

Business Jet *interiors* INTERNATIONAL

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EBACE PREVIEW

Product highlights
and trend insights
from page 79

*Are you
ready for the*

MARKET BOOM?

COMPLETION CENTERS
EXPLAIN WHY BUILDING
NOW WILL ENABLE
THEM TO CAPITALIZE
ON PROJECTED
GROWTH

INTERIOR TESTING

Gulfstream lifts the lid on its expansive testing regime, honed for its G500/G600 program

ACJNEO AND BBJ MAX

Everything you need to know about the next-generation big iron aircraft families

A330 MRTT

Lufthansa Technik discusses interior possibilities for this military tanker

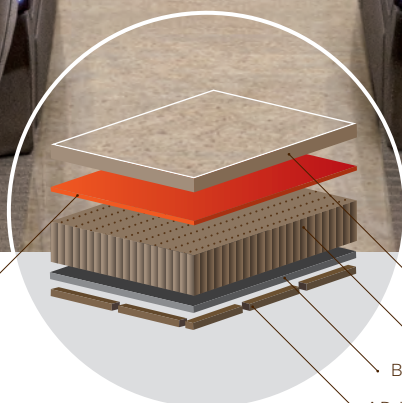
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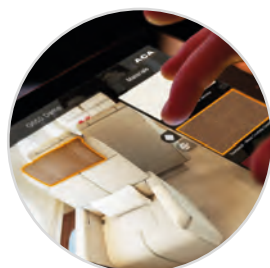
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SPRING IS IN THE AIR

As I write this, those of us in the Northern Hemisphere have just passed the Vernal Equinox, and there are signs of spring all around, certainly in my mother's garden. Likewise, shoots are emerging all over the business jet interiors industry, from bulbs planted carefully months or years ago.

GAMA's latest year-end shipment and billings roundup showed there were 1.3% more business jet deliveries in 2017 (676 units) than in 2016 (667 units). In revealing these figures, GAMA pointed to the service entry of several new aircraft types in 2017. If this is indeed the cause for the growth, then hopefully it should continue in 2018. This year should see the entry into service of Embraer's Phenom 300E, Gulfstream's G500 and G600, Bombardier's Global 7000 and Textron Aviation's Citation Longitude, following on from the already launched Pilatus PC-24.

There is also a lot of investment going on at completion centers – some of the biggest projects are detailed in the feature on page 14, but they are not the only ones. Other notable moves include expansions by F/List and Aeria Luxury Interiors, explored in the EBACE preview, from page 79.

Looking further ahead, there is also optimism surrounding the new generation of big iron airliners – the ACJneo and BBJ Max families. In the feature on page 42 we examine how completion centers are gearing up. "The challenge is to get business commitments and design freeze well in advance of input as these aircraft represent new technologies that have to be adapted to first; they are digital programs from the onset," says Scott Meyer, CEO at Comlux Completion. "We have completely refined our business model from a labor and materials burn perspective and developed new risk mitigation strategies to ensure the lowest downtimes."

Many designers have also been inspired by the new airframes, as you can see throughout this issue. "We've partnered with various industry designers to showcase concepts for both aircraft families," says Meyer. "This allows our clients to visualize their most-desired interior features and therefore take early decisions in the acquisition and cabin definition phases."

As my mother's efforts so visibly attest, long-term planning and hard work are the keys to a beautiful garden.

A handwritten signature in black ink, appearing to read 'Izzy Kington'.

Izzy Kington, editor

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PINBOARD



THIS CONCEPT, DESIGNED FOR ONE OF THE NEW BIG IRON AIRCRAFT THE INDUSTRY IS PREPARING FOR – THE ACJ319NEO – WAS CREATED BY JET AVIATION'S BASEL DESIGN STUDIO. TAKING INSPIRATION FROM THE OWNER'S YACHT, AND DESIGNED TO SUIT THE LONG MISSIONS POSSIBLE WITH THE NEO AIRCRAFT, THE LIGHT, BRIGHT INTERIOR FOCUSES ON LUXURY, COMFORT AND DESIGN FLEXIBILITY.





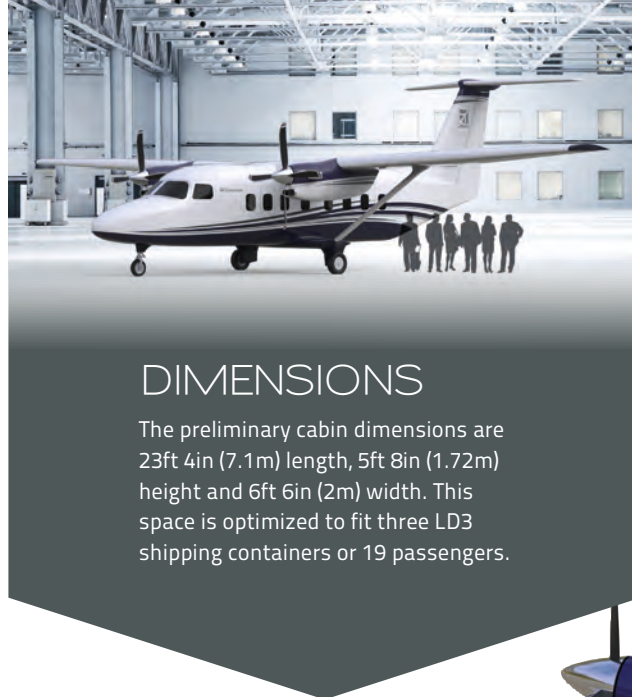
THIS IS M&R ASSOCIATES DESIGN'S PROPOSAL FOR THE BBJ MAX MODEL INTERIOR DESIGN COMPETITION ORGANIZED BY BOEING. THE AIMS WERE TO DESIGN A CABIN SUITABLE FOR PERSONAL AND BUSINESS TRIPS; MAXIMIZE OPEN SPACE IN THE MAIN CABIN AREA; AND ENSURE PRIVACY FOR THE OWNER, GUESTS AND CHILDREN. THE OPEN AREA CAN BE CONVERTED TO OFFER PRIVATE AREAS, THANKS TO A BULKHEAD THAT MOVES UP AND DOWN ELECTRICALLY. M&R TOOK INSPIRATION FROM THE AIRCRAFT'S WINGLETS, AS CAN BE SEEN IN THE DESIGN OF THE SEATS, THE DIVAN IN THE THEATER/ CHILDREN'S AREA, THE SIDELEDGE MOLDINGS AND THE USE OF CHROME PLATING FOR ALL METALLIC COMPONENTS.



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Program update

THE LATEST CLEAN-SHEET DESIGN FROM TEXTRON AVIATION IS THE CESSNA SKYCOURIER 408, A TWIN-ENGINE LARGE-UTILITY TURBOPROP THAT WILL BE AVAILABLE IN PASSENGER AND CARGO VARIANTS FROM 2020



DIMENSIONS

The preliminary cabin dimensions are 23ft 4in (7.1m) length, 5ft 8in (1.72m) height and 6ft 6in (2m) width. This space is optimized to fit three LD3 shipping containers or 19 passengers.



CUSTOMER INPUT

Launch customer FedEx Express has used Cessna Caravan aircraft for more than 30 years. Textron Aviation worked with the company to develop a clean-sheet design that will support the modernization of its current feeder fleet. "The SkyCourier's size and shape were essentially designed around its ability to handle three LD3 shipping containers and to afford efficient loading and unloading through a large cargo door," says Christi Tannahill. "We also considered the typical route of high-utilization operators like FedEx, to determine the most efficient combination of range, speed and payload."

Feedback is being collected from Textron Aviation's customer advisory board (CAB), too. "By having conversations with all types of operators about their wants, needs and priorities regarding aircraft travel, we are able to design a product with optimal features, particularly for the passenger variant," says Tannahill. "Feedback from the CAB is extremely valuable in designing everything from seat pitch to lighting and baggage location. We are working with our CAB to better understand how the cabin will be used, what cabin amenities customers want and how we can best maximize the cabin space for the passenger variant."



COMMUTER VARIANT

For operators who want to use the aircraft as a commuter aircraft, a variant is available that accommodates 19 passengers, and includes crew and passenger doors and large cabin windows.

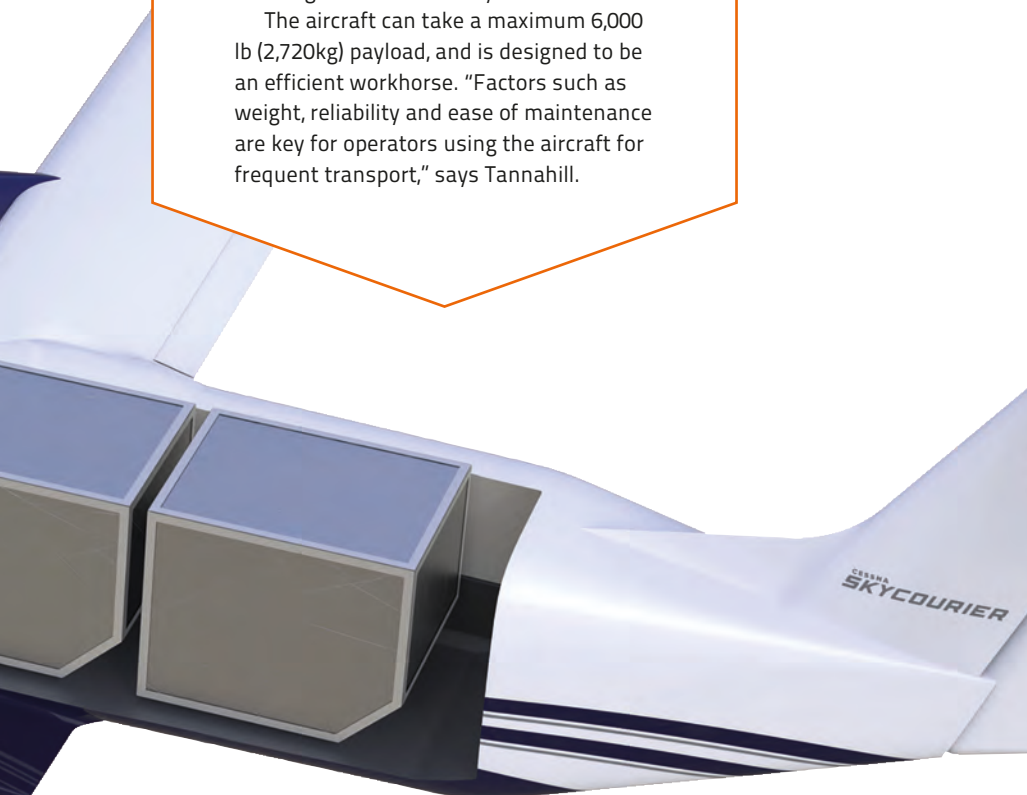
Christi Tannahill reveals Textron Aviation is also investigating the possibility of quick-change capabilities for operators who want to switch between the two variants. "We are looking into the flexible capabilities of the aircraft, but it is still too early in the development process to confirm specific configurations," she says.



CARGO VARIANT

To equip it for its role as a cargo aircraft, the cabin will have a large cargo door and a flat floor. The door is 87in (2.2m) wide and 69in (1.75m) tall. "A large door is key for easy loading and maximizing efficiency," says Christi Tannahill. "The flat floor was also important for easy loading and allowing a built-in roller system."

The aircraft can take a maximum 6,000 lb (2,720kg) payload, and is designed to be an efficient workhorse. "Factors such as weight, reliability and ease of maintenance are key for operators using the aircraft for frequent transport," says Tannahill.



SIMPLICITY

The aircraft will have a traditional aluminum skin and propellers, fixed landing gear and manual flight controls. "The aircraft is fairly simple in terms of technology," says Christi Tannahill. "The result of a non-complex aircraft is exceptionally high dispatch reliability rates."



Q&A



Christi Tannahill

SENIOR VICE PRESIDENT OF
INTERIOR DESIGN AND ENGINEERING,
TEXTRON AVIATION

Why did you embark on this clean-sheet design? What are the aircraft's USP and market?

The twin-engine utility space is a growing market that we weren't serving. We saw an opportunity to offer a modern aircraft to an aging market. The Cessna SkyCourier is a unique solution, particularly for high-utilization customers. No other current-production aircraft in this space offers the low operating costs and capabilities that this clean-sheet aircraft will.

How is the program progressing?

Right now, we are conducting wind tunnel testing, which will help finalize the design and aerodynamic characteristics of the aircraft. First flight is expected in 2019 with certification and entry into service of the cargo variant in 2020.

How are you ramping up your facilities for production?

We are targeting our west campus in Wichita, Kansas for final assembly of the aircraft. As we have done with other new products, including the Citation Longitude and Cessna Denali, we're maximizing our facility space by integrating solutions such as vertical tooling. We have a highly qualified workforce of new product development experts that will be integral in the design, testing and production of the Cessna SkyCourier. As the aircraft evolves through design and certification, we will continue to evaluate and allocate our resources accordingly.

What are you doing to make the certification process run smoothly?

The utility aircraft's simplicity and the integration of proven technology is beneficial in many ways, and one of those is in accelerating certification – there are fewer unknowns.



COMPLETIONS ROUNDUP

This quarter's announcements from completion centers around the world

GENEVA, SWITZERLAND

A Global 6000 has been fitted with Honeywell's JetWave satcom system at Jet Aviation, with a second project set for May 2018. The company also began building a new 8,700m² hangar.

BASEL, SWITZERLAND

AMAC Aerospace is working on two Ka-band projects – for a head-of-state A330 in for a C-check, IFE upgrade and seat refurbishment; and an A319. Other recent contracts include a C-check package on an ACJ330, and an annual maintenance check on a BBJ 737-700.

NUREMBERG, GERMANY

Aero-Dienst completed a 120-month inspection on a Global Express XRS for Global Jet. The project involved dismantling the VIP cabin, structure and system inspections.

NUREMBERG, GERMANY

FAI Technik installed an XRS cabin on a Global Express – a project that took 6,000 man-hours. The company also refurbished a Challenger 604 and began a Global Express refurbishment for Air Independence, and performed its first combined 12-year/12,000-hour inspection on a Learjet 60.

HAMBURG, GERMANY

Lufthansa Technik signed its first Boeing 787-8 VVIP completion contract, with work scheduled to start in 2018.

SINGAPORE

Jet Aviation's third hangar commenced operations. The 3,850m² hangar can accommodate two BBJ or ACJ aircraft, or five G550s. Projects are supported by an upgraded interior shop – a 300m² extension incorporates a new area for soft goods, a wood shop and drying rooms. The site has also received approval to re-foam and re-style 16g seats from Rockwell Collins.

PETERBOROUGH, CANADA

Private equity firm New Heritage Capital has become a minority stakeholder in Flying Colours Corp, boosting financial resources during a period of growth for the company.

KIRKLAND, WASHINGTON

A floor structure system that provides customizable attachment locations for monuments and furnishings on the Boeing 787 has earned Greenpoint its fifth patent.

ST LOUIS, MISSOURI

Flying Colours Corp (FCC) will modify six Q400MRs for aerial firefighting specialist Conair over "the next several years". FCC will create four interiors – a 64-passenger cabin, a freighter cabin for 9 tons of cargo, a medevac version with six stretchers and a combined 19-passenger/cargo cabin. Conair will install its own firefighting system so each aircraft can serve five missions.

WATERFORD, MICHIGAN

Pentastar Aviation gained an AML STC to install the Gogo Avance L5 internet system on G-IV, GV, GIV-X and GV-SP types.

CHATTANOOGA, TENNESSEE

With a new Embraer service center agreement finalized, West Star Aviation will now offer interior refurbishment, avionics and engine inspections, and part services for Phenom 100/300, Legacy 450/500 and Legacy 600/650 types.

FT WORTH, TEXAS

GDC Technics completed its first VVIP BBJ 787-8, installing a head-of-state cabin that it says is 20% lighter than industry estimates. The cabin features sound levels of 52dB SIL, humidification equipment and live TV. Other highlights include an ARINC 791 Ka-band antenna, Iridium antenna, satcom Antenna-R, forward-looking camera, therapeutic O₂ discharge port, quad camera, downward zoom camera, tail fin camera and satellite TV antenna.

SAN ANTONIO, TEXAS

Aeria Luxury Interiors contracted its third BBJ completion – a BBJ 737-700 due to arrive in the first quarter of 2018. The cabin, designed by Aeria, will include a VIP stateroom and an en-suite lavatory with showers, crew and passenger galleys, an office/meeting room, seating for staff and more lavatories.

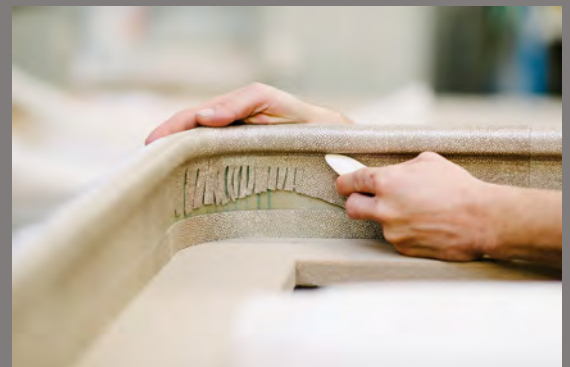
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Perhaps the most striking aspects of this BBJ Max 8 cabin concept from Alberto Pinto Design are the 'floating' cabinets, which are attached to the sidewalls rather than the floor. "The challenge is to work out the lightest frame structure to carry the weight of the cabinets," says Yves Pickardt, head of aircraft interiors at the company.

The design was created in response to a challenge from Comlux. The completion center teamed with four business jet interior designers to develop cabin concepts for the next generation of narrow-body aircraft – specifically the ACJ320neo and the BBJ Max 8. The goal was to capture the different cultures and styles of potential VIP customers. Each designer was required to develop renderings for both aircraft.

"Comlux's vision is not only about comfort and luxury, but also completion," comments Linda Pinto, CEO of Alberto Pinto Design. "We thus consider this a great opportunity to introduce more people to Pinto's interior design world. We have been dedicated to luxury residences, hotels and yachts for more than 45 years, and to VIP aircraft since 1998."

The main idea was to create a contemporary, light and sophisticated cabin with distinctive elements such as bulkheads with a strong pattern," says Pickardt. "We wanted to achieve a feeling of lightness and space."

The cabin makes great use of contrasting materials and colors – for example the darker ceiling cornices stand out against the lighter ceiling, drawing attention to the cabin's height.

In keeping with the trend for organic curves in modern designs, the cabin monuments are designed to incorporate as many curves as possible. "This also enhances the feeling of comfort and lightness, and makes it easy to move around in the cabin," says Pickardt.

The contemporary style extends to the seats, which are designed to be slim and classy. They feature hollow armrests to provide passengers with intelligent storage where they need it most. Pickardt believes that all aspects of the cabin's design are possible now. "Customers can ask Comlux to proceed with this design, or commission an original scheme," he says.

WINDOWS

The windows have a simple design, elevated by surrounding inlay made from a very thin metal.



DIVAN

The divan is too heavy to be attached to the sidewalls, but its floor attachments are recessed to create a hovering effect. It was made to look soft and enveloping, serving as a link between the different elements of the cabin.

CARBON FIBER

The cabin's contemporary feel is bolstered by the use of carbon fiber, for example in the seat shell. However, warm colors were used to keep a cozy atmosphere.

THRIVING

5

LOTS OF COMPANIES ARE INVESTING IN NEW OR UPGRADED INTERIOR COMPLETION FACILITIES IN A BID TO TAKE A BIGGER BITE OF THE MARKET – OR SIMPLY TO IMPROVE QUALITY. *BUSINESS JET INTERIORS INTERNATIONAL* EXAMINES FIVE OF THE BIGGEST RECENT PROJECTS

Words by Izzy Kington. Illustration by Nick Lowndes





Bombardier is recruiting for approximately 1,000 new positions over the next 18 months. Around 700 employees currently work at the Centre of Excellence. As well as holding recruitment events, the company partners with vocational training centers.



At the helm

Paul Simard began his career at Bombardier in 2010, as director of material and supply chain. Quickly working his way up the ranks, he was named general manager of operations for the Global Completion Centre in 2013, and vice president of operations two years later. He has particular expertise in lean operations and supply chain management.

