, 2021, NEAR KODIAK, ALASKA

The helicopter is presumed to have been destroyed and its solo pilot killed after it disappeared over open ocean on a flight from Anchorage to Kodiak. Its Spidertracks trace ended south of the Barron Islands about 70 miles north of Kodiak. No emergency locator transmitter signal was received. A two-day search by the Coast Guard located only "minimal debris believed to be from the helicopter," including an inflated yellow pop-out float. Several days later, parts of the helicopter's fuselage, skids, and float were found on a beach near Afognak Island.

The pilot was the owner of Kodiak Helicopters, which owned and operated the R66. A company pilot told investigators that the owner had him cancel any scheduled charter flights so he could take the helicopter for a few days to be in Kodiak with his family when a local news story concerning him broke. He said the accident pilot "seemed distracted and not himself." The Anchorage Daily News subsequently reported that a week earlier he'd resigned as head of the Alaska Native Tribal Health Consortium following charges of sexual misconduct, accusations the pilot denied.

FINAL REPORTS

Questionable Flight Planning Leads to Fuel Exhaustion

PIPER PA-42, MARCH 31, 2017, SOROCABA, BRAZIL

The pilot's inflight decision to skip an intermediate stop while flying at a lower-than-optimal altitude without setting power for maximum economy led to a dual loss of engine power on final approach. The airplane was destroyed and the pilot and passenger killed when it went down just one kilometer (0.62 miles) from the Sorocaba airport. The landing gear was extended. Cavitation in the fuel pumps' gear bushings and discoloration of the gear teeth from overheating indicated that the pumps had been run dry. There was no post-impact fire and no blighting of vegetation at the accident site.

The flight departed Manaus on a flight plan to Barra do Garças with a full load of fuel (3,752 pounds usable). En route, the pilot amended his destination to Sorocaba, 532 nm further away, and continued at an altitude of 13,500 feet and his filed airspeed of 220 knots. CENIPA investigators determined that the use of economy cruise power would have slowed the airplane to 202 knots but allowed the flight to be completed with a 30-minute fuel reserve. Using normal cruise power at FL250, the flight would have arrived with a reserve of one hour 15 minutes, but using normal cruise power at 13,500 feet would have required 4,175 pounds of fuel, 363 more than its capacity.

The choice of the lower altitude has not been explained. While the aircraft's logbooks did not record any deficiencies in its pressurization system, they were out of date, with no entries since its previous inspection in August 2016.

Partial-power Climb Caused Departure Stall

CESSNA 550, MAY 22, 2019, INDIANAPOLIS, INDIAN

Physical evidence corroborated by witness testimony showed that the pilot's failure to use full power during and after takeoff caused airspeed to decay, resulting in a fatal low-altitude stall. The 75-year-old airline transport pilot and his only passenger were killed when the jet crashed into a flooded cornfield half a mile northeast of the Indianapolis Regional Airport. About 80 percent of the wreckage was consumed by a post-impact fire.

Aggregated flight track data showed that the Citation's airspeed began decreasing from a maximum of 141 knots as it climbed through 163 feet agl; the last radar hit came at 263 feet agl and a groundspeed of 100 knots on a heading of 346 degrees. Surface winds were from 170 degrees at 9 knots gusting to 14, implying that its airspeed was between 86 and 93 knots. A witness on the ground reported seeing the jet roll to an estimated 90-degree bank with its nose parallel to the horizon; its nose stayed at or below the horizon as the wings rolled level, then dropped until the airplane hit the ground. The manufacturer calculated that at its estimated weight of 14,500 pounds, stall speed would be 100 knots at 45 degrees of bank and 118 knots in a 60-degree bank.

