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SEPTEMBER 2012

THE INTERNATIONAL REVIEW OF BUSINESS JET INTERIOR DESIGN AND COMPLETION

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EDITOR

Izzy Kington

EDITOR IN CHIEF

Nick Bradley

PROOFREADERSAubrey Jacobs-Tyson, Frank Millard,
Mary Russell**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**

Lauren Ansell, Guy Bird, Chris Colvin, Ben Frain

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

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Email: aircraftinteriors@ukipme.com **NBAA** (member)**Annual Subscriptions (four copies)**

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siblingrivalry

You may or may not have noticed that we have put a car – the beautiful Daimler Maybach – on the front cover of this issue. If you didn't notice – don't worry – for a long time the two sectors have been so entwined in terms of materials and design language that it can be difficult to see where one ends and the other begins. The influence of car aesthetics isn't just obvious in the first business jet designs of automotive stalwarts like Brabus and DC Design; it's plain to see the racing lines in OEM designs ranging from the new Bombardier Learjets to the Cessna Corvalis TTx. This is only natural given the shared end users, the overlapping pool of design talent and the cross-pollination of suppliers. All of which is explored in depth in our feature on page 22, where we also assess what each sector can learn from the other – it's not one-way traffic.

Manufacturing differences, too, are not as great as some might think. The lean manufacturing principles that were forged and developed in the automotive industry are now reaching maturity in the business jet arena, as explored in our feature on page 30. I saw this for myself when I toured the facilities of Bombardier and Flying Colours Corp in March. Each was dedicated to continually honing their techniques to meet their needs – principally to complete aircraft to the highest possible quality, on time. These, like short-run supercar lines, are no mass-production operations.

The automotive thread that runs through this issue also provides a car designer's perspective (page 14), crops up in the cross-sector portfolios of some of the USA's finest designers (page 72), takes in the possibilities of carbon fibre (page 118) and even takes over our lifestyle section (page 128)! But fear not, non-petrolheads, it does make lots of pit stops – for articles on showrooms (page 38), medical installations (page 56), and Edese Doret's BBJ designs for Royal Jet (page 64), as well as previews of this year's NBAA and MEBA tradeshow (pages 85 and 92, respectively). There is also a profile of Steve Taylor (page 48), whose amazingly varied career prior to becoming BBJ president took in engineering, flight testing and piloting. In May I was lucky enough to be a passenger on a BBJ for the first time, piloted by Steve and chief pilot Rene Gonzalez. Although the car and jet industries may quibble about who's better, for me personally, nothing beats the magic of travelling through the air in a VIP jumbo.



Izzy Kington, editor

Cover Image:
The Daimler Maybach

"The automotive industry has tended historically, especially in the USA, to be form-oriented, while aerospace has been function-oriented, but now the two are beginning to meld. Aerospace is following the fluid aesthetics of automotive interiors while automotive is following the exterior aerodynamics of aircraft"

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THE BOUNDARIES BETWEEN BUSINESS JET AND
AUTOMOTIVE INTERIOR DESIGN ARE BLURRING
Guy Bird, Business Jet Interiors International



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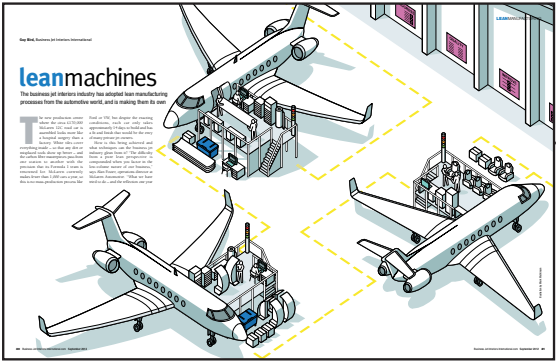
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ADOPTED LEAN MANUFACTURING PROCESSES
FROM THE AUTOMOTIVE WORLD, AND IS MAKING
THEM ITS OWN

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OEMS AND COMPLETION CENTRES ARE TAKING THE
TEDIOUS OUT OF SPECIFYING THE INSIDE OF A
CORPORATE JET

Chris Colvin, Business Jet Interiors International



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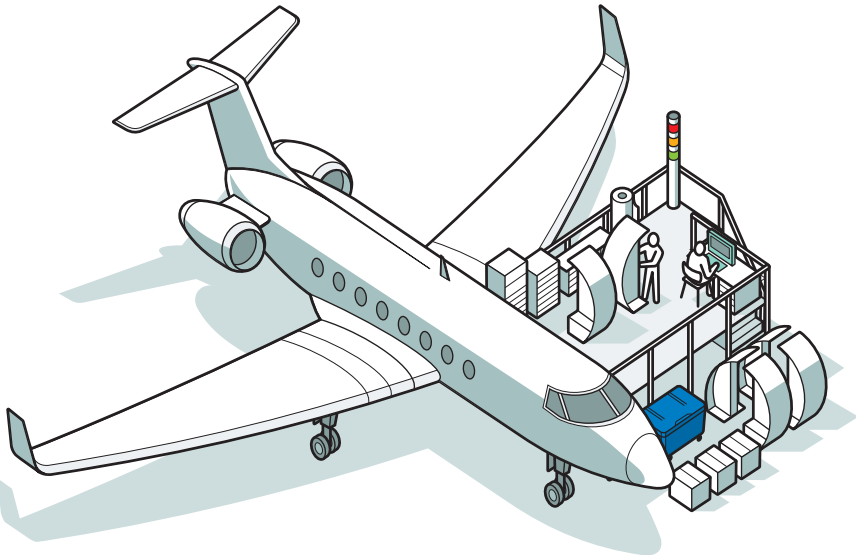


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AGEING HEADS OF STATE, POLITICAL LEADERS
AND BILLIONAIRES INCREASINGLY WANT THE
SECURITY OF AN INTENSIVE CARE WARD WITH
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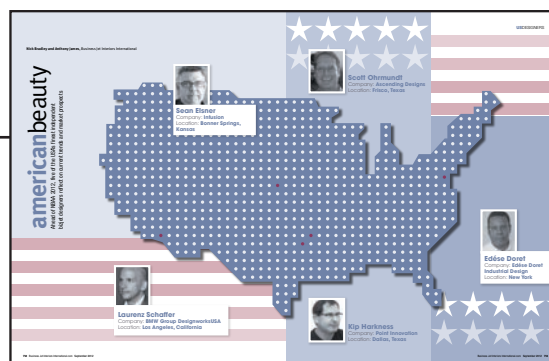


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AHEAD OF NBAA 2012, FIVE OF THE USA'S FINEST
INDEPENDENT BUSINESS JET INTERIOR DESIGNERS
REFLECT ON TRENDS, REGIONAL DIFFERENCES, AND
STANDOUT PROJECTS PAST AND PRESENT

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GOOD COFFEE IS NOW UBIQUITOUS ON THE
GROUND AND PASSENGERS HAVE HIGH
EXPECTATIONS FOR THEIR BUSINESS JET
BREW – SO GALLEY INSERT MANUFACTURERS
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The AeroLoft has eight private sleeping berths and a changing room

First BBJ 747-8 begins completion

A BBJ 747-8 has been delivered to Lufthansa Technik for the completion of its VIP interior, following the installation of the first AeroLoft by Boeing Global Transport & Executive Systems. The AeroLoft was designed and built by Greenpoint Technologies. It boosts cabin space by 393ft² (36.5m²) to 5,179ft² (481.2m²). Developed specifically for the BBJ 747-8, the AeroLoft is located above the main cabin between the upper deck and tail of the aircraft. Two additional BBJ 747-8s are scheduled to be fitted with the AeroLoft in 2012. In Hamburg, Germany, Lufthansa Technik has now begun work on the customised interior completion. The BBJ 747-8 should be delivered in mid-2014.

Flight Display Systems introduces Fly HD

Flight Display Systems has introduced a new concept in aircraft video technology. Fly HD is a complete high-definition (HD) system providing full 1080p video quality. Flight Display Systems had two goals when designing Fly HD: to build high-quality components and make them simple to install. The company says these goals were achieved by engineering the components to use HD-SDI signals on the common coaxial cable that is already installed on many aircraft, reducing the number of converters required and limiting the amount of rewiring necessary.

Fly HD monitors are sized from 7in to 55in in widescreen format.



GDC delivers head-of-state ACJ 320-200

Gore Design Completions (GDC) has delivered its first aircraft of 2012, an ACJ 320-200 for a returning head-of-state customer. The aircraft has a private stateroom and lavatory, executive office, conference room, and staff seating area.

The interior was designed by a team of GDC designers, led by owner and president Kathy Gore-Walters. This is the second interior the company has created for this customer, the first being for a BBJ 767 completed in 2008. "It is the ultimate compliment when a customer returns to GDC with another aircraft interior modification," said Gore-Walters.

This ACJ 320 delivery is the first in a string of wide- and narrow-body aircraft that the company is due to deliver in 2012. The company – which is based in San Antonio, Texas, USA – continues to hire employees even now this ACJ has been delivered, as the workforce from the project was reallocated to existing projects. With 700 employees (more than 350 direct and nearly 350 contract), GDC's workforce is larger than ever before.

Eurocopter to establish helicopter completion centre in China

In a signing ceremony witnessed by German Chancellor Angela Merkel and Chinese Prime Minister Wen Jiabao, Eurocopter and Tianjin Free Trade Zone (TFTZ) inked a memorandum of understanding (MoU) to explore the creation of a completion and customisation centre for Eurocopter's Ecureuil family of light helicopters in Tianjin. The China Completion Center will also be designed to enable future growth in accommodating other Eurocopter helicopter types.

Eurocopter and TFTZ, a partner of Airbus for its Tianjin-based A320 final assembly line, would form a joint venture, with the target of commencing operations by the end of 2013. The China Completion Center will be located adjacent to Airbus' Tianjin facility to allow for greater synergy within the EADS Group.

"Eurocopter will be able to ramp up production, our customers can benefit from faster delivery and prompt services, and the local market will gain an economic boost while also benefiting from international-standard aviation skills," said Lutz Bertling, president at Eurocopter.

Ecureuil helicopters are used for aerial and utility work, police missions, business aviation and heli-tourism.



The Gulfstream-designed CMS on both aircraft enables digital control of the cabin system network, including HD audio and video components



Unique bed part of Flying Colours' fifth Global Express refurbishment

In early July 2012, Flying Colours Corp completed its first Global Express refurbishment and maintenance project for a Malaysian customer, the fifth Global Express refurbishment the company has completed in the last 12 months.

The work included the refurbishment of all interior soft goods, woodwork and numerous IFE upgrades, which focused on modernising the aircraft with iPad holders and a Honeywell iPod dock. A particularly unique element of the project was the modification of the aft cabin to enable the installation of a permanent custom-made bed, which is located opposite two new single seats and a customised side-ledge. This was the first time such a modification has been undertaken by Flying Colours on a Global Express. It was accomplished under a new STC, which is to be validated by the Malaysian authorities. The work also included painting the livery and completing numerous maintenance inspections, service bulletins and modifications.

Meanwhile, subsidiary JetCorp Technical Services has begun work on its latest 'ExecLiner' conversion of the Bombardier CRJ 200 regional jet. The CRJ will be transformed into a 22-seat executive VIP configuration and is destined for a private Indonesian client.



G280 and G650 earn type certificates

The G280 (pictured) has earned type certificates from the US Federal Aviation Administration (FAA) and the Civil Aviation Authority of Israel (CAAI), and the G650 has received FAA type certification. Gulfstream plans to deliver the first of each aircraft before the end of 2012. The G280 cabin is 25ft, 10in long, providing room for a large lavatory, an improved galley and increased storage. Customers can select from three floorplans, which seat from eight to 10 and berth up to four, with storage of up to 154ft³ (4.63m³). The unfinished G650 cabin is 102in wide and 77in high, providing for a longer living area, more seat recline, expanded legroom and increased stateroom capabilities.

Associated Air Center completes 23rd BBJ

Associated Air Center (AAC) of Dallas, Texas, USA, has delivered its 23rd green BBJ completion, for an energy company based in eastern Europe. The interior includes a large sitting area complete with bench seating, retractable tables and individual 'captain's chairs', in addition to a custom-designed lavatory and bedroom. Other accoutrements include a fully equipped CMS incorporating IFE, WiFi communications and flat-panel monitors.

"This delivery showcased our design savvy, craftsmanship and our cabin interior expertise," said Chris Schechter, vice president and general manager at AAC. "The beauty and complexity of our designs are resonating with our customers and translating to greater brand awareness; our customers are coming to us in greater numbers from a wide variety of markets."

Among other recent achievements are AAC's contract award for an ACJ 330-200 series wide-body aircraft and the opening of its 4,000ft² VIP custom interior design centre, which includes a full-scale narrow-body VIP cabin interior.

Sabreliner delivers UH-60 to Bahraini military

Sabreliner has delivered a fully customised Sikorsky UH-60 VIP Black Hawk Helicopter to the Royal Bahraini Air Force, which will use it for a variety of missions, including transporting heads of state. The helicopter was modified at Sabreliner's facility in Perryville, Missouri, USA, under a Foreign Military Sales programme.

The cabin features four VIP seats and divan seats covered with classic cowhide leather from Townsend. The cockpit door and eyebrow panels were covered in Andes leather from Spineybeck, while the centre console trim pieces and crew seat frame covers, toekicks and closeouts were covered in Velluto Pelle leather from Spineybeck. The floors, lower door panels, and seat bases were carpeted with a custom colour from Kalogridis. Forward cabinets and the four VIP seat tables were covered in fig teak veneer from Carl F. Booth, with the latter having sycamore/walnut inlays. Electronics include four iPod docking stations and a 17in moving map from Flight Display Systems. Sabreliner's Clam Shell Door was also installed.

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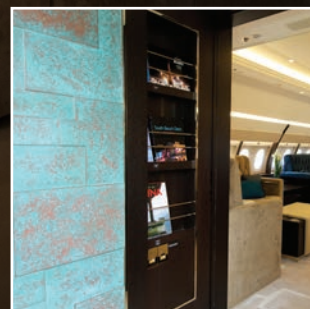
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Expansion at Comlux America

Comlux America has opened a 129,000ft² ACJ and BBJ completion hangar at Indianapolis International Airport, USA. The facility carries EASA, FAA, Bermuda, GACA (Saudi Arabia) and Aruban Part 145 repair stations. All supporting backshops are integrated, including cabinetry, sheet metal, systems, avionics, upholstery and finish departments. Additionally, the company's interior design centre, engineering department, certification group, technical publications department and document control centre are also readily accessed from the hangar floor, along with the programme management offices, procurement, planning and senior management team. The facility is also equipped with customer offices, including a prayer room for Middle Eastern clients, and a medical clinic for employees.

SR Technics delivers second VIP aircraft

SR Technics has redelivered its second VIP aircraft on time to a Middle Eastern customer. After a complete refurbishment at the company's VIP facilities in Zurich, Switzerland, the cabin features an upgraded IFE system and an additional communications system. The refreshed cabin also features new carpeting and flooring, reupholstered seats and new handcrafted furniture and cabinets.

In addition, the cabin has been reconfigured, enabling the customer to adapt the interior setup to accommodate changing operational needs.

A heavy maintenance C-Check was carried out in parallel, enabling downtime to be kept to a minimum.

"I feel very honoured that a government has entrusted our team with their aircraft, and we are very pleased with the completion of our second VIP project, especially with regards to our high-quality standards and on-time delivery," said André Wall, president at SR Technics.

Bell and Cessna open facility in Singapore

Textron companies Bell Helicopter and Cessna Aircraft Company have opened a new regional service centre in Singapore at Seletar Aerospace Park. The new facility offers repair, completion, fulfilment, maintenance and customisation solutions.

"The grand opening of our Asia Pacific service centre brings to life a vision of providing exceptional support to our current and future customers in this important growth region," said John L. Garrison, president and CEO of Bell Helicopter. "It is the result of years of planning for an increased presence in Asia Pacific that is a key market for both Bell Helicopter and Cessna."

The 160,500ft² service facility is equipped with hangars for Bell and Cessna products, a paint booth, warehouse, overhaul and maintenance shops, offices and a 77,000ft² ramp. Plans for the facility include training, customisation and completions, major refurbishment projects, labour and parts sales, as well as MRO.

BBJ3 agreement for Jet Aviation Basel

Jet Aviation Basel was recently contracted by an undisclosed client from the Middle East to complete a VIP cabin for a BBJ3. The work is scheduled to begin in the third quarter of 2012. The spacious interior has been designed by Studio E/motions, with a layout incorporating a living area, a conference/dining room and a private bedroom with en-suite bathroom.

Jet Aviation Basel recently delivered two newly completed ACJ340s – an ACJ340-600 and an ACJ340-300 – to undisclosed customers. Both aircraft feature highly customised VVIP interiors, designed by Studio E/motions and Andrew Winch Designs, respectively. During 2012 Jet Aviation Basel also delivered an ACJ319 for an undisclosed customer. The interior was completed to an extremely high-specification VVIP layout designed by Andrew Winch Designs. "I have never seen such complex and elegant interiors on any aircraft and the success of these projects is a credit to the talented people of Jet Aviation," said Neil Boyle, Jet Aviation Basel's vice president, completions centre.

"With such beautiful and complex designs, as well as the use of new materials in each aircraft, it has been hugely rewarding to see these projects come to fruition," said Elisabeth Harvey, Jet Aviation Basel's interior design manager.



racinglines



Ripley and Ripley/Top Gear

Jason Castriota provides an insight into the work of a supercar designer

What are your favourite past projects?

I have been very fortunate to work on a myriad of exciting projects for very iconic brands, ranging from production cars to concepts and bespoke one-of-a-kind cars for renowned collectors. If I were pressed I would have to say the first few projects that I won when I was at Pininfarina – namely the Maserati Birdcage 75 concept, the Maserati Gran Turismo and the Ferrari 599 GTB Fiorano. Most recently, I designed the SSC Tuatara (pictured above), which is set to challenge Bugatti as the world's fastest car. The Birdcage was a one-of-a-kind concept, whereas the Granturismo is produced in roughly 4,500 units a year and the 599 was produced in fewer than 1,000 units a year.

How does the design process work?

Designing a car is a huge undertaking. It takes two to three years and sometimes longer. The designers who generated the key directions lead a handful of supporting designers to execute and refine the design. This team works with scores of engineers to realise the final production-feasible car.

What limitations are there?

The biggest limitation is cost. Cars are incredibly complex and the investments are so large it is really difficult for many to fathom. New cars can cost anywhere from US\$500 million (£312.32 million) to more than US\$1 billion (£0.63 billion) to develop, and every penny counts. Thus designers

and engineers must collaborate and compromise to find the best solutions possible that fit our budgets. You learn to pick your battles!

How much customisation is possible?

Exotic, limited-series cars – and above all, bespoke cars – allow greater freedom and the ability to incorporate specific customer requests.

What are your favourite materials?

Carbon fibre allows the most leeway in shape and form, but it is very expensive to produce so is limited to more exotic and/or bespoke projects. It is still amazing to see an artisan metal-crafter hand-shape aluminium. It is a true art form.

What inspires you?

I have always been inspired by nature – and in particular the streamlined aquatic species such as sharks and manta rays. I am also extremely inspired by the blend of art and science that we see in aerospace, jet fighters, race cars – as these objects blend mechanics with streamlined forms.

What trends are shaping car design?

Material technology is a huge driver in the automotive industry and as designers we are always curious to see the horizon that can offer us new design opportunities. Obviously alternative drive-train technologies can have a large impact as well, as we move away from the idea that we need to have a giant engine taking up a third of a vehicle's space. Distributing batteries or fuel cells along the floor of a vehicle and having small motors driving the wheels opens up a lot of design and space utilisation opportunities.

What concerns are growing in importance in the automotive sector?

The biggest concern is efficiency. How do we make cars more efficient – smaller, lighter, with less power – but maintain the safety, comfort and performance we have grown accustomed to?

What would be your dream project?

Automotive wise, I am looking forward to putting my spin on a more mass-produced car. Beyond that, I would really love to work on an aerospace project! I am only now beginning to explore the possibilities of the world of business jets. The initial response has been encouraging and I can't wait to get my first projects under way.



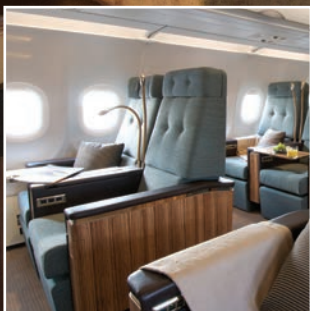
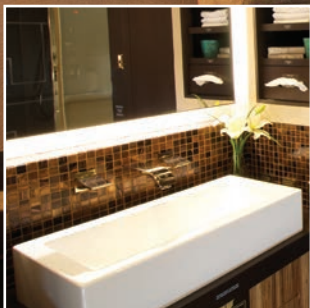
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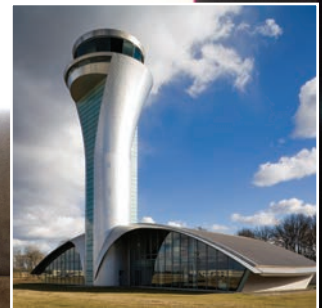
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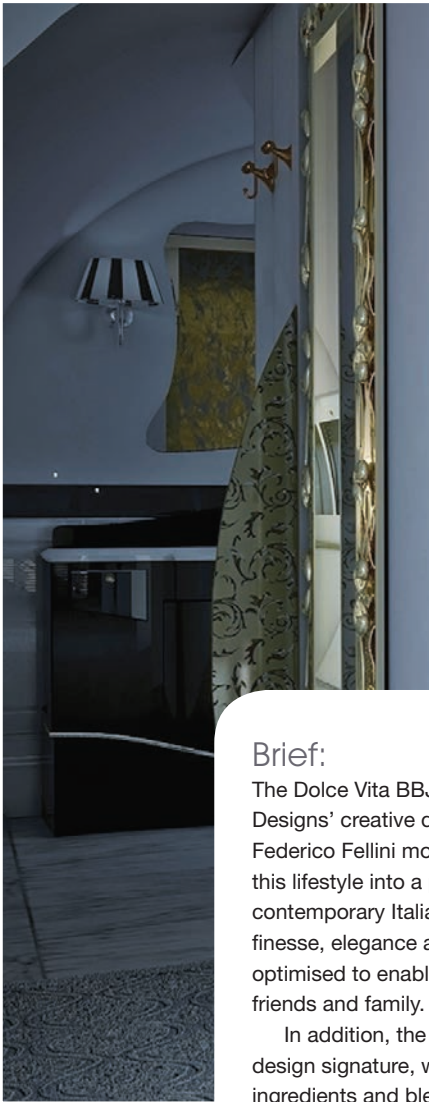


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italianjob



Brief:

The Dolce Vita BBJ is a tribute to the Italian heritage of AirJet Designs' creative director Jean-Pierre Alfano. Inspired by the 1960 Federico Fellini movie *La Dolce Vita*, Alfano set about to translate this lifestyle into a private jet design. Also influenced by contemporary Italian furniture, the design aims to encapsulate finesse, elegance and artisan craftsmanship, while offering a layout optimised to enable private jet owners to enjoy flight time with friends and family.

In addition, the project serves as a showcase for the company's design signature, which Alfano describes as "taking the finest ingredients and blending them with technical knowledge, passion and individual inspiration".