BOMBARDIER

Investment: New Global interiors manufacturing facility in Montreal, Canada

Opened: November 2017

Cost: US\$65m

Interior components for Global business jets will now be made at Bombardier's new Centre of Excellence (CoE), part of its Global Completion Centre in Montreal.

Renovation work began in 2016 and the 234,000ft² (21,700m²) facility was inaugurated in November 2017. The move comes as operations ramp up for the company's newest jet, the Global 7000, which is scheduled to enter service in 2018.

"The Global 7000 is the industry's largest purpose-built business jet," explains Paul Simard, vice president of operations at the Global Completion Centre. "Its arrival has

forced us to modernize the way in which we build our aircraft."

EFFICIENCIES

Lean manufacturing principles such as the 5Ss (sort, set in order, shine, standardize and sustain), visual management, kanban inventory control and andon support (a visual aid to highlight where corrective action is required) are deployed.

New equipment is used to simplify assembly and ensure greater accuracy. This includes an interior installation test rig, used to help resolve discrepancies "in minutes"; automated sanding machines; a new type of varnish; and new seat upholstery clips. "We wanted to achieve economies of scale," says Simard. "More precise manufacturing is reducing turnaround times. However, we continue

to work at striking a balance between automation and craftsmanship – and the final touch is always completed by hand."

WORKING ENVIRONMENT

The CoE is home to cabinet makers, cabinet finishers, upholsterers and specialized support personnel. Simard says automation eliminates repetitive movements for workers. The new equipment is also designed to be more ergonomic – for example, a multi-axis table enables seats to be rotated 180° and inclined at 90°. The facility also has very high ceilings and the work area is painted white to create a well-lit and open environment.

Other facilities aimed at adding to employee welfare include a cafeteria, showers and picnic tables.

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"The greatest challenge is to invest when the time is right, despite there having been a lean market these past few years," says Scott Meyer. "We are not hibernating, awaiting market recovery; we are investing to capture the recovery."



At the helm

Scott Meyer's aviation career began more than 29 years ago. He has been with Comlux Completion since 2009, almost since its inception, playing an integral part in its development, including creating the engineering department. He was appointed CEO in April 2015. Meyer's background includes engineering, certification, project management and composite materials research and development, including time as a NASA engineer.

comlux

2

COMLUX COMPLETION

Investment: Comlux 3.0 digitalization project in Indianapolis, Indiana

Implemented: Q1 2018 to Q2 2019

Cost: Approximately US\$2m

Comlux Completion has launched Comlux 3.0, an investment in technology, equipment, training and research and development. This encompasses everything from 3D engineering platforms to digital maintenance tools for paperless operations, a technology showroom and real-time project management.

The initial investments were in hardware, software and facility changes. These are to be followed by training, integration, validation and optimization, with full maturation in 2021.

CONTINUOUS IMPROVEMENT

Scott Meyer, CEO at Comlux Completion, emphasizes that the focus is on achieving continuously higher quality. "Rather than

expanding our footprint, we want to lead in terms of technology and improve our quality," he says. "We are in a competitive market where customers are looking for quality and efficiency that can in part be realized through digitized solutions. The technologies are available and we have to implement them to be well-positioned for future change."

PEOPLE

The company has also broadened employee benefits through growing its in-house 2,000ft² (185m²) full-service medical clinic and introducing profit-sharing programs. In 2017 the company hired almost 100 new employees. It intends to hire another 100 in 2018. Its workforce includes more than 150 roles – 55% in production and manufacturing, 25% in design engineering and certification, 10% in operations support and 10% in business administration.

"A company that advances technology not only attracts new business through that vision, but also the best workforce," contends Meyer.

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Duncan Aviation's enterprise-wide training programs include human factors classes. Staff also have access to fitness facilities and health and wellness programs.



At the helm

Since joining Duncan Aviation in 1994 as an airframe mechanic, Chad Doebling has held various management positions. In 2017 he moved to Provo to help build the facility, as vice president of operations. The site was already home to a maintenance facility, opened in 2010 under the guidance of Bill Prochazka, chief operating officer and executive vice president. Prochazka joined Duncan Aviation in 1987; prior to that his career included roles at Gates Learjet and Cessna.

3

DUNCAN AVIATION

Investment: Two new maintenance and modification hangars and a paint facility in Provo, Utah

Opening: Q1 2019 and Q4 2019

Cost: US\$70m

The expansion of Duncan Aviation's Provo site will enable it to offer the same interior capabilities as in Lincoln, Nebraska, and Battle Creek, Michigan. The 275,000ft² (25,500m²) site will include a 222,000ft² (20,600m²) maintenance and modifications center – with full cabinet, finish and upholstery shops – and a 53,000ft² (5,000m²) paint facility. The first modifications hangar and paint facility will open in the first quarter of 2019, with a second modifications hangar to open in the fourth quarter of 2019.

"With a strong economy and industry, the timing is right to build now," says Chad Doebling, vice president of operations, Duncan Aviation Provo. "If you look at projections for the business aviation

industry, there will be a need for more MRO capacity. Duncan Aviation has also felt the need for a while to provide full support for the western half of the USA, Canada, Mexico and the Pacific Rim countries."

EFFICIENCIES

Duncan Aviation believes standardizing processes, materials and tooling between its locations will enable it to increase capacity. "Cross-utilization of our CNC and advanced machinery will allow all locations to be efficient and improve quality," says Doebling. The company also practices continuous improvement. "Through lean methodologies, we ask team members to look for opportunities to make our processes, products and services better and more efficient," says Doebling.

Energy efficiency is a key focus – which is why LED lighting and energy-efficient blowers and compressors were chosen. "With an evaporative waste-treatment process, there will be no liquid discharge to the city from our paint operation, and a

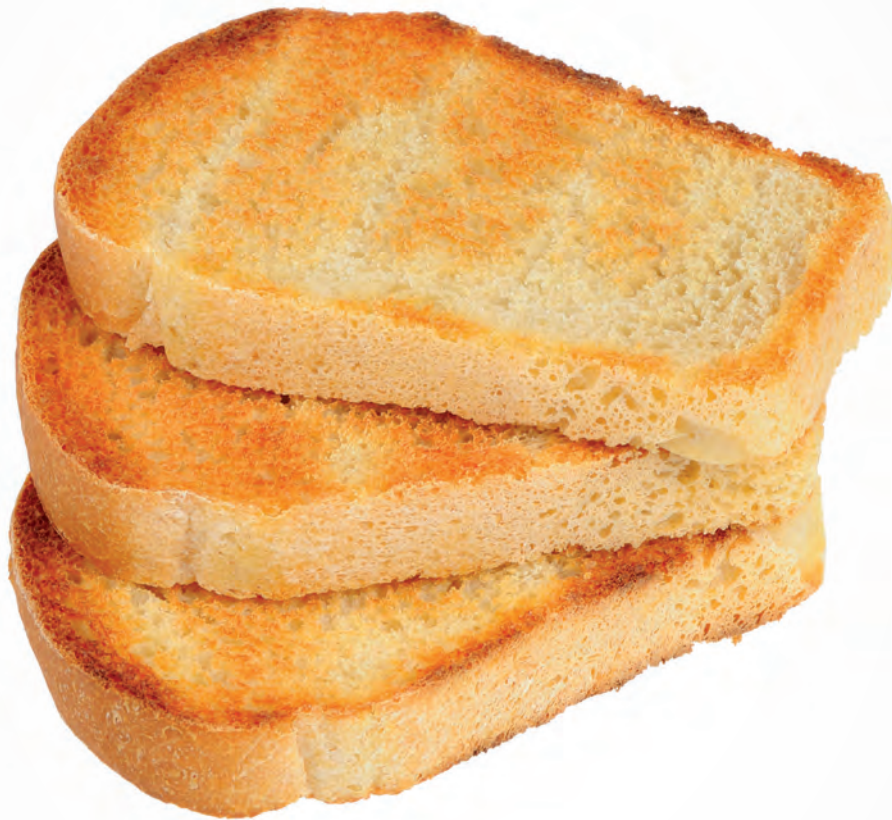
regenerative thermal oxidizer will remove close to 98% of airborne contaminants," says Doebling. "We will likely be the greenest business jet paint facility on the planet."

PEOPLE

In the next five years Provo will have a staff of 265 people, rising to 350 within 10 years. The company anticipates employing 22 installation, 24 interior, 41 paint and 67 airframe staff in Provo by 2020. By 2024, these numbers should rise to 34 installation, 37 interior, 54 paint and 106 airframe workers, and in 2028, there should be 41 installation, 51 interior, 65 paint and 128 airframe specialists at the site.

"We take recruitment very seriously," says Doebling. "We are recruiting highly skilled leadership and technical talent internally from Battle Creek and Lincoln. We are also working with local technical colleges and the military to promote and hire some of their top talent. We are seeing great success with this approach."

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Planning began in early September 2017, the renovations took place through December 2017, and the facility officially opened its doors in March 2018.



At the helm

Dave Stewart is an expert in lean manufacturing and management development. He has been credited with transforming the output of Flying Colours' headquarters in Peterborough, Canada, through efficiency improvements and waste-reduction methods. He also led internal kaizen projects, which involved the whole company improving productivity. Prior to this he ran a lean consultancy business, having spent more than a decade at Toyota Motor Manufacturing Canada.

FLYING COLOURS CORP

Investment: New facility in St Louis, Missouri

Opened: January 2018

Cost: US\$2m

Having purchased its St Louis site in 2009, Flying Colours recently expanded it with a new 40,300ft² (3,700m²) facility. "The investment was made in response to increased demand for completion and cabinetry work for larger cabin interiors," says Dave Stewart, vice president and general manager, Flying Colours St Louis. "The space will also satisfy the rise in demand for OEM cabinetry work."

The company has a long list of cabinetry projects in the pipeline. "Alongside the cabinetry comes other interior work such as seats, galleys and other sections of the aircraft, so it made sense to invest in a space that would allow us to grow more," says Stewart.

FACILITIES

The open-plan facility includes a CNC room for design and a machine room with detailing tools for woodwork/cabinetry. It has two climate-controlled finishing booths; insulated buffing and sanding sections; two varnish and paint mixing rooms; and assembly, framing and finishing areas. Flying Colours now has an enclosed curing room, which will be used in the finishing process.

The facility also has an area for soft furnishings such as seat coverings and panel finishing, a design engineering area and a

section for avionics. There are also offices for production control planning and production management, as well as conference rooms, storage areas and customer meeting areas.

EFFICIENCIES

"Working with an industrial designer, we've created a space that logically flows from the arrival of the materials to the final stages of completing the products," says Stewart.

The building is designed to provide a well-lit, spacious and clean working environment. "We've made our teams' jobs just a little bit easier by providing the latest technology," comments Stewart. "We have made sure to incorporate a great space for team members to take breaks."

PEOPLE

Eventually the site will be staffed by 40 in cabinetry, 15 in finishing, five in upholstery and five in quality assurance. Stewart has found recruitment the greatest challenge, and has been working with local recruitment companies to maximize the area's wealth of experienced technicians. "So far we have hired an extra 50 people in the cabinetry and finishing departments, bringing our total US team to 180 members," he says. "We welcome problem solvers, innovators and those with technical expertise. We also welcome those who have trained in a complementary profession, for example the automotive seat industry, and are happy to train them. We are big on training and will continue to invest in this."

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Construction began in November 2017, following two years of planning.



At the helm

Neil Boyle assumed responsibility for Jet Aviation's global VIP completions in January 2017, having previously served as vice president and general manager of the Basel completions center. He joined from Gulfstream, where he was manager of system installations, electrical, systems and structures for the G450. He also spent 20 years in the US Air Force and is a Certified Lean Six Sigma Green Belt, as well as holder of an FAA Airframe and Powerplant license.

5

JET AVIATION

Investment: A new wide-body hangar in Basel, Switzerland

Opening: End of 2018

Cost: Undisclosed

Replacing two of its existing hangars, Jet Aviation's new 94,000ft² (8,700m²) hangar in Basel is designed to meet rising demand for completions, maintenance, refurbishments, modifications and upgrades, particularly for wide-body aircraft. The facility will provide an extra 49,000ft² (4,550m²) of hangar space, and will accommodate wide- and narrow-body aircraft simultaneously.

"It will be suitable for wide-bodies up to the Boeing 747, and will also enable more flexibility in scheduling projects," says Neil Boyle, senior vice president, global VIP completions, Jet Aviation.

The project extends the tarmac by 54,000ft² (5,000m²) and adds 21,500ft² (2,000m²) for shops and offices.

EFFICIENCIES

"The new hangar is certainly leaner than the two hangars that preceded it and brings the large aircraft team into one hangar," says Boyle. "It has all the latest technologies, including a wood-laminate structure that helps maximize the building's height and strength."

Water will be heated by the airport, which Jet Aviation says is much more energy efficient. LED lights will be installed throughout and the roof will have many windows for natural light. "In addition the door is made of a special material that lets all the natural light in while blocking heat and glare," says Boyle.

The new offices feature chilled beams, which are integrated into the ceilings to distribute air throughout the room more efficiently. "The beams enable the air to circulate at low speeds, which minimizes fan use and noise," says Boyle.

PEOPLE

There are currently more than 1,400 employees on-site in Basel. "Jet Aviation works hard to attract and retain highly skilled employees," comments Boyle. "With our One Jet transformation, we are digitizing and standardizing our processes to further empower employees."

The company works with local governments and educational institutions to support apprenticeship programs in polymechanics and upholstery. It currently has 24 apprentices in Basel.

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tried

THE INTERIOR TESTING REGIMEN AT GULFSTREAM HAS BEEN OVERHAULED FOR THE DEVELOPMENT OF ITS TWO NEWEST AIRCRAFT, THE G500 AND G600

Words by Izzy Kington



tested

“The G500/G600 mock-ups led us to make some stylistic and shape changes to some components”



Two new clean-sheet Gulfstream jets, the G500 and G600, are expected to enter service in 2018 – and the manufacturer has worked very hard to ensure this all goes without a hitch in the cabin. The development process has included a huge number of tests intended to ensure the functionality, ergonomics, safety and reliability of each component.

For the G500 program, Gulfstream conducted more than 34,000 hours of testing in its ground labs before the aircraft even took its first flight. Now it is putting the cabin through its paces in the air, using an aircraft fully outfitted with a VIP interior. “Testing is a key part of every single thing that we do,” explains Naveed Aziz, director of completions research and development at Gulfstream.

SPATIAL AWARENESS

The first step on the G500/G600 program was to create mock-ups made of milled foam or foam core. As well as helping to hone the design, these tools enabled the company to begin testing functionality and ergonomics. “We also create full interior mock-ups to understand the spatial arrangement of the components,” says Aziz. “The G500/G600 mock-ups led us to make some stylistic and shape changes to some components.” Gulfstream has created several cabin mock-ups to elicit feedback as the designs have evolved.

The next step is to work with suppliers to create working prototypes, with which Gulfstream could begin to study moving parts. At this point,

The G500 replaces the G450, which entered service in 2005 and has now ceased production

MARK KOHLER



In his current role as vice president of advanced aircraft programs, Mark Kohler is overseeing the development, certification and entry into service of the G500 and G600 aircraft.

His background is in engineering development, having joined Gulfstream in 1992 as a design build team leader for the GV. His roles since have included directing the GIV, GV and G550 entry into service programs, and, as director of mid-cabin research and development programs, leading the G280 program.

“I oversaw all activities related to the design, development, flight testing, completions and ultimately the entry into service of the G280,” he says.

With a Bachelor of Science degree in aircraft engineering, Kohler is an airframe and powerplant mechanic and also a licensed private pilot.



The G500 and G600 are being made at two purpose-built facilities in Savannah, Georgia

FAR LEFT: THE SYSTEMS INTEGRATION BENCH

LEFT: THE G500 IRON BIRD

BELOW: CUSTOMERS CAN TRY OUT FLOORPLANS AND DESIGN OPTIONS IN AN IMMERSIVE REALITY SUITE

NAVEED AZIZ

Now director of completions research and development, Naveed Aziz joined Gulfstream straight out of college, as part of its co-op (internship) program. He was then hired as a design engineer, and served in various groups before the completions team.

"I held various roles within completions," he explains.

"I served as FAA designated engineering representative and then as program administrator for Gulfstream's Organization Designation Authorization."

Aziz then formed and led a small research and development group, looking at how to implement future products. "When the G500/G600 program started, I was fortunate enough to be able to participate in the development of the interior," he says.



the company started gathering customer feedback via its Advanced Technology Customer Advisory Team, comprised of operators using its current products. "They have a unique perspective as to how things should operate," says Mark Kohler, vice president of advanced aircraft programs at Gulfstream. "For example, there is a lid on the outside of the G500/G600 seat, which has a mechanism that required several iterations to mature. Allowing customers to evaluate that working prototype was very beneficial."

PARALLEL LINES

Certification and reliability testing follow, conducted in parallel with engineering work. Certification requirements necessitate tests for flammability, smoke and evacuation performance – performed in-house on test articles.

“We had approximately 16,500 test points for the interior”

Reliability tests often involve cycle testing using a KUKA robot. The number of cycles depends on the component under test. For example, a latch would go through 100,000 cycles to ensure robustness. The G500/G600's pocket door was another component to go through extensive cycle testing.

“It's really important that the experience for the customer is seamless; that nothing goes wrong when they're using any of the equipment, be it the seats, refrigerators, lights or switches,” says Aziz.

WORKING WITH VENDORS

Gulfstream is also involved in helping to test and certify vendor-supplied components, in joint development programs. “We work with them to ensure that each component meets our intent in terms of its functionality, aesthetics and quality,” says Aziz. “We help to determine the required mean time between failures and ensure the designs meet those. When suppliers run qualification tests, Gulfstream engineering authorized representatives



The G500 and G600 cabin interior testbeds will eventually be refurbished and sold



ABOVE: THE G600 SHOWCASE HAS BEEN A CRUCIAL TOOL FOR OBTAINING FEEDBACK

BELOW: THE UPGRADED G600 MOCK-UP, REVEALED IN NOVEMBER 2015



for the ODA witness them. In some cases, we ask suppliers to do reliability testing, and in other instances we do it in-house.”

Gulfstream has extensive in-house labs, established at the outset of the G500 program in 2010. These include a dimensionally accurate iron bird, a Conceptual Advanced Simulation Environment, a systems integration bench to integrate the avionics and aircraft systems with the aircraft's data concentration network, and an integration test facility (ITF) incorporating the flight deck and an outfitted cabin.

PARENTAL LOVE

“Our parent company, General Dynamics, has made a lot of investments in our facilities,” says Aziz. “For the G500/G600 program we have a fully outfitted interior lab, the



LEFT: THE IN-HOUSE ACOUSTICS LAB

ABOVE LEFT: THE G500 CABIN INTEGRATION TEST FACILITY

ABOVE: THE REFINED G500 DESIGN UNVEILED IN OCTOBER 2016



G500/G600 TIMELINE

2010

G500 and G600 development begins

OCTOBER 2014

G500/G600 program announced

MAY 2015

G500 makes first flight

OCTOBER 2015

Redesigned G600 interior unveiled

JUNE 2016

Full-scale G500/G600 cabin showcase begins US demonstration tour

AUGUST 2016

Fully outfitted G500, the cabin testbed, makes first flight

OCTOBER 2016

Redesigned G500 interior unveiled

MARCH 2017

ATCAT flies on fully outfitted G500

AUGUST 2017

Fully outfitted G600, the cabin testbed, makes first flight

JANUARY 2018

Final G450 delivered; G500 begins global demonstration tour

MARCH 2018

G500 begins function and reliability flight tests

2018

Expected FAA certification for G500 and G600



ABOVE AND LEFT: THE INTEGRATED TEST FACILITY, WHICH ENABLES GULFSTREAM TO INSTALL AND TEST INTERIOR COMPONENTS IN A DIMENSIONALLY ACCURATE REPRESENTATION OF THE AIRCRAFT



ITF, which replicates the aircraft interior; it does everything but fly. It's an incredible tool. As prototypes mature, we install them in the lab, test them and get feedback from our customers, which is invaluable. We bring customers into our facility to do that twice a year."

