

# Business Jet *interiors* INTERNATIONAL

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DECEMBER 2023/JANUARY 2024



## BBJ MODULAR

BBJ EXPLAINS HOW IN ADDITION TO ITS FULLY BESPOKE OFFER, AN ALTERNATIVE PRE-ENGINEERED MODULE APPROACH IS NOW AVAILABLE FOR THE BBJ 737-7

### PC-24 UPDATE

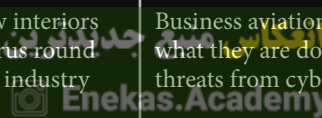
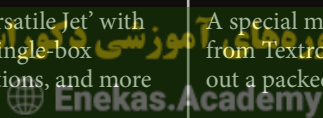
Pilatus has updated its 'Super Versatile Jet' with a new side-facing divan option, single-box IFE/CMS, bio-based material options, and more

### 2023 HIGHLIGHTS

A special milestone for Dassault, and new interiors from Textron Aviation, Embraer and Cirrus round out a packed year of developments in the industry

### CYBERSECURITY

Business aviation connectivity experts explain what they are doing to counter the evolving threats from cybercrime







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Head down the runway with a selection of the latest cabin designs

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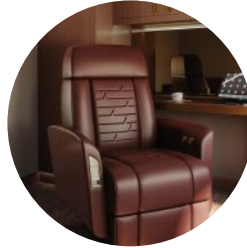


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Cover image: BBJ Select





## A YEAR IN REVIEW

**W**elcome to the Annual Review/Supplier Showcase issue! At this time each year we look back over the past 12 months' interior developments. Well, from my perspective 2023 has certainly been a full year on that front. There have been many interior announcements – from the Cessna Citation Ascend (*see the July 2023 issue*); to the ATR HighLine collection (*see the September/October 2023 issue*); to the updated Pilatus PC-24 (*see page 38*); to this issue's cover feature, the BBJ Select programme (*see page 22*).

The latter is an expansion of BBJ's offering. Customers can either chose the traditional bespoke route, or opt to take a new modular approach for the BBJ 737-7. The project is also notable for how it is being enabled by a true team effort, with Aloft AeroArchitects and Greenpoint Technologies lending their expertise.

Other interior announcements this year included the Cessna Citation CJ3 Gen2, the Embraer Phenom 100EX, and a Special-Edition Vision Jet from Cirrus Aircraft to celebrate 500 deliveries. All of these are covered from page 12,

along with reflections on a special milestone for Dassault: 60 years of Falcon business jets.

Beyond OEM announcements and updates, there have also been notable completions this year, such as the first outfitted ACJ TwoTwenty, delivered by Comlux; and an Art Deco-inspired bespoke ACJ319neo interior delivered by Jet Aviation (*see the July 2023 issue*).

Many beautiful concepts have also been revealed – you can see the latest from Lufthansa Technik among other special interior designs in the Wheels Up section (*page 8*).

A personal highlight of this year is the Sustainability Drive series, which aims to support innovation in the business jet interiors industry. Over the year we've put the spotlight on ideas and challenges in the realms of materials, completions and interior design, and even ran a seat design challenge. Key learnings are collated on page 20. I'm happy to confirm the series will continue – with future topics to include weight-saving, new forms of flight, best practice for transparency/communication, and much more.

Izzy Kington, editor



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## PINBOARD



LUFTHANSA TECHNIK, IN COLLABORATION WITH BBJ, RELEASED NEW IMAGES FOR ITS LATEST VVIP BBJ 777-9 CABIN CONCEPT, CELESTIALSTAR. THE DESIGNS EMPHASISE 'CONTEMPORARY PURITY', MIDDLE EASTERN GEOMETRIC DESIGN PATTERNS, AND THE VASTNESS OF THE SKY. PROJECTION TECHNOLOGY CAN TRANSFORM THE ENCLOSED VVIP BEDROOM, DISPLAYING CUSTOMISED DIGITAL CONTENT RANGING FROM A CINEMA SCREEN TO TRAVEL DESTINATIONS OR VIRTUAL ART. IF THERE IS LESS NEED FOR SECLUSION, ROTATING AND SLIDING LAMELLAE CAN OPEN THE SPACE TO THE REST OF THE CABIN.





THIS MODERN, MINIMALIST CONCEPT, ADAPTABLE FOR BOTH AIRBUS AND BOEING PLATFORMS, WAS CREATED BY AGNÈS GUIU, FORMERLY OF PIERREJEAN DESIGN STUDIO. STILL WORKING WITH THE STUDIO OCCASIONALLY ON A FREELANCE BASIS, GUIU IS NOW FORGING HER OWN VENTURE IN AIRCRAFT, YACHT AND LUXURY PROPERTY DESIGN.

THIS DESIGN INCLUDES A SPACIOUS AND WELCOMING FORWARD LOUNGE FEATURING A LARGE LOUNGE CHAIR WITH OTTOMAN AND MINI SIDE TABLE, AND A HI-LO COFFEE TABLE THAT CAN BE EXTENDED INTO A DINING TABLE. THE EXTRA-LARGE BEDROOM FEATURES A KING-SIZE BED, TWO MINI 'SOFA'S' AND A LARGE SCREEN. THE CABIN IS COMPLETED WITH A WASHROOM EQUIPPED WITH SEPARATE TOILETS AND SHOWER.



THE HONDAJET 2600 CONCEPT INTRODUCED IN 2021 HAS BEEN REBRANDED AS THE HONDAJET ECHELON. THE DETAILED DESIGN STAGE IS NOW WELL UNDERWAY, TARGETING AN AIRCRAFT LEVEL CRITICAL DESIGN REVIEW IN SUMMER 2024, WITH SELECT LONG-LEAD FABRICATION IN PROGRESS. TYPE CERTIFICATION IS ANTICIPATED IN 2028. IT IS DESIGNED AS A SINGLE-PILOT LIGHT JET CAPABLE OF NON-STOP TRANSCONTINENTAL FLIGHT ACROSS THE USA. THE CABIN WILL ACCOMMODATE ONE CREW AND 10 PASSENGERS, OR TWO CREW AND NINE PASSENGERS.

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# golden opportunity



This golden vision for the Gulfstream G650ER was created by Lie Alonso Dynasty, envisaging "the New Golden Era", explains Valeria Lie Alonso, co-founder of the studio. "This was designed for those who resonate with our brand and vision, infused in exoticism and the 'ancient future', celebrating multi-ethnic ancestral roots, leading us towards an age of exuberance and prosperity," she elaborates.

In her former role at Gulfstream Aerospace, Valeria Lie Alonso was primarily in charge of design completions for the G650ER. "Ever since founding Lie Alonso, we've created a new design language, and this concept represents my artistic language being translated into a very feasible aircraft design," she says. "Having a lot of experience working with this jet, I am very aware of its customisation potentials and limitations, and my goal was to create something truly unique and special that would also be feasible without being a heavy burden on my former colleagues, especially for the engineering and manufacturing teams. Its complexities are mainly in bespoke finishes, to be developed with leading industry suppliers that are not only capable but eager to work on these special designs."

The concept has four cabin zones. It features a lavatory and galley at the entrance; double-club seats in the forward cabin; a divan and credenza in the mid cabin, followed by a conference/dining area; and a private aft cabin with divan, single seat and aft lav. "I wanted to maximise comfort and lounge opportunities with social areas for both business meetings and family gatherings," says Lie Alonso. "This configuration allows flexibility, and the divans can become beds."

The carpet, sidewalls and custom lighting have a recurring motif of laurels, matching the exterior livery. They were created from free hand drawings, and represent nature, virtue and prosperity. On the sidewalls these will be achieved with silk embroidery.

Lie Alonso says the most challenging part to implement may be the ceiling light, because of the metal parts curving along with the ceiling panel. "Other than that it really will be about ensuring all the highly bespoke finishes are developed with precision and utmost care, ensuring the colours are cohesive, the embroidery is beautifully made, all the fine details are just perfect," she says. "We are looking forward to collaborating with all the teams involved." ❖

## CHEVRONS

The bulkheads will feature ribbed wood veneer, with the doors featuring a grey chevron pattern, adding a contemporary touch. "It will be developed with a special pearlised finish, to add mystique to the design," says Valeria Lie Alonso.

This material is also applied on the credenza sides, valance PSU trims, and galley and lavatory top drawers.







## SEATS

Caramel leather creates a classic look, with forest green leather on the back and arm shrouds, and a burgundy purple trim. "I added a backrest quilt pattern with diagonal lines tying in with the chevron pattern used for wood veneer on board," says Valeria Lie Alonso. "To finish, I added our logo to the headrest, in silk embroidery."



## CARPET

The custom carpet is envisaged as a wool and silk blend with a burgundy purple hue, reminiscent of the Primavera flower, abundant in Brazil.





# 2023 *highlights*

ROUNDING OUT A YEAR OF COVERING LOTS  
OF BIG ANNOUNCEMENTS, READ ON FOR  
YET MORE KEY DEVELOPMENTS, FROM A  
SPECIAL MILESTONE TO NEW INTERIORS

*Words by Izzy Kington*

## FALCON JET ANNIVERSARY

In May, Dassault marked the 60<sup>th</sup> anniversary of its Falcon line. The Mystère-Falcon 20, the company's first business jet, made its debut flight on 4 May 1963 and was adopted for the launch of both Pan Am Business Jets, and later, FedEx. That model was the start of a line of 27 types. Vadim Feldzer, head of Falcon global communications at Dassault Aviation, says one of the keys to this success is passion. "Aviation has been in the DNA of a lot of French engineers since the beginning of aviation in the early 20<sup>th</sup> century," he says.

Designing and building business jets alongside fighter jets has also been a key part of the recipe in terms of expertise, with many fighter jet technologies translated to the Falcon line over the years. Feldzer adds that "a strong appetite for elegant design" is also an inherent part of French culture: "Our airplanes have always been recognised for their unique elegance and aesthetic. Marcel Dassault, the founder of the company, used to say, 'For an airplane to fly well, it must be beautiful.'"

However, Feldzer notes that at the beginning, Falcons were noted more for their performance and handling qualities than the cabins: "Regarding our cabin interiors, I think

it would be fair to say that it was not our main domain of excellence until the past 15-20 years. Passenger experience and cabin design have since become a top focus of our Falcon teams and are now a strong brand differentiator of the product line."

