

Business Jet *interiors* INTERNATIONAL

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10th
ANNIVERSARY
special issue

REVEALED: *the future cabin*

A DECADE ON FROM OUR LAUNCH, INDUSTRY EXPERTS
REVEAL THE INNOVATIONS WE CAN EXPECT OVER THE
NEXT 10 YEARS IN 10 KEY AREAS OF THE CABIN

COMPLETION SKILLS

Is Europe's business aviation sector facing
a recruitment crisis?

HNWI PSYCHOLOGY

How to understand the key demands of high-net-
worth individuals during a completion project

FUTURE VEHICLES

The threat posed by increasingly interconnected
modes of personal transportation

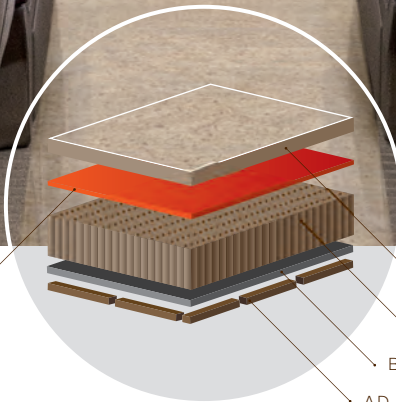
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Wheels up

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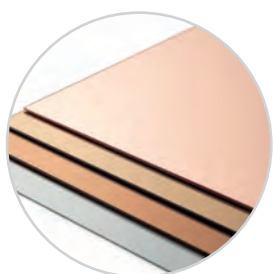
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FUTURE FOCUSED



elcome to the 10th anniversary issue of *Business Jet Interiors International*! I joined the team for the second issue in 2007, and have therefore been witness to nearly the full decade of the magazine's history – a time of great change in the industry. Indeed, in this issue there are in-depth interviews with two OEM design leads, who emphasize that customers today have much greater expectations of the cabin experience. Clearly this encompasses everything from aesthetics to ergonomics, technology and customization.

Standout innovations over the past 10 years range from stone flooring to real glass, modular seating and new types of galley equipment. We've also seen huge advances in PED integration and inflight connectivity, the more widespread adoption of carbon fiber, and major progression in 3D visualization, 3D printing and other technological tools. I spoke to a wide range of industry experts to compile their views on the

innovations we are likely to see over the next decade – and those on the wishlist – for the cover feature on page 16. It makes fascinating reading, and of course you can also turn to page 106 to read about the nearer-term innovations set to be shown at NBAA-BACE 2017 on October 10-12.

Although the lion's share of this issue is devoted to the industry's present and future, we couldn't resist a look back to our very first issue too. The magazine's first editor, Anthony James, revisits some of that publication's key stories on page 102. I also had a lot of fun picking out my 10 favorite non-OEM designs featured in the magazine over the years, for the feature on page 44 – an eye-catching selection indeed.

On behalf of the whole team, I'd like to thank everyone who has contributed to the magazine's success over the past decade. We very much look forward to supporting the industry as it evolves and innovates over the next 10 years and beyond. I can't wait to see what happens!

Izzy Kington, editor

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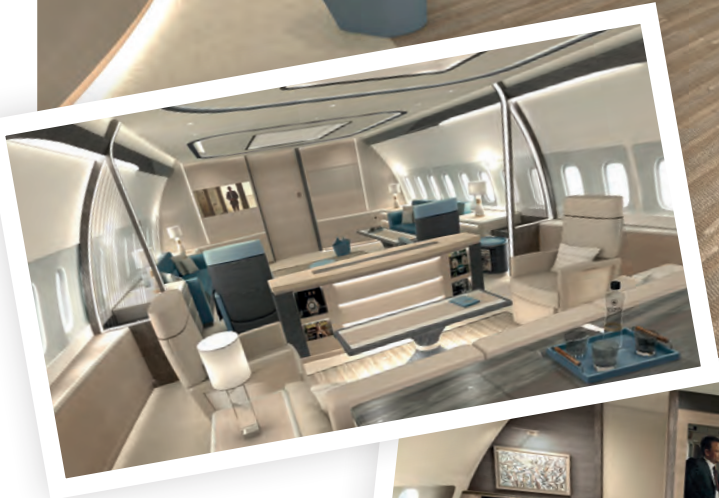
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WITH THIS BBJ 787-900 INTERIOR, M&R ASSOCIATES DESIGN WAS AIMING TO REPLICATE THE FEEL OF A CONTEMPORARY HOME, WITH LARGE OPEN SPACES. ALL AUDIO AND VIDEO SYSTEMS ARE INTEGRATED INSIDE FURNITURE, TO BE INVISIBLE. NATURAL MATERIALS ABOUND, INCLUDING CERUSED (LIMED) WOOD AND TEXTILES INCLUDING LINEN, COTTON AND WOOL. THESE ARE CONTRASTED WITH TITANIUM, SATIN AND SHINY FINISHES.



PIERREJEAN DESIGN STUDIO HAS BEEN WORKING ON SOME DESIGNS FOR THE AERION AS2 SUPERSONIC BUSINESS JET.



THIS IS THE RESULT OF F/LIST GERMANY'S FIRST LARGE-SCALE REFURBISHMENT, A CHALLENGER 850 OWNED BY CHARTER OPERATOR AIR-X. THE UPHOLSTERY, LININGS AND CARPETS WERE UPDATED, AND MATT OAK SURFACES WERE REWORKED.



PIPER ANNOUNCED A NEW PERSONALIZATION UPGRADE PACKAGE CALLED M600/EXP IN APRIL 2017. IT GIVES CUSTOMERS THE OPPORTUNITY TO PERSONALIZE AREAS OF THEIR INTERIOR, FROM A SELECTION OF UPGRADED STITCHING PATTERNS, ADORNMENTS AND FOUR EXTERIOR PAINT SCHEMES.



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CARBON COPY CREATED OF CARBON-FIBER INTERIOR

Back in 2014, Flying Colours Corp (FCC) delivered a Challenger 850 with a distinctive black and white interior, with a red divan, and full of carbon fiber. Now the completion center is replicating the interior on a pre-owned Global Express for the same client, who has sold the original.

The aircraft arrived at FCC's site in Peterborough, Ontario, Canada, in February 2017. After a pre-purchase inspection, the aircraft entered the refurbishment and modification stage in April 2017. As well as the refurbishment, the project involved floorplan modifications, the addition of Ka-band connectivity equipment, and some other IFE upgrades. The workscope also included heavy maintenance and a customized paint scheme.





Q&A Sean Gillespie

EXECUTIVE VICE PRESIDENT,
FLYING COLOURS CORP

What was the brief?

This project is for the same client that we completed a Challenger 850 for four years ago. He's now sold that aircraft and bought a Global Express, because he wants to be able to fly further. But he loved the Challenger 850 interior so much that he wants to repeat it by retrofitting it on this pre-owned Global Express. He still loves the carbon fiber, the white and black scheme, and the modern and sleek look. Now he's also putting in the latest and greatest in connectivity.

What are the main challenges in recreating the interior on a different airframe?

Everything is different. He wanted the same seat design but that means putting it on a different seat frame, which has different armrests, a different headrest, back, width, everything. Our design team worked with him and his team to refine it. We tried to match the design as much as possible. There are some things you can change – for example the headrests and armrests – and keep the same certification, because it's just a service bolt to the seat. We work with seat vendors when clients want to change things, for example to get the right kind of curve to the seat.

Have you seen more demand for less classic-looking interiors and materials lately?

I don't know if it's a trend, but for us it seems to be that way right now with private clients. It doesn't appeal to everyone, but a lot of people like the black and white look at the moment, especially in Asia. As far as I know, this client's Challenger 850 was sold relatively quickly.

Then in terms of materials, clients – including those who want something very non-standard in terms of the design – are also thinking more about durability these days. They're looking at alternatives to high-gloss wood because it scratches and can crack. We're always looking at finishes that don't crack, and paying attention to the way that things are curved so that they don't have a sharp radius, to increase durability.

Are you seeing an uptick in refurbishment activity?

It's a buyer's market right now, so that usually leaves more money to put into the design. I just met with a client about an aircraft that I don't think would normally be in the price range it is. So then, of course, he says, "If I can buy it for that much, then I can put this much in it."



The livery will be very different from the original Challenger 850's. It will be implemented in a charcoal gray and gold color scheme.



There are 10 passenger seats and two three-place divans. Most of the seats are the original models, recovered in white leather. Seats opposite one of the divans are based on new models from Rockwell Collins. One divan is upholstered in a cherry red fabric.



The IFE system is the main point of departure from the Challenger 850, which was completed four years ago. The client decided to retain some of the equipment that was already in the pre-owned Global, as it had been updated by the previous owner not that long ago.



Honeywell's JetWave Ka-Band satellite communications system has been installed, which involved attaching LRUs, a radome and tail-mounted antenna. The system works with Inmarsat's Global Xpress (GX) Aviation broadband service, and enables live TV and video streaming across multiple onboard devices.



The materials are very similar to those on the Challenger 850, but come from different suppliers. Black and gray carbon fiber is used in place of wood veneer throughout, although there are some ebony accents. The color scheme extends to the black and white countertops in the galley and patterned carpet. Satin nickel plating completes the look.

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COMPLETIONS ROUNDUP

This quarter's announcements from completion centers around the world

HAMBURG, GERMANY

The Lufthansa Technik Group welcomed 151 young people on traditional or dual-study training programs: 76 in Hamburg, 44 in Frankfurt, 16 in Arnstadt, 11 in Alzey and four in Munich. The company offers training in 15 professions and courses of study. This year, 13% of the new trainees are women – 5% more than last year.

BERLIN, GERMANY

F/List Germany refurbished a Challenger 850. The seats and divan were re-upholstered, the former with a cream leather and the latter with a fabric. The ceiling and sidewalls feature new linings, and there are also new PSU panels. Matte oak surfaces – in the galley and on sideledges, the bulkhead and partition – were reworked, and the cabin is finished with grape-colored carpet.

BASEL, SWITZERLAND

AMAC can now conduct maintenance checks on aircraft registered in Taiwan. AMAC pursued the CAA approval so it could perform a C Check on a VIP ACJ319. The company also redelivered its third VVIP BBJ 777-200LR, following a 20-month nose-to-tail completion. AMAC also recently completed a 12-year base maintenance inspection and cabin refurbishment on an ACJ340-200 and a 24-month inspection on a BBJ747-8i. Recent base maintenance projects include two BBJs, a head-of-state A330 and a GIV.

VILNIUS, LITHUANIA

AviaAM Leasing delivered a Boeing 737-500 to KlasJet following a five-month modification by FL Technics. The aircraft's 126 economy seats were swapped for 56 business class models.

PETERBOROUGH, CANADA

Flying Colours Corp installed Rockwell Collins' FANS 1/A system and its own ADS-B solution on a Challenger 604 registered in Canada. It was one part of a 48-month maintenance inspection that took under two months. Another project saw the company install its first Honeywell JetWave Ka-band satcom system as part a Global Express refurbishment that also included IFE upgrades and modifications to the floorplan.

MOSES LAKE, WASHINGTON

Greenpoint Technologies redelivered a VIP BBJ 777-200LR to Crystal AirCruises ahead of schedule, following an interior completion that began in August 2016. The aircraft features an expansive lounge with divans, custom coved ceilings, and dining tables. Seats on board are a customized version of Zodiac Aerospace's Aura, with an increased seat width, customized privacy surround, four-way adjustable headrest, and storage ottoman. Greenpoint also signed for its sixth BBJ 787 interior modification – a BBJ 787-8, for which it will design the interior.

BANGOR, MAINE

C&L Aviation Group can now upgrade and replace old CMS in Challenger, Gulfstream, Hawker, Learjet and other aircraft types with the CMS solution from DPI Labs.

ST LOUIS, MISSOURI

Flying Colours Corp retrofitted Alto's new Cadence Switch System on two Challenger 850s for a corporate fleet operator. The cabins were reconfigured to include 19 business-class seats in a shuttle layout. The galley and other monuments were reconfigured, while soft goods, cabinetry and lighting were all updated. Both aircraft now have 25 switch panels, used to control all galley, cabin and lavatory functions.

ST LOUIS, ILLINOIS

Gulfstream is to assume responsibility for the maintenance operations currently run by sister company Jet Aviation at St Louis Downtown Airport. Jet Aviation will fulfill its current MRO and completions obligations through the transition, which is scheduled to complete in 2018.

INDIANAPOLIS, INDIANA

A private customer in Asia tasked Comlux Completion with a VIP ACJ320neo completion, the center's first such contract. The green delivery is scheduled for September 2019. It is estimated that the completion will take around 10 months.

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Beechcraft



Hawker

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With this BBJ 777 interior, Nikki Gledhill, designer and CEO of MBG International

Design, was going for a modern, yet timeless look. "Many recent projects have involved contemporary interiors with hard, clean lines," she says. "I wanted to escape rigid walls with something more organic and flowing."

The initial inspiration was a textile Gledhill saw while traveling for a project in Saudi Arabia. "It was linen with navy and gold embellishment," she says. "While navy and gold are a trendy combination in residential design, the combination has also been a timeless look for aviation for many decades. Soft lines combined with different textures created a nice balance of color and void." In the lounge for example, the veneer and gold accents are combined with soft navy leather.

Gledhill has paid a lot of attention to the lighting, one of her favorite aspects of interior design. Examples include a custom chandelier and sconce lighting in the master bedroom, and an organic light fixture in the lounge.

"I always try and utilize ambient and accent lighting in any project," she says. "Unique light fixtures provide a focal point as well as much-needed lighting in all spaces."

She thinks the biggest complications for certification would be the chandeliers and the seating. "Ottomans are usually a big hurdle as well, as designers don't imagine seatbelts, but as the certification process starts that becomes an enormous obstacle."

Gledhill hopes to develop the interior for the entire aircraft. "This started out as a fun side project for us to work on without any crazy deadlines or hurdles," she says. "Hopefully this can translate into a project for a client in the coming years."

SEATING

The various seating types – divans, accent chairs and the dining chairs – are all meant to be comfortable and are distinctive for each space. "Keeping the divans consistent with the private bedroom helps to tie the rooms together," says Gledhill.

OTTOMAN

The circular ottoman, finished in soft leather, was created to provoke conversation and interaction between occupants. "A friendly game of chess on the ottoman top is a nice way to relax in flight," says Gledhill.



GUIDED TOUR

Private stateroom

The focal point is a king-size bed with a headboard that incorporates accent lighting and storage. "Integrating a television into the curved panels allowed us to also install artwork, which can still be seen when the television is not in use," says Gledhill. "Integrating a foot bench into the bed and a soft flowing divan is a distinctive goal I had for this area."

Private lavatory

The private lavatory has two soft-shaped, free-standing sinks in front of backlit panels that provide lighting and artwork. Custom-made 3D-printed mirror frames also feature IFE monitors. There is a rainhead shower with digitally controlled temperature and water flow. The room also features LED lighting and a monitor. The area is finished with wood flooring.



Dining room

The dining table has a freeform custom table base and is surrounded by six high-back seats in a mixture of veneer, metal, leather and fiberglass. To help divide the large room, the bar area curves up to the ceiling into a freeform chandelier to mirror the table base below. The white high-gloss bulkheads with high-contrast veneer and gold accents give a modern style.

BAR AREA

The bar provides a space for passengers to enjoy a drink or light snack, but also works to divide the room without adding bulkheads and closing off spaces.



classic example



The aim of this design study for the ACJ350neo was to give potential clients another example of Lufthansa Technik Creative Design's flexibility regarding style and look on board.

"Lufthansa Technik has shown its ability with futuristic concepts; for example, the A350 Coming Home concept or the Sensual Purity Concept – a cooperation between Lufthansa Technik and the Mercedes-Benz Style team," says Michael Bork, aircraft interior architect, VIP and Special Mission Aircraft Services, Lufthansa Technik. "But we also see ongoing demand for timeless classic designs with new and fresh accents. For some owners, this is more pleasant and relaxing. They like to be surrounded by classic and timeless design elements, giving a familiar and tidy overall impression."

Consequently, the design has a classic western design style with an open, spacious feel. "By mixing this with technical themes, including indirect mood lighting, IFE systems, chrome parts and modern carpet patterns, we create visual links between the timeless elements and the high-tech aircraft," says Bork.

To keep the overall atmosphere light and bright, heavy-looking items and colors are avoided. All elements and details are designed to be easily adaptable to all A350neo floorplan configurations. "The concept can be seamlessly sustained to all kinds of onboard rooms – including bedrooms, guest and VIP bathrooms, a hallway and an office – and shapes a solid basis for further and detailed design development," comments Bork.

As with other Lufthansa Technik studies, the concept has already been checked for feasibility. "It has been proven to be practicable and feasible for realization with respect to regulations, certification, maintainability and, of course, Lufthansa Technik's quality standards," says Bork. "All the renderings shown are examples for early conceptual impressions, and a work in progress. They are representative of Lufthansa Technik's development process and what customers can expect at the early stages of the design process. After approval of the style concept, details will be developed in depth based on customer feedback."

LIGHTING

The neutral palette provides the perfect backdrop for mood lighting, while monuments are given a 'floating' look by using LED strip lighting underneath

SLIDING DOORS

Integrated sliding doors offer the possibility to completely separate all areas from each other. This enables private settings or a very spacious setup



COLUMNS

The classic look is completed by decorative columns reminiscent of classic architecture

GUIDED TOUR

Entrance area

The large, round entrance area, at Door 2, is equipped with double sliding doors that provide an identical look on each of the four sides. These doors are all positioned symmetrically to each other, also covering the left- and right-hand aircraft doors during flight. The short hallway has two VIP lavatories, one on each side.



Lounge

The generous lounge accommodates up to 16 passengers, with four divans, four tables and four single seats. IFE is delivered via three 55in screens – one aft and two forward.

Conference/dining area

This area, which seats 10 people, ends at Door 3. There are two 55in screens, centered on the forward and aft bulkheads. Other areas on the aircraft have yet to be defined.



the future

EXPERTS FROM THROUGHOUT THE
INDUSTRY DISCUSS THE CABIN INNOVATIONS
WE CAN EXPECT OVER THE NEXT DECADE

Words by Izzy Kington. Illustration by Sean Rodwell



IFEC AND CMS

There seems to be consensus that the trends for increased connectivity and use of PEDs will grow. "The challenge will be supporting a multitude of off-the-shelf platforms in terms of charging and input," says Tray Crow, director of interior design at Gulfstream.

For Inmarsat, which offers a Ka-band internet service with speeds up to 30Mbps, the key is to keep adding capacity. Kurt Weidemeyer, vice president of business and general aviation, says Inmarsat is talking to its hardware suppliers to introduce "proven" modem technology that will take streaming speeds to 330Mbps within the next two years. "We're also looking to get more efficiency out of the antenna," he says.

Also within the sphere of connectivity, Chris Moore, CCO of Satcom Direct, says maintaining the integrity of data in the air through cybersecurity tools is key.

PEDs aren't the only technologies that could contribute to the demise of fixed displays, says Billie Noble, director of electrical engineering at Associated Air Center (AAC): "I would like to see some interior designs replace monitors with screenless TVs that work like holograms."

Yves Pickardt, VIP aircraft interior designer at Linda Pinto-led studio Alberto Pinto, has the same idea: "You can get rid of real monitors and display information on almost any surface."

Elisabeth Harvey, director of design at the Jet Aviation Basel

Design Studio, says fixed PCUs will be replaced by smart storage solutions and holding devices for PEDs, but that 3D screens will become more popular. In the near term, Vince Restivo, vice president of program management at Mente Group, says space-saving OLED/QLED screens aren't too far off. "Practical video-conferencing and voice-activated system interfaces will soon be prevalent," he says. "Camera and video screen improvements will also make virtual reality a part of the interior."

Pickardt of Alberto Pinto and Adam White, director of Factorydesign, also expect a move to voice control. Harvey of Jet Aviation expects certain developments in the car industry to translate to private aircraft interiors within the next 10 years. "Hologram touch displays or gesture control will give passengers much more freedom in the cabin," she says.

Jay Beever, vice president of interior design at Embraer Executive Jets, warns that importing from other industries has to be done carefully. "We do not want to accidentally incorporate something that becomes out of date quickly," he says.

Overall, Noble of AAC says the move is toward functions combining in more unobtrusive and lighter equipment: "Companies will start producing smart boxes that include all the functions needed."

The recent FCX-001 concept from Bell Helicopter envisages augmented reality being used for infotainment

There is now a European Centre for Cyber Security in Aviation; members will be provided with intelligence on cyberattacks and on-demand means to face these threats

The new Glass Cabin 3D moving map from FDS Avionics enables passengers to see through the cabin to the surrounding terrain in the direction they point their PED



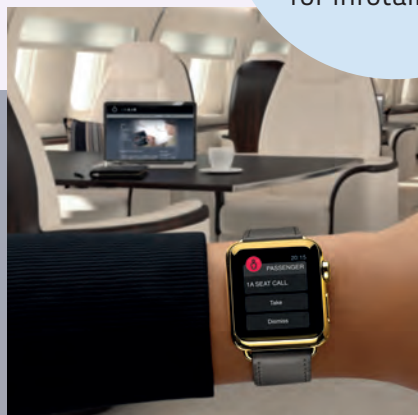
TOP: FDS AVIONICS' GLASS CABIN 3D MOVING MAP

ABOVE: VISION SYSTEMS INTRODUCED GESTURE CONTROL FOR ITS SPD-SMART EDW



RIGHT: SATCOM DIRECT AND LUFTHANSA TECHNIK RECENTLY LAUNCHED A PED-FRIENDLY IFE CONTENT SERVICE DELIVERED VIA SMARTBOX

Inmarsat is launching the European Aviation Network, using a combination of satellite and air-to-ground technologies. In test flights, the service hit speeds of up to 75Mbps. Kurt Weidemeyer credits this to having a 30MHz frequency spectrum and using 4G LTE technology



LEFT: IDAIR ENABLES CMS CONTROL FROM PASSENGERS' SMART WATCHES

RIGHT: GESTURE CONTROL IS ALREADY IN SOME CARS – INCLUDING THIS VW GOLF

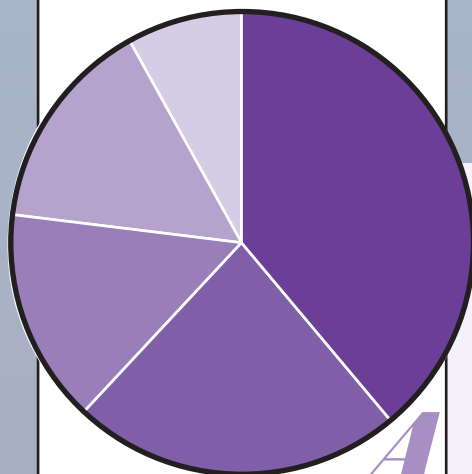


Readers' poll

Q

What would you like seat manufacturers to prioritize when developing new products?

As of publication day, our online readers say...



- 39% Enabling more customization
- 23% Integration of inductive charging
- 15% Integration of new control technologies
- 15% Reduced weight
- 8% Greater reliability/durability
- 0% Reduced cost
- 0% Improvements to seat heating
- 0% Improvements to massage functionality

RIGHT: MODULAR FLOORING ON BELL'S FCX-001 CONCEPT ENABLES RAPID CHANGES TO THE SEAT CONFIGURATION



HAECO Cabin Solutions created a double-hinge headrest to support the head and neck better than static and articulating headrests. Arc has a five-segment, articulating-joint cushion system with adjustable tilt and height

Taking Inairvation's Chair as its base, F A Porsche has created a seat concept incorporating titanium and carbon fiber



SEATS

The modular nature of Inairvation's ETSO 9g- and 16g-certified Chair platform is one of the biggest recent changes in the seat market. Chair is the basis for a new design by Alberto Pinto, created as part of a showcase concept for the BBJ737 MAX 7, 8 and 9, with a brief to look good for the next 10 years. "We used their technology for a one-pedestal base, but designed a carbon-fiber shell with a Kevlar-ending surrounding," says Yves Pickardt of Alberto Pinto.

Features include massage, integrated speakers in the headrest and a compartment in the armrest for controls and storage. To see through his vision, Pickardt is pushing for research to be conducted on how to apply leather to foam without stitching. "The old way, stitching and cutting like tailoring a suit, belongs to the past," he says. "A new technology would be to glue and vacuum the leather directly to the shaped foam, which you would then just cut around. I am confident this technology could be developed, and it would enable a seat to be upholstered 10 times faster."

Meanwhile, Adam White, director of Factorydesign, is hoping to see new superlight structures, not growing out of the floor but apparently hanging in space. "I'd like to see structural, high-tech materials on show rather than have working parts hidden by styling and cosmetic covers that add weight," he says.

On the subject of materials, could we see magnesium used in future aircraft seat designs? Birmingham City University in the UK and magnesium component supplier Meridian are collaborating on research and development (and educational) programs to push its wider use. According to the university, magnesium, at 1.8g/cm³, is 75% lighter than steel and 33% lighter than aluminum; it is abundant; 100% recyclable; and can deliver high strength.

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LIGHTING

Warja Borges, owner and designer at Unique Aircraft, hopes to see LED lighting replicate warmer, softer tones of yore. "It's very difficult to get an equal, smooth, neutral-warm light like old-fashioned bulbs," she says. "Some light sources change the color of your carefully selected surfaces, especially beige and gray ones, which is not what you want."

Others are excited by the prospect of using digital projectors to transform their cabins. "With some of the new projection systems, let's have passing constellations, cloud formations and brand-appropriate patterns – moving gently, of course," says Adam White of Factorydesign.

Likewise, Yves Pickardt of Alberto Pinto sees the opportunity to integrate LED lighting with thin glass products.

"There is a French artist who creates fractal images of flowers or trees that grow; computer images with thousands of colors and shapes that move in front of your eyes," he says. "If you could combine that with LEDs, software and glass on an aircraft, then you would really break the mold."

There could also be opportunities to improve controls. Sean Gillespie, executive vice president at Flying Colours Corp (FCC), says some clients want to eliminate switches. Meanwhile, Billie Noble of AAC is hoping for more opportunities to interface lighting and other systems using Bluetooth, to reduce the customer's bandwidth when using data. "Some lighting vendors have set off in this direction and I am expecting more to follow soon," she says.

Aircraft Lighting International products can be adjusted via Bluetooth, saving passengers' data

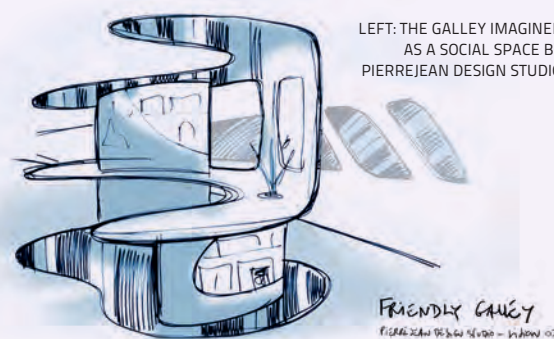
RIGHT AND BELOW: PROJECTION AND CARBON-FIBER CLAD READING LIGHTS ON THE PAGANI ACJ319NEO INFINITO DESIGN



RIGHT: AEROLUX SAYS WEIGHT REDUCTION IS THE BIGGEST CHALLENGE AHEAD



LEFT: THE GALLEY IMAGINED AS A SOCIAL SPACE BY PIERREJEAN DESIGN STUDIO



Lufthansa Technik began European Technical Standard Order (ETSO) testing for its Induction Cooking Platform in August 2017. It enables fresh food preparation using a pan, toaster or pot, and has an integrated fume hood, odor filter system, and pot containment system

LEFT: LUFTHANSA TECHNIK'S INDUCTION COOKING PLATFORM



GALLEYS

Warja Borges of Unique Aircraft would like to see aesthetic improvements in this area. "It would be great to have more modern-looking galley equipment that could also blend smoothly into the front surface with a cover," she says.

Beyond simple changes to the look, however, Sean Gillespie of FCC has seen a lot of demand for completely bespoke equipment, including one client who wanted an ice drawer to chill his vodka to a certain temperature. "We had to test it all, it was expensive," says Gillespie.

Galley insert specialist Aerolux has also responded to many such requests over the years (see page 144), but says the major challenge ahead will be

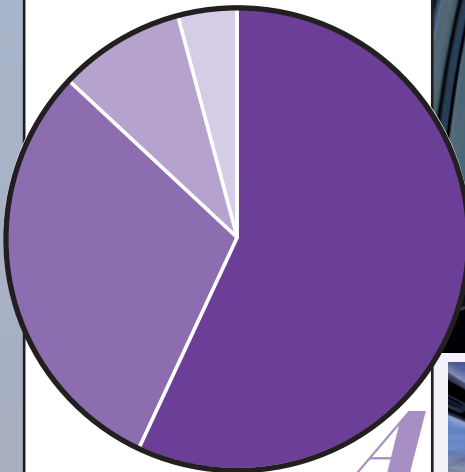
meeting weight reduction demands.

"An oven that was acceptable yesterday will need to be 15% lighter in the future. Everyone's demanding lighter and lighter equipment," says Glenn McQuire, engineering manager at Aerolux. "We're utilizing new materials and advances in construction technology, but a big issue with thinner and lighter fabrications is maintaining strength and resilience to damage. However, we're also looking on this development as a positive, because in the search for weight reduction, others may make inferior products. At Aerolux we won't compromise on quality; we build our galley equipment to have a 25-year lifespan or longer."

Readers' poll

Q Which of these window innovations would you most like to see become commonplace over the next 10 years?

As of publication day, our online readers say...



