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JULY 2012

THE INTERNATIONAL REVIEW OF BUSINESS JET INTERIOR DESIGN AND COMPLETION



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Izzy Kington

EDITOR IN CHIEF

Nick Bradley

PROOFREADERS

Aubrey Jacobs-Tyson, Frank Millard

ART EDITOR

Anna Davie

ASSISTANT ART EDITOR

Louise Adams

DESIGNAndy Bass, Andrew Locke,
Craig Marshall, Nicola Turner,
Julie Welby, Ben White**HEAD OF PRODUCTION & LOGISTICS**

Ian Donovan

DEPUTY PRODUCTION MANAGER

Lewis Hopkins

PRODUCTION TEAMCarole Doran, Cassie Inns,
Robyn Skalsky**CONTRIBUTORS**

Guy Bird, Chris Colvin, Tim Whitaker

CEO

Tony Robinson

MANAGING DIRECTOR

Graham Johnson

EDITORIAL DIRECTOR

Anthony James

ART DIRECTOR

James Sutcliffe

PUBLICATION MANAGER

Simon Hughes

INTERNATIONAL ADVERTISING SALES

Roger Baker, Sally James

CIRCULATION & SUBSCRIPTIONS MANAGER

Suzie Matthews

published by **UKIP Media & Events Ltd****Business Jet Interiors International**Abinger House, Church Street,
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labouroflove

I have a confession to make. Every single time I go shopping – whether it's to a clothes shop for a simple pair of jeans or to the supermarket for groceries – I end up buying at least twice as much as I had planned. We've all done it: bought something not because we needed it but because we fell in love with it. In our feature on page 42, the industry's designers discuss how they go about creating that indefinable allure that tugs at the customer's heart strings. As Voltaire said, "It is not sufficient to see and to know the beauty of a work. We must feel and be affected by it." This 'emotional engineering' goes beyond beauty; it's about the items that aren't strictly functional, the bits that reflect the customer's life and style, the aspects that make the aircraft a personalised home from home as well as a vital business tool.

One element that instantly customises every cabin is the veneer, but it can be very challenging to get right, as detailed in our feature on page 26. Lighting systems are another key weapon in the fight for greater personalisation. On page 62 we examine what today's systems can do – from allowing passengers to select mood lighting presets and colour temperature to new form factors giving designers more options.

Elsewhere in the magazine, we look at the new offerings from Bombardier and Cessna. On page 18 we see how the Learjet 85 interior has been translated for two smaller models, the 70 and 75; while on page 34 we examine the Cessna Citation Longitude, a new derivative of the Latitude, which itself was only unveiled in November 2011.

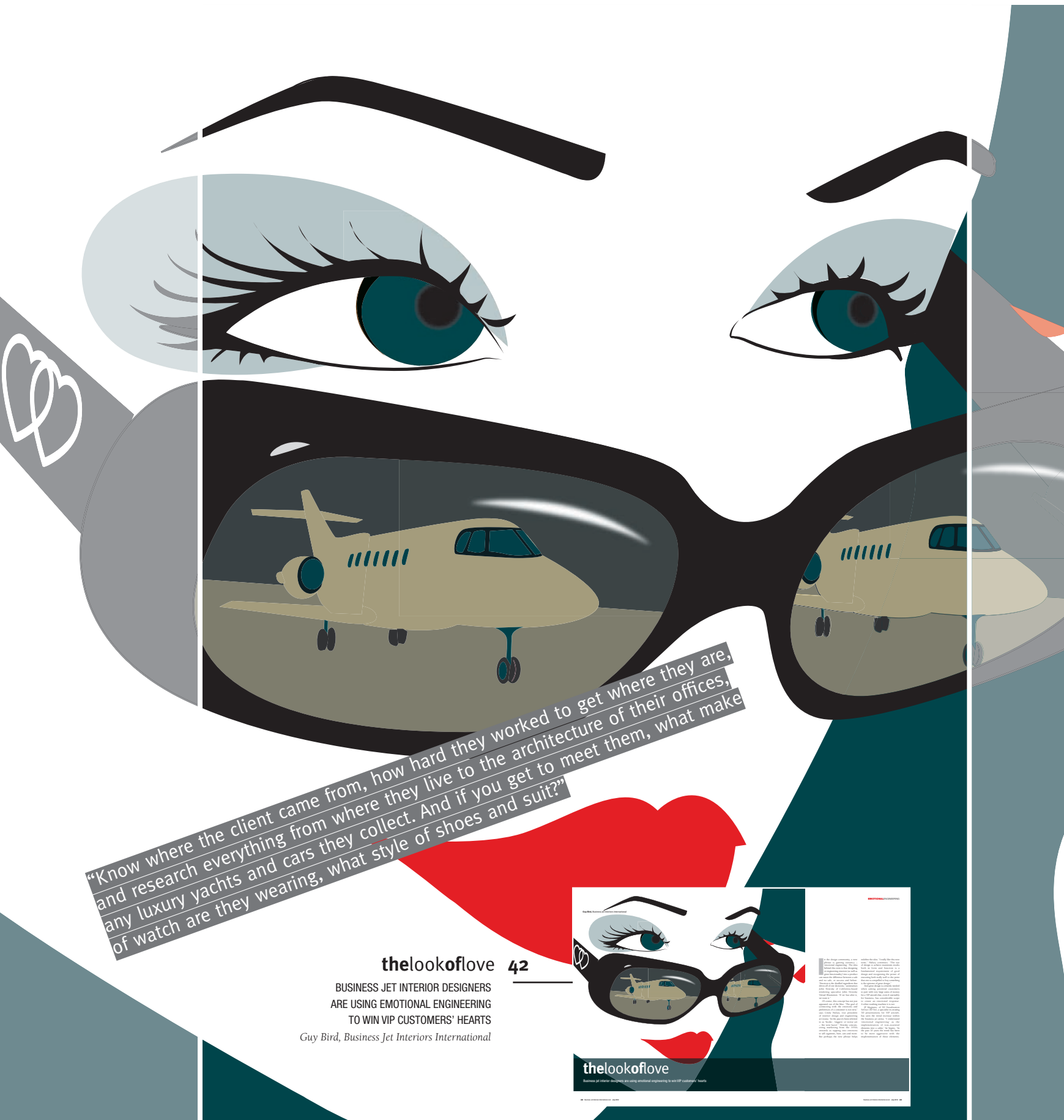
We've also taken the temperature of the VIP completions market, the results of which you can read on page 52. It seems more demand for the big wide-bodies is encouraging growth across the board. A number of key completion centres are already well-placed to serve the wide-body market, others want to branch out into this big business, another section hopes to scoop the smaller projects and at the same time several MROs are stepping up to offer refurbishment services. The sheer scale of wide-bodies clearly provides very fertile ground for show-stopping elements, but regardless of the size of the cabin, I would hope emotional engineering plays a part in everyone's projects. There is always a way, in every interior design, to make the customer's heart leap.



Izzy Kington, editor



Cover image:
Sylvie Pinsonneaux/
eyecandy.co.uk



"Know where the client came from, how hard they worked to get where they are, and research everything from where they live to the architecture of their offices, any luxury yachts and cars they collect. And if you get to meet them, what make of watch are they wearing, what style of shoes and suit?"

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ARE USING EMOTIONAL ENGINEERING
TO WIN VIP CUSTOMERS' HEARTS

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Despite giving more space to the shower/lavatory area, the aircraft still offers two lounges with seating for eight passengers, plus a crew area

Extra seating options for Embraer Phenoms

With the certification of a two-place divan (pictured) by Brazil's ANAC, Embraer is now offering an additional seating configuration for the Phenom 300 that brings capacity for the light aircraft up to 11 passengers. FAA and EASA certifications are expected to follow shortly. The divan is certified for two occupants during take-off and landing. A seventh cabin seat and a belted lavatory are other options already in service.

Embraer is also offering two new interior options for the Phenom 100 – a fifth seat replacing the wardrobe in the forward cabin, and a belted lavatory. Both options are now available and flying in customer aircraft. The new seating options have the potential to bring the Phenom 100's total occupancy to eight. In addition, Embraer is in the process of certifying an increase in maximum zero fuel weight (MZFW) for those requiring higher payload capacity. The company expects to offer this as an option later in 2012.

Both the Phenom 100 and 300 have interiors designed in partnership with BMW Group DesignworksUSA. Factoring in NBAA IFR fuel reserves, the Phenom 300 has a range of 1,971 nautical miles (3,650km) and the entry-level Phenom 100 has a range of 1,178 nautical miles (2,182km) with four occupants.



Shower option available for Falcon 7X

Dassault Falcon has delivered its first Falcon 7X equipped with a new VIP shower and lavatory area. The configuration is now available for all 7X customers as a standard option. The shower can be used both in flight and on the ground and offers up to 30 minutes of showering time with a maximum temperature of 48°C (118°F). The shower's electrochromatic window can be switched instantly from clear to opaque for privacy. In other news, Dassault recently completed the first installation of a CMS and HD AVOD IFE system designed by Rockwell Collins for the 7X and Falcon 900. The system – based on Venue CMS – will be marketed by Dassault as FalconCabin HD+.

IDAIR introduces wireless infotainment concept

IDAIR, the joint venture between Lufthansa Technik and Panasonic Avionics, has unveiled a wireless infotainment system concept. The system will provide passengers with news, video, audio data and flight information. The product is being developed under the brand name Eclipsair. The technology will be made available to the VIP market directly by IDAIR and will also be offered to the business jet market as an integrated part of Lufthansa Technik's nice HD system. The product should be available for customer installations in the second quarter of 2013.

Eclipsair will be offered as a standalone system or integrated with IDAIR's global communication solution and IFE/CMS. The single-box solution combines an IEEE 802.11n wireless access point (WLAN) and a web-based media server, providing wireless distribution of streaming media to a variety of mobile passenger devices. The system supports various content protection and digital rights management frameworks and will be offered with a studio-approved content service.

26th Global XRS for Innotech Aviation

Montreal-based Innotech Aviation has delivered a Global XRS to Bombardier – the 26th Global interior the Bombardier-Preferred Completion Facility has installed. The interior can accommodate 11 passengers. In the next few months Innotech also expects to deliver its first Global 6000.

The completion includes custom paint work performed at Innotech's 41,000ft² paint preparation and application facility at Trudeau International Airport. The company says its paint shop is equipped with environmentally friendly technology that provides a cleaner application, better adhesion and substantially less paint waste than conventional spray methods. It has been running at full capacity since it opened in 2008.





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Yacht-inspired touches include extensive use of holly and teak wood, faux marble floors and ribs along the sidewall that mimic a boat's hull



ACJC delivers VIP interior for head of state

Airbus Corporate Jet Centre (ACJC) has delivered its latest cabin, an ACJ319, to a head of state. The cabin was also designed by ACJC's in-house design studio.

For this governmental interior, space and ergonomics were optimised to facilitate work in a relaxing ambiance. Certified for 19 passengers, the six-zone cabin features a 'long perspective', allowing passengers to see through the entire aircraft at a glance. "The cabin is designed to communicate comfort throughout – from bright colours and fluid shapes to noble materials such as high-quality leathers, polished marble and handmade wool carpet," said Sylvain Mariat, head of ACJC's design studio.

The business-like main lounge is built around a six-seat table, surrounded by two sideboards and a large LCD monitor. Dedicated to privacy, the aft zones comprise an office with club-two seating and a sofa; a master bedroom including a queen-size bed with a divan; and a large independent washroom complete with a full-height oval shower.

Finishes include gloss paint and nickel plating on monuments, while the wall partitions are enhanced with lightly embossed leather. "I wanted to create a simple and refined atmosphere, lightly decorated by the contrast of dark and bright colours, such as warm brown for some partitions and white ivory for furnishing," said Mariat.

As in the last ACJ319 cabin ACJC delivered, the cabin is equipped with the latest telephony system developed by the company's R&D team, designed to offer top-quality sound. This aircraft also offers connectivity based on a complete SwiftBroadband satcom solution.

Edése Doret creates nautical Boeing 757

Edése Doret has transformed a Boeing 757-200 airliner into a VVIP cabin with a yacht theme. The cabin features a crew area, forward galley, forward lounge, guest lavatory, master bedroom, master lavatory (with shower and bidet), two guest rooms with berthable divans and Hi-Lo table, aft lounge, aft lavatory and a large aft galley. The aircraft seats 38, with full-flat sleeping for 16-21. Entertainment comes courtesy of a Kaleidescape AVOD system with an integrated media server, available on all monitors. Other highlights include a six-way exterior view camera system; Airshow 4000 inflight information system; automatic window shades; and varied lighting modes.

Indian MRO and car designer unveil mock-up

Indian MRO Air Works India Engineering has unveiled a prototype of a mid-size business jet interior. The asymmetrical design was developed exclusively for Air Works by Indian automobile designer Dilip Chhabria at the latter's facility in Pune, India. The aim is to showcase the companies' cabin refurbishment services.

"Our plan is to leverage our airframe, avionics and now interior refurbishment capabilities collectively to provide customers with an option to upgrade their aircraft in terms of avionics (IFE, satcom), design, comfort and ergonomics, which will help them improve their flying experience," said Vivek Gour, MD of Air Works.



Flying Colours completes ninth ExecLiner CRJ

Canada-based completion centre Flying Colours Corp has unveiled its ninth ExecLiner CRJ conversion. The cabin was designed by the company's in-house design team, headed by Kate Ahrens. The interior is configured for 16 passengers and features a fully digital touchscreen CMS, Airshow 4000, iPod connectivity and dual galleys. Forward and aft lavatories have also been fitted.

Long-time client and partner Maine Aviation will be marketing the aircraft. Maine Aviation already operates two CRJ conversions completed by Flying Colours Corp, and is currently selling a further two, including this latest aircraft.



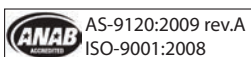
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Comlux America delivers ACJ; wins BBJ contracts

Fly Comlux has welcomed a new ACJ319 (pictured below), the second new ACJ to join the Comlux fleet in 2012. The cabin was completed by Comlux America, which is based in Indianapolis, Indiana, USA. The aircraft boasts modern IFE and connectivity and a range of more than 10 hours.

Comlux America also recently announced two new BBJ completion contracts. The first, which arrived at the company's facility in May 2012, is for a customer based in Russia and will have a VVIP cabin designed by sister company Comlux Creatives.

The second BBJ is for Hyundai Motor Company and is expected to arrive at the facility during the second quarter of 2013. This cabin is also being designed by Comlux Creatives. Features will include a forward lounge area and a private office that can be converted into a large bedroom in the middle of the cabin. The aircraft will be equipped with a private bathroom and a business-class seating area at the rear. The aircraft will also be equipped with a satcom system with SwiftBroadband capabilities, video streaming to iPads, moodlighting and an upgraded insulation package to reduce cabin noise.



Brabus expands into jet customisation

Car and yacht personalisation specialist Brabus is now offering executive jet cabin design and manufacturing services. It is focusing on aircraft such as the Bombardier Global Express and Challenger families, the Dassault Falcon series and larger business liners. To implement this concept Brabus has forged an alliance with three partners. Sourcing, purchasing and aircraft management services are offered in cooperation with PrivatAir; aircraft completion and redesign will take place at RUAG Aviation's facilities in Munich, Germany; and Happy Design Studio will create livery designs. Brabus has already presented two concepts – Elegance and Sportive – for the Bombardier Global Express.

