

BusinessJet *interiors* INTERNATIONAL

APRIL 2014

THE INTERNATIONAL REVIEW OF BUSINESS JET INTERIOR DESIGN AND COMPLETION

sweetdreams

THE BBJ 787 DREAMLINER HAS INSPIRED BEAUTIFUL
DESIGNS – NOW IT'S TIME TO MAKE THEM A REALITY



ALSO IN THIS ISSUE: LINEAGE 1000E BEST OF BEECHCRAFT DESIGN DIRECTORY ECLIPSE 550 BEDS

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wideview

Gathering pictures for our feature on the BBJ 787 was easy – it sometimes feels like everybody has a design or a plan for the aircraft. But whether it is the spatial freedom offered by its wide-body dimensions or the fame of the Dreamliner brand that inspires, actually completing one is a different proposition altogether.

Greenpoint Technologies, one of the three completion centres to so far announce contracts, explains the Dreamliner difference: “The novel composite fuselage and floor structure present the need for new design solutions for structural attachment of the interior furnishings,” says Christine Hadley, senior manager of marketing at the company. “For example, the seat tracks are completely different from any other commercial aircraft. In addition, the electrical architecture is entirely different from other jetliners – the aircraft’s advanced electrical systems include power supply and software-controlled air-conditioning, water and waste and communication systems.”

These aircraft may have only just started to arrive at completion centres, but the roots of these projects were put down much earlier. “Over the past year alone, Greenpoint has held weekly engineering and interior design meetings to define the technical integration of each discipline and to work through details such as ceiling design, sidewall attachments, window integration, IFE integration, plumbing systems, electrical load analysis, rapid decompression and structural substantiation,” reveals Hadley.

More completion centres reveal their preparations for the BBJ 787 in our feature on page 42. Other highlights in this issue include an examination of improvements made to Embraer’s Lineage 1000E (p22) and the Legacy 450 and 500 programmes (p60); an analysis of the models that have defined Beechcraft (p32); a case study of a Challenger 850 dripping in carbon fibre (p68); a look at the reborn Eclipse 550 (p76); and insights into OEM helicopter design (p84).

With the aim of helping those seeking an interior design partner, we’ve also compiled a directory of VIP cabin designers working in Europe (p52). Compiling the list, it quickly became obvious that the continent has an incredible number of talented designers. We hope you will find the directory useful; it is something we intend to nurture and expand in the years to come.

Izzy Kington, editor



Cover image: A BBJ 787
design by Pierrejean
Design Studio

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BBJ 787 42

THE FIRST GREEN BBJ 787 DELIVERY IN DECEMBER 2013 HERALDED THE BEGINNING OF A BUSY PERIOD FOR BOEING-APPROVED COMPLETION CENTRES
Kirby Harrison, Business Jet Interiors International



"The all-composite structures present a unique set of requirements for interior completions; we have invested heavily to master their impact on the completion process"

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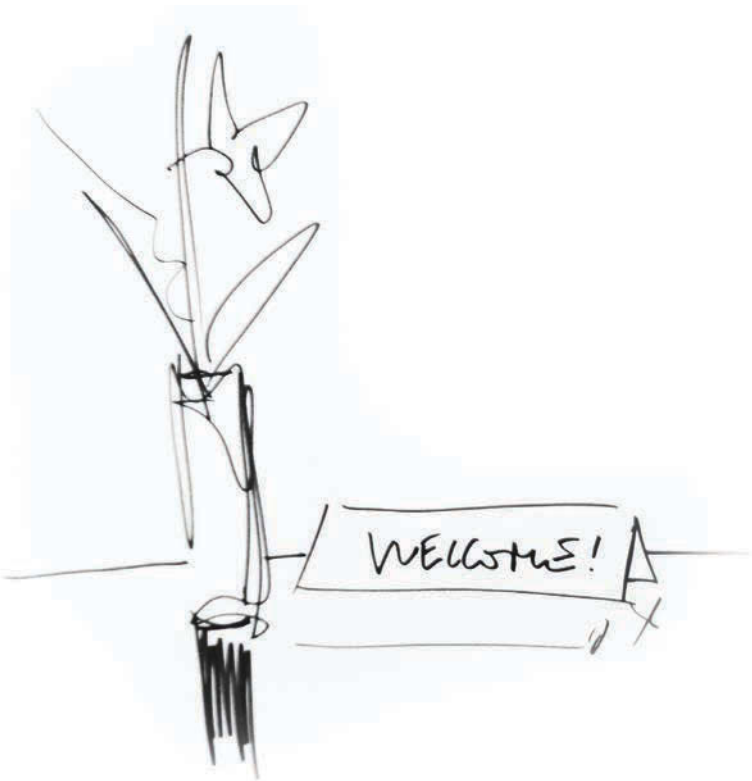
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A BBJ 787 BY PIERREJEAN DESIGN STUDIO THAT USES LIGHT AND WALL PANELS TO STUNNING EFFECT

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THE LINEAGE 1000E RECENTLY BENEFITED FROM UPDATES TO ITS MODULAR OEM INTERIOR, BUT FOR CLIENTS WHO WANT EVEN MORE CUSTOMISATION, THE AIRCRAFT IS AVAILABLE FOR GREEN COMPLETION

Izzy Kington, Business Jet Interiors International

Beechcraft's best

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AS BEECHCRAFT JOINS CESSNA UNDER THE TEXTRON UMBRELLA, WE EXAMINE THE PRODUCTS THAT HAVE LED THE MANUFACTURER TO THIS POINT

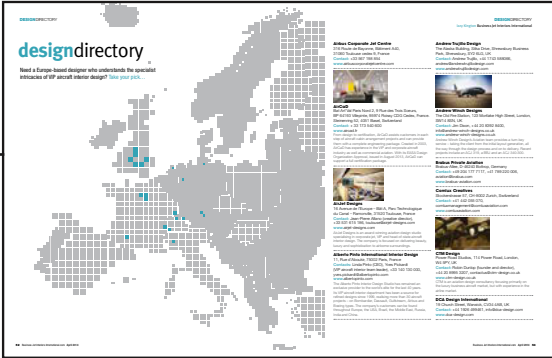
Chris Colvin, Business Jet Interiors International



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A DIRECTORY OF EUROPE-BASED DESIGNERS WHO UNDERSTAND THE SPECIALIST INTRICACIES OF VIP AIRCRAFT INTERIOR DESIGN

Izzy Kingston, Business Jet Interiors International



Legacy 450 and 500 60

THE CABINS OF EMBRAER'S UPCOMING LEGACY 450 AND 500 AIRCRAFT BENEFIT FROM A THOROUGH CUSTOMER CONSULTATION PROCESS

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Challenger 850 case study 68

TRADITIONAL WOOD VENEER WAS DITCHED IN FAVOUR OF CARBON FIBRE ON THIS CHALLENGER 850 REFURBISHMENT

Paul Eden, Business Jet Interiors International

Eclipse 550 76

WITH THE REBIRTH OF ITS VERY LIGHT JET, ECLIPSE HOPES ITS DARK DAYS ARE OVER

Chris Colvin, Business Jet Interiors International



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84 helicopter design

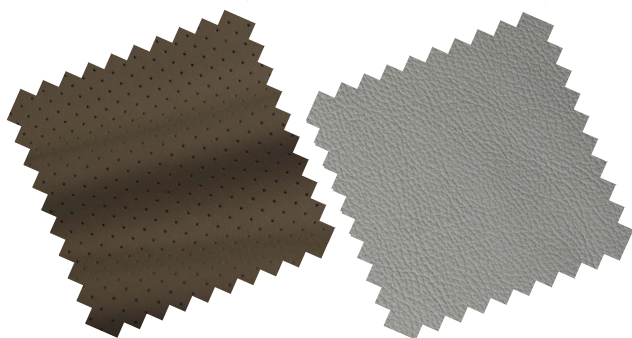
HELICOPTER OEMS TACKLE WEIGHT AND SPACE RESTRAINTS THAT ARE ARGUABLY EVEN GREATER THAN IN A JET CABIN

Tim Kern, Business Jet Interiors International

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A CORNUCOPIA OF THE LATEST LEATHERS, TEXTILES AND CARPETS DEVELOPED FOR BUSINESS JETS

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FIRST DELIVERIES FOR CITATION SOVEREIGN+ AND CITATION M2

In December 2013, Cessna achieved FAA certification and made the first deliveries of its new Citation Sovereign+ midsize business jet and the Citation M2 light jet.

The Citation Sovereign+ is based on the established Citation Sovereign. The cabin is 68in high, 66in wide and 25ft 3in long. New cabin amenities include the integrated Cessna Clarity CMS with touchscreen controllers and larger seats. The standard interior also features a 30in refreshment centre (with dual water tanks) and private aft lavatory. The Citation Sovereign+ has a range of 3,000 nautical miles.

Meanwhile, the Citation M2 is a clean-sheet design that was announced in September 2011. Thanks to a 5in dropped aisle the cabin is 57in high. It is 58in wide, and, including the cockpit, 15ft 9in long. Interior highlights include adjustable seats, eight windows and 45.6ft³ of unpressurised baggage space, across two separate areas. The aircraft has a range of 1,300 nautical miles.



The Sovereign+ features Cessna's Clarity CMS. This includes touchscreen controllers, internet, an interactive moving map and PED integration. Clarity is also available as an option on the M2.

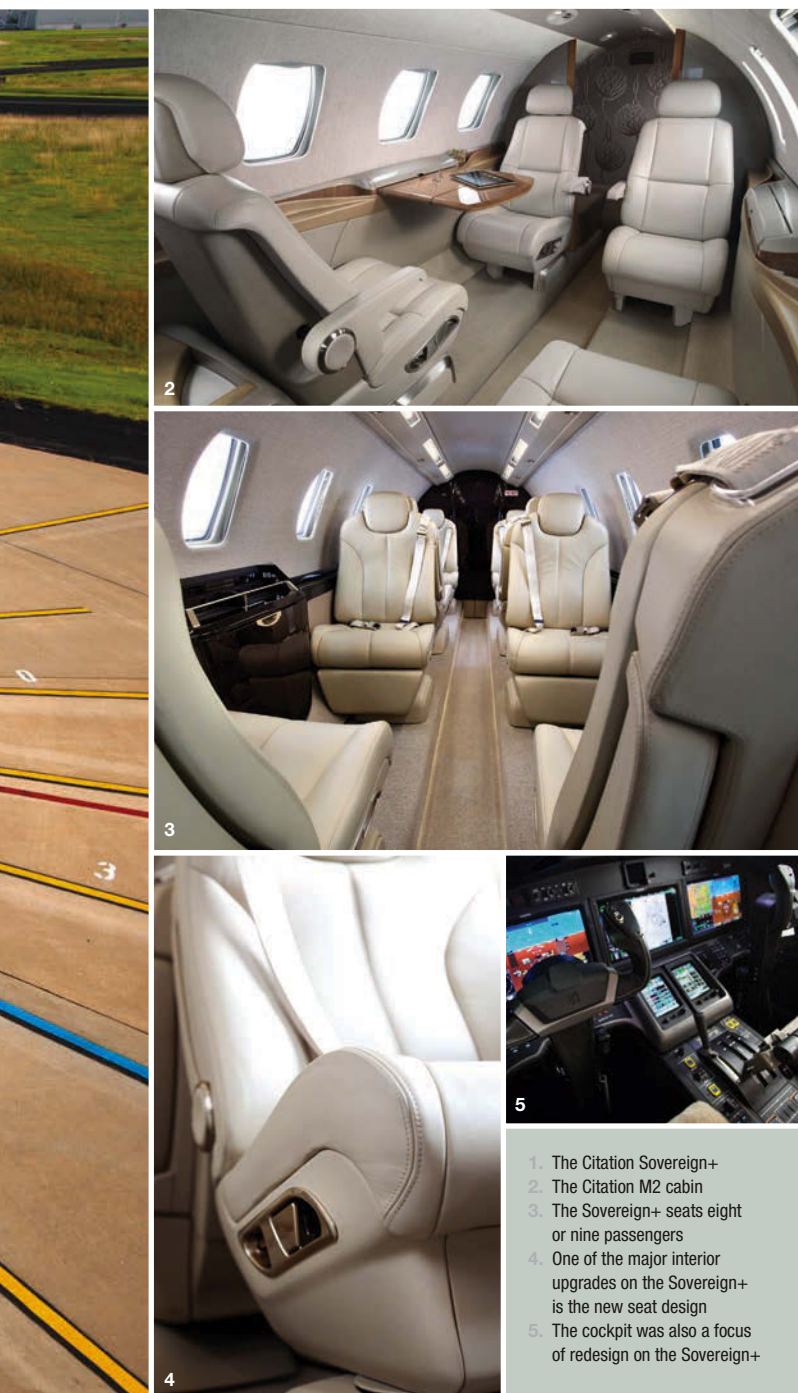


The Sovereign+ is available in eight- and nine-seat configurations. One of the improvements made to the seats was to recess the armrests, thereby giving more aisle room. Lumbar support and footrests are available as options. Meanwhile, the Citation M2 has room for four or five passengers and two pilots.



The aft lav on the Sovereign+ is separated from the cabin by a sliding door, and features a sink with hot and cold water. The M2 has a belted flushing toilet.

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1. The Citation Sovereign+
2. The Citation M2 cabin
3. The Sovereign+ seats eight or nine passengers
4. One of the major interior upgrades on the Sovereign+ is the new seat design
5. The cockpit was also a focus of redesign on the Sovereign+



The Sovereign+ maintains sea-level pressure up to 25,000ft, and 7,230ft-level pressure at its 47,000ft ceiling. It also has a new environmental control system. The M2 has adjustable air vents at each seat.



Q&A: CINDY HALSEY, SENIOR VICE PRESIDENT OF INTERIOR DESIGN ENGINEERING AT CESSNA

WHAT ARE THE INTERIOR HIGHLIGHTS?

The main focus of both interiors was to provide a clean, comfortable and integrated design from cockpit to cabin. We chose to address the interior experience for both pilot and passenger, providing a seamless design flow throughout the entire aircraft. The core market is different for each aircraft, one obviously being owner flown and the other for executive transport. No changes in the overall interior design have been requested on either aircraft. Both interior designs have been met with great enthusiasm.

WHAT OPTIONS ARE THERE FOR CUSTOMISATION?

We support customers who choose to personalise their aircraft. This typically entails unique finish materials, designs that embody their personal tastes or minor cabinetry configuration changes to accommodate specific mission profiles. Exteriors are also an area that customers really enjoy personalising.

HOW DOES THE CERTIFICATION PROCESS DIFFER FOR LEGACY AND CLEAN-SHEET DESIGNS?

The certification processes are similar. We certify legacy platforms to the latest regulatory amendment levels in most instances. The advantage of legacy over clean sheet is primarily time; we can leverage existing designs on legacy platforms. For clean-sheet designs we can't leverage existing designs, therefore they inherently take longer.

WHAT WAS CHALLENGING ABOUT THESE COMPLETIONS?

Customer expectations are driving us to think differently than in years past. These new models are designed to address various challenges in the completion cycle. The expectation of a high-quality, well-designed product is not negotiable. We focused heavily on new materials, manufacturing methods and assembly techniques to ensure a high-quality product. Changes in the regulatory environment can be a challenge to our customers as rules are more stringent today. Features acceptable in the past may not be possible today because of more regulatory oversight. A flexible supply chain is also critical in bringing everything together in a timely manner. We learn from every first completion and pass those lessons learned to each new model. That is the benefit of having a long history of producing great aircraft.

WHAT MAKES YOU PROUD ABOUT THESE LANDMARKS?

I am most proud of the amazing, talented team we have here at Cessna. They listen to customers. They have a passion for making beautiful products. They drive the research and development efforts it takes to bring innovative products to market and they collaborate across all facets of the company to ensure we get it right. As leaders, all we have to do is get out of their way!

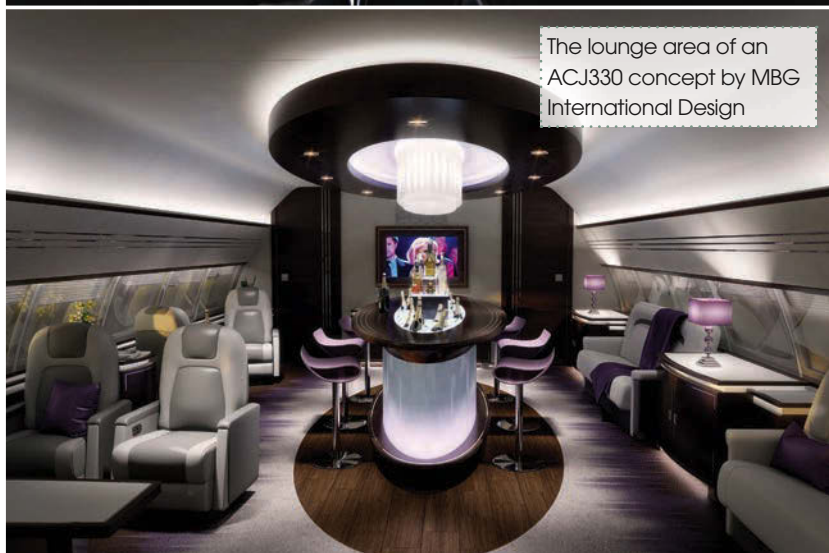
PINBOARD



Daher-Socata's new TBM 900 turboprop, which was certified in March 2014



An ACJ319 designed by Cabinet Alberto Pinto, now entering completion at AMAC Aerospace



The lounge area of an ACJ330 concept by MBG International Design



A majlis on a BBJ 747-8 designed by RWR Designs for a Middle Eastern customer

LAUNCHES



Emteq's 3X series of white wash lighting, designed to make it easier to upgrade to LED lighting



A new printing process for plastic substrates, metal and fabric, from the Stag Group



A tablet mount from Rockwell Collins for its Venue HD CMS and IFE system



HelioJet SpectrumCC, a lighting solution from Schott and Lufthansa Technik



The lounge on an ACJ330-200 by M&R associates design



A Challenger 605 that was added to Global Jet's charter fleet in February 2014

A collection of in-stock fabrics, leathers and carpets for refurbishment projects, from Gulfstream



SkyOne, an IFE and CMS system, and Sky-Fi, a wireless ICS, from Custom Control Concepts

LUXURY LIVING



Clara table lamp by Donghia; €2,989 (US\$4,122)



Pinto Paris's Sodalite collection: €6,900 for the lamp; €2,900 for the large box; €2,300 for the medium box; €1,500 for the small box



A bejewelled bottle opener featuring aquamarine and turquoise, curated by Katharine Pooley; £349.95 (US\$586)



Hermès Dressage L'heure Masquée watch in rose gold; €32,900 (US\$43,750)

BEST OF THE WEB

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COMPLETIONS ROUND-UP

THIS QUARTER'S ANNOUNCEMENTS FROM COMPLETION CENTRES AROUND THE WORLD

MONTREAL, QUEBEC, CANADA:

GAL Aerospace completed the acquisition of AeroQuest, which manufactures components including showers, countertops, window shades, cabinetry and cabin peripheral panels.

KIRKLAND, WASHINGTON, USA:

Greenpoint Technologies announced two BBJ 787 completion contracts; and promoted Annika Wicklund to director, design.

BORDEAUX, FRANCE:

Sabena technics has achieved qualification as a BBJ completion centre, and been awarded the design and VIP cabin integration contract for a new BBJ 737-700. The VIP completion teams have already started the design and engineering work. The aircraft is expected in March 2015.

HAMBURG, GERMANY:

Lufthansa Technik is increasing its investment in R&D from €50m over the last five years to €200m over the next four years.

LINCOLN, NEBRASKA, USA:

Duncan Aviation is collaborating with Cessna on an upgrade programme for the Citation CJ2+. The company also recently put together a mobile team of interior service specialists to provide scheduled and unscheduled interior services outside of its major facilities; and completed its second Falcon 900B project with Universal Avionics' EFI-890R cockpit retrofit upgrade. The aircraft also showcases a newly designed interior, paint and fully digital HD CMS. In December, the company's Lincoln, Nebraska, facility celebrated its 50th anniversary.

BASEL, SWITZERLAND: AMAC

Aerospace has been awarded its first completion contract from an Asia-based client. The ACJ319 will undergo a complete nose-to-tail completion using designs provided by Alberto Pinto. The completion is anticipated to start in summer 2014 and be re-delivered by the second quarter of 2015. In February 2014, the company announced a BBJ 777-200LR completion contract.

PETERBOROUGH, ONTARIO, CANADA:

Flying Colours Corp delivered its first Bombardier Challenger 850 to feature a reconfigured cabin with carbon fibre throughout. The company also delivered a reconfigured Challenger 604 destined for a Nigeria-based client; and received complete airframe and specialised service CCAR 145 MOC approval from the Civil Aviation Administration of China.

OBERPFAFFENHOFEN, GERMANY:

328 has won a contract to manufacture an ACJ340-600 rear galley complex for Jet Aviation Basel. The manufacture will be undertaken at 328's headquarters, with installation to take place at Jet Aviation in Basel.

EDLITZ-THOMASBERG, AUSTRIA:

Lufthansa Technik and LIST components & furniture founded a joint venture company, Inairvation. The companies intend to blend entertainment electronics, furniture and lighting together in an advanced design.

ST LOUIS, MISSOURI, USA:

Flying Colours Corp's USA-based facility is close to finalising major reconfiguration and maintenance work on a Bombardier Learjet 35 for a private African client.

INDIANAPOLIS, INDIANA, USA:

Comlux America announced an ACJ320 completion contract. The aircraft is expected to arrive in the second quarter of 2014, and will be outfitted with an interior designed by Comlux Creatives.

BASEL, SWITZERLAND: Jet

Aviation Basel was selected to complete the interior of an ACJ320 for a head of state. The aircraft is expected in the third quarter of 2014, and to be redelivered to the client at the end of 2015. The configuration will include a bedroom, bathroom, lounge and office area, in addition to a large executive staff area.