A

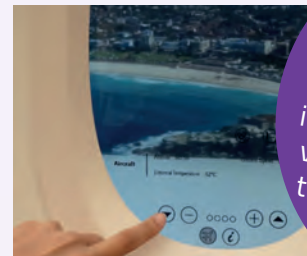
- 57% Electronic adjustment of tint/opacity
- 30% Much larger windows
- 9% Integration of IFE/CMS controls
- 4% Replacement by camera-fed displays



THE LATEST AS2 CONCEPT FROM DESIGN Q INCLUDES A 'SKYSCREEN'

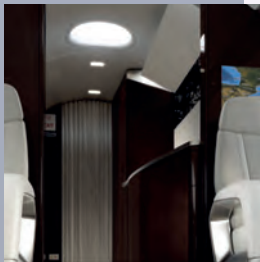


ABOVE: A TECHNICON CONCEPT USING CAMERA-FED SCREENS



ABOVE: VISION SYSTEMS' ELECTRONICALLY DIMMABLE WINDOW WITH VIDEO DISPLAY

Vision Systems has developed an electronically dimmable window (shown left) integrating an interactive video display that uses a transparent, flexible and thin color screen



TOP: THE UPCOMING DASSAULT FALCON 5X WILL HAVE A DIMMABLE SKYLIGHT DEVELOPED WITH VISION SYSTEMS

ABOVE: THE PORTRAIT WINDOW ON EMBRAER'S LINEAGE 1000E

WINDOWS

FCC'S Sean Gillespie reports that windows can be a deciding factor in an aircraft purchase: "We have a client that loves his Global 6000 but is buying the Global 7000 because he wants the windows, which are gigantic. He's going to put a Global 6000 layout into the Global 7000 because he just wants the windows."

Designs such as Fokker's SkyView Panoramic Window, which envisaged a huge window the width of three standard ones on a BBJ, and Embraer's portrait window on the Lineage 1000E, have caught the imagination. Meanwhile, some designers have explored the idea of removing windows completely, instead lining the sidewalls with camera-fed displays. Jay Beever of Embraer comes down on the side of big windows rather than none. "We would like to advance with regard to large windows and see

technology allow for greater integration with the environment," he says.

Meanwhile, Warja Borges of Unique Aircraft is looking forward to seeing the first panoramic windows installed. "It would be great if engineering and design could work closer together on such special features as both perspectives are important to develop a perfect solution," she comments.

Elisabeth Harvey of Jet Aviation provides a reminder that in the end all will be decided by customer demand. "It will be interesting to see how far OEMs go to embrace change and how willing clients will be to adopt an aircraft that is either windowless or much more open," she says. "Panoramic windows, which will also control the amount of natural light, the cabin humidity and temperature, will be an interesting development."

STEWARD: "SIR, WOULD YOU LIKE YOUR FRIED EGGS OVER-EASY,
OVER-MEDIUM, OVER-HARD OR SUNNY-SIDE UP?"

PASSENGER: "AHHH, YOU MUST HAVE AN AEROLUX
AL-SK15-100 SERIES SKILLET IN THE GALLEY!"

STEWARD: "BUT, OF COURSE, SIR, THIS IS *YOUR* BUSINESS JET."



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RIGHT: F/LIST'S MICROLUMBER TECHNIQUE CREATES THE IMPRESSION OF SOLID WOOD



AMAC Aerospace has created a new building process for lightweight cabinets that involves applying veneer to a new composite panel. The company says the weight reduction per monument could be as much as 30%

HARD MATERIALS

There have been huge advances in this area over the past 10 years, particularly in flooring, giving Gulfstream's Tray Crow faith in the industry's ability to make precious materials lightweight and durable. Adam White of Factorydesign also mentions the imperative for hard and durable materials: "Nanotech products are getting cleverer every year and we should have surfaces that look so good they defy being on board," he says.

Frank McKnight, CFO/partner at Signature Plating, senses an appetite for new plating finishes. "No new precious metals have been discovered, so the direction is to alter the color of current finishes

while keeping them in a platable and durable state," he says. "This can be easily done with a painted finish."

While Jay Beever of Embraer believes advances in composite, synthetic and recycled materials will play a crucial role, depending on acceptance, Yves Pickardt of Alberto Pinto calls for new technologies putting a new spin on real wood or marble: "I don't think we will ever get rid of natural materials, but there will be new treatments and ways of working with them," he says.

"I see hard materials becoming lighter, stronger and more flexible," says Elisabeth Harvey of Jet Aviation.

Jormac Aerospace is finding more uses for carbon fiber – including profiles, tie rods, periphery lining panels and support structures

Real stone with underfloor heating is now available from F/List. The product is 0.44in (11.1mm) thick, with a construction height of 0.67in (17.1mm). The company says it is "only negligibly heavier" than the non-heated version

Leather flooring is now available from F/List and Boxmark

SOFT MATERIALS

Tray Crow of Gulfstream would like to see further advancements in flame treatment so that leather has a more natural feel, with a softer hand. "In addition, we will continually be challenged to increase quality, while decreasing weight at the same time," he says.

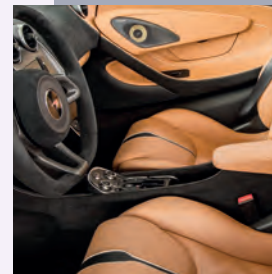
Mary Lee, senior completions designer at Duncan Aviation, says the trend is to replicate looks from the automotive, residential and yacht industries. "We work closely with material, carpet and leather vendors and suppliers to help recognize and support these trends and requests," she says.

Likewise, Chad Evans, director of aviation sales at Moore & Giles, sees the industry leaning on seat designs from the high-end automotive industry. "Unique

stitches and perforation are hot right now," says Evans.

But could more upholstery work be taken over by machines? Sean Gillespie of FCC says while a lot of leather work is automated, at least at the cutting stage, highly customized designs will still require a craftsman's attention. "Recently a client wanted double French stitching in two colors – that has to be done by a person," he says.

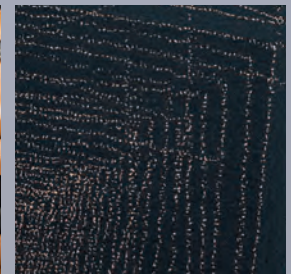
Meanwhile, Jennifer Kirchgessner, creative director at Scott Group Studio, says lead time is a crucial area for development. "Designers are working under tighter timelines," she says. "We are constantly working to develop tools and technology to make their jobs easier, and provide reduced lead times."



ABOVE: LUXURY CARS SUCH AS THIS McLAREN 570S SPIDER WILL CONTINUE TO INFLUENCE UPHOLSTERY TRENDS



TOP: THE CARPET ON A BBJ777 CONCEPT BY UNIQUE AIRCRAFT



ABOVE: PART OF SCOTT GROUP'S NEW AERIAL COLLECTION

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AGT recently added gold, rose gold, silver and bronze colors to its range of real glass

CTT is working to adapt its humidification system for traditional business jets; the key challenge is the small amount of space available



AIR QUALITY

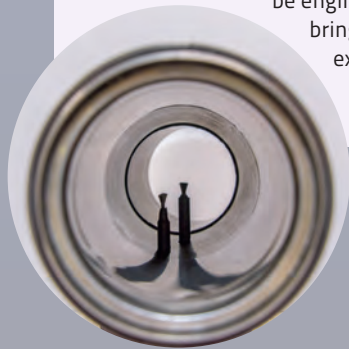
Does the launch of Aviation Clean Air's air and surface purification system indicate a growing focus on cabin air quality across the industry?

"Aviation remains one of the few major industries in which discussion has not really started regarding the use of more sustainable materials and materials that actively improve the space around them," says Elisabeth Harvey of Jet Aviation. "I anticipate much more focus on air quality and environmental issues in the next 10 years. Clean air coatings, which already exist outside the industry, could be developed, together with enhancements to the already existing solutions of air ionization."

Adam White of Factorydesign says cost will be the biggest factor in the wider roll-out of air quality technologies: "Putting aside fume events, which can be engineered out, it's all about bringing down the cost of existing filtration and conditioning technologies."

A European Commission study is underway on cabin air quality, following two recent studies into the subject

Zodiac Aerospace has created a fragrance diffuser, which it says is certifiable and can be installed throughout the cabin



ABOVE: AVIATION CLEAN AIR'S PURIFICATION TECHNOLOGY

GLASS

With the release of Amendment 19 to EASA's certification specifications for large aircraft (CS25), AeroGlass mirrors and transparencies from AviationGlass & Technology (AGT) can be installed as minor modifications, without requiring additional certification or STCs.

Now AGT is releasing a host of glass-based products, giving designers a new palette of colors and functions, including the ability to integrate lighting. "Our mirrors and transparencies are becoming smarter," says John Rietveldt, CEO of AGT. "Messages and signs light up and shine through translucent glass to

Another glass specialist, Air-Craftglass, will soon launch the Natural Collection (pictured left). This will give designers a choice of 300+ varieties of wood veneer, laminated with glass for a scratch-proof, UV-resistant surface

create a more captivating onboard experience."

Meanwhile, Air-Craftglass sees myriad applications for its glass products – from lenses, dust panels and mirrors, to shower doors, bulkheads, tabletops, cabinet doors and windows, floors and decorated elements. It says it can integrate lighting, TV screens and logos into its mirrors.

"We will see more and more glass, because we see it more and more in architecture," says Yves Pickardt of Alberto Pinto.

SOUNDPROOFING

"Traveling on the B787 and A350 show the improvement with sound generally when new materials are used for aircraft construction," says Adam White of Factorydesign. "However, there are also increasingly sophisticated electronic systems that help deaden noise, which I expect to see increasingly employed."

Warja Borges of Unique Aircraft adds that there is always a balance to be made between soundproofing and range. "New lightweight materials for soundproofing would be a great innovation to reach both targets, especially to support the advantages offered by the new Max and neo narrow-bodies," she says.

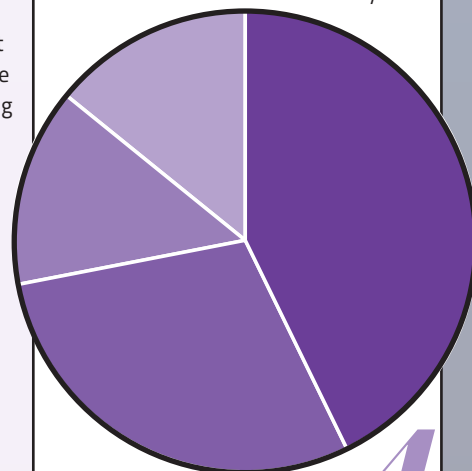
Meanwhile, Bell Helicopters believes technology such as its Speech Interference Level Enhanced Noise System could become the standard for VIP/business helicopter cabins of the future, enabling passengers to converse without headsets.

Readers' poll

Q

Which aspect of the cabin environment is the most important for people purchasing a business jet?

As of publication day, our online readers say...



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PEOPLE *person*

FOR TIM FAGAN, MANAGER OF INDUSTRIAL DESIGN AT BOMBARDIER BUSINESS AIRCRAFT, CABINS – SUCH AS THE NEW ONE FOR THE GLOBAL 5000 AND 6000 – MUST BE CENTERED ON THE PEOPLE USING THEM

Words by Izzy Kington

*“Interactions with
people who use the
aircraft are extremely
important for us”*



Aircraft now have more options for flooring, as shown by the Global 6000 demonstrator's use of marble in the lavatories and wood in the galley



TOP: THE GLOBAL 6000'S VENUE CMS

ABOVE: THE GLOBAL 5000 CABIN FEATURES NEW SEATS IDEALLY SUITED TO LONG-DISTANCE TRAVEL

Tim Fagan's design career at Bombardier has spanned 18 years, with 12 of those on the business aviation side. He is now manager of industrial design for business aircraft, heading up a team responsible for all new product development.

The key change Fagan has witnessed over the past 10 years is an intensifying focus on the passenger experience. A turning point in this regard was the design of the clean-sheet Global 7000, the first of Bombardier's business aircraft projects where the preliminary cabin design and mock-ups were created before the fuselage definition was frozen. The aircraft is due to go into service in the second half of 2018. "We created a seat layout to determine the correct space between seats," says Fagan. "We wanted to have one window beside every seated occupant and one centered on every table, which influenced the design of

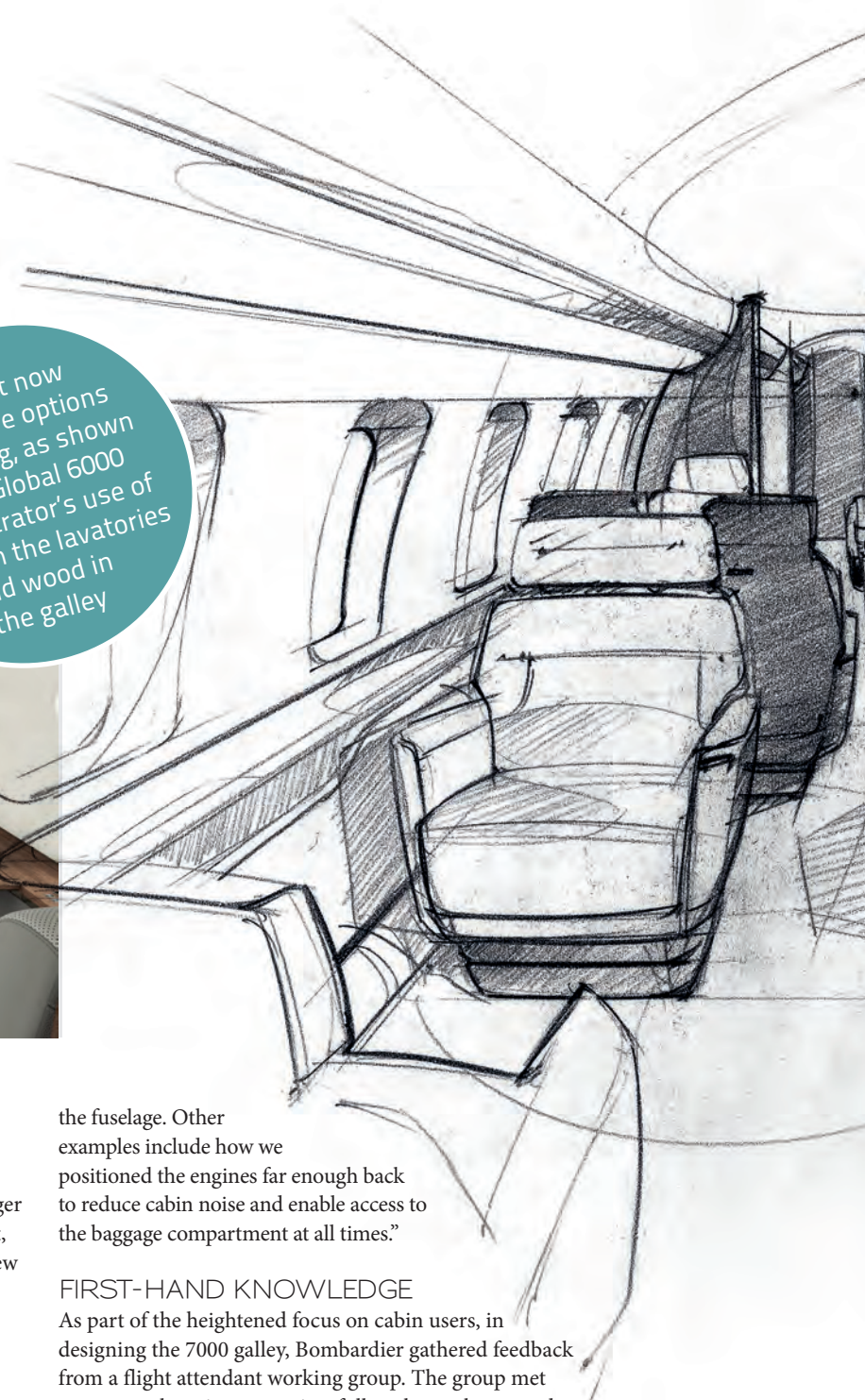
the fuselage. Other examples include how we positioned the engines far enough back to reduce cabin noise and enable access to the baggage compartment at all times."

FIRST-HAND KNOWLEDGE

As part of the heightened focus on cabin users, in designing the 7000 galley, Bombardier gathered feedback from a flight attendant working group. The group met over several sessions to review full-scale mock-ups and help develop the galley's key functionalities.

"Flight attendants helped us to understand the right balance of storage versus working space, what they need to be able to do and what trade-offs we needed to make to deliver the right balance of functionality," says Fagan. "Interactions with people who use the aircraft are extremely important for us. In many ways they know the aircraft better than we do, or in different ways, because they're using it day-to-day."

Another change over the past 10 years is that there is now more collaboration between the industrial design,





A CAREER IN INDUSTRIAL DESIGN

Tim Fagan joined Bombardier as an industrial designer in 1999, working on interior definition for the commercial Q400 program. On moving to the business aircraft side, he worked in various customer-facing roles – as a designer and account manager, then on to product development, working on programs including the Vision flight deck and cabin trim, finish and ergonomics.

"It's a lot of fun," he says. "We have this multidisciplinary industrial design team, with people specializing in ergonomics, CAD, 3D modeling and visualization, manufacturing, mock-ups and so on."



“Flight attendants helped us to understand the right balance of storage versus working space”

engineering and operations teams during product development. “The process involves things like doing full-scale mock-ups to understand at a very early stage where things should be,” says Fagan. “For example, when we’re designing an entertainment cabinet, we need to determine the correct size for the monitor, and what height is best in terms of sightlines from the seats. We want to get these things right before engineering begins; it’s more difficult to fix them later.”

The latest evidence of the team’s hard work is the Premier cabin for the Global 5000 and Global 6000, developed to align the aircraft with the Global 7000. The first production Premier cabin was shown on a Global

6000 on the company’s static display at EBACE in May 2017.

“We’ve taken the opportunity to bring lessons from the Global 7000 into these aircraft now, as early as we can,” says Fagan. “You’ll see a lot of the family resemblance between the aircraft.”

SEAT ERGONOMICS

The seats have been completely resculpted. “We’ve taken the profile of the Global 7000 seat, plus some of the stitching and finish details,” says Fagan. “That seat in turn was

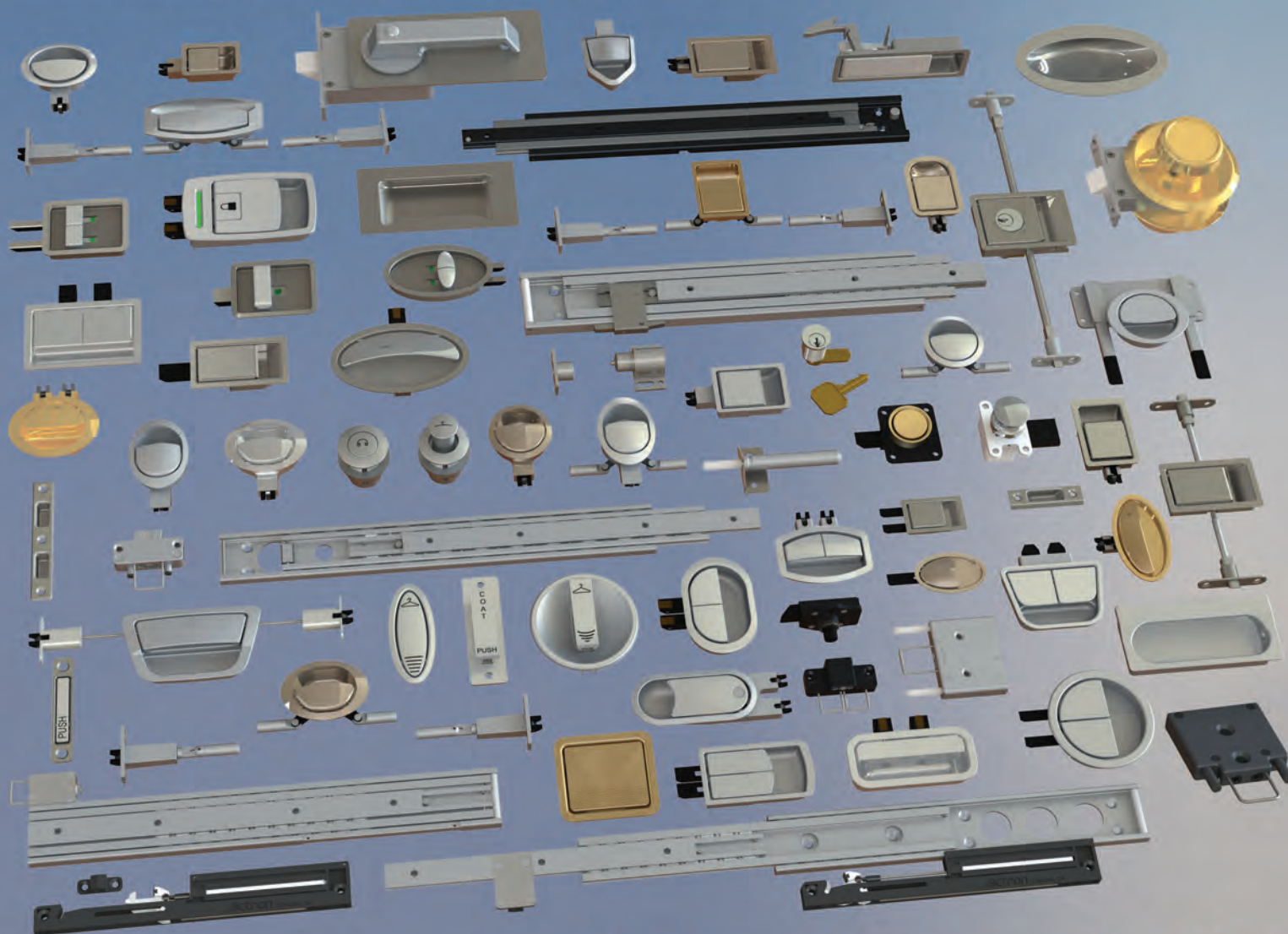
MAIN: BOMBARDIER SAYS THE GLOBAL 7000 IS THE ONLY BUSINESS JET TO OFFER FOUR LIVING SPACES AND A DEDICATED CREW REST AREA

ABOVE: THE NEW PREMIER CABIN ON THE GLOBAL 5000



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inspired by high-end automotive styling, and a focus on getting the most out of the leather. The hard back shell has a sort of convex shape that gives us real control over the form, so it holds stitched details very well. It also allows us to carve away some of the volume and enables easier access for installation and maintenance.”

HUMAN FACTORS

As well as visual elements, the industrial design team is very focused on human factors. “We’ve standardized the raised backrest so that it’s very wide and high, to



ABOVE: A VIEW OF THE GLOBAL 6000 CABIN, LOOKING AFT



LEFT: A FORWARD-LOOKING VIEW OF THE GLOBAL 6000 INTERIOR

provide support, particularly in a deep reclining position,” says Fagan. “We also raised the armrests slightly to take some pressure off the upper body, which really facilitates finding the next comfortable position. If you watch people sitting down for long durations, they unconsciously shift from side to side.”

The seat cushion has also been shortened a little and rounded to promote better contact between the occupant’s feet and the ground. “The small movements people make go through the body and into the floor, so their feet are really involved in those shifts, and if they are

The trend for visual contrast in seat upholstery is exemplified by the Premier cabin’s use of perforated, straight-grain and textured leather

“We’ve standardized the raised backrest so that it’s very wide and high”

IN-HOUSE CRAFTS

Across the Global family, all seat upholstery is crafted at Bombardier’s Centre of Excellence in Montreal, Canada. “We keep it all in-house, which is how we’ve built commonality and consistency across our products,” says Tim Fagan. “When we develop a seat, we start with a basic geometry, based on the proper seat height, the location of all of the elements, where the body is in contact, and of

course a visual styling inspiration. Then we work with engineering and operations people – those who are actually doing the manufacturing – to understand aspects such as where stitch and seam lines should be. It enables more precision and control. A collaborative design process, including the people who are actually doing the stitching and upholstery, is important to getting the correct result.”

not in contact properly, the person has pressure building up on the back of their thighs,” says Fagan.

HAPTIC FEEDBACK

Care has been taken over haptic interactions generally. “This is an area where we find inspiration from home furnishings – looking at the way a drawer feels when it closes, for example,” says Fagan. “The automotive industry is also a great inspiration. In luxury vehicles, a lot of attention is paid to things such as the weight of the door, what it sounds like when you close the trunk, the exhaust note. These are small elements, but they

“We’ve added textures that you don’t necessarily discover right away”



ABOVE: THE CHALLENGER 650'S SIDELEDGE IS A GOOD EXAMPLE OF ATTENTION TO DETAIL

BELOW: THE GLOBAL 7000'S MASTER SUITE FEATURES AN ARRAY OF FURNISHING OPTIONS, INCLUDING A TRUE STAND-UP SHOWER IN THE AVAILABLE ENSUITE

help to create a sense of luxury and that you're being taken care of. We strive to make sure nothing is left to chance.”

LAYERED LUXURY

The cabin lines follow a minimalist philosophy inspired by home furnishings. Little details are combined to create what Fagan calls layered luxury. “We’ve added textures here and there that you don’t necessarily discover right away,” he says. “There’s always something to catch the eye.” Examples on the demonstrator aircraft shown at EBACE include textured leather on the seat backrests and contrasting polished and satin finishes on bulkheads.

The sideledge design is now flat and straight so that it runs straight down the cabin. There are a lot of stowage spaces for passengers’ personal items. For

example, there is a small tray where they might place a phone, and if they flip it up they will discover a shallow and a deep cupholder.

NETWORK GAINS

This space also houses a mount for the tablet arm – a must given the strong demand to use PEDs for entertainment and connectivity on board. The aircraft are available with Bombardier’s Ka-band high-speed internet system, which provides connectivity speeds of up to 15MB/s, enabling passengers to use Facetime and Netflix, for example. “A movie streams at something like 1.5MB/s, so at the maximum rate you could have nine or 10 data streams,” explains Fagan. Passengers can also use their Apple and Android PEDs as CMS controls, after downloading an app.

Elements that remain largely unchanged from the previous design include the lighting and the galley layout, where the lessons from the Global 7000 had to be integrated with special care. “With the galley, we wanted to preserve what made the Global 6000 so successful in service, but take the opportunity to bring in some of what we’ve developed on the Global 7000,” says Fagan. “The structural elements are different, so making that adaptation while preserving what people have come to love was one of the challenges.”



SMOOTH RIDE

A recent video shows an elaborate dominos setup on board the Global 6000. It is intended to highlight Bombardier’s work on ensuring a stable cabin in flight. Tim Fagan cites this as a great example of how Bombardier designs the airframe to ensure the quality of the passenger experience. “We use very flexible wings that act like the shock absorbers in a car, absorbing a lot of vibrations and isolating the cabin, so that even through turbulence the environment is very smooth,” he says. “Another element of it is that the wings are very slender, with a small surface area relative to the mass of the aircraft, which also lends itself to a smoother ride because there is less surface to be acted on by fluctuations in the air and turbulence.”

The high-lift package also plays a part. “When landing you need more surface area, so we deploy the slats and flaps so that the aircraft can make a nice, slow approach,” says Fagan.



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ASSOCIATION HAS SOUNDED THE ALARM FOR
AN IMPENDING SHORTAGE OF SPECIALIZED SKILLS
IN EUROPE'S BUSINESS AVIATION SECTOR

Words by Marisa Garcia. Illustration by Phil Hackett

“We have a cogent story to tell about the key benefits of business aviation, including as a career path, but we need to do a better job of telling it”

In May 2017, the European Business Aviation Association (EBAA) published a study, conducted on its behalf by Korn Ferry Hay Group, that reveals the competition for talent with commercial aviation – particularly for pilots and maintenance technicians – will put a strain on general aviation businesses over the coming decades.

The EBAA argues that airlines are more aware of the growing competition for specialized employees, and are doing more to attract pilots and technicians than smaller business aviation operations, some of which may lack the human resources infrastructure to recruit and retain the workforce they need.

“We are looking to raise awareness of this looming problem within the industry and among stakeholders – including the European Commission and other government entities and regulators,” says Brandon Mitchener, CEO of the EBAA.



In the nine EU countries with the most business aviation employees, 75% of these people work in France, Germany and the UK

STEM SELLS

The diminishing numbers of students in Europe pursuing careers in science, technology, engineering and mathematics (STEM) make the skills shortage more difficult to overcome, because these subjects are critical to highly technical aviation careers. The study also cites a shrinking supply of talent from the military, previously a key source. In addition, the EBAA hopes to attract more women to the field. “I think we have a cogent story to tell about the key benefits of business aviation, including as a career path, but we need to do a better job of telling it,” Mitchener says.

One of the recommendations the study makes is for collaboration between aviation stakeholders to attract talent. Additionally, it contends that companies should focus on building stronger in-house training and educational programs, to retain talent and keep their skills fresh.

THE NUMBERS

There is a marked disparity in talent distribution across the EU. Most business aviation employees are based in France, Germany, the UK, Italy, Switzerland, Spain and Poland, but even between those, the numbers vary greatly, according to the EBAA report.

France and Germany are closely matched with a talent pool of 97,681 and 92,526 respectively. The next highest country, the UK, has a pool of 35,087, followed closely by Italy with 30,304. There is a big drop to the next highest country, Switzerland, which has 17,301 business aviation employees. Spain and Poland are closely matched with 12,547 and

10,629 respectively. From there, the distribution is more even, though descending as low as 131 qualified employees in Liechtenstein. While this country may be able to attract talent from its neighbors, Iceland, with a talent pool of 213 and a growing commercial aviation sector, may be particularly challenged.

The EBAA report focuses on the nine EU countries with the largest labor pools. In those countries, the talent must be divided between 1,826 business aviation players, including 979 operators, 656 airports, and a much smaller number of MROs, FBOs and manufacturers.

ABOVE: AMAC, BASED IN BASEL, SWITZERLAND, CONTINUES TO SEEK MOTIVATED STAFF FOR ROLES IN AIRCRAFT MAINTENANCE, COMPLETION AND REFURBISHMENT



Switzerland
has the most
business aviation
employees per
capita in the EU –
139 per 100,000
people

BELOW: AN AMAC
CRAFTSMAN AT WORK;
THE FACILITY EMPLOYS
STAFF FROM MORE
THAN 40 COUNTRIES

INSET BELOW: CLAUDIA
SCHNEIDER OF AMAC



The report highlights the emerging technologies that will drive the training needs of existing staff and the recruitment of new employees with relevant specializations, specifically STEM students. These trends include the digitization of business aviation, avionics in particular; the rise of big data analytics for tasks like predictive maintenance, inventory optimization, monitoring of parts usage and health tracking; mobile technologies, including apps for managing MRO operations; systems integration of various databases; new production methods, including additive manufacturing; new materials, especially composite materials; new process standards for flight operations; and increased automation, which will lead to a higher demand for IT skills and lower demand for administrative roles. The introduction of larger aircraft may also affect demand for technicians. Of all these, digitization is expected to have the greatest impact.

