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EBACE PREVIEW

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product and service
innovations from
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bespoke DESIGN

HOW ARE YOUR
COMPETITORS FULFILLING
REQUESTS FOR ONE-OFF
CABIN ELEMENTS?

CHRISTI TANNAHILL

Get to know Textron Aviation's senior vice president of interior design and engineering

WINDOWS

Industry heavyweights discuss whether technology offers a viable alternative to real windows

BBJ 777X

Boeing Business Jets reveals the cabin comfort improvements included on its new wide-bodies

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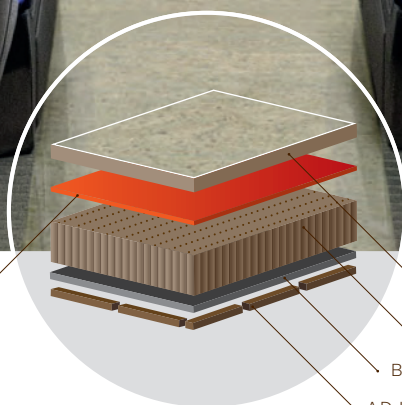


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Wheels up

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IDAIR



BREAK THE MOLD

Welcome to the bespoke issue! Everywhere you turn in this edition you will find designers, completion centers and OEMs attempting to make clients' wildest dreams a reality, despite facing challenges ranging from cost and production line efficiency, to the all-important certification requirements.

There's discussion of the major challenges of bespoke elements in the feature on page 16, some examples of innovative developments and ideas from page 24, a one-off cabin case study from page 30, and the latest materials to add a personalizing touch can be found from page 36.

One new platform that will certainly offer plenty of scope for designers to run riot is the BBJ 777X. Turn to page 64 to see what designs have already been unveiled and learn all about the comfort features Boeing has built in.

Another exciting development is HAV's Airlander 10 airship, particularly as it has less stringent certification requirements than jets that

fly faster and higher – opening up many more possibilities for cabin furniture. The airship is being developed to cater for three-day luxury tourist trips. While the Design Q cabin featured on page 56 will be offered as a production interior, Howard Guy, founder and CEO of the design firm, is already interacting with potential customers interested in customizing it. "They all want different things," he says. "Something designed for tours of Antarctica is going to be very different to something for South America. We're trying to find as many cool things as possible to excite them all."

Generally, Guy says it's a designer's job to present customers with things that would never otherwise occur to them. "That's what people like, but it's the hardest thing to do," he says. "People can't really tell you what they want until they see it. Our job is to invent those things and wow them. But very rich people are the hardest to wow, because they can have anything."

Izzy Kington, editor

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ONE OF A NUMBER
OF PRIVATE AIRCRAFT
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AT WINCH DESIGN



THE LATEST ADDITION TO JET AVIATION'S MANAGED FLEET IN EMEA IS A BBJ1 THAT CAN ACCOMMODATE 11 PASSENGERS. IT FEATURES A MASTER BEDROOM AND ENSUITE WITH SHOWER, GUEST AND CREW LAVATORIES AND TWO SIDE-FACING DIVANS THAT CONVERT TO SINGLE BERTHS.



THIS IS THE WORLD'S SECOND VVIP BBJ 787-8 INTERIOR, COMPLETED BY GREENPOINT TECHNOLOGIES IN DECEMBER 2018. THE CABIN FEATURES AN OPEN LIVING SPACE AND PRIVATE ROOMS – EVEN INCLUDING A GYM WITH VAULTED CEILINGS. THE MAIN LOUNGE FEATURES A METALLIC GLASS TILE WALL AND EMBOSSED HAND-TIPPED LEATHER SEATS. THE INTERIOR ALSO INCLUDES A GRAND MASTER SUITE WITH ITS OWN LOUNGE AND OFFICE, AS WELL AS EXTENSIVE CREW ACCOMMODATIONS AND LARGE SERVICE GALLEYS.



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LEGACY 600 RENOVATED BY EMBRAER IN SOROCABA, BRAZIL

Embraer Executive Jets is ramping up its aftermarket interior services in Brazil, and now has an interior shop at its service center in Sorocaba. In February 2019 the facility led the renovation of a Legacy 600, with some cabinetry and livery work performed in São José dos Campos.

The jet, built in 2006, was bought by a South American customer who didn't like the current design, so a redesign was proposed. The updates include new seats, carpets, ceiling material, side panels and new varnish for the cabinetry. There is also new flooring in the galley, and the divan and curtains have been updated with new fabrics.

The service team overhauled landing gear and installed ADS-B Out, along with a GPS upgrade.





The aircraft has three cabin zones, accommodating 13 passengers. There is a wet galley at the entrance, with one flight attendant seat. The first zone has four club seats; the second has two double club seats, a conference table and credenza. The third zone features a divan and two club seats, a rear lavatory and inflight access to the baggage compartment. Embraer says this configuration is the most popular for the Legacy 600.



The third zone is separated by a bulkhead comprising partitions on each side and a curtain in the middle. One of the partitions can be removed, even in flight.



The original carpet was replaced with a new one made to specification, with a pattern chosen by the customer. A vinyl floor was installed in the galley and the aft toilet.



The original bluish leather covers of the seats and divan were worn out, so they were replaced with white ones with diamond stitching.



The cabinetry, including tables, was marred by extensive cracks in the varnish. After the original varnish was removed, a new coating was applied with a different color finish.



The Ultraleather covers used for valances and sidewall panels were stained and damaged, so new ones were installed.

Q&A

Frank Stevens

VICE PRESIDENT OF GLOBAL MRO CENTERS, EMBRAER



Why are you expanding your aftermarket interior services in Brazil?

The Brazilian business aviation fleet is maturing. Customers require high-end support for their interiors. The TechCare platform offers the best integrated service and support solutions, from small repairs to fully customized interiors – as exemplified by this renovation.

What challenges have you faced?

Competing with current Brazilian service providers has proved a challenge, but a welcome one. Cabin renovation is quite work-intensive. Our strategy has been to offer superior quality, using the highest-grade materials designed specifically for aviation.



Everton Vicente de Lima

GENERAL MANAGER OF THE BRAZIL SERVICE CENTER

How have you built up your cabin interior capabilities in Sorocaba?

We began setting up the Sorocaba interior shop in 2018, and the official opening is scheduled for 2019. This Legacy 600 was renovated in Sorocaba, although the exterior paint and some cabinetry replacement, was performed in our São José dos Campos facility. The Sorocaba interior shop is a dedicated aftermarket facility for business aviation. To offer interior refurbishments with top-notch craftsmanship, Embraer has signed a partnership with F/List.

What kind of interior work can you perform?

Currently we can address seat upholstery, panel covers, carpet, varnish, veneer and metal finishing, flooring and countertops. There are always opportunities to offer more services, but the decision to expand, including when, will depend on market trends and customers' needs.

What did you learn from this project?

An interior redesign can renew the owner's love for an aircraft, getting very close to the feeling of owning a new one.

What other projects do you have in the pipeline?

Several projects are underway and will be disclosed soon.

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COMPLETIONS ROUNDUP

This quarter's announcements from completion centers around the world

BASEL, SWITZERLAND

Jet Aviation increased its maintenance, completion and refurbishment capacity by opening a 8,700m² (93,646ft²) hangar. An extended nose-box permits two wide-body aircraft concurrently. There is 2,000m² (21,528ft²) of space for shops and offices.

BASEL, SWITZERLAND

AMAC signed its first full BBJ Max 9 completion. The aircraft should arrive in 2020, and will be fitted with an interior designed by Gaugain. Other projects included minor cabin refurbishments on an ACJ319, a head-of-state ACJ319, and a head-of-state BBJ 747, all of which were also in for maintenance.

NUREMBERG, GERMANY

A Global Express is undergoing a 240-month inspection and refurbishment at FAI Technik. The jet will be fitted with a cabin designed by Tim Callies, plus new CMS and Ka-band wi-fi.

ISTANBUL, TURKEY

AMAC completed a C check on a Falcon 2000. The work also included a cockpit and cabin refurbishment and ADS-B Out modification.

XIAMEN, CHINA

HAECO PJS is to collaborate with Eight Partnership on private jet cabin designs. HAECO PJS also gained EASA Part 21 Subpart J Design Organisation Approval, enabling it to approve minor changes and repairs.

DUBAI, UAE

Lufthansa Technik received GACA approval for maintenance on Saudi Arabia-registered jets. Its mechanics conducted an A check on an A320 at DC Aviation Al-Futtaim's hangar. The companies cooperate for maintenance and minor cabin modifications.

MOSES LAKE, WASHINGTON

Greenpoint completed a VVIP BBJ 787-8 interior featuring an open living space and a gym with vaulted ceilings. The main lounge showcases a metallic glass tile wall and embossed hand-tipped leather seats. The interior also includes extensive crew accommodations and service galleys.

WICHITA, KANSAS

Yingling Aviation is building a 23,000ft² (2,137m²) facility for avionics and maintenance work, and has leased a 50,000ft² (4,650m²) space that includes paint and prep hangars, plus space for interior work.

FORT WORTH, TEXAS

GDC Technics has a new ownership structure, having welcomed new partners Oriole Capital Group, Trive Capital and Maz Aviation.

CHESTERFIELD, MISSOURI

Flying Colours added a fifth hangar that will accommodate three large jet maintenance, avionics and interior projects at once.

EAST ALTON, ILLINOIS

West Star built a 60,000ft² (5,574m²) hangar to expand its maintenance programs. The company also gained an FAA STC to install a Mid-Continent MD93 digital clock/USB charger on Falcon 50 aircraft.

INDIANAPOLIS, INDIANA

The first BBJ Max 8 arrived at Comlux, to be fitted with a cabin designed by Peter Marino. The aircraft should be delivered to its US-based owner before the end of 2019.

CHATTANOOGA, TENNESSEE

West Star's facility is now an authorized service center for the Lineage 1000 and 1000E – offering interior redesign and refurbishment, among other services.

HURON PARK, CANADA

A New York-based charter company received a Learjet 60 following a minor interior refurbishment, paint work and Gogo Avance L3 wi-fi installation by New United Goderich.

PETERBOROUGH, CANADA

Flying Colours celebrated 30 years of MRO and interior operations. The company is currently building another hangar, expanding its capacity for large jet completions, refurbishment and maintenance. It also delivered the final Challenger 650 of three kitted out with medevac cabins for Swiss Air-Rescue Rega; see page 30 for details.

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ahead of the curve



This curvaceous design for the BBJ Max 7 (based on the Boeing 737 Max) was designed by SkyStyle and visualized by KiPcreating, in collaboration with Boeing Business Jets.

Lucas Colombo, design director and co-founder of SkyStyle, recalls being approached by Boeing after winning an accolade at the 2018 Yacht and Aviation Awards. Boeing requested a “serene” design to showcase the jet.

In SkyStyle’s concept, Genesis Unique, curved valances and furnishings create a calming environment and a feeling of continuation through the cabin. “Rather than a patchwork of traditional sections, the design seamlessly integrates every zone into a single, continuous, luxurious and livable solution,” says Colombo.

He adds that the BBJ Max 7’s cabin dimensions made shaping monuments easy. “The height of the cabin enabled us to design curved features so you’ll never feel as though you were confined to a traditional tube,” says Colombo.

The concept employs several novel moving items. For example, there is a wineglass rack that lowers from the ceiling over the galley preparation table, so you can transition from a working space to a dining setting in seconds. This preparation table is directly adjacent to a meeting table, with the two separated by a partition. At the push of a button, the partition slides aside, the meeting table lowers, and the preparation table glides over to cover the meeting table, with the place settings and prepared meal *in situ*.

Another example is the wardrobe in the master suite – it is concealed by a wooden wall that slides back with the push of a button. Colombo believes all these features are 100% possible with current technology, and envisages completion centers deploying certified lightweight materials to realize the design without a penalty to the BBJ’s range.

The next step for the project will see Boeing and SkyStyle present a new version at ABACE in April 2019, inspired by Chinese culture and interests. “Alternative themes show the flexibility of this design, and demonstrate the broad versatility and appeal it has to customers all over the world,” says Colombo.



VALANCES

Inspired by lenticular clouds, the valances are sculpted to create a feeling of movement.

DIVAN

The central divan has a hidden forward-sliding footrest that enables a new seating area with multiple possibilities.

NATURAL INFLUENCES

The main influences are from the natural world – for example, sand, sky and clouds. “Fiber optic lighting is used to generate a starry night sky effect, the sculpted valances mimic clouds, and the curved monuments evoke rolling hills,” says Colombo.

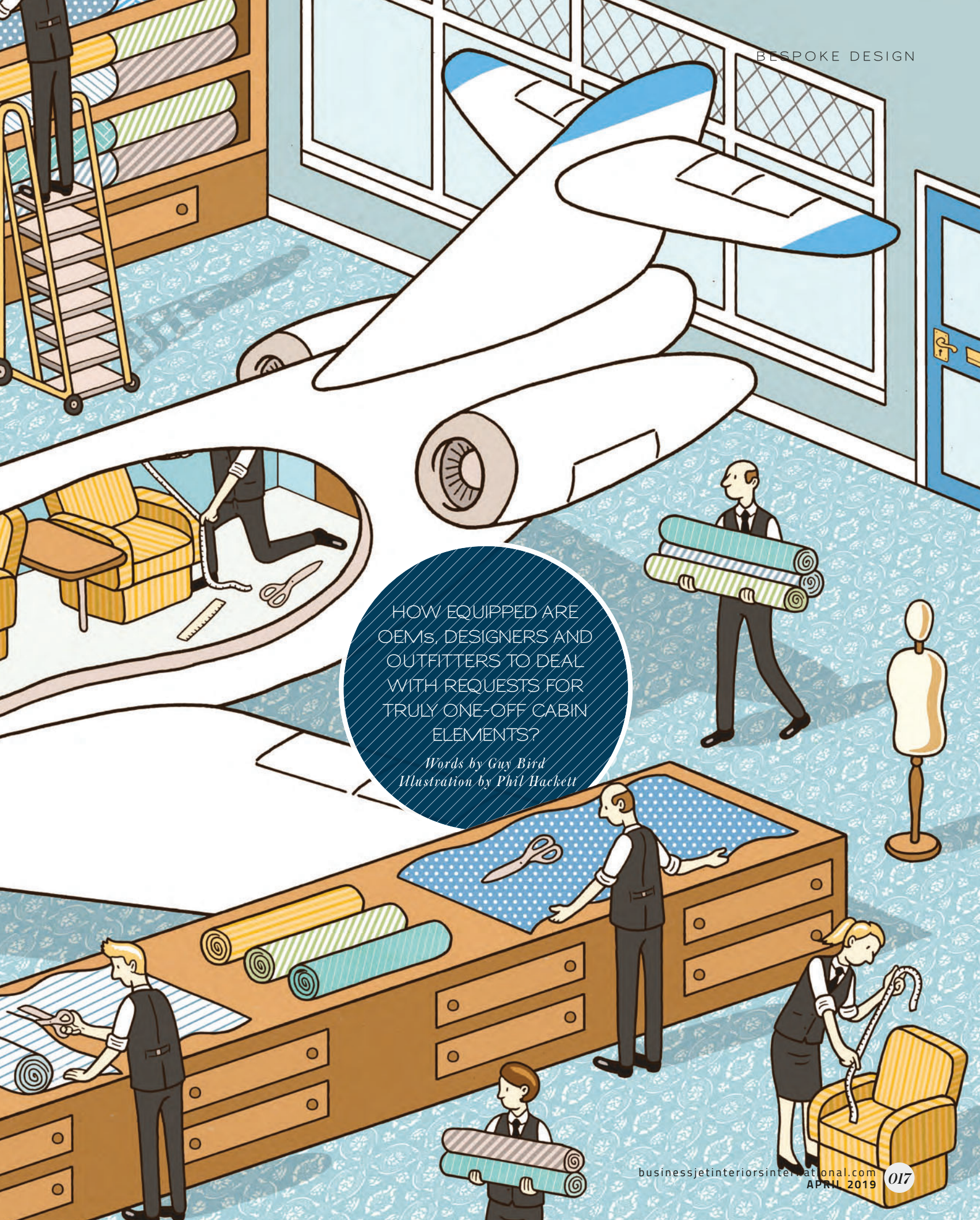
PARTITION

An electrically powered folding partition enables passengers to separate off the private area – comprised of the office and master suite – from the rest of the cabin when required.

BESPOKE DESIGN

tailor

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APRIL 2019



HOW EQUIPPED ARE
OEMs, DESIGNERS AND
OUTFITTERS TO DEAL
WITH REQUESTS FOR
TRULY ONE-OFF CABIN
ELEMENTS?