The Falcon 6X is the perfect example of how the passenger experience now shapes cabin design, he says. The jet's design accolades include the Red Dot Award and an International Yacht & Aviation Award. The 6X has a substantial cabin cross-section, including a stand-up height of 6ft, 6in.

The upcoming Falcon 10X is even larger. As well as the residential-inspired design, Feldzer notes a key aspect of the aircraft is its "library-quiet" cabin. He says the Falcon 7X and 8X programmes led to key improvements in the soundproofing quest carried throughout the Falcon family and they will be even better in the 6X and 10X. "We are perfecting very accurate techniques to get the best soundproofing in our aircraft, without adding weight," he says. "Now we have precise measurement – a very, very elaborate way to insulate the sound origin perfectly and to address and fix it."





TOP LEFT: THE FALCON 8X AND THE RAFALE FIGHTER JET

ABOVE: THE FRENCH AVIATOR JACQUELINE AURIOL, WHO SET SEVERAL OF HER WORLD AIR SPEED RECORDS IN DASSAULT AIRCRAFT

LEFT: THE RESIDENTIAL-INSPIRED FALCON 10X WILL HAVE A RANGE OF 7,500 NAUTICAL MILES (13,890KM)

FAR LEFT: THE FALCON 6X, WHICH ENTERED SERVICE IN EARLY DECEMBER, HAS A RANGE OF 5,500 NAUTICAL MILES (10,200KM)

More than 2,700 Falcons have been made – the best-selling is the Falcon 2000, with nearly 700 deliveries, then the Falcon 900 with 550, and the Falcon 7X/SX line accounts for 400







## CESSNA CITATION CJ3 GEN2

The last few years have seen Textron Aviation update many of its product line, and in October it revealed the latest - the Cessna Citation CJ3 Gen2 light jet, expected to enter service in 2025. This was even deemed "our most comprehensive Gen2 product announcement yet" by company president and CEO, Ron Draper.

The updates span the cockpit and the interior, and were influenced greatly by a customer advisory board (CAB) of CJ3 owners, along with other stakeholders, including mechanics.

The changes start on the outside, with a new illuminated step design with a handle for safety. There are cockpit changes too, including 4.5in (11.4cm) more legroom for pilots, for better comfort and access. Christi Tannahill, SVP of customer experience at Textron Aviation, says the extra room was "one of the most passionate pieces from our customers because so many of them fly the aircraft". She adds it was probably the most difficult element to achieve, as it hadn't been done for the other Gen2 aircraft, and it involved moving and re-engineering some structural pieces.

Some of the features that are shared between Gen2 cabins include the CMS. "Whether you have an M2 or an XLS Gen2, there's familiarity in that DNA," says Tannahill. "It's allowed us to take some of those high-end features and incorporate them in our entry-level jets as well."

Another of the shared features is an optional side-facing seat in the forward area that folds to provide a place for luggage.

Another option is a refreshment centre with expanded cabinet storage; the standard is a fixed side-facing seat.

The cabin seats are new, featuring base and floor tracking and optional swivel. "You can even swivel the chair completely around," says Tannahill. "You can lie flat if you want. A lot of big jet amenities were incorporated."

Other new features include RGB accent lights so customers can adjust the colour of lighting; USB-C power at every seat; top-loading tables; illuminated side pockets; and wireless charging trays on the sideledge by every main cabin seat (not the side-facing or lavatory seats). "When somebody gets in an aircraft, they usually take their phone and set it on the sideledge," says Tannahill. "So now when they do that, whether they're intentionally doing it or not, it automatically will charge their phone."

There's also an optional high-power outlet for a coffee machine; ice and trash storage; and a cabin master control switch panel that pilots can access. "One of the things that's unique to this aircraft is the pilots may fly the airplane and not have anybody in the back," says Tannahill.

The lavatory is now externally serviceable, and there's a new optional sink and vanity design with dedicated water supply, plus CoolView skylights.

Perhaps one of the most eye-catching features of the mockup shown at NBAA-BACE and pictured here is the gold plating. Tannahill shares that the company is attracting an increasing number of first-time buyers and wants to show off its range. "The sky's the limit when it comes to designing your aircraft, from the paint job all the way through the interior," she says. "We hadn't really used this kind of gold metal before, and we wanted to showcase what the possibilities are."

Demand for customisation is strong – Tannahill says while historically about 25% of customers would customise their aircraft in some way, now it's about 90% across the whole range, but primarily in the jet product line.

There are various palette schemes as a starting point to make selections less overwhelming, she says, and customers typically want to add a custom carpet, stitching or other unique detail. For example, special veneer inlay designs are possible reusing leftover pieces of veneer. "We own our interior manufacturing facility, which just expanded by another 16,000ft [4,877m], because we have so much customisation going on," she adds.

TOP LEFT:  
AUTOTHROTTLES  
HAVE BEEN ADDED

LEFT & RIGHT:  
AS BEFORE,  
THE STANDARD  
CONFIGURATION  
SEATS NINE





LEFT: THE CITATION CJ3 GEN2 WILL BE ABLE TO OPERATE USING SAF





## EMBRAER PHENOM 100EX

This year's NBAA-BACE saw the unveiling of the Embraer Phenom 100EX, an update to the Phenom 100 entry-level jet, which has been in operation since 2008. The Phenom 100EX has already gained ANAC, FAA and EASA certification and is sold out through 2024.

Jay Beever, vice president of Embraer Design Operations, explains that the programme began with package studies to improve ergonomics by making the most of the space and clearing away anything unnecessary.

The second aspect was craftsmanship, which involved asking which features of Embraer's 'Design DNA' – such as the upper tech panels, which house cabin controls in a glass strip above passengers' heads – could be implemented without adding weight and part count. Then there was the design, and working out what was possible within the entry-level offering.

"We found a way to make a flush tech panel, like the Praetors one per side, with no interference to antennas and flat gaspers from the Phenom 300E," says Beever. "That cleared out an inch of head space right away. We were also able to bring gesture-based controls into the tech panels – a butler with wings that disappears when you don't

need it and appears when you do. It became a really nice homologation of different pieces of our DNA from the different airplanes into that one."

Embraer has reduced its use of wood veneer in the Phenom 100EX cabin, instead opting for a durable soft trim on the outside of the table areas, which also saves weight. The new tables also have a flush-to-the-wall design, giving 40% more flat table space.

While the new seats are 2in (5cm) wider per side, the new armrests articulate into an unobtrusive position when up, meaning they don't encroach on aisle space. "I say the aisle got wider by 3in [7.6cm]," Beever says. "So you now have a wider aisle, wider seats, and more headroom and the fuselage stayed the same. That's what this business is ultimately all about when it comes to interior design; we have a fixed space that you cannot change the dimensions of. How far can you take technology to its point of reduction, in part count and in size, to get you more packaged space? That's what excites me; that continues to evolve."

Some of the other updates include a side-facing fifth seat and belted lavatory; more use of sustainable materials; more legroom for the pilot; and avionics upgrades.



TOP LEFT: THE JET NOW HAS AN UPPER TECH PANEL ON EACH SIDE

LEFT: THE NEW, WIDER SEATS



LEFT: THE OUTSIDE  
OF THE TABLE  
ASSEMBLY HAS  
SOFT TRIM

BELOW LEFT: THE  
PHENOM 100EX IS  
AN ENTRY-LEVEL JET

BELOW:  
ERGONOMICS,  
CRAFTSMANSHIP  
AND DESIGN  
WERE THREE KEY  
WATCHWORDS  
FOR THE UPDATE





## LIMITED-EDITION '500<sup>TH</sup>' CIRRUS VISION JET

In October, Cirrus Aircraft revealed the Special Edition Vision Jet (SF50), developed to commemorate 500 deliveries of the single-engine, single-pilot-certified jet. The Special Edition was limited to five aircraft – all of which have been sold. "To commemorate the milestone we created an exterior livery that is pretty bold and striking, and a bespoke interior, unique to only five aircraft," says Patrick Sniffen, executive director of global marketing at Cirrus Aircraft.

For the exterior there were five colour options, complementing Obsidian Black and Vision Blue paint, and 500<sup>th</sup> Limited Edition branding. The interior has a blue and grey scheme with touches of carbon fibre. Crew seats are upholstered in a heathered grey Alcantara with leather shoulder- and head-rests, finished with 500<sup>th</sup> edition emblem embroidery. The seat's centre is finished in perforated leather with a diamond pattern.

"It's a heathered Alcantara, which has sort of a wool appearance, but it's got the same wear characteristics as any other piece of Alcantara used for a seat surface," comments Sniffen. "We did a diamond-quilted pattern with contrast stitching – this carries through on all the seating."

The Alcantara is supplied by Perrone. Other suppliers include SCS Interiors for the upholstery, and Aeristo for leather. The Vision Jet platform was released in 2016, and has been updated many times

since. The interior comes in various configurations, seating up to seven.

"Because the fuselage itself is a fully carbon fibre pressure vessel, we can make this non-standard shape that creates a lot of passenger comfort," comments Sniffen. "So when you sit in the back seat, you've got a lot of legroom. There's also an executive option with a console in the centre, which gives you two fold-out workspaces."

Sniffen says seats can be removed in 10 minutes by the pilot or owner. "The other interesting piece that we announced last year is the flex cargo management system," he adds. "Basically you can take these back seats out and using the same connecting hardware, you're able to secure your cargo, whether that's coolers or golf clubs or whatever."

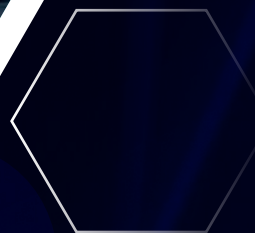
Other creature comforts include wi-fi, full-cabin climate control, and an IFE system whereby passengers can watch their own content on the 18in drop-down screen, connecting via Bluetooth or HDMI. When not in use the screen is stored in the carbon fibre 'surfboard' panel on the ceiling. This also houses the oxygen masks and Safe-Return auto-land system. Other amenities include USB-C charging ports, and cupholders with hidden cubbies. There is a separate baggage compartment, even making use of tail space for longer items like skis.

