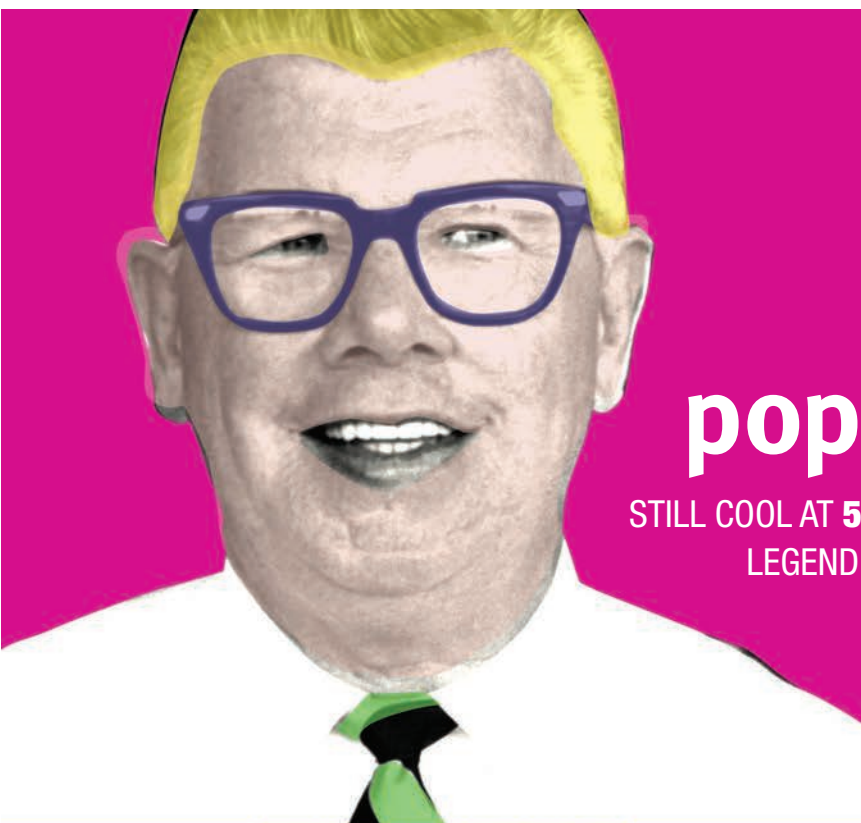


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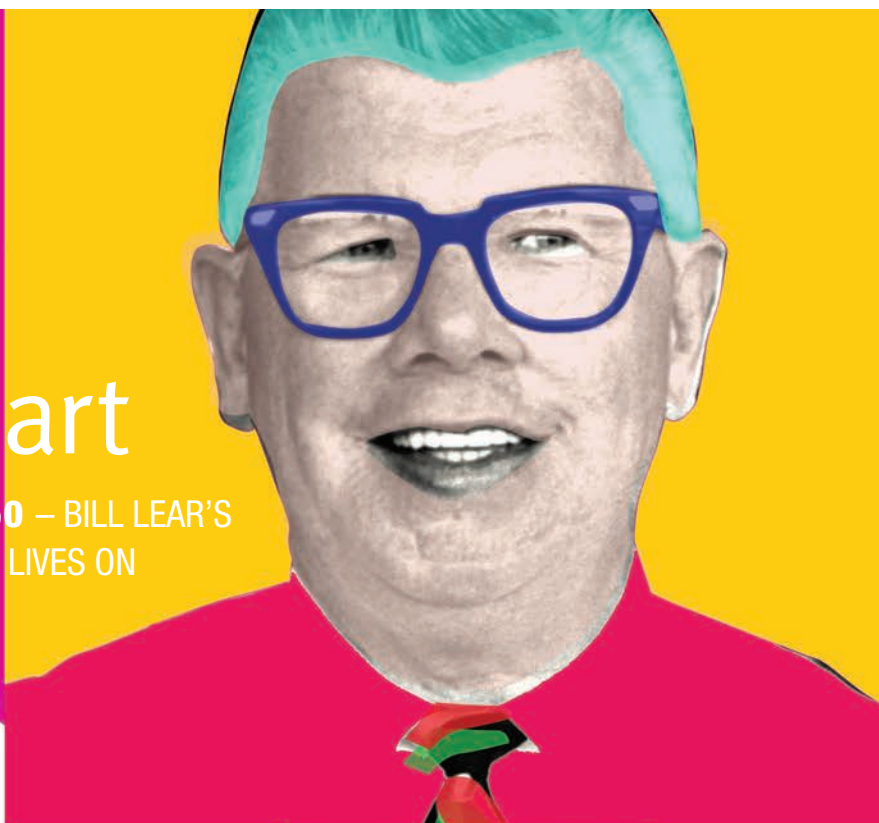
APRIL 2013