BERN-BELP, SWITZERLAND:

RUAG Aviation upgraded a 33-year-old DHC-6 Twin Otter for Blue Bird Aviation Yemen.

OBERPFAFFENHOFEN, GERMANY:

RUAG Aviation and Yasava are collaborating to deliver the Astral Design concept for long-range large-cabin business jets. RUAG Aviation will perform the cabin integration work.

SAN ANTONIO, TEXAS, USA:

AERIA Luxury Interiors became an approved BBJ completion centre and secured its first green completion contract from a Europe-based BBJ 737 customer.

DENTON, TEXAS, USA:

Greenpoint Aerospace inducted a BBJ3 for a minor interior refurbishment during the aircraft's maintenance A-check.

DALLAS, TEXAS, USA:

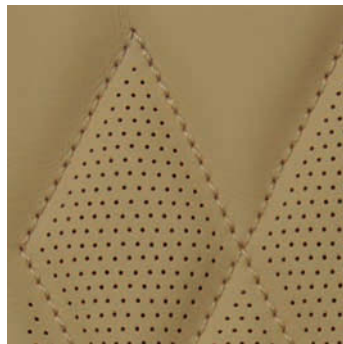
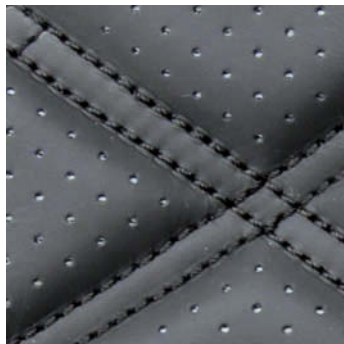
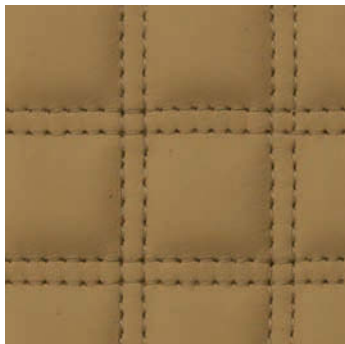
Associated Air Center (AAC) announced a BBJ 787-8 completion contract in January. The aircraft should be delivered green by Boeing in mid-2014. The interior was designed by AAC's in-house design team. AAC also received STC approval for multiple wi-fi solutions for the Satcom Direct Router; signed its 12th BBJ 12-year inspection; and redelivered its 11th 12-year check – including a full cabin refurbishment.

SINGAPORE:

Bombardier chose Flying Colours Corp to offer refurbishment services for Learjet, Challenger and Global jets at the OEM's Singapore Service Centre.

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ARABIAN LIGHTS

This BBJ 787 interior, code-named Noor, was designed by Pierrejean Design Studio for an undisclosed client. The aircraft will be used privately, and will accommodate 30 passengers.

"The owners were looking for something totally new, as befitting the BBJ 787," says Jacques Pierrejean, principal at Pierrejean Design Studio. "Our idea was to develop something very new in opposition to the heritage of their own country; a reminiscence of tradition in a futuristic environment. We were influenced by the delicate use of light in traditional architecture, and the light that is glimpsed in narrow streets. This kind of mysterious atmosphere was the starting point of our design philosophy."

To achieve this, Pierrejean proposed creating a second, decorative, skin for the sidewalls, which would also hide LED light sources. The panels are clearly influenced by mashrabiya, a type of wooden window covering featuring elaborate carvings that is found in traditional Arabic architecture. "This decorative concept was devised paying special attention to the weight impact of these additional structures," says Pierrejean. "The panels will be specially moulded from a composite material, and installed against the window frames."

Pierrejean notes that the design definition was completed quite quickly. "We started with the owner's brief, then after further exchanges we produced some hand sketches to make sure that the target was clear and the requests fulfilled," he says. "We suggested three colour schemes, using mood and sample boards. The final style was clarified by adding pictures. We agreed very rapidly on the materials."

After producing renderings showing different angles, and some details in full-scale 3D, the design house proposed a full-scale mock-up. "Moving through this concept the owner immediately accepted our proposal and was even more convinced than during the rendering stage, when they thought it all a little bit too futuristic," says Pierrejean.

SIDEWALLS

Each of the double window panels is covered by a creamy, pearly white frame with a 3D cut-out pattern that lets in light from LEDs hidden behind.

TABLE

The concept was to offer lower seating than is conventional, while maximising comfort. The table will be lacquered with a delicate satin coating.



GUIDED TOUR

LIGHTING

The cabin's soft and neutral colour scheme creates a fantastic background for a range of subtle lighting scenarios. In the dining area these will range from soft for dining to bright for conference sessions.

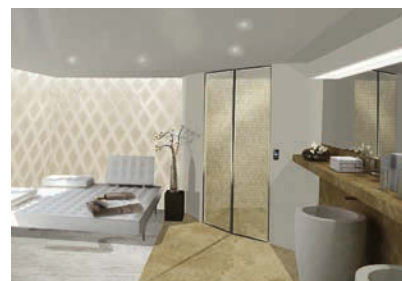
BEDROOM

The bedroom is designed in the same spirit as the dining room – with panels covering the sidewalls, which hide LED light sources. Also like the dining room, mood lighting features prominently. In terms of comfort, the bed has an articulated mattress, so the angle can be adjusted to enable its use as a day bed in harmony with the other seats in this room, or for sleeping.



DRESSING ROOM AND WASHROOM

Between the bedroom and the washroom is a dressing room with a vanity unit, where the owner can place his luggage. The washroom is split into two parts – for him and for her. In each area there is a dedicated stowage – each with its own illumination to assist users when they are looking for something.

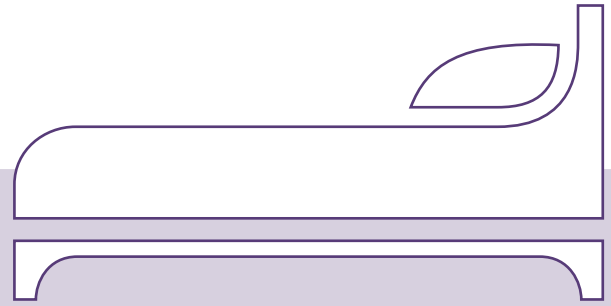


GALLEY

The aircraft's owner wanted to be able to cook his own meals on board, so the galley was imagined like a domestic kitchen – large enough to be part of the owner's recreation area. The galley is now not reserved for the crew, but is as important a part of the cabin as the lounge or dining area.

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DESIGN PANEL: BEDS

FROM THE ANGLE OF THE BED TO THE DENSITY OF ITS MATTRESS FOAM, ITS SAFETY IN AN EMERGENCY AND THE FEEL OF ITS LINEN – THERE ARE MANY FACTORS TO CONSIDER IN THE QUEST FOR THE PERFECT INFLIGHT SLEEPING ENVIRONMENT

NIKKI GLEDHILL: Balancing functionality with aesthetics. Customers who own an aircraft large enough for a bed expect it to be comfortable while still an integral part of the design. Many customers say they would like the aircraft bed to feel more like the one in their home.

WHAT IS CHALLENGING ABOUT THESE INSTALLATIONS?

SEAN GILLESPIE: Achieving the client's comfort and bed size requests within the space you have available. With medium-size jets the limited space may be used for multiple purposes – sitting and socialising as well as sleeping. Also, it's important to ensure that the bed looks good and functions perfectly. We have had customers demand many things when it comes to sleeping, including beds that pivot depending on where the aircraft is positioned. We have also made beds out of seats, using custom-manufactured mattresses. Generally clients also want the sleeping area to be private.

ED HARRIS: During the initial discussions, the completion centre must determine if the bed will be an articulating type so that the headboard can move in flight to adjust for the 3° tilt in flight. If not, the centre can just make a fixed platform with no articulation, but with 3° built into the platform. The only problem with this is if that the customer uses the bed on the ground, it can be uncomfortable.

The next issue is that because a bed takes up so much room (normally outboard), it makes the room's decompression analysis more complicated. This means that although we may have completed our structural analysis, it is later complicated by a mechanical systems engineer who is running behind with the decompression analysis. Air exchanges back and forth between the upper and lower cargo/main deck outboard, and the bed is directly in this path, so you must take into account the bed's ability to withstand flight and crash loads, and ensure it has adequate openings for air to flow around it.

We certify beds under the FAA STC process or per Technical Standards Order (TSO) 39B. You can think of the bed as a berth in an aircraft when using the TSO method. In both cases, we pull-test the bed frame the emergency loads. This testing makes the weight and construction of the bed frame critical. Because most beds have two people sleeping in them, we have to factor for 2,500 lb up loads, 5,500 lb down loads and 5,000 lb side loads. We also ensure the bed is prepared for a medical emergency, by means of an emergency override that drops the headboard and footboard to a flat position for CPR. Certification of a new bed design can easily take 12 months, so the completion centre must take this into account right at the beginning of the programme.

After all these challenges, the bed has to match the customer's approved design. Customers demand a quality product that meets all the aesthetics of the renderings and specification and can be FAA/EASA certified.

ALLAN DUCK: When sourcing bed linen for VIP jets, sizing is always the major issue because of the complexity of mattress sizes, shapes and depths, as well as the location of the bed and whether an appropriate tuck can be accomplished. Generally, the standard retail sizes (king, queen, etc) do not work. Clients expect the best materials, such as cotton sateen, percale, cotton voile and linen. Preferences for embroidery, colour and piping are evident as well but are generally easily achievable.

THE PANEL



NIKKI GLEDHILL
CEO and interior designer at
MBG International Design



ED HARRIS
vice president of sales and
marketing at Jeff Bonner
Research & Development



ALLAN DUCK
principal of
Dahlgren Duck & Associates



SEAN GILLESPIE
executive vice president of
Flying Colours Corp

ALLAN DUCK: We work directly with the finest linen manufacturers. They need to have state-of-the-art facilities, yet maintain old-world artistry. They have to be excellent at interpreting the design, cutting, sewing and fitting to exacting specifications while always considering shrinkage. Important factors in a great sleeping experience include mattress quality and coil tension, sheeting, blankets, pillows and duvets.

NIKKI GLEDHILL: It is important to ensure that the client understands what is achievable from the start of the design process. We can make mattresses to meet specific requests, arrange for luxurious bedding and customise the ergonomics of the mattress. As designers, our challenge remains to create a shroud that is aesthetically in line with the design as well as meeting all the requirements for certification. Sometimes creating an environment with ambient lighting, and soothing colours and materials, can take the focus off the bed and allow the customer to enjoy the room in its entirety.

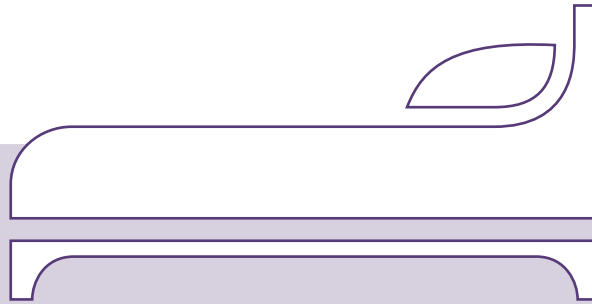
HOW HAVE YOU OVERCOME THESE CHALLENGES?

ED HARRIS: It is vital to employ the right engineering company to do the initial design. A bed design requires a 25.562 DER to be involved, but there are only a handful of these people in the USA. I rely on Steve Brown of SBJ Aero.

We recently delivered a bed that faced inboard on an ACJ340. The customer wanted the bed to be controlled by the CMS. It has an electric headboard, so you can read in bed and an electric tilting feature to adjust for the 3° take-off angle. This means the whole bed platform has to rise up; it was a very complicated design.

To optimise comfort, we can raise the legs and the head simultaneously or independently. When I was a medic in the army, we were taught to move people so that they don't sleep on one spot and create a pressure point; it's important that the customer has control over their sleeping environment. I would recommend a soft-to-medium foam density for the mattress.

SEAN GILLESPIE: We have created templates for the customer to test fit to ensure it meets their comfort demands. Our most recent bed installation was a permanent solution in the aft cabin of a Global Express. We designed and engineered the bed with a custom mattress and bed frame. The cabin is private, with a pocket door separating the mid-cabin from the aft.



ED HARRIS: The bed in its current design has been around for many years. It is like the wheel; how do you improve on perfection? The key to sleep is the mattress – come up with a better mattress and you have a better sleeping environment. Domestic beds typically have a mattress with a box spring underneath, which adds support to the mattress and allows for some spring rate, controlling the weight on the mattress. We have made a bed pan that has some of the characteristics of a box spring. Air, water and goose down are wonderful to sleep on, but they all have design and certification problems on an aircraft.

NIKKI GLEDHILL: With more technologies and custom parts becoming less expensive to produce we will be able to design and install beds that are outside the box. One potential hurdle is finding customers who are willing to pay for initial certification studies as well as agreeing to change a feature that has been the same for many years. Being the first to do something is both groundbreaking and expensive, and not all customers will feel their bed is worth spending extra money on, unlike their seats and divans.

If I could create a radically different sleeping environment, perhaps it would be interesting to integrate a suspended bed from the headliner. By using connectors that can absorb the movement of the fuselage in flight, a slight rocking motion could provide a nice soothing feeling while resting.

WHAT DOES THE FUTURE HOLD?
WHAT IS OUT OF THE QUESTION?

SEAN GILLESPIE: I think the demand for beds and other comfortable sleeping environments can only increase. We never say something is impossible or out of the question. We never rule anything out.

ALLAN DUCK: We haven't noticed specific trends in linen and do not expect anything vastly different from what has satisfied affluent individuals for centuries. We think that because of the internet and social media, there will be a greater awareness of what makes a great sleep experience. We are a strategic partner with Jetbed, as we provide custom linens to fit their products' specifications, and we expect continued growth for their product.



THE VIP BEDROOM ON AN
ACJ330-200 CONCEPT BY
MBG INTERNATIONAL DESIGN

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lineofbeauty

The Lineage 1000E recently benefited from updates to its modular OEM interior, but for clients who want even more customisation, the aircraft is available for green completion



1. The Lineage 1000E interior, unveiled at NBAA 2013

Modularity has been a keystone of the Lineage 1000E's proposition since its launch in 2006. Customers have 4,085ft³ to play with, within which they can create a five-zone interior (accommodating up to 19 passengers) by selecting from pre-engineered modules, created in cooperation with Priestmangoode. "The number of combinations possible is vast, so most of the aircraft delivered so far have been very unique," says Augusto Salgado da Rocha, senior manager of product strategy and sales engineering at Embraer Executive Jets.

All of the 18 Lineage 1000s delivered have followed this concept – so it is no surprise that it survives Embraer's latest updates to the aircraft, unveiled at NBAA 2013. As well as enhancements to the range, cockpit and exterior, there is a new – but still modular – interior design, developed in partnership with LIST components & furniture. "The modular strategy provides a level of flexibility never before seen in an OEM interior," says Salgado da Rocha. "A dining room, 13.8ft-long divan, media lounge, office, bar, master bedroom and shower are some of the possibilities that make the Lineage 1000E a unique offer."



2



3

What's new? Design improvements include a new sideledge design and personal storage spaces, refreshed monuments, better ergonomics and more storage space in the galley, redesigned lavatories and bedroom, improved acoustics and style enhancements. The seats are also new – built by Aero Seating Technologies to offer better ergonomics and a more refined structure and upholstery. In addition, pocket doors are now electric and tables deploy automatically.

Another big upgrade is the new CMS/IFE system – Honeywell's Ovation

POCKET DOORS ARE NOW ELECTRIC AND TABLES DEPLOY AUTOMATICALLY

Select. Both the (redesigned) media lounge in zone three and the bedroom in zone five feature dedicated media centres. All audio and video inputs converge on these areas, including local Blu-ray players and iPod dock options, AV inputs (HDMI, USB, RCA, 3.5mm audio, VGA), power outlets and surround 5.1 audio.

The digital system also features iPad and local touchscreen controls, HD 1080p video and larger (up to 55in) and slimmer displays. The system can be integrated with Apple devices and other streaming boxes, and can be controlled wirelessly by iPad. Another highlight is the JetMap high-resolution 3D moving map, while adjustable shelves and PC power outlets make for easy installation of game consoles. Honeywell also provides its Primus Epic avionics suite for the aircraft.

2-4. Key improvements include new sideledges, seats and CMS/IFE, plus more stowage in the galley

LINEAGE 1000 TIMELINE

May 2006

Lineage 1000 announced

November 2007

First delivery to a completion centre (PATS Aircraft Completions of Georgetown, Delaware, USA) for outfitting with a Priestmangoode-designed interior

December 2008

ANAC and EASA type certification

January 2009

FAA type certification

May 2009

First Lineage 1000 delivered to HE Aamer Abdul Jalil Al Fahim of Abu Dhabi, UAE

August 2011

CAAC type certification

August 2012

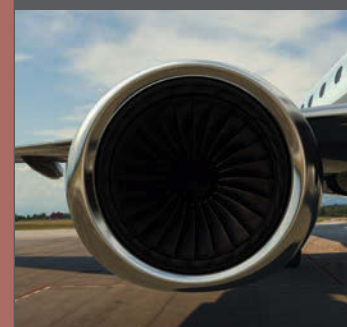
First delivery to a customer based in mainland China – Xinjiang Guanghui Industry Investment Group

December 2012

IAC/MAK type certification

October 2013

Lineage 1000E announced



New material options include LIST's stone veneer and stone flooring (which can be used in the welcome lounge, galley and lavatories) and countertops. A shower will be available with stone or wood veneer walls, as well as stone flooring. LIST's stone flooring is also offered on the Legacy 650, 500 and 450. The stone (natural granite) is cut to 2.5mm to minimise weight.

Above and beyond The Austrian company's involvement went beyond that of a supplier, however. "Our remit was to take Embraer's concept design and develop a high-quality interior based on our experience producing cabinets and components," comments Peter Berein, who is responsible for programme management at LIST. "We

Weight reductions

The Lineage 1000E is about 500 lb lighter than its predecessor, mainly due to efforts in three areas.

The first of these areas is structures. The forward fuselage has been optimised by removing the forward door and mechanisms. Depending on the interior configuration, up to 13 'mirage' windows – those hidden behind interior monuments – can be removed. The fuselage's internal supports have also been tailored to the Lineage 1000E interior.

The second area in which weight savings were made is systems. The harness has been optimised, through better design and routing; while CMS/IFE architecture has been revisited, with the result that all remote boxes are now attached directly to the fuselage, so lighter attachments can be used.

Finally, weight has been saved in the cabinetry design, through solutions such as eliminating hardwood for tables and sideledges.

had to adapt the industrial design to ensure optimised production processes and the best use of materials. Our task was to engineer, certify and manufacture a product of the highest quality, and that is innovative in terms of materials and product development."

"LIST has been involved with other Embraer programmes, such as the Legacy 650, 600, 500 and 450, and the experience has been very positive," says Salgado da Rocha. "Innovative materials, such as the stone veneer – as well as manufacturing capabilities that allow for improved quality, finishing and unique design features – made LIST a perfect fit for this new aircraft. For instance, their ability to apply veneer to curved surfaces allowed hardwood to be removed from table and sideledge edges, which is not only beautiful, but also reduces weight."

"Thanks to a newly developed process, wood veneer can be applied to 3D formed parts without any seams," explains Berein. Applications include stowage cabinets in the galley and entrance areas. "This allows wood veneer to be applied to cabinetry throughout the entire aircraft,

WE HAD TO ADAPT THE INDUSTRIAL DESIGN TO ENSURE OPTIMISED PRODUCTION PROCESSES

5. SottoStudio's Skyacht One interior, which highlights the aircraft's availability for green completions

DESIGN IN BRIEF

Eddie Sotto of SottoStudios created this bespoke Lineage 1000E, named Skyacht One, to be featured as one of 21 'ultimate gifts' in the Robb Report's December 2013 issue.

EXPERIENTIAL DESIGN: Sotto honed his theatrical, experiential style in Disney's Imagineering division, where he was senior vice president of concept design. With this interior he was keen to tell a story – that of navigation. "There is power in continuity," he says. "Experiential design is about your senses – what you smell and touch, etc. If you can tune all of the sensory experiences around one idea, it produces a much more powerful emotional result."

NAVIGATION: Sotto wanted to go against the modern look, and was inspired by the exposed engineering of classic yachts. Even the underside of the aircraft would be painted to look like a mahogany hull. Inside, details such as Italian marquetry, mahogany ribs with inlaid panelling, brass window frames, armillary spheres and Cellarius charts continue the navigational theme.

LUXURY PRODUCTS: As well as taking inspiration from luxury products, the aircraft is furnished with some – for example, Piero Fornacetti's Astrolabio dinner service. Sotto was determined that the interior should reflect the richness that private jet owners are used to in other aspects of their life. "Clients always say they want to reward close inspection," he says. "The closer you get, the better it should be, just like any fine antique or car."



5

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over the
Lineage 1000

3

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(including cockpit)

something normally restricted by design. The elimination of hardwood for 3D parts also saved weight.”

LIST also developed “ultra-light” 3D carbon fibre parts for applications including the shower, headliner, window panels and complex pieces of furniture. Berein adds that the company’s expertise in cabinetry also means the Lineage 1000E now benefits from surface finishes that can withstand a much wider range of environmental conditions.

As well as cabinetry, LIST was responsible for the design of water and waste systems, pocket door and fold-out table mechanisms, and electrical components. “A new hi-lo table was also developed with infinitely variable height adjustment and a single leg for more legroom,” says Berein. “It meets the abuse requirements at any height. We also made its movement quieter and smoother.”