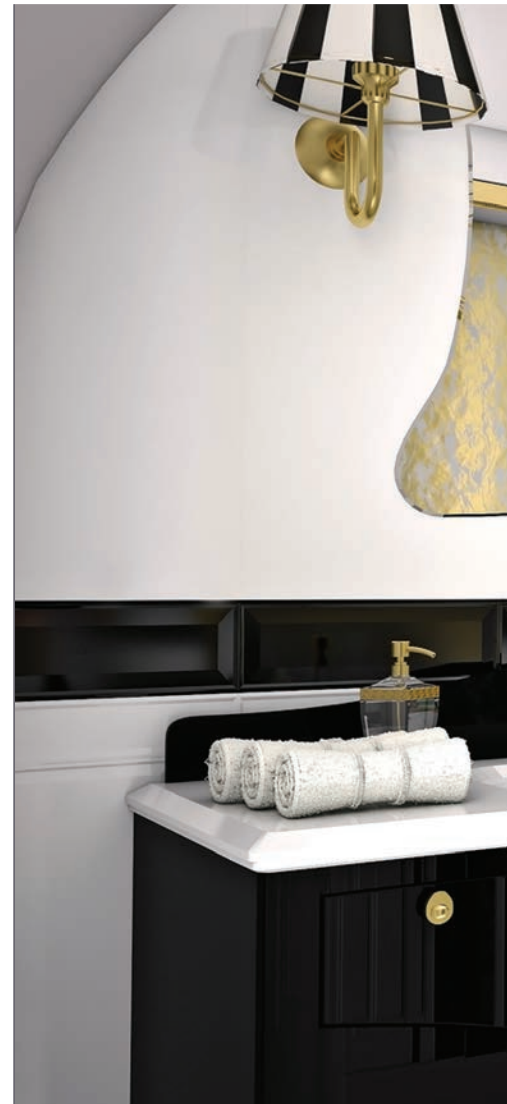
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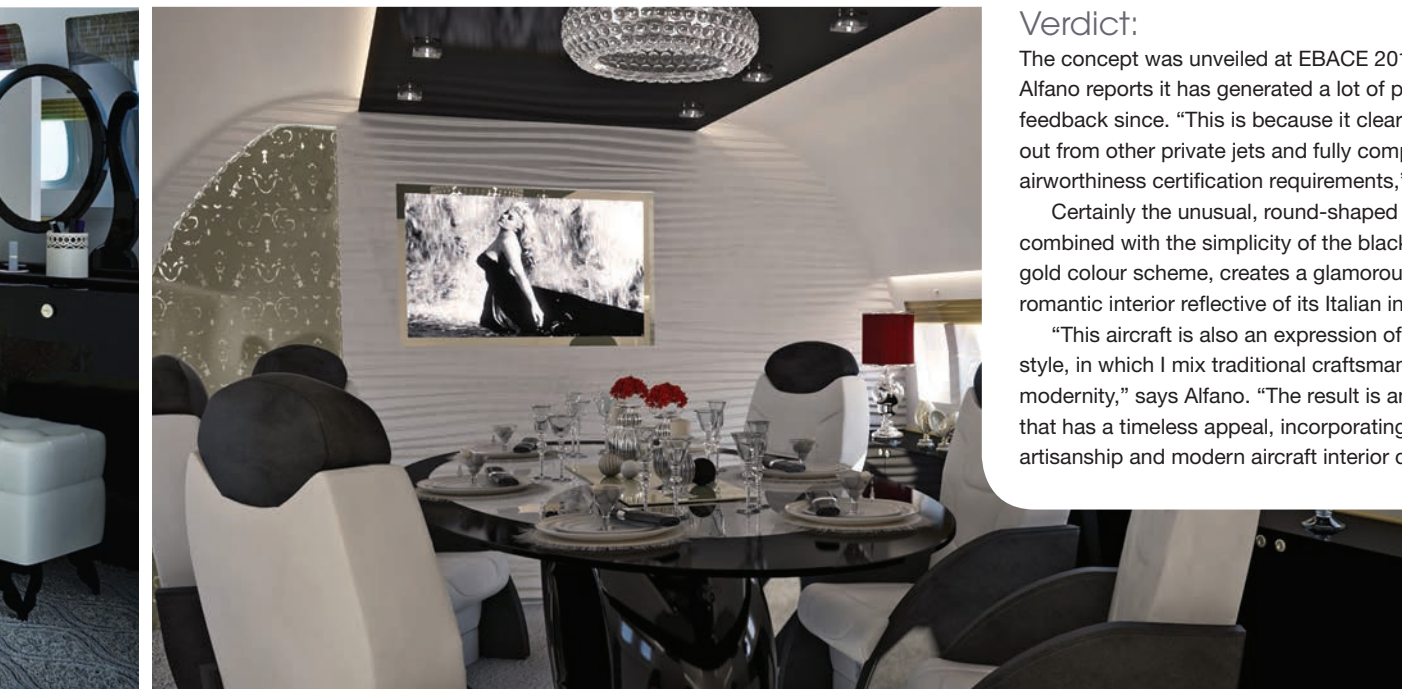
The aircraft's layout consists of two lounge areas and a master bedroom fitted with semicircular divans and a round bed. Rounded shapes were used to make the living spaces stand out from the straight bulkheads conventionally seen in aircraft, and to invoke a warm and friendly atmosphere.

The furniture was also designed as a departure from the traditional monument styles seen in many aircraft, and to give the jet owner and their guests a feeling of flying in their own unique luxury hotel or villa. This sensation is amplified by the subtle integration of decorative accessories such as dinnerware, lamps and ceiling lights; the painstaking care paid to the selection of high-end materials; and special design details such as a gold relief decoration on the sliding doors.

Materials include soft Italian leather and matte crocodile skin for the divans, high-end silk and cashmere for linens, and Carrara marble flooring for the master lavatory.

The styling is an updated version of neo-baroque, with a sleek mix of black and white elements. This simple colour scheme is complemented by carefully chosen red accents and gold details. For example, golden finishes can be found around the flat-panel screens, the shutters and the sliding doors.



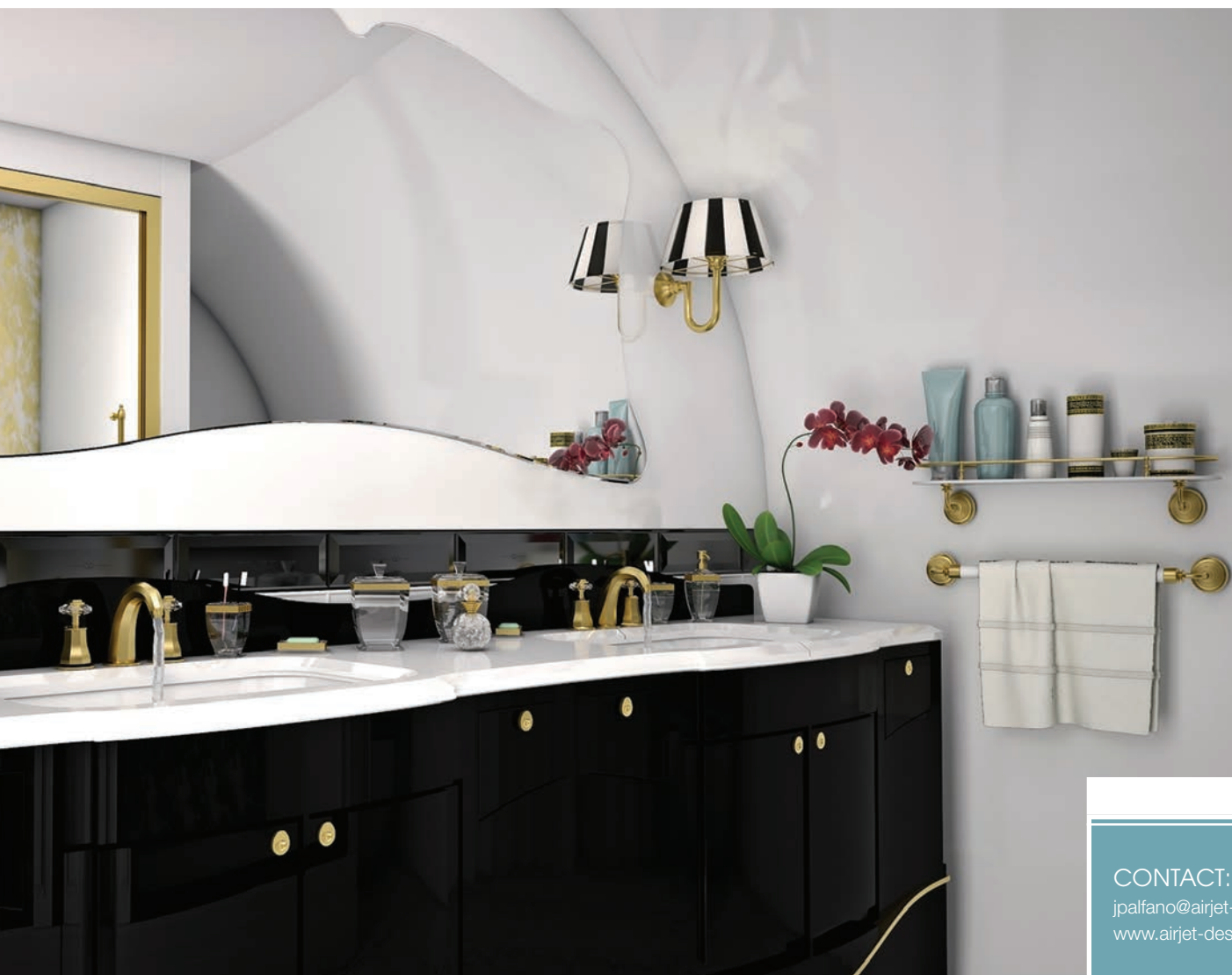


Verdict:

The concept was unveiled at EBACE 2012 and Alfano reports it has generated a lot of positive feedback since. "This is because it clearly stands out from other private jets and fully complies with airworthiness certification requirements," he says.

Certainly the unusual, round-shaped furniture, combined with the simplicity of the black, white and gold colour scheme, creates a glamorous and romantic interior reflective of its Italian influences.

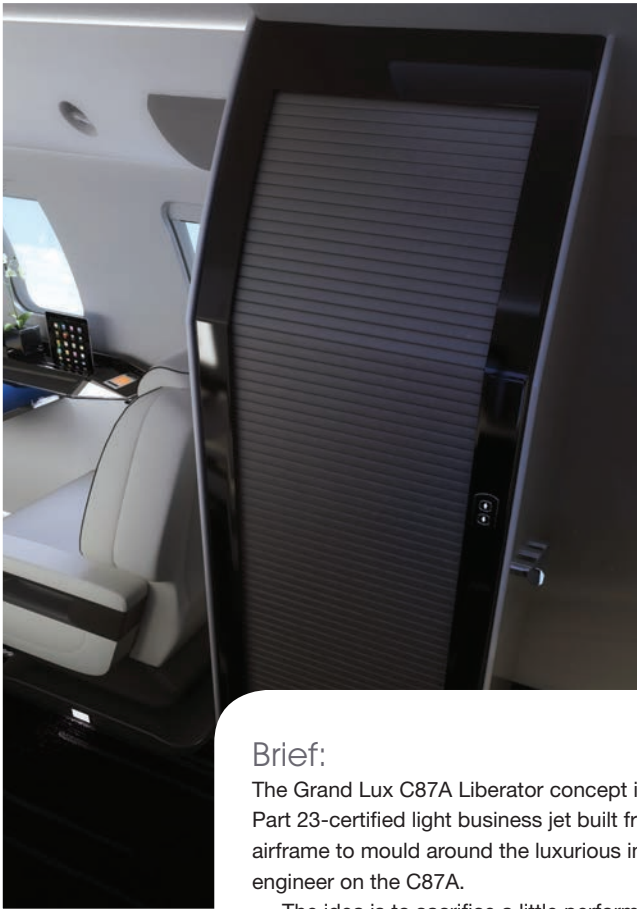
"This aircraft is also an expression of my design style, in which I mix traditional craftsmanship with modernity," says Alfano. "The result is an interior that has a timeless appeal, incorporating luxury artisanship and modern aircraft interior design."



CONTACT:

jpalfano@airjet-designs.com
www.airjet-designs.com

innerbeauty



Brief:

The Grand Lux C87A Liberator concept is Aerospace Designworks' vision for a FAR Part 23-certified light business jet built from the inside out. "We are adjusting the airframe to mould around the luxurious interior," says Javier Quintana, chief engineer on the C87A.

The idea is to sacrifice a little performance in return for the most luxurious and spacious cabin in its class. "The C87A Liberator is not intended to be another Ferrari, but the first Rolls Royce in the segment," explains Quintana. "It's not meant to be the fastest nor the lightest; it's meant to be the most spacious and luxurious."

Description:

With a height of 6.1ft and width of 7.5ft, the cabin has room for four full-size, air-conditioned and heated trackable VIP seats, plus wide sideledges with stowage spaces, tablet and phone cradles, USB connectivity, power outlets and dual-size cupholders. Aerospace Designworks also envisages the incorporation of retractable electric touch-sensitive tables, used to connect with phones, tablets and WiFi; acoustic wall valance panels; 13.5in x 19in windows with electrical shades; and up-and-down-wash LED mood lighting.

The entry area includes a belted observer seat; a crew closet with upper tambour doors; a coat closet with electrical tambour doors and wheelchair stowage; and a refreshment centre with wet sink, espresso station, bottle compartment (other options include stainless steel dispensers and a microwave), ice chest, waste disposal, dimmable illuminated placards, and more storage space.

The sixth passenger is seated on the belted toilet, which will be certified for take-off and landing. The lavatory area will have a rigid electrical pocket door for privacy, and also feature two windows and a serviceable vanity with storage compartments, no-touch taps and soap dispenser. The toilet shroud will be provisioned with personal service product dispensers and upgradable to bidet configuration with showerhead and pan.

Other standout features include a large baggage compartment that will be accessible both from the cabin in flight, and externally via a full-height access door.

Materials include high-gloss black and white piano veneer; leather seats and valances; Ultrasuede sidewalls and headliner; and a Carrara marble finish.





Verdict:

The concept started as an employee training exercise, but the company soon came to believe it had real potential – perhaps for up to 2,000 units over the next 20 years, at US\$8.5 million per aircraft. Aerospace Designworks hopes to finalise the conceptual configuration by the end of 2012, secure financial backing in 2013, and open a bidding process for component manufacturers later that year. Quintana says the company will set up an assembly line in the USA or South America, “inspired by the great automotive manufacturer mega factories such as McLaren and Ferrari”. He envisages it entering service in 2021.



CONTACT:

Javier Quintana
+1 214 906 2707
www.aerospacedesignworks.com

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1. The BMW Zagato Roadster targets the same customers as private jets



roadtoriches

The boundaries between business jet and automotive interior design continue to blur

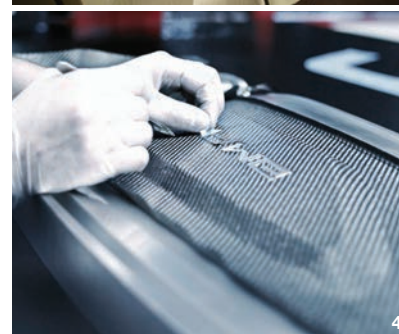
It would be surprising to find a private jet owner who didn't also own a very high-end car or two. Given the common ground between the industries, it is perhaps not surprising that several well-known automotive suppliers have crossed over into the VIP jet business recently.

One of these is Brabus, a German company that has 'tuned' (customised) the performance and aesthetic of Mercedes cars since 1977. At EBACE 2012 it unveiled its first two concept jet interiors. "We've always offered yacht work but also had supercar clients requesting changes to their jets," says Constantin Buschmann, project manager of Brabus's new aviation division. "They said, 'Why can't I have the same customised interior from my car – with its stitching and carbon fibre and Alcantara – in my private jet?' Of

course modifying an aircraft takes more than putting a different piece of leather on an armchair – certification is a lot more complicated than at first glance – which is why we are taking a serious approach now with good partnerships."

Those aircraft industry partners are RUAG Aviation, which will handle redesign and completion at its base in Munich, Germany; Privat Air, which will offer aircraft sourcing, purchasing and management; and Happy Design Studio, which will work on the exterior livery designs. Brabus's contributory competencies "combine engineering and technical aspects with luxury aspects", according to Buschmann.

The first interior designs, based on Bombardier's Global Express, clearly betray their automotive inspiration – from the perforated cream leather, sculpted seats, exposed diamond-pattern stitching and dark wood veneer



furniture inserts of the Elegance cabin, to the matt black leather, aluminium surfaces and contrasting red stitching of the Sportive version. A great deal of attention has been paid to making the fit and finish look immaculate.

Buschmann says feedback from EBACE was positive and he is now targeting two types of customer – “those who buy an aircraft from the manufacturer but are not satisfied with it as it is and want to customise it, or the ‘buy used and freshen up’ approach where a new layout is needed as well”.

Air Works of India is an aircraft MRO provider that has solicited an automotive expert to do something similar. At the 2012 Hyderabad Air Show it launched a prototype with Dilip Chhabria's DC Design. Chhabria is an ex-General Motors car designer who decided to set up his own company back in Mumbai, India, after gaining expertise in the USA early in his career. The prototype serves as “a calling card” to alert target customers to the new refurbishment and retrofit service, according to Vivek Gour, Air Works' managing director.

Gour thinks the cross-pollination of the bespoke car and aircraft industries will continue. “The trend for auto design companies getting into the aircraft interior market is on the rise,” he says. “Corporate jets are increasingly

seen as a smart investment. Business leaders and the wealthy elite not only prefer travelling exclusively and hassle-free, but are also increasingly seeking customisation to make their jets truly ‘private statements’.”

Carbon footprint Beyond the taut leather, smart wood and matte metal so often found in modern car interiors, Jonathan Salzman, CEO of California-based aircraft refinishing and detailing business International Aero, sees the aircraft industry's use of carbon fibre as another key car-influenced trend. “Carbon fibre has been used heavily in aerospace from a structural standpoint for a long time, but the automotive industry has taken it over as an aesthetic element,” he says.

Unsurprisingly, Frieder Knoedler of materials specialists 3C Carbon Composite Company – whose client list includes BMW and Mercedes' performance arm, AMG – is a big fan of carbon fibre too, describing it as “modern, high value and producing a special feeling of luxury”. He also justifies it for business jets from a price perspective: “The costs for mould-and-die production are relatively low in the carbon composite industry, so carbon fibre solutions could be very cost-efficient as the production process for small-scale series has similarities to

2. Brabus's Sportive design for the Bombardier Global Express
3. The Elegance interior by Brabus
4. 3C is now applying its carbon fibre expertise in the business jet market
5. The aircraft mock-up developed by Air Works of India and DC Design

prototype processes,” he says. “Carbon fibre solutions only become expensive if you look at large-scale productions.”

No excuses Knoedler's assertion would suggest that the perception from some quarters – that business jets cannot match the quality of high-end motors because of a lack of economies of scale – could be false. Howard Guy, director of UK-based luxury transport design company Design Q, agrees: “What is constantly thrown back at me from the aircraft industry is that it's all very well for the car industry, that because their products are mass-produced it can afford the research and development costs. But that's twaddle.”

Guy goes on to cite the circa £1.2 million Aston Martin ONE-77 supercar as a prime example of excellent small-series car design (a maximum of 77 will be made). “You can do things high-volume carmakers can't do,” he says.

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BMW targets the jet set

The official press photos of the BMW Zagato Roadster unveiled at 2012's Pebble Beach this August were the usual slick mix of angles and locations bar one aspect – a mild plot line involving a glamorous couple and a private jet. The pitch from the Bavarian carmaker is fairly obvious – a BMW Zagato Roadster is just the sort of potentially limited-edition vehicle VIP jet users should consider for their private airport transfers.

For now, the car is officially just a heavily modified Z4 one-off designed in conjunction with the Italian coachbuilder Zagato to wow the crowds at the US connoisseur car event, but BMW and Zagato have already shown a Coupe version at the European equivalent of Pebble Beach – Villa D'Este on the shores of Lake Como in Italy – in May 2012.

And as both events attract similarly super-wealthy car (and no doubt jet) collectors in their droves, if enough showed an interest in buying either vehicle, BMW would and could almost certainly deliver a small series run of the car featuring a new bonnet, bumper and Z-shaped grille mesh, plus some other upscale interior additions. The cost could end up twice the original Z4's price – so nearer to £100,000 – but with Aston Martin and Zagato doing exactly the same thing at 2011's Villa D'Este and then announcing a short production run in the low 100s soon after, there's a strong precedent.



“THE WHOLE LEARJET 85 INTERIOR WAS DRIVEN BY AUTOMOTIVE KNOWLEDGE”

- 6. A private jet features in marketing for the BMW Zagato Roadster
- 7. The Bombardier Learjet 85

“They have to injection-mould, spending maybe a million pounds on tools to get low-cost, high-quality parts out. But if you're making much fewer you can use the real deal and machine a piece of aluminium and show it off in a way the volume car business would love to but can't afford. You look at how Bentley or Aston Martin seats are made and you cannot fault the foam or stitching. They are just beautiful things and there's no reason why business jets should be any less.”

Alan Mobberley, chief designer at UK-based Envisage Group Design – which offers design and engineering across the gamut of ground-, sea- and air-based vehicles – believes the

business jet industry could really benefit from an infusion of automotive design skills. “The most significant improvement in auto interiors in the past decade has been the attention to optical quality, ensuring panel gaps are controlled and disguised wherever possible,” says Mobberley. “Probably the most significant benefit to the business jet sector would be in the digital control of the fit and finish of components and assemblies.”

Design Q's Guy believes that the business jet interior industry needs to be more amenable to ambitious designs. “The private jet industry, wherever you look, is predominantly about beige leather and walnut or some

similar veneer, so whether the aircraft is 20 years old or built yesterday, they sort of look the same,” he says. “But I think a revolution is coming.”

Design Q's recent aviation CV includes the Bombardier Learjet 85, which Guy says was a breakthrough product for a number of reasons. “The whole Learjet 85 interior was driven by automotive knowledge. All the parts are curved, there isn't a straight line and yet there's a tightness to it, every line is strong,” he says. “That's difficult to do on an aircraft interior, when you're dealing with companies that are like cabinetmakers. The Learjet 85 not only broke out of that but also justified itself by having somewhere to put your stuff. Lots of private jets don't have anywhere to put your things like they do on commercial aircraft.”

Two-way traffic This influx of automotive influence does not mean car designers do not admire aircraft design and borrow from it in their

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Harnessing car racing's brand power

Aside from any aesthetic influence they may derive from its designs, some business jet OEMs have also tried to tap into the high profile of the automotive world's stars – whose lives seem particularly suited to owning a jet – to help market their wares.

Bombardier is a case in point. In March 2012 it announced it had delivered a Global 5000 to three-time F1 World Champion – and keen pilot – Niki Lauda (the aircraft was also notable for being the first to tote the Vision Flight Deck). Lauda's previous ride was a Challenger 300. The manufacturer has also harvested brand ambassadors from the sport – including Lewis Hamilton for Learjet.

Hawker Beechcraft (HBC) has gone even further, in 2011 announcing an alliance with Group Lotus that included the possibility of “allowing our engineers to share knowledge and expertise”, according to Shawn Vick, HBC executive vice president. For a limited time, HBC offered a Lotus Evora sports car with every Hawker aircraft purchase, and a Lotus Elise with Beechcraft King Air orders to customers in Europe, the Middle East and Africa.

Meanwhile Cessna recently became an associate sponsor of Chip Ganassi Racing Teams (CGRT). CGRT owner and four-time defending IZOD IndyCar Series Champion Chip Ganassi proclaims himself a fan of the Citation Ten: “This aircraft shrinks the map for me and has become a vital piece of my business,” he says.

It's not just OEMs. At NBAA 2012 (to be held in Orlando, Florida, USA, on 30 October to 1 November) Rockwell Collins will host the Caterham F1 team show car and the team's US test driver Alexander Rossi. Rockwell Collins entered into a strategic agreement with the F1 team to provide aviation technology in exchange for promotion on the sport's world stage. Rossi will be on hand to meet NBAA attendees and sign autographs.

Of course no discussion on the meeting of the automotive and business jet worlds would be complete without mention of F1 driver Thierry Boutsen, who turned to aircraft sales and acquisitions in 1997. Building on his success in these endeavours, Boutsen added completion management (in 2006) and amenity design (in 2011) to Boutsen Aviation's offering.

creations. “The cockpit of the Mercedes SLS AMG is a good example and thrust levers are another,” points out 3C's Knoedler. “But while the auto industry tries to transport forms and technical details from aircraft into cars, it will be the modern materials and high-end surfaces coming from cars that will influence business jet design in the coming years.”

Laurenz Schaffer, president of BMW Group DesignworksUSA, also salutes the level of investment in developing materials in the automotive industry. “A multi-billion dollar global industry of paint, leather, carpet, textile and polymer suppliers supports automotive colour and material development,” he contends. “Each new vehicle produced displays colours and materials created specifically for it.” He believes the business jet industry's key gift to the car industry could be its expertise in weight optimisation.

International Aero's Saltman sees some influence moving both ways too. “The automotive industry has tended historically, especially in the USA, to be form-oriented, while aerospace has been function-oriented,” he says. “But now the two are beginning to meld. Aerospace is following the fluid aesthetics of automotive interiors while



- 8. Lewis Hamilton is a Learjet brand ambassador
- 9. Hawker Beechcraft teamed up with Group Lotus in 2011
- 10. Cessna tapped into automotive style for its Corvalis TTx

automotive is following the exterior aerodynamics of aircraft.”

Certification challenge Another shift beyond aesthetics, which is perhaps not so obvious, is in the processes car developers use, says Design Q's Guy. “When you go from concept to production, ‘who’ and ‘how’ is part of that,” he says. “In the past it would be down to suppliers – the seat company or sidewall manufacturer – to interpret the designer's sketch, which would always take the design back 40-50%. And if those firms said, ‘That's the way it has to be because of certification’, that's the way it ended up.”