*Words by Guy Bird
Illustration by Phil Hackett*

“Certification can unduly delay projects if the request is too far out”

MAIN AND BELOW: ROLLS-ROYCE CREATED THE FULLY BESPOKE SWEPTAIL FOR A SINGLE CUSTOMER



Before embarking on how bespoke elements are created for business jet cabins, it's perhaps instructive to remember where the word 'bespoke' comes from. "It's an overused word in modern culture, but we're acutely aware of the origin of the term, in its Savile Row beginnings when a cloth was cut for a specific customer and put to one side, to be spoken for," says Alex Innes, head of bespoke at Rolls-Royce Motor Cars. "It's that same philosophy that serves us to today in tailoring these magnificent cars."

The people who can afford a private jet are accustomed to having clothes and cars tailored to their exact specification. But can aircraft offer the same level of personalization, given constraints ranging from cabin shape to connection points, safety certification rules and cost?

BLANK CANVAS

At the top end of the market, of course, every cabin is bespoke – big iron BBJ and ACJ aircraft are delivered green to completion centers for a unique interior to be installed. Alex Fecteau, director of marketing at Boeing Business Jets, says its aircraft can be outfitted with every conceivable airframe option, air stairs, avionics and vision systems. Boeing offers a list of pre-engineered and certified options, but Fecteau says the OEM is not averse to considering new details. "A customer normally hires a designer to make their interior vision come to life, which is completed by one of 14 Boeing-licensed centers," he says. "This is the

BESPOKE AT ROLLS-ROYCE

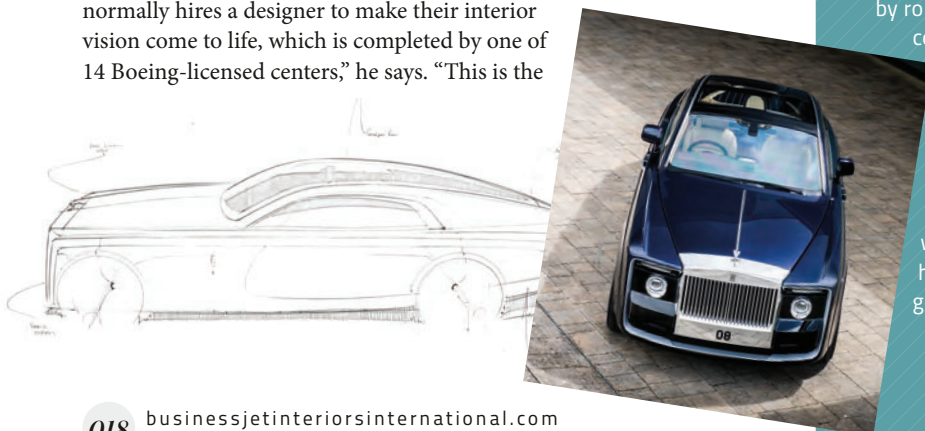
Unlike most luxury car companies, Rolls-Royce enables its customers to discuss specifications and experience the brand's craftsmanship first-hand at its headquarters in Goodwood, UK, where its cars are assembled. "We don't put our clients in front of a set of predetermined options," says Alex Innes, head of bespoke at Rolls-Royce. "For us, it really is a blank sheet of paper and we demonstrate that by putting the client in front of the design team. It brings the process more in line with commissioning a superyacht or building the house of your dreams."

Almost every Rolls-Royce car features bespoke elements. A typical manufacture time is two days per car, but in 2017 the brand unveiled a standalone model made for just one customer. The Sweptail features a fully bespoke exterior and cabin which took four years to realize, from first idea to final car.

There's just one long manufacturing line at Rolls-Royce, with areas where the cars can be rolled to one side for specialist work before being rolled back on to the line. The only work undertaken by robots is the spray-painting of the bespoke-mix exterior colors, so there isn't the pressure of a mechanized process.

"We can go to the wood shop and deliberate on how we solve something with the people there," says Innes. "It's all on one site and we're afforded a direct exchange which is obvious in the quality of what we're able to achieve."

When asked how long his part of the process takes, Brian Staite, general manager of the leather shop, has a wry answer. "Somewhat facetiously we say, 'long enough'," he responds with grin. "We have deadlines, but it's about getting it right."



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stage where many certifications usually happen. Often Boeing and the completion center work together to certify options with the appropriate regulatory agency. Certification can unduly delay projects if the request is too far out, so to speak. We and our licensed centers work very closely with customers to find the best way to give them the options they want within the timeline they need.”

PERSONAL SERVICE

Christi Tannahill, senior vice president of interior design and engineering at Textron Aviation, also says the bespoke tag can be applied to its line-fit business jet cabins. “Every aircraft owner is different and we provide a personalized service for each one, so in a way, every aircraft is bespoke,” she reasons. “A customer’s interior is a highly personal expression of what’s important to them, and this is reflected in our design process. Because we have our own seat manufacturing, CMS and electrical teams, we’re able to work on much of what’s required in-house, which gives us a lot of flexibility.”

Particularly challenging requests have the potential to take longer than standard interiors. Bombardier says such occurrences are not disruptive. Requests for one-off elements come in less than 15% of the time

Christi Tannahill elaborates on her customer-focused approach on page 48



“If necessary, we will collaborate with one of our many suppliers to meet specific requests”

across all Global products. “We mostly deal with design requirements in-house, but if necessary, we will collaborate with one of our many suppliers to meet specific requests,” says Patricia Parent, director of customer account management, Global aircraft, at Bombardier.

SMART LOGISTICS

Bombardier’s operation is set up to enable such projects without impacting the efficiency of its main production line. “When a last-minute request that might be outside the scope of our predetermined scheduling and planning comes in, we pull the aircraft out of our dynamic line – a production line in which an aircraft moves from one position to the next for standard installations – and into our static line, where an aircraft remains in the same position,” says Parent. “This allows teams to work on the aspects that may take more time to complete, without impacting the general production schedule.”

This is part of the lean manufacturing model the OEM has implemented across its sites. “It lets us simultaneously complete standard installations and satisfy custom requests,” Parent adds.

Some completion centers also work on custom interiors for traditional business jets. “One of our hallmark customization pieces is our credenza, which contains hidden seats,” says Scott McCool, vice president of interiors at Constant Aviation. “The client wanted the ability to add seating at the table without compromising the cabin configuration.”

WATCH AND LEARN

All the companies that contributed to this article see the benefit in watching how bespoke requests are dealt with not only by their aviation competition, but also in related industries.

Boeing says the closest industry is yachts in terms of customer mindset and onboard needs, while Gulfstream also benchmarks bespoke car programs, textiles, horology, jewelry and furniture design. Bombardier notes the importance of “sound and tactile feedback to reinforce the luxury visual experience and create a more emotional connection between aircraft and passenger”.

Meanwhile, companies including Airbus Corporate Jets (ACJ) have allied with big names in other industries to create something special. ACJ’s 2017 collaboration with hypercar maker Pagani resulted in the Infinito cabin concept.



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INSET: STONE CAN BE CUSTOMIZED WITH BESPOKE ENGRAVING AT F/LIST

F/List has completed bespoke work on everything from single-engine turboprops to helicopters and wide-body jets

F/LIST DEVELOPED VARIOUS BESPOKE SOLUTIONS FOR A VIP BBJ 787 COMPLETION MANAGED BY KESTREL AVIATION MANAGEMENT, INCLUDING THE REAL CREMA MARFIL MARBLE STONE VENEER USED FOR THIS VANITY UNIT

McCool says, "With our expertise in maintenance and operation, engineering and interior design, we are uniquely positioned with the OEMs. We are able to work through any engineering or STC requirements to deliver one-of-a-kind designs."

CERTIFICATION CHALLENGES

Another company with a lot of experience on custom projects is F/List. It has worked with OEMs including Bombardier, Embraer, Gulfstream, Dassault and Pilatus, as well as completion and service centers. "Our customers require solutions that are inherently challenging from a certification standpoint," says Ulrich Gehling, vice president of aircraft interiors at F/List. "With our EASA Part 145 and also 21J and 21G approvals, we can deal with the majority of cabin certification requirements internally."

On many projects, F/List has enabled new types of veneer to be used. Flammability is always a challenge when gaining such certifications. "However, our proprietary veneer treatment is very good in terms of flammability resistance and doesn't show the negative effects of fogging over time, which can be seen with other treatments involving salt-based flame retardants," says Gehling. "Also, other certification challenges such as slip-resistance requirements have been overcome for all our natural stone and wood floorings."

THE SKY'S THE LIMIT

Every business cited was keen to stress that despite their flexibility and keenness to please clients, safety had to come first. One efficient way of getting certain elements on board is to treat it as loose equipment. "If a design element requires a change, we leverage our engineering team to configure a solution or STC," says Constant's McCool. "Considerations are made for how passengers use the space and we can solve issues by customizing access and storage for any loose equipment." ❖

TOO UNIQUE TO RESELL?

Pascal Bachmann, senior vice president of sales, EMEA, for Jetcraft, says the most sought-after second-hand aircraft are "finished tastefully and neutrally, without any extreme customizations".

"Generally, it will be difficult to resell an aircraft that has a floorplan differing from the one offered as standard by the manufacturer," he says. "Buyers like to have something standard, and so do financing companies – it is simply easier to resell."

Bachmann has seen purchasers rip out nearly new cabins to put their own stamp on the interior, but says this remains the exception. "The average lifetime of a jet is 20 years, and the average period of ownership is about 10 years," he says. "Pre-owned aircraft less than five years

old are in high demand right now, and typically need very little refitting if they are cared for properly. But with limited inventory of younger aircraft available, we are seeing a trend toward purchasing older aircraft and completely refurbishing them."

The most creative customizations Bachmann has seen are from the Middle East and Asia. "But we have customers around the world that have tailored their interior to meet a specific need or preference," he says. "That is one of the biggest benefits of full ownership. I remember a Swiss buyer who wanted his aircraft to have the feel of his mountain home, and another who insisted on teak flooring, like on his yacht. We also recently owned a Global 6000 with a Fendi interior."

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IDEAS

AS PART OF THIS ISSUE'S FOCUS
ON BESPOKE DESIGN, THREE TOP
DESIGNERS REVEAL THE WORK THAT
GOES INTO CREATING INNOVATIVE
CABIN ELEMENTS

Words by Izzy Kington





LEFT: UNIQUE AIRCRAFT'S DESIGN STUDY FOR THE BBJ MAX 7

BELOW: ANOTHER DESIGN STUDY, FOR THE BBJ 777X, ALSO FEATURES OLED SCREENS IMPLEMENTED IN TRANSPARENT PARTITIONS



IMAGE: BOEING

WHERE DID YOUR LATEST INNOVATIVE IDEA COME FROM?

OLED technology enables a totally different approach to placing monitors in the cabin. Inspired by screens integrated in hotel bathroom mirrors, my idea was to implement screens in transparent partitions. I included the idea in two recent design studies – one for the B777X and the other for the BBJ Max 7. Designing interiors for upcoming aircraft types motivates me to give new technologies and materials a try.

HOW IS THIS A DEPARTURE FROM THE CURRENT STATUS QUO?

OLED monitors can make a big impact on aircraft interior design, where we are always limited in terms of space. This technology would give us so many more options for

placing monitors in the cabin – enabling us to peel them off the walls, where they have traditionally been placed and stand out as big black squares within the cabin.

Onboard connectivity is very important nowadays. The technology in this sector is evolving quickly and designer are challenged to implement it into the design nicely.

WHAT CHALLENGES NEED TO BE OVERCOME TO MAKE THIS A REALITY?

Both the OLED screen technology and its integration in transparent partitions definitely presents a certification challenge and would require some investigation.

HOW IMPORTANT IS IT TO CUSTOMERS TO HAVE SOMETHING BESPOKE AND INNOVATIVE IN THEIR CABINS?

If the innovation or bespoke element improves comfort and connectivity, it's always to their advantage.

CAN YOU SEE ANY WAY FOR THE INDUSTRY TO CHANGE TO MAKE IT EASIER TO INNOVATE?

The VIP market is always a bit dependent on the commercial aviation world – new technologies are invented there first, simply because the market is much bigger.

It would definitely be an advantage for the industry if suppliers would be a bit more flexible in terms of customizing their products for VIP aircraft.



Warja Borges

Owner and interior architect, Unique Aircraft

Howard Guy

Founder and CEO, Design Q



WHERE DID YOUR LATEST INNOVATIVE IDEA COME FROM?

A persistent bugbear of mine is the compromised galley design on many jets – made even more problematic by the logistics of providing fresh food for both the outward and return legs of the journey. This issue was brought home to me a couple of years ago at EBACE.

Due to the no-show of a speaker at a cabin crew conference, and with only 20 minutes notice, I made an impromptu presentation on jet interiors and practical help for the crew. Afterwards, I was approached by Paula Kraft, who is something of a legend in the business jet catering world. She told me about the realities for crew managing the logistics. I couldn't believe my ears when I heard the lengths crew sometimes have to go to store fresh produce for their flights – tales of food stored in

hotel baths packed with ice from the bar to keep it in optimum condition. Paula's story got me thinking; a new method of storage and delivery was needed.

WHAT IS THE CURRENT STATUS QUO?

Although galleys have improved considerably over the years, they are usually located in an unfortunate position at the main door and are therefore passengers' first impression of the aircraft. Storage and worktop space are squeezed to a minimum to maximize space in the main cabin. In the majority of business jets, galleys are positioned in and feel like a corridor.

Then there is the plight of cabin crew. Paula explained to me that once a flight is designated, it is the flight attendant's responsibility to stock it with everything needed. Food and drink is the first point of panic. The attendant will often get late notice when the jet is due to fly – maybe the evening before an early morning flight – and given very specific demands for food, newspapers and ground transportation, for both legs. If the food is procured through a catering service, the order needs to be made ASAP. It is quite likely the food will be delivered to the attendant's home or hotel – delivery to the aircraft is often not an option.



The condition of the ingredients must be perfect, but in a hotel room there are no facilities to keep food properly. The minibar is neither large nor cold enough, so the options are a chill box or to pack the bath or shower with ice from the bar – hardly hygienic and rendering the bath/shower inoperable for the crew member. The reality of how crew try to keep ingredients fresh for such a gourmet dinner is in total contrast to the expectations of the passengers.

WHAT CHANGES DID YOU PROPOSE?

Paula's idea was to produce a controlled method of storage and delivery from the food preparer to the aircraft, as we see in commercial aviation. In business aviation, the processes of food preparation and delivery are often random and unmonitored, which can actually be dangerous.

The Just In Time food safety process requires a method of transportation; a sealed and chilled box that can easily be pulled on wheels like a case, and accommodated in a dedicated space in the galley. Ideally it needs to act like a refrigerator in flight. The majority of small to medium business jets do not have refrigerators on board, but having one is not necessarily a help – they take up space, add weight, and do not solve the problem of transport to the aircraft.

Paula suggested a box with a sealed security lock, with the location and internal temperature continuously monitored by a cell phone tracker. This would also enable the food provider to prove that the temperature stays within mandatory limits.

Design Q therefore designed an integrated, refrigerated food travel case, called the Flight Fresh Box. It offers a controlled and easy-to-use food storage and delivery solution.

HOW WERE CERTIFICATION, SIZE AND POWER CHALLENGES OVERCOME?

Designed as a carry-on item, the Flight Fresh Box does not require certification. The case can be plugged into the mains in any hotel room to run its chiller and/or recharge its internal battery. The battery pack keeps the chiller working en route from the hotel to the jet. It comes in two sizes to ensure compatibility with the dimensions of galley stowages on most OEM aircraft types.