Green giant As well as all these improvements to its modular offering, Embraer has recently stepped up its promotion of the fact that the Lineage 1000E is available with a green

IT TAKES AROUND 12 MONTHS TO PRODUCE A GREEN LINEAGE 1000E

6. The modular Lineage 1000E now features electric tables

7. SottoStudio’s Skyacht One concept features mahogany ribs inspired by yachts

type certification (TC) package – an option that has actually been available since 2011. This means the aircraft is delivered green (without interior fittings, but with documentation and engineering support) to the third-party completion centre of the client’s choice, where it is outfitted with a completely bespoke cabin. Eddie Sotto’s Skyacht One concept (see *Design In Brief*, previous page) highlights this ability.

Jay Beaver, vice president of marketing and interior design at Embraer Executive Aircraft, estimates that it takes around 12 months to produce a green Lineage 1000E, and a further 24 months for a completion centre to install a bespoke interior of the complexity of Skyacht One. Should someone order that cabin (only one



Embraer Lineage 1000E

Cabin width: 8ft 9in

Cabin height: 6ft 7in

Cabin length: 84ft 4in

Seats: 3 crew + 19 passengers

Range: 4,600 nautical miles at Mach 0.78 with eight passengers, three crew and NBAA IFR reserves

High-speed cruise: 472kts

Max altitude: 41,000ft

Price: US\$53m (£32m)

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8

Material matters

Customers have a huge selection of materials to choose from for the modular Lineage 1000E – including 700 fabrics, 400 leathers, 60 carpets and 35 veneers.

To help customers with this process, Embraer opened a 58,000ft² two-storey Customer Center at its Melbourne campus in Florida, USA, in December 2011. The facility – which is used for customers of all Embraer's executive jets – includes a mock-up showroom, dining room and event area, Phenom 100 delivery hangar and suites, and five design studios equipped with large flatscreen monitors and rendering software.

will be sold, to ensure exclusivity), it will cost them US\$83m (£50m). A baseline modular Lineage 1000E is US\$53m (£32m) at 2014 list prices, and the interior installation takes roughly four months, bearing in mind the interior production starts earlier, in parallel to that of the airframe. The interiors are fitted at Embraer's facility in São José dos Campos, Brazil.

Sizing up the competition Embraer does not offer any of its other aircraft as

a green package. However, as an ultra-large executive jet based on an airliner platform (the single-aisle E190), the Lineage 1000E is in direct competition with BBJs and ACJs.

Within this category, Salgado da Rocha says the ACJ318 is the Lineage 1000E's closest competitor, as it has a similar floorplan area. "The Lineage 1000E has a lower price point, 13-20% lower operating cost, and greater operational flexibility than the ACJ318," he contends. "Besides this,

- 8. The modular interior's new seats are supplied by Aero Seating Technologies
- 9. Embraer is pitching the Lineage 1000E against ultra-large 'big iron' aircraft and ultra-long-range jets

the Lineage 1000E has very attractive cabin geometry. While other aircraft may have wider cross-sections, the Lineage 1000E's longer cabin allows for more compartmentalisation. With the modular Lineage 1000E we have a welcome area, five cabin zones, plus the 323ft³ inflight-accessible baggage compartment, and hard partitions and pocket doors throughout the cabin. The ACJ318, with a similar floor area, has a wider cross-section but a shorter cabin, which allows for four zones."

THE LINEAGE 1000E IS IN DIRECT COMPETITION WITH BBJs AND ACJs



9

Range versus cabin volume Salgado da Rocha makes the case that the Lineage 1000E also competes, indirectly, in the ultra-long-range category if range is "not a hard point" for the customer.

"While the Lineage 1000E does not have the range of an aircraft in that category, its cabin volume can be more than double that of a similarly priced jet in that class," he elaborates. "The Lineage 1000E is capturing attention from people interested in buying ultra-long-range jets. Some people may question how many times they will really need to fly more than 4,500 nautical miles non-stop and start wondering why not enjoy a much more comfortable cabin instead? The cabin will be there for every flight, while that ultra-long mission may happen only once in a while."

Clearly, in both markets targeted by the Lineage 1000E, its cabin is an extremely important part of the sales proposition. **END**

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SKILLETS





mixedfortune

As Beechcraft joins Cessna under the Textron umbrella, we examine the products that have led the manufacturer to this point



Beechcraft's heritage goes back to 1932, and includes the manufacture of more than 54,000 aircraft. The company has done much to advance business aviation in general, and business aircraft interiors in particular.

Its recent history has been a little more turbulent – Hawker Beechcraft went into Chapter 11 protection in 2012, from which it emerged without

the Hawker moniker, reflecting the company's decision to put the Hawker jet programmes on ice.

But the restructuring seems to have been a wise move. The company reports that it became very profitable again. Now it has been acquired by Textron, and joins former rival Cessna under the Textron Aviation brand, which has Scott Ernest, Cessna's president and CEO since 2011, at the helm as CEO. In the March 2014

1. Walter and Olive Ann Beech in 1941, overlooking the assembly line



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2



3

announcement, Textron noted that Cessna, Beechcraft and Hawker would “remain distinct brands to preserve their rich histories and respective strengths in the marketplace”.

There is a certain synergy and irony in all of this. In 1924 Clyde Cessna, Walter Beech and Lloyd Stearman started the Travel Air Manufacturing Company in Wichita, Kansas, USA. In 1927, Cessna left to start his own company and in 1932 Beech would follow suit. But despite their entwined

2. The King Air 350i, first delivered in October 2008
3. The King Air C90GTx, first delivered in July 2010

beginnings, Cessna and Beechcraft have taken quite different approaches.

Head and heart Beech (as it was called at the time) appeared to believe that its responsible and economical line of King Air turboprops would never be supplanted by business jets for trips under 600 miles. So as Cessna began developing its thirstier Citation fanjet in the 1960s, largely for this same mission, Beech responded by bifurcating the King Air line. But the

CESSNA AND BEECHCRAFT HAVE TAKEN QUITE DIFFERENT APPROACHES

BEECHCRAFT'S DEFINING MODELS

Model 17 to G17 'Staggerwing'

This slick US\$14,000 (£8,412) biplane made its debut in 1932. It features a single radial engine and retractable landing gear, with seating for five. It also boasts a brisk cruise speed of 200mph. Its rugged main landing gear and tail dragger design allow it to easily land on grass and dirt runways. The model was called the Staggerwing because its top wing is set slightly aft of the bottom one. Aimed at the corporate market, construction was largely spruce and fabric; interiors offered leather, mohair and mahogany, creating the look and feel of a

luxury automobile of the day. Passengers sit behind the pilot positions on a padded three-place bench seat easily accessed by a pair of large doors. Beechcraft built 785 during the aircraft's 15-year production run. The aircraft was used as a bomber during the Spanish Civil War and as a VIP transport for the US Army Air Forces and the Navy in World War II. The 241 Staggerwings that have survived are coveted by aviation enthusiasts – a Staggerwing in good condition can command a price of more than US\$500,000 (£300,415) today.



Bocman1973 / Shutterstock.com



CESSNA'S CITATION ATE MORE AND MORE OF THE KING AIR'S MARKET SHARE

- 4-5. Beechcraft unveiled updated interiors for its Baron and Bonanza models in 2011
6. The company's headquarters in Wichita

Citation ate more and more of the King Air's market share.

Perceptions Perhaps this is because, despite the fact that a turboprop may have a bigger cabin, arrives in around the same time for trips under 300 miles, and can do so for less, it may not have the same glamorous associations. Arriving in a jet, no matter how small or how slow, has an air of regality.

Beech responded in the late 1970s by launching the Starship, an all-composite tail-less twin turboprop pusher that expanded the technology envelope in all directions – at a

company that had always been evolutionary. Beech spent an estimated US\$1bn (£0.6bn) on the project and only built 53 aircraft, which it would later buy up and incinerate rather than bear the cost of ongoing product support – although a handful of



Models 18 to H18 'Twin Beech'

Like the Model 17, the twin-engine Model 18 features a tail gear layout with retractable main gear. The Model 18 debuted in 1937 and stayed in production until 1970; more than 7,000 were delivered. Most of these were used as military trainers during World War II, but the aircraft developed a loyal corporate clientele and featured a cabin layout that remains a mainstay of business aircraft today: facing seats in a club-four configuration with tables that deploy from the sidewalls. Beginning with the Model E18S in 1955, the fuselage height was stretched by 6in, to improve passenger comfort. The Model 18 remains in service today, mainly with freight and skydiving operations.

Model 35 to G36 'Bonanza'

The single-engine piston Bonanza is the longest continuously produced aircraft in history, with more than 18,000 units delivered since 1947. A key feature of the current model, the G36, is that the cabin can be reconfigured quickly, with a choice of four layouts, seating up to six passengers. Beechcraft's Baron aircraft is based on the Bonanza, but with twin engines.

Models 65 to 80 'Queen Air'

The Queen Air is another piston-powered twin that was aimed at the business market. Some 900 were produced between 1960 and 1978. Queen Airs can be identified by their square passenger windows and

squared-off tail. The fuselage became the basis of the King Air that followed.

Models 90 to 350i 'King Air'

Sleek exterior styling, oval passenger windows and the smoothness and reliability of twin turboprop power distinguish King Airs. The aircraft have been in production since 1964, and during the 1960s, commanded 77% of the twin turboprop market. Currently Beechcraft has three models on offer, in increasing sizes: the C90GTx, the 250 and the 350i/ER. Highlights of these latest models include sliding and swivelling executive passenger seats, lavatory seats, drink rails, improved pressurisation and air-conditioning, and a tall air stair.



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renegade owners refused to participate in the carnage, so some of these aircraft still fly today.

Jet set From the 1980s, Beech tried to make its own mark in the jet market by buying, refining, distributing and periodically updating a pair of jets – the light Diamond from Mitsubishi (renamed the Beechjet and later the Hawker 400) and the midsize HS125 Hawker from British Aerospace. This was a successful strategy – Beech delivered 667 Beechjets in total, and 1,084 HS125 variants between 1993 and 2012.

Meanwhile, Beech developed a pair of its own jets, the light Premier and



the super-midsize Hawker 4000, both with composite fuselages. The Premier achieved some market success, with 295 delivered by 2012, when production stopped. The Hawker 4000 programme was not as successful. Announced in 1996, the aircraft took more than a decade to certify and another two years after that to debug. By the time production ended in 2012, 76 had been made.

7-8. The midsize Hawker 900XP
9. The King Air C90GTx cabin

FROM THE 1980s, BEECH TRIED TO MAKE ITS OWN MARK IN THE JET MARKET



Model 2000 'Starship'

The prototype Starship made its first flight in February 1986 and was certified in December 1989. Despite its difficulties, the twin-turbine Starship did blaze the trail for the business aircraft of today. It was the first pressurised all-composite aircraft to achieve certification, the first 'tail-less' aircraft to do so, and the first to feature an all-glass digital instrument panel in the cockpit. Some argue that the beefy wing design still delivers a smoother ride than any other business aircraft. The aircraft also featured a forward canard, and had seating for six passengers. Another iteration, the 2000A, featured reduced cabin noise and performance improvements.

Models 400 to 400XPR 'Beechjet'

The flat-floor cabin and then-unique squared oval fuselage gave passengers more leg and shoulder room than any other light jet of its era. The 305ft³ passenger cabin is 4ft 9in tall, 4ft 11in wide, and 15ft 6in long. Cabin pressure is equivalent to sea level up to 24,000ft. The jet was upgraded and renamed several times, as the 400A, the 400XP and the 450XP. Beechcraft began offering an upgrade package for the 400XP and 400A in 2010. The 400XPR (pictured right) features winglets, a new engine and optional enhancements including interior refurbishment. The airframe also serves as the basis for Nextant Aerospace's remanufactured version, the 400XT. As well as



new Williams FJ44 engines, the 400XT package includes LED lighting, modern switching, IFE components, re-foamed and recovered seats, better soundproofing and restyled headliner and sidewalls.



TEXTRON'S MAIN REASON FOR BUYING BEECHCRAFT IS THE KING AIR LINE

11



Changing hands Over the years, Beech has changed ownership many times – first it was taken over by the defence conglomerate Raytheon, then by a pair of investment banks (which rebranded the company as Hawker Beechcraft), and finally, by its creditors through bankruptcy. Now, the restructured company has been bought by Textron for US\$1.4bn (£0.84bn).

Funnily enough, Textron's main reason for buying Beechcraft is the

10. The interior of the King Air 350i
11. The three current-production King Air models (350i, 250 and C90GTx) flying in January 2014 to mark the 50-year anniversary of the King Air

value of the King Air line. Through all the company's changes, the rugged, simple turboprop twin has stubbornly stayed in production since 1964, popular with a market niche that will not die. Product support for the installed fleet in 2013 was worth nearly US\$400m (£240m). Even as Beechcraft was dragging itself from bankruptcy in

2012, it delivered 107 King Airs. The company estimates there is an installed fleet of more than 7,000 King Airs. The ballooned airliner variant, the 1900, has sold 700 more, and military variants in service around the world account for thousands more still. There is a lot of life left in the Beechcraft brand yet. **END**

Hawker 800 to 900XP



Beechcraft had been marketing Hawkers for years before it decided to purchase the programme from British Aerospace in 1993. The rugged midsize aircraft became popular with fractional programmes including NetJets and FlightOptions. Over the years, the series benefitted from upgrades in systems, engines, airfoils and interiors. A major interior block change in 1999 included new cabin lighting, redesigned window frames and restyled seats, yielding a more fluid and open look in the cabin.

Premier I to II

With its all-composite fuselage mated to metal wings and fuel-efficient engines, the speedy and roomy Premier should have taken the light jet market by storm. Composites gave the Premier a cabin that is three times stronger and 20% lighter than a comparable aluminium tube. It is also taller and wider than anything else in class, with seating for six or seven passengers. However, there were some fit, finish and function problems with the initial deliveries – including headliners that became dislodged in flight – and while these were all completely remedied, the aircraft's reputation never fully recovered. In total, 295 Premiers were built.

Hawker 4000



Made using the same techniques as the Premier, the Hawker 4000 had the same advantages scaled to the new super-midsize class. This translated into room for two pilots and nine passengers. Flying at 495mph with four passengers, the Hawker 4000 has a range of 3,300 nautical miles. The Hawker 4000 is also notable for having one of the quietest business jet cabins, achieved by mounting headliners, sidewalls and monuments on a series of acoustic isolators. Were it not for its developmental delays, perhaps this aircraft would have dominated its class.

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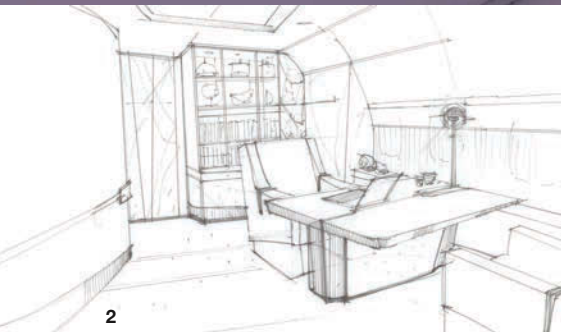
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dreammachine

The first green BBJ 787 delivery in December 2013 heralded the beginning of a busy period for Boeing-approved completion centres

Several completion centres now have BBJ 787s in their hangars. The first green BBJ 787-8 delivery was made in December 2013 and two more followed in early February 2014. Of the 13 BBJ 787s on order, two should be delivered before the end of 2014. Boeing Business Jets expects BBJ 787 deliveries to continue through 2018.

The BBJ 787 is an executive or VIP version of the Boeing 787 Dreamliner, a wide-body aircraft that can carry up to 330 passengers in commercial airline service. As with all BBJs, the aircraft is delivered by Boeing Business Jets to the customer green, that is, without its interior fittings. It is then flown to an independent completion centre for cabin outfitting – a process that is expected to take between 18 months and two years for the BBJ 787.

1-4. The evolution of Greenpoint's Azure concept for the BBJ 787 airframe

BBJ 787 TIMELINE

April 2004

Commercial Boeing 787-8 and 787-9 Dreamliner programmes launched

June 2013

Commercial Boeing 787-10 Dreamliner programme launched

October 2013

Gore Design Completions (GDC) announces two BBJ 787 completion contracts

December 2013

Boeing Business Jets delivers first BBJ 787-8; Greenpoint Technologies announces BBJ 787 completion contract

January 2014

Associated Air Center announces BBJ 787-8 completion contract; Greenpoint Technologies announces second BBJ 787 contract

February 2014

Boeing Business Jets announces delivery of two BBJ 787-8s within a week, one to GDC

Mid-2014

Scheduled first delivery of commercial Boeing 787-9 Dreamliner

2018

Scheduled first delivery of Boeing 787-10



With its 2,415ft² cabin, the BBJ 787-8 is the smallest of Boeing's wide-body aircraft. The BBJ 777 variants and the BBJ 747-8 are larger, the latter having a 4,786ft² cabin. Boeing also plans to offer a stretched version of the BBJ 787, the BBJ 787-9, which will boost cabin area to 2,775ft². Airline deliveries of that aircraft are expected to start in 2014, with VIP versions following later. A third variant, the 787-10, will be even longer, but Boeing Business Jets has not yet said if it will be available for VIP completions; the first airliner delivery of that type is expected in 2018.

In its airliner configuration, the 787-8 is priced at US\$211.9m (£128.5m) and the 787-9 costs US\$249.5m (£151.3m). The interior completion is expected to add

US\$100m-US\$170m (£60m-£103m) on top of this.

Boeing Business Jets has authorised eight completion centres to outfit the BBJ 787: Altitude Aerospace Interiors in Auckland, New Zealand; AMAC Aerospace in Basel, Switzerland; Associated Air Center (AAC) in Dallas, Texas, USA; Gore Design Completions (GDC) in San Antonio, Texas; Greenpoint Technologies in Kirkland, Washington, USA; Jet Aviation in Basel; L-3 Platform Integration in Waco, Texas; and Lufthansa Technik in Hamburg, Germany.

Famous five AAC, GDC and Greenpoint are the first completion centres to announce BBJ 787 outfitting contracts – GDC and Greenpoint have secured two each, AAC has one. One

5-7. GDC's BBJ 787 concept from 2011



BOEING BUSINESS JETS HAS AUTHORISED EIGHT COMPLETION CENTRES TO OUTFIT THE BBJ 787

6



7



The rivals

Perhaps the biggest competitor to the BBJ 787 is the upcoming ACJ350. The Airbus aircraft has a slightly larger cabin in terms of deck area – 2,905ft² compared with 2,762ft². However, this difference is reflected in the price: the airline version of the A350-900 is US\$278m (£168.7m) while the 787-8 is US\$211.9m (£128.5m) – both prices not including the VIP interiors, which in both cases are fitted by independent completion centres.

Obviously the Boeing aircraft is available first. Airbus expects to deliver its first A350-900 to Qatar Airways before the end of 2014, but with an airline orderbook already totalling more than 800 aircraft, it may be late 2015 or early 2016 before the first ACJ350-900 enters completion. With many BBJ 747-8s already in completion centre hangars, and with BBJ 787 deliveries beginning now, there may be some fierce competition for completion slots.

Airbus Corporate Jets has so far announced a single order for the ACJ350. "It is still early and we forecast many more orders once we have worked through some of the large backlog of airline orders," says David Velupillai, marketing director at Airbus Corporate Jets.

of the BBJ 787s delivered in February went to GDC, the destinations of the other two deliveries are so far not publicly known. Both Greenpoint and GDC will complete their two BBJ 787 interiors simultaneously.

GDC was quick off the mark in preparing for this airframe, introducing a 3D interior concept for it in 2011. That design features headliners with swirling patterns, ceiling fans and furniture positioned according to the cabin's air currents, "creating a fluid environment that wraps itself around the passengers", says GDC's director of sales and marketing, Joe Barrett.

Time trials Now GDC has rolled its first BBJ 787 into the hangar and is engaged in finalising the design. The aircraft will have AVOD IFE and wireless PED connectivity throughout the cabin, as well as Ku-band high-speed internet service. As the completion could take two years, the company says it is creating an upgrade path to enable the integration of new technology as it becomes available.

GDC delivered a BBJ 3 and two ACJ340s in 2013, and expects to deliver another ACJ340 in April 2014. It is also working on a head-of-state ACJ330 completion for delivery at the end of May 2014, and an ACJ320 to be delivered by the end of 2014.

Greenpoint's first BBJ 787 is expected to arrive later in 2014, followed a few months later by its second. The company's facilities, not far from the Boeing plant in Everett, Washington, USA, will easily hold both aircraft simultaneously, with room for a third. As with GDC's BBJ 787s, the Greenpoint-outfitted interiors will feature AVOD IFE and wireless connectivity with PEDs.

At AAC, critical design review was completed in early 2014. The aircraft is expected to arrive in late June 2014, with customer delivery anticipated for

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CENTRES ARE TAKING PARTICULAR CARE WITH CABIN ACOUSTICS

8. A BBJ 787 office concept by AAC
9-10. Jet Aviation Basel's Timeless concept for the BBJ 787

the fourth quarter of 2015. Like most of the BBJ 787s on order, this one is also for a head of state. The amenities are similar to those being installed at GDC and Greenpoint, and also include Blu-ray players, touchscreen monitors at each seat and an externally mounted landscape camera linked to the moving map display. Like those other BBJ 787s, there will be a large stateroom with private lavatory and shower.

Carbon fibre acoustics All three centres are taking particular care with cabin acoustics to deal with the harder carbon fibre hull. Greenpoint's senior



BBJ 787-8

Cabin width: 18ft

Cabin height: 7ft 6in

Cabin length: 138ft 9in

Seats: 2 crew + 242 passengers in airliner configuration

Range: 9,260 nautical miles

High-speed cruise: 515kts

Max altitude: 43,000ft

Price: US\$211.9m (£128.5m) in airliner configuration

marketing manager, Christine Hadley, says additional treatments are planned to ensure cabin noise levels are equal to or lower than other business jets.