Guy's a big believer in shattering that mindset, and thinks an influx of automotive suppliers could shake



8



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things up a bit. “Certification is seen as this thing you can't change or work with, but the reality is that certification is a process, and things don't have to be flat or square to conform,” he says. “We have products out there in the marketplace right now that we manufactured that nobody knows about, because the supply base couldn't do it or didn't want to. That's what I find very exciting about automotive coming into aviation.” **END**

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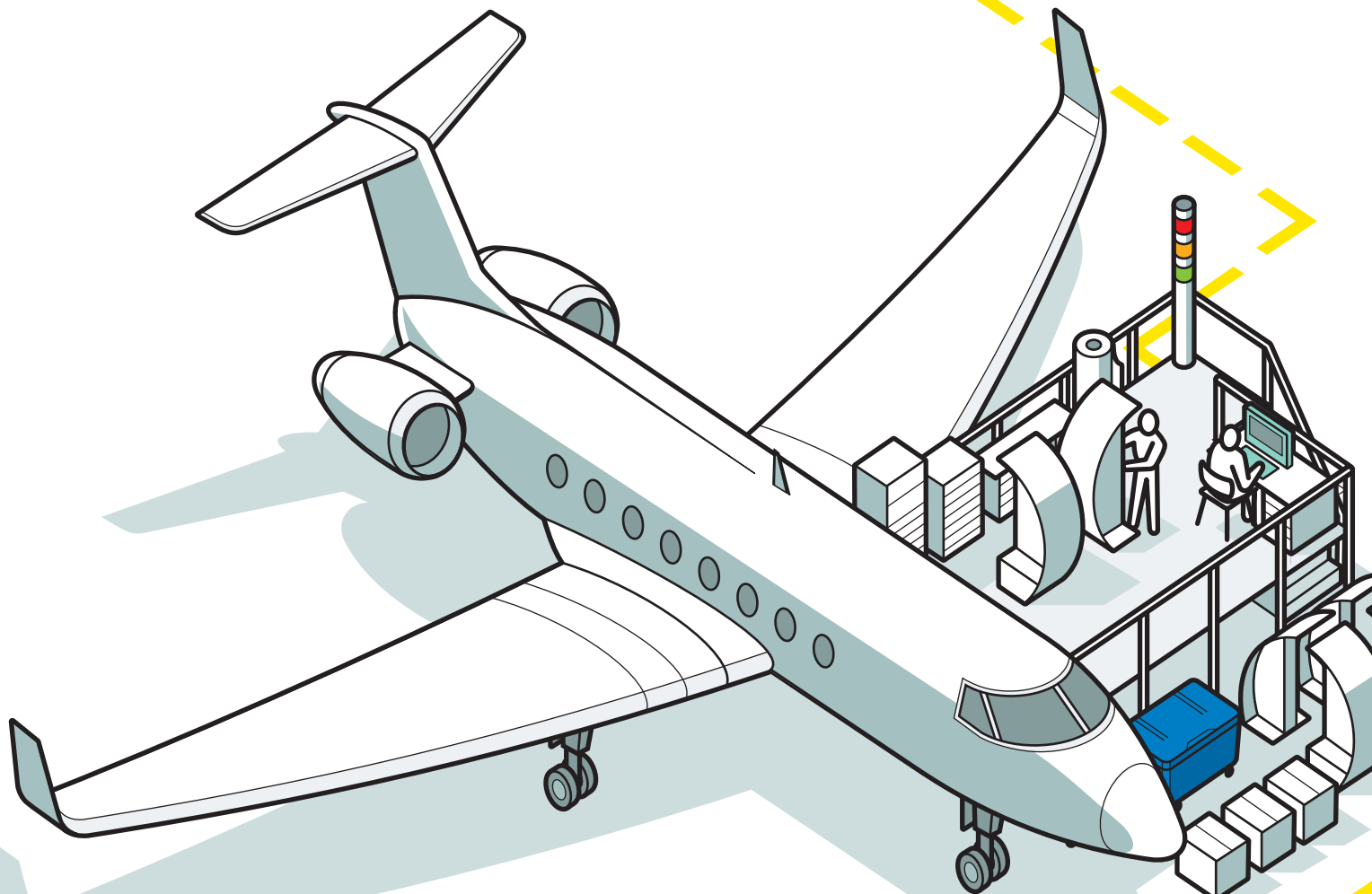
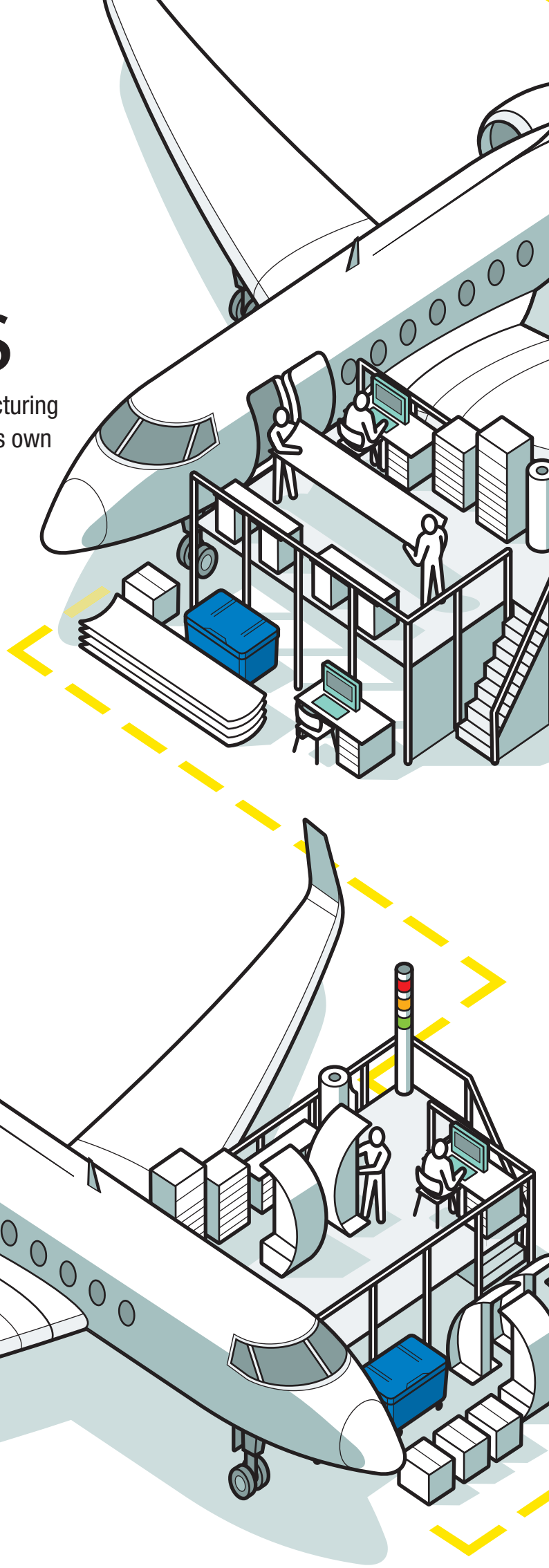
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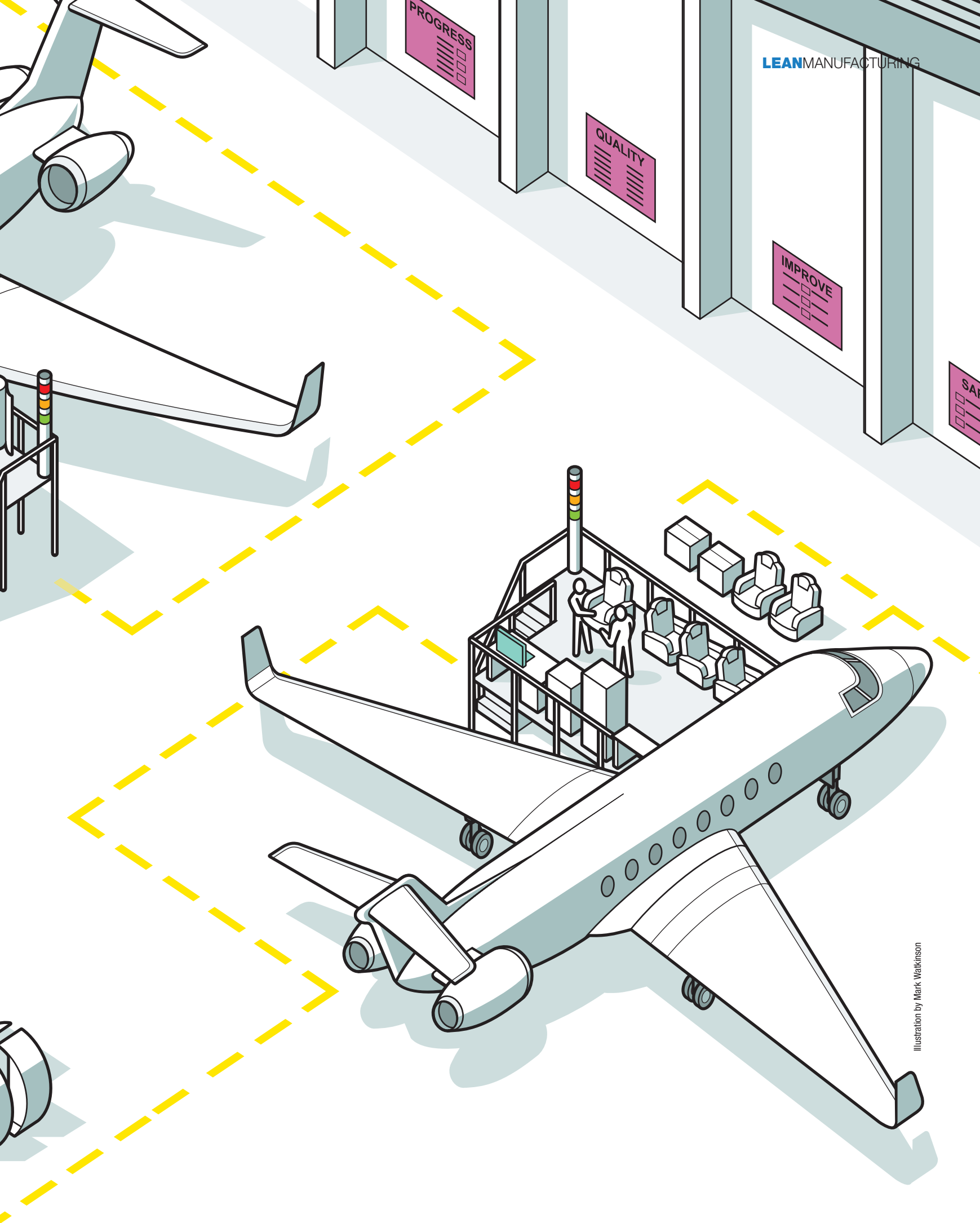
The business jet interiors industry has adopted lean manufacturing processes from the automotive world, and is making them its own

The new production centre where the circa £170,000 McLaren 12C road car is assembled looks more like a hospital surgery than a factory. White tiles cover everything inside – so that any dirt or misplaced tools show up better – and the carbon fibre masterpieces pass from one station to another with the precision that its Formula 1 team is renowned for. McLaren currently makes fewer than 1,000 cars a year, so this is no mass-production process like

Ford or VW, but despite the exacting conditions, each car only takes approximately 14 days to build and has a fit and finish that would be the envy of many private jet owners.

How is this being achieved and what techniques can the business jet industry glean from it? “The difficulty from a pure lean perspective is compounded when you factor in the low-volume nature of our business,” says Alan Foster, operations director at McLaren Automotive. “What we have tried to do – and the reflection one year





A guiding hand

Lean techniques are being applied in many industries, and a whole stratum of consultant experts has developed to support these efforts. One consultant with an understanding of the concept's potential aviation applications is Jeff Hajek, founder of USA-based Velaction Continuous Improvement. Hajek is a West Point US Military Academy graduate and has a degree in mechanical engineering (with a concentration in aerospace engineering). He is a big believer in making lean techniques understandable and usable in real life for frontline workers.

To that end he thinks designers should make an effort to understand the impact of their decisions. "A good way to start this journey is to have the design team actually help manufacture the products it designs," says Hajek. "Consider a two- or three-week stint on the shop floor doing production work for all new design engineers, and spend at least one full day a month actually turning wrenches for seasoned ones. It gives them a better perspective on their decisions. The goal of design for manufacturing is to have a production plan created during the design phase. This should be done for every part as well as the final assembly. The main challenge is that this can add to the initial cost of the design, even though it will eliminate problems and waste in the long run."

in is that we are achieving it – is to fuse hand craftsmanship with modern lean manufacturing principles, such as standardised work, 'no fault forward', team-focused work groups, a flexible workforce, lean materials management and simple visual control."

To take the 'no fault forward' practice as one example, Foster says each workstation has a list of tasks that have to be completed before the vehicle can be passed on to the next station,

"WHAT WE HAVE TRIED TO DO IS TO FUSE HAND CRAFTSMANSHIP WITH MODERN LEAN PRINCIPLES"

and when it is, the vehicle is physically handed forward by the members of the production team. "As the vehicle arrives in the station, the team member swipes their personal bio-card into the system to register their ownership, and enters the vehicle's production number," he continues. "From this point you have perfect synchronisation of who did what, when and where – a foundation of traceability, and a digital fingerprint of processes completed, which is recorded against a vehicle's production schedule."

The Aston Martin ONE-77 – so-called because only up to 77 units will be produced – is another example of a small-scale, high-quality automotive cabin. At £1.2 million each, customers can specify their interior within a palette of colour and trim options, ranging from exposed carbon

fibre and billet-machined aluminium to saddle-style leather hides.

Unlike its relatively larger volume models like the DB9 and Vantage – built in the hundreds and thousands – the ONE-77 is built by hand in a standalone building in the company's grounds. Each car is static throughout the build, rather than progressing from station to station.

The finish is incredible, a result not only of the considerable skills of the 27 technicians that build them, but also because their abilities are promoted so heavily as part of the final product. The fact their work is celebrated so publicly by the company creates another lean benefit – putting staff at the centre of the enterprise and engendering fierce pride in the work they do. Aston Martin's workforce is almost part of the product, like McLaren's facility is "a

1. McLaren's 12C production centre
2. The Aston Martin ONE-77



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A few lean buzzwords, decoded by Velaction

5S: This entails creating an organised, effective workspace that supports the processes being performed in the area. The terms come from the Japanese words – *seiri* (sort), *seiton* (straighten), *seiso* (scrub), *seiketsu* (standardise) and *shitsuke* (sustain).

KAIZEN: Another Japanese word, 'kaizen' roughly translates in to 'change for the good'. Some organisations use the word as a generic term to describe any improvement.

GEMBA: The foundation of this principal is that to really understand a process, you have to go to the spot where the work is done. The concept of gemba is part of a bigger philosophy known as the 'three reals' – you have to go to the real place to observe the real thing to get the real facts and data. 'Go to gemba' is a common refrain that lean experts use.

ANDON: This comes from an old Japanese word for paper lantern. An everyday example of an andon is the warning light on your car's dashboard that indicates when the petrol tank is getting close to empty. An andon must go hand-in-hand with a plan for action.

KANBAN: This is a system used to manage the flow of inventory in a lean manufacturing process. In Japanese, the word means 'signboard'.



executive jet interior sites now feature U lines (the aircraft are arranged in a U-shape), just-in-time (JIT) processes, continuous flow and quality clinic process charts and FOE programmes.

Continuous improvements "The Lineage 1000, Legacy 600 and 650 and Phenom 100 and 300 utilise the same concepts defined in our Program of Enterprise Excellence Embraer (P3E)," explains Marco Tulio, senior president of operations and COO at the manufacturer. "This has three main objectives – customer satisfaction, shareholder return and employee welfare. The Embraer assembly lines using P3E concepts are organised by continuous improvement cells, which receive excellence certification levels based on their process maturity and quality levels."

Tulio says the techniques have also helped the business beyond production lines. "The kaizen methodology applied at Embraer helped transform all areas of the company, not just the production areas," he comments. "Kaizen is a management philosophy based on the elimination of waste, techniques and stimulation of collective creativity for process improvement."

Bombardier has also reaped the benefits of lean processes, claiming efficiency increases of 40% on its Challenger line since 2004, as well as "massive leaps in our capabilities", according to Marc Arpin, director of

EMBRAER'S LEADERSHIP TEAM HAS VISITED TOYOTA, DELL, PRATT & WHITNEY, GE AND OTHERS

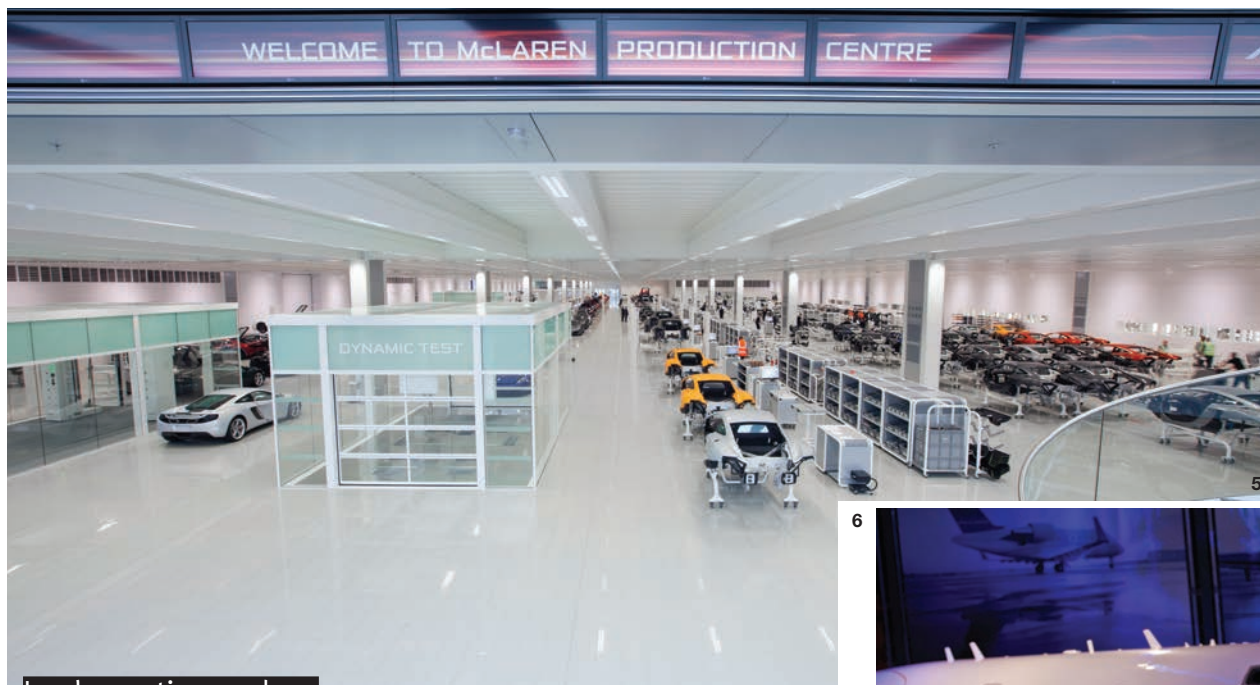
marketing tool for our brand and products", Foster says – not just a place to make things.

Lean completions Business jet-related businesses are already seeing the benefits of such an approach too. Flying Colours Corp's director of operations, Dave Stewart, readily admits the automotive industry has been an influence and the business jet completions and maintenance company has already implemented some lean techniques. "Standardised processes that include built-in quality

3-4. Embraer's interior production line

gates and 'one-piece-flow' have already been adopted in many facets of our business jet interior manufacturing departments, and the use of jigs and fixtures to error-proof processes and minimise production set-up time has proved indispensable," Stewart says.

Embraer Executive Jets has adopted many of these lean methods too. An ex-Toyota consultant, Shingijutsu Global Consulting, helped its process change as well as the Createch Group, and Embraer's leadership team has visited Toyota, Dell, Pratt & Whitney, GE and others to learn more. Its



Implementing andons

Greenpoint Technologies has recently implemented andons in its office and manufacturing facilities to help managers swiftly remove barriers. “Andons are a lean tool that systematically notify management, maintenance and other workers of a quality or process problem. They provide a warning signal of a budding issue,” says Katelin Benson, implementation specialist in programmes at the completion centre. “Most of us are guilty of setting defects to the side, however small or large, whether it’s a part or engineering drawing with an error; the defects usually end up in their own pile to be dealt with later. This pile creates its own waste, and often requires a side process to deal with defects, hiding the real problem. Hidden problems in an organisation are pervasive and expensive.”

Benson believes andons and visual controls are especially important in an office environment. “Instead of putting that defect aside and dealing with it later, the andon system creates an opportunity for process improvement – why was that defect created in the first place? If it happened once, it’s likely to happen again,” she says.



5. McLaren’s 12C cars pass through a series of workstations that each perform a specific set of tasks
6. An important aspect for Bombardier is engaging its workers – thus everyone attends at least one delivery a year

customer account management on Bombardier’s Challenger programme. U lines are used, with workstations on the inside of the U, aligned with the aircraft doors. A key factor is ensuring each employee is empowered and encouraged – not only to do their job better with pride in their work – but also to feel confident enough to flag up problems with senior management. “Employees are now in the position to make decisions,” Arpin says. “If you bring ownership to the people actually doing the job, they will be even prouder of what they build.”

It’s a sentiment echoed by McLaren’s Foster: “What is normal to us should be outstanding and amazing to anyone who touches our organisation,” he says. “McLaren Automotive is unique, there

is no one doing what we do or the way we do it. It’s not an easy journey and there is no ‘one size fits all’ solution, but it starts with the people. By far they are McLaren’s most prized assets.”

Limitations Of course this perfect world is hard to implement across a diverse manufacturing process, especially one that involves outside suppliers, as Flying Colours’ Stewart concedes: “One of the biggest differences in the quality of suppliers between the two industries that challenges the adoption of auto-style manufacturing is the sometimes unpredictable lead times which can limit the ability to operate in a true JIT environment,” he says.

However, Andy Parton of the Society of Motor Manufacturers and

Traders Industry Forum – which shares best practice between automotive, aerospace and other industries – believes those industries may be closer than perhaps sometimes perceived. “Traditionally much of the tier-two supply base is shared between the automotive and aerospace industries,” Parton says. “Many work to the industry quality standard AS9100 and lean principles have been successfully adopted by all the major OEMs such as Boeing and Airbus.”

But no good student of the lean way of life would ever rest on their laurels. As Embraer’s Tulio sagely concludes, “As stated on the fifth principle of lean philosophy, each process must pursue perfection, so the lean journey does not have an end” **END**

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Chris Colvin, Business Jet Interiors International

No longer are customers greeted with barrages of mix-and-match sample books that leave them brain-swollen, blurry-eyed and stammering at day's end. Now the process of defining a business jet interior is more like a trip to the spa. Well, almost.

At Embraer's new customer centre in Melbourne, Florida, USA, clients and prospects get the services of a concierge. Along the curved outdoor walkway, there is an array of high-end, padded wicker furniture and waving palm trees that make you think you are walking into a resort. All that's missing is a waiter in a pink jacket handing you a mint julep. Then again, ask the concierge and it can probably be arranged. Inside, the reception atrium is more art gallery than an office entrance. Coloured glass formed into whimsical wing shapes hangs from the ceiling, paintings by Brazilian artists embellish the walls, and brushed aluminium and stainless steel panels demarcate dark woods and white stone in a modern, clean, high-contrast look that resembles the inside of one of the company's Phenom jets.

Closing the deal Embraer is a relative newcomer in the corporate jet game, and its Melbourne customer centre and showrooms act as powerful sales tools, according to Robert Knebel, Embraer's vice president of executive aircraft sales. He says the company closes a deal with 90% of the customers who visit. "They come here already knowing the aircraft can do the job, but then they see the facility and meet our people," he says. "They get to see the kind of investment we have made."

Embraer Executive Jets' president, Ernie Edwards, agrees: "I can think of three recent deals we've closed as a direct result of customers being able to fly into Melbourne," he says. "The facility has achieved exactly what we wanted it to."

The Melbourne customer centre has two main showrooms – one for the



showbusiness

OEMs and completion centres are taking the tedium out of specifying the inside of a corporate jet



1. The Legacy and Lineage showroom at Embraer's customer centre in Melbourne, Florida, USA

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EMBRAER TRIES TO GIVE ALL ITS CUSTOMERS A LARGE-AIRCRAFT BUYING EXPERIENCE

smaller Phenom 100 and 300 aircraft and another that handles customers for the larger Legacy and Lineage aircraft. Both are modern, attractive, filled with natural light, and have large flatscreen monitors capable of quickly displaying high-tech renderings of cabin layouts and colour and material combinations.

But no matter what size aircraft is being purchased, Embraer tries to give all its customers a large-aircraft buying experience and its staffing reflects this.



The company recently appointed Gulfstream alumni Jay Beever and Riba Talib, vice president of interior design and senior designer, respectively. Another senior designer, Joshua Rea, joined the company from completion centre Gore Design.

Two-step process Large-cabin aircraft OEMs and big iron completion centres have long recognised the importance of customer showrooms in the sales process. “It’s a must-have tool for us,” says Tray Crow, director of interior design for Gulfstream Aerospace. In Savannah, Georgia, USA, Gulfstream has two large aircraft showrooms that are mirror images of each other, enabling the company to handle simultaneous customer presentations. A third showroom across the field is dedicated to refurbishment customers. Once the customer has selected cabin configuration and materials, they move into interior planning rooms. “It’s a two-step process,” says Crow.

Gulfstream’s showrooms are each around 250ft² and can accommodate parties as large as 10 people. It is there

3



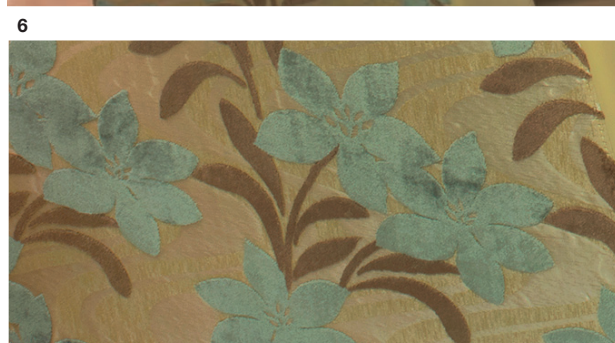
2-3. Embraer customers can see and feel a huge array of material samples

4. The impressive reception at Embraer’s new base in Melbourne

that customers can look at and feel a seemingly endless choice of finishes and fabrics. “More than 400 suppliers are represented in memo samples,” says Crow. “We have multiple suppliers of leathers and custom colours.”

