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ROYAL JET BBJs

Carbon fiber and metal composite replace wood veneer on two ultra-modern charter BBJs

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Wheels up

Head down the runway with a selection of the latest cabin designs, product launches, case study news and completion announcements

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ROYAL JET BBJs

Charter operator Royal Jet turned to Edése Doret to create a strikingly modern interior overflowing with carbon fiber for two new BBJ 737-700s

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RETROFIT IFEC

Fast-moving developments in consumer technology are driving demand for IFEC and CMS retrofit upgrades – but such installations are not without their challenges

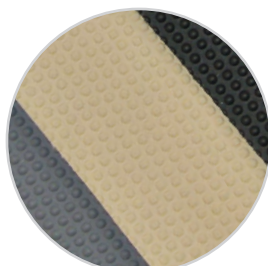




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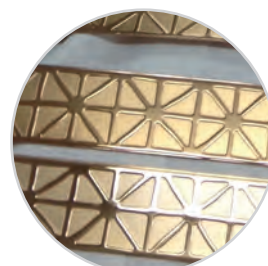
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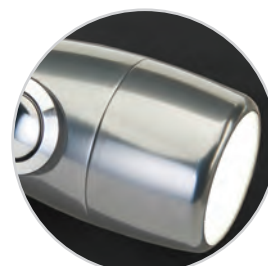
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Cover image: The chair seat, offered by Inairvation



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MODERN TIMES

Just a few years ago, it would have been unthinkable that a seat of the ilk shown on the cover of this magazine could grace a business jet. The image shows one of thousands of possible configurations for the chair, a platform engineered by Lufthansa Technik with design support from Pierrejean Design Studio and now offered through Inairvation, Lufthansa Technik's joint venture with F/List.

The idea is that various seats tailored for dining, sleeping, working and so on can be created around one certified structure. Changes to dimensions, padding and upholstery are classed as minor deviations under the product's 9g and 16g ETSO certifications.

The product is notable for its use of carbon fiber for primary load parts, as detailed in the feature on page 16. The article also assesses the potential of other materials and technologies to take seating to the next level. In addition, you will find key information – including dimensions, standard and optional features, and certifications – for other current seats on the market, in one

easy-to-read piece. It's clear that there are plenty of exciting designs out there right now, from a range of manufacturers, but it will be fascinating to see what else can be achieved.

For another forward-looking design, turn to page 24 to read all about Royal Jet's new charter BBJs, which were designed by Edése Doret and include massive amounts of carbon fiber, bulkheads comprising 3D pyramids rendered in metal composite, and the newly available Ka-band internet.

Then on page 32 we round up all the latest developments in IFEC, with a special focus on retrofit solutions, and we take a look at the challenges involved in keeping aircraft in line with consumer technologies.

There is also a special showcase section from page 41, where you can discover what various companies have been concentrating on through the year, and what they believe are the important issues that will impact the year ahead. Overall, I see that the industry is working very hard to create interiors that will meet the modern customer's expectations.

A handwritten signature in black ink, appearing to read 'Izzy Kington', with a stylized, flowing script.

Izzy Kington, editor

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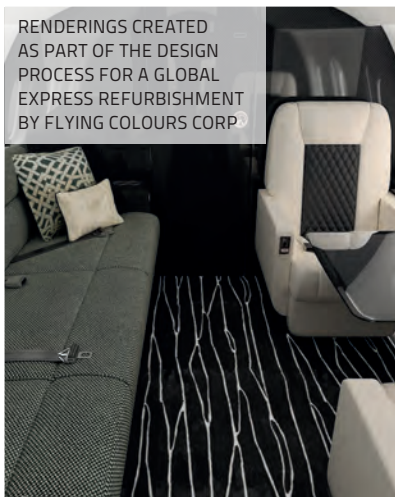
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THE DASSAULT FALCON 900LX CABIN, WHICH HAS BEEN COMPLETELY REDESIGNED AND NOW HAS A NEW LED MOOD LIGHTING SYSTEM, NEW CONNECTIVITY SERVICES AND A VACUUM TOILET SYSTEM





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THE FINAL VERSION OF THE VIP DESIGN CREATED BY LUFTHANSA TECHNIK AND MERCEDES-BENZ STYLE FOR AIRBUS AND BOEING AIRCRAFT



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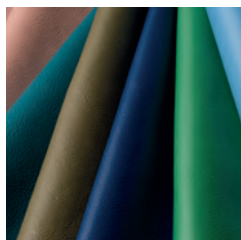


GULFSTREAM'S INTERIOR FOR THE UPCOMING G500, INCLUDING A NEW SEAT DESIGN

LAUNCHES



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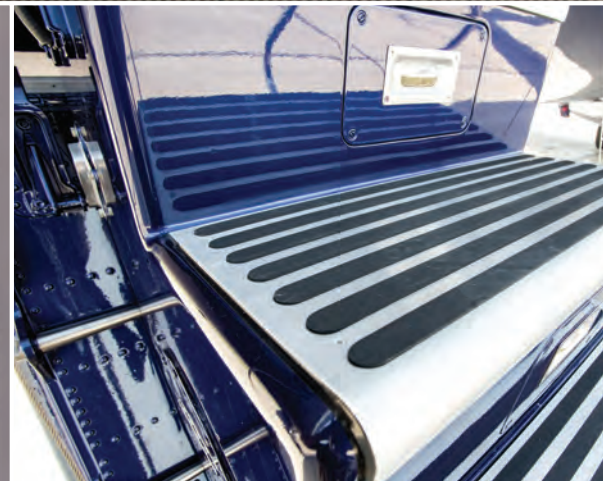
1. THE PROTOTYPE FOR AN ELECTRIC, DUAL-PEDESTAL HI-LO DINING TABLE CREATED BY MSB
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4. A PLUG-AND-PLAY DIGITAL AUDIO UPGRADE FOR THE LEGACY 600, FROM ALTO AVIATION

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GLOBAL EXPRESS UNDERGOES SPORTY TRANSFORMATION AT DUNCAN AVIATION

Inspired by the owner's preference for a modern interior, Duncan Aviation transformed the interior of this Bombardier Global Express from a traditional neutral environment to a modern and sporty design. The traditional wood veneer was replaced with blue carbon fiber and silver metallic painted cabinetry. The client's passion for fine wines and gourmet food also made the galley an important element, leading to the design of a custom wine chiller.

The project, which included an all-new interior, exterior paintwork, and CMS and wi-fi installations, took roughly 23 weeks to complete. "This aircraft arrived at our facility directly out of a pre-purchase evaluation, therefore the typical planning and parts procurement period needed to be rolled into the total aircraft downtime," says Mary Lee, senior completions designer at Duncan Aviation.





Q&A

Mary Lee

SENIOR COMPLETIONS DESIGNER,
DUNCAN AVIATION



The custom-designed airstair incorporates stainless steel, aluminum and a neoprene rubber tread to complement the modern aesthetic inside the cabin.



LED upwash and downwash lighting from B/E Aerospace was installed in the entrance area, galley, main cabin and lavatory, along with blue floor-level lighting. Another nice detail is the custom blue LED-illuminated wine cabinet in the galley.



Duncan Aviation designed and fabricated new drink rails featuring custom black powder-coated switch bezels with polished chrome trim, blue carbon-fiber, storage compartments and USB charging stations concealed under sliding, leather-covered lids. The company also designed illuminated cupholders.



New cabinetry includes custom wine storage, an upper tower in the galley and a mid-cabin credenza. Modifications were made to the lower galley cabinetry and lavatory storage.



Rockwell Collins' Venue CMS was installed and integrated with the sideledges and ambient lighting. It enables digital control of audio and video, speakers, and CMS functions through an iPad application. A new Gogo Biz ATG-5000 receiver with two antennas was also installed for wi-fi access throughout the aircraft. The installation was completed with the Gogo Text & Talk upgrade, enabling personal cell phone use.

Which elements were changed?

The interior finishes are completely new – from the hand-made Tai Ping carpeting, custom-tipped Garrett leather sidewalls to the arched plated inlay on the dividers. The cabin also has new drink rails and lower sidewalls, as well as modified PSU valance panels in the main cabin, which incorporate a trim cap painted silver and new custom chrome-plated light/air vent escutcheons. The pleated window shades were refurbished and their electric controls were integrated into the new CMS. Seating was upgraded to a new electric assist model from B/E Aerospace, with custom perforated leather from Townsend, finished with a blue welt cord and French stitching. The cabinetry was modified throughout for better functionality and improved aesthetics – for example, the final cabin includes a new upper galley tower with illuminated crystal display. A new credenza with a pull-out kibitzer was added in the mid-cabin area to provide storage and additional seating.

What is most special about the design?

The blue carbon fiber is a beautiful material, used conservatively. Complementary materials including granite, silver cabinetry, brushed aluminum and polished chrome – as well as blue LED accent lighting in the cupholders and at floor level – really highlight the carbon fiber. The result is a beautiful blue illumination throughout the aircraft. The exterior paint colors were also selected to harmonize with the interior palette. For a personal touch, the sleek arched stripe scheme incorporates elements of the owner's logo.

What custom solutions were incorporated?

The illuminated cupholders, drink rails, entry-step treatment and wine cabinet are custom solutions that were designed and fabricated by Duncan Aviation. For the cupholders, I worked very closely with our fabrication group to achieve the desired result, keeping the blue LED ring inside to a minimum. We used a black powder coating on the inside of the cupholder to reduce reflections. Full dimming capabilities were also integrated into the design with the new CMS.

How do you approach the challenge of integrating and certifying custom equipment?

Duncan Aviation has strong certification capabilities and developing custom solutions is one of our specialties. Custom projects entail collaboration between our in-house design, cabinet, fabrication, engineering and certification teams, as well as our ODA. Having all these disciplines under one roof is a real asset.

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COMPLETIONS ROUNDUP

This quarter's announcements from completion centers around the world

TOULOUSE, FRANCE

Airbus Corporate Jet Centre upgraded an ACJ320 with a wi-fi solution that allows the internet to be used to make telephone calls.

The retrofit included an upgraded Airbus SwiftBroadband solution, involving the replacement of the aircraft's top skin fuselage panel. This was conducted in parallel with a major heavy maintenance check.

HAMBURG, GERMANY

Lufthansa Technik launched Smart Lifecycle Program, a cost per-flight-hour service for VIP and special-mission aircraft customers.

BASEL, SWITZERLAND

Jet Aviation received the first of two BBJ 777-300ERs it will complete for Boeing on behalf of a government client in Asia. This is the first BBJ 777 VVIP completion for Jet Aviation.

BASEL, SWITZERLAND

AMAC Aerospace won contracts for five base maintenance projects and a 72-month inspection and registration change on a GV. It also handled a G450 registration change and has a G300 in for a 144-month inspection.

ZURICH, SWITZERLAND

SR Technics received base maintenance approval from the Federal Office of Civil Aviation (acting on EASA's behalf), to offer cabin modification services for the B777.

SINGAPORE

Jet Aviation is adding a 3,850m² hangar, plus 380m² to its interior shop and 315m² of storage space. The project should be completed in November 2017. The hangar will be able to house two BBJs or five G550s.

PETERBOROUGH, CANADA

As well as the Bombardier Global Express, Flying Colours Corp can now install Inairvation pre-engineered retrofit solutions on Bombardier Challenger 300 and 605 and Gulfstream G450 and G550 models. Work on the first Global began in September 2016 and is scheduled for re-delivery in March 2017. The cabin will have new B/E Aerospace seats, carbon-fiber veneer, ebony hardwood, mood lighting and a GoGo ATG 5000 connectivity system. The Inairvation package includes Lufthansa Technik's nice HD CMS/IFE system and sideledges made by F/List.

MOSES LAKE, WASHINGTON

Greenpoint Technologies will help develop a VIP interior for Spike Aerospace's S-512 supersonic business jet. It is also completing a B777-200LR for Crystal AirCruises, having collaborated with the company for the interior design. It includes a lounge with a stand-up bar, sofas and tables; custom lie-flat seats; flatscreen monitors, and wi-fi and IFE. The aircraft will accommodate 84 passengers. Delivery is scheduled for 2017.

COLUMBUS, OHIO

Spirit Aeronautics is to install Gogo ATG-4000 communication, Honeywell AIS-2000 satellite TV and Honeywell HD-710 satcom systems on a G550. The Satcom Direct Router and Gogo OnePhones will also be installed and the interior will be enhanced.

WATERFORD, MICHIGAN

Pentastar Aviation will develop STCs for the installation of the SmartSky Networks 4G connectivity system on G450s and G550s.

CLEVELAND, OHIO

Constant Aviation is offering Honeywell's Ovation Select CMS upgrade on Gulfstream IV, V, G450 and G550, and Bombardier Global 5000, 6000 and Express aircraft. It also received an STC for Gogo's ATG-8000 package on the Embraer Legacy 600/650/Shuttle.

LINCOLN, NEBRASKA

Duncan Aviation will develop STCs for the installation of the Gogo 4G system on Dassault Falcon 900 series, Bombardier Global Express and Challenger 600 series and the Gulfstream 200 at all its locations.

ST LOUIS, MISSOURI

Rockwell Collins presented Jet Aviation St Louis with an award celebrating achievements including more than 25 Venue CMS installations.

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sea bird



Dornier Seawings began series production on its new amphibious aircraft, the SeaStar, in February 2016 and expects the first delivery to be made in 2018. The company is offering various interior configurations – including 12 seats for a commuter craft, nine seats for corporate missions and a seven-seat VIP layout. Quick-change equipment is available.

Recently, Dornier Seawings collaborated with Winch Design on a six-seat VIP version of the interior. It was a natural project for the design company, as it has numerous VIP aircraft and yacht designs to its name. “The brief, written by ourselves, was to create a signature interior for the Dornier SeaStar as a unique and practical complement to an explorer superyacht, or maybe for the intrepid islander,” says Jim Dixon, head of aviation at Winch Design.

The company took its inspirations from sailing boats and the luxury 1950s/1960s California lake cruisers designed by Riva and ChrisCraft – as evidenced most visibly in the prominent ring frames and interior ‘decking’.

The latter element, implemented in bleached teak and stainless steel, also helps provide the practicality and versatility Winch Design recognized as being vital for the aircraft’s potential use on water. Dixon says the interior also had to be suitable for a variety of missions. “It will be used for very short flights requiring easy, simple functionality, plus longer flights requiring comfort and a relaxed ambience,” he explains. “We also wanted to create a light cabin to emphasize spaciousness and offer great unobstructed views from the windows.”

The design offers multiple opportunities for customization, inside and out. Clients can choose materials, finishes, colors and seat styles. “Customization is rare in this class of aircraft, but as lifestyle accessory, a unique signature is highly desirable for the owner,” says Dixon.