SIMULATED SERVICE

The ITF has also been used to simulate service with flight attendants. It is 100% geometrically representative of the fuselage. "It's gone through many updates, ultimately maturing into the state you see on the flying testbed," says Kohler.

Aziz says one of the many benefits of being able to mature components in the ITF is that the first G500 interior installation was extremely smooth. He also says the systems integration bench has been extremely useful in simulating and testing the Gulfstream CMS. Other facilities include anechoic chambers for acoustics and electrical emissions.

But perhaps the most useful investment has been to include an outfitted aircraft as part of the test fleet for each jet. As of February 2018, the G500 cabin testbed had

flown for more than 400 hours, before even beginning the FAA's stipulated 300 hours of function and reliability tests. It is now on a global demonstration tour – another chance to gain customer feedback. "Interior regulations mostly relate to safety, not the cabin experience," says Aziz. "We go above and beyond the regulations because all features must work seamlessly to provide a memorable experience."

REPEATED USE

The aircraft has flown various missions, including night flights, in turbulence, and hot and cold weather. During these test flights, systems and components were operated repeatedly. "We had approximately 16,500 test points just for the interior," says Aziz. "We tested every single aspect – from seat comfort to the functionality of switches, to how the light may appear through unintentional gaps between panels. In terms of the latter, once we started flying the aircraft we did notice some places that we needed to tweak, so we used a 3D scanner to examine the movement thoroughly and then compensated for it through engineering."

“The aircraft is the ultimate testbed, validating all the work that has gone before”

See the September 2017 issue for an interview with Tray Crow, who led the aesthetic design of the G500/G600 cabins

implement, while other changes turn out to be tough.”

Overall, Kohler is confident that Gulfstream’s focus on early feedback, thorough testing, and especially its flying testbed, will ensure the new aircraft enter service smoothly. “The maturity is far more advanced than in previous programs, where we continued to learn after entry into service,” he says. “The aircraft is the ultimate testbed, validating all the work that has gone before. Investing up-front to learn lessons early has a big pay-off, because if you learn something once you’ve fielded a product, it’s much more difficult to implement.”



Testers also used thermal cameras to ensure the environment is comfortable, and sound intensity scanners to pick up any noise against the surfaces. “We have one of the quietest interiors in the industry, if not the quietest,” says Aziz. “The side effect of that is you hear some sounds that you normally wouldn’t. We pick up on those and then make design changes to ensure it doesn’t become a nuisance.”

“The cabin noise levels are so low that even the latch of a drawer becomes quite noticeable,” says Kohler. “Extensive work was carried out in our acoustic test lab to understand the noise they make during operation. We work with our suppliers to ensure that noise levels will be transparent to the customer.”

Another aspect tweaked after flight tests was the backlighting. “We had a couple of flights where we asked people to set up the cabin like they were going to sleep, reporting anything that bothered them,” says Aziz. “The backlighting for switches was one of those items; it was perhaps a little too bright for night operations, so we tweaked it.”

LATE CHANGES

Aziz concedes that the cut-off for design changes should be the critical design review, but interior changes that will affect customers are treated with more flexibility. “We do our best to make sure that issues are caught in the various stages of testing, but you always find something that may need to be changed,” he explains. “We want to make all the changes and sometimes it does get a little critical. Some changes are easy to

THE G500 FLIGHT TEST CAMPAIGN INCLUDES FIVE AIRCRAFT, INCLUDING A FULLY OUTFITTED CABIN TESTBED

PRODUCT COMPARISON

Gulfstream’s engagement with its customers in the development of the G500 has extended to demonstration flights, but not just on that aircraft. In the summer of 2017 it conducted a product comparison test.

“We flew the same passengers on a G500, a G650

and a G550, using the same flight profiles, and let them evaluate each of the products,” explains Mark Kohler. “We were able to determine that the passenger experience on the G500 was equal to or better than our other products. That was very helpful in validating the configuration.”

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ACJ380 CONCEPT

Grand



INTEREST IN A VVIP VERSION OF AIRBUS'S MAMMOTH A380 IS NOT DEAD, AS LUFTHANSA TECHNIK CAN ATTEST, HAVING CREATED THIS CONCEPT FOR A MIDDLE-EASTERN CLIENT

Words by Anthony James

It wasn't just Airbus that breathed a huge sigh of relief at the start of 2017 on hearing the news that Emirates had placed a US\$16bn order for 36 more A380 aircraft (20 firm orders and 16 options), with deliveries starting in 2020. The deal effectively breathed new life into the double-deck platform and rekindled the hopes of any completion centers still keen to complete the world's first VVIP ACJ380.

Following the Emirates deal, Lufthansa Technik, which has long harbored a desire to be the first to complete a VVIP ACJ380, contacted *Business Jet Interiors International* to exclusively reveal an intricately detailed ACJ380 cabin concept called Still Alive, which it had worked on with an undisclosed VVIP client from the Middle East.

"When we started the project, we were unsure whether the A380 would be continued," comments Michael Reicheneker, an aircraft interior architect with nearly three decades of experience of working for the German VIP completions specialist.

THREE MONTHS OF TALKS

The design began following an initial conversation between the unnamed client and the completion center at the end of 2015. "From that point, it took something like three months to develop the cabin interior architecture and design concept, following very intense communication with the client's representative, who was not only close to the client but also immersed in the culture of the client's region," explains Reicheneker. "Further meetings helped refine our ideas, and it took another four weeks to finalize the layout and overall



development. Once the floorplan was clear, we were able to step into the renderings and work on the materials. We chose a relatively simple materials palette – not too much and not too fancy – a modern approach.”

While basically modern, the layout also nods to traditional customs with separate entrance entrances for female and male passengers on the main deck, and a large majlis. “The main entrance is for the VIP and female guests,” says Reichenecker. “When you enter, there is a curved wall with a monitor to greet important guests.”

Immediately to the left is the master bedroom and bathroom. “The VIP’s private

Both decks
on the A380
extend the full
length of the
fuselage

MASTER OF DISGUISE

Emergency door casings in the dining and conference zone are disguised as art displays. They also help to subdivide the space into dedicated areas.

Another clever trick sees essential structure hidden behind veneered sidewalls. “There are a lot of applications in the ceiling or underneath it and there’s also structural elements that combine the upper and the lower deck that we had to work around,” explains Michael Reichenecker. “The wooden side panel with the four windows at the front of the majlis area actually covers a lot of structural components, which we integrated in the cabin’s architectural design.”

TOP LEFT: THE VIP LOUNGE

RIGHT: THE MASTER BEDROOM
FEATURES A KING-SIZE BED

rooms have been placed on the main deck, next to the main entrance,” says Reichenecker. “The space under the front staircase has been used for wardrobes and a shower to make the best possible use of the room available.”

KING-SIZE BED

The master bedroom has a king-size bed angled towards the windows for better views of the ‘cloudscape’ outside, as well as a wall-mounted monitor. Reichenecker notes that such a large bed is still relatively rare, even in VIP completions. “However, in an A380, it is fairly easy to include a bed of this size. To us, it adds to the experience of an abundance of space.”





The A380
offers 550m²
(5,920ft²) of
cabin space

“From the VVIP seat at the table, you can look all the way through to the entrance and enjoy the huge space the A380 offers”

LEFT: THE MAJLIS AND DINING AREA ARE DESIGNED AS A CONNECTED GRAND OPEN SPACE

SIMPLE TASTES

The color and trim scheme includes very strong contrasts – specifically dark woods and light fabrics. The material palette includes real wood veneer, leather on the walls and silk carpets. “There

are only a few materials, but they are very high-class ones,” says Michael Reicheneker.

“We didn’t use many ornaments, as we were looking for a more Western style,” Reicheneker adds.

Lufthansa Technik also developed a proprietary window shading system for this concept. Back-lit glass panels are designed to give the impression of much larger windows. Daylight can be individually dimmed by turning the lamella, or closed out via additional electrical shades. The completion center believes this system enhances light management – an important feature in enabling passengers to adjust to the destination’s time zone.

ALTITUDE TRAINING

Behind the bedroom is a gym: “It has a couple of machines, and a separate entrance allows for welcoming guests for workout sessions,” says Reicheneker, who also acknowledges there are safety precautions to take when exercising during flight.

“You would not be able to use it during turbulence,” he cautions. “You also have thinner air at cruising level. The cabin altitude is approximately 2,500m (8,000ft), so it’s the equivalent of exercising at the top of a mountain; you need to be fit.”

Aft of the gym and to the right of the main entrance is the majlis, which while a traditional component, has a modern feel. The furniture is arranged in a club-lounge style to allow for relaxed conversation, explains Reicheneker: “It was designed to have more of a club atmosphere, like a traditional English private members’ club where people get together to talk, play chess, or watch a movie.”

The majlis opens out into a dining and conference area, dominated by a large table seating the principal at its head, along with 14 guests down the sides. There is no dividing wall between this and the majlis, to ensure the master seat at the top of the dining table offers long views over a cabin brimming with abundant space. “From the VVIP seat at the table, you can look all the way through the cabin to the entrance and enjoy the huge space the A380 offers,” says Reicheneker. “You get a complete view over your guests and the space you command.”

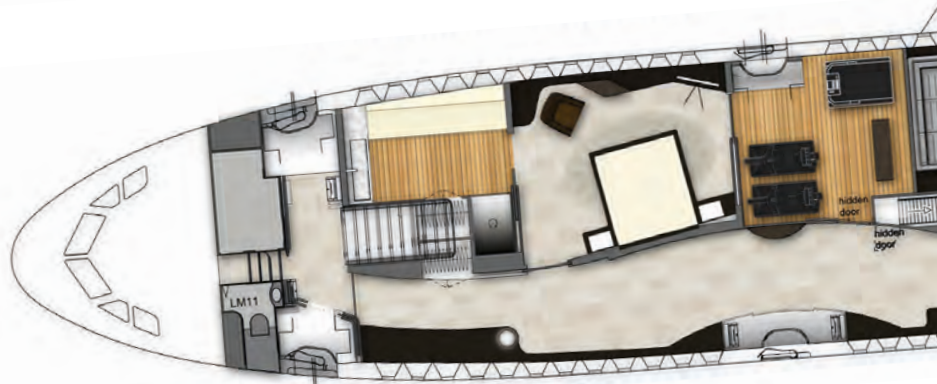
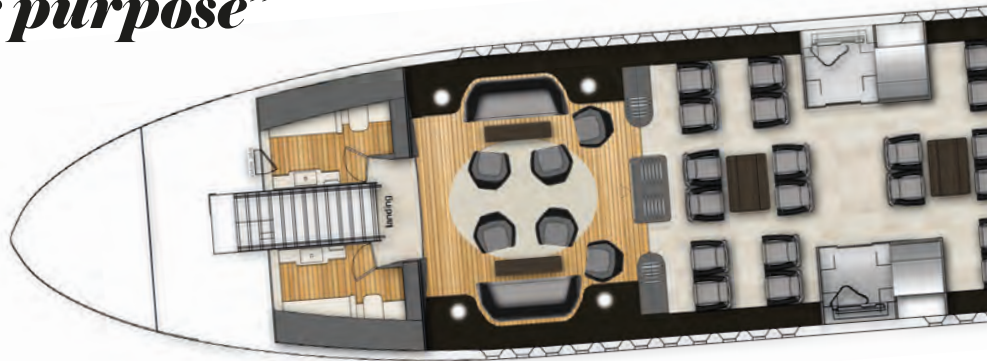
“Normally prayer areas double in their use, but this is a secluded room set aside for one purpose”

A cinema lounge sits behind the dining/conference area. “The seating has a circular arrangement to make it feel comfortable and cozy when watching a movie, but to also double as a smaller, more private and quiet conference room,” says Reicheneker. “It can also be used as a small breakfast room with a buffet laid out on the credenza beneath the screen.”

SCREEN DREAMS

Reicheneker suggests the screen could be LED or OLED, and as large as 158in (4m) diagonally. “We included a similar screen on an ACJ350 concept design. It could be a curved screen – which we hope will be available soon. Currently the maximum screen size is 65in but of course there is demand for even larger ones.”

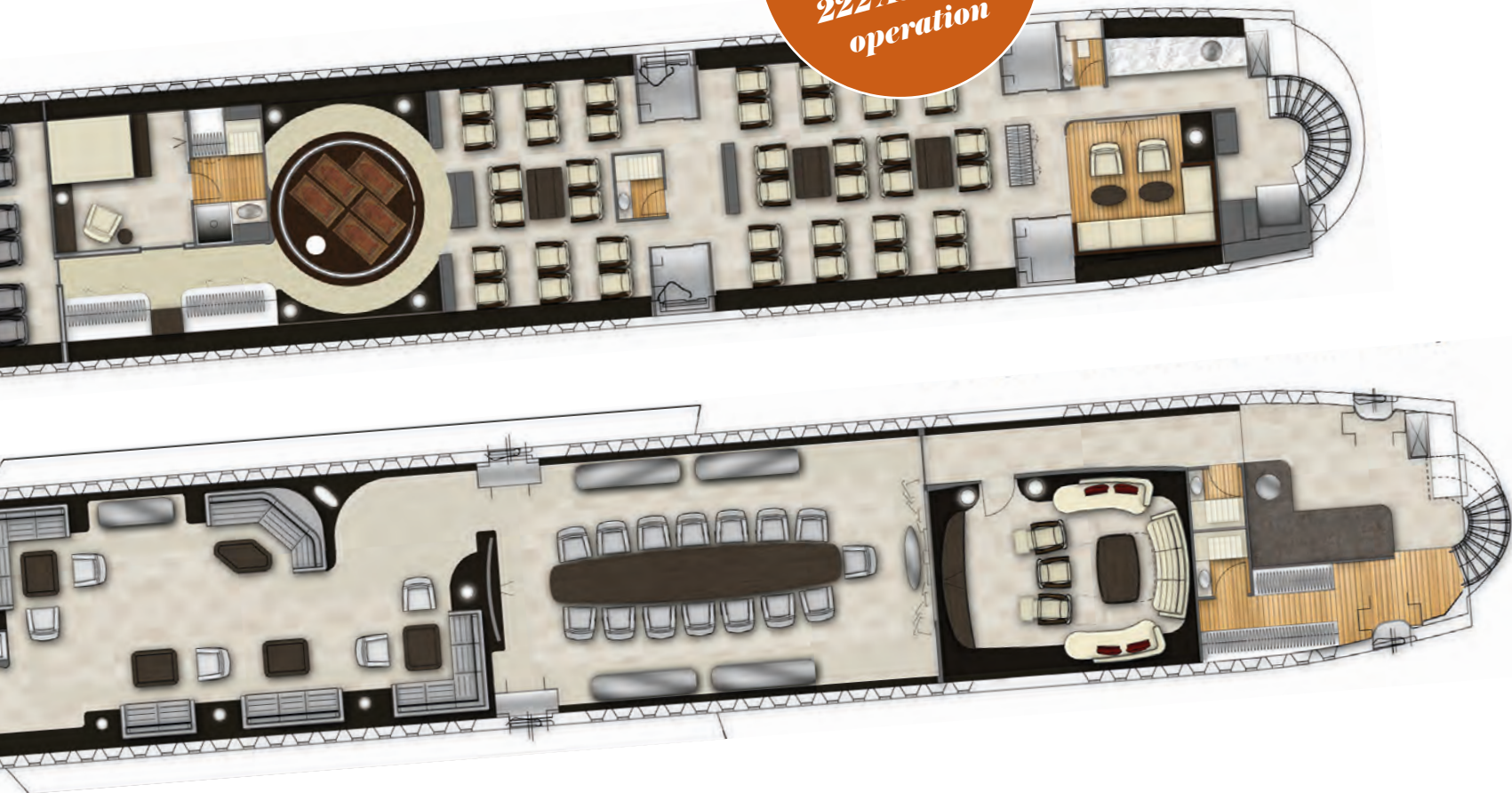
All monument dimensions are dictated to a degree by the size of the doorframe they have to pass through for installation, but Reicheneker says there are always solutions: “Ultimately, the need to fit it through the door applies for every monument you install. But, just as the dining table would need to be sectioned, we could split an extra large monitor into several pieces. We are working on that and how to minimize the gaps between the screens.”



UNIQUE SEATS

The seats in the ladies' lounge (pictured on page 36) would be custom-made, based on the 'chair' 16g-certified seat platform, developed by Lufthansa Technik and now produced and sold by Inairvation, the company's joint venture with F/List. “The seat platform and underlying structure is already certified, and offers the possibility, within certain limits, to design the seat that you see,” says Michael Reicheneker. “I created this seat design specifically for this particular aircraft interior.”

*As of
February 2018,
there were
222 A380s in
operation*



The cinema lounge is next to the aft entrance, opening onto the main galley and guest lavatories, with a spiral staircase at the rear of the aircraft leading to the upper deck. “The aft entrance is where male guests come in and store their coats and other items, and then they go upstairs to the men’s lounge and a first-class-style seating area for 24 guests,” explains Reichenecker. “The men’s lounge would be part office, part club. The first-class area has some seats that can turn toward each other, with a table in the middle.”

CIRCULAR PRAYER ROOM

The prayer room, which Reichenecker describes as “one of the most important features in the aircraft” is strategically located in the center of the upper deck. “This symbolizes the importance of this room,” notes Reichenecker. “The room is circular and is untouched by other walls, so it stands by itself. A pointer identifies the position of Mecca. It’s possible for five people in there to pray together facing in the right direction. Usually onboard prayer areas double in their use but this is a secluded room set aside for this one purpose.”

ABOVE: THE FULL LOPA FOR THE DOUBLE-DECK AIRCRAFT

LEFT: THE ‘CLUB LOUNGE STYLE’ MAJLIS IS DESIGNED TO ENABLE RELAXED CONVERSATIONS

A guest room and bathroom are located forward of the prayer room, and are intended for the exclusive use of a VIP guest.

LADIES’ LOUNGE

After the guest room and bathroom is the female first-class area with seating for 20 passengers, and a dedicated ladies’ lounge, featuring six seats and two divans. “The lounge at the front of the upper deck was designed for a group to relax and talk,” explains Reichenecker. “We set it up as a lounge to be enjoyed in a less formal way and equipped it accordingly. The guest lavatories in the vicinity of the ladies’ lounge are a lot larger than normal powder rooms, and are big enough for changing one’s outfit in complete comfort.”

So why has no actual completion work started? “While we developed a very detailed and well-received design based on discussions with a potential customer, not every design results in a contract immediately,” explains Reichenecker. “In this case the project did not go forward and hence we can share the concept and some of its details.” ☒

Brighter



TOP: AN ACJ320NEO
CONCEPT BY
LUFTHANSA TECHNIK

BOTTOM: THE MAIN
LOUNGE ON A BBJ MAX
CONCEPT BY AERIA
LUXURY INTERIORS

The newest aircraft from Airbus and Boeing – the ACJneo and BBJ Max families – are targeted at VIPs who travel around the globe with a large complement of staff. Airbus is offering two aircraft based on its A320neo (new engine option) airliner family – the ACJ319neo and ACJ320neo. Boeing is offering the BBJ Max 7, BBJ Max 8 and BBJ Max 9, all derived from the Boeing 737 Max.

Both families offer plenty of room for creative interior design, and range that connects many of the world's capitals non-stop. Aerodynamic improvements and more efficient engines deliver greater fuel efficiency. These are the biggest selling points for both Airbus and Boeing.

“When I look at what customers want in a business jet and how their expectations have changed in the 20 years since we launched the original BBJ, customers want to fly further and in greater comfort with more space, and bring a bigger team,” says Andrew Gough, marketing analyst at Boeing Business Jets.

future

THE UPCOMING ACJNEO AND BBJ MAX AIRCRAFT DO NOT DIFFER MUCH FROM THEIR PREDECESSORS IN TERMS OF INTERIOR POSSIBILITIES, BUT THEIR INCREASED RANGE AND EFFICIENCY ARE DRIVING HEALTHY DEMAND

Words by Marisa Garcia



THE CLUB LOUNGE ON A BBJ MAX
CONCEPT CREATED BY WINCH
DESIGN AT THE REQUEST OF
COMLUX COMPLECTIONS

Airbus has
announced nine
orders for the
ACJneo family –
three ACJ319neo
and six ACJ320neo

Both airframe manufacturers see demand for these capabilities from clients around the world. “We see the same market for the Max as we do for the next-generation version of the BBJ 737,” says Greg Laxton, president of Boeing Business Jets.