Technological wizardry From the showrooms, customers migrate to the interior planning rooms, where they are shown renderings on high-tech monitors, detailing what their choices would look like. If customers still have visualisation questions, they are able to actually look around an aircraft on the production line.

However, long before the customer arrives in Savannah, Gulfstream already has a strong idea of their likes and



dislikes, and that can substantially speed the selection process. “The completion sales and design team is expected to know the client and have data on anything they have specified in the past,” says Crow. “We have that material available at the initial meeting. After 10 years, some clients want a change, but if they are operating a corporate fleet, there may be something about their brand they are trying to maintain in the interior.”

Research is the first step. Dialogue is the second, sometimes even before the customer arrives at the showroom. “It is a very personal experience,” says Crow. “There is an executive and an interior designer teamed with every customer. They follow the project all the way through and give the customer a unique and personal experience. We ask customers how they are going to use the aircraft, how many passengers they plan to carry, and if it will be used

5-7. The single-aisle mock-up at AAC's new design centre serves to show off the company's capabilities

for charter. In that way we can better serve the customer when selecting materials, say for durability.”

Gulfstream also tracks customer preferences and design trends. “We track everything that we define for our customers and it goes into a database,” explains Crow. “That gives us detailed information on colour trends, veneers and other valuable data. At the same time, we look at trends in other markets – such as yachts, automotive, residential, office and hospitality.”

Big iron completion is the ultimate manifestation of the art. Customers can spend nine figures on wide-body interiors. Associated Air Center (AAC)

in Dallas, Texas, USA, opened a new customer showroom in June 2012. The object, according to AAC vice president and general manager Chris Schechter, was to create an environment where customers could “make their interior selections and at the same time be wowed when experiencing what their vision could be like”.

Karen Cooper, AAC's design centre manager, reveals the facility's look was inspired by high-end retail spaces: “We wanted it to be able to transition to every area and constantly display industry trends, the latest of what suppliers are offering, and easily integrate them into a display area.”



Element of surprise The showroom is a neutral canvas peppered with features designed to surprise and delight. “The shiny floor is a warm, neutral wood. It is all very precise and the idea is you are not overwhelmed by the visual stuff and you can focus on the things we are going to discuss,” says Cooper.

Also part of the design centre is a single-aisle mock-up, representative of the “craftsman and details that can be used in any environment”, says Cooper. “It is not specific to any airframe. We



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8



“A CUSTOMER CAN BRING HIS IPHONE AND INTERACT WITH THE CMS”

use it to show more refined design areas as opposed to giant broad brush stuff.” The mock-up contains a half galley and a sliding door entrance leads to an area that represents a bathroom, giving customers a sense of dimension.

Schechter says the showroom is helpful in illustrating details: “We can demonstrate how the galley inserts work, how mechanisms function, and how doors open and close – all the details that make up the living space are there to be experienced.”

The mock-up is also equipped with fully functional WiFi, CMS and IFE systems. “A customer can bring his iPhone and interact with the CMS on the mock-up,” says Schechter. Or the customer can use the iPad already on

- 8. A marble exit sign created for ACJC's showroom
- 9. ACJC's leather life jacket shows off its craftsmanship
- 10. Sylvain Mariat's favourite ACJC 'Masterpiece' – a gyroscope

9



Art house

One completion centre that has a particularly fun showroom is Airbus Corporate Jet Centre (ACJC) in Toulouse, France. In 2011, Sylvain Mariat, head of ACJC's design studio, was tasked with showcasing what the company's designers and craftspeople could achieve. He responded by designing a series of quirky aviation-related objects that were then handmade using materials that are actually available for customers to use in their cabins.

Stéphane Toussaint, a leather craftsman at ACJC who used to work for Hermes, created a life vest out of aviation-compliant leather. Another ACJC artisan, Kada Djilali-Ayad, a wood specialist, created chocks out of ash tree wood. The two collaborated on a joystick crafted from bird's eye maple and walnut wood and leather. “It's very complex because you have a very complex edge and the stitching is special,” says Mariat.

A particular favourite of Mariat's is a gyroscope made from two kinds of wood (macassar and bird's eye maple), with inlaid antique bronze and pearlescent leather corners. It was crafted by Sylvain Raulhac.

Another prominent part of the showroom is the welcome desk, which is shaped from ash tree wood into the exact profile of an ACJ320, completed with a winglet that looks like titanium but is in fact a very light and very realistic imitation.

Other objects include an exit sign made out of marble with inlaid nacre and a seatbelt with a nacre buckle made by Tesserae; a navigational chart printed on Tapis's Tapisuede fabric; and an engine fan crafted from marble hollowed out to a thickness of only 2mm.

This last piece was made by Claude Retegui, a vendor based in the southwest of France that had not worked in the business jet world before. “They'd made marble for yachts and hotels but never worked on aircraft before,” says Mariat. The company approached Mariat, and learning of the showroom concept, persuaded him to design a piece for it to create. Mariat obliged, although he was not a big fan of marble, finding that “sometimes it's a little bit cliché”. However, the final product – which is surprising light – won him over, and the company has since completed many successful projects with ACJC.

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board. AAC also has the ability to develop customised graphical user interfaces for the CMS.

"We want customers to be able to experience everything," adds Cooper, noting that suppliers must commit to keep showroom displays updated at least annually. "We see fabrics and textile vendors here at least twice a year and edit through the new fabrics twice a year," she adds.

When one of AAC's customers or their representative arrives at the facility, finishes are laid out and sketches are at the ready. Customers can rapidly see the available options and their vision takes shape via imagery shown on a 52in monitor.

"We have a giant library of 3D renderings that incorporate different cabin configurations, seat styling and textiles," reveals Cooper. "We can project them and run through different scenarios. Customers want to be able to see the end product quickly."

Showing off The showroom also allows for a bit of whimsy. "We have wallpaper on the bulkhead mock-up that is made

"IF CLIENTS CAN SIT IN AN ENVIRONMENT THAT SHOWS THEM WHAT THEY ARE GETTING, IT MITIGATES CHANGES"

11. AAC prepares carefully for customer visits – arranging finishes and sketches to suit their profile

12. Embraer's growing campus in Melbourne, Florida

of beaded glass," says Cooper. "Unless you are on trend and staying current, you would never think of that for an aircraft, but it passes our burn tests and is beautiful. It is a nice little decorative element we can include."

Providing customers with details and options without overwhelming them can sometimes be a fine line, but a necessary one, according to Cooper and Schechter. Nothing balloons an interior completion budget like last-minute changes. "There is a clear correlation between due diligence on the front end, understanding customer needs, designing for customer desires and not having issues on the back end of the process," says Schechter.

That is where a showroom really earns its keep. "If clients can sit in an environment that shows them what they are getting, it mitigates changes," says Cooper.

Gulfstream's Crow agrees that having a decent showroom is vital. "We wouldn't be able to do our jobs as well as we do without it," he says.

For Embraer's Edwards, the appeal is basic: having a showroom allows customers to "touch and feel" and say, "OK, we get it". **END**

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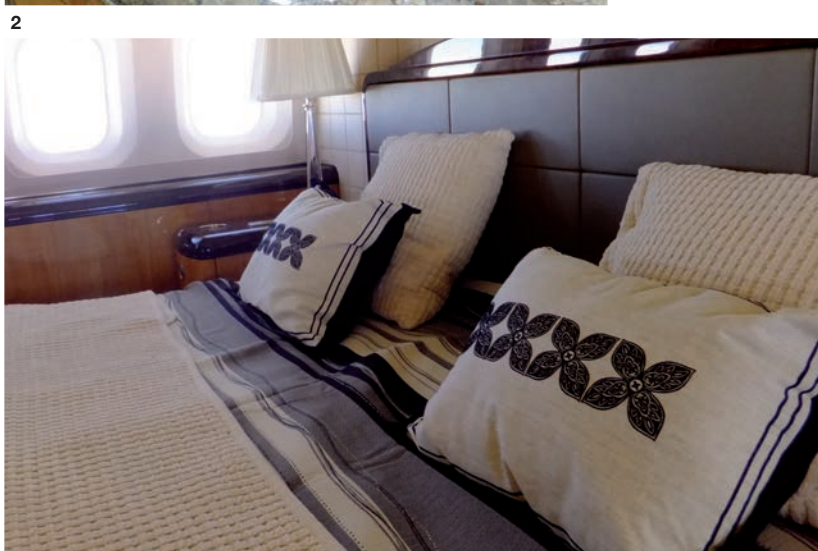
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A spectacularly diverse aviation career and life-long obsession with flight helps Boeing Business Jets president Steve Taylor to connect with customers – helpful considering the company's mandate to support these operators for the (very long) life of the aircraft



1. BBJ's president Steve Taylor (left) and chief pilot Rene Gonzalez (right) at the helm of the first BBJ 747-8

2-4. The BBJ that Taylor and Gonzalez flew to EBACE 2012, which was completed in 2009 by Greenpoint



3



4

Boeing Business Jets (BBJ) president Steve Taylor is as comfortable flying an aircraft as most other people are driving a car. In fact, he first soloed an aircraft on his 16th birthday – the day before he got his drivers' licence.

"I'm one of those geeky kids that grew up reading aircraft magazines and all the rest," he says. "My father is also a pilot and so I grew up in and around aircraft. I got my licence on my 17th and I've pretty much been on this path ever since."

That path started with periods as an engineer and then engineering manager at Boeing. When the BBJ programme started in 1996, Taylor was asked to become a sales director. "That was a career switch for me, from the technical side into the sales side," he says. "I had been flying little aircraft my whole life up to that point and switching into the BBJ world really allowed me to get a lot closer to our customers and to see how these aircraft are operated."

After a few years on the sales side, a customer offered Taylor the job of piloting their BBJ – an offer he found impossible to resist. However he came back into the Boeing fold to fly Boeing's

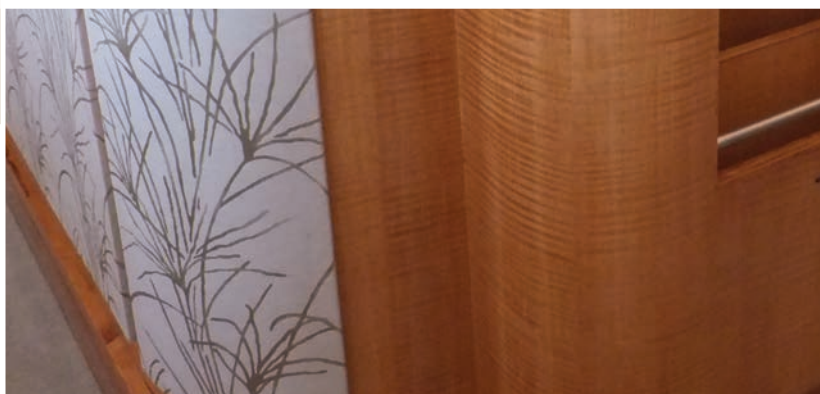


corporate aircraft, and later joined the flight test programme. He became BBJ's chief pilot in 2006 and then president in 2009. "I joke with people that I can't hold a steady job!" he says.

Family pursuit Despite it not being the main part of his job any longer, flying is still a huge part of Taylor's life, and indeed that of his whole family. In his spare time he flies small aircraft – "I have a couple of partnerships with some friends and so I fly anything I can get" – and takes his children for flights "like my dad did when I was a kid". Incidentally, his 90-year-old father is still flying. Taylor also flies BBJs whenever he can – around six times a year – sometimes to demonstrate the aircraft and sometimes to deliver them to tradeshow, or for a delivery. "I also sneak over and do flight testing when I get a chance" he says.

5-6. Highlights of this Greenpoint-completed BBJ include silk wall panels, a karaoke machine and mood lighting

6



Because of his various roles along the way, Taylor has probably flown close to half of the existing BBJ fleet, logging his most hours in BBJ 737s. "For me it is the most comfortable of the lot and it's like putting on tennis shoes and a pair of jeans, I just feel like I'm right at home," he says.

Of course this passion for, and familiarity with, flying instantly gives Taylor rapport with customers. "I think it matters," he says. "I can have a conversation with a customer on many different levels and really feel like I'm

bringing value to that conversation, so I do think it helps a lot."

The BBJ set-up is like "a small aircraft company hidden within the great big Boeing company", Taylor says. Around 50 people are employed in product development, production, sales and marketing and product support at BBJ. "They're all Boeing people and they're all sort of melted into this one, small, very customer-focused organisation," explains Taylor. "In my world I really get to touch everything, from the decisions about what products we're going to introduce and how we're going to modify the aircraft, all the way through helping our customers put them in service and working through in-service issues with the customers that are already operating them."

"I CAN HAVE A CONVERSATION WITH A CUSTOMER ON MANY DIFFERENT LEVELS; IT HELPS A LOT"



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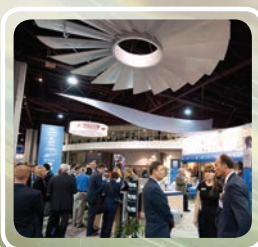
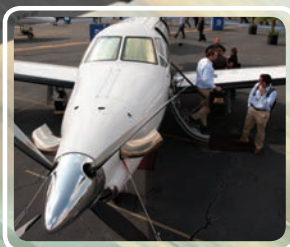
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Versailles in the sky

Boeing Business Jets displayed two BBJs at EBACE 2012 – both of which were up for sale. One of these, completed by Jet Aviation in 1999, has a highly personalised Versailles-inspired interior. “It suits some peoples’ tastes and not others,” says Taylor. “The thing that I like about it is the beautiful inlaid wood. They hired a French artisan and he spent a year and a half just doing the wood inlays in the aircraft and all along the sidewalls and the tabletops. All of it is done with this incredible wood mosaic and it’s all the real thing. It’s a craftsman’s touch and it’s spectacular.”

This kind of level of personalisation is a hallmark of BBJs, and accordingly, Taylor says he’s noticing more refurbishments that go beyond replacing the soft goods, particularly as the aircraft typically boast a very long service life. “Some of the designs are so specific to one person’s taste that we’re now seeing a few cases where people are buying an older aircraft and redoing the interior completely to a new style,” he says. “Most BBJs are operated 350-400 hours a year, so a 10-year-old aircraft like this one has only about 3,500 hours on it. For a Boeing aircraft, that’s nothing – our commercial customers will fly almost that in a year, so the aircraft itself has got a tonne of life still ahead of it; it’s different from traditional corporate jets.”

The worth of the BBJ business to Boeing is not a simple numbers equation. “BBJ makes up about 2% of Boeing’s overall aircraft sales, so from that aspect it’s not a huge number,” says Taylor. “However, the customers that buy BBJs are extremely important individuals – perhaps the same people that are making decisions for their national or private airlines; or in some cases they are heads of state and they are involved in decisions about military spending. So we think it’s a very good opportunity for us to give them an excellent experience with the company, its product and its support.”

Support structure This support includes a network of VIP field service specialists around the world. Boeing’s big Commercial Aviation Services (CAS) organisation also includes dedicated BBJ people. BBJ delivers the aircraft green, but recommends select designers and completion centres that it trusts to do a good job. BBJ has now approved 17 completion centres, including a subset of seven that have proven their capability with twin-aisle models. “The ones that we want to licence are the ones that have already proven that they know how to do the work,” says Taylor. “But if a customer



“OWNING AND SUPPORTING THESE ASSETS IS A LONG-TERM RELATIONSHIP”

7-8. The Versailles-inspired BBJ

tells us that for some reason they have a relationship with a centre and they want to do the work there, we’ll supply all the support to them and once they’ve demonstrated that they can do a completion, then we’ll licence them for other completion work.”

Sometimes BBJ also helps customers to market their aircraft when they decide the time is right to resell. “We don’t actually manage the sale of used aircraft ourselves, but we try to work very closely with our customers to know who is showing aircraft and where they are in the market,” says Taylor. “Owning and supporting these assets is a long-term relationship, so we feel like we’re in a position to be able to



help some of our existing customers as their requirements change.”

Taylor says currently there are around nine BBJs on the resale market – just short of 10% of the fleet. “In this business most people figure 10% is about right,” he says. “If it’s more than 10%, it’s an indication that the market is kind of weak, and if it’s less than that, then the market is really strong and it’s fairly easy to sell new aircraft.”

Typical BBJ owners are not really impacted by fluctuations in the economy. “You won’t see BBJs at fire sale prices, it’s not like they’re trying to get out of them, but more frequently maybe the gentleman will be advancing in years and he’ll decide that he’s not

For sale, one previous owner

One of the BBJs on display at EBACE 2012 was completed in 2009 by Greenpoint for a private client based in eastern Europe, and is now on the market, being marketed by Moscow-based Petroff Air. "The owner decided he was going to go in a different direction and so he put it directly up for sale," says Taylor. "He's never flown on it."

The front section of the BBJ 737 includes an entrance way with crew seating; a large galley; a VIP lounge with four lie-flat seats (in olive leather), a four-place divan and Hi-Lo tables; and a dining area with six more lie-flat seats (in cream leather) around a large table. The aft section includes an enclosed seating area with two facing divans; a private office/bedroom; and a lavatory with shower, underfloor heating and finishes including real marble.

Highlights include humidifiers in the bedroom and dining area; handmade silk-covered side panels; three large IFE monitors (opposite the divan in the lounge, at the head of the dining table and in the bedroom) and even a fully certified karaoke machine!

travelling so much – that's a more common scenario for us." Indeed, this was the case with one of the two BBJs the company showed at EBACE 2012 – both of which were up for sale.

New models In terms of new BBJs, there are several twin-aisle models set to make their VIP debut shortly. BBJ will have delivered eight green BBJ 747-8s by the end of 2012. "The 747 is an incredible space and it's remarkable to see customers' plans for using that room," says Taylor. "Most of those are quite far along in the design process." AMAC, Associated, Baysys, Greenpoint, Jet Aviation, L3 and Lufthansa Technik are the twin-aisle-capable centres that have been licenced by Boeing.

The first of the BBJ 747-8s is now being outfitted at Lufthansa Technik's facility in Hamburg, Germany, for expected delivery in mid 2014. Greenpoint Technologies' Aeroloft has

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9-10. Luxurious materials take centre stage on the 2009 BBJ by Greenpoint

11. The first BBJ 747-8 sets off for Lufthansa Technik, where it is now being completed



9



"THE BBJ 787'S SYSTEMS HAVE BEEN DESIGNED TO ALLOW THE CEILING TO BE PUSHED VERY HIGH"

already been installed by Boeing Global Transport & Executive Systems. Aeroloft adds 393ft² of cabin space above the main cabin between the upper deck and tail of the aircraft, and includes eight private sleeping berths and a changing room.

Boeing is also developing re-engined 'MAX' versions of its 737 family, which, when combined with new winglets, should offer a 13-14% improvement in fuel efficiency, and therefore range. "We're studying very aggressively what we can do with a BBJ version of the MAX and we're speaking with customers now about the capabilities of that aircraft," says Taylor. The first of those is expected around 2017/2018.

But the next in line is the BBJ 787, for which there are "about a dozen" orders. Taylor can't be more specific on the number because a few customers

have yet to decide whether to opt for a VIP or airline interior.

"We're planning to deliver the first BBJ 787 in 2013, and so we're now working very actively with the completion centres on how to design and interface the interior of those aircraft," says Taylor. "We've only got a couple that have advanced to interior definition, but the ones that I have seen are just spectacular. One of the great advantages of the BBJ 787 is the systems have been designed to allow the ceiling to be pushed very high and our customers' VIP interiors are going to take advantage of its high, open architecture. So I think when we get those aircraft in service you're really going to feel something special." **END**

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vip treatment

Ageing heads of state, political leaders and billionaires increasingly want the security of an intensive care ward with them wherever they go – even at 40,000ft



1

In a world where VIP aircraft can remain aloft without refuelling for 20 hours, medical care is uneven, terrorism potentially means danger lurks around every corner and world leaders are living longer, why take chances? More medical equipment is being installed on VIP aircraft than ever before, whether in dedicated medical suites or cleverly camouflaged in cabinets and under beds and divans. It runs the

gamut from simple defibrillators to heart-lung machines to complete surgical suites so sophisticated that they can maintain the vital signs of someone who is otherwise clinically dead. When it comes to life and death, money is no object.

"There's always been a requirement for onboard medical equipment on VIP and head-of-state aircraft, especially in the Middle East, and the equipment is getting more advanced," comments

1. A patient is carried on to an aircraft using equipment from Aerolite Max Bucher

Horst Heinicke, vice president of international marketing for Spectrum Aeromed, which supplies medical components for aircraft.

The new generation of onboard medical equipment takes advantage of an aircraft's built-in WiFi system to transmit real-time patient data from medical devices not only to the medical staff on board, but also to specialists on the ground. "If the patient's parameters worsen, the medical professionals can



3



“THE BIGGER THE AIRCRAFT, THE MORE EQUIPMENT THEY HAVE”

decide how to react and whether or not to continue the flight,” says Heinicke.

This sort of onboard monitoring has become very sophisticated and can include wireless patient shirts with embedded medical sensors. Other monitoring equipment, such as Remote Diagnostic Technologies’ Tempus 2000, uses a simple graphical user interface, much like you find on a smartphone, and allows someone with no medical experience to collect and transmit a sick person’s vital signs, including blood pressure, pulse, heart condition and still video pictures, from any air location to ground-based medical experts who give real-time advice. The communications interface includes an integrated voice link.

Heinecke says that onboard medical equipment follows one basic rule: “The bigger the aircraft, the more equipment they have. Of the eight BBJ 747-8s that are on order, I know of at least six that are getting medical equipment.”

Largely to accommodate potential medical needs, completion centres

2-3. Aerolite equipment installed in a medical interior

Greenpoint and L-3 have designed custom lifts (elevators) for the BBJ 747-8 that deploy to the tarmac when the aircraft is on the ground and also can move between decks while the aircraft is airborne. In California, Aerocon Engineering has designed a lightweight air stair for the BBJ 737 that facilitates stretcher loading.

Personal care Increasingly, medical equipment is highly customised and heavily engineered, according to Hans Bretscher, general manager of Aerolite Max Bucher subsidiary Aerolite America. “It is a niche market with international clientele,” he says. “An aeromedical operation in Turkey might have a different application to an operation in Germany, Canada or the USA, so it is all custom. Flight profiles and the actual utilisation of the equipment vary. There is customisation where the equipment goes and what type of equipment is installed, how many patients are catered for and what stretcher loading system is used, but

the bones of these things are always the same.” Bretscher says designers are also getting into the act beyond suggesting where the equipment is installed to expressing preferences for its look and feel. “They want a certain look or particular colours,” he reveals.

Heinicke comments that aircraft designers, both at the OEM and the completion centre level, often wait too long for input from aeromedical suppliers and this causes delays. “Medical is something most people don’t understand,” he says. “By the time we are invited to a meeting such as a preliminary design review (PDR), the designer already has the floorplan approved and the medical space assigned. You have to look for the best compromise.” One cannot always be

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found. “You have designers, engineers, material people and sometimes medical staff at these PDRs, but nobody really wants to handle the medical specifications,” says Heinicke. “It is sometimes difficult to get information from the customer. Medical can mean anything. You find yourself working against the cabin crew, who want the space for closets or the galley.”

Occasionally, medical requirements dictate a floorplan change. “We had one situation where we moved an ACJ 320 galley because otherwise there would have been no room to move or intubate the patient,” Heinicke adds.

Early planning Minimising aircraft downtime in the completion cycle means planning a medical interior early in the design process. “We work closely with the OEMs, including Embraer and Hawker Beechcraft,” says Heinicke. “We want to help them sell the product by optimising the interior design at an early stage. The goal is that at delivery the medical interior is already specified

4. A Spectrum Aeromed ACJ 320 installation
5. A BBJ 747-400 project by the company
6. Another BBJ kitted out with medical equipment from Spectrum Aeromed

and installed and the customer can start flying. If you have to keep the aircraft on the ground waiting for six months, well that is no fun.”

Bretscher and Heinicke both agree that the smaller the aircraft, the more complex the installation. First there is the question of geometry. “Sometimes it is a challenge to get a stretcher into a smaller aircraft,” Bretscher concedes. Once aloft, a smaller cabin can restrict health care professionals’ access to all areas of the patient, who is typically tucked against a cabin sidewall. This requires some fresh design thinking and Aerolite has fashioned a new solution to the problem – intensive care unit (ICU) mounting provisions that allow the ICU to be moved inboard in flight so caregivers have full-body access to the patient. Aerolite will

Nextant 400XT picks up air ambulance order

When Nextant Aerospace recently announced its order from Asia Pacific Jets for 10 Nextant 400XTs, it also divulged that some of these are to be fitted with air ambulance interiors rather than the standard business jet cabin. The 10 aircraft are scheduled for delivery over three years – the first two due by the end of 2012.

