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« Business aviation operators such as air-ambulance provider FAI Air Ambulance have stepped up efforts to help during the coronavirus pandemic, in this case by installing this Epishuttle patient isolation pod, which allows patients to be transported while connected to a lifesaving ventilator.

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Bizav community digs deep for Covid humanitarian aid

by Charles Alcock

In the maelstrom of the Covid pandemic's impact on the business aviation sector, it has been hard to find space to reflect the personal toll it has taken on those working in the industry, but also their extraordinary response to this unprecedented public health and humanitarian crisis. What's clear is that across the industry, companies and individuals have tapped two important reserves that have sustained them in previous times of hardship: self-belief and a desire to demonstrate aviation's special ability to support those in dire

need even when, or perhaps especially when, times are exceptionally tough.

Many of business aviation's humanitarian efforts have happened under the radar, and in many cases, those responsible prefer to keep it that way. But it's right to acknowledge some of the inspiring initiatives taken by the industry, even if what follows is just a selective cross-section of episodes in which this sector of aviation has been a force for good. What makes much of this all the more remarkable is that these above-and-beyond

efforts were being made at a time when the industry faced an existential crisis, with business and personal travel all but completely suspended for weeks on end.

In the early stages of the Covid crisis, the scramble for medical supplies and equipment was paramount and several business aircraft operators and support providers rose to the challenge. Aircraft were dispatched wherever they were needed to move key personnel and supplies to where

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In lieu of the pandemic-cancelled NBAA-BACE 2020 last month, the **AIN** staff instead worked hard to connect with companies and industry leaders that would have attended the annual business aviation show. The result is this special print issue, which contains a collection of in-depth features and coverage to celebrate the business aviation industry's resilience, value, and innovation.

All three of these qualities are visibly present in our cover story, in which senior editor Charles Alcock highlights the humanitarian efforts we have seen from the industry during the Covid-19 crisis. Like similar efforts in the wake of hurricanes, floods, earthquakes, and other disasters, business aviation—thanks to its flexibility and capability—once again was the first responder in the immediate aftermath of pandemic-

induced border shutdowns, repatriating stranded travelers, moving scarce personal protective equipment (PPE) where it was needed, and transporting Covid patients to care facilities.

The manufacturing side of the industry also stepped up in a big way. Companies such as Piper Aircraft scrambled to set up makeshift production lines to make face shields, while others such as Embraer and CAE went far outside of their normal zone to manufacture ventilators for severely ill, hospitalized Covid patients.

Frankly, we couldn't think of a better way to begin this issue. Inside, you'll find more stories that reflect what makes this industry special.

Chad Trautvetter

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NBAA Memories

In the absence of this year's NBAA show that was canceled due to the Covid-19 pandemic, below are remembrances of past conventions from captains of the industry to you, our readers. The responses highlight how the annual event resonates throughout the industry.

See uncut show memories and others at our NBAA show memories landing page. (ainonline.com/aviation-news/nbaa-memories/all-news)



ED BOLEN
President and CEO of NBAA

Attending every NBAA-BACE since 1995 has provided me with a quarter-century of cherished memories. The convention is always an amazing showcase of breathtaking new products and services. But my most profound memories are of the remarkable people who annually gather to celebrate all things business aviation.

Through the years, I have been blessed to find myself in the presence of icons and legends, including Neil Armstrong, Joan Garrett, the Tuskegee Airmen, Arnold Palmer, and Jeff Bezos. I have also had the joy of being surrounded by industry newcomers and veterans, volunteers who support humanitarian relief efforts, and students who yearn for a career in aviation.

I could go on and on about special memories at NBAA. Here are three stories that mean the world to me.

At the 2010 Convention in Atlanta, we had a very special ceremony. For the first time ever, we had a Day 2 opening session. As part of that session we had then-FAA Administrator Randy Babbitt present the FAA's Wright Brothers Master Pilot Award to Neil Armstrong, Gene Cernan, Arnold Palmer, Clay Lacy, and Russ Meyer. The award includes a lapel pin. Watching each of those epic individuals walk across the stage and be "pinned" by the Administrator was absolutely goosebump-inducing.

At the 2012 Convention in Orlando, NBAA recognized the Tuskegee Airmen with our highest honor, The Meritorious Service Award. George Lucas, who produced the award-winning movie *Red Tails*, was scheduled to be at the Orange County Convention Center to introduce the Tuskegee Airmen. A little more than 24 hours before the ceremony, we got a call from Lucas. He said that "something had come up," and he would not be able to be with us in Orlando. However, he said he was on his way to a studio, where he would film an appropriate introduction for the airmen. He said he couldn't talk about what had come up, but that

he hoped when we learned about it, we would understand. George did indeed film a beautiful and heartfelt introduction that we played on the big screen as we presented our award. About an hour later, the news broke that—while we were presenting the Meritorious Service Award—George had closed a deal to sell LucasFilms to Disney for \$4 billion.

In 2015, we were in Las Vegas, and Dierks Bentley was set to be our keynote speaker. The night before the show opened I saw Dierks at a reception. He told me that he had been working hard on his speech, but that he was nervous because he had never stood at a podium and talked to a crowd. He was used to singing, not speaking. I tried not to act surprised, but it was a little concerning to learn that our keynote speaker had zero public speaking experience. Of course, when the curtain rose, Dierks was absolutely brilliant—one of the best speakers we've ever had. Turns out, he made a last-minute decision in the green room not to read the speech he had spent weeks writing. Instead, he just walked out and spoke from the heart about what being a pilot meant to him. His passion and emotion reverberated throughout the crowd. He was a smash hit. ■



DAVE FRANSON
President and owner of Franson Consulting and president of the Wichita Aero Club

I have actually attended the show for 42 of my 46 years in the business aircraft community. I even managed two NBAA conventions—1992 and 1993—while serving as v-p of meetings and membership.

When I took over in April 1992, much of the preparation for the upcoming show in Dallas hadn't been done. Fortunately, I had long attended the show and was familiar with it. Early on, I hired Kathleen Hull (now Blouin) and she brought excellent organizational skills and creativity. She went on to make exceptional contributions to NBAA over the next two decades. We were shocked to learn that there were no signed contracts for upcoming show sites or dates.

A long-standing NBAA board tenet excluded Las Vegas and Orlando, Florida, from consideration, even though both sites had more than adequate space. The problem, according to the "conventional wisdom" of the board, was that either site would offer too many distractions and would adversely affect attendance and focus. Kathleen and I visited both places, put together a proposal that included possible sites and presented them to the board in a closely-guarded meeting at NBAA headquarters in Washington, D.C.

We weren't sure whether we would be celebrated or reprimanded for proposing the previously forbidden sites, but the board chose to hold the 1995 show in Vegas and the 1996 convention in Orlando. Right after the decision had been made, the board meeting recessed briefly. Within minutes of stepping out of the session, I got a call from a veteran editor who said, "I understand you'll be taking the convention to Las Vegas and Orlando for the first time ever." It turned out he got a tip from a well-connected board member who divulged the secret as soon as we took our break. Business aviation is definitely a close-knit industry!

NBAA will always be among my most enjoyable experiences. The biggest reasons, of course, are all of you who have made it so. For me, NBAA really means: "No Better Aviation Associates." ■

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WILSON LEACH
AIN Managing Director

Other than the two NBAA Conventions that were cancelled/postponed—September 2001 due to 9/11, and the Katrina postponement of 2005—two other NBAA Conventions immediately come to mind.

The most relevant and important to me was the 2003 NBAA convention in Orlando, Florida. It was when NBAA held its awards dinner on the third night of the convention, and the guest of honor was Ray Siegfried, founder of Nordam. Ray had been diagnosed with ALS/Lou Gehrig's disease in early 2000, and even though he was clearly affected by this debilitating disease, he ran Nordam right up until his death on Oct. 6, 2005.

As the guest speaker at the 2003 convention—effectively fully paralyzed and bound to a wheelchair—Ray spoke

eloquently for 30 minutes using the then-new technology called Eyegaze, where he could speak through a computerized system using eye commands. Ray gave such an articulate, direct, heartfelt, poignant, unbelievable talk to everyone in the audience that it is impossible to put into words.

Included at my table were Russ Meyer, Ed Bolen, and several others. Every one of us was completely spellbound by the remarkable strength and character Ray displayed that evening. At the end of Ray's talk—of course, to a standing, applauding ovation—there was not one dry eye in the house. No one at our table could say a word—Ray left us all speechless.

Another memorable NBAA was Dallas 1997. As usual, I can't sleep the night before the opening day issue and always ask our distribution team to slide a first-off edition of NBAA Convention News under my door, typically at 4 a.m.

Early that Tuesday morning, I am thumbing through the issue and come to an article on Bombardier, where there is a picture of Trevor Young, the lead executive on the Continental Jet (now known as the Challenger 300) development team. However, the entire caption was written to describe a picture of the famous founder and then-current CEO of Bombardier, Laurent Beaudoin. In other words, we mistakenly put the wrong picture with

the caption and article. Disaster loomed...

I had learned through many years of firsthand experience that when you have an error of this magnitude, it's best to confront it head-on and alert the people in question. I was much younger then and said what the hell—being an hour later on the east coast, I was able to contact the security guard at Bombardier in Montreal. Somehow I managed to wrangle from him the hotel Mr. Beaudoin was staying at in Dallas.

So I called Mr. Beaudoin at his hotel, and caught him while he was shaving. I explained the situation as best I could but had no idea what his reaction was because he was just grunting as I was talking—he was shaving and clearly wasn't happy.

My first mission on that opening day of the convention was to go to the Bombardier booth and offer a mea culpa. Laurent and his cohorts, including Trevor Young, were all laughing at the page of NBAA Convention News that had been placed upon an easel so everyone within Bombardier could get a good laugh out of it.

To this day I still marvel at how such a negative situation somehow turned positive. Yes, there was a little bit of foresight on my part, just a little; but the real takeaway was how an industry leader like Laurent Beaudoin kept ego in check and had a good laugh. I've never forgotten this experience and never will. ■

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NBAA honors successful DEF flameout safe landing

by Kerry Lynch

NBAA marked its first Virtual Safety Week with a Safety Town Hall on October 7 that celebrated the airmanship, attentiveness in the flight deck, and crew resource management during the successful dead-stick landing of a Cessna Citation II in Savannah, Georgia, following a diesel exhaust fluid (DEF)-induced dual engine flameout.

NBAA also took the occasion of the virtual Safety Town Hall to announce its inaugural NBAA Above and Beyond Airmanship Award that was presented to the pilots involved, Bruce Monnier and Gerald Downs, for their roles in what the webinar's moderator, aerospace and science journalist Miles O'Brien, termed as business aviation's version of "Miracle on the Hudson."

The Citation, N744AT, was one of two operated by air-ambulance operator Air Trek that lost engine power on May 9, 2019, from DEF contamination after receiving fuel from the FBO at Punta Gorda Airport (PGD) in Florida. The second Citation lost power in one engine, while N744AT lost power from both engines.

The incidents—among 15 DEF contamination events that have occurred in the past three years, according to Town Hall participant and AOPA Air Safety Foundation senior v-p Richard McSpadden—helped spur a concerted government/industry effort to raise awareness about the dangers of DEF contamination and the need for proper training, storing, marketing, and handling. In fact, McSpadden said industry groups are pushing to get DEF off airports altogether because the risks are too grave. "This stuff is dangerous," he emphasized.

But Wednesday's town hall also focused on the successes of the May 9, 2019 event and how two pilots who rarely flew together worked calmly in concert, drawing upon experiences in training and knowledge of glider flying, to land an aircraft at an alternate airport after issues first surfaced while flying at 35,000 feet over the Atlantic Ocean.

"NBAA is honored to present Bruce Monnier and Gerald Downs with the first NBAA Above and Beyond Airmanship Award in recognition of their professionalism and bravery," said NBAA president and CEO Ed Bolen. "Their story is inspirational to everyone in the business aviation industry and a reminder of the importance of always keeping safety in the forefront."

Monnier, the flying pilot of the flight that day, is an airline transport pilot, flight instructor, and captain with more than 4,000 flight hours. Perhaps serendipitously, at a previous flight training session in a simulator, Monnier had asked his flight instructor if he could practice a dual engine-flameout with spare simulator time.

As it turned out, that training became

important because the airplane behaved exactly as it had in the simulator after it had lost both engines. Monnier said that during simulator training, he was skeptical, thinking the scenario was a bit optimistic in the way it was handling. "Then, here we are in the real world and it happens," he said, adding his reaction was, "This isn't bad at all. This is just like the simulator."

Also helping the scenario was copilot Downs, who, while a part-time pilot for Air Trek, is an airline transport pilot with more than 10,000 flight hours, instructor pilot, and holds ratings in fixed-wing, helicopter, glider, and gyroplane aircraft over a 48-year aviation career. In describing the event, Downs noted that with gliders it is about energy management and that is what this scenario involved.



Bruce Monnier

all their electrics died, they just knew to work the battery and reset the battery and whatever the steps are," he said.

While based and fueled in Punta Gorda, Monnier and Downs had flown to Naples Municipal Airport without incident to pick up a patient and two other passengers—including the patient's daughter, who Monnier mentioned was a nervous flyer—and two medical crew. Before the flight, Monnier had promised a smooth flight to their destination of Niagara Falls.

While overwater at about 35,000 feet, Monnier said he "was kind of fidgeting with the fan speed on the number one engine," when Downs noticed this was going on for some time and queried about it. They both noticed it did not want to "settle down," Monnier said. The engine then started to lose power, but at this point, it was still a "non-event," he said. Monnier pulled back the engine a little and then tried to roll it back up to see how it reacted, but it continued to lose power. "That's when we knew we had a problem with the number one engine."

They did not declare an emergency at



Gerald Downs

“We had an undercast and just about the time we were going through the undercast, about 1,500 feet of it, we lost all our electric [power]...”

"When you're flying a glider, you've got so much energy and you know, how it's going to fly," he said. While he had not seen this in a Citation, when Monnier said he was going to put flaps down in preparation for landing, Downs told Monnier to wait for a moment while he looked at the glide angle in comparison with the horizon and then said that it's okay for flaps.

Another factor in the scenario was the crew pairing. Both are highly experienced pilots, but Monnier had more experience with the Citation II. Downs flies every couple of months for Air Trek, Monnier said. "Not very often. He's definitely a reserve. But he's been doing it for years with Air Trek. When I came aboard and was trained, I was trained the same way that he had been doing it," he said. "So, when we get up, there is definitely standardization with every new copilot that I fly with. It's the same thing, exact same thing for when we swap crews. It's a nonissue."

McSpadden called that standardization, as well as their training and background, key, noting how quickly it happened. "They really didn't have the time to reference the checklist. For example, when

this juncture—"single-engine is really a nonissue in the twin-turbine world," Monnier said—but they did decide to divert. They weighed options of closest airport and were both familiar with Savannah, which was 40 miles out. They chose that option and began to descend.

The pilots let the medics know that they were diverting so they could brief the passengers and that it was not going to be a big deal. "We would just land, get another plane and run them up to New York as planned," he said.

Passing through 8,000 feet, the same thing happened with the second engine. "That gets your attention for sure. Now we have an emergency," Monnier said. But by that point, they had already gone through all the checklists and procedures and rolled them over to the extent possible to the evolving situation.

"At that point, all the electric was still working," Downs said. "We knew exactly how far we were. We're 13 miles. We're at 8,000 feet descending a thousand feet a minute. When you do the math, we had about 21 miles of energy in reserve. So, it was going to be easy if we don't mess it up."

However, he added, then "things got a little more interesting. We had an undercast and just about the time we were going through the undercast, about 1,500 feet of it, we lost all our electric [power], which was not a comforting thing."

Now, they are using their "peanut attitude indicator. We're saying, okay, this is not good," Downs said. Monnier, who knows the airplane well, was able to reset the battery and the electric power returned. When they cleared the undercast they saw the airport, right where they had anticipated.

It was a moment they had prepared for, Monnier said. "When we turned towards the field at 8,000 feet, we discussed, what systems do we expect that [we] have a problem with, what systems won't work? What will work? We discussed the electric flaps and we'd discussed when to put down the gear."

The landing gear is hydraulically driven, so they anticipated a problem there. "We familiarized and talked about, again, the procedure for pneumatically blowing down the gear—we expected to have to pneumatically blow it down. And we discussed whether we'd have brakes."

Dropping the gear was a bit of an adventure, taking about 15 to 16 seconds for all three green lights, almost three times as long as normal. "We were not happy campers until we saw all the green lights," Downs said.

But the gear did come down and they came to a complete stop on the runway. Of course, without an engine, there was no taxiing, which led to the passenger who was already a nervous flyer to inquire why. That's when the passengers were informed that the second engine had quit as well.

With the calm demeanor and constant communication of the pilots between themselves, the passengers had no idea of the full extent of the troubles the aircraft had encountered. After the aircraft was towed in, the patient was put in a room where he could receive necessary medical assistance until a backup aircraft arrived.

Once it did, they loaded back up and flew on to Niagara Falls. However, the delays allowed poor weather to set in and now instead of a smooth flight, it was one that occurred through storms and required a low approach.

At the end, Downs said, the nervous passenger informed him she still did not like flying on small aircraft, but if she did, she wanted the same crew and gave him a big hug. "That made it all worth it."

They had dinner with the medics, hopped back in the airplane, and returned to Florida, calling it "all in a day's work."

McSpadden praised their performance. "They were very attentive to the engine, which is instructive for all of us. And then as soon as they had the problem, they immediately began the divert. If you back-track on the mileage, if they hadn't taken it seriously from the very start and begun those actions, they wouldn't have made it," he said, calling the events a "remarkable example." ■

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Signs are growing that business aviation in the U.S. is gaining strength and in some respects exceeding expectations, according to participants in an AIN webinar that included an aircraft broker, legal consultant and tax attorney, and charter/management company leader.

Industry leaders optimistic about bizav rebounding

by Kerry Lynch

While acknowledging the difficulties and uncertainties that have come with the global Covid-19 pandemic, industry leaders are upbeat about the prospects for business aviation given the new entrants and the fact that flight hours are climbing back even without business-focused flights.

During an AIN webinar held on October 6, “A Business Aviation Update from Trusted Advisors—Separating Fact from Fiction,” Jay Mesinger, president of Mesinger Jet Sales, said it is a fact that the pandemic has changed the business aircraft market. When people started to indicate in March and April that they would not fly commercial (on airlines), there was skepticism on whether that would translate into business aircraft sales.

“Actually, starting in June, it has translated,” he said. “We have never been as busy. We are working very hard to take those people...and help them buy their first airplane. [It’s] very, very exciting.” This has a ripple effect because these sales mean more insurance gets sold, hangars rented, pilots hired, and maintenance accomplished, Mesinger added.

Demand is increasing, but for individuals, he said, adding the corporate buyer has “pretty much retreated right now. Corporations are sitting back for the moment.”

Despite that increase in new buyers, Mesinger called “fiction” the belief that the new business is driving up prices. First-time buyers are looking for opportunity, he said. As a result, prices have softened anywhere between 5 percent and 20 percent. But that’s a vast improvement from the price drops of 50 percent to 70 percent experienced in 2008. He also called current rumors of the availability of huge discounting now “fiction.”

“I haven’t seen a huge amount of supply coming in and, although we’ve got a huge amount of demand from the first-time buyer, the corporate buying has almost all stopped. So, it left the supply and demand ratio still fairly balanced.”

Because the corporate buyer is waiting in the wings, the market still is not stable, he said, saying rumors otherwise are fiction.

Also speaking during the webinar, GKG Law president Keith Swirsky said he too is seeing a lot of first-time buyers, particularly in the area of fractional ownership. “Those tend to be buyers that do not have business use for aircraft and they are specifically having conversations with me about not wanting to fly commercial.” The customers have not experienced much private aviation, he said.

“They’re looking for other options such as block charter from a management and charter company or any other kind of products or derivative products that are in the marketplace today,” he said.

Also, he is seeing a lot of tax-, financing-, and pricing-motivated purchase decisions. “I’m seeing a lot of strategic buyers, trying to obtain a big write-off, low cost of financing, and an attractive pricing environment,” he said.

Swirsky said there have been incorrect assumptions associated with how quickly a deal can get done because, with much more financing ongoing, the process has slowed. “Financing has become the long pole in the tent,” he said.

In addition, Swirsky added he’s been surprised by the number of calls he’s gotten from new buyers looking for bonus depreciation—a business write-off—when they want the aircraft for personal

use. “There is a big fiction, which of course has been prevalent for years and in particular now, which is I can buy a plane and write it all off.”

As far as the pace of recovery, Dan Drohan, chairman and CEO of Solairus Aviation, likened it to a checkmark model, giving the analogy of riding down the elevator and walking up stairs.

“Early on, we contemplated whether this was going to look more like September 11th or more like the 2008 financial crisis. As it turns out, I think it’s really a whole new animal, something totally different for us,” he said. “I would say Covid has impacted us for longer than we expected, but probably not as deeply as we anticipated.”

Drohan estimated that following the April trough, activity has returned to roughly about 85 percent of what it was in 2019. The fleet development side of the business has been brisk, he said.

The types of flying have changed, he agreed. Most people are flying for leisure and traveling between homes as the trend in the virtual environment has been to leave metropolitan locations for homes in more vacation-like spots. As such, these executives now need to move between first, second, and third homes rather than business facilities.

While there’s no question that the pandemic is bringing new people into business aviation, the question is whether these people will become long-term customers. “I see a lot of what I’m going to call ‘one-hit-wonders’ right now, especially in the charter world,” Drohan said. “I think people are experimenting with this.”

The good news is this travel has offset some of the corporate travel that still hasn’t returned. “And hopefully for all of us, we capture some of them,” he said. The key, he added, will be to bring a high level of professionalism and service. He also stressed the need for the business aviation community to work together to ensure a consistent experience.

“I have always been a big believer in cooperation. Today, [with] my biggest, fiercest competitors, we’re fighting like hell against each other for a client. Tomorrow I will need one of them to take care of the client I’ve already earned,” he said. “So, I think integrity, direct honesty, and working well with industry peers is a really critical key to that outcome [of retaining new customers].”

But he warned that charter companies should not race to the bottom on pricing to keep those customers. New clients should be brought in with proper expectations on pricing, Drohan said.

Mesinger agreed and said the same holds true with aircraft brokerage, noting some clients search out price first. “But if you’re focused only on the price, you could get really caught up in the cost,” he said, and then lose on service. “I’ve had people get out of the airplane business because they’ve had a bad pilot experience. They’ve had a bad management company experience. It has nothing to do with the airplane or meeting the needs or meeting the mission. It was the ancillary services that just frustrated them and made them get out. And that’s getting out for all the wrong reasons.” Those clients typically chose vendors because of price and walked away thinking the entire industry was bad.

“I absolutely believe in the team approach,” Swirsky further said. First-time buyers should have a team of advisors that “know each other well, that enjoy each other’s professionalism, and can work together for the benefit of the client. High-quality service, caring for your client, and doing a good job for your client is a key to success for everyone involved in the transaction and primarily the client.”

As far as prospects for 2021, Mesinger said his anticipation and hope is that next year bests 2019. He noted that the industry was actually starting to see a slowdown then and pointed to December 2017 numbers when used sales reached 405 but then fell to 256 last year. He said that given the current environment where business is active even without corporate flying, there could be a boom in business once corporate flying returns. But, at the least, his hope is 2021 exceeds 2019 levels.

Swirsky was equally optimistic, saying his practice, in particular, saw a surge in business in August and added that business is appearing “analogous” with 2007.