Legacy 600 converted for flexible medevac role

Jet Aviation Dusseldorf has converted an Embraer Legacy 600 to serve both as a medevac aircraft for four patients and as a VIP charter aircraft accommodating up to 14 passengers. The medevac conversion is supported by the company's EASA-approved Part 21 organisation and is designed to ensure a short reconfiguration time. "It is now possible to convert the aircraft from a VIP charter aircraft to a medical evacuation aircraft within just one working day," said Sebastian Groeger, vice president and general manager of Jet Aviation Dusseldorf.

The facility offers MRO, avionics, refurbishment, FBO and AOG services.



Cessna Caravan interiors to be installed in China

Cessna has signed a strategic agreement with CAIGA and the Shijiazhuang Municipal Government, having entered into a strategic framework with CAIGA's parent company, AVIC, in March 2012. This next step forms a cooperation framework for an eventual joint venture supporting final assembly, sales and customer support for the Cessna Caravan in China for the Chinese market.

"These Cessna aircraft will be manufactured in the USA, in Kansas, and sent to Shijiazhuang, China, to undergo final assembly and then be sold in China," said Mike Shih, vice president, China strategy and business development for Cessna. CAIGA's facilities in Shijiazhuang will be used for final assembly, painting, testing, interior installation, customisation, flight testing and delivery of Chinese customers' Cessna Caravans.

"We have seen interest for the Caravan for use in commuter aviation fleets as well as China's growing tourist and sightseeing businesses," said Lannie O'Bannion, business leader for Caravan aircraft.

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Didier Wolff, owner/
designer at Happy Design
Studio, sheds light on the
art of designing business
jet liveries

How much of your work is on business jets?

Around 50% of our work has been on private jet projects – the rest is divided between military and airline work. We expect private jet activity to grow more than the other areas from now on, due to the response from this market to our designs.

Do your liveries reflect the interior design?

It is one scenario, if wished by the owner. The interior design can also be inspired by the livery. Nevertheless, there is no reason why they can't be different. In such cases, the aircraft door is the passage from one world to the other, between what is displayed and what is private.

Have you ever had to guide a client away from an idea that wouldn't work?

In some, rare, situations, requests are too far away from what the aircraft's curves and natural aesthetic can take. I also couldn't work on a project that I couldn't identify with. Our clients understand that it is possible to depart from the usual classic scheme.

What is the most challenging aspect?

Supervising the painting process. In the paint shop I have a limited time frame to ensure that the design will adapt perfectly onto the aircraft with absolutely no mistakes. This part of the job brings together a devoted team with absolute precision. As with a musical instrument, the livery must be

tuned up perfectly and thrill from every angle.

During the creation phase I dedicate my attention to all the angles the aircraft can be seen from – from underneath of course, but also from a terminal room and from air-to-air shooting angles, so for instance it can be used to promote the company's new identity. Definitely, the supervision part is by far the most thrilling phase.

How often are business jets painted?

Each aircraft type has its own cycle of technical checks so there is no general answer for this question. On top of that, in most cases an aircraft will require a paint job when it is sold.

What paint do you use?

Unless this is left to us to decide, we often go with the workshop's usual paint supplier. In all cases, we make sure the paint is made according to our requirements for quality. We usually use a base coat followed by a clear coat, a rather new technique that allows complex coloured designs to be implemented with as little as possible impact on the aircraft's downtime. Painting time depends on various issues – the aircraft size, the condition of its existing paint, the complexity of the design – but roughly between five and 15 days.

How do you ensure accuracy?

We supervise the painting process every time. It is mandatory because without this close and intense supervision, no matter how great the paint shop is, third parties' interpretations of lines, curves, intensity, proportions, and so on, will affect the overall balance of the design. Even with the back-up of an engineering order (a technical map of the design on the aircraft scheme) adjustments on the real aircraft are always necessary. I personally supervise each step of the painting process, from colour checking to final inspection.

What's your favourite past project?

I think of it every day – when the French Air Force let me work on two Rafales, to be painted in five days within the French Army base at 113 St Dizier. All conditions – human and technical – united to create the perfect job. The trust they put into my work – giving me the opportunity to work on aircraft worth US\$170 million each by just telling me "It's yours now" – gave me wings. There was also a feeling of brotherhood, to be accepted as a civilian to work within such a small and unique community.

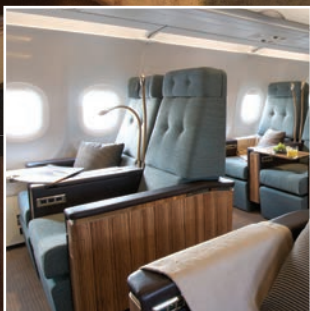
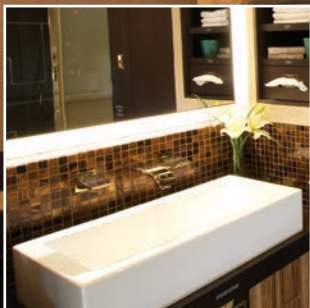


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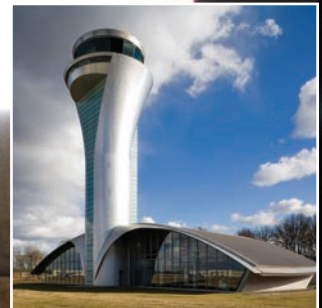
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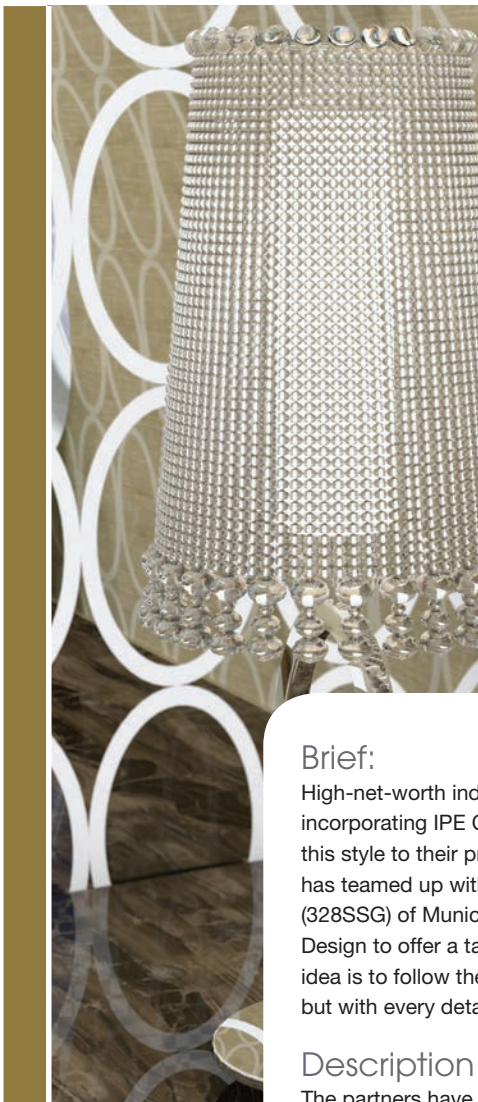
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Brief:

High-net-worth individuals who have houses or yachts incorporating IPE Cavalli's Visionnaire brand can now extend this style to their private jets. The Italian furniture design group has teamed up with completion centre 328 Support Services (328SSG) of Munich, Germany, and UK-based design firm CTM Design to offer a tailor-made aircraft completion service. The idea is to follow the Visionnaire brand and design philosophy, but with every detail personalised for the customer.

Description:

The partners have designed a 12-seat VIP Dornier 328 interior to showcase the possibilities, based on the existing Dornier Business Jet (DBJ) concept unveiled by 328SSG and CTM Design in 2010. "We have used a configuration that we know works," says Robin Dunlop of CTM Design, which will support Visionnaire's creative direction.

However, the styling is all new. "The Visionnaire brand is a fusion of many styles with a healthy dose of Italian flair," says Dunlop. "You have baroque, gothic and a little bit of art deco, balanced with a clean, contemporary edge. There is also a humorous side to the brand, manifesting as novelty aspects such as a door handle inspired by King Arthur's sword in the stone, or diamante AK47 machine gun wall art."

High-end audio and video technology will be installed discreetly, while the colours and materials reflect Visionnaire's collections. "This season its creams and beiges," says Dunlop. "While to some these may initially have a low impact, when you get close you see the richness of texture in the leather, stingray and snake skins. These materials are highlighted by cut-crystal glass detailing, rich gold silks and Italian marbles. A lot of these aspects are then framed by high-gloss polished metal plating in white and almond gold and black chrome."






Verdict:

328SSG modified its Dornier 328 cabin cut-away to display the concept at EBACE 2012. "Mock-ups help develop production techniques, affirm design requirements and implementation, help ergonomically and allow us to experiment," says Ray Mosses, head of sales at 328SSG. "This interior has unique features, such as large areas of polished plated surfaces. Using automotive production techniques we are able to manufacture these to a high quality." The centre has completed 12 VIP interiors. The latest three were DBJs, but it has also supported other types (the Gulfstream IV, ACJ319 and Boeing 737) and made monuments for larger aircraft such as the ACJ340 and Boeing 767. Its current hangar can house aircraft up to the size of a Boeing 737. Mosses says if a client wishes to apply the style to a larger aircraft, the completion could be carried out at another facility where 328SSG has a partnership in place. "It is entirely up to the customer how they would like us to approach their project – complete interiors for Gulfstreams, Bombardiers, etc, or select pieces for larger aircraft," he says.



CONTACT:

www.328support.de;
www.328design.de;
www.ctm-design.co.uk;
www.ipe.it

A photograph of three white Learjet business jets with red accents flying in formation over a tropical coastline. The jets are seen from a low angle, emphasizing their sleek design and the red tips on their wings and tails. The background features a vibrant blue sky with scattered white clouds and a lush green coastline with turquoise water visible below. The text "Chris Colvin, Business Jet Interiors International" is positioned in the upper left corner.

Chris Colvin, Business Jet Interiors International

formationflight

Bombardier has migrated its new Learjet 85 interior into two smaller siblings – the Learjet 70 and 75

1. From left to right, the Learjet 85, 60XR, 70 and 75



The Learjet models 40 and 45 have been around for a while now. Deliveries of the 45 began in 1998 and customers began receiving the shorter model 40 in 2004. Deliveries of the current models 45XR and 40XR began in 2004 and 2006 respectively. The XRs featured a mildly refreshed cabin and tweaked Honeywell engines. Initial market reaction was positive but has faltered in recent years, partially the fault of the hit global economic gyrations have dealt the light/middle jet market, but also due to the fact these aircraft are getting a little long in the tooth.

When Bombardier launched the Learjet 85 project in 2007, there was some speculation that its airframe construction methods and materials would migrate down to its smaller siblings, the 40, 45 and 60. That isn't going to happen – yet. However, several aspects of the 85's interior are being incorporated into the 40 and 45 and that, combined with new Garmin G5000 glass panel/touchscreen avionics and modified engines, has prompted Learjet to rebrand the 40 and 45 as the 70 and 75. The new models will sell for US\$11.1 million (approximately £7.13 million) and US\$13.55 million (£8.71 million) respectively, and should enter service during 2013.

Family resemblance Both models clone the interior styling of the 85, with sidewall cutouts for more onboard storage and restyled PSUs. While the



2. The Learjet 75

seats will use the same frames that are on the 40 and 45, they have been resculpted for a more modern look and enhanced passenger comfort. "We tried to get the seat designs as harmonised as possible," says David Flett, manager of programmes and aircraft integration for Bombardier's Learjet line.

The 70 and 75 galley areas have been completely redesigned as well. The right-hand forward closet has been eliminated, yielding much more galley space – compared with the 45, it is increased by 30%. There is room to

THE BIG NEWS IS THE INCORPORATION OF AN UPDATED VERSION OF LUFTHANSA TECHNIK'S NICE

store catering for all eight passengers. Lavatory styling and functionality has also been refreshed. For veneer, a new simulated oil finish will be offered in addition to the existing high gloss and satin finish options.

Entertainment industry Fine and dandy as all these things are, the big news on the 70 and 75 is the incorporation of an updated version of Lufthansa Technik's nice HD CMS and IFE system. Lufthansa Technik originally developed nice for its VIP completions after experiencing frustration with other commercially available systems. It quickly realised the system had applications downstream. Bombardier saw the system's potential and adapted it for the Challenger 300 super-mid-size jet. More than 250 nice systems are flying in Challenger 300s, says Dave Crossett, Lufthansa Technik's principal executive for sales and marketing.

Bombardier has also selected nice for the mid-size Learjet 85, due to enter service in 2013.

Because nice was first applied to VVIP Boeing 737s and 747s, Crossett says there was a misunderstanding that the system could only be applied to large aircraft. "People thought big aircraft equated into big equipment," he says. "That's ridiculous. It translates into more equipment, not bigger."

One of the key features of nice (since the beginning) is the trim panel speaker system, which maintains uniform sound throughout the cabin. "A transducer is attached to a cabin (interior) panel," says Crossett. "If you touch the panel you can feel it vibrate; the panel becomes the speaker."

Crossett believes the approach is perfect for an aircraft. "People using conventional speakers position and adjust them on the ground, but when you get up in the air, the environment

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“WITH THE TRANSDUCER, THE WHOLE PANEL IS THE SPEAKER; NO MATTER WHERE I AM FROM THAT PANEL, THE SOUND IS UNIFORM”



Learjet 70

Cabin width: 5ft 1.4in

Cabin height: 4ft 11.1in

Cabin length: 17ft 8.2in

Seats: 2 crew + 6 + 1 passengers

Range: 2,060 nautical miles with four passengers and NBAA IFR reserves

High-speed cruise: 465kts

Max altitude: 51,000ft

Price: US\$11.1 million (£7.13 million)

is completely different,” he points out. “There is high ambient noise caused by the flow of air around the outside of the aircraft. So what do you do when this happens? Well, most people crank up the volume. The people sitting next to the speaker are getting blown away, but if you are sitting 5ft away from it, you are having a hard time hearing. There is not uniform flow and there is not uniform sound. With the transducer, the whole panel is the speaker; no matter where I am from that panel, the sound is uniform. I don’t have to crank it up because I am always next to a ‘speaker’.”

Crossett says the transducers work on most materials and are very reliable. The units are approximately 3in in diameter. On the Challenger 300 they are fitted 12 a side, and even with a left/right channel configuration, the sound is so uniform that people think

they are sitting in the midst of a surround-sound system.

Less is more The nice system has been refined for the 70 and 75 to be more functional and compact. “When you develop something new, you are always trying to do more with less – you are taking boxes away and integrating functions,” says Crossett. “With nice HD we reduced a lot of weight and a lot of boxes compared with the original nice system.” The system’s look mimics high-end consumer electronics. Ultra-thin 7in HD monitors at the seat positions are deployed via the same pop-up mechanism developed for the 85. “The display is very thin, very small, not something you would expect in our industry,” says Crossett.

The system’s functionality is also impressive. “The amount of (system) interface is tremendous,” Crossett says,



3-4. The Learjet 70 interior

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Pilot-pleasing upgrades

As noticeable as the cabin changes are, the biggest differences on the 70 and 75 involve the engines and the electronics. The venerable Honeywell TFE731s in the back have 10% more take-off thrust, enabling faster climb times, the ability to use shorter runways and better aircraft performance from high-altitude runways and on hot days.