Jay Heublein, vice president of Nextant Aerospace, says the air ambulance market is a natural fit for the aircraft type. The 400XT is based on a ‘remanufactured’ Beechjet 400A/XP airframe with a rebuilt interior (plus new engine, avionics and electronics) offering 400ft³ of space – 305ft³ in the cabin and 95ft³ in the cockpit. It has a range of 2,003 nautical miles.

“From a functionality standpoint, perhaps the most important feature of any jet to be used as an air ambulance is the availability of adequate cabin space,” says Heublein. “A flat floor that can easily accommodate a fully equipped hospital bed with ample room to manoeuvre around the patient while providing care is critical. For the comfort and peace of mind of the patient, the jet should also have the ability to transport two or three additional passengers – relatives, fellow travellers or colleagues – in addition to the caregiver and patient.”

Heublein says that outfitting a light jet as an air ambulance isn’t necessarily more expensive than a typical executive configuration. “Operators should consider client needs, typical missions, the types of care to be provided and their business strategies, then work with manufacturers to customise aircraft accordingly,” he says. “Nextant can tailor interiors to meet operators’ needs – whether that’s as streamlined as a simple patient transport system or as sophisticated as a cardiac life support platform.”

install this technology in medically equipped Bombardier Challengers operated by the provincial government of Quebec in Canada later this year.

Aside from access, Bretscher says electrical power is often a consideration for business jets installed with medical apparatus. “You need more power on a smaller aircraft for the extra equipment – things like intravenous solution warmers, ventilators, monitors, blood coolers and pumps,” he says.

Most medical devices in aircraft have built-in back-up power using modern battery technology, such as lithium ion, “comparable to what you would find in a good laptop”, Bretscher says. However, he adds that installing a medical interior can dictate the need to add inverters and other equipment to a business jet’s electrical bus.



A flying hospital

Pursuing its mission to eliminate avoidable blindness worldwide, non-profit organisation ORBIS has taken onboard medical installations to the extreme – operating whole aircraft as eye hospitals. It started in 1982 using a refitted McDonnell Douglas DC-8, which was later replaced with a DC-10 converted at Mobile Aerospace Engineering in Mobile, Alabama, USA. The modification took approximately 18 months and first flew for ORBIS in May 1994.

The Flying Eye Hospital boasts a complete ophthalmic operating suite, including a four-bed pre-operation and recovery room, sub-sterile room and laser room, as well as a fully equipped teaching laser room. The modified airframe brings the floor panel deflection tolerance to .0001in for laser eye surgery. For independence on the ground, the DC-10 carries auxiliary air conditioners, a water purification system and an oxygen generation system.

ORBIS plans to introduce the next-generation Flying Eye Hospital in 2013 – an MD-10 aircraft that is currently being converted in California, USA. MMIC is responsible for the medical modules, Structural Integrity Engineering (SIE) for the aircraft engineering and Lift for the interiors.

An average of seven Flying Eye Hospital programmes take place each year. In 2011, 936 medical professionals received training and 386 eye surgeries were performed on board the DC-10.

Then there is also the matter of the suitability of the medical equipment for flight and the possible airframe installation of oxygen systems, plumbing and electrical provisions.

Not all medical equipment is up to the task. “Sometimes the customer will ask for the exact same equipment that you would find in a hospital ICU, but it isn’t transport capable, it can’t take the shock and vibration of flight or creates interference with aircraft avionics or communication,” comments Heinicke. “Then we have to have a discussion. We try and use equipment that is already used in modern medical transport. We know this is the kind of equipment that will not fail under temperature and climate changes or under shock and vibration. The customer will typically accept our recommendation because they don’t want to take the risk of the equipment failing.” Spectrum tests equipment on the ground and in the air.

Weight is also an issue. Spectrum is using more carbon fibre on its components to shave pounds. “It gives you more freedom in the design and you can customise installations,” explains Heinicke. “You can optimise

7-8. Surgery is performed on board the ORBIS Flying Eye Hospital



the installation to the size of the aircraft better with carbon fibre than you can with aluminium.” Spectrum is already using composite bases and mounts, however, Heinicke acknowledges that composites require more engineering on the front end.

According to Bretscher, Aerolite finds that composite structures have their advantages and are used more and more for weight-saving reasons, but for applications and mechanisms such as equipment mounts, the company still prefers to use aircraft aluminium, with great results.

The price of outfitting an aircraft with medical hardware runs anywhere from US\$60,000 (£37,741) for a basic stretcher and pedestal in a King Air turboprop, into millions of dollars for head-of-state aircraft. “The sky is the limit,” comments Heinicke, noting that medical installations, even in small business jets, can easily top US\$1.5 million (£0.94 million). **END**

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Abu Dhabi-based charter Royal Jet is modernising its Boeing Business Jet (BBJ) fleet with various designs by Edése Doret

The six BBJ 737-700s offered for charter operations by Royal Jet from Abu Dhabi Airport constitute the largest privately operated BBJ fleet in the world.

Three of these were refurbished relatively recently – one (registration A6-RJX) in 2007 and two (A6-RJY and A6-DFR) in 2010. However, the other three (A6-RJZ, A6-AIN and A6-DAS) have not been updated since their original interiors were installed in 2001, and Royal Jet decided it was time for a new look.

“The reason for the refurbishment is to keep our fleet interiors fresh and modern, in line with the expectations of our guests,” explains Shane O’Hare, CEO of Royal Jet. “At this end of the market, we must always keep up with customer expectations and offer the very best in cutting-edge technology and luxury.”

The company decided upon Edése Doret Industrial Design (EDID) to help them do just this; a company that is no stranger to exotic designs. “They wanted to do something different and cutting edge with their interiors,” says Edése Doret of EDID. “I think they were inspired by the living wall project we did last year.”

EDID’s living wall design involved the conceptual transformation of a BBJ 787-9 into a ‘flying garden’, complete with evergreen plant life growing from bulkheads in the entryway, master bedroom, lavatory and office. The reaction to such a leftfield concept is something Doret is clearly proud of. “When we presented the option for the living wall, the customer said that it wasn’t that we were thinking outside the box, rather that the box wasn’t even inside the room,” he jokes.

The first of Royal Jet’s BBJ fleet to benefit from Doret’s creativity is A6-AIN – currently being outfitted by

1. The first of EDID’s BBJ designs for Royal Jet



**“THE CHAIRMAN
CHOSE THE
MODERN OPTION; HIS
THINKING WAS MORE
PROGRESSIVE THAN
I HAD EXPECTED”**



Sabena technics in Bordeaux, France. EDID has also been asked to design interiors for A6-RJZ and A6-DAS – the first of these is on Doret’s drawing board right now.

Modern art “When we had the initial design meeting for A6-AIN, the chairman chose the modern option and I knew what direction they wanted the brand to go in,” relates Doret. “His thinking was more progressive than I had expected. He had a design vision for Royal Jet, which we now share – very cutting edge, modern and chic. He wanted to have what no one else has in terms of aviation interiors. He wanted

to get away from wood on the bulkheads and look for new materials and finishes.” Despite being presented with a number of choices, Royal Jet was decisive. “For the first BBJ, we did propose several options to them and their initial selection gave us a direction for where to take the remaining aircraft in terms of styling,” says Doret. “We offered a contemporary-style interior and a neo-classic interior, but what they went for was a very modern look, and that modern interior went through a number of further iterations to get to what we have now.”

A6-AIN’s new interior will have a quintessentially modern look with a

2. The VIP bedroom on the A6-AIN BBJ
3. EDID’s design for A6-AIN’s refurbished VIP lounge

number of surprising material choices, including ostrich skin on the seatbacks and bulkheads and jet glass on longitudinal bulkheads. Doret is also using some new finishes, such as metals covered in a new smoked nickel coating, made possible by metal specialists Techno-coat.

Geek chic In terms of technology, the upgrade includes the installation of a new AVOD system, which is able to distribute any type of source to any type of distribution point. Sources in the aircraft will include three Blu-ray players, five iPod docking stations, five iPad docking stations, two VGA ports



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and a moving map. The AVOD server is able to distribute these sources to high-definition (HD) monitors, headset jacks and various loudspeakers throughout the aircraft.

Surround sound will be available in the VIP bedroom, first-class section and lounge, business- and economy-class areas. All loudspeakers are specified to fulfil bandwidth requirements of between 25Hz and 35Hz, with an efficiency of 90dB and above.

All the VIP seats will incorporate an individual 10.4in HD in-seat monitor and passenger control unit (PCU). This PCU includes individual attendant call push button, reading light, audio selection and volume controls.

The forward lounge will be finished with a 37in HD LCD monitor on the bulkhead, and other bulkhead monitors will be “a minimum of 20in HD” models, according to Doret.

The satcom upgrade includes providing SwiftBroadband (SBB) with the aid of a Generation 2 CNX-200 WiFi router to distribute wireless internet throughout. The Honeywell MCS 6000 will be upgraded to a Honeywell MCS 7163 and the avionics subsystem will also be upgraded to an HGA CMA 2102 SB system.

GSM phone connectivity will be added with an AeroMobile GSM system, while the Rockwell Collins Airshow 400 product, which provides worldwide coverage, will be upgraded to version two. All flight information will be presented in two languages – English and Arabic.

The layout of the aircraft remains unchanged. It consists of a bedroom at the front of the cabin, with the forward VIP lounge incorporating four club-

Covering all bases

As well as its six BBJs, Royal Jet also offers two Gulfstream G300s and a Bombardier Learjet 60 for charter. The G300s each have 10 VIP seats and a divan seating two more passengers, and boast MagnaStar C2000 satcom. They were introduced in 2003.

Meanwhile the Learjet 60 was made in 1998 and refurbished in 2008. It seats seven and is also equipped with the MagnaStar C2000 satcom.

The operator is confident that with these three aircraft types, it covers the gamut of charter needs in the region. “There is a limited number of BBJs in service worldwide, so there’s a global market for our fleet,” says Shane O’Hare, CEO of Royal Jet. “It complements our other Learjet and Gulfstream aircraft perfectly.”

The company also eschews the idea of fleetwide design commonality adopted by others. “Each of our nine aircraft is like a five-star luxury hotel, and they are all very individual,” says O’Hare.



THE STANDARD CONFIGURATION WILL SEAT 36, BUT A HIGH-DENSITY LAYOUT ACCOMMODATES 46

4. Royal Jet's Learjet 60, which was last refurbished in 2008
5. Bulkhead HD monitors on the A6-AIN BBJ will be at least 20in

four setups, followed by an eight-seat business-class cabin and a 12-seat economy-class section.

The aircraft is configurable for several seating layouts. The standard configuration will seat 36, but a high-density layout accommodates 46 passengers by replacing business-class seats with three rows of economy ones.

Doret's involvement also extended to the livery. “They were looking for a marriage between airline and private aviation,” he says. “After two meetings the chairman had settled on an option

– I don’t know if that was luck or our ability to identify what they wanted.”

Bringing the design to life The task of performing the US\$9 million (approximately £5.67 million) upgrade falls on Sabena technics, which was awarded the contract in March 2012. As well as the cabin refurbishment, Sabena technics is responsible for painting the livery, performing aircraft maintenance and the aforementioned AVOD upgrade, including obtaining necessary certification – such as the



The last refurbishment

Until A6-AIN is delivered later in 2012, the newest interiors in Royal Jet's fleet belong to the BBJs registered as A6-RJY and A6-DFR – which were refurbished in 2010.

A6-RJY features a majlis-style VIP meeting lounge, a more formal meeting and dining area, and a rest and relaxation zone. It seats up to 40 passengers, with 14 lie-flat VIP seats (equipped with in-armrest 10.4in screens), two three-place divans, eight more seats in the meeting/dining area and 12 standard seats in the aft cabin. Technological wizardry includes broadband WiFi, GSM mobile connectivity, satellite telephone, fax machines, live TV, and 42in and 28in screens.

Meanwhile, A6-DFR is configured for up to 21 passengers (three in VIP seats and 18 on divans), and includes two lounges, a private office and stateroom, as well as two shower rooms.



“WE SPENT SEVERAL MONTHS ON PRE-ENGINEERING FOR THIS PROJECT”

Alternate Means Of Compliance (AMOC) to FAA AD 2009-12-06, regarding the means for the flight crew to isolate and shutdown electrical power to the IFE/CMS in case of fire or any emergency condition.

“Pre-engineering is an essential step for this kind of project,” comments Philippe Rochet, chief operating officer, production, at Sabena technics. “It is during this period that our customer's vision is confronted with the reality of an aircraft's possibilities.”

The company is, however, well equipped to deal with the rigours and demands of discerning customers. “Our VIP completion centre, based in Bordeaux, can count on an in-house design office that is Part 21 J and G certified and which has carried out numerous VIP completion projects,”

- 6. The A6-AIN BBJ will have ostrich skin on the seatbacks and bulkheads
- 7. The current interior on the A6-DFR BBJ
- 8. A6-RJY's interior dates from 2007

says Rochet. “We spent several months on pre-engineering for this project.”

The work has involved almost all areas of Sabena technic's workforce. “The number of people working on the Royal Jet BBJ varies depending on the progress of the project, but you could say that approximately 200 people are involved – from the design office and programme management team to those working on electrical and mechanical outfitting, monuments, seats and more,” says Rochet.

To lower the impact on Royal Jet's operations, Sabena has assigned a dedicated management team to the project. “Our goal is to provide the highest quality, be it for the technology installed on board, the materials used or the fitting of each element in the aircraft,” says Rochet. “We are also

working with a challenging timeframe, but our VIP completion centre is Part 145 certified, which allows us to fabricate electrical and mechanical kits ahead of schedule, saving some valuable time.”

The first of the refurbished BBJs – and indeed the combination of Doret's vision and Sabena technics' workmanship – should be unveiled in 2013. It will be put to work on corporate and VIP private charters across the globe from its base in Abu Dhabi. “This BBJ (A6-AIN) will be the pride of our fleet when she returns to service,” enthuses O'Hare. “This is the second such upgrade to our fleet and is part of Royal Jet's strategy to ensure that we continue to be the benchmark in the private jet travel market.”

Reflections With one design complete and another being finalised, Doret is able to offer some reflections on the process of working with Royal Jet so far. “They like to push the envelope,” he says. “They allow us to do things that sometimes we're held back from doing. We like to try to introduce something new that customers might not have thought of so that's what we're doing with Royal Jet. They know what they want and they have a good eye for design.” From a man who thinks nothing of putting a garden in an aircraft, that's praise indeed. **END**

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Ahead of NBAA 2012, five of the USA's finest independent bizjet designers reflect on current trends and market prospects



Sean Elsner

Company: **Infusion**

Location: **Bonner Springs, Kansas**



Laurenz Schaffer

Company: **BMW Group DesignworksUSA**

Location: **Los Angeles, California**



Scott Ohrmundt

Company: **Ascending Designs**

Location: **Frisco, Texas**



Edése Doret

Company: **Edése Doret**

Industrial Design

Location: **New York**



Kip Harkness

Company: **Point Innovation**

Location: **Dallas, Texas**

Kip Harkness



Company: **Point Innovation**
 Location: **Dallas, Texas**
 Founded: **1995**
 Other key personnel: **Vas Obeyesekere, Kosta Gianakopoulos, Amanda Schneider and Monte Curran**

“INTERIORS THAT CAN SENSE AND REACT TO USERS’ HABITS WILL BECOME THE NORM”

Point Innovation’s rich history in aviation design started in 1995 in the commercial sector. “We have worked with leading seat manufacturers to develop some of the most successful commercial aircraft seats,” notes Kip Harkness, COO of Point Innovation. “These seats currently hold a considerable share of the market.”

The company’s business jet division got underway with Harkness’ arrival in 2008. “He brings over 25 years of design experience with commercial and business jet interiors,” explains Monte Curran, CEO and founder. “He has led teams at Bombardier, Galaxy Aerospace and other firms.”

Part of Point’s USP is its broad experience – taking in the aviation, medical, industrial and military sectors, as well as consumer products. The company also boasts depth in aviation projects. “Our firm is different than most because we serve a broad market including commercial and business aircraft, with experience ranging from entire aircraft to specific components,”

says Harkness. “We are involved throughout the product’s lifecycle, from conception to production.”

At least half of the firm’s 50 creative and technical designers work on aviation-related products on a daily basis. Customers include Tier 1 aviation suppliers, VIP owners, airlines and aircraft manufacturers.

Harkness feels the industry is returning to a “classic modern period” that embraces “a mid-century romantic blend of eco-friendly materials with a practical mix of technology”. Individual control and personalisation is at the heart of this trend. “Interiors that can sense and react to users’ habits will become the norm,” he says. “Interior space and technology applications will feature comfort, flexibility and connectivity. The idea of a ‘smart environment’ that tailors itself to the user’s needs with minimal effort from the user is key.”

Landmark projects completed by either Harkness or Point include the original Piaggio P180 interior from 1987.

1. A forward stateroom for a BBJ 747
2. The Aeron supersonic concept interior

“This featured clean timeless lines that hid passenger amenities until in use,” comments Harkness. He has also worked with aviation design guru Benn Isaacman on a Gulfstream interior for Nike’s Phil Knight. “Point and I also designed Bombardier Challenger 604, Learjet 60 and Learjet 45 production interior offerings; the Galaxy Aerospace (now Gulfstream) mid-size business jet interior; and an ACJ 380 interior loft concept first shown at NBAA 2011,” says Harkness.

Current work includes a floorplan, material selections and renderings for a supersonic business jet; and a concept VIP interior for a BBJ 747 based on the client’s current floorplan.

What new materials, products or innovations interest you?

“New forms of coneless speakers allow high-quality sound to be generated from extremely thin spaces. Technologies such as IR sensors, gesture recognition and advances in wireless data transmission allow interactivity to such a high level that the way we think of interior jet design could be completely restructured.”



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Edése Doret



Company: **Edése Doret Industrial Design**

Location: **New York**

Founded: **1991**

Other key personnel: **Luz Martinez, Rafia Ahmed Chowdhury and Torree Cline**

Founded as a design agency with a focus on product, graphic and interior design, Edése Doret Industrial Design (EDID) began its first foray into aviation in 1996, developing interiors for Agusta A109E Power helicopters.

“Our unique selling point is our creativity,” asserts company president Edése Doret. “If you look at projects like the ACJ 380 interior, this changed the way designers look at interiors, moving away from the mobile home-styled interiors to a more domestic feel.”

For creativity, check out Doret’s BBJ 787-9 concept with living walls in the entryway, master bedroom, master lavatory and office bulkheads (top right).

“We are also known for providing more service to our client than what we are contracted for, as well as the speed in which we can develop a design of an interior,” says Doret.

EDID specialises in VIP projects for ‘big iron’ – Doret’s portfolio includes interiors for Royal Jet’s new BBJs (see page 64), the BBJ 787-9 concept already mentioned and the biggest of the lot – an ACJ 380. EDID is currently working on an ACJ318 Elite, a BBJ3, BBJ 747SP and a BBJ 747-8i for a head of state.

“A lot of our clients find us through word-of-mouth,” is all Doret will reveal about his customers, many of whom hail from the Middle East. In fact Doret will shortly offer bespoke design direct from the region. “We are set to open an office in Jeddah, Saudi Arabia, to serve our clients in the kingdom,” he says. The Jeddah operation will be staffed by a marketing specialist and a designer.

Asked to describe ‘American design’, Doret instantly dismisses the question: “I don’t think you can pigeon hole North American designers in comparison to the

3-4. The ‘Flying Garden’ BBJ 787-9 concept with living walls

international market,” he says. “As designers we all have individual styles. It depends on the client and the type of interior they desire. Some designers may produce the same style interior for all their projects. As for myself, I study the client’s lifestyle to develop an interior.”

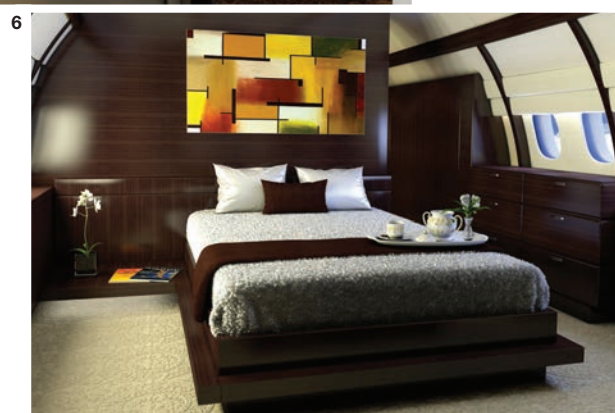
What clients generally want falls into two broad categories, according to Doret: “Younger clients from the Gulf states and North America are looking for a more contemporary and modern interior; older clients from the Gulf states prefer a more neo-classic interior. As far as technology is concerned, they all want the latest and greatest in WiFi, satellite phones and live television.”

Any hot design trends?

“Metal composites, jet glass and new leather textures are all of interest.”



5



6

Scott Ohrmundt



Company: **Ascending Designs**

Location: **Frisco, Texas**

Founded: **1996**

Other key personnel: **Jeannine Ohrmundt and Jason Guerrero**

Even though he's been designing luxury jets since 1986, including being part of the design team for a BBJ 727 with gyro jacuzzi for the Sultan of Brunei, Scott Ohrmundt's feet remain well and truly on the ground. Unless, of course, he's jetting off to some far-flung corner of the globe. "We've been to China five times in the past 18 months alone," he reveals. "The Asian market is where we're seeing the highest demand – three out of four of our 2011 projects were for Asia and the other one was for a European client."

This demographic breakdown would have been completely different 10 years ago. "North American buyers dominated the market in terms of units but that has really shifted," Ohrmundt explains. Yet catering to an increasingly international market has generally been a good thing for US designers, particularly as it has allowed them to explore more "non-traditional" concepts. "This stems from

the key idea that early buyers perceived the aircraft as primarily a transportation tool whereas newer buyers regard them as more of a reflection of their individuality," says Ohrmundt.

Designing for a diverse range of cultures has also allowed Ohrmundt and his colleagues – including wife Jeannine – to expand their creative horizons in terms of fabrics. "As the industry moves forward and cross-border relationships increase even further, the perceived differences between North American and international design will best be identified by the cultural background of the buyer, their view of the function of the aircraft, and their personal taste preferences."

Across the board, Ohrmundt is seeing more demand for WiFi, connectivity, mobile telephone solutions and enhanced data transmission. "The impact of IFE in terms of weight, space and electromagnetic issues is growing and

5-6. An ACJ 319 concept

what you recommend for installation today can be obsolete by the time the aircraft is delivered 18 months later," he says. "It's becoming critical to engineer and plan for the ability to upgrade and modify these elements frequently."

Ascending Designs recently moved into a new office in Frisco and a second "out west" is on the cards. "We are scheduled to deliver our first Asian ACJ 319 completion this November and we've also just signed a contract with a head of state for a green BBJ 737-8 for delivery in December 2013," says Ohrmundt. "We're in the conceptual phase, which is by far my favourite."

What has caught your eye lately?

"Custom Control Concepts' AVOD incorporated into the monitors is a real positive, and will force IFE suppliers to move in the same direction, the consequence being more space for the end client."

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Ascending Designs
2251 Fox Ridge Trail
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www.ascendingdesigns.com

Scott Ohrmundt, Owner
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NBAA 2012

Booth # 3976

Sean Elsner



Company: **Infusion**
Location: **Bonner Springs, Kansas**
Founded: **1997**
Other key personnel: **Tim Baine, Lance Rake, Jay Robinson, Doug Holda and Valerie Stephenson**

“INTERFACE DESIGN IS STILL IN ITS INFANCY ON BOARD CORPORATE AIRCRAFT”

Sean Elsner, founder and president of Infusion Design, believes teaming up with Robinson Design under the Infusion banner was a logical next step, as the two firms had successfully collaborated on previous business jet interior projects. The new partnership will, in his opinion, “directly benefit our customer base” and “greatly expand the core competence of each organisation”.

The company now boasts a diverse group of designers who have a great deal of experience both within and outside of aircraft design. “We’re a responsive team that’s capable of solving problems quickly,” Elsner continues. “Clients that seek out our services tend to favour contemporary interior design, and although contracts in North America are less frequent than perhaps they once were, the expectations are much higher.”

Although Elsner and his colleagues have worked on aircraft of every size, it is clear by simply perusing the Infusion order books that there is gathering interest in larger jets. “China and Russia are gearing up in this space and we have had to increase capacity to meet the specific challenges that these bigger aircraft pose,” he says.

Earlier this year, in fact, Infusion completed a green BBJ for an unnamed client, a project originally commissioned in 2010. “This featured a unique galley with an island, designed specifically for the mission requirements of the customer,” Elsner reveals. The removal of the forward bulkheads was a particularly neat tweak and created an impressive perception of volume upon entry into the cabin. “There was also a seating and dining area with collapsible tables that further increased the sense of space. The overall feel is warm and contemporary.” Elsner explains.

“Most of our inspiration is the result of emerging technologies and trends found

within other industries,” says Elsner, citing the use of materials in consumer products and the automotive sector as especially stimulating in terms of creativity. Comparatively, though, the Infusion president feels there is still some catching up to be done with other sectors in terms of technology. “Interface design is still in its infancy on board corporate aircraft, but we expect that as demand for inflight technology grows, entertainment and environment controls will have to become simultaneously more

7. One of Infusion’s most recent BBJ projects

powerful and easier to comprehend. A typical customer can walk on board with an array of highly advanced personal devices, so the ability to be able to interface with other technologies on board is going to be a key focus area in the future.”