Drohan also agreed, saying he is bullish about the current market dynamic. But in the meantime, he said, the company is remaining cautious in its approach to business because there are still so many unknowns that have come with the pandemic. ■



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Feds work with industry on new rules during pandemic

by Kerry Lynch

While the Covid-19 pandemic has introduced numerous complexities for normal business operations, the government has remained busy on the rulemaking front with a number of proposals and final actions coming out either as the outbreak began to spread globally or during the crisis itself. And work on those rules has continued since.

Expanding Pilot Records Database

For business aviation, one of the most notable actions was the March 30 release of a notice of proposed rulemaking (NPRM) to impose new electronic pilot records database (PRD) requirements, expanding the record-keeping and public-reporting mandate to corporate operators for the first time. That rule further would define a corporate operator for the first time (as one that typically flies with two or more aircraft and requires type-rated pilots) and would call for the submission of details such as comments from check pilots during pilot training in the PRD.



Ed Bolen,
president and
CEO, NBAA

Much to the chagrin of NBAA and other business and general aviation interests, the FAA provided only a standard 90-day public review and comment period. The groups had sought additional time to gather the necessary data to present a full picture of the ramifications of the rule. They noted that with the difficulties of operating during the Covid environment, such a process was more time consuming than normal. However, the FAA was not convinced.

Even so, NBAA, which had called the proposal “regulatory overreach” and “overly burdensome,” put out a rallying cry to its membership and, as a result, the NPRM drew 800 comments on the docket, many of them NBAA members in opposition.

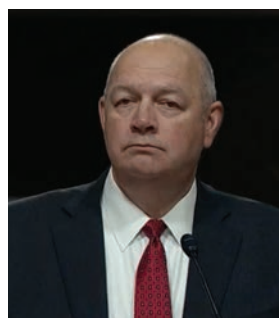
Further, NBAA president and CEO Ed Bolen and Aircraft Owners and Pilots Association president Mark Baker appealed to FAA Administrator Steve Dickson in a joint letter expressing their concerns about the NPRM. Separately, Bolen broached the topic directly to Dickson during a virtual NBAA Town Hall. Dickson had already appeared versed on the issue, saying, “This may be an overbroad solution” and “I’m hopeful that as

[we] work through all the comments that we’ll end up with something that everyone could embrace.”

Doug Carr, v-p of regulatory and international affairs for NBAA, said he was encouraged by the administrator’s comments, saying Dickson “definitely understands some of our concerns....He gets the value of the data and who it should apply to. But, I’m hopeful that he’s also able to appreciate the expansion that’s proposed under the rule in terms of affected operators and the cost.” He added that, in the end, the NPRM is about having access to pilot information to make hiring decisions, and there are other tools that can accomplish that without having to expand the PRD requirements to corporate operators, which would impose a burden with a “de minimis increase in safety value.”

While the comment period closed on June 29, Carr said work continues to gather information and data on the true costs and full ramifications of such an expansion of PRD requirements. Plans are to present this information to government decision-makers once it is fully accumulated. Carr noted that when the FAA drafts its final rule, it will have to go through another series of reviews at the Department of Transportation (DOT) and the Office of Management and Budget.

Because OMB looks at the rule from an economic basis, “we think there’s potentially going to be some cost-benefit data that will be helpful for that discussion. That will be one of the agencies that would be of interest for such cost data,” Carr said, expressing the belief that while NBAA is not opposed to the rule itself, “the applicability to us is based, in our view, on some flawed assumptions.”



FAA
Administrator
Steve Dickson

Supersonic Rules Waiting in the Wings

The FAA has other major rulemakings in the works, including those establishing for the first time broad-based takeoff and landing certification standards for supersonic aircraft. The lack of such standards is a primary obstacle to the certification of new supersonic aircraft. Announced at the end of March and published in the April 13 Federal Register, the NPRM comes as the international community,



Boom Supersonic recently rolled out its XB-1 third-scale demonstrator, which is designed to explore technologies applicable to the company’s Overture supersonic airliner.

through the International Civil Aviation Organization (ICAO), prepares to lay a foundation for global supersonic noise standards later in the decade. The NPRM also comes as the field of new supersonic designs becomes increasingly crowded with recently announced aspirations such as Virgin Galactic’s Mach 3 jet and the government’s supersonic Air Force One executive transport.

The comment period on the supersonic landing and takeoff proposal closed July 13 and nearly 300 comments weighed in on the proposal.

The industry largely welcomed the effort. “It’s necessary for the FAA to identify what the expected requirements are going to be in order to enable the size and the volume of investment and commitment to research and development,” said Walter Desrosier, v-p of engineering and maintenance for the General Aviation Manufacturers Association (GAMA). “You have to have an understanding of what the applicable standards are going to be, what the applicable framework is going to be. I think what the FAA has done is they’ve addressed the thing that’s most immediate in terms of domestic operations. They’re addressing the standard and promulgating a standard for the landing and takeoff.”

Meanwhile, other issues will need to be addressed in the future, such as noise and the approach to sonic boom. With that research still ongoing, “there’s not enough known there.” This is a broader discussion for the international arena, Desrosier added. But for now, “What the FAA is doing is appropriate in terms of enabling and facilitating the ability for the industry to continue to invest in the development and the technology, but for the development of these products more is going to be needed.”

Carr, agreed, calling the NPRM an important step towards “what we hope is going to be the reintroduction of supersonic flight. We’re hopeful that a supersonic business aircraft becomes one of the first new supersonic transports.” But to accomplish that, the global community

has to start laying the groundwork now.

He added this is one of a number of efforts, including demonstrations that will take place to measure sound exposures of new technologies. “We need to have people see it. We need to have people hear it,” he said, and added, “We’re going to be following this very closely as the technology evolves and the testing continues” so the community can help provide insight to all the decision-makers involved in supersonic.

Predictably environmentalist groups are opposing such standards. In fact, 60 such organizations coalesced in their comments to the FAA in expressing opposition. Supersonic airplanes “failed nearly two decades ago because of the aircraft’s sky-high fuel consumption and inability to meet environmental regulations,” the organizations said, telling the FAA that given “our limited carbon budget, limited time to act, and urgent need to slash greenhouse pollution from the aviation sector overall, allowing super-polluting aircraft to enter the U.S. sky would be madness.”

Kevin Welsch, executive director of the FAA’s Office of Environment and Energy, said during an American Institute of Aeronautics and Astronautics Aviation Forum, that the FAA is looking at how to mitigate effects and hopes to communicate that what is proposed from a noise standpoint is consistent with the majority of aircraft currently in production. “Our focus...has been how we can support the reemergence of supersonic aircraft from a regulatory perspective to ensure that, as technology advances, the FAA is putting in place the necessary regulatory changes,” he said.

Remote IDs for Drones

Meanwhile, also in the emerging technology field, the FAA has been working on remote identification requirements (ID) for unmanned aerial systems (UAS) to help further facilitate their integration into the national airspace system.

Carr noted the FAA had indicated its intention to push the final rule out this year, and three UAS industry groups

» continues on page 44

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Collins Aerospace

Honeywell forecast sees market optimism with a Covid pandemic dip then rebound

by Curt Epstein

In the wake of a turbulent 2020, which has already left much of the aviation industry shaken, aircraft systems manufacturer Honeywell, in its 29th annual Global Business Aviation Outlook, noted some slight retrenching from last year's forecast. Nonetheless, it ultimately concluded that the market remains optimistic and prepared to ride out any near-term Covid pandemic headwinds.

"Business jet usage is expected to rebound to 80 to 85 percent of 2019 levels in the fourth quarter of 2020, indicating demand for business jet travel is returning after a slowdown as the pandemic began," said Heath Patrick, Americas aftermarket president for Honeywell Aerospace. "The information we gleaned from operators shows a less than one percent decline in five-year purchase plans, so despite the short-term effects of the pandemic, we don't expect long-term changes to purchase plans or the overall health of the business jet market."

The survey report, traditionally released on the opening day of NBAA's annual conference and exhibition, predicts deliveries of 7,300 new business jets over the next decade, down 4 percent from a year ago, while the total value of the sales dipped by 5 percent from \$248 billion to \$235 billion. "Business jet deliveries are expected to recover to 2019 aircraft and expenditure levels in the first half of the decade," said Shantanu Vaish, Honeywell's director of strategic marketing. "New future platforms in the medium-large, large and very-high-speed/ultra-long-range classes will stimulate long-term growth."

Among the questions asked of more than 1,000 non-fractional business jet

operators this year starting in July were some regarding how the Covid pandemic has impacted their purchase plans for new aircraft. Those interviews, along with information from aircraft manufacturers, are used to shape the first half-decade of the outlook, while economic models weigh more heavily in the latter half.

Honeywell found that 80 percent of those surveyed this year indicated their purchase plans have not been affected by the Covid slowdown, and of the remaining 20 percent, the vast majority said that they plan to hold on to their existing aircraft for a longer period of time. "Fortunately, compared to the last recession, we're not seeing the urge to sell [aircraft] Vaish told AIN, comparing this crisis to the aftermath of the global economic downturn in 2008. About 82 percent of the respondents in North America said they expected to operate their jets less frequently this year than they did in 2019, with a bounce back to last year's levels expected by the end of next year.

In terms of the five-year purchase plans for new jets, based on survey responses, they equate to approximately 16 percent of the global installed fleet, which is in line with the 2019 survey results. Of those who have indicated that they will be purchasing an aircraft in the next five years, 30 percent are planned to take place in the next two years, five percentage points lower than the results last year, indicating those purchases, while still planned are being moved further into the future. "The good thing is we're seeing a quick recovery towards the end of that five-year time, and at the end of the 10 years we're seeing a one percent, very minimal change," said Vaish.

Through the end of the 10-year window, Honeywell projects a 4 to 5 percent annual growth rate in deliveries, aligned with an expected worldwide economic recovery. That is higher than last year's expectation due in part to Covid-related declines in 2020. In terms of cabin size, despite the border shutdowns that hobbled much of the long-range, large-cabin aircraft earlier this year, the category still has the industry's focus, with the segment predicted to account for more than 40 percent of new private jet deliveries and nearly 70 percent of the value over the next five years, followed by the small cabin aircraft, which rose six percentage points this year to approximately 35 percent, and the midsize at 19 percent.

North America continues to be the area of greatest demand for business aircraft and will account for an estimated 64 percent of worldwide demand for new jets over the next five years, according to Vaish, an increase of four percentage points from last year's results. Purchase expectations remain unchanged from last year's survey, with approximately 15 percent of the fleet being replaced over the next half-decade, with 32 percent of North American operators planning to schedule their new purchases within the next two years, down 4 percent from last year.

In Europe, the global share of demand is expected to be at 18 percent, with operators there slowly replacing aging aircraft in the fleet over the next five years. The region shows the highest purchase expectations in this year's survey, equating to 24 percent of the fleet planned for replacement, which while down by four points

from last year remains within the average of the past five years worth of surveys. Of those, 24 percent plan to make their purchases in the next two years, below the global average of 30 percent.

Latin America saw a drop of six percentage points year-over-year in its planned new jet purchases, declining from 21 percent last year to 15 percent this year, representing a five-year low and reflecting the economic pessimism in the region. In last year's outlook, Latin America was expected to account for 7 percent of the new jet demand over the next five years. That number has slipped to approximately 3 percent this year. Only 19 percent of the anticipated purchases are expected to come within the next two years, well below the global average.

“Business jet usage is expected to rebound to 80 to 85 percent of 2019 levels in the fourth quarter of 2020, indicating demand for business jet travel is returning after a slowdown as the pandemic began”

– Heath Patrick

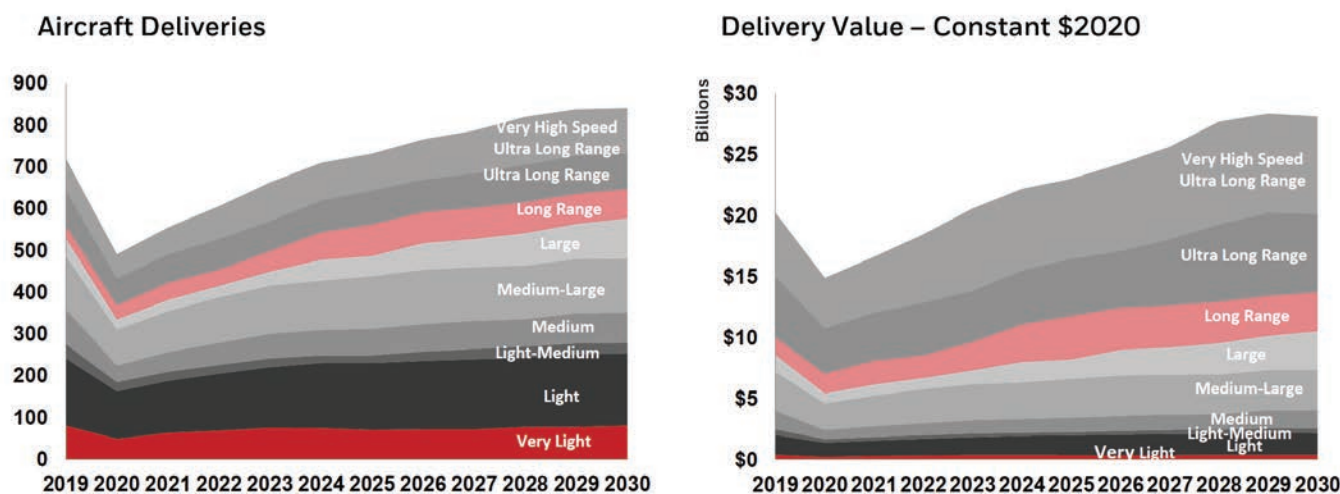
Americas aftermarket president for Honeywell Aerospace

In the Asia-Pacific region, new jet acquisition plans call for 14 percent of the fleet over the next years, a rate largely unchanged from last year's survey. Based on those responses, Honeywell's forecast gives it a 10 percent share of global new jet demand through 2026. The percentage of those planning purchases within the next two years declined from 40 percent in 2019 to 30 percent this year.

Among the respondents in the Middle East and Africa, 16 percent indicated they will replace or add a new jet to their fleet over the next five years, which is up four percentage points from last year's survey. That would give the region 4 percent of global demand for the first half of the survey period. Of those intending a purchase during that timeframe, more than a quarter said that it would happen within the next two years.

While the Honeywell outlook delves mainly into new jet purchases and deliveries, the company also inquires about used aircraft and found that plans to acquire preowned jets over the next five years declined by six percentage points from last year, with estimates that 25 percent of used business jets will be sold over the next half-decade. While that number is down from the 31 percent registered a year ago, Vaish noted that 2019 saw a spike in such plans and that the resulting number this year is more in line with historical averages for used aircraft intentions. ■

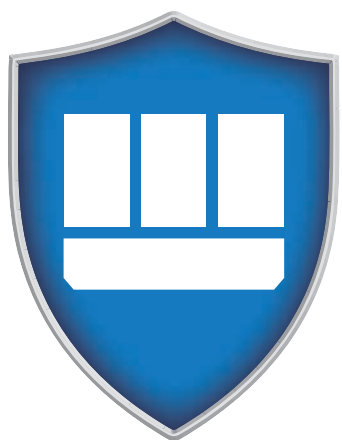
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A passenger flying in a Vista Jet Bombardier Global logs on to the internet using Collins Aerospace's LuxStream satcom, which offers speeds of up to 25 Mbps in the U.S. and 15 Mbps globally. Collins provides hardware and airtime service, while Astronics makes the tail-mounted antenna.

Connectivity: better and faster than ever

by James Wynbrandt

Forget yesterday's focus on monitors, cabin management systems (CMS), and cabin accessories like digital device holders and wireless chargers. The buzz in business aircraft cabin electronics this year is the hum of current powering the expanding fleet of Wi-Fi-equipped aircraft, and the excitement behind the software, hardware, and services driving an ever better onboard online experience.

"In-flight connectivity is one of the most in-demand features on today's business aircraft," said Dori Henderson, executive director for business aviation and digital solutions at Collins Aerospace.

Now that hunger for connectivity has spread beyond the large and even midsize cabin market. "Wi-Fi has become one of the most important features requested by our customers," said Tom Aniello, marketing v-p at Pilatus Aircraft, which has added a Wi-Fi option for its PC-12 turbo-prop single and PC-24 light twinjet.

Meanwhile, next-generation satellite and terrestrial networks now coming online hint that connectivity will dominate business aviation's cabin electronics realm for some time.

Honeywell, whose JetWave hardware in partnership with Inmarsat's JetConnex satellite network launched the global airborne highspeed connectivity era in 2017, has developed its new Forge cabin router to bring the service to smaller aircraft. Forge is 70 percent smaller and costs significantly less than earlier Honeywell routers, while software updates add new functionality through Honeywell's Forge analytics platform, including flight management, cabin connectivity, and predictive maintenance analytics. The Forge portal is available for customers buying Honeywell services such as flight planning, datalink, cabin systems, and satcom.

Looking ahead, Honeywell engineers are developing technology "to maximize the pipes, the bandwidth, and spectrum," said John Peterson, Honeywell's v-p and general manager of services and connectivity, promising "exciting products" in 2021.

LuxStream, the high-speed broadband Ku-band satcom network developed by Collins Aerospace in partnership with satellite network operator SES, offers speeds of up to 25 Mbps in the U.S. and 15 Mbps elsewhere, excluding the polar regions. Launched late last year on VistaJet's Bombardier Globals, LuxStream is now available for retrofit on all Bombardier Globals through STCs developed with Q.C.M. Design Switzerland, as well as Gulfstream's G350, G450, GV/G550 through STCs developed by Van Nuys, California-based Western Jet Aviation. Collins provides the cabin router and KuSAT-2000 satcom terminal, and its ArincDirect unit is the service provider for LuxStream. New York's Astronics provides LuxStream's tail-mounted antenna.

STCs for the Gulfstream GIV/GIV-SP are also available, according to Collins, with STCs for the Bombardier Challenger 600 series and 850 and Dassault Falcon 7X expected soon. On the CMS front, Collins added 4K video capability to Venue, with the launch aftermarket monitor installation performed by West Star Aviation.

Viasat's new Ka-band satcom service, which can provide typical speeds higher than 20 Mbps, is now STC'd for the Gulfstream G650/650ER via installation of Viasat's Global Aero Terminal 5510. That terminal accesses the ViaSat-1, ViaSat-2, and European Ka-band satellite platform. The 5510 Terminal also provides forward compatibility with Viasat's next-generation ViaSat-3 satellites.

With its more robust capacity, Viasat recently removed connectivity speed limits for business aviation customers of

its Ka-band network, said James Person, director of business development and strategy for Viasat. Some customers are seeing speeds greater than 40 Mbps. This means that "customers will now get the best possible speeds available, making for a premium in-flight connectivity experience," the company said. Meanwhile, Viasat has doubled the size of its maximum service plan, which includes unlimited streaming, to 200 GB per month.

Simple Antenna

Satcom Direct's newest Plane Simple antenna is a dual tail-mounted Ka/Ku-band antenna system for midsize and larger business jets available in two variants, one each for Ku- or Ka-band frequencies, both sharing the same two modular, network-agnostic line-replaceable units and wiring. The system architecture, developed in partnership with Germany-based QEST Quantenelektronische Systeme, simplifies installation and provides a future-compatible connectivity system, according to Satcom Direct.

The new antennas will access Intelsat FlexExec (Ku-band) and Inmarsat Jet Connex (Ka-band) satellite networks. The first Ku-band antenna will be available by year-end and STC approval is expected early next year; Ka-band capability will be available later next year. In addition to boosting broadband speeds, the new antenna technology "allows us to capture more data analytics for performance," said Satcom Direct business aviation president Chris Moore.

The advance of satellite constellations notwithstanding, air-to-ground (ATG) networks still provide benefits, including lower costs and less latency over much of terrestrial North America, and Gogo Business Aviation continues to build on those advantages. Its Avance L5 and L3

ATG Wi-Fi systems, introduced in 2017 and 2018, respectively, are available on a growing number of aircraft models as line-fit factory options and retrofits. Gogo marked its 1,000th L5 in service in August, while more than 450 L3 systems are operating.

Network speeds on the Avance L5 are similar to 4G on the internet, which supports video streaming and other network-intensive activities. The smaller, lower-cost L3—aimed at the light jet and turboprop markets—offers about one-third that speed.

Bombardier Aerospace now offers the L5 on new Learjet 70s and 75s and as retrofits for in-service Learjet 40s, 45s, 70s, and 75s. Meanwhile, Illinois-based Flightstar received its own STC approval for L5 installations on the same Learjet models.

Duncan Aviation, which already had seven L5 installation approvals, has a new STC for the Cessna Citation X/X+. Duncan also teamed with Gogo on STCs for the new Avance L3 and Avance Smart Cabin System (SCS), which will allow the installation of Avance L3 Wi-Fi or a standalone SCS in more than a dozen aircraft models, including the Gulfstream IV/G450 and Bombardier Challenger 300, 350, 604, 605, and 650.

Pilatus chose the Avance L3 system as an option for new PC-24s and PC-12NGXs.

Gogo also recently lowered the altitude (from 10,000 feet to 3,000 feet agl) from which L5- and L3-equipped aircraft can access their ATG network, which adds 15 to 20 minutes of extra connectivity time for a typical flight, according to Gogo.

Would-be ATG network player SmartSky, beset by delays since its planned 2016 launch, has prevailed in a lawsuit brought by Gogo questioning the validity of its patents. SmartSky's network has been built out and tested and STCs for installations on multiple aircraft are in hand, but the Research Triangle, North Carolina company missed its last announced launch target in the second quarter.

Meanwhile, already circling some 100 to 600 miles above the earth, coming constellations of low Earth orbit (LEO) satellites are preparing to provide global broadband at fiberoptic-like speeds. These include LEO networks from SpaceX, Starlink, OneWeb, Telesat, and Amazon. Telesat satellites developed by Airbus can deliver speeds of more than 400 Mbps, latency of just 40 milliseconds, and seamless beam and satellite handovers, with worldwide coverage.

Iridium's L-band Next satellite constellation, completed early last year, will provide much higher speeds than the classic Iridium network. Collins is now testing its forthcoming Certus higher-speed satcom service, the Next constellation's first aviation application, and plans to offer Certus hardware, including two types of antennas, in 2022.

Collins is also developing Certus hardware for smaller aircraft or those that don't need full broadband internet capability, ranging from light jets and helicopters through transports. ■

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Bizav women's panel underscores being bold

by Kerry Lynch

Women from a cross-section of business aviation gathered for an NBAA News Hour online discussion to stress the importance of taking risks, having a willingness to “be the first,” and mentoring to pave the way for a more diverse workforce. Moderated by JetLaw partner Kali Hague, the News Hour, “Women in Bizav—Being Bold,” featured women who hold varied roles from operators to airport and maintenance fields.

Julia Harrington, lead captain and Chicago base manager for Axis Jet, discussed how “being bold” is “really about being unafraid to take a seat at the table and go

after your goals with tenacity—and not letting being the first stop you from wanting to move forward with those goals.”

At her initial charter flying job, Harrington was the first woman pilot hired by that company. She conceded that, at the time, there were some barriers to break through: the head of the flight operation was worried about how the wives of the other pilots would react. That, she said, “is too old school for these modern times,” but was a short-lived concern.

Since then, that company has employed multiple female pilots and recently had a

female-only crew, Harrington said. “You never know what doors [being first] can open for the future,” she said. “Once those barriers were broken down, I know that the flight department has benefitted greatly from having a more diverse staff.”