GDC has been working with acoustic treatment vendors, who in turn have been working with Boeing. It is not unusual to see a jet the size of a BBJ 787 emerge with an average cabin noise level below 50dB speech interference level (SIL). In rare cases, this has been reduced to around 46dB SIL, roughly equivalent to an office.

None of the completion centres were willing to discuss the installation of ground-fire missile detection and

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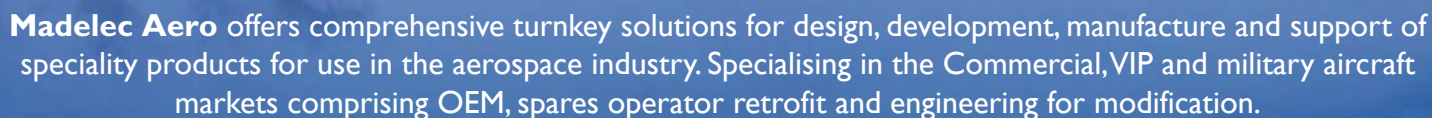
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11-13. Details from
Pierrejean Design
Studio's Trendy
BBJ 787 concept

ONE OF THE MAIN CHALLENGES WILL BE THE CARBON FIBRE COMPOSITE FUSELAGE

avoidance systems. However, Boeing Business Jets says that these days, it is common for head-of-state aircraft to include a missile defence system, despite the extra weight and costs.

Ready, willing and able Other large centres are also gearing up to meet demand for BBJ 787 interior completions and are actively bidding on projects. Among them is Lufthansa Technik, which is in the final negotiations for its first BBJ 787 contract. Walter Heerdt, senior vice president of marketing and sales at Lufthansa Technik, notes that his company has been part of many Boeing aircraft programmes since their concept and design phases. "Our engineers contributed to the development of aircraft maintenance concepts, and have more than 20 years of experience using composite materials," he says.

Another completion centre that has prepared for the BBJ 787 is L-3 Platform Integration. The company is "well prepared for the initial completions of this new platform", says Ken McAlpin, vice president of VIP and head-of-state programmes at L-3.

As well as an investment of almost US\$2m (£1.21m) over the past three years, the preparation has involved "working very closely with Boeing to integrate the capabilities that the company offers into our supplier base", says McAlpin.



When L-3 was granted a four-year extension of its FAA Organization Designation Authorization (ODA) in early 2013, the BBJ 787 was added to the list of aircraft it is authorised to modify. The ODA allows L-3 to issue certificates of airworthiness and STCs as a designee on behalf of the FAA.

L-3 was one of the first companies to engage with Boeing on the BBJ 787 – it collaborated with the manufacturer and a major engine supplier in 2007 to qualify the first 787 engine solution on a flying testbed aircraft.

Composite challenges One of the main challenges with BBJ 787 completions will be the carbon fibre composite fuselage. Recognising this, Boeing



14. An office designed by L-3
15. A master bathroom by Andrew Winch Designs, rendered by 3D Viz and Lufthansa Technik



BBJ 787-9

Cabin width: 18ft

Cabin height: 7ft 6in

Cabin length: 158ft 9in

Seats: 2 crew + 280 passengers in airliner configuration

Range: 9,250 nautical miles

High-speed cruise: 515kts

Max altitude: 43,000ft

Price: US\$249.5m (£151.3m) in airliner configuration

Business Jets held BBJ 787 completion centre summits in Everett, which drew around 50 representatives, from centres as far away as New Zealand.

Jet Aviation Basel also sent a team of Part 145 licensed engineers to receive EASA Part 66 B1/B2 type training at Boeing, and has initiated the process to receive EASA approval. Jet Aviation Basel engineers also completed an advanced structural repairs training course provided by Boeing.

"The all-composite structures present a unique set of requirements for interior completions," says Neil Boyle, vice president and general manager of the Jet Aviation Basel completion centre. "We have invested heavily to master their impact on the completion process."

Taking the load Lufthansa Technik highlights load distribution as the key issue when installing cabin

components in a carbon fibre composite fuselage. It recently completed a joint project with the German Aerospace Center and the Technical University of Darmstadt, initiated in 2010, to research the topic. The result is a 'floor panel hardpoint', a type of connector, that can be glued to floor panels and used to fix cabin components, taking a load of up to 3,000N. These are already being used on a BBJ 747-8 completion.

According to Greenpoint's Hadley, one of the most difficult aspects of installing an interior within a composite hull is making modifications to the primary structure that require OEM involvement and approvals. "With the BBJ 787 having a completely new composite airframe, this process had to be reinvented," says Hadley.

It will be fascinating to see how these new technologies and processes translate into real cabins. **END**

Battery woes in the past

In early 2013, a lithium-ion battery on an empty Japan Airlines Boeing 787 flight overheated and created a fire. The aircraft landed safely, but subsequent problems, also attributed to the lithium-ion battery, resulted in the entire fleet being grounded.

That problem has been solved, according to Boeing spokesperson Karen Crabtree, pushing aside any worries that might linger concerning the BBJ 787. "Boeing has developed a comprehensive set of solutions that reduce the potential for a battery issue, reduce the effects of a battery issue, and isolate the battery," she explains. Among these is a redesign of the battery, as well as the battery charger. In addition, the company has added an enclosure that separates the battery from all other elements.

"Since the certification of the improved battery system and the return to service of the 787 Dreamliner fleet, there have been no battery cell issues," says Crabtree. "We continue to stay abreast of current developments in the field of battery technology through our own explorations and through industry partnerships. The 787 has redundant layers of protection designed into its systems to ensure the safety of those on board."



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The Jet Aviation Basel Design Studio, which currently employs 12 designers, was established in 2001, and offers conceptual design, technical design and feasibility studies and design management services. Specialising in VIP cabin interior designs, the studio has designed approximately half of the narrow- and wide-body aircraft completed at Jet Aviation's completion facility in Basel. The Design Studio has also collaborated with other design houses and designers, offering an interface between the designer and the completion centre's engineering and production teams. "Whether managing the entire creative process or working in collaboration with other design houses offering design management services, we push the limits to remain ahead of the design curve to create new and inspirational designs," says Elisabeth Harvey, manager of the Jet Aviation Basel Design Studio.

Lufthansa Technik

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Lufthansa Technik's Creative Design department is staffed by a section manager (Ralf Walter), two interior architects (Michael Bork and Michael Reichenecker), a design assistant, four design engineers (floorplan and elevations) and three surface material experts. Its focus is on highly individual VIP and VVIP cabin interior designs for Airbus and Boeing aircraft.



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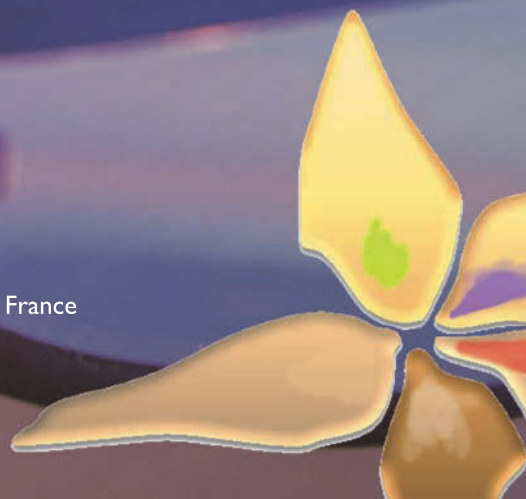
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Mahler Industrial Design develops, designs and monitors aircraft interiors for VIP, government, corporate and airline customers, and is listed by Airbus and Boeing as a preferred aircraft interior designer. Notable present projects include an ACJ319, a BBJ 1 and a BBJ 787. Past projects include ACJ320, ACJ330, BBJ 2 and BBJ 747-8 designs.

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Pegasus Design was launched in 2006 by Peder Eidsgaard and currently has offices in London and Monaco. The company has completed 20 VVIP aircraft designs, including several BBJs and ACJs. Its most recent was an ACJ319.

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Founded in 1983, Piet Boon is a Dutch multidisciplinary design company delivering luxurious exterior, interior and product designs for residential, corporate, hospitality, superyacht and private jet customers around the world.

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RUAG Aviation

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Technicon Design

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Technicon Design recently applied its commercial aviation experience to an interior design commission for a major business jet manufacturer. It also created the Ixion windowless jet concept to demonstrate its capabilities.



Tim Callies Design

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Tim Callies Design gets his influences from travelling around the world and specialises in both contemporary and classic interior designs. In his previous employment at Comlux Creatives he designed an ACJ 319 (pictured) for which he won an International Yacht and Aviation Award in 2013.



Unique Aircraft

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jointeffort

The cabins of Embraer's upcoming Legacy 450 and 500 aircraft benefit from a thorough customer consultation process

When Embraer embarked seven years ago on the Legacy 450 and 500 programmes, its mission was to provide interiors that matched the audacity of the overall project. The company decided cabins would be bigger than those in competing aircraft, spaces would be reinvented, and a different and more thoughtful aesthetic would underpin it all. As Jay Beever, vice president of marketing and interior design, points out, that required a nothing-is-sacred re-evaluation.

"Our plan was to modify and rework the necessary areas of the interior to achieve the best result for the customer," he summarises. To do so, Embraer went back to those

customers and involved them from the start in a cooperative exercise that has, the company believes, produced the transformational results it wanted. Throughout the process, the mantra was 'more for less' and the aim was a concerted attack on this market segment.

Bigger cabin Not content with a 6ft-high cabin and flat floor throughout, halfway through the formative stages of the project Embraer took the big decision to extend the 450's fuselage by a little more than 6in. It may not sound much but it means the US\$16.57m (£10m) Legacy 450 will be able to accommodate up to nine passengers. The move also gave seat manufacturer B/E Aerospace more options with its latest-generation





products. With the cabin now measuring 24ft from the aft cockpit wall to the internal baggage compartment, passengers have more legroom and the three individual seats in the baseline configuration have more pitch. For instance, the back seats benefit from a 46in recline instead of the original 42in, while the single aft-facing seat tilts an extra 2in. To boot, all three seats swivel with enough room left over for individual pocket tables. The centre club seats can be converted into flat beds.

As Augusto Salgado da Rocha, senior manager of product strategy for Embraer Executive Jets, said at the time, “What we’ve done is make a six- or seven-seat aircraft with comfortable positions everywhere.”

Embraer proceeded with its plan of creating the ultimate customer

1. The 2014 edition of the Legacy 500

Let there be light

In addition to the natural light that will come in through windows right beside the seats, the provision of artificial light was top of the agenda. The manufacturer recognised early on that LEDs were the answer. With 14 years' experience in the design and manufacture of LED interior lighting systems for aircraft, B/E Aerospace was Embraer's choice for both aircraft. According to the supplier, LED systems are more reliable, lighter and consume less power than traditional aviation lighting – but the installation process required considerable forethought.

"The main items of consideration during this design period included colour, temperature, material reflectivity and absorption, user interfaces to the lighting product and overall cabin aesthetics," says B/E Aerospace.

Embraer also required bespoke solutions in terms of functionality and aesthetics – the goal was seamless connectivity. The toe-kick lighting, exit/ordnance and stairway lights feature LED products. The washlight system in the cabin, which was specially developed for the 450 and 500, is designed to integrate naturally with the lighting in the galley and lav. And the reading lights "were also developed to complement the design language of the B/E Aerospace-supplied air gaspers", according to the company.

experience. It wanted to know how the aircraft served customers; if using the aircraft's systems felt intuitive; and if, after hours spent in the aircraft, they found that details became more interesting. To find out these things, it was imperative to plan customer feedback events at intervals in the development, starting with the 500.

This customer feedback was taken very seriously. "It was decided to make improvements to the original design in reaction to the many customer surveys we undertook and to the test campaign with the mock-up," says Beever.

All the latest technology was thrown into Embraer's learning process. The company conducted man-machine interface studies with the help of full-scale, pre-production mock-ups (rigs) developed by Austria's FACC group, a composites specialist. The rigs enabled the designers to evaluate ergonomics, craftsmanship and systems control. "We used simulated flights that represented the full envelope of the aircraft's capability," adds Beever.

The Legacy 450 and 500 concepts were launched at NBAA in September 2007. By the end of 2012 Embraer felt

ready to convert all the information it had so painstakingly acquired into reality. "We decided to implement many of these lessons learned by reworking key features of the interior with the help of our internal design and engineering teams in Melbourne in Florida, and São José dos Campos in Brazil," recalls Beever.

In this a key element was a process known as geometric dimensioning and tolerancing (GD&T) that, broadly speaking, tells manufacturing staff the exact degree of precision required on



Embraer Legacy 500

Cabin width: 6ft 10in

Cabin height: 6ft

Cabin length: 27ft 5in

Seats: 2 crew + 12 passengers

Range: 3,000 nautical miles in long-range cruise with 4 passengers, 2 pilots and NBAA IFR reserves

High-speed cruise: 550kts

Max altitude: 45,000ft

Price: US\$19.95m (£11.90m)



3



2



4

2-4. Details from the Legacy 500, which should enter service in 2014



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STATS**Embraer Legacy 450****Cabin width:** 6ft 10in**Cabin height:** 6ft**Cabin length:** 24ft**Seats:** 2 crew + 9 passengers**Range:** 2,500 nautical miles in long-range cruise with 4 passengers, 2 pilots and NBAA IFR reserves**High-speed cruise:** 550kts**Max altitude:** 45,000ft**Price:** US\$16.57m (£10m)

GD&T HAS ENABLED THE BEST CRAFTSMANSHIP AND CABIN EXPERIENCE



each controlled feature of the assembly. Once the numbers are crunched, the fabricating machines are set accordingly. “The GD&T we used to develop this final interior has enabled the best craftsmanship and cabin experience in the industry,” enthuses Beever. For example, the sideledge lids and storage bins are so precisely engineered that they operate almost like jewellery boxes.

Practical magic In both aircraft, a lot of thought has gone into the functional areas. The lavatory features a solid door, vanity, basin and vacuum toilet, unexpected in the 450’s mid-light segment in particular. There is a lot of storage. The 450, for example, boasts 150ft³ of space, capable of swallowing six pairs of skis, four fold-up garment bags and 14 carry-on bags. The volume is divided into a 6ft-high, 40ft³ internal compartment (which is heated, pressurised and accessible during flight) with the balance external.

Suppliers also stepped up to the mark. Honeywell went back to the drawing board to radically redesign its Ovation Select CMS. Passengers have control over everything from their seats

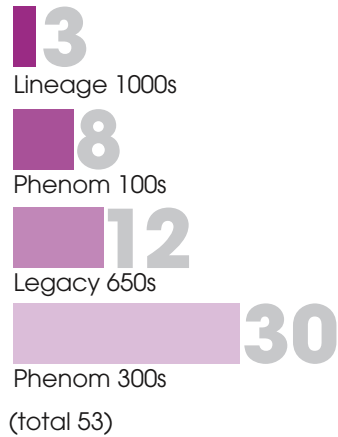
5-7. The 2014 edition of the Legacy 450

– connectivity, electronic devices, Apple TV, HD gaming systems, lighting, seating angles, even the galley and window shades – through icon-based touchscreens. “Every seat becomes its own office and theatre in the sky,” says Rob Wilson, president of Honeywell’s business aviation division.

As well as the cabinetry, Austria’s List Components & Furniture provides the stone veneer flooring that is optional in the 500’s wet galley and



Embraer Executive Jet deliveries in the fourth quarter of 2013



lavatory. For the linings throughout the aircraft, FACC devised “super-lightweight” Nomex cores under a system known as partial reinforcement in place of the standard aluminium cores. This was partly to keep weight down and partly to speed up the assembly line, and was a considerable scientific challenge because these panels have to withstand high dynamic loads. For good measure, FACC also developed a new method of attaching the cabin components. According to the company, this gave a two-fold gain: it will help speed up the assembly line of blank cabins – that is, minus seats and other fixtures – to five-a-month at full production, while also fixing the components more securely in a way

THE POTENTIAL TO CUSTOMISE THE CABIN IS A MAJOR SELLING POINT

- 8-9. Details in the Legacy 450 cabin
10. The centre club seats, shown here on the Legacy 500, can be converted into flat beds

that “substantially reduces noise levels in the cabin”.

Customisation Embraer aimed to give owners maximum latitude to apply their creativity to the interior. In the space opposite the entry door, for example, they can replace the standard right-hand storage cabinet and aft-facing seat with a two-seat divan. And if owners aren’t too worried about maximising passenger capacity, they can ditch the divan in favour of a full-size dry or wet galley with running hot and cold water, ice drawer, storage for tableware and a 110V power outlet. Further customisation in the galley comes in the shape of a monitor and espresso maker. The same principle of choice applies to the décor. For example, the valances on the upper sidewall may be veneered or layered in leather. Similarly for the shrouds on the console tables at each seated position.

As Beever points out, the potential to customise the cabin is a major selling point, not only because a customer can tailor the materials and configuration to their taste, but because second-hand buyers can too. Clearly, Embraer has listened very closely to its customers. **END**





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carbontrading

Wood veneer was ditched in favour of carbon fibre on this Challenger 850 refurbishment

Projects like this Bombardier Challenger 850 refurbishment don't come along very often, even when you are as familiar with the airframe as Flying Colours Corp is. As of March 2014, the company had completed 15 green Challenger 850s at its facility at Peterborough Municipal Airport in Ontario, Canada.

Unusually, on this aircraft the Asian owner specified an ultra-modern look



2

making extensive use of carbon fibre in place of wood veneer. Combined with white leather upholstery, dark wood accents and a striking red divan, the result is very different from the neutral, veneer-heavy look that dominates business aircraft design.

“The cabin has a full VIP fit similar to those in other Challenger 850s that we’ve finished,” says Eric Gillespie, executive vice president at Flying Colours Corp. “As a refurbishment, its carbon fibre content was the highlight;

we’ve used carbon fibre as an accent trim in the past, but not for a whole aircraft. Everywhere that we’d normally use wood veneer – tables, galleys, bulkheads, PSU handrails, lavatory vanities and toilet enclosures – we used carbon fibre instead. We used custom-engineered carbon sheets and accented with an ebony hardwood, fitting white seats featuring carbon fibre insets on their inboard armrests.”

Other finishes include satin nickel plating, white countertops and a black

Tai Ping carpet with a white branchlike splinter pattern.

Divine divan Although its look is very different, when it comes to layout, the aircraft does not deviate much from a standard Challenger 850 configuration. There is a club-four at the front, followed by a conference area, a berthable three-place divan, aft club and rear lavatory. The divan is the notable exception to the norm, although Flying Colours Corp has

1-2. The refurbished Challenger 850

made similar installations on one or two other occasions. The installation involves removing two seats on the right side of the mid-cabin area to make space for the divan opposite the standard double seats. “It makes for a useful meeting space,” says Gillespie. “The client selected a bright cherry-coloured fabric for the divan, and it just pops out in contrast to the black and white.”

The IFE is typical of a Challenger 850, but with modifications. “We upgraded monitors to 22in widescreen units for a more modern feel, and replaced the older Airshow unit with a Rockwell Collins Airshow 4000, with revised software for the region,” says Gillespie. “SwiftBroadband and a new phone also went in, along with wi-fi.”

The installation of the bulkhead monitors was carefully planned to ensure that they were fully viewable from any point in the cabin.

Taking shape The customer came to Flying Colours Corp with a vision that Gillespie says was “merged with our



suggestions”, before he and a design team travelled to meet the client for further discussion. “We spent a couple of days looking at colours and samples, but the customer was keen on carbon fibre from the outset and although we offered other options, it came back to his original choice,” Gillespie elaborates. “The white seats were in his initial scheme, but the red divan,

Singapore wing

At the Singapore Airshow in February 2014, Bombardier announced that it had selected Flying Colours Corp to deliver interior refurbishment services at its new Singapore Service Centre at Seletar Airport. The move is perhaps not surprising given Flying Colours Corp’s extensive experience in Bombardier completions and refurbishments and the geographical proximity of the two companies’ headquarters.

Flying Colours Corp is preparing to set up on the second floor at the Singapore Service Centre, where it will offer cabin removal, reinstallation, upholstery and other finishing work. It is due to begin operations later in 2014, initially with a mixed workforce. Locally recruited personnel will be augmented by specialists from Flying Colours Corp’s sites in Peterborough and St. Louis, Missouri. The latter will be picked for having skills relevant to particular projects, and the postings will be temporary. In the long term, the intention is to operate with a mostly local workforce. It is likely that Singaporean workers will be sent to Peterborough for 3-4 months of on-the-job training.

The idea behind the centre is to serve demand for business aircraft in the wider Asia region, including India, China and Australia, as well as Singapore, especially as used aircraft come up for refurbishment. “We already have opportunities in Singapore,” says Eric Gillespie. “We’re working to get it going as quickly as we can to satisfy those opportunities and manage customer expectations. I hope that once we’re up and running, it’ll be a case of trying to keep up with demand. We’re really excited about the possibilities.”

THE CUSTOMER WAS KEEN ON CARBON FIBRE FROM THE OUTSET



3-5. Carbon fibre was used wherever there would normally have been wood veneer

5



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Local expansion

As well as setting up abroad, Flying Colours Corp plans to add two exterior paint booths to its Peterborough site, ready for use in 2015/16 and adding to a Global Express-size booth that was built in 2001. A recently erected hangar is currently used for installation and some avionics work, as well as heavy maintenance for many aircraft types.

Growth relating to Bombardier platforms is considered by the company to be of primary importance, with current market trends indicating that the key market is Asia and especially China – 14 of Flying Colours' 15 Challenger 850 completions have been for Chinese clients. However, the company's focus is on controlled growth and recruitment. It has partnerships with local colleges and schools, the aim being to nurture a future workforce.