What are Infusion’s flagship VIP interior projects?

“A green BBJ completion, our heritage with the Bombardier project line, and the Embraer Legacy.”





8

9



Laurenz Schaffer



Company: **BMW Group DesignworksUSA**

Location: **Los Angeles, California**

Founded: **1972**

Other key personnel: **Monika Zych, Niko von Saurma, Gerhard Steinle and Magnus Aspegren**

According to BMW Group DesignworksUSA's president, Laurenz Schaffer, the company's ability to transfer know-how not only from the automotive side of the BMW business, but also marine, rail, lifestyle, recreation, healthcare and numerous other sectors, gives it a unique edge in the business jet interiors market. "This cross-fertilisation – the ability to transfer and transform what we learn from working on other design programmes for our parent company to external clients and vice versa – is a special USP for us," he feels.

Despite DesignworksUSA's status as a relative newcomer in business aviation (it began working in the field in 2000), its portfolio includes high-profile projects, such as the Embraer Legacy 500. The 12-passenger cabin interior and full cockpit was based on the 'intelligent luxury' theme created when it worked with Embraer on the Phenom 100 and 300. "Because of the scale of the programme and what it generated in terms of impact for Embraer, I would say the Legacy 500 is one of my favourite projects," Schaffer reveals.

More recently, the German designer and his colleagues have been kept busy on a new cabin interior concept for the 8-10-passenger Dassault Falcon 2000S. "For this project, I was particularly proud of the way we made intelligent use of the space, the dimensions, light, colour and materials, and created a cabin where the perceived space is expansive, despite it being 7ft 8in wide," comments Schaffer. "There is an abundance of natural light, its look is sleek and clean and the quality is impeccable."

Space being a prime consideration for many aircraft interiors, Schaffer expects carbon fibre materials to gain in prominence. "Not just for weight reduction and efficiency, but also to create an authentic look and feel of lightness and efficiency as a visual experience," he says. This will combine with more variability in how cabin space is used and adapted to different user needs and modes of travelling. "We are currently looking at applications for intelligent materials such as piezo electric fibres, for instance, which can change property and potentially even shape,"

8-9. The Dassault Falcon 2000S

says Schaffer. "The use of composites in interior spaces has been limited to date, but that has definitely caught my eye and I expect their integration to increase."

Schaffer has also noticed lots of technological improvements. "There is more LED and lately OLED lighting technology being used," he says. "I think we'll see more innovations with seating in the future, too, with seats that better adapt to different modes with increased variability and comfort. I think it's a given that IFE will go through radical changes in the years ahead, with more interactive and personalised services taking off. And because people expect to have access to data, information and services at all times, connectivity will increasingly influence the design process."

Where are you seeing most demand for your services?

"We have seen a large number of companies focusing on China with competitive products in both the business jet and commercial aviation area. To better understand the market and the demands, we opened a studio in Shanghai in April 2012."

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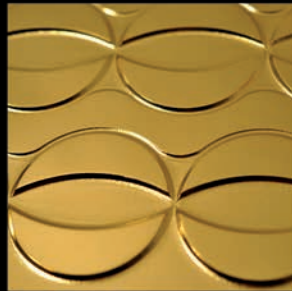
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NBAA 2012

The 2012 NBAA Annual Meeting and Convention will be held in Orlando, Florida, USA, on 30 October to 1 November. From the latest in IFE to new soft materials and completion capabilities – the following pages detail lots of innovations you won't want to miss.



Total eclipse

IDAIR will show Eclipsair, an infotainment system that provides passengers with news, video, audio data and flight information. It supports a variety of mobile devices and operating systems, screen sizes and resolutions. Passengers will be able to view the content through the web browser on their smartphone or tablet. Additional functions, such as controls for cabin lighting or window panels, can be integrated into the system.

The company says Eclipsair is a single-box solution that provides a fully operational wireless IFE system within an aircraft cabin, to be installed during an overnight period, only requiring a minimum of installation materials and manpower. It can be used as a supplement to other IDAIR IFE systems or as a standalone infotainment solution. The joint venture partners complement each other well in this new product – Lufthansa Technik will provide the hardware and Panasonic Avionics Corporation will develop its software. IDAIR plans to have the first systems available for installation in the second quarter of 2013.



Going large

Altitude VIP Completions will launch its comprehensive BBJ 787 completions services. Previously focusing solely on

green BBJ completions, Altitude is now adding BBJ 787 completions to its portfolio, particularly targeting clientele in the Middle East.

Altitude says it is benefitting from advanced knowledge of the new-generation airframe obtained from its parent company – Air New Zealand being Boeing's launch customer for the Boeing 787-9. This understanding of the aircraft has already secured Altitude interior design and development contracts for international airlines.

Now this expertise is being offered to the VVIP market. The launch into this new aircraft type will see a substantial increase in resources, including dedicated hangar space, support shops and employees. New facilities and infrastructure are being developed in Auckland, New Zealand, and should be completed in time for the first BBJ 787 deliveries in 2014. Altitude offers an in-house solution to projects ranging from maintenance checks through to full green completions.



See for yourself

This year, attendees won't have to go all the way to the static display to board an ACJ 320 – just to 3DViz's stand. In its 10th year, the company will introduce a new

technology that until recently was limited to the US military.

The 3D Virtual Reality Cabin enables designers and completion centres' customers to step into their aircraft way before they have been built. "The system is quite simple. It consists of a laptop and a headset that projects our ultra-realistic interiors into an immersive display, fooling the mind and giving the user the impression that they are actually walking inside the aircraft," says J.P. Magnano, CEO of 3DViz.

The company's renderings and animations will also be showcased on a large high-definition 3D TV in the booth's mini amphitheatre. In addition, visitors will be able to check out the latest iPad application available to aircraft manufacturers. The application, which can be downloaded from the app store, will let the user configure a cabin – in this case a Pilatus PC 12 – with all the available materials and finishes.



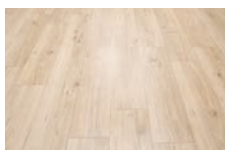
The Leather & Lace look can be laser-etched on to hair-on hides

Lace value

There will be three new leather collections on Edelman Leather's stand. 'Leather & Lace' was inspired by Spanish lace handcrafted using age-old techniques, modernised through the use of laser etching and cut technology. This look can be realised with Cavallini hair-on hides for an accent on a sidewall, dado panel, bulkhead or runner; Napoli leather for seating; or Royal Suede for added texture.

Edelman will also highlight its Super Soft collection of pure European calfskins. These are the softest hides the company offers, and feature a natural grain finished with aniline dyes.

The third collection on display is Shearling, a natural lamb product that can be applied as an insert on a private aircraft seat, or for pillow accents.



Hold the floor

Extending its line of wood-look flooring options, Lonseal will show its latest offering – Lonwood Madera. A wide-plank design available in six colours, Lonwood Madera is

a sheet vinyl that features detailed graining and knotting. This realistic look is further enhanced by articulated plank lines. The aim was to suggest old-world craftsmanship paired with the crisp, clean lines of contemporary living. Lonwood Madera also features Lonseal's Topseal formulation, a factory-applied urethane finish that the company says protects the floor, reduces scuffing and simplifies routine maintenance.

Lonseal says its flooring meets most major manufacturer material specifications and FAA safety standards, including FAR 25.853a and FAR 25.793. The company also strives to provide the finest quality environmentally conscious products.



Table talk

A new Hi-Lo conference table will be the main focus on MSB Design's stand. The company says it is easily installed, made of ultra light components, boasts a quiet operation, has infinite locking positions and can come with an extension leaf up to 18in.

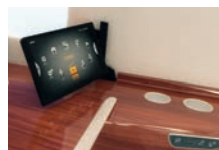
MSB employees like to demonstrate the stability of the table as it would be used or misused in the cabin – by sitting on the edge of the tabletop. They have even been known to stand on the table to show its strength. The table has a 300 lb static load capacity. Deliveries began in early 2012.



Light hearted

Comlux America will highlight its weight-saving expertise, as demonstrated by its latest ACJ 319 completion, which was delivered with an interior weight 1,100 lbs

(489.9kg) less than the customer's specified requirement. The aircraft boasts gold-trimmed domed ceilings and a divan that converts into a queen-sized bed. Comlux America upgraded the acoustic system based on data from previous completions, yielding 49dB SIL in the master areas; replaced the factory ECS system with a system that provides an environment of $\pm 1^\circ\text{C}$; and optimised process specifications to ensure build methods increased strength-to-weight ratios.



Nice work

Lufthansa Technik will display the latest features of its nice high-definition (HD) CMS/IFE system, including HD video at each seat via thin pop-up HD displays and wireless 802.11ac connections to tablets and smartphones.

The system includes media interfaces (USB, Apple, HDMI) that will enable streaming on the high-bandwidth Ethernet network. The Media Center unit includes a Blu-ray player, an AVoD server and a map server. The user interface combines a scroll wheel with an animated graphical user interface on touchscreens. Control is also offered via wireless applications for iPhones, iPads and Android devices.

nice was recently selected by Bombardier as the baseline CMS/IFE offering on the Learjet 85 (pictured), 70 and 75; and on another unnamed OEM line-fit programme.

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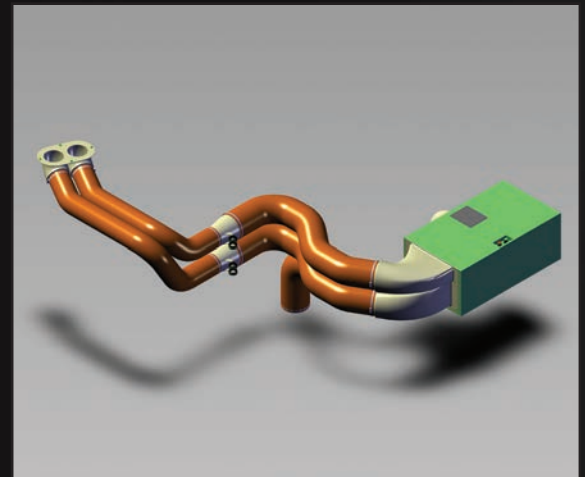
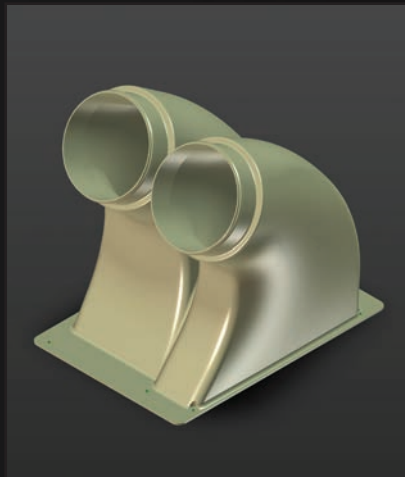
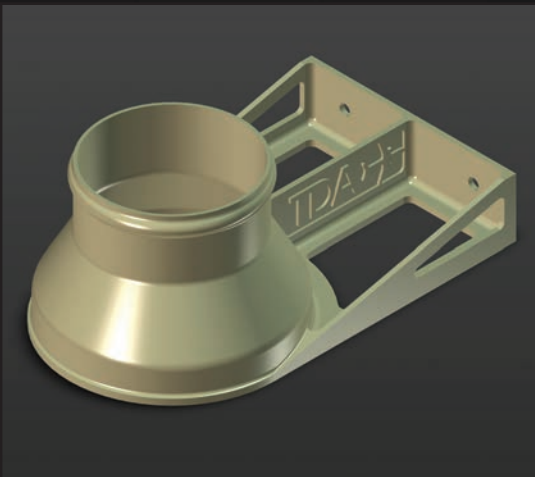
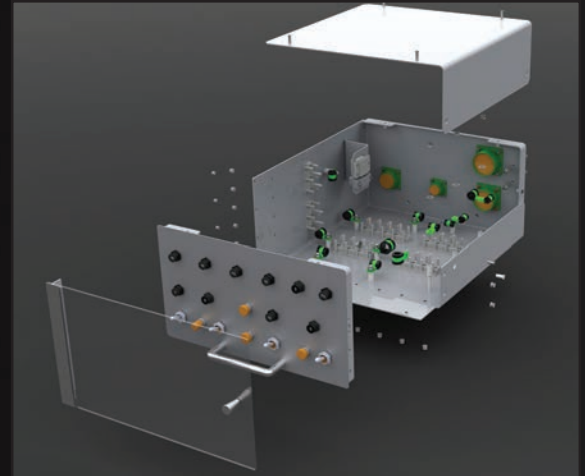
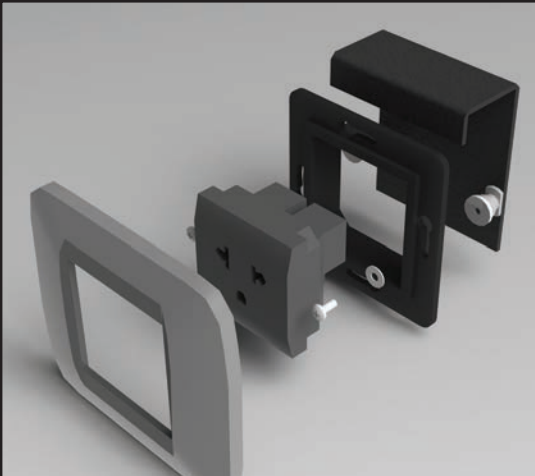
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Duncan Aviation backs up its 14-day transformation with a written guarantee and three-year interior warranty

Short but sweet

Duncan Aviation will highlight a programme that promises 14-day interiors for certain Citation and Learjet models. The transformation includes complete interior soft goods for the flight deck, cabin and lavatory for Citation X, Encore, Ultra, XL, XLS and Sovereign models and Learjet 45 and 60 models. Additional services, like cabinetry touch-ups and minor airframe due items, can be added.

The company says the keys to this programme are proper planning and coordination; decades of experience in Citation and Learjet interior refurbishment; efficient processes; the utilisation of pre-engineered seat designs; and state-of-the-art manufacturing technologies. Duncan Aviation has facilities in Lincoln, Nebraska, and Battle Creek, Michigan, USA.

Ring the changes

TrueNorth will feature its Stylus handsets. Having unveiled the Stylus at NBAA 2011, the company reports that product development is complete and it is starting to deliver it as part of its connectivity solution to a number of VIP aircraft owners and operators.

Stylus handsets are designed to be stylish and robust while offering high-quality voice and audio. Tailor-made and personalised from aluminium and Corning Gorilla Glass, the phone is customisable to fit every aircraft interior.

It is part of the Simphone Open Cabin system, which also delivers WiFi, fax, enterprise email and connectivity for mobile devices. The app-based solution is flexible and scalable.



Easy going

The focus of Flight Display Systems' stand will be Fly HD, a high-definition (HD) system that provides full 1080p video quality. The company had two goals when designing Fly HD: to build high-quality components and

make them simple to install. It says these goals were achieved by engineering the components to use HD-SDI signals on the common coaxial cable that is already installed on many aircraft, reducing the number of converters required and limiting the rewiring necessary.

The Fly HD components include HD widescreen monitors, HD-SDI backbone switches and converters, and HD source equipment. Fly HD monitors are sized from 7in to 55in in widescreen format. The smaller 7in and 10in versions can be attached to arm mounts, while larger displays are typically used on bulkheads and in custom-built consoles.



Ready for launch

Building on its Venue high-definition (HD) cabin and entertainment management system, Rockwell Collins is hinting at unveiling a market-first, airworthy system to enable an experience found in home entertainment environments.

"We're on the verge of bringing a capability to the cabin that will resonate with those wanting to extend what they already do at home, and that is compliant with all aviation and copyright laws," said Duc Huy Tran, director of cabin systems marketing for Rockwell Collins.

The company will also host the Caterham F1 Team show car and the team's US test driver Alexander Rossi at its NBAA exhibit. Rockwell Collins entered into an agreement with the Caterham F1 Team to provide aviation technology in exchange for promotion on the sport's world stage. Rossi will meet NBAA attendees and sign autographs.



Get connected

ViaSat will promote its Yonder inflight internet service, which boasts near-global coverage provided by a network of Ku-band satellites. The service can be used for email, shopping, access to a VPN, and even internet calls and watching video clips. It is available for a fixed monthly service cost and offers access from the minute passengers board the aircraft, even while idling, taxiing and in flight at less than 10,000ft.

ViaSat says data shows on-the-ground usage accounts for as much as 35% of overall usage. Yonder is in service today on hundreds of business aircraft.



Vision Systems says its Smart Up tablet deployment arm is ready to be installed in all types of seat

Gripping stuff

Vision Systems will showcase its “compact and silent” motorised deployment arm for tablets, called Smart Up. The solution has a screw clamping system that means it can be adapted for portrait and landscape use. Screen orientation is also adjustable.

The company will also highlight an application that enables passengers to access IFE and CMS functions on their personal electronic devices (PEDs). The VisiSmart application provides streaming access to video, music and news from the aircraft’s media centre, and also enables passengers to control lights and window shades, all through their PEDs. All the multimedia content, cabin management and connectivity features can be hosted in one unit, the VisiBox.



True colours

Moore and Giles will introduce a variety of new colours in its Ascot leather collection. Ascot is a lightly printed full-grain leather. Designed in Germany on native hides

averaging 55-65ft, its production is managed exclusively by the tannery from the start to finish. The company says Ascot is treated in the drum to pass FAR 25.853 (j)(ii).

Knowing that durability is a key factor in leather selection, Moore & Giles has tested Ascot in some of the most stringent industry assessments including taber abrasion, elongation, tear strength, flex and cracking. All Moore and Giles aviation leathers are treated to meet aviation specifications. The company has a wide variety of leathers it can customise for aviation clientele.



Screen star

PGA will present its latest innovations in IFE and CMS equipment, including Smart Touch Cabin, a WiFi Apple application that enables passengers to control various cabin functions (including lighting, AVOD, window shades and sat TV) from their Apple devices.

PGA offers touchscreens ranging in size from 3.5in to 20in. It will showcase its flagship products – a 10.4in slim video touchscreen and a 3.5in keyboard touchscreen.

In addition, PGA offers a wide range of connector panels (RJ45, USB, HD, VGA, etc.), which will be exhibited during the show. These are offered in a variety of colours and plating to suit any cabin style.

Lasting legacy

Embraer Executive Jets’ NBAA highlight will be the 2012 Legacy 650 and, for the first time, the full-size cabin mock-up of the Legacy 450. The never-before-seen Legacy 450 layout shares the same modern aesthetic as its sister aircraft, the Legacy 500. Embraer will also have the ultra-large Lineage 1000, super-mid-size Legacy 600, light Phenom 300 and entry-level Phenom 100 on display.

Embraer reports it has attracted top industry talent following the opening of a new customer centre at its facility in Melbourne, Florida, USA, which includes a new Legacy and Lineage design studio. The company is also building the Embraer Engineering and Technology Center next to its Phenom assembly, paint and delivery facilities. The centre’s initial work will focus on business aircraft interiors contributing to advanced interior materials.



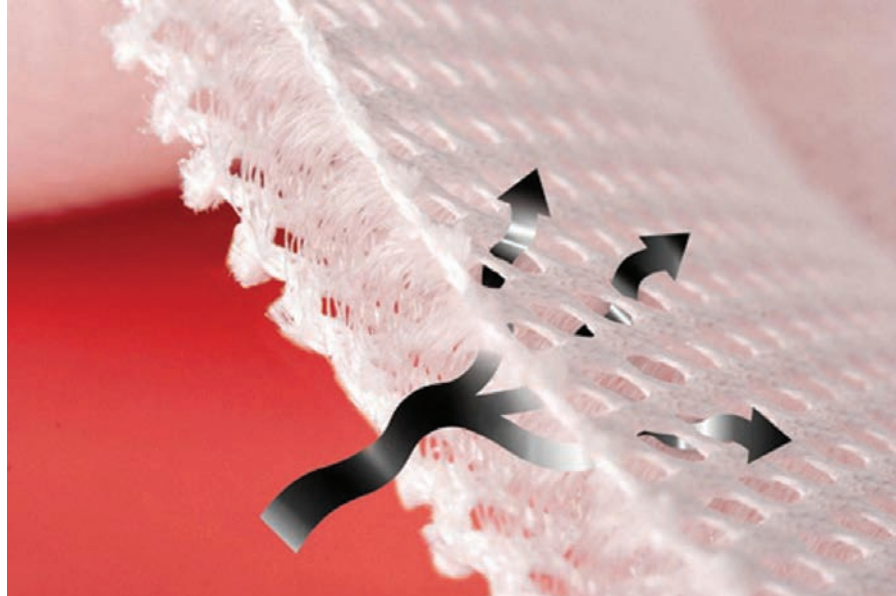
Find serenity

Aero Seating Technologies (AST) will showcase its 9g and 16g seating solutions. Features of the next-generation 16g-certified Master Class seat include adjustment for 3in of vertical recline. Fore, aft and lateral translation – including 360° swivel and full-flat berthing with drop-down armrest – is standard on all AST’s 9g and 16g

Master Class VIP seats.

The company will also highlight its new Serenity series, which includes an audio massage function that interacts with the aircraft’s IFE system. Available as a full power seat for both narrow- and wide-body jets, it also features fully flat recline.

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MEBA 2012

Al Maktoum International Airport in Dubai, UAE, will be the stage for the Middle East Business Aviation (MEBA) 2012 event, on 11-13 December. This preview should give you a taste of the luxurious and technological innovations set to take the floor



The E-3 shade provides two ways to control the amount of light entering the aircraft cabin

Light duties

Lou Martin & Associates will present its newest innovation, the E-3 window shade system, which combines a pleated shade with an electrochromatic outer lens. The company's pleated window shade systems range from manually operated single and dual shades to electrically operated shades with mechanical override systems. It will also custom-design specialised shade systems, such as bulkhead shades to allow selective privacy for an individual compartment and venetian blind units.



Comfort zone

Boutsen Aviation will present its 'one-stop-shop' for cabin comfort. Based on 15 years of experience in aircraft sales, this new department was established a year ago

with a passion for decoration and perfection. The company supplies chinaware, crystal, cutlery, bedroom and bathroom equipment, amenities and many other useful and decorative items for the entire VIP aircraft interior.

After extensive investigation, the company has teamed up with prestigious luxury brands to be able to offer customisation for everything from chinaware to cashmere flying socks.



Command and control

Rockwell Collins will feature its Venue high-definition (HD) cabin and entertainment management system, which boasts more than 150 business aircraft installations. "In a

relatively short time period, Venue has become the cabin system of choice for many operators," says Duc Huy Tran, director of cabin systems marketing for Rockwell Collins. "The system's high reliability, performance, intuitive interfaces and flexibility to adapt to any business aircraft cabin has much to do with its success."

The system is available as a forward-fit or retrofit solution and utilises an array of HD touchscreen displays for crew and passengers to manage Venue's entertainment and environmental settings.

Tran also encourages attendees to stop and see the new Airshow app for the iPad, which includes a panoramic moving map view.



Personalised spaces

Canada-based Flying Colours Corp and US subsidiary JetCorp Technical Services will talk up their refurbishment and completion programme for Global

Express aircraft. Tailored furnishings (such as aft-cabin double divans) and sophisticated IFEC installations have all featured in recent VVIP completions. The team will also detail its expertise in connectivity. In early 2012 it was approved as a ViaSat reseller and installer, and since early 2011 has installed numerous WiFi setups. The company will also show stone flooring, galley and bathroom surface products, which it says are highly requested in the region.



Turbo charged

AMAC Aerospace will be exhibiting in conjunction with Pilatus to mark the former's recent appointment as an exclusive sales distributor for the PC-12NG

turboprop throughout the Middle East. AMAC Aerospace will showcase its own six-seat PC-12NG at the static display.

The company will also detail its maintenance services, which range from heavy checks and inspections to AOG requests; modifications to major overhauls; and avionics repairs to installations and upgrades.

AMAC Aerospace says the Middle Eastern region is particularly important to the company, as much of its expertise extends to the wide-body aircraft range including the BBJ 777 series, the BBJ 747-8i and affiliated family series, ACJ 330 series and the ACJ 340 series, all of which are very popular in the region.

From the publishers of Business Jet Interiors International magazine

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The Transportation Weight Loss Diet Conference is a unique event that will bring together key innovators from across the automotive, aerospace and rail industries, as well as leading academics, to highlight major breakthroughs in mass reduction.