When Harrington moved on to Axis, she noted, her new employer was “ready to accept women” and has since encouraged her to seek leadership roles.

Hague added that it is important to note that there aren’t many women in business aviation. “Just because you are the first doesn’t mean the company is opposed to having [women] there.” It is just there are fewer to hire, she said.

GrandView Aviation COO Jessie Naor stressed the importance of being an advocate for oneself. Many women tend to want to please others before they would step forward in a leadership role. “[We] have to be first for a moment here so we can help others,” Naor said, stressing that this can be accomplished in an upbeat manner. “You can be positive and still be promoting yourself. You don’t have to be aggressive in a negative way.”

Opening Doors

She pointed to her strong interest in rest and duty regulations. Naor was always pushing for improvements in the rules. “I was really loud to a lot of people,” she said, and in the end was appointed to an FAA Rest and Duty Rulemaking Committee. This participation in turn opened doors to other appointments, Naor said.

As for breaking down barriers, she noted society has been conditioned in many ways that little actions are not necessarily conscious actions. Naor gave the example of shaking hands. People will tend to reach for a male’s hand before a female’s. “Most people don’t notice it,” she said. She responds by extending hers first to bypass that. “You do that over and over...[it] makes an impact,” she said. That grows from the little moment to life choices, such as having counselors encourage girls to seek an engineering degree rather than an alternative career.

Erin Croop, marketing coordinator for Lee County Port Authority–Page Field, meanwhile, added that women must remain curious, constantly questioning and learning, and have the courage to take on new things. That acquired knowledge can be shared with others coming into the industry.

Lee Brewster, director of communications, public relations, and industry engagement for ATP, further noted that women should “embrace who you are. It’s okay to be feminine and a mechanic,” she said, adding that many people over her career helped her understand that.

Hague noted, “That reflects where feminism is today” versus in decades past. “While some of us might be the first in our company, we’re probably not the first in the industry. That gives women a lot more freedom...to be who we want to be. We don’t have to fit a certain image,” she said.

Women also have to be willing to be confident in going after positions, said



Julia Harrington, lead captain and Chicago base manager for Axis Jet, discussed breaking barriers as a female pilot during an NBAA News Hour.



Women in Aviation International’s Annual Girls in Aviation Day 2019.

Women in Aviation International’s Girls in Aviation Day expands around globe

Women in Aviation International’s (WAI) 6th Annual Girls in Aviation Day (GIAD) has reached its most expansive draw yet with thousands of participants from at least 55 countries tuning into this year’s festivities virtually. Kicked off September 26 with the launch of a new U.S. Air Force-sponsored Aviation for Girls app, the event went online this year with many of the activities available year-round for free.

“Our goal in delivering a virtual experience for this year’s Girls in Aviation Day was to extend our reach and inspire girls—no matter where they live or learn,” said WAI CEO Allison McKay. “Last year, our in-person events reached girls in 18 countries. This year, the app has already tripled our reach and connected with girls all around the world providing them with access to hours of inspiring content to expand their knowledge about all the opportunities in aviation and aerospace.”

The GIAD app enables participants to explore and engage when it’s convenient to them, said Molly Martin, outreach

director for WAI. Since this year’s events are not limited by the location of WAI chapters or corporate members, WAI virtual could reach the globe in places where the events hadn’t yet.

The event has reached Israel, Saudi Arabia, and Tunisia, Argentina, Bolivia, and Venezuela, to Cape Verde, Zambia, Botswana, Rwanda, Egypt, Syria, Sri Lanka, Bangladesh, Serbia, Poland, Finland, and Uzbekistan, among many others. All content is available in English, but some also is translated into French and Spanish.

On the launch day several “live events” took place to celebrate the event, but activities and content are anticipated to be added throughout the year to keep the participants engaged.

Other content includes virtual tours of airports, museums, and other locations, flight simulations, book readings, interviews with scholarship winners, and numerous hands-on activities. Digital versions of Aviation for Girls magazine are also available. **K.L.**

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NTSB chairman Sumwalt stresses fitness for duty at NBAA virtual safety week

by Kerry Lynch

National Transportation Safety Board (NTSB) chairman Robert Sumwalt helped cap off NBAA's week of virtual safety events with a message on the importance of taking precautions in the air and on the ground to ensure fitness for duty.

Sumwalt spoke on the last day of NBAA's Virtual Safety Week that brought online many of the events typically held in person during NBAA-BACE, including the Single-Pilot Safety Standdown and National Safety Forum as well as the association's safety awards. In addition, Virtual Safety Week hosted a Safety Town Hall for the first time.

The NTSB chair participated on October 9 during the National Safety Forum, which carried a theme of "Optimizing Your Personal Performance" and focused on fitness for duty for individuals and organizations through effective sleep management, as well as maintaining a healthy mind and healthy body.

Sumwalt praised NBAA for continuing to host the event virtually and said even though there was a venue change, that did not diminish the quality of the events. He added that this year's theme was "one of critical importance."

Four of the issues on the NTSB's "Most Wanted List" of transportation safety improvements center on "ensuring the transportation workers are of sound, mind, body, and soul—basically being fit for duties," he noted. These include reducing distractions, fatigue-related



National Transportation Safety Board chairman Robert Sumwalt highlighted several concerns about fitness for duty, including remaining safe on the ground and in the air, during his discussion as part of NBAA's National Safety Forum.

accidents, and alcohol and drug impairment in transportation, as well as ensuring medical fitness.

Sumwalt in particular focused on drug impairment, pointing to a study released this year on the incidences of drugs found in the systems of pilots killed in aircraft crashes.

That study updated a similar review conducted in 2014 and found the prevalence of drugs has trended upward. The original study looked at the toxicology results of fatally injured pilots from the years 1990 to 2012, while the most

recently released study looked at 952 pilots fatally injured in aircraft crashes from 2013 to 2017.

In 2012, 40 percent were found with at least one drug of any kind in their system. By 2017 that number had risen to almost 50 percent.

Of the pilots examined in the most recent study, 28 percent tested positive for at least one potentially impairing drug, up from 23 percent in the 2014 study, and 15 percent tested positive with at least one drug that pointed to a potentially impairing condition, a 3 percent increase from 2014.

Meanwhile, 10 percent were found to have a controlled substance in their system, up from 8 percent in 2014, and 5 percent tested positive for an illegal drug, up slightly from 4 percent in the 2014 study.

Nearly half the pilots involved had an ATP or commercial pilot certificate, he said, but cautioned that does not necessarily mean they were operating in business aviation. He also cautioned that not all were potentially impairing or illegal drugs, noting many involved slower sedating antihistamines and other over-the-counter cold and allergy medication.

He worried about those with potentially impairing drugs and/or conditions and said "it gets really concerning" with the controlled substances, which are not permitted. The same holds true, obviously for illicit drugs, the most common of which would be marijuana.

The other issue he highlighted on the list was distractions. "These days in the cockpit, you've got a lot of distractions and potential distractions," he said. But as attention focuses on that, he is concerned as well about distractions once the pilot leaves the aircraft—"once we close the aircraft door, close up the hangar, and we get into our car."

He asked how many pilots pick up the phone in the car to check emails, send a quick text message, or call home to say they are on the ground.

The National Safety Council designated October as distracted driving awareness month, he pointed out, adding, "I'll tell you, I've met with a lot of families whose loved ones have been killed by a distracted driver." His concern is that "we're all careful when it comes to flying airplanes," but then pilots will get in the car and pick up the phone.

Also, along the personal fitness line is the need to get help for mental and other health issues, he said, "I'll be willing to bet that most of us are just a teeny bit Type A, right? That's a trait that can help us, but it's a trait that can also work against us. And if you're like me, you really don't want to pick up the phone and ask for help—whether we're calling for mental health counseling, whether we're calling for family counseling, whether we're calling about physical ailments. The fact is it's difficult for us to pick up the phone."

But he stressed that resources are available to help pilots. While with the airlines, Sumwalt said pilots had access to an air medical office where they could call to discuss health-related concerns confidentially.

Similar services are available to business aviation and should be used, he said. Peer-support programs can be equally important and should be something corporate operators consider, he said.

He concluded by questioning whether business aviation organizations have provided enough resources to support the full care of an employee and whether the business aviation community, including NBAA, would consider the development of peer-support programs. ■

■ Bombardier ramping up hiring for this year's internships

Bombardier is planning to hire up to 1,000 students for paid internships in Canada during the 2020-2021 academic year. The Montreal-headquartered business jet maker is working with more than 30 universities and colleges across Canada to fill internships with engineering, science, finance, law, communications, and other business students.

"Providing students with real-world experience has never been more important," said Bombardier president and CEO Éric Martel. "Notwithstanding the exceptional challenges presented by the current health and economic crisis, Bombardier will continue to work with post-secondary institutions in Canada to provide meaningful opportunities to the brightest minds of the next generation."

For the just-ended 2019-2020 academic year, Bombardier exceeded its goal with more than 1,200 filled intern positions.

Bombardier also this month launched a Women in Engineering (WIE) internship



program in partnership with the Gina Cody School for Engineering and Computer Science (GCS) at Concordia University. This program is designed to help inspire female students to pursue engineering and technology careers. Along with the internship, the program includes individualized coaching.

"We believe that a diverse workforce yields

the best results. However, today, women are vastly underrepresented in engineering positions across the aerospace industry," Martel said. "The WIE program is designed to help address this issue by providing mentorship opportunities for female engineering students to develop their skills and accelerate their careers." K.L.

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FlightSafety LiveLearning eases Covid travel limits

by Gregory Polek

While the effects of the Covid-19 crisis have touched virtually every aspect of the aviation industry, the pandemic's resulting limitations on classroom instruction could have hit companies such as FlightSafety International particularly hard. But as schools around the world see mixed results in their efforts to balance education needs with health imperatives, FlightSafety characterizes its remote LiveLearning program as broadly successful, delivering 1,750 pilot courses and 1,095 mechanics courses since its introduction in March.

LiveLearning differs from the company's well established eLearning offerings in that it replicates the classroom environment with a live instructor. Most recently, the company has expanded its LiveLearning offerings to include EASA-approved courses taught from its

facilities in Paris and Farnborough, UK.

FlightSafety senior v-p of operations Brian Moore told AIN that, particularly for recurrent training, the program has "boomed" since its launch in March, both among pilots and mechanics. V-p of sales and marketing Steve Gross explained that the company did something similar for ancillary courses such as RVSM and MMEL training for three or four years before the pandemic.

"We took that technology and broadened it to do a two- or three-day recurrent," said Gross. "We've done the rare initial [training] this way too, but we really want to keep it to recurrent. We think that it's best if you're doing an initial to do it at the facility."

Gross added that the demand for the training has come from across the fleet, notably the Dassault Falcon 900, 2000,



To ensure that FlightSafety International customers can continue training during the pandemic, the company rolled out the instructor-led LiveLearning program.

and 7X; Gulfstream G280 and G650; and Cessna Citation Sovereign. "It's a really interesting mix, the take-up of it," said Gross. "The quality of the instruction has not suffered. We still use our technology from the classroom and present it online. You can ask a question in general so the whole class can hear or what they've done

is set up a private chat for the attendees."

For those who prefer to remain in the classroom, FlightSafety must follow all mandated health and cleaning protocols, and the company has gained FAA relief from requirements that students don oxygen masks as part of their training.

Further relief from the FAA took the form of a "virtually" certified flight simulator in Dallas. "So rather than having the inspector sitting in the box with us going through the qualification, we brought him in through video and other web-based means to see all the squiggly lines and see the thing fly and do all the demo and all the things that would normally be done," explained Moore.

The FAA has also given FlightSafety some relief on the number of days and hours needed for FAR 61.58 recurrent proficiency checks in some programs, said Moore. "The FAA has just given us very recently some flexibility in being able to deliver those checks in a reduced footprint...I think everybody's a little shocked, but the FAA has been outstanding in terms of supporting the things that needed to be done here."

Of course, FlightSafety and all training organizations need flexibility from regulators at a time enrollment has fallen due to Covid-related demand weakness and border closures into the U.S., where much of the training takes place. However, domestic operations have recovered to a great degree since a low point in April, along with business aviation operations in general. "I'll tell you April was a tough month, but things have continued to grow since then," said Gross. "And I think what you're seeing [is] the light jet, medium jet, and part of the charter industry is coming back pretty strong. We're seeing that same thing."

Meanwhile, FlightSafety's Farnborough and Paris centers have resumed operating after national Covid restrictions forced their closure, meaning all of the company's facilities worldwide are open. "We're seeing a pretty good resurgence in business," added Moore. "The international just due to various travel ban concerns has been the more challenging market, but domestically it's been strong for us." ■

Nicechat lets passenger voices do the commanding

by James Wynbrandt

Lufthansa Technik's (LHT's) in-development "nicechat," which can control cabin entertainment and environmental systems via voice command, is coming to market next year aboard an unnamed aircraft manufacturer's new business jets.

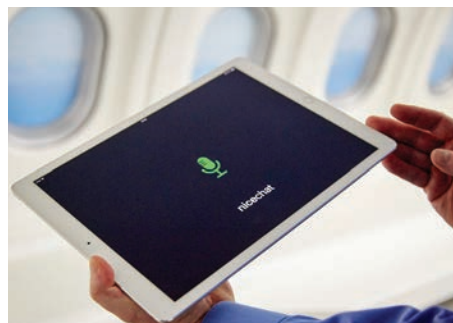
"Initially, it will be on one model," said Andrew Muirhead, LHT's original equipment innovation product division head. "I wouldn't be surprised if it became available on others."

Nicechat will be integrated with LHT's signature "nice" cabin management system (CMS) already on the manufacturer's jets, but Muirhead declined to say if it would be standard or optional equipment, as LHT does "not want to preempt any announcement" from the OEM. But the voice command system is readily adaptable to other CMSs and to aftermarket retrofits, and LHT plans to make it available for those applications as well.

"There's quite a lot of interest in this technology—it's not specifically tied to one solution," he said. "I think it could pretty much go on any aircraft."

Nicechat will handle commands that typically require passengers to make menu-driven choices on display screens, such as entertainment modes and content, and customized lighting and temperature preferences.

"We're not talking about simple things like lights on, lights off," said Muirhead.



"We're focusing on things that take a little more effort." He also said the voice system would be capable of learning.

Voice command is one component of LHT's plan to digitize and personalize onboard experiences—a goal enabled by its in-development fifth-generation nice CMS, which will support technologies like OLED ceiling panel displays and onboard sensors.

"The idea is that anyone interacting with the cabin management system can make it the way they want it," Muirhead said. "Voice control is just one part of the fifth-generation system."

Last October, at NBAA-BACE in Las Vegas, LHT showcased these emerging capabilities on a mockup of a nine-foot section of a cabin featuring nicechat and an OLED ceiling panel that responded to spoken commands, shifting among a variety of different decors and appearances—a stucco ceiling, a mural, or a skylight looking into the heavens, for example.

At the time, LHT was already working with the launch customer on developing customized voice commands for its nice CMS installations. The command library is "stored locally on the aircraft," Muirhead said, so it doesn't require onboard connectivity. Also, the system activates with a button rather than voice to ensure it can't listen to conversations by unintentional activation—an "important criteria" for passengers on business and VIP aircraft, according to LHT.

Meanwhile, display panels could be embedded in a variety of surfaces. "We're looking at creating a cabin environment by integrating OLED to create a digital ambiance in the aircraft," Muirhead said. "It's dynamic configuration of the cabin based on the context of personal preferences, and where the aircraft is at a particular time and place in the journey—for watching movies, for working—it's like a canvas."

Bolstering the efforts, LHT's AerQ joint venture launched last year with LG Electronics, which aims to bring display technologies like OLED to the commercial airliner market, will carry spinoff benefits for business aviation, according to Muirhead.

The coming nice update will also accommodate sensors that collect information to assist in customizing the experience, in-cabin maintenance, and for a new focus: health and hygienics.

"We have a big R&D emphasis on sensors and air filtration and water filtration," said Muirhead. "We just launched a new product for water filtration that's much higher performance in terms of reducing bacteria in the water." Once public aviation gatherings recommence, he said, "We're going to make a big song and dance about it at a trade show." ■



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Boom rolled out its one-third scale XB-1 demonstrator on October 7, it measures 71 feet long, or roughly a third of the length of the planned Overture supersonic airliner.

Analysts: many contenders, but little supersonic space

by Kerry Lynch

While the ban on supersonic flight over land is still in place, the field of supersonic contenders is growing increasingly crowded as new prospective developers jump into the fray while others accelerate their pace of development.

This field has expanded even during the pandemic with recent announcements covering Virgin Galactic's Mach 3 jet and the U.S. government's supersonic Air Force One executive transport. They join a fray that has already included Aerion Supersonic with its AS2 Mach 1.4 business jet, Boom with the Overture Mach 2.2 airliner, and the Mach 1.6 Spike Supersonic Jet that could have commercial or business aircraft possibilities.

Meanwhile, on the research front, Lockheed Martin, which has already been in the supersonic realm on the military side, is deeply involved in low-boom research with the NASA X-59 Quiet SuperSonic Technology (QueSST) demonstrator.

However, the question remains whether supersonic is a reasonable possibility in the next decade and, if so, how many aircraft can the market reasonably sustain? As for plausibility, analysts are optimistic that supersonic is a realistic possibility. As for the market, most agree that there might be room for one to two players at most.

"I am bullish," said Rolland Vincent, president of Rolland Vincent Associates and JetNet IQ creator/director, adding that the prospects now look strong enough to include supersonic production in JetNet's long-term forecast. That forecast predicts a 10-year market for 300 supersonic business jets, which incidentally is the forecast production rate Aerion has projected for its AS2.

While Vincent emphasizes that "speed sells," he doubts the market could accommodate all those who are either in or

contemplating joining the market. "The five will become two," he said. The commercial airliner side might open up further room.

However, Vincent worries that the downturn associated with Covid might provide difficulties for these programs, causing investors to scale back. "What is Covid doing to all of this? Nothing good," he said. "This is going to delay quite a bit of investment in the sector." This in turn could push off when a supersonic aircraft may reach the market, he said.

Richard Aboulafia, v-p of analysis for Teal Group, meanwhile, noted that business jets and commercial airliners operate in very different economic models and said he believes there is more hope in the business jet side than for a commercial variant. "The prospects for supersonics exist with business. They do not exist with commercial," he said. For a commercial airline model to work with supersonics, he said, the flights would need to be offered at full-fare first class. "There just aren't enough city pairs, not enough routes where these people exist in sufficient numbers."

This is especially true in the current environment, making the road for companies looking to the commercial market first more difficult, he said.

Brian Foley, founder of Brian Foley Associates, said he believes the activity in the development arena makes the outlook promising. "The number of entrants suggests that the market has been validated and the enabling technologies such as propulsion and aerodynamics are soon to be there," he said.

Foley, who has been retained by Spike on its program—but cautions that his thoughts are his own, not necessarily those of Spike—however, pointed to one of the biggest obstacles for these aircraft: "The

path will go at the speed of cash. These undertakings cost billions." This means finding the interest of a billionaire aviation enthusiast, sovereign fund, or a well-timed military contract, he said.

As far as the size of the market, he said, "There is perhaps room for only a couple of players to compete over a finite number of sales." He agrees with Vincent on the potential volume, saying the market could sustain about 300 units over 10 years and noting that's been a fairly consistent estimate since the 1990s. He further estimated a decade-long potential market value of \$37 billion at \$150 million per copy. List prices may be high, he added, "since there would be no other aircraft that could do the job."

He also underscored the importance of reaching the market ahead of the competitors. "The first manufacturer to deliver would garner much of the obtainable market by virtue of being first into a very niche segment."

As for the programs, no full-scale flying prototype has been produced as yet from the new breed of supersonic hopefuls. From a development standpoint, Aerion this year put many key pieces in motion that could put it on pace to be the first out of the gate. Aerion refined its AS2 design to one that could reach the market sooner, it is about ready to kick off construction on a massive headquarters complex that will house production, and it has nailed down many of the suppliers for the production aircraft. It also has begun high-speed wind tunnel testing. Plans call to cut metal in 2023, fly the first test aircraft in 2025, and reach market somewhere around 2027.

Importantly, Aerion is designing its aircraft to be able to fly over land subsonically at a very high speed, just under the speed of sound, but reach supersonic speeds over water. This enables it to reach the market regardless of whether the ban on supersonic flight over land is lifted. However, Aerion is also eyeing the possibility of a lower supersonic speed over land that does not produce the same sonic boom for the longer term.

Foley expressed the view that the quickest path to market will be near-sonic overland and supersonic over water. But he also stressed that longer-term, the market must be able to fly supersonic over land.

If Aerion forges ahead and reaches the market first, it will give it a big advantage, Aboulafia said, given the limited size of the market.

The analysts all pointed out risks associated with Aerion's partnership with Boeing. Notably, Boeing, which reported a hefty \$2.4 billion second-quarter loss from the pandemic and the woes of the Max program, recently announced plans to shutter its NeXt division, which is the overarching organization that has invested in Aerion. Boeing reportedly has invested several hundred million dollars for a 40 percent stake in the company and two board positions. While questions have been raised about Boeing's commitment to the supersonic development, Aerion has said that Boeing remains a long-term investor.

Aboulafia said Aerion has had a

"remarkable run" with partnerships that have also included in the past Airbus and Lockheed Martin. "I don't know where they are with Boeing," he said. "It doesn't look great. We'll see."

And Vincent also expressed concern the pandemic has taken a toll on GE, which is developing the Affinity engine that will power the AS2.

Meanwhile, Boom in recent months has marked a couple of milestones that are propelling its ambitions for a Mach 2.2, 55-passenger Overture. On October 7, Boom rolled out a "Baby Boom" or the XB-1, which is a third-scale model that the company says is "more than a scale replica," but said it would "provide insights "into future cost-savings, safety, efficiency, and sustainability for Overture."

Flight trials of the XB-1 are to begin next year at Mojave Air and Space Port. Plans also call to kick off the Overture certification program by the middle of the decade with a 2030 entry into service.

As for supersonic flight over land, Boom also is initially looking at subsonic over land, for now, saying it is focusing on "500+ primarily transoceanic routes that benefit from supersonic speeds—such as New York to London or San Francisco to Tokyo. Overture won't generate a sonic boom over land cruising at subsonic speeds."

Boom had raised \$160 million from investors and is continuing its fundraising effort. While looking at a more difficult commercial market, its program did receive an important boost from the U.S. government.

Boom joined Exosonic and Hermeus—lesser-known developers of supersonic passenger aircraft—in receiving contracts from the U.S. Air Force's Presidential and Executive Airlift Directorate to develop executive transports that could be used as Air Force One. Like Boom, Exosonic is working on a supersonic airliner, while Hermeus hopes to develop a smaller, 20-seat hypersonic airplane.

Spike, meanwhile, has been relatively quiet on its development front. But it has been busy building a team of well-known and seasoned aerospace veterans that can build the case for the concept and attract funding. A couple of key executives who have come on board of late are John Thomas, former CEO of Virgin Australia Airline, and Bill Boisture, whose resume includes being president and COO of Gulfstream Aerospace, president of NetJets, chairman and CEO of Hawker Beechcraft, and, currently, operating partner at AeroEquity.

"I had been skeptical of the business model for supersonic flight as the corporate market seemed too small for a supersonic business jet," Boisture said. "But the Spike Supersonic Jet can meet the needs of private, corporate, and commercial airline operations. Being able to serve multiple markets expands the opportunity dramatically and makes a strong business case for Spike Aerospace."