Customisation is possible through Cirrus Aircraft's Xi Design team, giving customers choices for colours, materials and textures, and the ability to add personal details through technologies such as laser engraving.



**The Vision Jet platform (not only this Limited Edition) was updated earlier in 2023 with the addition of Auto Radar powered by Garmin, and Cirrus IQ**





FAR LEFT, ABOVE  
& BELOW: FIVE  
EXTERIOR OPTIONS  
WERE CREATED, ALL  
WITH ENERGETIC  
GRAPHIC LINES

LEFT: THE INTERIOR  
MATCHES CARBON  
FIBRE WITH BLUE  
AND GREY TONES





# Lessons LEARNED

REFLECTIONS FROM A YEAR OF EXPLORING HOW  
THE CABIN INTERIORS INDUSTRY CAN INNOVATE  
IN TERMS OF SUSTAINABILITY

*Words by Izzy Kingdon*

## MATERIALS

The year kicked off with a deep-dive into cabin materials – where sustainability innovations can focus on everything from weight-saving to maximising service life, to the use of recycled or recyclable raw materials, and production processes. This complicated picture can make evaluating sustainability a challenge – a solution might shine in one area and not so much in another. Other highlighted challenges include meeting certification requirements while maintaining durability and affordability. It was also noted that sustainable solutions are absolutely possible to achieve without compromise to aesthetics.

[Click for the full article.](#)



## Completions

Next up, interior completion and refurbishment practices came under the microscope. Again the picture is a complex one as there are many facets to sustainability – from the use of renewable energy to special considerations for activities such as painting.

Prioritising local companies in the supply chain was another idea explored, along with the use of reusable or sustainable packaging for shipping.

In terms of the interior equipment and materials to install, solutions mentioned ranged from LED lighting to pineapple leather, bio-based resin, and printed films as a lighter alternative to exotic wood veneers. Durability, certification compliance and cost were considerations. Another was being able to source sustainable interior products in sufficient quantities.

Interviewees reported variable demand from clients for sustainable interior options, and perhaps need for greater promotion of them. [Click for the full article.](#)





## Seat design challenge

For a special feature in the July 2023 issue, VIP aircraft interior designers were invited to create brand-new seat designs tackling sustainability, prompting a cascade of designs to get excited about!

While designers found it important to retain factors such as ergonomics and the experience as key design drivers, they had myriad ideas for sustainable innovations. There was a strong focus on lightweighting – achieved with methods including printed parts; composite materials; and simplified and leaner architecture. Ways were also proposed to improve production processes – such as replacing fabric dyeing with microencapsulation and reducing

part count. Modular solutions and common mounting systems were envisaged to support a longer lifetime through easier updates, while designing in easy separation of components was also suggested.

The designers had the option of envisaging concepts beyond what is possible today. An array of potential alternative material innovations were mentioned – including lab-grown leather; foams based on soya and aloe vera; hemp-enforced bio plastic; sustainable resin; and natural fibre technologies. Other approaches included the use of reclaimed veneer and sustainably sourced leather; and a focus on traceability. [Click for the full article.](#)

## INTERIOR DESIGN

Most recently, representatives from design firms and aircraft OEMs shared their design ideas. There was also a breakdown of sustainable terminology, and discussion of effective communication, from how OEMs can be transparent about their initiatives, to calling for more information from suppliers.

Potential material ideas included Eucalyptus veneer, notable for its fast growth; composite veneer; composite leather; and 3D-printing titanium for interior trim components. Other suggestions included vegetable tanning instead of chemical tanning; the use of sustainable substrates, foams and adhesives; water-based paints; and natural dyes.

Designing for easy maintenance, considering the location of suppliers, recycling old parts, and a need for assurance as to the durability of new solutions were also covered.

[Click for the full article.](#)

## WHAT'S NEXT?

Recognising the key importance of this topic, *Business Jet Interiors International* will continue the Sustainability Drive series. Topics to be explored will include new forms of flight; lightweighting; best practice for transparency/communication; and meeting the needs of a new generation of customers and talent.





# Pick and mix

MAIN: A LOUNGE IN THE  
EARTHBOUND STYLE

INSET: AN OFFICE IN THE SAME STYLE



*Words by Izzy Kington*



***“We launched BBJ Select to simplify the purchase process for our customers”***

The aircraft  
can fly  
**15**  
hours  
non-stop

**T**he strategy of pre-engineering interior zone modules that customers can mix and match to create their preferred business aircraft layout is not a new one. But it is new to Boeing Business Jets (BBJ), where the usual process is delivering green aircraft to be fitted with clean-sheet, 100% custom cabins at third-party completion centres. That fully bespoke approach is still available across the BBJ product line, but at NBAA-BACE 2023, the OEM unveiled an additional option for the BBJ 737-7, the newest member of the BBJ 737 Max family.

The BBJ Select programme allows customers to select from pre-designed layouts – totalling 144 possible cabin combinations – and three colour palettes. By eliminating one-time engineering costs and design work, BBJ proposes the advantages of a lower, more predictable cost; reduced downtime; and turnkey project management. “We launched BBJ Select to simplify the purchase process for our customers by streamlining the design of their cabin,” says Drew Gough, head of BBJ sales, Americas.

## AUXILIARY FUEL TANKS

Aloft AeroArchitects has provided auxiliary fuel tanks to the BBJ programme since its inception in 1996, and has been a specialist in that market for 40 years. On the BBJ 737-7 used for BBJ Select, the upgrade extends the range to 6,550 nautical miles (12,130km).

“It takes a very well-performing aircraft and almost doubles its range,” says Matt Hill of Aloft.

It’s a modular upgrade; customers can select how many extra tanks they want to balance needs around range and cargo space. Tanks can also be added or removed later. “It’s a very successful system,” says Hill. “It’s been adopted in the commercial market, and we have many special-mission, head-of-state and military applications. It’s the backbone of our partnership with Boeing.”



BBJ Select has six cabin zones – with modular options for four of these



Gough says BBJ Select aircraft will spend less time in completion for two principal reasons. “We have pulled forward a lot of the interior engineering work that often takes place after a green aircraft purchase,” he explains. “The BBJ Select catalogue is defined, meaning we are able to shave additional time off the post-green delivery completion process.”

The second factor supporting an expedited timescale is BBJ’s selection of Aloft AeroArchitects and Greenpoint Technologies – through a competitive process – as major partners for the programme. “Interior integration will take place at Aloft AeroArchitects, the long-time supplier of BBJ auxiliary fuel tanks,” explains Gough. “This allows for what is typically a sequential process – the auxiliary fuel tank install then on to completion – to be a concurrent process where the auxiliary tanks and interior work are completed simultaneously. This saves months of time compared with a typical completion.”

#### HORSES FOR COURSES

It’s important customers choose the right programme for them. “Because of BBJ’s history of selling clean-sheet, 100% custom cabins, a potential challenge will be keeping a subset of customers from wanting to alter the

OPPOSITE PAGE: THE AFT STATEROOM IN THE MIDNIGHT STYLE

ABOVE: THE U-SHAPED DIVAN OPTION FOR THE FORWARD LOUNGE, IN THE SERENE DESIGN STYLE

#### CABIN STATS



### BBJ Select

Cabin width: 3.53m (11ft 7in)

Cabin height: 2.16m (7ft 1in)

Cabin length: 26.1m (85ft 8in)

Seats: 2 pilot seats and 2 crew jump seats in cockpit, 13-25 passenger seats plus 2 flight attendant jump seats in cabin

Range: 6,550nm (12,130km) with eight passengers, NBAA mission rules, 50% winds, 3% airways allowance

Maximum altitude: 41,000ft (12,497m)

Typical cruise speed: Mach 0.79 (834km/h) at typical cruising altitude



# ON-DEMAND CULTURE

Matt Hill of Aloft anticipates the programme will have broad appeal – “there are good options within the layout and the style that could pretty well suit any customer”. However, he does see an evolution in customers in general – an appetite for quicker acquisitions that could perhaps be a reflection of on-demand culture.

“The people looking into this product over the last decade have changed,” says Hill. “There’s more appeal for speed than there used to be, and there’s a new consumer of business jets.

“Even in the aftermarket, you’re seeing a different type of buyer getting into big aircraft sooner than historically,” he adds. “Used BBJs are quite in demand, and demand is coming back in the USA.”

He also notes that the BBJ Select’s modular flexibility could benefit second buyers down the line, as they could switch out modules to meet their own needs.

BBJ Select modules,” says Gough. “Customers who desire a different layout from the BBJ Select options can still purchase the green aircraft and take it to a completion centre of their choice for a one-off cabin completion.”

On BBJ Select, Boeing is the primary interface for customers, and Aloft is responsible for the interior programme management. Greenpoint’s responsibilities include the interior design – making use of its design centre, which is very close to Boeing’s facility in Seattle, Washington – and manufacturing/engineering of the interior components at Greenpoint’s site in Denton, Texas. When the green aircraft arrives at Aloft in Georgetown, Delaware, Aloft will install the interior kit from Greenpoint, and engineer the integration of CMS, electrical, wastewater, connectivity and other systems, in parallel with the auxiliary fuel tank modification. Aloft’s in-house ODA will issue the STC.

## SUPER GROUP

“We’ve always viewed Greenpoint as a collaboration opportunity,” explains Matt Hill, VP of sales and service at Aloft, on why the companies launched a joint bid in response to Boeing’s RFP. “We tend to focus on narrow-bodies, and Greenpoint’s been ultra-successful on the wide-body market. Our strategy is to outsource or partner on products within the cabin, so there was an obvious collaboration opportunity already there, structurally, between the companies.

ABOVE: A VIEW FROM THE AFT LOUNGE, IN THE SERENE STYLE

Culture was also a big factor. “The two organisations have a very similar spirit,” explains Bret Neely, VP of sales and design at Greenpoint. “It was just an easy process. When we went to carve up the workscope for example, there were no disagreements. We felt together we were an unbeatable team.”

Between them Aloft and Greenpoint have completed around 70 projects, of which 40 are narrow-bodies. “It was hard to imagine an individual entity in our business making as compelling a case,” says Hill.

## CROWD-PLEASERS

Cabin options have been chosen to meet the needs of the broadest range of potential customers possible. “You can’t design for the extremes, but what’s the most likely best use case,” says Hill.