CONFIRMED SPEAKERS TO DATE:

Matt Zaluzec manager Materials Research Advanced Engineering Department, Ford Motor Company • Dr John Fish senior manager Airframe Technology Lockheed Martin Aeronautics Co • Tomasz Krynski chief engineer PSA Peugeot Citroën • Robert McIntosh chief engineer - Weights Boeing • Jacques Belley, Director R&D, Standardization and Innovation Bombardier Transportation North America • Oliver Walter Responsible Product Manager BMW i3 BMW • Dr Srikanth Ghantae senior technology specialist - Plastics Volvo Trucks North America • Dr Ley Richardson principal application research associate - Aerospace DuPont Protection Technologies • Pradeep Kumar Manager - Global Bus & Coach Programme Ashok Leyland Limited • Toru Yamanaka General Manager Automotive Center Toray Industries Inc • Ramkisan Gite PAT lead - Weight Reduction Tata Motors • Phillip Bell product line manager Corning Incorporated • Scott Blake president Assembly Guidance • Byron Bloch director Auto Safety Expert LLC • Jonas Braam research engineer Sapa Technology • Mike Brock market development manager Rogers Corporation • Daniel Buckley manager of R&D AGFM • Ravi Chilukuri director EASI • Antonio Coelho R&D director Amorim Cork Composites • Freddie Colsoul account manager LMS North America • Prof Glenn Daehn professor Ohio State University Materials Science and Engineering • Nico Den Ouden sales and marketing director E-Leather Group • Dr Jorge F. dos Santos head of department Helmholtz-Zentrum Geesthacht • Ramkisan Gite PAT lead - Weight Reduction Tata Motors • Neil Gross president Acme Mills Company • Phil Hall managing director Caterham Composites • Georg Heidelbergmann president Adapt Laser Systems • Prof Santiago Hernandez professor University of Coruna • Prof Pete Hylton director of Motorsports Engineering Indiana University Purdue University Indianapolis • James Jones CCG manager - Americas Composites Consulting Group • Greg Kolwich manager Value Engineering Services FEV Inc • Prof Konstantinos Kontis professor and deputy director The University of Manchester • Oliver Kuttner CEO Edison2 LLC • Prof Khalid Lafdi professor Department of Chemical and Materials Engineering UDRI and Wright Brothers Institute Endowed Chair in Nanomaterials • Donald Lasell president and chief engineer Think Composites • Michael Lee Project Manager EASI • Mogens Løkke CEO ECOMove ApS • Dr Ralph-Dieter Maier manager Aerospace Technologies BASF Corporation • José Rui Marcelino design manager Almadesign • Cameron May director GfE Materials Technology Inc • Patrick McGowan vice president GT Alloys • Prof Shaker Meguid Professor and Director Engineering Mechanics and Design Laboratory, Department of Mechanical and Industrial Engineering University of Toronto • Dr Mohammad Moniruzzaman product development engineer SABIC • Dr Dries Moors innovation manager Bekaert • Jeff Moyer Meridian Lightweight Technologies • Anthony Norton senior director Global Automotive & Off-Highway Vehicles Altair • Ms Gulsen Oncul A350 Ailerons EPM TAI • Tony Padula product manager Amphenol Pcd • Vasant Pednekar senior engineer Application Development Lanxess Corporation • Gregory Peterson senior technical specialist Lotus Engineering Inc • Alexander Pozzi vice president Advanced Design Group Seating Products B/E Aerospace • Paul Priestman director Priestmangoode • Javier Rodriguez Director Vehicle Integration & E/E EDAG Inc • Alasdair Ryder business unit manager - High Volume Manufacturing Umeco Structural Materials • Greg Schroeder research analyst Manufacturing Engineering & Technology Center for Automotive Research • Gary Seale managing director Cobra • Steven Sopher technical director JSP • Richard Strout president Leading Edge Motorsport • Gerret Suhl head of Sales Car Trim GmbH • Manoj Surana manager - Engineering Research Centre Tata Motors Ltd • Ashutosh Tomar senior researcher Jaguar and Land Rover • Dan Williams product manager - Automotive Granta Design Ltd • Ingo Wuggetzer vice president Cabin Innovation and Design Airbus Operations GmbH • Dr Robert Yancey senior director - Global Aerospace Altair Engineering • Dennis Sieminski PE NEI Software • Janice Grzywa market development manager Victrex

If weight reduction, fuel efficiency or environmental impact matter to you, then you need to attend this conference!

OCTOBER 24-25, 2012 BOSTON, MA, USA

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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

without compromising safety, efficiency, or performance.

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

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.

Design-driven innovation and cross-pollination for lightness

José Rui Marcelino, design manager, Almadesign, Portugal

Cabin Concept 2050 based on a bionic structure

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

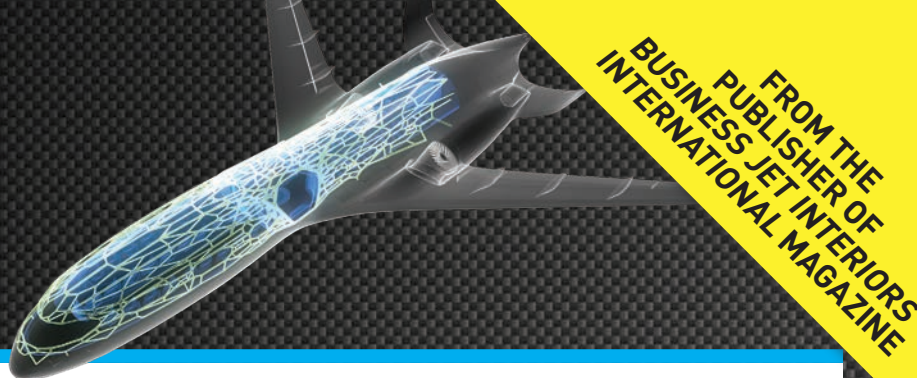
Employing new design techniques to deliver lightweight seats

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

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BOSTON, MA, USA



FROM THE
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INTERNATIONAL MAGAZINE

HiAnt® Simulation: Simulating structural composite hybrid parts made from continuous fiber reinforced plastics

Vasant Pednekar, Senior Engineer - Application Development, Lanxess Corporation, USA

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

Computer-based tools for designing with new materials

Dennis Sieminski, P.E., NEi Software, USA

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 Heidelmann, president, Adapt Laser Systems, USA

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

Tony Padula, product manager, Amphenol Pcd, USA and Janice Grzywa, Market Development Manager, Victrex USA, Inc, 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

Pioneering a sustainable business model

Stuart Jones, VP Research and Development, Interface Americas, USA

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

Advancements in Cast Magnesium Structural Components

Jeffrey L Moyer, Vice President, Business Development & Engineering, Meridian Lightweight Technologies Inc, Canada

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

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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

Guksen 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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magicbeans

Good coffee is now ubiquitous on the ground and passengers have high expectations for their business jet brew – so galley insert manufacturers are responding with ever more sophisticated machines

trueprofessional

The new Gourmet Beverage Maker from B/E Aerospace uses a 15-bar pump and an advanced thermoblock heating system with precise temperature control to produce single servings of coffee, hot water for tea, and barista-style espresso and cappuccino. The stylish unit incorporates intuitive and ergonomic controls designed to make it simple to operate, including a one-touch cappuccino function.

Compatible with widely available coffee and espresso pods, and featuring an easily accessible tank for bottled water that does not require a plumbed galley, the Gourmet Beverage Maker has global applicability for a broad range of aircraft platforms.

www.beaerospace.com



expressdelivery

Aerolux has 25 years of experience in serving the Aviation industry with an exclusive, innovative and specialised range of espresso machine and beverage makers optimised for an enhanced inflight experience. The company is now producing a 28VDC version for the business jet market.

Aerolux is the sole manufacturer of the award-winning espresso maker, which uses the authentic Nespresso capsule system, approved for aircraft use. The company worked closely with Nespresso on its development.

This machine is versatile, easy to use and very reliable. It can also provide hot water for tea and steam for cappuccinos if required. It comes with high-specification finishes to suit individual requirements.

www.aerolux.co.uk



freerange

The latest coffee and espresso makers from Monogram Systems (TIA Division) were designed specifically for business jets, to rival some of the best in-home consumer products.

The coffee brewer features a manual-fill water tank, which is easily removable for cleaning, and a tap that quickly dispenses hot water for tea and other beverages. In addition, the machine is capable of brewing with loose ground coffee, giving passengers and crew flexible choices. The machine is rail-mounted for easy installation and

removal, and also features a large, simple interface, a self-monitoring system and a drip stop. The espresso maker incorporates an easily removable water tank; 10-bar pressure brewing system; a patent-pending universal pod holder system; a steam frother spout; a large user interface; and self-monitoring system.

The TIA Division offers the ability to work with OEM partners to develop a unique industrial design to complement the overall cabin.

www.monogramsystems.com/tia



homebrew

When developing its latest coffeemaker, Sell's aim was to provide "flying coffee that tastes like at home".

The machine's improved brew head has been designed to bring out the best of the coffee bean, while the insulated tap, together with the insulated serving pot, allows the crew to serve fresh, hot coffee in a safe way. The new machine also features a tea brewing function.

The biggest challenge was to combine form and function – to deliver an attractive and elegant outer appearance while simultaneously incorporating the increased functionalities required today. Weight savings were also of paramount importance in the machine's design.

www.sell-interiors.com

newandimproved

The Iacobucci HF Group has developed a new espresso machine for the business jet market. The idea was to use lightweight materials and the latest technology to offer a reliable, stylish and functional machine, that also offers a big reduction in weight compared with previous models.

The new machine (as with all Iacobucci HF machines) uses patented heat exchangers to ensure instant and continuous operation, avoiding the need to reheat the water after each use. The company says this also makes the espresso maker competitively lightweight. The machine has an open system, enabling all ESE (easy serving espresso) pods to be used.

The main features of the new machine are an incorporated drain; an elegant front panel design (black and rounded); new flashing icons; new materials that are less sensitive to heat; a modern, ergonomic handle; a backlit panel; a flow meter for precise brewing; a pressure sensor; a new latch mechanism; a new spout adapter; a new handle locking system; new-generation hardware and software; a lighter plumbing system; and lighter heat exchanger.

www.iacobuccigroup.com





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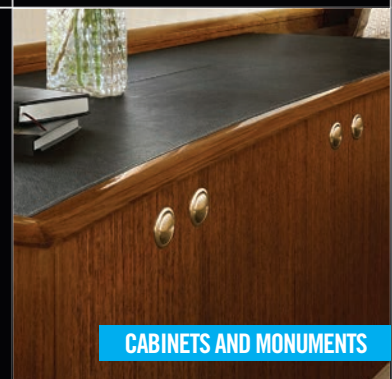


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top table

A single-pedestal Hi-Lo table is the latest elegant and practical design from MSB

2011 marked a turning point for MSB Design. Established just seven years ago in Montreal, Canada, the company has invested considerable resources in the research and development of innovative business jet interior components. In 2011 this effort culminated in the launch of a flagship product developed in-house by the company's team of engineers – a single-pedestal Hi-Lo table.

"Our goal was to redefine the standards within the industry," says Mario Sévigny, co-president and founder of the company. The result is impressive – the table provides surprising stability, has infinite locking positions and can come with an extension leaf up to 18in. It has been designed to offer easy installation, a very low stow height, ultra-quiet operation and super-light components. The table was also optimised to please passengers with elegant lines and ergonomic design. To further boost comfort by enabling easy access, MSB designed and patented a single pedestal for the product. "Our customers choose our table because it offers a superior overall experience," says Sévigny.

MSB reports that the product has now passed all the necessary certifications and qualifications, and the company has signed two major contracts with OEMs for manufacture of the Hi-Lo table. End-users should soon experience both manual and electric versions of this product.

In addition to the Hi-Lo table, MSB provides customers with a wide range of other customised products and parts.

Supported by a multidisciplinary, highly qualified team of designers, engineers and manufacturing specialists, MSB's mandate is to complete projects on schedule and in accordance with the highest quality and performance standards.

The company offers customised monuments and galley inserts for OEMs and completion centres. It has manufactured inserts for all kinds of tableware, as well as for bottles of fine champagne and cognac, ice tongs, soap and just about anything you might find on board a private jet. MSB also offers glassware holders to display and protect delicate items such as fine glasses.

In addition to providing assembled monuments, the company has also developed a ready-to-assemble kit of flat and curved panels for all aircraft monuments and periphery parts.

Excellence and customer satisfaction are prime concerns, and the company ensures strict adherence to quality and security standards at every step of a project, from the evaluation process through to final delivery. Anticipating needs and expectations has always been a driving principle. "It's not simply about delivering an excellent product to a customer, it's the customer's entire experience that makes MSB stand out," explains Shannon Gilbert, the company's director of business development. "We continually strive to develop superior products and services."

MSB Design

Reader Enquiry No. 501



3



- 1 Mario Sévigny demonstrates the sturdiness of the Hi-Lo table
- 2 An MSB glass rack
- 3 The Hi-Lo table's single pedestal can be set at any height

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salesforce



A real-time 3D application that enables aircraft buyers to customise and visualise their purchase

With the aim of driving the sale of new and refurbished aircraft, visualisation specialist Lightbox has developed Cbox, a real-time 3D application. The marketing tool enables users to navigate the interior and exterior of any aircraft and customise it by selecting materials, finishes, layouts and paint schemes.

"Digital imaging has revolutionised the design and sales process with a high level of realism and real-time interactivity helping to create an impactful, memorable impression in prospective buyers," says Max Pardo, head of operations and principal at Lightbox. "The days when clients had to visualise interior designs just by looking at material samples or 2D drawings are over. With Cbox, clients can easily change an interior configuration in seconds with an intuitive, user-friendly interface."

Cbox was conceived with one overriding mission in mind – to drive sales for clients. Thus Lightbox worked hard to optimise the interface's visual quality (to impress the sophisticated audience), ease of use and interactivity, while enabling full customisation to reflect each client's unique identity.

The application was featured at Gulfstream's NBAA 2011 booth, where guests had the opportunity to navigate and configure a G550 aircraft. Visitors created personalised cabin interiors by changing carpets, leathers, veneers, fabrics and plating finishes in real time. Prospective buyers could also select between various exterior paint scheme options and visualise the design from every angle.

"We identified a need for a client-centric tool that actually drives sales and enhances the decision-making process for prospective buyers," says Vicky Moore, vice president and principal with Corbis Global Group. "No other application in the world matches Cbox in the way it combines an intuitive interface, highly realistic visuals and real-time navigation. This translates into sales growth for our clients – that's our number one goal with this product."

A key development challenge was balancing the application's ease of use and functionality. "More and more, the world is expecting simplicity while demanding a high level of sophistication in the quality of visual presentations," says Moore. "Complex software tools that require substantial training and resources to deliver moderate visual quality are something of the past. The right marketing tool allows users with very little expertise to easily operate the software, navigating and interacting comfortably with just a few clicks. Cbox is well positioned to lead the future of interactive visualisation in this industry."

Lightbox is the visualisation arm of the Corbis Global Group, an architectural, visualisation and engineering support company with a presence in Los Angeles, USA; Cordoba, Argentina; Dubai, UAE; Melbourne, Australia; and São Paulo, Brazil.

Corbis Global Group

Reader Enquiry No. 502

- 1-3 A visualisation of a G550 interior
4. A 3D rendering of an ACJ 330-200 interior

legaleagle

A new solution will enable business jet passengers to share movies while flying – legally

Despite efforts to eliminate digital rights management (DRM), many feel that DRM is here to stay. What does that mean for business aircraft passengers wanting a home-like entertainment system six miles above the ground? Rockwell Collins believes it means more companies and individuals currently in DRM violation will likely transition to an airborne movie-viewing experience that is in compliance with the law – after all, no one wants to pay a hefty fine if caught.

With the advent of the personal tablet computer and online digital entertainment stores, specifically iTunes, more people are bringing their own content on board to stay occupied during a long flight. These individuals are not breaking any laws by purchasing content through iTunes or something similar for their own viewing purposes. “That is all fine and good until a group of passengers want to see the movie on a larger screen within the cabin,” says Duc Huy Tran, director of cabin systems marketing for business jet CMS and IFE system manufacturer Rockwell Collins. “DRM makes it difficult to legally provide digital content for an on-demand experience in a business aircraft.”

Tran contends that the business aircraft digital entertainment market is not large enough to mirror the model used by commercial airlines to license Hollywood content – whereby a selection of edited movies is shipped to the aircraft once a month and loaded overnight. “For a new movie, the subscription fee can be as high as US\$150,000 (£94,881),” says Tran. “It is

unlikely that any corporate flight department wants to deal with this type of situation.”

There are solutions for business jets whereby non-DRM personal content can be viewed on demand. “However, with more and more Hollywood hits being distributed with DRM, a solution like this may not make sense in the long run,” says Tran.

Along with DRM compliance, there are other rules business jet owners need to consider – set by governing aviation agencies like the FAA. Monitors, servers and anything else used for entertainment in the cabin (personal devices excluded) that is a permanent fixture must be airworthy and certified. “The hardware should be RTCA/DO-160G compliant to ensure it passes all environmental, electrical and structural tests required by the FAA,” says Tran.

Rockwell Collins claims to be ahead of the game when it comes to DRM-compliant, airworthy solutions. In fact, the company says it is on the verge of unveiling a new solution for its touted ‘flexible’ Venue system that will bring a new level of entertainment sharing on board.

“The cabin experience we provide our customers has to meet business aircraft passenger expectations, which are based on what is available to them at home,” says Tran. “When someone buys a movie from an online digital store like iTunes, they have a right to watch their purchased film wherever they choose. That includes repeating the movie on a monitor in a business jet.”

Tran goes on to say this notion of legality applies even more so to fractional charters, which have a wider and larger base of customers. It is especially important that they have the proper licensing agreement for sharing movies on board.

When asked about the timing of the new entertainment sharing supplement to the Venue HD system, which boasts more than 140 business jet installations, Tran replies, “Soon – keep an eye out for an announcement.”

1. Rockwell Collins will soon unveil an update to its popular Venue CMS solution



1

Rockwell Collins

Reader Enquiry No. 503

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Skylounger Benefits:

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1. Set seat configuration.



2. Open valves on mattress & fit.



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oneline

Its commitment to making VIP customers' visions fly has prompted SR Technics to tackle one large-cabin project at a time

April 2011 saw the addition of a VIP completion centre to SR Technics' portfolio, affording a unique service offering to the large-cabin business jet market. The new completion centre can already boast two projects under its belt. Both were accomplished on time and included a heavy maintenance check. SR Technics is one of only a handful of VIP facilities worldwide with the ability to combine MRO services with interior completion. "This provides a huge advantage to our customers, bringing real time savings," comments André Wall, president of SR Technics. "Our on-time mind-set and high level of reliability are most valuable for high-end modification and completion customers."

Headquartered in Zurich, Switzerland, SR Technics upholds the vaunted Swiss values of confidentiality, quality and reliability. The company accredits its success to a dedication to world-class quality standards; a highly attractive and easy-to-reach location at the international business hub of Switzerland; long-standing MRO experience courtesy of a passionate team of experts; and a commitment to create innovative tailor-made solutions. The completion centre operates out of the historic 4,800m² Bogenhangar at Zurich Airport, which has been refurbished with a comfortable and contemporary interior. Clients are promised confidentiality at all times, and the standalone facility has secure key access.

To ensure full attention is given to each project, SR Technics has taken the decision

to accept only one project at a time. This is despite the fact that the facility has enough space to accommodate one Airbus ACJ340-300 or three BBJs.

"VIP completion projects are often plagued by delays," explains Wall. "We want to overturn this trend and we have a good track record to date. This is partly due to the fact that we will only accept one completion project at a time, ensuring that our passionate and experienced team of VIP experts can provide undivided customer support throughout the project. But it is also part of our culture to not only meet customer expectations, but also exceed them. On-time delivery is something we don't compromise on. If we promise an aircraft back on a certain date, we will deliver on that date."

The company says this one-project approach also enables its team to integrate multiple customer requests during the project downtime, offering full flexibility and adaptability. The completion centre's team of craftsmen, interior designers, engineers and project managers were handpicked for the passion and innovation that they bring to all that they do. "Across the modification or completion process they relish the opportunity to challenge traditional boundaries, to create unique handmade interiors and cabin experiences that constitute the customer's signature in the sky," says Wall.

The focus of these artisans is to balance design and functionality with weight optimisation and noise cancellation

concerns, while all the time ensuring that the aircraft fully meets the customer's lifestyle and demands. "Guidance and advice are provided throughout each project to ensure an interior that perfectly balances business and pleasure," says Wall.

Meanwhile, a wider team caters for visiting clients' day-to-day needs, for example booking hotels, suggesting weekend excursions and securing tables at world-renowned restaurants.

SR Technics

Reader Enquiry No. 504



1. The refurbished Bogenhangar
2. A detail from one of the cabins already refurbished at the facility
3. SR Technics' passionate VIP team is fully focused on quality

brainsandbeauty

An alternative to leather, Tapis' Ultraleather is designed to offer aesthetic choice and outstanding performance

1. Ultraleather Promessa
2. A Gulfstream GIV with seats and bulkheads covered in Ultraleather



Aircraft seating requires an extremely durable, soft and comfortable fabric. A popular alternative to leather, Tapis' Ultraleather is designed to offer a luxurious feel and style, plus enhanced performance. It has been used in aircraft seating applications for more than a decade.

Tapis says Ultraleather is less than half the weight of traditional leathers, reducing fuel consumption and costs. It is produced using high-quality polycarbonate resins. Each product undergoes rigorous hydrolysis testing (as per ISO 1419 Method C and ASTM D 3690-02 se. 6.11) to ensure that it meets the company's standards for durability, as well as resistance to heat, moisture and UV.

The product offers 100% yield and maintains a consistent colour and texture throughout the production run. It is also designed to be easy to care for. "Most stains can be removed with plain soap and water, and the product can even be disinfected using a 5:1 water-to-bleach solution – without affecting the colour or the grain," says Jason Estes, director of sales at Tapis.

"Additionally, no toxic aftercare is needed to keep Ultraleather looking its best." From an environmental perspective, Estes says the manufacturing process minimises effluent, reduces emissions and consumes less energy.

One of the most durable of the Ultraleather collections is Promessa, which features a

two-toned texture. "Infused with an inherent EPA-registered, antimicrobial agent, Promessa provides protection against bacteria for the lifetime of the product," says Estes.

To even further extend the lifespan of Ultraleather, Tapis has partnered with The Leather Institute to provide customers with the resources to deep clean and repair the product. Under this partnership, Tapis now offers a biodegradable cleaner for the general maintenance of Ultraleather. In addition, The Leather Institute offers restoration services including cleaning products, conditioning, touch-ups, colour restoration, repair and training.

To assist clients in fulfilling their design visions, Tapis can develop custom grains, colours and finishes with Ultraleather products. Indeed, it has for airlines including Singapore Airlines, Etihad Airways, Swiss Air, Kingfisher Airlines and JAL. In addition, many fabrics in Tapis' product line complement each other, allowing for even greater customisation and balance in the cabin. For example, Ultrasuede and TapiSuede flannels are also suitable for use as seat materials, and have been used in combination with Ultraleather as seat inserts.

Ultrasuede is made of 100% recycled microfibres using a process optimised for reduced energy consumption while TapiSuede is comprised of 88% high-purity recycled polyester and 12% polyurethane. The polyester fibres are a mixture of post-industrial and post-consumer recycled polyester.

"These fabrics are durable, luxurious and like Ultraleather, environmentally friendly," says Estes. "Another variant, TapiSuede BHC-SS, maintains the same characteristics as the standard TapiSuede, but is extremely lightweight and meets the most stringent flame-retardant requirements for commercial aircraft. The durability, flexibility and ability to function on many panels with various adhesives make TapiSuede BHC-SS an excellent choice for aircraft interiors."



Tapis

Reader Enquiry No. 505

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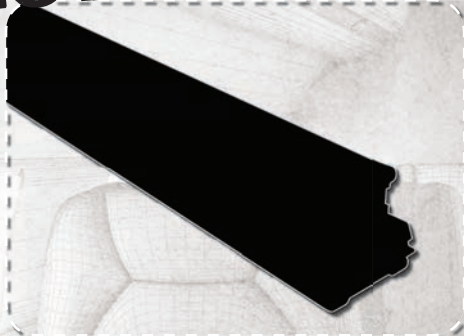


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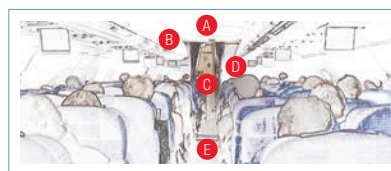
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highroller

A partnership with Silverlining has resulted in a rich selection of new finishes for Dahlgren Duck's luxurious serving trolley

- 1 A customised dinnerware set
- 2 The trolley finished in walnut and 'sports rust' shagreen, with a laser-etched logo



The mantra 'reach for the stars' has been the driving force behind Dahlgren Duck (DDA) – a luxury amenity provider for VIP aircraft interiors, yachts and palaces – for the past 30 years. Most recently, it provided the inspiration for the company to expand the choices available within its range of VIP aircraft trolleys.

As reported in the March 2010 issue of *Business Jet Interiors International*, DDA seized the opportunity to develop an elegant and functional aircraft food and tea service trolley. Believing, through discussions with aircraft interior designers and flight department personnel, that no such item existed at the VIP level, DDA set about a research and development process to create its own. The company reports that the resulting product has been wildly popular ever since its launch.

One would think that DDA's fully gold-plated aircraft trolley would be the epitome of elegance. It is indeed stunning, but not necessarily to everyone's taste or budget. Again the company resolved to reach for the stars. "We decided to step up our game through other creative

offerings, equally elegant, if not more so, each with their own unique custom finishes," says Jim Dahlgren, one of DDA's principals. "DDA has partnered with Silverlining – an award-winning English manufacturer of bespoke luxury furniture – to accomplish this goal. Since 1985 Silverlining has created bespoke furniture for super yachts, embassies, museums and private residences worldwide. It has earned a reputation for the highest quality in the industry, innovative design, imaginative use of materials and exceptional craftsmanship."