The non-volatile memory in the right engine's Fadec recorded no faults but also never began recording a logic trend snapshot, which requires the throttle lever angle to be set to full takeoff power for at least two seconds after the weight-on-wheels switch opens. (Damage precluded downloading the left engine's Fadec data.) A witness who'd flown with the pilot twice in the Citation, most recently the day before the accident, reported that on both occasions he was "very behind the airplane," pulling the power levers back early and flying at slower-than-normal airspeeds while maintaining that the jet "flew like a [Cessna] 172." The NTSB accordingly attributed the accident to "The pilot's failure to fully advance the power levers during the takeoff and initial climb..."

Multiple Factors Led to B.C. CFIT

CESSNA 208 FLOATPLANE, JULY 26, 2019, ADDENBROKE ISLAND, BRITISH COLUMBIA, CANADA

Fatigue and group dynamics may have contributed to the pilot's choice to continue flying into reduced visibility under low ceilings. The pilot and three passengers were killed and four other passengers suffered serious injuries when their float-equipped Cessna Caravan hit a forested hillside on Addenbroke Island at an elevation of 490 feet. One other passenger escaped with minor injuries. The flight was one of four company aircraft that departed to the north-northwest from Vancouver Harbour Water Aerodrome, carrying three passengers to a fishing lodge and the fourth to a research station nearby. All were initially delayed for weather but eventually took off despite consistent reports of conditions below VFR minima along the last 75 miles of the route.

The accident flight was scheduled to depart first at 0730 but actually took off third, more than two hours later. It maintained 4,500 feet for the first hour, then slowly descended to 1,300 feet. Seventeen minutes later it began another gradual descent, this time to 330 feet over the ocean just offshore. A returning company aircraft that entered Fitz Hugh Sound southbound descended to 170 feet over the water after entering an area of heavy rain. Its pilot was in radio contact with the accident pilot and they agreed to stay on opposite sides of the channel. The accident pilot altered course slightly to the east and descended to 230 feet as the airplanes passed one another at a distance of about 2 nm. The accident airplane then turned 25 degrees to the west and began a gradual climb. Less than two minutes later, it struck trees in straight and level flight.

Reports and camera footage from lighthouses near the site showed visibilities varying from 15 statute miles to as little as 1/8 mile in rain and fog. Interviews with other company pilots and cellphone records from the accident flight led TSB investigators to conclude that the pilot was likely using the autopilot well below its certificated en-route minimum of 800 feet agl and had disabled the Garmin G1000's obstruction warning and synthetic vision systems. The pilot, who had a second job, had worked 27 of the past 28 days, including 83.5 hours the preceding week on a schedule conducive to circadian rhythm disruption, with less than five hours sleep on at least one night.

The TSB also noted that while company pilots made individual go/no-go decisions, those for multiple-aircraft charters "are made either explicitly and/or implicitly as a group," as are decisions to continue or turn back. Groups comprised of individuals with widely varying levels of seniority can be susceptible to conformity or compliance biases in these situations. In this case, the first (successful) flight was made by the company's operations manager, who reported the weather conditions to the others. ■

50
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Textron Aviation delivers 600th CJ3-series twinjet

by Jerry Siebenmark

Less than a week after handing over its 1,000th Cessna Citation 560XL, Textron Aviation delivered its 600th Cessna CJ3-series jet on April 5 to an undisclosed North American customer. The Model 525B series includes the CJ3 and CJ3+.

"Since joining the Citation family, the Citation CJ3 series has proven to be an incredible performer for customers around the world with the connectivity, price, range, and efficient operation that puts it at the top of its category," said Textron Aviation senior v-p of global sales and flight operations Lannie O'Bannion. "The CJ3+ remains a strong performer due to its versatility as Covid-19 limitations have prompted customers to look for alternatives to commercial travel."

Equipped with Garmin G3000 avionics and powered by two Williams FJ44-3A turbofan engines, the CJ3+ has maximum seating for nine passengers and can carry up to 1,000 pounds of baggage. NBAA IFR range is 2,040 nm.