Fixed elements include the forward section’s crew rest, galley and VIP lavatory, and the back section’s stateroom and en-suite shower room. In-between are four zones with various options. The forward lounge’s four choices include business-class seating, a divan/cinema setup, club

***“You can’t design for the extremes, but what’s the most likely best use case”***



seats, or a club/divan blend. The mid lounge offers three options for club seating. The larger aft lounge's three choices all provide a divan, seats and a long table in different configurations. Finally, the private room can be set up for meetings, or with a queen-size bed, a lounge-style divan or as more of a private office.

### THREE'S A CHARM

There are three design styles: Serene, Midnight and Earthbound. "With each design style, there are supplementary colour choices for specified areas of the cabin," adds McCahl Troupe, design manager at Greenpoint. "For example, curated colour palettes include additional leather and fabric shades for the client to personalise their seating."

The programme could be particularly helpful for customers who might be overwhelmed by the choices involved in a bespoke project, Hill suggests. "A pretty fair amount of customers desire to be led through that," he says. "We want to offer something that allows the client to be more hands-off if they'd like. You want to offer some customisation, but without affecting the efficiency we built in. The quality will be the highest

THE AIRCRAFT HAS  
CAPACITY FOR UP TO  
54 CHECKED BAGS

BBJ Select comes  
with a five-year  
Boeing parts  
and interior  
workmanship  
warranty





## ***“Competition’s changing and trying to go it alone is not as productive as being a team”***

infrastructure. Neely adds that “we also need suppliers that are going to be around for many, many years”.

“The utopia is we find supply-chain participants that are easily aligned like we are, so we’re looking for strategic long-range vision,” adds Hill.

Overall, the teamwork is the most satisfying aspect of the project for Neely of Greenpoint: “The industry is changing, competition’s changing and trying to go it alone is not as productive as being a team; teamwork is everywhere and it really makes us more effective.”

Hill agrees: “I hope we can do more of it; it’s a benefit to the customer in the end.”

### WHAT’S NEXT?

Customers can place orders now for an aircraft ready to enter service as early as 2026, BBJ shares. “BBJ Select is very enticing for our prospective and current BBJ customers, and we are in active conversations with them about the purchase process,” reveals Gough.

He also adds that Boeing will explore the potential market for expanding the BBJ Select cabin approach to other aircraft types in the future. ✕

The BBJ 737-7  
airframe has 884ft<sup>2</sup>  
(82.13m<sup>2</sup>) of  
cabin space

ABOVE: THE STATEROOM’S EN-SUITE,  
ONE OF THE AREAS THAT IS FIXED,  
SHOWN IN THE MIDNIGHT STYLE

end of luxury, like you’d expect on a completely custom interior; the efficiency is what creates the value. The modularity should not be misconstrued as a sacrifice in any way – the capability of the cabin is as you’d expect.”

A key benefit of modularity can be its flexibility – enabling owners to swap out zones with greater ease as their operational needs change for example.

“The infrastructure will accommodate any zone – the lighting, the oxygen drops, all the stuff behind the scenes is there already to accommodate each of these options,” says Hill. “In today’s world, the pace of change is faster, so the idea that the mission of the owner would change is probably more likely.”

Another benefit of the modular concept, Hill says, is that replacement parts can be quicker to access, and even pre-made. “In ultra-custom world, to decide to make spare cabinet doors or something like that, it’s a different decision,” he says. “Here, there’s essentially a production line of the same structure.”

### FUTURE FOCUS

The project is now in the supplier selection phase. One requirement is for the backbone of electrical systems and IFE/CMS to be applicable well into the future, enabling upgrades by swapping out hardware such as switch panels and monitors, without having to change the entire

## ***Design*** FACTORS

The interior was designed by a team at Greenpoint Technologies. Inspiration from the yacht and automotive industries informed elements such as furniture details, seat design and divan styling.

“One detail I particularly admire is the quilting pattern on the single VIP seats, which was inspired by automotive industry techniques,” says McCahl Troupe of Greenpoint.

One of the primary goals was to ensure the ceiling and window architecture enhanced the cabin’s sense of openness. “In addition to maximising the cabin space,

we incorporated accent lighting throughout, including toe-kick lighting, valance panel upwash and downwash lighting, and ceiling cove lighting,” says Troupe.

Human factors were also studied carefully. “Each module was thoroughly analysed using 95<sup>th</sup>- and 5<sup>th</sup>-percentile male and female human models to ensure the layouts can accommodate every zone using the repeated design,” says Troupe. “This included assessing the placement of divans and single seats in relation to other monuments, as well as the cabin linings.”




## THE FUTURE IS **HERE**


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# Cat &

CYBERCRIME IS AN  
EVER-PRESENT THREAT,  
WHICH BUSINESS JET  
CONNECTIVITY PLAYERS  
ARE COUNTERING THROUGH  
VARIOUS MEANS

*Words by Rob Coppinger*



# Mouse

In business aviation, connectivity is not an option but a prerequisite. Users demand free-flowing information, and this is enabled by a vast infrastructure. To ensure the cybersecurity of the connectivity solution, there must be no weak links between the user, the satellite and the terrestrial data centre.

"The hardware and software, if professionally managed by aviation IT experts, are not the weakest links," says Josh Wheeler, senior director of entry into service at Satcom Direct (SD), which provides satellite services and systems for business aviation. "We have built robust routers and antennas to meet the demanding needs of business aviation to effectively and consistently transmit data," he adds.

## JOINED-UP SOLUTION

Wheeler explains that the sector is becoming "more digitised", with data generated from an aircraft providing valuable insights into aircraft performance, for example, and it all needs to be protected. SD develops its own software, infrastructure and hardware. Wheeler says customers benefit from SD's "heightened visibility into the connectivity system and can be better prepared to anticipate and mitigate any events".

Too often, Wheeler explains, cyber events are instigated by bad actors taking advantage of those who are unaware of what they need to do. Security breaches can begin with a lack of awareness of phishing emails. Passengers' devices might lack antivirus software, or they might log into a non-password-protected network and inadvertently upload malware. "This is why we focus on education too," says Wheeler.



***“The hardware and software, if professionally managed by aviation IT experts, are not the weakest links”***

**CrowdStrike's 2023 Global Threat Report found 71% of attacks were malware-free in 2022, and cloud exploitation rose by 95%**

MAIN: SD PROVIDES MULTI-LEVEL CYBERSECURITY SUPPORT

LEFT: IN 2020 SD OPENED THE UPGRADED NETWORK OPERATIONS CENTER AT ITS HQ, USING AI AND MACHINE LEARNING TO GAIN ENHANCED VISIBILITY ON THE STATUS OF EACH AIRCRAFT

SmartSky Networks, an air-to-ground network provider, offers connectivity in the continental USA. The onboard systems work with cabin wireless access points such as the Honeywell GoDirect Router and the Satcom Direct Router. Sean Reilly, VP of air transport management and digital solutions at SmartSky Networks, emphasises the company utilises a blend of its patented innovations and the best technologies available: “Our network is designed from the ground up and each aircraft gets its own dedicated connection,” he says. “The separate connection means no bandwidth is ever shared with other aircraft, providing enhanced performance and information security.”

That beam is also constantly changing every few minutes and to hack into it, if it can be detected in time, the hacker would need the “secret handshake” of that beam, Reilly says. “We’ve got more than 30,000 beams available in the USA, and each has its own unique identifier but it’s obviously changing as well,” he says.

Despite this there are still threats and the hackers are becoming more creative. “The vast majority [of vulnerabilities] are web application issues and nearly three quarters of attacks are now

## *The year* AHEAD

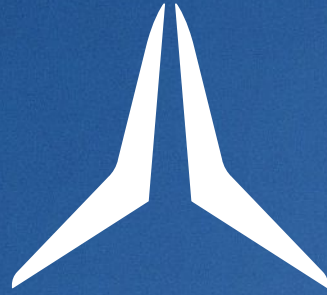
For SmartSky Networks, key events over the next 12 months will include national and regional NBAA events, the Aircraft Interiors Expo and Aircraft Electronics Association (AEA) conventions, OEM and customer conferences, and more, where the company shares it will promote greater spectrum availability for crew data.

Gogo will attend all the major business aviation events in 2024, including EBACE, NBAA-BACE, AEA and the respective regional events put on by NBAA and AEA, in addition to other events in Europe and the Middle East. The firm will also host a dealer advisory council and customer advisory council during the year.

For Satcom Direct, 2024 will bring data science that can provide a new set of tools for cybersecurity professionals. Machine learning can aid in the analysis of unusual data behaviour and indicate unusual patterns of behaviour, the company notes. Looking to the past to predict the future is also something data science can help with.







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malware-free,” Reilly says, referencing cybersecurity firm CrowdStrike’s 2023 Global Threat Report.

#### WEB APPLICATION ISSUES

Security misconfiguration and broken authentication are two problems associated with web application issues. The lack of an identifiable malware program makes these threats even more difficult to detect. “The key to avoiding these threats is avoiding unsecure networks – that’s what makes SmartSky’s inflight connectivity so different,” says Reilly.

Meanwhile, spacecraft orbiting the Earth underpin Viasat’s connectivity solutions. “Following our recent acquisition of Inmarsat, we now have a total of 18 satellites in orbit that already provide ample near-global coverage over both Ka-band and L-band,” says Claudio D’Amico, VP of strategic market engagement for business aviation at Viasat. “Our partners will play an important role here too. For example, at NBAA-BACE this year, Honeywell, Orbit and SD announced future terminal innovations that will allow business aviation customers to access our full Ka-band network.”

***“The key to avoiding these threats is avoiding unsecure networks”***

Onboard cybersecurity solutions include SystemX software from CCX Technologies

TOP: SD CONSIDERS PASSENGER EDUCATION A KEY PART OF CYBERSECURITY DEFENCE

INSET ABOVE: WITH SD’S CYBERSECURITY SOLUTION, THREATS CAN BE MONITORED VIA IPAD



The cybersecurity for this orbit-to-Earth infrastructure has “deep layers, engineered into our end-to-end systems from the outset,” explains D’Amico.