We envisage that the Flight Fresh Boxes would belong to catering suppliers so they would ensure they are maintained and kept in optimum condition. To top it all, the food waste can be reloaded



ABOVE AND BELOW: THE FLIGHT FRESH BOX, WHICH IS SIZED TO FIT STANDARD GALLEY STOWAGES

OPPOSITE PAGE: AN ERGONOMIC TEST MOCK-UP OF THE UNIT, INTEGRATED INTO THE GALLEY MOCK-UP DESIGN Q HAS BUILT FOR THE AERION AS2 DEVELOPMENT

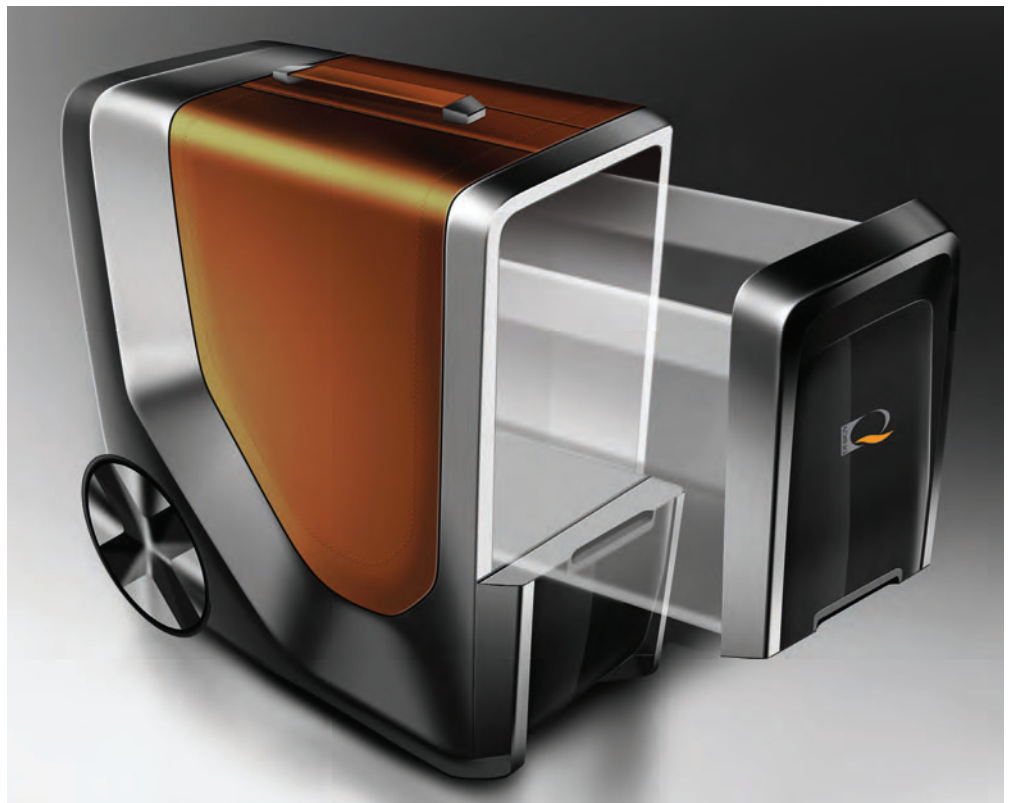
back into the sealed containers and then returned to the catering company chilled, avoiding any unpleasant aromas in the aircraft.

Sometimes the best ideas are the simplest ones. The devil, of course, is in the detail. Design Q has drawn on technology developed originally for the medical world to solve this aviation chiller thriller.

HOW IMPORTANT IS IT TO CUSTOMERS TO HAVE SOMETHING INNOVATIVE IN THEIR CABINS?

Our ability to engineer one-off solutions is a draw for a lot of our customers – a lot of design houses don't offer that. We're working on a project right now for a private individual, and it's clear they want the aircraft to be absolutely awesome, different, wild, and not like anybody else's. We've integrated things that have not been done before, including new technology, and have it fully certified. But we can't publicize the project because they're very private.

It's for a new aircraft, so within reason, they could've had any finish from the OEM. But this customer didn't want a customized version of the standard interior; they wanted a handful of one-off things. That's very difficult for OEMs to do, for cost and risk reasons, but because we have a great relationship with the OEM, and engineering skills of our own, I was able to push it into slightly unknown territory so together we could deliver something way above the norm.



Jacques Pierrejean

Designer, Pierrejean Vision



WHERE DID YOUR MOST INNOVATIVE IDEA COME FROM?

While we were working on an outfitting project with Lufthansa Technik, we proposed the idea of a new seat design that would be much more versatile than any created for VIP cabins before. We wanted to take the comfort, materials and ergonomics of the sort of armchair or rocking chair you might find at home and apply it on board for passengers of all sizes. We wanted the seat to be available for commercial and private aircraft, of any size or type.

Fortunately, we were given the green light from Lufthansa Technik to move forward with realization. They allocated an engineer to the budding project, and we performed deep market analysis concerning the way the seat should be customized.

Finally, we launched the finished product, named chair, in cooperation with the completion center. Production and sales of the product are now coordinated by Inairvation, Lufthansa Technik's joint venture with F/List.

HOW WAS IT A DEPARTURE FROM THE STATUS QUO AT THE TIME?

Before chair, seats were made of quite a heavy material. After many sketches and conceptual designs, we concluded that our seat must be extremely lightweight. We performed market research to perfect what we knew would be a unique seat design using a structure of carbon fiber. However, six months later, this material failed

the certification tests and so we finalized it with a metal structure instead. It is nevertheless much lighter than other seat designs.

WHAT CHALLENGES HAD TO BE OVERCOME TO MAKE IT A REALITY?

It is difficult to comprehend how much goes into designing a new aircraft seat. This may be why so few new designs appear on the market. The final product must meet aviation safety standards, as well as performing functions such as swiveling, moving forward and backward, and be stable enough during take-off and landing. To overcome these challenges, we had to work with a highly skilled team of engineers, and balance respecting our design ideas with adhering to the technical regulations.

HOW IMPORTANT IS IT TO CUSTOMERS TO HAVE SOMETHING BESPOKE AND INNOVATIVE IN THEIR CABINS?

Most of our clients are not focused on the concept of innovation, but on how the idea can enhance their experience. Sometimes we are asked for specific elements that are technically difficult or even impossible to achieve, such as integrating a bathtub on board. We try to provide solutions for these types of demands – however, building a structure around the bath to collect the water in case of turbulence is not realistic.

CAN YOU SEE ANY WAY FOR THE INDUSTRY TO CHANGE TO MAKE IT EASIER TO INNOVATE?

The greatest limitations for innovation are the safety standards. Regulations are becoming stricter, which makes it challenging to introduce new ideas or use certain materials – such as our proposed carbon-fiber seat. However, we have found that by focusing on elements within the aircraft that are not affected by safety regulations, we can bring many new concepts to the table. For example, with the introduction of LED lighting, we were able to completely change cabin ambience. ☒



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650 AIR AMBULANCE FLEET,
SWISS AIR-RESCUE REGA
REQUIRED A ONE-OFF
DESIGN WITH LOTS OF
BESPOKE ELEMENTS

Words by Izzy Kington



we



PHOTOS: SWISS AIR-RESCUE REGA

care

“The newly developed ICUs are considerably wider and will be noticeably more comfortable”

As Urs Nagel, head of jet operations at Swiss Air-Rescue Rega, says, “The cabin of an ambulance jet cannot simply be chosen from a catalog.”

When the time came to update the company’s fleet, a new cabin had to be specially designed to meet its needs.

Rega provides airborne medical assistance in Switzerland and abroad. It is on standby 24 hours a day, 365 days a year, ready to respond to emergency calls. “Operations in Switzerland are carried out with a helicopter fleet, and our three Challenger 650 jets carry out repatriation flights across the globe,” says Nagel. “With our new Challenger 650 fleet, we have three of the most modern ambulance jets in the world and we know we can rely on them. We invested a lot in improving the avionics and medical equipment.”

Rega received the Challenger 650s in March, July and December 2018, following a design and build process that began with the contract signing in 2015.

The Challenger 650s replace three Challenger 604 jets that Rega operated previously



SMOOTH BOARDING

Access and egress was a major consideration. Flying Colours’ Sean Gillespie says the width of the Challenger 650 facilitates entry of patient stretchers and accompanying equipment into the cabin.

Passengers can board via integral stairs or a custom-designed ramp. The ramp has a shallower angle than that developed for Rega’s previous aircraft, to make it safer and easier to load stretchers. Aerolite also cut the physical forces that are exerted on the

ramp in use, by more than half. In addition, deployment can be achieved by a single person. The design was tested with a wooden scale model.

“The foldable loading ramp is a key feature, enabling smooth access for stretchers,” says Gillespie. “This ramp is stored within the aircraft and hence available for every trip.”

A custom moveable medical cabinet, manufactured by Aerolite, also facilitates passenger transportation in and out of the aircraft.

Restful atmosphere

The aircraft is designed to be exceptionally quiet, to ensure a comfortable working environment for medical staff and for patients who may be distressed.

"The Challenger 650 is already a quiet aircraft," says Sean Gillespie of Flying Colours. "We worked with supplier Hutchinson to install custom soundproofing, using the latest sound-damping material."

The material was incorporated in the areas of the cabin found to be most vulnerable to sound, following careful analysis.



"We needed to create an interior that would offer ample light, spaciousness and the ability to work," comments Sean Gillespie, executive vice president at Flying Colours. "It was essential to create an interior that is clinical, clean, functional and comfortable."

The forward cabin section includes an office area for medical staff and a custom crew rest area, which can be converted into various configurations, including lie-flat sleeping positions for two people.

MEDICAL BREAKTHROUGH

The main cabin includes two custom ICUs with medical cabinets – although Aerolite supplied reconfiguration mechanisms that enable the crew to change the floorplan in line with mission requirements. The cabin can operate as a fully functional ICU for two patients with attending critical care personnel, or can be reconfigured to transport four patient units with seats for a medical team. Extra medical equipment can be accommodated as needed.

Rega had several requirements for the ICUs. "The newly developed ICUs are considerably wider and will be noticeably more comfortable for patients," says Nagel.

The company's relationship with Bombardier goes back a long way. Having operated Bombardier Learjets, Rega acquired its first Challenger in 1982. "This latest acquisition follows decades of proven reliability in service," notes Simon Jackson, director of sales at Bombardier Specialized Aircraft. "When an aircraft is used in life or death situations, the proven reliability of our products is an asset."

On this project, Bombardier's Specialized Aircraft division was the prime contractor, providing overall program oversight and information on all aspects of the aircraft. "Bombardier worked in close collaboration with all parties to ensure that the aircraft were designed, assembled and completed expertly and efficiently, and delivered on time," says Jackson.

The aircraft were assembled in Montreal, Quebec, Canada, and then delivered to Flying Colours in Peterborough, Ontario. Flying Colours worked in close collaboration with Rega and Bombardier to design the interior and was responsible for its integration, testing and certification. Aerolite was a key partner, designing and manufacturing the medical equipment, including the intensive care units (ICUs).

WORKING ENVIRONMENT

The design process involved the input of Rega's team of doctors, nurses and aircraft crew. Rega devised a list of cabin improvements it wanted to make, based on its operational experience, workshops and tests.

ABOVE: THE TWO ICUs, A CUSTOM DESIGN BY AEROLITE

ABOVE RIGHT: THE MAIN CABIN ALSO HAS SIX SEATS SUPPLIED BY COLLINS AEROSPACE

LEFT: THE AFT OF THE AIRCRAFT FEATURES A GALLEY, LAVATORY AND BAGGAGE COMPARTMENT

There are two oxygen systems on board – one for the cockpit and one for medical needs

“A standard business aircraft refrigerator does not meet the requirements of a medevac aircraft”



Most of the medical equipment is modular, making future updates easier

The operator also wanted to be able to adjust the foot section of the bed, so the patient's legs can be raised, especially when they are suffering from back injuries. The hardness of the mattress can be adjusted, and there is a pressure-relief function that activates wavelike movements to combat the risk of thrombosis and pressure sores. The ICU areas also have various ports for power and oxygen outlets. Custom, high-intensity lighting was installed over each ICU to deliver the best light for medics to work in. The LED lighting was supplied by Collins Aerospace, while the light housings were designed and 3D printed by Flying Colours.

CUSTOM REFRIGERATORS

The aft of the aircraft has six Collins Aerospace seats. The aircraft also features dual galleys, a custom aft lavatory and a baggage compartment that is accessible in flight.

The galleys include custom Enflite refrigerators. “A standard business aircraft refrigerator does not meet the requirements of a medevac aircraft,” says Gillespie. “The Enflite ones were specifically made for European operations – operating at 220V – and sized to fit in the custom galley.”

Rega evaluated 64 different aircraft types before deciding on the Challenger 650

ABOVE: AT THE VERY FRONT IS A CREW REST AND OFFICE AREA

All materials were selected for aesthetic appeal and durability. “For example, we manufactured custom stainless-steel sideledges for ease of cleaning and durability,” says Gillespie. “The ICU areas have aeromat vinyl flooring, while the passenger area features a durable carpet that can easily be removed.”

WI-FI AND LIGHTING

Unlike Rega's previous jets, the Challenger 650s are fitted with wi-fi. This means crew can monitor their patients' medical parameters – such as pulse, oxygen saturation and blood pressure – from their seats, using tablets. They can also share information with Rega's Operations Centre and hospitals on the ground.

Tablets can also be used to control the new lighting. A broader range of light settings enables crew to tend to patients without necessarily waking them up – the bluish night-flight mode is a particular hit. In emergencies, full cabin lights can be switched on immediately. “On the old jet it was either light or dark,” says Thomas Burren, head of nursing service, jets, at Rega. “What was good for the crew often disturbed the patient, and vice versa. Now we can adjust the brightness smoothly and separately for different sections of the cabin. Sleeping patients will wake up less as a result.”

Overall, Gillespie underlines that true cooperation is essential on a custom project such as this, involving multiple parties. “Every project is a learning experience, and this one highlights the need for an experienced, collaborative team to ensure that every detail of the cabin helps contribute to the mission,” he says. ✕

MEDEVAC OPTIONS

Bombardier works closely with each medevac client to develop a product best suited to their requirements.

“Medevac operators vary from using dedicated aircraft with highly specialized interiors, to multirole aircraft with quick-change interiors that can be swapped in and out depending on the mission,” says Simon Jackson.

The Bombardier Learjet platform has a long history of medevac use, which the OEM says is due to its “speed, reliability and low operating

costs”. The Challenger series is a suitable option for longer missions.

“The Challenger 650 provides an exceptionally smooth ride that benefits patients, minimizes pilot fatigue and extends the life of equipment,” says the spokesperson. “The widest-in-class cabin allows for a highly specialized medical suite. The low noise also contributes to comfort. With its 4,000-nautical-mile range and Mach 0.85 cruise speed, this aircraft can be counted on to get rescue crews where they need to be.”

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4. Circles embroidery, by Boxmark
5. Quilted embossment in Light Grey, by Foglizzo Leather
6. Honeycomb embossment in Honey Yellow, by Foglizzo Leather
7. Geometric embossment in Teal Blue, by Foglizzo Leather
8. Indirug embossment in Navy Blue, by Foglizzo Leather
9. Eden in Acorn, by Moore & Giles
10. Eden in Mulberry, by Moore & Giles
11. Eden in Glacier, by Moore & Giles
12. Eden in Moss, by Moore & Giles
13. Pinwheel in Antique Legends French Blue, by Townsend Leather
14. Diamond in Classic Venetian Lace, by Townsend Leather
15. Shovels in Classic Hamilton Grey, by Townsend Leather
16. Patchwork Diamond in Manchester Pinion, by Townsend Leather
17. Pegasus in Prussian Blue, by Yarwood Leather

Upholstery fabrics

1. Wool-blend Extra 1, by Lantal
2. Wool-blend Extra 5, by Lantal
3. Wool-blend Extra 4, by Lantal
4. Woven Vail in Ermine, by Tapis
5. Woven Valley in Rice, by Tapis
6. Mira X Suono in color 50, by Tisca
7. Mira X Suono in color 61, by Tisca
8. Mira X Suono in color 21, by Tisca
9. Mira X Ritmo in color 74, by Tisca
10. Condor in Graphite, by Yarwood Leather