The cockpit features the new touchscreen Garmin G5000 avionics systems that will allow pilots to dial directly into the Aircell ATG 5000 WiFi system or the Iridium satellite phone via the touchscreens while wearing their headsets. The G5000 also allows the pilots to control cabin lighting.

citing its ability to input from many Apple, USB and HDMI devices. “You can plug a thumb drive into the system, execute the file and stream it to every seat,” he adds.

Passengers will be able to access and control the nice system – and indeed all cabin functions – through the cabin WiFi with an app downloadable to their personal devices. “We have a really good, animated, interface,” says Crossett. “You don’t need a tutorial to learn the system.” He also notes that passengers can access it from virtually any seated or reclining position by either touching the screen or turning and pushing a small control wheel.

Centre of excellence Perhaps nice HD’s most innovative feature is the new optional media centre, which is about the same size as a Blu-ray player. The single device has lots of storage and can be upgraded with software via a thumb drive to make it an AVOD server, a wireless server, a media server and a map server. “I can host all of those applications at one time on the box and I can simultaneously play back two of them at a time in HD,” says Crossett. “In the old days you had a DVD server and a map server, and making a video server into an AVOD server was a very expensive proposition. Now I can take all of those applications from one small device. It’s actually smaller than our old DVD player.”

The nice HD system is designed with open IP architecture that is highly configurable. It allows Lufthansa Technik to offer many cabin packages covering environmental control, lighting and integration of third-party solutions such as satcom, TV, portable



WITH THE NEW MODELS 70, 75 AND 85 ALL SCHEDULED TO COME ON LINE IN 2013, LEARJET’S 50TH ANNIVERSARY SHOULD BE SPECIAL

- 5. The Learjet 75 will have a range of 2,040 nautical miles
- 6. The Learjet 70 and 75 will feature the Vision Flight Deck cockpit

audio/video devices and cameras. The nice HD system also meets current legal requirements for streaming HD content with integrated digital rights management and approved encryption.

The system has allowed Bombardier to take some weight out of the cabins and is part of a package that breathes new life into a languishing product line. The Learjet 70 and 75 cabins will have substantially better look, feel and function compared with the 40 and 45

and customers have already taken notice – Bombardier has more than 50 commitments. With the new models 70, 75 and 85 all scheduled to come on line in 2013, Learjet’s 50th anniversary should be special. The innovative spirit of the brand’s founder, William Powell Lear, clearly lives on. **END**

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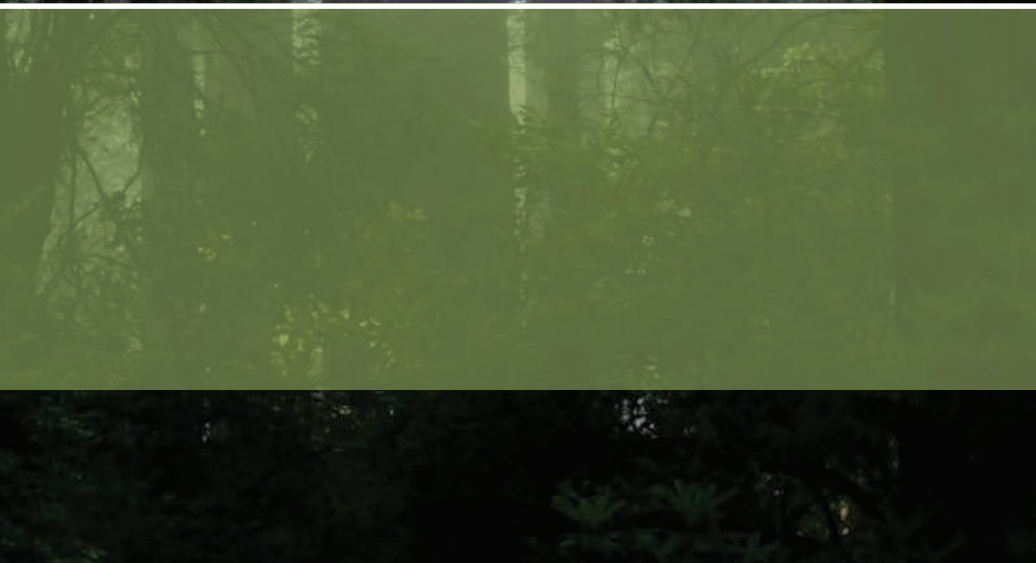
Chris Colvin, Business Jet Interiors International

fruitsoftheforest

From a forensic search of the world's forests to demanding lab tests and painstaking care in the cabinetry shop – getting the veneer right can be the most challenging part of a business jet interior project



Jonathan Tichon/shutterstock.com



Airfoils, engines and avionics have changed a great deal in business aircraft over the years, but one thing remains the same: the desire of aircraft owners to incorporate fine woods into their cabins. There are now more choices than ever before, fireproofed in high-gloss or satin finishes with burls that range from the simple and exotic to the subtle and bold, and used on surfaces from bulkheads, drink rails and seating to accent panels, opulent galleys and lavs.

Wood veneers define spaces, accentuate lines, provide design continuity and tie cabin sections together in a unified, flowing manner. They also allow aircraft owners to place their personal imprimatur on interiors that – at the low end at least – are becoming increasingly standardised. The right veneer is art in motion. Conversely, the wrong selection can make a new aircraft appear dated and cheapen the look of an expensive one.

The process of creating veneer is complex. At Goodrich Aircraft Interiors (Booth Veneers) in Jeffersonville, Indiana, USA, veneer plywood is manufactured that is just 1.8mm thick, consisting of three plies. The veneers are produced from the company's multimillion-dollar inventory of 750 logs, many of which are centuries old. More than 150 tree species and cuts are represented and, with the exception of Antarctica, gathered from every continent. The veneer plywood is cut into precise shapes for custom cabinetry, furniture, doors and bulkheads, and often includes symmetrical grain patterns and intricate inlays. Goodrich's expertise in this sphere is revered, so much so it is extensively involved in customer education and regularly organises seminars that are attended by the industry's leading designers.



Veneer 101

For the uninitiated, here's a quick primer. Most veneer comes from the trunk of the tree. Long wood veneer may be sliced flat cut, quarter cut or rotary cut, depending on the species or patterns in the structure of the wood. Veneer sliced across the log perpendicular to a radius is called flat cut or crown cut. Grain pattern will commonly produce arches, ovals or hourglass patterns in the veneer.

Veneer sliced parallel to a radius is called quarter cut. In this case, grain pattern will usually be fairly straight or have slight curves. Patterns on the surface that usually runs across the grain are known as 'figure', which can be strong in quartered veneer.

Rotary-sliced veneer is cut on the circumference of the log. Bird's eye, pommele and burls are sliced using this method. Wild patterns of grain and figure dominate the surface of the veneer.

Veneer is sometimes smoked or fumed to change its colour, which involves exposing high-quality veneer to an ammonia-rich chamber that darkens the product by chemical reaction to natural tannins in the wood fibre. Only veneers with a high tannin content will change significantly in colour.

Burls are usually described as full, cluster or swirl. Many logs commonly display more than one pattern through each sequence. Many burls have two-tone character in some bundles. Many burls on the market today are random bundles of burl from the same log. Bundles clipped in sequence can produce burl panels that naturally evolve through an interior design.

1-3. Burl veneers from Original Marquetry

Finding the one The journey to finding the right veneer can be a lengthy and complicated one. If you don't find the right log, nothing else matters. It involves specialised knowledge that is closely held and sometimes appears almost tribal. And you have to be willing to go anywhere.

"Our company has spent 30 years developing a network of trusted suppliers that understand the unique needs of the aviation market," explains Jason London, director of marketing at Booth Veneers. "Our log buyers are on the road on average twice a week. We use both US and international suppliers to fulfil our customers' demanding requests and we personally inspect each log prior to purchase. If there is a log in Europe we need to see to meet a specific customer request, then we go to Europe to see it first hand."

The biggest problem Goodrich faces is consistency. "The aviation market wants a log that is unique and beautiful but sufficiently consistent to produce enough homogeneous veneer to complete the aircraft interior. This can be difficult, especially for the larger platforms," London says. "Some species do present a greater challenge – large burls are difficult to find and can be very expensive. They also present

a challenge to the cabinetmakers in finishing and matching hardwood."

Cabinetmakers rely on the veneer suppliers to maintain an adequate stock, suggests Mike Hammers, vice president of Custom Aircraft Cabinets (CAC) in Little Rock, Arkansas, USA. "This is fortunately determined and handled by the supplier," he says. "They record the log number and catalogue each piece photographically

"THE AVIATION MARKET WANTS A LOG THAT IS UNIQUE AND BEAUTIFUL BUT CONSISTENT"



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4-6. A huge variety of veneer is available, as demonstrated by this range from Mundy Veneer

and by size for future reference.” This is especially useful when fleet operators are looking for cabin uniformity.

With just this in mind, Goodrich always buys more than it needs. “We complete enough aircraft that we know from history how much wood is needed to complete an order for most platforms, but to be safe we hold considerably more than that,” London reveals. “Once the order is completed, we hold the remaining veneer for a period of time to cover any additional material that might be needed.” Some rare woods and grains are just not suitable for large fleet applications

“SOME VENEERS ARE NOT SUITABLE FOR A LARGE FLEET DUE TO RARITY OR EXTREME LOG VARIATION”

though. “This can be challenging,” says London. “Some veneers are simply not suitable for a large fleet as a result of rarity or extreme variation from log to log. When we are brought in early in the programme we can definitely help customers select beautiful veneers that can accomplish the challenging goal of covering a number of aircraft with a similar look and feel.”

A bigger problem for Hammers tends to come from the customer when their “veneer mapping specification is not well detailed”. To mitigate this, CAC conducts its own sourcing. “Our supervisors serve the combined role for the sourcing,” he says. “We do not call upon third-party specialists.”

Waste not, want not Environmental awareness and fair trade considerations also drive practices for both veneer

suppliers and users. “As responsible members of the wood industry, we are also concerned with sustainable and ethical harvest. We therefore carry an FSC Chain of Custody certificate, which allows us to supply veneers harvested in an environmentally and socially beneficial manner as the customer wishes,” says London.

Goodrich is also seeing increased popularity in reconstituted veneers. “They have definitely taken a place in our industry in recent years,” London feels. “They can fit the customers’ need for consistency of colour and pattern and some can be quite pleasing.”

CAC is also seeing a move to reconstituted veneers. “They’re gaining in popularity due to the lower costs and versatility in rare species, as well as a seeming perception in colour consistency and grain,” Hammers agrees.

These man-made products use real wood, urea resin adhesives and dyes and are ‘wallpaper’ consistent and often simulate expensive, natural veneers.

At the shop level, though, the most effective environmental practice can be minimising waste. “Because normally there is a minimal number of veneer sheets, with a secondary back-up sheet, we have developed internal processes for all employees that stress the importance of conserving the veneer,” Hammers reveals. “The thought process here is to assume there is only one sheet and there is no back-up at all.”

Then, once selected, veneers must be extensively tested. “We have a series of analyses specific to our needs for





The burning question

One of Skandia's specialties is flammability testing for veneer used in cabinetry. "Cabinetry, bulkheads and other large structures for large corporate aircraft must be certified to the FAA regulation 14 CFR 25.853(a) F Part I (a)(1)(i) 60-second bunsen burner test, or in some instances (a)(1)(ii) 12-second vertical," reveals Judy Johnson, a DER/DAR flammability division manager at the company. "In these cases, materials must be tested as a complete section representing the cabinet or other structure as it will be installed on the aircraft." This includes the wood or veneer, substrate, adhesive and finishes such as stains, paints and other coats.

"Other FAA regulations may apply to different assemblies or applications within an aircraft," she adds. To proceed with testing, Skandia requires three test specimens, each 3in wide by 12in long, at the same thickness as the 'as installed' part. If the as installed part exceeds 0.75in in thickness, the specimen may be manufactured into two components so the entire assembly can be tested.

"These test methods utilise 99% methane for fuel and flame temperature must be at least 1,550°F (843°C)," Johnson says. "The differences between the two tests are flame application period and the pass/fail criteria."

7-8. Veneer burn testing at Skandia

"EUROPEAN CLIENTS ARE SEEKING MORE STRAIGHT-GRAINED WOODS ... SATIN FINISHES ARE BECOMING MORE POPULAR AS WELL"

cutting, gluing and sanding the product," London explains. "We also consider burn testing requirements, although our customers perform many more tests on the veneer to ensure it will meet their needs for their activities as well." Meanwhile, CAC outsources its burn testing to Skandia (see box).

Fashion cycle As with anything, tastes change periodically in the world of veneer. "In our experience, trends in specific species seem to change about every two years," says Hammers. "Bird's

eye maple, for instance, was the dominant trend for quite some time, although it's now difficult to find quality veneer in that species." Changes in applications, grain patterns and finishes are also trending, according to the CAC vice president. "Interestingly, there is a new trend with application of the veneer, which entails applying it horizontally instead of vertically," he says. "Another production trend that seems to be currently gaining popularity is satin finish in lieu of the very popular high gloss."