Foley believes that "cash-strapped Boeing's future commitment to the Aerion

» continues on page 31

Universal Avionics crafts response to Covid effects

by Jerry Siebenmark

The Covid-19 pandemic has forced many companies to examine how they could do business in light of concerns about the coronavirus and travel restrictions. Universal Avionics is one of them, and almost from the start it began planning how it would conduct business as close as possible to normal.

Since July, Universal has begun to roll out programs to serve as a substitute for many canceled industry shows, such as NBAA-BACE, as well as for traditional field visits to its customers.

The Tucson, Arizona-based company's approach includes the launch of a webinar series tied to its ClearVision enhanced flight vision system (EFVS) and the UA Academy Online Learning Center, which provides on-demand, remote training for customers, authorized dealers, and integrators. It also offers some less conventional initiatives that include creating a mobile demonstration unit (MDU); equipping a Gulfstream III with Universal's latest avionics, including ClearVision EFVS; and

introduction of desktop computer-based virtual-reality (VR) training.

Universal CEO Dror Yahav told AIN that in an effort to better understand how to maintain a connection with its customers, dealers, and technicians, the company concluded that those groups shared one value: personal relationships. "The majority of them—80 to 85 percent—seem to appreciate very, very much the personal touch, the relationship," he explained. So it was important that whatever Universal did during the pandemic "touch" those stakeholders in a meaningful way and through these varied means, Yahav added.

That's when the idea for the MDU was conceived. The MDU is a converted trailer set up like a flight deck and equipped with the company's latest avionics, including FMS with LPV capability, data communications, InSight integrated display system, Interactive Synthetic Vision System (i-SVS), and ClearVision EFVS with the SkyLens Head-Wearable Display (HWD).

The benefit of the MDU is that it provides for one-on-one demonstrations without the need for a trade show and booth. It's especially beneficial now because it allows those demos to occur privately while the participants are social distancing. "There's [only] so much you can do with a [webinar] presentation," Yahav said, adding that the demo units for those systems were just sitting in a warehouse. "So we said let's pack it up and go to those customers and show them what we do."

Since the mid-July launch, the MDU has traveled to customers in Scottsdale, Arizona; Texas; and Wichita, where Global Aviation Technologies hosted it for a two-day visit. Robert Randall, Universal's director of strategic business development, noted that the MDU has been an effective means of "trying to stay out in front of the customer" during the pandemic, and he expects it to make additional visits to Kansas City, St. Louis, and Minneapolis, as well as possibly some East Coast cities. "It's proven to be an effective tool," he said.

Commensurate with the MDU, Universal also is outfitting a Gulfstream III with its avionics, including the ClearVision EFVS and SkyLens HWD, enabling customers to experience these systems in flight.

Lastly, Yahav said Universal is a couple of months away from having a ClearVision EFVS VR tool ready for the market. That

tool, which is compatible with X-Plane flight-simulation software, will allow customers to experience the EFVS and HWD in the most portable and cost-effective way. "This is an experience we can deliver," Yahav said, adding that customers will be able to "see stuff that they cannot do without the real equipment."

Users wearing an Oculus Rift S VR headset will be able to view inside and outside the simulated cockpit windows and view meteorological conditions that they would see from the SkyLens HWD. The tool will support takeoff, en route, and landing scenarios and can be autopilot-coupled or flown by hand. A ClearVision VR Trainer version includes a yoke and pedals. Besides being available for sale, it will be used by Universal's training department in its course offerings. The first version will be a Boeing 737 flight deck with audio voiceovers to guide a user through the demo or training session.

Yahav said that while these measures required Universal to increase its research and development budget at a time when many companies are cutting costs, he thinks there will ultimately be a healthy payoff. "This crisis will create a lot of opportunities for us as a company [so] that when the market will start to recover...we will be in a better position," he explained. "I see very good opportunities due to this approach." ■

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Keeping the pilot in the loop on flight to autonomy

by Matt Thurber

An FAA Special Airworthiness Information Bulletin issued on September 24 (SAIB AIR-20-15) perfectly captures the conundrum that faces pilots flying modern aircraft. Automation can easily dupe a pilot into letting the airplane decide which way to go instead of the pilot ensuring that the airplane is doing what the pilot believed was specified.

The SAIB summarizes a problem with the avionics in the Boeing 787, where the autopilot flight director system (AFDS) fails to capture the localizer when the airplane intercepts the beam at angles greater than 40 degrees. Pilots are taught to verify the selected mode on the flight mode annunciator (FMA), after pushing the button on the flight guidance panel to select that mode. And in this case, the FMA showed exactly what the pilot expected—LOC—but the AFDS elected not to capture the localizer but continued beyond the beam at a 20- to 30-degree angle while also capturing and initiating a descent on the glideslope.

Obviously, this is a safety risk, with the airplane descending on a heading different than the localizer, and this prompted the FAA to issue the SAIB. Boeing was aware of this because it had already released Flight Crew Operations Manual Bulletin TBC-106 on Dec. 18, 2019, and Boeing was working with the avionics supplier on a fix.

Automation is helpful when it works properly and does exactly what the pilot expects, but subtle breakdowns like the one mentioned in the SAIB can be hard to detect. And the more automation is added to aircraft, the more pilots need to be vigilant to spot such problems. The Flight Safety Foundation sums this up succinctly, in a briefing note titled



Scott Evans, Gulfstream director, demonstration and corporate flight operations, helped develop the G500/G600 Honeywell Epic-based Symmetry flight deck, which focuses on keeping the pilot in the loop during all phases of flight.

“Automated Cockpit Guidelines,” which “discusses how to improve training for interfacing with automation.” Here is what the briefing note recommends:

“When performing an action on the flight guidance control panel or the FMS central display unit—or control/display unit (CDU)—to give a command to the automated flight system (AFS), the pilot has an expectation of the aircraft reaction and, therefore, must have in mind the following questions: what do I want the aircraft to fly now? What do I want the aircraft to fly next? These imply answering the following questions: which mode did I engage and which target did I set for the aircraft to fly now? Is the aircraft following the intended vertical and horizontal flight path and targets? Which mode did I arm and which target did I preset for the aircraft to fly next?”

In an article published by Air Facts Journal, “On Automation and Airmanship,” pilot Steve Green shares some of his strategies in a lengthy but compelling summation of the automation problem. His article begins: “I have been known, on occasion, to talk to the autopilot. ‘Why on earth are you closing the throttles now?’ or ‘What? Who told you to fly at 210 knots?’ It’s possible that this could be a little unnerving to an unsuspecting first officer, but there are occasions when it is necessary to question the autopilot’s

intentions or even its situational awareness. Sometimes I have to intervene: ‘No, no, let’s not do it that way...here, let’s try this mode...’ And every so often, ‘Oh for goodness’ sake, stop making this harder than it is...’ a comment usually associated with disconnecting the thing.”

In Green’s view, there are two schools of thought when it comes to automation. In its most basic form, he sees designers stuck in a closed-loop environment. In his view, their thinking doesn’t go beyond seeing “the operating environment only as a socio-mechanical construct, such as the National Airspace System...” and that it’s only necessary to design automation that reacts to “set parameters.” Or to train a pilot to fly within those set parameters, what he calls “the cybernetic view of technology.”

But Green argues this just results in creating “a systems operator who is unprepared to debate on terms of equality with the mountain, the sea, and the wind, or, for that matter, with the central processing unit of the flight control computer. The foresight is pre-programmed, trapped within the closed control loops, and limited to a narrow set of anticipated threats, or specific risks. This is antithetical to airmanship, because those parameters will eventually fall out of equality with the vast tribunal of a tempestuous sky.”

Green goes on to explain, “The fundamental flaw in attempts to adapt the cybernetic view of technology to the problems of flight lies in the belief that we have expanded our knowledge to a point at which we have absolute, predictable, and repeatable control within a tempestuous sky. We don’t, and likely never will. An analog world will simply swat away a digital mindset.

“In the end, we can only preserve mastery of the aircraft if we understand airmanship as the management of uncertainty, not simply the management of systems. We must know how the airplane is constructed to achieve the design capabilities, and match this with a strategy for how we want the airplane to be flown to utilize those capabilities, and then insist that the autoflight

systems fly our plan. When those systems don’t fly our plan, we need to step in and do some of that pilot stuff. The automation can never be allowed to become the master of the airplane, obvious or otherwise; in no case can it be allowed to place the successful outcome of any maneuver in any doubt whatsoever.”

AIN posed questions about automation design and philosophy to avionics manufacturers, following are some of their thoughts.

Garmin

Garmin engineers have been working on avionics automation since the company was founded, and most recently Garmin achieved an industry first, certification of its Autoland, a general aviation emergency automatic landing system. The first certification was in the Piper M600, and this was followed by the Daher TBM 940 and Cirrus Vision Jet G2. “We think we’ll have over 100 flying in the field by the end of the year,” said Phil Straub, Garmin executive v-p and managing director of aviation.

“Automation is sort of a continuum of what we’ve been doing for a long time,” he explained. “Autoland follows that path, it’s a big leap. The Autoland software is the heart and core of what we do and we had to design those systems [brake controls, engine controls, passenger displays, etc.] to help make it do that.”

Another way of looking at automation is the term coined by the General Aviation Manufacturers Association (GAMA): simplified vehicle operations. The concept is to design automation that doesn’t add to the pilot’s burden but frees up resources that the pilot can apply to solving problems and flying the aircraft. An example is a caution and advisory system (CAS)-linked checklist. When a CAS message pops up, the system automatically pulls up the abnormal checklist and related synoptic diagram, so the pilot doesn’t have to paw through a printed checklist or try to figure out which system to look at. “That’s the type of automation we like,” Straub said.

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In late June 2020, Airbus completed its two-year Autonomous Takeoff and Landing project when an A350-1000 airliner made an autonomous flight from Toulouse in France.

Family-owned businesses look to pass torch

by Curt Epstein

While business aviation as an industry has existed for more than seven decades, there are still some family-owned companies that have bucked the trend toward corporate consolidation and trace their lineage back nearly that long—or even longer in some cases. They have seen their share of ups and downs over the years, but these companies have grown and thrived and are passing their legacies to a new generation.

While Duncan Aviation is a well-known name today as the largest privately-owned business jet service provider in the world, that wasn't the case in 1956 when Donald Duncan—a private pilot who had made a living purchasing, flying, and selling surplus U.S. government aircraft—became a partner in a Beechcraft dealership in Omaha, Nebraska.

After selling hundreds of airplanes, the company expanded to a second location in Lincoln and soon became a Learjet distributor, selling approximately 450 of the new and used twinjets before all dealership agreements were canceled after Learjet was sold to Gates Rubber. Instead, Duncan was named as the first authorized Learjet service center. Donald's son, Robert, joined the company in 1965 and became president a few years later. In 2007 he retired, and his son Todd, long a company member, was named chairman.

"I do think it is unique in this part of the industry that we have so many family businesses, and I think a real strength," he told *AIN*. "For us, it's enabled us to control our own destiny and really control our own culture."

Today, that culture spans three major repair facilities (in Lincoln; Battle Creek, Michigan; and Provo, Utah); 26 satellite avionics and engine rapid response locations at major airports across the U.S.; and company staff of 2,342 employees.

"I think our customers and our team members identify with that long-term vision of how we look at the business, that we're going to be in this for generations and have been," said Duncan, adding that the company lineage will be extended to a fourth-generation as his twin sons have joined the staff as well—one as an A&P mechanic and the other in the accounting and auditing department.

Duncan noted that the company's financial stability has allowed it

to fund growth using its own capital, but like most companies in this space he still fields a number of purchase inquiries. "I think that's just the natural private equity environment

that we all live in now; there are only a finite amount of companies that are available at a certain size or in a certain market," he said. "That's just never been an interest of ours and we don't see that changing."

As far as 2020 is concerned, Duncan noted that while the Covid pandemic has pumped the brakes on international clientele, which normally accounts for up to 20 percent of its

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Duncan Aviation family members Todd with twin sons Harrison (left) and Paul Kent (right).

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keeping the pilot in the avionics loop

“It keeps the pilot in the loop and removes pilot actions, but we don’t have the pilot saying, ‘what is it doing?’”

For Garmin, some of its best ideas come from the people who work for the company and are also pilots, something that Garmin incentivizes by helping pay for flying lessons and regular training. A Garmin engineer and pilot, for example, came up with the idea for Electronic Stability & Protection (ESP), which is now standard on a variety of aircraft types. ESP uses autopilot servos when the autopilot is off to “nudge” the controls when pitch and bank attitudes reach certain limits. Further developments enabled envelope protection features such as automatically lowering the nose to prevent a stall (underspeed protection) and overspeed protection, which raises the nose to prevent excess speed. And of course, ESP became a building block for Autoland.

Straub hinted at other products that might derive from building blocks like SafeTaxi, which was introduced more than a decade ago. At the time, Garmin had to develop its own georeferenced airport taxi diagrams as they weren’t available otherwise. SafeTaxi not only helps with situational awareness, he said, but could also lead to automatic taxi routing that takes into account clearance limits and airport hotspots.

These products are not full automation, Straub said. “I call it putting safety nets around the aircraft and crew.”

This philosophy extends to Garmin’s avionics in larger aircraft, such as the G3000 and G5000 touchscreen-controlled flight decks in many Cessna Citation models and the Learjet 70/75 and aftermarket upgrades like the King Air G1000 and Citation G3000 and G5000 mods. Straub flies a King Air 350 and CitationJet and during training, he said, “the busiest thing you do is that missed-approach procedure, especially single-engine. There is a whole lot happening 200

feet off the deck, in half-mile visibility.”

Typically autopilots were designed to switch off after the pilot pushed the go-around button, so the pilot had to remember to switch it back on during a complex process of adding power, pitching up, resetting flaps, retracting the landing gear, and reselecting the nav mode. “We didn’t like that,” he said, and the Garmin design keeps the autopilot coupled during the go-around and automatically sequences the nav as needed for the missed approach.

If the airplane has autothrottles, even better, as it’s easier for the pilot to manage a go-around and avoid getting too slow or too fast with the power being set automatically. Now autothrottles are moving into smaller airplanes, with Garmin systems in the TBM 940, M600, and Vision Jet, and an IS&S system in the King Air. “Every airplane ought to have autothrottles,” he said, and this is becoming more possible because Garmin’s system simply attaches to the throttle cable instead of adding complex mechanisms in the throttle quadrant.

“They should belong in piston airplanes,” he said. “[Without an autothrottle], during a go-around, if you do nothing, it buys you time and you won’t stall. But if you have an autothrottle, the airplane does exactly what it needs to do.”

Further on the automation front, Garmin worked closely with Embraer on incorporating the Brazilian manufacturer’s Runway Overrun Awareness and Alerting System (ROAAS) in the new Phenom 300E. Garmin has developed its own ROAAS library, but in this case Embraer engineers designed the system for the 300E. “We try to be flexible and accommodating with customers,” Straub said. “Embraer has a huge depth of talent, and they had the desire to do their own ROAAS.”

One of the critical questions that comes up in automation discussions is how all these tools and capabilities affect pilot training. One might assume that if the integrated avionics and flight control systems are easier to operate that training times might decrease, but that hasn’t been the case. The opposite seems to be true, in that pilots who become more dependent on automation need more training



Bombardier’s Global 7500 features fly-by-wire flight controls and the Vision flight deck with the latest Collins Aerospace Pro Line Fusion-based avionics.

in airmanship. “This is something we all have to grapple with and how to manage that,” he said. It remains important for pilots to understand the aircraft’s systems and what the automation is doing at all times and to be able to keep flying the airplane no matter what goes wrong.

Straub said that Garmin is working on new developments related to the automation theme, but while “we love talking about the stuff we’re working on, there are things we can’t talk about. There are certain things computers do really well,” he said, “and there are some unique opportunities. We’re going to see more with connectivity, not a new satcom system, but what type of information can move back and forth.”

He explained the connectivity angle in relation to the Autoland system, which is designed to land the airplane safely at a suitable nearby airport after the pilot becomes incapacitated. But this means the airplane could land at an airport in a relatively remote area. “If you look at the country, it’s not all that populated in some places. If you think about Autoland, it prioritizes time. But what if we have better connectivity, and what if at the other end we can communicate with the airplane? We know it was a massive heart attack, so we may not want to get down in Garden City [Kansas], how about we go on to Wichita [where there are bigger hospitals]. If you have connectivity you can have an exchange about what’s going on and have a person on the ground override the original destination. And then have support services on hand when the airplane arrives. Saving lives is what we’re after.”

Collins Aerospace

“The goal of automation is a good question because we’re going to have to think of automation in the context of how it truly takes tasks off the crew and not just automating those tasks,” said Charles Wade, director of marketing for business and regional avionics at Collins Aerospace. “The traditional thought is to take a task and automate it. Behind the scene, we’ve got to be careful. Are you truly taking a task away or moving a task and end up increasing the pilot workload and he has one more thing to watch?

The goal has to be to truly reduce the number of tasks on the flight deck.”

Regulators will drive these explorations and with different outcomes depending on the country where developments take place, Wade explained. For example, in Canada, business jets can’t be flown by a single pilot even if certified for one-pilot operations in the U.S. “When we look at this broadly, the complexities of the international flavor of this topic and what we’re going to do in the U.S., there is lots of runway in front of us to sort this out.”

The pressure to keep adding automation to passenger-carrying aircraft isn’t just for the sake of doing so but also stemming from the development of autonomous aerial vehicles (AAVs) such as electric aircraft. “We’re watching some of the technology and problem solving going on with the AAV segment,” he explained, “so there’s a natural thought to say, ‘How come I can’t do that?’” But there is also the question of how soon full automation will happen with passengers onboard. “That’s where the game changes,” he added, with considerations about liability, insurance, and return on investment.”

For the nearer term, where pilots are still in the flight deck, solving the problem of reducing the tasks that pilots have to perform will be challenging. “We can’t isolate the avionics from the rest of the airplane,” he said. “We have to take a holistic look,” which means how all the aircraft’s systems and the pilot interfaces interact and how that is managed.

“The value propositions are going to be incremental in nature,” Wade explained. “I don’t know of anybody who is going to take this head-on and revolutionize the flight deck now, given the state of the economy.” A lot of work needs to be done on regulations, too. “There is going to have to be new technology and new ways of managing that flight deck that have not been certified before. In the context of market activity around this, when we talk about reduced-crew operations or simplified-vehicle operations, we’ve gone beyond autoland, which Collins has done for years for Boeing and the commercial market.

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Even older jets like this Citation Excel can be upgraded with the latest Garmin G5000 avionics so pilots can take advantage of modern technology benefits.

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Passing the bizav torch

business, it has done “okay” this year and is seeing signs of recovery.

The start of Sheltair, which now operates 18 FBOs and more than four million sq ft of aviation-related real estate, came by accident in 1963, when company founder, chairman, and CEO Jerry Holland purchased some aircraft hangars in Fort Lauderdale then later acquired a plot of airport property that included an FBO. While that FBO business tanked at first, Holland studied the industry, turned it around, and continued to build hangars and add locations.

Earlier this year, the company named Lisa Holland, Jerry’s daughter and a successful businesswoman in her own right, as company president. “I think I built the company in a way that I wasn’t looking to sell it and make a fast return on the money,” the elder Holland told *AIN*. “I was looking for something long term. He added that, like most, he’s turned down some lucrative offers.



Sheltair’s Kai Seymour (left), Lisa Holland, and Jerry Holland (right).

“Obviously we know through the last probably 15 to 20 years it’s become more hedge-fund operated, more public-company operated, so, fortunately, we’re one of the larger independent companies out there still. This gives us an opportunity to do things the way we feel they should be done and not the way somebody up the ladder tells you how to do it.”

Jerry’s grandson, Kai Seymour, with a newly-minted business management degree, also just joined the company to provide its third-generation succession.

No discussion about family-owned business aviation companies could be considered complete without mention of Cutter Aviation, which was established 92 years ago as an aviation service provider and likely pre-dates the term FBO. Founded by William P. Cutter in 1928 in Albuquerque, New Mexico, the company provided flight training, fueling,

maintenance, and charter from a rudimentary dirt-floored shelter.

Nowadays, the Phoenix-based company has become a regional powerhouse in the Southwestern U.S. with 234 employees spread over four FBOs and three maintenance centers. The company is also a leading sales dealer for several aircraft manufacturers, and according to president and CEO Will Cutter, the pandemic has had a positive effect on the business,

as he expects this year to be the best in its storied history. “We’re selling all the planes we can get our hands on and our shops are all full.”

Being one of the oldest companies in the industry means more legacy to live up to, according to Cutter. “I think the difference between me and the bigger boys is my name is on the building and I’ve got to earn it every day,” he said. “The other guys, they’re there for now, but they may be moving on.”

And Cutter plans for that name to stay on the building through its fourth generation of family ownership. “We could sell out but I don’t know that I’m able to do anything else, other than get a little cash, have some money in the bank, and go do something else. But now that two of my kids are in the business and a lot of people have been here for 30 and 40 years, it is kind of like it would be selling out on your family.” ■

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keeping the pilot in the avionics loop

This is trying to take that next step and now revisit the philosophical aspect of that airplane and how it needs to be managed.”

Driving much of this exploration is keen interest in the AAV market and the eVTOL and electric-, electric-hybrid-, and hydrogen-powered aircraft that visionary designers are developing. “This has impacted the OEMs and their curiosity about what can be done,” he said. For Collins, he added, “The initial plays are around anything we can do to make that airplane safer. [Current airline aircraft] are safe, their record is through the roof. But we’re going to continue pulling on that thread because we can always do better.”

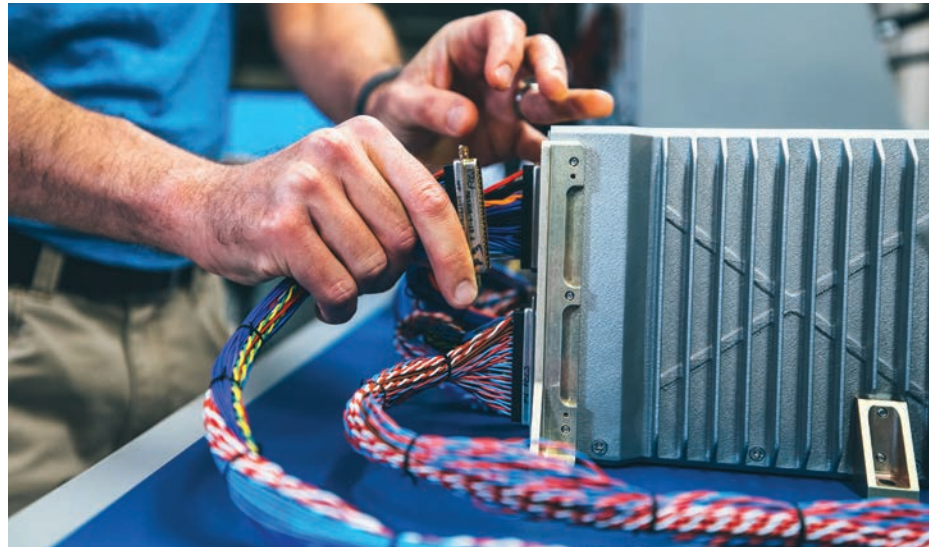
On the training front, Wade agrees that over the years much more capability and functionality have been added to avionics. “When we started in this industry, avionics were built on vacuum tubes. We’ve watched it evolve over time and bring awesome technology to market. But over time we’ve just kept adding, and we’re reaching the point of saturation within that flight deck. There are more things in front of these pilots than they’ve ever had before. One [way] we have to tackle is that simplification; how to truly reduce pilot workload. To integrate another piece won’t help.”