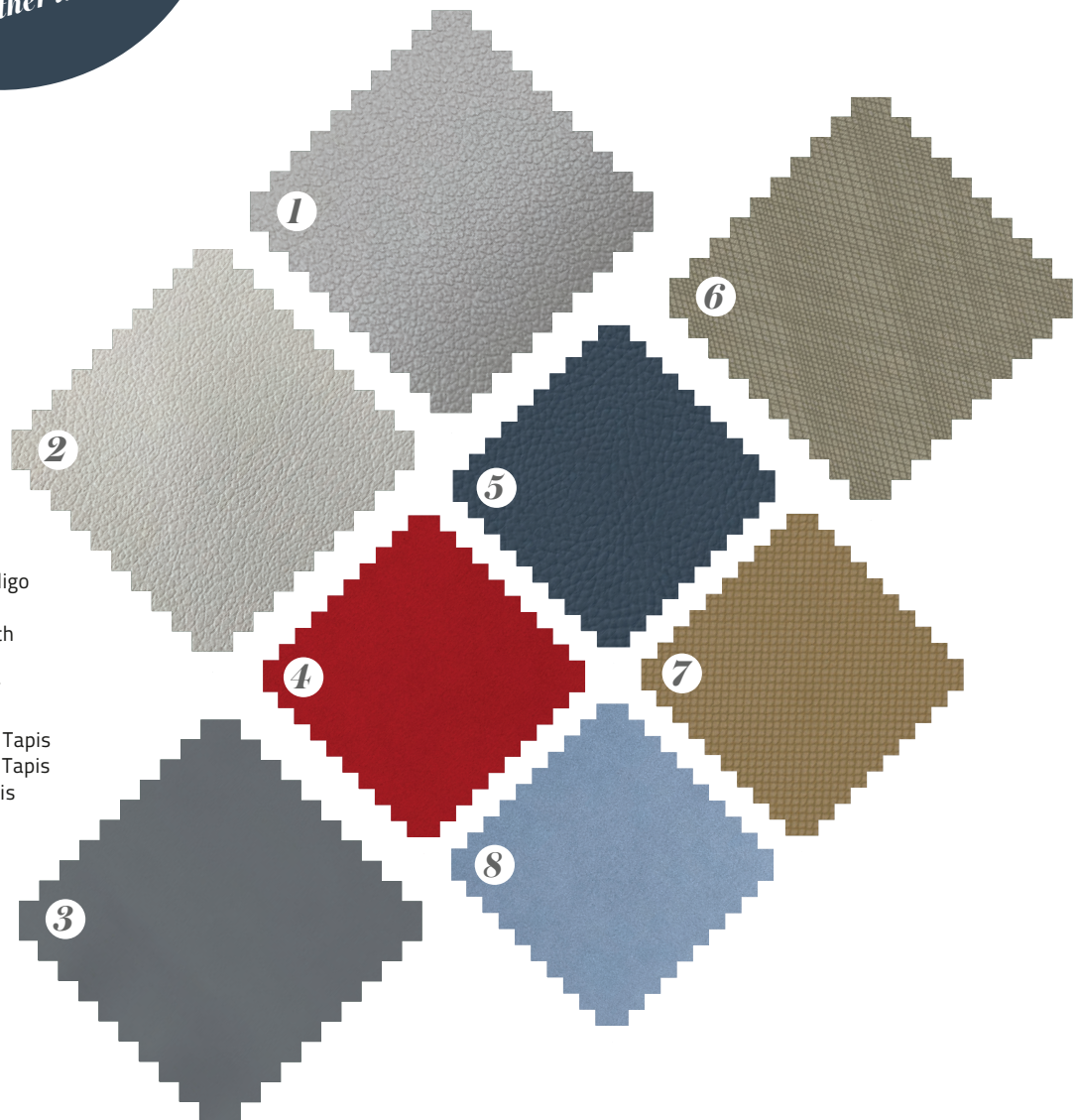


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& Giles' Olive Green
leathers, Eden is crafted
using an olive leaf extract.
This 100% organic tanning
agent by Wet-green
uses fallen olive leaves to
achieve mineral-free
tanning

Citing customer concern regarding the colorfastness of clothing such as jeans resulting from the trend for eco-friendly manufacturing, Willow Tex has developed indigo dye resistance for its Izit Leather lines

Faux leather

1. Izit Leather Junior in Glacier, with indigo dye resist, by Willow Tex
2. Izit Leather Junior in Polar White, with indigo dye resist, by Willow Tex
3. Hawk in Pebble, by Yarwood Leather
4. Ultrasuede Nu in Red, by Tapis
5. Ultraleather Tottori in Hot Spring, by Tapis
6. Ultraleather Wired in Sugar Cone, by Tapis
7. Ultraleather Dwell in Tee Pee, by Tapis
8. Ultrasuede Nu in Horizon, by Tapis



Carpets



1. Wool Extra 1, by Lantal
2. Wool Extra 3, by Lantal
3. Wool Extra 4, by Lantal
4. Handtuft Diamond 1, by Tisca
5. Colored by Nature in Bark, by Tisca
6. Bellavista in Dolphin, by Tisca
7. Escala Hollyn with silk, by Scott Group Studio
8. Escala Akachi with silk, by Scott Group Studio
9. Escala Claes with silk, by Scott Group Studio

Non-textile flooring

1. Tiled vinyl flooring in Goa Walnut, by F/List
2. Nexflor in Red Oak, by Duracote
3. Nexflor in Clove Mahogany, by Duracote



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MANUFACTURERS ARE CONTINUALLY MAKING
WINDOWS LARGER. COULD VIRTUAL WINDOWS
PROVIDE AN EASIER ALTERNATIVE?

Words by Marisa Garcia

BELOW: THE GLOBAL 7500



Part of the joy of flying is being able to see the world from high above. Many manufacturers are seeking to make the most of this by making windows as large as possible. For example, it was a part of Bombardier's Global 7500 development program.

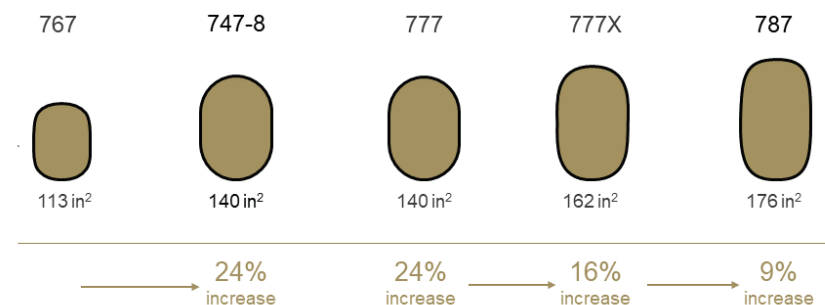
"Customers very much prize the beautiful views you get on board an aircraft," says Tim Fagan, manager of industrial design at Bombardier Business Aircraft. "We strive to always create an agreeable and calming environment for our customers. Windows only enhance that experience. It's very similar to buying a home; people want to enjoy beautiful views and natural lighting."

NATURAL BEAUTY

Embraer also sees customer demand for larger windows. "Customers continue to demonstrate interest in outfitting their aircraft with large windows – whether they're floor-to-ceiling as seen in the Kyoto Airship, or wider than usual as designed in the Manhattan and Hollywood concepts for the Lineage 1000E," says Jay Beever, vice president of interior design at Embraer Executive Jets. "Customers are drawn to these features because they provide additional light, making the aircraft feel larger, and they also help passengers feel more connected to the natural environment."

The Boeing 787 – and therefore the BBJ 787 – was also designed with this passenger preference in mind. "We made much larger windows, so that people sitting in the center of a commercial aircraft would feel like they have

BELOW: THE WINDOWS HAVE BECOME LARGER WITH EACH OF BBJ'S WIDE-BODY DEVELOPMENTS



EMBRAER CAN INCORPORATE A PORTRAIT VIEW WINDOW ON THE LINEAGE 1000E

a window seat," says Capt. Alex Fecteau, director of marketing at Boeing Business Jets. "They are a good 40-50% larger than any other commercial aircraft window was at the time."

POPULAR DEMAND

Fecteau says the windows proved so popular that when Boeing came to develop the 777X, it was important to re-engineer windows to make them larger than on the original 777, even though the aircraft have the same fuselage. "That has proved very popular and is definitely a good selling point," he adds. "I don't know that a customer strictly selects an aircraft based on that, over other factors, but it's definitely a nice-to-have, and they appreciate it."

Window size is limited by the need to ensure the structural integrity of the fuselage. "Both the window and



“Customers are drawn to large windows because they provide additional light, making the aircraft feel larger, and they also help passengers feel more connected to the natural environment”

where the edges are joined to the fuselage must be carefully engineered to withstand the greater stress along those interfaces, to be strong enough to hold the air pressure at those high altitudes,” says Fecteau. “The larger the window, the more robust the surrounding fuselage structure must be. We were able to make such large windows on the 787 because of the extraordinary strength of the composite fuselage tube.”

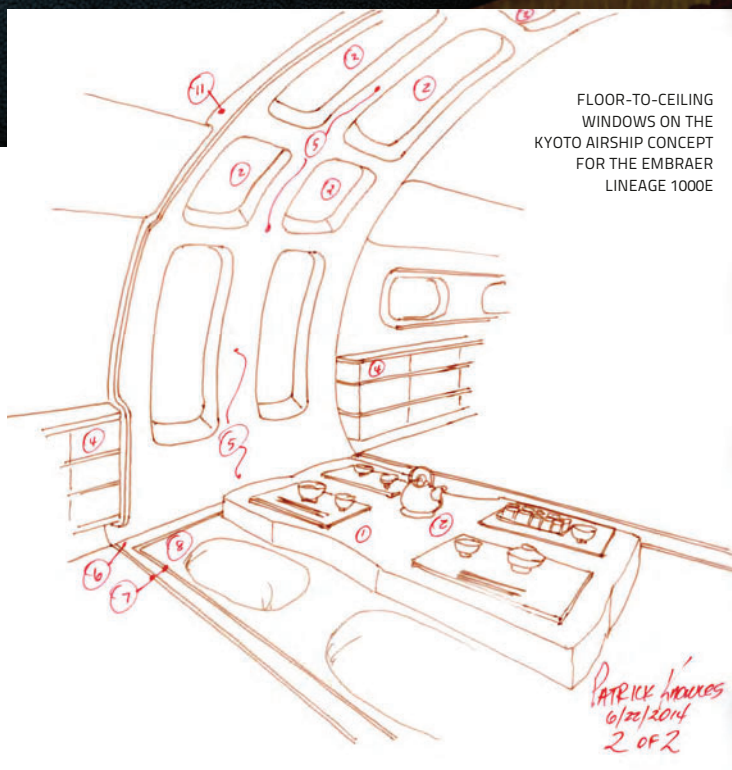
STRUCTURAL SOLUTIONS

Boeing is able to lathe the composite structure in variable layers, making it thicker around windows and doors to sustain the stress from pressure at altitude. With aluminum fuselages, such as that of the 777X, the challenge is greater, but Boeing says it has made windows as large as physics allow. “Engineering analyses showed very high strength margins, which allowed us to safely enlarge the windows to the present size,” says Fecteau.

Bombardier brought together multidisciplinary teams to find an engineering solution that would allow the introduction of larger windows on the Global 7500. “The final result is extra-large windows that are 80% bigger than those in current-generation aircraft, welcoming more natural light per square foot of cabin than in any other business jet,” Fagan says.

Embraer has used 3D-printed alloys and glass technology to reinforce the structural parts of its aircraft to support large and even floor-to-ceiling windows. “It’s now much easier for our team to execute a customer’s vision because we have access to technology that enables us to do this more and more, even in extreme environments,” says Beever.

***Embraer’s
Kyoto Airship
has four windows
that are the size
of standard
exit doors***



FLOOR-TO-CEILING
WINDOWS ON THE
KYOTO AIRSHIP CONCEPT
FOR THE EMBRAER
LINEAGE 1000E

ART DECO WINDOW

When it comes to unusual windows, Embraer has form. The OEM says a floor-to-ceiling window is possible on its Lineage 1000E, as seen on its Kyoto Airship concept. In 2017, it also released images of an Art Deco-inspired arrangement – called the Portrait View window – for the Manhattan and Hollywood Lineage 1000E concepts created by Jay Beever and former Disney imagineer Eddie Sotto.

The window forms the centerpiece for the Cloud Bar section of the five-zone cabins.

Daniel Bachmann, corporate communications manager at Embraer, reveals the location of the window is as important as the structure around it. “The Portrait Window has to be forward of the wing, for the aircraft to push the reinforced structure as opposed to pulling it,” he explains.

“If the cabin is really dark and everybody is sleeping, and you barely crack open a traditional sliding window covering, it floods the cabin with light”

The positioning of windows is also the subject of attention. Boeing has raised windows relative to the seat, putting the wider part closer to eye-level. Bombardier has also positioned windows to improve sightlines.

The location of windows and cabin layouts are also intrinsically linked. For example, Bombardier has spaced windows on the Global 7500 to ensure there is a window for every seat and a window centered on every table. “We led an intensive study during the detailed design phase of the Global 7500 to ensure we could line up the seats and the windows to provide our customers with optimal viewing angles from any seat throughout the aircraft’s four living zones,” says Fagan.

Embraer’s Beever says that expanding windows, and the structures that support them, gives customers more



ABOVE: VIRTUAL WINDOWS GIVE MID-CABIN PASSENGERS A VIEW IN EMIRATES’ NEW FIRST CLASS

BELOW: ELECTRONICALLY DIMMING WINDOWS FEATURE ON THE B787

options in terms of cabin layouts. “Windows with a broader field-of-view give greater freedom in terms of seat positioning than traditional forward or aft-facing positions,” he says. “The viewing experience will evolve and a variety of control devices will give passengers equal freedom to control their visual environment.”

WINDOW DRESSING

There are now various options for shading. Boeing opted for electronically dimmable windows on the BBJ 777X, which Fecteau believes are “far superior” to traditional sliding screens. “If the cabin is really dark and everybody is sleeping, and you barely crack open a traditional sliding window covering, it floods the cabin with light,” he says. “With an electronically dimmable window, you can slowly brighten the window. Because of the glass polarization, you can see outside, but not flood the cabin with light. If you lighten it all the way, you will brighten the cabin, but it’s never as harsh as opening the screen on the window and then letting all the sunlight come straight through.”

Fecteau believes dimmable windows can be even more attractive for smaller jets, where the beam effect of





At 162in² (1,045cm²), the Boeing 777X's windows are 16% larger than the Boeing 777's

BELOW: FOKKER AND BOEING'S SKYVIEW PANORAMIC WINDOW CONCEPT WAS THE WIDTH OF THREE REGULAR CABIN WINDOWS

passengers in the middle suites a virtual window. Projected images are pulled from a camera mounted outside the aircraft. The move reinforces how important the view outside is to passengers.

SUPERSONIC NICHE

Can virtual windows replace real windows entirely? Fecteau points out that real windows have an important safety function, because they give passengers an immediate view of the situation outside in the event of an emergency. The arguments for replacing real windows are generally cost and higher structural integrity in high-speed operating conditions. On Concorde, for example, windows had to be very small. "Supersonic aircraft are subject to aerodynamic heating, which creates more stress on their structures," says Fecteau. "It might be more critical to have virtual windows in those cabins."

opening a screen can be more intense. "On the other hand, most business jets have aftermarket window coverings with different shades – one type to dim the harsh outside light, and another to block it out," he says.

Interior design choices, such as overlays that connect two or more aircraft windows behind a glass panel, fitted with multiple screens, can help manage and distribute natural light while making the cabin feel more like a home. "That's a personal aesthetic," comments Fecteau. "People really go out of their way to prevent it from looking like an airliner."

A DIFFERENT VIEW

Some aircraft concepts – particularly for supersonic jets – have mooted bypassing the myriad engineering difficulties of creating larger, perfectly positioned and shaded windows altogether. Instead, they propose virtual windows, where views of the skies, IFE content or other soothing visuals would be projected on to flexible and perhaps huge OLED screens.

Projected views are not just a concept. In Emirates Airlines' new first class, the technique is used to give

WHAT BECAME OF SKYVIEW?

Several years ago, Boeing and Fokker looked at the possibility of developing the Skyview Panoramic Window for BBJ, BBJ 2 and BBJ Max types, by effectively combining three 737 windows into one measuring 4.5 x 1.5ft (1.4 x 0.5m).

However, the partners determined that it would be difficult to recoup the investment. "It's an expensive

proposition to break a hole that big in a fuselage," says Fecteau at Boeing Business Jets. "It was popular, but difficult to do. It has to sit between certain frames in the fuselage. It would have been expensive, and there was not enough demand to justify the giant engineering and certification costs. Fokker could offer the feature as an STC aftermarket."



THE S-512'S CABIN-LENGTH SCREENS COULD DISPLAY LIVE CAMERA FEEDS, MOVIES, IMAGES AND PRESENTATIONS

Spike says replacing windows with OLED screens will reduce cabin noise by 20dB on the supersonic S-512

“Trends flow continuously at a higher rate than product development, which often limits technology capture opportunities”

Fagan of Bombardier is monitoring developments. “Screen technology is emerging quickly, driven in large part by consumer electronics,” he says. “This technology offers new possibilities, but we don’t feel that it is ready to fully replace windows yet.”

FUTURE-PROOFING

Embraer’s Beever is also cautious about adopting technology that could quickly become obsolete. “Trends flow continuously at a higher rate than product development, which often limits technology capture opportunities,” he comments.

Beever says Embraer’s focus is not on where technology is today, but rather on the environmental experiences its customers are asking it to draw inspiration from. “Our quest has led us to procuring future-state technology that will become a platform for more evolution, as opposed to a point-in-time technology that will only require that it be renewed again and again, pinning customers to the past,” he says. “My feeling is that the future of aerospace interiors will not depend on technology synthesizing our environment, but rather opening up our environment to the analog world.”

Another approach could be to combine the benefits of real and virtual windows. Fecteau sees promise in smart window concepts that involve superimposing relevant information onto a real window surface, using technology similar to heads-up displays. These augmented reality windows could enhance the passenger experience, without sacrificing the view. “You could have your own tour guide as you fly along,” he says. ☒

VIRTUAL SKYLIGHTS

Design Q has been looking at opportunities to implement OLED screens in ceiling panels for some time. “There are certification concerns, but as the products get thinner and lighter, it is becoming a real opportunity,” says Howard Guy, founder and CEO at the company.

One application is to link the screens to exterior cameras, as illustrated by Design Q’s Aeron proposal. OLED screens could also be used as an ambient lighting source. “Instead of the traditional PSU LEDs, we could make use of billions of pixels,” he says. “But best of all is the opportunity to lie back in your seat and watch a movie on such a large screen above you – it would be a new height in IFE.”