The CJ3 is part of the CitationJet family of single-pilot twinjets and was introduced to the market at NBAA 2002, followed by FAA type certification and first delivery in 2004. The CJ3+ was first delivered in 2014. ■

Textron Aviation handed over the 600th Citation CJ3-series jet, a CJ3+, to an undisclosed North American customer on April 5.

› continued from page 1

1,000th Citation 560XL delivered

product strategy at the time was to build upon the success of the original Citation and develop successive models that were slightly larger than their predecessors and had a higher speed and increased range but were similarly reliable and had a low cost of operation. Examples of that strategy include the Citation II, an upgrade to the Citation I; and the Citation V, an upgrade to the Citation II.

"Development costs for these upgraded Citations were much lower, and we were able to use many components of the original model," said Meyer, adding that the Citation II employed a stretched fuselage, the same airfoil, and the same empennage as the Citation I as well as many of the same systems. "The same was true about the move from the II to the V," he said.

The 560XL was another example of this strategy, Meyer explained, noting that by the time it came along, Cessna had delivered more than 3,000 Citation Is, IIs, S/IIs, and Ultras. "As a result, we had a really solid base of prospects looking to upgrade to a midsize jet," he said.

But not just any midsize jet. Citation owners and operators—some of whom comprised its Citation Advisory Council—wanted a midsize jet that had a stand-up cabin, short-field performance, adequate speed and range, and high reliability at an attractive price, Meyer noted. The price—$6.775 million at the time—was kept down in part by Cessna engineers who devised a lower-cost way of mating the wings to the fuselage that required fewer parts and fewer hours to assemble, Meyer added.

"The beauty of the Excel to me is we knew there would be a solid market," he said. When Cessna announced the Excel at the 1994 NBAA convention, he added, it took 50 orders for the jet, "which had never happened in the industry before." By the time deliveries began, Cessna had a backlog of 200 orders for the Excel.

The third edition of *The Legend of Cessna*, published in 2007, credited Meyer with saying he expected the company to sell more than 1,000 Excels. "We were so confident of the Excel it seemed like a reasonable statement to make," he said. "And the good news is it's still in production." Whenever 560XL production does end, Meyer said, it "might turn out to be" the longest business jet in production for a single model. "It was a good program that benefited from the experience we had on prior and existing Citation models." ■

by Gordon Gilbert

Within 6 Months

May 13, 2021 **NEW**

EASA: AFIS Phraseology

The introduction of updated ATC-provided airport flight information service (AFIS) requirements on Jan. 27, 2022 necessitates establishment of standardized phraseology to be used for air–ground voice communications when providing such service. EASA has proposed regulations to ensure that standard phraseology is incorporated into the new AFIS requirements. Comments are due by May 13, 2021.

May 25, 2021 **NEW**

EASA: Helicopter Bird Strikes

Windshield bird-strike protection rules are proposed for EASA Part CS-27 small helicopters. The requirements will apply to newly design rotorcraft in Europe and be similar to the bird-strike standards that have been in place since 1996 for Part CS-29 and U.S. FAR Part 29 large helicopter designs. Comments on the proposal are due by May 25, 2021.

May 27, 2021 and Aug. 25, 2021

EASA: Aging Aircraft Structure

Incremental deadlines are set for implementing new and revised EASA regulations to address large turbine airplane structural aging risk factors. Design approval holders must develop data to support continuing structural integrity programs. Operators of covered airplanes need to revise maintenance programs to incorporate those data and to address the adverse effects of airframe modifications and repairs.

May 31, 2021

EASA: Ditching Survivability

Improving the ability of occupants to survive a water impact from a helicopter ditching is the subject of a EASA NPA that would revise type certification standards for both small (Part CS-27) and large (Part CS-29) rotorcraft by requiring several design improvements. In addition, this NPA also proposes enhancements to certification specifications for new ditching and emergency flotation provisions. Comments are due May 31, 2021.