Another challenge is the relative stagnation of the sector in Europe, and an expectation that it will continue to consolidate, with some smaller companies exiting the market, leaving fewer local

employers. At the same time, the report points to a growing number of employees being drawn to jobs in the Middle East and Asia, where training costs are lower and salaries may be better, at least in the context of living costs and return on investment for education.

“Increased automation will lead to a higher demand for IT skills”

is an advantage in recruiting. People from more than 40 countries presently work at the facility. AMAC has also hired technicians with proximal skills, specifically individuals from the automotive industry who were made redundant during the global downturn in 2008.

Still, Schneider recognizes that recruiting in the business aviation sector is becoming more challenging. The company is developing in an in-house training program whereby experienced technicians develop tomorrow's specialists. The company works with local schools to find candidates. “Technicians will undergo specialized on-the-job-training

Readers' poll

Q Does the EBAA's report tally with your experiences in the interiors sector?

As of publication day, our online readers say...

100% Yes

A

PLANS IN PLACE

So how are European MROs and completion centers planning to respond? Claudia Schneider, manager of human resources at AMAC Aerospace, says the company's location in Basel, Switzerland, at the border of Germany, France and Switzerland,



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LEFT AND ABOVE: LUFTHANSA TECHNIK WORKS CLOSELY WITH LOCAL HIGH SCHOOLS TO SOURCE NEW RECRUITS

BELOW: MARTIN HORN OF LUFTHANSA TECHNIK

at our facilities in Basel," says Schneider. "The goal is to have these young technicians trained in-house and licensed by EASA as the next generation of AMAC's workforce."

MODERN METHODS

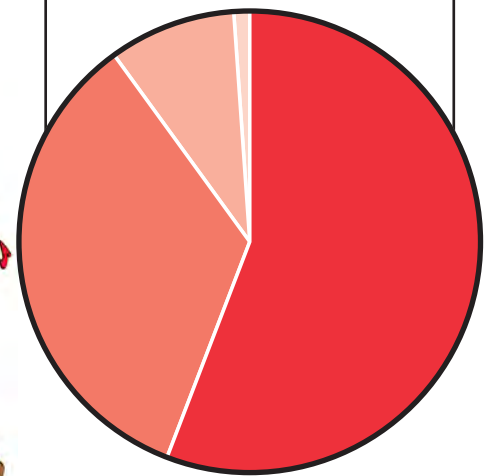
Social media has also been a reliable recruiting tool. "LinkedIn is a great digital employment platform that allows us to search for licensed engineers," says Schneider. "The internet allows a new form of recruitment that hasn't been experienced in business aviation before. LinkedIn offers a good approach to an employment class that is getting more difficult to be in."



Employers in the nine EU countries with the biggest business aviation workforces

- Manufacturers: 56%
- Operators: 34%
- MROs: 9%
- FBOs: 1%

Source: *Shortage of Skills in European Business Aviation*, Korn Ferry Hay Group, May 2017



FIRST STEPS

Lufthansa Technik has built a strong community recruiting infrastructure through its collaboration with educational institutions.

"For our partner high schools, we offer an extensive orientation and information program. In a first step, students have the chance to get information on the various apprenticeships offered," says Martin Horn of Lufthansa Technik. "In addition, they can engage in small mechanical and electronic tasks to explore their interests and visit the grounds. Finally, they are offered an internship in a department that fits their interests. Above that, we cooperate with technical vocational

schools, where our apprentices are taught the theoretical concepts of the training content here."

The company also cooperates with selected universities for combined vocational training and academic degree programs, goes to university job fairs, offers field trips and participates in initiatives to encourage young people to pursue careers in aviation and STEM. "We support and cooperate with state-aided programs such as the NaT, an initiative for science and technology; Fascination of Flying, a kid's club; Germany Stipend; and engage in nationwide activities including Girls' Day and Social Day," says Horn.

Fokker – now part of GKN Aerospace – has offered in-company training (with a job guarantee) for decades. The 22-month course involves one day of theory and four days of on-the-job training each week, at three of the company's plants in the Netherlands or in the company school nearby. "We train students at an intermediate vocational education level, for assembly operator and aircraft mechanic roles," says Marianne Mulder, communications representative for Fokker. "This provides us with a steady flow of craftsmanship."

Martin Horn, senior director of recruiting and vocational training at Lufthansa Technik, says that the company is well-aware of a shrinking pool of future employees, but believes the strength of the brand will protect the company. "Because we are well-known for international and attractive jobs, we do not experience a shortage of highly qualified staff as much as a small company might already do," Horn says. "However, we have been preparing to face the challenge of skill shortages for quite some time and are confident that our wide variety of measures and programs will successfully counteract the problem."

THE UNDERREPRESENTED 50%

The programs include efforts to reach out to women. "We start to interact with our target group at a very young age, offering internships for pupils and participating in



RIGHT AND ABOVE: TRAINING AT LUFTHANSA TECHNIK

NETWORK CONNECTIONS

For university interns, Lufthansa Technik maintains a training program called Technik Talents. Once interns have completed their practical training, they can move on to special training programs and stay connected to other interns through dedicated training and networking events until they complete their advanced studies. "We also keep in touch with our Technik Talents alumni to enlarge our talent pool with candidates who have already gained working experience," says Martin Horn of Lufthansa Technik.

various initiatives, including MintPink, which aims at inspiring young girls to pursue a technical career," explains Horn. "We also offer various apprenticeships – mostly with a technical focus – and combined vocational training and academic degree programs. For college graduates, we offer Start-Technik, which gives trainees a comprehensive overview of the company and possible future positions."

Lufthansa Technik has run an apprenticeship program for more than 60 years, and has found this old-world tradition works very well in the modern world if it is constantly adapted. It has 120 apprentice positions for aircraft mechanics, electronics technicians and other specializations, lasting 3 to 3.5 years, and also offers 500 internship positions for pupils and 600 university internships a year.



According to the Royal Academy of Engineering, only 9% of professional engineers in the UK are women

"In the first year, apprentices spend their time in a workshop, specifically designed for learning," says Horn. "Here they are being taught basic handcraft by highly qualified teachers. In their second year, apprentices start practical training, with the support and mentoring of skilled workers. Apprentices regularly spend chapters of approximately three weeks in vocational schools to study the theoretical concepts."

SKILLS UPDATE

Lufthansa Technik also works to build the skillsets of existing employees, offering training in new competencies and specializations in emerging technologies. "Those offers include theoretical and practical training, but we also enable our employees to pursue an academic degree by supporting their bachelors' or masters' studies," says Horn.

This approach fits core recommendations of the Korn Ferry Hay Group report: "Business aviation, and aviation overall, needs to work to make itself more attractive not only to young people, graduates and women, but also to all those highly skilled, technically savvy aviation professionals who are going to other aviation segments or sectors. To be able to achieve this, it also needs to improve its HR practices." ✕

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THE EDITOR PICKS HER 10
FAVORITE NON-OEM DESIGNS TO
GRACE THE PAGES OF *BUSINESS
JET INTERIORS INTERNATIONAL*
OVER THE PAST 10 YEARS

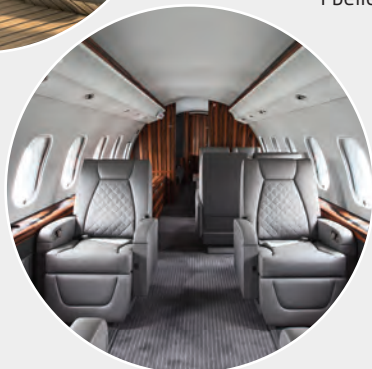
Words by Izzy Kington



DESIGNS OF THE DECADE

SELECTION CRITERIA

Choosing just 10 designs from the past decade has certainly been a tough ask. To narrow it down, I've ruled out OEM designs and concentrated on customized VIP completions and concepts. Of course the final selection is highly subjective, but I believe these designs are a fitting representation of the innovation that is possible in this wonderfully creative field.



Royal Jet BBJ 737-700s

DESIGN
Edése Doret Industrial Design

COMPLETION
Lufthansa Technik

FEATURED
January 2017



the design

Edése Doret has produced some memorable designs over the years – including a concept with living walls – but this completed design for two BBJ 737-700s operated by Royal Jet gets the nod (early renderings pictured). Particularly eye-catching elements include the molded ceiling with integrated lighting from CCC, and the 3D-patterned bulkheads fashioned from metal composite, jet glass and leather. The aircraft is also notable for its extensive use of carbon fiber (and absence of wood veneer). Seat vendor PAC and carbon-fiber provider JCB Aero came up with a special solution to enable the material's certification for this Part 21 charter aircraft, while F/List supplied carbon-fiber flooring. These are aircraft to please lovers of modern design and unconventional materials.

WHAT HAPPENED NEXT?

Rob DiCasteri, CEO of Royal Jet, says that since their delivery in November 2016, the aircraft have barely been on the ground – they have been in high demand, primarily for VIP charter missions. “Our aim was to give the corporate jet experience a more modern and contemporary feel,” he adds. “We allowed Edése Doret to expand the boundaries of design and he did a fantastic job in translating it into the interior features of the aircraft.”

Edése Doret, president of Edése Doret Industrial Design, is grateful for the opportunity to explore the boundaries of design. “We were fortunate to have a relationship with Royal Jet, and to collaborate with the chairman, who shared our vision,” he says. “Following the MEBA show in Dubai, UAE, in December 2016, we received a lot of calls from both potential clients and colleagues within the industry commending us on the unique design. Following the success of the Royal Jet BBJs, a new client awarded us a turnkey contract for an ACJ320neo. We will try to continue pushing the boundaries.”

the design

This is another design notable for a material innovation – the use of Kaolin porcelain in the place of metal inlays, and even for some of the bathroom tiles. ACJC worked with a famous porcelain company in Limoges, France, to develop the material for aviation use. Fire performance is obviously not a barrier for this fire-hardened material, but it would have to be coated with resin to keep it in one piece, to minimize the risk of breakage. "Porcelain products, as created by high-end French brands, are part of the new generation of relaxed luxury," says Sylvain Mariat, head of creative design at ACJ (and formerly at ACJC).

WHAT HAPPENED NEXT?

The design was not made for a specific customer, and has not been picked up by one yet, but succeeds in highlighting the possibilities of a new material. "The cabin illustrates the feeling of luxury that we want to highlight as part of our vision of excellence," says Mariat. "It was a great experience to feature this unique material. This cabin has yet to be realized, but I believe in the persistence to drive a vision forward, especially in creating something related to hospitality and lifestyle, even when it is very challenging."

ACJ319 Kaolin

DESIGN
Airbus Corporate Jet Centre

FEATURED
October 2016



Sensual Purity Concept

DESIGN
Mercedes-Benz Style
and Lufthansa Technik

FEATURED
July 2015



WHAT HAPPENED NEXT?

The design study was worked into a viable product and presented at the Monaco Yacht Show 2016. Lufthansa Technik has since been in talks with several potential customers. "We are sure that the topic will get another push with the arrival of the first ACJ320neo and BBJ Max VIP aircraft," says Ulf Seehusen, senior project manager specification and design, VIP & Special Mission Aircraft Services.

Seehusen adds that more than 90% of the concept has been translated to the final design without noticeable changes. "This is a figure that makes us really proud," he says. "For example, we made some slight modifications to seat contours, introduced monument and lining splits and incorporated air outlets and vents. Everything that was defined in the first run has been proven in terms of design, engineering, production and certification. Especially, no compromise was made regarding the Helix structure and materials, as they are a fundamental part of the Mercedes-Benz Style design philosophy."

Conceived for narrow-body ACJ/BBJ types, the first renderings of this design from Mercedes-Benz Style and Lufthansa Technik showed about 40% of the cabin – a 10m-long social area. The swirling Helix structure gives it a character unlike any other cabin design, with the ceiling, sidewalls and floors folding into each other to create functional zones. Another major idea in this concept is that of integrating IFE/CMS control touchscreens on the electronically dimmable windows. Meanwhile, a limited palette of five materials and a focus on fluid shapes help to give the cabin an ultramodern, automotive feel in keeping with its innovative structure.

the design

Three-time Formula 1 champion Niki Lauda graciously welcomed *Business Jet Interiors International* on board his Global 6000 in early 2015. The first thing to say about the cabin is that the veneer and its application are both unusual and exquisite. F/List, tasked with creating the cabinetry, had to find a solution to counteract the natural oiliness of the African ebony used. It has also been laid up painstakingly in a variety of ways and has a natural-looking matte finish. The veneer is complemented very well with pinstripe fabrics and gray seat leather, creating a business-like, masculine and distinctive aesthetic.

WHAT HAPPENED NEXT?

During the interview, Lauda revealed that he flies around 550 hours a year, piloting himself, and intended to use this aircraft to reach all Formula 1 races and for business purposes. He seemed very happy with the design, which was created for him from no brief by Hannes Rausch, his long-term design partner. Soon after, in May 2015, it was announced that Lauda had purchased a new Global 7000.

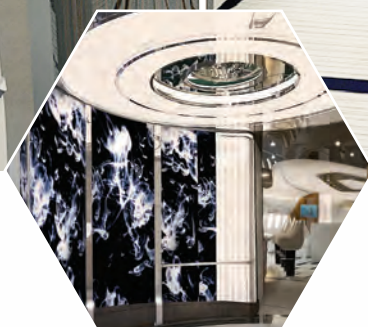
Niki Lauda's Global 6000

DESIGN
Hannes Rausch

COMPLETION
Bombardier

FEATURED
April 2015



BBJ 787-9***Azure***DESIGN
Greenpoint Technologies
and Julie MyersFEATURED
September 2014**WHAT HAPPENED NEXT?**

Although Greenpoint has yet to build a 787 Azure interior, it has incorporated many aspects of the design into its other VVIP 787 completions. "We recommend many Azure interior elements to our clients, including an exercise room, prominent sculptural forms, an entertainment lounge and bar, artistic display cabinetry, and a heavy focus on ambient lighting," says Annika Svore Wicklund, design director at Greenpoint. "Our Azure concept looked into the future of private aviation interiors, and we are proud to see many of the visionary elements – such as OLED screens, specialized paints, panel lighting and thin glass mirrors – now implemented in the market."

This concept makes adept use of organic forms and materials including marble to pay its homage to natural beauty. The use of lots of mirrored surfaces, and the digital abyss artwork in the entrance and lounge, creates an ethereal atmosphere. All this is unmarred by the sight of CMS/IFE equipment, hidden from sight. Although in conceptual form, Greenpoint worked to make the design fully buildable, taking into account the challenges of the BBJ 787's composite airframe.

the design

The most striking aspect of this design is the sidewall lighting, influenced by mashrabiya, carved wooden window coverings found in Arabic traditions. Pierrejean proposed hiding the LED light sources behind a second skin made from composite material.

The neutral color scheme adds to the luminous feel. "The design philosophy for this aircraft was a minimalist but ergonomic style," says Jacques Pierrejean, principal at Pierrejean Design Studio. "High luxury doesn't necessary mean overloaded decoration. A simple but beautifully designed shape may be synonymous of luxury too. We also intend to think that small details make the whole thing sometimes."

WHAT HAPPENED NEXT?

The aircraft interior design was conceived in close cooperation with the owner. Pierrejean has continued in his championing of novel designs. "Aircraft interior design is a very conservative field," he comments. "Originality is too often banned or considered a disturbing or unreasonable quality. The majority of aircraft interiors display little evidence of creative thinking and innovation. We have to face quite an ambiguous situation here; our clients want a very personal environment, but not too creative, with immediate visual references to conventional standards of comfort and luxury."

Regarding this design, Pierrejean notes that lighting technology has moved forward in the meantime. "We suggest changing the onboard ambiances using specific equipment and programs, including specially shaped crystals to obtain a unique and very soft lighting effect."



BBJ 787 Noor

DESIGN
Pierrejean Design Studio

FEATURED
April 2014

BBJ 787-8 *Visionary*

DESIGN
Jet Aviation Design Studio

FEATURED
September 2013



the design

Back in 2013, Jet Aviation Design Studio created two interiors for the BBJ 787. "Timeless was more about long-term appeal, while Visionary was more futuristic, looking at where aviation design could go in this century and beyond," says Elisabeth Harvey, director of design at Jet Aviation's Basel Design Studio. "At the time, the Visionary concept challenged a lot of the contemporary rules of aviation design. When we worked on the concept, the idea of a wide-body aircraft for less than 19 passengers was unusual."

The open-plan, multifunctional living space was inspired by modern loft apartments and contemporary homes. "To complement this, we looked at how we could challenge established thinking around design and furniture," says Harvey. "For example, furniture that gave the illusion of free standing. This is something that we are now seeing actually executed in design trends for 2017/2018 interiors."

WHAT HAPPENED NEXT?

The campaign won the SBID International Design Excellence Awards in 2013 for Visualization. "We also recently had a client inquire about recreating the design with a slightly different floorplan," reveals Harvey. "While this project did not come to fruition, it cemented in my mind that the Visionary campaign really was ahead of its time, and now, four years later, the industry is ready to meet that evolution."

the design

Although it was created in 2011, this classic design has stood the test of time. "We believe that classical and simple chic doesn't get old fashioned," says Yves Pickardt, an interior designer at the Linda Pinto-led Alberto Pinto International Interior Design studio. "Our design is only about beautiful woods, leathers and fabrics, and a nice custom carpet pattern, nothing more. Of course, the quality of the materials and the assembly makes the difference. Haute couture perspective was key when designing the cabin, and the result came out of the Gulfstream completion center beyond our expectations."

WHAT HAPPENED NEXT?

Pickardt reports that the cabin is perfectly kept, in its original condition. "According to our latest information, the aircraft is still owned and operated by our clients and they are still very satisfied," he says. "Absolutely no problems have been reported to us since delivery. The aircraft flies mainly in Brazil and from Brazil to the USA and Europe. We believe this is still one of our most successful aircraft interiors."

G550 completion

DESIGN
Alberto Pinto International
Interior Design

COMPLETION
Gulfstream

FEATURED
September 2011



*ACJ320 Jubilee*DESIGN
Comlux CreativesCOMPLETION
Comlux CompletionFEATURED
April 2011

This cozy cabin was Comlux Completion's first full narrow-body completion, coinciding with efforts by the company to build up a team to fulfill the project.

Designed for a charter role, the aircraft had to be durable – which led to the use of a satin finish rather than a high-gloss one, for example – as well as offer the flexibility to cater for a wide range of groups and appeal, particularly to the Asian market. With a palette inspired by sand and sea, the overall feeling is classic and contemporary. "Our engineering department made the designers' dreams a reality," says Richard Gaona, executive chairman and CEO of Comlux. "The VVIP quality inside was a key to the success, and the Asian style was really appreciated."

WHAT HAPPENED NEXT?

After three years in the VVIP charter market, the aircraft was sold to a charter client who truly loved it, reports Gaona. "Since then it has been in government use in Southeast Asia," he adds. "When we operated it, the market response was very good, particularly from governments. It was really designed for world leaders, with its three zones and modern style. The number of seats was also a key part of its success."

the design

This must be one of the most memorable ideas printed in the magazine – an extending deck that opens the lounge out into whatever exotic location the rugged aircraft can reach. "The Avro 146 was originally designed for military uses so it inherited a remarkable ability to not necessarily need a runway or a very long one either; desert sand or a field snow can be accommodated," says Howard Guy, CEO of Design Q. "The cargo door was fitted and certified for passengers and cargo, so there are four of these with the door installed. BAE was looking at spending £1.4m (US\$1.8m) just to remove the doors and convert to a conventional passenger aircraft, but we told them to hang on and came up with the idea of using it as a viewing point or indeed an extending deck."

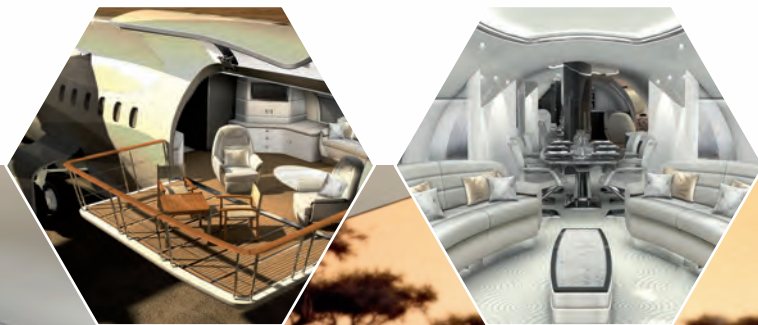
WHAT HAPPENED NEXT?

Guy is indignant about some of the response to the concept. "It's all quite feasible but over the years we have received some condemning mail from so-called industry know-it-alls who thought the proposal was pure fiction," he says. "The reality is quite the opposite."

ABJ Explorer One

DESIGN
Design Q

FEATURED
July 2010





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Modern MORES

GULFSTREAM'S DIRECTOR OF INTERIOR DESIGN, TRAY CROW, EXPLAINS HOW HIGHER EXPECTATIONS OF COMFORT, FLEXIBILITY AND QUALITY HAVE TRANSFORMED DESIGN AND TESTING PROCESSES OVER THE PAST DECADE

Words by Izzy Kington

Over the past decade Gulfstream has brought three new aircraft to market – the G280, G650 and G650ER. It also has two more on the slate – the G500 entering service in 2017 and the G600 in 2018. To solve any potential cabin issues before service entry, the cabin developed for the two upcoming aircraft was showcased at EBACE in May 2017 on a fully outfitted test article that Gulfstream uses as part of its flight testing program.

“This is a good example of how the industry has changed over the past 10 years,” says Tray Crow, director of interior design for Gulfstream. “Ten years ago the focus was much more on the airframe. Today our customers are a lot more savvy about the interior, and that probably has to do with the amount of information that’s out there, and people being much more tuned into what’s going on in the design world.”

“Ten years ago the focus was much more on the airframe”



“We completely changed the interior within a year”

RIGHT: CUSTOMERS CAN DECIDE BETWEEN FORWARD AND AFT GALLEY OPTIONS ON THE G500

At Gulfstream the interior development process begins in its integration test facility, which is used to examine everything from technology and wiring to furniture attachment points. “The next step typically is to build a mock-up that we can show to customers,” explains Crow.

The G600 mock-up was unveiled in 2014, and from customers’ feedback the OEM developed a brand-new architecture. The revised mock-up was showcased in 2015 and 2016. “We completely changed the interior within a year,” says Crow. “It was very well received. The culmination of that process is being able to take the architecture that you’ve developed, put it in a test aircraft, and ensure that it’s going to function in the air the way you anticipate it to. It allows

A good example of redundancy on the G500/G600 is the multitude of ways to control the window shades – as well as fixed touchscreens in the storage area and the galley, there are easy to access switches



us to get ahead from a quality standpoint, to iron out any squeaks, rattles, steps and gaps. We want to test and deliver a product that is not only beautiful, but also encapsulates the quality craftsmanship of the employees at Gulfstream.”

FLYING LAB

The test aircraft is “always in the air,” according to Crow. As well as flight test engineers, Gulfstream deploys research and development engineers, interior designers and industrial designers to evaluate aspects including the lighting. “We assess things like whether it is operating as it should and then make modifications to improve the design,” says Crow.

The team also looks at how material applications are working and makes alterations as necessary. One example of this relates to the hidden storage areas in the lower sidewalls next to each seat. “We examined every aspect of the cabin looking for any opportunity to give storage space to our customers,” says Crow. “We had an area in the lower sidewall that wasn’t really being used for anything behind the scenes, so we carved out space for

VIRTUAL REALITY

Gulfstream used virtual reality (VR) headsets to showcase the G500 cabin experience at EBACE 2017.

“You’re actually able to operate drawers and doors and deploy tables,” says Tray Crow. “Then you can flip through a variety of interior themes and it shows you how the color and materials can completely transform the look and feel of the aircraft’s interior.”

Crow expects VR technology to continue to advance: “We’re not too far off wireless VR headsets,” he says. “That’s going to transform the way we interact with our customers, because we will be able to take or send headsets to customers in remote parts of the world so that they can experience what they’ve defined remotely. It will be a pretty incredible moment.”



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LEFT: G500 GALLEY OPTIONS
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“Offering a cabin that will flex with customer needs is important”

personal storage. It's not visible when you come into the cabin, but just by tracking your seat inboard, you have a simple storage solution right next to you. However, from installing this element on the aircraft, we could see that our first surface design wasn't the best in terms of wrapping the material around the curve, so we've completely redefined the surface and the design.”

Crow says that another huge change over the past decade is that customers now expect a lot more flexibility in terms of layout, to create something specific to their mission.

“Our client base is varied, so offering a cabin that will flex with their needs is important,” he says. “We're connecting with our customers in a more consultative way than before. When we first engage with them on the definition of the aircraft, we're looking to understand how they want to use the cabin. We ask about the typical mission length, passenger load, if they fly with children or pets and so on. That helps us to provide a series of solutions.”

FLEXIBLE GALLEY

A good example of flexibility on the G500/G600 is the galley. It can be positioned forward or aft, and is designed for flexibility in terms of inserts. “For example, the refrigerator can be at waist height or, for those who prefer more food preparation space, below the counter. Other options include a larger garbage container and larger ice stores.”

Another area of built-in flexibility is the plug-and-play nature of the beverage makers. “If you know that all your passengers on one flight drink espresso, you can load the aircraft with espresso machines,” says Crow. “If you know

The G500/G600 cabin includes a concave PSU, designed to give more headspace and make the cabin feel wider

CHECK MATE

The G650ER on Gulfstream's static display at EBACE 2017 was the one that recently won Best Private Jet interior at the International Yacht and Aviation Awards.

The theme for the aircraft's interior is chess. This is evident in subtle details including squares stitched on the seats, and where gloss black ebony accents contrast with a matte walnut veneer on the cabin architecture and furniture.

The cabin has four areas – a living area with four individual seats, an entertainment area incorporating a divan facing a credenza with a 32in pop-up monitor, a six-place dining/conference table, and an aft stateroom.

there's someone on the next flight who likes tea, you can load a hot beverage maker and an espresso machine. It takes about 30 minutes to switch them."

THREE SEAT TYPES

Customers also have a choice of three seat types. "We made a big effort in developing an all-new seat platform for the G500," says Crow. "We went looking for new ways to improve comfort for a variety of body types."

The Minimalist seat is the flattest, least contoured seat on offer. "It's perfect for berthing, so it's the right seat for customers who do a lot of night flights," says Crow.

The seat installed on the test aircraft is the Classic design. "It's the one most like what you would find in our other product lines, but it has a bit more bolstering and quilted inserts that add another layer of comfort," says Crow. "The seat pan actually holds you in the seat."

The third type is the Sport seat. "It is the most bolstered and contoured, and it really hugs you, as you would expect in a sports car," says Crow. "Then we layer in a tremendous amount of expert finishing details, so customers can personalize their seats. We've developed a baseline architecture that can flex to a variety of design aesthetics. That's important to our customers." ✕

"We made a big effort in developing an all-new seat platform"

FIVE THEMES

As a starting point to fire customers' imaginations when specifying a G500 or G600 cabin, Gulfstream has developed five interior themes for the aircraft. Tying in with the three seat types on offer, there are Minimalist, Classic and Sport general themes. The two others are Next Generation and Opulent.

"This allows us to present the cabin in a variety of finishes," says Tray Crow. "The themes are bold and strong, to garner a reaction so that we can start tailoring bespoke interior proposals specific to the customer."

Tray Crow heads up a team of nearly 50 interior and visualization designers



RIGHT: THE FULL-SIZE G600 INTERIOR MOCK-UP WAS DISPLAYED AT NBAA IN 2014, 2015 AND 2016

Torino

Inspired by the mountain landscape of the Turin region in Italy, Torino has a welcoming pronounced, pebble grain texture. These full-bodied Italian cowhides have a uniform grain, consistent color, and durable finish, resulting in superior cutting yields with minimal waste. As a LeatherShield product, Torino requires little maintenance, making it an ideal option for high traffic areas.