SPACIAL AWARENESS

The Max offers a 14% improvement in efficiency, a 40% reduction in engine noise, about 1,000 nautical miles longer range, and a longer airframe than the current BBJ, which translates into a cabin that is 6ft longer, for a total area of 884ft² (82m²).

“We continue to have customers look for our Max aircraft, based on range and payload, the number of bags that fit in the cargo space, and also the interior space,” says Laxton. “We know we are on the right track because we have sold 18 BBJ Max family aircraft to date.”

Airbus has reported nine ACJneo family orders. New-generation engines and Sharklets give the ACJ320 family a 16% fuel saving, bringing a leap in range. The ACJ319neo will have a range of 6,750 nautical miles and an 893ft² (83m²) cabin.

“They want to carry more bags rather than fly ultra-long-range missions”





AN ACJ320NEO LOUNGE
DESIGNED BY JET AVIATION

BELOW LEFT AND RIGHT: A
BBJ MAX DESIGN BY AERIA
LUXURY INTERIORS

BOTTOM: A BBJ MAX 7 LOUNGE
BY UNIQUE AIRCRAFT

Boeing
reports 18
orders for the
BBJ Max
family



Cabin altitude has
been improved with
ACJ's latest aircraft –
it is less than 6,400ft
on the ACJ319neo
and ACJ320neo



Boeing's Gough says increased luggage capacity is also an important selling feature with a longer-range aircraft. The efficiency of the Max's new engines enables long-range flights with fewer reserve fuel tanks and the longer fuselage yields more volume in the hold. "On the BBJ, the maximum number of fuel tanks a customer can install is nine, but about 85% of our customers choose to install seven or fewer," says Gough. "They've looked at their missions and decided that they want to carry more bags rather than fly ultra-long-range missions. A seven-tank BBJ will fly 7,000 nautical miles and carry 55 bags in the lower cargo hold. A BBJ Max 7 will only need three auxiliary fuel tanks to fly the same mission, which means it can carry 159 bags in the lower hold. Fewer tanks allows more baggage – up to as many as 255 bags."

The A319neo can be fitted with five additional center tanks (ACT) – and improvements to the installation mean that the cargo hold can take 18.4m³ (650ft³) more baggage with three or more ACTs. If customers choose a single ACT, the hold can accommodate 165 large suitcases. The maximum range advertised for the ACJ319neo – 6,750 nautical miles – factors in all five ACTs, in addition to eight passengers and 27 suitcases.

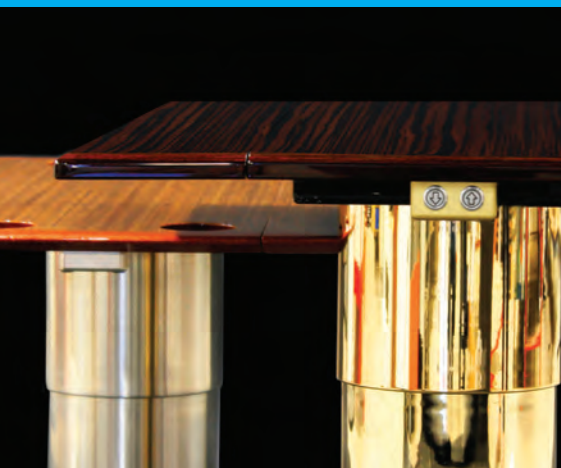
WEIGHT GAINS

Variations in the metrics issued by the two manufacturers complicates direct comparisons. Boeing has set a 16,000 lb interior weight allowance for the BBJ Max 7, an increase over the 15,000 lb allowance on the current-generation BBJ. That increases to 18,000 lb on the BBJ Max 8 and 21,000 lb on the BBJ Max 9.



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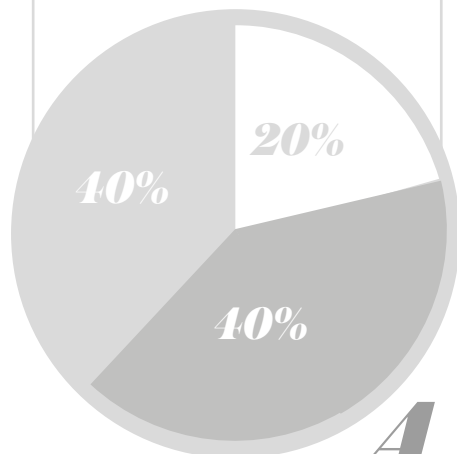
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Readers' poll

Q Which of the three BBJ Max siblings will be most in demand? As of publication day, our online readers say...



A

20% BBJ Max 7
40% BBJ Max 8
40% BBJ Max 9



ABOVE: A DETAILED SEAT STUDY FOR A BBJ MAX 8 CONCEPT BY ALBERTO PINTO DESIGN



LEFT: THE BEDROOM ON LUFTHANSA TECHNIK'S 'PEACOCK' ACJ320NEO CABIN CONCEPT

“When it comes to completion there is no real departure from the previous generations”

“We don’t publish a completion allowance, because this is determined individually with each customer,” says David Velupillai, marketing director at Airbus Corporate Jets.

In terms of interior outfitting, the completions centers consulted for this article don’t expect any real differences that will affect cabin design, but do expect longer timelines for certification. “When it comes to completion there is no real departure from the previous generations,” says Eric Hoegen, director of completion sales and key account management at AMAC Aerospace.

FIRST COMPLETIONS

The first BBJ Max completion – a BBJ Max 8 – is scheduled to begin in 2018, although the next OEM delivery slots are not until 2021 for the BBJ Max 8 and BBJ Max 9, and 2022 for the BBJ Max 7. The first ACJneo completion – an ACJ320neo ordered by Acropolis Aviation – is due to enter completion at the end of 2018, with a target service entry of the fourth quarter of 2019. ACJ319neo deliveries are due to start in the second quarter of 2019.

Acropolis Aviation’s aircraft is one of two ACJ320neo completion projects AMAC is working on. “There are no particular changes to the outfitting or the engineering compared with what we are doing on the other models,” says Hoegen. “There are some changes to the type certificate, but none on the engineering data that is made available to the completion centers.”

Meanwhile, Wieland Timm, senior director of sales for VIP and special-mission aircraft at Lufthansa Technik,

LARGE AIRCRAFT TRENDS

AMAC’s Eric Hoegen reveals that open cooktop cooking is taking off as a feature on larger business jets, something that may continue to trend on the next-generation aircraft families.

“We are seeing more aircraft owners flying with open cooktops; this is probably the biggest development in galleys,” he says. “Three years ago, we did the first ACJ319 with

air extraction, and it was fitted with a large wok for an Asian customer.”

Hoegen also expects Ka-band connectivity to be a priority for customers. “We see Ka-band systems offering broadband connectivity and on the IFE side we are going to the latest generation of entertainment, with large 4K monitors and AVOD systems, plus HD streaming to iPads,” he says.

RIGHT: AN ACJNEO CONCEPT
BY DESIGN Q, CREATED FOR
COMLUX COMPLETIONS

BELOW: ANOTHER DESIGN
CREATED FOR COMLUX, THIS
TIME BY UNIQUE AIRCRAFT
FOR THE BBJ MAX



Customers for the
ACJ320neo family
include Acropolis
Aviation, Comlux
and K5 Aviation



reveals that a lot of the installation requirements for the previous generations relied on 'grandfathered' certification – elements were approved because they had previously been approved on similar aircraft. "The ACJneo and the BBJ Max have no grandfather rights left," he says. "The rules have changed. The technical details are coming in now to the engineering departments."

Laxton emphasizes that Boeing is committed to ensuring completion centers have the support they need in meeting the new certification requirements. "We work very closely with all of the completion centers because we want them to understand the aircraft build and be able to price," he says. "We are working with them, to help them with the engineering. Of course, we also offer turnkey completion management, where we take on responsibility for the whole project and contract with the completion center directly to complete the aircraft."

"Airbus has extensive experience in managing turnkey cabin completions, with more than 70 to its credit," comments Velupillai.

A NEW HOPE

Boeing says sales of the BBJ Max family have been strong, and 2017 brought the best sales year since 2006 in this segment. Airbus is also pleased with sales. "The A320neo airliner family has won more than 6,000 aircraft orders and has the dominant market share, which augurs well for the success of the ACJ320 family," says Velupillai.

AMAC's Hoegen views the introduction of these new aircraft as good for market development. "There are more aircraft coming to the completion market and I think the new models are the driver," he comments. "The worldwide economy has also improved over the past two years and that may also be a factor. From a completion center perspective, we feel that it's more driven by the new models with their fuel-efficient engines and increased range." ✕

"The ACJneo and the BBJ Max have no grandfather rights left – the rules have changed"

AIRLINE EXPERIENCE

Lufthansa Technik has not yet signed customers for the ACJneo or BBJ Max, but expects to in time.

"We are very positive that we will sign one or two contracts," says Wieland Timm. He believes the company's experience working on the commercial versions of these aircraft will be an advantage in reducing certification complexity. "We have a close link to Lufthansa, the launch airline for the neo," says Timm. "We are handling maintenance events, engineering orders, and component work and engine overhaul. Our engineers are in very close contact with those on the commercial side. They are also included in all training events and special studies provided by the OEMs, and work with manufacturers' engineering departments."

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THE WINNER OF BOEING'S BBJ
MAX 7 CABIN DESIGN COMPETITION,
ALBERTO PINTO INTERIOR DESIGN,
REVEALS ALL ABOUT THE PROJECT

Words by Izzy Kington

THE COMPETITION

In 2016, Boeing invited 10 design studios to submit cabin concepts for its new BBJ Max 7. The winning design was made into a cutaway scale model that is to be used to promote the aircraft for a decade. It was created by Alberto Pinto Interior Design, a Paris-based agency run by Linda Pinto.

"There was a very simple specification," says Yves Pickardt, head of the VIP aircraft interior department at Alberto Pinto Interior Design. "It

was to be for an unknown business person, a CEO of a big company, who would sometimes be traveling with family. The aesthetics should be quite new, not a really classical design. The most difficult thing was to design something that will still be relevant in 10 years' time."

The company found out its concept had won in August 2016. "The full design was delivered by November 2016, and the model was presented at EBACE 2017," says Pickardt.



As well as a mandatory crew toilet, the cabin has an enclosed rest area for two crew members, featuring lie-flat leather business seats, office equipment and storage



SEATS

The seats are based on Inairvation's customizable chair platform, which features a single-pedestal base. Pickardt's version features a carbon-fiber shell in dark golden brown, with a chrome trim. White molded Kevlar and carbon fiber were used for the armrests, which also have a compartment for controls, storage and connection points. The seats also feature speakers in the headrest, massage functionality, and full track and swivel.

The cushions showcase a technology Pickardt would like to see developed, whereby the leather is vacuum-molded and glued directly to the foam, to speed the upholstery process.

Flooring materials include Tai-Ping carpets, Crema Marfil stone in the bathrooms and non-textile flooring from Amtico in the galley



The dining area features a classic rectangular six-place hi-lo dining table with four fold-in leaves, storage credenzas and a retractable OLED monitor

WINDOW PANELS

One of the most interesting features is the window paneling. "Normally, these panels are either suede, leather, fabric or wood, but we've used a strip of Lexan printed with a decorative pattern," says Pickardt. "The Lexan is detached from the regular window panel, with light coming from underneath, to give the feeling that there are no real walls, widening the cabin. This is what I call breaking the box."

The Lexan panels are flanked by wood veneered dado panels and Nytek lining on the upper valance panel. Electric shades are integrated behind the Lexan for shading.



Pickardt describes the design as being an assembly of curved lines. There are many smooth corners and S-shaped sidewalls. The entrance area, bedroom and VIP bathroom have trapezoidal shapes

The front lounge accommodates five passengers, and the aft lounge seats seven. The aft lounge can be separated off from the main cabin and made part of the VIP suite



MASTER SUITE

The master bedroom features a queen-size bed that is angled to enable easy access from both sides. There are nightstands on each side, while the headboard features an illuminated slot that could be used for personal belongings. The bedroom also has two high storage compartments, a vanity/desk with a sliding and rotating stool, and a large monitor.

Meanwhile, the bathroom is dominated by a fully transparent shower that can accommodate two people. The floorboards are made from teak, while ceiling lights shine through white Lexan. There is also a toilet, a vanity area and two high storage cabinets.

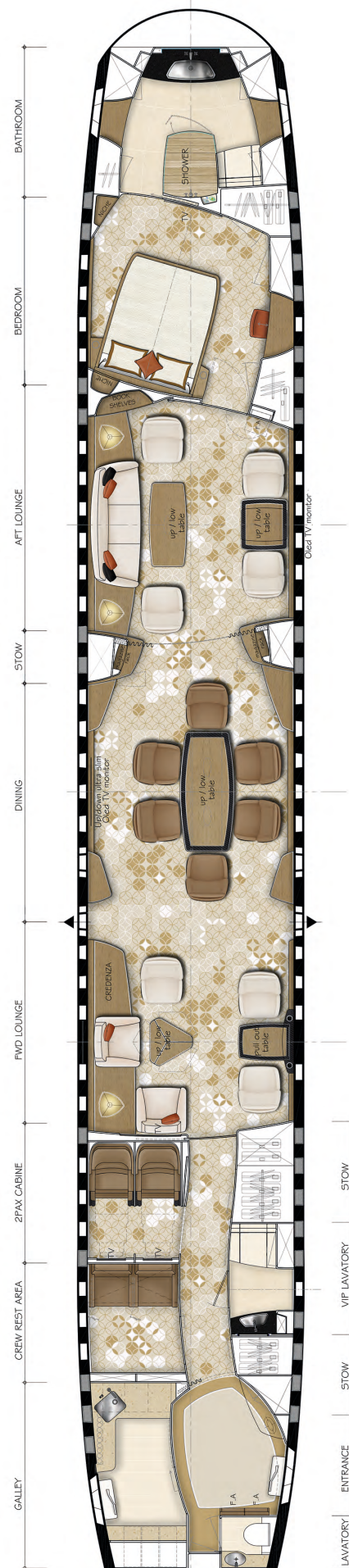
THE MODEL

The model was made in six months by PacMin in Los Angeles, using renderings, a LOPA, and material samples for reference. "I visited them once during the project to see if everything was all right," says Pickardt.

PacMin said this is the most detailed and intricate scale model it has produced. It is 9.2ft (2.8m) long with a 9.8ft (3m) wingspan. More than 400 parts were produced, including casted chairs and hand-sculpted tables. Production methods included scratch building (60%), casting (20%), CNC machining (10%) and additive manufacturing (10%). Every piece was painted to replicate the look and texture of the material specified. The model also includes 20ft of lights and five OLED TVs that are capable of independent playback.

The layout accommodates 19 passengers and two crew

Pickardt envisages the entrance hall being divided off from the rest of the cabin by a curtain when attendants are loading service carts from the large, three-sided galley






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LUFTHANSA TECHNIK HAS THE EXCLUSIVE CONTRACT TO MODIFY A330 MRTTs TO FULFILL THE MILITARY MARKET'S DESIRE FOR AIR REFUELING COMBINED WITH GOVERNMENTAL OR MEDEVAC CABINS

Words by Izzy Kingston

royale



ABOVE: THE GOVERNOR CABIN'S PRIVATE OFFICE

LEFT: A WORKING AREA IN THE STATE CABIN

BELOW: THE AFT PTU AREA IN THE RESCUE VERSION

Used to refuel military aircraft in the air, the A330 Multi Role Tanker Transport (MRTT) can hold 111,000kg (245,000 lb) fuel in its belly, while keeping its main deck free for a transport role. “The military market is more interested in this aircraft than any other as they all need the air refueling capability combined with a second role,” says Wieland Timm, head of corporate sales for VIP and special-mission aircraft at Lufthansa Technik. “Many belong to air forces, which are often also responsible for medevac or government transportation.”

Airbus has sold 70 A330 MRTTs, which it delivers with an airline-style cabin. Other configurations can be installed by Lufthansa Technik, which signed an exclusive agreement with Airbus in 2017.

FOUR CABINS

Lufthansa Technik has created four fixed layouts for the aircraft. There are two governmental cabins – State and Governor – both with a private bedroom for the prime minister/president at the front and a delegation area at the back that can be separated from the ministerial area by walls. In between these, the Governor design has a ministers’ office with club seating and tables, as well as an enclosed room for press conferences, with a U-shaped divan. The State cabin has a dining/meeting room with a table that 10 people can sit around. There are two galleys, to serve the ministerial and delegation areas separately, along with lavatories for each part of the cabin.

The prime minister’s area has a bathroom with a shower. “With state visits, where they may be stopping in several countries, passengers usually sleep on the aircraft,” says Timm. “They are usually only visiting

*Lufthansa
Technik has built
73 governmental/
head-of-state
cabins*

for a few hours before heading to the next stop, so they need to prepare themselves on board.”

The Medevac cabin features three areas: a highly private area for treating high-ranking patients or those with very serious injuries; an area for up to six injured people on patient transport units (PTU); and a seating area. The PTU is a Lufthansa Technik product, which can be expanded into an intensive care unit with equipment including blood pressure and oxygen systems and monitors. There are seats for medical personnel near each

“With state visits, where they may be stopping in several countries, passengers usually sleep on the aircraft”



MILITARY BACKGROUND

Lufthansa Technik does not work on military aircraft types *per se* – unless you count the military derivatives of the Boeing 737 and 767. “However, we also have worked on aircraft that look civil, but have military registrations, because they belong to air forces,” says Wieland Timm. “We have delivered those to several air forces in Europe.”

The company has also done a lot of A310 modification and maintenance work for the German Air Force. These aircraft are designed for combat and medevac.



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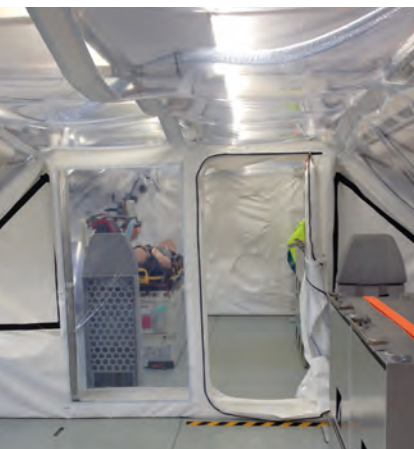
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PTU. “The European Rescue Authority told us how military rescue works, and what equipment is needed,” says Timm. “We can provide all the equipment it asked for, and even supply the medications, because Lufthansa Airlines has a PTU it can install when needed.”

The Trooper cabin has a smaller medical area with four PTUs – the rest of the cabin is filled with seating to transport troops or delegations.

MILITARY COMMUNICATIONS

All versions can be equipped with communications equipment including live TV and internet connectivity. Military communication systems can be integrated in a communications center or other dedicated area. In the State and Governor cabins, there are fixed IFE monitors in the delegation areas, and a separate IFE system for the ministerial area. “The military equipment depends on the customer,” says Timm. “Some only request dedicated phones in the communications center. Sometimes it’s split so the prime minister’s office is separate – because they want to watch independent films about the person they are visiting, for example.”

“The European Rescue Authority told us how military rescue works, and what equipment is needed”



If anti-missile systems are required, these are integrated by the military, not at Lufthansa Technik

EBOLA RESCUE

In November 2014, Lufthansa Technik delivered an A340-300 with a difference – it had been converted to include specially developed quarantine tents to enable the transportation and treatment of Ebola patients. Named ‘Robert Koch’, the aircraft was delivered to the German government.

There is a seating area for 19 people at the front, with the aircraft’s middle and rear given over to a patient transportation isolation unit. This is surrounded by an airtight tent with negative pressure, with two more exterior airtight tents serving as buffer areas for safe entry and exit.

The tents had to be flexible enough to withstand take-off, landing, and so on, without breaking. “The big challenge was to find a solution for what happens in a rapid decompression situation,” says Wieland Timm. “If this caused a leak, where would it go? Would contaminated air be able to flow throughout the aircraft? Our engineers found a technical solution whereby contaminated air would be caught in a big bag.”