BBJ’s Fecteau also notes that some BBJ 777X concepts feature enormous OLED virtual screens overhead. “That’s something that would improve the environment of our aircraft,” he says. “I see that as a feature that people may want.”

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the active listener

CHRISTI TANNAHILL OF TEXTRON AVIATION
TALKS UP THE BENEFITS OF QUIETENING
DOWN AND LISTENING TO WHAT THE
CUSTOMER REALLY, REALLY WANTS

Words by Guy Bird

The art of listening goes a long way in Christi Tannahill's book. The senior vice president of interior design and engineering at Textron Aviation feels it's been one of the secrets to her success for more than 25 years.

"I've had diverse roles in my career, and every time I'm in a new position I find that I'm not the expert, so I really have to understand," she says earnestly over the phone from Textron Aviation's headquarters in Wichita, Kansas. "When you have the best people, they teach you well, but you have to be able to listen to them. Rather than directing everybody in what they should do, really listening is a great morale builder for the team. We've

had high-net-worth individuals and people who run large companies very impressed with the way we've taken their feedback and turned it into something important to them; that goes a long way."

CUSTOMER FACING

Tannahill's background speaks more to the business and customer relationship side of her role than the design side; indeed, her bachelor's degree is in business administration. "I've worked closely with customers for most of my career, and although my education wasn't in design, it's something that has been dear to my heart," she says. "My CEO asked me if I would take responsibility

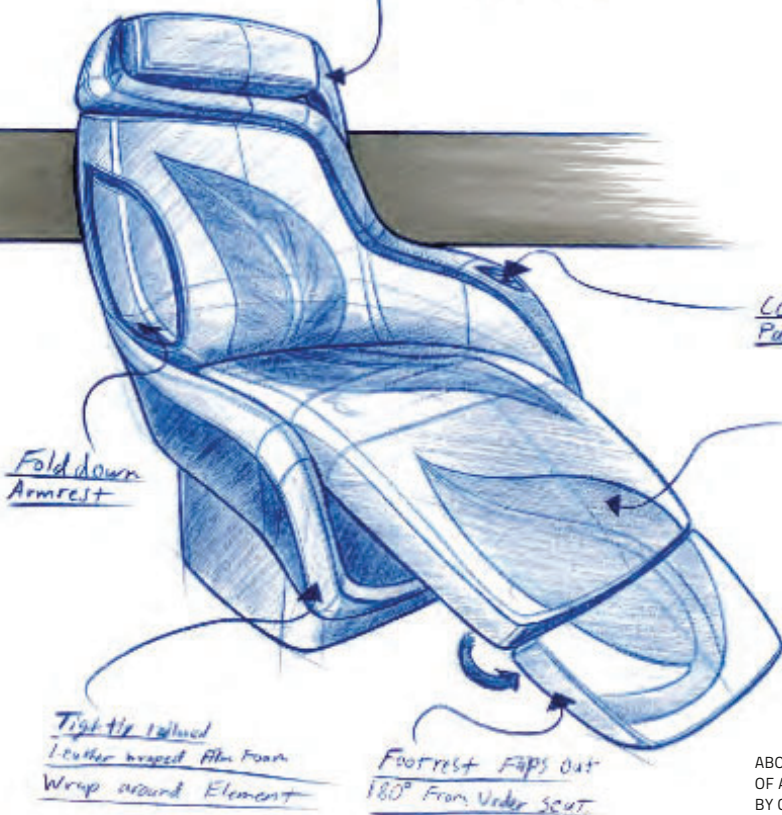


“It’s valuable to bring our engineering and design team to meet the customer early in the process so that they can hear and understand each other”

The Beechcraft, Cessna and Hawker brands account for more than half of all general aviation aircraft flying



Brushed Aluminum Headrest Support



CAREER HIGHLIGHTS

Having earned a BA in business administration from Wichita State University in Kansas, Tannahill held roles including managing the customer support division for Delta Airlines' Wichita location, and leading the quality department of Koch Industries' aviation division.

She joined Beechcraft in 1999, and as senior vice president of the company's Global Customer Support organization, led an operation of more than 1,000 professionals working in technical and field support, parts distribution, aircraft support programs and aircraft services.

Her next role was as senior vice president of turboprop aircraft and interior design at Textron Aviation, and she became senior vice president of interior design and engineering in 2016.

In her personal life, Tannahill loves anything to do with the outside and nature – from fishing and water skiing, to watching her kids play sports. “I have a 20-year-old daughter at the University of Kansas, a son in middle school who plays basketball, and a 17-year-old stepson. I also have two French bulldogs – Izzy and Max – they’re awesome.”

for interiors for a couple of reasons. There were quite a few new aircraft coming to market, and we really wanted to take a fresh approach by designing our aircraft around what our customers wanted, versus an engineering approach. My background, and the customer relationships we had fostered, allowed us to build aircraft in a different way than before.”

Tannahill's approach to navigating the potentially choppy waters involving big design and engineering decisions and colleagues and exacting clients is to be the diplomatic go-between. “I believe it's valuable to bring our engineering and design team to meet the customer early

ABOVE: SKETCHES AND RENDERINGS OF A “NEAR FUTURE” SEAT CONCEPT BY CHRISTI TANNAHILL

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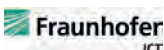
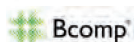
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“I spend a lot of time traveling with customers to make sure the relationship we establish is personal”



One ongoing development is the Citation Longitude, which featured in our October 2018 issue



in the process so that they can hear and understand each other,” she says. “A customer might ask for something that my team can find another way to do by minimizing the certification requirements. Our engineering and design team is extremely creative. This way the process is quicker too.”

DEVIL IN THE DETAILS

To give just one example, Tannahill describes the care taken to change something as seemingly simple as a sidewall. “While it might seem a very simple area to change, you have to look at the mechanisms that could be affected; there might be systems behind the sidewall ledge,” she says. “We had a customer who wanted to completely redesign the sidewall to flow differently and give more space in the aisle. Working directly with them, we were able to achieve something they liked aesthetically, which opened up the aircraft. It took us time to get there, because what the customer wanted to do could have interfered with things you don’t want to have to re-certify, like the seat, tray table and windows. But we were able to do it and the customer bought multiple aircraft because of it. The sidewall ledges became thinner and looked more modern; they gained legroom and it really fit into the overall style of their fleet.”

Although her role is focused more on strategic product development than individual projects, Tannahill is still heavily involved with listening

to customers. “I spend time bringing customers to our advisory board to elicit their feedback,” she says. “We use virtual and augmented reality a lot in our design facility so customers can walk through our mock-ups. We observe how they react to the sound systems, the cockpit, and more, to see what works and what doesn’t. We constantly get feedback to improve new and existing designs.”

Tannahill also spends a lot of time traveling with customers, establishing personal relationships. “We want to understand them and say thank you for the business,” she says. “I’ll be taking a

ABOVE: A GALLEY CONCEPT CREATED BY CHRISTI TANNAHILL AND THE TEXTRON AVIATION DESIGN TEAM

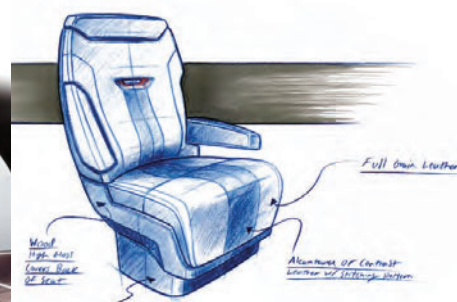
Life lesson

For Christi Tannahill, really listening to customers is paramount. “It’s easy to tell them, ‘No, that can’t be done, that hasn’t been done before, or that’s difficult to do,’ but we listen and look at what can be done. When we’re able to achieve something like that, the customer changes the way they look at us. I had a customer tell me just recently, ‘You listened to everything I asked for and were able to find solutions. Nobody has been able to do that for me.’”



ABOVE: A CABIN CONCEPT BY THE
TEXTRON AVIATION TEAM

ABOVE RIGHT: AN ITERATION OF
THE SEAT CONCEPT DESIGNED
TO SUIT TODAY'S MARKET



continue to grow as trends, but putting these into an aircraft is difficult because they're heavy. We work with great aviation suppliers to find solutions without adding a lot of weight. They understand the critical elements of design and certification. We have suppliers who will build mock-ups for customers to look at too, from sinks to wine chillers, and more."

WISH LIST

As to the future of the industry, in a perfect world she'd appreciate "understanding the technology path for the next 15 years" and would prefer fewer restrictions and quicker certification, while keeping safety paramount. But more than anything, she seems happy to listen and then deliver, as she concludes with confidence: "You get the most impact when you listen." ☘

"Nature is a theme we've carried forward to luxury interiors across our Cessna and Beechcraft products"

group of customers fishing soon. They love to fly their products in and relax, but also spend time with our leadership team. They make time to do it; it means a lot to them. It's not just business."

TREND SCOUT

To keep abreast of new trends, Tannahill and her team visit trade shows, including commercial design show NeoCon in Chicago; Heimtextil in Frankfurt, Germany, to see the latest in textiles; the Miami Yacht Show; and the SIGGRAPH conference in Vancouver, Canada, which specializes in digital arts, graphics, computer gaming, AR/VR techniques and innovation. Tannahill is increasingly looking to the gaming industry for specialist roles. "We've gone to technology schools and hired people with gaming degrees who understand how to create a virtual experience that can showcase the latest cabin trends and technology in a cost-effective way. That's part of the build process we didn't have five years ago."

So what trends does she see resonating with customers right now? "Nature is a theme we've carried forward to luxury interiors across our Cessna and Beechcraft products," says Tannahill. "Last year, we announced a special Beechcraft King Air 350i turboprop, in partnership with King Ranch, one of the largest global ranching brands. The interior includes King Ranch pewter trim accents below the four cabin tables, the 'Running W' branding iron logo on bulkhead quilting, King Ranch-branded throw carpets, hair-on-hide lumbar pillows, and ostrich muslin vinyl headliner and window panels."

While not wanting to name-drop one supplier over another, she's happy to credit their collective good work. "Stone and hardwood flooring

A current project, the Cessna SkyCourier turboprop, should make its first flight in 2019

A PERSONAL ACHIEVEMENT

When asked to recount her biggest work achievement, Christi Tannahill turns to a bespoke project for an individual customer.

"We worked with one customer who had multiple luxury items from cars to boats and when he took his aircraft he said, 'This is the best purchase I've ever made in my life', because it was completely customized to his needs," she says. "It was emotional because of things going on in his life and he'd planned it for a long time. It was a 9- to 12-month project and he was very hands-on. Every seat was customized with something different and the carpet was hand-designed and had never been used before. He spent a lot of time on details, not only to satisfy himself, but for everybody he would take along. It was probably one of the most customized aircraft we've ever done. It was great to be a part of that."

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DESIGNING A CABIN FOR
A LUXURIOUS AIRSHIP THAT
COULD STAY IN THE AIR FOR
DAYS AT A TIME IS A DREAM
PROJECT FOR DESIGN Q

Words by Izzy Kingston

BACKGROUND

The days of luxury airship travel could be near, if Hybrid Air Vehicles (HAV) gets its way. The possibilities offered by its Airlander 10, currently under development, are exciting. With a cabin that is 150ft (46m) long, the airship is designed to take off and land from virtually any flat surface and stay in the air for days. Limited to a 10,000ft (3,000m) altitude, the cabin doesn't have to be pressurized.

HAV teamed up with Design Q to design an interior that would accommodate 18 passengers on three-day tourist expeditions; the company has been working on it since 2017 and the project is now in the prototype stage. The next step is to gain certification and customers.

"It is a dream project," says Howard Guy, founder and CEO of Design Q. "We were very keen to pursue it, because I knew the parameters were very different from anything else, and it would open up new ways of thinking. Everything we're doing on Airlander is making us ask why we can't do it on other aircraft."

DINING AREA

At the very front of the cabin is a raised dining section that's around 20ft (6m) long. The front and the rear ends of the Airlander's floor have to be raised so that they don't drag on the ground during take-off and landing. The original design envisaged a gradual ramp up from the cabin to the flight deck. "We built a full-size model of the first 45ft (14m) of the cabin, to figure out how the spaces were going to work," says Guy. "The ramp was too steep – if you were on it during TTL you wouldn't be standing up at the end."

The team decided to raise the platform and add steps – and realized a window could be implemented underneath. "It's like a glass-bottomed boat," says Guy. "Sitting at the table, you can see through the flight deck and experience the forward view. You can see in every direction except straight up. The windows are huge, so you can see out in a way that you can't on any other sort of aircraft."



BAR/GALLEY

This eye-catching feature is one of a couple of ideas Design Q has had stored away for future reference. It is a galley where chefs can prepare meals, but it is also a bar/coffee bar that eight people could sit around. "All the best drinks from around the world will be backlit and displayed in a way that just makes you think, 'I want to spend a lot of time here,'" says Guy. "It's the first thing you see when you board, and it is something to die for. It's practical, it's the right size, and it's where everybody wants to be."

He also notes that people sitting at that height around the bar will have a great view of the world outside.

The reception area doubles as a place for meetings. "It's likely that tour operators will employ experts on the area you're going to," says Guy. The space could also accommodate a piano or other entertainment.

CERTIFICATION

Guy says crash test requirements are probably the biggest point of difference on this project. "You typically have to test aircraft structures to 16g," he says. "The Airlander cabin will probably only need to be tested to 3g, if passengers are strapped in for TTL. The parameters are way, way lower, mainly because if anything were to go wrong, the ship would have a very slow descent. That immediately opens up a whole bunch of things that you can't do on normal aircraft. It's much easier to make furniture to withstand 3g, and you can also completely change the way that the seats work, for example."

Head injury criteria (HIC) will not be a consideration, because any impacts would be very slow and there will be plenty of space between people. "If they're strapped in then we won't have the HIC problem at all," Guy adds.

The fire regulations will be the same as on a commercial aircraft, which Guy says doesn't present any huge problems.





The Airlander 10 has a top speed of 75kts

AIRLANDER 10



SEATING

The open-plan lounge has a flexible seating system to support passengers' many needs throughout the trip. Within the 3g parameters they can sit on the sofas for TTL, if belted.

"Passengers won't have to face forward," adds Guy. "We're also investigating how we could move furniture in flight. People may want to look out or in, be grouped with a couple of people or facing everyone. We are designing for groups to interact. It's a dynamic cabin rather than a fixed one."

The seats will still need to be affixed, to enable loads to be

transferred to the floor, but Guy says they could be rotated, or moved along a track, maybe by around 6ft (2m).

The work of building and certifying the seats has not yet begun, and suppliers haven't been selected, but Design Q has a close relationship with Pitch Aircraft Seating. "Gary Doy, our co-director, has been developing seating with Pitch over the past 10 years, so that's an exciting avenue and gives us a lot of credibility," he says. "We're saying to HAV, 'We'll build the seat, certify it, and it will be the same as in the pictures.'"



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WINDOWS

Many windows are almost floor-to-ceiling and some can be opened in flight. "The windows are not under great dynamic stress, and because of its low altitude, the windows don't need the structural integrity to keep a higher pressure inside than outside," says Guy. "That means the windows can be much bigger."

The airship can fly at low altitudes, making little noise, meaning it could bring passengers very close to spectacular sights such as animal migrations. "It will be like *Blue Planet* live," says Guy. "You can wait silently in the sky, sipping champagne, for spectacles to happen. It's like the Orient Express or an exclusive cruise ship – it's going to be a once-in-a-lifetime experience."



Storage is a crucial factor in supporting long luxury trips – and the supplies also add weight. "HAV's aircraft is specified to enable three-day trips, or even take things like snowmobiles," says Guy.

BEDROOMS

The team is looking at how the private bedrooms could be reconfigured the night before a flight to cater for various group sizes. Instead of having empty cabins, those that are occupied could be made bigger.

Guy says this could be achieved with moveable partitions or curtains. The latter could work well aesthetically because the roof of the gondola is nestled into the aircraft's hull, creating a tent-like shape. "It evokes the romance of moving through the desert with tents and sitting under the stars," he says. "Closing out areas with curtains would also create a soft feel."

The best, master cabin, will be positioned at the aft of the aircraft so that the occupant can enjoy a panoramic view looking rearward. There will also be "quite a few" spa-like bathrooms, Guy promises.

For boarding, the airship will sit about 1ft above the ground, so passengers can just step onto it while it floats there. "We have looked at how to cater for around 10 wheelchair users," says Guy. "The cabin will accommodate full-sized wheelchairs and we can add facilities in bedrooms, lavatories and showers so that everyone can use the whole ship."

FUN DETAILS

Guy is having a lot of fun designing details such as branded cutlery and salt and pepper cellars. "Those are the things that really make the journey memorable," he says.