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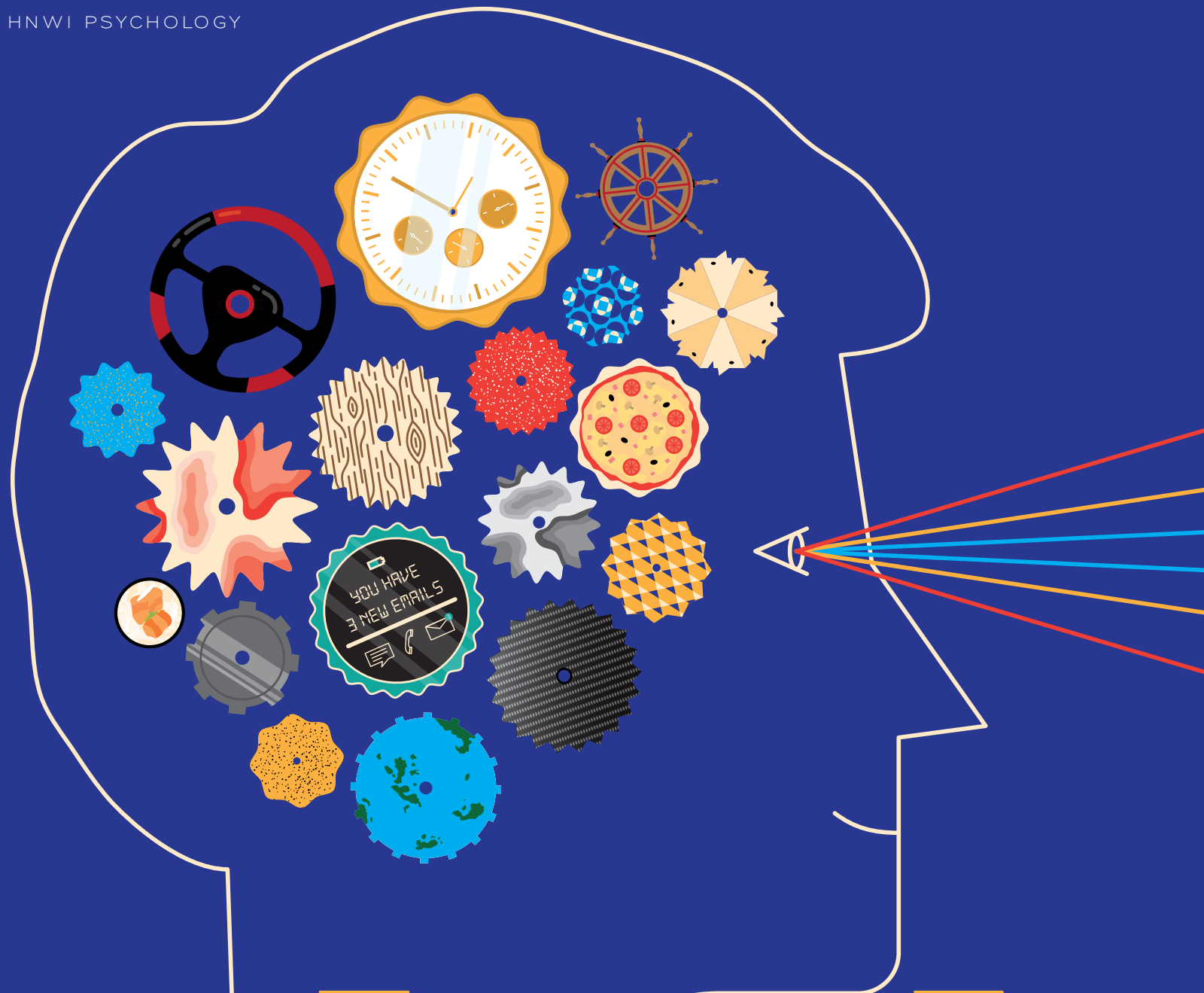
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View 13 NEW Torino colors at NBAA, booth N5725.

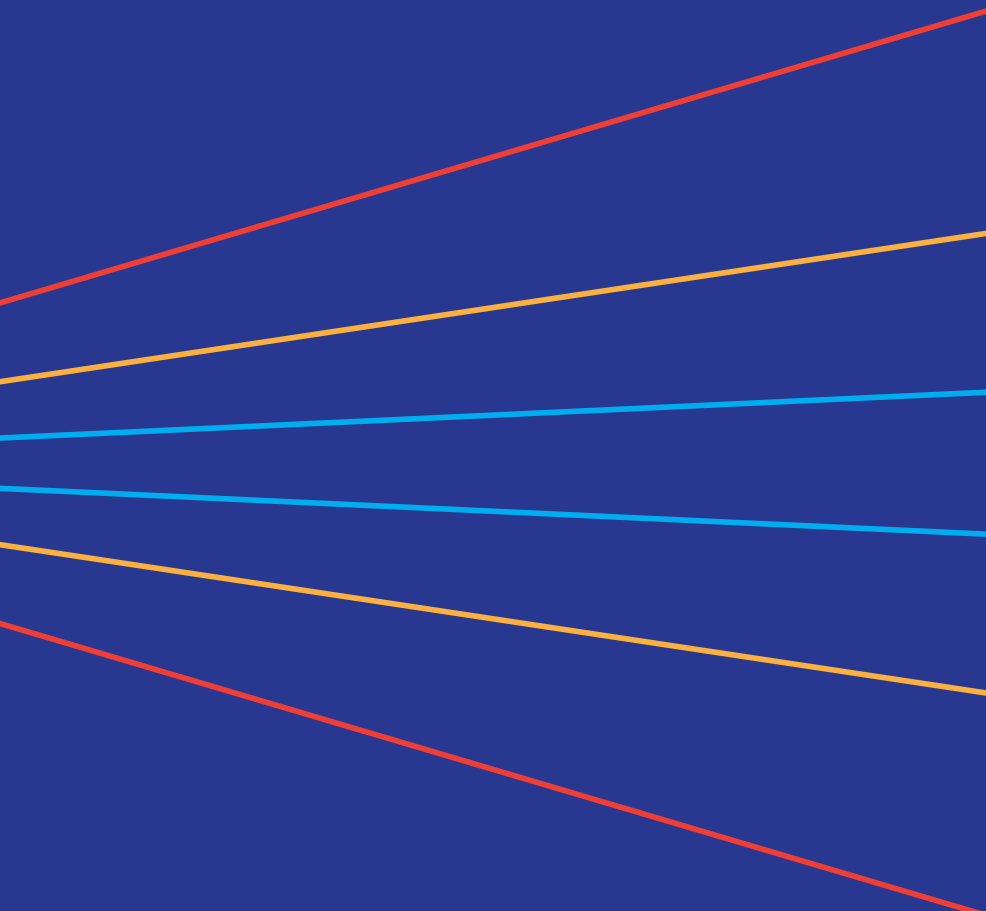
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valued



Money can't buy happiness, but it helps. For those with an abundant supply of money, it is the definition of happiness that changes, with rising expectations.

Airbus Corporate Jets (ACJ) commissioned a study conducted by Ledbury Research, which presents some perspective on the needs and values of high-net-worth individuals (HNWI) and their perception of luxury. The research looked at 250 billionaires in China, the Middle East and Russia, where the combined numbers of HNWI are now larger than in the USA.

Luxury preferences among these individuals evolves with a greater accumulation of wealth. HNWI will expect high-quality superior design; as their wealth increases, so does the value they place on craftsmanship and rarity, as well as investment value. The wealthiest may prefer the finest quality available, unique pieces and fully bespoke elements.

CONFIDENT CUSTOMERS

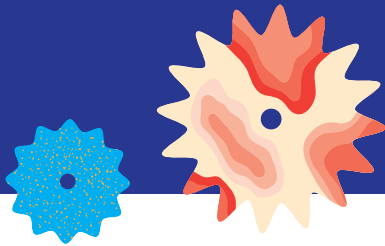
Although their material reach may vary, these individuals have some characteristics in common. They are highly determined people with confidence in their own ideas and decision making. Because they know what they want, the report suggests, billionaires can be easier to deal with than other HNWI, who may have only a vague concept of the outcome they'd like to see from a project. That said, that same confidence translates into some inflexibility.

Self-made billionaires are generally intelligent and methodical, Airbus finds, focused on detail and able to assimilate information quickly. They are likely to pick up

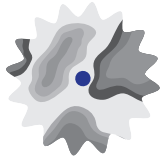
TIME, PERSONALIZATION AND DISCRETION ARE JUST SOME OF THE KEY DEMANDS OF HIGH-NET-WORTH INDIVIDUALS DURING A COMPLETION PROJECT

Words by Marisa Garcia. Illustration by Denis Carrier

stommer



“No one likes it if you just assume that cost is not important”



on mistakes. Their key need is for a unique, tailored service that respects their capabilities and values.

“I find that the common thread is that they are very demanding in a good way that makes you raise the bar to meet the requirements,” says Havilande Whitcomb, founder of Aviation Aesthetics, a design company.

WISE INVESTMENTS

While HNWIs may have vast resources to spend, they want to invest those resources wisely. Whitcomb finds that HNWIs expect due consideration of costs and time. “Money is a factor,” she says. “No one likes it if you just assume that cost is not important. I always try to be respectful of that. Everything in aviation is so expensive, and although design is not driven by price, it’s still important to respect costs. Any project has three factors: time, quality and cost. And time is money, especially for people who are very busy.”

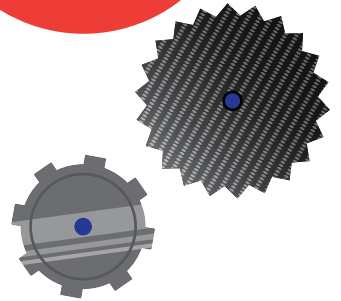
Time is a huge factor, especially aircraft downtime. “It’s important to communicate the designer’s vision so that you come very well prepared, with good ideas, and are able to make changes in a timely way,” says Whitcomb.

While Whitcomb’s experience is generally working directly with HNWIs in the USA and Europe who are well informed and involved in the decisions along the way, the Airbus study finds that many billionaires may rely on advisors to help them deal with the day-to-day management of projects. In many ways, this goes back to time limitations, but it also serves to highlight the value these individuals place on trust.

Those who function as trusted advisors for HNWIs may include family members, especially in the Middle East, where legacy wealth is established and family members guard over various day-to-day responsibilities, Airbus says. In Russia, advisors may not be family members, but they are part of a close-knit network. In China, these relationships may be more transient and it is possible that advisors will change over the timeline of a project.

Time also plays a role in HNWI’s perception of luxury, especially in the context of travel. As Airbus explains, “For billionaires, what they think of as luxury is

In 2015, 210 individuals broke through the billion-dollar wealth ceiling



BELOW, LEFT: AN IDAIR USER INTERFACE; SIMPLE, INTUITIVE CONTROLS AND GOOD WI-FI REMAIN KEY TO A SUCCESSFUL CABIN, REGARDLESS OF WEALTH

BELOW: A VIP LOUNGE SCHEME BY GREENPOINT TECHNOLOGIES

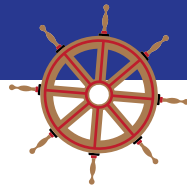
WHERE ARE ALL THE BILLIONAIRES?

UBS/PWC’s *Billionaires 2016 Report* makes interesting reading to those wanting to know where to find a billionaire. Although the USA has the world’s largest population of billionaires, this population grew by only 1% in 2015, reaching 538 individuals. Their combined wealth fell by 6% from US\$2.6tn to US\$2.4tn.

Europe has the largest concentration of multigenerational billionaires. The region’s billionaire wealth dipped slightly by 3% during 2015 and is valued at US\$1.3tn. Germany and Switzerland have the region’s largest concentration of ‘old’ wealth.

Every three days there is one new billionaire in Asia, with the largest concentration of HNWIs in China. During 2015, 113 Asian entrepreneurs reached billionaire status, with many young entrepreneurs in technology, consumer retail and real-estate markets. They account for more than half (54%) of the year’s global total of billionaires and have a combined wealth of US\$1.5tn.





The billionaire population in the 14 largest billionaire markets rose to 1,397 in 2015

less about tangible things and more about making their lives easier and better." Airbus breaks down this concept of luxury further into three key elements: having more free time; enjoying life; and the 'money can't buy' values of moments spent with loved ones and in good health.

HOME COMFORTS

Those values influence design choices as well. At the heart of their preferences is the idea that they want to travel in the same comfort as they have at home. They want continuity of experience in the air as on the ground. "When they are traveling, they want to be comfortable," says Whitcomb. "They want beautiful things, but more of a casual feeling from home transferred to the aircraft. For my US and European clients, it's about a quiet, relaxed elegance."

Airbus finds that as people accumulate wealth, they transition from impulse buying to more discerning, selective purchases. Some may still be influenced by peers and brands, but they trend toward quality products and materials, and away from showiness. While those who have newly acquired wealth may gravitate toward certain status symbols, like branded

GALLEY DEMANDS

Havilande Whitcomb, founder of Aviation Aesthetics, says HNWI's want their aircraft to be an extension of their home, and nowhere is this more challenging than in the galley. "For example, finding a good coffee maker, small but powerful microwaves and ovens, and ensuring they are all efficient is really challenging," she says. "People want a really good cup of coffee. They are used to it elsewhere, and want that on the aircraft. Of course, food and drink tastes a bit different at altitude, but a good caterer can help. People have higher expectations about food and drink, and how it's served. They'd like a very nice table top, for example."

CUSTOMIZED ACCESSORIES, SUCH AS THIS MAJILIS LAMP FROM A VIP SCHEME BY JET AVIATION, ARE POPULAR WITH WEALTHY CLIENTS



possessions with logos, they evolve beyond that toward a more subtle and selective personal taste. They will prefer bespoke quality materials and pieces and customization.

UNDERSTATED LUXURY

This move away from showiness toward comfort also affects structure. Many internationally minded HNWI's may prefer less formal settings, with seating arrangements around a coffee table rather than boardroom-style seating, for example, Airbus says. Whitcomb also suggests that HNWI's may prefer a fine quality set of tableware and glassware that is still functional, with an understated elegance, rather than more formal china and crystal glasses.

This is all relative to the individual and may vary by region. Some HNWI's may travel with an entourage that includes household staff and may expect fine catering, even special orders from their favorite restaurants. Airbus suggests this is especially true among Middle Eastern clients. But the desire for continuity of life experience is a



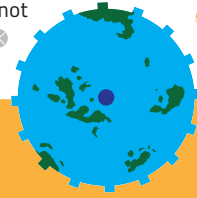
The average billionaire's wealth fell from US\$4bn in 2014 to US\$3.7bn in 2015



a high priority for HNWIs. "Today's next generation are facing a much wider array of options due to better education, digitization and technology," says a financial advisor quoted in USB/PWC's *Billionaires Report 2016*. "This amplifies the importance of purpose and meaning for them when choosing what to do and what not to do."

This prioritization of technology also reflects the value placed on the continuity of experience. It requires designers, manufacturers and suppliers to find ways to reliably deliver technology improvements. "Wi-fi connectivity is the main goal now," says Whitcomb. "I try to make sure that all of that technology is incorporated in a beautiful way."

HNWIs also place high value on privacy – it is an integral part of their lifestyle. In fact, Airbus finds that need for privacy is a key driver of private jet purchases. With that, comes an expectation of discretion from suppliers and service providers. "They expect the utmost discretion," says Whitcomb. "I always assume that transactions are completely private. Half my projects are not even published, or put on the website." ☒



A NEW GENERATION

According to UBS/PWC's *Billionaires 2016 Report*, we are entering a period of the biggest-ever wealth transfer, with an estimated 460 billionaires expected to hand over US\$2.1tn to their heirs. These millennial billionaire heirs may depart from the consumer behavior of the previous generation. With broader values and greater choices, they may choose philanthropy over entrepreneurialism, personal careers over working in the family business. Many of these billionaire heirs may cash out or keep their businesses as owners but not direct managers.

Fortunes can be fleeting. Business risk and asset dilution have led some to lose their billionaire status. The report finds that over the past 20 years, 90% of those who dipped below the billionaire mark did so in the first and second generation. More than two-thirds (70%) of fortunes have been reduced after the first generation and a further fifth (20%) had lost their fortunes by the end of the second generation.



TOP: HAND STITCHING AND QUALITY MATERIALS GIVE A LUXURIOUS FEEL TO THIS EMBRAER-DESIGNED SEAT

ABOVE: A COMLUX COMPLETION WITH PLENTY OF SAFE STORAGE SPACE FOR CUSTOM GLASSWARE

common thread, regardless of the level of wealth or region.

"When they travel, they want to have whatever they want as they do in their home country. They are used to living in a certain way and expect this to continue," the Airbus report states.

Durability, reliability and continuity of service are also critical to these individuals. As Whitcomb says, aircraft downtime is expensive, so they will want to have materials and components that not only look and feel good, but can also be counted on to last. They will also expect service providers to be available on-call when things don't go as expected, Airbus says.

TECHNOLOGICAL PRIORITIES

As technology becomes a greater driver of wealth, it is perhaps no surprise that technology integration in aircraft is also

Award-winning technology

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BAE Systems is honored to receive the 2017 Aviation Week Technology Laureate – along with Gulfstream Aerospace Corporation – for the first commercial active control side sticks on the Gulfstream G500 and G600 business jets.



BBJ DEMONSTRATOR

show rooms



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BOEING BUSINESS JETS HAS
A NEW AIRCRAFT CREATED
SPECIFICALLY TO DEMONSTRATE
THE CUSTOMIZED WORKING
AND SOCIAL ENVIRONMENTS
THAT CAN BE IMPLEMENTED
ON BOARD

Words by Christine Velarde



AMAC is
celebrating its
10th anniversary
in 2017

People interesting in buying a BBJ can now get an idea of the interior possibilities with a tour of a cabin outfitted by AMAC Aerospace. It is Boeing Business Jets' first demonstrator aircraft in more than a decade. The company says it will be used primarily as a sales tool at air shows and customer meetings. It has already been presented at the Paris Air Show 2017 and EBACE 2017.

The completion contract was awarded to AMAC in June 2015, and the aircraft arrived at the company's facility in Basel, Switzerland, in March 2016. The concept engineering, design and production engineering phases were performed almost simultaneously, enabling AMAC to complete the aircraft within the agreed 12 months. The engineering and production work totalled more than 200,000 hours.

Boeing Business Jets had two main requirements: the BBJ had to offer a private and quiet working environment for day-to-day users, and be a flagship to attract prospective customers. "To meet these two requirements, we had to reduce the noise level, balance the cabin air distribution and develop and implement a customized lightweight concept," says Christian Schirlin, director of VIP completions and head of project management at AMAC. "In addition we paid special attention to making full use of the cabin space to offer the highest levels of comfort during long flights."

Warja Borges, interior architect and owner of Unique Aircraft, was responsible for the interior design. Her brief was to create a comfortable cabin suitable for long-distance business flights for 2-10 passengers and crew, and to create a VIP look. "I imagined the passenger traveling to important meetings and needing to concentrate and prepare, and after a stressful day, needing to relax and recharge, so I wanted to create surroundings giving energy and tranquility," says Borges.

This focus on serenity begins in the entrance area/galley. "From the first step on board I wanted a feeling of calm," says Borges. "I put a lot of thought into creating an open and inviting space – providing a sincere welcome on board, even though many functionalities are integrated in this area."

DOMESTIC SETTING

The galley/bar area was inspired by open living spaces in residential designs. "Food preparation and service activities are centered on the large countertop/bar surface, which has additional pull-out tables and an extra table in front of left-hand door one," says Borges. "We used the latest galley equipment, including induction ovens for fresh food preparation, an espresso maker, two coffee makers, a huge fridge and a microwave."

The area also includes the BBJ insignia displayed prominently on the side of the galley/bar.

The curved hallway guides the passenger into the main passenger cabin. "The idea of the curve is to ease passengers into calmness after a stressful day," says

LIVELY LIVERY

The livery design, The Helix, was painted by RUAG in Munich, Germany. The design incorporates BBJ branding on the tail, with a main wave line in Boeing blue and further waves in BBJ gold.

"It was a difficult paint job, especially the taping of the lines," says Borges. "You want them to look straight from every direction, but the body of an aircraft isn't straight. You need a lot of experience to compensate for that."

PHOTOS: BOEING

TOP LEFT: THE TEAM AT AMAC COMPLETED THE PROJECT IN 12 MONTHS

ABOVE AND INSET: THE ENTRANCE GALLEY/BAR AREA



Equipment including chinaware, cutlery, glasses, bed linen and blankets was supplied by Boutsen Design

Borges. Stowage space is integrated into the walls on the left. The door to the lounge has a 31.5in (80cm) opening.

The crew area can be separated from the entrance by a cross-aisle curtain. On one side is a two-place divan, and on the other a crew rest with a bunk bed that converts into two sleepers. The crew rest with the bunk bed can be split off with a bifold door.

HIDDEN AMENITIES

The forward lounge can be used as a social or working space. Outlets and ports are hidden behind flaps or in the armrests. Borges worked closely with Stéphane Bibler, AMAC's project manager, and Larry

Hinebaugh, BBJ's completion manager/customer representative, to design a mechanism that would enable the table to rotate, slide and go high or low. All the tables are deployable, giving convenient working surfaces or an additional dining area. The right-hand cabinet features a 42in (106cm) pop-up monitor, while a telephone and remote control are hidden under flaps in the left-hand sideledge. Between the forward lounge and dining area is an office cabinet with an integrated printer/fax machine.

PAC's FS1400 seat structure forms the basis for a customized seat design by Unique Aircraft. "Every little detail in my sketches was translated into a mock-up at AMAC's workshops to make it look exactly like my design," comments Borges. "The seat has my favorite detail on the aircraft – the piping around the armrest and backrest. It's

ABOVE: A CUSTOM DESIGN WAS BUILT ON A PAC SEAT STRUCTURE

COURTESY OF BOEING



BBJ DEMONSTRATOR 2017

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FAR LEFT: BOTH SHOWERS ON BOARD HAVE A RAINFALL SHOWERHEAD AND A WAND

LEFT: THE MASTER BEDROOM HAS A 63IN-WIDE DOUBLE BED

AMAC developed a camera system to aid pilots in determining the location of the wings and wingtips during taxi and parking operations

VIRTUAL TOURS

ACA-3D developed an online application to enable people to have a virtual walkthrough of the completed cabin. "The entire interior was created in the Virtual Cabin App by ACA-3D," says Warja Borges of Unique Aircraft. "This tool was very helpful during the preliminary and critical design reviews to verify the cabin interior with the customer."

"This application was very helpful for us as well as for the client, as you have a better sense of space and you can already see the end product, even though you are still in the middle of the completion process," says Christian Schirlin of AMAC Aerospace.

not round but square, which looks so much more elegant and sophisticated and emphasizes the design of the seat."

The dining area can also be used as working area; outlets and ports are integrated under the table and in armrests. All the cabinets in this area were designed to store dining equipment – for example, glasses can be stored in drawer trays. For ease of cleaning, the entire unit can be taken to the cleaning area like a tray.

WATER FEATURES

Next up is the guest lavatory, which has a shower. The one-tone interior is intended to give a spacious feeling, bolstered by the transparent corner of the shower. In both this and the main shower there is a rainfall setting and a handset.

The next area, accessed via a double sliding door, is the multifunctional room, which can be used as a guest bedroom thanks to a berthing divan, or as a private office or

lounge. Power outlets and ports are hidden behind flaps on the front of the divan armrests, and the desk hosts a telephone and outlets behind a top flap. The room has a 32in (81cm) screen, with a remote control behind a flap in the sideledge. Stowage space is integrated in the aft desk table leg. All these touches are designed to make the room seem very open. "When the double sliding door is left open, the room has a more spacious feel," says Borges.

PRIVATE SANCTUARY

The bedroom is dominated by a double bed that is 63in (160cm) wide and has stowage space underneath. Ambient lighting is provided by the decorative nightstand lamps, which sport the BBJ logo, and are supplemented by snake lights for reading. Integrated stowage in the aft bulkhead is accessible from the bathroom as well.

In the master bathroom the main monument is the washstand, flanked by stowage space in left- and right-hand drawers, apothecary cabinets and mirror stowage. The shower has the maximum number of transparent surfaces.

Schirlin says the main challenge of the completion was to find the right balance



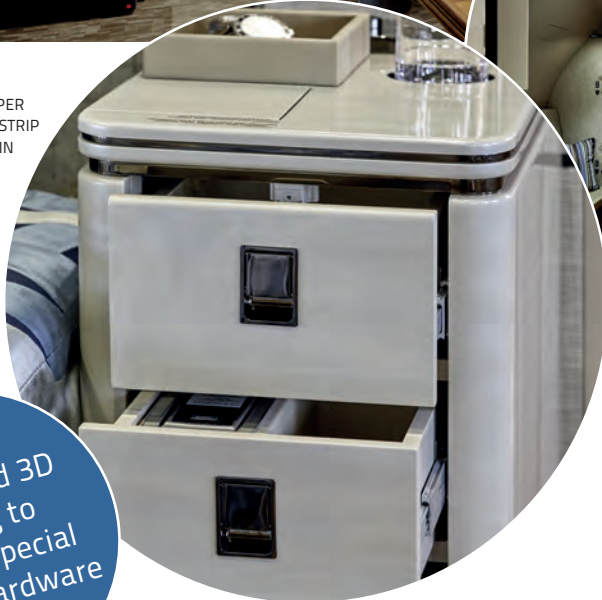
LIGHT TOUCHES

Another special focus on this project was the cabin lighting – besides the usual indirect wash lights and spotlights, several non-standard solutions were found. For example, the lounge table is illuminated with huge lightbulbs instead of standard spotlights, and the normal upper wash light was eschewed in favor of a light strip that creates an area of soft light.

"In addition, inspired by a living room atmosphere, we integrated five bespoke floor lamps in the lounge/dining area," says Borges.

ABOVE AND INSET RIGHT: INSTEAD OF NORMAL UPPER WASH LIGHTING, A LIGHT STRIP RUNS THROUGH THE CABIN

RIGHT: THE BEDROOM FEATURES A NIGHT STAND WITH AMPLE STORAGE



AMAC used 3D printing to develop special custom hardware

size by pushing the ceiling height and sidewall panels up and out to the limit," says Borges. "The one-piece sidewall panel extends from windows to ceiling, and the light stripe above raises the ceiling visually. We kept the surrounding colors light, with a tone-in-tone color selection – for example, the doors and monitor frames blend into their surroundings."

UNIFIED DESIGN

The design incorporates repeated shapes, patterns, materials, colors and details for a unified aesthetic throughout the aircraft. Wood was used minimally and there is only one colored monument per area, which is blue.

"The carpet design runs throughout and it only alternates in terms of pattern density – there's no threshold," adds Borges. "Stowage areas are integrated in bulkheads and walls, and there are no material changes on the doors, making them nearly invisible."

Another element supporting this unified feeling is the metal trim, which runs uninterrupted through the whole cabin, continuing even on doors and door frames. "One's eyes shouldn't get caught on any interruption, disharmony or mismatch, but pleasantly wander, guided by the 'endless' metal trims," says Borges. "We also focused on sophisticated design details such as the seat backrest and armrest design, floor lamps, magnetic cupholders, hidden details and other special features, to make the design glamorous as well as calming." ✕

between weight saving and noise reduction. The company developed weight-saving techniques for various cabinets, parts and systems. "For example, lightweight and robust standalone floor lamps were customized for this project," says Schirlin. "They were developed, certified and produced by us. Our engineering department worked closely with our subsidiary, JCB Aero, on the certification and production of these lamps, which are distinguished by a modern and pure design."

One challenge was to keep the cabin feeling open and airy, with a clean design. "We highlighted the BBJ's generous cabin



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THE BUSINESS JET INDUSTRY SHOULD KEEP
A FIRM EYE ON WHAT'S HAPPENING IN
OTHER, INCREASINGLY INTERCONNECTED,
MODES OF PERSONAL TRANSPORTATION

Words by Guy Bird

future



AIRBUS/ITALDESIGN

AIRBUS'S FLYING CAR

The Airbus Pop-Up concept – created in collaboration with Italdesign – is a joined-up transport solution that envisages the passenger being able to stay within the same personal capsule throughout their air and ground journeys, to keep things luxurious and personal.

The central monocoque carbon-fiber passenger capsule – which seats two – couples with a battery-powered carbon-fiber chassis ground module to become a city car. It can also be carried by an air module, propelled by eight counter-rotating rotors, to become a self-piloted aircraft.

The idea is that when not needed, the modules and the capsule can return autonomously to their recharging stations to await their next customers. Charging would be complete in 15 minutes. Trips could be planned, paid for and hailed via an app.

The air module's range, without payload, is 60 miles (100km) so suits short missions. On land, a top speed of 60mph (100km/h) is listed, so progress would be brisk enough for a city car.

THE AIRBUS/ITALDESIGN POP-UP CONCEPT USES THE SAME POD AS THE BASIS FOR ROAD AND AIR TRANSPORT

The landscape of personal transportation is set to change radically within the next two decades in response to changing customer priorities, legislation, technology and fuel sources. Expected trends include electrification, connectivity and autonomous driving in the automotive sector, and renewed interest in supersonic flight, flying cars, space flight and artificial intelligence in aviation. The question of how the business jet industry could fit into this evolving new world is a fascinating one.

Nicola Crea is course director for automotive and transport design at the UK's Coventry University, and heavily involved in the just-opened UK National Transport Design Centre. He predicts massive and exciting developments. "We're expecting big changes in mobility, so we're interested in transport of all types beyond automotive," he enthuses. "We've worked for 15 years in boat design, and for the future, we'll go into aviation and trains too. In the future, a lot of people are going to build transportation, not traditional cars. We've seen little signs, such as the Google car. Modes of transport will have a lot of additional qualities,

responding to technological development and new requirements. Supercars – today's noisy, fast, beautiful, racing cars for the street – might fly too, and do other high-luxury things."

ROADS TO THE AIR

While still not commercial reality, and far from a new idea, big players from both the automotive and the aerospace worlds are taking flying cars seriously. Toyota is reportedly planning a flying car prototype for the 2020 Tokyo Olympics opening ceremony and Airbus unveiled its Pop-Up concept at the 2017 Geneva Motor Show with automotive design and engineering expert Italdesign (now fully under the wing of parent group VW).

The latter concept is an app-enabled, zero-emissions vehicle envisioned to fly or drive short city missions – and link with public transport – as a time-saving solution to global urban congestion and pollution.

Airbus has even appointed a general manager for urban air mobility, Mathias

Thomsen. "Adding a third dimension to seamless multimodal transportation networks will without a doubt improve the way we get from A to B," he commented at the Pop-Up concept's unveiling event. "Successfully implementing solutions that will work both in the air and on the ground requires a joint reflection on the part of both aerospace and automotive sectors, alongside collaboration with local government bodies for infrastructure and regulatory frameworks."

Italdesign's CEO, Jorg Astalosch, also believes in a more joined-up approach. "Today, automobiles are part of a much wider ecosystem," he says. "If you want to design the urban vehicle of the future, the traditional car cannot be the solution for megacities alone."

SUPERSONIC BOOM

To compete, in terms of stand-out luxury service, several aviation projects are looking again at supersonic travel – from Aerion to Spike and even NASA – and their designers are questioning what kind of VIP experience should match such speed. Howard Guy, of independent design firm DesignQ, is working on the Aerion AS2 project and is forthright about business jets needing to up their game. "It's inevitable that flying cars and going to the moon will affect business jets," he says. "The quality of business jets

"The quality of business jets has improved massively, but they're still crying out for radical change"



LEFT AND BELOW: AERION'S SUPERSONIC JET, THE AS2, IS UNDER DEVELOPMENT



has improved massively, but they're still crying out for radical change."