Lufthansa Technik also designed a special, cleanable floor surface. “Firstly, we had to ensure spilt fluids can’t harm the aircraft systems,” says Timm. “Secondly, you have to be able to clean up fluids easily, to avoid cross-contamination.”

ABOVE AND RIGHT: IN 2014, LUFTHANSA TECHNIK CREATED A SPECIAL QUARANTINE TENT TO ENABLE THE SAFE TRANSPORT OF EBOLA PATIENTS ON AN A340-300

BELOW: THERE ARE SEATS FOR CAREGIVERS BESIDE EACH PTU IN THE RESCUE JET’S FORWARD CABIN

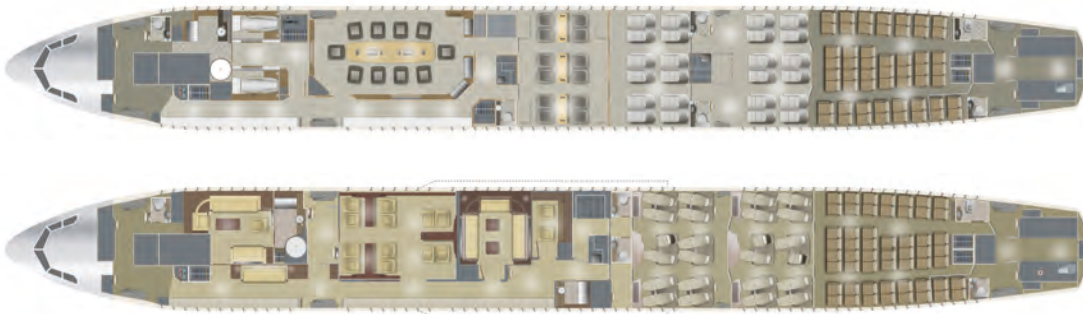


Ease of cleaning is the most important attribute of materials used in the Medevac and Trooper cabins, so no soft materials are used. In contrast, the Governor and State cabins make wide use of fabric and carpet, not least for their noise reduction properties.

PRIVATE CONVERSATIONS

The walls of the enclosed rooms are lined with soft materials rather than glossy ones, for noise reduction, and soundproofing materials are integrated behind the lining. “The walls are specially treated so that you normally can’t hear what is being talked about in the rooms,” says Timm. “This is standard for governmental aircraft. In

Soundproofing is done with materials rather than electronic systems – Wieland Timm says this is because the latter don't work for full rooms



addition, the delegation area is at the back of the aircraft, separated from the ministerial areas by more guest seating or storage areas.”

Although the front of the aircraft – which is where customers want the bedroom – is not naturally the quietest area, Lufthansa Technik has worked to bring sound levels down. “The major limitation with soundproofing is weight, but on a wide-body you are less limited than on a narrow-body,” says Timm.

CUSTOMIZATION POSSIBILITIES

Although Timm believes the existing designs will suit up to 90% of customers, the cabins are intended as proposals that can be customized. The size of the rooms, the number of PTUs, the medical equipment and cabinetry can all be changed. However, the PTU itself is a fixed design.

One element that cannot be changed on the A330 MRTT – the main departure from the A330 – is a fixed cabinet, roughly the size of three lavatories, in the forward area, after the cockpit door. It is installed by Airbus Defence and Space to house the computers and systems needed for the air refueling system. “It’s the major thing to work around,” explains Timm. “The rest is normal work – we have outfitted a lot of A330 and A340 aircraft.”

MILITARY REGISTRATION

The cabins will be built to EASA certification requirements, with the STC validated by the relevant national civil authority and then to a military STC. “We have a dedicated team who are used to military requirements, because we work on a lot of governmental aircraft that are also operated by air forces and therefore need military registrations,” says Timm.

TOP: THE STATE LAYOUT

ABOVE: THE GOVERNOR LAYOUT

BOTTOM LEFT: SEATING IN THE TROOPER CABIN

BELOW: A CONFERENCE AREA IN THE STATE CABIN

Mechanics and engineers must have NATO clearance to work on the aircraft. The cabins also had to meet NATO TEMPEST requirements. “We had a dedicated team working on that; it was not easy,” says Timm.

FIRST PROJECT

The company is now working on its first A330 MRTT modification in Hamburg, Germany. The aircraft will have the State layout and is scheduled for redelivery in 2018. That project started two years ago. The design took only six or seven months, because most of the equipment had been built before for other aircraft. Timm says this type of cabin takes around 12 months to produce, install and certify. That timeframe also includes training personnel to use the cabin.

As well as installing the interiors on new jets, Lufthansa Technik will be able to modify in-service A330 MRTTs, and has fielded several such requests. The modification costs around US\$60-80m – much of the variation depends on the IFEC equipment specified. ☒

“We work on a lot of governmental aircraft that are also operated by air forces and therefore need military registrations”

UNIVERSAL ACCESS

The aircraft has three doors, with Door Two being the entrance used for patients and by people using wheelchairs, because the hallway there is wide enough for an aircraft wheelchair.

Wieland Timm points out that this is a particular consideration for governmental aircraft, because the aircraft’s users – politicians – can change over the aircraft’s 10-15-year service, and it is unknown if wheelchair access will be needed at some point.



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JETS, SYLVAIN MARIAT REFLECTS
ON THE OPPORTUNITIES
HE HAS TO INNOVATE

Words by Izzy Kington

g





Airbus has created around 70 turnkey cabins, where it managed the outfitting, either at ACJC or through third-party outfitters



With design and flying his two great passions, Sylvain Mariat is clearly very happy as head of creative design at Airbus Corporate Jets (ACJ). In fact, he has spent his entire career at Airbus, since joining in 2003 as a cabin design manager on the A380 program. "This was my chance to discover the Airbus world, and aircraft constraints," says Mariat. "I was very happy, because I love aircraft – I'm a single-engine aerobatic pilot. I had created designs for a few of the smallest types, but my wish was to design bigger aircraft, to exercise my creativity."

After five years, Mariat was made head of creative design at Airbus Corporate Jet Centre (ACJC), an Airbus subsidiary that outfitted narrow-body ACJs. "This is where I learned more about corporate jets, and I designed many aircraft," says Mariat. "My intention was to push new ways of design while staying in line with customers' wishes. I think it was appreciated, because I had some repeat customers."



TOP: THE ACJ319 CABIN CONCEPT CREATED WITH PAGANI IN 2017

ABOVE: AN ACJ319 OUTFITTED BY ACJC WITH AN IN-HOUSE DESIGN, IN 2015

At the time ACJC closed its doors, Mariat had worked there for almost 10 years. He transferred to ACJ in March 2017. "I'm proud to continue my work at Airbus, because I'm working with the right product," he says. "I stay because each project is unique; I love it."

CUSTOMER DESIGNS

Mariat and his team support customers with concept proposals, floorplans and complete designs, and can also work with customers' designers in a supporting role. "The design process is not far removed from what I'm used to,"

MARIAT'S TREND TIPS

Hospitality

"More and more, our customers want to provide full comfort for everybody on board," says Sylvain Mariat. "Whereas in the past they wanted one bedroom, with guests located further aft, our latest design has full-height super-first cabins."

Terracotta tones

Mariat has seen a trend for brassy, terracotta tones with a hint of orange and red. He believes this will continue over the next year. "Terracotta is an earthy color that looks beautiful when used for soft materials," he says.

Glass

"Ultrathin and lightweight glass materials are now certified for aviation," says Mariat. "This is a completely new path for designers; glass is a good material, but to preserve the cabin acoustics we have to ensure we use it sparingly."

"Designing a new concept is a good opportunity for us to see if we can push some new technology or innovation"



he says. "I continue to work on designs – even making hand sketches with markers on white canvas – and meet customers in their homes or hotels to see what we can do together. After that, I come back to Airbus and work with a big team of engineers and program staff to design the aircraft."

When tasked with designing a cabin for a specific customer, Mariat takes a bespoke approach. "I sometimes say to a customer that I will design their aircraft like I'm their tailor," he says. "I've often taken customers' arm measurements to be sure that the cupholder will be at the right distance for them. Details are vital in this job."

One change for Mariat is that while ACJC was focused on narrow-body aircraft, now he can touch all Airbus aircraft. "Our wide-body aircraft – for example the ACJ330neo and the ACJ350 – offer a huge amount of space, so it's a big chance for me to be creative," he says.

THE BRIDGE

ACJ is a business unit within the bigger Airbus organization, and therefore Mariat has easy access to its resources and expertise. "I'm a bridge between external designers and ACJ," he says. "For example, we are now starting on a sophisticated cabin design, for which we are calling upon the weight and balance expertise of Airbus engineers, to decide on the best floorplans to meet the customer's operational goals."

This closeness with both outfitters and customers also helps him with the strategic nature of the role – Mariat has the opportunity to influence the brand with his new concepts, and even make improvements to aircraft platforms. "I can collaborate with engineers who are working on the aircraft's structure itself, not just the cabin," says Mariat. "This means I have a better overview of the aircraft than I did before and can work to define what we can improve. My job is to work with the engineers here to transform what is primarily an airliner into a corporate jet. I could be

The project Sylvain Mariat is most proud of is the ACJ320neo Melody concept. "The aircraft is a huge canvas, and to make the cabin contemporary and spacious, while also warm, was not easy," he says

MAIN: THE CINEMA AREA ON THE ACJ320NEO MELODY CONCEPT

TOP RIGHT: A DETAIL FROM THE PAGANI COLLABORATION



involved in redesigning the galley, lavatories – every part."

FLIGHT TESTING

Mariat can even work directly with flight test engineers. "When they are conducting flight tests, we can ask them to check if we can use certain technologies, or we can use sensors to see how we could improve aspects such as the soundproofing, the temperature or the airflow," he says.

He's now investigating how airstairs could be improved. "As part of the Melody ACJ320neo concept, we wanted to redesign the entrance to hide metallic parts on the floor," he adds. "Designing a new concept is a good opportunity for us to see if we can push some new technology or innovation. For Melody, we also worked with a premium brand to improve the soundproofing, and we're working on a similar project now with another kind of technology."

A LIFE IN AVIATION

As he was growing up, Sylvain Mariat was inspired by his father, a pilot of Airbus Alouette II and Écureuil rescue helicopters. "I wanted to become a pilot, but because of a medical problem, I turned to design," he says.

However, Mariat is able to indulge his passion for flying as a single-engine aerobatics pilot. He also has friends in business aviation who share his passion. "It's a small world – I have a good friend in the business who has a beautiful Spitfire, based in Duxford, in the UK," he says. "Every year we go to the Flying Legends Airshow together. The Spitfire is a unique aircraft, which links with my work, because each ACJ is unique too."

“The first aircraft designers translated elements from yacht designs – so many designers still use this kind of vestige without knowing why”



Sylvain Mariat's past collaborators include Richard Mille for the ACJ Tourbillon watch, and supercar designer Pagani for an ACJ319neo concept

Mariat finds inspiration everywhere, including at non-aviation design exhibitions such as Milan Design Week. “I also exchange ideas with good friends who I used to work with, but who are now designing for other fields,” he reveals. “We get together in Paris or in London a few times each year, and we talk about what things we want to improve, and if we want to attempt to implement some new technology, and so on. It’s the best way to find inspiration.”

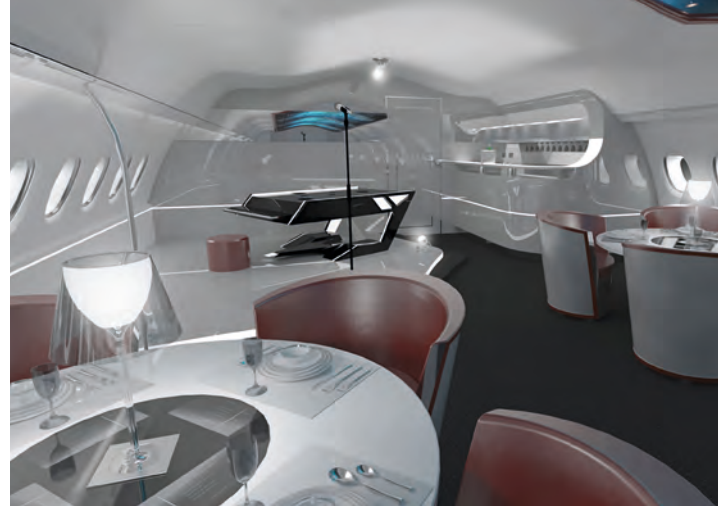
With technological developments, Mariat believes the focus should be on improving ease of use and maintenance. “Responding to customer feedback and input from our services department, we want cabin technologies to be very simple to use and also to change,” he explains.

“We are also looking at using sensors that would provide real-time feedback on cabin elements to optimize maintenance, but we want to also have a better design from the beginning.”

ECOLOGICAL DEVELOPMENTS

In terms of material innovations, Mariat is currently working with vendors to develop ecologically friendly versions of their products, for example wood, carpet and even glue. “I’m pushing for that in one of our latest projects, where the customer has asked us to ensure every decorative material used is ecologically friendly,” he says. This means tracing the provenance of veneers, for example.

Mariat is not looking for anything in particular at EBACE 2018, but is looking forward to discussing the technologies he wants to develop, and



TOP RIGHT: A CONCEPTUAL ENTERTAINMENT SPACE ON BOARD AN ACJ380, CREATED FOR BUSINESS JET INTERIORS INTERNATIONAL IN 2016

ABOVE RIGHT: MINI SUITES ON THE ACJ319 KAOLIN CONCEPT FROM 2016

ABOVE LEFT: THE LOUNGE AREA ON AN ACJ319 DELIVERED BY ACJC IN 2015

showing off the team’s latest project, which he will only say is “new and trendy”.

A CLEAN SHEET

Overall, he thinks designers should question why they feel the need to repeat previous designs. “The first aircraft designers translated elements from yacht designs, for example, the porthole-style window,” says Mariat. “So many designers still use this kind of vestige without knowing why. The same applies with lighting domes. I particularly like to work on the lighting dome and the seats – many times we have designed unusual domes to present to our customers. I want to see

designers creating something more contemporary and clever from the start.”

DESIGN TOOLS

Airbus uses 3D renderings to give an accurate representation of its cabin designs. “We want to create the greatest realism in the least possible time,” says Sylvain Mariat. “We also need to simulate the light at specific altitudes, so we can see how it impacts colors.”

The company also uses VR technology to enable its customers to explore the inside of their aircraft before they are built. 3D printing has also been in use at Airbus for a decade. “Now we are working with a 3D printer that prints in color,” says Mariat.



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Lufthansa Technik

Hot tips

Designers and completion experts reveal the design and technological trends that will matter in 2018



Michael Reichenecker

AIRCRAFT INTERIOR ARCHITECT, VIP AND SPECIAL-MISSION AIRCRAFT SERVICES, LUFTHANSA TECHNIK



Kate Ahrens

VICE PRESIDENT OF DESIGN, FLYING COLOURS CORP



Annika Wicklund

DIRECTOR OF DESIGN, GREENPOINT TECHNOLOGIES



Steve Daschel

SENIOR DIRECTOR OF ENGINEERING, GREENPOINT TECHNOLOGIES



Bill Dalton

DIRECTOR OF PROJECT DEFINITION AND INTEGRATION, GREENPOINT TECHNOLOGIES



Christine Hadley

DIRECTOR OF MARKETING, GREENPOINT TECHNOLOGIES



Elisabeth Harvey

DIRECTOR OF DESIGN, BASEL DESIGN STUDIO, JET AVIATION



Patrick Knowles

PRINCIPAL, PATRICK KNOWLES DESIGNS



Jacques Pierrejean

PRINCIPAL, PIERREJEAN DESIGN STUDIO

ELISABETH HARVEY

There is a continued trend for curved architectural styles to balance out the still popular classical design approaches. Curvy and natural shapes were featured in the latest interior fairs in Paris and Milan, not only with soft materials but also with wood. 3D veneering opens up many possibilities for a designer. Although still a popular application, wood is no longer applied just as wood; I see growing interest in alternative techniques, such as embossing, straw marquetry and woven wood, as well as 3D forming.

JACQUES PIERREJEAN

Warm neutral colors and the classical blend of fabric, leather and wood will remain popular, but we would like to propose a new range of colors, such as green and blue. 3D textures will give a totally new appearance to the cabin.



JIM DIXON

Our customers often ask us to design their aircraft to feel homely, so it would make sense for the materials used to tend toward those found in the home. For example, fabric seating rather than leather; wood and stone flooring; calm and natural color palettes on the interior, but more extravagant and intricate liveries for the exterior.

PATRICK KNOWLES

Virtually anything organic is on the pulse at the moment. This kind of element is most effective when used in juxtaposition. For example, pairing live-edge natural wood with highly polished and refined surfaces brings attention to the organic quality of the wood.

There is also a trend for layering or combining textures. Metallic fittings can benefit greatly from a brushed, stippled, hammered or leathered effect. Likewise, applying different finishes to the same wood veneer can prevent monotony.

What styles, colors and textures will be popular in the year ahead?

CHRISTELLE DIETSCH

It's really hard to speak of general trends, because each interior is created based on the owner's taste and personality, as well as cultural factors. However, we do see a common desire to show the natural beauty of the materials.



Jim Dixon

HEAD OF AVIATION, WINCH DESIGN



Christelle Dietsch

AIRCRAFT INTERIOR DESIGNER,
AMAC AEROSPACE

KATE AHRENS

We are seeing a huge push for satin, rather than gloss, veneer. Wood is still popular, but there's been a sea change with requests for more exotic woods, with black, gray and even white stains. The modern zen look is popular.

We also see more flowing curves, including in seat shapes. Armrests are curved at the front and have an arc to help settle the arm. There is a move toward thinner seats that are equally comfortable, but look more stylish. The traditional square shape looks dated.

The move to contemporary styling is also reflected in plating metals – we are seeing more brushed and satin finishes. The popularity of a gray, black and white palette has encouraged more use of dark polished chrome.

What cabin technologies are growing in popularity?

MICHAEL REICHENECKER

Lighting systems that can be reconfigured even after installation will lead to more freedom in terms of cabin layout. I have initiated a number of lighting innovations that are now being patented by Lufthansa Technik.

PATRICK KNOWLES

Real-time interaction with family, friends and the workplace will, in all likelihood, become of greater importance. The ability to manipulate lighting to enable travelers to transition to new time zones will become more prevalent.

JIM DIXON

Our latest BBJ features electro-dimmable lighting and a 64in TV – the largest offered for a certified aircraft interior. There is also a mirror-faced TV integrated into the marble vanity area. The main cabin is equipped with full-spectrum, audio-synced lighting. We are also seeing the introduction of micro-perforated fabrics and panels that have considerable soundproofing properties.

STEVE DASCHER

Galleys are improving with the introduction of certified microwave ovens, multilayer convection ovens, induction cook tops, high-speed-cycle dishwashers, multimode refrigerator/freezers and odor extraction. There is also more demand for colored accent and wash lighting with programmable scenes, unique ceiling light features and artwork with integrated lighting. Demand is increasing for lie-flat seats with electrically actuated tracking, recline, leg rests, lumbar/massage and headrests. Seats are equipped with wired or wireless AV entertainment equipment and electrical outlets.

BILL DALTON

Customers want the highest resolution possible for monitors, which is currently 4K and will soon be 8K. They are also requesting OLED and curved monitors. For media, they are asking for fewer fixed components such as Blu-ray players, and more streaming options such as server-based solutions or services like Netflix over broadband connection.

ELISABETH HARVEY

I'm seeing the translation of the smart home concept into the cabin, enabling lighting, audio/visual equipment, air-conditioning, and so on, to be controlled via a touchscreen or phone. Having control devices that are so easily upgradable enables innovative applications, as well as new design possibilities.

KATE AHRENS

Everything related to Bluetooth, so the cabin can be managed from a handheld device. Principals want to communicate with the flight attendant or flight deck without having to press a call button. IP platforms are also becoming more popular – for example, fridges or coffee machines that automatically reorder food items/pods when they are running low. Mood lighting has grown in popularity, and the concept could be extended to mood music and blinds.

CHRISTELLE DIETSCH

Connectivity is now a major desire – we've had a lot of requests for Ka-band antenna installations over the past 12 months.