Dixon is most proud of what has been achieved within a relatively small envelope. “The design adopts proven installation and technologies, but provides a very unique flying environment for such a relatively small leisure aircraft,” he explains.

The company is looking forward to working with a VIP customer to realize the first custom fit-out of the design.

RING FRAMES

Wood veneered ring frames visually appear to hold the fuselage together, like a modern-day Spruce Goose.

TABLES

The tabletops’ sunburst veneer and polished metal details recall the Art Deco period.



GUIDED TOUR

Cabin

The interior features six forward-facing seats, two of which have large tables. The leather-clad seats are finished with stitching and other details reminiscent of the age of classic coach-building. This aesthetic is also evident in the Art Deco-inspired sunburst pattern on the tables and bulkheads, the use of natural wood, and polished metal detailing.

Exterior

As the aircraft essentially has a hull signature, the exterior livery takes its cues from fast wood-built tender boats. The decks are finished in bleached teak, matching the cabin interior, so wet feet are not a problem.



DECKING

Wood floors with stainless-steel rub rails, inspired by the teak decks of sailboats, are intended as a durable and practical flooring solution for the seaplane, enabling passengers to hop on and off the aircraft quickly and carelessly in bare feet, with beach equipment, etc.



sweet music



With deliveries of the ACJ320neo family due to start at the end of 2018, Sylvain Mariat, head of creative design and concepts at Airbus Corporate Jets (ACJ), was tasked with creating a concept for the interior.

The Melody cabin is designed to reflect the curves of natural landscapes. This is particularly evident in the curving passageway that flows through the cabin and in the rounded walls. "Zones are separated with extra-large openings, rather than more traditional doorways," says Mariat. "These can still be closed off for privacy."

For example, a Japanese-inspired folding door enables a larger than usual opening between the conference/dining area and the home cinema.

Another aim was to achieve optimum sound quality. "It was like designing a theater," says Mariat. "We worked with a sound specialist, Focal, to integrate loudspeakers into the ceiling. We used rectangular-panel loudspeakers and designed the ceiling to have a smooth uninterrupted curve for the best acoustics."

Rectangular lighting features in the ceiling complement the loudspeakers. Through electronic dimming, passengers can also control how much light comes through the windows.

Overall, Mariat says the aircraft's generous cabin dimensions will lead to passengers moving around more. "So it's more about delivering the contents of an office suite or a house, rather than the typical 'train compartment' interior of traditional business jets," he adds. "Meanwhile, we have to respect aircraft constraints in terms of safety, weight and center of gravity."

This focus on marrying practicality and style led to the design of a wood-look band linking the mid-cabin emergency exits – helping them to blend into the design. Mariat says that elements of the cabin will be made from honeycomb core sandwiched with carbon fiber, and he draws attention to this with a honeycomb pattern.

The ACJ320neo Melody cabin made its debut at NBAA 2016, where visitors were able to view it in 3D virtual reality, via a smartphone. ACJ is now collecting further feedback from the marketplace.

ACJ320neo customers can customize the cabin completely, and if they wanted this design, Mariat says it is fully realizable. He also says it could be adapted for the slightly shorter ACJ319neo.



SCREEN

There are three curved 65in screens throughout the cabin. Sylvain Mariat believes they are bigger than any previously installed on a jet.



CEILING

Strip-lighting in an alternating light and dark pattern is intended to emphasize the height and space of the ceiling.

CARPET

Fiber-optic lighting is built into the carpet, providing guidance in low lighting. The honeycomb pattern is repeated throughout the cabin.

GUIDED TOUR

Entrance

The entrance features a crew rest, toilet and galley, the latter designed to have more work surfaces than usual and no sharp angles.

Lounge

This area has a curved sofa, club-two seating, desk space and a curved 65in screen.

Conference and dining

The table seats six and is slightly angled to create a fluid feel. Flat surfaces close by provide practical space for personal effects.

Home cinema

Pictured below, this area has a retractable monitor and curved sofa. As in the bedroom, there is a plant-based decorative panel.

Anteroom

This area is intended for use by guests, and includes a bathroom.

Master bathroom

Equipped with a lavatory, shower and washbasin, the master bathroom also features a circular mirror that can be made transparent at the touch of a button, providing a view into the master bedroom.

Master bedroom

A double bed is positioned in the center of the master bedroom, enabling access from both sides. There is also a sofa and another big screen.



SITTING TARGETS

WHILE SEAT MANUFACTURERS PRESENT THEIR CURRENT MODELS, EXPERTS ANALYZE THE PROSPECTS OF ALTERNATIVE SEAT MATERIALS AND TECHNOLOGIES

Words by Marisa Garcia



chair

Manufacturer: Inairvation

Creator of pictured design:

Pierrejean Design Studio

Launched: 2014 presentation, 2015 certification

Width: 17-25in between armrests

Height: 15-18in seat height; 30-53in overall

Depth: 18-20in, depending on the configuration

Weight: 45-70kg structure including mounting plate, plus an extra 30kg for details and payloads

Construction materials: CFRP for several large primary parts, aluminum seat box

Standard features: Mechanical or electric release of tracking (up to 5.5in in each direction/11in travel along one axis; 190° swivel in each direction; rocking function (can be deactivated)

Optional features: Leg rest; headrest; slide-down armrest; second recline articulation for lazy Z positions; electromechanical amenities including heating, cooling, massage and power plugs

Certifications: ETSO 16g and 9g certification for all large aircraft



Amalfi

Manufacturer: Iacobucci HF Aerospace,
designed with Aloft AeroArchitects

Launched: November 2016

Width: 21in between arms

Height: 45.7in

Depth: 79.6in

Construction materials: Aluminum structure,
composite shell

Standard features: Lower pod surround for privacy in full flat sleeping position; 7in center console width, one-leaf meal tray; fully electrical actuation, PC power and USB charging outlet; provisioning for wi-fi, accent and mood lighting; iPad holder with continuous charging interface

Optional features: Lumbar support; electrical massage function; IFE provisioning;
aesthetic customization

Certifications: C127a 16g



CARBON FIBER

When it comes to seat structures, the traditional aluminum has a few new rivals. Carbon fiber has been used for seat shells and so on before, and it is now possible to implement it for primary load parts. For example, the new chair engineered by Lufthansa Technik with design support from Pierrejean Design Studio, includes primary load parts made from carbon fiber-reinforced plastic (CFRP), including the backrest. These parts are built using autoclave pressure molding and vacuum molding.

Oliver Thomaschewski, head of seating and structures at Lufthansa Technik, says the material enables the company to answer the call for more unusual shapes. "The classic aerospace aluminum, which is used in the majority of seat structures, has limits," he says. "The degree to which you can deform the material, without breaking and completely destroying it, is very small. Aluminum is perfect for other aircraft parts, but for seats where you need to support high loads and energy absorption, it's not the best choice. Carbon fiber gives us the opportunity to build up very stable and organic forms."

The seat's articulation mechanisms are made from aluminum and steel. "Steel is also very uncommon in aerospace, because it's considered to be very heavy," says Thomaschewski. "It is heavy, but it's also good for energy absorption, compensating for the behavior of the CFRP."

Thomaschewski acknowledges that carbon fiber is not as easy to certify for primary load parts as aluminum: "It's not easy to certify it; all the regulations have to be negotiated for each and every part," he says. However, the company has now succeeded in attaining 9g and 16g ETSO certifications for the chair family.



ALUMINUM-LITHIUM ALLOYS

Could aluminum-lithium alloys find favor for seating applications in the future? These alloys offer the possibility of weight savings, and are also interesting for their stiffness, and ability to be welded, forged and molded.

"Lithium is the least dense metallic element, so these alloys are much less dense than pure aluminum," explains Sylvain Mariat, head of the creative design studio at Airbus Corporate Jet Centre (ACJC). "Such alloys are thus of great interest for the aerospace industry, because of their weight savings. We probably will use them in a cabin, as soon as we have a specific request from a VIP customer. These alloys are very precious and are best used for dedicated products."

MAGNESIUM ALLOYS

Another material on the radar – for its low density (and thus weight), its strength and its flexibility – is magnesium alloy. Progress was made in August 2015 when supplier Magnesium Elektron succeeded in overturning a blanket ban on the use of magnesium alloys for aircraft interior parts, helped to develop a new fire-testing standard and certified two of its magnesium alloy products for aircraft applications.

"Magnesium would be a nice replacement for the standard aluminum parts we still use for our seat structures," says Oliver Thomaschewski of Lufthansa Technik. "These alloys only became available, from a flammability certification point of view, after our design had been finalized. We might consider changing out some aluminum parts with magnesium for the next generation."

"Magnesium alloys have a hexagonal lattice structure, which affects their fundamental properties," says Sylvain Mariat of ACJC. "Airbus uses magnesium alloys for specific products, and we selected this material for the Richard Mille ACJ Tourbillon RM 50-02 watch. It is one of the strongest metals, but is very difficult to cut. If magnesium is cut at high speed, the tools must be sharpened after every time."

Double Sleeper Seat

Manufacturer: PAC

Launched: 2013

Length: 76-78in deployed, 56in not deployed (Model 2502)

Height: 45in to top of shell (Model 2502)

Depth: 54in (Model 2502)

Construction materials: Composite surround; aluminum frame; aluminum mechanisms

Versions: Single, double or triple units; 59-60in and 78-80in pitch

Standard features: Motorized actuation with manual override

Optional features: Customizable cabinet shape and trim, lighting, manual or motorized privacy dividers, fixed or drop-down arms, meal tray shapes and finishes, switch bezels, plating and belt colors, provision for seatback screens

Certifications: 16g for the Boeing 747-8 (main and upper decks) and Boeing 737, 9g for the Airbus A319, 16g for the Boeing 777 and Boeing 787 in process now

SEMI-ELECTRIC CONTROL

Lufthansa Technik's Oliver Thomaschewski sees opportunity for improvements to be made to seat controls.

"I hate the traditional seat controls – they don't move in the direction you expect and they move too slowly," he says. "We developed a semi-electric solution for

chair that allows you to move the seat mechanically, using the passenger's body forces. You are in full control of the seat, but are assisted."

For example, passengers are assisted in reclining the seat between 60° and 90°, as it is difficult to stabilize the body in that

range, leading to a falling feeling. "You have one button to press and then with gentle pressure on the headrest and the backrest you adjust the seat on your own the way you like it."

Yasava's Aiana Wave seat also makes use of gravity in a similar way.

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Serene

Manufacturer: Embraer Aero Seating Technologies (EAST)

Launched: 2013

Width: 18.5-23in

Height: 40.5-42.5in

Depth: 30.3in

Construction materials: Aluminum and composite materials

Standard features: 9in longitudinal and 5in lateral tracking; 360° swivel; full backrest recline for berthing configuration; full leg rest extension for berthing configuration; mechanical, electric-assisted or wireless controls according to customer specification

Optional features: massage system with four modes, zone selection, speed and intensity adjustment; configurable audio response massage; lumbar adjustment; heating elements; passive cooling with Venti Mesh application; active cooling

Certifications: 16g for the BBJ, ACJ and Embraer Lineage 1000



G70

Manufacturer: Embraer Aero Seating Technologies (EAST)

Launched: 2010

Width: 18.5-22in

Height: 39-45.5in

Depth: 28.2in

Construction materials: Aluminum and composite materials
Standard features: 3in vertical adjustment; 9in longitudinal and 5in lateral tracking; 360° swivel; backrest recline with integrated pan lifter for full flat berthing

Optional features: Headrest with flexible wings; drop-down armrest; massage system with four modes, zone selection, speed and intensity adjustment; reading light; electric lumbar adjustment; heating elements and passive cooling with Venti Mesh application; retractable individual LCD monitor; tray table; floor tracking

Certifications: 16g for the Bombardier Global XRS and CRJ

PRINTED MATERIALS

Oliver Thomaschewski of Lufthansa Technik believes 3D printing offers great opportunities for innovation, if regulatory authorities can simplify the certification process. "We already plan to use some 3D printed parts for secondary structures," he says. "We even had some regulatory samples that we processed with 3D printing and were so happy with the results that we are likely to use these parts in our chairs."

The key advantages of 3D printing are shortened manufacturing and assembly processes and fewer parts, Thomaschewski says. Lufthansa Technik has printed bearing and actuation systems with rotation elements, from plastic, and is also investigating metal additive layer manufacturing. "The chances are very high that 3D printing will become more normal, not only for secondary structures, but also higher-level parts," says Thomaschewski. "Really, 3D printing is no more than a special form of welding. If you frame it like that, it should be easy to come up with the certification rules. If you handle it as a completely new process, it can be very complicated."

Sylvain Mariat of ACJC comments that multi-material, multicolor 3D printing is a very useful tool for prototypes, models and learning aids, but is currently not suitable for final parts. "It helps us to communicate design ideas more clearly, and identify improvements sooner, by capturing fine details in a range of colors and materials," he explains. "However, we haven't used it yet for final products, as we have yet to be satisfied with the finish."

SMART TEXTILES

Sylvain Mariat of ACJC sees great demand for smarter seat cover textiles. "We are in contact with external partners with the goal of proposing some great applications for our demanding customers – seat and sofa fabrics that feel cool to the touch in warm environments, for example," he says. "Some aircraft sit for a long time in the desert, and it can take a long time for air-conditioning to cool the cabin."



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INDUCTIVE CHARGING

With passengers' love of PEDs, could seats soon be equipped with inductive charging pads? Sylvain Mariat of ACJC certainly thinks so. "The most modern smartphones use this kind of charging at home," he says. "It offers a lot of advantages: no corrosion, better durability and better aesthetics. Ludwig Mies van der Rohe said 'Less is more'. We could add 'Fewer cables is better!' However, inductive charging is slower, and it is still relatively expensive. We also have to take into account that when a mobile device is plugged in with a cable, it can still be moved around and operated, while in most implementations of inductive charging, the mobile device must be left on a pad."

Oliver Thomaschewski says Lufthansa Technik has already had requests to install inductive chargers. "There is interest in it, but the technology is not ready," he says.

Modular Berthable Divan

Manufacturer: Starling Aerospace
Launched: March 2016 presentation,
September 2016 installation

Width: 91in

Height: 31in

Depth: 25in, 35in when berthed

Weight: 47.5kg frame

Construction materials: Aluminum for the frame

Versions: One, two, three or four places

Standard features: Manual conversion with a single motion into a flat bed; custom styling and upholstery

Optional features: End arms, stowage doors, drawers and plug-in arm, VIP finishes including gold plating and silk

Certifications: 9g and 16g for B737-700, B737-800, B767-300, B777-200, B777-300 and B787-800

The company says it can be installed on any aircraft, with certification by its in-house DOA

BIOMETRIC MONITORING

Looking beyond the near future, the integration of biometric monitoring directly into seats could eliminate the need for dedicated medical areas on board. "The role of the designer will be to smartly integrate ways to monitor fingerprints, veins in the hand, DNA, and the iris and retina, so as to enable early detection of any medical problems in flight," says Sylvain Mariat of ACJC.