Goodrich's London agrees. "At this time, very light or very dark veneers are in favour," he concludes. "The medium-toned orange and red woods that were popular a few years ago seem dated now. The European clients are seeking more straight grained woods. We hear through our customers that satin finishes are becoming more popular as well." **END**

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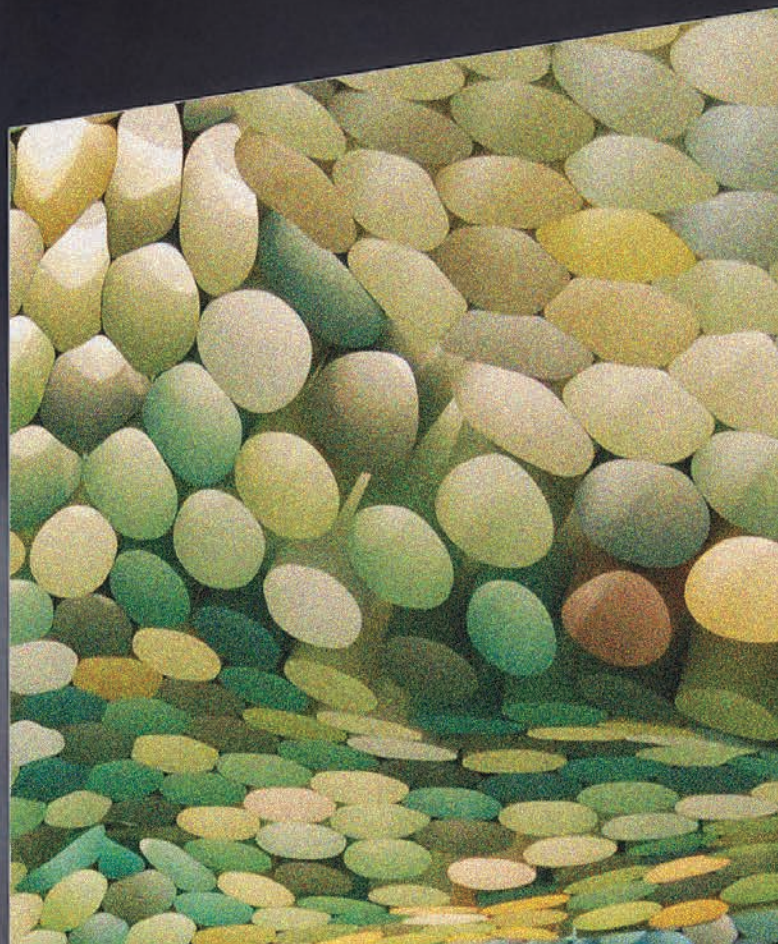
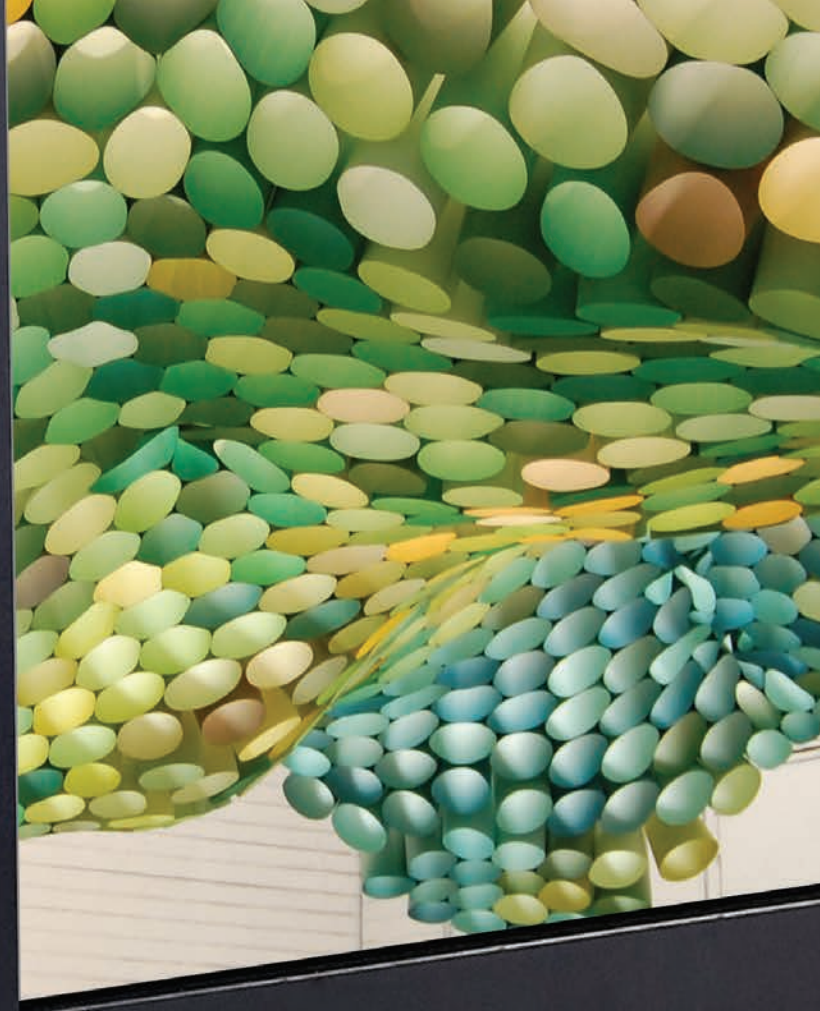
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1. The Citation
Longitude

This is how it works. An OEM unveils a new or updated design and then either simultaneously or within the year, launches a longer-ranged, more capable version. Gulfstream did it with the G450 and G550, Hawker Beechcraft did it with the Hawker 750 and 900, Embraer did it with both the Phenom 100 and 300 and the Legacy 450 and 500. Bombardier did it with the Global 7000 and 8000 and more recently, with the Learjet 70 and 75. Cessna has also done this previously several times, most recently with the XLS and the Sovereign.

From both the manufacturing and marketing perspective, twins make perfect sense. The aircraft use a lot of the same airframe parts, interior components and certification data. Sometimes they even share the same production line. All of this commonality cuts costs. Corporate marketers get to slice a niche market once over again and have a logical step-up aircraft at the ready when the owner of the lowered-number and lesser-priced twin wants to trade up.

So now Cessna is having new twins. At EBACE 2012 in May it unveiled a stretched variant of the mid-size Latitude jet announced at last year's NBAA (October 2011). The US\$25.99 million (£16.69 million) Model 800 Citation Longitude will have a range of 4,000 nautical miles and seating for eight or nine passengers. First flight is scheduled for 2016, with entry into service expected in 2017. The Latitude is positioned between the Citation XLS+ and the Citation Sovereign, while the Longitude is at the top end of the Cessna product line.

With full fuel, the Longitude will have an available payload of 1,950 lb and a maximum take-off weight of 55,000 lb. Fully loaded it will need just 5,400ft of runway. At cruise, it will leave a lot of older competitors far behind – high-speed cruise is 490kts.

greatlengths

A derivative of the new Citation Latitude, Cessna's Citation Longitude has a stretched cabin with a particularly generous galley and lavatory that reflect its long range





2



2. The spacious aft lavatory area
3. Satellite TV and WiFi are included



3



CABIN STATS



Cessna Citation Longitude

Cabin width: 6ft 5in
Cabin height: 6ft
Cabin length: 31ft
Seats: 2 crew + 8-10 passengers
Range: 4,000 nautical miles with four passengers and NBAA IFR reserves
High-speed cruise: 490kts
Max altitude: 45,000ft
Price: US\$25.99 million (£16.69 million)

The new Snecma Silvercrest engines will propel the Longitude to 43,000ft in just 23 minutes. Meanwhile, the dual-zoned environmental control system (ECS) will provide a 6,000ft cabin at 45,000ft.

Cessna displayed a mock-up of the Longitude cabin at EBACE. It carries over the same feel and clean European styling of its shorter sibling, including the LED lighting and the adjustable light rings around the windows. Cessna may also opt for dimmable electronic window shades on the Longitude.

The Longitude's 31ft, flat-floor cabin is 9ft longer than the Latitude's, but it shares the same interior fuselage cross-section – 6ft tall, 6ft 5in wide. The Longitude also shares the Latitude's single executive passenger seats, Clarity fibre-optic CMS/IFEC system (developed with Heads Up Technologies) and ECS. But the Longitude is designed to stay in the air almost twice as long as the Latitude, so, in terms of the cabin, that is where the family resemblance ends.

Fine dining The Longitude's large and deep forward galley is perhaps its most striking interior feature. Although still in the concept stage, the galley area in the mock-up prompted very positive reaction at EBACE, according to Cindy Halsey, Cessna's senior vice president of interior design, engineering and development. "When we showed it to customers, they really grasped the cleaner, more modern and open look," she says. "It's just a really efficient design with less clutter – what you would call 'quiet dark' in the cockpit."

Of course the galley in an aircraft capable of this range must enable flight attendants to provide multiple meal services and an almost continuous supply of snacks and beverages. Cessna



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CESSNA HAS PUT A LOT OF THOUGHT INTO THE DIVAN, WHICH IT EXPECTS WILL BE THE MOST POPULAR SEAT

equipped the mock-up's galley with a beverage chiller and provisions for a cappuccino and espresso machine, along with the traditional convection and microwave oven. The drawers are intentionally large to create a flowing look and make things easier to find. "If you look at how kitchens in homes have evolved, you have these large expanses," Halsey notes. She also anticipates some Longitude operators will fly without a flight attendant as part of a new trend she has noticed – a desire to make food and beverage service "a little more casual".

Practicality is also built in. The galley will be able to accommodate ATLAS trays, which are especially popular in Europe. "A lot of our European customers like to bring these large rolling tray carriers," Halsey adds. "We can personalise the galley for any purchaser, but we don't have to do it with a lot of little drawers." The galley will also be provisioned with a sink and a pressurised water system.

A flight attendant/third crew seat is set opposite the galley area and the base of that seat will be equipped with an optional chemical flushing toilet for

4. Fully operational galley with oven, cold storage and pressurised water system
5. Passengers benefit from 31ft of flat-floor convenience and stand-up headroom
6. High-gloss veneer finishes add to the luxurious feel

crew use. Doors will close off both the cockpit and the galley from the main cabin, creating a private forward lav area. The forward lav will not be part of the vacuum waste system in the aft lav.

Sitting comfortably A forward-club configuration of four executive seats is located immediately aft of the galley. The passenger seating area is 200in long, providing plenty of room to recline the single seats into berthing positions. Aft of that is either a second club-four setting or a three-place divan opposite either an entertainment centre or a two-seat half club. Cessna has put a lot of thought into the divan, which it expects will be the most popular seat on board. The patent-pending design

features push-button, electric recline. The standard upright position gives the divan the same seat pitch as the single executive seats as opposed to the traditional 90° bolt-upright stance. The divan can also be reclined all the way into a full berthing position, creating a sleeping area for two adults. Halsey says it is too early to know if there will be storage below the divan. However, its fixed end-arm monuments will have room for cupholders, slide-out monitors and some storage.

The optional entertainment credenza opposite the divan features a large pop-up HD monitor that is part of the Clarity system, as well as storage and two padded areas that can be used for footrests or single – albeit small –





Cessna Citation Latitude

Cabin width: 6ft 5in

Cabin height: 6ft

Cabin length: 22ft

Seats: 2 crew + 8 passengers

Range: 2,300 nautical miles with NBAA IFR reserves

High-speed cruise: 442kts

Max altitude: 45,000ft

Price: US\$14.9 million (£9.56 million)

Big order for Latitude

In early June 2012, Cessna announced a big purchase agreement with NetJets for up to 150 of the Longitude's stablemate, the Latitude, which was unveiled in October 2011. Initial deliveries are scheduled to begin in 2016. Cessna and NetJets have a history going back more than 20 years. NetJets currently owns and operates more than 250 Citations – including Encore, XLS+, Sovereign and X aircraft.

“The Citation Latitudes will enable us to deliver unparalleled safety, service, reliability and efficiency, along with new aircraft features that will differentiate our fleet and build on the NetJets flying experience,” reveals NetJets chairman and CEO Jordan Hansell.

Positioned between the XLS+ and the Sovereign in Cessna's product line, the Latitude has space for up to eight passengers. Key features include Garmin G5000 avionics and the Clairity fibre-optic CMS solution. The prototype's first flight is expected midway through 2014, with FAA certification (Part 25) and entry into service scheduled for 2015.

kibitzers (not certified for take-off and landing) to form a conversation/meeting area.

Mock-up visitors praised the divan's comfort. “They said, ‘Oh man, this is where I would spend the entire flight’,” Halsey reports. “A lot of people visiting the mock-up sat back there and had conversations.” She says divan occupants would probably need to wear airbag seatbelts for take-off and landing to meet certification requirements, adding that new-generation airbag seatbelts are very thin and comfortable.

7. The Citation Latitude, which was unveiled at NBAA 2011

THE LONGITUDE WILL BE THE LARGEST AIRCRAFT CESSNA HAS ATTEMPTED SINCE ITS COLUMBUS PROGRAMME

Similar to the galley, the wide aft lav (complete with vacuum flushing toilet, sink and storage closet) is distinctively clean looking and oversized to prepare it for long missions. “We planned that space to be very generous,” Halsey reveals. “We tucked the storage in the areas that are less obtrusive. The storage cabinet opposite the toilet has room for linens, pillows and easily accessible service items.”

Dressing the part Aft of the lavatory, a pair of wide pocket doors open into a dressing and luggage storage area that resembles a domestic walk-in closet. “You have this humongous space to dress and clean up,” she continues. “It is real space not eaten up by area ruling.” Within the space there is room for shelves and hanging clothes. IFE equipment that requires a pressurised

environment could also be placed there to facilitate easy access.

The Longitude will be the largest aircraft Cessna has attempted since its Columbus programme was cancelled in 2009. “There's no carry-over from Columbus,” Halsey says. “The Latitude was our base and our design team produced a development mock-up (for the Longitude) where they tried out a lot of new ideas. It's probably one of the best collaborative projects Cessna has ever worked on.”

In short, the Longitude has taken the best ideas from the Latitude and combined them with new ones, not only stretching a fuselage but expanding the idea of what's possible in a mid-size business jet. **END**

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Guy Bird, Business Jet Interiors International



thelookoflove

Business jet interior designers are using emotional engineering to win VIP customers' hearts



In the design community, a new phrase is gaining currency – ‘emotional engineering’. The idea behind this term is that designing or engineering emotion (as well as great functionality) into a product can mean the difference between a sale and no sale, or success and failure. “Emotion is the distilled ingredient that drives all of our decisions,” summarises John Slowsky of California-based rendering specialist John Slowsky Virtual Illustration. “If we lust after it, we want it.”

Of course, this concept has not just appeared out of the blue. “The goal of connecting with the emotions and preferences of a consumer is not new,” says Cindy Halsey, vice president of interior design and engineering at Cessna. “In the past it’s been referred to as ‘hooks’, ‘triggers’ or worse yet – ‘the wow factor’.” Slowsky concurs, citing marketing from the 1950s onwards as tapping into emotions to sell cigarettes, beer, cars and more. But perhaps the new phrase helps

redefine the idea. “I really like this new term,” Halsey continues. “The use of design to achieve maximum results both in form and function is a fundamental requirement of good design and recognising the power of executing both really well to the point that one is compelled to buy something is the epitome of great design.”

And great design is certainly needed when asking potential customers to part with very large sums of money for a VIP aircraft that, even if ostensibly for business, has considerable scope to create an emotional response. A white washing machine it is not.

JP Magnano of 3D Visualization Service (3D Viz), a specialist in creating 3D presentations for VIP aircraft, has seen the trend increase within the business jet arena. “I understand ‘emotional engineering’ as the implementation of non-essential elements into a cabin,” he begins. “In the past 10 years the trend has been to be more aggressive with the implementation of these elements.

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“IT’S TRANSFORMING AN AIRCRAFT FROM ITS MAIN ROLE AS TRANSPORT TO AN EXPERIENCE IN ITSELF”

Technologies such as large pop-up TVs, complex lighting and AV controls and internet connectivity have played a vital role in VIP completions. But other non-technological elements, such as full kitchens and rooms dedicated to watching films, yoga, massage, gambling and prayer, have also been incorporated steadily. It’s transforming an aircraft from its main role as transport to an experience in itself.”

What areas can be emotional? So what areas of the cabin can benefit most from emotional engineering? To start,

1. JP Magnano cites this Boeing 787 concept by Gore Design as having a dreamlike quality that could appeal to a Far Eastern client
2. This ACJ380 concept by Patrick Knowles (also visualised by 3D Viz) was created using design elements from a client’s yacht

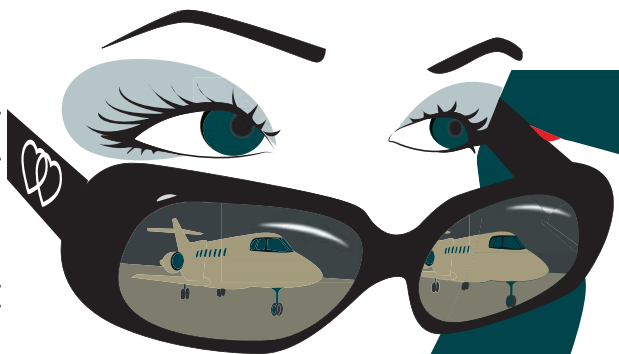
Slowsky suggests “making the seating location more attractive and luxurious compels the buyer to visualise sitting in that location; it is a very important location”. Meanwhile Magnano says he’s seen many presentations where the seat design reflects egos and social hierarchy: “Designers will create different size seats for VIPs versus non-VIPs. Other elements include stitched logos and emblems as well as different materials.”