Recent investment into Peterborough Municipal Airport – US\$25m (£15m) from the City of Peterborough and the federal and provincial governments – has also benefitted the company. Infrastructure changes include a runway extension to 7,000ft and improved taxiways and hard-standing areas, in part to cope with the weight of A320 and Boeing 737 aircraft. This suits Flying Colours Corp's desire to expand into ACJ and BBJ work.

Separately, ongoing discussions with Bombardier over completions of green Global jets, and other Challenger-derived products, are likely to result in new work for 2015.

carpet and some of the other colours came together over those few days.”

Flying Colours Corp typically creates 3D renderings of main cabin, galley and lavatory views so that design details can be finalised – changes are rare once installation has begun. In this case, the client worked through several revised views of the lavatory, galley and main cabin, especially as carpet colour options were explored. The taps in the rear lavatory vanity unit were also changed for more modern-looking ones at the rendering stage.

Carbon fibre trials Representatives from almost every part of the company's workforce were involved in the design evolution. “It took a full team effort – our designers, interior group, quality, maintenance and engineering teams were all involved in discussing how we should do the refurbishment, understanding the cost and the timeline,” says Gillespie. “Once we started, the cabin came together quite quickly, although we had to do some trials in bending, applying and

WHILE YOU CAN BEND A WOOD VENEER TO PRETTY MUCH ANY SHAPE YOU WANT, YOU CAN'T BE THAT FLEXIBLE WITH CARBON FIBRE



- 6. Changes made at the rendering stage included the taps
- 7. The main challenge with the carbon fibre was bending it around curves

finishing the carbon fibre. We also had to modify the spacing of the divan end cabinets because they came up against the emergency exit.”

Carbon fibre was employed for purely aesthetic reasons, although Gillespie notes that the sheets are thinner than regular veneer and a little lighter. Given the metal-like finish of the material, surface treatments were also used more sparingly than they would be on a wooden surface.

In a fix The real challenge was to affix carbon fibre on such a large scale. “We had to do some troubleshooting,” Gillespie says. “While you can bend a wood veneer to pretty much any shape you want, you can't be that flexible



- 8. The branch-pattern carpet was supplied by Tai Ping
- 9. The galley, complete with white countertops
- 10. As the only cabin element that is not black or white, the cherry-red divan has real impact



WE WANTED TO USE ONLY CARBON FIBRE, BUT HARDWOOD ADDED A LITTLE EXTRA DURABILITY IN TRICKY AREAS



with carbon fibre. Bending the material around bulkheads, corners and hard edges was more difficult, but we wanted to avoid too many angles, keeping to the modern curves of the original design. This is where the hardwood helped. We wanted to use only carbon fibre, but the hardwood made more sense and added a little extra durability in those tricky areas.”

Time and place From first contact, the company had about a month before the aircraft arrived in Peterborough. “We had it for four-and-a-half months for the refurbishment itself,” says Gillespie. “A regular refurbishment would take

around three months, but the extra options and a little maintenance added to the time on this one.” Gillespie credits lean manufacturing techniques, which Flying Colours Corp has been working on for several years, with increasing efficiency during the process. “They’re ingrained in everything we do,” he says. “It’s about managing every aspect of the completion for maximum efficiency.”

The aircraft was redelivered in January 2014, to the satisfaction of both the owner and the people who worked on it – Gillespie admits that it remains among the projects in which the company takes greatest pride. **END**

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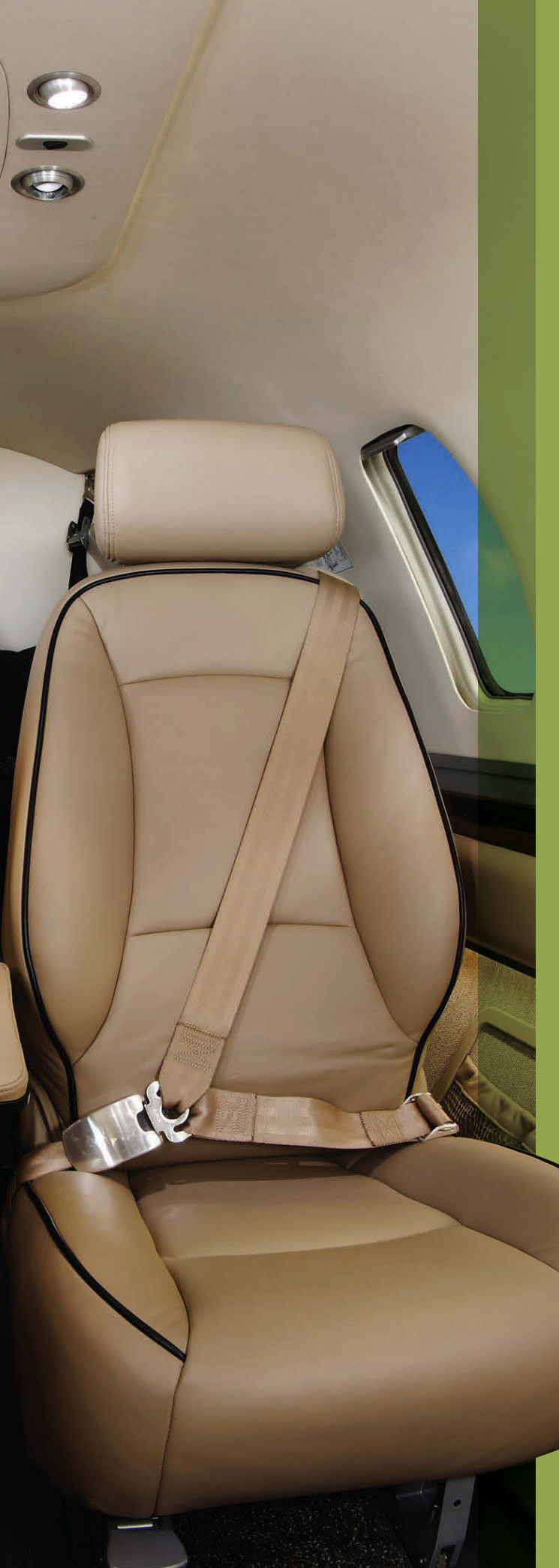
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lordoflight

With the rebirth of its very light jet,
Eclipse hopes its dark days are over

The craze for very light jets that began in the 1990s ended with the global economic downturn in 2008 and financial insolvency for many market entrants. One such case is that of Eclipse Aviation, which was founded in 1997 on the notion that you could apply production-line manufacturing to aircraft. The aircraft in question, the Eclipse 500, looked like a smaller Learjet and cost less than US\$1m (£0.6m). Eclipse planned to make 1,000 units annually, using manufacturing techniques including friction-stir welding.

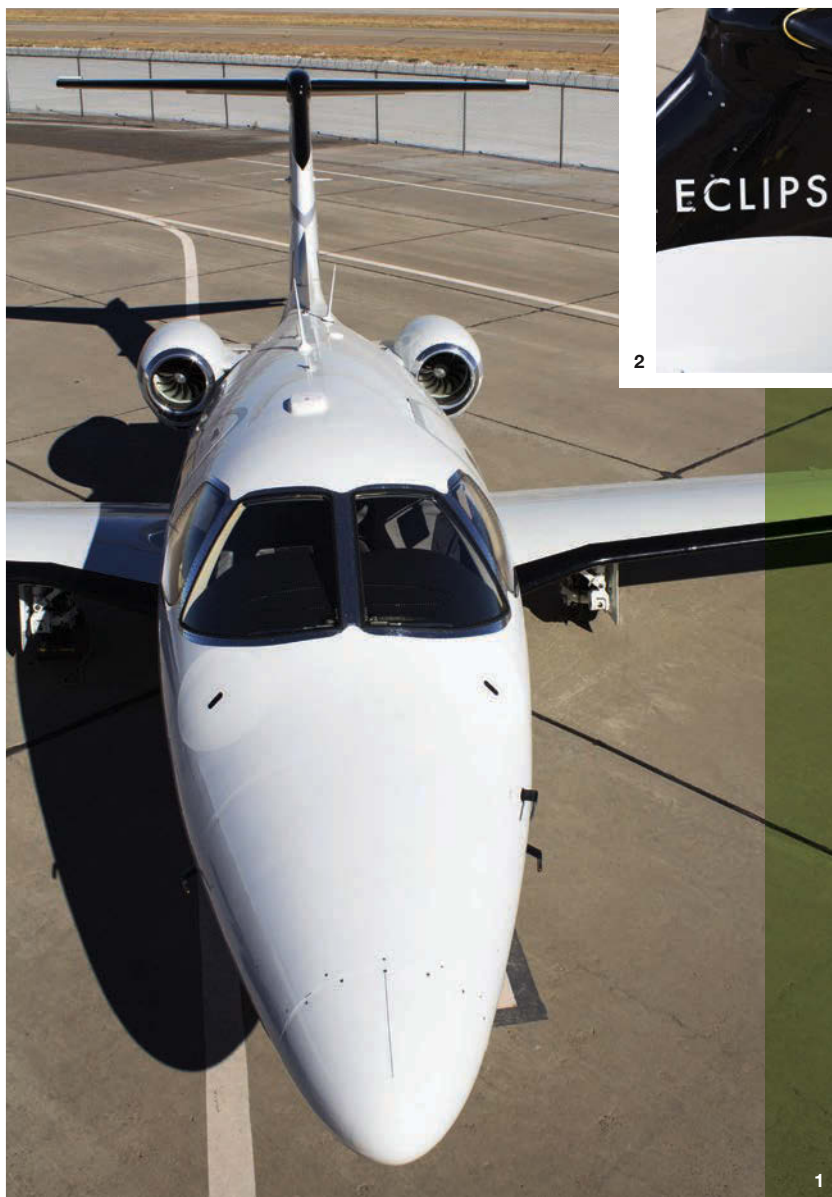
There were some problems with this strategy. First, it depended on there being mass demand for the aircraft. This was supposed to be generated by a surge in scheduled air taxi customers, buying individual seats, who needed access to small and medium airports.

One company founded to capitalise on this air taxi market was DayJet – but the necessary demand never came. Maybe it was because of the aircraft's

tight cabin, the small baggage compartment, or the lack of lavatory accommodation. Whatever the reasons, after operating a handful of aircraft for less than a year, DayJet closed up shop in October 2008.

The second challenge was funding and staffing the certification process. Nothing about this aircraft was incremental – not the new engines, not the radical and highly integrated glass panel avionics, not even the way the airframe was built. This meant certification was going to take longer than normal. It also didn't help that Eclipse had never built an aircraft before, which meant its processes and factory had to be certified as well.

Dance of death By the time it filed bankruptcy in 2008 (a month after DayJet folded), Eclipse had spent US\$1.4bn (£0.8bn). Though 260 aircraft had been delivered – every one at a loss – they had problems. The avionics lacked the functionality promised, the aircraft was not yet certified to fly into known icing and the interiors (complete with faux leather seats) were cheesy.



- 1-3. The Eclipse 550, a six-seat very light jet that is designed to be flown by a single pilot
4. A Total Eclipse jet – a factory refurbished Eclipse 500

in 2010. This gave United Technologies a way into the corporate jet market – beyond its Pratt & Whitney engines. A benefit for Eclipse was access to Sikorsky's global supply chain and seasoned aviation executives for advice. At about the same time, United Technologies acquired Goodrich – which makes aircraft interior components such as seats and cabin shells – for US\$16bn (£9.6bn). Goodrich was rebranded within UTC Aerospace Systems.

Based on Eclipse's success remanufacturing and upgrading aircraft, it decided to restart the production line with a new aircraft



THERE WAS A BASE OF 260 CUSTOMERS WHO NEEDED SUPPORT AND UPGRADES

That would have been the end of the story, but for two things. First, there was a base of 260 customers who needed support and upgrades for their aircraft. Second, despite everything, the Eclipse 500 was a good aircraft – with a 370kts cruising speed, a range of 1,125 nautical miles and really low operating costs. These qualities were not lost on those flying the aircraft – nor on those waiting to fly it.

In particular it did not go unnoticed by a businessman from South Carolina

named Mason Holland – one of the deposit holders who was left holding nothing. Holland put an investor group together and bought Eclipse's assets out of bankruptcy in 2009 with an eye to supporting the customer base, remanufacturing and reselling used aircraft, and eventually putting the aircraft back into production.

Piece of mind Then good fortune struck: United Technologies' Sikorsky unit bought a minority stake in Eclipse

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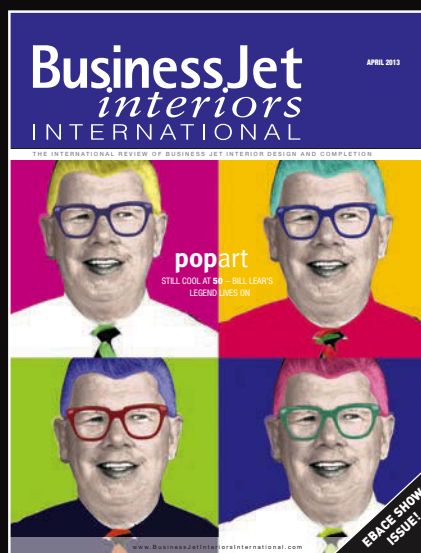
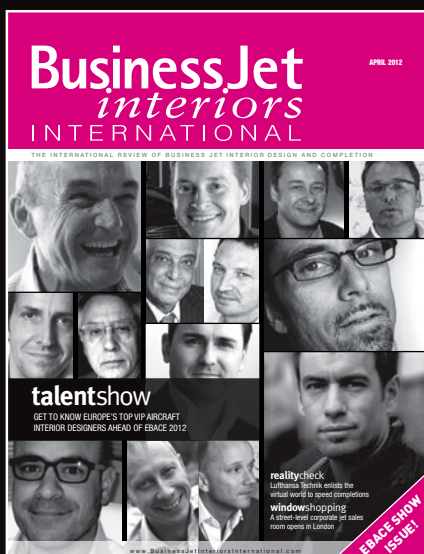
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ECLIPSE TIMELINE

1997

Eclipse Aviation founded, 500 launched

October 2008

The 500's biggest customer, DayJet, ceases operations

November 2008

Eclipse Aviation files for bankruptcy

September 2009

Eclipse Aviation's assets bought by Mason Holland

October 2010

United Technologies' Sikorsky Aircraft buys a minority stake in Eclipse Aviation; Eclipse announces 550

April 2012

FAA issues 550 production certificate

March 2014

First 550 delivered

5-6. The production line in Albuquerque, New Mexico

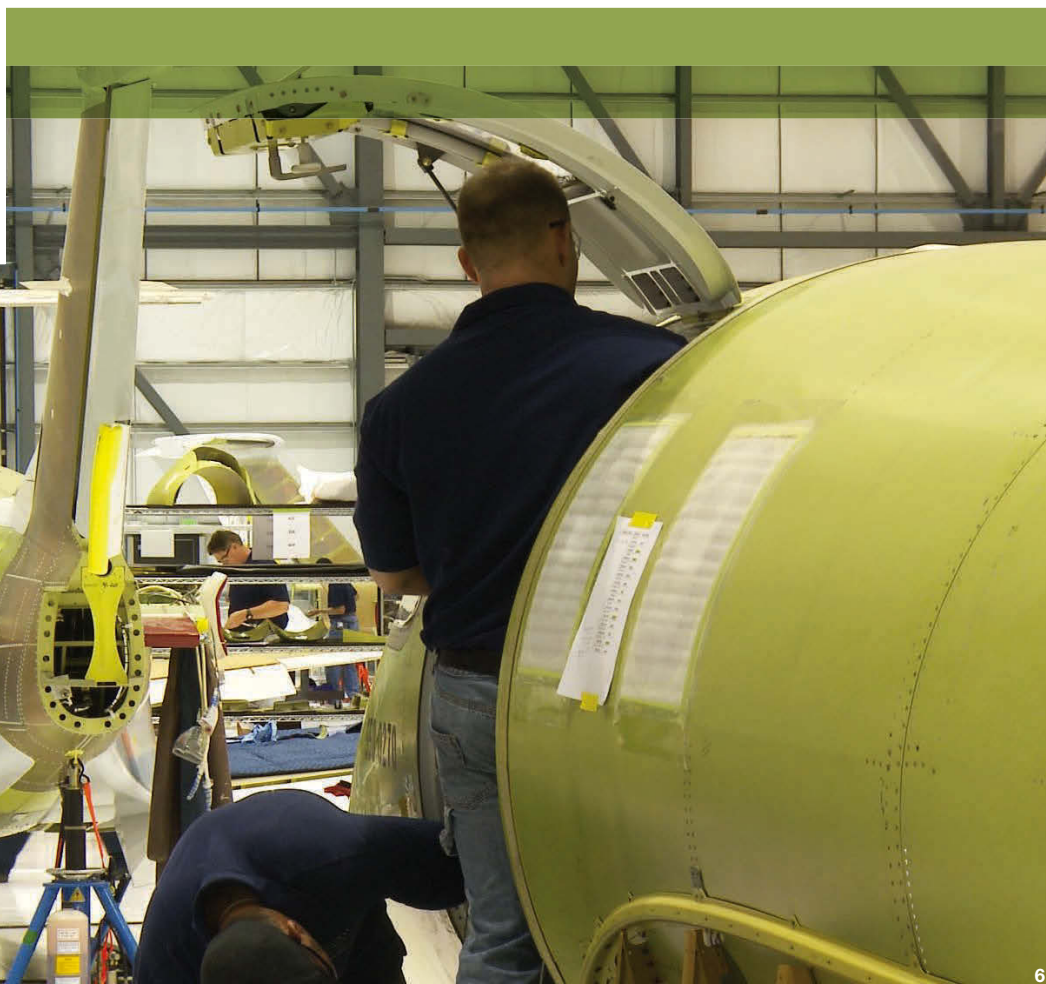
called the Eclipse 550. It would have improved systems including electronic anti-skid brakes, avionics improvements such as synthetic and enhanced vision, more powerful displays, dual integrated flight-management systems and autothrottles.

Working with UTC Aerospace Systems in Wichita, Kansas, the passenger cabin also got a makeover. "The 550 actually has a whole new interior from the ground up," says Cary Winter, senior vice president of

manufacturing, engineering and technical operations at Eclipse. "It may look somewhat the same, but we wanted to get better tolerances and better fit and finish. We revised the cabin shell from a three-piece to a two-piece, which gives it a much cleaner look and eliminates visual noise. We also chose more robust materials for areas including the baggage compartment and the floor panels."

Fear of the dark Overhead lighting panels were changed from a rectangular design to what Winter calls "more of a surfboard shape" with rounded edges. The company also upgraded the quality of the soft goods, including carpets and seat leathers. Pleated window shades were replaced with a more cellular design that prevents binding and uneven closing; hydrographic inserts were added to the drinks rail to create a more upscale feel; and armrests were reworked to improve comfort.

Keeping up with passengers' carry-on devices, power outlets were



updated to include USB charging. There are three 110V outlets, two in the cabin and one in the cockpit, that also support USB charging. An Iridium satellite phone headset remains optional. The Iridium box is standard for all aircraft and also automatically sends engine data back to Pratt & Whitney for trend monitoring. Unneeded access panels were also eliminated to clean up the appearance of the cabin. One thing that hasn't changed is that there is still no room for a lavatory or a lav seat.

Throughout the redesign, Eclipse needed to be careful not to add weight, given the aircraft's relatively small size.



Eclipse 550

Cabin width: 4ft 9.6in

Cabin height: 4ft 2.4in

Cabin length: 12ft 4.8in

Seats: 2 crew + 4 passengers

Range: 1,125 nautical miles

High-speed cruise: 375kts

Max altitude: 41,000ft

Price: US\$2.895m (£1.74m)



7. The upgraded cockpit, which includes more powerful displays
8. The cabin shell is now composed of two pieces rather than three

"We needed to be mindful of this, but at the same time we wanted to create a look that made the customer more comfortable and give a little more luxury to the aircraft," says Winter. In fact, the interior is around 10 lb lighter, thanks in part to new soundproofing.

Customers will be able to choose from several pre-matched colour and fabric combinations, named Winfield, Diablo, Sierra and Canyon. "They are all luxurious interiors," comments Winter. "Customers want a high-quality interior, so we made that our standard." Customers can also design their own combinations with Hillaero of Lincoln, Nebraska, Eclipse's designated interior customiser.

Brave new world In terms of layout, the 550 has 3-4 forward-facing seats behind the two in the cockpit. "The interior pretty much comes pre-loaded, and most people are very comfortable with the configuration," Winter says. "The new interior won't necessarily take any less time to install, but it's going to be neater and cleaner for customers," says Winter. "It looks like a business jet now, not a car."

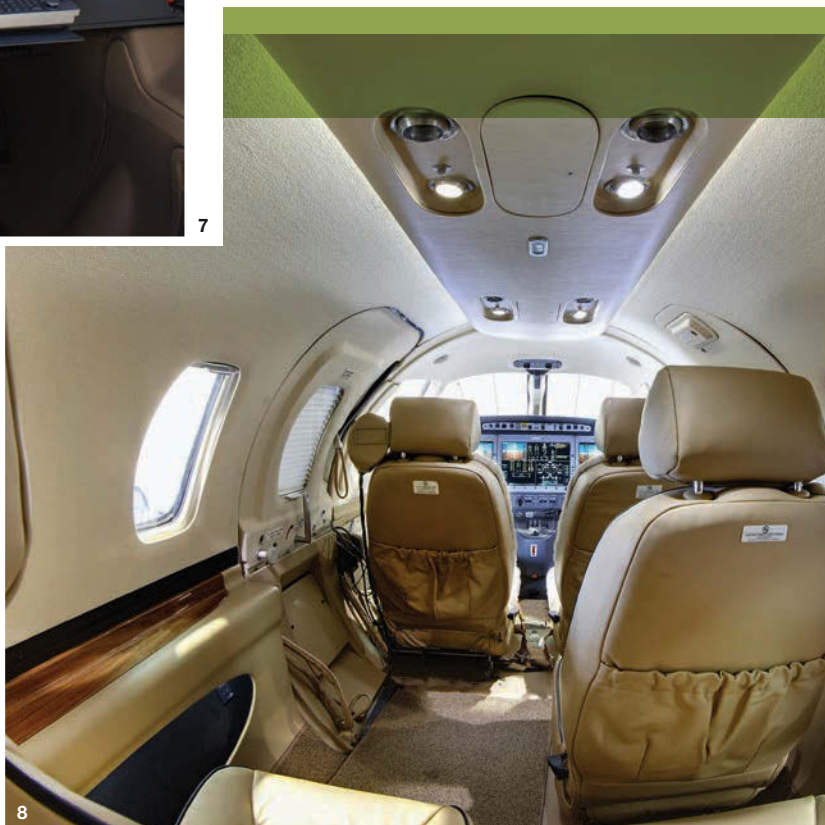
Eclipse delivered the first 550 in March 2014. **END**

Supporting artist

You may have noticed that some of the headings in this article are titles of albums by heavy metal band Iron Maiden. This is because the Eclipse 550 is being championed by the band's lead singer, Bruce Dickinson, through his role as chairman of Aeris Aviation, sole European distributor of the aircraft. Dickinson, a commercial pilot, has racked up more than 50 hours flying the Eclipse on tour in the USA.