Inspirational branded designs include Cathay Pacific's salt and pepper cellars, which look like pebbles, and Virgin Atlantic's aircraft-shaped cellars. "You can tell how successful they are by how many don't get returned," says Guy.

He also promises many other surprises to be revealed over the coming months – watch this space for all the details. ✕





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Words by Izzy Kington

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MY CONCEPT: *Warja Borges, principal, Unique Aircraft*

HOW DOES YOUR CONCEPT MAKE THE MOST OF THE AIRCRAFT'S SELLING POINTS?

We wanted the cabin to be elegant and stimulating and highlight the volume of the BBJ 777X, as well as the bigger window size. We used very bright materials for the window surrounds to create a light, almost transparent appearance.

The design alternates between narrow and spacious to exaggerate the effect of the fuselage width as you enter each zone. The gold and silver color scheme reflects the classic elegance of palace décor morphed

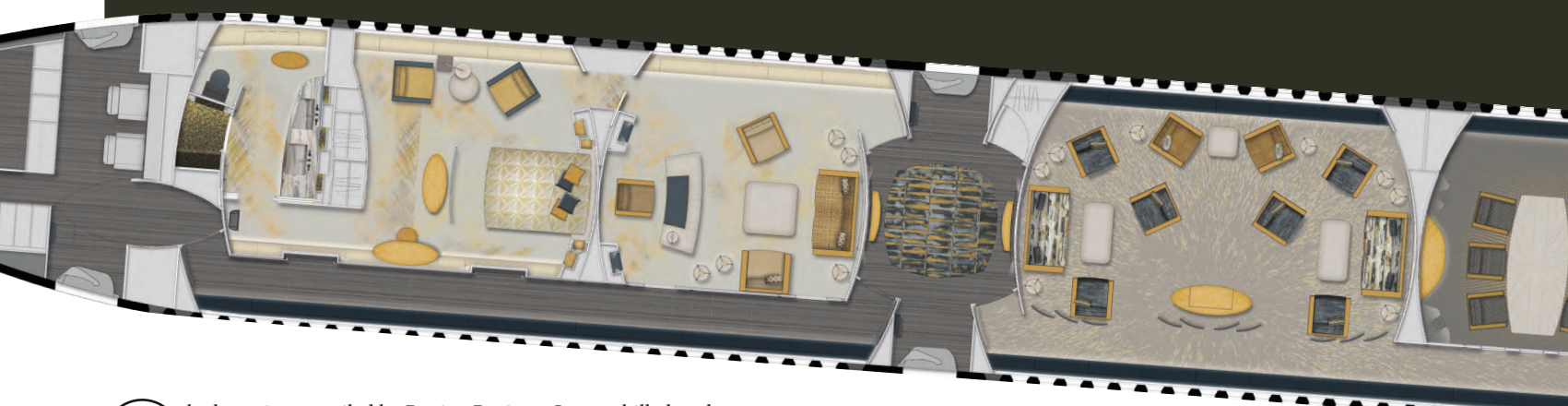
into a contemporary design. But it also represents the opposites of sun and moon, warm and cold, precious metals and rocks.

WHAT CABIN FEATURES ARE NECESSARY FOR VERY LONG FLIGHTS?

When an aircraft is flying 18+ hours non-stop, you can't simply stuff a whole bunch of staff seats in the back. Similarly, VIP guests will not be happy spending the flight in 'dining chair number four'. One has to think about how passengers use common spaces, and provide each a home-base to return to.

WHAT CHALLENGES DO YOU FORESEE FOR BBJ 777X COMPLETIONS?

In general, I don't see any particular completion challenges for this aircraft type. For this concept design, novel structures such as the huge transparent panels and the special light fixtures may be the most challenging aspects from an engineering and certification standpoint. However, none of them are impossible to translate into aviation regulations. I also think that OLED screen technology will be certified for aviation use soon.



The latest jets unveiled by Boeing Business Jets are billed as the longest-range business jets ever, capable of flying between any two points on Earth non-stop. The aircraft were unveiled in December 2018, with concepts from Greenpoint Technologies, Jet Aviation and Unique Aircraft.

The BBJ 777-8 has a 3,256ft² (302.5m²) cabin, can fly 11,645 nautical miles (21,570km), and has a green list price of approximately US\$460m for a 2022 delivery. The BBJ 777-9 has a 3,689ft² (342.7m²) cabin, a range of 11,000 nautical miles (20,370km) and will cost around US\$471m for a 2021 green delivery. BBJ estimates completions will cost from US\$90m to US\$175m and take 18 to 24 months to complete.

STEADY SALES

BBJ 777X development began in 2016 after the commercial program was well underway, since commercial platforms are much larger market drivers. "Since the inception of the BBJ brand in 1996, we have normally sold between two and six wide-body BBJs per year," says Capt. Alex Fecteau, director of marketing at Boeing Business Jets. "Demand has remained stable, but requirements continue to grow in areas such as range, comfort, efficiency and environmental improvements, all of which we've addressed on the BBJ 777X."

Fecteau says the BBJ 777X benefits from the common structure and many systems carried forward from the commercial 777, newer functionalities and systems developed for the 787, and the main deck space of the 747.

ABOVE AND INSET
ABOVE: UNIQUE'S
BBJ 777X DESIGN

CABIN STATS



BBJ 777-8

Cabin width: 19ft 7in (6m)
Cabin height: 7ft 10in (2.4m)
Cabin length: 180ft (55m)
Seats: 2 crew + 75 passengers
Range: 11,645 nautical miles (21,570km)
Maximum cruise speed: Mach 0.89
Maximum altitude: 43,100ft
Price: US\$460m (2022 green delivery)

The commercial
777X development
program started in
2013, and the first 777-9
should be delivered
to an airline in
2020

It comes as standard with the best options available for its commercial sister, including maximum certified take-off weight. Also included are the electronically dimming windows and triple cabin air-filtration of the 787.

The windows can be darkened from clear to 99.99% opaque. "If passengers wish to lighten them, the light will not flood the compartment and disturb other passengers like with traditional sliding window covers," adds Fecteau.

TRIPLE FILTRATION

The air-filtration system includes ozone filtration; HEPA filtration to remove bacteria, viruses, fungi and particulates; and gaseous filtration to remove odors, gaseous contaminants and other irritants.

Maximum cabin altitude has been reduced to 6,000ft. "Studies show this greatly improves comfort – making air easier to breathe, increasing humidity, and reducing fatigue, headaches and jetlag," says Fecteau. Further lowering it provides negligible incremental benefit."

Boeing defines wide-body BBJs as aircraft the size of the BBJ 777X and up

CABIN STATS



BBJ 777-9

Cabin width: 19ft 7in (6m)
Cabin height: 7ft 10in (2.4m)
Cabin length: 202ft (62m)
Seats: 2 crew + 75 passengers
Range: 11,000 nautical miles (20,370km)
Maximum cruise speed: Mach 0.89
Maximum altitude: 43,100ft
Price: US\$471m (2021 green delivery)

There is also a humidification system in the flight deck. Fecteau says completion centers can add humidification systems for the main cabin.

TACKLING TURBULENCE

Another comfort improvement has been targeted through Boeing's Smooth Ride technology, introduced on the 787. Static and dynamic air-pressure readings are taken from the front of the aircraft in flight. Pressure disturbances are correlated with air turbulence, analyzed, and the fly-by-

wire system uses this data to make small control inputs to the flight control surfaces to counteract turbulence.

Fecteau also says proprietary noise-damping technology in the engine cowl has lowered decibel ratings to well below ICAO standards for future engine noise levels. "Completion centers also do other things to reduce noise, from widening air ducts, to reducing ventilation air speeds, to adding sound-deadening

TOP: A GRAND ENTRANCE AREA DESIGNED BY JET AVIATION

BELOW: JET AVIATION'S DESIGN FOR A MASTER SUITE ON THE BBJ 777X





ABOVE: GREENPOINT'S GUEST ROOM AND MASTER SUITE DESIGNS

insulation," he adds. "Since the engines are so much quieter, the amount of insulation is reduced, saving weight and increasing range."

Boeing has also added surface surveillance cameras, built-in overhead crew rest facilities, heated and air-conditioned cargo options, and network file servers that support the jet's electronic backbone, designed to allow rapid diagnosis of faults requiring maintenance attention.

All BBJs come with entitlements including pilot, cabin crew and maintenance training; engineering support to assist with interior completion and certification of aftermarket options; five years' warranty on the entire aircraft and engines; and "multimillion-dollar" waivers for engineering intellectual property (IP). "This allows customers who order directly from Boeing to hire any designer or completion center and not have to pay the usual fees for Boeing's engineering IP," says Fecteau.

OUTFITTER DATA PACKAGES

There are 14 licensed completion centers, and Boeing is developing outfitter data packages with the engineering specifications necessary for completions. "Given the new systems, different sized fuselages and windows, filtration systems, lower cabin altitude, different exit door placements, and more, there will be a need for us to work closely with completion centers," says Fecteau.

The ranges advertised are based on carrying 75 passengers at 200 lb (91kg) each, typical flight rules with alternate fuel, and completion allowances

of 55,000 lb (24,950kg) for the BBJ 777-8 and 65,000 lb (29,500kg) for the BBJ 777-9. "These are typical completion weights on these size aircraft, and the allowances are not unrealistically light," says Fecteau. "Customers can add even more weight and still fly non-stop between any city pairs."

SUPPLY AND DEMAND

The first BBJ 777X should be available for 2021 delivery, but Fecteau says Boeing could try to find an earlier position if a customer urgently needed one sooner. "We normally like about 18 months lead time to order specific options," he adds. "Customers also need to select an interior designer, design and completion center, and order materials, so 12 to 18 months is a good timeline. If a customer wants Boeing to do the manufacture, design and completion end-to-end, we'd require about the same lead time."

Supply is affected by commercial demand. "Given that a number of wide-bodies are getting to the age where commercial customers are considering the next round of orders, prudence would dictate selecting your BBJ 777X earlier rather than later," says Fecteau. ☒

MY CONCEPT: *Annika Wicklund,* *design director,* *Greenpoint Technologies*

HOW DOES YOUR CONCEPT MAKE THE MOST OF THE JET'S SELLING POINTS?

Greenpoint designed the Lotus interior to achieve a contemporary, multifunctional design with broad market appeal, and containing all the luxuries expected. Advanced technology is concealed throughout the cabin.

The design team embraced the larger windows and wider cabin of the 777X. The Lotus ceiling architecture is clean and modern, drawing your eye to the large windows and enhancing the expansive feel.

In the media room, we added large OLED monitors to the sidewalls to create a full surround experience and create adaptability. It was important to embrace the idea of efficiency, travel and speed throughout.

WHAT CABIN FEATURES ARE NECESSARY FOR VERY LONG FLIGHTS?

The Lotus interior offers multiple rooms with various functions to entertain and relax during flight. It gives passengers the ability to work or hold a virtual meeting conference, watch a movie in the sunken media room, dine with meals prepared by a Michelin-star chef, play games with family or guests, sleep, shower, or even read a book next to an OLED fireplace.

WHAT CHALLENGES DO YOU FORESEE FOR BBJ 777X COMPLETIONS?

We are ready to start collaborating with clients on BBJ 777X interior completions. The design and technical challenges of new airframes such as the BBJ Max or BBJ 777X are similar to those we have already solved with proprietary solutions certified for our BBJ 787 deliveries.

Most BBJ wide-body sales are for head-of-state and charter applications, with the occasional private operator



THE LOUNGE ON GREENPOINT'S LOTUS CONCEPT



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EBACE *preview*

Thousands of business aviation professionals are expected to converge on Geneva, Switzerland, on May 21-23, 2019, for this year's EBACE. With more than 400 exhibitors to see across the 430,556ft² (40,000m²) halls, here's a sneak peek at some of the highlights to seek out...

VIP concept

As well as its VIP completions and maintenance solutions, AERIA Luxury Interiors will showcase Le Blanc et Noir Owner's Retreat – a BBJ Max 8 design shortlisted in the Private Jet Design Concept category of the 2019 International Yacht and Aviation Awards.

The modern design was created by in-house designer Natalie Rodriguez. "It's a truly rewarding experience to see young, talented designers exercise such creativity and innovation to produce a one-of-a-kind vision that a client might not have imagined was possible," said Ron Soret, vice president and general manager.

Paying particular attention to health and wellness, Le Blanc et

Noir Owner's Retreat features a fitness center and relaxation sanctuary. Aesthetic highlights include the use of herringbone-patterned wood veneer flooring, a custom ceiling, and organically shaped valance and sideledges.

The fitness room/spa is outfitted with exercise equipment and electronic massage seats, encompassed by luxurious decor.

In the VIP bedroom there is a king-size bed, with a frosted translucent panel integrated into the headboard to allow natural light through, and a simulated fireplace.

The VIP lavatory features a steam shower, twin black marble vanities and Carrara marble/wood veneer flooring.



VINYL TILES

Fans of F/List's flooring product portfolio will be keen to see the latest addition – Tiled Vinyl Flooring. The new product was designed to combine the advantages of widely used and well-tested aircraft vinyl flooring with the versatility and practicability of F/List's tiled flooring concept.

"While being resilient and easy to care for, conventional vinyl flooring for aircraft is usually laid from a roll like a yard product, offering virtually no design or customization possibilities and an inconvenient removal procedure," says Dieter Franz, responsible for business development and sales, new market, in F/List's aircraft division. "Tiled Vinyl Flooring dispels these problems through its handy tile structure and our innovative fastening system, known from other F/List flooring products."

This allows for custom tiling concepts such as herringbone patterns, planking, squares, basket weave, and more. It is also possible to combine different tiles – for example, different wood species or stone prints – to create interesting effects.

The product is most suitable for entrance, lavatory and galley areas, and those parts of the main cabin where fluid and wear resistance are most called for. F/List reports that the product has passed all certification and qualification tests, including for slip resistance and fluid susceptibility, because the proven properties of the selected vinyl surface, Gerflor Batiflex AV 155, are not altered during production of the tiles. F/List offers all 13 wood and stone prints available in the AV 155 portfolio, which can be arranged in a custom tiling scheme.

The organizers expect around 13,000 attendees at EBACE 2019

Expanded upholstery abilities

Aeristo has been building its leather quilting and perforation design portfolio since 2008. Thoughtfully considering aviation applications, Aeristo's in-house design team draws inspiration from around the world. The quilted leather designs range from classic

diamond patterns to elaborate motifs utilizing precise perforations, meticulous stitching, and cushioning. Aeristo says that hand-crafting the designs enables it to match the customers' needs and expectations, regardless of the size or intricacy of the design.



"I'd like to see new seats with new functions, materials and comfort solutions. I'm also interested in solutions for food preparation and gym equipment"

Jacques Pierrejean, designer, Pierrejean Vision, and principal, Pierrejean Design Studio



CARPET COLLECTION

A new collection of carpet designs will be introduced by Scott Group Studio. The Escala Collection was inspired by the constantly changing natural environment, and by the interplay of large- and small-scale elements.



INFLIGHT WI-FI

Visitors to Inmarsat's booth can expect updates on Jet ConneX, a Ka-band global inflight wi-fi option for business jets. The company says demand remains incredibly strong, with the solution selected as the preferred line-fit option by four major business jet OEMs and now installed and activated on more than 450 aircraft worldwide.

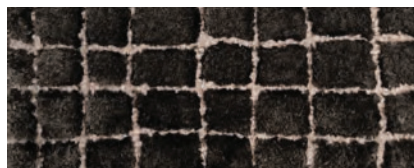
Using Inmarsat's Ka-band satellite network, Jet ConneX is designed to provide high-speed, consistent global coverage across all major routes. Working with its distribution and installation partners, Inmarsat has now received more than 40 type certificate and STC approvals for Jet ConneX.

The EBACE 2019 static display should include **50+** aircraft

HANDMADE CARPETS

A new handmade, hand tufted carpet collection will be introduced by Tisca. This range is all about 3D structures, reliefs, low-high textures, cut and loop pile combinations, volume, small repeats and bold patterns. There is a strong emphasis on elegant, dark colors, mixed with whiskey and deep red shades.

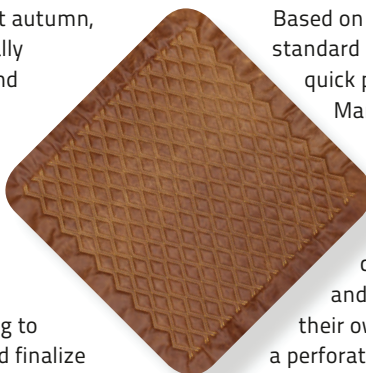
Tisca says the aim is to inspire designers, specifiers, operators and OEMs alike. As usual, Tisca developed matching upholstery and decorative fabrics for each carpet, thus creating an integrated off-the-shelf collection.