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INTERIOR OVERFLOWING WITH
CARBON FIBER FOR TWO NEW
BBJ 737-700s

Words by Izzy Kingdon

marchy



Each aircraft has eight VIP, eight business class and 18 standard seats



The brief was modern and spectacular, so that's what Ed  se Doret delivered. The designer won the competition, back in March 2015, to design two BBJ 737-700 interiors for Royal Jet, a VIP charter company based in Abu Dhabi, UAE. "I presented three design concepts that you could call very aggressive," says Doret. "They're very modern because Royal Jet's clients have very modern tastes. For example, we created something very different for the ceiling design, involving a lot of lighting effects and a molded panel design that merges into the sidewall. From a previous BBJ project we did with Royal Jet, we also knew that the company had a fondness for carbon fiber."

Royal Jet provided a LOPA and Doret got to work creating two aircraft with the same layout but different color palettes. One was delivered to Royal Jet in October 2016 and the other should arrive in November 2016.

VIP CHARTER AND MEDEVAC

"These two new BBJs will be primarily used as part of our VIP charter offering," says Rob DiCasteri, president and CEO at Royal Jet. The company also has GCAA

FLEET UTILIZATION

With these two additions, Royal Jet now has a fleet of 13 charter aircraft, with potential passenger occupancies ranging between seven and 52. There are eight BBJs, two Bombardier Global 5000s, two Bombardier Learjets and one Gulfstream G300.

As a charter operator, ease of maintenance is essential to ensure maximum utilization of the aircraft. "The bottom line is that we want

these aircraft to be flying, not on the ground, so everywhere we can optimize ease of maintenance we have," comments Rob DiCasteri, president and CEO of Royal Jet. "Each aircraft has its own critical locations where periodical inspections are required or system-relevant components are located. Very individual solutions were required to optimize access to these areas."



FAR LEFT: THE MAIN LOUNGE, WHICH HAS TWO CLUB-FOUR SEATING SETUPS

LEFT: THE PAC SEATS FEATURE A LOT OF CARBON FIBER

INSET: A METAL LOGO INTEGRATED IN CARBON FIBER IN THE ENTRANCE

authorization for medical evacuation services, and could use the BBJs for this purpose. Both aircraft can accommodate 34 passengers. “Based on the feedback from our clients, the cabin will be flexible,” says DiCastri. “It can be configured to include a combination of features, including a VIP bedroom and bathroom, flexible lounge areas, and configurable business and economy seating.”

A WALKTHROUGH

Doret says the layout is similar to that of the previous BBJ designed for Royal Jet. “Their customers like the bedroom up-front so that it is segregated from the general seating areas,” he says. “The principal doesn’t want to walk through an economy area to get to the bedroom.”

As well as the VIP bedroom and bathroom, the front section also includes a crew lavatory and forward galley. Further aft is a lounge featuring two club-four setups separated by a table. Behind that is the emergency over-wing exit, then

“We created something very different for the ceiling design, involving a lot of lighting effects and a molded panel design that merges into the sidewall”

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the business class area with its four lie-flat doubles, then a guest lavatory, closets and the video control center. Next up is an 18-seat economy class area, then a standard lavatory and more storage, followed by the aft galley.

EXPO MISSION

Royal Jet and Edése Doret spent time at Aircraft Interiors Expo in Hamburg, Germany, in April 2015, to vet around 10 completion centers for the project. Lufthansa Technik was ultimately assigned and subsequently built all the interior and lining parts in-house.

“Lufthansa Technik has done an excellent job in keeping the project on time and on budget, and the Royal Jet team responsible for overseeing the



Of the 34 seats on board each aircraft, 14 offer lie-flat functionality

TOP: THE CORRIDOR WITH ITS CARBON-FIBER CREDENZAS

ABOVE: THE VIP BATHROOM

BELOW LEFT: THE CARPET WAS CREATED BY TAI PING



ROYAL JET BBJ TIMELINE

SEPTEMBER 2014

Two BBJs ordered

MARCH 2015

Edése Doret appointed to design the interiors

JUNE 2015

Lufthansa Technik appointed to perform the completion in Hamburg, Germany

JULY 2015

Kick-off meeting in Abu Dhabi, UAE

AUGUST 2015

Preliminary design review in Hamburg

SEPTEMBER 2015

Green aircraft inducted at Lufthansa Technik's site; turnkey seats ordered from PAC Seating

OCTOBER 2015

Final design review in Hamburg

OCTOBER 2016

First aircraft delivered

NOVEMBER 2016

Second delivery scheduled

process has done some incredible work assisting them,” says DiCatri. “I’ve seen many outfitting processes go off-course over the years, but this was one of the most efficient and cost-effective completions I’ve seen. Everyone involved deserves a big pat on the back.”

Doret says the lighting design in particular required Lufthansa Technik to come up with some clever solutions, especially for the molded ceiling and to light the stone flooring. He says CCC products were used and Lufthansa Technik created a partial cabin mock-up.

KA-BAND INTERNET

The IFEC equipment is also non-standard. “These will be the first BBJs with Ka-band wi-fi internet,” says DiCatri. “The system’s large bandwidth enables streaming services including Netflix and IP-based live TV, with download and upload speeds not seen before in this sphere.”

The IFEC system, from CCC, includes AVOD, Blu-ray players and telephony. There is also a Lufthansa Technik moving map. Content can be accessed on iPads and there are two 42in HD LCD screens, one in the lounge and the other in the master bedroom, plus there is a 10in HD LCD screen at each seat.

All the seats – lie-flat VIP, business and economy types – are new models developed and certified by PAC. The back shells and some other parts are made from carbon fiber, supplied by JCB Aero.

Carbon fiber makes many appearances throughout the interior. “There’s actually no wood veneer in either aircraft,” says Doret. “We used a lot of metal composite from Metal Composite, glass from Air Cabin Trading and of course carbon fiber from JCB Aero.”

“Wood veneer is often used in private jets, but we wanted to offer something superior and unique,” says DiCasteri. “Royal Jet is the first commercially approved charter operator to install carbon-fiber interiors.”

“That was one of the biggest achievements of this project,” states Doret. “You could use carbon fiber on other categories of aircraft, but it wasn’t possible to use carbon fiber for a Part 21 charter aircraft until PAC and JCB Aero came up with a solution for the smoke, toxicity and heat-release certification.”

Carbon fiber was even used for flooring in the galleys, passageways and lavatories – a solution from F/List. “It’s a theme that ties the cabin together,” says Doret. There are also areas covered with carpet supplied by Tai Ping. Other materials include leather from Townsend, Ultraleather from Tapis and quartz from F/List. The window shades were supplied by ATG.

PYRAMID STRUCTURE

One of the most striking elements of the cabin design is a raised pyramid pattern that features on bulkheads. These are implemented in metal composite in the master bedroom, lounge and business class area; jet glass in the lavatories; and leather in the economy seating area.

The schedule was perhaps the most challenging aspect for Doret. “Royal Jet is



“It wasn’t possible to use carbon fiber for a Part 21 charter aircraft until PAC and JCB Aero came up with a solution”

MOON SHOT

Edése Doret has an admission to make. “We’ve come to realize that we have to make our renderings more accurate than they’ve been in the past, because the facility and the client rely on that to build from, along with CAD drawings and a written specification,” he says.

Doret has an interesting theory about different approaches to innovation. “The way Germans such as Lufthansa Technik work is, they find a solution first and then propose the concept,” he says. “As Americans, we propose the concept and then find a way to make it work, like President Kennedy did when he issued the challenge to put someone on the moon. I get a lot of flak for coming up with things that people say can’t be done, but then we find a way to do it.”

He is excited by Lufthansa Technik’s chair product, which offers huge customization possibilities. “A lot of the seat concepts I came up with in the past can now be done, which is great,” says Doret. “I think technology is now catching up to my design vision.”

ABOVE: THE ENTRANCE AND GALLEY AREA

BOTTOM LEFT: THE PYRAMID-PATTERNED BULKHEADS AND MOLDED CEILING EVEN EXTEND INTO THE VIP BATHROOM

almost like a private airline, so the schedule is very important,” he says. “It was a challenge to adhere to because the design is so aggressive.”

DESIGN CHAMPION

Overall, Doret is very grateful for the scope he was given to include unusual elements. “Royal Jet is probably the coolest client to work with, because I’m allowed to do things that are considered crazy,” he says. “Royal Jet allows us to expand the boundaries of design.”

For his part, DiCasteri is very satisfied with the final product: “From all the feedback we’ve had so far, the project has been a resounding success,” he says. “Our long-term customers have been anticipating the arrival of these aircraft since we ordered them, so we expect that they will be very busy from the outset. We’ve been teasing them with photos and progress updates, and as a result we’re already taking bookings.”

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CHANNEL CHANGE

FAST-MOVING DEVELOPMENTS IN CONSUMER TECHNOLOGY ARE DRIVING DEMAND FOR IFEC AND CMS RETROFIT UPGRADES – BUT SUCH INSTALLATIONS ARE NOT WITHOUT THEIR CHALLENGES

Words by Robert Coppinger. Illustration by Karine Faou

When trying to improve the passenger experience on board an in-service VIP or business jet, IFEC and CMS retrofit upgrades are a very popular choice. Gunnar Jancke, director of AMAC Aerospace's Quality Assurance and Design Organization, and a certification verification engineer, believes widespread use of broadband internet, wi-fi and large flat TV screens at home and in airlines' first class suites is driving the demand. "This influence from first class is becoming a stronger pushing point," he notes.

Scott Brooks, director of avionics solutions at Pentastar Aviation, believes

the consumer market is innovating more rapidly than before, driving demand for more frequent refurbishment. "The pace of change is accelerating at an extremely high rate compared with what we saw 20 years ago," he says. "Then you would put a system in and it would not be modified for 20-plus years. I just don't think that is the case anymore, with the rate at which technologies are changing."

Aviation certification requirements mean there is a lag between the emergence of these rapidly evolving consumer technologies and their roll-out on aircraft. "The aviation sector is seen as having leading technology, but actually in many areas it lags behind," says Jancke. "You





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have all this certification effort, which means the original equipment – including the cockpit systems and IFE – is a little bit behind.”

While home internet took off in the 1990s, Jancke recalls that early efforts to get connectivity onto business jets were made at the start of the 21st century.

SIZE MATTERS

Brooks and Jancke agree that the biggest factor influencing what can be achieved – for example how fast the internet will be and how many screens and of what size can fit – is the size of the aircraft.

“Some aircraft will qualify for full-blown IFE systems with multiple sources, multiple monitors and wireless streaming AVOD, while some smaller jets will only qualify for a very basic system,” says Brooks of Pentastar.

“The pace of change is accelerating at an extremely high rate compared with what we saw 20 years ago”

ABOVE LEFT: AN A320 CABIN COMPLETION PROJECT BY AMAC AEROSPACE THAT INVOLVED EXTENSIVE IFE UPGRADES

ABOVE RIGHT: A COMPLETED INTERIOR BY AMAC AEROSPACE

Jancke says passenger expectations of screen size can be at odds with what is possible. A 40in flatscreen is not uncommon at home, but a business jet is ultimately going to be constrained by its fuselage diameter. “The bulkhead in Gulfstream models may take a screen up to 27in at a push, but it fills the whole bulkhead, from the fuselage to the door cut-out,” he says.

JET CONNEX GOES LIVE

The new global Ka-band connectivity service from Inmarsat, Jet ConneX, has formally entered service. Jet ConneX packages currently offer speeds of up to 15Mbps, but Inmarsat says this could increase. Passengers can stream live TV, browse the internet, send email and text messages, conduct video conferences and download files.

“A rigorous testing process for Jet ConneX was completed over the past eight months, with the support of our customers, distribution partners and Honeywell, the only authorized manufacturer of the hardware needed to access the service,” says Kurt Weidemeyer, vice president of business and general aviation at Inmarsat. “We logged thousands of flight hours, flew to every continent and ran hundreds of tests to put the system under stresses that are well beyond that expected in normal business passenger use.”

Honeywell Aerospace’s JetWave hardware has been certified for eight aircraft types, and the company is working on 20 more.

Bombardier has begun deliveries of Global aircraft equipped with the service. As well as being an option for new Globals, the system is available for retrofit. A Global 5000 has already undergone the retrofit at Bombardier’s Singapore service center.

Jet ConneX will become available as a line-fit option and for retrofit on Gulfstream G650ER, G650, G550 and G450 aircraft from 2017, and on the G500 and G600 upon entry into service.

Meanwhile, to speed up availability on Dassault’s jets, existing radomes for the 7X, 8X and aftermarket F900 family have been tested and authorized to operate with JetWave. Dedicated Ka-band radomes should be available for all Dassault jets in 2017.

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NBAA NEWSFLASH!
SmartSky Networks has approved TrueNorth Avionics' Optelity Cabin Gateway router for the upcoming SmartSky 4G air-to-ground network. TrueNorth says the move will enable fast streaming to multiple devices on large jets



Another factor Jancke identifies with ever larger displays is the need to arrange the seating so that people can see the screen properly, without it being too close or obscured by other furnishings.

HANDING OVER CONTROL

The progress of consumer electronics has made an impact on CMS too, with passengers now wanting to be able to use PEDs as remote controls, or at least have a more user-friendly interface. "The major players in CMS are making every effort to make interaction with the system more intuitive, copying the iPhone model a little and trying to make it more intuitive," says David Loso, avionics sales representative at Jet Aviation St Louis and former president of the avionics sales association.

User interface upgrades may make for a smooth passenger experience, but installing the supporting infrastructure certainly has its challenges. "The biggest hurdle is always the modifications to bulkheads and drape rails that are typically required when we change the size of monitors or the size and shape of passenger control units," says Loso.

Steve Metayer, vice president of aftermarket sales at Textron Aviation, says there are various challenges in integrating

NBAA NEWSFLASH!

The Global Aero Terminal 5510, a Ka-band shipset including a mobile airborne antenna, an integrated modem and a power supply, will be available in mid-2017 from ViaSat. The antenna needs only one slot in the aircraft's radome. ViaSat says the service will offer peak data rates of up to 16Mbps, and enable HD video conferencing and streaming. Up to 100GB of data will be available per month.