The solution isn’t just the avionics design, he explained, but working in partnership with other entities such as the FAA to integrate the aircraft into the National Airspace System. “We’re reliant on the airspace management toolset to streamline communications, route updates, and weather updates, which is what we’re trying to do with CPDLC and other technologies. We see a lot of opportunities to leverage those technologies, and not by adding another layer but simplifying.”

As an example of how this could help pilots, Wade pointed out that now when pilots fly from one flight information region or ATC center to another, they have to switch frequencies. “When we’re on a cell phone, we don’t have to do that,” he said. “Why are we forcing the pilot to dial the new frequency?”

There are many avenues of exploration for new technologies that will make pilots’ jobs easier and improve safety. “There’s nothing we’re doing that’s outside the imagination of industry right now,” Wade said. “Collins is working through and thinking through this future much like everybody else. We’re trying to put our own unique value proposition around it and work through that.”

The airspace management aspect is a major factor that will affect the application of these technologies, especially as it relates to reducing or eliminating pilot positions in the aircraft. “We can create what we want,” he said, “but the long pole is going to be around airspace management. Is ATC ready to manage multiple



Honeywell’s compact fly-by-wire system is ideal for the advanced air mobility market and could someday lead to lower cost advanced flight controls for smaller manned aircraft.

aircraft without a pilot in it?” And he added, “I haven’t seen anything from the regulatory [side] that’s driving specifications or regulations on what a reduced crew or single-pilot aircraft would look like.”

There are more subtle issues that designers will have to address, too. Unpressurized AAVs generally will fly at low altitudes and for short-range trips and won’t need airport infrastructure. But for longer flights, even with an electric-powered airplane, all the requirements apply, from needing a terminal or FBO to taxiing to the runway for takeoff and transition into the National Airspace System.

“That transition from what they’re doing now and to the next level has lots of complexities they’re not dealing with today,” Wade said. “There are key technologies they’re going to require. We’re going to see that part of the industry monitored and helping with safety and control laws and flight management type technology. That’s the layer of complexity you have to deal with.”

Collins Aerospace, he said, “is actively evaluating the value propositions and how to bring the right technologies to market. There are only a handful of companies that supply this technology. Something as complex as what we’re doing, there aren’t a lot of players. There are a lot of niche players, but not anybody that can bring it together [like we can].”

Honeywell Aerospace

The focus for aircraft automation hasn’t changed, explained Mike Ingram, v-p and general manager of avionics at Honeywell Aerospace. What automation does is improve the ride for passengers and lower pilot workload, all with the goal of adding to the overall level of safety. With properly designed automation, the pilot has less to think about and can focus on working with air traffic controllers, next steps in flight planning, and flying the aircraft.

Although there has been plenty of talk about and even tests of aircraft that can fly without a pilot, “The move from dual to single pilot in very expensive business jets will be a longer development,” he said. “It won’t happen right away.” There is an effort, however, to do just that in

the airline world, although that has been delayed by the coronavirus pandemic.

“There still is a push with airlines to reduce the number of pilots, especially for the time between takeoff and landing.” To facilitate that, Boeing and Airbus are working with suppliers like Honeywell on systems to monitor pilots’ drowsiness level or detect incapacitation but still allow ground personnel to communicate with the crew.

Ingram expects to see further developments like Garmin’s Autoland system, especially for owner-flown, one-pilot airplanes. “Garmin set the precedent,” he said, “and that’s something airplanes in that class all will need to have.”

Honeywell developed the automatic descent mode for business jets equipped with its Epic avionics suites, an early example of automation that helps incapacitated pilots. The capabilities of automation will continue to move downmarket to smaller jets, Ingram added, and indeed many of them already offer envelope protection features such as Garmin’s ESP that help pilots avoid unusual attitudes or coupled go-around capability, which greatly eases the flying burden in a stressful and busy environment close to the ground.

In larger jets, flight testing successfully showed that an Airbus A350 could take off by itself, guided by cameras viewing the runway instead of using GPS or other electronic sensors. Honeywell’s IntuVue RDR-84K electronically steered radar can provide similar accuracy in IFR conditions, Ingram said. “As the sensors become better, whether visual, radar, or lidar, they enable more automation because the airplane can sense more accurately the environment.”

Honeywell pioneered autoland in airliners, and Ingram sees opportunities to take “expensive technology and bring it into the lower end of the business aviation space. CAT IIIb is basically zero-zero conditions, and we’ve been landing without pilot intervention for a long time.”

The ultimate automation implementation is a pilotless aircraft, and fly-by-wire flight controls are a key building block for that capability, although creative designers like Reliable Robotics have flight

tested unmanned conventional airplanes using servos attached to control cables.

“There are many benefits to fly-by-wire,” Ingram said, “not only from a safety and weight perspective, especially on larger aircraft, but fly-by-wire can react much faster than a cable-pulley-autopilot flight control system.” This includes mitigating some of the effects of turbulence because the electronic controls can react much quicker than a pilot and help dampen out the turbulence.

“Fly-by-wire controlling all actuation and motor control can significantly help you get that aircraft under control and understand the aerodynamics of that aircraft,” he said. “There is a huge interest from OEMs; they can do the computations in the computer rather than mechanically in the aircraft.”

Now aircraft design has reached the point where a manufacturer can ask Honeywell to integrate a fly-by-wire control system with all the necessary control laws and a triple-redundant hardware package. And the final control input can either be a pilot in the airplane actuating a sidestick or yoke or a pilot on the ground controlling the airplane remotely or even full autonomy. The cost of fly-by-wire, while still much more expensive than mechanical controls, is improving for smaller aircraft, especially as companies like Honeywell develop compact fly-by-wire controls for the AAV market.

Auto manufacturers, especially Tesla, are already well along in developing sophisticated near-autonomous controls. “Certain cars have full autopilot mode,” he said, “and you can turn it on if you’re not interested in driving.” In an airplane application, this “gives the pilot more choice if there is an emergency, the ability to not have to worry about the airplane and deal with the emergency.” It could also help if the system allowed for an automatic non-emergency landing, say, if an ill passenger needed assistance, the pilot could let the airplane land itself while taking care of the passenger. “That would be a big help,” he said.

The next step is to incorporate artificial intelligence in the automation. “We see this trend towards how can we incorporate artificial intelligence and machine learning into avionics and controlling the aircraft,” he said. “There is a lot of research going on there. The silver nugget will be when a company or organization is able to certify artificial intelligence in a realistic use-case scenario. There are some developers [working on it], but how to certify it? How do we create a deterministic output and prove to certification authorities that it’s doing what we said it would do. Those are the trends now.”

“[Autopilots] have been around for over 100 years,” Ingram said. Lawrence Sperry publicly demonstrated early autopilot controls in 1914, and Honeywell ended up acquiring Sperry years later. “We’ve had 100 years to develop automation on aircraft,” he concluded, “but now we’re taking it to the next level of autonomy, that is going to be the next step.” ■

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supersonic space

program and Boom's reliance on the collapsed airliner industry has fundamentally changed the dynamic of the race and put it up for grabs," and said, "For me, the low-boom signature of the Spike program enables it to compete across a broad spectrum of corporate, military, and airline markets."

Spike is planning the 18-passenger, Mach 1.6 S-512, which will feature a low sonic boom over land and could be developed either as a business jet or possibly commercially.

Meanwhile, Virgin Galactic unveiled it was in the "first stage design scope" of a supersonic delta-wing commercial aircraft that could carry up to 19 people, fly at altitudes above 60,000 feet, and reach speeds of Mach 3.

Internationally, the Russian government continues to research possibilities of a supersonic business jet, recently declaring it would be a clean-sheet design, rather than earlier reports of a revamped Tu-160 bomber. Aboulafia stressed this is an important path, noting the concept of converting an old military model into a high-end supersonic model didn't make sense. "There might've been some technology at some point, but the idea of converting it [to a business jet], that's something you scratch your head over."

But perhaps one of the most critical efforts—for the entire supersonic development slate—involves the most experienced member of the fray, Lockheed Martin. The manufacturer of the famed SR-71 has put its Skunk Works facility to work on another supersonic project, the 96-foot-long, Mach 1.4 X-59 QueSST, which is anticipated to begin flying in 2021 to conduct key noise research as part of NASA's X-plane project. The demonstrator will test the low-boom concept, or as program officials say, a "sonic thud," to help gather data on the impact of shapes from advanced supersonic designs on communities. This data is anticipated to help serve as a basis for new standards that could ultimately lift the ban on supersonic flight over the next decade.

Despite its once-affiliation with Aerion, Lockheed Martin has no publicly stated plans to build a commercial supersonic business jet, at least for now.

As supersonic designs advance, the NASA/Lockheed Martin research becomes all the more important to convince regulators

to revise supersonic rules. Foley said the path to supersonic must involve "regulatory agencies setting objective noise standards for an acceptable boom over land, not just in the airport environment."

A common thread is these programs will be designed to meet the latest noise standards and run on sustainable alternative fuel (SAF). While no conventional jet appears to have the capability for 100 percent SAF currently,

the move to all-SAF appears to be critical to bringing supersonic aircraft to market.

Already, the environmental community has signaled it will fight any new supersonic entry on the basis that such a vehicle will produce far more emissions than conventional airplanes. Having this opposition may be a significant barrier to any rule change regarding supersonic flight over land even though the new breed of supersonic

aircraft designers all have repeatedly stated that no one has any interest in returning a Concorde-like design, with associated emissions and noise, to market.

The ability to run 100 percent sustainably could help allay such environmental concerns. And Aboulafia said this sustainability is an imperative for supersonic jets: "Otherwise it's just not going to fly—well, it'll fly, but it will not fly politically." ■

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SAF still key for bizav's target of a sustainable future

by Curt Epstein

Sustainability remains one of the foremost topics in aviation and indeed most believe that, for the industry to grow, it is crucial for it to embrace more environmentally-friendly concepts.

In 2009, the business aviation community, through its representative organizations, announced three goals to mitigate bizav's effect on climate change: achieve carbon-neutral growth by 2020; improve fuel efficiency by 2 percent per year from 2010 to 2020; and reduce CO₂ emissions by 50 percent by 2050 relative to 2005.

There are currently four pillars to which business aviation is pinning its hopes of meeting those stated goals: airframe and engine improvements and optimization; new air traffic control technology and procedures; market-based measures such as the purchase of carbon offset credits; and the adoption and use of sustainable aviation fuel (SAF).

"Without sustainable aviation fuels, we will not meet our goal," said David Coleal, former president of Bombardier Aviation and the chairman of the General Aviation Manufacturers Association (GAMA) environmental committee. "And it actually has the biggest impact of any of the pillars we are talking about."

An industry coalition—including GAMA, NATA, NBAA, EBAA, IBAC, and its newest member, the Commercial Aviation Alternative Fuels Initiative (CAAFI)—is dedicated to educating the industry about the use and benefits of SAF. Its recently released second edition guide to the renewable fuel entitled "Fueling the Future," which serves as a clearinghouse of information on all aspects of the value chain. According to the coalition, the single-largest potential reduction in aviation's greenhouse emissions will result from the broad adoption of SAF in place of the current fossil-fuel-based jet-A.

In September, replacing a live event that was to have taken place in March in Washington, D.C., the coalition held its first online summit, a two-day event that gathered together a constellation of experts encompassing all aspects of the industry including operators, legislators, regulators, fuel suppliers, and others for a quartet of panel discussions to determine how best and how quickly to ramp up the acceptance, demand, and supply for SAF.

Speaking during the event, Joel Szabat,



During a sustainable fuel event held before last year's EBACE show, participating aircraft fueled up with SAF on the way to Geneva.

the U.S. Department of Transportation's assistant secretary for aviation and international affairs, noted, "In the first half of 2020, the aviation sector uplifted more than three million gallons of sustainable aviation fuel—a 100 percent increase over the entirety of 2019. So, to me, this is all the more impressive when you consider that this increase in fuel usage is happening against the backdrop of the Covid pandemic and the more than considerable reduction in aviation demand."

One key point the industry continues to stress is that blended SAF is simply a drop-in replacement for conventional jet fuel, and its use is endorsed by aircraft and engine OEMs. "The airplane itself does not know the difference between sustainable aviation fuel and regular aviation fuel, but the environment does," said NBAA president and CEO Ed Bolen, as he kicked off the online event.

One misconception about SAF is that its main environmental benefits stem from its use in aircraft. While SAF fuels do not contain sulfur—which, with traditional fuels, is released into the atmosphere in the form of sulfur oxides, a component of acid rain—"what's lost on a lot of people is that the actual amount of CO₂ coming out of the tailpipe is nearly identical to the amount of CO₂ that comes out of the tailpipe for a plane flying on petroleum-based jet fuel," explained Steve Csonka executive director of CAAFI.

He added that the difference lies in the benefits inherent in the production of each, which could potentially result in CO₂ emission reductions of more than 100 percent over the life cycle of the fuel. "Fundamentally, this is what we're talking about. Instead of continuing to pull carbon molecules out of the ground, burning them, and turning them into additional CO₂ in our atmosphere, what we're trying to do is pull carbon molecules out of our biosphere from different plant matters and recycle those carbon molecules so that in the long run, we abate or even

potentially reduce the amount of carbon that we're exposed to in our biosphere."

As such, the industry's task is to advocate SAF usage and demand to spur increased production and investment in new facilities, which will help bring prices down, according to Michael Amalfitano, president of Embraer Executive Aircraft. He also believes it is his company's role as an aircraft manufacturer to educate its customers on the use and benefits of SAF.

Gulfstream, like most other manufacturers, concurs, announcing in mid-September that it had renewed its SAF supply agreement with World Fuel Services for another five years. The companies signed the first such multiyear purchase agreement in business aviation back in 2015.

The fuel—produced by World Energy at its refinery in Paramount, California, from a feedstock of agricultural waste, fats, and oils—powers Gulfstream's Savannah, Georgia-based fleet, including corporate, demonstration, completion, customer support, and flight-test aircraft. SAF is also available to customers at its Van Nuys and Long Beach, California service centers and the OEM plans to have it on hand at its new Farnborough Airport facility in the UK as well.

"Reducing our impact on the environment by using SAF is a move we should all consider making," said company president Mark Burns, adding he believes customer awareness and interest in the fuel is growing rapidly.

With that awareness comes other misconceptions, however—possible damage to the aircraft and increased microbial growth in fuel tanks, all of which have been addressed and/or debunked by the experts and OEMs, leading some to believe that more industry education on the topic is required.

One current hurdle faced by SAF is its higher price than standard jet-A, due to its limited availability. "As we can see, the current low supply obviously leads to

higher prices. That's not different than any other segment," said Amalfitano.

This price differential has been exacerbated of late by the overabundance of conventional jet-A due to the drastic reductions in commercial airline schedules as a result of the Covid pandemic. The price per barrel of crude oil plummeted from more than \$60 dollars per barrel, actually reaching negative territory before somewhat stabilizing at around \$37 at press time. Yet experts believe this is an aberration and those in the sustainable fuel industry say this is not hindering their current efforts to increase the supply of SAF.

Increased Production

The industry continues to develop new pathways for the production of SAF, with seven currently approved. The most recent, this summer from Japan's IHI Corporation and that country's New Energy and Industrial Technology Development Organization, involves the use of microalgae as a feedstock. Other low-competition sources currently involve used cooking oil, plant oils, municipal solid waste, waste gases, sugars, purpose-grown biomass, and some crops and agricultural residues.

According to Czonka, at least 15 more processes are in the pipeline toward earning ATSM D7566 (the specification for jet fuel) certification, which will continue to expand the available supply of the renewable fuel. "By 2026, production should top one billion gallons annually, but still represents only 1 percent of demand," he said.

Last November, Shell Aviation announced it would support its long-term strategic partner SkyNRG in the development of the first dedicated SAF production plant in Europe. The fuel company will provide technical and commercial expertise to the DSL-01 project in Delfzijl, Netherlands, which is slated to be commissioned in 2022. The plant will produce 100,000 tonnes of SAF a year, corresponding to a reduction of lifecycle

CO₂ emissions of approximately 270,000 tonnes. Combined with the green production factors, the lifecycle carbon emissions for the fuel produced there will be around 85 percent lower than that of conventional jet fuel.

And, in August, Phillips 66 said it is planning to fully convert its San Francisco Refinery in Rodeo, California, from crude oil processing to renewable fuels, using feedstocks such as used cooking oil, fats, greases, and soybean oils. Combined with the production of renewable fuels from an existing project in development, the output could surpass 800 million gallons a year, making it the largest such facility in the world, with production slated to begin in 2024.

Neste's current SAF production is 34 million gallons, but due to an expansion project at its Singapore refinery, along with upgrades to its Rotterdam facility, the Finnish company could have the capacity to produce almost half a billion gallons of SAF annually by 2023.

While Gevo currently produces 100,000 gallons a year of SAF at its facility in Silsby, Texas, by early next year it expects to round that number out to one million gallons, and by 2024 to 40 million gallons a year.

World Energy is currently investing \$1 billion into its facility in Paramount, California, and by late 2022 it will increase its total capacity of 25 million gallons a year to approximately 150 million gallons a year of neat (unblended) SAF.

While those increases in production volume sound impressive, they still fall short as far as what will be required, according to IBAC director general Kurt Edwards. "We have a global aspirational goal to halve our emissions by 2050, compared to 2005 levels. We know we have to make a transition away from fossil fuels, towards sustainable fuels that can be used with current equipment," Edwards said during September's two-day summit. "SAF is going to be a critical technology to help us achieve that goal; to get there, we may need as much as 500 million tons of SAF per year for the entire global system."

Distribution

The industry has had a series of sustainability milestones since a January 2019 SAF event at California's Van Nuys Airport, which marked the first time SAF was made available to business aircraft at a public airport. Along with education sessions, it included demonstration flights on Gulfstream, Bombardier, and Embraer aircraft powered by the SAF fuels produced by World Fuel and Gevo and provided by World Fuel Services and Avfuel respectively and distributed to the four FBOs on the field. A series of demonstrations followed, including a similar industry-wide education event ahead of 2019 EBACE held at the UK's Farnborough Airport, where business aircraft heading to the Geneva show could fill up for what was billed as the largest industry fly-in powered by SAF.

In January, the World Economic Forum, an event that typically attracts global leaders and hundreds of private aircraft flights, was chosen as another demonstration, with SAF available to fuel departing aircraft at Zurich Airport. The occasion was used to also educate operators to the payment and credit transfer concept of book-and-claim, where those wishing to use SAF can purchase it, even at airports where the actual fuel is not available.

While they would pay for the fuel, including any price differential, under the book-and-claim scheme, the actual "molecules" would be dispensed to another operator at an airport where the fuel is available, while the purchasing user would receive the credits under whatever carbon reporting system they operate under, through a strictly-accounted procedure intended to prevent double crediting of the SAF use.

California has become a hotbed for sustainable fuel usage due to the state's Low



The Phillips 66 refinery in Rodeo, California, is being converted to renewable fuels manufacturing, which will eliminate crude oil processing at the bay-side plant.

Carbon Fuels Standard (LCFS), which aims to reduce the carbon intensity of fuels burned in the state and incentivize through taxes and credits the production and distribution of low life-cycle carbon emission fuels. On the production side, the LCFS provides a credit that enables them to offset the production cost and, in addition to that, provides a rebate or discount to the consumer.

"We have to look at the market that we can distribute the product into," said Chris Cooper, Neste's v-p for North American renewable aviation. "And in this case, California provides the best scenario for rebates and incentives to bring the price point down to the end-user or the pilots buying fuel."

As a result, much of the SAF and other sustainable fuels produced in the U.S., and even the world, are finding their way to the Golden State. "That's what's creating the value in the marketplace that is unique to California," Graham Noyes, executive director of the Low Carbon Fuels Coalition, told AIN.

"Some of these very low carbon fuels like sustainable aviation fuel can be all the way down to the point where they're reducing 70 percent of the greenhouse gasses, they have a carbon intensity score of 30 there and for a fuel like that," he explained. "Depending on the credit price, that fuel could be getting \$1.50 to \$2 [per gallon] of crediting coming from the LCFS program."

Factor in any other local low-carbon incentives and it builds to the point where many producers would be willing to ship sustainable fuel across the country or even overseas to California for sale. Oregon, which has a much smaller aviation market, has adopted a similar standard, and measures were being considered by the Washington and New York state legislatures before being derailed by the Covid pandemic in March.

"It would be a major breakthrough to have it first of all in New York," said Noyes, "but also to then have that kind of policy structure in the Northeast where

New York is obviously a leader. To the extent that policy gets established there, there's a good opportunity for other states in the area to learn more about the policy, see how it works, and potentially adopt it as well."

Cooper explained there currently only exists local or regional legislation to promote the use of SAF, and he says there need to be federal policy incentives established as well to support and incentivize the industry's growth across the country.

"More than likely the most efficient would be some form of tax rebate that could be applied federally," he told AIN. "In which case, when you're producing product in the Midwest or you're producing in the Northeast, it should stay [there] because the federal government is helping us do so. I think we need to concentrate on how business aviation can help promote sustainability and extend that to their passengers so that we can work together in Washington D.C., to be sure that we have incentives that properly help us create value or identify the value in SAF."

The Atlantic Council, a non-partisan think tank, recently published its own white paper, "Sustainable Aviation Fuel Policy in the United States: A Pragmatic Way Forward," in which it outlined a list of initiatives that would need to be promoted to establish a viable SAF market and even the playing field against conventional petroleum fuels. Among them are establishing a SAF specific blender's tax credit to encourage fuel production and escalation into the fuel supply; providing an excise tax exemption from the Airport and Airways Trust Fund's domestic commercial fuel tax to reduce the current price gap with fossil jet fuel; and improving SAF's credit generation level by updating the fossil fuel emissions baseline that SAF is compared against.

In July, Neste announced that it had begun shipping Texas-finished SAF to California for delivery via a standard multi-product pipeline instead of truck to San Francisco International Airport (SFO) for airline use. That was followed in September with an announcement of a partnership between Neste and Signature Flight Support consisting of an offtake agreement of five million gallons to establish "permanent supplies" of SAF at SFO and the UK's London Luton Airport, marking Signature as the largest FBO purchaser of the sustainable fuel. As part of the deal, NetJets agreed to the purchase of three million gallons of SAF, covering all of its flights from SFO and from its Columbus, Ohio headquarters as well, using book-and-claim in the case of the latter.

In addition, global operator VistaJet recently announced that, as part of its Sustainability in Aviation pledge, it has signed an agreement with SkyNRG to create a voluntary program that allows customers to specify if they wish to pay for the volume of SAF consumed in their flight, which is then distributed elsewhere through a book-and-claim mechanism.

Jet Aviation, which supplies SAF at its Van Nuys facility and provided SAF during the World Economic Forum demonstration event, is looking to establish permanent supplies of the fuel at its Swiss locations and then expanding it into its Netherlands FBOs, according to company president David Paddock. He also serves as this year's chairman of GAMA.

Paddock alluded to a new legislative initiative from the European Commission known as ReFuelEU Aviation, which will be launched by the end of this year to help spur supply and demand for sustainable aviation fuels in Europe. Though some countries such as Norway have already initiated quota mandates on the use of SAF, the EC noted that "while sustainable aviation fuels have the potential to significantly reduce aircraft emissions, this potential is largely untapped as such fuels represent only 0.05 percent of total jet fuel consumption." The EC concluded, "The present production and use of SAF in the EU is still negligible." ■

Newest ACJ offers bizliner size at below large-cabin prices

By James Wynbrandt

Airbus Corporate Jets (ACJ) and production partner/launch customer Comlux Group introduced in October the ACJ TwoTwenty, a private version of the Airbus A220-100 single-aisle airliner that “will offer an alternative to the traditional large cabin business jet and the bizliner,” Benoit Defforge, president of Toulouse-based ACJ, told *AIN*.