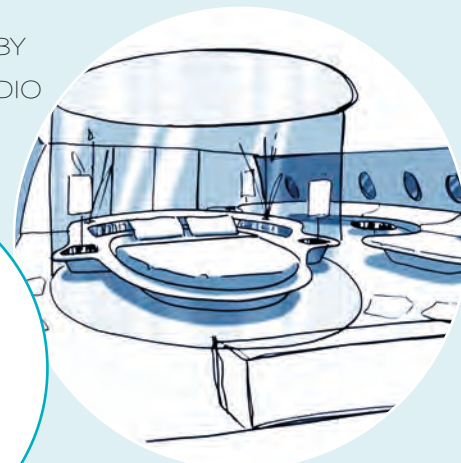
JET AVIATION'S DISHWASHER

STEVE DASCHEL

There is still considerable demand to develop new technologies for galleys, to enable gourmet meal service. The challenges include securing cooking utensils and hot food during turbulence and preventing odors from filling the cabin. Equipment must be qualified to stringent safety requirements and fit in compact spaces.

LED is the lighting technology of choice for the foreseeable future. Improvements such as self-tuning LED groups, systems that allow reprogramming, or tuning via the CMS, will optimize maintenance and the user experience. Special lighting technologies – such as light-emitting sheets or flexible sheets and tubes – will be integrated when certified.

A CONCEPT BY
PIERREJEAN
DESIGN STUDIO
FEATURING
PLEXIGLAS
PARTITIONS

MICHAEL
REICHENECKER

I'd like to see larger screens, flexible lighting and natural materials and surfaces.

KATE AHRENS

The switchless cabin will make an entrance soon, facilitated by handheld devices. We also need to fulfill the expectations of the always-on generation.

What new technologies need to be developed for aviation next?

ELISABETH HARVEY

I'd like to see fully integrated lighting solutions similar to those in the car industry. As LED technology advances, lighting should become more versatile, moving to the more architectural approach seen in houses and yachts, and combined with smart controls to enable customization.

JACQUES PIERREJEAN

Panel lighting on the ceiling would be interesting. I'd also like to see an interactive Plexiglas partition.

We wish to push windows further in terms of size and shape. We expect to soon see a window panel that gives a wider angle of view.

PATRICK KNOWLES

To help those who have an acute fear of flying, I'd like to see the development of a pod or room in which they can be immersed in a virtual environment, for example sitting in a recreation of their favorite chair from home. The concept could also include a gyro seat that would effectively level-out turbulence.

CHRISTELLE DIETSCH

GUIs are mostly created for airliners, not private aircraft. Pretty much only the background can be customized; the icons are not adapted to private use or look old-fashioned.

Our customers are looking for more personalization.

BILL DALTON

One challenge is that some of the developed technologies still need to be propagated to the full spectrum of components. For example, monitor technologies have evolved from HD (1080) to 4K, and from LCD to OLED, but so far IFE manufacturers have only rolled out these technologies to large monitors.

JIM DIXON

The top end of the business jet sector is increasingly aspiring to the same level of customization typical of big iron aircraft. We would also like to use carbon fiber where high strength and low weight are required.



JIM DIXON

In our latest BBJ, we used a combination of exotic shell materials; hand-stitched motifs on seats, valance panels and carpets; and mother-of-pearl accessories. We also incorporated artwork, color palettes and materials normally found in a home to fulfill this home-from-home dream. Carbon fiber is also growing in popularity, as it gives a contemporary feel and is a very good alternative to a timber finish. It is available in a multitude of colors, including off-white and silver.

What materials are growing in popularity?

KATE AHRENS

We are seeing a growth in the use of carbon fiber as a main material for monuments, whereas before it was used purely as an accent. We have been experimenting to see if we can create some new colors and we've investigated using Kevlar and dyed fiberglass, because a wider range of colors can be generated using these materials. We're also using weaves of carbon fiber and fiberglass to create new looks and colors.

ELISABETH HARVEY

2018 will be about going back to basics and being more environmentally friendly, with an increased use of natural materials. Brass will start to feature, combined with natural materials such as marble, along with matt black finishes that complement the more usual palette of nickel, platinum and chrome. A good example is the brass basin set into marble designed by Piero Lissoni for Boffi.

JACQUES PIERREJEAN

We would like to promote the use of Plexiglas, Corian, woven metal, carbon fiber, inflatable elements and 3D textures. Plexiglas could be used for transparent partitions. We could also incorporate flower petals, metal fibers or anything inside them, and play with light. Leather combined with Corian may create an interesting mix of tradition and modernity. Bulkheads and ceilings could feature soft materials tone-matched with matte and satin lacquers. Leather embossing is now mechanically easier and gives us more customization opportunities. Corian or textured metal could offer another direction for flooring, and LED dots could be integrated into carpet to add night-time ambience. New fibers such as vicuna could upgrade carpet comfort.

PATRICK KNOWLES

There is a greater consciousness of robustness. For example, solution-dyed acrylic textiles were originally relegated to the exterior decks of boats – such fibers could be spotted a continent away. However, they have improved and are now challenging some silk, wool and mohair weaves, also offering an attractive price and durability. The ability to remove wine stains from the cream fabric of a divan, for example, using only a spritz of water lightly laced with bleach, makes this an alluring product.

ANNIKA WICKLUND

Dimensional and tactile materials, for example carpets with depth and textures, embossed leathers and feature walls.

JACQUES PIERREJEAN

TV screen foil technology is not ready yet, but on its way to being used on board. With this material, we could diffuse TV images and panoramic landscapes, creating the effect of moving partitions. It also has the potential to be used as a lighting source.

ANNIKA WICKLUND

We are very interested in new engineered materials and treatments – from the durability and consistency in quartz and reconstituted veneer, to nano products. These offer our aircraft interiors both a beautiful, repeatable look and long-term performance.

KATE AHRENS

We would benefit from more lightweight, durable and interchangeable materials.

Another issue is that when some materials are treated with fire retardant, it can affect their malleability or even change the color. If we could develop new ways of making fabrics fire-retardant without altering their essence, that would be most welcome.

PATRICK KNOWLES

Several materials are fascinating. One in particular is a textile woven from wood veneer, which results in an incredibly organic, tactile and elegant effect. This product could help fulfill the requirement for a diverse selection of textiles, particularly in larger aircraft with several compartments. I'm not sure about its certification status though.

Are there any new materials that have caught your eye?

JIM DIXON

There is rapid development in the use of natural stone and mineral glass. There is still a lot of development to be done in these areas, but the potential is great for these technologies to seriously enhance interior design.

PATRICK KNOWLES
WOULD LIKE TO
REPLICATE THE
LOOK OF MOSS
ON BOARD

MICHAEL REICHENECKER

Anything that lets us build a lighter cabin. In particular, I would like to see more lightweight materials that can be used for both surface and structure.

JIM DIXON

I'd like to see materials such as heavy linens, classic mohair and glove-soft leather, all of which capture a living-room ambience.

What other materials would you like to see developed for aviation use?

ANNIKA WICKLUND

We are very interested in alternate flooring ideas that perform well.

PATRICK KNOWLES

Materials that take their lead from nature in a raw, unprocessed capacity can add a striking contrast to the highly polished and slick surfaces typically associated with aircraft. Two ideas to bring the outside in are natural tree bark and moss. Focusing on the latter, moss will obviously not withstand certification, but perhaps an imitation of it could. Its aerated structure is not only aesthetically interesting, but could enhance sound absorption. However, the material would have to remain loyal to the attributes of its real-life counterpart, and should be used sparingly.

How might new technologies impact your work processes in the year ahead?

PATRICK KNOWLES

Digital presentations briefly impressed our client base, but we are finding it more and more of a challenge to thoroughly engage and dazzle clients, because they are bombarded by all things virtual all the time.

STEVE DASCHEL

Integrating VIP interiors on newer aircraft including the BBJ787 and ACJ350 – with their software-controlled cabin service systems, complex electrical systems, composite structure and more rigorous certification requirements – requires close cooperation with OEMs.

CHRISTELLE DIETSCH

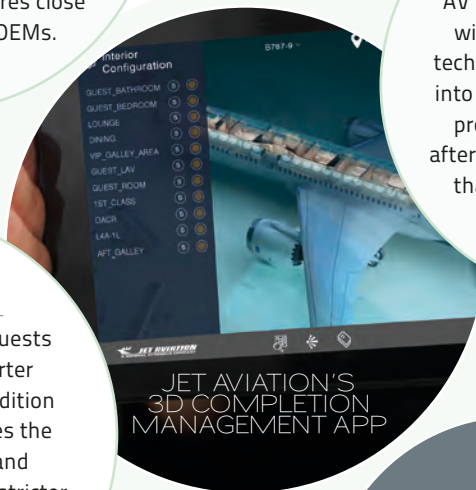
3D printing will have a growing impact on the way we work, especially in private aviation, where each aircraft is nearly a prototype. 3D printing will enable us to produce really small-series parts at a more reasonable cost, enabling us to increase the design complexity. It's as easy to print a simple tube as it is to print a double helix wrapped in a spiral staircase draped by a net. The possibilities are also huge in terms of the variety of materials that can already be handled, including ceramics, sandstone, plastics and metals.

ELISABETH HARVEY

VR presentations will start to be used not just for marketing, but to gain final approvals from principals for their interiors. Interior design is also developing to support end-to-end design in 3D – from the first concept through to detailed design and design engineering.

JIM DIXON

AV companies will work closely with designers to ensure the technology is properly integrated into a room as part of the design process rather than being an afterthought. The key is to ensure that the company is involved from the beginning.



STEVE DASCHEL

There have been more requests to certify aircraft for charter operations (Part 135) in addition to private use. This requires the integration of features and materials that comply with stricter regulatory requirements, while achieving the aesthetic VIP customers expect.

CHRISTELLE DIETSCH

The most demanding trends are the incorporation of electrical technologies that have an impact/function for the end user. These include fiber-optic lighting in ceiling panels, curved flat sections that could resemble a bar, enlarged shower cubicles and heated floors in a wet area. Spatial planning is key.

Have you noticed any other trends?

PATRICK KNOWLES

Subtle nods to yesteryear are trending, but whether this shows up in this year's cabins is yet to be seen. This may involve reimagining an old design using the current design vernacular, for example, a contemporary seat inspired by a traditional wing-back chair.

JIM DIXON

There is a trend for contemporary materials, and to only use timbers when applied with different techniques. Carbon fiber tends to be a favorite for clients looking for a clean, contemporary theme. Although it's beautiful, it is best used for smaller areas and details.

KATE AHRENS

We watch the automotive and hospitality markets carefully as trends often transfer. As the average age of a business jet traveler reduces, this is likely to bring other demands on board. We've seen more requests for unusual elements, including a safe and a bidet. Owners seem more inclined to replicate their experience on the ground than previously and as we specialize in customized products, we tend to receive very specific requests. There's also a trend for cabins to be zoned into sections for different functionalities, but with a continuous look throughout.



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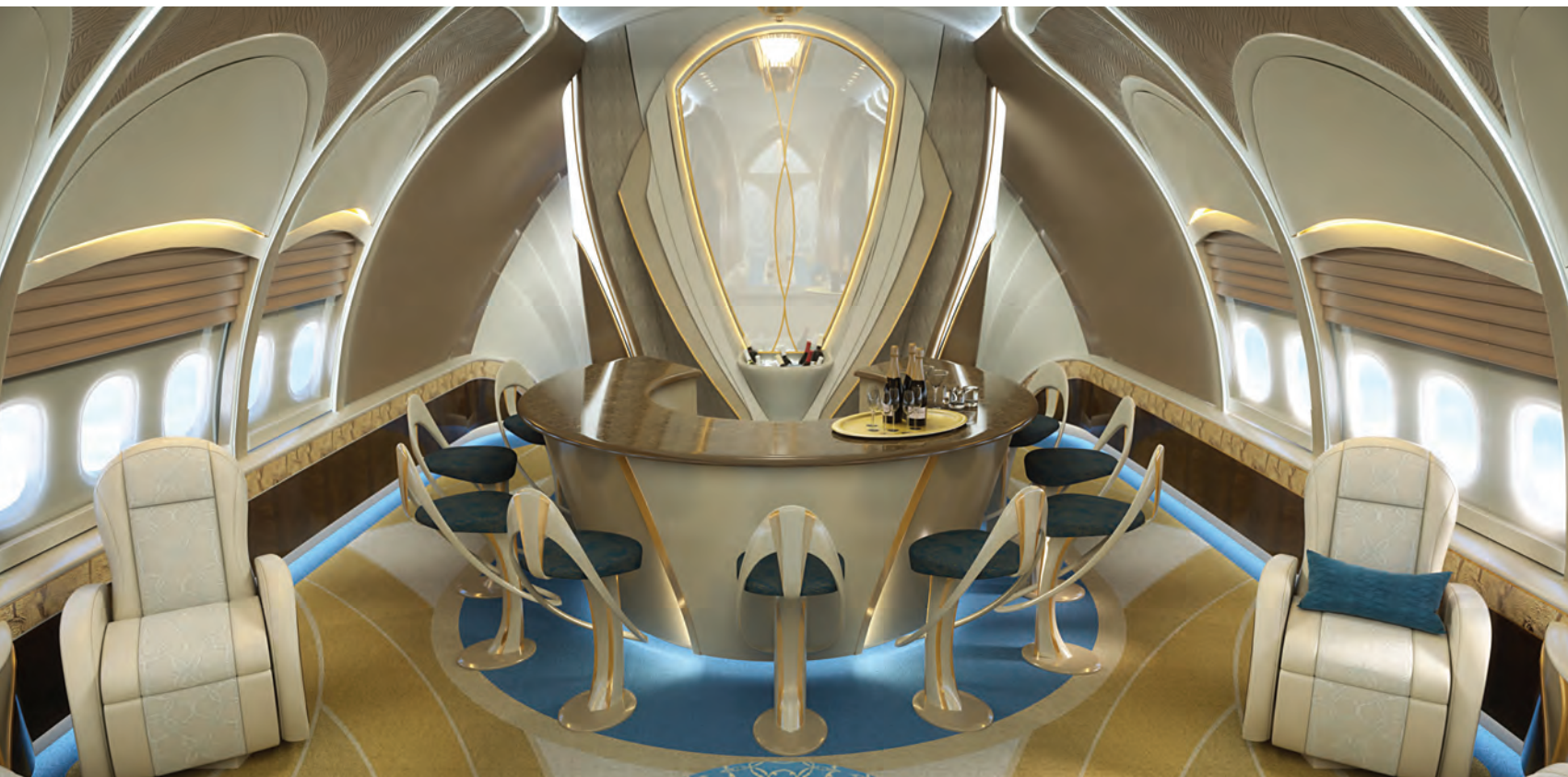
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VIP COMPLETIONS

Having just clinched a contract for a BBJ 737-700, its third VIP completion since delivering its first green BBJ in late 2015, Aeria Luxury Interiors is optimistic about the year ahead. "While it's certainly a tough industry to take part in, we have leveraged our MRO capabilities to stay exceptionally busy by performing heavy maintenance checks on various projects over the past three months, with much more work to be anticipated," says Ron Soret, vice president and general manager of completions at the company.

As well as VIP completions, Aeria can provide scheduled or unscheduled maintenance from its facility in San Antonio, Texas. A recent expansion included a new cabinet and upholstery shop, as well as a conference and design showroom – boosting Aeria's ability to showcase its design and fabrication services. The company believes the upcoming ACJneo and BBJ Max types will turn the market around, making the coming year look especially bright.



LEATHER LAUNCHES

Visitors looking for new leathers should head to Townsend Leather's booth. The Rapture Tipped and Rapture Handiwork Cowhide collection is designed to highlight its embossed pebble grain in two ways. These two-toned leathers work well as textured accents. There are five stock colors, which coordinate with the company's in-stock program of more than 100 leathers.

Rapture Tipped and Rapture Handiwork feature hand-applied techniques intended to create a worn look alongside great cutting yield, wear performance and grain consistency.

Townsend will also distribute its in-stock portfolio sampling tool. It is arranged by color and includes product descriptions, performance ratings and recommended applications for each in-stock leather.



EBACE 2018

The industry is preparing to converge once again in Geneva, Switzerland, for EBACE 2018, this year held on May 29-31. Here's a taste of some of the interior innovations you can expect – from new soft goods to expanded cabin services.

More than 400 exhibitors are expected at EBACE 2018

Soft launches

One new product to be unveiled at EBACE is the Tiara Colored by Nature carpet collection. These carpets are produced from 100% undyed wool. The collection consists of six colors, achieved by mixing wool from different sheep breeds. The carpets are designed to have a thick pile height, intriguing texture, excellent sound absorption and stain resistance, and are fully certified for aviation.

Tisca will also introduce a range of wool-blend upholstery fabrics, pictured. Each of the six designs are available in a wide range of colors, for 129 configurations in total. The fabrics are produced from natural, renewable raw materials and are certified for aviation use.

Both the new fabric and carpet collections are available in stock, ready for immediate shipment and available with no minimum order quantity.



"We expect to find information about camera visualization, IFE, lighting, galley inserts and a lot of surprises!"

Jacques Pierrejean, principal, Pierrejean Design Studio

CABIN CONCEPTS

Lufthansa Technik is planning to introduce a 1:20-scale model of its ACJ350 Home interior concept, including a full material presentation.

"We are constantly improving our presentation techniques," comments Michael Reicheneker, aircraft interior architect, VIP and special-mission aircraft services, Lufthansa Technik. "We have taken a lead role in 3D virtual reality presentations. Our ACJ350 Home interior, A330 MRTT cabin, and many more, can be experienced in full immersion with 3D goggles and several virtual presentation tools at our booth."

OPEN FOR VIEWING

Among the aircraft on Gulfstream's static display will be the new G500 and the flagship G650ER. The G500 (pictured) draws on engineering accomplishments developed for the G650 and G650ER.

Highlights include 100% fresh air, infused every two minutes, and 14 windows, which are 26in wide. Each jet will be outfitted to the customer's style – options include walnut burl veneers, stone flooring and diamond-quilted seats.



The exhibition hall will cover more than 430,556ft² (40,000m²)

Ka-band STCs

Responding to strong demand for high-speed connectivity on large VIP aircraft, AMAC Aerospace has developed several in-house STCs for Ka-band installations. Its engineering department developed an STC to install a Ka-band antenna on an ACJ330-200 in the third quarter of 2017. The Honeywell JetWave Ka-band satcom system, including antenna, was fitted during a base maintenance check that was combined with cabin interior modifications.

This STC was reused on a head-of-state ACJ330 that arrived at AMAC's facility in Basel, Switzerland, in the first

quarter of 2018. As well as the Ka-band installation, the project involved a C-check, an IFE upgrade including new switch panels and 4K monitors, seat refurbishment, and the replacement of obsolete parts.

The company also developed an STC enabling Ka-band installations on ACJ319 aircraft – first used on an ACJ319 for which AMAC also completed a six-year inspection in the first quarter of 2018.

Other notable projects of the past year include a VVIP BBJ 777-200LR completion; a 12-year base maintenance inspection and cabin refurbishment on a head-of-state ACJ340-200; and a 24-month inspection, involving some cabin work, on a head-of-state BBJ 747-8i. All three aircraft were redelivered in the second quarter of 2017.



NEW CARPETS

A new collection of aviation carpets that is inspired by the concept of layering will be on display at Scott Group Studio's booth. Believing that layers provide interest, texture and complexity, Scott Group created a layered look for the Stratis collection using a series of patterns and textures. The carpets are made from 100% New Zealand wool, as well as silk, depending on the sample. All Scott Group's custom carpets are Green Label Plus certified.



“We will be looking for the latest galley inserts, lighting technologies, IFE, seating products and materials – including new ceiling/sidewall, flooring and cabinet finish solutions”

Steve Daschel, senior director of engineering, Greenpoint Technologies



Rob Scholl

SENIOR VICE PRESIDENT, SALES AND MARKETING, TEXTRON AVIATION

How is the Cessna Citation Longitude progressing?

We are excited to bring the Citation Longitude back to Geneva for EBACE 2018. The aircraft is progressing well through the flight test program ahead of receiving FAA type certification and entering into service in 2018.