THE INTERNATIONAL REVIEW OF BUSINESS JET INTERIOR DESIGN AND COMPLETION



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**EDITOR:** Izzy Kington  
isabel.kington@ukipme.com

**EDITOR-IN-CHIEF:** Nick Bradley

**PRODUCTION EDITOR:** Alex Bradley

**CHIEF SUB EDITOR:** Andrew Pickering

**DEPUTY CHIEF SUB EDITOR:** Nick Shepherd

**PROOFREADERS:** Frank Millard,

Kari Wilkin, Lynn Wright

**CONTRIBUTORS:** Guy Bird, James Careless,  
Chris Colvin, Ben Frain, Tim Kern

**ART EDITOR:** Anna Davie

**ASSISTANT ART EDITOR:** Louise Adams

**ART DIRECTOR:** James Sutcliffe

**DESIGN:** Andy Bass, Andrew Locke, Craig  
Marshall, Nicola Turner, Julie Welby, Ben White

**HEAD OF PRODUCTION & LOGISTICS:** Ian Donovan

**DEPUTY PRODUCTION MANAGER:** Lewis Hopkins

**PRODUCTION TEAM:** Carole Doran,

Cassie Inns, Robyn Skalsky

**PUBLICATION MANAGER:** Simon Hughes

simon.hughes@ukipme.com

**INTERNATIONAL ADVERTISING SALES:**

Roger Baker

roger.baker@ukipme.com

Sally James

sally.james@ukipme.com

**CIRCULATION & SUBSCRIPTIONS MANAGER:**

Suzie Matthews

**CEO:** Tony Robinson

**MANAGING DIRECTOR:** Graham Johnson

**EDITORIAL DIRECTOR:** Anthony James

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**Business Jet Interiors International**

Abinger House, Church Street,

Dorking, Surrey, RH4 1DF, UK

**Tel:** +44 1306 743744

**Email:** aircraftinteriors@ukipme.com

**Website:** www.businessjetinteriorsinternational.com

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## keepup

Riddle me this: What won't wait but will stand still? What can be free but also kept, bought and spent? What is the great destroyer but a great healer too? I include this little puzzle because the answer is a recurring theme in this issue. It is – as I'm sure you will have deduced – time. Half a century has passed since the first Learjet and the first Falcon took to the skies. The Falcon we salute by looking at its latest evolution, the fully customisable 2000LXS (page 58). For the Learjet we pop into a time machine to meet its creator, Bill Lear, and see how interiors were done back then (page 24). For me the best bit is seeing decades-old photos sitting alongside the slick new Model 85 – time certainly flies, but the commitment to evolve in line with customer demand is the same.

Maybe the biggest challenge is keeping up with the sheer pace of change expected – and perhaps nowhere is this truer than in the IFEC sphere. In our feature on page 50, IFEC manufacturers reveal what they consider the current gold standard, what issues are involved in translating consumer technologies to the aircraft environment, and what could be the next exciting technologies to make the leap.

Hopefully you will notice that the magazine itself is also progressing with the times. In particular, the news section (page 8) has been completely revamped so that it acts as a complement to our website, [www.businessjetinteriorsinternational.com](http://www.businessjetinteriorsinternational.com), which is where we post all the big news as it happens. The magazine's news section now acts as a review of the past quarter, where we can tie the disparate threads together and delve behind the headlines. Another change is the back page, which is now a nosy look at designs from other sectors – I believe that to keep track of customer trends and expectations, one must be open to inspiration from all around (and it would seem the designers profiled in our feature on page 35 certainly are). We've also made one or two other little tweaks for you to spot! But although it is evolving, the focus of your magazine remains constant – to reflect and support a dynamic industry with incisive and informative features, and plenty of inspiration. Let me know what you think – would it be very modern of me to suggest our LinkedIn group (search for Business Jet Interiors World Expo) as the perfect forum?