ABOVE LEFT: NEW IFEC SYSTEMS WILL BE NETWORKED WITH AN EXISTING SATELLITE-BASED BROADBAND MULTILINK SYSTEM ON A G550 BEING UPGRADED BY SPIRIT AERONAUTICS

ABOVE RIGHT: TRUENORTH'S OPTELITY PRO CABIN GATEWAY IS A MODULAR COMMUNICATIONS PLATFORM DESIGNED TO ENABLE EASY UPGRADES

wi-fi and enabling PED use on board in-service aircraft. "Challenges include managing multiple network SSIDs to ensure seamless access to onboard IFE content and the internet from PEDs; upgrading or enhancing CMS controls without rewiring the entire cabin, which would drive installation costs too high; finding real estate for a new internet antenna on top of the aircraft; and achieving transmitting personal electronic device (TPED) tolerant certifications."

ETHERNET SIMPLIFICATION

Jet Aviation St Louis's Loso says that Ethernet is definitely helping to simplify IFEC installations. "From the hardware side it's becoming a little simpler because now we're doing things over high-speed databuses and Ethernet, and there are fewer boxes involved," he explains. "More of it is run by the databus than the discrete wiring, so it is little less complex."

"It's becoming a little simpler because now we're doing things over high-speed databuses and Ethernet and there are fewer boxes involved"



“Fuselage size and current antenna configuration are the first concerns when surveying an aircraft for connectivity installations”

Brooks of Pentastar is skeptical about the degree to which existing wired equipment can be retained. “Occasionally a customer wants to retain a piece of source equipment, but more often the system is replaced in its entirety,” he says. A change from a coaxial cable-based system to Ethernet and wi-fi would likely require a root-and-branch change because coaxial and Ethernet are two very different technologies.

Loso has the same view. He says that while a situation varies from airframe to airframe and upgrading a manufacturer’s system can allow the reuse of some of the components, the inevitable need to replace those components a few years later means that “in most cases a lot of these systems are approaching obsolescence and the best thing is to get it up-to-date”.

FIXING AN ANTENNA

Perhaps the most difficult retrofit of all is a satellite antenna installation, if the aircraft was not designed to have one in the first place. “Fuselage size and current antenna configuration are the first concerns when

NBAA NEWSFLASH!

A plug-and-play digital cabin audio upgrade is now available from Alto Aviation for Embraer Legacy 600s with analog Alto or Baker systems. In other news, Alto's modular Cadence Switch System was selected by Innova Aerospace for its Citation 560 retrofit program. “This design provides our technicians with the ability to make changes without the need to send switch panels back to the manufacturer for software updates,” says Dave Miner, director of operations at Innova's site in Perryville, Missouri.

surveying an aircraft for connectivity installations,” says Brooks.

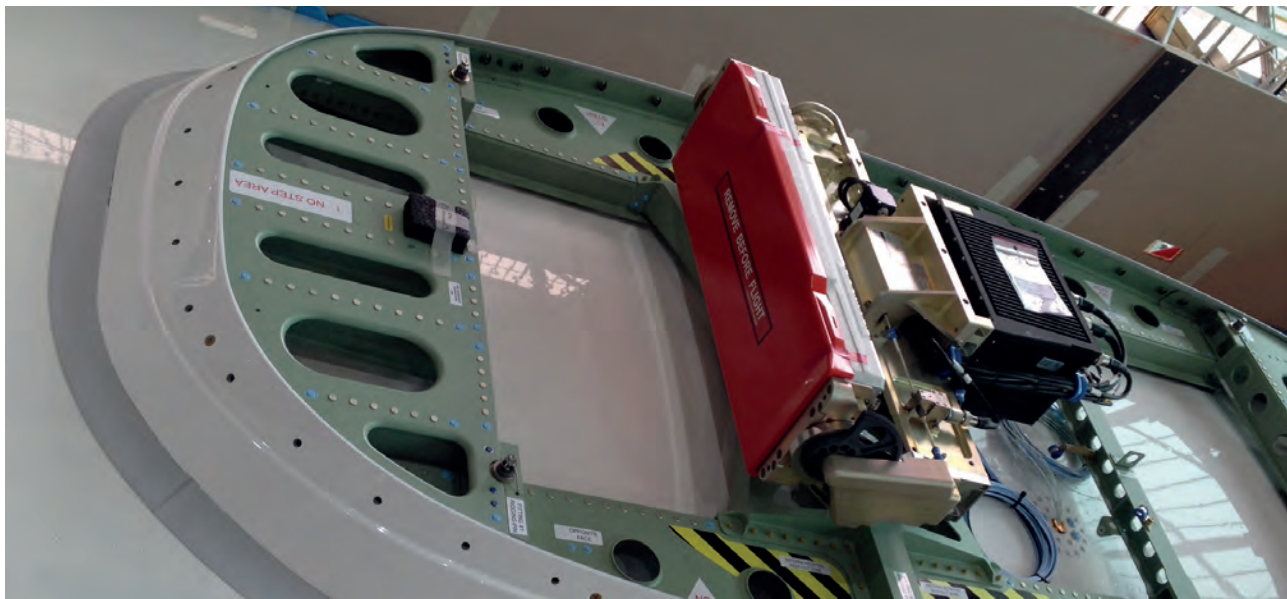
“Completion centers can provide engineering services to design a radome for an antenna, but it is very costly,” Jancke says. He points to the fact that the A320, for example, was not designed with an antenna and its rudder control wiring passes down the top of the fuselage, meaning that radomes have to be located

elsewhere. On larger aircraft, OEMs have built in radome areas and sometimes there are two, one for satcom and the other for TV broadcasts.

However, satcom wi-fi is a very popular installation. “Charter operators are in serious competitive jeopardy if their fleets are not wi-fi equipped,” points out Brooks. ☒

ABOVE: AN AMAC AEROSPACE REFURBISHMENT PROJECT

BELOW: IN PARTNERSHIP WITH A EUROPEAN MRO, EAD AEROSPACE RECENTLY GAINED AN STC TO ENABLE THE INSTALLATION OF HONEYWELL'S JETWAVE HARDWARE ON AN ACJ319, USING ITS SATCOM UNIVERSAL MOUNTING SYSTEM





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SECOND LIFE

So much work had to be done on a recent Global 5000 refurbishment that Jet Aviation St Louis treated the project more like a green completion

The company has performed more than 235 completions and more than 200 refurbishments

The Bombardier Global 5000 arrived at Jet Aviation St Louis with a lengthy and well-defined list of work that went far beyond the comprehensive requirements mandated for every 120-month inspection. The interior required a reconfiguration, a re-veneer, a re-plating – a full renovation. The list on this project was so extensive, so replete with work that began with 're', that all of the teams that descended on the aircraft to begin the work soon took to calling the project a 're-completion'.

"There wouldn't be anything left of the old interior by the time the project was completed," says Donna Cruthis, a modification sales and design representative at Jet Aviation St Louis. "It really was like designing a green completion; starting with bare walls and floor and creating exactly the look and feel the owner wanted. It was the kind of project we love to do because we get to touch everything you see and feel in the cabin – the total look, comfort, texture, color, patterns and shading. We get to bring the owner's vision – their dream – to reality. With a project this detailed, we take even the smallest detail very seriously because we really are designing the owner's home away from home."

TAKE IT ALL APART

The mandated work on the greasy stuff in a 120-month inspection is every bit as extensive as what was scheduled for the cabin. Everything has to be disassembled, inspected and overhauled. The engines are pulled. All of the landing gear is overhauled. The exterior is repainted many times.

Jet Aviation St Louis says the required work in the cabin is just as far-reaching on this kind of project. The interior must be stripped and the avionics checked out; most often, they are upgraded to the





MAIN: THE GLOBAL 5000 FOLLOWING ITS 'RE-COMPLETION'

LEFT: THERE ARE HIDDEN CONTROL TOUCHPADS IN TWO OF THE SEATS



latest communications and entertainment capabilities. Owners often take this opportunity to redesign, renovate or reconfigure the cabin – just as was planned for this project.

Jet Aviation St Louis has 37 of these Global inspections to its name. All of the work is done in-house; the company has 17 backshops on-site.

With a project this extensive, the designers work with the owners as if the aircraft was brand new. All of the cabin surfaces have to be chosen and coordinated to work together to create the desired effect. One misstep can destroy the entire plan. Fabrics, colors, patterns, leathers – all of the soft goods

from floor to ceiling must be chosen and coordinated, while meeting the owner's approval. The veneer is replaced or refinished. Galleys, tables, all of the monuments are rebuilt or replaced. Countertops, sinks and fixtures can be retained or replaced. Other metal trim, from seatbelt buckles to bezels to trim on monuments, can be replaced or, as in this case, re-plated. Seat design and finishing must be decided, even down to the style of the stitching to be used. And behind all of those choices looms the issue of safety; every surface in the cabin has to pass federal flammability standards.

GALLEY EXTENSION

One of the first interior challenges required the designers to call on the skills of the engineers and the composite and cabinet shops. The owner wanted the galley area extended into what was the galley annex to provide more counter space and storage compartments for the mid and upper galley. That kind of structural change had to be engineered to safely remove the old annex partition and its support pieces, while designing and engineering the new monument additions and support pieces.

Hidden gem

Two of the six UCT seats have an additional feature – they can be operated electrically. The control touchpad is hidden under a custom-designed lid built into the leather armrest. Even a detail of such relatively small size requires a long list of engineering and design activities.

The space for the control panel has to be built into the armrest, fulfilling the

necessary structural and power requirements. The leather has to be cut and finished to accommodate the control panel, in this case with the added complication of a leather-wrapped lid designed specifically for the recess in the armrest.

The entire assembly has to fit and operate flawlessly, with a finished appearance that complements the armrest and seat.

Once all the changes to the structures were designed and approved, the composite and cabinet shops had to build the new cabinetry in such a way that it could be installed seamlessly next to the existing galley. "That was a real challenge," reveals Cruthis. "Galley sections are usually built at the same time. Adding a new section during the refurbishment meant matching the new dimensions to the existing dimensions exactly, and in a way that wouldn't be obvious to the eye. The cabinet shop did an awesome job of combining those two monuments into one streamlined piece to create the new, expanded galley. It is a real testament to the cabinetmakers' craftsmanship. It is beautiful."

STAINING THE VENEER

The owner wanted all of the veneer, throughout the aircraft, to be stained a slightly darker tone than its original color. After all of the monuments and trim had been removed from the cabin and taken to the cabinet shop, the veneer was removed, and a new Eucalyptus variety was applied.

"This was one of the first veneer projects the finish shop completed using a new process that eliminates shrinkage



– a wavy appearance that sometimes appears after time," says Cruthis. "The finish the shop applies now is truly remarkable, and our testing shows that the new finish holds up well in the long term, without shrinkage. From the galley to the tables to the sideledges, the finish is just flawless."

To complete the look of the galley, granite countertops were added that have a heavy vein accented by crystals that sparkle in the light. This countertop material was also used in the lavatory, and finished with polished champagne gold fixtures.

With those basics decided, the owner's personal designer, Donna Guerra of DG&A Interior Design, started work on the overall design theme for the cabin, the

Daily record

All of the energetic activity of this 're-completion' was captured in a time-lapse video titled *Rebirth of an Airplane*. Five time-lapse cameras were mounted outside, on, and inside the aircraft. They took a photo every minute, 24 hours a day, seven days a week, for four months. Approximately 864,000 photos were taken in total.

It took the two cinematographers 240 man-hours to edit the 5-6 days of B-roll footage into a 3-minute, 47-second video that captures everything from the disassembly to overhaul, renovation and rebuilding. The video can be viewed here: http://www.businessjetinteriorsinternational.com/global_video.php



LEFT: THE CARPET IN PARTICULAR WAS CHOSEN TO FIT THE CLIENT'S ART DECO BRIEF

BELOW: FIXTURES INCLUDING FAUCETS ARE FINISHED IN POLISHED CHAMPAGNE GOLD



aim being to differentiate the new interior from every other aircraft. Guerra and Cruthis worked together to execute the owner's vision.

ART DECO INFLUENCE

"The owner wanted an Art Deco feel," says Cruthis. "Donna Guerra suggested a very specific medium blue tone accented by a medium taupe. The first step toward building the overall appearance was to commission a custom silk- and wool-blend carpet in a bold geometric pattern. It creates the required Art Deco atmosphere perfectly."

The next challenge was the seats. The look was an essential element, but they also had to offer comfort, and be built on

a strong and solid base that also meets structural engineering standards.

For this cabin, the seat design makes use of two materials – a blue/green leather and a plush chenille for the insert. The leather pieces were cut out by the facility's computer-controlled Gerber machine, and the covers were assembled and stitched by hand in the upholstery shop. The divan was covered in a complementary blue fabric.

CALL FOR CHAMPAGNE

To provide a finishing touch, exposed metal throughout the cabin was re-plated. Seatbelt buckles, cup holder trims, control bezels, drawer and door pulls, slender metal inlays in tabletops, sideedges and window lines – all were re-plated in polished champagne gold.

The aircraft was also fitted with new avionics and IFEC equipment. This includes iPad electronic flight bags in the cockpit with XM weather; iPad interfaces for CMS control and virtual circuit-breakers control; Rockwell Collins' Venue system and Airshow app; SwiftBroadband service with Satcom Direct Router and Global VT; HD monitors and iPad mounts on the tabletops. Passengers can use the installed monitors and touchscreens, as well as tablets, to experience true AVOD media content.

The exterior of the aircraft was updated with a custom metallic, split base in blue stripes and the owner's company logo. "The result of all the design and planning is an aircraft unlike any other," says Cruthis. ✕

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AMERICAN DREAM

Austrian VIP jet and yacht outfitter F/List is extending its expertise to the North American market and beyond

To be closer to more of its customers, offer stronger product support and be able to adapt to local conditions better, Austrian business F/List has expanded to distant lands. In addition to Canada, the company has established offices in the USA and the UAE. "Our customers' needs are very important to us and the optimal response to these is only possible on a local basis," says Katharina List-Nagl, CEO of F/List. "The jump to North America and the Middle East was a logical step for us."

List-Nagl is part of the third generation of her family to manage F/List. The company currently employs around 700 people, who work every day on the development and production of custom interiors for clients all over the world. "We have the passion to go beyond borders – in our minds and in the world," says List-Nagl. "This is why we are expanding our activities in North America and the Middle East. Our goal is clear: we want Austria's craftsmanship to spread throughout the world."

One of the company's first moves to strengthen its presence in North America was its participation in November 2016 at



The expansion will not affect F/List's services for the European market



Arabian flights

Another interface between F/List and its customers is being created in the UAE – the company plans to open a showroom at Dubai International Airport's Free Zone early in 2017. Business jet owners will be able to see material samples and learn about options for onboard repair, refurbishment and retrofit projects.