#### CONSTANT LOOK-OUT

The network is monitored constantly to evaluate threats and anomalies without the need for additional hardware on the aircraft, D’Amico explains. In business aviation, Viasat’s Ka-band capacity provides high-speed solutions for a broad range of aircraft, from super-midsize to large-cabin jets. “Our L-band capacity provides resilient services that can either be used as primary connectivity for smaller or older aircraft,” D’Amico says.

At Gogo, security measures span both hardware and software solutions. The company offers 3G in-cabin wi-fi as



part of its solution that connects with its 4G network. "We have physical hardware in the network that is solely for cybersecurity, and there's also a lot of software solutions, so it's a combination of both," says Michael Schnepf, VP of network engineering at Gogo.

#### LAYER 7 FIREWALLS

Schnepf adds that Gogo's vendors use industry-standard software firewalls. "It's a Layer 7 next-gen firewall that will come with software," says Schnepf. "Cisco, Palo Alto Networks, all those vendors have their own software."

Gogo also has cybersecurity software solutions that can run on any common-off-the-shelf (COTS) servers.

Like other companies, Gogo also has a security centre. Operating from Broomfield, Colorado, the Gogo Network Operations Center provides monitoring and troubleshooting for all the elements of the Gogo Business Aviation mobile broadband network. Beyond the centre, the firm's own satellite ground stations and its cables linking them to other infrastructure provide what Gogo calls "secured networking" to its firewalled and segmented data centres.

Schnepf sees cybersecurity growing in importance, and says Gogo has exciting

CrowdStrike tracked more than 200 adversaries in 2022, including 33 newly named ones

## "We're growing our cybersecurity programme"

solutions coming: "We're growing our cybersecurity programme; the business is expanding globally."

#### GONE PHISHING

Like other companies, Gogo is seeing an increase in phishing attacks. "Threat actors attempt to impersonate legitimate communication and target users with malicious emails and text messages," says Schnepf. "They are an attempt to get users to click a hyperlink to install malware. Educating personnel to avoid this is a key change."

Methods of attack and defence evolve endlessly. For the business jet passenger, an hour in the classroom might be the ultimate defence. ☒

BELOW: AN SD CUSTOMER EDUCATION SESSION



# SOCIAL *engineering*

Social engineering is a term used to describe the manipulation of people – a key hacker skill. In this context it involves manipulating people into giving up their information, making other cybersecurity measures irrelevant.

There are four steps to a successful social engineering attack: preparation, infiltration, exploitation and disengagement. With an

understanding of these steps, people can better protect themselves.

In the preparation stage, the hacker gathers information about their victims, often from social media. Infiltration, also known as phishing, is where the hacker contacts their victim, often impersonating a trustworthy source, for example a service provider's

call centre. The hacker builds the target's trust and then exploits them, requesting important information that can range from account log-ins to payment methods or contact information. With the cyberattack underway, the hacker will move to phase four, disengagement, which is simply to stop communicating with the victim.



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# Natural

UPDATES TO THE  
PILATUS PC-24 'SUPER  
VERSATILE JET' INCLUDE  
A NEW DIVAN, COMPACT BUT  
POWERFUL IFE, BIO-BASED  
MATERIAL OPTIONS  
AND MORE

*Words by Guy Bird*

**L**istening to your customers is usually a wise business move, one that Swiss aircraft maker Pilatus has clearly adopted in updating the PC-24 'Super Versatile Jet'. The updates begin with extended payload-range for new aircraft deliveries from 2024. This was a direct response to customer feedback.

"We decided to look deeply into the aircraft's structure and see where we could take out weight," explains Flavia Vianna, director of product management, business aviation, Pilatus. "We modified a lot of the structural parts during this rework. We really went to the extreme and even reviewed some manufacturing processes. It was a long process that included a flight test campaign to guarantee no changes to the handling of the aircraft."

## TRIMMING THE WEIGHT

Pilatus refined wing and fuselage structural elements – including making some ground spoilers out of carbon fibre – and lots of these little changes result in the revised PC-24 benefitting from a 600 lb (272kg) increase in full





# evolution

fuel payload, to 1,314 lb (596kg). Maximum payload capacity is 3,100 lb (1,406kg). This enables operators to increase the aircraft's maximum range by 200 nautical miles (370km) to 2,000 nautical miles (3,704km) with six passengers. These changes enable operators to enjoy one of the aircraft's key selling points even more – its large cargo door and inflight-accessible cargo area.

## SPATIAL AWARENESS

Vianna says that while most of the interior feedback was already great, it's part of her job to dig in to optimise the cabin ever further. The aircraft got a forward galley option in 2019, which has a 'pick-rate' exceeding 80%. Customer feedback revealed the forward area could be improved, specifically regarding the sink's envelope. "It's an iconic piece that I can say was designed with heart and soul, but it wasn't optimal for the space," says Vianna. "When cabin crew served a coffee they had to put the jug somewhere else, so we now have a bigger and nicer countertop area. We have made better use of the space."

F/LIST CREATED A CUSTOMISED VERSION OF F/LAB AENIGMA FOR THE BULKHEADS AND DECORATIVE SURFACES OF THE PC-24 SHOWN AT NBAA-BACE 2023

She continues that the entrance area encapsulates the aircraft's modular design: "We have a crystal cabinet option, but if it's not something you want, it can be pulled out. All these details make the cabin adjustable to specific customer needs."

The PC-24 design has always prioritised flexibility, enabling seats to be removed quickly for example. "This is unique to our interior, and it saves carbon footprint by reducing weight and therefore fuel consumption," says Vianna. "You can take parts out that are not needed for that specific mission."

## DIVIDE AND CONQUER

A similar analysis was applied to storage spaces. "We had lots of big cabinets that weren't optimised for every usage, because they didn't have enough partitions and just seemed big and empty," says Vianna. "However, some customers use the big space for blankets or pillows and we didn't want to lose that functionality either. The solution was to redesign the cabinets in a way that they could be

F/LISTGMBH



***“We really went to the extreme and even reviewed some manufacturing processes”***



In all the update  
includes more than  
**1,000**  
modifications

filled up with modular containers and dividers. These can be removed if you're not going to use them. Moreover, even the cabinets can be pulled out too if not required.”

The pilot can take the cabinets out, recalculate weight and balance “and you're off to fly without that weight if you're not going to use it,” says Vianna.

#### SLEEPING BEAUTY

A crucial change is the new side-facing divan option. The divan is 6ft 6in (1.98m) long and can be converted into a bed in flight. Vianna says that even though typical flights for this airframe are two to four hours long, people still want to be able to sleep. Since the PC-24's original launch, the seats have been reworked and recertified to add full recline, but Pilatus still wanted to offer “a proper bed”, in the aft, quieter area of the aircraft, and make it as big as possible.

“It's a huge divan,” says Vianna. “At NBAA-BACE we couldn't find anybody that couldn't lay head-to-toe on it.

## CUSTOMISATION IS KING

Flavia Vianna notes that Pilatus “really goes beyond” with cabin customisation. “We start with six CMF schemes designed by BMW, but in most cases, that is only the starting point. I don't think I've seen a single aircraft this past year go ahead just with one scheme. They always mix and match.”

But customisation doesn't stop there, Vianna says. Complex

quilting and perforation is possible for example, working with partners such as Aeristo. “We offer over 10 quilting patterns. But if needed, we also go beyond and customise quilting for customers.”

Customers can ‘spec’ aircraft at sales centres globally, which have standard collection materials to hand, or go to design centres in Switzerland and Colorado for more in-depth customisation.





The new mood lighting supports pre-programmed and customer-made presets

## CABIN STATS

### Pilatus PC-24

Cabin width: 1.69m (5ft 7in)  
Cabin height: 1.55m (5ft 1in)  
Cabin length: 7.01m (23ft)  
Seats: 1-2 in cockpit, up to 10 in cabin  
Range: 2,000nm (3,704km) with six passengers, NBAA IFR reserve, long-range cruise, single pilot  
Maximum altitude: 45,000ft (13,716m)  
Maximum cruise speed: 440ktas (815km/h)  
Price: US\$13m (fully equipped, 2024 price)

To optimise comfort even further, you can pull it open and it becomes a comfortably sized bed. We also added everything you can think of: there are drawers underneath; plug-in tables for eating on; power outlets and USB ports; and cupholders everywhere. We used to have a requirement for one cupholder per passenger, so we doubled that just to make sure. On the divan I actually added two more cupholders just because we had space at the back of the sideledge.”

#### SINGLE-BOX IFE

An upgrade to the IFE/CMS is a key change. Lufthansa Technik created an Ethernet-based, customised version of its ‘nice’ system, housing the entire system in a single, compact line-replaceable unit. “That saves weight with no compromise on what we offer the customer,” says Vianna. “Everything you would expect in a bigger aircraft, you have here, and for very little weight.”

TOP: THE REDESIGNED FORWARD REFRESHMENT AREA

ABOVE: A DIVAN IS NOW AVAILABLE AS AN OPTION

## NOISE *reduction*

The updates include an overall 3dB reduction in cabin noise, enabled by the redesign of passenger service unit ducting, and the use of noise-absorbing curtain and tuned engine

accessory air intake ducts for example.

Additionally, a layer of noise-absorbing material was added to the carpet.

“You don’t see that very often,” says Flavia

Vianna. “Even if you customise the carpet design, we’ll have this underlayer of noise-absorbing material custom to Pilatus. Our supplier Tisca produces it to our specification.”



*“Lufthansa Technik went the extra mile to meet our weight and envelope targets”*

F/List is a long-term partner for Pilatus, supplying wood veneer, carbon fibre and more

The ‘integrated CMS 4.0’ (iCMS 4.0) system features a 10in touchscreen controller (positioned on a bulkhead); 3D moving map; USB ports; 1TB of storage space for personal AVOD; and four high-fidelity cabin speakers with optional subwoofer, HDMI input and mood lighting. The wi-fi is capable of simultaneous 2.4GHz and 5GHz, and there is a Bluetooth transceiver for audio sink or source; and multicast streaming.

#### JIGSAW PUZZLE

“Lufthansa Technik went the extra mile to meet our weight and envelope targets, because we’re focusing on releasing space

ABOVE: DIVIDER WALLS, SEATS AND CABINETS ON THE PC-24 CAN BE REMOVED FOR SPECIFIC FLIGHTS

BELOW: KEY AIRCRAFT DATA WILL BE TRANSMITTED AUTOMATICALLY TO ENABLE PREDICTIVE MAINTENANCE



for customer use,” explains Vianna. “We wrote a very tight requirement list, by listening to our customers on what’s necessary and expected on the PC-24.”