Izzy Kington, editor





8 news

A DETAILED LOOK AT THE FIRST G650 AND G280 DELIVERIES; A ROUND-UP OF RECENT COMPLETIONS; NEW DESIGNS; PRODUCT LAUNCHES; AN INTRODUCTION TO ODYSSEY AEROSPACE'S NEW DIRECTOR OF ENGINEERING; AND A REVIEW OF BUSINESS JET INTERIORS WORLD EXPO 2013

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Izzy Kington, Business Jet Interiors International

ACJ318 Enhanced  
AIRBUS HAS UPDATED ITS PACKAGED CABIN, THE ACJ318

Guy Bird, Business Jet Interiors International

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bundleof fun

Airbus has enhanced its packaged cabin, the ACJ318

The Airbus ACJ318 is a new addition to the Airbus family of business jets. It is a 31-seat, twin-engine, low-wing aircraft with a maximum range of 4,000 nautical miles. The ACJ318 is designed to provide a comfortable and efficient flying experience for business travelers. It features a spacious cabin with large windows, comfortable seating, and a variety of amenities. The ACJ318 is also equipped with a variety of safety features, including a crashworthy landing gear and a fire-resistant fuselage. The ACJ318 is a versatile aircraft that can be configured for a variety of different uses, including as a corporate jet, a charter aircraft, or a regional airliner.



## 50 IFEC quality

ADVANCES IN TOUCHSCREEN, 3D, OLED, HD, LCD AND OTHER CONSUMER TECHNOLOGIES ARE PUSHING THE DEVELOPMENT OF EVER THINNER, LIGHTER, BRIGHTER, MORE FUNCTIONAL IFEC EQUIPMENT SOLUTIONS

*Ben Frain, Business Jet Interiors International*

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*Chris Colvin, Business Jet Interiors International*

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IMPROVEMENTS DEVELOPED FOR THE NEW CITATION X ARE BEING TRANSLATED TO KEEP THE CITATION SOVEREIGN IN THE RUNNING

*Chris Colvin, Business Jet Interiors International*

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Chris Colvin, Business Jet Interiors International

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# It's all about the image

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## GULFSTREAM ACHIEVES A DOUBLE WITH SERVICE ENTRY OF G650 AND G280

The long-range G650 and the super-mid-size G280 are both now in service. Both debut aircraft went to customers based in the USA.

The first outfitted G650 earned its FAA Production Certificate (PC) and was delivered on 20 December 2012. The aircraft had earned its FAA type certificate (TC) on 7 September 2012, and achieved its EASA TC on 21 December 2012. It also has TCs from Bermuda and the Isle of Man.

The G650 typically seats eight passengers in a cabin that is 46ft 10in long, 8ft 6in wide and 6ft 5in tall. It has a range of 6,000 nautical miles at Mach 0.90 or 7,000 nautical miles at Mach 0.85 (both figures with eight passengers, four crew and NBAA IFR reserves).

Gulfstream announced the first G280 delivery on 14 November 2012. The fully outfitted jet went to a manufacturer. The G280 – which was a joint effort between Gulfstream and Israel Aerospace Industries – earned TC from the FAA and the Civil Aviation Authority of Israel on 30 August 2012.

The G280 cabin is 25ft 10in long, 6ft 3in tall and 7ft 2in wide. At full capacity (four passengers and two crew) and with NBAA IFR reserves the G280 has a range of 3,600 nautical miles at Mach 0.80 or 3,000 nautical miles at Mach 0.84.



Both aircraft adhere to Gulfstream's Cabin Essential design philosophy – all of the cabin systems on the G650 (lighting, power, CMS, IFE, water and waste) and select cabin systems on the G280 are designed with redundancy to minimise the risk of losing functionality.



The Gulfstream-designed CMS serves as the hub of the cabin network on both aircraft. It enables digital control of cabin systems, including HD audio and video components; lighting; temperature; attendant call; and Gulfstream's CabinView passenger flight information system. Passenger control units are loaded onto an iPod Touch and provide the floorplan of the aircraft.



The G280 features inflight access to a 154ft<sup>3</sup> storage compartment; the G650's baggage capacity is 195ft<sup>3</sup>.