Working areas that need to be functional and logical can also have a sprinkling of emotional engineering,

“particularly in wide-body aircraft”, says Magnano. “I’ve seen proposals for a private office with motorised doors that can open the room into a lounge or close it to make it fully private.”

Mood lighting is another element ripe for emotional engineering, as it can be used to help passengers feel more in tune with regular patterns of night and day while crossing time zones. Magnano even cites an example of emotion engineered into a stowage area, in the Boeing 787 concept presented by BMW Group DesignworksUSA, which features

Illustration by Sylvie Pinsonneaux/eyecandy.co.uk



“UNDERSTANDING THEIR LIFESTYLE IS CRUCIAL. ONLY THEN DO WE PICK UP THE PENCIL AND RESPOND TO IT”

a glass floor so the customer could see their precious exotic car in the cargo hold below. The one area of an aircraft Slowsky has yet to see the trend encroach on is restrooms. “I have seen gold-plated lavatories but I have never seen an emotional lavatory,” he says. “Bathrooms do not sell jets but they need to continue the overall design.”

3-4. Andrew Winch Designs' Edora BBJ interior
5. The lounge of an Elite ACJ318 by Andrew Winch Designs

Understanding the customer Working out which design cues might create the

desired emotion in your potential customer can be a valuable skill. “Each designer has their own style in which they like to work with the customer, just as most customers have their own unique style, needs and expectations of how they will use their aircraft,” says Halsey. “The designer should listen to their client – not just hear – but really listen. There is a big difference.”

For Jim Dixon, aviation director at London-based Andrew Winch Designs,

communication and intuition are vital. “We have to have the confidence to ask the questions that make our clients feel relaxed and willing to open up to explaining who they are and what they do,” he says. “Understanding their lifestyle is crucial. Only then do we pick up the pencil and respond to it.”

Slowsky emphasises the importance of doing your homework. “Know the culture where the decision makers are from,” he advises. “Know their influences. Who do they compete with, admire, or who were their mentors? Understand where they perceive themselves five years from now. Always lean towards luxury, understated elegance, ‘less is more’ and know the company’s colour branding. Know where the client came from, how hard they worked to get where they are, and research everything from where they live, the architecture of their offices, any luxury yachts and cars they collect. And if you get to meet them, what make of watch are they wearing, what style of shoes and suit?”

Meeting the user of the product will always give something away that a designer can use says Texas-based VIP jet design veteran Rick Roseman. “It might not happen on the first visit, but in the majority of cases you’ll see them get excited by something eventually,” he says. “They’re not going to sign off on it until they do. And then you have to tap into that stylistic preference.”



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6

Five great emotional designs

FIAT 500

What made this car a global sales success is its combination of 'just enough' retro looks – taking the quietly smiling face, headlamps and similar side profile of the 1960s original – teamed up with bigger and more practical proportions, thousands of customisation options and low-emission engines for a modern age.

ARNE JACOBSEN EGG CHAIR

The Egg chair, designed in 1958, is the sort of seat cat-stroking Bond villains would approve of. Its high back is comfortable and you can draw your legs up into it or hang them over the sides. But its best feature is the way the higher parts of its sides curve pleasingly outwards to create privacy and personal space.

PANERAI LUMINOR MARINA WATCH

Although other watchmakers offer more complicated dials, the Italian-designed Panerai keeps a simple face, a signature protective winder clasp and chunky proportions. The clear back also reveals an intricately bejewelled movement, a perfect emotional design touch that makes visible its inner complexity and craftsmanship.

GUGGENHEIM MUSEUM BILBAO

A building that transformed the fortunes of a whole city through its radical design. This huge whirlwind of metal by architect Frank Gehry is like nothing else in the Spanish city and after landing in 1997 has attracted as many tourists coming to marvel at its shiny exterior structure as the artworks inside.

APPLE IPHONE

An obvious choice, but a product that redefined what functions a phone could perform and the ease with which it could perform them. It has a simple, intuitive but beautiful design that invites interrogation and rewards discoveries with seemingly endless ability.

It is not uncommon for the designer to see the end user only for a short time – due to high fliers' busy schedules – or perhaps in the case of presidents or royalty, not at all. Of course this makes things harder, but Slowsky says a lot of relevant information can still be gleaned from their assistants: "You can learn a lot by reading their assistants, who want to impress their boss."

The customer's cultural and generational background can also affect which colours, features and material combinations create an emotional response. However, Halsey stresses all business jet buyers expect the highest quality. "We all respond differently to specific emotional associations, yet there are certain features that evoke universal appeal," she says. "Fit, finish and attention to detail are fairly synonymous with quality. We track everything from levels of spend and types of buying preferences to region, and so on, but we find that high-net-worth individuals all have similar traits, regardless of culture – with the exception of faith-based requirements."

Seeing is believing Once the designer has engineered emotion into his or her designs, the ability of new technology to render them is also having an increasing influence. Dougie Cross, managing director of TigerX, a UK-based specialist in image and animation creation, says his business can take source information from hand-drawn sketches, through 2D CAD plans and up to 3D mesh information and turn it in to "highly accurate, photorealistic visualisation and animation, and even stereoscopic

7



"A GREAT SHOT PLAYS ON THE VIEWER'S THOUGHT PROCESS OF IMAGINING THEMSELVES IN THE ENVIRONMENT"

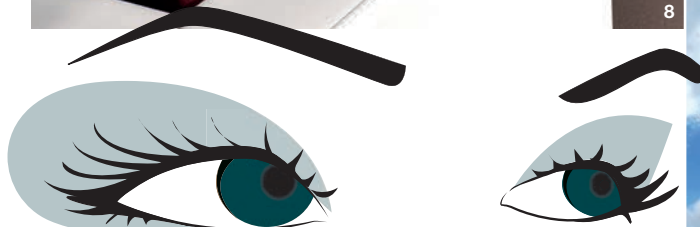
6. Fiat's 500 is a prime example of an emotionally engineered car
7. Arne Jacobsen's cocooning Egg chair suggests protection and privacy in its form

cinematic 3D". Indeed, a recent client hired an entire cinema to showcase one of its animations. "The beauty of computer-generated imagery is that we have absolute control of every aspect of sun angle, lighting wash, textural detail, composition and therefore the emotional response," says

Cross. "A great shot plays on the viewer's thought process of imagining themselves in the environment."

JP Magnano's 3D Visualization Service can even create fully immersive virtual reality cabins. "The user sees, feels and thinks he is inside the finished cabin," he enthuses. "The client can get close enough to a newspaper on a table to read the article. The system is available today and several completion centres have already purchased it and successfully used it in presentations for real clients."

Light simulation software specialist Optis takes a slightly different track, having developed technology that can recreate actual light conditions in specific worldwide locations according to season and time of day, and even take into account the age of the



“VIRTUAL ILLUSTRATION SUCCEEDS WHEN SEEING IS BELIEVING”

customer viewing. “It helps to imagine what your future aircraft interior will be by making the image the most beautiful and attractive,” says Jacques Delacour, CEO and founder of Optis. “Its capacity to assist in emotional engineering is limited, however, as what you visualise is a dream in which materials and lights are artificial. They can create an artificial emotion for your customers because the effect may be unable to be generated. This is exactly why we have developed a unique physics-based technology taking into account simultaneously the law of optics, light effects and human vision.”

8. BMW Group DesignworksUSA's Boeing 787 concept allows owners to show off their precious cargo
9. A John Slowsky virtual illustration for Nice Helicopters, with livery designed by Remy Chevarin



Such technology is hugely exciting but that doesn't stop designer Rick Roseman also using the odd pencil sketch in addition to favoured software such as SolidWorks and 3D StudioMax. “I'm an artist, so I enjoy the pencil-to-paper process and usually run that by the client early on, too,” he says.

Ultimately the technology is only as good as its emotional, human user. “It's how you use the tools,” says Slowsky. “If you can build triggers in your presentation that carry an emotional wave then you've accomplished the objective. If you kill the emotion because of awkward compositions,

an incorrect colour palette, or using too much technology, then congratulations, you've just successfully defeated yourself. Virtual illustration succeeds when seeing is believing, when you express emotion in a continued stream that contains a story arc and when you successfully remove any room for doubt in the viewer's mind.” **END**

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The big iron (converted airliner) sector continues to flaunt its immunity to the global economic gyrations as the uber-rich and head-of-state class graduate from single- to twin-aisle luxury liners.

Steve Taylor, president of Boeing Business Jets (BBJ), says he has certainly noticed increased demand for twin-aisle VIP products. Boeing's offering breaks down into the BBJ, BBJ2 and BBJ3 aircraft, which are derived from the single-aisle 737 family, and VIP versions of its twin-aisle aircraft, the 747, 767, 777 and 787. It has delivered 20 VIP twin-aisle aircraft in recent years and another 20 are on order. Of these, 11 are VIP 787s and nine are VIP 747-8s.

"In light of the unprecedented demand for our twin-aisle VIP products, Boeing has developed new and unique ways to support completion centres and customers," comments Taylor. This includes working closely with completion centres to ensure a smooth flow of aircraft. BBJ has approved a total of 16 completion centres, eight of which can handle single- and twin-aisle Boeing aircraft – AMAC Aerospace, Associated Air Center, Baysys Technologies, Gore Design and Completions, Greenpoint Technologies, Jet Aviation Basel, L3 and Lufthansa Technik. The other centres approved for single-aisle BBJs are Air France Industries, Altitude Aerospace Interiors (Altitude), BizJet

chainreaction

Increased demand for big iron completions is encouraging everyone to up their game – from those gearing up for wide-bodies, to the new players providing capacity further down the chain



2



International, Comlux America, Fokker Aircraft Services, PATS Aircraft Systems, SR Technics and TAECO.

"We have added two completion centres each year over the past four years as we have gradually ramped up our completion capacity," says Taylor. "Capacity exists today for near-term green completions in the BBJ, BBJ2 and BBJ3 aircraft so there really is no wait (for single-aisle completions)."

If a customer placed an order now (July 2012) for a single-aisle BBJ, they



3

should consider a completion slot no earlier than August 2013, assuming a green aircraft is available. Twin-aisle aircraft require a longer lead time. "However, the customers of our twin-aisle products have prepared well in both the selection of their aircraft and their completion centre," says Taylor. "Capacity exists for all of our nine VIP 747-8 aircraft, even though we will deliver eight of these in this calendar year. This is a result of the continuous relationship we have with completion



4

COMPLETIONCAPACITY

1. A recent ACJ319 completion by Airbus Corporate Jet Centre
2. A narrow-body BBJ completed by Greenpoint in 2010
3. Jet Aviation Dubai is one of a new raft of MROs expanding into interior refurbishment
4. Customers are falling in love with the space offered by wide-bodies – exemplified here by a Lufthansa Technik VIP Boeing 747-8 I concept

centres and our customers." Taylor says that Boeing recruits completion centres that display the necessary "skills, quality and craftsmanship that our customers demand". But the company has no plans to add any more authorised centres at this time. "We feel we have the completion capacity we need to support our aircraft customers," Taylor says. "However, we will continue to closely watch demand to ensure we have the right level of completion capacity for all BBJ/VIP products in the coming years."

Meanwhile, Airbus offers corporate versions of four single-aisle models (the ACJ318, ACJ319, ACJ320 and ACJ321) and four twin-aisles (the ACJ330, ACJ340, ACJ350 and ACJ380). Of its 170 VIP sales so far, 110 are single-aisles and 60 are wide-bodies. In 2011, the manufacturer sold 10 ACJs, including one wide-body.

While David Velupillai, marketing director at Airbus Corporate Jets, notes that "most of the demand is for ACJ318s and ACJ319s", he is also seeing "a steady interest in Airbus VIP wide-bodies from customers that want even greater capacity, comfort and capability – such as 'non-stop to the world' range".

Waiting times for completion slots depend on the aircraft type and what clients want to install inside. "However,

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5-6 Designs by TAECO for Las Vegas Sands Corp's reconfigured Boeing 737-300s

TAECO to reconfigure Boeing 737-300s

Taikoo Aircraft Engineering Company (TAECO) is one of the more recent additions to Airbus's and Boeing's approved outfitter lists, having gained the accreditations in 2011. With its years of MRO experience and base in Xiamen, China, the centre is well positioned to benefit from the region's expected business aviation boom.

The company is now working on the reconfiguration of two Boeing 737-300s for customer Las Vegas Sands Corp, pictured. The aircraft are to be converted from airline configurations for VIP use, with modifications including new bulkheads and lavatories. The first is currently in progress and the second is due later in 2012. TAECO's design team was led by Zhang Xiao Huan (Smile Zhang) assisted by Xia En Liang.

"The basic layout was defined by the customer while TAECO's design team helped to choose the colours and materials to create a practical, simple and natural looking interior, making use of earth tones to create a cabin with a feeling of safety, comfort, elegance and relaxation," says Peter Murton, vice president, commercial, for TAECO's cabin completion centre.

you can probably find an ACJ319 cabin-outfitting slot in the second half of 2013," says Velupillai. "As always, it's first come first served, and availability depends on how much demand there is in the marketplace at any given time."

The OEM has approved 10 completion centres – AMAC Aerospace, Associated Air Center, BizJet International, Comlux America, Fokker Aircraft Services, Gore Design and Completions, Jet Aviation Basel, Lufthansa Technik, TAECO and its own 100% subsidiary, Airbus Corporate Jet Centre. "Our aim has been to create a wide choice of outfitters that we can recommend with confidence, as well as to ensure sufficient capacity to meet our customers' needs," says Velupillai. "We have also tried to ensure a good geographical spread, and today can recommend outfitters in Asia, America and Europe."

The process of gaining Airbus approval involves an audit, and once

approved the completion centres are monitored regularly, "so that we can continue to be confident that customers will be happy with the result", comments Velupillai. Airbus Corporate Jets can also manage the cabin outfitting process and provide turnkey solutions upon request.

Going up Boeing has also tried to offer a wide geographical spread with its approved completion centres, two of its most recent additions being based in New Zealand (Altitude) and China (TAECO). Although it currently concentrates on single-aisle BBJs, the new Boeing wide-bodies factor large in Altitude's plans for the future. "The company is currently contracted to develop customised interior furniture for several Boeing 787 and Boeing 747-8 airline customers," says Matthew Woollaston – head of VIP completions at the company. "Altitude intends to capitalise on its world-leading position

5

6



Renewed agreement for ACJ318s

Airbus and Lufthansa Technik recently renewed their general agreement regarding cooperation in the VIP and executive jet market and will continue to further develop their partnership in this area. The companies have worked together closely for the completion of Airbus Corporate Jets since 1998. Within the ACJ318 programme, Lufthansa Technik is Airbus's cabin interior partner. So far, 15 ACJ318 cabin completions have been delivered out of Lufthansa Technik's completion centre in Hamburg, Germany, and latterly by its US subsidiary BizJet International, in Tulsa, Oklahoma. Two ACJ318s are currently under completion, and a further three aircraft are scheduled for completion in Tulsa.

In addition, the companies regularly work together in the highly individual VIP completion business for the ACJ320, ACJ330 and ACJ340 families. In 2010 and 2011, two ACJ319s and two ACJ340-300s were delivered to the German government. Lufthansa Technik also has several ACJs for private customers in its order book.