Fitting in the box was still quite a task. “Most aircraft in this category have a drop-down aisle, and they use that space under the seats for the electronics,” says Vianna. “We don’t want to do that to our nice flat floor, which is very comfortable, so we had to find some space between frames.”

Customers don’t have too long to wait to enjoy these changes. The divan and IFE system are still prototypes, displayed at NBAA-BACE 2023 on an aircraft with an experimental certificate, to gain feedback. The targeted entry into service is Q2 2024 for the divan and Q3 2024 for the IFE. All the other updates will feature on new aircraft delivered from 2024. ✕

## AENIGMA *application*

The PC-24 displayed at NBAA-BACE 2023 featured the first business aircraft application for F/List’s F/Lab Aenigma bio-based material. Applied to bulkhead and decorative surfaces, the material was customised to have a silver finish, which was achieved using pure metal powder and avoiding the use of synthetic and petrol-based pigments.

Flavia Vianna of Pilatus says F/List provides a huge variety of possibilities with F/Lab Aenigma. The application shown at NBAA-

BACE was designed to match stripes in the carpet. “That’s just to show how far we can go with the design of this beautiful material,” says Vianna. “The response at NBAA-BACE was very positive.”

The demonstrator also showcased a new engineered stone used for countertops and flooring. The new countertop design has grooves around the edges to prevent spills. “Everything has chamfers and they’re less rounded, they have a more edgy and sleek

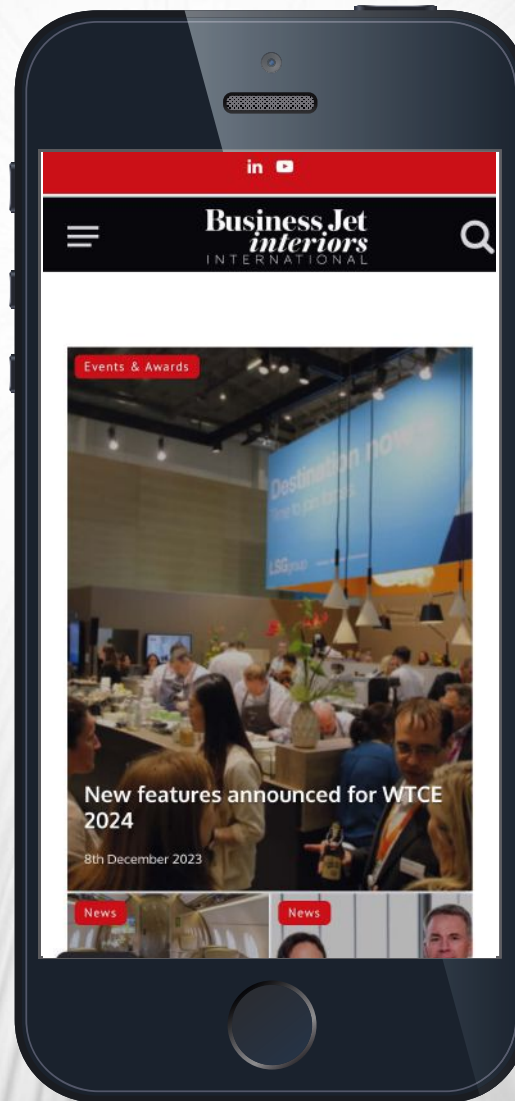
shape following our Pilatus design language throughout the cabin,” says Vianna.

This more angular design required the most robust material possible. “F/List proposed this engineered stone, which is super robust, can conform to the shapes we designed, and is controlled, so we don’t get unexpected natural unwanted veins and stains,” says Vianna. “It’s still real stone, but acts less like marble and more like granite in terms of robustness, while being as beautiful as marble.”



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# FINE DINING

BUSINESS JET CABIN INSERT AND GALLEY SUPPLIERS SHARE THEIR LATEST DEVELOPMENTS TO ELEVATE ONBOARD CATERING

*Words by Izzy Kington*

## Longer-lasting chill

The latest addition to Bucher's ARCTiCart product family (which also includes trolleys) is an ATLAS-standard insulated galley insert. The Box is highly insulated, to keep drinks cold, ice cream frozen or meals safely chilled for an extended period.

Bucher says this is achieved through high-performance, self-contained insulation – no air chiller or dry ice is needed – serving simpler and more efficient cold chain logistics for aircraft catering.

"High-performance heat-shielding materials and an optimised structural design combine to keep the initial temperature of food and drinks low," comments Francisco Aguilera, CEO of Bucher. "It minimises heat transfer between the interior of the container and the external environment."

Additionally, the unit is designed to offer high capacity and comes with a handle for

easy carriage to and from the aircraft. Its latches allow a seal or lock to be placed. Bucher says the door and wall thickness is similar to non-insulated standard units.

The technology utilised in this product also features in full- and half-size catering trolleys





## Improved user interfaces

Enflite has developed a new generation of galley appliances. These include even-flow convection and microwave ovens, and a refrigerator/freezer unit – all of which have a new glass front face. The range also includes a coffee maker and warming/cooling drawer inserts. All feature a new capacitive touch user interface. 28VDC or 115VAC power options are available.

All the products can be delivered as integrated components or line replaceable units for executive, VIP and head-of-state aircraft. Enflite also offers customisation of size and finish, and elements such as which side doors are hinged on. The products are backed by a one-year warranty on parts and labour.

The coffeemaker has a front-mounted fill port and requires no plumbing, producing 54fl oz (1.5 l) of coffee. The unit weighs 16 lb (7.3kg) and Enflite says load factors meet or exceed the requirements of 14 CFR 25.561, with TSO certification pending. The unit has a non-pressurised water tank, is controlled by microprocessor and has a server guard to help prevent spills, while a lock keeps the brew basket in place.

The new refrigerator features design improvements including a new controller/user interface with added push button for Celsius or Fahrenheit options and more precise temperature settings. The internal temperature sensor has been redesigned for reliability, and there is a new magnetic door seal and improved adjustable door latch. The new unit weighs 42 lb (19kg) with 20 lb (9kg) capacity (forward-facing) and 40 lb capacity (side- or aft-facing), and operates at 32-44°F (0°-6.7°C). Load factors meet or exceed 14 CFR 25.561 requirements. It is DO-160 tested and certified.

Meanwhile, the new warming and cooling drawer operates at 40-140°F (4-60°C). It weighs 23 lb (10.4kg) with 50 lb (22.7kg) capacity. Features include an interior light that activates when the lid is opened or closed; an illuminated on/off switch; and an insulated lid.



IMAGE: SAFRAN

## Greener COUNTERTOPS

As well as its galley inserts, Safran Cabin also builds entire galleys. Here the company bears in mind that the galley is often the first element people see when they step on board, and therefore its design has to fulfil expectations of elegance and refinement.

Environmental requirements are also influencing Safran Cabin's galley work. The firm shares that in the design of its countertops, it opts for materials including pre-consumer recycled content, and with low levels of volatile organic compounds, to reduce its

ecological footprint. "This approach opens up alternatives to traditional stone surfaces, while preserving the characteristic refinement of our products," says Michel Bussey, VP and general manager of the Safran Cabin Canada site. "This initiative, in harmony with our concern for the environment, translates into a wide variety of customisation choices for the countertops of our cabinets. We are enthusiastic about contributing to a travel experience that combines elegance and durability, so that every flight is an exceptional experience."

Safran Cabin's galley inserts include coffeemakers, kettles, convection and microwave ovens, and warming drawers



# NATURAL BEAUTY

A new design philosophy aims to blend high-end aesthetics and environmental excellence – Perrone explains how Noble genuine leather and Alcantara have been formulated to fit the bill

**I**n business and private aviation, high-end aesthetics and comfort must meet durability and sustainability. Perrone Performance Leathers & Textiles is committed to crafting extraordinary materials that redefine the standard, including in terms of sustainability. Noble is one of the company's premium leather ranges, and is designed to offer sophistication and resilience, softness, flexibility and strength.

In the realm of high-end aviation, personalisation reigns supreme, and Perrone has factored this into its Noble offering. A full spectrum of colours and customisation options are available for the range, to enable free creative expression.

Perrone shares that for Noble, the best crusts are selected for processing into grade-A hides, eliminating any mixture of grades and to ensure consistency and quality. The manufacturing process was developed to maintain the native characteristics of the material.

## STRENGTH AND BEAUTY

Noble hides comes in sizes of 48-58ft<sup>2</sup> (4.46-5.39m<sup>2</sup>), with a thickness of 0.9-1.1mm (0.035-0.043in). Perrone says this gives Noble both grandeur and enduring strength. "The large hide size not only enhances efficiency but also contributes





BELOW & RIGHT: DUCHESS  
GENUINE LEATHER

Perrone's Noble  
leather weighs  
686-839g/m<sup>2</sup>  
(2.25-2.75oz/ft<sup>2</sup>)

MAIN: NOBLE, A RANGE  
OF GENUINE LEATHER MADE  
FROM GRADE-A HIDES

LEFT: MONARCH GENUINE  
LEATHER IS ALSO AN OPTION  
FOR BUSINESS JETS

to cleaner and more consistent finishes," says Bill Perrone, president at Perrone.

From a passenger's perspective, leather can be synonymous with a luxurious and comfortable travel experience.

"Associated with quality and style, leather has a timeless appeal that resonates with those who appreciate the finer things in life," says Perrone.

#### SAFETY FIRST

Safety is paramount in aviation interiors, and here Noble surpasses expectations, Perrone shares. The material successfully passes both the 12- and 60-second vertical burn specifications. "This is a testament to Perrone's dedication to crafting not just outstanding but also safe and high-quality products," says Perrone. "This commitment to safety is interwoven

with the material's inherent characteristics, providing a seamless blend of both opulence and security."

What of Noble's environmental credentials? "While synthetic materials are often perceived as more sustainable, it's crucial to recognise that leather, particularly from Perrone, is inherently upcycled," says Perrone. "As a by-product of the meat industry, leather is already being repurposed and given new life, reducing waste. Perrone is also committed to ensuring the longest possible lifespan for its products, aligning with the industry trend of valuing repair and refurbishment over replacement."