June 2, 2021

U.S.: Aircraft Fuel Truck/ Farm Fire Standards

The National Fire Prevention Association (NFPA) has revised its aviation servicing standards to call for the installation of automatic shutdown systems on aircraft fuel trucks and fuel farms. The NFPA standards, typically adopted as requirements by regulatory agencies, apply to in-service trucks and fuel farms, as well as for new equipment. In-service equipment would need to be retrofitted by June 2, 2021.

June 12, 2021

U.S.: Weight and Balance Program

Extensive changes to how aircraft weight and balance calculations are to be made were adopted last year under OpSpec Notice 8900.551 and Advisory Circular AC 120-27F. The compliance effective date is June 12, 2021. The FAA will no longer publish average passenger or baggage weights. Until June 12, operators will have the option to use actual weights or an approved average weight method they have developed. After June 12, operators that have not received amended OpSpecs/MSpecs/LOAs should use actual weights.

Within 12 Months

Nov. 4, 2021

ICAO: Runway Surface Format

In response to the on-going Covid-19 pandemic, ICAO has delayed for one year the applicability date of the new global reporting format (GRF) for assessing runway conditions to Nov. 4, 2021. ICAO, in partnership with key international organizations, will continue to provide support to member states and stakeholders as they emerge from the current crisis and revise their implementation plans.

Nov. 25, 2021

Canada: ELTs

Starting on Nov. 25, 2021, Canadian-registered commercial and private aircraft are required to have an emergency locator transmitter that broadcasts simultaneously on the 406 MHz and 121.5 MHz frequencies. Foreign-registered aircraft operating in Canada must have at least one 406 MHz ELT by November 25. Currently, Canadian aviation regulations only require that aircraft operate with one 121.5 MHz ELT.

Beyond 12 Months

Sept. 16, 2022 and Sept. 16, 2023

U.S.: UAS Remote ID

New FAR Part 89 requires that after Sept. 16, 2022, no unmanned aircraft system (UAS) can be produced without FAA-approved remote identification capability. After Sept. 16, 2023, no unmanned aircraft can be operated unless it is equipped with remote ID capability as described in new Part 89 or is transmitting ADS-B Out under Part 91.

For the most current compliance status, see: https://www.ainonline.com/aviation-news/compliance-countdown

by Kerry Lynch

JAMES ELIAN

HELINA TESHOME

DEREK THOMSON

CAMERON BURR

DAVID MACDONALD

AirSprint Private Aviation has expanded the roles of its senior leadership. **James Elian** has added the title of CEO in addition to his duties as president. Elian has served as president since 2015 and has been with the company for 20 years. **Jared Williams** is now COO in addition to his previous responsibilities as v-p of operations. Williams joined AirSprint in 2017.

Petar Todorovic was promoted to president of *sage-popovich*, while **Nick Popovich** moved to the role of chairman. Todorovic, who joined sage-popovich in 2014, most recently was v-p of operations. Popovich, who is also owner of the company, had formerly served as president of the firm.

Krimson Aviation, an Addis Ababa-based flight support, charter, and aviation consultancy, promoted **Helina Teshome** to managing director, appointed **Gideon Girma** to the newly created position of commercial manager, and named **Michael Mesfin** concierge services manager. Teshome previously served as Krimson's chief commercial officer. Girma joins Krimson after serving with Ethiopian Airlines and Aeroservices. Mesfin has spent nearly a decade working at travel firms and international organizations.

Global Aerospace named **Sharon Holahan** global head of complex claims and **Michael Dobson** interim director of claims. Holahan has served as executive v-p and director of claims in the U.S. since 2012. Dobson, who has been group head of claims and group general counsel, has more than 25 years of experience in the legal and claims insurance market.

Lewis Prebble joined *StandardAero* as president of the company's Airlines & Fleets division. Prebble, who has 25 years of aerospace experience, most recently served as senior v-p for the Americas for Rolls-Royce and also has held a number of senior roles with Bombardier.