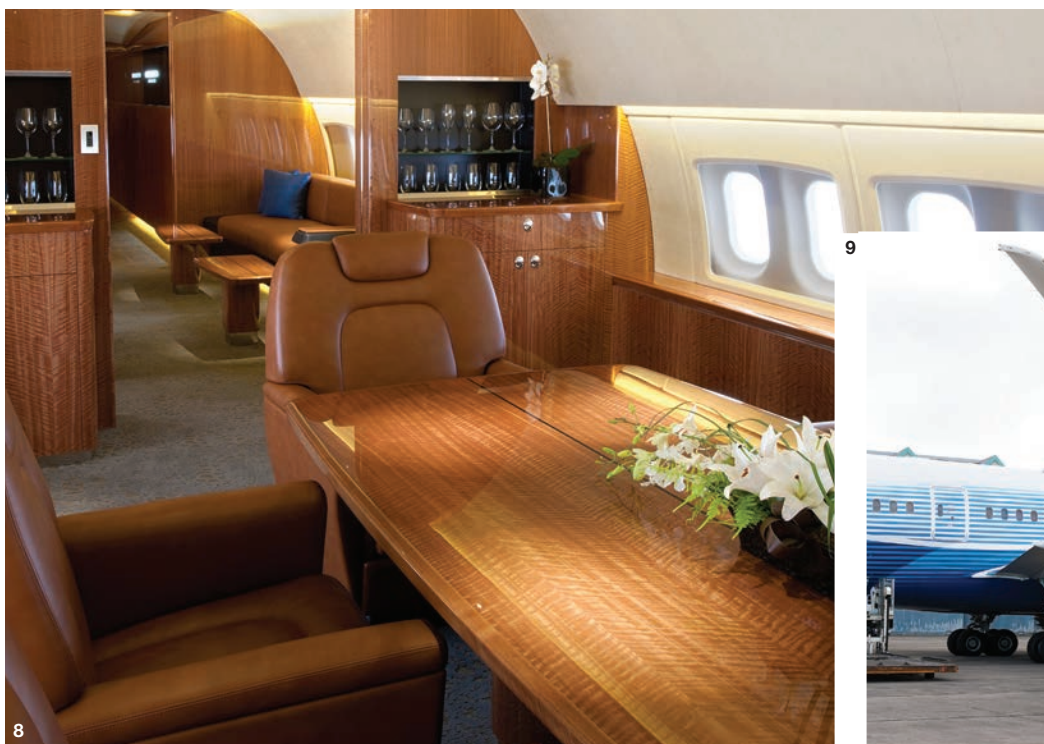
in this market and offer completion slots to VVIP Boeing 787 customers from 2014. This is in addition to the current offering of BBJ slots from 2013." Altitude's parent company, Air New Zealand, will be the first airline to operate a Boeing 787-9. "Altitude's support of this programme enables it to gain advanced knowledge on the airframe and consequently develop entirely new engineering IP required to integrate with the composite fuselage and new-generation aircraft systems," Woollaston says.

Altitude has two completion centres – in Auckland and Christchurch. The company says it can confirm a slot immediately, but for an effective programme advises that advanced engineering should begin 6-9 months (for a narrow-body) or 12-18 months (for a wide-body) ahead of when the aircraft arrives on dock. The idea is to use this time to plan the completion, to smooth workflow and minimise delays when the aircraft arrives. "Early planning and decision making is by far the most effective way to ensure a

7. An ACJ318 completed by BizJet International
8. Altitude built a mock-up to showcase its BBJ capabilities
9. Boeing's 787 demonstrator at Altitude's Auckland facility

customer receives their completed aircraft as quickly as possible," says Woollaston. "Advance slot confirmation is ideal for both the customer and the completion facility. Typically, it is long-lead items rather than engineering activity that determine the advanced time required." Woollaston says these long-lead items typically include seats, IFE/CMS systems and cabin shells. The lead time for an IFE/CMS system can be as long as 12 months.

Because of the new technology associated with the mostly composite Boeing 787, Woollaston expects the total completion cycle – from planning to the delivery of the finished aircraft – to run anywhere from 30-36 months and ring the cash register to the tune of US\$60-100 million (approximately £38.6-64.3 million) "and up".



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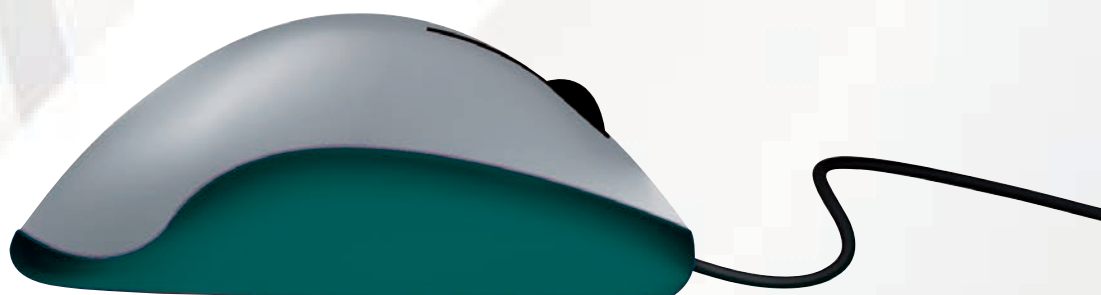
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11



10

10-12. SR Technics now offers interior design and completion services, building on its MRO background

However, the lure of wide-body contracts has not discouraged Altitude from taking on “smaller” projects and Woollaston doesn’t expect that to change. The company’s move into the wide-body VVIP market is part of an ordered growth plan that also includes the modification of existing hangar and support shops “to cater for the lengthy on-dock times required to fit out a wide-body aircraft”.

“Altitude’s growth plan ensures other areas – such as existing in-house design, engineering and procurement

resources – grow capacity accordingly,” says Woollaston. “Effective strategic planning by management early on in the formation of the company has ensured that all these factors have been suitably prepared for.”

Woollaston believes increasing competition in the VIP wide-body market will ultimately be good for the customer and the industry, pushing it to achieve greater things. “The rapid introduction of the VIP Boeing 747-8 to the market has certainly strained the supply chain and completion centres

alike and there was a high risk of a major imbalance of completion centre capacity versus completion demand,” he says. “This has been largely addressed by the introduction of new smaller tier players into the narrow-body completion arena. The key challenge now is to see measured growth of wide-body completion centre options by some of the small tier centres stepping up. Altitude is confident it has the requisite skills, experience and capacity to do this.”

Wide mandate SR Technics in Zurich, Switzerland, is another new player stepping up to the wide-body bar. Building on its solid reputation as an MRO service provider, and with the assistance of shareholder Mubadala Development Company, in April 2011 SR Technics opened a dedicated VIP completion centre to serve both the single- and twin-aisle VIP market. Its refurbished 4,800m² hangar at Zurich airport can accommodate an ACJ340-300 or three BBJs, and includes modern production facilities, a prayer room and a VIP lounge with concierge services. The secure, standalone facility “is designed to ensure the customer’s daily business and personal needs are met, while overseeing any completion or refurbishment activities,” says André Wall, president of SR Technics.

The company delivered its first VIP cabin reconfiguration and system upgrade – a wide-body ACJ converted from conventional airline configuration – in February 2012 to a Middle Eastern customer. It followed this up with its second VVIP cabin modification contract, announced in May 2012.

Taking the plunge into the interior completions business required a large

INCREASING COMPETITION IN THE VIP WIDE-BODY MARKET WILL ULTIMATELY BE GOOD FOR THE CUSTOMER AND THE INDUSTRY



12

Shifts and new players in the wider completions market

There are several facilities entering or increasing their involvement in the business jet interior completions business. In San Antonio, Texas, USA, STA San Antonio is re-entering the market under the name Aeria Luxury Interiors after around a decade focused on MRO business (see page 73). It offers maintenance and modification services for narrow- and wide-body aircraft, including most Boeing and Airbus models.

Another one to watch is GALMENA, the joint venture of GAL Aviation of Canada and MENA Aerospace Enterprises of Bahrain. GALMENA will provide interior design, refurbishment and installation services for corporate aircraft and VIP airliners in Bahrain. The outfit should be ready to commence work in October 2012. GALMENA has also signed a service agreement with ExecuJet Middle East, that will see it develop and administer a fabrication and refurbishment centre in Bahrain, and operate a refurbishment and installation workshop at ExecuJet Middle East's base in Dubai, UAE.

Meanwhile, Jet Aviation facilities in Hong Kong and Dubai are expanding into interior refurbishment. Jet Aviation Dubai plans to start providing interior capabilities in the second half of 2012. Services will include upholstery, carpeting, repainting headliner and side panels, chrome- and gold-plating, woodwork, sheet metal work, and the repair of fibreglass, plastic and composite items. In Hong Kong, the new 483.10m² (5,200ft²) interior shop

includes four work bays for upholstery, carpeting, faux finishing and spray-painting.

Canadian completion centre Flying Colours Corp is also looking to extend its presence in Asia, and is in advanced discussions with a number of Asian businesses. Ratification is expected in late-2012.

BBJ specialist Greenpoint Technologies is another completion centre getting a foot into the Chinese market. It recently signed an MOU with MRO specialist Ameco Beijing for cooperation on commercial and VIP business jet completions in Greater China and the Asia-Pacific region. The MOU is the first step in finalising a relationship for collaborative engineering, certification and installation of narrow- and wide-body VIP modifications.

In Europe, Aero-Dienst (which is based in Nuremberg, Germany) has teamed up with Metrica Aviation Interior to add interior refurbishment and cosmetic repairs to its maintenance offering. Repairs and cabin refurbishments can be carried out at the same time as other maintenance operations, all under one roof. Workshops and offices have been set up to perform work such as installing carpets, coverings and panels.

Finally, at London Luton Airport in the UK, Ocean Sky is refurbishing its maintenance hangar, increasing tooling and completing a new interiors workshop and showroom. The work should be complete by the end of 2012.

“WE LOOKED AT THE SYNERGIES WE COULD DRAW UPON WITHIN OUR EXISTING BACKSHOPS”

amount of both planning and capital. “Behind the scenes we have had to buy in machinery specific to VIP completions to equip our specialist backshops for cabinetry, upholstery, sheet metal, electronics and varnishing and for use within the hangar,” says Wall. The company also laid the groundwork for strategic partnerships with key completions suppliers.

“We also looked at the synergies we could draw upon within our existing backshops – such as engines, components, heavy/base maintenance and training, as required,” says Wall. “This ability to offer a wider service offering to our VIP customers provides added value.”

Wall sees VIP interior completions as a natural extension of the company's ongoing MRO business, and believes that the company's ability to combine interior refurbishments with heavy maintenance events such as C checks (as on the company's first project) is a real asset. He predicts SR Technics should be able to throughput green completions of narrow-bodies in 9-11 months and wide-bodies in 15-24 months, with a workforce of 200 and 350, respectively. Overall, the company's total employment stands at 3,200. And as the demand for VIP wide-bodies expands, that number will surely grow. **END**

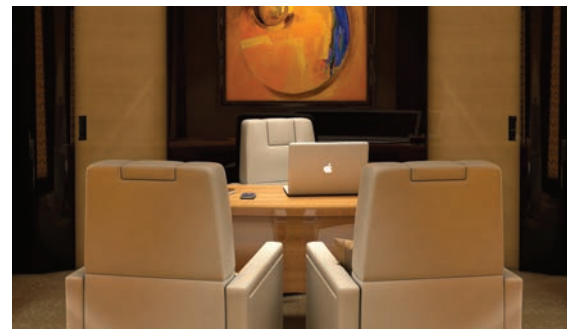
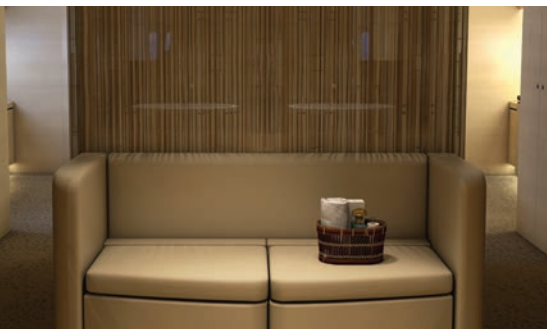


13. Jet Aviation Hong Kong now offers cabin interior refurbishment

14. Aero-Dienst teamed with Metrica to add interior shops in Nuremberg



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Tim Whitaker, Business Jet Interiors International



lightreading

LED technology is driving a huge transition in business jet cabin lighting, helping to satisfy the need for comfort, luxury and personal control over the inflight environment

In recent years the design of aircraft cabin lighting products has increasingly moved beyond the basic requirements of reliability and functionality to include ways to enhance the passenger experience. Systems that allow passengers to control their cabin environment – via dimming individual lights or changing their colour, for example – are becoming more widely available. In addition, the advent of new lighting technologies, particularly LEDs, has resulted in novel form factors and enhanced performance.

“Lighting has gone from simple on/off functionality to dynamic controls, mood lighting options, stylised fixtures and decorative accents,” says Scott Sweet, senior business development manager and product manager at Emteq. According to Sweet, Emteq has found that the primary consideration when installing new lighting systems in a cabin is the passenger experience. “This applies both to aftermarket upgrades, with an end operator wanting the ideal interior for their needs, and also to production aircraft, with the OEM wanting to differentiate themselves from the other airframes available,” he says.

Olaf Schultz, senior product manager for aviation at Schott Lighting and Imaging, believes that high-quality lighting can definitely influence the buying decision. “It is of increasing relevance for the traveller because it serves both functional and emotional aspects,” he says.

Many of the recent advances in lighting systems have been enabled by the development of highly efficient and reliable products that use LEDs. These miniature light sources are designed to operate with lower power consumption than conventional lighting technologies and can also be more robust, which can result in big savings in the time and cost of replacing lamps and providing other essential maintenance.

Top form LEDs also enable various innovative form factors, such as the AuraPlane from Schott, an LED surface light with a thickness of only 6mm, which emits light homogeneously and can be integrated into wall and ceiling panels. Likewise, Emteq’s Flat Panel LED Tile is a backlit panel that can be used as a low-profile light in many aircraft cabin applications – floors, countertops, walls, vanity fittings and ceilings. With a tile approach, the light can be scaled to fit any size space. Emteq’s Sweet says that the product has met the challenge of presenting “an architectural lighting design element to the aviation industry’s strict standards and safety guidelines”.

Perhaps the most exciting feature of LED technology is the ability to control the light output, not only in terms of brightness but also in terms of colour. For example, the Spectrum Lighting family from Custom Control Concepts (CCC) provides full dimming control and endless colour variations, presets and customisable mood settings. “Control is incorporated into each light

2



1. Emteq's Quasar Full Spectrum mood lighting system
2. VIP cabin lighting from B/E Aerospace



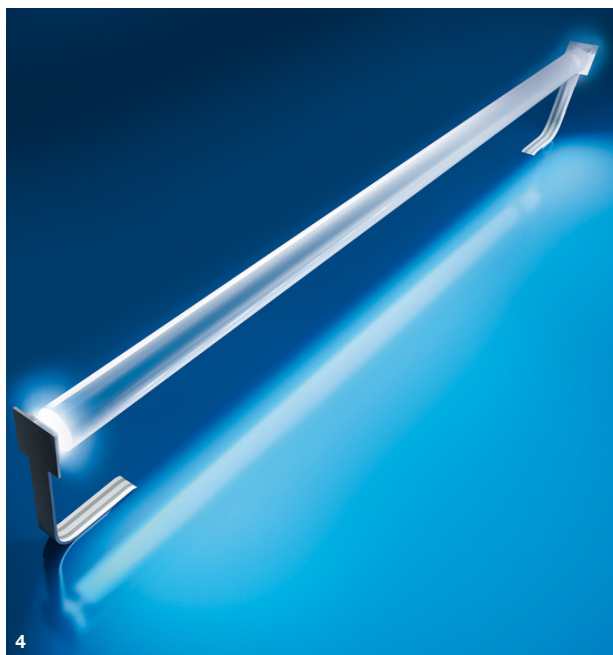
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to allow individual light adjustment,” says Austin Campbell, marketing coordinator at CCC. “Custom presets easily recall the passenger’s favourite lighting settings, while lights may be grouped to facilitate programming.” Conversely, rather than controlling individual lights, a CMS can facilitate control of specific cabin zones.