Quilting and perforation

After a soft launch this past autumn, Townsend Leather is officially debuting its new quilting and perforating capabilities at EBACE, along with a standardized line of six designs for the private aviation market.

Having acquired the machinery in mid-2018, Townsend has been working to fine-tune this capability and finalize an offering of the most popular quilted patterns on leather. The machinery enables the creation of popular and one-of-a-kind pattern seat inserts and panels featuring decorative designs made through technical stitching and custom perforation. This process uses both thread and hole punches to create designs on leather for upholstery applications.



Based on early customer feedback, six standard patterns have been created for quick production lead times – Pinwheel, Marquise Diamond, Diamond Perf, Patchwork Diamond, Shovels and Honeycomb. Standard sizes include 28 x 28in and 38 x 28in panels and customers can choose from Townsend's thread and leather color library or supply their own thread, and can opt to include a perforating effect as well.

Custom quilting patterns can also often be achieved with similar turn times, based on a customer's submitted artwork. Product support is provided in the form of digital renderings or physical samples and strike-offs.

Quilted designs can be produced on any one of Townsend's in-stock, standard or custom colored leathers.

Cabin customization

German business jet fleet operator FAI Aviation Group will celebrate its 30th anniversary at EBACE. Notable successes of the past year include the expansion of its maintenance division, FAI Technik, in Nuremberg, Germany. FAI Technik specializes in Bombardier types, offering heavy maintenance, including cabin modification. It recently completed its sixth full Global Express cabin refurbishment.

The Global Express now features a custom interior designed by FAI's award-winning design partner, Tim Callies, who worked

with the aircraft owner to select custom features to suit their taste and lifestyle.

The Global Express was FAI's third Signature Edition aircraft. The program enables a buyer to personalize the cabin design and select upgrades for an all-in turnkey price. The end result offers the benefit of a fully refurbished aircraft with major maintenance inspections completed.

As well as its MRO and VIP charter operations, FAI is also a fixed-wing air ambulance jet operator, logging more than 10,000 hours per year.



"For me EBACE is more about networking than ideas, as most of the industry's core companies are there"

Warja Borges, owner and interior architect, Unique Aircraft

DESIGN AND COMPLETION

Flying Colours will promote its MRO, interiors and completions services that have led to 30 successful years of business. The milestone will be celebrated with delegates and customers during the show. The company now has three international sites, and is expanding its footprint at both its North American facilities.

The team will highlight the company's capabilities in all areas of maintenance, special-missions modifications, interior design and completion services, avionics, connectivity and paintwork, and highlight the benefits of having projects undertaken by a single source. A new European sales manager will also be introduced as the company continues its expansion plans.



INTERIOR DESIGN

Visitors embarking on a VIP, special-mission or corporate interior project should seek out Platinum Jet, which finalized two wide-body interiors in 2018. The independent design firm works with aircraft owners, designing custom interiors and seeing the aircraft through completion by carrying out quality and design inspections. Its latest concept, to be displayed, is for a BBJ 767.

The company also offers program management. "Interior design doesn't end with a beautiful design for us," says Kimberly Kohnert, president, primary designer and program manager. "For a completion to be successful, we must take into consideration not only the design and finish materials, but the weight of all components, durability, noise abatement and the substructure and background materials. This combines to make a perfect interior



that lasts for decades and exceeds the client's high expectations."

Joining Kohnert on the EBACE booth will be company controller Shelby Mann.

Q&A

Arjen Groeneveld

EMEA REGIONAL MANAGER, DUNCAN AVIATION



What recent investments has Duncan Aviation made?

Over the last 20 years, Duncan Aviation has invested roughly US\$273m in facilities, tooling and new capabilities and US\$53.5m in training and team member development.

We are in the midst of the biggest expansion we have made to date – a US\$65m investment in a new maintenance, repair and overhaul complex at our EASA-approved facility in Provo, Utah. This expansion includes nearly 275,000ft² (25,548m²) of buildings with two maintenance and modifications hangars, a paint facility and various backshops.

When will the Provo expansion be completed?

The first maintenance hangar was completed in January and has been busy since its opening. In April, the paint complex is expected to begin providing the paint services for which Duncan Aviation is known. This summer, the second maintenance hangar will

be complete and all backshops and administrative areas will be done by the second quarter of 2020.

What other capabilities are you building?

In addition, Duncan Aviation built a new engine test cell last year and has been performing core zone inspection (CZI) events on Honeywell TFE731 engines for more than a year now. We have been an industry leader in major periodic inspection events, performing 200+ annually. Now, we also have the capability and authorization to do those CZIs at our engine shop in Lincoln, Nebraska. We also continue to invest in an inventory of rental engines.

This year, we have also expanded our aircraft sales and acquisitions team to include Portugal-based Jose Costas, most recently regional vice president of EMEA sales for Embraer Executive Jets. Jose will team up with Tim Barber, who represents Duncan Aviation aircraft sales out of London, to provide global aircraft sales and acquisition services.



Q&A



Peter Landquist

VICE PRESIDENT OF SALES AND MARKETING, CTT SYSTEMS

What will you show at EBACE?

We will showcase our Inflight Humidification System, which is now fitted on more than 95 VIP aircraft. The system maintains cabin air at a relative humidity level of around 20%, and also includes moisture control to prevent fuselage corrosion. The technology can benefit the passenger cabin, flight deck and crew rest area.

The system reduces the problems caused by dry air – which include fatigue, jetlag, red eye, dry skin and the risk of catching viruses and diseases. The system is based on evaporative cooling technology and uses a method that effectively reduces the transfer of bacteria. Food and drink taste better. Overall, well-being and sleep patterns are greatly enhanced, with benefits to crew efficiency and enabling the busy executive to arrive at their destination in better shape than when they took off.

Can you detail any recent developments in the product line?

Our latest system designs – for ACJ320 Neo and BBJ Max 8 aircraft – are currently being installed by completion centers. We expect several new orders during 2019.

What trends are you seeing in terms of demand?

The system has proved very popular with wide-body operators. These aircraft are capable of operating over very long distances and at high altitudes where the air is cold and dry. This combination

leads to both passenger and crew discomfort, which is easily rectified by our solution.

The Inflight Humidification System can be retrofitted or installed on the production line – either way it significantly increases the aircraft's residual value. The system is available as basic or optional equipment for flight deck and crew rest areas on aircraft including the B787, B777X, A380 and A350. It has been in commercial operation on the B787 since 2008, and its performance and reliability have exceeded our expectations. A number of major commercial airlines have selected our humidification solution for first and business on their A350 and B777-9 aircraft.



BBJ concepts

With a presence on Safran's booth, Greenpoint Technologies will showcase its Lotus VVIP concept for the BBJ 777X, as well as a 1/20th-scale model of its award-winning Azure interior for the BBJ 787-9.

With Lotus, Greenpoint's design team aimed to create a contemporary, functional interior with the luxuries of a world-class hotel. The team drew inspiration from Asia-Pacific cultures, incorporating celestial and organic elements. The company says its client profile appreciates the progressive

design of layers, contrast, movement and technological advancements.

Highlights include a grand circular entry area complete with a wind-blown watercolor sculpture wall; an elevated lounge with a raised ceiling; a sunken media room; a library with an OLED screen fireplace; a private guest suite; and a master suite with a king-size bed, walk-in dressing room with heated hardwood flooring, and lavatory with rain shower. Other features include adjustable lighting, concealed technology and OLED screens. ●



EBACE 2018
featured 418
exhibitors, and
54 aircraft on
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FORM AND FUNCTION

The newest galley inserts from Safran Cabin, as featured on the Global 7500, enable a highly functional space to also be a beautiful one

Atmosphere Elite is the name of the newly developed range of appliances tailored for the Bombardier Global 7500 and now ready to fly. The product line is designed to offer the latest technology for the preparation of food and hot beverages, and for food preservation.

The range includes a combi microwave oven combining a microwave and a large oven, a double cup cappuccino espresso maker, a warming drawer, a drip coffee machine, a hot water kettle, a combi steam oven combining a large convection oven with steam cooking capabilities, an air chiller and refrigerators.

THE HEART OF THE HOME

"The approach has changed," says Tancredi Ingrassia, vice president of sales and marketing at Safran Cabin, the company formerly known as Zodiac Executive Inserts. "Recent consumer trends clearly indicate that kitchen appliances have become key part of design. Like in today's homes and yachts, the newly developed Atmosphere Elite adds a luxurious look, feel and finish in business aircraft interiors."

The sleek look of Atmosphere Elite is worth showing off, but the range is more than just aesthetically appealing. Each product has been designed to make the cabin experience memorable. "It's a significant departure from the usual galley inserts, bought off-the-shelf and then strategically hidden," says Ingrassia. "These state-of-the-art appliances work together to turn inflight dining into more than a quick bite between home cooking and a restaurant: it is a memorable experience in itself. The convection and steam ovens don't just heat prepared food, they can be

Passengers can enjoy espresso-based beverages including cappuccino, latte, macchiato and flat white





used to create five-course meals from scratch. The coffee/espreso machine rivals those in a passenger's favorite café. And while one refrigeration unit chills ingredients, an optional second space is ideal for cooling the finest wines to their ideal serving temperature."

PRACTICALITIES CONSIDERED

A lot of effort has also gone into the size of each appliance and the galley layout on the Global 7500, to ensure efficiency in the galley. "It looks simple, but a lot of thought has gone into that simplicity," says Ingrassia.

Safran Cabin believes the range will be hugely popular. "We are set for growth," says Ingrassia. "The appliances have been developed and tested with the support of chefs to ensure restaurant standards in terms of taste and texture, delivered consistently to satisfy the most demanding of passengers. We are ready to deliver an array of dishes exploring a wide range of flavors, some of them very unusual even to the most sophisticated of diners. The range will enable a truly unprecedented inflight dining experience."

The Global 7500 garnered a prestigious Red Dot design award in 2018 in recognition of its design innovations. Atmosphere Elite appliances are now flying on this aircraft and will also be on the Global 6500. They are also available for retrofit and upgrade projects.

Other galley inserts from Safran Cabin have been installed on Textron Citation Longitude, Bombardier Challenger and Global, Gulfstream G500 and G600, Embraer Phenom and Legacy and Dassault Falcon types. ✕

FREE READER INQUIRY SERVICE

To request more details from Safran Cabin, visit www.ukimediaevents.com/info/aimbj

CONNECT THE DOTS

There are many factors to consider when choosing an inflight connectivity network

Inflight connectivity is now seen by many as vital to passengers' productivity and enjoyment, as well as their flight's safety and efficiency. The question for operators is not whether to equip aircraft with connectivity, but how to select a service or technology that fits their needs and provides the best user experience.

The choice of connectivity provider(s) has often hinged on coverage, cost and capacity. SmartSky Networks says that choice should now also encompass consideration of affordability, security and overall performance. Operators also need to assess possible technology advances, to ensure their investment doesn't become obsolete.

AVAILABLE OPTIONS

The primary connectivity options are satellite and air-to-ground (ATG) systems. Traditionally satellite connectivity was the only option for aircraft over the water since ATG systems obviously struggle where there is no ground. "For larger jets, the best answer is a hybrid of complementary systems – both satellite and ATG," says Nancy Walker, chief commercial officer at SmartSky Networks. "This allows for reduced costs and improved user experience with ATG on land routes, while maintaining connectivity with satellite when the aircraft is over water."

Walker explains that operators can sometimes struggle to embrace the importance of the overall user experience. "A combination of attributes affect how the experience feels," she adds. "Latency, throughput to and from the aircraft, and packet loss are the most important of those attributes. Placing too much emphasis on one while sacrificing others



can have an adverse effect on user experience."

Latency is the time it takes for a data packet to go from one point to another. That time is measured in milliseconds, but even a small lag due to latency can have a big impact on performance. "ATG systems naturally have a lower latency due to the much greater distance between satellite orbits and the aircraft," says Walker. "That distance can create a difference of up to 10 times the latency."

LAGGING DOUBT

Why does that matter? "Nearly anything you take for granted online at home depends on low latency, a key feature of 5G networks: loading websites, gaming and videoconferencing," Walker explains. "In the air, those tasks become virtually impossible with high-latency networks. Aircraft owners should seek providers whose network offers speed and capacity both to and from an aircraft, not just in one direction – because the internet is really a two-way communication."

Another aspect to consider is security. Modern systems can transmit real-time data to and from the aircraft to ensure smooth and safe operations. Weather and routing information can help pilots to save fuel, while sharing data with ground crew can enable them to plan and execute maintenance efficiently.

This data – along with potentially sensitive passenger information – needs to be transmitted securely. "Owners should look for network providers who have moved beyond decades-old technology with known vulnerabilities," advises Walker. "Ask about the security of the signal. Will your data be sent on a single, aircraft-focused beam? Or are you sharing the same bandwidth as hundreds of other aircraft?"

"The age of connection is here. If you consider these factors when choosing a network, you can take advantage of it." ✖

As well as a 4G LTE solution for larger jets, SmartSky Networks offers a LiTE product for light jets and turboprops

FREE READER INQUIRY SERVICE

To request more details from SmartSky Networks, visit www.ukimediaevents.com/info/aimbj



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MISSION ACCOMPLISHED

With fewer big iron completions up for grabs, AMAC Aerospace has thrived by diversifying its services

waleed Muhiddin, director of business development and marketing at AMAC Aerospace, believes the industry has emerged from a lull in activity that lasted nearly 18 months. During this time, AMAC actually increased its workload, by diversifying. Many of its maintenance projects have involved the installation of Ka-band antennas and cabin retrofits.

"A lull in big iron completion projects is an MRO and completion center's worst nightmare, but we have persevered and overcome most obstacles through diversification," says Muhiddin. "In fact, we signed more maintenance contracts in 2018 than any other year since our inception."

BOMBARDIER PROJECTS

In May 2018, AMAC announced it had gained Bombardier Authorised Service Facility (ASF) approval. It means a closer collaboration with the OEM, whereby AMAC can complete warranty work on Bombardier's behalf. There are approximately 800 Bombardier aircraft of various types in service in Europe. At the moment, AMAC does not have enough bays and slots to service them – hence the decision to expand with a fifth hangar at EuroAirport in Basel, Switzerland. The new hangar will accommodate up to five Bombardier aircraft at a time – for example three Challenger 300s and two Global 7500s. The hangars should take approximately a year to build. The work will also add 22,000m² (236,806ft²) to the company's apron at EuroAirport.

Muhiddin reports a healthy outlook for completions as a whole. "We are the only completion center to boast a catalog of

In line with building its fifth hangar in Basel, AMAC will recruit 100 workers over the next 12-18 months



AMAC'S NEW FACILITY IN BODRUM, TURKEY, WILL SERVICE PRIVATE JETS IN THE SUMMER

new work, including our second BBJ 747-8i and the very first ACJneo, which has arrived at our facility," he says.

The company has also secured two new BBJ 737 Max (-8 and -9) projects, with first inductions being prepared for the fourth quarter of 2019 and the second quarter of 2020. "Airbus and Boeing are also closing the gap to the first deliveries of the ACJ350 XWB and BBJ 777 Max," says Muhiddin. "We expect that these aircraft will create a second peak in wide-body completions – the first being five/six years ago – with BBJ 747-8i deliveries. With these new platforms will come new technology for implementation and installation; AMAC is ready."

SUCCESS IN TURKEY

AMAC also has operations in Turkey, which Muhiddin reports as being healthy and stable. The facility in Istanbul has completed its first C-check on a Dassault Falcon 2000, which went to plan.

Meanwhile, the Bodrum facility has had interest from several airlines for

maintenance work. The facility is set up to offer airline maintenance during the winter months and flip to business aviation maintenance in the summer.

"Having the only MRO in Bodrum means we can attract a lot of new clients from the region, as our facility is much closer to their home bases," says Muhiddin.

Meanwhile, sister company JCB Aero is continuing specialized work for a variety of suppliers. "JCB is manufacturing and installing composite seats on the A350 and a trust-based relationship with Safran has resulted in a multiyear contract for several projects, including the manufacture of first and business seat composite shells, which will be installed on B777 models," says Muhiddin.

JCB Aero has also developed a new search and rescue configuration for the EC175 cockpit and cabin linings, with 18 more options than the oil and gas configuration. Other developments for the helicopter include night vision paint, foldable windows and a steerable light. ☒



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Jet fuel emissions entering and lingering in a closed cabin environment exposes the crew and passengers to annoying odors.