Guy cites the work for Aerion as instructive: "It's a whole new platform and product, and because it's supersonic it has to stand out from everything else that isn't. Going faster isn't good enough. Our role has been to challenge every single aspect, to figure out why you put certain things in certain places – why have the door or the galley in the front? Or even the flight deck? Increasingly, you're not going to need the pilot at the front, with fly-by-wire and cruising at 35,000ft most of the time. That changes the aircraft layout and gives opportunities that weren't there before."

Adam White, director at Factorydesign, also sees new opportunities in the supersonic revival, and says designers must do away with old thinking. "The perspective must not be 'airline' – it must offer the impeccable five-star service of a

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DIGITAL FUTURE

Digital interaction is a crucial factor for the future VIP experience. That might not mean more screens and buttons, but rather fewer and more intuitive ones, and in terms of preflight experience too.

"The world of Uber is creeping into how you might choose your mode of travel; it is a more dynamic interface compared with the old agents," says Adam White of Factorydesign. "Connectivity is essential, but I just don't see it remaining in the old format. There are a lot of very smart gesture-controlled, voice-activated approaches, and in VIP travel, which is not restrained in the same way as commercial airlines in terms of cost and certification, it will be a faster track to get some of the sharper tech onto the aircraft."

"Millennials are growing up in rich families, inheriting money and asking for more advanced, innovative technology"

restaurant," he explains. "We don't want to waste time with galleys. Nobody in the world would say that the best that can be prepared in the air can compare with what can be prepared on the ground – so don't do it. Clearly the seats don't need to lie flat on such an aircraft either. When we designed the last Concorde seats, we looked at the design language of an Aston Martin or a board room – quite different from an airline seat."

CHANGING LANES

This crossover approach was seen recently in Airbus's recent collaboration with Italian hypercar maker Pagani for the Infinito ACJ319neo cabin design. The headline impression is the lack of a headliner; instead the illusion of an open sky is created via the projection of imagery from outside the aircraft. The concept also features sporty automotive-style seating and finishes including soft leathers, metal, wood and carbon fiber.

BELOW LEFT: BENTLEY REVEALED THIS LUXURIOUS ELECTRIC VEHICLE CONCEPT, THE EXP12 SPEED 6E, IN APRIL 2017

BELOW: STEFAN SIELAFF, DIRECTOR OF DESIGN AT BENTLEY AND MULLINER, ITS PERSONAL COMMISSIONING DIVISION



Bentley is another influential car brand that shares customers with the business jet industry, and therefore shares its common focus on highly luxurious but traditional aesthetics. However, Bentley's design director, Stefan Sielaff, believes it too must modernize. "In the last few decades, the typical Bentley customer was rather conservative and maybe not asking for mega-technical electronic innovation," he reasons. "But this is changing as our customers are getting younger. Millennials are growing up in rich families, inheriting money and asking for more advanced, innovative technology."

RIGHT AND BELOW: SPIKE IS ANOTHER PLAYER IN THE RACE TO PRODUCE A SUPERSONIC BUSINESS JET, WITH ITS S-512



Siellaff says this – in combination with the trends for higher autonomy and electric driving – will have a big impact on the human machine interface (HMI), which will have to be managed carefully. “I’m from this Bauhaus, German design education, where you want simpler stuff, so I’m disappointed things have got more complicated,” he says. “Touchscreens have translated from iPhones and iPads, and they are innovative, but I don’t want to fiddle around on touchpads and screens in a car. It’s important to ask what a luxury answer to this issue is. Luxury is about service. We could deliver such a service in a car via talking to a ‘butler’, an avatar. A lot of activities should be deliverable by speech.”

FAST FORWARD

“Not forgetting our heritage and genetic codes design-wise, we need to accelerate our next generation of cars,” says Siellaff. “In the future, we won’t only be designing cars, but also luxury products – furniture, accessories and more. It’s not just about material quality, but design quality too.”

Factorydesign’s White also highlights the growing impact of automotive-inspired

ALICE IN WONDERLAND

Eviation is just one company pushing for a future of electric flight. Its clean-sheet commuter aircraft, Alice, would carry nine passengers and two crew for around 1,000km at a cruise speed of 240kts. The 12m-long aircraft is being designed to meet FAA Part 135 regulations for commuter and on-demand operations.

The aircraft would be powered by a lithium-ion battery, with the main pusher propeller at the tail and two others at the wingtips. To compensate for the heaviness of the battery (65% of the aircraft weight), the body would be made entirely from composite material.

Eviation is now building a prototype and expects Alice to make its first flight in late 2018.

materials, such as composites. “You can’t get away from how important it is to shed weight,” he says. “We’re putting more and more exotic materials into aircraft, so I would eventually like to see a cabin filled with furniture I can see through, because it is so light in its structure. When I get on an aircraft today, the front end is full of folded mattresses and heavy tombstone monuments. I can imagine everything becoming more skeletal and delicate, so the quality of the materials can be expressed through their design. What an easy way to show finesse.”

Clearly the business jet industry should be excited about, and prepared for, rapid change. ☒



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WITH ITS OLIVE-BRANCH MOTIFS, LIGHT COLOR PALETTE AND FLAT-FLOOR SHOWER, EMBRAER'S LATEST LINEAGE 1000E DEMONSTRATOR IS PROMOTING PEACE AND BALANCE

Words by Izzy Kington

DEMONSTRATOR ROLE

This interior, unveiled at EBACE 2017, is Embraer's new Lineage 1000E demonstrator, intended to show the full customization opportunities afforded by the airframe. It will be shown to select prospects and is available for sale at US\$55m.

The interior was designed in-house and fitted to a brand-new aircraft. From specification to delivery, the project took 14 months. "We built this one at risk, but we know someone is going to want it," says Jay Beever, vice president of interior design at Embraer Executive Jets.

PEACE MACHINE

The aircraft is designed to be customers' home away from home, and has a distinctly feminine feel. Beever reveals that it was designed with his wife's taste in mind, and particularly her preference for silvery-gray driftwood. That's why the typical blonde or dark wood is looked over in favor of a light gray veneer.

Above all, Beever wanted to create a feeling of serenity, and therefore chose to incorporate an olive-branch motif. This symbol is embossed into pearlized leather, incorporated into the silk-wool carpet and is the subject of a mural in the foyer.

Light tones are used throughout to amplify the effect of the natural and cabin lighting

Embraer says 15Mbps internet capability can be retrofitted from early 2018



LOUNGE

The lounge has three seating areas – a club-four, an entertainment area with a divan facing a 42in monitor, and a six-place conference group. The 42in monitor does not need to be stowed for take-off or landing. "The open style provides an unobstructed view of the entire lounge from any seat and mitigates sensations of isolation that over-segmentation brings," says Beever.

The aircraft is equipped with Honeywell's Ovation Select IFEC system



The carpet was specially developed with a supplier to match the olive-branch mural in the foyer

FOYER AND GALLEY

The foyer includes a divan, where passengers can sit to remove their coats and shoes. As they step into the wide-aisle galley, they are offered a glimpse of the owner's china, crystal and silverware collection.

"More particular guests will notice the Scandinavian Edge finish to the contours of the galley, revealing the layers of stacked veneers," says Beever.

This area also makes use of granite veneer surfaces. Straight after the galley is a six-place dining space that can be closed off from the main lounge.



LAVATORY AND SHOWER

The biggest engineering challenge was the two-person shower, a first for the Lineage. It has a 30-gallon dedicated water tank, which gives roughly 40 minutes of shower time, and features a waterfall-style head and a wand. The shower has glass-door cabinets for supplies and towels, enabling passengers to dry off while still in a warm environment.

The shower's floating flat stone veneer floor has a drainage channel around the border that captures water and drains it underneath. "Aircraft sitting on the ramp have a different nose angle than when flying," says Beever. "Drainage is critical and most aircraft showers end up with floors that have angled surfaces, which are not ergonomically favorable for passenger stability and equilibrium when the shower is in use. We created an elevated floor that allows water drainage peripherally to the angled surfaces beneath it, all the while achieving a full stand-up shower."

Natural light is maximized through the inclusion of windows. "The windows offer the additional benefit of a horizon reference to mitigate confinement and vertigo sensations brought on by closed environments," says Beever.

Achieving all these things at the same time was not easy, Beever adds.

"To keep the shower stable in flight we had to really think out the way it is mounted and attached to the fuselage," he explains. "We had to isolate the unit in such a way that the exterior window is located properly and yet not allowing the fuselage adjustments in flight to manipulate the assembly."

Embraer has expanded its use of granite veneer to cover walls – this is the second Embraer aircraft (and first on public display) to have this feature

As well as a fixed queen-sized bed, the suite features home-style amenities including an IFE monitor, climate control, windows, wardrobe, lavatory and access to the baggage compartment



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Words by Izzy Kington. Illustration by Paddy Mills



Michael Kramer

Kramer joined Jet Aviation in February 2016, from the yacht industry. "He is a talented young designer who brings an excellent balance of skills to the team: not only is he creative, he also has strong technical skills and the ability to find solutions that work for our customers, and see them through to the end," notes Elisabeth Harvey, head of the Jet Aviation Design Studio.



HOW AND WHY DID YOU GET INTO THE INDUSTRY?

I started my career working in yacht interior design, both with design studios and for a shipyard. For aviation, you are obviously dealing with similar customers and they expect the same design standard, and you have similar restrictions and regulations. However, aviation presents even more stringent challenges, and that was very appealing. Working for an in-house design studio was also a draw – you have a lot more visibility and involvement in the entire process, and access to engineering, production and installation, so you can really see a project through from concept to execution and work together with other teams to meet the challenges and specifications of that design.

WHAT HAS SURPRISED YOU?

I was surprised by the rigidity and regulations. When you design for a yacht, generally the exterior and interior are worked on together, so there is more flexibility. For an aircraft completion, the aircraft arrives and you must make a design work within set parameters. That is the challenge of aviation design and part of what makes it so interesting. I was also pleasantly surprised to see such an international team at Jet Aviation. Elisabeth Harvey has this philosophy of plucking talent from different industries to keep the perspective fresh, but also to look for home-grown talent.

WHAT WORK ARE YOU MOST PROUD OF?

Jet Aviation was approached by Airbus to create a design concept to coincide with the launch of the

ACJ350. The brief was to give the interior a wow factor that matched the innovation and space provided by the new composite fuselage. I was part of the team that worked on the design. We called it Limitless, to reflect the idea that we were pushing the boundaries of traditional aviation design, moving toward a lighter, softer interior that feels much more residential. Partly this was achieved by the flexibility of the layout; for example, the living and dining areas can be separated instantly, thanks to an electrochromatic glass divider. Although technology was a big part of the concept, we wanted it to feel unobtrusive, focusing instead on the design, with sculpted and woven leather panels, intricate marquetry details, artwork lit within niches and sculptures on credenzas. Lighting was also a feature. The ACJ350 features larger windows than older aircraft, and to enhance this, we worked on a series of ambient and accent lighting concepts.

WHAT NEW MATERIALS, TECHNOLOGIES AND IDEAS WOULD YOU LIKE TO IMPLEMENT?

Lighting design is something I would like to see more emphasis on. It is something that we explored in the ACJ350 Limitless concept – the idea of using not only the traditional spotlights, but more ambient lighting solutions. Similarly, I'd like to see more residential materials used, such as stone flooring.

I am also interested in 3D printing, specifically how it could provide customers with more complex shapes and textures, such as sweeping curved panels, or, as we just did on an aircraft, 3D-printed lamps, which allowed us to work with much more intricate designs.

HOW AND WHY DID YOU GET INTO THE INDUSTRY?

I grew up in an aviation family and became intrigued by the industry when I was young. So, I wrote to Flying Colours when I saw a position advertised online. I was put through quite a strict interview process, but after the third interview I was offered the position within an hour of leaving the facility. Working at Flying Colours Corp has been a major boost to my career, because the team is expert in all aspects of aircraft completions. I'm very proud to have been involved in the creation of some very luxurious, stunning and comfortable interiors.

WHAT HAS SURPRISED YOU?

I knew that it was a niche area, but I hadn't realized just how much so. Everything is different in an aircraft. The walls are long and straight, but not vertical; headroom is limited; traffic flow is restricted; weight and its distribution are important considerations; materials are specialized and constantly changing; repairs are regulated and costly; aircraft availability is minimal. Some shapes work well, others don't. All components must meet specific regulations, as well as strict smoke and fire tests. From curtains to electronic components, everything must pass. That means almost nothing is readily available – it all comes from specialty suppliers, so you need to know where to go.

When an owner says to me I'd like the interior to look like my yacht or car, I never say no – I must manage expectations, but present an interior that matches the vision. This can be challenging and we may suggest modifications, but I'm always confident we can deliver.

WHAT DESIGN ARE YOU MOST PROUD OF?

One of the designs I'm most proud of is a carbon-fiber interior that I first worked on about four years ago. The client's company is Chinese, but he is an American, so he wanted to incorporate an East-meets-West influence. For me, as a Canadian Chinese citizen, it was a great opportunity to use my cultural knowledge of both regions to support the design.

The aircraft was a Challenger 850 and the final styling was informed by black, white and red. Most of the monuments and surfaces were done in carbon fiber instead of the usual wood. It was a very striking design; the first cabin I'd seen with this look and feel.

Most importantly, the client was pleased with it. In fact, he has returned with a Bombardier Global and wants to replicate the look and feel of his first aircraft.

WHAT NEW MATERIALS, TECHNOLOGIES AND IDEAS WOULD YOU LIKE TO SEE?

We have become real experts in handling carbon fiber but the coloring can be quite limiting; it's pretty much black and white so right now we are experimenting with dyeing the carbon fiber. Different colors are often used in cars, but when you add a color it can seriously change the flammability, which makes it difficult to pass aviation tests. I'd like to see more colors available – it's trending in the high-end car sector, so naturally we are getting requests for this.

I'd also like to see a CMS that allows you to control the ambient lighting and the windows together, so they can be synchronized to match.



Summer Sun

Since joining Flying Colours Corp, Sun has made herself indispensable, stepping up to the role of interior design and program manager in 2014. "Summer Sun is truly living up to her name when it comes to bringing a ray of light to our in-house design team," says Kate Ahrens, vice president of interior design at Flying Colours Corp. "She brings new ideas and concepts, and is prepared to tackle any challenge a design may throw at her. She's also been invaluable to our Asian expansion, with her understanding of the culture and how Asian clients may have different requirements to North American, for example."

Kylie Fencil

An aircraft interior designer since 2013, Fencil joined StandardAero's business aviation facility in Springfield, Illinois, in 2016. "Kylie is very detail orientated, and strives to exceed not only her external, but also her internal customers' expectations," says Matt Hughes, manager of production at the facility. "She works very closely with customers on their projects and provides well-received ideas in the overall aircraft design. Kylie is very upbeat and customers love working with her. She is an asset to my department, and the company. We look forward to what she has to offer in the years to come."



HOW AND WHY DID YOU GET INTO THE INDUSTRY?

My passions in life are design, aviation and travel. Ultimately, I wanted to integrate my passions into my pursuit.

WHAT HAS SURPRISED YOU ABOUT IT?

The FAA regulations and the costs associated with flammability testing were eye-openers. Regulations for the flame resistance of fabrics, leathers, carpets and any other decorative material are obstacles faced on every aircraft project. You need to be knowledgeable about material content, which contents can be treated, which will pass, and which to avoid altogether.

WHAT DESIGNS ARE YOU MOST PROUD OF?

My favorite designs have clean lines, a good contrast between materials and a patterned carpet.

WHAT NEW MATERIALS, TECHNOLOGIES AND IDEAS WOULD YOU LIKE TO IMPLEMENT?

Current trending designs include contrasting materials, satin finishes and wood flooring. I would love to see the implementation of more decorative translucent materials into the cabins, besides the most common clear and frosted lexan.

On the MRO side, we've seen more aircraft being upgrading with comforts including more USB charging ports, phones and wi-fi systems. Customers want all this technology to be right at their fingertips.

A high-angle, close-up photograph of a woman's legs from the knees down. She is wearing light-colored, strappy high-heeled sandals. Her legs are crossed at the ankles. She is sitting on a light-colored rug with a complex, organic, brown and gold pattern. Her hands are resting on her knees; the right hand has a large gold ring and a wide gold cuff. She is wearing a brown skirt.

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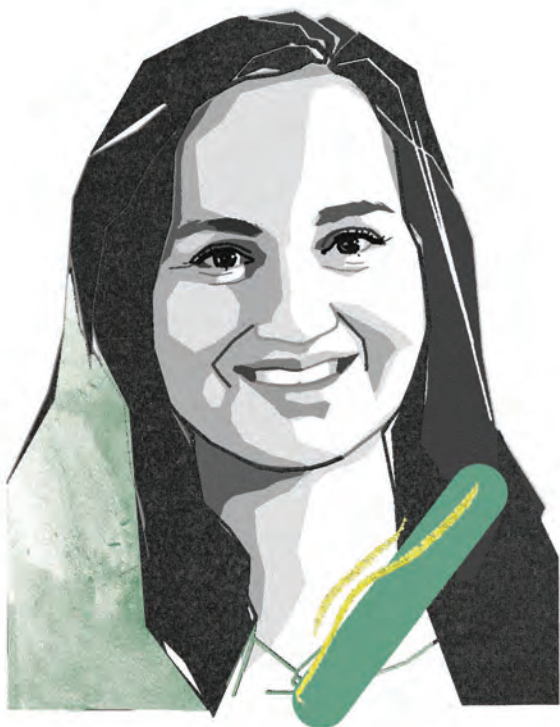
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HOW AND WHY DID YOU GET INTO THE INDUSTRY?

I have always been passionate about interior design and the aviation industry; my father introduced me to aircraft, as he is a Boeing engineer. After my first year of design school, I began applying studio assignments to yachts and aircraft, building my academic portfolio around transportation design. I was introduced to Greenpoint through an internship program with the Seattle Design Center.

WHAT HAS SURPRISED YOU?

The biggest surprise is the constant communication and coordination required between design and engineering. The design phase does not end once the deckplan and interior elevations are complete. New challenges arise from conceptual designs, which require swift problem solving and adaptability to keep on schedule.



WHAT DESIGN ARE YOU MOST PROUD OF?

For one program, we needed to fit a microwave above a sink. This caused a protrusion through the bulkhead wall of a fitness room, where a corner cabinet with open shelving resided. We redesigned the cabinet, creating an aesthetically appealing and functional solution that also provided easy access for maintenance purposes.

In another case, a client requested an interior design theme board representing a classical French style with a modern twist, for a BBJ Max. We included French design elements including floral motifs, a gold distressed sofa frame and furniture with fluted legs. We then added marble subway tiles and a classic club chair, along with a linear-designed dresser to simplify and modernize the cabin's theme.

WHAT NEW MATERIALS, TECHNOLOGIES AND IDEAS WOULD YOU LIKE TO IMPLEMENT?

I would like to use 3D printing to visualize interfaces between forms and furniture during the conceptual design phase. The long, tubular body of an aircraft is somewhat limiting. It is crucial to understand early on how the client will interact with the furniture as they move through the cabin.

McCahl Surdyk

Design assistant Surdyk joined the Greenpoint Technologies team as a summer intern with a strong passion for aviation, space planning and collaborative brainstorming. "She immediately won us over with her positive, can-do attitude," said Annika Wicklund, design director at Greenpoint.

"Since joining our team full-time in April 2016, McCahl has embarked on supporting many deckplans and mood boards for sales campaigns including technical drawings for our BBJ 787 programs. We are honored to have her and look forward to seeing what her future will bring."

Stephanie Kuhn

Kuhn has worked as a completions designer at Duncan Aviation for the past five years.

"Stephanie has the unique ability to understand the customer's preferences and transfer that insight to textile and design choices," says Nate Klenke, manager of completions service sales at the company. "The ability to combine that with top-notch organizational skills, meticulous pursuit of quality, and understanding of certification requirements and production schedules, makes her a strong asset to the design team."



HOW AND WHY DID YOU GET INTO THE INDUSTRY?

Interior design has always been a passion of mine. My introduction to aviation design was a tour of Duncan Aviation when I was studying interior design at the University of Nebraska. It became a goal to work for the company, and I had the opportunity to join the MRO design team five years ago. Before I started at Duncan Aviation, I was in commercial design for 15 years. Although I truly enjoyed my time in that sector, aviation design has been much more gratifying in so many ways.

WHAT HAS SURPRISED YOU ABOUT THE AVIATION WORLD?

A challenge typically encountered in aviation design is applying and modifying the designs to meet FAA and EASA regulations, while still meeting the customers' needs and preferences. With the assistance of engineers and through collaboration with Duncan Aviation's amazing interior teams and technicians, we are usually able to overcome various obstacles and find solutions.

WHAT DESIGN ARE YOU MOST PROUD OF?

I have been proud of every project I have been involved in. Not only am I pleased with the outcome of the design but, most importantly, with the relationships that have been made along the way. I strive to get to know each customer on a personal level, listen carefully to them, and understand their wants and needs. I then provide suggestions that I believe create an image that portrays

their personality and wishes accurately. That is very gratifying to me.

For example, I was recently involved in designing two new berthing divans. A lot of considerations were made regarding the overall look and appearance of these; a lot went into something that seems relatively simple. I explored how the drink rail intersects the back of the divan, the style and function of the armrests, the comfort of the foam for both sitting and sleeping, and even how the back cushions are stowed when the divans were deployed into a bed.

Another rewarding project was a Falcon 900 that was to be used primarily by the operator's family, which includes three small children. That had an impact on what we chose for the colors, the durability of the fabrics, the softness of the carpet and the function of the lavatory. I enjoyed getting to know the owners, so I could incorporate their personalities into the design and achieve an interior that is not only aesthetically pleasing, but also functional.

WHAT NEW MATERIALS, TECHNOLOGIES AND IDEAS WOULD YOU LIKE TO IMPLEMENT?

Customers are accustomed to computer-generated illustrations to help them visualize how a design will look. Duncan Aviation recently added a 3D animator to help customers see the finished product before the project has begun. Having the technology to produce these images to clearly illustrate our design intent has been very beneficial.



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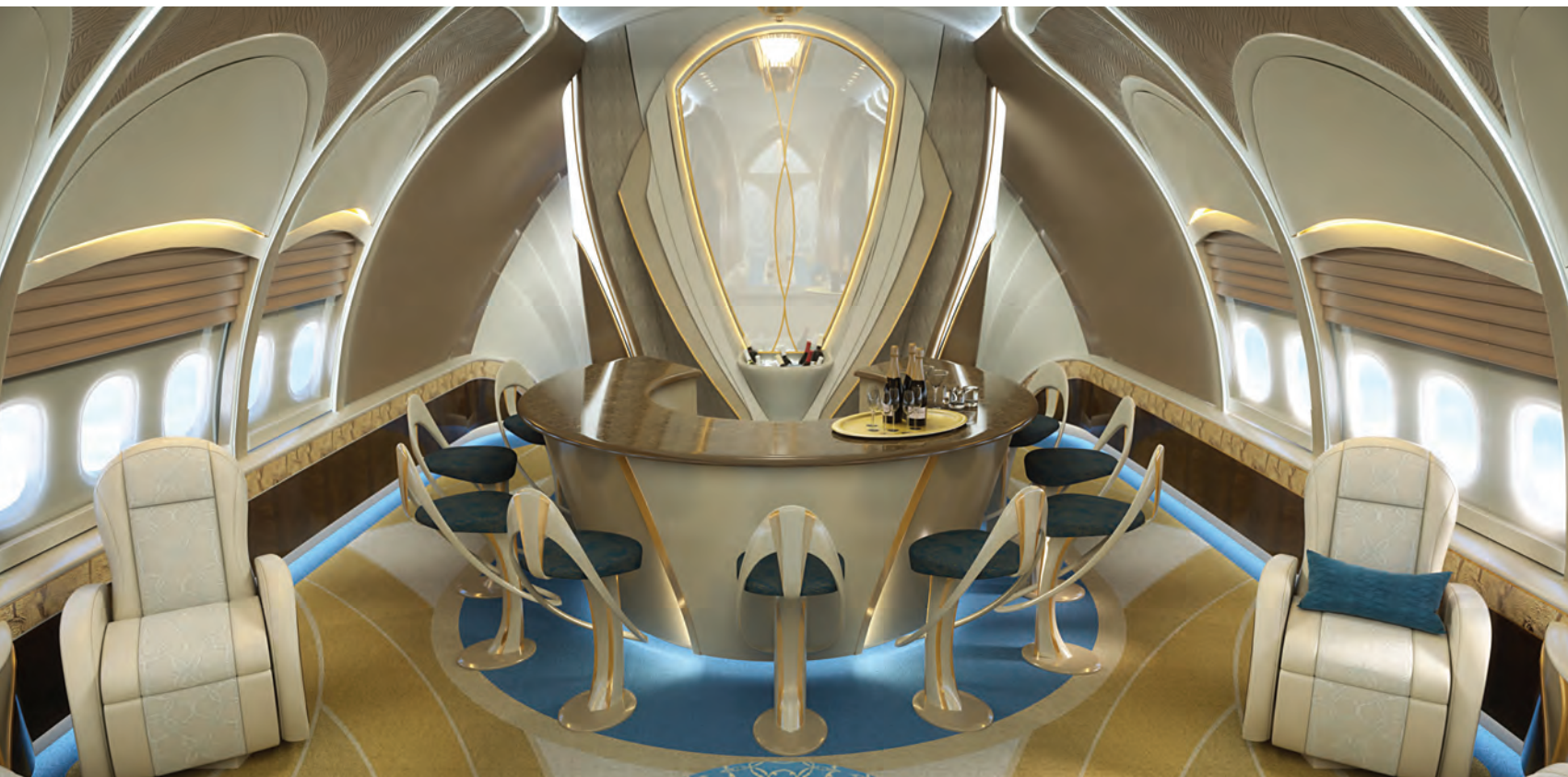
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THINGS HAVE CHANGED

Words by Anthony James



SEPTEMBER 2007

WISE WORDS —→

To give our launch issue some instant gravitas, we persuaded Benn Isaacman, the author of countless classic cabin designs, including those for the iconic Learjet, to pen a guest foreword that speculated on the increasing role of computer-aided design, and ever more sophisticated cabin rendering and visualization software – a trend that continues to this day. Ten years on, Isaacman comments: "You know what has changed the most? Lighting. Before LEDs, the first thing a designer had to consider was how to change a lightbulb. Now they last 20,000 hours. Composites have also transformed seating, as we can now mold a seat for comfort before we put a cushion on it."



Benn Isaacman,
the 'daddy' of bizjet interior
design, shares his view of the
industry past, present and future

With the launch of the industry's first magazine dedicated to business jet interiors, I'd like to take this opportunity to consider the past changes that have taken place since the start of my career.

The first aircraft specifically designed for private use was the Learjet, which was developed with private capital for the purpose of business aviation, rather than as an offshoot of a military or government programme.

"Services have moved to the business jet," said Bill Lane, in an interview back in the 1980s. People laughed – today there are about 10,000 business jets in service.

Along with the development of the aircraft, the development of functional business interiors and the people who designed them. In my way of thinking, these are the people that make the aircraft a "business machine". The designers are concerned with the needs of those who are entering the aircraft from right – the business owner. The business of aircraft interiors has grown from a few firms and designers, with some still active and some long gone.

Companies like General Aircraft on the West Coast, Norton and Norton in St Louis, Missouri, Heston Aviation on the East Coast and Day Forward in Texas, were pioneers in the complete business interiors. Independent designers like Dave Ellis, Jim Gilman, Howard

Timlin, Art DeSimone, as well as in-house staff designers of the companies, including Richard Kraus, Jim Ryan, George Rothger and Harold Russell at Beechcraft.

These men, joined by many other men and women, are now what is part of a unique community of designers who have elevated what I like to call the "State of the Art".

Early on, nearly everything was a new invention: interior chairs, tables, lighting, connectivity and seats simply didn't exist because the market for such products was so limited. The points of reference for the aircraft had not been created by the designers. It was a ground-up learning experience.

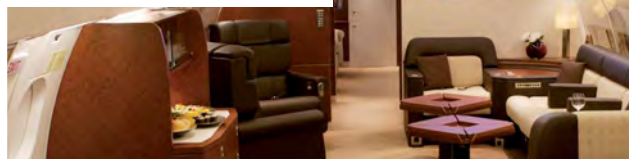


Business Jet Interiors International September 2007 19

Anthony James Business Jet Interiors International

standardbearer

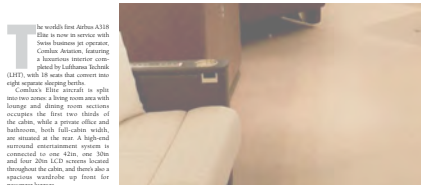
Comlux Aviation has taken delivery of its first A318 Elite from Lufthansa Technik



"We are very pleased with the interior of our new Airbus A318 Elite and the support Lufthansa Technik has given to us during the design and completion phase of this brand new VIP aircraft," says Comlux CEO, Frank Boller. "Several different areas in the cabin provide unmatched privacy for work and relaxation for even the most diverse groups and delegations, enabling us to offer a much more extensive product on business and VIP charter, especially when many of the seats can be converted into flat beds for overnight flights."

Client Brief: Simple lines and low-drag furniture make the most of the A318's impressive cabin width, underlining the space available on board. "We wanted to keep it as clean and open as possible, to emphasize the fact that no other jet in the class can compete with the A318's cabin size," explains Comlux's Inland, Berchges, who oversee the project. "Lux is definitely better than most – if you want to keep space, you have to stay things away."

Customer charter: As a leading charter company, Comlux came to LHT with a very specific brief: "The interior had



The world's first Airbus A318 Elite is now in service with Swiss business jet operator, Comlux Aviation. Featuring a luxurious interior completed by Lufthansa Technik (LHT), with 18 seats that convert into eight separate sleeping berths.

Comlux's Elite aircraft is split into two zones: a lounge area with lounge and dining room occupies the first two thirds of the cabin, while a private office and bathroom, both full-cabin width, are situated at the rear. A high-end technical entertainment system is connected to one 42in, one 20in and four 20in LCD screens located throughout the cabin, and from side a spacious wardrobe up front for passenger baggage.