Systems such as Emteq’s Quasar Full Spectrum mood lighting system are able to achieve variations in colour through the use of red, green and blue (RGB) LEDs, which can reproduce all the colours of the visible spectrum. But some white-light LED fixtures can also be adjusted to reproduce either warm-white light similar to an incandescent lamp, daylight white or cool-white light that is generally better to read by. Beadlight, for example, manufactures flexible reading lights that allow users to choose the colour temperature of white light. The lights also incorporate diffusion technology to reduce glare.

A common approach in aircraft is to use strips of LEDs, but it can be difficult to hide the individual points of light along the strip. Variations in light output from LED to LED can also be difficult to control, especially as time goes by. LED performance can degrade, particularly if the temperature of the LEDs is too high, so fixtures must be designed to remove heat from the LEDs in an effective manner.

A novel approach developed jointly by Schott and Lufthansa Technik is HelioJet. Light from two LEDs is emitted into opposite ends of a glass rod. The light is mixed and emitted



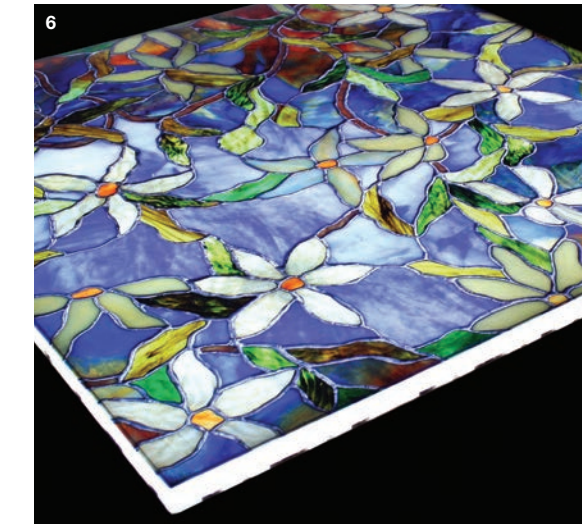
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3. Aveo Engineering’s AirBeam Airliner light
4. The HelioJet light developed by Schott and Lufthansa Technik
5. Custom Control Concept’s Spectrum system can be controlled via iPad
6. Emteq’s Flat Panel LED Tile

along the length of the rod in a uniform fashion. Schott’s Schultz says that this combines the advantages of fluorescent tubes, in particular homogeneous light distribution, with those of LEDs, such as long lifetime and high reliability. Similarly, Schott’s HelioLine uses a flexible optical cable with an overall diameter of only 3mm. It provides contour lighting and mood effects for applications such as cocktail tables, and emits homogeneous lighting in one colour over a maximum length of 6m with two light sources.

LED technology is not new, but the emphasis has shifted recently. Initially, there was a rush to install LED lighting to meet requirements for personalised lighting. This rush, says Schultz, “kicked off a quality discussion” in the industry to ensure that the lighting systems were reliable over a long period and could be easily maintained. “Nowadays, low energy consumption and high reliability are product standards in our industry,” says Schultz. “From now on, features like warm colours, homogeneous light output and passenger control units are becoming more important.”

Market caution But how easy is it to introduce new products into the business jet market? According to Schultz, the biggest challenges in bringing new technologies to market are environmental testing, preparing the required documentation and



conducting accelerated ageing of electronic products to determine long-term reliability. Another barrier is integration as lighting systems become more complex. Campbell says that CCC’s Spectrum lighting family was designed to be dynamic, flexible and interchangeable for compatibility with any common aircraft system.

Meanwhile Emteq’s Sweet points out that most OEMs and operators want to install products that are proven, whereas a new system is more of a risk. Emteq’s approach is to involve its technology partners during the development phase and to implement a very robust testing phase. “This contributes to Emteq being able to offer new systems that are proven,” says Sweet. Even so, he says, “it can take a year to get traction in the market with a new system”. **END**

“IT CAN TAKE A YEAR TO GET TRACTION IN THE MARKET WITH A NEW SYSTEM”

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Transportation Weight Loss Diet Conference 2012

The Transportation Weight Loss Diet Conference will bring together designers, engineers, program leaders, and heads of industry from the global aerospace, automotive, and rail industries for a two-day conference dedicated to cutting-edge research and technologies aimed at reducing weight and

decreasing overall carbon footprint, without compromising safety, efficiency, or operational ability.

Presentations will include real examples of how challenges and compromises can be overcome and avoided through intelligent design choices and initiatives, as well as new materials and engineering practices.

The conference provides an unparalleled opportunity for a transfer of ideas between transport sectors, highlighting the best new approaches with the greatest potential to reduce weight, save fuel, enhance performance, and lessen environmental impact. Don't delay – make sure you book your place in Boston this October!

PRELIMINARY CONFERENCE PROGRAM

DAY 1 Wednesday, October 24

Setting the scene: the future of mass reduction

The opening session of the conference will highlight key trends and motives for mass reduction in the automotive, aerospace, and rail sectors, as well as examining potential future supply issues for lightweight materials.

Keynote presentation

Matt Zaluzec, manager, Materials Research and Advanced Engineering Department, Research and Advanced Engineering Center, Ford Motor Company, USA

Lightweight rail transportation at Bombardier

Jacques Belley, R&D director, Standardization and Innovation, Bombardier Transportation, USA

Less is more: automotive downweighting opportunities with mixed materials

Greg Schroeder, research analyst, Manufacturing, Engineering & Technology, Center for Automotive Research, USA

Lightweight materials

This session will look at a range of materials for use in vehicle mass reduction applications. New-generation meta and para aramids, intermetallic replacements for Ni-based superalloys, magnesium alloys, metal matrix composites, and 'fuzzy fiber' will all be profiled. The session will also cover manufacturing CFRP parts.

Advanced lightweighting materials: Nomex, Kevlar, and beyond

Dr Ley Richardson, principal application research associate - Aerospace, DuPont Protection Technologies, USA

Gamma Ti alloys: commercial solutions for carbon reduction

Cameron May, director, GfE Materials Technology Inc, USA

How metal matrix composites have been redesigned for more machinability and lower cost

Patrick McGowan, vice president, GT Alloys, USA

Magnesium applications for lighter-weight vehicles

John Mowrey, CEO, ZD Metal Products, USA

Passenger environments

Transportation needs to be attractive and easy to use. Transportation operators and manufacturers need to satisfy passengers and customers. Consumers must view mass reduction as an improvement to their transport experience. This session will look at how this can be achieved.

Designing efficient passenger environments

Paul Priestman, director, Priestmangoode, UK

Cabin Concept 2050 based on a bionic structure

Ingo Wuggetzer, vice president Cabin Innovation and Design, Airbus Operations GmbH, Germany

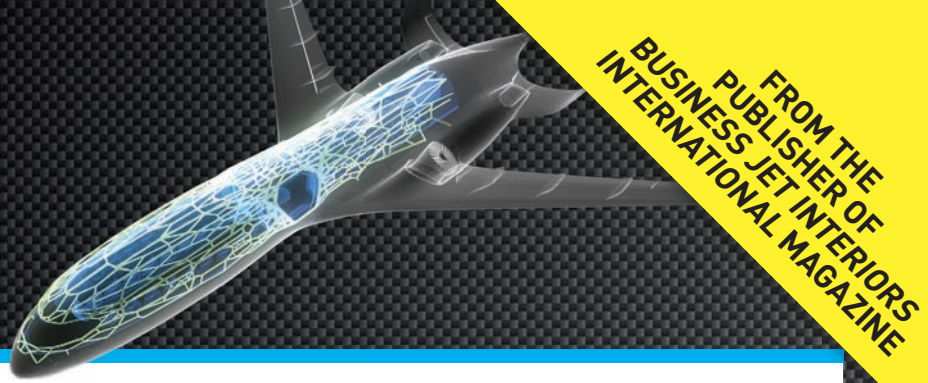
Employing new design techniques to deliver lightweight seats

Alexander Pozzi, vice president Advanced Design Group, Seating Products, B/E Aerospace, USA

Low-calorie light infotainment

Ashutosh Tomar, senior researcher, Jaguar and Land Rover, UK

transportation weight loss diet conference 2012



FROM THE
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Low-cost multifunctional-use composite to reduce weight

Prof Khalid Lafdi, professor, Department of Chemical and Materials Engineering University of Dayton Research Institute and Wright Brothers Institute Endowed Chair in Nanomaterials, USA

Developing volume manufacturing processes for carbon-fiber reinforced automotive body structures

Donald Lasell, president and chief engineer, Think Composites, USA

Manufacturing with lightweight materials

This session sees presentations covering high-speed automated manufacturing processes and techniques using composites; and looks at how smartphones may deliver new, strong, lightweight glazing solutions to transportation, as well as new mixed materials.

High-volume, high-speed preforming for structural composites

Daniel Buckley, manager of R&D, AGFM, USA

The development of effective prepreg solutions for the transport sector

Alasdair Ryder, business unit manager - High Volume Manufacturing, Umeco Structural Materials, UK

Strong, lightweight glass laminates for transportation weight reduction

Phillip Bell, product line manager, Corning Incorporated, USA

EASI: steel cord reinforcement for injection molded parts

Dr Dries Moors, innovation manager, Bekaert, Belgium

Lessons from aerospace: integrating lightweight materials information into engineering workflows

Dan Williams, product manager - Automotive, Granta Design Ltd, UK

Objective composites manufacturing process control: reducing uncertainty, overdesign and weight

Scott Blake, president, Assembly Guidance, USA

Lightening the way ahead

Phil Hall, managing director, Caterham Composites, Germany

Lightweight design of composite structures

Dr Robert Yancey, senior director - Global Aerospace, Altair Engineering, USA

Technologies for lightweight design and performance verification

Ravi Chilukuri, director, EASI, USA & Michael Lee, project manager, EASI, USA

Polyetherimide-carbon fiber as metal substitute in aircraft food tray arms

Dr Mohammad Moniruzzaman, product development engineer, Sabic, USA

Innovative solutions for railway floors and interior panels using cork

Antonio Coelho, R&D director, Amorim Cork Composites, Portugal

Automotive case studies and applications

What are the major vehicle manufacturers achieving in terms of mass reduction? This session looks at specific case studies of vehicles and programs.

VSL Project: sustainable and affordable technology for CO₂ emission

Tomasz Krynski, chief engineer, PSA Peugeot Citroën, France

Weight reduction lessons and achievements: product development

Ramkisan Gite, PAT lead - Weight Reduction, Tata Motors, India

The BMW i3: a battery electric vehicle – right from the beginning

Oliver Walter, responsible product manager BMW i3, BMW, Germany

Using alternative plastic materials for weight reduction on heavy trucks

Dr Srikanth Ghantae, senior technology specialist - Plastics, Volvo Trucks North America, USA

Use of composites in bus structures for significant weight reductions

Mukul Mitra, program manager, Ashok Leyland Limited, India. Pradeep Kumar, manager - Global Bus & Coach Programme, Ashok Leyland Limited, India

Weight reduction through value engineering

Manoj Surana, manager - Engineering Research Centre, Tata Motors Ltd, India

Light-duty vehicle mass reduction and cost analysis: midsize CUV

Greg Kolwich, manager, Value Engineering Services, FEV Inc, USA

Reducing vehicle weight with composite materials

James Jones, CCG manager - Americas, Composites Consulting Group, USA

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DAY 2 Thursday, October 25

Simulation and integration

The design and engineering challenges of integrating composite materials into structures and parts is addressed in this session, with presentations focusing on simulation, design optimization and process control techniques.

Intelligent adhesive bonds that provide an early warning system for structural failures

Prof Shaker Meguid, professor and director Engineering Mechanics and Design Laboratory, Department of Mechanical and Industrial Engineering, University of Toronto, Canada

Design and fabrication of multi-material structures

Prof Glenn Daehn, professor, Ohio State University, Materials Science and Engineering, USA

Laser cleaning pre-treatment for bonding of lightweight metals

Georg Heidelberg, president, Adapt Laser Systems, USA

Achieving weight reduction through design, material selection, and application-specific products

Tony Padula, product manager, Amphenol Pcd, USA

Mechanical performance of friction spot-welded joints in 2198-T8 alloy

Dr Jorge F. dos Santos, head of department, Helmholtz-Zentrum Geesthacht, Germany

Aerospace materials for aircraft lightweighting applications

Dr Ralph-Dieter Maier, manager, Aerospace Technologies, BASF Corporation, USA

Design-driven innovation and cross-pollination for lightness

José Rui Marcelino, design manager, Almadesign, Portugal

Parametric study and topology optimization for platform concepts

Anthony Norton, senior director, Global Automotive & Off-Highway Vehicles, Altair, USA

Lord UltraConductive film and coatings for lightning strike protection

Ross Zambanini, senior global market segment manager, Aerospace & Defense, Lord Corporation, USA

Experiences with the electrical use of carbon fiber

Walter Kiersch, CEO, Carbon Conduction Technologies (CCT) GmbH, Germany



Automotive case studies and applications

Edison2's Very Light Car: a new automotive architecture

Oliver Kuttner, CEO, Edison2 LLC, USA

Half-weight vehicle with new materials: chassis, body, and driveline

Mogens Løkke, CEO, ECOmove ApS, Denmark

Full vehicle lightweight designing based on CAE techniques

Javier Rodriguez, director Vehicle Integration & E/E, EDAG Inc, USA

Prospective view of CFRP as a technology for weight reduction of automobiles

Toru Yamanaka, general manager, Automotive Center, Toray Industries Inc, Japan

HiAnt simulation: simulating structural continuous fiber-reinforced thermoplastics parts

Vasant Pednekar, senior engineer Application Development, Lanxess Corporation, USA

Automotive safety

One of the key concerns in downweighting vehicles is the issue of safety. This session looks at the issue not from the perspective of how far we can compromise safety for mass reduction, but rather how mass reduction actually increases safety and what lessons may be learned from motorsport.

Enhancing vehicle safety and crashworthiness with weight-loss improvements

Byron Bloch, director, Auto Safety Expert LLC, USA

Designing a lightweight body structure meeting federal impact requirements

Gregory Peterson, senior technical specialist, Lotus Engineering Inc, USA

Characterization of crash properties in aluminum extrusions

Jonas Braam, research engineer, Sapa Technology, Sweden

New materials and design technologies for motorsports

Prof Pete Hylton, director of Motorsports Engineering, Indiana University Purdue University Indianapolis, USA

transportation weight loss diet conference 2012



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Aerospace design developments

Looking specifically at aerospace, this session considers specific examples of mass reduction developments and the lessons learned in significantly increasing composite percentages in aircraft structures, as well as some interesting designs for drag reduction and innovative uses of carbon fiber.