Slated for early 2023 entry into service, the ACJ TwoTwenty (220) will be delivered fully outfitted from a wide choice of predefined luxury cabin configurations, and priced “just under” today’s latest large cabin business jets, Defforge said. (Gulfstream’s G700 and Bombardier’s Global 7500 list for about \$75 million and \$72.8 million, respectively.)

“Our strategy is to package the product with a flexible-catalog cabin,” Defforge continued, contrasting the approach with its customary green deliveries and third-party completions that bring the minimum price of a starter ACJ model to \$100 million.

With a significant range increase to 5,650 nm and five-ton mtow boost; ETOPS certification for extended overwater legs in hand; and a 6,000-foot maximum cabin altitude, the ACJ220 will be capable of linking London and Los Angeles; Moscow and Jakarta; Tokyo and Dubai; or Beijing and Melbourne comfortably, ACJ



Airbus Corporate Jets has introduced the ACJ TwoTwenty, a corporate version of its A220 airliner. The company has tapped Comlux Group to outfit the cabins of the first 15 TwoTwentys, shutting out other completions firms until later this decade.

said, with a cabin offering three times the space but lower operating costs than today’s largest business jets.

Swiss corporate airliner specialist Comlux Group is taking the first two of the “Xtra Large Bizjets,” as ACJ tags the 220s, and its Indianapolis, Indiana Comlux Completion facility will outfit the first 15 cabins under an exclusive agreement with ACJ. (Four additional orders from undisclosed customers are in hand.)

Defforge promises “a very modern platform with the latest technology,” including Ku-band connectivity with double the speed of current onboard Wi-Fi, and an optional humidification system. Available in three interior motifs (avant-garde, or modern; timeless; and quintessence), the choices of interior design options combine to create 80 different interior configurations.

“This is a unique product in business aviation,” said Richard Gaona, group executive chairman and CEO, noting its unprecedented combination of size and operational economy compared to executive airliners, as well as the large-cabin business jets ACJ referenced. Fuel

consumption on its Pratt and Whitney PW1500G engines “is very low—50 percent less than the [ACJ]318,” Gaona said.

The group has extensive experience completing, operating, and owning ACJs, having purchased and put 20 into service prior to this deal. The company’s Malta-based operations arm, Comlux Aviation, will make its 220’s available for charter and sale.

The airframe has “good bones”; developed by Bombardier as the next generation short-haul airliner (the CSeries) and made with a significant amount of composite materials, Airbus famously bought the program in 2018 (for \$1) amidst the Canadian company’s cratering finances.

ACJ is also developing a low-utilization maintenance plan for the 220, as it offers for its other models. These airframes are

designed for rugged commercial service but are rarely flown as often or hard when outfitted for private use, obviating the rigorous inspection and servicing schedules mandated for commercial operators.

Though Boeing’s BBJs have dominated the world’s executive aircraft market in recent years and ACJ is a European company, the ACJ220 is well-positioned for sales in the U.S., business aviation’s global capital: The airframe is made in Alabama, the engines in Connecticut, and the completions performed in Indiana.

Comlux will receive the first airframe in December 2021 and is allowing 12 months for the first completion, with entry into service slated for early 2023, and anticipates eight months turn time per aircraft thereafter, and three to four ACJ220 deliveries per year. ■



The ACJ TwoTwenty taps the unique features of the nearly all-composite, Bombardier-designed CSeries/Airbus A220 to offer a new corporate jet to the large-cabin market.

Lawmakers shift funds to help preserve Airport and Airway Trust Fund liquidity

As the U.S. Congress approved a stopgap bill to extend funding for government agencies, including the FAA, through December 11, lawmakers took an unusual step of moving \$14 billion out of the federal treasury general funds into the Airport and Airway Trust Fund. The funding will help keep the trust fund liquid as it was in danger of depletion as an unintended consequence of the CARES Act and the ongoing dampened travel in general from the Covid-19 crisis.

The CARES Act gave an exemption through the end of the year from commercial air transportation taxes, including those on passenger tickets, cargo, and fuel. While the fuel excise taxes remained in place for general aviation, it is a small contribution into the trust fund and the majority of revenue came from passenger ticket and cargo taxes.

The trust fund was established in 1970 originally to help pay for capital improvements for the U.S. airport and airway system. However, over the years it was increasingly used to pay for FAA’s operations and a range of other aviation expenses. In Fiscal Year 2020, it paid for 97 percent of all FAA expenses.

Aviation groups, including the Aircraft Owners and Pilots Association, this spring appealed to lawmakers to take steps to help shore up the trust fund, noting that it had a healthy cash balance of \$17.9 billion at the beginning of FY2020. Of that, \$6 billion was uncommitted—or not designated for any specific spending. Under the current scenario, the groups were concerned about the uncommitted balance reaching a negative \$3.5 billion by the end of the fiscal year. **K.L.**

bizav helps with coronavirus aid

they were needed, and multiple manufacturers rapidly shifted gears to produce equipment that was far removed from their usual output.

As scheduled airline service started to evaporate, business aircraft, and especially those in charter fleets, were increasingly called into service to repatriate those displaced by travel restrictions and also Covid patients. In some cases, cabins had to be rapidly reconfigured and disinfected to take account of the medical risks, and this included the use of new technology such as the new Epishuttle patient isolation pod. Emergency medical flight providers such as Germany's DFT Luftrettung have installed this device, which allows patients to be connected to a ventilator while in the airtight space.

Early in the crisis, NBAA worked in tandem with the American Hospital Association to establish a way for first responders to request emergency flights from a list of operators offering transportation via the industry group's HERO database. On the other side of the Atlantic, the European Business Aviation Association established a Covid resource center to help coordinate the industry's response to rapidly shifting needs.

In late March, a pair of long-range Net-Jets Bombardier Global 6000s flew from the U.S. to Nanjing in China to collect N95 masks and other items needed by the New York-based Mount Sinai Medical System. The operation, which was supported by Goldman Sachs, involved complex approval processes with Chinese officials, the U.S. Customs and Border Protection agency, and the Food and Drug Administration.

A Million Masks

In a similar initiative, the New England Patriots football team's Boeing 767 was pressed into service for another operation to bring one million masks from Shenzhen, China to healthcare workers in Massachusetts. In this instance, Universal Weather & Aviation provided flight and logistics support.

To support French government efforts to guard against the Covid outbreak, Dassault Aviation provided a Falcon 8X and a Falcon 900 to fly medical teams and supplies to small airports around France as part of Operation Resilience. The aircraft have been operated out of Paris Le Bourget Airport by Dassault Falcon Service.

VistaJet also scrambled its fleet of Global and Challenger 350 aircraft to provide complimentary empty leg flights to enable medical personnel and health experts to move around the world in Covid relief efforts. The operator received technical support from Control Risks, Osprey, and MedAire in keeping the flights safe. Subsidiary company XO also



Dassault converted this Falcon 900B and a Falcon 8X to cargo configuration to carry medical supplies and doctors to small airports in France to help battle the coronavirus.

made private lift available to carry medical supplies to New York City at the height of the first wave of infections.

Meanwhile, manufacturers including Honeywell, Textron Aviation, Embraer, Piper, CAE, Universal Avionics, Cirrus Aircraft, and Husky Corp. adapted their facilities to produce items such as face masks and ventilators. Safe Flight Instrument provided equipment that enabled a single ventilator to be used by four patients simultaneously. Gulfstream worked with two General Dynamics sister companies to use 3D printers to produce adapters for a clinical trial to see if CPAP/BiPAP machines could be converted to ventilators, as well as making bands for face masks.

Back in early April 2020, private flight provider Wheels Up teamed up with hunger relief organization Feeding America and Seattle Seahawks quarterback Russell Wilson to launch an initiative called Meals Up with the aim of supplying 10 million meals for people facing hunger in the economic fall out from Covid. By mid-September, the project had raised the equivalent of 47 million meals for Feeding America's network of 200 food banks across the U.S.

To mark the achievement, Textron Aviation paid to repaint one of Wheels Up's Beechcraft 350i twin turboprops in a special orange livery. The aircraft manufacturer also made a financial donation to cover the cost of another 500,000 meals.

Another organization putting Textron aircraft to good use is the U.S. Civil Air Patrol (CAP), which has harnessed its substantial fleet of Cessna aircraft to perform missions such as delivering Covid samples to laboratories for testing, as well as personal protective equipment, cleaning supplies, and ventilators to more remote locations.

As of early October, 527 aircraft from the CAP fleet had logged almost 2,200 flight hours in Covid relief operations that delivered more than six million meals, collected almost 900 units of blood, and delivered almost 900,000 pounds of bulk food and meals. The volunteer operation has also transported around 2.3 million masks, more than 22,000 Covid test kits,

and just under 100,000 test samples.

According to Randy Bolinger, CAP's chief of marketing and strategic communications, the Covid campaign has been the group's largest mobilization since World War II.

The CAP is part of the U.S. Air Force Auxiliary and was formed early in 1941 to mobilize America's civilian aviation resources as part of the national defense effort. Today, its volunteers make extensive use of aircraft in support of CAP's mission to support communities with emergency response. For the Covid relief efforts, it currently has a pool of around 2,400 pilots, more than 2,800 observers, and almost 36,000 volunteers.

“With Covid-19, it's as if a hurricane has hit 50 states. Normally, it's just two or three. From a disaster standpoint, [with an aircraft] I can move people anywhere and anytime I need almost immediately and that's critical in this current marketplace.”

— ADS president and CEO Simon Elliott

Texas-based Active Deployment Systems (ADS) has been putting its Cessna Citation CJ2+ to good use in its efforts to provide support services for Covid-19 response efforts in at least half a dozen U.S. states. The company provides temporary infrastructure support, mainly under contract from state and federal agencies.

As in previous disaster relief efforts, such as after Hurricane Katrina, ADS responders have been flying in to install temporary infrastructure for medical and

community support operations. The CJ2+ allowed its teams to move around quickly and efficiently even at the height of Covid travel restrictions.

“Hospital beds can't be set up without restrooms, generators, fuel and showers and everything else,” explained ADS president and CEO Simon Elliott. “With Covid-19, it's as if a hurricane has hit 50 states. Normally, it's just two or three. From a disaster standpoint, [with an aircraft] I can move people anywhere and anytime I need almost immediately and that's critical in this current marketplace.”

Covid presented an exceptional challenge to the Corporate Angel Network (CAN), which for many years has harnessed complimentary rides on supporters' private aircraft to transport cancer patients and their families. Despite the obvious difficulty of guarding against the spread of Covid infection, CAN partner operators have continued to provide lift and, in some cases, arranging dedicated flights to do so.

Similarly, Patient Airlift Services (PALS), which also arranges free flights for those needing medical care who would be unable to travel via airline, has continued to operate. In April, Joe Howley, co-founder of PALS, took delivery of a new Embraer Phenom 300E, fitted with the new Bossa Nova cabin interior.

Even at a time when business aviation's bottom line has been hard hit by the steep decline in revenue, many companies have continued to reach into their pockets to help others. For example, aircraft maintenance program provider JSSI has made several donations to humanitarian causes during the pandemic. These include \$40,000 to the Feeding America program, \$100,000 to Wheels Up's Meals Up campaign, and \$6,000 to the Global Food Network. They come on top of its other recent contributions to relief efforts for the forest fires in Australia earlier this year and some local causes in Ohio.

In response to the hardship facing many companies during the ongoing crisis and especially smaller operators, some organizations have shown willingness to help out with support or special offers. For example, in March, the Luxaviation Group launched its European Business Aviation Solidarity Initiative to help others weather the crisis by providing resources to help keep their clients and assets safe. The company gave other firms access to the purchasing power and administrative resources of its procurement department, providing the same pricing and terms it enjoys from its suppliers based on its high-volume aircraft charter and management operation. It helped 15 competitors through the program.

The new AIN Top Flight awards for the business aviation industry will include special recognition for charitable and humanitarian efforts. The Top Flight nominees will be announced in the December edition of AIN, followed by the winners in the January issue.



KATHLEEN BLOUIN
NBAA senior v-p of conventions
and forums (retired)

I could write a book about the NBAA Convention, which I attended from 1980-2015, but here are experiences that stand out.

The Katrina Story

On a Sunday, the late great Jan Barden woke me at 5 a.m. to advise that she was being evacuated from her home near New Orleans—Hurricane Katrina was coming with great force. The NBAA Convention was scheduled to be in that city in eight weeks. That afternoon I received two more calls. The amazing Kim Showalter simply said: Kathleen whatever you need us to do, we will do. The legendary Pat Epps called with the same message. Brian Williams on NBC News appeared in waders on Canal Street with water up to his hips, and I will never forget the look on NBAA president and CEO Ed Bolen's face as he appeared in my doorway on Monday.

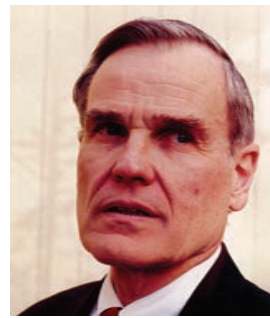
After calling the few cities able to host the convention, we were on an airplane to Orlando. Although our normal East/West building was occupied throughout the Fall, the newly built North/South perfectly square hall was available.

Our Guardian Angel Ed McNeill, who had helped us through the September

11 crisis when the show was again to be held in New Orleans, had relocated to Orlando in a semi-official capacity with the convention bureau. He knew us and the convention well and made it his mission to bring all-hands-on-deck to fit us in. Linda Peters and Roxanne Ebbers reworked the 1,000,000-sq-ft show floor. Deb Hanson moved 30,000 hotel bookings. Joe Hart had perhaps the easiest job in working with the Showalters to lay out the 150 display aircraft at Orlando Executive Airport. By Friday, we were able to tell the NBAA board that the convention had been successfully relocated from New Orleans to Orlando within eight weeks of the event—a monumental task.

Parade of Airplanes

During our first time in Las Vegas, we realized how close McCarran International Airport was to the Las Vegas Convention Center. What if we tried to move airplanes from the airport—then site of the static display—to the convention center for an indoor display? The genius team of Joe Hart and Nelson Aveleno went to work looking at all obstacles on every roadway and came up with a plan to make an opening in the surrounding airport gate, remove and replace light poles, temporarily raise traffic lights, move signs and billboards, fill potholes and other roadway obstructions and ensure one of the doors in the convention center was wide enough to accommodate some of the planes. For obvious traffic reasons, the movement took place in the middle of the night. We were all excited to be part of the “Parade of Planes” and witnessed shocked expressions on folks in the streets as we passed by with our “Parade of Planes.” Of course, our parade is now a fixture of the convention in both Las Vegas and Orlando. ■



JOHN “JACK” OLCOTT
Founder of General Aero Company
and former NBAA president

Although I had been attending NBAA's Annual Meeting and Convention since the early 1970s, I had always gone directly to the exhibit hall and never attended an Opening General Session that the association held as its kickoff event. My first convention as NBAA's president was 1992, where I had to be at the General Session. It was indeed an eyeopener. Attendance by convention-goers was sparse, perhaps for good reason. Everyone wanted to see the new products on display within the exhibit hall. Our NBAA Board made it clear that the lack of attendee participation had to change.

For the 1993 event, held in Atlanta, the convention staff headed by Dave Franson and Kathleen Blouin (né Hull) initiated a new format. We scheduled a special speaker who we thought would draw attendees, and we kept the exhibit hall closed until

the Opening General Session concluded.

The featured speaker in 1993 was Fran Tarkenton, an all-star quarterback for the Minnesota Vikings and New York Giants, and we launched the “No Plane. No Gain” advocacy program with our associates at GAMA. That format, along with cooperation from Ed Stimpson, Stan Green, and others at GAMA, remained a hallmark of subsequent NBAA conventions and I believe characterizes the relationship between NBAA and GAMA today.

Attendance expanded steadily from 1993 through a high point of more than 33,000 (if memory serves me correctly) when NBAA held its first annual event in Las Vegas. The final attendance figure ended in the number 666. I announced the number as 33,662 since I felt the number 666 was somewhat disturbing considering the venue we selected that year.

My favorite convention was the event we held in New Orleans in 2001, moved from early September to a week or so before Christmas because of 9/11. Some exhibitors boycotted the event, but others joined into the spirit of resilience and support for Business Aviation. The companies that did participate said it was one of their best since attendees were enthusiastic and business was particularly rewarding. Dick Koenig, the publisher of *Flying*, said that was understandable. Anyone who would interrupt their holiday schedule so close to Christmas had to be a dedicated buyer. ■



JOHN AND MARTHA KING
King Schools co-owners
and co-chairs

We have been attending the NBAA Convention regularly since we purchased our first business jet—a Citation 500—in 1987. We have owned business jets continuously since then and find the conventions very relevant to both our business and flying lives. They are educational, motivational, and fun. We don't recall having missed a convention since we first attended. We believe it is valuable to support NBAA since we feel that without

NBAA we wouldn't have business aviation in the way it is today.

One of our favorite moments came last year. NBAA president and CEO Ed Bolen introduced Magic Johnson onstage for his motivational talk. Then, to Ed's great surprise, Magic jumped down from the stage and went searching through the audience for a short person who wouldn't be camera shy about providing a contrast with his great height.

He found that person in the front row in the form of 5-foot 1-inch Martha King, who through her own magic—of video—had taught nearly half of the pilots in the country to fly. What he wouldn't have known—since you wouldn't guess it by looking at her—is he also found, among other things, an airline transport pilot for airplanes and helicopters and an instrument flight instructor for both. The audience cracked up with laughter at the picture they made together, and the photo has a prized spot in Martha's office. It could only happen at an NBAA Convention! ■



PETE BUNCE
President and CEO of the General
Aviation Manufacturers Association

One of my fondest memories came in 2006 when Dassault, Honeywell, and Duncan all teamed up to upgrade Jimmy Buffet's Falcon, and, in return, he put in an awesome concert for a small crowd in Orlando and then greeted everyone afterward.

Collectively, what I look forward to the most is seeing all my friends and colleagues in the evening off the convention floor. Like so many others in our industry, one received more reception invites than could possibly be attended so it is a fun challenge how many receptions we can hit in one evening.

I get a lot of business done at these gatherings and I think my wife Patty and I have a personal record of seven receptions in one evening. We always loved to end our Tuesday evenings closing down the Nordam reception,

which was always absolutely top-notch.

A few years back, they rented Elvis's suite on top of the old Las Vegas Hilton. We were the last guests there with many of the Siegfried family just telling stories around a big table sipping very good wine when all of a sudden they said they had rented the Elvis suite for a 24-hour period and no one was spending the night in the suite so they offered it to Patty and me. Excruciatingly, we had to pass up the unique opportunity because we had an early flight out the next morning and had all our luggage in another hotel. All I could think about was missing out on that gold plated huge jacuzzi bathtub looking out at the lights of Vegas!

I also loved watching my wife drag an exhausted Ed Bolen out on the dance floor at the Wednesday evening CAN gala back when bands were brought in to perform. Patty also dragged Gene Cernan out on the dance floor where he used his sore knees as his excuse for his lack of fancy dance moves.

My most vivid but sad memory was walking around to visit my board members in the hall during 2008 as the stock market was crumbling. Each of these leaders knew that this was a harbinger of another recession, coming relatively soon after the painful recession of 2001. Everyone's mood was just sheer dread but the true veracity of the “Great Recession” was to be experienced a few weeks later followed quickly by the debacle in D.C. of the auto executives testifying on the Hill about their bailouts. ■



PATTY WAGSTAFF
Aerobatic champion and founder of Patty Wagstaff Airshows and Patty Wagstaff Aviation Safety

I first started going to NBAA shows in the mid-1990s when I was working with and sponsored by BF Goodrich Aerospace. BF Goodrich always had a big presence at the convention and I was lucky enough to be a part of its booth, static displays, and social events. And let's face it—NBAA has the best, first-class social events of any convention in the world.

One of the fun things we did was raffle off a flight with me in an Extra 300. I met people who were very persistent in waiting at the booth until their name was called,

and sometimes it was. Persistence pays off! I made friends from those raffles that I still keep in touch with today. Since then I have been to NBAA shows for other companies, and most recently with Simcom as its upset training provider. I am a regular at some of the big trade shows such as AOPA in the past, AEA, WAI, and, of course, Sun'n'Fun and Oshkosh, but what I most enjoy about NBAA is seeing friends that I don't see often at those events.

One year I saw some friends, big shots from Mexico, at one of the large airplane manufacturer booths and went over to greet them. They were in a meeting and looked bored and I knew they would want me to say a quick hello. Security immediately stopped me from getting any closer with a look: "What's this girl want with our most valued customers? She doesn't even have a business suit on." About then one of my friends spotted me and the whole group came out with big hugs and kisses and heartfelt greetings. I left, giving security a small nod, and you know what—it felt good to break a stereotype.

Just one of many fun memories of NBAA. Let's plan many more. Have face mask, will travel. ■



JAKE CARTWRIGHT
Vice-chairman of Solairus Aviation (retired)

Forty-four years passed between my first NBAA show and my last. I attended the conventions with Cessna, Aviation Methods, TAG Aviation, and Solairus Aviation. Over the years the convention experiences began to blur, but one is still clear...my first.

Fresh from flying the F-4 Phantom with the Marine Corps, I was fortunate to get hired by Cessna in July of 1971 as a demonstration pilot for its first jet, the Citation 500.

Jim Taylor, v-p of Cessna's jet marketing division, was a marketing genius. We would be showing the new aircraft at the NBAA Convention in September 1971 in

Minneapolis. Jim decided to have Susan Oliver—actress, pilot, and 1970 Powder Puff Derby winner—fly the aircraft to the show, with Jim Markel, our chief pilot, in the right seat. Our only other demo pilot, Walt Young, and I rode along in the cabin. Susan created quite a sensation, as did the aircraft.

At MSP, the flight line was filled with aircraft of the day, such as the MU-2, Learjet 24, Falcon 20, Sabre 60, DH-125, JetStar, Gulfstream II, and even a corporate BAC-111. In those days, nearly everyone actually flew demonstration flights during the show, so in addition to answering questions about the aircraft, we stayed busy flying.

The exhibit hall was in a large tent on the airport grounds. I assume there were booths in the tent, but I don't remember leaving the flight line. There was one NBAA hotel and every manufacturer had a hospitality suite in that hotel. No buses, no driving, you just walked down the hall from Gulfstream to Falcon to Learjet, etc., pretty simple.

The convention certainly changed from 1971 to 2015. But for me, what remained constant was the ability to create lasting business relationships and most important, lifelong friendships that enriched both my personal and working life. ■



BRIAN BARENTS
Executive chairman of Aerion Supersonic (retired)

My first year was 1976 in Denver. It was memorable as it was the year I joined Cessna as a rookie Citation salesman. At the time we had one Citation in the product line—the original 500. We literally woke up the press on opening day and at a breakfast that morning announced three all-new products: the Citations I, II, and III. The rest is history as these models provided the basic platform for Cessna to sell thousands of Citations.