Additionally, the Longitude has been on a 46-city demo tour across the USA and has been receiving extremely positive reviews from those who have experienced the aircraft first-hand. Most recently, the Longitude completed a demo tour that circled the globe, visiting the Singapore Airshow, followed by a regional demo tour through the APAC region. It then traveled to Europe, where it demonstrated its capabilities to customers, before returning home to Wichita, Kansas.



What are the interior's selling points?

It is a super-midsize aircraft with seating for up to 12. In a standard double-club configuration, its stand-up, flat-floor cabin delivers the most legroom in its class. The aircraft features fully berthable seats, an inflight accessible walk-in baggage compartment, and offers one of the lowest cabin altitudes in its category at 1,814m (5,950ft).

Passengers are consistently impressed with the extremely quiet cabin – Textron Aviation's engineers meticulously designed the aircraft from the occupant's ear outward. The Longitude also features Bluetooth CMS that can be controlled from the customer's personal device.

The Longitude has also been engineered with maintainability in mind – our engineers designed it to MSG-3 standards, achieving inspection intervals of 800 hours or 18 months, minimizing aircraft downtime.

How have you prepared your completion facilities for the program?

Our completion facilities are actively outfitting aircraft for customers. From initial design and production build, to the seats, furniture, outfitting and paint – the entire process is located on-site, ensuring the quality of every component meets our high standards. We continuously incorporate improvements into the process to support the quality build of all our aircraft.



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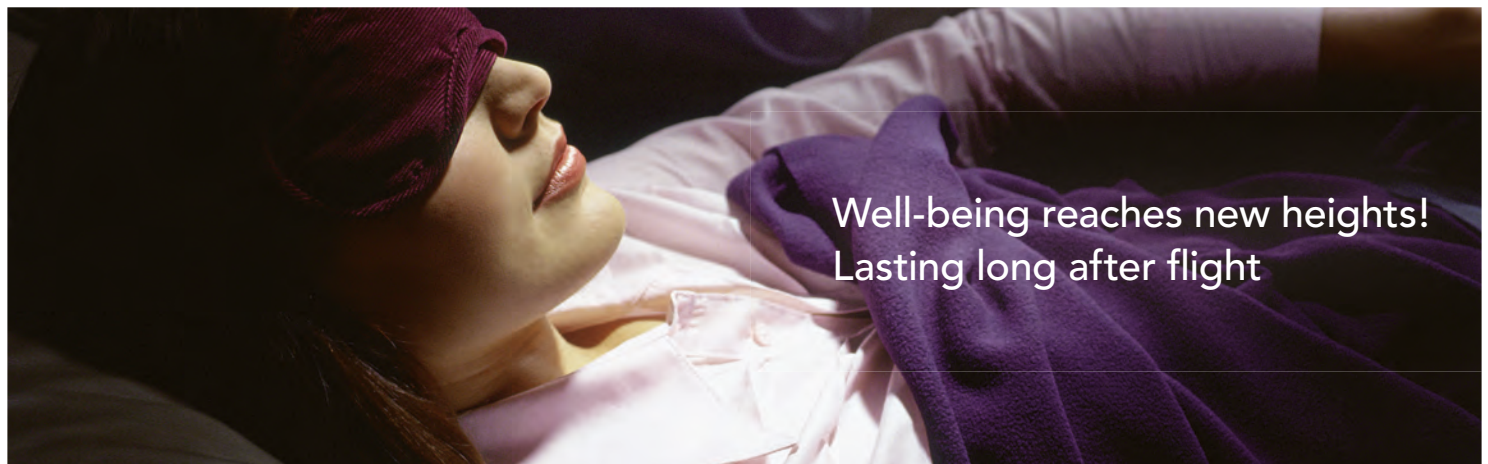
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Cabin air is far more dry than any place on earth. The dry cabin air is together with cabin pressure, noise, vibrations and lightning a key factor behind jet lag.

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Crew rest and flight deck humidifiers (85 %) are a de facto standard on Boeing 787. Now humidifiers also migrate to the passenger cabin on long distance aircraft.*

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A humidified cabin makes passengers feel more at ease, relaxed and well-balanced. The sleep is real and jet lag is diminished.

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CTT
SYSTEMS

* SFE available on Airbus A350 and Boeing 777X, STC available on Boeing 777 and Airbus A330

Middle East expansion

Its latest expansion means F/List's aftermarket capabilities are now available in Dubai, UAE. Together with F/List Germany's upholstery expertise and the Austrian headquarters' cabinet refurbishment capacities at its disposal, F/List Middle East can offer a full range of refurbishment services.

The facility is the latest of F/List's recently opened or enlarged international subsidiaries. In 2017, the

foundation of F/List Germany in Berlin greatly extended F/List's aftermarket portfolio and capacities. F/List Canada moved to a new location with enhanced production facilities that will serve as F/List's

main North American production and product support site and wood veneer competence center. In 2018 these efforts will continue, with the aim of offering a worldwide support network.



"We will look out for interesting materials and surface finishes; lighting technologies that enable more complex and customizable design; and advances in interior fittings and fixtures"

Jim Dixon, head of aviation, Winch Design

SPECIAL-MISSION INTERIORS

Following delivery of several missionized aircraft to the European market, Flying Colours Corp will highlight its design engineering capabilities. The company promises to specify, design and roll out even the most complex of special-mission requests. Flying Colours has delivered more than 10 special-mission aircraft to Europe in recent years – including medevac, multi-mission and military cabins.

The company will also showcase its new cabinetry facility at its site in St Louis, Missouri, which supports increased demand for monument work.

In addition, Flying Colours will promote its avionics and maintenance expertise. The team will detail the best approaches to ADS-B Out installation. As it begins work on its next Bombardier Global 8C check, the company's expertise in this area will also be highlighted.

"Following our recent investment from New Heritage Capital, we've moved into the next phase of strategic growth," says Sean Gillespie, executive vice president at Flying Colours. "This involves increasing hangar space and introducing more services, and will eventually see us with a presence in Europe."



Around 13,000 industry professionals are expected to attend

HIGH-SPEED WI-FI

The focus for Inmarsat will again be its global high-speed wi-fi offering for business jets – Jet ConneX – which has been going from strength to strength over the past year. With more than 30 STCs achieved and all major manufacturers now on board, global installations are increasing. More than 200 aircraft have been equipped with the JetWave hardware from Honeywell, which enables aircraft to connect to Jet ConneX. And 2017 also saw Inmarsat named as the world's leading inflight internet service provider at the World Travel Awards in December.

Jet ConneX is designed to offer the same fast and reliable connectivity that people are accustomed to on the ground. Inmarsat says its Ka-band satellite network provides consistent global coverage across 100% of major airline routes. Passengers can join live video conferences, download large files and stream content in the air. Data plans up to 15Mbps are available.

"We have seen overwhelming demand for Jet ConneX and, with the technology now available to Gulfstream, Bombardier, Dassault, Airbus, Boeing and Embraer customers, we only expect this to increase," comments Michael Rack, senior vice president of core business, aviation, at Inmarsat. "Installations on G550 aircraft are proving particularly popular since approval was granted last year, as are the additional data plans we can now offer to Dassault customers. In fact, Fortune 500 companies are lining up to get Jet ConneX."





Ku-band connectivity

Global satellite connectivity solutions including Gogo Ku and Gogo 2Ku will be highlighted by Gogo Business Aviation. In September 2017, Gogo announced it would become a global provider of connectivity with a new service operation on high-throughput satellites on its existing Ku-band satellite network. The service is expected to become available at the end of 2018.

The Gogo network can leverage an open ecosystem of more than 100 satellites for built-in redundancy. The company says that as demand for bandwidth increases, it will leverage the growing network of Ku satellites

to ensure customers can access increased capacity.

The primary components of the onboard Ku system include a tail-mounted antenna and hardware that are compatible with the Gogo Avance platform. Gogo Ku will deliver global coverage with service from take-off to landing. Gogo says it will enable fast web browsing, live streaming of video and audio, on-demand movies, large file downloads, personal smartphone use on board, real-time data for cockpit apps, and remote diagnostics.

Meanwhile, 2Ku is already flying on larger VVIP aircraft.

The 193,750ft² (18,000m²) static display will host 55+ aircraft



“EBACE is a great show for end clients, decision makers and OEMs, but AMAC’s engineering and design team also attends other shows to see what new technologies are coming to the forefront – for example, Aircraft Interior Expo”

Christelle Dietsch, aircraft interior designer, AMAC Aerospace

DROP-IN LED SOLUTIONS

Bombardier Global Express and Challenger owner/operators can now benefit from a direct-replacement self-ballasted LED system that runs on 115VAC 400Hz – supplied by Aircraft Lighting International. The development means one can now bypass the AL-2115 and AL-2116 ballast and operate directly off shipside power while keeping all existing controllers. Aircraft Lighting



International says that coupled with direct-replacement LED readers, the new system enables the entire cabin to benefit from LED technology, at a more affordable cost.

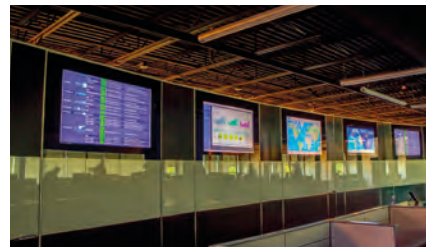
Aircraft Lighting International’s LED systems are designed to offer longer lamp life, emit virtually no heat, consume less power, and have fewer parts to maintain. Moreover, there is no need to rewire the aircraft or install new assemblies. The 115VAC self-ballasted system also contains no mercury, does not emit radiation or UV waves, and it comes with a three-year manufacturer’s warranty.

The company will also display its self-ballasted T5 LED lamp system, designed to replace old bi-pin fluorescent tubes without requiring any rewiring or system updates. All the installer has to do is pop out the bi-pin fluorescent lamp and plug the LED in. Aircraft Lighting International says this system is a lifesaver for regional and charter operations because it is a simple installation that utilizes existing CMS, and the switch to LED means less maintenance.

CYBERSECURITY

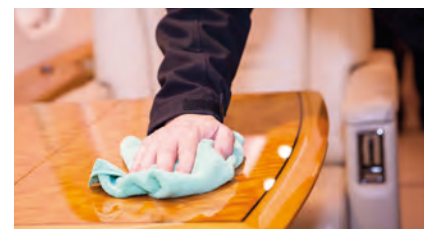
Products and services designed to help operators maximize cybersecurity will be showcased by Satcom Direct (SD). The company’s entry-level free assessment tool forms the basis from which it can develop a tailored strategy for clients. SD offers four levels of service; the highest is a financially guaranteed services suite. SD has also developed cybersecurity training options – from introductory workshops to certified courses.

SD will also detail its new Service Level Agreement (SLA) program for Inmarsat Jet ConneX customers. The SLAs include on-site support, proactive monitoring, outage notifications and guaranteed email and phone call response times. Plans to expand to other platforms will be discussed at EBACE.



EXPANDED CABIN SERVICES

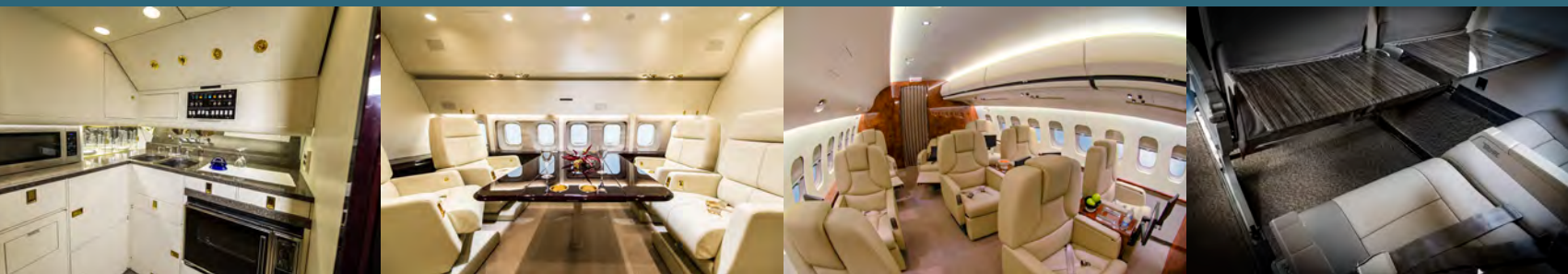
TAG Aviation’s Farnborough Maintenance Services (TFMS) in the UK has enhanced its interior and on-site repair capabilities. Services now include Zodiac Aerospace Business Aircraft Interiors’ Smart Repairs for damaged woodwork. The company says these are considerably less expensive than a full panel re-spray, require no prior booking and can be turned around within a short time. TFMS also offers on-site cleaning and detailing services. TAG will also highlight its Maintenance Services Centre in Geneva, Switzerland, which can combine scheduled heavy maintenance checks with cabin, cockpit and system upgrades.





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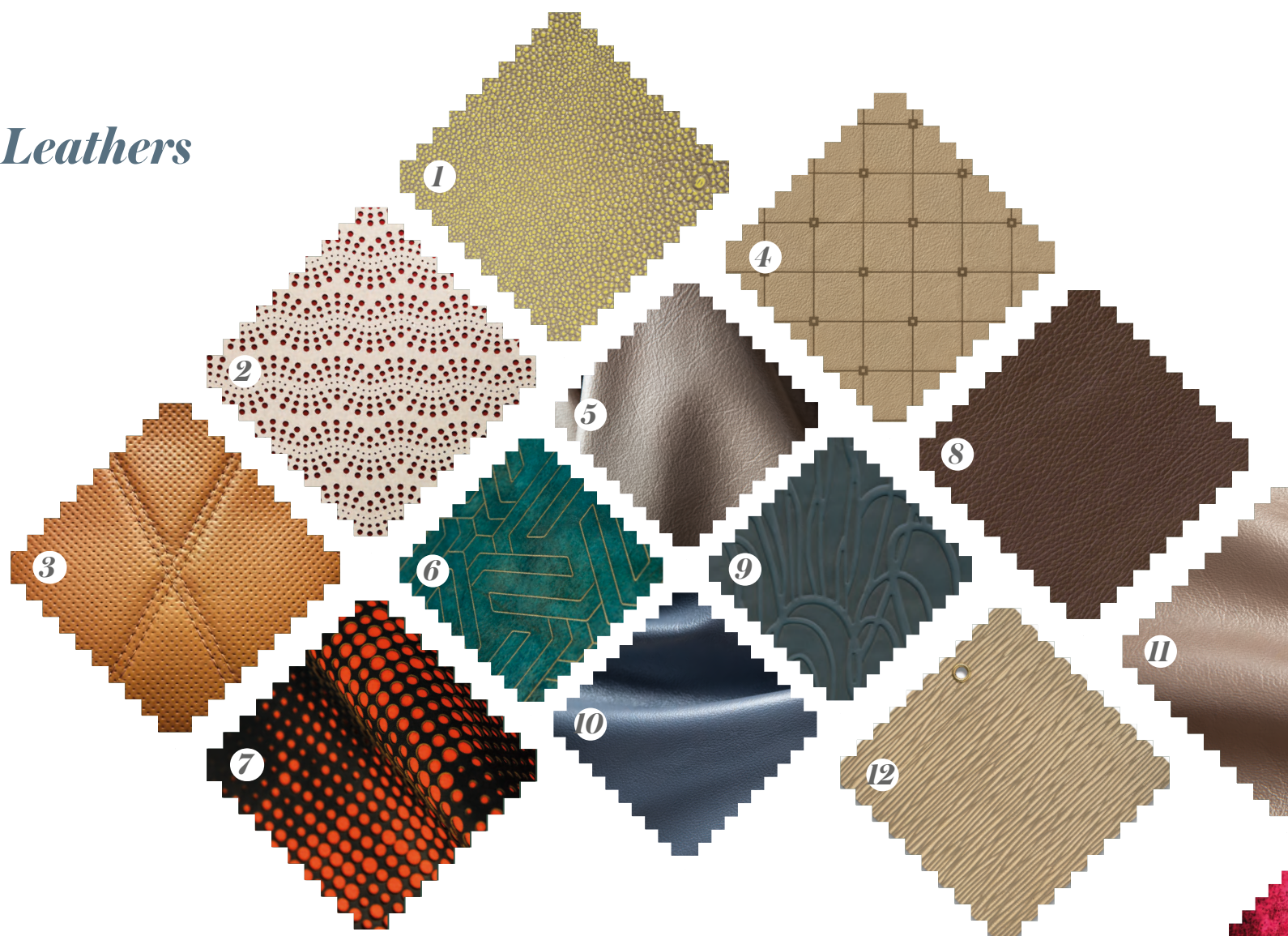
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material matters

A roundup of the latest soft furnishings developed for private jets reveals trends for interesting textures and gray tones

Leathers

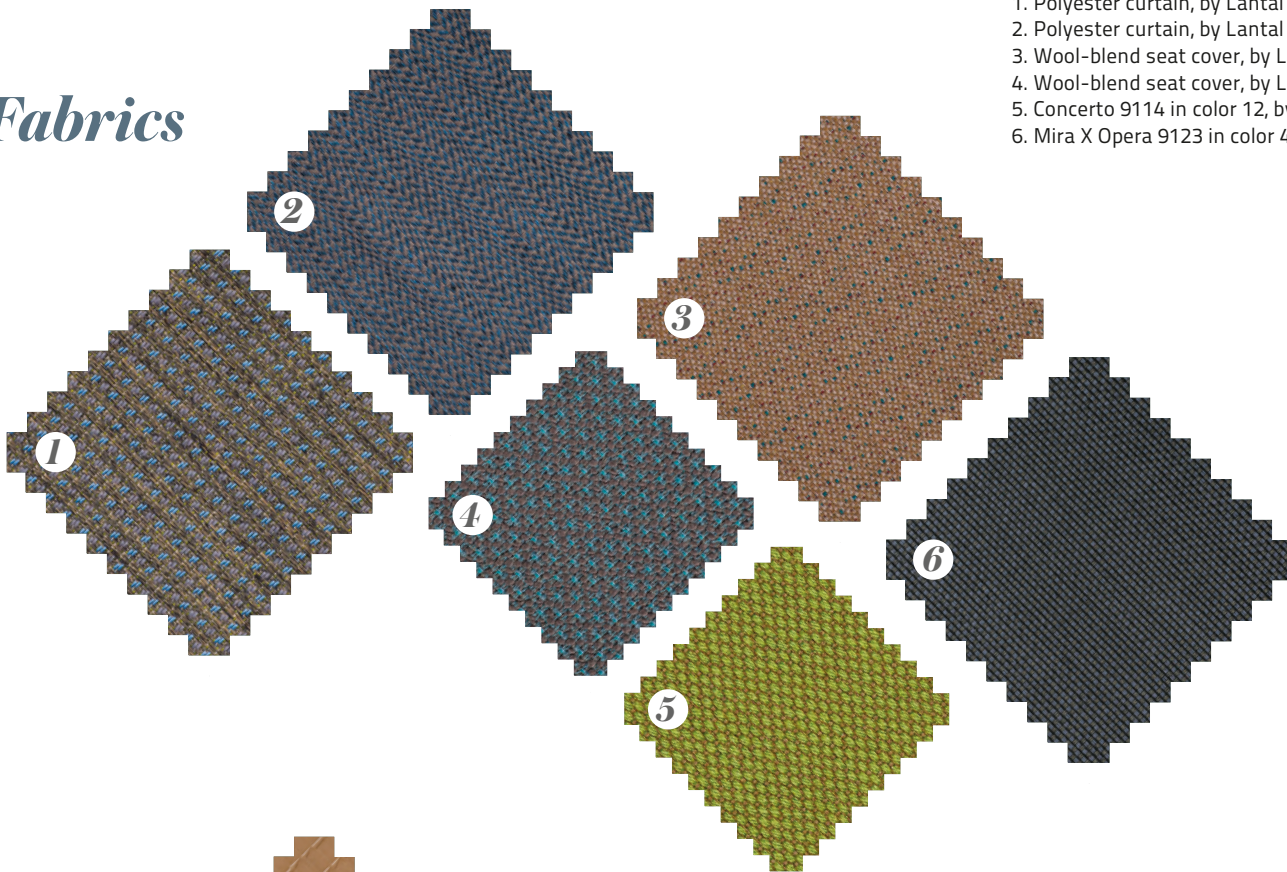


1. Embossed Shagreen in Cactus, by Edelman Leather
2. Baron in Samos/Maranello, with wave perforation, by Boxmark
3. Royal in Saddle Brown, with rhomboid perforation, by Boxmark
4. Lattice in Pearlescence Smoke, by Garrett Leather
5. Celeste in Burnt Sugar, by Moore & Giles
6. Laser on colored parchment, by Atelier Foglizzo
7. Perforated aniline leather, by Atelier Foglizzo
8. Rapture Tipped in Brown Sugar, by Townsend Leather
9. Candid in Turquoise, by Stacy Garcia for Townsend Leather