The retrofit services offered by Inairvation, the joint venture between F/List and Lufthansa Technik, will be highlighted at the new facility. The Inairvation retrofit includes pre-engineered packages for the exchange of CMS/IFE equipment and sideledges for various aircraft types. Another offer will be a free inspection of existing interiors and detailed consultation on F/List's products. All questions will be answered directly by on-site employees.

NBAA, its first US trade fair appearance. Several product innovations were presented, including lightweight solutions that its joint venture company Hilitech has formulated to weigh up to 30% less than the industry standard. Other products highlighted at the show included leather flooring, and wood and stone flooring with integrated heating.

CANADA CALLING

But the foundation for the North American expansion was laid years ago, in Canada, under the F/List Canada subsidiary. Now a new, larger facility is

Latest products

With its headquarters in Thomasberg, Austria, F/List specializes in the manufacture of interiors for business and private jets, mega-yachts and luxury residences. Services range from planning and development to engineering and manufacturing. The company is known for regularly coming up with new onboard solutions making use of wood, stone, leather and carbon. Its latest products include lightweight solutions for cabin systems: Hilitech, a joint venture between F/List and the Hintsteiner Group, has developed a construction that it says reduces interior weight by up to 30%.

At NBAA 2016, F/List unveiled underfloor heating as an option for wood and stone flooring. Surface temperature can be adjusted between 23-33°C.

FAR LEFT TOP: A WOOD VENEER PIECE WITH A 3D EDGE AND PERFECTLY FITTED METAL RIM

FAR LEFT BOTTOM: F/LIST'S STONE VENEER IS 0.8MM-THICK

CENTER: F/LIST'S MICROLUMBER CREATES THE ILLUSION OF SOLID WOOD THROUGH LAYERED VENEERS

LEFT: MANUFACTURING TECHNIQUES DEVELOPED BY HILITECH ARE SAID TO REDUCE WEIGHT BY 30%

being established in Montreal, to expand the company's capacity in the region. The Veneer Selection and Production Competence Center will house offices, a customer showroom and production facilities. The latest machinery will be installed, including machines for the production of one-, two- and three-ply veneer and micro lumber veneer; the newest varnishing technology; and five-axis CNC machines.

North American customers can now sample products and inspect their orders locally, and will save time and money through the elimination of long-distance

shipping from Austria and delays in customs. The process of defining the wood veneer layout will also be easier. Customers will still be able to make these choices at the company's headquarters in Austria if they prefer.

The site's capabilities will include design and material selection support; the creation of mock-ups; cabinet manufacturing; the repair and refreshment of wood and soft goods; full cabin retrofit and modification projects; and onboard repairs.

The expansion entails a US\$6m investment. The facility is due to start

production in the third quarter of 2017, and by 2020, a team of 100 employees will be in place, working in production and product support for customers in Canada and the USA.

LOCAL PARTNER

"It is important to us that our customers have a partner who understands their processes and, where appropriate, who can also operate within their infrastructures," says Werner Kartner, vice president, aircraft interior, F/List. "The best way to offer that is with professional staff on-site."

F/List creates cabinetry for OEM programs and custom aircraft interior projects



Trend Talk

"In the course of the coming year, F/List will introduce a quantum leap in terms of interior customization. Our latest laser technology allows for the engraving of surfaces of any hardness or smoothness, without stencils and with maximum precision, and it is cheaper and quicker than sandblasting. This new process can be applied to our stone veneer and stone flooring to create top-quality, individually customizable real stone surfaces. Our research and development department is currently working to make the technique applicable to wood flooring as well. In the long run, we aim to make it possible to laser-engrave more materials – ceramic, metal, carbon and Lexan – and ever-larger work pieces. Starting in 2017, it will be possible to engrave panels up to 7 x 10ft."

*Werner Kartner, vice president,
aircraft interior, F/List*

Canada is not the only country where F/List has expansion plans. In June 2016, F/List USA was founded in Delaware, and an office was established in Florida. Its activities will be expanded based on the Canadian model. "Our expansion to the USA allows us to intensify relations with our American customers and enhance our product support," says Kartner. "Our aim is to promote our product portfolio and increase collaboration with OEMs, completion centers and MROs."

The company says a local presence will enable customers' wishes to be fulfilled faster and improve how local conditions and USA-specific features are taken into account. Air transport and customs procedures will be eliminated.

Less expensive local trucking transportation will extend the company's range of activities. The company's current services for this market range from small onboard repairs to full refurbishment and retrofit projects, completed in collaboration with service centers that provide all the necessary certificates. With a local team of specially trained employees, and without having to ship cabinets to Austria, lead times will be greatly reduced.

ENSURING QUALITY

"We see the strengthening of relations with our American partners as one of the most important objectives of this expansion," says Kartner. "Through good

TOP LEFT: F/LIST'S CABINETRY IS USED ON THE EMBRAER LEGACY 500

BELOW: F/LIST'S LEATHER, WOOD AND STONE FLOORING PRODUCTS COME IN MANY VARIETIES AND CAN BE FINISHED WITH BRUSHING, POLISHING, INLAYS AND EMBOSSEING

INSET: STONE WITH A PATTERN CREATED USING A NEW LASER ENGRAVING TECHNIQUE

collaboration, we can ensure customer satisfaction and the highest quality."

List-Nagl says the point of the expansion is to replicate the quality produced in Austria for all customers, and ensure this quality is retained through to the aircraft delivery and beyond. She believes the key will be to hold firm to the company's core values and traditions. "In the 1950s, my grandfather founded a small carpentry company," says List-Nagl. "Nearly 70 years later, it is an internationally successful company with big expansion plans. This development brings a lot of joy, but also a lot of responsibility. We are looking forward to a positive and exciting future." ❖

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FULL PELT

Leather is a hugely popular material for VIP aircraft, but there are many factors that go into getting it right – from offering the desired color and texture options, to meeting strict quality and certification requirements and ensuring proper handling

P rivate, corporate and VIP aircraft designers have numerous options for seating materials, including many types of fabric, vinyl and leather. So why do so many choose leather? “First and foremost, leather provides a luxurious feel and comfort that is in a class of its own,” says Jennifer Coleman, director of aviation sales at Garrett Leather. “Designers tend to gravitate toward natural materials. As a natural, organic product, leather provides exceptional flexibility, strength and durability that cannot be replicated by any man-made product.”

Leather is also porous, which allows it to breathe. “This means that it remains cool to the touch and adjusts to body temperature, making it a comfortable option, especially when sitting for long periods of time,” says Coleman. “In addition, leather wears remarkably well and becomes softer and suppler with time. Pure aniline leathers develop a rich patina. Finally, many leather products offer superior durability for high-traffic

Half hide orders are accepted without additional cutting fees

Surprise!

Some aviation designers may shy away from using leather because they have the impression that it is cost-prohibitive. Garrett Leather says they may be surprised to learn that in some cases, leather may be quite competitive, especially when all costs are considered, including those for flammability treatment, testing and certification.

“In addition, lead times play a major role in cost savings,” says Jennifer Coleman of Garrett Leather. “Having an aircraft sit in the hangar

while waiting for materials to arrive is costly and can add up quickly. Fast deliveries save time, increase efficiency and reduce costs dramatically. For example, a client in Alaska has found that it is more cost-effective to order competitively priced products from Garrett Leather – located in Buffalo, New York – because of the aforementioned costs and short lead times. Leather also lasts up to five times longer than other upholstery materials, which reduces the frequency of costly replacement.”



Trend Talk

"For seating, we've seen a trend toward light, cool colors. Light gray to cool white is a frequent request. Designers are creating overall color schemes showcasing strong contrasting hues, for example dark blues paired with light grays. We're also seeing a very clean, contemporary look of white and black with small areas of bright color or textured patterns. Many of the textures are tone on tone, making the change evident but subtle."

Jennifer Coleman, director of aviation sales, Garrett Leather

CLOCKWISE FROM TOP: SHEEPSKIN, ALLURA, WOVEN AND SHEEPSKIN PRODUCTS FROM GARRETT LEATHER

BOTTOM RIGHT: MORE COLORS IN THE WOVEN RANGE

areas, provide anti-bacterial protection, and are water- and stain-resistant. Leather is easier to maintain than several other coverings, as it simply requires regular dusting and periodic cleaning with a mild cleanser."

ONLY THE BEST

The aircraft interiors industry has very exacting requirements of leather in terms of quality, safety, style and comfort. "Many aircraft manufacturers have very exacting quality standards that must be followed strictly," says Coleman.

For seat leather, criteria include wear resistance, tearing strength and flexibility. "However, these properties should not be achieved at the expense of feel or touch," states Coleman. "Durable, yet soft, is still the requirement."

In addition, proper handling of the leather is vital to ensure the overall quality of the product. "Hides that are stored in tubes or boxes for extended periods of time tend to have many wrinkles and creases," notes Coleman. "For optimal results, leather should be kept on 'horses'. Leather shipments should be unpacked immediately upon receipt and stored properly."

SAFETY FIRST

In addition to quality standards, materials specified for aircraft must adhere to strict flammability requirements, established by the federal government. "These requirements mandate that materials must be treated with specific flame-retardants to withstand a 12-second vertical flame burn," says Coleman. "For every aircraft interior, materials must be tested by a registered testing facility and certified to confirm that flammability requirements have been met."

Aviation focus

Garrett Leather has two products that were developed specifically for the aviation market: Avion and Flight. Both of these products are treated during the tanning process to meet flammability requirements. The company says its Flight collection has the added benefit of passing the rigorous 60-second vertical burn test, giving customers peace of mind when specifying for Part 135 aircraft.

Color options in both collections were determined by the most frequent requests from aircraft

designers throughout the world. Both products are part of Garrett's LeatherShield offering, designed to provide superior durability for high-traffic areas. LeatherShield products are treated in the drum for extra resistance to flames, water, stains and UV, and to provide an anti-bacterial finish.

Many popular colors in other product collections are also treated in the drum during the tanning process, which means that aircraft orders can ship within two business days of purchase.

LEFT: THE AVION RANGE, WHICH WAS DEVELOPED SPECIFICALLY FOR THE AVIATION MARKET

BELOW: GARRETT LEATHER'S OTHER AVIATION-SPECIFIC COLLECTION, FLIGHT

BOTTOM: THE IMPRESS RANGE

More than
90% of Garrett's
orders are shipped
within two
business days

Garrett Leather has noticed that flame treatment in the dying drum has become more important for aviation designers. "Adding the flame retardants during processing allows for maximum penetration of the chemicals throughout the hides, improving consistency and final burn test results," says Coleman. "By ensuring flammability requirements are taken care of during production, designers can be confident that the samples in their library accurately reflect the final feel of the product."

Coleman also contends that treating leather in the drum shortens lead time, as no additional surface treatments have to be applied.

COLOR AND TEXTURE

Garrett Leather says that neutral hues of soft gray and warm taupe have been the leading colors for aviation interiors for quite some time. Many designers are also using custom colors in their designs, to create a unique look.

"Designers often request leather colors to match other interior components, for example the headliner material or wood veneers," reports Coleman. Garrett Leather recently made a custom strike-off for a private aircraft to match the brand color of Tiffany & Co.



The company also notes that added texture is very popular for aviation interiors, and can be achieved with embossing or special finishing techniques. Garrett Leather offers an extensive range of embossing patterns, with themes including animal prints, weaves and geometric shapes. Its special finishing techniques, which include hand-tipping, are applied to highlight the appearance of the natural grain or embossed pattern. Another popular way to incorporate more texture in the main cabin is with soft nubuck suede accents and woven leather.

SHEEPSKIN COMFORT

Style and comfort are also important in the cockpit. In addition to leather, sheepskin is widely used in aviation, specifically for pilot seats. Designers can

select from ironed or naturally curly fleece. "Genuine sheepskin provides exceptional comfort because it remains cool during the summer heat and warm during the cold winter months," says Coleman. "Sheepskin offers many benefits. Along with its alluring softness, sheepskin is naturally flame resistant and passes aviation flammability requirements without needing any further treatment."

It is clear that there are many challenges in replicating the comforts and styles enjoyed by clients in their homes. "Interior designers work diligently to please aircraft owners, passengers and crew members alike," says Coleman. "That is not always an easy task, especially when the aviation industry faces unique challenges with numerous safety regulations and strict quality standards. Garrett Leather takes great pleasure in rising to these challenges and working alongside talented aviation designers to help them achieve and exceed the highest expectations of their most discerning customers." ❖

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MATERIAL WORLD

The flooring and soft furnishing options currently offered by Aerofloor are wide-ranging, but the company is always looking to add new lines and meet the industry's evolving needs

Extensive stock of multiple flooring and soft furnishing products fills a warehouse in Colchester, Essex, UK, ready for immediate dispatch to VIP and private aircraft owners, helicopter operators and commercial airlines. These clients count on Aerofloor whether they are only looking to recover a slightly worse-for-wear seat or need enough materials to carry out an entire interior refurbishment. From its base in Colchester, the company is well situated for swift access to Stansted, Gatwick and Heathrow airports. It is also close to two major sea ports – Harwich and Felixstowe.