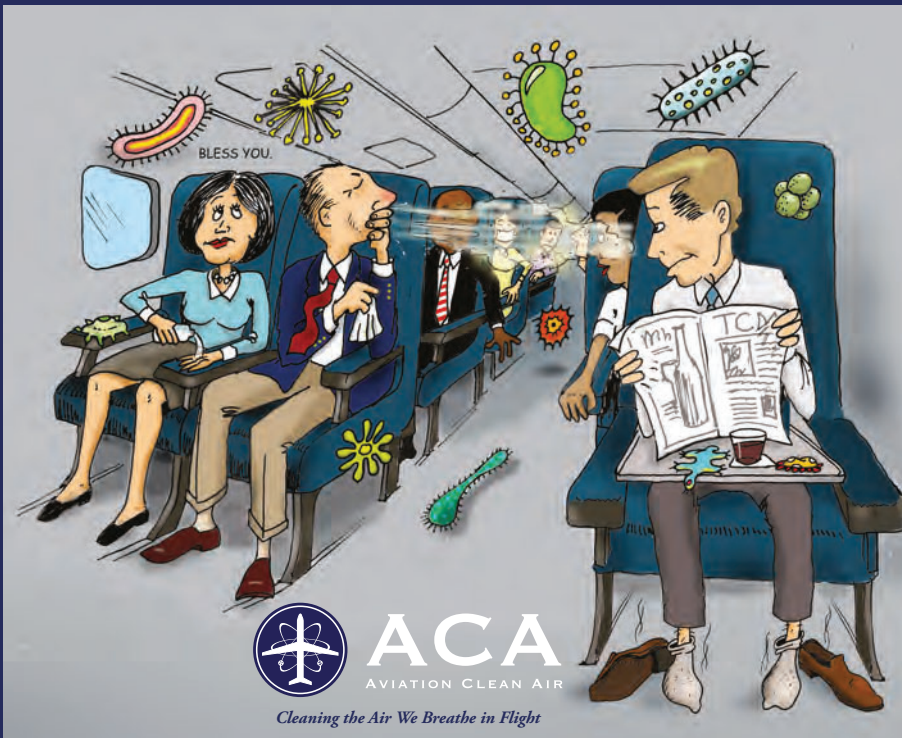
Galley, lavatory, and body odors are often offensive.

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THE NEXT GENERATION

Three years into his presidency of King Aerospace, Jarid King shares what it means for a millennial to be at the helm

When Jarid King became president of King Aerospace in 2016, he had a sense of the role's magnitude. "I witnessed the extraordinary effort it took my father, Jerry, to build a company," he says. "Still I had to walk in his shoes to understand the enormity of leadership."

King turns 30 this summer, putting him firmly in the millennial bracket. "Our generation is said to be civic-minded and team-oriented, but also sheltered and entitled," he says. "I don't like labels, but if you think of the millennials in your life, you know we want to change the world."

Noting how former Southwest Airlines CEO Herb Kelleher was a mentor to his dad, and played a pivotal role in shaping 'King Kulture', King says Kelleher's

"servant leadership" lives on at the company he founded and at King Aerospace. "Culture may start at the top, but it permeates every part of your operation," he says. "Ensuring team members share common corporate values and purpose doesn't just happen. Each person needs to know their purpose. A leader's job is to help them find it, taking the time to get to know people. The team must agree what it stands for and what sets it apart in the market."

King's mentors include Ron Soret of Aeria Luxury Interiors, Jeff Barstow of Boeing, and his dad. "Their call-me-anytime offers of help aren't empty words," he says. "They share the wisdom



they've gained through decades in the industry. It means everything to have counsel you trust."

Not all his lessons have been learned from the job, though. "I've watched my mother successfully beat two rounds of cancer," says King. "Her never-give-up example gives me strength, while her unfailing sense of humor reminds me that we just happen to work on aircraft. Our real job is to make a positive difference in the lives of others." ❖

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AS NATURE INTENDED

ACA's Air and Surface Purification system uses a proactive, natural process to ensure cabin air and surfaces are clean and fresh

The USP of its Air and Surface Purification system, says Aviation Clean Air (ACA), is that it is proactive. It is designed to clean air and surfaces, eliminate odors and kill pathogens where they live throughout the air-conditioned spaces of an aircraft.

"Our natural purification process produces no harmful ozone or chemicals and requires no scheduled maintenance; it is not a filter system," says Howard Hackney, managing member at ACA.

The system is mounted to the existing environmental control system supply duct and works electronically to create positive and negative ions from the hydrogen and oxygen molecules in the water vapor present in the air. The ions cluster around microparticles, gases, airborne mold spores, viruses and bacteria. As this occurs, a natural



reaction results in the pathogens being inactivated, and odors dissipated.

ACA has an STC for the BBJ, as well as G450, GV, G550, G650 and G650ER types. Components have been installed on Gulfstream, Dassault, Boeing and Airbus aircraft. Hackney recalls one G550 owner reporting that odors from the galley and

lavatories now disappear within a couple of minutes of initiating air-conditioning, and that oil vapor odors during engine starts dissipate within a few seconds.

"The ACA system not only cleans the surfaces, it removes fumes and odors, leaving the air fresh," the customer said. "Passengers, as well as the crew, report feeling refreshed even after long flights."

ACA has Parts Manufacturer Approval for the system and Approved Supplier status from Gulfstream. It has submitted patent applications for design and utility with the US Patent Office. The component is officially patent-pending. ❖

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MATERIAL WORLD

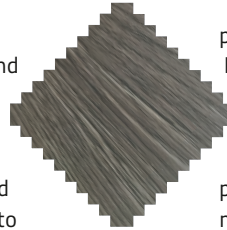
As well as a full range of off-the-shelf engineered materials for everything from flooring to sound barriers, Duracote can create completely bespoke solutions to meet customers' needs

Founded in 1947, Duracote is a manufacturer of flexible engineered materials for the aviation, automotive and industrial markets. Specializing in coating and laminating, Duracote produces fire, sound, antistatic, flooring and UV-curable solutions. As a Boeing and Lockheed Martin approved source, Duracote's materials are specified to fit a multitude of aircraft in the military, commercial and business aviation sectors.

The company offers non-textile flooring options for high-wear areas in aircraft. Its Durug and Nexflor lines include single- and duo-tone colors

for the cockpit, as well as decorative woodgrains for the galley, entryway and lavatory. Duracote's color lab is able to match any federal standard color, Pantone or color chip.

The company has developed all its flooring materials to meet the vertical burn, liquid channeling and coefficient-of-friction requirements of commercial and business aviation, while also incorporating antistatic properties. The flexible flooring can be used on its own, or with a foam or non-woven backing that is 0.13in (0.32cm) or 0.25in (0.64cm) thick. The non-woven backing complements the top layer by adding antimicrobial and hydrophobic



properties to restrict the growth of mold. For specialized needs, Duracote will develop custom and/or exclusive flooring constructions and patterns.

The company's other aircraft interior products include DuraTrim fire-reactive materials and DuraSonic sound barriers. Technical datasheets and product bulletins are available on its website.

Duracote also offers the Invent process, whereby it will create custom products to meet customers' flame, sound and anti-static specifications. ☒

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THE LIGHT FANTASTIC

New certifications are expanding the range of aircraft that can benefit from ALI's plug-and-play LED upgrades

The FAA has granted Part Manufacturer Approval (PMA) to Aircraft Lighting International (ALI) for its N2024 Dimmer Module, part of its already-PMA-certified L5800-XXX-YY LEDs.

"The L5800 LED system is now a fully certified plug-and-play upgrade to the discontinued B/E Aerospace 5800 system and a more affordable alternative to the 7800 system," says Shervin Rezaie, general manager at ALI. "Receiving the PMA for the N2024 demonstrates ALI's continued mission to give owner/operators what they need in a simple package. Now all you have to do is unplug the existing dimmer module and obsolete lamps and plug in our L5800 LEDs and N2024 Dimmer Module. You'll keep the existing connectors, controllers and enjoy improved lighting. There is no need for a new CMS or wiring."



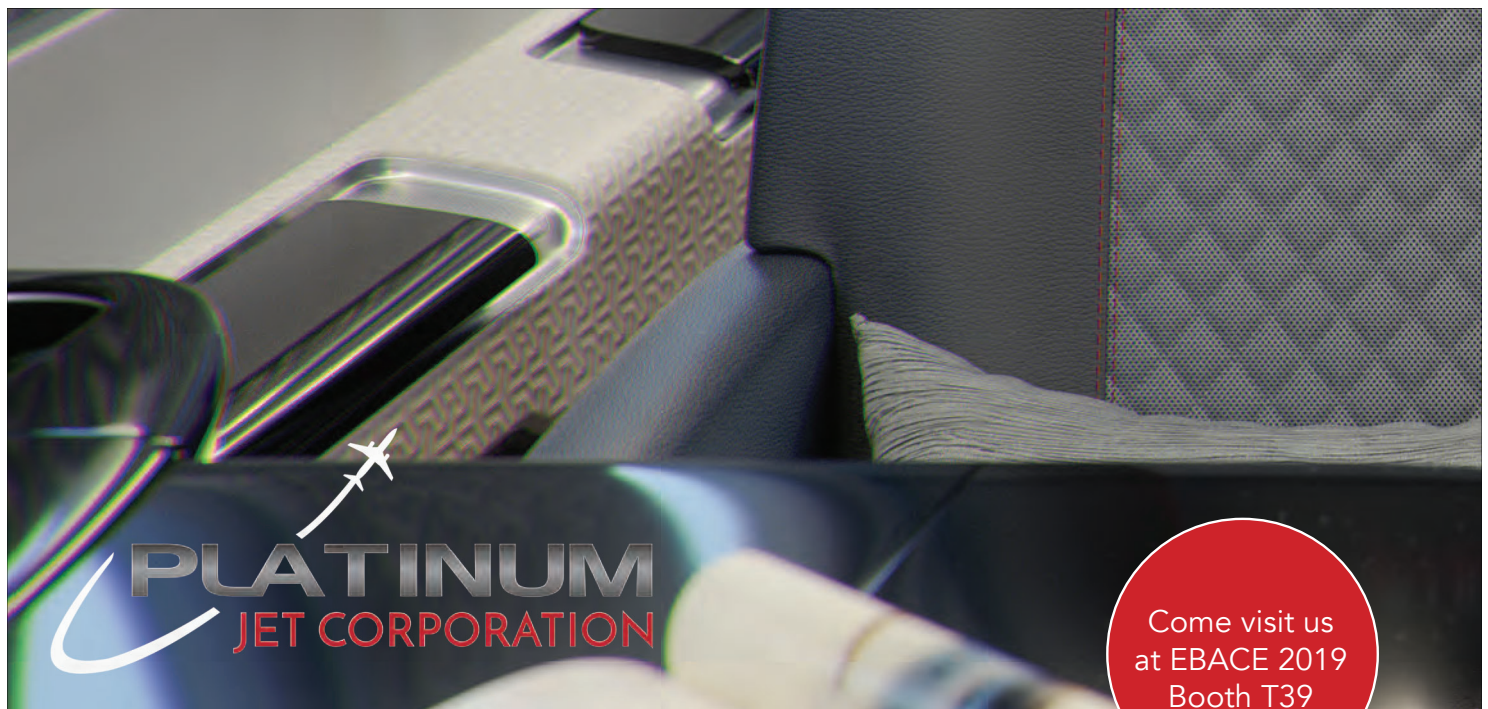
ALI also holds PMA for its N1495X and L1309X LED readers. It recently expanded the platforms these can be installed on. The full list is the Boeing 737, 747, 757, 767 and 777; Dassault Falcon 900 and 2000; Gulfstream G-IV, GIV-X, G-V and GV-SP; plus various Learjet, Beechcraft and Cessna aircraft. The N1495X can replace 313, 356, 1495, 1495x, 1819, 1864, MS25069-1495, MS25231-313, 998502-13 and 998502-15 bulbs, and the L1309X can replace 1308, 1309 and 2232 bulbs.

"These LED readers are three to five times brighter and have a lifespan of more than 60,000 hours," says Rezaie. "Also, ALI's LED readers use one-tenth of the power used by the incandescent bulbs they replace."

ALI's LED systems are developed to facilitate the transition away from the incandescent/fluorescent lighting systems. The company says all its LED lamps integrate into existing systems, reduce maintenance costs and come with a three-year manufacturer's warranty. The full range will be on display at EBACE 2019, to be held in Geneva, Switzerland, May 21-23, on booth R110. ☒

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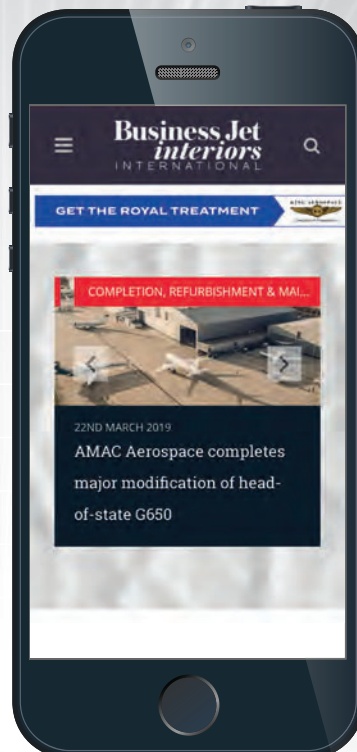
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FINISHED ARTICLE

Having identified a trend for finished parts, Signature Plating has developed internal processes to support it

A couple of years ago, through direct input from customers and meetings with industry leaders, Signature Plating identified a desire for parts to be delivered completely ready for installation. The Cibolo, Texas-based company set about developing the ability to support this trend.

While the concept itself isn't new, Signature Plating notes that today's airframe OEMs, seat manufacturers and integrators are looking for ways to streamline their internal processes related to materials logistics and parts processing consolidation.

"The market is looking to primary suppliers to provide finished parts that meet a program's or a customer's specific cosmetic specification, and is ready for installation once delivered," says Frank McKnight, CFO and partner at Signature Plating. "Our customers are responsible for every aspect of part acquisition, from the identification of the potential supplier to manufacturing and then to the plating

and/or anodizing. Streamlining this process significantly reduces inventory and vendor management costs. Production schedules are better maintained coordinating with one reliable vendor."

Signature Plating says supply chain managers can reduce their internal costs, paperwork and daily management of inventory, manufacturing and outside processes by transferring the responsibilities of program management to them. "We are working with multiple customers developing programs that save considerable inventory maintenance and acquisition costs," says McKnight.

The expanded supplier role gives Signature Plating total responsibility to manage inventory, manufacture, process



SIGNATURE PLATING TURNS RAW ALUMINUM OR STEEL INTO FINISHED PLATED PARTS READY TO INSTALL

and deliver the desired program parts virtually right to the production line.

"This arrangement allows us to more fully support our customers by providing them greater opportunity to focus on the development of new products to meet their company's goals and objectives," says

McKnight. "Our customers are always looking for methods to maximize their internal resources – Signature Plating listened and delivered." ❖

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THIS MODERN BAR SHOWCASES HOW CONCRETE CAN BRING DRAMA AND TEXTURE

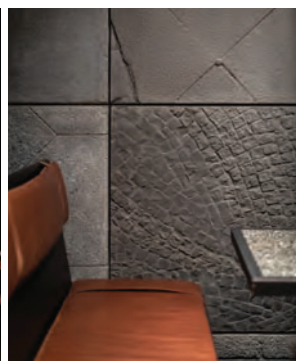
Concrete is not most people's idea of a luxurious material, and yet Berlin-based architect Thilo Reich has used it to create a cool, modern aesthetic in a small bar in Moscow, Russia.

The idea running through the Berlin Bar is to recreate Berlin in Moscow. Thilo Reich personally took casts of segments of Berlin sidewalks to create the concrete wall reliefs. Each section is from an area of the city with a link to Russia. Meanwhile, prefabricated concrete stones were used for the bar and the tabletops, offset with fine brass lines.

The roughness and grayness of the material contrasts to great effect with the golden opulence often expected of gastronomic establishments in Moscow.

The lighting is also key in creating a dramatic overall effect, and offers yet more links to Berlin. The lamps are composed from sections of East Berlin street lights, while the illuminated letters that make up 'Berlin' were part of an advertisement in the city's former Russian sector.

Further details include a mirror composed of window panes from the former Palast der Republik. ✕



PHOTOS: THILO REICH/VZCOM

OTHER EYE-CATCHING DESIGNS FROM VARIOUS INDUSTRIES...



PIK ROTER/AUDAX/VZCOM

- 1 This home, inspired by Milanese design, was created for a family in Toronto, Canada. Audax oversaw the architecture and interior design and provided custom furnishings. Luxurious materials abound, from burled elm, to Grand Antique marble, shagreen and plush textiles.



OCEANCO

- 2 Esquel, a diesel-electric yacht, was designed by Oceanco, Timur Bozca Design, interior stylist Gina Brennan, Lateral Naval Architects and Engineering, and Pelorus for young explorers. The layout can accommodate extra cabins, as well as medical and research areas.



- 3 This bespoke version of the McLaren 720S Spider, by McLaren Special Operations (MSO), features specially developed Burton Blue Alcantara and Jet Black leather, as well as lots of carbon fiber. Elements including the seatbacks and floor mats have MSO branding.

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