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COMLUX ELITE

Business Jet Interiors International September 2007 19

HOLD THE FRONT PAGE

Deciding on our cover wasn't easy, however we eventually settled on a rather unassuming interior, at least at first glance, dreamt up by Comlux Aviation for the maiden ACJ318 Elite, delivered by industry heavyweight Lufthansa Technik. Designed for charter, on an aircraft type specifically developed with efficiency and operating costs in mind, we felt the interior was a

marvel of modularity, making the most of the available, predefined cabin options, yet still delivering luxury and refinement through its careful selection of finishes. Within a few years, Comlux had effortlessly branched out from aircraft charter to VIP design and outfitting, via Comlux Completion, which recently signed its first ACJ320neo cabin project.

VISIT OUR
WEBSITE TO
READ MORE
BACK ISSUES

EBACE SAW
AROUND 11,000
VISITORS IN 2007,
AND 13,000
IN 2017

COMPLETIONS CONUNDRUM

A decade ago, just as now, writing about VIP wide-body completions inevitably involved pondering whether demand was in danger of outstripping supply, spurred in part at the time by the prospect of the first ever VIP A380. What has changed since are some of the names vying for each multimillion-dollar cabin outfitting contract. Our original feature refers to

DeCrane Aircraft Delaware, for example, which later became PATS Aircraft and is now known as Aloft AeroArchitects. As for the first ever VVIP A380, it was never actually delivered, with Airbus officially canceling the order, originally placed by Saudi Prince Alwaleed and subsequently sold on to another, undisclosed, customer, at the end of 2014.



FANTASY FLIGHT

Confession time: magazine editors love intricate images of glamorous, minutely detailed, but ultimately somewhat impractical interiors that owe more to a Bond movie than the pragmatic needs of those who choose to fly privately for business or pleasure. But it's just so refreshing to see something completely different from all the very sensible, highly commendable, but admittedly rather boring, beige, predictable interior schemes that we normally get to choose from. And for a dash of Hollywood for our first issue, it seemed logical to pick the brains of a design agency based in California. BMW Group DesignworksUSA more than obliged, with a multi-level VIP scheme for a Boeing 787, complete with a transparent floor that revealed a luxury sedan parked below in a flying 'auto garage'. The car? A BMW, of course!



PERSONAL ISSUES

Back in 2007, Very Light Jets (VLJs) were the 'next big thing'. Analysts were convinced they would help realize a democratization of business aviation, ushering in an exciting era of air taxis and affordable bizjet charter. A new generation of OEMs (Aerocomp, Diamond, Eclipse, Epic, Flaris, Maverick, Piper, Sport Jet, Stratos) were charged with delivering the dream, however nearly all fell by the wayside following a sharp recession and doubts about the legality of air taxi operations, allowing some of the more established manufacturers to eventually get back in on the act. At least we backed a winner – the Cirrus Jet shown here was the first incarnation of what is now the Cirrus SF Vision, currently in production with a backlog of more than 600 orders. No one mentions VLJs anymore, but 'personal jets' in the form of Phenoms, Citations and HondaJets have carved a new niche, featuring interiors heavily influenced by the automotive sector.



FASHION FORECAST

Described as paving the way for the industry's first 'couture' aircraft, our feature on TAG Aircraft Interior's collaboration with Versace ensured a generous sprinkling of stardust over our first issue. The fashion house's signature Greek fret and Medusa head motifs underpinned an elegant black and white interior concept scheme that oozed

timeless style. In hindsight, it also screamed the sort of excess and ostentatiousness that can signal an impending stock market crash – sure enough, a sub-prime crisis engulfed Wall Street the following year, wiping trillions from the books. However, aviation quickly recovered, and a global wealthy elite continues to invest in designer, tailor-made jets.

2007 SAW
US\$21BN
WORTH OF
DELIVERIES,
WITH US\$20BN
IN 2016*

*SOURCE: GAMA

VIVA LAS VEGAS!

The business aviation world will descend on Las Vegas on October 10-12, 2017, for this year's NBAA Business Aviation Convention & Exhibition (NBAA-BACE). Read on for a taste of the exciting products and services set to be showcased...



Veneer innovation

NBAA-BACE will see the official launch of Air-Craftglass's Natural Collection 2018. This is a collection of more than 300 real wood veneers that are laminated with an ultra-thin layer of chemically tempered glass. The aim is to give the product a flawless, high-gloss look that is scratch- and UV-resistant. Furthermore, the company says the product will pass the V60 as well as the 65/65 heat release tests (besides other mechanical tests).

The product has already been nominated or shortlisted for the Crystal Cabin Awards 2017, German Design Awards 2018 and The International Yacht & Aviation Awards 2018.

Air-Craftglass will also show its ultra-thin clear glass and real silver mirrored glass. Transparent and mirrored glass is already in production. The company says the Natural Collection will follow shortly, and that all are certifiable for VIP and commercial aircraft use.

ADS-B OUT SLOTS



With rising demand for connectivity, and the ADS-B Out mandate rapidly approaching, Flying Colours Corp will

promote its avionics expertise. The team will talk about scheduling ADS-B Out installations and how to minimize aircraft downtime.

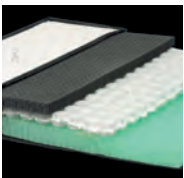
The company will also showcase its iCMS, IFE and connectivity capabilities. Avionics teams at the company's Canadian and US facilities have installed Honeywell's JetWave Ka-band, Viasat's Ku-band, GoGo's 4G, and SD's Router technologies within the past six months.

Another topic will be how the business has doubled the size of its cabinetry workshops in St Louis in response to new client contracts. Delegates will also discover more about the company's special-mission capabilities, completion and refurbishment services, and basic-to-heavy maintenance offerings.

27,000
attendees are
expected in 2017



COMFORT MATTRESSES



If you're feeling sleepy, head to JetPedic's booth. Its mattresses – customized to fit club seats, conference

and divan areas – include the Series 500. This combines three layers of support. The honeycomb base layer gives comfort across firm and soft platforms. Next is a layer of micro pocket coils. The top layer is a Talalay charcoal-infused graphite latex, which JetPedic says helps channel heat away from the body. All three layers are covered in a cool-touch, cashmere quilted cover. The Series 500 is recommended for applications spanning multiple surfaces, including the club seat style, conference style and the dual seat pop-up style mattresses. JetPedic says all its mattresses are low profile and lightweight, with custom hinge folds to enable quick deployment, easy assembly and compact storage.

Suite debut

The latest concept from Aerospace Technologies Group (ATG) will be demonstrated. Skypod is a modular, fully private, traveling compartment for two, primarily intended for the VIP market. The mini-cabin features ATG's latest Panacea shade systems, a combination of electromechanical and electronic-dimming shade systems, which also feature multi-spectrum LED effect/wash lighting.

Skypod includes the latest-generation, lie-flat VIP seating; a 4D Airborne Theater System featuring a 43in 4K super-UHD monitor coupled with Dolby Atmos 3D surround sound; and an active noise canceling system that doesn't require headsets. Future options under consideration include a 65in diagonally curved OLED headliner panel; multiple seating/bedding configurations; and even a medevac version.



More than
1,100
companies
will exhibit
in 2017

EXPANDED RANGE

Inspired by the mountain landscape of Turin in Italy, Garrett Leather's Torino collection has been in demand for nearly a decade. The company says this Italian leather has a uniform, pronounced pebble grain, consistent color and a durable finish, resulting in high cutting yields, and that it requires little maintenance, making it ideal for high-traffic interiors.

At this year's show, 13 new aviation colors will be unveiled. All 30 Torino colors will be in stock for immediate shipment from October 2017.

The fifth element

Follow your nose to Zodiac Aerospace's booth, where it will launch Five, an airworthy fragrance diffuser for VIP cabins. Aircraft owners can opt for Inspired Mood, a curated collection of luxury fragrances; Signature Expression, whereby their favorite perfume is translated into the air; or Unique Essence, a custom fragrance designed by a scent expert.

The Five diffuser system is the result of two years of research and development, the custom design

expertise of Zodiac Pacific Precision Products, and an adaptation of the latest diffusion technology developed by scent marketing companies.

The company says Five controls the on/off cycle and intensity to provide a pleasant and constant fragrance experience, and includes self-sealing cartridges to preserve the richness of the fragrance, and a dry-scent technology that eliminates the risks of spills in the aircraft.

The static displays will feature nearly 100 business aircraft



CATCH A LATCH

Its ability to work with customers on joint development projects will be a focus for Galley Support Innovations (GSI), which has specialized in aircraft interior hardware for more than 60 years. As well as diverse product lines for customers to choose from, GSI can work with customers on custom hardware solutions to provide the fit, function and aesthetics required. The company works with customers from the design to prototyping and full-scale production. Its capabilities include a full CNC machine shop, in-house testing lab, 3D printing prototyping, complete 3D environment (Catia and Autodesk) and DER services.



SATCOM SYSTEMS

The newest innovation on Cobham Satcom's booth will be the compact Aviator S satcom system, which is due to enter the qualification phase in 2017 and be certified for flight through an EASA TSO by mid-2018. The two-LRU solution has a Helga antenna and enables Inmarsat's new SwiftBroadband-Safety (SB-S) IP data service.

The range starts with the Aviator 200S, designed for smaller aircraft, with a weight of less than 6kg (13.2 lb). It also includes the Aviator 600S, with IGA5001 antenna, and the Aviator 700S, with HGA antenna, both of which support independent channels for the cockpit and the cabin, enabling connectivity for voice calls, email and internet browsing.

Ensuring that smaller aircraft can benefit from L-band systems on the SwiftBroadband network, Cobham Satcom is also highlighting its Aviator Special Purpose systems for special application or customers with specific requirements.



Q&A



Philip Brunger

VICE PRESIDENT OF SALES AND DEVELOPMENT, DAHLGREN DUCK & ASSOCIATES (DDA)

What products/services will you highlight at NBAA 2017?

In addition to a general push toward products with a more modern flare, we are continuing to see increased demand for items that incorporate a mix of textures and colors reflecting nature. We'll be highlighting dinnerware, flatware, crystal and other accessories that have a combination of matte and gloss finishes, as well as items that have bold metallic elements – mainly gold and platinum. We'll also introduce a range heavily influenced by current trends in the fashion world. One pattern is the Tie Set collection from Hermès – a mix and match concept, where customers can select from various color options.

What investments have you made recently?

Whether it is refining our proprietary catalog, or enhancing our website to adapt to the changing needs of our customers, DDA continues to place our technology platform at the forefront. We've also recently conducted a major remerchandising effort in our showroom. Working with our key vendors, we've moved away from the traditional retail-type layout and have created a workroom environment. Customers now have easier access to products that they can touch and feel as they work through each component of an interior. One notable enhancement is the addition of a Baccarat-themed B bar, a dramatic red-themed space encompassing all things Baccarat (and one of only a handful in the USA). Whether a customer is looking to source a chandelier or the latest Baccarat tumblers, our clients can feel inspired while viewing all the latest products.

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Big News for Big Irons

New Cadence Switch System™




ALTO Aviation's new low-cost, fit compatible Cabin Management System replacement is here.

ALTO Aviation's engineers have developed a new CMS replacement solution specifically designed for the biggest jets in Business Aviation. The new Cadence Switch System™ or CSS provides your cabin with a full CMS/IFE upgrade, making little to no changes in woodwork, considerably reducing installation costs, and delivering the most powerful front row, center stage ALTO Sound™ & HD video experience to every area in the cabin.

- Fit compatible with existing cutouts
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- Discrete logic with no integration software required
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Upgrade program

The indoor static display will include Elliott Aviation's 400E. The program gives Beechjet 400A/Hawker 400XP owners à la carte options to modernize their airframe, a useful load increase and upgraded passenger amenities.

Paired with the G5000 avionics replacement, the useful load increases by more than 350 lb. The redesigned interior includes a shell kit with a recessed headliner designed to create more headroom. The interior has USB charging ports, redesigned cabinetry and all-new LED lighting. The aircraft on display also features Textron winglets and a custom paint scheme by Elliott Aviation.



SWITCH SWITCHES

Those looking to replace old, broken, obsolete or non-serviceable cabin switches, while minimizing woodwork and installation costs, should investigate Alto Aviation's new Cadence Switch System (CSS). It's also available for new installations. This series of fit-compatible modular switches allows customizable panel dimensions and functionality through discrete logic and no software. Alto says it can adapt a cover bezel for a fit-compatible solution to match any cutout without having to define a new switch design.

The foundation for this new series is the modular, discrete switch assembly. These modules come in sizes from 1-6 positions, predefined headphone modules, and other accessory modules including USB charging, HDMI port and Bluetooth interface.



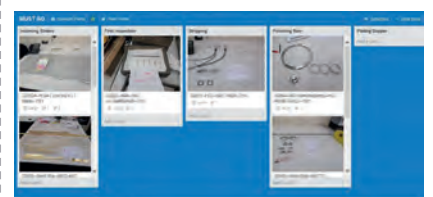
After adding 21 colors to its in-stock Classic Cowhide offering earlier in 2017, Townsend Leather continues to expand its in-stock and quick-ship programs. Townsend has long offered made-to-order lead times of typically four weeks, but is also committing to more stock for customers needing immediate shipment or having only 1-2 weeks to wait.

Townsend's most popular product line for aviation seating, Classic Cowhide, is a lightly finished, smooth-grain, soft, supple and durable leather made on very clean, large hides averaging 60ft². Townsend is also offering the same colors in Pinnacle, an embossed, rounded grain texture. Pinnacle hides can be ready to ship in two weeks. In addition, Townsend is stocking a multitude of decorative leathers, including many of its Shimmering Suede line, which is popular for sidewalls and dado panels, along with a new line of embossed and hand-tipped or hand-worked leathers called Rapture.

EXPANDED STOCK

REAL-TIME TRACKING

This year brought exciting changes to Signature Plating with the promotion of Paul Sahaneck to the position of president. In addition, the company launched its online SignaTrack technology, which enables customers to see their plating orders progress in real time, 24/7. Signature Plating has also added two new base finishes and 12 new final finishes, expanding its product line to more than 150 finishes and growing. The company says it also has much more on the horizon to release over the next few months.



Lightweight water solutions

The newest products from International Water-Guard Industries (IWG) are the High Efficiency Light Weight Lavatory Water Heater and the Light Weight Motorized Valve. These are designed to offer reduced weight, a smaller size, increased reliability, and a more intelligent solution for water distribution systems.

The company says its new water heater offers precise water temperature setting and an internal environment that drastically reduces calcium build-up on the heater elements and eliminates potential bacteria growth.

Meanwhile, the Light Weight Motorized Operating Valve weighs 1.2 lb (0.54Kg) while maintaining an MTBF reliability of 45,000 hours, says IWG.

Organizers say the tradeshow is the sixth-largest in the USA

CONNECTIVITY CONTROL

This year's focus for Honeywell is keeping operators informed and in control of their connectivity service. From new connectivity offerings to the latest GoDirect services, Honeywell is committed to giving operators access to the most up-to-date information and reliable connectivity.

At its booth, Honeywell will be showing how real-time information can help manage operators' connectivity services. The company will demonstrate its full suite of GoDirect app services.



GALLEY INSERT LAUNCH

A new line of galley inserts will be launched by Zodiac Aerospace. The Atmosphere line, developed and tailored to the newest interiors, offers the latest technology in cooking ovens, microwave and hot beverage preparation. The range is designed to combine a luxurious look, feel and finish, with amazing food-cooking capabilities such as brewing a wide range of beverages including cappuccino, latte, macchiato, flat white, and more than 100 varieties of tea.



Q&A



Marc A Cognetti

DIRECTOR OF MARKETING,
PERRONE AEROSPACE

What products will you highlight at NBAA 2017?

We will be showing luxurious leathers and textiles developed with the most discerning travelers in mind. The colors and textures we make available have been curated by designers to facilitate the coordination of other interior materials, such as carpets and veneers.

How does your latest range meet customers' requirements?

Regulations, the size of the market, and return on research and development, make it very difficult to design and develop products specifically for aviation. Perrone Aerospace is unique; when we develop interior products, we are not adopting products from other markets, or designing with other markets in mind. Our primary focus is aerospace.

What customization opportunities do you offer?

We offer custom solutions to help create one-of-a-kind aircraft interiors. We have invested in the very best manufacturing technology and finest raw material. As a manufacturer, we produce exactly what you want; we don't just sell you what we have, although we also offer more than 31,000 hides in stock.

What trends are impacting your business?

Increased sales of pre-owned aircraft have had a positive impact on the refurbishment business for companies like ours. Regarding design, many of the latest trends are driven by ancillary markets such as fashion, and premium sport and luxury automobiles. Thirdly, a focus on environmental impact is at the foundation of everything we produce.

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For more information contact us at contact@inairvation.aero

FINISHING TOUCHES



Enikon Aerospace (ENAE), a supplier of aircraft interior surface finishes, is considering expanding into the USA, Canada and

Mexico, and recently hired a new director of business development for the USA, to support customers in the field.

Recent initiatives include the implementation of lean manufacturing protocols, pursuit of additional quality standards to accompany its EN9100 and ISO14001 certifications; developing new aesthetic methods for aluminum/chrome brush finish effects; and upgrading facility equipment for hydro transfer printing technology.

About 1,100 students participated in the Careers in Business Aviation Day at the 2016 show



Alcantara launch

Taking cues from performance and luxury automobiles, Perrone Aerospace is expanding its Alcantara footprint by launching a new line of perforation styles and patterns at this year's NBAA.

The Rally collection targets both the sporty general aviation interior trend and the sophistication of corporate and VIP interiors. The complementary colored backing material is designed to help provide dimensional stability and support, along with a unique visual appeal. There are currently 12 perforation/backing cloth combinations in stock. Custom colors are available.

LOTS OF LAUNCHES

The latest developments made to Lufthansa Technik's nice HD include the latest audio technology and Satcom Direct's nicemedia content service. Today, nice is flying on more than 750 aircraft – the system will also be demonstrated on various aircraft on the static display. In other news, at the end of July 2017, the first aircraft was equipped with niceview mobile, a personal moving map that enables on-demand interactive viewing and configuration on personal devices.

Another product to see is the Induction Cooking Platform, which enables the preparation of meals with a pan, toaster or a pot. It takes up no more space than a conventional oven and has an integrated fume hood and odor filter system. Lufthansa Technik will also highlight DishwashAir, which is designed to use the minimum of fresh water and have reasonable electrical power consumption, finishing cycles in six minutes.

The Three-In-One-Solution (TIOS⁺) will also be on display. Its material layer structure makes it possible to install Ka-, L- or Ku-band antennas and an HD camera on the vertical stabilizer, providing high-speed internet and TV connections.



LICENSED MEDIA SERVICE

Top-rated movies, including blockbusters, new releases, classics and TV programming, as well as music content, are available with IDAIR's licensed Media Service, developed for VVIP aircraft in full cooperation with major Hollywood studios as well as local distributors. Content, and the frequency and volume per update, can be customized.

The service complements IDAIR's IFEC/CMS solution, which includes monitor sizes up to 75in and sound systems with active noise-canceling headsets and overhead surround sound.

Lighting scenarios, window shades, dimming windows and a graphical user interface complete the movie experience. All aspects of IDAIR's IFEC/CMS solution can be controlled with different types of passenger control units, including tablets.





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IACOBUCCI|HF
AEROSPACE

Q&A



Wade Radke

CHIEF OPERATIONS OFFICER,
GALLEY SUPPORT INNOVATIONS (GSI)

What matters most to OEMs?

OEMs are moving toward a zero-defect culture, concentrating on perceived quality. Latches and mechanisms must do more than just perform to a maximum lifecycle; they must also look and feel good. We have been working with OEMs to help define zero-defect culture and measure perceived quality. We have introduced testing procedures including simultaneous in-line cycle load evaluation, soundproof cabinet decibel evaluation, vibration value awareness, and material surface deviation standards.

What trends are impacting your business?

With advances in polymers and suchlike, lighter materials are being evaluated every day. We have positioned ourselves to take advantage of these with our patent-pending multipart design concept. This allows us to introduce lightweight material without compromising strength or lifecycle, and to personalize each latch, even down to a quantity of one, without a large cost increase.

Can you detail new products you are working on?

We are always trying to push the envelope with technology-infused latching mechanisms. In fact, we are about to unveil lightweight, zero friction, high-load capacity latches.

Have you introduced any new production methods recently?

Our three-part base model latching mechanism allows for rapid visual changes with little mechanical change. With that, we have incorporated a look-forward machining process with high-speed capabilities, producing a better than 14 RMS surface finish off the machine.

The main static display will be at Henderson Executive Airport; a smaller one will be held inside the convention center

Motion solutions

Smart mechanical kinematic solutions specialist Bucher Aerospace Corporation will show products including Quebec, a fully automatic and mechanical sideedge table mechanism for storing large tabletops in a reduced storage space. The kinematics are 100% mechanical and highly adjustable for specific applications.

Also on display will be Bern, a mechanism for large first-class suites. Bucher says a well-balanced lift-assist enables effortless deployment of a 24 x 24in table top. The table features ~30in of forward/aft adjustment on bearings selected to enable easy adjustment, even when the table is fully loaded.

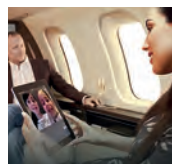
Doha is another first-class style table. This mechanism features a generously sized table with forward/

aft adjustability. The table is released via a pushbutton and deploys vertically, automatically. The company says the dampened motion provides a high-end feel with the lower cost and better reliability enabled by using a completely mechanical design.

Another highlight is Bucher's extra-light bulkhead sliding door mechanism with assisted motion. This has no kind of electrical or pneumatic actuator, the aim being to achieve new levels of light weight, reliability and maintenance-friendliness.



WI-FI UPDATE



The global, high-speed wi-fi service, Jet ConneX, will be center stage on Inmarsat's booth. All major private jet

manufacturers are now offering Jet ConneX as a line-fit option, and they all connect to the service using Honeywell's JetWave hardware.

Additionally, in May 2017, Lufthansa Technik's Two-In-One-Solution radome, which accommodates two antennas in one radome and connects to Jet ConneX using JetWave, was type approved for BBJ3 aircraft.

"Jet ConneX is the only truly global, high-speed wi-fi option available for business jets today, covering 100% of major airline routes," says Kurt Weidemeyer, Inmarsat's vice president of business and general aviation.

CYBERSECURITY ASSESSMENTS

As more passengers travel on increasingly connected executive jets, SD will promote the importance of maintaining the integrity of data transmitted during flight. SD will showcase its new suite of services, which provides a range of security solutions that can be customized for each individual flight department.

As well as giving advice on how to combat security risks through best practice, SD will discuss the benefits of creating strong security postures and the importance of active monitoring of security threats, to safeguard the onboard network.

The company will also introduce its new compact LTE Hub router, which brings greater data capability to a wider range of aircraft sizes, as well as supporting rotary aircraft connectivity.

Slim 4K/UHD displays

A range of ultra-thin slim bezel 4K/UHD monitors will be announced by Sky Definition Aero Systems. The bezel design can be mounted flush to a partition or hung like a picture frame. Available LCD panel sizes range from 24in up to 75in.

Sky Definition Aero Systems says 4K/UHD technology enhances the viewing experience by producing images with sharper and crisper detail, using a palette of more than one billion colors. It also says 4K/UHD screens have a wider range of brightness and a greater sense of realism and depth. Sky Definition Aero Systems' video processor is intended to improve the quality

of HD content further by capturing image detail that is lost in the translation from lower to higher resolutions.

Access to 4K/UHD content is now a reality. Several devices in the consumer market allow the download and storage of 4K/UHD content. The company will demonstrate the playback of 4K/UHD content from these devices on its monitors at the show.

Future products are said to include a 17.3in 4K/UHD monitor designed for light/mid-size aircraft or in-seat displays.

In 2016, there were 114 aircraft on the external static display and nine aircraft and six helicopters indoors



NEW FACILITY

There will be a sneak peak of the maintenance, modifications and paint complex Duncan Aviation plans to open in Provo, Utah, by the end of 2019. The company will also highlight its connectivity expertise, having installed more than 600 wi-fi systems. It is Gogo Business Aviation's AOG service partner and is developing STCs for Gogo's new 4G service. In addition, Duncan Aviation aerospace engineers have provided operational support and design direction to SmartSky Networks.

Meanwhile, the firm will continue its efforts to educate customers about ADS-B Out and the upcoming crunch on industry capacity.

To alleviate potential backlog in the booth, avionics experts will be available for face-to-face conversations via video-conference hotline phones.



LEATHER 101

A free new online course will be highlighted by luxury natural leather developer Moore & Giles. This online course is a fully accredited continuing education course that provides users with an overview of the history of leather and how it is used today. Upon completion, users will receive one hour of CEU credit from the IDCEC.

"I'm excited about our CEU because it is important to understand leather when making the decision of adding it to your design projects," says Whitney Tinsley, director of education at Moore & Giles. "The CEU will be used by designers, retailers, manufacturers and the public."

Primarily, the course will be available for users to take online. Moore & Giles representatives will also offer this course in person at showrooms and design centers around the world.



GLOBAL EXPANSION

This year saw a big expansion of F/List's international activities. The foundation of F/List Germany, following the acquisition of OHS Aviation Services, boosts the company's aftermarket capabilities in Berlin. A strong cooperation with LBAS and Inairvation covers everything from maintenance and refurbishments, to cabin modifications and CMS/IFE upgrades with EASA Part 21J certification.

In Q4 of 2017, a production plant will be put into operation in Laval, Québec, Canada. Mario Lepine (pictured top), has taken up the role of CEO of F/List Canada and will oversee its growth to a headcount of 100 by 2020. Mario Pantuso (pictured bottom) is the company's new sales manager for the USA.

HI-LO TABLES



Fresh from opening the doors of its new facility in Savannah, Georgia, USA, in August 2017, MSB Design will showcase a range

of hi-lo table technology modifications. The ability to charge electronic devices is being incorporated, along with the introduction of stowage fixings that integrate with portable devices. The first mock-up of a table that incorporates individual monitors will be on show. These are permanently fixed into the table to connect with onboard devices or used as personal screens.

"Our team has devised products that not only store devices safely, but make them accessible, in an unobtrusive way," says Shannon Gill, business development director at MSB, pictured.

LIMITLESS

One of a kind, every time

Visionary or timeless, bold or subtle; the world's most exclusive members' club or a sanctuary from the world below: each Jet Aviation Completions interior is a finely hand-crafted representation of an individual idea.

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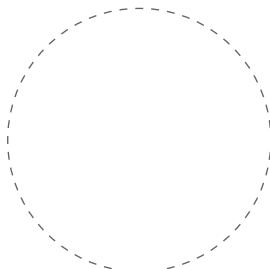
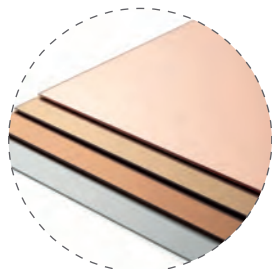
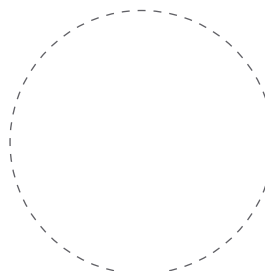


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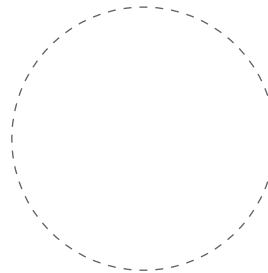
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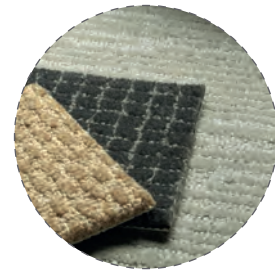
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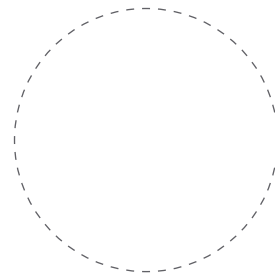
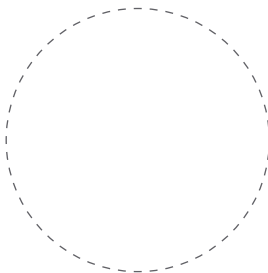


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GREAT PERSONALITY

Many more aircraft owners are specifying increasingly personal interiors from Duncan Aviation

Duncan Aviation has full-service locations in Michigan, Nebraska and Utah

Over the past several years, Duncan Aviation's design team has seen a marked shift in the design of aircraft interiors worldwide to include brighter colors and more customization. "In 2010, for example, many aircraft operators were concerned about the resale value of their aircraft, so they were very conservative when choosing designs and colors," says Rachael Weverka, an aircraft interior designer at Duncan Aviation. "The designs were elegant and professional, but featured muted colors, and personal touches were few and far between. You hardly ever saw company logos."

That is starting to change. Recently Weverka has designed seats that match the styling of sports cars and has even used gold-toned snakeskin fabric. "Now owners want interiors that reflect their personalities," she says. "Custom designs involve colors, fabrics and textures we haven't often used in aircraft interiors."

Ken Reita, a multimedia illustrator with Duncan Aviation, agrees. He recently worked on refurbishing an aircraft using a color palette influenced by the bright hues of Miami, the location of the operator's headquarters. "As we visited the client's office, with its bright orange terrazzo flooring and brushed chrome accents, we began envisioning an interior with non-traditional colors," says Reita. "The client was right on board and didn't shy away from contemporary styling. Although the colors and materials are somewhat unconventional for a business jet, the design isn't radical and is quite tasteful."

Even the more conservative owners are shifting away from the previously prevalent tan and beige to white and gray tones with accents such as coral and red. Blues, especially navy, are also making a resurgence.



10th anniversary

A decade of change

"Technological changes have included updated CMS, color-changing LED lighting, wi-fi and the use of PEDs on board. Then there are the stricter regulations, including the 16g certified aircraft, which has had a big effect on seat and cabin design."

Mary Lee, senior completions designer, Duncan Aviation



Personalization goes much further than colors though, says Mary Lee, senior aircraft designer at Duncan Aviation. "We are seeing custom carpets in larger-scale patterns and seat designs that use two-tone leathers, quilting, welt cord and contrasting stitching to provide more individual looks," she says.