"Now that the jet is back in production, the market for it to reach its full potential is enormous," says Dickinson. "There are no other twin-engine jets that can come close to the Eclipse in terms of cost and economy, and with a range in excess of 1,000 nautical miles, it is ideal for Europe. It is great to fly and I am excited by the future for this remarkable aircraft."

Dickinson is also chairman of a service and maintenance facility, Cardiff Aviation, in St Athan, UK.



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1. Bell Helicopter's latest launch, the Bell 505 Jet Ranger X



BELL 505
JET RANGER X

spindoctors

Helicopter OEMs tackle weight and space restraints that are arguably even greater than in a jet cabin

Although helicopters and business jets usually have quite different missions, rotorcraft owners are being trained to expect similar amenities in the cabin, and perhaps even more connectivity.

Helicopters' utility comes from their ability to operate off-airport, that is, from their ability to take-off and land vertically, but that also makes them noisy, because of their compactness, power and lift mechanism.

Power-to-weight ratios must be high. There are only two practical ways to improve that ratio – increase power or reduce weight. Increasing power requires greater efficiency or more fuel (which carries a weight penalty, thus exacerbating the problem), and can increase noise. Sound-dampening materials can be bulky and expensive. And because helicopters are not pressurised, they do not benefit from the collateral acoustic insulation of the pressure vessel and its sealing. Helicopter cabins, perhaps even more



2. AgustaWestland's AW109 Power
3. The EC135 P3/T3 Stylence by Airbus Helicopters



than business jet ones, must be light in weight, but still comfortable.

Connecting flights Helicopter interiors are also usually smaller than business jet cabins. A common problem resulting from this is when passengers transfer from a jet to a helicopter and they want to carry the same amount of luggage. Space utilisation is critical, and open space, the most flexible, comes at the highest premium.

Because helicopters are often used for the last stretch of a journey, landing at the exact site of a meeting, robust communication systems can become more critical and more expected, because they enable executives to make last-minute changes and briefings.

These challenges are offset by advantages: trips are shorter, so there is no need for a lav, water or a galley. The aforementioned pressurisation is unnecessary. Interior space can be

increased wherever glass is employed, because single-layer windows are thinner than insulated walls. And helicopter designers have the same palette of certified carpeting, fabrics and leathers as their jet counterparts.

How do these elements come together in a modern luxury helicopter? "With a VIP interior, the sky's the limit," says Andrew Zahasky, marketing design and rendering specialist at Bell Helicopter. "We use our vast experience to marry the art of the possible with the specific desires of each customer. We work diligently to make a VIP customer's helicopter a seamless experience with their other vehicles, like their limousine."

Business tools Zahasky has also noticed the demand for more office functionality. "We've seen a shift away from entertainment to connectivity," he says. That means fewer screens and



Heli-Expo highlights

Heli-Expo 2014 was held in Anaheim, California, USA, in February. AgustaWestland's biggest news at the show was the launch of the AW109 Trekker, its first light twin-engine helicopter to offer skid landing gear. The AW109 Trekker is based on the AW109/Grand range of helicopters and has a cabin the same size as the Grand/GrandNew. It can accommodate up to six passengers or one stretcher with 3-4 medical attendants, or two stretchers and two medical attendants. The helicopter supports single-pilot operation, so an extra passenger can be carried in the cockpit if required.

The show was Airbus Helicopters' first major rotorcraft event in its new identity. Among the company's announcements was an upgraded version of the EC225 Super Puma, the EC225e. The improvements include more payload, an additional fuel tank, new avionics and a new cabin layout, designed with customers to provide better comfort and access. Airbus Helicopters also unveiled the latest member of its Super Puma family – a multimission utility workhorse version called the AS332 C1e.

Finally, Bell Helicopter launched a new short light single helicopter – the Bell 505 Jet Ranger X. It's a five-seat helicopter featuring a fully flat floor and clamshell doors. Bell Helicopter also used the event to provide an update on the Bell 525 Relentless programme. The 16-passenger helicopter that is expected to make its first flight later in 2014.



more mobile communications, including teleconferencing. “And aesthetics remain important,” he adds.

In the past, non-utility helicopter interiors have been seen as the domain of independent completion and custom shops, but Zahasky says customers are increasingly asking more of Bell Helicopter as an OEM. “There are good completions shops, but many customers want to deal only with the OEM,” he says.

He believes OEMs’ main advantages are experience, and the fact that engineers and interior designers can work side by side early on. This means things like wire harnesses can be built to accommodate options, cutting the amount of modification required during completion. He contends that an OEM also has a greater ability to maintain close relationships with pilots, maintenance providers and

WE’VE SEEN A SHIFT AWAY FROM ENTERTAINMENT TO CONNECTIVITY

4. Airbus Helicopters’ AS332 L1 in VIP configuration
5. The Bell 525 Relentless
6. The AgustaWestland Grand New
7. The EC225 from Airbus Helicopters

handlers. “They tell me things about the aircraft in operation that I might not have thought of,” says Zahasky.

Customer driven Bell has expanded its colour offerings over the past five years. “For example, we now have matte finishing options, on a par with those seen on high-end sports cars,” comments Zahasky. “We offer more than 150 colours and we work closely with the customer to ensure that he or she will be more than satisfied with their design. We can match corporate



4 5





Magnificent machine

At Heli-Expo in February 2014, Mecaer Aviation Group (MAG) unveiled a VVIP interior concept for the Bell 429. The Bell 429 MAGnificent was showcased in a full-scale mock-up at the show.

The Italian company's aim was to introduce Italian style and craftsmanship in an interior that also abided by aviation standards. The concept features four seats, finished in hand-stitched premium leather, and MAG's noise and vibration abatement system, Silens.

MAG also used the show to demonstrate its proprietary IFE system I-Feel, featuring wi-fi connectivity, along with its AW169 VIP interior mock-up. The company has six completion centres spread across Italy, the UK, Russia and the USA.

but specialist equipment may require specialist maintenance or equipment," Peterson says, and this may also make resale more difficult.

logos and liveries – and even do custom work. Every detail is within 3ft of your face, so you make your mark with the details."

Again, Zahasky says customer feedback is driving the options offered. "The traditional looks are popular, but we also want to offer new looks like stainless steel and carbon fibre, not just the traditional wood panelling and shiny brass," he says. "We don't want anyone to buy from someone else because we couldn't offer what they wanted. We also want to offer things our competitors don't."

The upcoming Bell 525 Relentless is a new proposition altogether; it's a lot larger than the Bell 407 or Bell 429, allowing many more interior options. "It presents opportunities we've never had before," enthuses Zahasky.

Always ready For Paul Peterson, marketing support engineer and manager, completions at Airbus Helicopters, a vital consideration is that the product has to work every time. "We emphasise uptime, availability and continuing airworthiness," he says. "Whether it's simple or complex, you want something that's available."

Customers or their designers sometimes want features that are impossible, impractical or overly expensive in an aircraft. Some other ideas are possible, but their unusualness means they are only available from one producer, or even

THE CABIN IS SMALL, SO DETAILS REALLY MATTER, AND ARE ESTABLISHED EARLY

one person. Peterson warns that this is particularly the case with more complex or exotic entertainment, communication or electronic systems. "You may have to find 'that guy'," he says. "He may be available, but across the country; he may be booked solid for two months. If you have a complex or specialist system, you may face inconvenient downtime."

As well as possibly extending the completion by months, customers may face delays when the equipment needs maintenance work. "Typically, annual inspections will be done in the field,

- 8. MAG's MAGnificent VVIP interior for the Bell 429
- 9. AgustaWestland's AW109 Trekker

Splitting distance There is also the issue of space. "Compared with a fixed-wing aircraft, you have very little space, and you must find a space for everything," says Peterson. He adds that sometimes that means splitting equipment – placing controls some distance from the things they control. This is done for space reasons, but also because of centre of gravity issues or for maintenance accessibility. It's also not unusual for clients to request that controls are clustered near the master seat, so that the principal doesn't have to reach about.

"The cabin is small, so details really matter, and are established early on in the design process," says Peterson. "Early renderings are quite detailed; they show switches, stitching, where the pouches are, etc. We spend hours ensuring the customer knows what they're getting." The approach is also used to ensure that everything will fit – that a full pouch, for example, will not interfere with a fold-down table.

Like Zahasky, Peterson emphasises the benefits of OEM experience. "So many things are done because we know what works historically," says Peterson. "There is also a lot of tribal knowledge that covers placement – for example, where heat goes; what presents an obstacle to something else; and where people put their hands as they enter and exit the aircraft. There are a lot of things that only experience will cover." **END**



WHERE THE MINDS OF ASIAN BUSINESS AVIATION MEET



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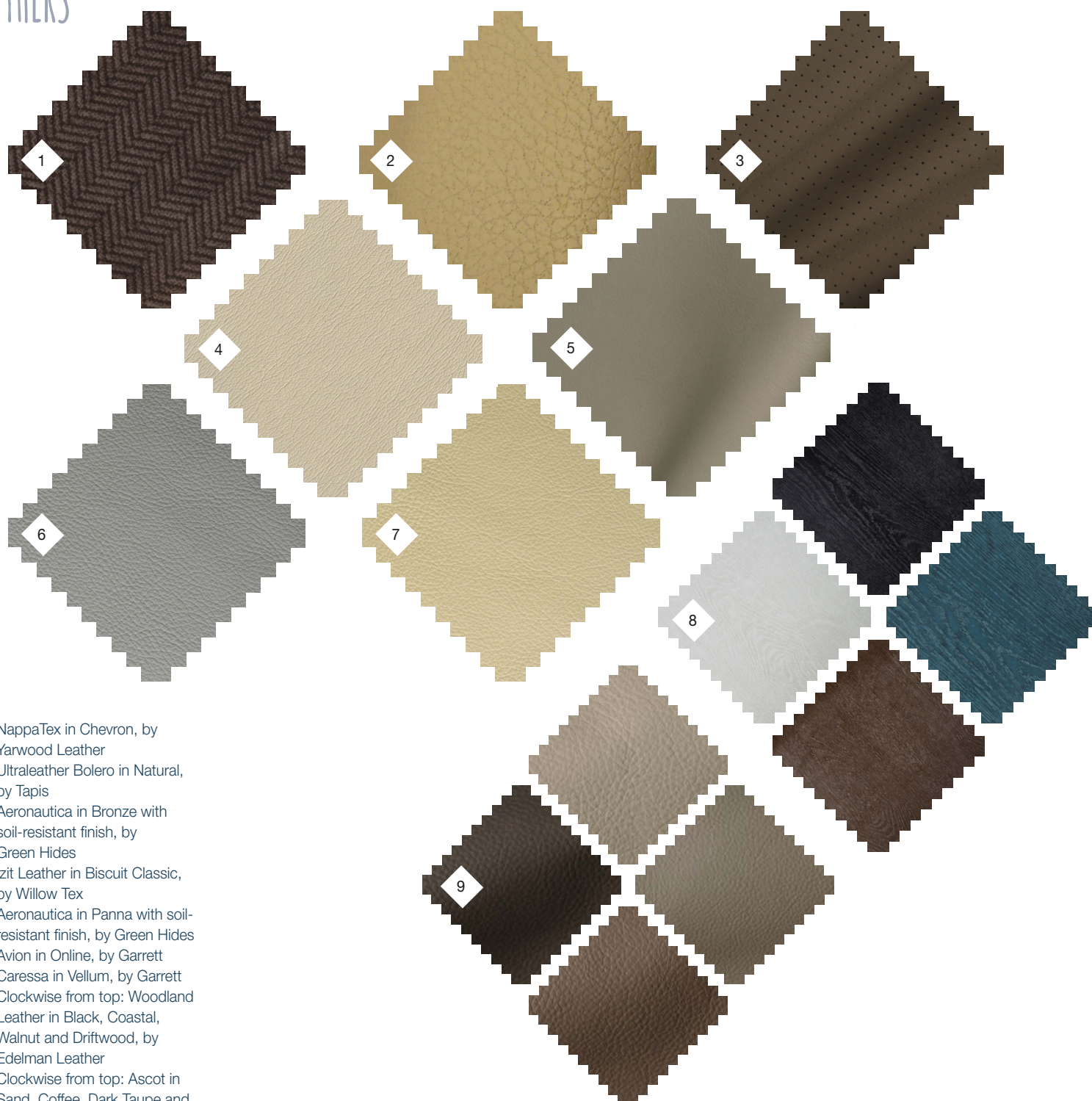
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developed for business jets

LEATHERS



1. NappaTex in Chevron, by Yarwood Leather
2. Ultraleather Bolero in Natural, by Tapis
3. Aeronautica in Bronze with soil-resistant finish, by Green Hides
4. Izit Leather in Biscuit Classic, by Willow Tex
5. Aeronautica in Panna with soil-resistant finish, by Green Hides
6. Avion in Online, by Garrett
7. Caressa in Vellum, by Garrett
8. Clockwise from top: Woodland Leather in Black, Coastal, Walnut and Driftwood, by Edelman Leather
9. Clockwise from top: Ascot in Sand, Coffee, Dark Taupe and Buccaneer, by Moore & Giles

LEATHERS



- 10. Ultraleather Linen in Nude, by Tapis
- 11. Ultraleather Vienna in Almond, by Tapis
- 12. Andrew Winch Collection in Jetstream, by Foglizzo

CARPETS



- 1. Classic in Blue, by Tisca Tiara
- 2. Wollbruessel in Mid-grey, by Tisca Tiara
- 3. Kuba in Kudu pattern, by Scott Group
- 4. Arlanda in Crystal, by Tisca Tiara
- 5. Capriccio in Sand, by Tisca Tiara



TEXTILE TRENDS

Tammie Hogan, who has more than 18 years of experience as an aircraft upholstery technician, recently joined Spirit Aeronautics of Columbus, Ohio, USA. Here she shares the trends she has noticed in terms of colours, textures, materials and stitches.

The most noticeable trend is for a light, neutral palate – chosen to make the cabin feel bright. This is often brought to life using just a hint of bold colour, print or pattern. For example, woven textures add an interesting dimension, while grey can be paired with crisp white and a splash of colour – blue and green have been popular. Also lighter tan and beige have been used with chocolate brown and gold, for a hint of colour.

In terms of upholstery techniques, I have noticed demand for clean structural lines with very little detail stitching. When detail stitching is requested, clients opt for decorative hand-applied stitching.

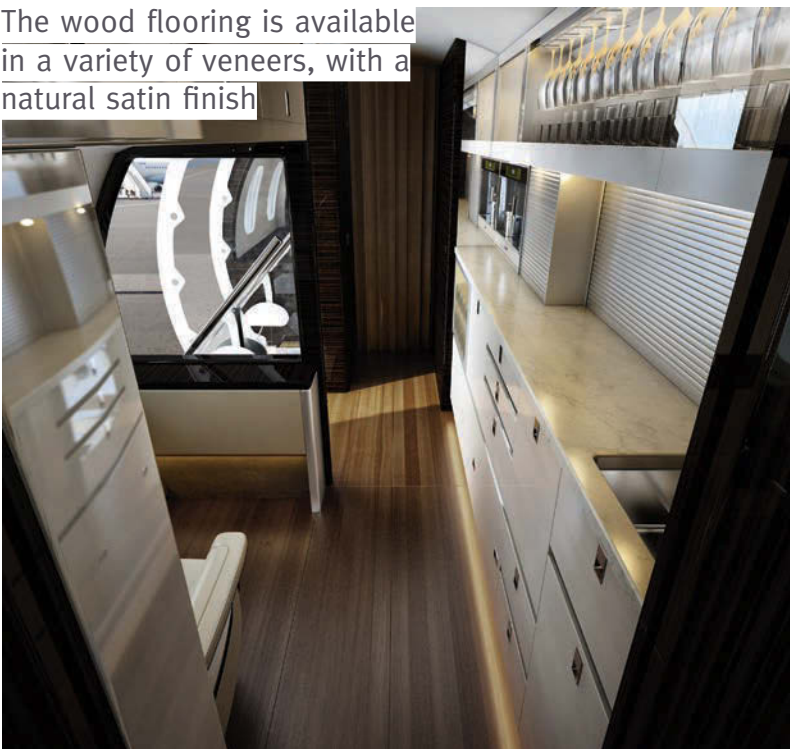
My advice for clients choosing materials is not to overlook durability and maintenance. Although something may look nice now, it does not mean it will last.

EBACE 2014

Around 12,000 people are expected to convene in Geneva, Switzerland, for EBACE 2014 on 20-22 May. As well as an exhibition at the Palexpo that will feature nearly 500 companies, there should be more than 50 aircraft on static display at nearby Geneva International Airport. EBACE will also feature events including a Safety Workshop, International Aircraft Transactions Seminar and Cabin Crew Conference.



The wood flooring is available in a variety of veneers, with a natural satin finish



WOOD YOU BELIEVE IT

Adding to its real stone flooring and stone veneer products, LIST components & furniture will use EBACE to launch its latest development – real wood flooring for business and private jets. The Austrian interior manufacturer says the product is already certified and meets all the applicable safety and flammability requirements.

The flooring is approximately 10mm thick and available in rectangular and curved panels, to fit the contours of various types of aircraft. It can be laid in entrance areas, shower and toilet areas, and parts of the main cabin. Inlay and marquetry work is also possible.

LIST has developed a special locking system and ‘floating’ installation for the product, which it says makes the panels easy to install and maintain.

“Now, for the first time, it is possible to create the atmosphere and charm of a real wood floor in an aircraft,” says Andreas Aigner, director of R&D at the company. “Moreover it is a safe and durable product due to its slip resistance, as well as its high scratch and abrasion resistance. It is also very easy to clean.”

52

aircraft were on static display at EBACE 2013



Light fantastic

Aircraft Lighting International (ALI) will showcase its range of FAA-PMA approved fluorescent and LED lighting systems. Besides carrying a full array of 12mm

replacement fluorescent lamps in stock, ALI has replacement LED lamps available for next-day delivery. These LED lamps are 100% interchangeable with the existing 12mm series fluorescent lamps and require no rewiring and no new lamp holders, connectors, dimmers or controllers. The company's 28V DC LED lamp kit – which incorporates the LED lamp and ballast as one unit – is designed for ease of installation, full dimming and customisable lengths.

ALI will also highlight new products that it says will soon be FAA-PMA approved – replacement LED reading lights and dimmable mood lighting.



Model behaviour

Lufthansa Technik will exhibit a 1:20 scale model of a BBJ 747-8. The model features 90 pieces of furniture and components, two staircases, and Greenpoint Technologies' Aeroloft. Lufthansa Technik is currently working on the completion of two BBJ 747-8s in Hamburg, Germany. The first should be delivered in mid-2014.

Lufthansa Technik will also feature a mock-up to showcase Inairvation, its new joint venture with List furniture & components. In addition, at its booth, the company will present the latest features of its nice HD content management system. Lufthansa Technik says customers can experience innovative ways to control cabin, communications and IFE functions with its third-generation user interface. Lufthansa Technik offers AVOD as a baseline solution for nice HD and has introduced a licensed content service supported by Hollywood studios. The content service is offered in conjunction with joint-venture partner IDAIR.



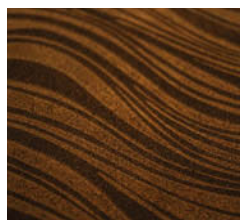
One-stop shop

Flying Colours Corp will showcase its completions, refurbishment and maintenance services. Since EBACE 2013, the company has further aligned its St Louis facility, previously known as

JetCorp Technical Services, by renaming it Flying Colours Corp KSUS; and finished phase one of a three-phase expansion project at its headquarters in Peterborough, Ontario, Canada. The new hangar has capacity for wide-body aircraft, so increasing the scope of work the company can offer.

Flying Colours has also been working on developing interior designs using carbon fibre as an integral part – and will present images of its first Challenger 850 completed using carbon fibre.

Flying Colours was also recently selected to provide interior refurbishment capabilities at Bombardier's Singapore service centre.



Natural selection

Foglizzo will showcase a collection of leathers designed with Andrew Winch. The collection was inspired by the sky, earth and sea. It includes 36 colours, three embossed textures and three grain leathers.



Green dream

On top of its recent appointment as a BBJ completion centre, AERIA will highlight the signing of its first green completion contract for a BBJ 737.

Targeted to arrive at the company's hangar in December 2014, the aircraft is scheduled for redelivery by October 2015. AERIA says the green BBJ 737 will be designed by its own VIP interior design team and outfitted with the finest materials and furnishings.