Wencor Group named **Josh Abelson** to the newly created role of president of PMA and chief commercial officer of PMA and distribution. Abelson has more than 35 years of sales, marketing, and supply chain experience with companies including Aviall, Heico, and AeroTurbine, and most recently was president of Delta Material Services.

Hawthorne Global Aviation Services appointed **Cameron Burr** executive chairman of the board. Hawthorne also added **Glenn Leonard** and **Jon Slangerup** to the board. Burr, who has served on the Hawthorne board since the company's inception in 2011, is a managing partner at JetCapital. Leonard brings a background in corporate, charter, and airline operations and previously co-founded Cavok. Slangerup has more than 30 years of executive leadership experience including with Mxi Technologies, the Port of Long Beach, and FedEx.

The *General Aviation Manufacturers Association (GAMA)* added three members to its Executive Committee: **David Coleal**, CEO of Incora; **JoeBen Bevirt**, founder and CEO of Joby Aviation; and **Roei Ganzarski**, CEO of magniX and executive chairman of Eviation.

David Hess has joined the board of *Woodward*. Most recently CEO for Arconic, Hess spent 38 years at United Technologies, including as executive v-p and chief customer officer of UTC Aerospace, president of Pratt & Whitney, and president of Hamilton Sundstrand.

Derek Thomson, the commercial director and accountable manager for *Air Charter Scotland*, was appointed to the board of The Air Charter Association (ACA). Thomson brings 25 years of aviation experience to his role on the ACA board, including in both rotary and fixed-wing operations and sales.

Bombardier appointed **Stuart Bailey** as general manager of its recently acquired Berlin Service Centre in Germany. Bailey previously spent two decades with Lufthansa, holding roles in Germany, Malta, and the U.S.

H+S Aviation appointed **Len Russo** as a global strategic account executive for the company's GE Aviation T700 and CT7 engine product lines. Russo has more than 30 years of aviation industry experience, most recently focused on the GE T700 and CT7 engine lines. H+S also named **Jim Payton** global strategic account executive for the company's CTS800 engine product line business. Payton has more than 35 years of aviation experience, primarily with Rolls-Royce.

Gulfstream Aerospace named **Antonia Gilbert** senior regional sales manager for western and southern Europe. Gilbert has more than 12 years of business aviation experience, most recently with Jet Aviation in Basel and before that as a charter broker with JetAlliance in Austria and Global Jet Concept in Geneva.

Norm Matheis has taken a business development role with *Mid-Canada Mod Center*. Matheis joins Mid-Canada after serving with Universal Avionics, Field Aviation, and Bombardier Aerospace and most recently as an avionics and special missions aircraft consultant.

Jet Support Services, Inc. named **Pascale Barhouch** director of business development for the Middle East and India. Barhouch has 13 years of experience, previously holding senior sales and marketing roles with Abjad Group, Rizon Jet, and, most recently, Gogo Business Aviation.

ACC Aviation appointed **David Macdonald** as head of global business development. Macdonald has more than three decades of aviation experience, including with Air Partner, Hunt & Palmer, and Oxygen Aviation.

ACASS appointed **Chris Warton** as sales director of Western/Central U.S. and Mexico. Warton joins ACASS with a background in flight operations, customer service, training, and sales, having previously served with Bombardier and CAE.

C&L Aviation Services hired **Roger Daily** to serve as assistant director of maintenance. Daily has 30 years of aviation experience, most recently with ExpressJet.

West Star Aviation named **Michael Sichmeller** avionics technical sales manager at its East Alton, Illinois facility. Sichmeller has more than 37 years of aviation experience. **Sam McRickard** joined West Star as project manager at the Grand Junction, Colorado facility. He had held R&D, design, and certification project management positions at Cirrus Aircraft.

Duncan Aviation named **Jason Thuman** manager of its satellite shop in Kansas City. Thuman has 14 years of experience performing avionics installations at Duncan and is finishing his bachelor's degree in business management and leadership with work set to begin on a master's in organizational leadership in July.