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## Q&A: WILLIAM GAY, DIRECTOR OF COMPLETION SALES AT GULFSTREAM

### WHAT TWEAKS HAVE BEEN MADE SINCE THE INTERIORS WERE ANNOUNCED?

On the G650, we tweaked the positioning of the single seats slightly to enable access to controller storage areas. We've also made some minor tweaks to the software for the CMS and CabinView, but not anything an operator is likely to notice. The modest changes we've made reflect the close working relationship we have with our customers, who provide feedback throughout the design process.

### HOW MUCH CUSTOMISATION IS POSSIBLE?

We offer a great deal of customisation when it comes to the decorative treatments inside the aircraft, which is where most customers want to demonstrate their style. Customers can tailor carpet patterns as well as seating, and finishes on sidewall panels, bulkheads and the galley. We offer a wide variety of floorplans (three for the G280 and 12 for the G650). The G650 floorplans can also be tailored in terms of how the seats are arranged.

### WHAT HAS BEEN CUSTOMISED ON THESE DELIVERIES?

We avoid doing much customisation of early-serial-number aircraft, because they contribute data in terms of performance, reliability and maintenance. If the aircraft had a great deal of customisation, the data would be skewed. That said, consistency in the outfitting of those initial aircraft means we can get real-world customer feedback on how well the cabin and its systems are working.

### WHAT WAS CHALLENGING ABOUT THE COMPLETIONS?

We introduced an entirely new interior and CMS with the G650 and G280. Integrating that system has been challenging, but adequate preparation has helped us to meet that challenge. To ensure optimum performance, we tested a G650 with a fully outfitted interior during our flight-test programme. We also had an interior installation in our integration test facility, all of which served to ensure the interior did what we said it would do.

### WHAT INVESTMENT HAVE YOU MADE TO SUPPORT THE COMPLETION OF THESE NEW AIRCRAFT TYPES?

First, we trained employees on the 3D design software that was used to design and build the G650, because this is the first aircraft we've built entirely in 3D. We also converted our former service centre in Savannah, Georgia, into a state-of-the-art completion facility for the G650. Much like the manufacturing facility that handles the airframe, the G650 completions facility was specifically designed for that aircraft. It has an elevated staging area, where employees can sequence interior components for a smooth transfer into the aircraft. Instead of lugging items up the air stair or through the baggage compartment, they can guide them through the main entry doorway without climbing. This greatly reduces the potential for injury to employees and saves wear and tear on the aircraft. It's a much more efficient and safe method.



Cabin altitude is 6,000ft at 41,000ft on the G280; and 4,850ft at 51,000ft or 3,300ft at 41,000ft on the G650.



There are 19 large windows on the G280; 16 on the G650.

# COMPLETIONS ROUND-UP

THIS QUARTER'S ANNOUNCEMENTS FROM COMPLETION CENTRES AROUND THE WORLD

## KIRKLAND, WASHINGTON, USA:

Greenpoint Technologies delivered its 19<sup>th</sup> BBJ on time – a BBJ3. The company's engineering and design team partnered with design firm Strack and Associates to create the interior. Greenpoint also delivered its third BBJ 747-8 Aeroloft, on time, to a Middle Eastern customer.

## PETERBOROUGH, CANADA:

Flying Colours Corp won interior modification contracts for seven Bombardier CRJ700 NextGen aircraft, for a Chinese client.

**TOULOUSE, FRANCE:** Airbus Corporate Jet Centre won the contract to provide a VIP Pass long-term maintenance package for Russia SFD, the operator of two federal state ACJs recently delivered by the company.

## BASEL, SWITZERLAND:

In early November 2012 Jet Aviation Basel redelivered a highly customised BBJ 737-900 to a customer in the Middle East.

## INDIANAPOLIS, INDIANA, USA:

Comlux Aviation Services has been restructured and reinforced to offer maintenance and refurbishment for ACJs and BBJs. It has also been appointed as a Legacy 600/650 and Lineage 1000 service centre.

## OXFORD, CONNECTICUT, USA:

Pentastar Aviation acquired Aviation Interior Solutions, enabling the company to expand its maintenance offerings to include refurbishment and completion services, as well as custom solutions, IFE and upholstery.