Future aircraft composite weight savings opportunities and challenges

Dr John Fish, senior manager Airframe Technology, Lockheed Martin Aeronautics Co, USA

Challenges, and opportunities, of introducing composites into the 787 airplane design

Robert McIntosh, chief engineer - Weights, Boeing, USA

Weight opportunities of wide-body aircraft composite ailerons

Gulsen Oncul, A350 Ailerons EPM, TAI, Turkey

Multimodel structural optimization of commercial aircraft

Prof Santiago Hernandez, professor, University of Coruna, Spain

Understanding weight reduction relationships for rotorcraft

Dr Daniel Schrage, professor, Georgia Tech, USA

Drag-reduction technologies for low-speed applications

Prof Konstantinos Kontis, professor and deputy director, The University of Manchester, UK

Multi-disciplinary optimization of a pylon for mass and drag reduction

Freddie Colsoul, account manager, LMS North America, USA

CLOSE

Lightweight seating

Safe, comfortable seats – sometimes in large numbers – are a key requirement for most vehicles, especially aircraft and trains. Hence seating can add significantly to vehicle weight. This session is dedicated entirely to looking at this critical area for mass reduction with a range of approaches and products discussed.

Weight reduction in seat cushions

Mike Brock, market development manager, Rogers Corporation, USA

The use of high-strength polymers for metal replacement

Gary Seale, managing director, Cobra, UK

Lightweight structural solutions for transportation seating using expanded polypropylene (EPP)

Steven Sopher, technical director, JSP, USA

Weight savings through the use of suspension textiles

Neil Gross, president, Acme Mills Company, USA

Weight-saving possibilities on dress covers

Gerret Suhl, head of Sales, Car Trim GmbH, Germany

Win, win, win: lightweight leather

Nico Den Ouden, sales and marketing director, E-Leather Group, UK

CLOSE

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best of both

Carbon composite components can combine automotive quality and business jet style

- 1-2. Craftsmen at the company's plant in Germany
3. The Mercedes-Benz SLS AMG

Although the surface qualities seen in the automotive industry continue to serve as an inspiration for surfaces in the aircraft industry (particularly for business jets), the contrary is true in the context of design.

A great example is the cockpit design of Mercedes-Benz's new 'gullwing' SLS AMG, which is based on the style of a business jet. In addition to a thrust lever and outlet nozzles, which look confusingly similar to an aero-engine, the car was also given 'wings'. In an advertisement campaign for the car, the company justifiably asks the question: "A cockpit. An engine. Two wings. Is it still a car?"

Yet although the SLS AMG's styling is influenced by aviation, the materials used inside reflect the automotive school of design. The car's carbon composite components were developed and manufactured by 3C-Carbon Composite Company of Landsberg am Lech in Bavaria, Germany.

The whole interior is honed for maximum quality – the 3D effect of the carbon composite material combines with accurate, fibre-compatible processing to produce a very special gloss and feeling of luxury, as befits the vehicle. 3C-Carbon Composite Company tailored its manufacturing process to ensure that the client's stringent demands for surface quality were achieved while also supporting the vehicle's ambitious lightweight construction aims. Indeed, the company reports that it succeeded in reducing the weight of the interior fittings by almost two thirds in comparison with standard equipment.

3C-Carbon Composite Company says that carbon composite components can be produced to offer the same rigidity and strength as comparable components made of steel, but with two thirds of their weight. "Even compared with aluminium components, the weight advantage amounts to at least 30%, using far thinner material," says Frieder Knoedler, project manager at the company.

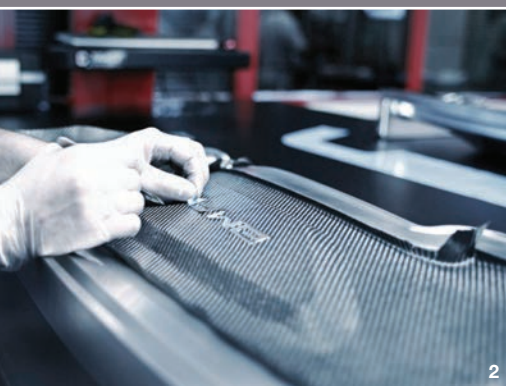
Carbon composite components are based on a material that consists of fine, high-strength carbon fibres that are up to ten times thinner than a human hair. "A fibre long enough to extend from the earth to the moon would still weigh only 25g," says Knoedler.

Between 1,000 and 24,000 of these fibres are combined to form individual strings. From these strings, weaving and sewing machines form multilayer fibre mats, which can be shaped into any 3D figure. This enables extremely complex structures and components to be formed. In the resin transfer moulding process, a liquid artificial resin is injected into the component moulds. Heat is applied to harden this resin, providing the required structure with its final shape and stability.

3C-Carbon Composite Company offers a single-source manufacturing process – including design, model and mould construction, production and bespoke finishing – for everything from top-end surfaces to simple structural components. The company says this ensures its production complies with the strictest requirements of the aircraft industry.

3C-Carbon Composite Company was founded in 2003, boasts 250 employees and operates out of a 12,000m² production area. Serving the motorsports (Formula 1, DTM, Le Mans), automotive, aerospace, mechanical engineering and medical technology sectors, its customers include leading German car manufacturers and renowned aerospace companies such as EADS and Eurocopter.

3C-Carbon Composite Company Reader Enquiry No. 501



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backinbusiness

STA San Antonio will re-enter the VIP completion market with a new completion centre, Aeria

San Antonio, Texas, USA, could be regarded as one of the birthplaces of large-cabin VIP completions. Its reputation dates back to the 1980s with the establishment of the Dee Howard Company, now known as ST Aerospace San Antonio (STA San Antonio). Recently the company announced that it will open a new VIP completion centre in the city, named Aeria Luxury Interiors (Aeria).

Leading Aeria will be Ron Soret, who began his VIP completion experience with the former Dee Howard Company. He says his staff have experience on more than 50 green completion projects and possess the knowledge and experience to handle a multitude of VIP aircraft modifications. "ST Aerospace is highly experienced and has a great reputation in the MRO business," says Soret. "Aeria will be run with the same passion and professionalism."

Complementing Aeria is the newest affiliate of ST Aerospace, DRB Aviation Consultants, an engineering firm also located in San Antonio. DRB has supported multiple VIP completions over the past 12 years and boasts Organisational Designation Authorisation (ODA), enabling

it to issue STCs with minimal oversight from the FAA. DRB says the ODA also allows improved control over the certification schedule for VIP completions.

STA San Antonio's West hangar is being converted from a maintenance hangar to a VIP completion hangar for Aeria by installing office spaces, conference rooms and various shops, such as cabinetry, upholstery and avionics/electrical. The hangar itself has been renovated with new insulation, skylights and a polished floor.

A key benefit of having Aeria located in San Antonio is access to the skilled labour pool in the region. Even though STA San Antonio went through a period of about 10 years where it focused on the MRO side of the business, the company felt the time was right to re-enter the VIP completion market. The hallmarks that made the Dee Howard Company a successful VIP completion centre – attention to detail, innovation, quality and maintaining a customer-first attitude – will be central to Aeria's core values. A large number of supporting businesses are also located in the region, which will bolster the efforts of Aeria to deliver world-class quality in its



interiors. Aeria will also have the support of the MRO side of the business.

STA San Antonio is located at San Antonio International Airport. The company provides maintenance and modification services for a wide range of narrow-body and wide-body aircraft, including most Boeing and Airbus models. With facilities covering more than 700,000ft², eight wide-body and seven narrow-body aircraft can be accommodated simultaneously for a wide range of maintenance work. STA San Antonio is fully certified by the US FAA (Class 4 certificate number SRXR430X) and EASA (145.5899).

Aeria Luxury Interiors

Reader Enquiry No. 502



1-3 A Boeing 787
concept by Aeria



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joining forces

A strategic partnership between Loher Raumexklusiv and Airbus Corporate Jet Centre promises quality and innovation in VIP interior design

1. Loher Raumexklusiv's VVIP galley concept
2. The company signed a partnership agreement with ACJC at EBACE 2012



1

At this year's EBACE show (held in Geneva, Switzerland on 14-16 May 2012), Loher Raumexklusiv showcased its efficiency and expertise in VVIP aircraft interior design with an impressive display of exclusive cabin interior components. Also at the show, the company signed a general agreement with Airbus Corporate Jet Centre (ACJC), which specialises in VIP cabin completion and associated services. The agreement forms a stable foundation for a strategic partnership.

Both ACJC and Loher Raumexklusiv have a strong corporate focus on quality and innovation. The idea behind pooling the two companies' skills and experience is to create synergies and a very strong team that will cooperate on VIP aircraft interior design projects.

Certified under 21G, 21J and Part 145, Loher Raumexklusiv boasts years of experience providing top-quality interior furnishings. At Aircraft Interiors Expo 2010, the company debuted its innovative concept for an extravagant VVIP galley that would enable culinary delights to be prepared freshly.

"The technically sophisticated, compact galley with bar area sets new standards in aircraft interiors," says Alfred Loher Jr of Loher

Raumexklusiv. "Equipped with the very latest technology, it meets the highest standards of ergonomics and functionality."

Loher Raumexklusiv was founded in 1931 and is now managed by Alfred Loher and his sons Alfred Loher Junior and Roland Loher. The company specialises in creating individual, high-quality interior fittings and one-off pieces of furniture. In fact, Loher Raumexklusiv now has more than 80 years of experience in developing, planning and manufacturing exclusive interiors and furnishings for villas, boardrooms, yachts and private jets. Now in the hands of the third generation, the family firm has developed into a modern, forward-thinking, internationally oriented firm devoted to craftsmanship, with a workforce of about 215 people.

The enterprise has been DIN EN ISO 9001 certified since 1996 and DIN EN ISO 9001-2008 certified since 2009. In 2011, the company gained DIN EN 9100 certification (Aerospace Quality Management) for the first time.

Loher Raumexklusiv has been licensed by the German Federal Aviation Office as a manufacturing plant for aircraft interiors under Part 21 Section A Subpart G for C1/C2 ratings (appliances and parts) since 2006, enabling the company to operate in the market as an independent supplier. In 2007, the company obtained a licence as an approved maintenance organisation under Part 145. The firm has also been audited by three European aircraft outfitters as a supplier of aircraft interiors.

The incorporation of Loher Engineering in 2009 and its certification as a design organisation by EASA under Part 21, Section A, Subpart J was a further milestone, enabling the company to offer expertise across the board, even for complex projects.

This year's EBACE was the first for the company. Loher Raumexklusiv is also a regular exhibitor at the Monaco Yacht Show and Aircraft Interiors Expo in Hamburg, Germany. The firm was recently awarded the Bavarian Quality Prize 2012 by the Department of Trade and Industry in Munich, Germany.



2

Loher Raumexklusiv

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Prestige Cabin Interior Consulting provides you with the specialist representation for all fields of your VVIP aircraft interior completion and maintenance requirements.

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ingoodhands



Nick Gleis Photography

Prestige Cabin Interiors Consulting provides specialist, independent representation for all fields of VVIP aircraft cabin interior completions, modifications and maintenance requirements. The company has worked on many successful wide-body and narrow-body VVIP cabin interior completion projects, culminating in successful deliveries (of many aircraft) for two head-of-state operators. The company has almost two decades of experience in VVIP aircraft operations and 40 years of experience in aircraft maintenance.

"A successful project is completed on schedule, within budget, to the highest quality standards, and most importantly, to the satisfaction of the customer," comments John Sambolec, director of Prestige Cabin Interiors Consulting. "Managing the complexity of an aircraft interior completion requires years of experience that is only acquired through previous accomplishments."

Each client is provided an experienced full-time project manager who embodies

the commitment and dedication that is fundamental to the company. The aim of providing full-time management is to ensure that attention is given to the smallest detail, the project is monitored consistently and decisions can be made and approved swiftly, so that schedule is not impacted.

The company believes a comprehensive technical specification, forming part of the completion agreement, is key to a successful aircraft interior completion. Prestige Cabin Interiors Consulting has found that for the best results, the project manager's involvement should commence with the creation of the aircraft's technical specification, the completion centre selection process and contract negotiations. The company says that commitment, dedication and experience are essential to provide aircraft owners with the reassurance that their major investment will receive comprehensive, round-the-clock, professional support.

Prestige Cabin Interiors Consulting Reader Enquiry No. 504

touchofclass

Founded in 1971, Canada-based Duro-lak manufactures and supplies industrial coating products for wood. The company's commitment to innovation has resulted in the development of its own range of speciality coating products, so it can offer a large inventory of various high-quality choices.

As part of its research and development programme, Duro-lak's qualified chemists liaise constantly with international suppliers. The aim is to provide the latest technology available and to meet customer requirements, while simultaneously complying with increasingly stringent environmental specifications. Sustainability is of great importance to Duro-lak and the company is developing low-VOC, water-based coating products designed to meet high environmental standards.

Duro-lak entered the aviation world with the development of a fire-retardant veneer coating system for luxury aircraft cabins engineered to comply with the FAR 25.853 A&B requirement. This 'high-solids' coating was designed to provide durability, adhesion, flexibility and fire resistance and has a wet-look finish. The coating can be applied on any kind of wood – even the

exotic types that are particularly popular in the business jet industry.

Duro-lak prides itself on friendly and professional customer service, with helpful staff on hand that will be happy to discuss the company's products and services in depth.

Duro-lak

Reader Enquiry No. 505





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Used in an increasing number of applications within the commercial aircraft market, Zotefoams says its Zotek F polyvinylidene fluoride (PVDF) foam is growing in popularity due to lighter weight and enhanced performance for solutions such as flex hoses, ECS ducting, window seals, thermal insulation, etc.

Zotek F OSU is now also being used in business jet applications such as carpet underlay, soft touch panels, decorative composite laminates as well as pipe insulation, general insulation and heat shields. Specified by Boeing, NASA and NATO, Zotek F has become a favoured choice for an increasing number of aviation applications where low weight is critical.

Developments in PVDF polymer technology have led to the introduction of three new grades of material – the Zotek F OSU range in Flexible (33kg/m³), Semi-rigid (34kg/m³), and Rigid (74kg/m³) – which are designed to combine excellent FST (flame, smoke and toxicity) performance with exceptionally low heat

release, in doing so meeting the requirements of FAR 25.853d.

The company says its new range offers all of the qualities you would expect from a PVDF polymer – resisting UV, chemicals and operational duties at temperatures up to 150°C – yet its fine closed-cell structure offers high impact resistance, presents a total fluid barrier and provides excellent noise and heat insulation.

Zotefoams' bespoke manufacturing process of nitrogen infusion and free expansion creates high-purity, lightweight foams with uniform, controlled cell size. Zotefoams says this generates outstanding isotropic mechanical properties and exceptional performance-to-weight ratios. The Zotek F material offers ease of fabrication via welding, machining and thermoforming and when coupled with adhesives, composite solutions with fabrics and laminates gives greater flexibility in the creation of low-OSU interior solutions.

Zotefoams

Reader Enquiry No.506



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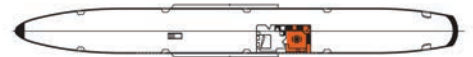
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