Sometime later, I became the CEO at Learjet in 1989. Shortly thereafter we emerged from bankruptcy and ultimately sold the company to Bombardier. With its financial support, we were able to quickly re-introduce the Learjet 31 followed by the Learjet 60. Two years later at the NBAA convention, we made the announcement of the first all-new Learjet in two decades—the Learjet 45. It was a glorious day for the 3,000 Learjet employees who had weathered the difficult days of bankruptcy. The Learjet 45 was the first eight-place aircraft in its class and became a great seller. It later became the

Learjet 75, which is still in production today.

At the NBAA convention in 1997, we announced the formation of Galaxy Aerospace in partnership with Israel Aircraft Industries. At the same time, we introduced the all-new Galaxy, which was the first super-midsize jet. After a successful development and certification program, the aircraft entered service in 1999. The company was later acquired by Gulfstream Aerospace and continues to be a part of the product line (now as the G280).

In 2004, we introduced to the world at the NBAA convention Aerion Corp., a high-tech company that would bring back supersonic travel to the industry following the retirement of the Concorde. It was clear that the market required another dimension for its continued growth.

Since the introduction of the jet age in the early 1950s, the industry was stuck on essentially the same speeds for 60 years. With the growth of long-range travel, the requirement for higher speed and the return to the supersonic era was compelling. And with the evolution of new technology, new modern environmentally sensitive propulsion systems, and new construction techniques, Aerion is capable of overcoming the economic and environmental objections of previous supersonic designs. Today, the company is partnered with Boeing, General Electric, and countless other leading aerospace companies to bring the Aerion AS2 to the market by the middle of this decade.

While I'll miss this year's convention for the first time in 44 years, I will look forward to the exciting announcements at next year's gathering. Until then good health to everyone! ■



LOU SENO
Chairman emeritus of JSSI

The downsized post-9/11 NBAA Convention held in December 2001 in New Orleans will always be one that will I remember.

Our country was still in shock over the devastating events of that infamous day just 90 short days prior. The last thing people

wanted at that time was to have to travel to another business conference, and I do recall the rather negative comments coming from some of my colleagues who had no desire to travel to Louisiana during what would be a rather somber holiday season.

I very clearly remember NBAA promoting the event as "A Gathering of Friends" and, in reality, that is exactly what it ended up being.

That particular convention in 2001 was just what the doctor ordered. I don't think I will ever forget how therapeutic those hugs and handshakes were the morning the convention floor opened. Thanks so much to NBAA president and CEO Ed Bolen and his team for giving our industry just what we all needed at such a critical time!

I can't imagine what it would be like had I not been able to spend virtually my entire life in business aviation! ■



MARY MILLER
V-p of industry and government affairs for Signature Aviation

Thirty-some years of NBAA conventions make for a lot of memories. [In 1992] my company, Butler Aviation, had recently

merged with Page Avjet. I was one of a dozen customer service employees in the combined company selected to attend that year's convention in Dallas. We were all eager to meet our new Page Avjet teammates.

One awkward challenge for us gregarious customer service types: we literally did not know our name when we all arrived in Dallas. The name of our new company was so top secret that the executive leadership did not even distribute our new name badges until minutes before the press conference announcement.

After the press gathered, a drape lifted from over a fuel truck, and there it was on the side of the truck. Signature Flight Support was born at NBAA 1992! ■



CYRILLE COSMAO/DASSAULT

Flying in the Age of Covid-19

by James Wynbrandt

Covid-19 has upended the business aviation industry, bringing aircraft manufacturing, maintenance, and transactions to a virtual halt. But these systemic shocks have been of relatively little consequence to private jet travelers—so far, at least.

Most have been resigned to staying sheltered or were required to do so. Yet, while governments shut borders, airlines slashed service, and your office became off-limits, private aviation remained open for business. If you needed to charter, use hours on your jet card, or summon your fractional-share aircraft, your provider could accommodate you. For aircraft owners, meanwhile, access to the National Airspace System remained uninterrupted.

Meanwhile, the industry quickly implemented effective safety protocols. It also secured financial and regulatory assistance from Congress and the FAA to keep business aviation and the airways open. Indeed, business aviation demonstrated once again, perhaps more emphatically than ever before, that its people, equipment, and culture can be counted on in times of crisis.

But make no mistake: Covid-19 is dramatically altering this industry, and you need to understand what's changing, how those changes will affect your flights, and what you can do to be ready.

Business Aviation's New Flight Rules

The first rule of flying in the coronavirus era: make sure your lift provider—whether a charter or jet card company, membership or fractional program, flight department, or yourself as an owner—follows recommended standards for coronavirus prevention. If you travel on

your company's aircraft, or on a principal's owner-flown aircraft, ask the head of the flight department or whoever is in charge of the boss's airplane about health procedures.

The Centers for Disease Control, Food and Drug Administration, and World Health Organization are among agencies promulgating standards. Comprehensive compliance guidance is available from business aviation groups, including the NBAA, Helicopter Association International (HAI), National Air Transportation Association (NATA), and European Business Aviation Association (EBAA).

Virtually all providers, from operators to ground-service suppliers, have developed and instituted Covid-19 protocols. Signature Aviation's SignatureAssure is among now-common branded safety programs based on standards from the aforementioned agencies, and the company ensures that its service partners observe them, as well. Universal Weather and Aviation, for example, has implemented its own standards-based program at the top 100 destinations frequented by its flight-services customers, covering FBO operations, in-flight catering, and ground transportation.

For the foreseeable future, you'll see examples of these measures throughout your journey. You'll be asked about your health and recent travel, have your temperature read before departure, and fly with a mask-wearing crew. The aircraft will have been disinfected immediately after its last use to ensure that it's safe for servicing by ground personnel and again, for your safety, before you board. You will be offered a mask. Catering options may be limited, and onboard service items may be disposable.

Protocols are in a constant state of updating as researchers gain more understanding about the coronavirus and new disinfection products and systems come to market. Charter broker Magellan Jets had to "learn how to match up the list of FDA- and Environmental Protection Agency (EPA)-approved cleaning materials" and then distribute ample supplies to its partner operators, COO Todd Weeber said during a NATA webinar.

Companies have become accustomed to customers requesting details about cleaners and procedures, according to that webinar's participants, so don't be shy about asking. At an NBAA-hosted webinar on disinfection practices, decontamination expert Frances Grinstead recommended that customers demand peer-reviewed data on the efficacy of each product and system the provider uses.

Remember that though all U.S. public-use airports remain open, surrounding communities may be under various lockdowns, so investigate your intended destination accordingly. If you're planning to travel internationally, your charter provider will research any Covid-19 restrictions affecting the flight, your entry into the country of destination, and quarantine issues.

Financial Concerns Regarding Lift Providers

For the duration of the downturn, charter will likely remain on sale along many routes, as operators struggle to generate cash flow and book enough business to satisfy the manufacturer-recommended minimum operational time for engines and aircraft. This has led to a "race to the bottom in pricing," says Worldwide Jet's Noel Fournier. However, one-way pricing has reportedly become less available on some routes, as providers aren't confident that they can find customers to book the return legs.

Many jet card, membership access, and fractional programs report an uptick in customer renewals and inquiries from prospects. Fractional-fleet operator FlexJet's CEO, Mike Silvestro, terms such activity "off the charts," and NetJets saw in May "the best month of new customer relationships" in 10 years.

Yet Covid-19 has revealed the risks to financial health that charter providers can represent, in the failure of light jet operator JetSuite. The high-profile company, backed by Jet Blue and Qatar Airways, owed some \$50 million in deposits to customers when it was forced into bankruptcy after the pandemic cratered demand. In bankruptcy filings, JetSuite revealed that it had never been profitable. (Several membership programs stepped up to offer discounted services to former customers who lost deposits, though most of these programs require deposits of their own.)

The true financial condition of privately held companies is impossible to know. Nonetheless, ask for audited financials before depositing funds with any flight provider. Consider working with a consultant to help with your choice. And seek a provider that offers an escrow option. In the wake of JetSuite's bankruptcy, for example, Clay Lacy Aviation introduced interest-bearing, protected accounts for customer deposits.

Coronavirus 101 for Aircraft Owners

Aircraft owners must ensure that an effective written Covid-19 protection plan—which outlines standards and practices to be followed throughout flight operations—is in place. The NBAA has published guidelines owners can use to implement cleaning protocols, and HAI has issued "Covid Clean" standards for rotorcraft operators. These cover disinfection and cleaning procedures for aircraft and facilities, and the use of personal protective equipment (PPE).

Consider the ground services at your destination airport and contact any facility you're considering for a tech stop or longer stay to ask about its Covid-19 protocols. If a management company operates your airplane, satisfy yourself that it has instituted appropriate practices.

Make sure you've minimized the potential for liability claims arising from Covid-19 exposure in your aircraft, whether from a charter customer, a line person who handled the baggage, or others. Aviation attorney David Mayer advises requesting Covid-19 waivers and indemnities from affected individuals to mitigate the risk of liability claims. Examine your insurance policy to see whether it protects you against such claims. Though proving a link between a suspected exposure and infection is difficult, you must take reasonable care to maintain a safe and healthy environment in and around the aircraft to avoid being considered negligent and liable.

Ensure that your flight crew remains sharp despite falling flight hours and the FAA's waived recurrency and training requirements. Wyvern's senior director

of quality and education, Andrew Day, suggests providing simulator stick time “at the very least.”

Maintain manufacturer-mandated operational minimums for your aircraft and engines; failure to comply can void warranties. At Solairus Aviation, which has 119 aircraft on its charter certificate, owners allow their crews to perform takeoffs and landings, “and in some cases a few approaches,” notes Tom Benvenuto, senior v-p of flight operations. To maintain their focus on aviation, Solairus also regularly gathers its remotely based crewmembers online in small groups to discuss aircraft systems and procedures.

Monitor the financial health of your management company, as well. As demand for lift skyrocketed in the lead-up to business aviation’s last cataclysm—the Great Recession—some management companies underpriced their fees to draw aircraft owners, calculating that their 15 percent share of charter revenue would compensate. Some of their clients, meanwhile, counted on charter income to make aircraft ownership financially viable. Both approaches revealed their folly in the ensuing collapse.

Sound management companies charge fees commensurate with the services they offer and keep owners apprised of the economics and realities of the charter market. If your management company doesn’t appear to be doing that, ask why.

Buying and Selling Aircraft in a Pandemic

Buying and selling business aircraft during Covid-19 hasn’t been as easy as booking a flight through charter or other “asset light” access programs. At the onset of the coronavirus era, uncertainty about aircraft valuations brought transaction activity to a near standstill; with residual values unknown, aircraft financiers turned off the spigots, and prospective buyers walked away from deals. Moreover, the mechanics of transactions—moving an aircraft to an inspection site and returning the crew home as well as ensuring the facility would remain open and that needed parts would be available—became fraught with risks of their own, further inhibiting transactions.

The last convulsion of this scale followed the 2008 financial collapse, which introduced a decade of declining values. But consider important differences between then and now. The 2008 debacle was triggered by a financial bubble, one big enough to levitate the values of some preowned business jets higher than those of new models (no waiting in line!). By contrast, valuations on the eve of the Covid-19 era were reality-based, and for now, government stimulus programs are helping to soften financial fallout, and panic pricing hasn’t cut residual values.

A sales slowdown began in the fourth quarter of 2019 after more than a year of market stabilization, and low global economic growth prospects were anticipated to put a damper on demand in 2020 anyway, but not on the scale Covid-19 created.



In April and May, preowned business jet transactions were down about half, year over year, from a total of 431 to 217.

On the plus side, “sellers have [refused] to capitulate to market pressure to sell quick and cheap,” says JetNet’s Paul Cardarelli.

As of mid-June, inventory stood at 10.3 percent, with some 2,300 jets on the market. Though that’s above the 10 percent threshold considered to separate a buyer’s and seller’s market, no influx of for-sale aircraft accompanied the decline in transactions. By contrast, in the recession, inventory quickly began rising and ultimately topped out near 18 percent.

Also, by mid-June, average values of business jets fell 13 percent from Covid’s onset, Amstat reported, with large-cabin models losing the most (15 percent) and light jets the least (12 percent).

But the market remains thin, and with uncertainty prevailing, professionals advise buyers and sellers alike to wait for more clarity.

If you’re thinking of selling, use the current downtime for maintenance and upgrades that will make your aircraft stand out in what is likely to become a more competitive market. If you’re a

buyer, work to identify the best models for your mission. The economic downturn is sure to motivate some owners to sell their aircraft, and some bargains for cash purchasers may be available. If you want to capitalize on such an opportunity, don’t try to lowball your bid, angling for the deal of a lifetime. Identify a target acquisition and seek a reasonable discount rather than a fire-sale price.

Meanwhile, the slowdown that began last year and was accelerated by Covid-19 has hit sales of new aircraft as well. Manufacturers have reduced workforces and lowered production and sales targets and will likely sell 30 percent fewer aircraft than they did last year, predicts JetNet’s Rolland Vincent—even as a new generation of models (the Pilatus PC-24, Bombardier Global 7500, and Gulfstream 500 and 600, for example) come to market. Some new aircraft are reportedly being discounted. So if you’ve been thinking about buying new, this could be an excellent time to do it.

The Route Ahead

One rare bright spot in the Covid-19 crisis is that it has for now erased business

aviation’s pilot shortage, which had increasingly constrained operations and raised concerns about the industry’s growth prospects. The airlines are expected to furlough thousands of pilots before traffic returns to pre-pandemic levels, ending the exodus of corporate pilots to the commercial world, though the length of the reprieve is debated.

Meanwhile, the economy will remain business aviation’s underlying driver, and for now, as goes Covid-19, so goes the economy. But whatever the economic trend, the consensus is that in the long term the pandemic will bring business aviation many new customers who are concerned about the health risks of commercial aviation.

Fully 90 percent of the approximately one million people who can afford to fly privately do not, according to a recent McKinsey study based on Credit Suisse and Wealth-X data. Moreover, 40 percent of billionaires are 70-plus years old, and the average age of ultra-high-net-worth Americans is 58, putting this group at high risk for Covid-19 and other pathogenic diseases.

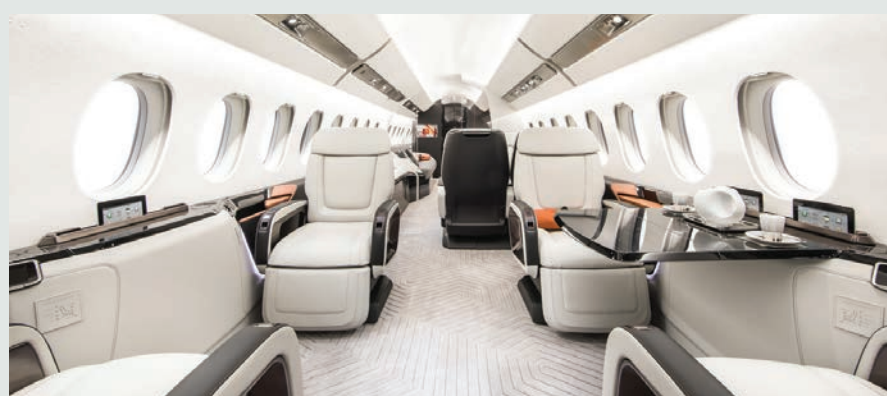
But fewer providers may be around to offer them service. Grants, cash reserves, and investor funds are helping to keep business aviation airborne, but many industry observers expect that if the downturn continues beyond this year, some providers could consolidate or go out of business. Conversely, many believe that should the war against Covid-19 turn a corner by year’s end, we’ll see a strong market turn.

“During an economic downturn or a recession, business aviation has been the first to go and the last to come back,” says Joe Moeggenberg, CEO and president of aviation services company Argus International. “This [current situation] is just the opposite. Companies are not selling their airplanes, corporate flight departments are not putting aircraft on the market or furloughing pilots and other staff, and the same goes for charter operators.” ■

Flowy Falcon 6X cabin wins international design award

Dassault Aviation’s Falcon 6X won the International Yacht & Aviation Award for interior design, the French aircraft manufacturer announced in September. The in-development 6X, which is expected to fly next year and enter service in 2022, will have the largest cabin cross-section of any purpose-built business jet, Dassault said.

“This award reflects the innovative manner in which our in-house design studio conceived the Falcon 6X cabin, which entailed going well beyond simply improving the aircraft’s interior decoration,” said Dassault Aviation chairman and CEO Eric Trapier. “With extensive input from customers,



our engineers rethought the entire interior design process, employing a sensory design approach that will completely redefine the passenger flight experience.”

“Sensory design” manages air, light, and sound to maximize health and wellness, according to Dassault. In the Falcon 6X, this approach influenced materials, textures, and finishes as well as furniture layout

and furnishings, interior lighting and color schemes, and cabin contours.

The result, said Dassault, is a cabin with “flowing uninterrupted lines, innovative furniture design, flush surfaces, and recessed technology [that] provide a cozy, clutter-free interior designed to enhance the feeling of spaciousness and facilitate productivity and relaxation.” **C.T.**

Sustainability is good for bizav, say industry leaders

by Gregory Polek

Business aviation has long suffered a perception problem over its carbon footprint, and the need to convince governments of the industry's commitment to environmental sustainability now more than ever presents a challenge it shouldn't ignore. While the industry can claim it accounts for just 2 percent of the CO₂ that commercial aviation emits, the view of a business jet as a gold-plated conveyance for a certain stratum of individuals with an outsized carbon footprint sometimes overshadows the societal good business aviation has done. Whether or not one considers that tension valid or understandable, industry leaders have come to recognize the importance of educating the public on the contributions business aviation has made to the technological progress from which everyone benefits.

Former Bombardier Aviation president David Coleal, who left the company on October 1 and who is also GAMA environmental committee chairman, spoke with *AIN* in September and highlighted the fact that younger people—those who comprise what one day will become business aviation's customer base—generally



David Coleal,
Former
Bombardier
Aviation
president

“We clearly have to make sure that our industry is not seen as a contributor, but as a leader in sustainability.”

show more concern for the environment than previous generations. Consequently, exhibiting a commitment to sustainability makes good long-term business sense.

“We clearly have to make sure that our industry is not seen as a contributor, but as a leader in sustainability,” said Coleal.

“So, from a social perspective, business aviation—with flight shaming and all these things—we've become an easy target. We have to continually be out front demonstrating leadership. And we all have to make sure that we're not doing anything that is a detriment to our future customers. We want them to fly private so that they can see the benefit in safety and sustainability and advanced technology and job creation—all the great things this industry does.”

While much of today's effort from the business aviation perspective centers on promoting the availability and viability of sustainable alternative fuels (SAF), new airframe, avionics, and engine technology, for example, have long contributed to the fuel burn reduction and dramatic noise cuts vital to the aviation industry's drive for environmental sustainability.

Along with SAF, air traffic control infrastructure, and market-based measures, technological innovation today stands as one of the four pillars of sustainability, even if environmental concerns haven't always been an apparent motivator in the quest for better, faster, and more economical airplanes. While wing design advances allow for more speed and better performance overall, the industry can now point to the resulting environmental benefits their more efficient lift characteristics bring vis a vis less fuel burn.

While participating in the Virtual Business Aviation Sustainability Summit in

mid-September, Coleal talked about the contribution of wing design advances to environmental progress, specifically citing the fuel burn improvements generated by Bombardier's Global family. “For example, the Global 5500 and 6500 are 13 percent more fuel-efficient than their predecessors, and the 7500 features everything from a next-generation perspective,” said Coleal.

“The importance of wing design is that it allows you to be efficient in all phases of flight, especially during takeoff and landing when you have high power settings and, therefore, higher emissions. Having an airfoil that allows you to get off the ground quickly and back to a cruise setting is really critical for CO₂ emission. And when you're coming in and the aircraft's dirty and you're fully deployed...having an airfoil that gives you a lot of lift for lower power settings can actually help reduce CO₂ emissions.”

Coleal noted that a highly efficient wing allows an aircraft to benefit from other systems advances—in engines, for example. “I think this integration of the entire aircraft becomes important; it's how we think about a recipe for the future,” he explained. “This helps reduce the whole CO₂ footprint from cradle to operation to retirement.”

But just as an aircraft's environmental footprint benefits from the smart integration of airframe with engines, a more efficient airplane needs an efficiently designed infrastructure to realize its full sustainability potential, added Coleal.

“Aircraft can come in and land quickly, but when you have this infrastructure that has planes vectoring and loitering and burning fuel...it's a waste,” he said. “That's why I think the beauty of the way we've approached this is we want advanced aircraft that can operate in a seamless, efficient system on the lowest-emission fuel. All three in conjunction give us a truly holistic approach to how we reduce emissions. And in the short term, if some of those aren't there, you can use book-and-claim and carbon offsets to kind of round out the entire system.” ■

Bombardier takes holistic view of Global 7500 environmental footprint

Earlier this year, the Bombardier Global 7500 became the first business jet to receive an Environmental Product Declaration (EPD) through The International EPD System. Third-party verified to international ISO 14025 and related standards, the EPD discloses detailed environmental information about the Global 7500's lifecycle, such as CO₂ emissions, noise, water consumption, and other key environmental impact indicators. Based in Sweden, The International EPD System has a library of published EPDs for products from 31 countries in an effort to foster transparency about environmental lifecycles.

Bombardier called the publication of the Global 7500 EPD an important milestone in the company's environmental sustainability strategy, which also has involved the increased adoption of sustainable alternative fuels (SAF), a reduction of its CO₂ footprint, expanded aircraft recyclability, and further sustainable sourcing.

The publication of the EPD is an outgrowth of efforts that Bombardier incorporated throughout the development of the Global 7500, the company said. In a first for the company, a Bombardier Eco-Design team applied product innovation lifecycle processes throughout the development process

to ensure that the ultra-long-range business jet minimizes its impact on the environment from design to the aircraft's end-of-life. This involved a focus on health, safety, and environmental considerations during design, production, support, and end-of-life. In addition, this approach involved years of collaboration with the supply chain.

Operational lifecycles, including an evaluation of noise and fuel burn, are considered. Further, Bombardier considered recyclability and recovery rates for end-of-life, reporting that material recycling and energy recovery aggregate to an 85 percent recoverability rate by weight for the Global 7500. **K.L.**



The Global 7500 is the first business jet to have a published Environmental Product Declaration disclosing detailed environmental information about its lifecycle, such as CO₂ emissions, noise, water consumption, and other key environmental impact indicators.

NEWS note

The European Business Aviation Association is expanding efforts to enable meeting the United Nations Sustainable Development Goals with the creation of two working groups to develop guidelines surrounding the new Standards and Training for Aviation Responsibility and Sustainability (Stars) initiative. One working group will focus on environmental standards, while the second will focus on social standards.

Once completed, the standards will be integrated into the International Standard for Business Aircraft Operations (IS-BAO) and the International Standard for Business Aircraft Handling (IS-BAH), as well as available for standalone use for organizations that do not involve operating aircraft or providing ground services. ■



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Bizav interiors: new comfort, functionality, and style

by James Wynbrandt

A lighter color palette, home-like furnishings, straighter lines, and more natural materials; these are among the broad trends in today's business aircraft interior design book, applied by OEMs and aftermarket outfitters alike, in combination with improved environmental systems, digital capabilities, and all the comforts and conveniences buyers expect in their homes and offices.

In a typical year, industry executives might have surveyed some of these advances in person this month as they walked the aisles or on static display at the NBAA's annual convention. But while business aviation's biggest gathering has been canceled by the coronavirus pandemic, the aircraft interiors world has continued turning, and if anything the global lockdown has focused even more attention on the cabin. It's not just about looking good, but functionality, safety, and wellness, and the new-generation flagships of the business aviation fleet have the technology and the space to deliver the goods.