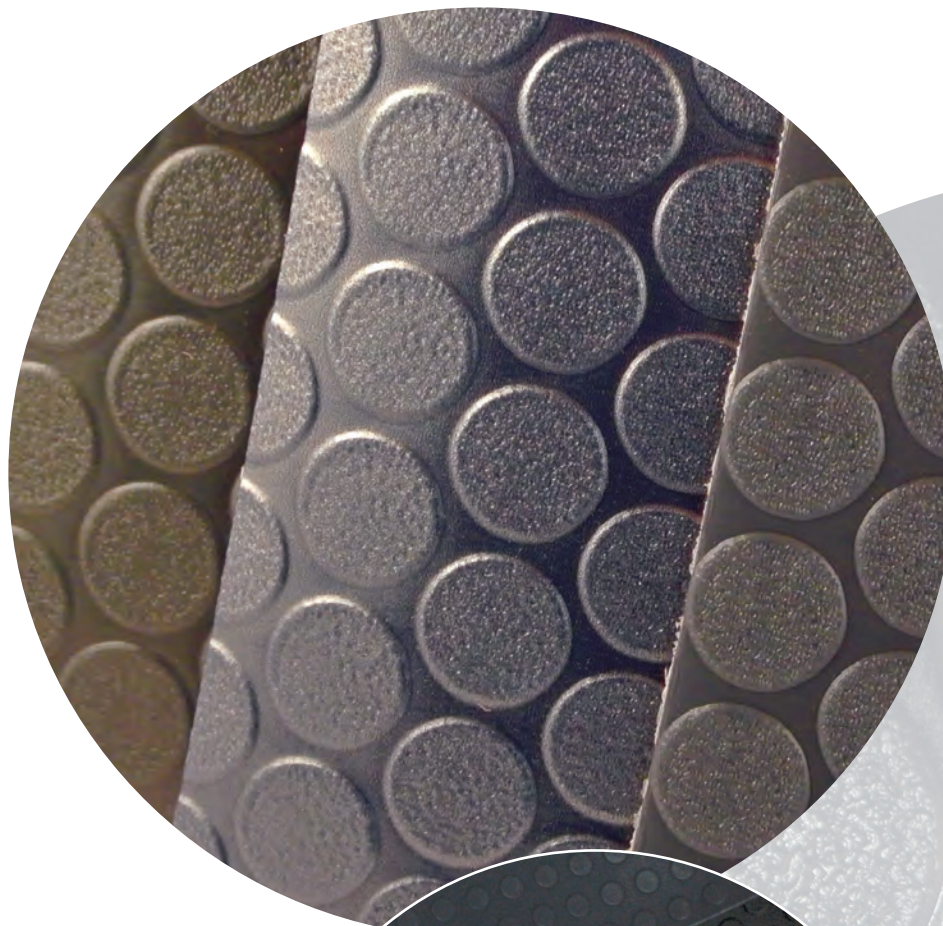
"Our customers appreciate our in-stock program, especially when they have an AOG requirement and cannot afford to incur expensive fees for aircraft delays waiting for goods to come in," explains David Welsh, managing director at Aerofloor. "We have never imposed large minimum order quantities on our customers and it has always been our objective to serve everyone in the aviation industry, regardless of the size of the company."

Aerofloor was founded in 1983 by husband and wife duo Clive and Linda Jones, and grew under their leadership. Following their retirement in 2013, the company was purchased by Welsh, who has more than 20 years' experience in the aviation industry.

NEW ADDITIONS

Aerofloor is committed to its existing product lines – which include Aeroclad and Lonseal Loncoin II flooring – but Welsh says it is also moving with the times and seeking new products to offer.

"The aviation industry is expected to grow by 4.6% every year for the next 20 years, indicating that there will be an array of exciting new products coming to

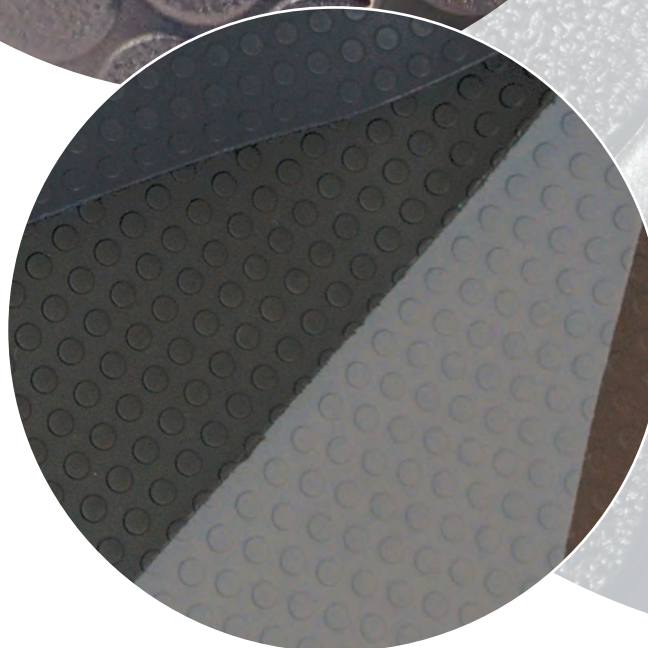


ABOVE: LONSEAL LONCOIN II, WHICH IS AVAILABLE IN BOTH 6FT AND 8FT WIDTHS

RIGHT: THE AEROCCLAD STUD NON-TEXTILE FLOORING PRODUCT

TOP RIGHT: AEROCCLAD WITH A PIMPLE TEXTURE

FAR RIGHT: AEROFLOOR OFFERS A WIDE SELECTION OF LAMBSKIN, VINYL AND OTHER TEXTILES FOR PILOT SEATS



Quality assurance

ISO 9001 certification is one of the highest standards for developing and maintaining quality management systems. Aerofloor has possessed this important certification for more than 10 years, and in December 2015, transitioned its certification to the UKAS-accredited company BSI, the first national standards body, which is dedicated to helping organizations to achieve exemplary standards.

Aerofloor has appointed a quality manager to ensure that the entire organization operates in accordance with the instructions detailed in its quality manual. "This demonstrates our commitment to quality assurance and customer satisfaction and shows that the high standards set out in our policies are continually monitored and met," says MD David Welsh.

Best-selling products range from VIP textiles to non-textile flooring and carpets

Along with the new carpet ranges, 2016 also saw Aerofloor establish an agreement to stock a selection of cleaning supplies from Frasers Aerospace. "In our eyes, Frasers Aerospace has really set the benchmark when it comes to innovative products," says Welsh. "In particular, its AEROfab product has generated a lot of positive buzz from our customers. It is a concentrated enzymatic preparation for breaking down protein-based deposits at source, and can be used on both fabrics and carpets. As demand grows we will expand the selection we have in stock for immediate dispatch."

SSJ100 PROGRAM

This busy year also saw the culmination of an exciting program, when Irish airline CityJet took delivery of three SSJ100 aircraft from SuperJet International, with flooring supplied by Aerofloor. The product has a small dot effect and is available in an 8ft width, enabling all the intended floor area to be covered in one

market," says Welsh. "We are committed to offering the very best to our customers as we evolve with these changes."

In 2016, Aerofloor launched three new carpet ranges aimed at the aircraft interior market, for which it received very positive feedback from its customers. The company can carry out flame retardancy treatment on all its new carpet ranges using a custom-built concertina spray booth at its premises.

Burn testing and certification

The majority of soft furnishings used in an aircraft have to undergo rigorous testing procedures to ensure that they comply with the strict guidelines of the governing aviation authority.

Aerofloor has its own on-site burn test laboratory, which has been built in accordance with the directives set out in the EASA.CS25 and FAR25 Large Aeroplanes manual. The lab is fully equipped and staffed by trained personnel who are experienced in both the 12- and 60-second vertical burn test.

"All equipment is maintained to very high standards, and is tested and serviced annually," notes David Welsh.

The company is also able to conduct testing on behalf of customers who provide samples, either of the material in its original state, or made up as a composition of how it will be used in the aircraft.

"To maintain our high standards of quality, all certifiable materials supplied by Aerofloor are tested in-house and are accompanied by a certificate of conformity and vertical burn test report," says Welsh.



ABOVE RIGHT: A SAMPLE UNDERGOING BURN TESTING

RIGHT: MANY AIRCRAFT CARPET OPTIONS ARE READILY AVAILABLE

piece. Aerofloor was also involved in the design selection.

The company's management team regularly visits industry exhibitions to maintain relationships with customers and suppliers. "In today's society where communication is for the most part carried out electronically, we believe that it is equally important to preserve the humanistic element," says Welsh.

SPOTTING A NEED

The company is also dedicated to recognizing and reacting to the market's needs. For example, in 2013 Aerofloor saw a decline in the availability of popular sheepskins. "This opened an opportunity for research and development," comments Welsh. "We scoured the globe and found The Nugget Company, a family-run business in Texas, which produces high-quality lambskin. This enabled us to offer an alternative product to our customer. Feedback from customers and the number of repeat



orders received leads us to conclude that the hides offered by The Nugget Company far surpass that of our original product."

Another key issue for the industry is weight, which is why Aerofloor offers many non-textile flooring products – including Aeroclad and Lonseal Loncoin II – designed as lightweight alternatives to legacy products. "Both of these products are light and flexible and continue to be extremely popular," says Welsh.

Since the introduction of Aeroclad in the early 1990s, the product continues to be one of the company's main sellers and

Upholstery materials and specialized VIP cleaning products are also stocked

Welsh says this shows no signs of slowing down. Meanwhile, the 8ft-wide version of the Lonseal Loncoin II tends to be favored by those operating single-aisle aircraft as it eliminates seams or joints. "Many aircraft undergoing retrofit have their cabin interiors replaced with eco-friendly alternatives such as these," says Welsh. ☒

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We also have our own fully equipped in house laboratory in which we conduct the 12 and 60 second vertical burn testing as per EASA.CS25/FAR25.853 (A) App. F, Part 1 (A) Amendment 18.

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FAB FORTIES

Over its 40 years in the aviation industry, Tapis has developed a wide range of soft goods tailored to the sector's needs

In 2017, Tapis will celebrate its 40th year of serving the aviation industry. "In this notoriously cyclical market, that is no small feat," says Karen Caputo, president at the company. Founded in 1977 by Al Caputo, Tapis began by providing custom carpet for VIP aircraft. Ultrasuede came next, designed to offer enhanced stain resistance at no detriment to luxury.

A key challenge met by the company through the years has been to comply with updated flammability requirements without sacrificing design needs. Tapis now offers a multitude of fabrics that meet aviation requirements for both commercial and VIP aircraft.

AVIATION ADVANCES

"Tapis has been at the forefront of the aviation interiors industry with innovations including one of the first AN61 heat-release fabrics, now used by more than 50 commercial carriers," says Jason Estes, director of sales at Tapis.

The company's advances also include appliquéd, embroidered and screen-printed ceiling panels for VIP interiors, and bulkhead programs for Boeing, Airbus and several airlines. Tapis was also one of the first companies to provide qualified soft furnishings for vertical application in commercial aircraft, in 1986. Today, Tapis continues to respond to the needs of this specialized design



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

market by providing customers with new possibilities for their aircraft interiors.

Ultraleather has enjoyed great success in the aircraft interiors market. "This product is produced using custom-engineered, premium-grade polycarbonate resins and incorporates special strengthening components that exceed heavy-duty industry performance standards while delivering the highest standard of quality, luxury and unsurpassed comfort," says Estes.

This product can be engineered to achieve customer-specific requirements, including custom grains, colors, finishes

and technical specifications. The gloss level, weight, breathability and thickness can be adjusted and inherent properties, including enhanced ink and stain protection, can be incorporated.

Meanwhile, the modernized Ultraleather Tech Collection has a matte finish and is available in five patterns: Cove, Dwell, Helix, Eco Tech and Ultratech. Estes says: "Tailoring easily, this futuristic surface makes a unique statement in aviation interior applications."

Tapis also recently introduced a hand-picked collection of woven fabrics. The Woven Collection mixes pure silk,

Fire testing

A test lab that opened at Tapis's facility in Dallas, Texas, in January 2016, has been accepted by the FAA to produce test data for use in FAA type certification projects.

Testing at the lab is performed by highly trained technicians using equipment designed and manufactured by Marlin Engineering.

Bunsen burner test capabilities include 12- and 60-second vertical burn, 12- and 60-second horizontal burn, 45° burn and 60° burn.



Trend Talk

"Ink resist technology and lightweight textiles are becoming increasingly important to customers. Customization continues to be of great value in the business jet and VIP interiors industry. The ability to adjust the material's gloss level, weight, breathability and thickness is a huge advantage, as is the ability to incorporate enhanced inherent properties such as ink and stain protection."

*Kevin O'Brien, director of operations,
Tapis Corporation*

MAIN: THE WOVEN COLLECTION

INSET ABOVE: THE ELEVATE CARPET

INSET ABOVE RIGHT: TAPIS'S OTHER
NEW CARPET, EVOLUTION

BOTTOM LEFT: THE ULTRALEATHER
TECH COLLECTION

mercerized cotton and fine linen with performance-driven fibers to create fabrics designed to deliver the beauty and performance demanded.

CUSTOM POSSIBILITIES

With customization in mind, the 10 textiles in the Woven Collection come in a spectrum of colors and textures. "They coordinate seamlessly with one another and other Tapis products, yet provide differentiation from other luxury jet interiors," explains Estes.

When Tapis opened its doors in 1977, carpet was its primary product offering.

The company's two newest carpet collections for VIP aircraft interiors are Elevate and Evolution. Elevate has a textured loop pile and is designed to provide durability and softness. It gives a random striated effect. Evolution is a classic tip shear available in 32 colors. "This product has the soft luxurious hand you expect from wool, with the combination of loop and cut pile adding textural interest," says Estes.

TapiSuede is another fabric that has been used in luxury aircraft interiors for more than 30 years. The product line comes in three main textures: TapiSuede,

a solid coordinate; TapiSuede Flannel, a performance-oriented wool lookalike; and TapiSuede Strie, which has a textural, cut velvet-like quality. "TapiSuede is made in an ecologically friendly manner without harmful solvents and contains post-consumer polyester," Estes stresses. "This fabric is recognized for its richness of color and texture, making it a popular choice for designers." ❖

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To request more details from Tapis Corporation, visit www.ukipme.com/info/aimbj

DOUBLE DEBUT

Collaboration between a leading hospitality designer, Stacy Garcia, and aviation leather manufacturer Townsend Leather, has resulted in two new collections for the market

Founded in 2004, Stacy Garcia is a pre-eminent global lifestyle brand with roots in the hospitality design sector, offering product collections across a number of categories, including textiles, carpet, wall coverings, furniture and lighting.

"Renowned for its signature bold and colorful designs and in-depth trend forecasting, Stacy Garcia is the first and only design house to offer a complete design story for the hospitality industry," comments Sarah Eckler, senior vice president of sales and marketing at Townsend Leather.

Stacy Garcia recently expanded its reach into aviation design with a partnership with Townsend Leather that involves the launch of two leather lines geared toward use in aircraft interiors.

Headquartered in New York, the privately held product design company is helmed by founder and chief inspiration officer Stacy Garcia. "I have always known Townsend Leather for its success in working with partners to develop unique and forward-thinking products," says Garcia. "But once I toured the factory, it became apparent how much craftsmanship goes into the creation of its leathers, and that's when I knew our partnership would be the perfect combination of Townsend Leather's quality, with the colors and patterns that our brand is known for."

In November 2016 Townsend Leather and Stacy Garcia released two new leather collections, called Kinetic and Resurfaced. Both designs aim to enhance the natural grain of the leather with multidimensional embossing or hand-tipped effects that layer color.

"Townsend Leather is excited to be collaborating with Stacy Garcia on these beautiful new leathers," says Eckler. "Stacy's eye for color and texture, and her



The minimum order quantity for both new collections is just one hide

ability to combine design elements in striking ways, pairs beautifully with our capabilities as a manufacturer."