Interior highlights will include a forward crew lounge, a galley equipped for fresh meal preparation, a dining suite, a conference room, a large lounge and a master suite. A digital IFE system with multiple HD screens will be installed, along with Inmarsat and Iridium satellite communications systems and wi-fi for use with the high-speed data system. A humidification and zonal drying system will also be included. As part of the programme, AERIA will be developing an STC with approval from EASA.

Inspiration for the Azure interior's materials and organic forms came from land and sea



REST AZURED

Greenpoint Technologies will preview its Azure interior for the BBJ 787. The design features an open living space, a forward master suite and private office with two aft mini suites for guests. The central area includes a formal dining room and an entertainment lounge. Additional features include an aft spa room for exercise and relaxation. The completion centre will induct its first BBJ 787 for outfitting in 2014, and is preparing to make its first BBJ 747-8 delivery in the same year.

"Our designs are moving towards efficiency, both in energy and technology as well as space and comfort," says Annika Wicklund, design director at Greenpoint Technologies. "The main goal is to encompass all aspects of a client's life effectively into their business jet. We assimilate the highest level of performance, decorum and the luxuries of both home and office."

With its sister companies – Greenpoint Aerospace, Odyssey Aerospace Components and Greenpoint Products & Services – Greenpoint Technologies' services range from green completions to refurbishments and maintenance work, for aircraft ranging from wide-body to smaller jets.



Light entertainment

Vision Systems will present Energia, a self-powered electronically dimmable window; and Visi VIP, an IFE solution.

Energia produces its own energy from

the sun thanks to SunPartner Technologies' Wysips Glass technology, which consists of transparent photovoltaic cells integrated into the glazing. In less than five seconds, Energia dims from clear to dark. It can be controlled by simply pushing a button at the window, or from a control panel or PED such as a wireless tablet.

The Visi VIP solution is a scalable IFE system. Different configurations are possible with a single box and multiple screens, including tilt-down displays and HDMI screens with full HD resolution. It is also compatible with personal tablets.

The connectivity option enables internet access, email, video conferencing and smartphone usage over VoIP through a Satcom 1 receiver.

Complete service

AMAC Aerospace will promote its VIP completion and maintenance services. The family-run company's facilities in Basel, Switzerland, can accommodate wide-body and single-aisle jets, plus lighter business jet types.

The company will also use EBACE to showcase its expanded skill set, growing approvals portfolio and recent successes. AMAC is believed to be the first MRO in Europe to perform the 16-year/192-month structural inspection of a Gulfstream V. AMAC also recently completed its first wide-body maintenance/refurbishment project, an ACJ 340, which was redelivered to a private client.



460

exhibitors
participated at
EBACE 2013



Q&A:

Rachel Bahr,
chief marketing officer at Emteq

What are your plans for the show?

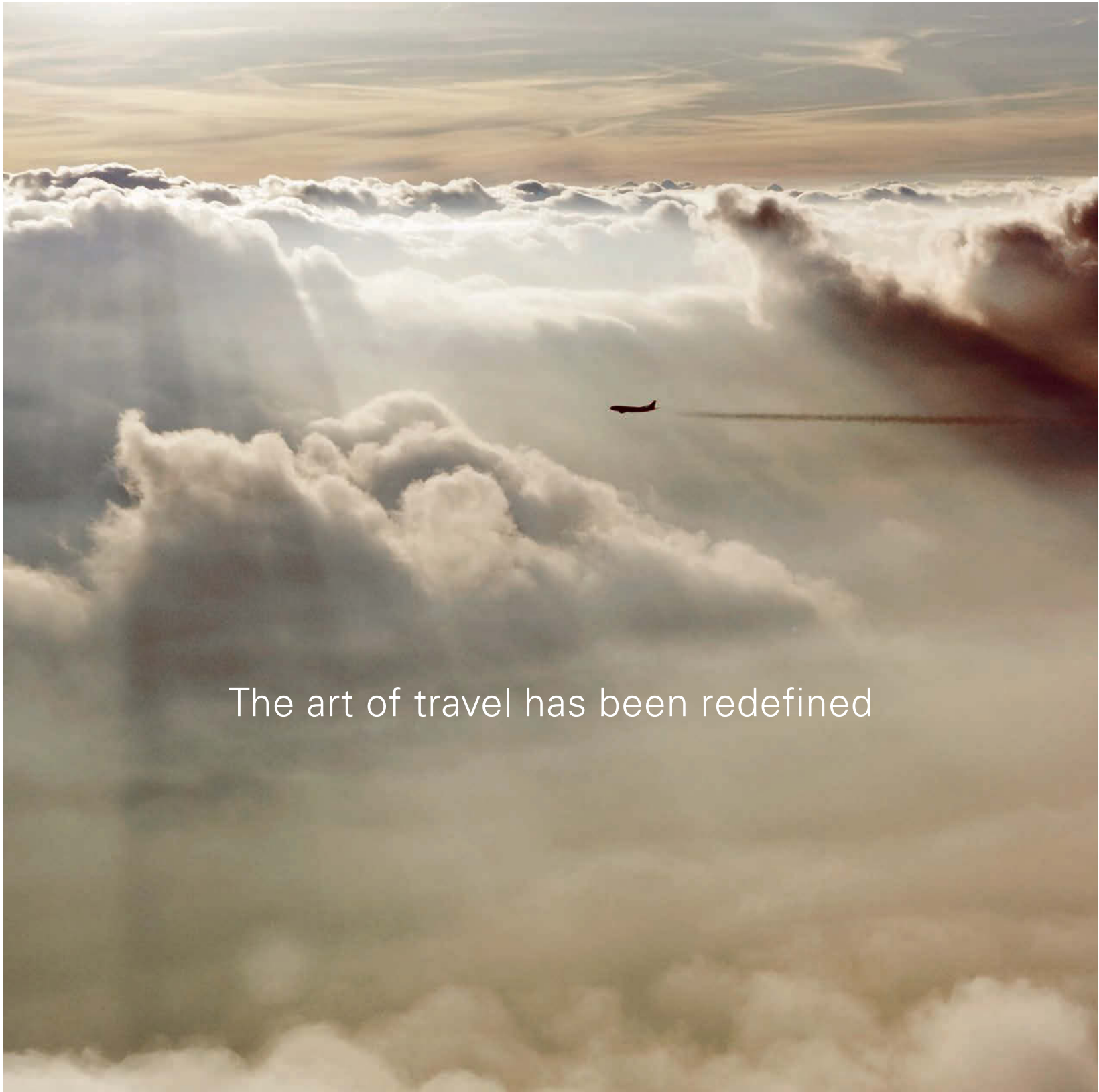
As well as announcing several new contracts, we will showcase five new products. These are the 3X series; our expanded line of Quasar full-spectrum mood lighting; specialist mirrors with backlighting; LED taxi and landing lights; and our 115VAC VIP lighting line. We will also display other LED interior lighting products, cabin outlets, USB chargers and eConnect.

How do the latest launches address demand?

We evolve our core products when necessary to make them easier to install and control, lighter, and to increase functionality. Customers are also demanding products that run directly off 115VAC, products that run directly off 28VDC with built-in power regulators, smart products that don't require boxes for control or to interface with a CMS, and the ability to upgrade from fluorescent systems to LED without having to rewire.

What is the future for VIP aircraft lighting?

We see lighting becoming more intuitive to passengers' needs. Passengers have come to expect the same capabilities as they get in their homes – systems that are set up to anticipate who is using the room for what purpose and synced to the time of day or portion of the journey. Designers will continue to ask for lighting to be applied in interesting and unique ways; they know the impact lighting has on the overall experience of the aircraft interior and they have seen that it can be done.



The art of travel has been redefined

The new Swiss standard in cabin design

Setting a new standard in VIP completion means rethinking all possibilities. Over eighteen months of interior designing, engineering and testing have led us to a new cabin solution that will redefine the art of travel. One major insight has paved the way: as much as individual tastes may differ – there is a combination of proportions and symmetries that makes all disagreements disappear. This combination we have been searching for. And this combination we finally found. A cabin solution that is ready for installation. Ensuring your aircraft will take off at the agreed time. www.srtechnics.com

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Venue is scalable to various aircraft types



VENUE FOR A PARTY

Rockwell Collins will showcase its Venue HD CMS and IFE system. Having announced at EBACE 2013 that it had delivered more than 300 Venue systems, the company plans to reveal another Venue milestone at this year's show. It will also feature new options for the system, including a personal tablet mounting solution.

Venue was recently selected for ACJ340, the largest aircraft type it has been chosen for. According to Greg Irmen, vice president and general manager for flight controls and information systems at Rockwell Collins, Venue's popularity in the VIP market stems from the simplicity of its hardware and the fact that it is designed to accommodate future consumer-driven technologies.

Other exhibit highlights for Rockwell Collins include its Tailwind multiregion onboard TV system, which can output HD and MPEG-4 programming, and its Airshow moving map solution.



Q&A:

Eric Jan,
head of VIP interior design at SR Technics

12,353

delegates attended
EBACE 2013

What are your plans for the show?

Following 16 months of research, our VIP team is launching a revolutionary design package that will transform the way cabins are completed and managed. It is for governmental and private narrow-body aircraft such as ACJs and BBJs.

Why have you developed this now?

It's time to rethink narrow-body interiors, because they are no longer fully adjusted to today's needs. These interiors are often overloaded with decorative elements modelled on stereotypes of luxury. There is a lag between the aesthetic style on board and the revolution underway in other areas of our lifestyle. The onboard ambience also needs to be cosy, to enable passengers to relax and unwind. In addition, galleys are more important now. The onboard galley no longer needs to be restricted to a hidden enclave only accessible to staff; it can become a convivial place that is at the heart and soul of the inflight life.

What else can you reveal?

Our innovation is based on simple solutions, but ones that reflect the high-end luxury demanded in the VIP world, and which meet each customer's individual needs. The product brings together various smart solutions and reconsiders traditional layouts to optimise the space and its flexibility. We also calculate that completion time will be cut by up to a third compared with the industry norm, so the product offers incredible value.

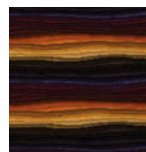


Boeing up

Sabena technics will highlight its new qualification as a BBJ completion centre. The company was recently contracted to design and outfit a BBJ 737-700. The design and engineering work has begun and the company expects the aircraft at its facility in Bordeaux, France, in March 2015.

Galley repair

Reheat International will promote the fact that it recently signed an agreement with MSI Aircraft Maintenance Services International to jointly repair galley equipment such as ovens, coffee makers, water heaters and boilers at MSI's repair facility in Dubai, UAE. Reheat has also positioned an exchange pool of ovens, coffee makers and water boilers there.



Magic carpet

Aircraft Interior Products (AIP) will present The Evolution of Design, a set of carpet designs that take inspiration from nature. The company will also showcase in-stock ranges of wool carpets.

All the in-stock options are made at the company's manufacturing facility in the USA and include AIP's soft anti-microbial backing.

AIP also recently entered into an agreement whereby FEHD will represent AIP's aircraft carpet in Europe – which AIP says will mean improved delivery times and better support for European customers.



Full service

The 328 Group will highlight services including base and line maintenance, interior monument manufacturing, interior design and certification, avionics upgrades and training across a range of aircraft types. The group includes 328 Support Services, 328 Design and JETS.



The value of our experience.

There is no substitute for experience. Our workforce has been intensively involved in aircraft completions and refurbishments for numerous VIPs and Head of State's. You can trust us to deliver the most complex and exclusive aircraft design on time and within budget, with full attention to the smallest details. Our staff have acquired vast experience in interior design, manufacturing, completion and in-service support.

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BULLETIN BOARD

Featuring Innovative
Advantage, PCB Piezotronics,
Aircraft Lighting International
and TAG Aviation

precocious talent

Only two years since its launch, AERIA has become an approved BBJ completion centre and has signed its first green BBJ 737 contract

In February 2012, MRO company ST Aerospace launched AERIA Luxury Interiors, a new brand name for its global VIP completion and refurbishment business. The name was inspired by the word 'aerial', reflecting the company's mission to satisfy highly demanding VIP customers with luxurious aerial interiors tailored to their every need.

Since then, ST Aerospace and the AERIA brand have achieved much in the cabin refurbishment segment. At the Singapore Airshow in February 2014, ST Aerospace announced it had recently been appointed as an ACJ service centre, and that AERIA has become an approved BBJ cabin completion centre.

With these latest endorsements, ST Aerospace will be able to offer a wide range of maintenance services for ACJ aircraft through its global network, and AERIA will be able to offer BBJ operators services ranging from interior design and completion, to maintenance and product development and integration.

In fact, the company has already clinched its first green BBJ 737 completion contract. Its in-house design team will create a VIP interior for the aircraft, with a focus on the finest materials and furnishings. The aircraft is scheduled to arrive at the facility in December 2014, and redelivery is scheduled for October 2015.

Another recent development at AERIA – indicative of its desire to combine technological innovation with artisanal excellence – is its acquisition of a 3D printer. This will be used for sales and marketing purposes, as well as for prototyping and limited production of non-structural parts. Customers will not be limited to viewing 3D drawings of seats or

side ledges on screen – they will soon be able to hold scale models in their hands.

Although it is a relatively new name, the management team behind the AERIA brand can lay claim to having a hand in more than 50 interior completion projects for aircraft belonging to VIPs and heads-of-state worldwide. AERIA stems from ST Aerospace San Antonio (STA San Antonio), a company that itself grew out of the famous Dee Howard Company, established in the 1980s.

To launch AERIA two years ago, one of STA San Antonio's maintenance hangars was converted for VIP completion work. Today, that facility is undergoing a 14,000ft² expansion. There will soon be a new cabinet and upholstery shop, as well as an additional building for the design, sales and marketing teams.

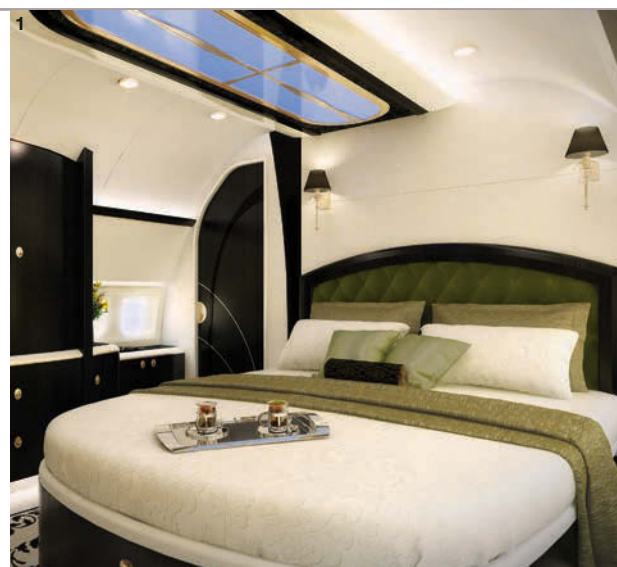
AERIA says that one of the key benefits of being located in San Antonio, Texas, USA, is its local pool of highly skilled engineering talent. Currently staffed with more than 40 employees, AERIA's plans include bolstering its team and further enhancing its interior capabilities.

The company is also situated close to a cluster of supporting businesses, including DRB Aviation Consultants, another of ST Aerospace's affiliate companies. DRB Aviation Consultants is endowed with an Organization Designation Authorization licence, which AERIA says enables the company to approve modifications more efficiently, ensuring a timely redelivery to the customer.

AERIA Luxury Interiors Reader Enquiry No. 501

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1-4. A BBJ concept by AERIA





Experience a distinct ability to create a very distinctive interior.

AERIA Luxury Interiors, the completions division of ST Aerospace San Antonio, specializes in VIP completion and refurbishment for Boeing and Airbus airframes. The AERIA team has renowned expertise in completions, engineering, and all related support activities. Our management team collectively has nearly 150 years of experience and has performed successful completions on more than 50 aircraft. For the ultimate expression of airborne style, elegance, and functionality, call on AERIA Luxury Interiors. [The Luxury of Experience.](#)

Come visit AERIA Luxury Interiors at our booth 3659 during EBACE 2014, May 20 - 22!
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AERIA
LUXURY INTERIORS

customerservice

In a business that relies on reputation, understanding customers' needs is paramount, says AMAC Aerospace

1-2. Renderings of an ACJ319 interior to be completed by AMAC



At its base at EuroAirport Basel-Mulhouse-Freiburg in Switzerland, AMAC Aerospace has developed a successful business completing corporate jet interiors for an elite client base that includes Fortune 500 companies, heads of state, royal families, entrepreneurs and other high-net-worth individuals. The company is the largest family-run business in the world providing private aviation maintenance, completion, refurbishment, charter and management services. The founders – group executive chairman and CEO Kadri Muhiddin, group chief operating officer Bernd Schramm and group chief financial officer Mauro Grossi – have a strong background in the sector. This means they understand what aircraft owners require from a completion centre: reliability, great service, top quality, and on-time and on-budget delivery.

For a completion project, once AMAC has taken delivery of the airframe, it fits bespoke furnishings and technology (in accordance with the owner's requirements) and can complete paintwork on-site too. The facility has two wide-body hangars and one narrow-body hangar. The company is also constructing a fourth hangar at the airport, to support the maintenance of VIP wide-body aircraft.

"As the distances between business centres expand, the demand for longer-range aircraft is increasing," says Muhiddin. "AMAC is well positioned to serve this market. We have the skills to provide the highest quality completions, featuring the latest in design, comfort and connectivity. And our capabilities are increasing all the time." The company has approvals from various aircraft manufacturers, including from Airbus and Boeing, enabling it to undertake completions and maintenance on the ACJ320 series, ACJ330s, ACJ340s, BBJ 777s and BBJ 747s. It also has the capacity to work on short- and mid-range aircraft.

One of the biggest challenges AMAC faces is providing an onboard working environment that is comfortable and practical. The company says that a full-scale communications suite and complementary IFE system is arguably now one of the most important parts of any completion.

"The need for effective connectivity has become a leading part of the design process," says Schramm. "The capacity to make calls as if you were on the ground, have speedy and reliable internet access, and office amenities for tablets and smartphones, is essential."

AMAC can install all these elements in-house, and says it also has the capacity to update systems as quickly as they change. The company is currently working on the design and implementation process for the installation of HD screens for 3D viewing.

AMAC has also built its reputation on paying attention to the details. For example, a recently completed ACJ319 was furnished with soft leathers, specially selected wood veneers, and a decorative cabin door inlaid with carved mother-of-pearl and wood marquetry panels. Another ongoing ACJ319 project incorporates carbon fibre accents, which AMAC believes to be a growing trend in aircraft interiors.

"The VIP aviation market is relatively compact, so networks are essential," says Muhiddin. "AMAC continues to deliver what these demanding customers expect."



AMAC Aerospace

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13:02 THERMOFORMABLE		Confirmed
13:06 LOW OUTGASSING		Confirmed
14:10 LOW WATER ABSORPTION		Confirmed
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17:07 CHEMICAL RESISTANT		Confirmed

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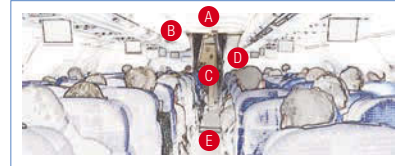
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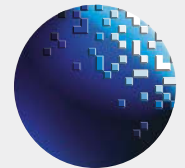
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finedetails

Sabrina Monte-Carlo attributes its impressive portfolio to its focus on craftsmanship, know-how, personalisation and obsessive attention to detail



1-2. An aircraft customised by Sabrina Monte-Carlo

'Perfection lies in the details' is the mantra that pervades all of Sabrina Monte-Carlo's work.

The company strives to create exclusive interior and exterior spaces that embody elegance, refinement and contemporary *art de vivre*. "Selecting from the finest and most refined brands in interior and exterior design, we reinterpret luxury to create habitats that correspond with perfection to the aesthetic and most exclusive style of each single client," says Sabrina Monteleone, founding president of Sabrina Monte-Carlo.

The company's projects include chalets, villas and yachts, in addition to private jets. "Private aviation represents a client's ultimate desire for privacy, comfort, flexibility, luxurious travelling and, last but not least, individual expression," says Monteleone. "In collaboration with world-renowned private jet engineers and designers, Sabrina Monte-Carlo creates a unique style for each project."

Monteleone says private jet owners are highly demanding not only in terms of design, functionality and the quality of the materials used, but also in terms of execution. "We have a department dedicated to project

management," she says. "From the project's genesis to its completion, they ensure not only that deadlines are met, but also that the time investment required from the client is kept to a minimum. All our projects are delivered with turnkey services."

When working for a client for the first time, the company undertakes extensive research in the initial stages. "Interior design is not a collection of objects, it is more the exact expression of a space, the reflection of the unique personality of each owner," says Monteleone. "Therefore, we study the client's needs, personal style and preferences. This allows us to be relevant from our very first proposal, so only fine-tuning is necessary after the first presentation meeting. When working for existing clients, the process is different as we normally have *carte blanche*."

Monteleone also notes that a private jet interior can incorporate the ultimate alliance between cutting-edge technologies and long-established heritage crafts. "Our huge palette of brands in interior design provides us with endless possibilities when customising the various spaces of an aircraft, allowing us also to accommodate the most difficult requests from our clients," Monteleone says.

Founded in Monaco in 1999 as a boutique for decorative objects and residential interior design, Sabrina Monte-Carlo quickly diversified into yachting and private jet interiors. "It was a natural evolution for us," explains Monteleone. "Clients wanted to work with us again. After we had decorated their winter ski chalets or waterfront villas, they invited us to work on their private jets and superyachts."



Sabrina Monte-Carlo

Reader Enquiry No. 503

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fullworks

A recent Hawker 900XP project showcases Marshall Aviation Services' ability to refurbish interior and exterior at the same time

The look and feel of an aircraft interior conveys a message about a company and an individual. Refurbishing an interior is a difficult balancing act between artistic vision and more practical aspects such as engineering capabilities and safety standards. Craftspeople must try and create the finest finishes while taking into account the functionality of the aircraft, always mindful of the customer's design ambition.