#### PANEL HIDES

Perrone has also developed a panel hides service, available with the Noble leather





ALCANTARA AVANT  
AND ALCANTARA  
AVANT PERFORATED

range. With the panel hides service, only the prime, central, portion of the hide is processed. "This reduces environmental impact during processing and transportation," comments Perrone.

The company also offers Alcantara. A globally recognised textile in high-end fashion, furnishing and automotive markets, Alcantara is also used in aircraft. In fact, Perrone is the exclusive distributor of this textile in the aviation market. "Known for its comfort, style and elegance, Alcantara is a preferred designer's choice for interiors in private jets, helicopters and major airline fleets," shares Perrone.

The versatile range includes Alcantara Avant for upholstery; Alcantara Master FR for corporate sidewalls, vertical surfaces and headliners; and Alcantara HR, a 65/65-compliant option for sidewalls, vertical surfaces and more.

Perrone characterises Alcantara as a textile melding durability, contemporary aesthetics, longevity and easy maintenance. The textile also aligns with the company's commitment to

sustainability. "Alcantara, certified carbon-neutral since 2009, leads the charge with a holistic approach to minimising environmental impact," says Perrone.

#### SUSTAINABILITY GOALS

The company's sustainability pledge outlines ambitious goals, such as ensuring 50% of its product catalogue comprises at least 50% recycled, carbon-neutral or renewable materials by 2030. Other commitments include its materials upcycling initiative, where unserviceable dress covers and scrap portions of leather materials are donated, reducing waste and supporting positive social impact. "As designers continue to shape the future of corporate aviation interiors, Noble genuine leather and Alcantara remain indispensable tools in their creative arsenal," says Perrone. "Noble's commitment to sophistication and sustainability – coupled with Alcantara's versatile compositions and eco-friendly credentials – exemplify the harmonious convergence of aesthetics and responsibility."

"Perrone stands as a one-stop source for those seeking to elevate their designs, seamlessly fusing luxury, durability and environmental consciousness in the high-flying world of corporate aviation interiors," he continues. "In the fast-paced evolution of aviation design, the utilisation of high-end materials like Noble genuine leather and Alcantara speaks volumes about the industry's dedication to elevating the passenger experience. With a canvas of customisation options and a commitment to sustainability, Perrone empowers designers to shape interiors that go beyond comfort, merging artistry with responsibility. The legacy of these materials extends beyond the luxurious confines of private jets and helicopters, marking a paradigm shift towards a future where elegance and eco-consciousness soar hand in hand." ✪

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# GLOBAL VISION

Ultraleather and faux suede products from Tapis are designed to offer many sustainability benefits

**U**ltraleather is a popular option for business jet interiors that has continued to develop over the years, with the most recent developments focused around sustainability. "The original Ultraleather has been a customer favourite for several years, and each Ultraleather product offers an array of sustainable attributes which will only continue to evolve into the future," says Lauren Kenealy, marketing manager at Tapis.

Perhaps one of the lesser-known facts about the polyurethane material is that Ultraleather products with 100% rayon backcloths feature Tencel Modal fibres, supplied by Lenzing Group. The fibres are produced from mainly beech wood, sourced from certified-sustainable forests in Austria and neighbouring countries. "A natural and renewable raw material, the fibres are produced using an efficient process that recycles water and solvents in an eco-responsible way," says Kenealy.

All Ultraleather materials that have a 100% rayon backcloth contain these fibres. These products include Ultraleather Original, Pro, Bolero, Dwell, Linen and more. "By using more than 83% bioenergy, the production of Tencel Modal emits 81.5% less greenhouse gas than generic modals," explains Kenealy.

## NEXT UPDATES

Ultraleathers with backcloths made from 65% polyester and 35% rayon will include "recycled and responsible resources" by 2025, Kenealy shares. "The recycled polyester will be sourced from Repreve and uses recycled plastic, post-consumer polyester, and recycled post-industrial polyester," she adds. "It uses an estimated 8.3 recycled plastic bottles per yard or nine bottles per meter. Supporting our use of recycled fibres, the use of Repreve helps conserve natural resources, diverts waste from landfill, and uses less energy."



MAIN: ULTRALEATHER  
VOLAR BIO, THE FIRST  
BIO-BASED ULTRALEATHER

RIGHT: ULTRALEATHER  
DWELL AND FUSION

For the 35%-rayon ranges – including Promessa, Promessa AV, Tottori, Coast, Pumice and more – Ecovero fibres will be used. "Ecovero is a branded viscose-alternative fibre produced by Lenzing that uses sustainable wood inputs from certified and controlled sources," says Kenealy. "Compared to generic viscose, Ecovero has up to 50% lower water impact and 50% fewer emissions calculated by the Higg Materials Sustainability Index."

In 2019, Ultraleather Volar Bio was introduced as the first bio-based Ultraleather collection. The product touts a 29% USDA BioPreferred Program label, because of its reduced dependence on finite resources. It incorporates wood pulp and corn-derived resins. By 2025, the collection will include Susterra propanediol, which is sourced from US corn dent kernels and does not detract from food supply or agricultural resources. "Dent corn is a

Tapis offers wide in-stock options and testing services at its 38,000ft<sup>2</sup> (3,530m<sup>2</sup>) facility in Dallas, Texas

BELOW: ULTRALEATHER BOLERO, ONE OF THE RANGES FEATURING TENCEL MODAL FIBRES

RIGHT: ULTRALEATHER ORIGINAL, ANOTHER EXAMPLE USING THE TENCEL MODAL WOOD-DERIVED FIBRES



both for seating and vertical surfaces. The company says with the use of customised Susterra and base product Tencel Modal fibres, Ultraleather can contain upwards of 70% renewable resources.

#### FAUX SUEDE

In addition to the advances of Ultraleather, Tapis has been working closely with its mills to increase the sustainability of its range of faux suede products. The main goal with Ultrasuede is to make it a 100% plant-based product. Since 2012 Ultrasuede has been made using ultra-fine fibres obtained from recycling technology. Ultrasuede's composition now consists of 30% plant-based PET. These fibres are made from by-products recovered from food processing, from the non-edible parts of sugar cane.

"Meanwhile TapiSuede is a superior-luxury, high-performance suede responsibly engineered with recycled polyester fibres," says Kenealy. "Using a pure recycling process free from organic solvents, the result is a textile of the

highest quality and purity, comparable to virgin polyester. TapiSuede is made with 84% less energy than that required to produce virgin polyester."

She elaborates that TapiSuede is made in a contained, water-borne suspension system; no harmful solvents are used; and no toxic substances are discharged into the environment. TapiSuede production is certified under the ISO 14001 standard for safety and environmental management.

"Tapis is committed to developing innovative products for aircraft cabin interiors that set a new standard for sustainability," Kenealy summarises. "We strive to reduce the carbon footprint of air travel significantly through cleaner manufacturing processes, the utilisation of recycled and plant-based materials, longer product life, and weight savings throughout all the sectors of aviation." ✕

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renewable, resource-efficient carbohydrate crop allowing the production of bio-based building blocks at a large-scale, replacing fossil fuels," says Kenealy. "Susterra is 100% bio-based, USDA certified, and reduces the carbon footprint."

To follow in the footsteps of Volar Bio, Tapis has started to develop customised Ultraleather products to include Susterra. The resins have been included successfully in various commercial airline programmes,



# WOOD WORKS

Philippe Seidenbinder, CEO of Skywoods, discusses his vision for the VIP sector and the evolving use of wood in VIP and VVIP aircraft cabins

**Q WHAT HAS BEEN THE MOST IMPORTANT EVENT FOR SKYWOODS RECENTLY?**

The most important recent event is certainly being selected by long-term customer Airbus Corporate Jets and Comlux to provide the wooden surfaces for the first 15 ACJ TwoTwenty interiors. This aircraft is a true game-changer in business aviation. Imagine – for the operative costs of a standard business jet, you can fly in a VIP single-aisle jet liner, with the associated cabin volume and luggage capacity. The advantages of this remarkable aircraft are so obvious, that the more Airbus can supply green aircraft to completion centres, the more they will sell it. The proof is that Comlux has sold two more recently, and I have no doubt that sales will accelerate as the first ACJ TwoTwenty aircraft are showcased to potential customers.

**HOW WOULD YOU SUM UP SKYWOODS' APPROACH?**

We embody a combination of French haute-couture spirit and German quality. When it comes to luxury and refinement, we set no limits. We love nothing more than to make a designer feel that with us, they can give free rein to their creativity.

This approach is exemplified by the sunburst artwork we recently created for Jet Aviation for the ACJ319 Thunderbird project. We spent an inordinate amount of time finding woods that harmonised perfectly. For the spokes, the wood had to be positioned in a very precise 50° alternating angle. It was a lot of work, but in the end, what a reward!

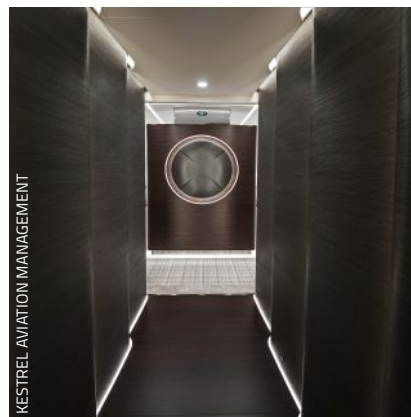
**SO YOU'RE FOCUSED ON TECHNICAL AND DECORATIVE INNOVATION?**

Of course. In recent years, in line with market trends, we have been working on materials and 3D effects. This is how we



ADRIEN DASTÈ / AIRBUS SAS 2023

TOP LEFT: A LOUNGE ON THE ACJ TWOTWENTY, FOR WHICH SKYWOODS PROVIDES WOODEN SURFACES



KESTREL AVIATION MANAGEMENT

developed a new type of embossing that imitates brushed wood. It was created for cabin co-designer Jacques Pierrejean and completion centre Greenpoint Technologies as part of Project Skyblue, the very first VVIP BBJ 787 completion, a project managed by Kestrel Aviation Management.