Kinetic is embossed and hand-tipped to accentuate the raised pattern. With Resurfaced, various shades are hand-painted on the leather to create a layered aesthetic. Each collection features six standard colors that can be shipped in four weeks, while custom colors carry a four- to five-week lead time. Hide sizes average 55-60ft² and the leathers are flame-proofed, with burn certification available upon request.

"These leathers are all produced at our facility in upstate New York, with quick turn times, attention to the finest quality

ABOVE: THE KINETIC AND RESURFACED LEATHER COLLECTIONS, WHICH INCLUDE SIX STANDARD OPTIONS EACH

and in adherence to industry standards for flammability," says Eckler.

Townsend Leather, founded in 1969, is a third-generation USA-based family business and manufacturer of upholstery hides and decorative leathers. As well as the commercial and head-of-state aviation sectors, the company also supplies its products to the residential, hospitality, home furnishings, corporate, business, motor coach and yachting markets internationally. ☒

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To request more details from Townsend Leather, visit www.ukipme.com/info/aimbj

Beyond the boundaries.

KINETIC COWHIDE



Stacy Garcia®

for



www.townsendleather.com/stacygarcia

NETWORK GAINS

Increased demand for aftermarket connectivity upgrades is being catered for through several initiatives at Pentastar Aviation

Over the past 12 months, Pentastar Aviation has observed a marked increase in the volume of used aircraft acquisitions. This trend has led to an uptick in requests for cabin upgrades, as new owners want to tailor the aircraft to their specific needs, with solutions to make things easier, better or more personal. Headquartered in Waterford, Michigan, Pentastar specializes in inspections, avionics and interior upgrades, refurbishments and reconfigurations, so is equipped to assist aircraft owners with their upgrade needs.

"Regardless of the model or mission, a business jet cabin should provide both comfort and efficiency," says Gordon Ross, director of interiors at Pentastar Aviation. "Emerging technologies, as well as our experienced and skilled avionics team, are enabling us to provide customers with both."

A popular request – and one that the team remains focused on – is enabling clients to have the same level of connectivity as they experience on the ground. "When it comes to connectivity, both Part 91 and Part 135 clients now expect the same level of service they receive at home or in the office, in terms of network speed and availability," says Ross. "Our avionics team works closely with our interior technicians to create this functionality while maintaining the distinctive design of the cabin."

In 2016, Pentastar Aviation partnered with SmartSky Networks to develop STCs for Gulfstream G450 and G550 aircraft that enable the company to perform the hardware installation for SmartSky's 4G connectivity solution. This enables passengers to stream, text and call in flight. SmartSky is offering an early-bird discount on this product, and to make it easier for customers to keep up



Pentastar Aviation is an FAA Class 3 and 4 repair station

with the latest technology, Pentastar is also offering an additional incentive. The first G350 or G450 customer and the first G500 or G550 customer to schedule the installation with Pentastar Aviation will receive a US\$25,000 discount.

In addition to connectivity solutions, the team focuses on maximizing downtime by also providing a range of simple cabin upgrades – including for lighting systems, CMS and IFE – that can be performed as standalone enhancements or in conjunction with a connectivity upgrade like wi-fi.

Additionally, the team provides cabin switching upgrades to control HD source equipment and monitors and surround sound, adding functionality to connectivity systems.

ABOVE:
PENTASTAR
UPGRADED
THE IFE AND
CMS, CHARGING
OUTLETS AND
LIGHTING ON
THIS MD-83

The company reports that demand for upgrades that provide convenience, for example, wireless charging modules, are also increasing. Pentastar has partnered with Cobalt Aerospace to introduce wireless charging modules that can be installed in existing drink rails or other cabin fixtures to ensure passengers can keep using their PEDs.

"As technology continues to change and evolve, our mission remains to set the standard by providing the latest advances in both products and services," comments Ross. ☒

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To request more details from Pentastar Aviation, visit www.ukipme.com/info/aimbj

Insights of Experience

from Pentastar Aviation

"In this industry, you'll succeed if you have a true passion for your work. Our success lies in the pride we take in the little things. You can tell a true craftsman by the details. We work one-on-one with our customers to ensure every detail of their project exceeds their standards, and ours – from the first stitch to the last."

Gordon Ross, Affiliate IIDA
Director of Aircraft Interiors
26 years of experience

PRIVATE JET CHARTER ■ AIRCRAFT MANAGEMENT ■ ADVISORY SERVICES
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STEPPING UP

Highlights of Aerocon Engineering's 2016 included the development of an aftermarket airstair kit for the BBJ 787-8I

Of its many achievements in 2016, Aerocon Engineering is particularly proud to have designed an onboard airstair system kit for aftermarket installation on a VVIP customer's BBJ 787-8I. The new product, with its dedicated stowage cabinet, is the culmination of a 24-month project.

"The development of this product is a major achievement for our team," says Benny Younesi, president and CEO at Aerocon. "We have supplied a very reliable product, and one which is also more efficient in weight, fit, form and function compared with anything else on the market today. We offer a full complement of installation kits that are all FAA- and EASA-STC approved."

The work focused on enhancing Aerocon's legacy airstair design to minimize weight and optimize performance. In the course of the development, Aerocon had to overcome challenges relating to space, the aircraft's composite structure, and certification.

"The space available by the passenger door was very limited, so we had to redesign our system to fit into the available space without losing performance or structural integrity," explains Younesi. "Also, because the BBJ 787-8 has a composite structure, we had to use new floor structural supports. The FAA certification was also very challenging because of the aircraft's composite structures. Aerocon had to receive concurrences and approval from both Boeing and the FAA to achieve the STC certification."

As well as its FAA STC, the system was granted EASA approval. It is now available for the B737, B757, B767, B787, B777 and B747, as well as the A318, A319, A320, A321, A330, A340, A350 and A380.

Younesi says one of the product's key features is that it requires almost no



maintenance. "Aerocon has been designing and installing airstair systems for more than 30 years and every project is a learning opportunity for us to improve the reliability of our systems," he explains. "This is achieved by advances in technologies, materials and components."

As well as airstair kits, the company designs and manufactures products including VVIP lift systems, crew rest compartments, thermal/acoustic noise reduction systems, environmental controls, cargo hoist systems, auxiliary power unit installations, air/liquid cooling systems for defense electronics, cargo fire protection/suppression systems, auxiliary fuel systems, and mechanical and electrical window shade systems.

In terms of the latter, Aerocon recently completed its first STC for the installation of window shades on Boeing 737-800 series aircraft. The company had been working on this design for more than a year, for a head-of-state customer.

The BBJ 787-8I's carbon-fiber fuselage introduced new challenges for Aerocon



ABOVE: AEROCON'S LATEST NOISE REDUCTION SYSTEM

LEFT: THE AIRSTAIRS AEROCON DEVELOPED FOR THE BBJ 787-8I

The window shade system comes in a choice of either electrical or mechanical operation, with single and dual shade options. It is designed to provide 99% blackout capability, dependability and quiet operation. Equipped with multiple switching options, it can be networked via CMS for individual or group operations. The window shades are available in custom colors and designs. Aerocon says the products meet FAA STC/PMA certification, the electrical components meet or exceed RTCA DO160, and the options meet or exceed OSU 65/65.

Another highlight of 2016 was the development of a cabin interior noise-reduction system, which was installed on Boeing 737-800, 787-8 and 747-8 models. "The new design is a very efficient system that resulted in average cabin sound levels in the low- to mid-50s in terms of dB-Sil3 and in some areas in the mid-40s," says Younesi. "The latest FAA and EASA certification requirements have been applied on all these projects." ❖

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AEROCON

CABIN INTERIOR NOISE REDUCTION



BOMBARDIER DHC-8-100

AEROCON takes a comprehensive approach to making the DHC-8-100 cabin interior quiet.

Complete interior acoustic analysis, both pre-modification and post-modification.

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Insulation Blanket Kit

Interior monuments and cabin periphery.

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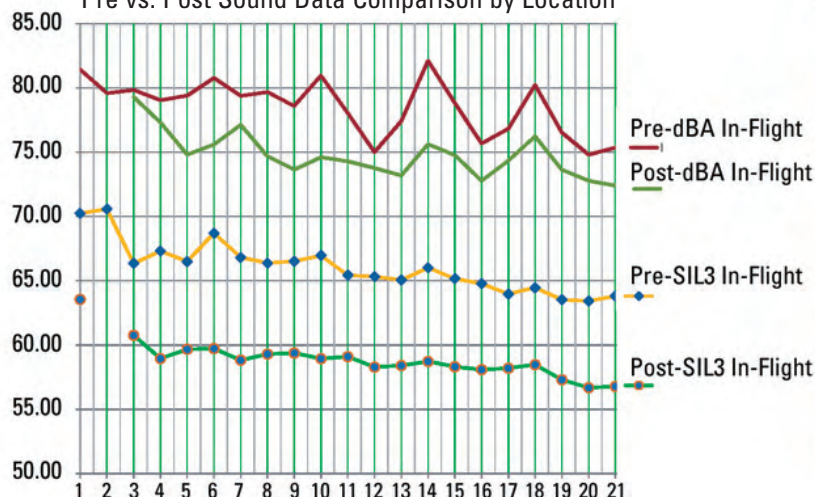
Can be easily integrated into standard maintenance events.

Complete STC / PMA Certified

DHC-8-200 / 300 Model Kits available.

Dash - 8 - 100

Pre vs. Post Sound Data Comparison by Location



- The reduction of dB-SIL3 represents a 60% reduction of perceived noise.
- Your DHC-8-100 cabin will have the comfort level of a quiet jet interior.



Aerospace Consultant Engineering – Aviation Technical Research Group

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AEROCON

MORE FOR LESS

Tasked with speeding up the process of customization, Innovative Advantage created a modular scalable network for IFE/CMS

It sounds contradictory, to enable customization and a faster turnaround time, but this is exactly what one major OEM was aiming for when it approached Innovative Advantage to create a solid framework upon which custom parts could be hung.

The goal was to create an interior that could support multiple 'skins'. As part of this, the OEM wanted to create an IFE/CMS system that could support all seating arrangements, different GUIs, and be installed at the green aircraft stage. The core wiring and provisioning were to be complete at the point when the aircraft was ready to move into the completion hangar. If the OEM could pull off this feat, then it could deliver the aircraft to its customers sooner.

Innovative Advantage worked closely with key completion engineers on the requirements and then presented the OEM with a concept for this modular scalable network. The OEM saw the benefits of the proposal and the AVDS backbone was born.

FIBER PROVIDER

The AVDS nodes, which are connected by fiber-optic cables, provide the core audio, video and Ethernet distribution system. It is wired and ready to go as the green aircraft moves to completion. The AVDS nodes are modular and the input/output (I/O) needed for a specific customer is easily tailored through choice of hardware and then configured with a powerful software tool by the customer.

Because they can select which AVDS nodes and I/O to install, completion engineers have the flexibility to support any customer desires. The network architecture reduces the wiring required. "The system has really worked out the way we all imagined," says Richard Morris, president at Innovative

Advantage. "We have been able to support every type of airframe from a G150 to a BBJ 747-8. Even more importantly, we have been able to adapt the AVDS backbone to newer consumer technologies, simply by designing new I/O cards for the AVDS nodes."

In fact, more than 20 I/O cards are now available. The original support for analog audio, composite video, component video and HDSDI video has been expanded to also include 3G HDSDI with embedded audio, HDMI, 4K, digital audio, expanded Ethernet and H.264 encoding and decoding.

REFRESHING CHANGE

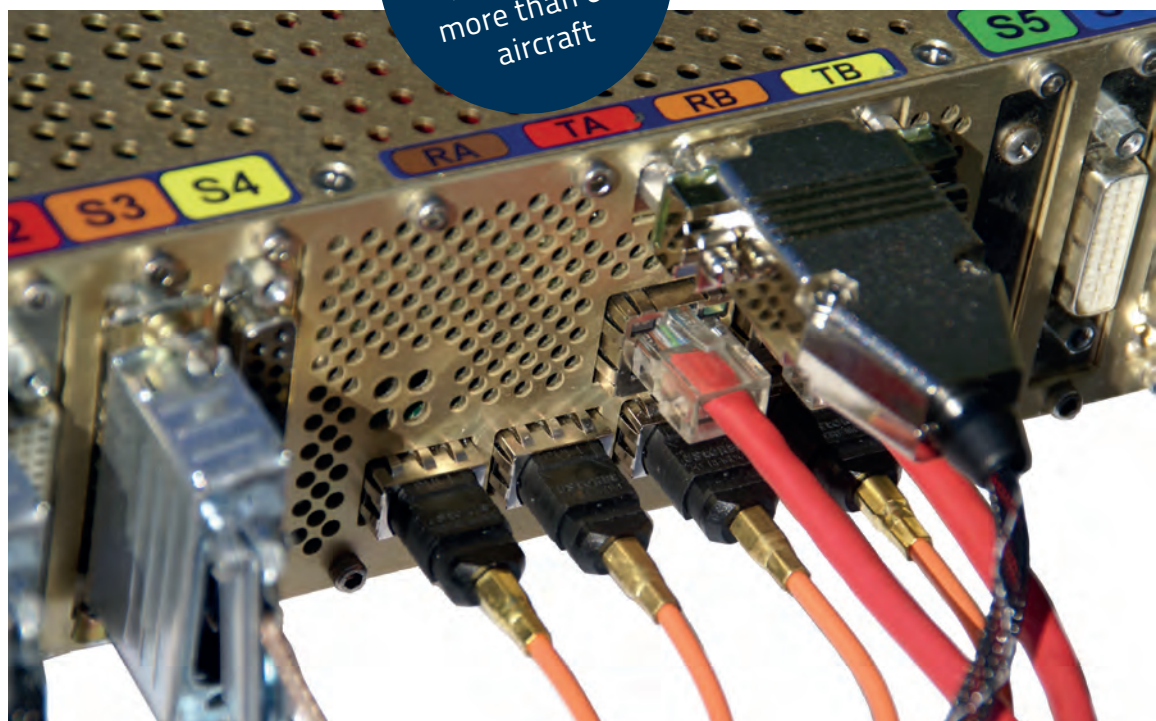
The company also says its scalable solution tackles IFE obsolescence. Up- and down-conversion of video signals

enables completion centers to add and update older IFE systems. AVDS interfaces with all CMS solutions.

Old monitors can be replaced with the AVDS backbone and live encoders for live streaming to PEDs. Streamed content is wrapped with DRM, and iOS and Android apps are available. The core architecture remains the same, but the AVDS backbone continues to evolve and support the latest consumer devices.

One of the newer I/O cards supports video tiling, which enables pictures to be shown inside other pictures. Customers can mix any of the video sources on the aircraft. Two or four cameras can be tiled and presented on one display, or the end user can look at their moving map and keep a movie or news feed visible at the same time.