Marshall Aviation Services' recent refurbishment of a Hawker 900XP business jet required the same delicate blend of engineering skill and creative vision. The company was selected not only for its 50 years of experience creating aircraft interiors, but also for its one-stop-shop capabilities, which it says enabled it to satisfy the customer's maintenance and paint requirements and make a cost-effective use of downtime.

Marshall's on-site Part 21 Design Organisation created an interior concept for the refurbishment using a combination of computer software and mood boards. In-house design engineers worked closely with the trim shop and sales managers to ensure optimum materials were selected.

The interior was removed; all the seats were recovered; bulkheads, closets and galleries were re-veneered; all bright work was re-plated or replaced as necessary; new carpets were laid; sidewalls were recovered and tables were refurbished. The overall objective was to bring the cabin back up to an 'as-new' standard.

While the interior was refurbished, the exterior was completely repainted on-site. Marshall Aviation Services opened its twin-bay, purpose-built paint facility and

complementary paint design centre at Broughton in the UK in January 2009. Capable of accommodating three super-midsize jets at any one time (or aircraft with a wingspan of 20m, a length of 25m and a height of 8m), the facility can service around 30 midsize business jets a year.

Buoyed by Marshall Aerospace and Defence Group's acquisition of Beechcraft's MRO facility at Broughton in September 2013, Marshall Aviation Services has won many exterior paint contracts of late, the most recent being an initial agreement with Britten Norman to repaint up to 15 aircraft. The site, formerly known as Hawker Beechcraft Services, has a 50-year legacy of delivering maintenance, modification, paint and upgrade services to owners of both Hawker and Beechcraft products. Now the site's skill set has extended to offer refurbishment for various aircraft types. The company says its range of interior and exterior capabilities and on-site support has brought about an increase in new aircraft business.

The company's paint capabilities at Cambridge International Airport are extensive, capable of handling aircraft up to the size of a BBJ 747. This facility is due to be further upgraded in 18 months' time.

Marshall Aviation Services' technical sales team will be available to talk about refurbishment options at EBACE 2014 (to be held from 20-22 May 2014 in Geneva, Switzerland) on Stand 5642 in Hall 6.

Marshall Aviation Services Reader Enquiry No. 504

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1-3. The Hawker 900XP recently refurbished by Marshall Aviation Services



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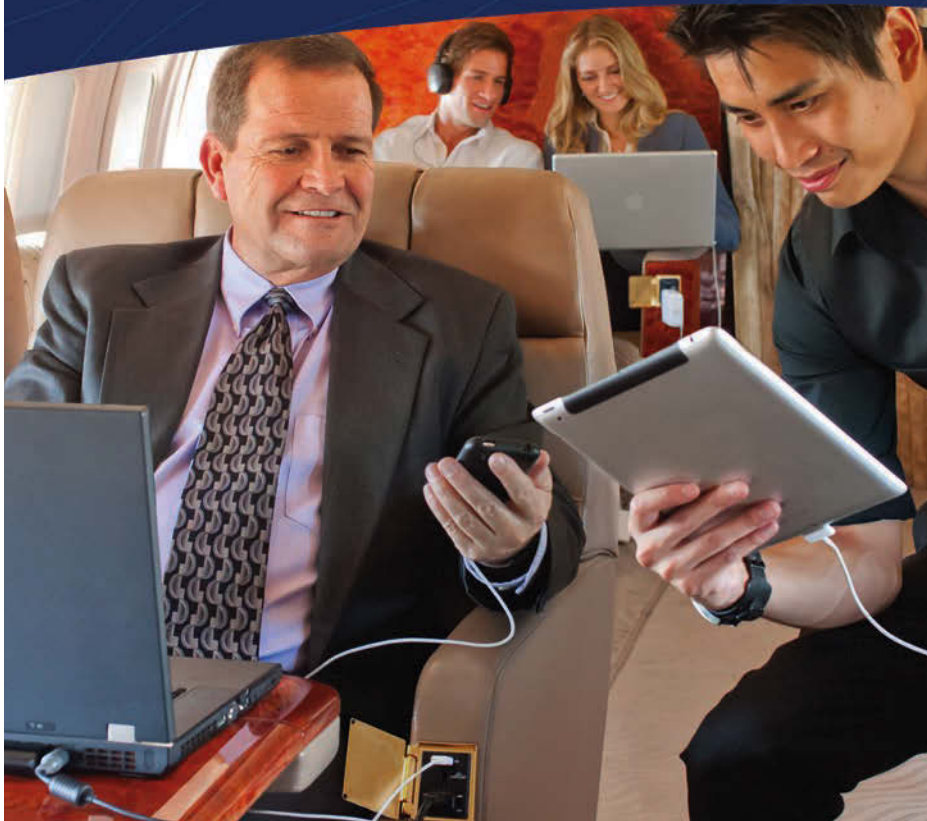


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Aircraft Interior Solutions

BUCHER

brightfuture

The upcoming IFEC solution from PGA is designed for simplicity, scalability and maintainability

PGA Electronic will soon complete the development of its full IP AVOD IFEC/CMS system, a completely new product based on Ethernet architecture. Using the system, passengers will be able to experience AVOD, approved early-window media (Hollywood films that are not yet available on DVD), games and wireless connectivity.

According to PGA, one advantage of the system is that it can be upgraded remotely – the integration of IP services simplifies the task of performing software updates during maintenance. Flexibility was another key design aim, which PGA has addressed by making the hardware interchangeable. The system features

1. PGA's new system will be compatible with various smartphones and tablets

automatic software configuration, for plug-and-play operation. PGA also believes the system will be very reliable, because it is based on IP technology, which is widely used all over the world in various sectors.

At the core of the new system is the Global Entertainment Server (GES). Among its many features, the GES will store approved early-window media, broadcast it via Ethernet streaming, and manage the setup and the configuration of devices automatically.

To get the most out of the system in terms of audio and video quality, PGA recommends that customers also select flatscreen and touchscreen monitors from its new Xtra range. These monitors were designed to offer the best picture quality. Models start at 12.2in and go up to 55in. The screens are compatible with DLNA technology and early-window content, can support IPTV and have USB inputs.

The system will also enable passengers to manage their media at all times, in all parts of the cabin. It is compatible with smartphones and tablet brands including iPad, iPhone and Samsung Galaxy. Passengers will be able to stream audio and video content from the server and view it on their devices. By the same token, they will be able to send their own media (such as family pictures and movies) for viewing on the cabin screens. These bring-on devices can also be used as remote controls, offering mastery over features such as lighting, the hostess call function, door closure, satellite TV, security camera, moving map systems and power management.

PGA Electronic

Reader Enquiry No. 505

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flowerpower

Connectivity enables passengers to take complete control over the Clematis cabin lighting system

1. The Clematis user interface

The latest lighting system from Sela is a smart LED full-spectrum LED lighting system called Clematis. The idea is that passengers can manage any cabin atmosphere easily, controlling lighting scenarios from their smartphone, tablet or wi-fi hub.

Sela says Clematis uses high-efficiency LED colour mood lighting fixtures and can be interfaced with any CMS. The system is compatible with various full colour and full white lighting sources offered by Sela, including RGB-W LED tubes, LED spotlights, LED reading lights, LED snake lights, LED star lights, LED carpet and strip lights and decorative lights.

In full-colour or white-light configurations, the light rendering is not limited to a bluish white; the colour rendering index is about 87% of the sun's spectrum.

Through the use of a standalone dimmer sequencer unit, called the LMCU, lighting colours and brightness effects can be controlled simultaneously and scenarios can be created and stored. The LMCU can drive any Sela lighting source, from one full colour way to four white colour ways.

The LMCU can either control lights by itself or follow instructions provided by CMS through Sela's Master Light Unit (MLU). The MLU is a master box designed to check and manage the

complete cabin lighting system in each room through an Ethernet, wi-fi or Bluetooth connection. Up to 124 LMCUs can be controlled by the MLU.

The MLU has been developed with the main goal of facilitating lighting scenario programming. Following a cost target from the beginning of the development, Sela says programming, configuration, lighting effect build up and fine-tuning are now quickly and simply accessible. This master box also includes a web server that checks that the entire cabin lighting system is operating correctly.

The MLU is a smart box with four Ethernet inputs and wi-fi connectivity, giving a simple interface for any control inputs. One of the Ethernet links is dedicated to enabling video features such as synchronising the lighting colours with a movie. The MLU is also equipped with four audio inputs, so the system can produce lighting colour variations in sync to music played in the cabin.

In addition, this smart box has been designed to enable multiscreen management. From the cabin crew's fixed touchscreen to personal mobile touchpads, the MLU is a multisite electronic platform.

All the lights are synchronised in terms of brightness and colour and various scenarios can be programmed and then adjusted throughout the aircraft's completion in accordance with the customer's requirements.

The Clematis system has already been installed on five ACJ 319s and retrofitted on two Falcon 50s.



Sela **Reader Enquiry No. 506**

To request more details from this advertiser, visit www.ukipme.com/info/aimbj

Skylounge

Cabin Sleep System

In 1997 Cascade Designs pioneered the development of the world's first customised self inflating aircraft cabin mattress to fit all aircraft models under the brand Skylounge™. To date there are in excess of 15,000 units in service.

About Us:

The Skylounge™ is lightweight and can be rolled up into a customised equipment bag and stored in a fraction of the space of a conventional sleeping unit. The underside is custom contoured to match the top surface of the users preferred seat configuration which ensures a flat top surface for sleeping. We design and manufacture for single, double and divan units.

To operate, open the valves, the mattress will self inflate in minutes. By closing the valves, the air is trapped inside the foam maintaining structural integrity. An electric pump can be provided as an accessory to assist with inflation and deflation.

Skylounge Benefits:

- Compatibility - customised design to fit any aircraft model
- Flexibility - mattress can be armrest height
- Security - ability to use seat belts
- Stow ability - minimal volume when deflated
- Lightweight - approx weight (single = 8.0lbs - double = 13.0lbs)
- Easy to use - user friendly set up and packaging
- Comfort - self regulated comfort
- Stability - minimal rocking during flight
- Longevity - decompression valve fitted
- Reliability - 2 year warranty
- Value - the most competitive price on the market
- Trust - over 15 years product history



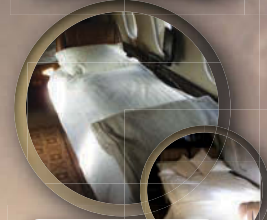
Mattress in Equipment Bag



1. Set seat configuration.



2. Open valves on mattress & fit.



3. Finished dressed beds.

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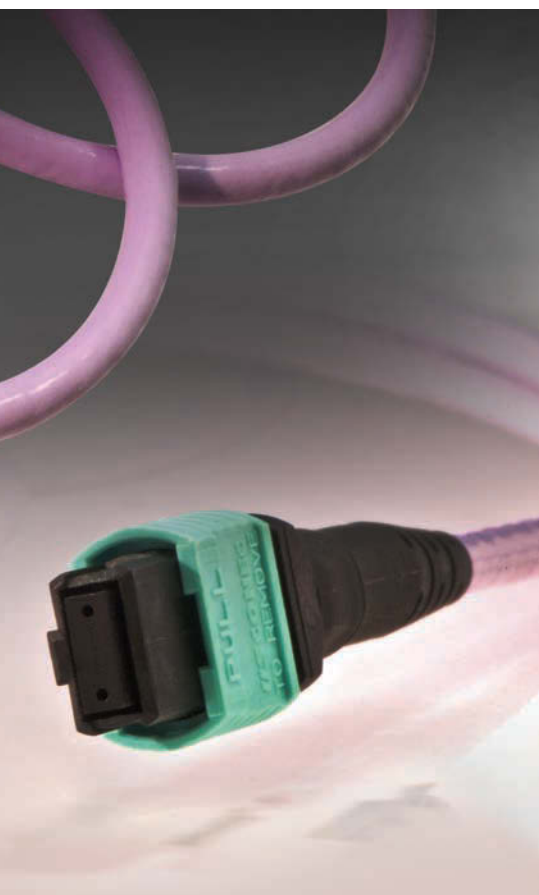
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more is less



"Weight, installation time and quality are critical for a VVIP IFE programme," says Dave Garing, vice president of business development at Innovative Advantage. "Completion centres have to provide the latest features in video and audio technology. The wiring requirements to support high-definition video, digital audio and Gigabit Ethernet have exploded."

To provide the increased bandwidth required and reduce the wiring task, Innovative Advantage uses a fibre-optic backbone to connect its audio video distribution system (AVDS). The company says that on a typical ACJ or BBJ installation, more than 3,800ft of wiring and 100 lb can be saved using the AVDS network for audio video distribution.

The fibre itself is made from glass, so therefore it can't conduct electrical current. In addition, the fibre is immune to electromagnetic radiation and generates no electromagnetic interference.

The fibre in an AVDS network often replaces a bundle or trunk of coax and shielded twisted pair wire 4-5in in diameter. "These bundles are very susceptible to

induced lightning effects," comments Garing. "One way to reduce the energy couple into the wiring is to reduce the area – fibre eliminates the bundle. An additional bonus is that fibre doesn't have to be run in conduit and needs no shielding for direct or indirect effects of lightning – making it a great solution for all aircraft installations, and especially on composite aircraft like the new BBJ 787."

Garing says the AVDS network is fault-tolerant and self-healing (any fibre can be broken and the system re-routes the channel automatically) with a 30,000-hour mean time between failures. The system can be controlled with any CMS via Ethernet or serial protocol.

More than 300 aircraft have been delivered with AVDS for all their audio and video switching. It is standard on a major OEM programme, and installed on BBJ 737, BBJ 747, Dassault and Bombardier aircraft.

Innovative Advantage **Reader Enquiry No. 507**

To request more details from this advertiser,

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soundcheck



Gas turbine engines, flaps, landing gear and air-conditioning are major sources of noise in business jet cabins. "Sound pressure levels affect both passengers and crew, so it is not just a comfort issue, but a safety one too," says Carmine Salzano, international manager at PCB Piezotronics' Aerospace & Defense division. "Mechanical structures in the surrounding environment are also affected by this acoustic stress, therefore full-scale aircraft, sub-assemblies and interior components, such as carpeting, fabric, seats and overhead storage bins, are subjected to a series of tests including acoustic measurements."

Salzano says acoustic testing is performed in three ways with business jets: in wind tunnels using scale models; during FAR Part 36 acoustic certification; and through cabin noise characterisation, using array microphones. "Instrumentation-grade array microphones are similar to those used by a rock band, but of very high quality and precision," says Salzano. "The precision is required to provide test engineers with an accurate map of the noise sources."

The tests measure parameters, including sound pressure, power and intensity. "Array microphones have the advantage of being

compact enough to fit into the smaller spaces found in business jets," comments Salzano. "They also pick up the full audio range for human hearing – from 20Hz to 20kHz. Large arrays of microphones are strategically placed in the cabin and the signals are then analysed using computer software. This provides the interior acoustic engineer with improved acoustic sound pressure mapping, acoustic power and intensity measurements." This data is used to determine where to place sound-absorbing materials and fabrics inside the cabin.

"Detecting noise can be difficult when measuring sound in different locations from multiple sources," continues Salzano. "The use of array microphones and proper analysis can assist in pinpointing sources of noise and thereby improving passenger comfort inside the cabin."

PCB Piezotronics

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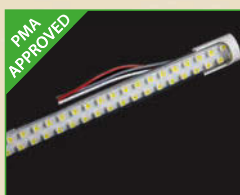
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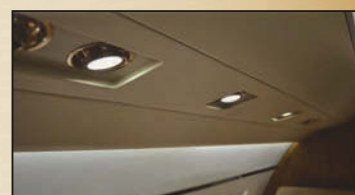
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lightrelief



Aircraft Lighting International (ALI) maintains that its replacement LED lamps make the decision to convert from fluorescent lamps a much easier one. Nick Michelinakis, president of ALI, says the replacement LED lamps are 100% interchangeable with existing 12mm-series fluorescent lamps. The fully dimmable LED lamps can be put in place without the need for rewiring, or any new lamp holders, connectors, dimmers and controllers.

"Downtime, cost and FAA paperwork are major issues when considering a conversion, and these replacement LED lamps eliminate those concerns," says Michelinakis. The lamps were designed to be extremely easy to install – the fluorescent lamps are taken out and the new LED ones can be put straight into the existing lamp holders.

ALI has been manufacturing aircraft interior lighting systems since 1998. As well as the replacement LED lamps, it continues to supply replacement fluorescent lamps. These replacement

fluorescent lamps are manufactured in carefully calibrated and controlled processes to ensure uniformity.

ALI also offers an FAA-PMA-approved 28V DC LED lamp kit that incorporates the LED lamp and ballast as one unit. This was also designed for ease of installation, and to offer dimming and customisable lengths. "The installation requires only three wires," says Michelinakis. "Without any tools, one can rotate the light 360°. This product allows for programmable dimming to the customer's specification. In addition, customisable lengths afford maximum design freedom."

ALI also offers a replacement LED reading light bulb that requires no modification to the light fixtures. These LED reading light bulbs replace 28V DC/AC halogen/incandescent miniature lamps.

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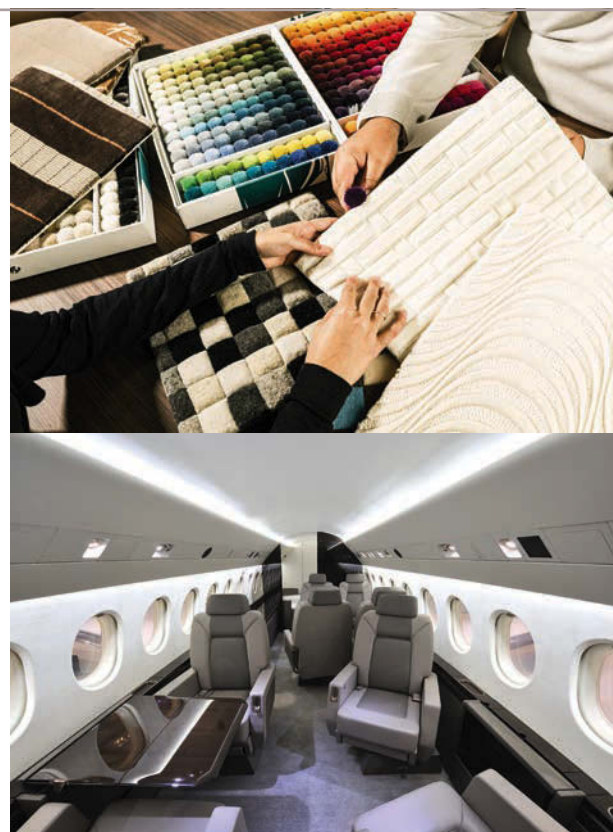
TAG Aviation's services for the private and business aviation industry include aircraft charter, management, maintenance, FBO/handling and crew training. In January 2014, the company acquired Burnet Interiors, tying in perfectly with its strategy of expanding and integrating its aeronautical workshops, following the construction of its new hangar at Geneva, Switzerland.

As a result of this acquisition, TAG Aviation can now lay claim to more than 40 years of experience in cabin refurbishment. With highly skilled staff at Geneva Airport, managed by expert maintenance and sales departments, TAG Aviation says it can now offer the very highest standards for cabin renovation and refurbishment projects. In addition, the company

says its new Part 21 approval means it can offer truly global solutions.

Franck Madignier, TAG Aviation's president of maintenance and FBO services, is delighted that the cabin interior workshop is now fully integrated into the company. "We have always enjoyed a first-class relationship with Burnet Interiors, and our two companies have grown ever closer as demand for cabin refurbishment and aircraft maintenance has expanded, so this integration will add an important new dimension to the services we offer to our clients," he comments.

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propercopper

Katharine Pooley's design for this London home showcases the many guises of copper



The brief was to incorporate copper finishes throughout the house, from the big features to little details such as lighting and fittings in the kitchen and bathrooms.

One of the most arresting features in the house is the staircase, which despite its grandeur has quite minimal, clean lines. Pooley incorporated glass partitions to lighten its appearance, and timber stair treads inlaid with stone, which contrast with the polished copper of the staircase frame and handrails.

For the staircase – and another statement piece, a fireplace – Pooley had copper chemically heat-treated and lacquered before installation to bring out a variety of reds, pinks and blues. In both cases the heat-treated copper is offset by polished sections.

The fireplace is the focal point of the living room. It is composed of copper sheets arranged to look like fish scales, and also incorporates some storage niches.

Other nice details are found in the bathroom, where polished copper fittings and piping create a modern take on a traditional use of the metal, and contrast beautifully with the light-coloured marble.



OTHER EYE-CATCHING DESIGNS FROM VARIOUS INDUSTRIES...



Priestmangoode's business and economy cabins for Thai Airways' new B777 are part of a wider programme to redesign the Thai Airways fleet. Business class was inspired by Thai hospitality, and features materials such as Thai teak wood, vertical silk foil and rattan on seat shells. Meanwhile, the new economy class was inspired by Thai street markets. Oranges and purples were used on seats and curtains, with metallic yarns to echo the iridescent effect of traditional Thai silks. Priestmangoode also redesigned the lavatories in wood and neutral colours for a contemporary look inspired by Thai spas.



These marble tiles are part of the Opus collection by Lithos Design, and are particularly notable for their beautiful coloured inlays. The range includes 25 different types of marble, five patterns in both continuous and standalone geometric shapes, and more than 10 colour options. The ready-to-use tiles are 60 x 60cm. The Opus collection is available exclusively from Fameed Khalique in the UK.



Chopi Chopi is an 80m mega-yacht – the largest CRN has ever built. The vessel has six decks that can host up to 12 guests in six suites, 30 crew members and nine staff.



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