**HOW DO YOU ENVISION THE COMPANY'S FUTURE?**

I believe that when you are a major supplier of wood to Airbus Corporate Jets, as well as to prestigious completion centres such as AMAC Aerospace and



FAR LEFT: A NEW TYPE OF BRUSHED WOOD EMBOSING EFFECT WAS CREATED FOR THE FIRST VVIP BBJ 787 COMPLETION

LEFT: SKYWOODS WAS JET AVIATION'S PARTNER FOR THE SUNBURST ARTWORK ON THIS ACJ319NEO, WHICH IS PART OF GLOBAL JET'S CHARTER FLEET

Jet Aviation, you can look to the future with a certain degree of serenity. However, it's up to us to continue proving to our customers, day after day, that we are the best-placed supplier to help them meet the ongoing challenge of VVIP aircraft cabin completion. Our motto is more relevant than ever: what you imagine, we can create. ✕

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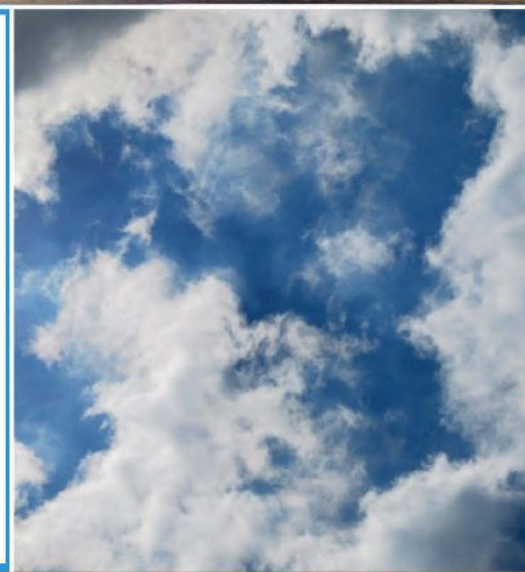
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# SAFETY FIRST

The use of personal electronic devices has become standard, so AMAC Aerospace's certification experts have developed new solutions to meet newly enhanced certification requirements

There are more than 100 AMAC engineers located in Basel, Switzerland, working across multiple disciplines, including certification, testing and much more

**M**odern travellers expect to use and charge their portable electronic devices (PEDs) wherever they are, on the ground and in the air. However, there are challenges for the creators of aircraft cabins in meeting that demand. "PEDs contain lithium batteries and present a very high fire risk," explains Rami El Olabi, Chief of Office of Airworthiness/CVE, AMAC Aerospace. "If a lithium battery catches fire, a traditional fire extinguisher cannot cope with it; this type of fire does not need oxygen from the atmosphere to sustain itself. Therefore, lithium batteries are only allowed to be transported in cabin hand luggage, where they can be monitored."

Regulatory bodies as the FAA and EASA set the safety certification rules. Yet, more challenges await engineers. Some aircraft owners would like several charging stations in the cabin, next to each other. "The comfort of the passenger is the nightmare of the engineer, as several devices mean an increased risk of propagation from one unit to the next in a fire," explains El Olabi.

## LITHIUM BATTERIES

To mitigate the risks, EASA released the new ETSO 142-b qualification standard for lithium batteries contained in equipment that is permanently installed on aircraft. This requires outfitters to choose suitable equipment, review the qualification data and respect installation requirements, for example staying away from oxygen and fuel sources when installing equipment containing lithium batteries.

EASA issued special conditions to outfitters, to regulate the installation of charging stations. "The main goal is avoiding fire propagation from one unit to the next and extinguishing the concerned unit on time," says El Olabi.



MAIN & INSET: USB CHARGING POINTS WERE INSTALLED AT FLOOR-LEVEL ON THIS BBJ 737, OPERATED BY ROYAL JET

AMAC Aerospace has successfully designed and installed a charging station for five iPads on an ACJ319. "The compliance demonstration activities dealt with a mix of design features that enhance fire containment and detectability, combined with a robust procedure to extinguish the unit on fire," shares El Olabi.

## FIRE EXTINGUISHERS

There have been other changes too, for example around the use of halon-free fire extinguishers. "Halon became forbidden in Europe due to environmental considerations," explains El Olabi. "The industry had to find ways of replacing halon in fire extinguishers with other agents that are efficient on the fire and not toxic for the user."

El Olabi also notes there are other cases where new safety requirements have necessitated the development of new solutions: "For example, side-facing seats present higher injury risks for

passengers than forward-facing seats; which led to the use of airbags in seatbelts and leg flail protection to avoid leg injuries."

Another customer requirement is for seamless wi-fi connection throughout all phases of flight. This means essential aircraft systems need to be compatible from an electromagnetic aspect, and there are additional test considerations.

"AMAC Aerospace's teams dedicate their engineering know-how to such challenges," comments El Olabi.

A particularly big regulatory change came with EASA's introduction of the Level of Involvement (LOI) process in Commission Regulation (EU)2019/897. AMAC developed internal procedures to ensure full compliance with this. The procedures, accepted by EASA, are used when AMAC applies for major changes to aircraft. ✕

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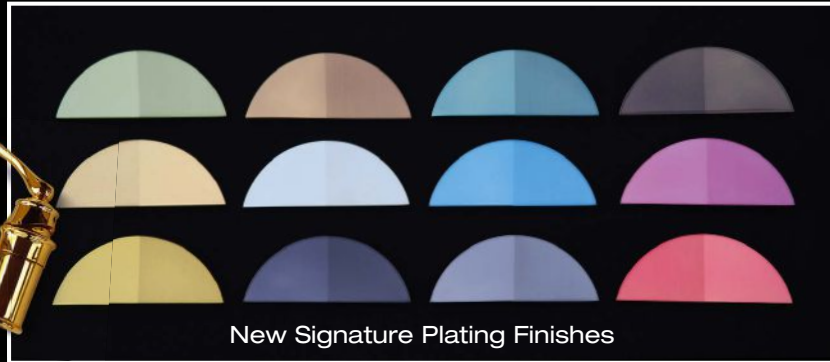




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## THE YEAR AHEAD

Some of our advertisers share their comments on what to expect from 2024



*We are looking forward to an exciting 12 months as our pipeline and hangars are full of promising new projects. We are proud to have gained worldwide recognition for designing and creating unique and beautiful interiors for private and VVIP aircraft. In 2024, we are dedicating our completion skills to the refurbishment of a Boeing 747-8 head-of-state aircraft. Furthermore, our long-term outlook includes a variety of Neo and Max aircraft. Last but not least, all our clients will profit from the many STCs we have built up over time, and we will continue with that."*

ERIC HOEGEN, GROUP SALES, AMAC AEROSPACE



*Crafting a product distinguished by its natural beauty, Townsend Leather is igniting the industry's return to the innate, luxurious roots of leather. In 2024, we aim to please the leather connoisseur that appreciates the original feel and look of leather by launching a calfskin product in light, soft and natural finishes and colours. Our aviation customers' desire for exquisite and lavish leathers will be fuelled by the reintroduction of elevated calfskin that is so nice, they'll be looking for opportunities to feature it on their next projects."*

DANIELLE STEDING, PRODUCT DEVELOPMENT, TOWNSEND LEATHER



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# hidden depths

THIS RESIDENTIAL PROJECT BY MU ARCHITECTURE RESPECTS THE SITE'S HISTORY AND FEATURES A MYSTERIOUS AMBIENCE

Suite 201 is a residential suite on a historic street in Montreal, Canada, where a former resident was Joe Beef, an innkeeper. The new design by MU Architecture celebrates this history while offering dark drama.

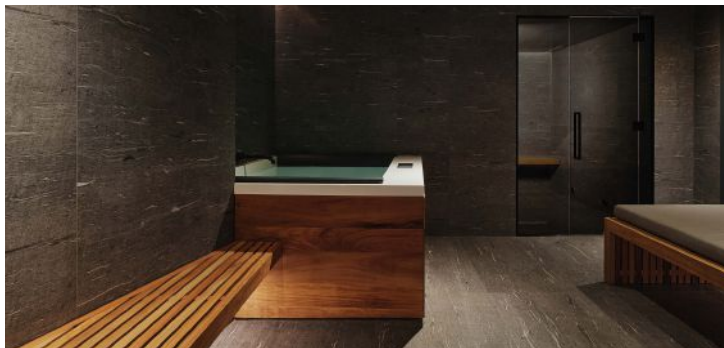
The living room takes on the concept of a tavern and integrates with a kitchen/functional service bar. Polarising film can transform the window glass to opaque for privacy. There are also subtly smoked glass panels.

The kitchen/bar features a dramatic dark scheme with black-stained woodwork, black quartz countertops, metal panels and metal shelves. Details such as the

wood grain, discreet ambient lighting and rounded corners – for example in the brass footrest and faucet – add touches of warmth and softness to balance the design.

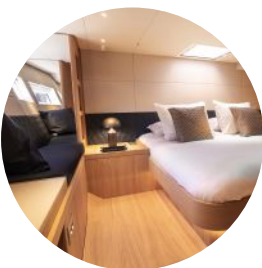
There are also several hidden doors throughout, one to a laundry room, and another to a spa area complete with steam bath, shower and relaxation platforms. Here ceramic surfaces resemble dark stone, and there is more indirect lighting, as well as smoked glass panels and iroko wood accents.

Meanwhile a hidden door in the master bedroom, veiled behind a mirror, opens into a dressing area with wood panelled walls. ❖



IMAGES: ULYSSE LEMERISE-BOUCHARD/V2COM

## OTHER EYE-CATCHING DESIGNS FROM VARIOUS INDUSTRIES...



1 Bentley Motors and Contest Yachts created this bespoke yacht interior for a private client, in the 20m Contest 67CS. Details include Bentley's signature diamond-quilted leather, as well as hand cross stitching usually used for steering wheels.



2 These first-class suites were created by tangerine for Japan Airlines' new A350-1000 fleet. The bespoke seat offers three modes – sofa, seat and single bed, and double bed. There is also a large, sliding dining table and space for a companion to join for dinner.



3 This penthouse was designed by ACPV Architects for a Ytech development in Miami, Florida, due for completion in 2027. It features silk georgette marble, eucalyptus wood claddings, mineral lime-based finishes, fluted glass walls, spaghetti stone touches and ash flooring.

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