The AVDS network is now installed on more than 600 aircraft



Trend Talk

"We are seeing a quick transition to having all content in our terrestrial lives streaming to our televisions, tablets and smartphones. The latest offerings for satellite and ATG connectivity should make this truly viable on aircraft. Pricing is falling, bandwidth increasing, and drops are being reduced – although it is still going to be a bumpy road.

We still see a demand for audio and/or video content delivered simply and cleanly to the seat. Most of our projects still have Blu-ray players but they all have HDMI auxiliary panels that the customer can use for Apple TV, Chromecast or movies they have downloaded onto their phones and tablets.

One challenge is that the interoperability issues with Apple, Amazon and Google products continue to plague all of us – in the air and on the ground."

Dave Garing, business development, Innovative Advantage



BOTTOM LEFT: AVDS
FIBER CONNECTIONS

Many of the larger completion centers use the AVDS backbone to support fully customized interiors. Innovative Advantage says wide-body head-of-state and VVIP completions often push the envelope in all aspects of the design. "We are now delivering the AVDS backbone with the same benefits – including shorter engineering times, reduced wiring and quicker checkout – for many of these aircraft as well," says Morris.

As Innovative Advantage enters its second decade, Morris says, "We are maintaining our focus on providing the best audio, video and Ethernet network possible for our OEM and completion center partners." ❖

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WINNING FORMULA

Demand for its plating services is growing, reports Signature Plating, and now the challenge is to grow without diluting the formula that brought success in the first place

Customers include aircraft interior designers and OEMs, as well as yacht designers

The total aircraft refurbishment market could be worth US\$4.3bn by 2017, according to a report by MarketsandMarkets (*Aircraft Refurbishing Market, Commercial, Cargo And Business Aircrafts, 2012-2017*). "The VIP aircraft market continues to grow, with more aircraft entering the market than are being retired," says Larry Donoho, president of Signature Plating. "Increasing demand for refurbishment offers opportunities for growth within the decorative plating industry."

A common request is to match existing finishes, and Signature Plating prides itself on being able to match virtually any finish out there. It also offers more than 100 of its own finishes; a range recently expanded with three new options – Polished Ultra-White Silver SP-331, Satin Ultra Gold SP-342, and Cordillera Ranch SP-325. The latter is similar in tone to antique bronze, but with richer colors.

Labor force efficiencies enable the company to keep capacity available for new major contracts. "With our current full-time labor force working one eight-hour shift per day, Monday through Friday, we are not even close to our production capacity," says Frank McKnight, chief financial officer and co-owner of the company.

Signature Plating says this production capacity also enables it to offer turnaround times that would not be possible were it working at or over capacity. The company is open to expanding its workforce in the future, but this will be done carefully. "While the company is poised to



grow and will add additional team members to increase capacity as needed, we will only do this strategically, as our employees are like family," says McKnight. "Strategic growth allows us to hire only those who can live the Signature culture."

This culture was built over 15 years in the industry. Processes have been improved continually, with the aim of

providing products of the highest quality, delivered on time and within budget. Paul Sahaneck, vice president, also cites creativity and adaptiveness as traits that have propelled the company to the top.

The company relies on a team of artisans that has more than 150 years of combined experience. "We have built a team of people who all believe in the company's vision and take pride in the final product," says Matthew McKnight, director of quality assurance.

Customer service is another key focus, which is why a specialist is assigned to oversee every project and ensure clients' requirements are met. Other employees include a chemist and quality control specialists. "Ensuring the chemistry of the bath, as well as the entire electrical process, requires constant attention," says Sahaneck.

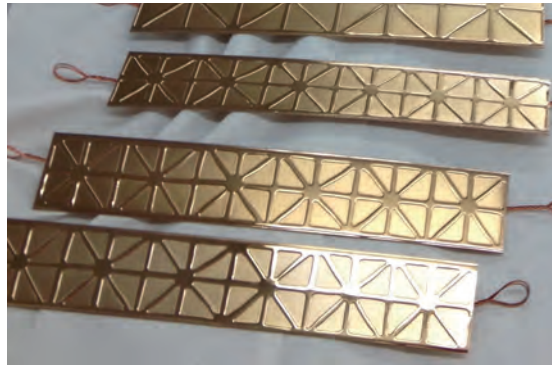
As a large percentage of the parts must be disassembled before the plating

Trend Talk

"What was custom 10-15 years ago is now standard. The market is being challenged to produce new custom designs for interior appointments and accessories, which in turn creates opportunities and challenges for the plating industry. We have been at the forefront of this trend, developing techniques for multitone finishes on single parts, and a new multisurface inlay. The need to introduce new finishes is also becoming apparent."

Frank McKnight, chief financial officer, Signature Plating





OPPOSITE PAGE: SIGNATURE'S ARTISANS HAVE 150 YEARS OF EXPERIENCE BETWEEN THEM

FAR LEFT: A PLATED SEAT CONTROL

LEFT: TEXTURED INLAYS

process and reassembled before final inspection and shipping, Signature also has an experienced team to handle this process. Tolerances must be maintained to ensure proper fit and maintain the integrity of the part. Dimension-critical parts receive special attention and tolerance checks are conducted throughout the plating process.

Donoho believes detailed planning is the key to delivering quality on time. "We have daily production meetings to ensure that each project is moving through the plating process as planned," he explains. "Signature utilizes a custom tool, Signatrack, to track parts in real time, all the way down to small parts such as screws, and provides screenshots for the

benefit of both Signature and the client. We give the customer a protected log-in for our system so they can see this valuable information."

The tool ensures that issues are noticed by staff instantly, so they can be rectified quickly. "The processes and systems we have in place also allow us to provide our customers with a status update and shipping report at the end of each production day," adds Sahaneck. ☒

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SIGNATURE PLATING

We're honest, dependable and dedicated. We'll give you the best product available. And we'll impress you with our customer service. But most importantly, your job will be done right – on time and on budget – every time. These qualities set us apart in the plating industry.

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LIGHT YEARS AHEAD

Developments in LED technology over the past decade have given rise to reading lights that offer more targeted illumination, space and weight savings, and aesthetic improvements

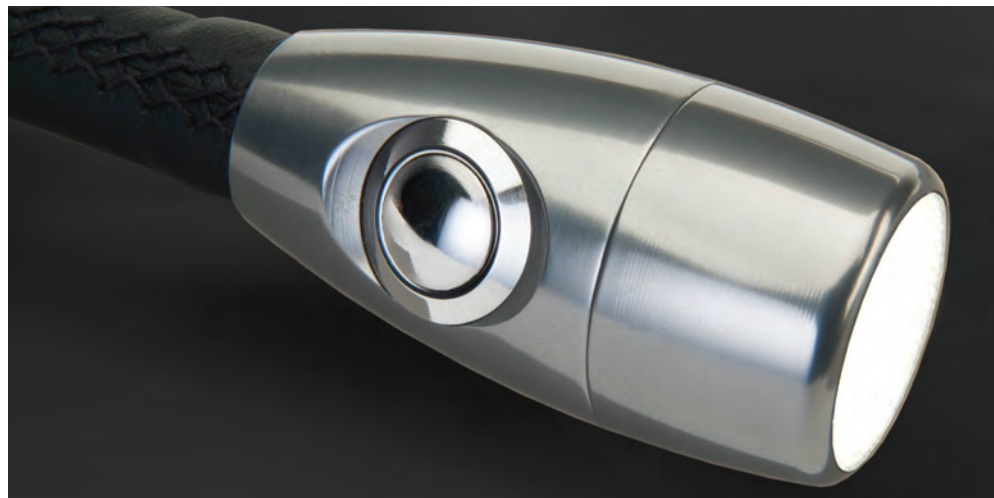
One of the biggest changes in the aircraft interiors market over the past 10 years has been the rapid development and growing popularity of LED lighting. An excellent way to see how LED lighting technology has progressed is to look in detail at the development of the reading light.

"The reading light used to be purely a light to read by," notes Gina Amies, director at Beadlight. "While this is still its primary function, it is not its sole purpose. The light is required to produce the correct level of output, the perfect color temperature, fit seamlessly within the cabin design and produce an attractive light. These are just some of the end users' requirements. The aircraft designers and fitters require low energy consumption, a light weight, a compact unit, and customization opportunities."

Beadlight specializes in the design and manufacture of reading lights. "We have been at the forefront of the LED market since 2003, when we supplied the first LED reading light to be fitted on a commercial aircraft," says Amies.

A very important aspect of a reading light design is that it creates a defined zone of light, with no light pollution. "LEDs are very versatile and techniques can be applied so that whether the passenger is in a luxurious double bed or a business class pod, other people nearby are completely undisturbed by the light, be it day or night," says Amies. "At Beadlight we are able to produce defined beams to suit the required environment. We assess the required intensity, not only concentrating on the lit area, but also factoring in the unlit area surrounding the user. The drop-off zone should be concise, providing task lighting that affects only the user."

Color temperature is another key aspect of a reading light. "In the past



there was only a choice of warm or cool lighting, but now we are able to offer a full spectrum of colors to help create the required atmosphere," says Amies.

GLARE-FREE DIFFUSION

Beadlight's most requested color temperature is around 4,000K. "The improvement in color rendering index (CRI) values offered by LEDs means that you don't have to go for a cool 5,000K to produce an attractive light to read by," notes Amies. "It is important that the correct diffusion is used with LEDs to ensure an even light. Beadlight has developed a patented glare-free diffusion

ABOVE:
BEADLIGHT
READING LIGHTS
JET STREAM
(TOP), ZONDA
(ABOVE LEFT)
AND ZEPHYR
(ABOVE RIGHT)

system that spreads the light evenly across the page, creating the ultimate light to read by. This diffusion helps prevent tiredness and eye strain from unwanted light glare."

A factor that is considered in every design is the use of space, because inside an aircraft cabin it must be maximized wherever possible.

"LEDs have enabled lights to be produced smaller and smaller," says Amies. "We have worked to reduce the depth of our lights to enable customers to fit them into composite panels, enabling space to be saved on panel depths and utilized in other areas."

Reading lights can also be used as a way to accessorize seats and areas. "It is important when selecting lights for an interior that they complement the design," says Amies. "We ensure all the components we use are of the highest quality, and because we have an in-house design team, we can produce custom lights on request."

MATCH MAKER

Beadlight offers custom finish options as standard. The leathers and threads applied to flexible stem lights are always coordinated with the upholstery so that the light matches the rest of the design.

Amies says LEDs have enabled vast savings in power consumption and a great reduction in maintenance. "They are now used in all areas, including strip lighting and screens," she says. "RGBW LEDs enable environments to be



Beadlight's three latest reading lights are Stellar, Mono and Sirocco M

LEFT: THE STELLAR READING LIGHT

transformed with color, at the press of a switch. In-depth research has been conducted to assess how colors affect passengers' moods, helping to ensure the ultimate experience. Overall, developments in lighting have transformed the passenger experience in ways that would not have even been considered 20 years ago. The innovation in the market is exciting and not ready to slow down. We are constantly pushing the boundaries and developing new products and technologies to stay at the front of the reading light market." ✕

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simple pleasures

THE WATCHWORDS FOR THIS 80M SUPERYACHT DESIGN WERE SIMPLICITY, PURITY AND EFFICIENCY

Having noted customer demand for a more efficient use of space on board yachts, Sinot Exclusive Yacht Design and Feadship Royal Dutch Shipyards responded with the Zen yacht design. It eschews the traditional wedding cake yacht design, spreading over only two decks, and is designed to offer a simple, harmonious and relaxing environment.

"In interior design, the concept of Zen is often associated with minimalism, simplicity and purity of lines," explains Sander Sinot, CEO and art director at Sinot Exclusive Yacht Design. "But

simplicity and purity are the hardest things to design – it means a rigorous evaluation of every space, detail, material and solution, resulting in many iterations before we reached the stage of the design as presented – and even then, we hope to be able to refine much, much more in dialog with a future owner."

Craftsmanship and natural materials were a vital part in achieving the required atmosphere. Materials include dark wood, chenille, 100% dull silk carpets, split sandstone, teak and tadelakt plaster. ☒



OTHER EYE-CATCHING DESIGNS FROM VARIOUS INDUSTRIES...



1 The La Fusion restaurant in Pekanbaru, Indonesia, was designed by Einstein & Associates and completed in May 2016. Taking inspiration from its location, and the French and Asian menu, the design fuses tropical Asia with French Art Deco.

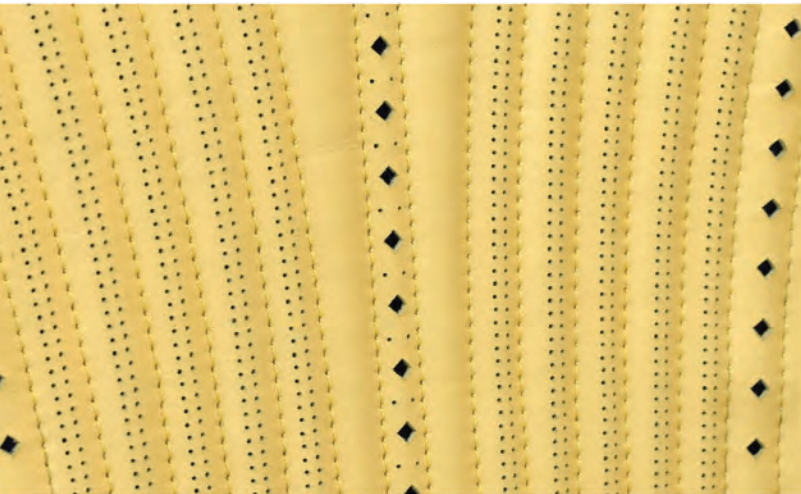


2 The creators of the Kaelo iceless ice bucket are interested in certifying the technology for private jets. They believe the lack of condensation and dripping are key benefits. A cold and dry environment is activated through a single touch of the bezel.



3 The Roman Bath in one of the entry-level suites at The 13, a hotel being built in Macau, China, at a cost of more than US\$7m per room. It is expected to open early in 2017. When not in use, the Roman Bath is covered by a retractable marble floor.

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by one of a kind

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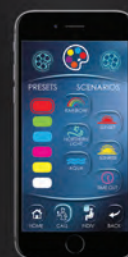
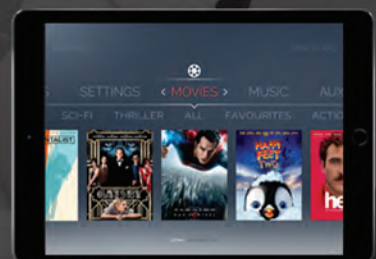
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