Unique lighting can include colored and even color-changing upwash and downwash lighting, as well as highlighting design elements with colored light. Good spots to

highlight include cupholders, galleys, wine coolers and even lavatory elements.

FINISHING TOUCHES

Alternative finishes are also growing. Lee says that carbon fiber is being used more for cabinetry and drinkrails. She is also seeing more painted finishes, metal and leather on cabinets. "Another new cabinetry trend we're seeing is to have a dark wood veneer combined with leather and other materials in various shades of white," she says. "The contrast in colors and materials provides a unique look."

There are also many technological changes. Many older CMS installations are incompatible with new connectivity technologies and are therefore being upgraded. These CMS upgrades are, in turn, driving design changes to integrate new touchscreen switch panels, larger HD monitors and carry-on devices. ☒

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To request more details from Duncan Aviation, visit www.ukimediaevents.com/info/aimbj



Before & After

LAVATORY SOLUTIONS

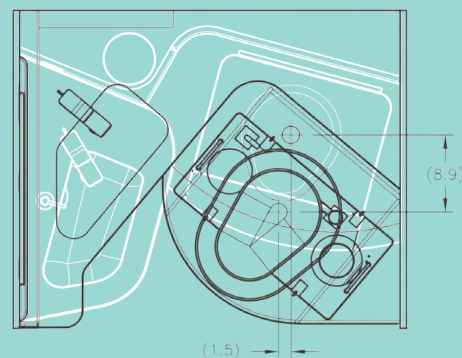
A Challenger 650 customer wanted to redesign their aircraft lavatory. By extending the size of the vanity and shifting the toilet, the lav is more accessible to passengers. "We did all of the engineering up front," says Project Manager Darrell Miller, "and we now have an STC (Supplemental Type Certificate) for the redesigned lavatory. So far, we have completed four aircraft with this new design. With the experience of the first two under our belt, we were able to deliver the second two Challenger 650s early."



Before/After



Watch a timelapse of the sink being fabricated from a solid piece of aluminum:
www.DuncanAviation.aero/lavsink



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RISE AND SHINE

Vertical lift is one of many comfort features EAST has worked to offer on its versatile seat platforms

It is not uncommon to hear of someone who has experienced discomfort in flight because of an incompatibility between their leg length and the seat height. "Seats with a vertical lift feature that enables passengers to personalize their comfort are already available from Embraer Aero Seating Technologies [EAST]," says Pete Perera, vice president of operations and business development at the company.

The feature has been implemented on certified seat systems in several projects and is available across all platforms, from light to ultra-large business jets, as well as narrow- and wide-body VVIP aircraft.

The development of vertical lift stems from EAST's focus on versatility, which was identified as crucial when the company entered the market 10 years ago. "It became clear that total versatility would be fundamental to offering the broadest range of seating options for the increasing variety of airframes entering service, as well as for all those that will need refurbishment," says Perera.

TOTAL VERSATILITY

The company's versatility is evidenced in the architecture of its seats and divans, which enable add-on features including the integration of CMS controls. Further personalization is achieved with integrated heating and passive cooling, as well as air bladder cushions to finely adjust comfort. The power-assist feature emulates common electronic window functions with press-and-hold operation. Integral, plug-in, low-back and flex-wing headrests are available to accommodate regulatory limits or personal preference.

Perera says EAST's certified seat systems can meet an array of structural integration and regulatory requirements across the spectrum of aircraft platforms.

EAST introduced vertical lift on its seating platforms in 2011



10th anniversary

A decade of change

"Our platform approach prepared us for the rapid evolution of handheld technology, which enabled us to integrate these devices with seat features and with the CMS."

Pete Perera, vice president of operations and business development, EAST

To accommodate the variety of cabin configurations – and to comply with regulatory requirements – seat implementations may include the ability to be positioned for take-off and landing, and repositioned for flight when they are installed in proximity to bulkheads.

The modular design of the company's divan allows the implementation of single- and multi-place seating and sections in U- or I-shaped configurations.

EAST is also incorporating the latest technological developments. It is already using carbon fiber and other non-standard materials for their low weight, and Perera says virtual prototyping and 3D printing accelerate product design and development. "EAST has embraced Industry 4.0 and the flexibility of scaling production while preserving the quality of its products – enabling rapid response to new business opportunities," he says.

As it completes a decade of business, EAST's agility and versatility have helped it build an enviable track record, but the company credits its success in the development and integration of seating solutions to its focus on listening to and collaborating with customers, from concept to completion. ☒

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To request more details from Embraer Aero Seating Technologies, visit www.ukimediaevents.com/info/aimbj

PLATFORM FOR GROWTH

With a new facility and several product developments underway, the year ahead should be an exciting one for table and CCF insert specialist MSB Design

This summer, MSB Design opened the doors of MSB Aerospace, its second North American production and manufacturing facility, in Savannah, Georgia. The 10,000ft² facility is the base for a team of existing MSB precision engineering experts and local recruits. "Demand for our technical expertise has grown a lot in the US aviation market," says Shannon Gill, business development director at the company. "To provide the service and quality for which we are known, we really needed to have a physical presence here."

The Savannah facility produces hi-lo tables, as well as crystal, china and flatware (CCF) inserts designed to safely stow valuables during all phases of flight.

The versatile single-pedestal tables can be used as coffee, conference or dining tables, as well as work desks. On the electric version, consisting of up to four pedestals, integrated Bluetooth technology enables the surface to be raised or lowered from anywhere in the cabin. Clients can also opt for an oval shroud to convert the existing round or square shape into an elegant oval.

PERSONAL EFFECTS

The bespoke CCF inserts can also be used to safeguard the increasing number of artworks and objets d'art that decorate cabins. Gill anticipates increasing demand for customized inserts to protect these pieces. "Each project requires our design department to liaise closely with the customer," she says. "Establishing the initial specification, understanding the use of the item, and creating the technical design is a very interactive process. Having closer proximity to the customer brings real added value."

MSB is also working closely with several US customers on prototype designs that it believes will bring new



Both MSB's facilities follow the AS9100 standard for production and engineering

innovations. "Most people will travel with at least two electronic items that need charging, so we are developing concepts to ensure that passengers can charge directly from the table," says Gill.

MSB is also developing a table that integrates monitors and screens.

New features are in production on the CCF insert side, too. "We are incorporating uplighting into our transparent crystal stowage units," says Gill. "This looks incredible and will add a real depth of style to any cabin." Other modifications are related to finishes, and include metal plating and complex edging and stitching, all customized to suit the cabin.

FURTHER GROWTH

Gill expects that the Savannah facility will generate 30% of the MSB manufacturing output over the next year as it fulfills existing and new contracts. "2017 has been a year of growth for us, and we see 2018 as expanding even further as we establish new clients and extend our offering to existing ones," she says. The adjacent space to MSB Savannah is empty, but is unlikely to be so for long. ✕

10th anniversary

Looking ahead

"Tables will be much more than workstations, and will be technically integrated into cabin functionality. A surface may be a computer screen or a dining table. With 3D printing being used for rapid mock-ups, more cost-effective product development is enabled, meaning we can be even more creative with customization."

Shannon Gill, business development director, MSB Design

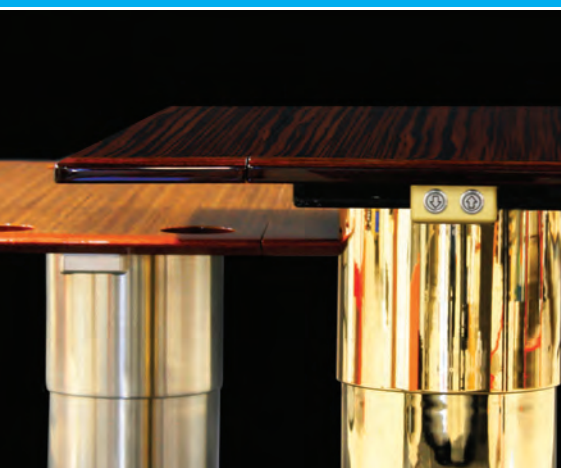
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NATURAL BEAUTY

With its new Natural Collection, Air-Craftglass is fulfilling its founding vision to offer a real glass alternative to plastic that also enables new applications

Air-Craftglass will launch the Natural Collection during NBAA-BACE 2017



10th anniversary

Looking ahead

"The commercial and VIP markets will grow closer, with both offering high-end, luxurious materials. For commercial airliners we see big opportunities to differentiate their first and business configurations."

Frans van Hapert, CEO and president, Air-Craftglass



Frans van Hapert has been on a mission since 2008 – to find a superior alternative to the plastics that are still commonly used in the aircraft industry. This mission led to Air-Craftglass's foundation in 2016. "Our talent for innovation has resulted in spectacular applications in glass, which will meet the strictest certification standards as recently laid down by EASA and FAA," says van Hapert, CEO and president of the company. "We offer the most comprehensive glass collection for a multiplicity of aerospace applications."

The market initially responded with skepticism when van Hapert introduced real glass, he recalls. "After nearly 10 years, the industry is finally ready to accept real lightweight glass, not only as an alternative product for plastics, but also as a solution offering completely new product applications," he says.

NEW POSSIBILITIES

The latest innovation from the company is the Natural Collection. "Until recently, only a limited number of wood types

were available and certified for the aviation industry," says van Hapert. "Now we can offer a selection of more than 300 types and colors of wood veneer. This is a real game-changer. With the Natural Collection we are showing the market that we always strive for groundbreaking new products that can really change aircraft interiors. Air-Craftglass's intention was not to stop at delivering an alternative for plastic materials, but to create added value, new functions and comfort, to set the new standard."

Looking ahead, van Hapert sees many opportunities for the company's glass solutions. "The real lightweight and scratch-resistant lenses and dust panels, real silver-plated glass mirrors for lavatories, and the huge variety of types and colors of wood veneers we are offering will definitely upgrade the interior of an aircraft," he says. "As well as the quality upgrade offered by glass's high UV and scratch resistance, our range of transparent, mirrored and wood-veneer-backed glass offers nearly unlimited combinations, and is

cost-efficient because of our patented production methods."

Even before the Natural Collection has been launched, the product has seen positive reaction and recognition from designers, architects, OEMs and others, as well as nominations for the Crystal Cabin Award 2017, the German Design Award and the Yacht & Aviation Awards 2018. "We feel that the market is ready for a major change – the biggest in many decades," says van Hapert. ☒

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THE NATURAL COLLECTION

THE NATURAL COLLECTION

Our talent for innovation has resulted in spectacular applications in glass (transparencies & mirrors), which meet the strictest certification standards in the aircraft industry.

With the new Natural Collection, Air-Craftglass is writing aviation history. This is a design evolution in the application of real wood veneer, in the highest quality finishes. Combined with a composite glass structure, the most beautiful wood finishes optimize the color, lightness, strength and interior comfort that only wood can provide. We offer a selection of more than 300 different types and colors of wood veneer.

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DRIVING FORCE

Moore & Giles is bringing automotive-inspired perforated and quilted patterns into the aviation interior space

Liaising with the finest custom factories in Italy, Moore & Giles works with the R&D departments of many luxury automotive brands that want to offer unique embroidery and perforated material options for seating. With a very large inventory of aviation-certified leather, the company says it can now offer the same level of quality to the aviation sector. "Our strength is our creativity," says Chad Evans, director of aviation sales at Moore & Giles. "Our experience in providing custom-designed, perforated and embroidered upholstery panels is unrivaled. We use the latest-generation CNC embroidery/perforating machines to get the most precise results possible, combining single- and multi-head machines to produce an unlimited number of patterns and designs."

Moore & Giles' HQ is home to more than four million square feet of in-stock leathers



CUSTOMER CARE

Moore & Giles aims to provide a seamless experience from design to installation, priding itself on quick turnaround times and a complete customer care team. The company also has a quality management system in place. This system focuses on achieving quality policy and objectives to meet customer expectations and specific aviation requirements.

Featuring well-known leathers including the Orion, Ascot, Athens and Apollo ranges, Moore & Giles offers up to 120 in-stock color options. Additionally, a complete custom program provides an infinite array of colors in full-grain leather. The company's headquarters is home to more than four million square feet of in-stock leathers.

"Our goal is to offer an assortment of neutrals along with colors, textures and designs that complement standard aviation for a touch of added luxury," says Matt Buckley, senior vice president of

sales at Moore & Giles. "Many of the company's more fashion-forward leathers can be treated to meet aviation technical specifications – a key differentiator since aviation designers are beginning to diversify their portfolio and infuse aircraft interiors with more innovative elements of design."

SUSTAINABILITY

A commitment to quality also comes with a commitment to sustainability. Moore & Giles focuses on three pillars of sustainability – environmental protection,

10th anniversary

A decade of change

"Modification centers and OEMs now require leather vendors to have a very strict quality manual. We became AS9120 compliant at the end of 2015 and are audited once a year."

Chad Evans, director of aviation sales, Moore & Giles



social responsibility and economic practice. It believes in the essential sustainability story: choosing well, not often. With more than 80% of the company's leather coming from relationships that are decades old, Moore & Giles understands that sustainability is as much in relationships as it is in a product. ✕

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OLDER AND WISER

Buying a used aircraft makes the most sense from a financial point of view, and can also enable greater customization, argues New United Goderich

Buying a new aircraft means that it will have the latest technology, a clean service history, possible tax advantages, warranties, possibly free flight training and bonus equipment. The OEM will install your chosen pre-approved cabin, as well as all the bells and whistles you want from its approved stock. "All of these perks will hopefully make the hefty price worthwhile, if the aircraft performs surprise free," says Nolan Kiely, marketing manager at New United Goderich, which specializes in aircraft maintenance and refurbishment.

Alternatively, used aircraft can offer a fantastic deal. "Some can be found at a quarter of the cost of a new model," says Kiely. "The downside is that the discount also brings uncertainty as to the status of the engines, airframe and avionics. Questions regarding how the aircraft was treated and if it was always hangared when not in use are brought into sales conversations. Experts ask these things to determine what issues may be lurking under the panels of the aircraft, how they will affect its value and what work the new owner will be paying for. In-depth inspections are completed, all the snags found are resolved and the aircraft is ready for use."

US\$28M DIFFERENCE

Kiely says the difference between the purchase price of a new and used Gulfstream G450 can be US\$28m in today's market, and argues that the used model offers a lot more customization possibilities. "Upon purchase, they can be 100% customized to an owner's specifications," he says. "To obtain your dream aircraft, you really do not need to spend that additional US\$28m. You would be truly surprised how far US\$2-6m can go toward personalizing a



The company's multihangar facility is in Centralia, Ontario, Canada

10th anniversary

Looking ahead

"We are doing more interior modifications. Our engineering department is being employed more often, so we have begun to invest a lot in these capabilities. We have some interesting plans for the future."

*Nolan Kiely,
marketing manager,
New United Goderich*



used aircraft. An owner can completely change almost anything about the look and feel, until it is a one-of-a-kind personal masterpiece. For example, a Bombardier CRJ200 can be transformed from an airline configuration to a custom VVIP Challenger 850 for 15 passengers, for US\$4-6m, inclusive of all the parts, labor and engineering required for the STC."

This trend toward aircraft modification and refurbishment is on the rise around



the world, worth an expected US\$7.5bn through 2025. "This is most notable in the North American and Asia Pacific regions, where there has been a shift from

buying new toward upgrading used aircraft, according to Business Wire and Cision," Kiely says. "I would argue that this ability to completely customize an aircraft to one's own preferences, while saving millions of dollars on the purchase, will bring greater pride to an owner taking delivery of a customized used aircraft than if they'd bought a new one. They are just imagining how much traveling they can do with the US\$22m they saved." ✕

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EFFICIENCY DRIVE

An LED upgrade should be a straightforward process, but DPI Labs warns it is vital to maximize cost savings from the start

The LED solutions utilize a dual-circuit design to function as emergency lighting as well

Many business operators are now incorporating LED lighting upgrades into their refurbishment and retrofit plans, aiming to improve passenger comfort and cost efficiency. But not all LED implementations are created equal, warns Scott DeSmet, director of communications for DPI Labs. "While not a complicated process, paying attention to the small details can yield even bigger cost-saving results," he says. "At DPI Labs, we've engineered a thorough LED installation that updates lighting, fixtures and systems integration into a simple, drop-in process."

The front install, drop-in light replacements require minimal or no woodwork/interior modification. The front-mounting options are available for many legacy lighting systems including MR-11 and MR-16 lights. The lighting operates on 28V DC or 115V AC power.

CMS INTEGRATION

DPI Labs ensures that the LED lighting is fully integrated into the aircraft's existing CMS for ease of use and automated operation. "We can incorporate the lighting function into any CMS for a seamless upgrade," says DeSmet.

The lighting fixtures offer reduced power consumption and operator savings, while matching existing aircraft décor. A variety of designs and finishes are available to support any interior. "Hyper-efficient, true-color rendering LED units are a standard part of all LED implementations," adds DeSmet. "There are numerous options and color schemes designed to maximize passenger comfort and productivity."

DPI Labs can implement LED lighting into any aircraft – commercial, private and military. Its LED implementation can be configured for compatibility with



10th anniversary

A decade of change

"Efficiencies are more of a focus for operators than ever before. Our engineers don't focus solely on the latest technology or widget; it is about providing value to the operator so that their investment is reflected in the bottom line."

Scott DeSmet, director of communications, DPI Labs



night-vision instrument systems and special-mission requirements.

In today's competitive environment, aircraft upgrades and refurbishments need to contribute to the bottom line. "A properly configured LED installation can result in immediate power savings of at least 80%," says DeSmet. "Additionally, 50,000-plus hours of LED life mean cost savings associated with parts, labor, paperwork and downtime."

DPI Labs specializes in making high-tech systems accessible for the retrofit market – including commercial, military

and private aircraft. Ease of installation, system compatibility and high-quality performance are cornerstones of every system.

"We are focused on engineering upgrade solutions that allow aircraft operators to incorporate the latest technologies in a straightforward, simple and cost-effective way," says DeSmet. "Our retrofits and upgrades provide the most modern technology, but implement it in a manner that causes minimal structure and operational impact. We see this as an increasingly important factor for the aviation market. An operator's goal is to provide passengers and customers with the best travel environment, but they must do it within tight budgets and schedules. We understand that and our engineers develop solutions that meet both needs." ✕

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EYES AND EARS

A good completions manager should contribute technical advice, industry knowledge and focused project oversight

The things that happen during the refurbishment/completion of an aircraft will affect the owner/operator for as long as they own it. The quality of the design, fabrication and interior installation becomes part of the personality of the aircraft.

"Modern aircraft interiors are complex, high-tech environments," says Vince Restivo, vice president of program management for the Mente Group. "When coupled with variations due to the ongoing development of systems and the continuous evolution of personal electronics, the number of time-sensitive decisions that must be made can be daunting. The consequences of missing some subtlety can make the process seem like crossing a minefield."

OPERATORS ARE BUSY

Mente Group completion management services are designed around two key factors. First, flight departments are tasked with providing world-class, round-the-clock transportation services and often do not have the resources to manage a completion project with the depth and attention to detail they would like. Second, the Mente Group completion management team lives in the completions world every day, and is therefore able to provide current knowledge and guidance on everything from cabin configuration to technology options and operational considerations.

"An important element of completion management is the time spent looking into every detail, making sure nothing falls through the cracks," says Restivo. "That requires being able to spend the necessary time reviewing critical installations without being called away for other duties. This allows our team to stay focused on the task at hand." Obsolescence avoidance is another



Mente Group offers consulting, transaction and asset advisory services

important element: "We keep up with which technologies are on the way out and where we can prevent costs and downtime in the future," explains Restivo. "For instance, the ability to guide our clients through the maze of connectivity options can lead to big savings by enabling them to make truly informed decisions on the total solution: initial costs, operational costs, performance expectations and long-term viability."

TIME AND QUALITY

Restivo believes that project management is also critical to an aircraft being delivered on time with the quality expected. "Successful completion management requires knowledge of the aircraft interior and technology options, and the ability to provide oversight of the design and engineering phases," he says. "If the engineering drawing release rate indicates that the flow of drawings to the supply chain and shops is behind schedule, this is an early indicator that the project schedule may already be impacted, even though the first piece of leather has yet to be cut. For anyone who

10th anniversary

Looking ahead

"Will Ka-band video streaming replace DBS Television? Current DBS (DirecTV) systems are facing a challenge in the business jet segment. Antenna technology has its limits, and the dish size required for HD content exceeds the available space on most current business jets. The downlink speeds available on Ka-band systems allow multiple video streams concurrently, but at a cost."

Vince Restivo, vice president of program management, Mente Group



has been involved with a completion or refurbishment that falls behind schedule, you know how difficult schedule recovery can be. The trick is to not let it get behind in the first place."

Overall, Restivo defines completion management as a resource-led, knowledge-based process where communications and experience, along with absolute attention to detail, are essential to a successful outcome.

"Considering that most flight departments get involved with a refurbishment or completion every few years at best, completion management is an important consideration to ensure the best outcome possible," he says. "The operational and maintenance personality of your aircraft depends on it." ❖

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FINISHING TOUCH

Metal plating expert FH Lambert has increased capacity to plate items up to 10ft long

A specialist in decorative metal plating and surface coatings, FH Lambert was founded in 1963, serving the jewelry and watch trade before developing into the aviation and yacht sectors.

"Our accomplished team provides the ultimate sumptuous finishing touch for manufacturers, completion centers and interior designers," says Jamie Lambert, managing director at FH Lambert. "We can apply our Decoplate finishes to trims, buckles, surrounds, lights, air gushers, cupholders, and much more."

Throughout the years, FH Lambert has provided a multitude of finishes for private jets, first class cabin interiors and superyachts. Its clients include some of the world's leading airlines and even royalty.

QUALITY CONTROL

FH Lambert constantly strives for excellence in production. At each stage of processing, articles are inspected for any defects and potential failures to ensure projects are processed efficiently at the highest standard possible. "Clients' demands are met with a consistent approach, irrespective of the market they represent," says Lambert.

The biggest change for the company in the last decade was its expansion to a larger facility, to accommodate the growing needs of the market. "We moved to a larger facility to cater for increased demand for larger articles," says Lambert. "Our new processing tanks can accommodate articles up to 10ft."

MOST WANTED

The company's more popular finishes include Black Chrome and Rose Gold. "The Decoplate Black Chrome finish is a striking choice for those who want to stand out from the crowd," says Lambert.



10th anniversary

Looking ahead

"We're looking into more durable scratch- and wear-resistant coatings for better surface protection."

Jamie Lambert,
managing director,
FH Lambert

FH Lambert holds AS 9100 accreditation

"It provides an understated elegance and looks superb in an Art Deco style interior. Meanwhile, the Decoplate Rose Gold finish has a unique reddish-pink hue that differentiates it from all the other golds. It adds a touch of decadence to earth-toned interiors and beautifully sets off cherry and teak woods."

The Decoplate Black Chrome tank can process articles up to 8ft long, while the Decoplate Rose Gold can plate up to 10ft; FH Lambert believes this to be the largest in the industry.

As well as many variations of the Decoplate line of finishes for aircraft

interiors and other industries, the company offers many related services in-house. These include surface protection with spray lacquering and protection inhibitors/nano coatings, designed to help protect the Decoplate finishes and act as a hard-wearing barrier. FH Lambert also assists with metal repairs and restoration and custom color matching. ✕

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THE TEST OF TIME

Like its soft materials, Tapis was made to last: the company has responded to changing needs in the aircraft interior industry for 40 years

This year, Tapis marks its 40th year of servicing the aviation industry. Founded in 1977 by Al Caputo, Tapis began by providing custom carpet for VIP aircraft. The product offering next included Ultrasuede, designed to combine excellent stain-resistance with luxuriousness. Soon after that, Tapis began offering Ultraleather, and continued by adding TapiSuede, a faux suede; Grospoint and Geneve, wool fabrics that became mainstays for bulkheads and chair bases; and various silks and woven fabrics.

"Our innovations have included one of the first AN61 heat-release fabrics and appliquéd, embroidered and screen-printed ceiling panels for VIP interiors," says Kevin O'Brien, vice president of operations and technical services at Tapis. "We were also one of the first companies to provide qualified soft furnishings for vertical applications in the commercial aviation market, in 1986."

Tapis is now under the direction of Al Caputo's daughter, Karen, and son, Bob. Karen Caputo has been with the company since its inception 40 years ago and has been president for 30 years. Indeed, Tapis credits its longevity to consistency in leadership, as well as a commitment to customer service and quality, and the ability to respond to evolving needs. As well as adding new products through the years, Tapis has continued to comply with updated flammability requirements without sacrificing design needs.

NEW TEST LAB

Tapis' new test lab in Dallas, Texas, has been approved by the FAA to produce test data for use in type certification projects. Testing is performed by highly trained technicians utilizing equipment from Marlin Engineering. Bunsen burner test capabilities include 12- and



10th anniversary

Looking ahead

"We see an increasing trend for more matte finishes, so we've developed many new textures in the Ultratech and Ultraleather collections."

**Kevin O'Brien, VP,
operations and
technical services, Tapis**



60-second vertical burn, 12- and 60-second horizontal burn, 45° burn and 60° burn.

The new laboratory also enables Tapis to work directly with seat manufacturers to develop customized solutions. "We are able to run treatment trials and test materials in their build-ups through

Tapis' operations are certified to AS 9100 and ISO 9001 standards

confidence testing to ensure they can move through the certification process smoothly," says O'Brien. "Our lab can also support the certification process."

LUXURY PRODUCTS

Tapis' products for the luxury segment include Ultrasuede. "It provides essential utility to the next generation of aircraft, with style, durability and rich, textured luxury," says O'Brien. "We can also transform Ultrasuede to fulfill any design vision. Customers can control colors and details. The available processes include resin, dye print, laser, dye sublimation, pinsonic and embossment."

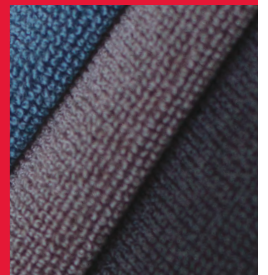
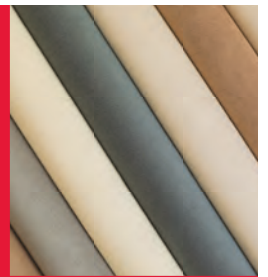
TapiSuede is another fabric that has been used on luxury aircraft interiors for more than 30 years.

"It is made in an ecologically friendly manner without harmful solvents and contains post-consumer polyester,"

says O'Brien. "This fabric is recognized for its richness of color and texture, making it a popular choice for designers. The product line comes in three main textures: TapiSuede, a luxurious solid coordinate; TapiSuede Flannel, a high-end, performance-oriented wool look-alike; and TapiSuede Strie, a fabric that has a textural, cut-velvet-like quality." ❖

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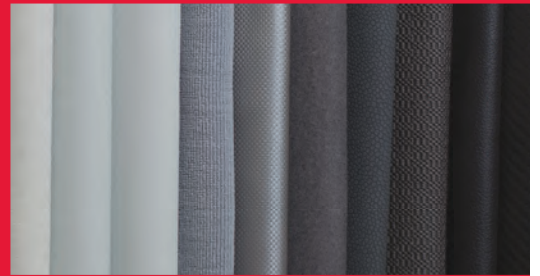
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Celebrating

40

YEARS



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MIRROR, MIRROR

Gold, rose gold, silver and bronze glass mirrors could fuel a new aircraft interior design trend

The mirrors can be implemented in any size or shape required

Since the introduction of new metallic colors for smartphones and laptops, the popularity of rose gold and gold mirrored items has soared. "Glamorously colored glass is now a hot trend in the aviation industry, particularly following the launch of our new range of colored glass mirrors," says John Rietveldt, CEO of AviationGlass & Technology. The company manufactures AeroGlass Mirror – a certified, ultra-thin, lightweight glass product available in rose gold, gold, silver and bronze. The mirrors can be produced in many colors and cut into any shape or size, enabling endless design opportunities to be brought into play virtually anywhere in the cabin.

CREATIVE SCOPE

"When it comes to luxurious personalization and a feeling of elevated space, mirrored glass inside the cabin can make all the difference," says Rietveldt. "Whether in the main cabin, a bar area, bedroom or bathroom, glass mirrors enhance both natural and artificial light to give passengers a feeling of lavish freedom and edgy interior design."

There are many creative possibilities, from single-color signature mirrors, to a mosaic of differently colored mirrors, to color-themed rooms and subtle details that run through each area of the aircraft. The glass mirrors can also feature integrated lighting and be customized with digitally embedded words and images. "If it's a touch of glamor that private or business jet owners are looking for, then our striking new bronze, silver, gold and trendy rose gold colored AeroGlass Mirrors are definitely something they need to consider when

10th anniversary

A decade of change

"In the five years since our foundation, we have witnessed a big shift toward sustainable materials that enhance safety and boost design opportunities. This is illustrated by the transition from polycarbonate to our products."

*John Rietveldt, CEO,
AviationGlass & Technology*



designing or remodeling their aircraft interiors," says Rietveldt. "Our mirrors help create beautiful cabins and a feeling of boundless space. Aircraft interiors can be tailored to radiate uniqueness and exclusivity. We are convinced that these mirrors are set to become the new lusted-after onboard item."

CERTIFICATION NEWS

Rietveldt says that AeroGlass is up to 50% thinner and 25% lighter than traditional polycarbonate products. "The material was recently confirmed by EASA as the

official certification baseline for glass parts in the cabin," he adds. "EASA categorized AeroGlass Mirrors and transparencies as minor modifications, removing the need for any additional certification or STC prior to installation."

Additionally, EASA's European Bilateral Aviation Safety Agreement with the FAA, outlining that basic modifications do not require additional FAA validation, means that the same AMC and certification for the replacement of lavatory mirrors and transparent glass parts are applicable in the USA. "Private jet owners all over the world can simply swap their scratched and cloudy plastic products for our creations to design their own superior onboard experience," says Rietveldt. ✕

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To request more details from AviationGlass & Technology, visit www.ukimediaevents.com/info/aimbj

CUSTOM COFFEE

Thanks to Aerolux's ability to make variations to its standard design, there are more satisfied VIP customers using a machine finely tuned to suit their galley, without compromise to usability or quality

On January 3, 1994, Swissair took delivery of its first Aerolux Espresso Maker, and in recognition of this breakthrough, Aerolux earned the prestigious Mercury Award.