The trolley's collapsible frame is now available in a variety of finishes, including ebony with shagreen accents, santos rosewood with trim in 'sports rust' shagreen and a rich cream-coloured leather trimmed with black anodised aluminium. The removable trays are finished to match the frame choices or alternatively they are available in light black carbon fibre. Front and rear face plates are functional components that lend themselves to the addition of a royal crest, monogram or logo in embossed leather, marquetry or laser etching. The lockable casters can be coloured in nickel or bronze to provide the finishing stylish touch. The trolley is completely collapsible and the trays and face plates are removable, a feature designed to enable easy storage within minimal space.

For the past 30 years DDA has addressed complex requirements for land, sea and air VIP projects. It specialises in the customised design of integrated dinner services including bespoke china, one-of-a-kind sterling silver flatware and barware, and exquisite table linens. It also offers linens for the bedroom and bathroom, as well as other interior amenities.

Dahlgren Duck

Reader Enquiry No. 506



bigpicture

Nowadays, renderings are an essential tool for the marketing and design of business jet interiors

When companies try to keep a close lid on costs, design processes can be stripped to the essentials and marketing budgets are often the first to be hacked. But experts say that can be a false economy.

"If the name of a company disappears, it's easy for clients to forget about it. Unfortunately, many companies make that mistake during tough times, and that's when their competitors pull ahead," contends J. P. Magnano, president of 3D Visualization Service, a leading computer graphics company serving the business jet industry. "What I tell my clients these days is that 3D images are the best way to market themselves to potential clients in tough economic times."

With current technology, 3D artists can create photorealistic interiors, animate them and even immerse a person into a virtual aircraft. "My best clients use these tools to show their work and excite their prospects," says Magnano. "It's a wonderful marketing tool and it's a lot cheaper than building a mock-up interior."

3D technology has made giant leaps since it was first introduced in the industry 15 years ago. Prices have gone down and today's image quality is just incredible, says Jeannine Ohrmundt of Ascending Designs, a design studio in Texas, USA. "Everything has evolved so much that renderings just look like a snapshot – you can barely tell the difference," she says.

New technologies have also enabled increased mobility for many of these tools. Nowadays a salesperson can carry renderings, animations and 'configurators'

– which allow clients to see how they could customise their aircraft interior – on a small laptop or even an iPad.

"Right now configurators are probably our best sellers," says Magnano. "There are simple ones, where you can change a few variables – such as the colour of the carpet, the seats, the bulkheads and the wood trims – and there are others that are extremely sophisticated, where you can change virtually any piece of the interior."

Ohrmundt says that in the current competitive market, in which customers are looking carefully at every detail in a quote, renderings actually help them save money. "So we don't quote them separately, we always add them to our design fee," she says. "We find that clients sometimes don't understand how important it is that they fully visualise our proposal."

If clients don't have the tools to enable them to see the design they signed off on they might find something they don't like further along in the process, when changes – not on paper but on the actual aircraft – are a lot costlier.

"I've seen clients receive US\$100,000 quotes from completion centres for a relatively minor change and they are just shocked," explains Ohrmundt. "They don't understand the process in our industry where everything has to be done with certifications that add to the cost."

Other designers find that helping a client visualise the aircraft helps them close a sale. That was the case for Robin Dunlop of CTM Design in the UK recently. A young customer had seen a Versace concept on

another aircraft and asked the studio for a proposal along those lines.

"We tried to produce sketches and ideas and drawings around this but he just couldn't see it," says Dunlop. So the studio decided to order renderings. "When we delivered the presentation the client looked dumbfounded," says Dunlop. "He said, 'I asked for more clarity, not for you to actually manufacture the thing'. I told him it was a computer rendering and he said 'Wow, no way; is that what my aircraft will look like? I love it! Where do I sign?'"

3D Visualization Service Reader Enquiry No. 507



1. An iPad configurator
2. 3D images can be used to immerse clients in a virtual aircraft interior
3. One of the renderings that helped CTM Design to seal the deal





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Image above: 3D rendering of Embraer Lineage 1000

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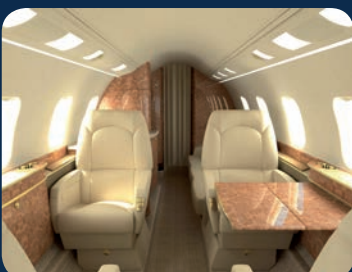
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powertrip

Installing power outlets can ensure passengers' devices never run low on battery, boosting productivity in the air

1. An outlet unit incorporating 110V and USB outlets
2. EmPower system components



1

There is no argument that the computing technology battle is a fierce one. "Hardware and software giants are fighting tooth and nail to one-up each other and provide their customers with the most efficient products possible," says Kellsey Justus, vice president of airborne power and control at Astronics. "Smartphones, tablets and high-powered laptops are quickly becoming just as effective as desktop computers. With the advent of cloud computing, having your mobile device at hand means having your files available at any time, for any purpose."

As a result, business executives expect their electronic devices to perform as their own virtual office. For those who travel often, lengthy flights may cause problems. "When stuck on a long business flight, a charged laptop or phone battery can make the difference between a productive trip or frustration over lost work time," says Justus.

Executives travelling via business jet or commercial carrier are at the mercy of their electronic device's battery life. For those travelling with families, handheld game systems or DVD players are a favourite distraction, while smartphones or tablets filled with a variety of apps appeal to any age.

"Regardless of age or occupation, passengers are deeply concerned with how long their electronics' battery can last," says Justus. Having an outlet available allows not only the uninterrupted use of electronics for the duration of a flight, but the ability to charge batteries for post-travel use as well.

Many OEMs have looked for ways to provide passengers with electrical outlets to solve this problem. The EmPower product line, offered by Astronics, delivers an off-the-shelf solution. This power supply system provides up to three outlets per unit. Each in-seat power supply contains redundant circuitry – making each box independent from the rest – and is designed to protect passengers with internal GFI and other safety features. "EmPower products are TSO certified, and meet or exceed the FAA's requirements," says Justus.

Each unit is available in various AC and DC configurations with up to 150VA per outlet. The most recent addition to the product line is a system that incorporates USB outlets, so passengers can charge their USB devices while also using 110VAC outlets for their laptop or other personal electronic devices. The USB outlets provide the power to operate and charge iPads and other tablet devices that require additional power over traditional USB ports.

"By adding outlets to either commercial aircraft or private business jets, a flight can be transformed from a potentially stressful and unproductive environment to an extension of the passenger's home or office," says Justus. "A business professional can make use of travel time by working on their laptop or tablet worry-free for hours – as well as charge their phone and listen to their MP3 player – and vacationers can relax on their flight and use all of their favourite electronic devices."

Weighing as little as 1kg (2.2lb) per in-seat power supply, Justus contends that EmPower units are "an easy and essential upgrade to any aircraft – ideal solutions that can make an enormous impact".



2

Astronics

Reader Enquiry No. 508

realitycheck

Photorealistic 3D renderings are being used not just to show off designs, but to help in their development

Based in Berlin, Germany, Mirage Computer Graphics (Mirage CG) produces photorealistic 3D renderings for the aircraft industry, principally for VIP jets. With more than 20 years of experience in the 3D rendering process, and projects ranging from the visualisation of architecture and transportation to commercials, watches and electronic devices, Mirage CG has for the past 10 years concentrated its efforts on the aircraft industry.

"In the business jet, VIP and VVIP aircraft industry, the interior design and exterior livery design process is a long and difficult road," comments Olivier Cugniet, owner of Mirage CG. "While designers are working on the concept, they need to check, verify and convince more and more using photorealistic 3D renderings."

These renderings are sometimes made by in-house artists and sometimes by independent rendering companies such as Mirage CG. Although Cugniet recognises that it is nice to have photorealistic 3D renderings to show off the cabin after the design process is completed, he contends that they are especially useful when used to support this undertaking while in progress. "Rendering a cabin is not just about pushing a button and seeing what we have done," he says. "It's going back and forth in the design process; testing new finishes, making comments and proposing solutions. It's all about the assistance we can offer in this difficult process, helping to create a luxurious and functional environment for the final customer. We

bring drawings, sketches and material samples to life, by putting it all together."

Likewise, the technology – by enabling designers to work with an accurate model of the aircraft – can be used to fine-tune liveries in three dimensions. "An additional benefit is that it can be used to prepare a file to assist with the painting process," says Cugniet. "But the main benefit is that the virtual aircraft can be presented in various realistic lighting conditions, flying or rolling on the ground, helping to convince a prospective buyer or supporting an owner to make a real choice."

Cugniet admits that there is room for renderings to be made even more realistic-looking. "If the various manufacturers were more inclined to provide effective data, we could add that final touch, making it difficult to determine if the final image is a photo or a computer rendering," he comments.

"Although more and more of the engineering process is done in 3D, this original data is not necessarily shared with visualisation artists. The issue of confidentiality and security sometimes undermines the process of producing a good, precise, photorealistic rendering."

Cugniet appeals to manufacturers to produce specially made packages, to speed up the process and enable better results. "The benefit to the manufacturers would be additional high-quality visuals showing their own products," he says.

Another potential limit on the depth of detail included in renderings is the time artists are able to spend on them. "In this

industry, the timeframe can be tight, but with the evolution of computer graphics technology, thankfully, a great deal can be done in a much shorter period than in years past," says Cugniet.

He believes the technologies used in the 3D rendering process will always evolve, lending increased flexibility, efficiency and new ideas. But in this progress, Cugniet emphasises that human talent will always make the difference – providing the mood, the atmosphere and the ability to overcome simple technological details.

"Of course, a good 3D rendering is amazing because of the software and the technology used," he concludes. "But without the talent of the guy behind the machine, the result would be nothing more than a picture."

Mirage CG

Reader Enquiry No. 509



1. A VIP seat concept for an EC155
2. A BBJ 737-900 interior concept



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carbontrading

3C explains why automotive-style carbon fibre composites are perfect for business jets

1. 3C's customers range from leading German car manufacturers to aerospace giants such as EADS and Eurocopter
2. The company's 250 employees ply their craft in a 12,000m² production area



As discussed elsewhere in this issue, carbon fibre composites are now being used as decorative elements in business jets, following the car industry's lead. 3C-Carbon Composites Company is a specialist in these materials.

"Until now, baroque interiors with plenty of wood and leather dominated the business jet industry," says Frieder Knoedler, project manager at 3C. "This has been the traditional design paradigm for decades. In the future it will be the modern materials and high-end surfaces from the automotive industry that will influence business jet design. If it was up to 3C, we would especially see carbon fibre surfaces. They are truly modern, luxurious materials that create a very special gloss in the cabin."

Knoedler says a key argument for this trend is that the materials aren't just used in sports cars. "They dominate the whole automotive industry up to the most expensive and exclusive limousines in the world – like the Mercedes-Benz S-Class or the Maybach," says Knoedler. "These cars have to fulfil the same demands as a business jet – comfort and recreation for their owner while he or she is driven or flown through the hectic trading of the world around him."

For the engineers from 3C it's not just the design possibilities that justify the use of carbon

fibre in business jet interiors, but the materials' technical characteristics. "3C can produce carbon composite components with the same rigidity and strength as comparable components made of steel, but that are as little as two thirds of their weight," says Knoedler. "Compared with aluminium, the weight advantage is at least 30%, using far thinner material." 3C's components are based on a material made from high-strength carbon fibres that are each up to 10 times thinner than a human hair. "The fibre stretched from the earth to the moon would weigh only 25g," says Knoedler. Knoedler also praises carbon fibre's resistance to fire, corrosion and fatigue. "These are exactly the most important requirements for aircraft interiors, to meet the current regulations," he says.

The company designs and produces carbon composite parts that serve as structural as well as aesthetic features. "Visual impact and structural function in one part is an intelligent and cost-efficient solution," says Knoedler. "Having just one part that is extremely lightweight and also makes the technique behind it visible is a recent challenge in the automotive industry and it might be for the business jet industry as well. There is no similar solution to carbon composite parts that is lighter, considering both structural and optical requirements."

3C also sees a big chance for the business jet industry in terms of carbon fibre's production costs. "As the costs for a mould-and-die production are relatively low, carbon fibre solutions could be very cost-efficient," says Knoedler. "The production process for short-series cars shares similarities with the prototype process. Carbon fibre solutions only become expensive if you look at mass production."

3C 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 Reader Enquiry No. 510





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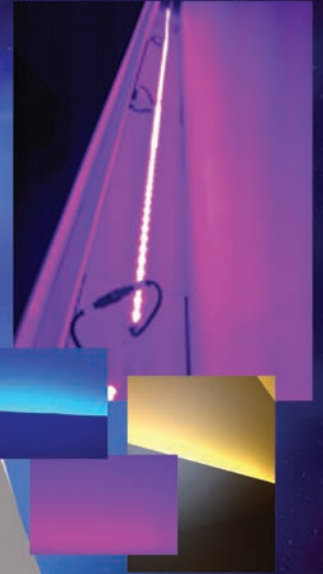
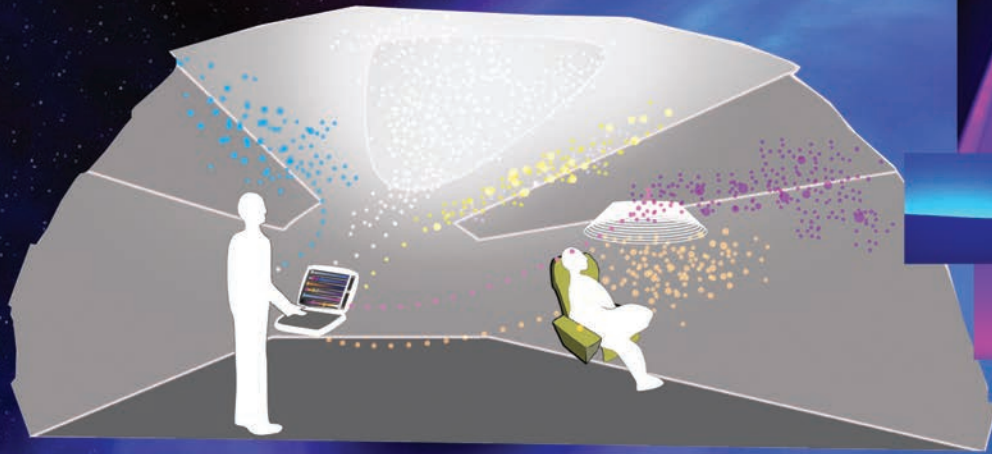
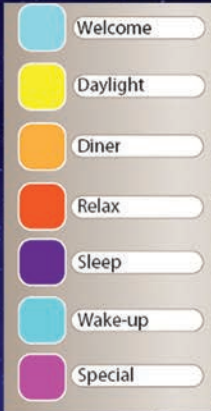
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colourcoordinated



"The advent of moodlighting technology in aircraft cabins a couple of years ago has completely reset passengers' expectations; this type of lighting has evolved from being purely functional to being synonymous with wellbeing," says Frédéric Relea, sales manager at SELA. "Lighting requirements have been continually revisited and reconsidered since."

Building on its years of experience and considering its customers' needs, SELA has developed a new smart moodlighting (RGB-W) system, Clematis.

The company believes Clematis is the first LED aircraft moodlighting system for aircraft that has an integrated power supply and a direct 115V AC or 28V DC connection. In daisy chain configuration and without required grounding, SELA LED RGB-W tubes can easily be installed using only clip holders.

With more than four billion colours, the product boasts a colour rendering index of 90%, and can render a range of white colours from 3,000K to 6,600K. "The idea is to create more colours in the cabin than nature

can provide outside, changing perceptions of what is possible," explains Relea.

The product has been developed for aircraft ranging from traditional business jets to wide-bodies – to offer continuous and homogeneous colours, filling the cabin, and smooth transitions. Clematis is a complete system operating with light management control units (LMCUs); this software is included in the package. Independent of the aircraft's CMS, the LMCU can be programmed for various lighting effects with the full support of SELA's designer, even just before the delivery of the aircraft. The lighting interface can be managed through the CMS or any control panel, eliminating the need to upgrade the CMS. Clematis is fully certified and has already been installed in an ACJ 319 and is currently being installed in three other corporate jets.

In addition to ambient lighting, all SELA cabin light fixtures can be upgraded in RGB-W for perfect homogeneity.

SELA

Reader Enquiry No.511

rescuemission

Represented in Europe and North America, Aerolite is a privately owned company that was founded 1995 by Max Bucher. Aerolite specialises in the design, engineering, production and installation of state-of-the-art corporate, VIP and air medical interiors for major providers of scene rescue, intensive care and SAR services worldwide.

The company boasts EASA DOA, POA and MOA approvals and is ISO 9001, EN9100 and ISO 13485 certified.

Aerolite Max Bucher Reader Enquiry No. 512





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foam comforts



VIP and business jet interiors are luxurious and sumptuous by design, realised with tactile materials and lavish finishes. Soft-touch panels and high-quality carpets are the order of the day, but business jet travellers are rarely aware of the role that foam plays in achieving this end.

Below the soft-touch partition and panel coverings and underneath carpets, the function of foam materials is to augment the feel of quality so important in business jets. They also have to boast the physical properties to meet mechanical performance requirements and the stringent aviation regulatory standards.

Zotefoams says its Zotek F OSU polyvinylidene fluoride (PVDF) foam is fast becoming the material solution of choice in business jet interior soft-touch and carpet underlay applications, because of its flame, smoke and toxicity (FST) performance. "It exhibits exceptionally low heat release, meeting the requirements of FAR 25.853d," says Glenn Sievwright, business development manager at Zotefoams. "This offers greater options for soft-touch composite solutions when combining Zotek F with other materials."

The manufacturing process employed by Zotefoams is designed to produce lightweight, high-purity foam that is free of pungent odours. "The product's closed cell nature ensures high thermal and acoustic insulation values and excellent resistance to impact and crush while offering a barrier to fluids," says Sievwright.

"We are seeing an increase in the use of Zotek F OSU Flexible for carpet underlay applications," reports Lorenz Foerster, director of sales at Wulfmeyer Aircraft Interior. "This high-performance material adds that touch of class expected by the owners and users of business jets."

The Zotek F OSU Flexible carpet underlay is normally supplied in 14mm-thick sheets, to offer a balance of performance and feel. "The foam offers a weight saving of up to 1kg/m² over traditional materials," adds Sievwright.

Wulfmeyer Aircraft Interior supplies Zotefoam's Zotek F materials in Europe and is able to supply split sheets in thicknesses of 2mm and upwards, with or without adhesive backing.

Zotefoams

Reader Enquiry No.513

flyinghigh

When Flying D Solutions opened its doors in 2009, its goal was to use the knowledge, resources and experience in the VIP/VVIP completion industry to ensure that customers' completion programmes achieved luxurious style while maintaining safety, operational functionality and unsurpassed reliability. To accomplish this, the company works with a global network of completion facilities and designers in cooperative working relationships. The goal is not only to provide the highest calibre design, engineering, analysis and certification services on these projects, but to also provide an exceptional level of customer service, all at a reasonable industry rate.

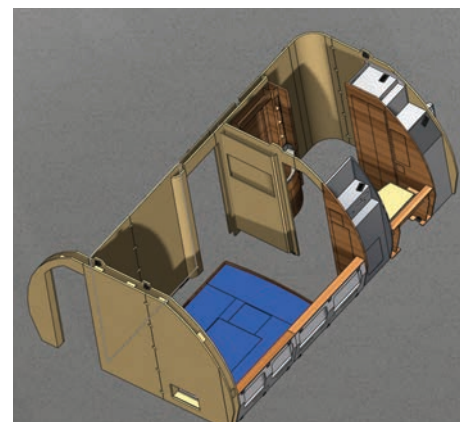
Since those early days, Flying D Solutions has continued to win contract awards on numerous VIP, head-of-state and corporate (wide- and narrow-body) aircraft projects in areas such as

consulting, preliminary and critical design review, vendor selection, interior design management and the design and engineering of luxury furnishings. The company says the success of these programmes, along with its adherence to the motto 'when schedule counts', has enabled Flying D Solutions to grow in what for many have been challenging economic times. As a result of this growth, the company has been developing and implementing additional capabilities in areas such as manufacturing and aircraft management.

Flying D Solutions also offers parts management, supply chain coordination, logistics, MRO management and consulting (commercial, private and military) and is a US Department of State registered broker (ITAR).

Flying D Solutions

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fastforward



For an OEM or completion centre, the value of a future-proof CMS backbone is being able to say yes when a customer wants to add the latest gadget from the consumer electronics world to the aircraft.

"Customers want to watch high-definition (HD) video and control the cabin with their portable electronic devices (PEDs)," says Dave Garing, vice president of business development at Innovative Advantage, manufacturer of the AVDS HD audio and video distribution system for aircraft. "4K and 8K video is right around the corner. Engineering, certification and support costs have to be minimised. Combine these requirements with the unique demands of the aircraft environment – having multiple displays with the same content, and audio that has to be synched – and choosing the right CMS backbone becomes critical."

Choosing wrong can mean telling the customer no. "The industry saw the difficulty of adding HD to the last generation of CMS installations," says

Garing. "While changing to new HD monitors and adding Blu-ray and HDMI inputs was expected, the real problem was the discovery that in almost all cases the fundamental distribution systems were incapable of supporting HD signals."

Garing says completion centres need to choose CMS systems that they can add to and change when the next audiovisual widget comes along. "AVDS nodes provide a modular, scalable, lightweight and flexible backbone for the aircraft," he says. "The backbone supports both uncompressed and streaming audio and video distributed over a reliable and fault-tolerant fibre optic ring network."

Innovative Advantage believes its AVDS backbone provides the performance found in the finest home theatres. "It offers the highest-quality video, perfectly synchronised audio, with the flexibility to keep pace with the rapidly changing consumer electronic world," says Garing.

Innovative Advantage

Reader Enquiry No.515

totalpackage

PATS Aircraft Systems prides itself on helping its customers go the extra mile – literally. For decades, its auxiliary fuel systems have extended the range of aircraft by as much as 50%. The certified products that PATS offers include systems for Boeing 737NG, 757 and 767; and CRJ200 and CL850 aircraft. Its auxiliary fuel system business is the cornerstone that PATS was founded on more than 30 years ago.

PATS is a leading provider of VIP aircraft maintenance, modifications and total interior completions, with more than 20 narrow-body VIP interior completions to its name. "As a BBJ-centric facility, PATS has hands-on BBJ experience that is unmatched in the industry," contends John Eichten, senior vice president of sales and marketing at PATS. "Because we support the PATS Auxiliary Fuel System on the entire BBJ fleet, we understand BBJ operators' operational and functionality requirements. We are committed to leveraging our experience for the benefit of our customers and

count three recently contracted BBJ interior completion contracts as an indication of the quality and value proposition offered by PATS."

The BBJ fleet is moving towards 12 years of age and PATS believes it is well positioned to offer turnkey maintenance and modification solutions. Eichten points to two BBJ interior refurbishment and scheduled heavy maintenance events as perfect examples of PATS' extensive experience and broad capability.

Many projects at PATS are concluded through the issue of STCs by PATS' in-house FAA ODA. The company says this designation, coupled with its engineering capability, results in smoother, quicker certifications and regulatory approvals, allowing for shorter aircraft downtime. PATS also offers its engineering and certification resources as a valuable service to the wider industry.

PATS Aircraft Systems

Reader Enquiry No. 516



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teamplayer



As both commercial and business segments recover from the global financial downturn of 2009, the general aviation industry is experiencing growth. "Coupled with this rapid growth, players in the market are striving to maintain their competitive advantage through unique designs for their aircraft interior cabin solutions," says Pat Walker, vice president at Bucher Aerospace.

The company employs a collaborative approach while conceptualising and producing unique products designed to satisfy the need to innovate and differentiate. Recently Bucher collaborated with AES and Lufthansa Technik to introduce an innovative pop-up IFE deployment concept. "By working with AES to incorporate the IFE electronics into a Bucher-designed enclosure and deployment system, we were able to meet all of the customer's functional and aesthetic goals despite very restrictive sideledge geometry," says Walker.

To ensure reliability and consistent operation, the pop-up mechanism utilises a gas spring replacement (GSR) device that

is rated for 200,000 cycles and a temperature from -40° to 195°F. The deployment system features a full 90° rotation as well as 30° of tilt, all while weighing less than 3lb for the 7in version. A 10in version is also in development.

Bucher Aerospace says a key challenge is that new products have to adhere to ever more stringent regulatory standards while still keeping in mind design differentiation. "Despite this, we are still able to offer lighter weight and higher quality engineered solutions such as this unique and innovative IFE pop up deployment system," says Walker. "In an industry involving many partners with many technical challenges, the importance of the Bucher Aerospace approach cannot be underestimated. Our focus on partnership, communication and design combined with the company's depth of engineered solutions, product offerings, expertise and strong design principles allows us to thrive in an environment filled with challenges, changes and growth."

Bucher Aerospace

Reader Enquiry No.517



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