10. Celeste in Galaxy, by Moore & Giles
11. Celeste in Iced Gold, by Moore & Giles
12. Sulky in Dune, by Edelman Leather
13. Foundation in Aged Copper, by Stacy Garcia for Townsend Leather
14. Prism in Avion Dove, by Garrett Leather
15. Star gold paper on suede, by Foglizzo Leather
16. Marea wax decor on suede, by Foglizzo Leather
17. Celeste in Moonbeam, by Moore & Giles

Fabrics

1. Polyester curtain, by Lantal Textiles
2. Polyester curtain, by Lantal Textiles
3. Wool-blend seat cover, by Lantal Textiles
4. Wool-blend seat cover, by Lantal Textiles
5. Concerto 9114 in color 12, by Tisca
6. Mira X Opera 9123 in color 42, by Tisca



“Although the Pantone color of the year for 2018 is Ultra Violet, purple will not be boarding many aircraft this year. Stone gray or warmer grays will probably rule in 2018. Their complement will probably take two paths – burnt citrus tones from the orange and lemon palettes, or deep blues such as navy and midnight hues”

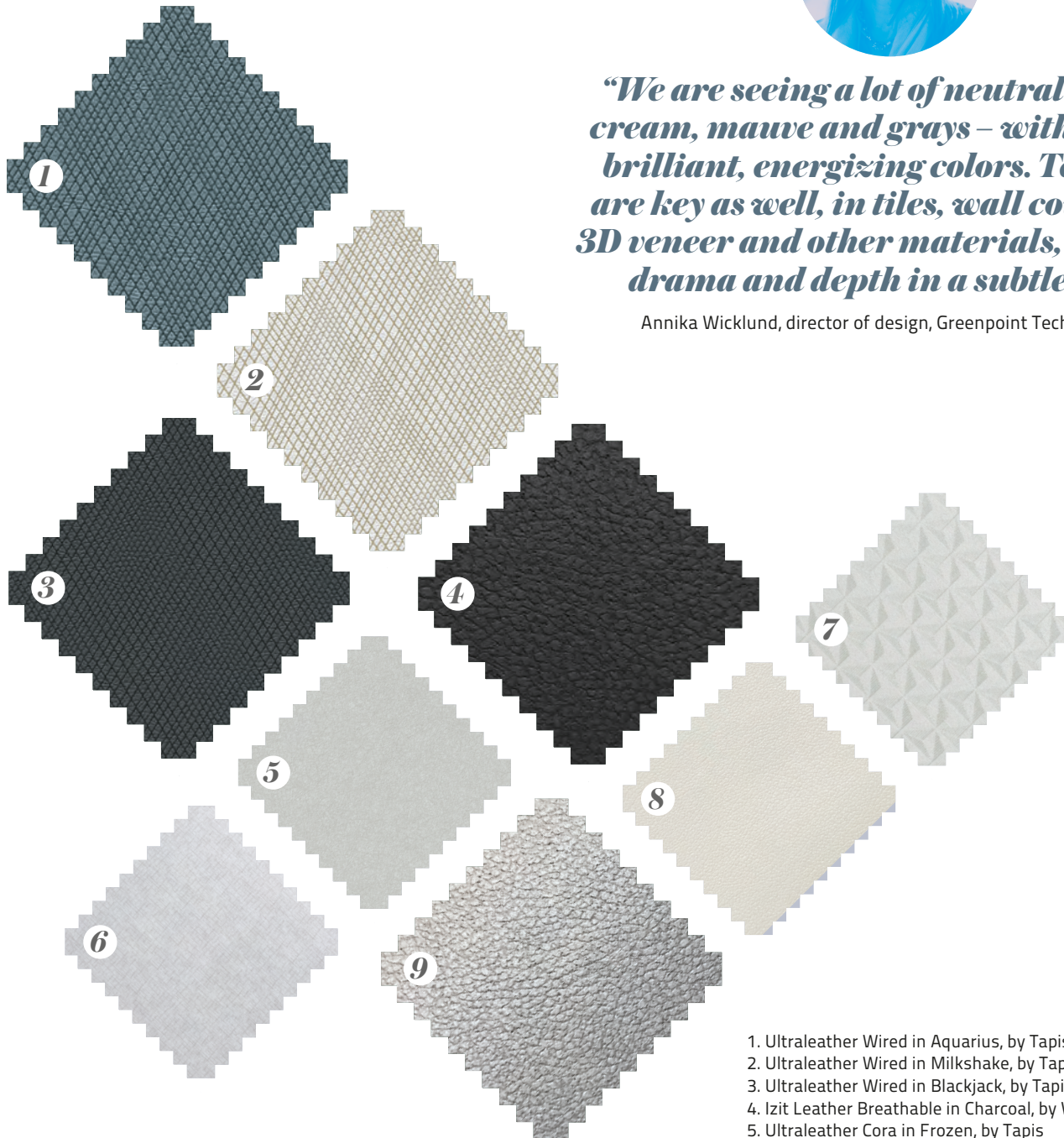
Patrick Knowles, principal, Patrick Knowles Designs

Faux leathers



“We are seeing a lot of neutral bases – cream, mauve and grays – with pops of brilliant, energizing colors. Textures are key as well, in tiles, wall coverings, 3D veneer and other materials, creating drama and depth in a subtle way”

Annika Wicklund, director of design, Greenpoint Technologies



1. Ultraleather Wired in Aquarius, by Tapis
2. Ultraleather Wired in Milkshake, by Tapis
3. Ultraleather Wired in Blackjack, by Tapis
4. Izit Leather Breathable in Charcoal, by Willow Tex
5. Ultraleather Cora in Frozen, by Tapis
6. Ultrasuede dye sublimation maze pattern in Platinum, by Tapis
7. Ultrasuede laser triangle pattern in Platinum, by Tapis
8. Izit Leather Junior in Polar White, by Willow Tex
9. Izit Leather Breathable in Frozen, by Willow Tex

Carpets



“We are seeing more requests for a gray, black and white palette; this is a noticeable change from last year”

Kate Ahrens, vice president of design, Flying Colours Corp



1. Wool-blend Luster carpet, by Lantal Textiles
2. Flocke handmade carpet, by Lantal Textiles
3. Wool mouliné carpet, by Lantal Textiles
4. Wool-blend Luster carpet, by Lantal Textiles
5. Arenia II S-2 with silk, by Scott Group Studio
6. Baria IV with silk, by Scott Group Studio
7. Phosphorescent with silk, by Scott Group Studio
8. Wilsito with silk, by Scott Group Studio
9. Zerbino 629 in color 1416, by Tisca
10. Handtuft MM160921 in beige, by Tisca

PICTURE PERFECT

How useful is a real-time configurator for small business jet refurbishment projects?

Completion centers and designers offering refurbishment services are tasked with helping customers to determine exactly how they wish to improve their aircraft.

Various tools exist to facilitate communication between the customer, the completion center and the designer, the main choice right now being between picture-based presentations and real-time configurators.

Over the past 30 years, ACA has established a reputation as one of the leading visualization companies.

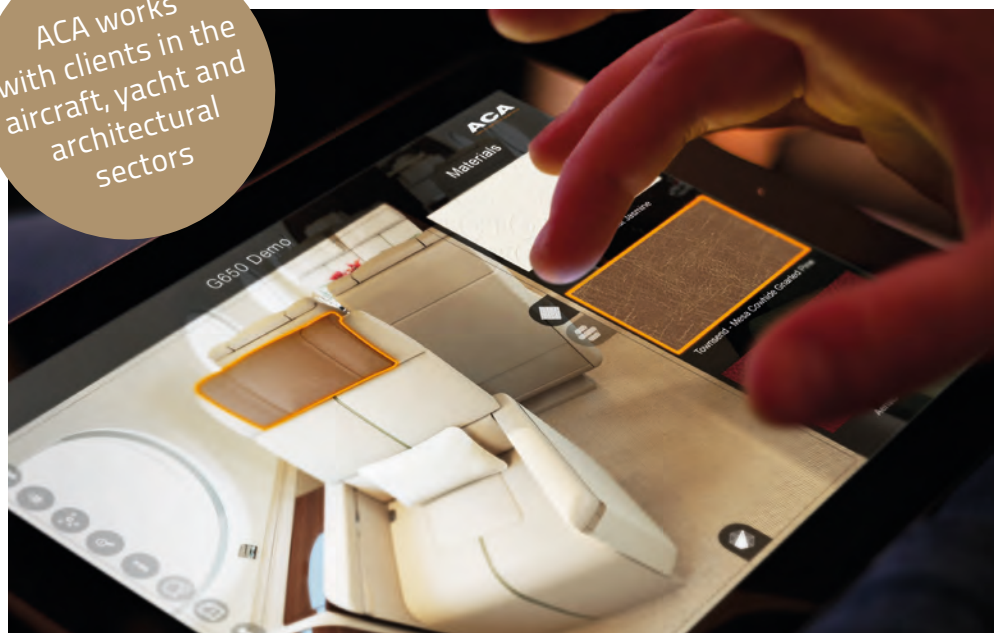
Its aim has been to create real-time configurators and picture-based presentation solutions that push the boundaries with each new software solution, without losing focus on quality.

"Within our daily business we are constantly confronted with the question of what is the best tool to enable communication between everyone involved in the process," says Tobias Malangré, CEO of ACA. "The main issues are how to react quickly to customers' requests, and within a reasonable budget, because the margins in refurbishing small private jets are often quite tight."

FREEDOM OF MOVEMENT

Malangré contends that a real-time-based VR configurator can be a good choice for this kind of project, as it enables the customer to move around the cabin freely, and because no further rendering steps are needed, it facilitates fast material selection. A standard interior can be prepared for any aircraft, then a large number of materials can be explored with the customer. "In using this tool, you have to take into account that the visual quality depends on the possibilities of the graphic device, which means a lower rendering quality and a higher dependency on hardware," says

ACA works with clients in the aircraft, yacht and architectural sectors



Malangré. "Besides this, the freedom to select from a large range of materials may cause problems in decision making."

Picture-based presentation – using still pictures or a 360° panorama app – enables the designer to present their carefully selected design proposals, including any geometric adjustments, in the highest achievable photorealistic quality. Malangré believes that the lack of free movement is made up for by the fact that the customer can be led to the main points of interest.

A TAILORED SUIT

In addition to these technical aspects, there is another major consideration – the customer. A private business jet is a very personal and individual product. The customer expects to be able to create an individually tailored interior.

"An interior setup provided by a configurator without the expertise of an experienced interior designer can give a

close idea of what could be expected, but unfortunately the price is the loss of uniqueness, similar to the feeling of trying on a ready-to-wear suit," says Malangré. "In our experience, taking into account all the pros and cons of the two technologies, the best solution right now is a picture-based presentation."

"We have a huge database of various aircraft types and an express modeling service, enabling us to provide several picture-based presentation possibilities that show carefully preselected design proposals, running on almost any device with the best price-performance ratio."

As techniques and devices are constantly improving, further developments can be expected in the coming years. ☒

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LIGHTEN THE MOOD

An LED mood lighting solution from ALI has transformed the ambiance on board a Beechjet 400A refurbished by C&L Aviation Group

A Beechjet 400A upgraded by C&L Aviation Group is the latest aircraft to be updated with an LED mood lighting system from Aircraft Lighting International (ALI). The system allows passengers to control the LED cabin lighting via a Bluetooth controller that can be downloaded to iOS or Android smartphones, or simply using the aircraft's wireless control.

The system enables a passenger to pick whichever color their mood desires. It is fully dimmable to ensure the perfect ambiance. Preset colors and programs are available. The system is self-ballasted, eliminating the need for inverters or ballasts. The installation involves fitting a dimmer module and plugging in the lights.



ALI's LED mood lighting system complements the interior upgrade performed by C&L's refurbishment team. The custom design includes a new executive seating layout and new

materials including metal accent plating and new wood finishes.

"Such a simple and cost-effective upgrade transformed a cabin from the late 1990s into a modern and sophisticated interior with state-of-the-art amenities," said Shervin Rezaie, general manager at ALI.

LED products from ALI come with a three-year manufacturer's warranty and are built in the USA. All ALI's LED systems will be on display at EBACE 2018, to be held in Geneva, Switzerland, on May 29-31, 2018. ✕

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MAXIMUM COMFORT

Having gained its first order for the type, the Cair inflight humidification system is now being tailored to suit the BBJ Max 8

The Cair VIP inflight humidification system from CTT Systems has won its first order for the BBJ Max 8 airframe. The installation will be performed by Jet Aviation. CTT Systems is upgrading its system for the aircraft, to reduce water consumption and weight, and make installation as easy as possible.

Three humidifiers will be fitted. CTT says these will work in parallel with maintain cabin humidification levels at 20% and over, up from near zero.

"The many undesirable results of low humidity on long-distance flights include upset sleep patterns, increased jet lag, headaches, red eyes and dry skin," says Peter Landquist, vice president of sales

and marketing at CTT. "As well as the health impacts, even the taste of food and drink can be tainted."

CTT also has ambitions to bring its humidification technology to the equally

new ACJ320neo soon. "Although the market for head-of-state, VIP and corporate aircraft has been slow for the past year and a half, it is now gathering momentum," says Landquist.

Cair systems are flying in more than 85 VVIP aircraft around the world – from BBJ 737s and ACJ320s up to BBJ 747s. The system is based on evaporative cooling technology and includes anti-corrosion protection to reduce electrical failures in cabin crown areas. ✕



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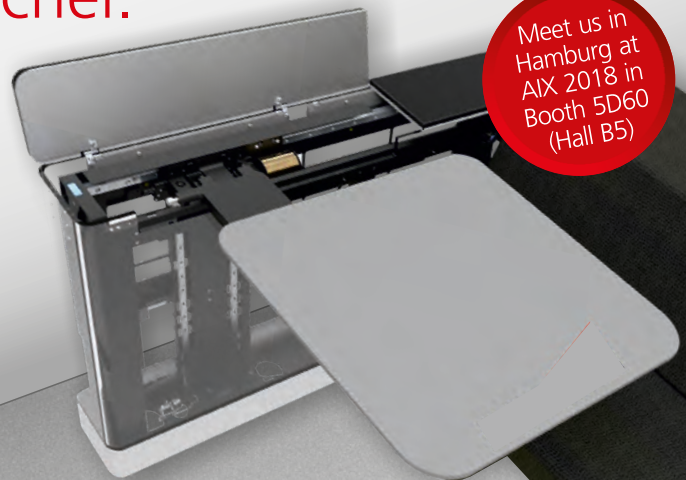


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UNCOMMON GROUND

The new non-textile flooring range from Duracote is engineered to meet the market's technical needs, while also offering scope for personalization

The latest offering from Duracote is Nexflor, a non-textile flooring for business, private and commercial aircraft. The product is in the final stages of development and will be commercially available in 2018. It was developed to address needs voiced by airlines and OEMs and can be modified to fit the specific requirements of customers' aircraft.

Duracote says Nexflor's benefits include optional non-woven or foam backing, fast and easy installation, antimicrobial and hydrophobic properties, and flame-reactive capabilities. The product will be offered in wood grain, stone and metal patterns to enable customization. Customers can also make specialized pattern requests.

Duracote, founded in 1947, manufactures flexible engineered materials for the aviation, automotive and industrial markets. Specializing in coating and laminating, Duracote produces fire, sound, anti-static, flooring



and UV-curable solutions. As a Boeing and Lockheed Martin-approved source, Duracote's materials are specified to fit a multitude of aircraft types used in the military, commercial and business aviation sectors.

The company's aircraft interior products include DuraTrim fire-reactive materials, DuraSonic sound barriers and Durug floor coverings. Technical

datasheets and product bulletins are available on its website. Duracote also offers its Invent process – whereby customers relate their flame, sound or anti-static specifications and the company creates a custom product. ☒

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star car

LED LIGHTING EFFECTS ARE THE STANDOUT FEATURE OF THE LEXUS LF-1 LIMITLESS CONCEPT

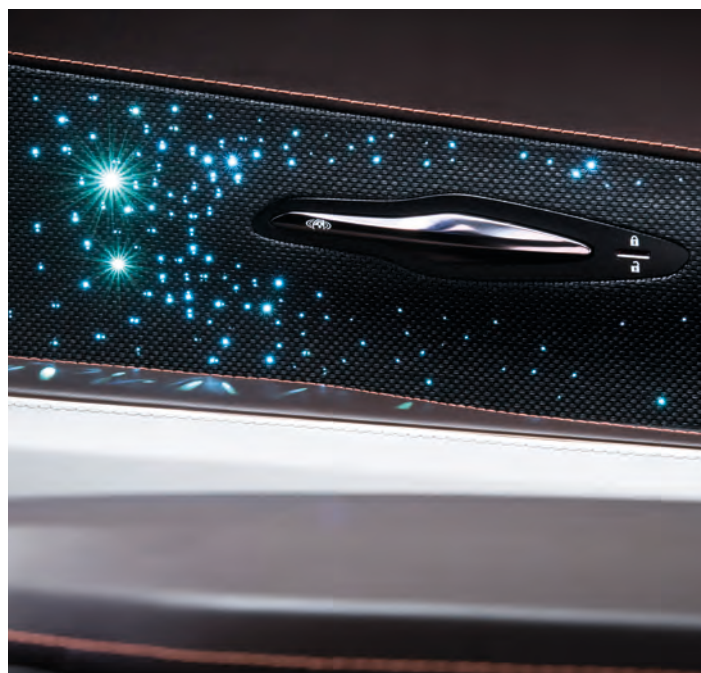
The 'molten katana' design language created by Caltty Design Research for the Lexus LF-1 Limitless concept was inspired by the idea of fusing the aesthetics of molten metal (flowing and organic) with a Japanese sword (sharp edges).

One beautiful detail is the twinkling constellation effect created by miniature LEDs set behind the wooden door trim. The lights shine through tiny perforations in a variety of colors. There are also different ambient

light sequences depending on which driving mode is initiated.

Another stand-out feature of the concept is the large amount of glass used for the roof, which Lexus says is "exploratory".

With the aim of providing the most comfort for every passenger, the back seats are the same as the front. The front space has been made as open and simple as possible, while passengers in the back can adjust the climate or entertainment through individual displays. ✕



OTHER EYE-CATCHING DESIGNS FROM THE AUTOMOTIVE WORLD...



1 Highlights of the new Audi A6 include new seats and a black-panel design, and an optional air quality package. There are five color and trim options, with materials including open-pore wood trim and leather on the instrument panel.



2 This is the electric and autonomous Lagonda Vision Concept car. Working with British craftsman David Snowden, Aston Martin created a cabin marrying ultra-modern carbon fiber and ceramic tiles with silk carpets and hand-woven wool upholstery.



3 Another autonomous car concept, Volkswagen's I.D. Vizzion has a lounge-like cabin that can be personalized by travel mode. It is primarily operated through gesture and voice control, and also makes use of augmented reality.

the bench seat



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CMS OBSOLESCENCE REPLACEMENTS

With SmartLink™ switches and modules designed as direct replacements to legacy systems, obsolete or worn systems can be efficiently replaced without the need for extensive cabinet or drink rail modifications which are costly and prolong downtime



INFLIGHT ENTERTAINMENT

High-def entertainment systems, lighting, comfort, crew and galley controls are all at the touch of a button, touch screen, remote or personal mobile device



THE FLIGHT DECK

The DPI Cockpit Annunciator is a solid state device which provides the highest reliability and performance of any flight deck display in the industry, developed as standard equipment for the Boeing 777



RENUÉ REFURBISHMENT

The Renue™ program is a proactive approach to refurbishing & refinishing. Switch panels and plating requirements are identified in advance of the anticipated rework, eliminating down time

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