The world's first airworthy Espresso Coffee Maker was created by Aerolux founder Ken Metcalfe and a small team of enthusiastic and dedicated engineer/designers. Swiss Air had promised Metcalfe that if he could produce an espresso machine, they would buy it.

"I wasn't a coffee drinker, more a tea man," recalls Dave Brennan, now chief electrical engineer at Aerolux. "When we began designing the machine, I thought I'd better start drinking espresso so that I could understand and taste for myself the difference in the quality of the coffee the machine produced. Eventually we got it producing perfect coffee. Now 25 years later, our machines are still producing perfect coffee, and I'm still drinking several espressos a day!"

LONGEVITY

The machine went from strength to strength and is now virtually synonymous with Aerolux. "Over the years, we've sold thousands of our espresso makers, and most of them are still in service," says Rob Shelton, sales director at the company. "It's the Aerolux aim to produce galley equipment that will outlast any aircraft's working life."

In the business/corporate jet market there are always requests for bespoke products, often because space is limited. "Over the last few years I have had numerous requests asking if we can supply an Espresso Coffee Maker with a reduced footprint, typically for aircraft such as the Hawker Beechcraft," says Glenn McQuire, engineering manager at Aerolux. "Often there is no room for a mounting rail and to make things worse,

10th anniversary

A decade of change

"Customers' requirements have changed massively in terms of quality, delivery and specification, and in particular, there is much greater demand for bespoke sizes and finishes. Regulations have also shifted continually – a positive move for safety. Business conditions have been tough, but Aerolux has sustained itself, and developed products, based primarily on a strong reputation for the reliability and functionality of its equipment."

Glenn McQuire, engineering manager, Aerolux



no drain connection or nearby interface into the wastewater sump on board."

One solution was to modify the unit to utilize a remote tank, tailor-made to fit into a very tight, but unused, space. The tank can be mounted up to 1m higher than the machine itself, but not below. In this case, it was placed alongside the coffee maker, a few meters away.

Several times, the issue has been to make a unit suitable for direct mounting,



rather than using the traditional rail. Another first was to mount the rear water inlet connector vertically, shortening the length of the unit by quite an amount. When a customer's galley offered no drain facility, Aerolux mounted the unit on top of a pull-out tank with capacity for 1.5 liters of wastewater.

PROBLEM SOLVING

"These are some of the many adjustments we've made, and no doubt different issues will be presented to us in the future," says McQuire. "We are always willing to design a way around most problems our customers present to us. Our target is to provide a bespoke product in a mass-market world, to make customers happy and, of course, to close a deal! Being able to adapt is one of the benefits of producing handmade products – a fixed production line can't do that." ☒

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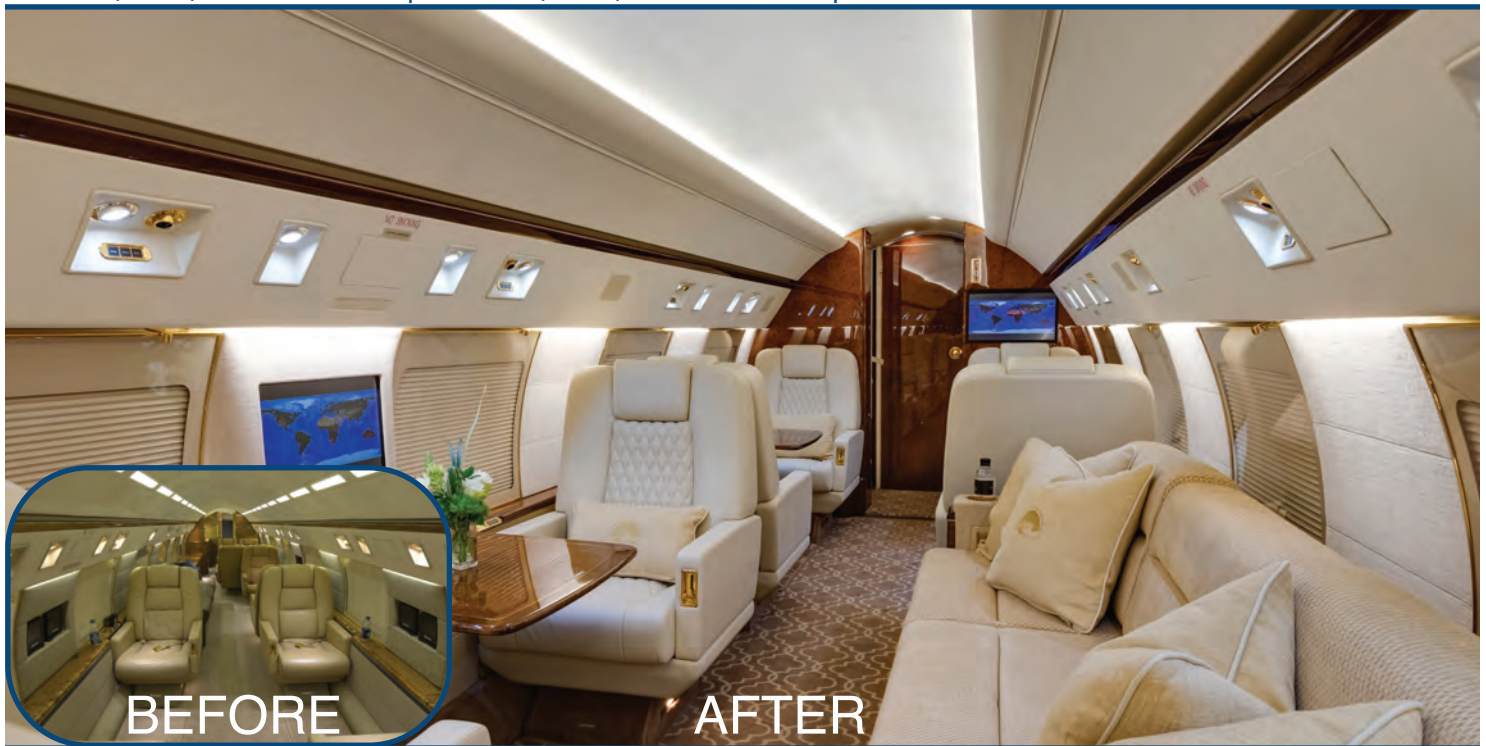
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EXPRESSIVE ARTS

A bespoke carpet design is one of the easier ways to make a statement on board, says Scott Group Studio

There are 17 styles in the new Aerial collection of hand-tufted rugs for aircraft

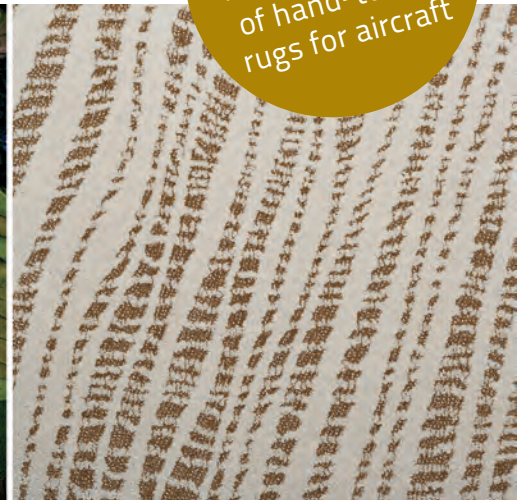
Elite passengers want luxurious cabins that reflect how they live on the ground. Carpeting is one of the most important choices a designer can make in trying to achieve this, say experts at Scott Group Studio, a leading carpet supplier for private jets.

While some aspects of an aircraft interior plan are constrained by regulations and dimensional realities, the carpet design can be liberating. It's a free-ranging opportunity to anchor a concept, create a mood and reflect a refined aesthetic sensibility. "Carpet is a way to articulate a design vision," says Jessica Courtright, a senior aviation designer at Scott Group Studio. "It can be very expressive and unique."

TREND TRACKING

Scott Group Studio's design team tracks and interprets trends from all over the world to ensure that the company's aviation offerings are inspired and *au courant*. One particularly influential trend it cites is a growing appreciation for noticeable nuances in carpet patterns versus predictable uniformities. "There's more interest in individuality and variance, more patterns that don't repeat but instead meander through the cabin," explains Courtright. "We're also seeing more desire for dimensionality, patterns that come forth and recede, as well as patterns that are softer rather than hard-edged, more organic and natural."

The new Aerial collection of hand-tufted silk-wool mix carpets interprets these trends. Inspired by observing Earth's surface from 30,000ft, it presents nature's organic twists and turns from a fresh vantage point. The varied terrain of a rice paddy, the winding of cracks in the arctic tundra, the lights that define towns and cities at night, are all translated into this collection.



10th anniversary

A decade of change

"We've seen interiors become more streamlined, and color palettes more diverse. Neutral tones are still extremely popular, but we see more variety: light gray, deep cooler browns, very light ivory tones and even navy blue."

Jennifer Kirchgessner, creative director, Scott Group Studio



One of the most important trends the company has noticed is that design is more global. Regional differences exist, but are becoming less pronounced. "While there are still some nuances for every market, the global landscape has changed so much," says Jennifer Kirchgessner, creative director at Scott Group Studio. "Trends are more interconnected and blended in today's more mobile global environment. We've seen this happening in the high-end retail market for some time, and we're seeing it in the aviation sector as well."

In addition to offering custom collections, the Scott Group Studio team works closely with outside designers, including some of the world's most recognized, to transform one-of-a-kind carpet designs into bespoke reality. Scott Group Studio says these relationships are a constant source of inspiration and just one of the ways it stays on the cusp of design trends. Fashion, residential and commercial interiors, and organizations such as the Color Marketing Group are also among the company's frequent go-to sources for information, forecasts and ideas. "We look everywhere, all the time," says Kirchgessner.

Design trends come and go, but Rich Ruggeri, executive vice president, emphasizes that Scott Group Studio's purpose and focus stays the same: "We never tire of transforming ideas into luxury carpets like no others on Earth – or in the sky." ❖

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NETWORK GAINS

Connectivity should lead to a digitized, synchronized, networked and secure business aviation future

SD estimates that it manufactures around 90% of the sector's routers

This year marks the 20th year of business for Satcom Direct (SD). Since connecting its first customers in 1997, it has continuously responded to the diversifying requirements of the sector and striven to anticipate the next essential service.

Today the business is developing the concept of a continuously connected aircraft. It offers a nose-to-tail set of hardware, software and infrastructure, enabling a range of IFEC and information offerings, as well as flight deck systems to optimize flight planning, maintenance and situational awareness.

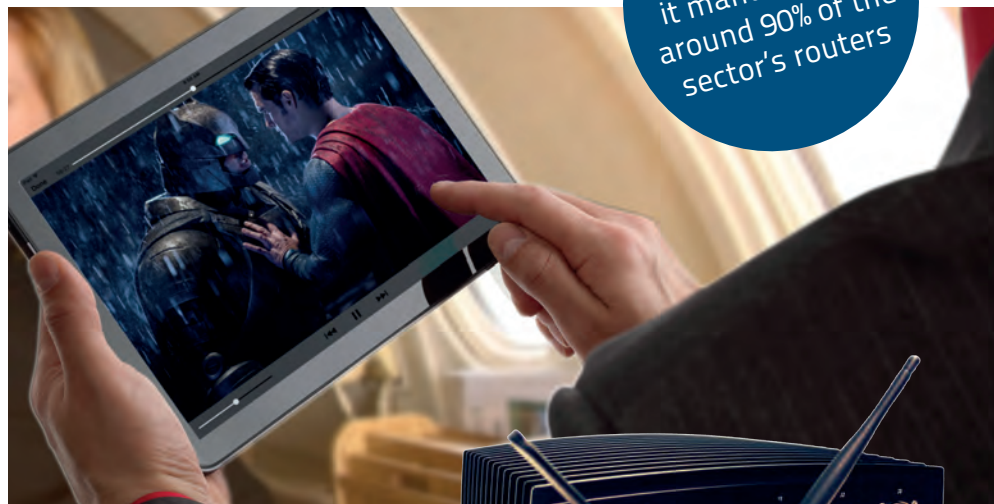
Underpinning much of this is the SD router family. The Satcom Direct Router (SDR) powers voice and data connectivity, while the WiFi Hub augments the SDR to provide richer, faster and more data.

RECENT ACQUISITIONS

SD has made important acquisitions recently. The purchase of the Airbus US government business COMSAT has enabled SD to provide faster satellite services. The addition of AircraftLogs supports internet-based scheduling and accounting software. Most importantly, SD stepped into the manufacturing arena when it acquired TrueNorth Avionics.

The company says there is a trend toward the convergence of services, and the digitization and synchronization of all phases of flight. SD Pro management technology synchronizes flight departments, aircraft and maintenance teams, to ensure constant connectivity. This is complemented by the Flight Deck Freedom product, designed to enhance pilots' situational awareness.

SD's integrated offering has proven attractive to operators large and small. European operators Air Alsie of Denmark and TAG Aviation (UK) both signed contracts in 2017. SD comments that



dealing with a single supplier boosts efficiency and reduces costs.

Behind the scenes, SD has concentrated on providing a robust support system with 16 offices worldwide, and a representative theoretically never more than four hours from a customer. "We have also developed two certified courses: aerIoT for aviation IT professionals, and

aeroCNCT for cabin crew and flight technicians," says Moore. "Just as we are agnostic about which service provider we recommend, so we are with our courses; anybody in the sector can take them."

DATA SECURITY

Looking to the future, SD recognizes that data integrity is essential. Certified in-house auditors are already providing cybersecurity assessments, following NIST standards, to keep data safe.

"Unless you have protected your aircraft, corporate data is extremely vulnerable when transmitting from the aircraft to the ground," says Moore. "Our services monitor the integrity of the network and any threats. We can also advise what to do to keep the fleet secure." ❖

10th anniversary

Looking ahead

"The future for aviation is in connectivity, digitization and synchronization. The combination of all these parts in one intelligent system will make business aviation more operationally efficient and much safer."

Chris Moore,
chief commercial
officer, SD



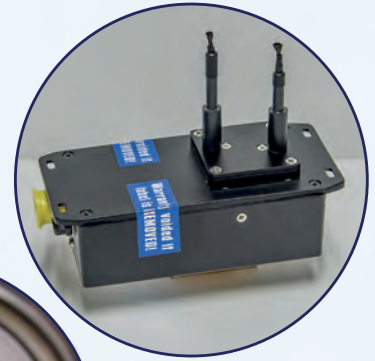
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FULL CHARGE

Passengers' love of PEDs is driving increasing demand for onboard power solutions

The need for passengers and pilots to stay charged and connected to laptops, tablets, cell phones and other electronics has operators searching for reliable USB and wall-outlet power. "We have seen a growing demand for inflight connectivity, which is increasing the need for in-seat and cabin power for passengers to charge their PEDs during their flights," says Tom Genovese, senior account manager at True Blue Power.

True Blue Power inverters, converters and USB charging ports are designed to provide an economical, easy-to-install solution, and are FAA and EASA certified.

EFFICIENT DESIGN

The TI250 Series DC-to-AC Inverter supplies 250W of clean, regulated wall-outlet power from the aircraft's 28VDC input to power cockpit and cabin accessories including laptops, tablets, cell phones, electronic flight bags and other power-hungry electronics. The 2.2 lb (1kg)

The TI250, TA102 and TA202 product lines hold FAA and EASA approval



TI250 inverter is engineered with a fanless design to save energy and reduce weight without the need for external cooling. This inverter can be installed in the cockpit or in multiple locations within the cabin, depending on the configuration of the aircraft.

Another product offered by True Blue Power is the compact TA102 Series Dual USB Charging Port, which simultaneously provides 2.1A per port and is capable of charging two USB-compatible devices at full power. Sealed units offer water-resistant protection against spills and surface cleaning solutions.

FUTURE-PROOFED

Then there is True Blue Power's TA202 Series High-Power USB Charging Port, a power source for current and next-generation devices with the option for single- and dual-port USB Type-A and Type-C configurations. Each unit simultaneously delivers 3A per port. ☒



10th anniversary

Looking ahead

"We continue to investigate product designs that produce more power, but are smaller, lighter and more cost-effective than legacy units. We are designing and certifying emergency power supplies that use a lithium-ion iron phosphate chemistry to power emergency cabin lighting systems, to cut maintenance requirements."

Tom Genovese, senior account manager, True Blue Power



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LIGHT FANTASTIC

A recent LED upgrade is saving weight, improving aesthetics and minimizing maintenance on a GIV-SP

The most recent LED cabin upgrade by Aircraft Lighting International (ALI) eliminated the subway-style fluorescent lighting system on a GIV-SP. ALI's systems are designed to replace standard pigtail fluorescent lamp systems. However, ALI's growing reputation in the industry sees refurbishment centers approaching the company to provide LED systems to replace bi-pin fluorescent systems.

The LED system used on the most recent upgrade is self-ballasted, which allows for the deletion of both the bi-pin fluorescent lamp and its associated ballast. "In addition to the weight savings accomplished with the removal of the ballast, a dated look was replaced by one opened up with seamless upwash lighting," says Shervin Rezaie, general manager at ALI.

LONGER LIFE

Rezaie says improved appearance and ambiance are not the only gain with this LED upgrade. "The aircraft will enjoy decreased maintenance costs because the LED lamps will last longer and draw far less current than the bi-pin fluorescent lamps," he says.

The lighting was replaced alongside a cabin interior upgrade to modernize the overall interior. "The LED installation merely added a few days to the interior upgrade," says Rezaie. "The warm color temperature diodes perfectly complement the comforting earth tones on the aircraft, which could have easily been lost with the original bi-pin fluorescent system."

The upgrade also included ALI's LED readers in a cool white color temperature. "Our readers are more focused than incandescent bulbs, which means passengers can work easily in



AFTER



BEFORE

appropriate lighting, without disturbing other passengers," adds Rezaie.

NBAA PLANS

ALI will announce its latest PMA certification, for the L1309X, at NBAA-BACE 2017. "It's another step forward in direct-replacement LED cabin lighting solutions," says Rezaie. ALI's existing PMA-certified line will also be displayed.

Rezaie believes that the next challenge for the industry will be the

ALI holds
FAA Parts
Manufacturer
Approval

10th anniversary

A decade of change

"We're about to celebrate our 20th anniversary in aerospace lighting. Despite our LEDs being available for the past 10 years, it's only been over the last five years that we have begun to see LED become ubiquitous on business jets."

Shervin Rezaie, general manager, ALI

integration of all cabin systems into one centralized platform. "Service and customer support will become even more essential to meet these demands over various platforms and systems," he says. "Those who collaborate will likely prove to be industry leaders." ✕

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10th anniversary

A decade of change

"Our smartphones are computers and we use them all the time for more and more: news, email, texts, streaming video, house controls and even the occasional voice call."

Dave Garing, vice president of sales and marketing, Innovative Advantage



Typically, testing a video output requires you to connect a monitor, find a source and then get the CMS to command the signal be switched to the monitor. "Your wiring is completed early and usually the Blu-ray players and monitors haven't been delivered yet," says David Garing, vice president of sales and marketing at Innovative Advantage. "Also, the CMS software usually isn't ready to control the switching and route the signal."

The latest AVDS audio/video switches include internal test pattern generators (TPG) and analyzers that allow installers to test outputs and monitors using a built-in signal. TPGs can be set to 3G, HD



or SD resolutions with frame rates from 24-60fps. The user can route TPG to all video outputs using the AVDS Client software. Using the internal analyzer, input signal can be routed to the analyzer so signal integrity can be checked.

With both, no external sources or test equipment is required.

"With support for both SD and HD signals, the flexible and modular AVDS is a great solution for obsolescence issues and upgrades to existing systems," comments Garing. ☒

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To request more details from Innovative Advantage, visit www.ukimediaevents.com/info/aimbj

ON TREND

Carpet color and pattern preferences may change, but superior customer service is always in vogue, says RedRock Custom Carpets

Cool grays, taupes and black are the latest trends according to RedRock Custom Carpets, which has noted an uptick in these color selections. RedRock also reports demand for unique designs including a variety of stripes and its DesignTuft patterns, produced using digital technology. The company employs designers with more than 25 years of experience to create or interpret custom patterns for discerning clients.

"Superior customer service is the goal of every employee," says Haley Tuck, director of sales at the company. "We have an integrated team approach – design, sampling order entry, manufacturing and shipping all happen at our facility in Winston, Georgia, USA."

Premium New Zealand wool is at the core of RedRock's products. "Simply put, we use the best raw material to make the best carpet in the industry," comments Tuck. "Our variable width machines allow for carpet dimensions from 3ft to 15ft wide. We have 64 standard colors in our pom set, providing infinite options. We also pride ourselves on offering customers the shortest lead times available in the industry."

In July 2017, RedRock launched a new quick-ship program called On the Fly. The program consists of 12 designs in three standard colorways, providing 36 variations that can be shipped in 7-10 business days upon submission of the purchase order. ☒



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BREATHE EASILY

ACA has designed a product to provide pristine air as well as continually sanitized surfaces on board

The air and surface purification technology offered by Aviation Clean Air (ACA) is a proactive component that can be added to an existing environmental control system. The ACA component is not a filter system; filtration systems are passive, only collecting the allergens and pathogens that find their way back to them, located somewhere in the mechanical area of the aircraft.

When air flows through the ECS ducts and into the cabin and cockpit, the ACA component removes odors and allergens, proactively and rapidly. It also kills pathogens in the air and on surfaces throughout the cockpit and cabin.

The component removes new odors caused by fuel emissions, as well as other VOCs generated by cooking, cleaning,

stagnant air, cigarette/cigar smoke and many other sources. ACA says its product kills pathogens including, but not limited to, the common cold, flu of all types and variations, MRSA, C. diff, E. coli, M. terrae, pneumonia and polio. A side benefit is that the product controls static electricity within the cabin and cockpit.

The technology, which ACA says is 100% green, works by duplicating and accelerating nature's cleaning process, with nothing else added. ACA says the benefits are noticeable to crew and passengers in just seconds.

The component has been designed to be installed onto the existing ECS ducts easily, have a negligible impact in terms of power and weight, and requires no continuing maintenance once installed. ✕



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CRYSTAL CLEAR

An app is being used to bring full transparency to plating project management

10th anniversary

A decade of change

"With 3D technology and the standardization of plating inspection criteria, a huge portion of subjectivity has been removed, leading to a dramatic reduction of rejects and rework."

Paul Sahaneck,
president/partner,
Signature Plating



The evolution of 3D visualization tools has had a big impact on Signature Plating over the past 10 years. They enable the plater to share an overview of the part, at a component level, with the customer/designer. They can show visible surface areas and where finished plating needs to be applied. This has improved communication and efficiency.

In January 2017, the company expanded on this with the SignaTrack app. This enables customers to see exactly where their plating is and view pictures of parts and orders. They can customize the app to receive notifications with every movement in the process.



"All too often, suppliers give inaccurate information to customers regarding their order's status," says Paul Sahaneck, president/partner at Signature Plating. "We have a no-surprises philosophy."

"We began using the app internally toward the end of 2015 and it has enabled us to reduce average turn time from 11.6 days to 6.4 days, and to improve our internal communication tenfold," says Frank McKnight, CFO/partner at the company. ✕

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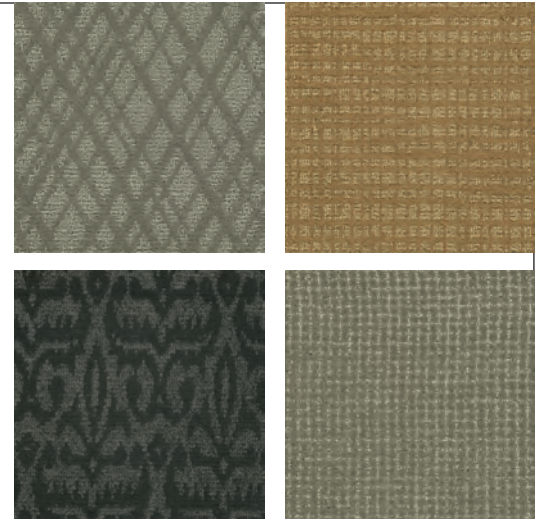
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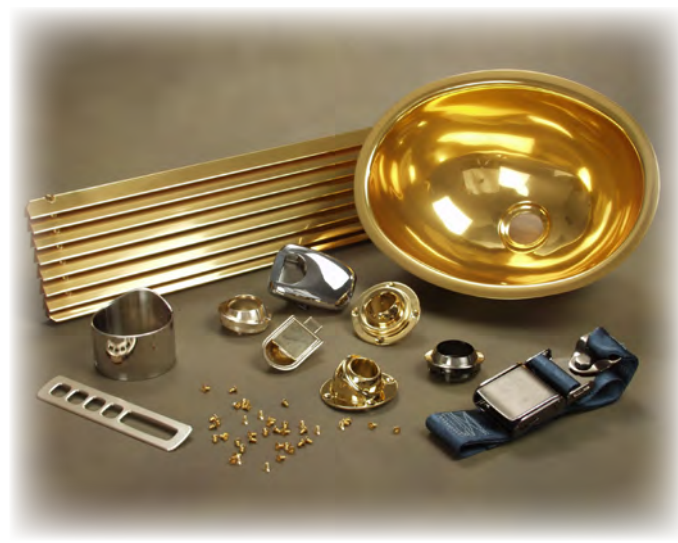
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Seats and divans can be transformed to offer passengers a great night's sleep, with JetPedic's custom mattress solutions

Private jet passengers need not struggle to sleep on board, because custom mattresses can be made by JetPedic to fit any aircraft seat or divan. The company prides itself on offering the same features and level of comfort found in brand-name mattresses made for the home. Its range includes mattresses for club seats with fold-down backs, club seats with pop-up units, conference seats and divans. All the mattresses have custom hinge-folds, designed to enable easy assembly and storage, and are weight-optimized. The beds are vacuum-packed to minimize their size, making them completely portable.



The range includes micro pocket coil, latex and gel memory foam models. The company also offers custom-fit bed linens, including a standard line of various thread counts and colors; and Italian linens from labels including Hamburg House, Matouk, Peacock Alley and Sferra, which are available with custom embroidery and monograms.

Custom-fit mattress pads, bedspreads and duvets can also be supplied. Additionally, a line of 100% Egyptian cotton towels can be completed with a monogram or designed to match the custom bedding ensemble.

10th anniversary

A decade of change

"The biggest change over the past 10 years has been the introduction of bigger aircraft that go further, resulting in the need for more comfortable sleeping solutions. Looking ahead, JetPedic wants to grow more in the European and Asian markets."

Dave Ogle, president/CEO, JetPedic

JetPedic has manufacturing plants and showrooms in Fort Lauderdale, Florida, and Costa Mesa, California. It can either take measurements in these locations or can travel to the customer. Orders are usually shipped within two weeks of measurement and JetPedic can ship internationally. ☒

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the road ahead

THE NEW AUDI A8 COULD SHOW THE WAY FORWARD FOR IFE/CMS AND SEAT DESIGNERS

The fourth generation of the Audi A8 was developed for highly automated driving and the technological advances extend to the interior too.

Reflecting Audi's focus on an uncluttered, clean design, the touchpad and rotary pushbutton of the previous model have been replaced by a main 10.1in touchscreen display that blends into its black surround when switched off, and a second touchscreen for controlling functions including the air-conditioning. The displays and buttons give both acoustic and

tactile feedback when operated. The driver can also control certain functions by giving the system auditory commands.

Customers opting for a relaxation seat in the rear of the A8 L are in for a treat. It features four adjustment options, new head restraints and a heated footrest with massage options.

Rear-seat passengers can also make phone calls and control cabin features – including HD Matrix reading lights, ambient lighting and seat massage – through a removable OLED remote in the center armrest. ✕



PHOTOS: AUDI

OTHER EYE-CATCHING DESIGNS FROM VARIOUS INDUSTRIES...



PHOTO: STEPHANE BRUGGER

- 1 The 1960s were a major inspiration in the recent redesign of Fairmont The Queen Elizabeth Hotel in Montréal, Canada, which originally opened in 1958. The project showcases the talents of Sid Lee Architecture and Architecture49.

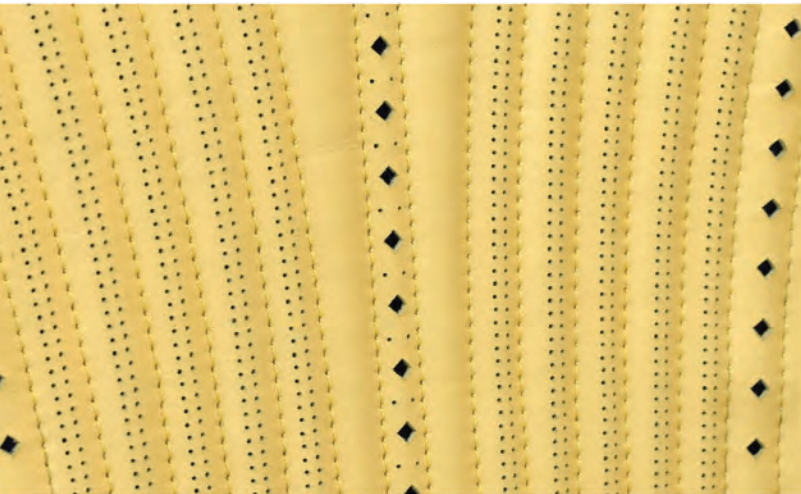


- 2 White leather and white stitching characterize the interior of this bespoke McLaren 720S created by McLaren Special Operations for US customer Michael Fux. However, there are also accents in the custom 'Fux Fuchsia' color used for the bodywork.



- 3 Filippetti has developed a new fly deck configuration for its Navetta 26 yacht. Customers can choose the open version with terrace, bar, sundeck and dining area, or a flexible version with a living room, kitchen, bar and adjustable dining table.

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