Gulfstream's forthcoming flagship, the G700, will feature high-end customized interiors, as always, but it will also have a cabin altitude of less than 4,000 feet at most cruise altitudes and an advanced circadian lighting system, ensuring passengers can arrive at their destinations refreshed and ready. The five-zone interior in what will be the tallest, widest, and longest cabin of any purpose-built business jet, according to Gulfstream, will give passengers (19 max) ample room to rest on ultra-long-range journeys when it enters service in 2022—though its largest-cabin crown may not be worn long.

In creating Dassault Aviation's forthcoming Falcon 6X cabin, "engineers rethought the entire interior design process, employing a 'sensory design' approach that will completely redefine the passenger flight experience," said chairman and CEO Eric Trappier. The design ethos manages air, light, and sound to maximize health and wellness, according to Dassault, expressed visually in flowing uninterrupted lines, flush surfaces, and recessed technology, providing "a cozy, clutter-free interior" and "the feeling of spaciousness."

The cabin is indeed spacious: at eight-feet, six-inches wide and six-feet, six-inches tall, the Falcon 6X cabin will be four inches wider and three inches higher than the G700's when it enters service in 2022.

Right at Home

Several cabin and interiors specialists report strong demand for residence-style furnishings. "Designers are bringing us floor plans—created in collaboration with

owners—that use cabinets that appear to be freestanding, resembling someone's furniture at home rather than extensions of bulkheads," said Gabi Hasko, a v-p at Canada's Flying Colours, whose portfolio includes extensive cabin outfitting work for Bombardier Global aircraft.

Jet Aviation's interior design studio is getting requests for "more monuments with the illusion of freestanding furniture, [and] carpets that are intricately cut to give the appearance of layered rugs," echoed Grischa Schmidt, the studio's senior director. Home-like touches such as paintings and decoration as fixed interior elements are also popular.

A corporate airliner—such as the ACJ-320neo that Comlux Completion is now outfitting at its Indiana facility—is the ideal vehicle for such bespoke customization. "The cabin aesthetic [of the ACJ320] is really focusing on a residential-type environment, a calming interior," Daron Dryer, CEO of the center, said. "Large backlit Roman shades will give the impression of large windows, rather than the small aircraft type," with additional lighting from a chandelier, "fixed, not swinging," Dryer added.

Sustainability, climate change, and social responsibility are also cabin design concerns today.

Embraer's Praeterra concept for the super-midsize Praetor 600 incorporates sustainable woods and other materials and recycled wool and worn employee uniforms in composite seat covers. An illuminated inlay on the aft bulkhead is fashioned from recycled ocean plastics.

These design trends are finding their way to the cabins of smaller aircraft, epitomized by the August debut of the first Embraer Phenom 300E outfitted with the optional Bossa Nova interior. First seen on the Praetor 600, the Bossa Nova cabin features carbon fiber accents, piano black surfaces, and Embraer's Ipanema custom quilted seat stitching.

Bespoke luxury interiors are becoming more common in the rotor world as well. Airbus Corporate Helicopters (ACH) and Aston Martin teamed this year to intro the Aston Martin Edition ACH130, a luxury version of the Airbus single-engine light helicopter for buyers "who draw satisfaction from personally piloting their aircraft," according to the French company. The pure black ultra-suede ACH130 cabin is accented with leather trims drawn from Aston Martin's autos and brogue detailing found in the DB11, with exterior paint schemes based on the Aston Martin palette.

ACH already has a long-term partnership with German carmaker Mercedes-Benz for special-edition ACH145 light twins, which cater more to the corporate market, noted ACH CEO Frédéric Lemos.



Dassault's spacious Falcon 6X cabin manages air, light, and sound to maximize health and wellness, with flowing lines, flush surfaces, and recessed technology.

Hill Helicopters unveiled this year its clean-sheet, five-seat HX50 turbine-single helicopter (aggressively slated to enter service in 2023), featuring an "interior design built around experience and comfort in the same manner as premium automobiles," said Jason Hill, CEO of the UK company. The cabin will incorporate climate control, Bluetooth connectivity, and "opulent finishes," and seats outfitted with drink holders, USB ports, and four-point harnesses, covered in two-tone Napa leather.

Extended Range Issues

Aircraft seating upgrades have progressed beyond fancy stitching, accessories, and plush upholstery, driven in part by challenges imposed by the extended range of today's long-haul bizjets, which can keep passengers onboard for some 15 hours.

When introduced in 2018 as a centerpiece of its ultra-long-range Global jets, Bombardier's Nuage chair was called "the first meaningful change in the operation and design of a business aircraft seat in 30 years." The seat's fully floating base allows precision tracking and swiveling without visible floor rails, a base design concept used for its reclining Nuage chaise for the Global 5500/6500 announced in 2019.

Collins Aerospace Systems has followed on with its next-generation Evolution seat, which includes extended leg rests; manually adjustable headrest; and armrests that can be lowered flush with the seat in full recline. Demonstrated last year at NBAA-BACE in Las Vegas, Evolution is set on a proprietary triple-roller system, allowing it to be positioned close to bulkheads and saving cabin space, while electric controls allow one-touch adjustments to takeoff/landing position, and a "zero-gravity" position.

Meanwhile, passengers haul more baggage today—in the hold and cabin—and designers are using "all of the nooks and little hidden spaces in an aircraft to their maximum, with pop-ups and pullouts" to stow carry-ons, said Shannon Gill, managing director of MSB Aerospace. The Georgia firm's accessories include lightweight

honeycombed cabinets with unique, hand-finished veneers installed on new and retrofit Gulfstreams and other business jets.

Reducing cabin weight and ambient sound levels are two more interior design imperatives, and MSB is among vendors offering composite acoustic insulation panels and liner systems that achieve both objectives. Now, with interiors hushed and Hi-Def media onboard, cabin audio quality grows in importance. HondaJet's Elite comes standard with Bongiovi's speakerless audio system, which uses vibrating transducers fitted to the back of interior panels to turn the entire cabin into a speaker.

Also this year, the first Bongiovi speakerless audio system retrofit installation—by Spirit Aeronautics of Columbus, Ohio—debuted on a Dassault Falcon 7X.

In the aftermarket seating market, "the biggest trend has been the introduction of quilted inserts," which customers have seen in luxury cars like Bentley and Ferrari, said Veta Traxler, paint and interior designer at West Star Aviation, on a recent AIN interior design webinar. That trend dovetails with a preference for "orangey colors that are currently popular in automotive interiors," she said.

For the practical-minded, luxury vinyl tile (LVT) offers an economical new flooring option that closely resembles real wood, available in planking, parquet, herringbone, and other patterns; At the high end, real stone veneer is becoming more popular, particularly for galley and high traffic areas.

LED lighting innovations—even circadian style cabin systems—are also now aftermarket staples, offering a complete spectrum (literally) of lighting options for in-service aircraft. For aircraft with fluorescent lighting systems, "plug and play" drop-in LEDs use less power, generate less heat, weigh less, and can quickly replace fluorescent fixtures, said Shervin Rezaie, GM at Aircraft Lighting International. That company's LEDs include systems that can be adjusted from warm to cool white light, and RGBW systems that include "mood lighting." ■

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FAA explores new rules and policies

appealed to the DOT to ensure there is no delay. Those groups, the Association for Unmanned Vehicle Systems International, the Consumer Technology Association, and the U.S. Chamber of Commerce's Technology Engagement Center, wrote DOT saying the remote ID standards will be "the linchpin needed for future rulemaking to pave the way for transformative uses of UAS with significant benefits for our economy and society."

NBAA welcomed the remote ID proposal when it was released late last year. "NBAA has long maintained that UAS offer great promise for a variety of applications, including for companies relying on aviation in the conduct of their business," Carr said at the time. "This notice from the FAA is a foundational document for moving forward with integrating not just UAS, but other emerging technologies, in a way that addresses our industry's collective safety, security, and other objectives."

However, Carr said the proposal was not without its concerns, specifically surrounding the privacy of data gathered from the drone operations.

Responsibility and the Hawaii Coalition Malama Ponsin took the issue to court to get seven more plans or agreements in place. As a result, the U.S. Court of Appeals for the District of Columbia Circuit in May gave the FAA and the NPS 120 days to file a plan to bring all 23 parks into compliance within two years or have concrete reasons why it would take longer. The agencies submitted that plan in late August.

Roadblocks at DOT

While the FAA has moved forward on these varied initiatives, industry officials have become concerned that it is getting bogged down in some of its smaller regulatory activities. The holdup isn't Covid, however. It comes from a DOT regulation implemented about a year ago that changed how different agencies, including the FAA, promulgate rules. This has led to extended reviews for regulatory actions that previously did not need such scrutiny, Desrosier said. These include interpretive rules, implementing guidance, and implementing policy, such as advisory circulars, guidance, orders, and acceptance of standards.

In aviation, Desrosier explained, many of these actions facilitate new technologies, vehicles, and types of future operations. "One of the areas that we're focused on is engaging with the administration in the rulemaking and regulatory

communication, navigation, surveillance," Desrosier said.

There are many new standards created to address the rapid development of avionics functions and capabilities, but they haven't been recognized by the FAA, he said, estimating that so far this year, the FAA has signed off on only a couple of the nearly 30 standards in the backlog.

In another example, the FAA in late September finally released the second set of the ASTM consensus-based standards for Part 23 aircraft. In the newly released notice of availability (NOA), the agency outlined 35 new and revised consensus standards that are viewed as acceptable means of compliance.

This was only the second NOA that the agency has released and was years in the making. The first was released over two years ago, in May 2018.

"We applaud the FAA's work to accept the latest set of important means of compliance standards," said GAMA president and CEO Pete Bunce in announcing the release. "Going forward, the FAA needs to continue working to improve and standardize the acceptance process because it will support a regulatory environment that advances innovation and development of safety-enhancing technologies."

IRS and Management Fees

On July 31, the Internal Revenue Service put out a long-awaited NPRM that states what its policy is toward taxation of aircraft management fees and attempts to clear up questions surrounding that.

The IRS's approach was dictated by Congress through the Tax Cut and Jobs Act passed in 2017, which spelled out that fees associated with the management of an aircraft owner for the owner's use should not be deemed as taxable as commercial air transportation. However, how that was implemented raised questions and industry groups feared that this issue was a relatively low priority for an agency wading through numerous mandates that came with the Jobs Act.

NBAA and the National Air Transportation Association (NATA) jointly submitted comments on the NPRM welcoming the proposal, especially as it was released during the pandemic. "Our industry secured a significant victory for aircraft owners and management companies through tax reform, and we look forward to working with the IRS on a final rule that provides clear guidance and follows congressional intent," said NBAA's Bolen.

"We are encouraged by the IRS response to our request for clarification of the tax exemption for aircraft management services. This rulemaking represents another milestone in our successful campaign to ensure appropriate application and understanding of the tax laws," added NATA president and CEO Timothy Obitts.

The associations, however, pushed for modifications in a number of areas of the proposal, such as surrounding the definitions of aircraft leases, to ensure the proposal meets the intent of the Jobs Act.

EPA's Aviation Emissions Standards

The Environmental Protection Agency (EPA) this past summer took a historic step with the release of an NPRM to regulate carbon emissions from aircraft for the first time. In 2016, the EPA found that greenhouse gas emissions in certain aircraft contributed to air pollution that causes climate change endangering public health and welfare. This endangerment finding compelled the agency to take action on emissions and on August 20, the EPA published the long-awaited proposal in the Federal Register.

The proposal would require new type designs to meet the prescribed standards for aircraft weighing more than 132,270 pounds on Jan. 1, 2020, and on Jan. 1, 2023 for turbojet aircraft weighing more than 12,500 pounds. In-production standards would apply beginning Jan. 1, 2028.

While such rulemakings typically raise concerns about costs, deadlines, or other mandates, in this case, the industry has largely embraced the step with an appreciation that it helps the U.S. to maintain a leadership position on the issue. Comments were due on October 19.

But in general, the rulemaking comes as there is broad recognition from industry leaders that the status quo is not acceptable on the environmental front and more will always need to be done in terms of efficiency and sustainability.

"The EPA, I would say, doesn't necessarily have a strong track record of supporting aviation concerns," NBAA's Carr conceded, "but I think as part of a broader approach to ensuring the U.S. remains competitive in aerospace, this is being viewed as a needed component of a broader strategy."

This proposal is the result of years of work that has been ongoing globally to establish targets that have buy-in both from regulators and manufacturers. Having these standards, he said, is critical because "the U.S. leadership in aviation has become more sensitive to the issues of the environment. And this is definitely a good way to reinforce that commitment."

"I think collectively as an industry, we've always recognized the critical importance of the U.S. trying to lead anything related to aviation and aerospace standards. So, at ICAO, we push a global standard and advocating for global adoption," Desrosier added. "I think what's critically important though in part of that global leadership is to be one of the ones that can readily adopt and implement the very standards that we pushed."

Desrosier worried that if the U.S. doesn't take such a step, "it will be set by others and they might be set in such a way or implemented in such a way that's not consistent with how we would like to see it being implemented."

For the EPA emissions standards, he said, "I do believe it's had a lot of support for the U.S. to move forward and not wait for others to lead the way." ■



Air tour management plans are back on the FAA's and National Park Services' radar and could have a profound effect on tour operators, especially in national parks.

Long Overdue Air Tour Plans

In another area, the FAA, by court order, is reigniting its joint effort with the National Park Service (NPS) to develop air tour management plans (ATMPs) over 23 national parks. This is an issue that literally spans decades when Native American communities, environmentalists, the Departments of Interior and Transportation, and air tour operators were all grappling with how to balance environmental concerns associated with national parks and the benefits of air tour operations.

In 2000, Congress directed the agencies to develop the ATMPs, but in 2012 amended that mandate to enable the agencies to enter voluntary agreements with air tour operators in lieu of the more formal plans.

No formal plans were ever put in place, but voluntary agreements had been reached for four parks. Losing patience with the seeming inertia on the issue, the Public Employees for Environmental

process because we are seeing a significant roadblock, a significant backlog, and barrier to things getting promulgated and just through the system," Desrosier said.

"They're all about the interpretation and the implementation of rules," he said, calling them "enablers" for technology and safety features. "A lot of these are necessary to allow these new things to come to market, to allow the new technology, the new products, the new jobs that come with it to be able to come to fruition."

As an example, Desrosier expressed concern about a "huge backlog" of acceptance of RTCA performance standards that are used in the development of TSOs for new avionics equipment. "For decades and decades, since the beginning of communication, navigation, and surveillance, RTCA was the body that the FAA and the industry used to help establish the kinds of standards necessary to support and facilitate these areas of [fast] changing and evolving high technology in

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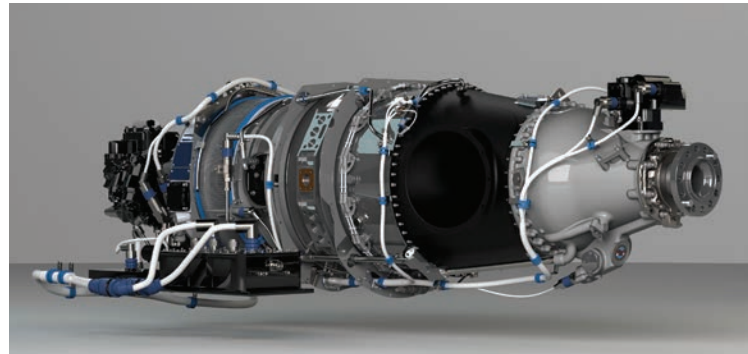
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Pratt & Whitney offers a leasing program for engines, including the PT6, where operators can lease an engine to match the aircraft's lifecycle.

Alternatives expand for costly turbine overhauls

by Jerry Siebenmark

With turbine engine overhauls costing \$800,000 or more, some owners and operators of legacy business jets are finding it difficult to justify the expense. At those prices, the value of their aircraft might not be worth the expense, even if their airframes still have a couple of hundred flight hours of life remaining in them.

It's among that group that MRO providers and engine OEMs are finding a growing market for cheaper alternatives to overhauls through engine leases, exchanges, or purchases of used engines that haven't yet reached their time for an overhaul.

Pratt & Whitney (P&W) began a little more than a year ago offering a spare engine program to the regional airline market for just that reason. This year, it has extended the program to include different leasing options for the business aviation, general aviation, helicopter, and APU markets.

"We are realizing in the other spaces, especially general aviation and the helicopter markets, there's been a huge demand for leased engines," Nicole Kappos, P&W's associate director of business development for aftermarket services, told *AIN*. "And one of the reasons why is what it allows the operator to do is basically maximize their return on their investment, hold on to their cash. Where liquidity is today, given the current context, is very important. We have everything from cargo to EMS operators to business jet operators asking for [this]."

Different options of P&W's leasing program include an "on-wing" lease in which P&W buys back the operator's engine and leases another engine to them. The on-wing lease also allows operators to lease an engine for a period that's aligned to the lifecycle of their aircraft. "[It] provides them with an engine for just the hours they need...and then they return the engine to us when the aircraft is no longer in use," Kappos said. "So, the good news here is it allows the operator to align their costs with the operating horizon."

Other options include a long-term lease that provides an engine for 12 months or more and another option that hasn't yet been introduced to the market but will enable the operator to purchase the engine at the conclusion of the lease's

term. All of the leases cover scheduled maintenance including overhauls and hot section inspections. The leases also don't require a minimum flight-hour requirement nor is there a core exchange requirement, she said. Also, leases of 12 months or longer provide the guarantee of "the most up-to-date" spare engine at all times, Kappos added. "Again, it's all about providing customer value...that's what we're here for."

The business aviation market was initially slow to respond to the program, but recently has seen rising interest in the on-wing lease option among operators of older business jets such as the Learjet 60, Kappos said. "They're nearing more of a mature engine... that's where we're seeing more of a demand."

StandardAero Offers Engine Exchange

Earlier this year, maintenance provider StandardAero launched an engine exchange program aimed in part at giving owners and operators a less costly option to a complete engine overhaul. The Scottsdale, Arizona-based MRO provider's engine exchange program lets aircraft owners exchange their engines or purchase replacement engines with less flight time to extend the life of their aircraft.

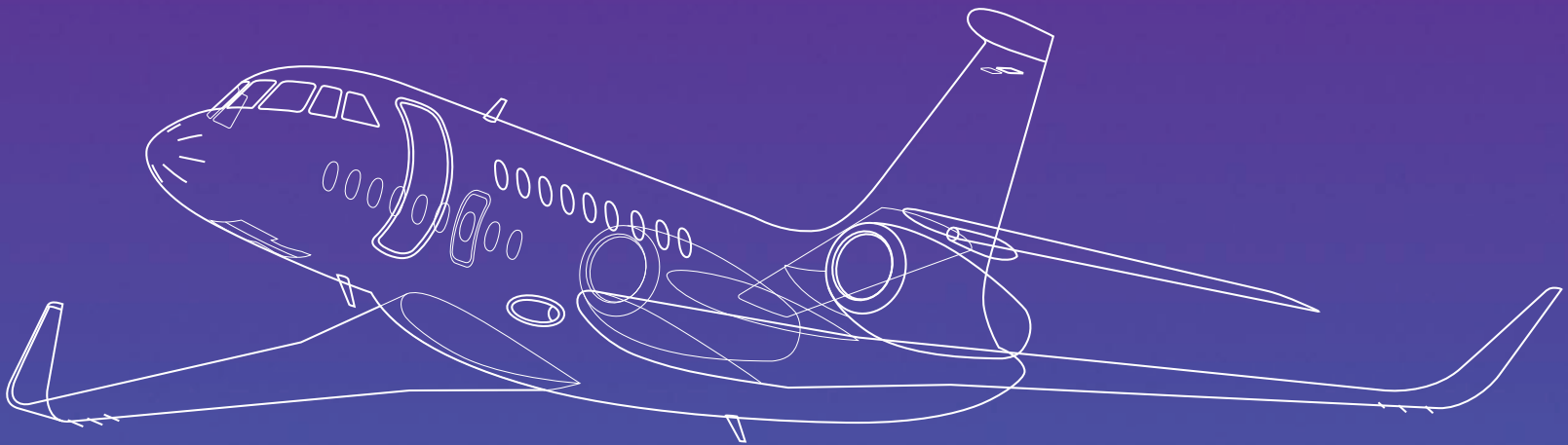
It currently applies to specific engine models—the Honeywell TFE731 and CFE738 and Pratt & Whitney PW305—as well as Honeywell 36-100/150-series APUs, but it could be extended to include other engine models, depending on interest, the company said.

Rhyse Booth, leader of the company's engine exchange program, told *AIN* that StandardAero has seen "a big increase" in requests for spare engines. "Requests for Honeywell products are up roughly 40 percent," Booth said. "The number of requests for non-Honeywell engine lines are up 75 percent. So, product that we weren't offering previously is showing promise and presenting new opportunity."

He added that the market for spare engines has been price-point competitive without any significant dips in overall prices. "We half expected to see engines liquidated at low prices in the Covid economy," Booth said. "That hasn't been the case." ■

VBACE

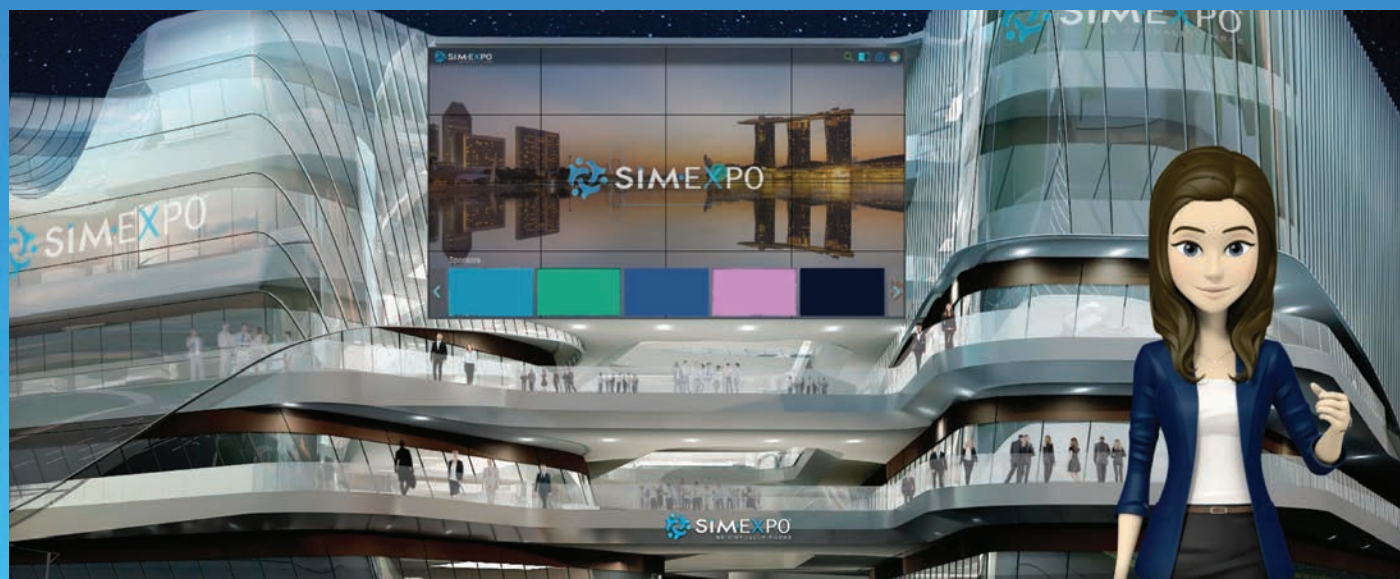
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