L2 Aviation appointed **Steve Pascoe** as engineering manager. Pascoe was a former senior engineering manager for Gogo and also has served with Global Eagle Entertainment and Collins Aerospace.

Fernando Quental was appointed Brazil area manager for *Bristow*. Quental, who brings more than 20 years of leadership experience to this role, recently was business unit director of oil, gas, chemicals, and minerals for SGS do Brasil and before that Latin America services director for Baker Hughes.

Todd Spangler joined *Jetcraft* as sales director for Florida and Central and South America. Spangler brings a 25-year business aviation career to his new role that has included senior sales positions at Bombardier, Elliott Jets, Hawker Beechcraft, and NetJets.

Flight Schedule Pro has added several new staff members. **Anna Luckey** is principal user experience designer; **Caleb Curry** is an application developer; **Brittany Simmons** is a marketing coordinator; **Leslie Schwarz** is an office manager; **Trent Husak** is lead technical support engineer; and **Bryan Kriss** is a front end application developer.

FreeFlight Systems promoted **Justin Yows**, **Kenia Goodman**, **Rob Hall**, and **Keith Maness**. Yows, who has been with the company for nine years, is now a production supervisor. Goodman began with FreeFlight in 2017 as a temp in shipping and receiving and has moved to several positions since, now as a buyer and planner. Hall joined the company in 2019 with a background in electronics and now has become procurement manager. Maness began as a process engineer a year ago and is now production manager. ■

AWARDS and HONORS

The *Aircraft Owners and Pilots Association* (AOPA) honored four aerospace innovators and leaders—famed designer **Burt Rutan**, retired U.S. Air Force Brig. Gen. **Charles McGee**, U.S. Air Force Lt. Col. **Kenyatta Ruffin**, and BRS Aerospace founder **Boris Popov**—during its fifth annual R.A. "Bob" Hoover Trophy Awards in February.

Rutan received the highest honor, the R.A. "Bob" Hoover Trophy, for his "airmanship, leadership, and passion for aviation." Rutan has designed 49 aircraft, including the Voyager, which flew around the world in 1986, and SpaceShipOne, which brought the first civilian astronaut to space in 2004.

AOPA presented the inaugural Brigadier General Charles E. McGee Aviation Inspiration Award to its namesake, Charles McGee, who was a member of the Tuskegee Airmen. AOPA noted that McGee fought two wars simultaneously during World War II, one against fascism in Europe and another against racism in the U.S.

Ruffin, meanwhile, also received the award as an "aviator and hero in the name of General McGee." An F–16 pilot and commander of the 71st Operations Support Squadron, Ruffin also founded a flight school, helped found a STEM summer camp, and founded the Legacy Flight Academy that works to preserve and grow the legacy of the Tuskegee Airmen.

The General Aviation Safety Award was presented to Popov, who is credited with helping to drive down the general aviation fatal accident rate with his whole-airframe parachute concept. The system is believed to have saved 438 lives to date. More than 30,000 general aviation aircraft are equipped with BRS parachutes. ■

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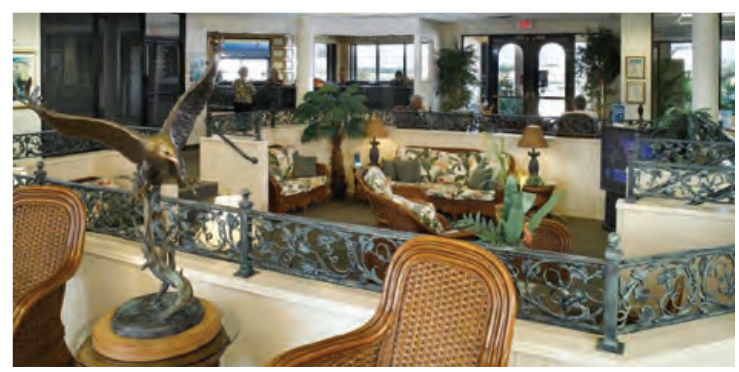

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