## BORDEAUX, FRANCE:

Sabena technics has been selected to carry out the VIP cabin modification of an ACJ319 for an Asian customer. The modern cabin will include two lounges configured with a club four and a club two. The company also installed two satcom systems on a new ATR 42-600 for a Middle East VIP operator; contracted a cabin modification project for two ACJ320s and an ACJ318; and announced its readiness to work on the ACJ380 following base maintenance rating from EASA. It was also chosen by Airbus for base maintenance on its Beluga fleet.

## BASEL, SWITZERLAND:

In November 2012, AMAC Aerospace delivered a BBJ 777-200LR for a customer in the Middle East, and received a BBJ 747-8i for completion.

## ST LOUIS, MISSOURI, USA:

Jet Aviation St Louis welcomed its first BBJ in February 2012, and a second is scheduled. Both will have maintenance and minor interior upgrades. The centre completed its 200<sup>th</sup> green aircraft – a Challenger 605 – in December 2012, a day after delivering a Global 6000.

## HAMBURG, GERMANY:

Lufthansa Technik has started the VIP cabin completion of a BBJ 2 for Freestream Aircraft. The interior was designed by Marc Newson and his aviation design studio, MNAerospace.

## DALLAS, TEXAS, USA:

Associated Air Center has gained authorised maintenance organisation approvals from the aviation authorities of China, Kuwait, Oman and Nigeria. It has also delivered its 24<sup>th</sup> BBJ (to a Far Eastern customer) and signed an agreement for the heavy maintenance, interior systems upgrade and major cabin refurbishment of another BBJ, for a Far Eastern head of state.

**BERLIN, GERMANY:** LBAS and OHS Aviation Services have completed an 8C check, partial cabin refurbishment and the installation of Honeywell's Ovation Select CMS on a Bombardier Global Express, for an Asian client.

## WACO, TEXAS, USA:

A second BBJ 747-8 has arrived at L-3 Platform Integration's completion centre for the installation of a VVIP interior.

## RICHMOND, VIRGINIA, USA:

BaySys Technologies has moved into a new hangar and production facility.

**SINGAPORE:** Jet Aviation Singapore is building a maintenance hangar alongside its current maintenance and FBO operation. The facility will incorporate new battery, tire, upholstery and woodworking backshops, plus two paint-spray booths and office space.

**ABU DHABI, UAE:** Jet Aviation Dubai has signed an agreement with First Emirates Aviation Group to offer interior refurbishment capabilities in Abu Dhabi.

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## PINBOARD



A business jet cabin concept  
by Pierrejean Design Studio



A BBJ 747-8 concept by  
Greenpoint Technologies

## LAUNCHES

A cabin interior  
design app at  
The Jet Business's  
London showroom

Meal boxes from  
Tastefully Yours,  
specifically  
designed for  
short flights



A GSM-based mobile  
phone solution from  
TrueNorth

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Find out what Lupita Ho of Rockwell Collins has to say about IFEC trends:

[www.businessjetinteriorsinternational.com/articles.php?ArticleID=534](http://www.businessjetinteriorsinternational.com/articles.php?ArticleID=534)



## GETTING TO KNOW...

JOHN TURNER, WHO BECAME THE  
NEW DIRECTOR OF ENGINEERING  
AT ODYSSEY AEROSPACE  
COMPONENTS IN JANUARY 2013

### WHAT ARE YOUR PLANS FOR OPTIMISING ENGINEERING EFFICIENCY AND QUALITY?

Odyssey embraces a culture of continuous improvement and we regularly hold lean workshops and kaizen events with the goal of improving our processes, removing waste and increasing efficiency across all departments. Additionally, Odyssey and (parent company) Greenpoint regularly work together on continuous improvement initiatives and we have implemented many common metrics and improvement practices. My job is to ensure we support our customers' requirements by providing the highest quality and most innovative engineering.

### ODYSSEY IS CURRENTLY HIRING STRESS ENGINEERS AND CABINETRY MANUFACTURERS. HOW DIFFICULT IS IT FINDING ENOUGH SKILLED PEOPLE?

We are very selective and endeavour to hire the best of the best. It is always a challenge to hire the best engineers, but building the right team is the most important thing I do and it is imperative for our success. We have tremendous advantages attracting and retaining the best talent here as we offer a fantastic work culture, great benefits and the best engineering software tools in the industry. Our engineers enjoy a great professional work setting and this contributes to our efficiency.

### HOW WILL YOU SUPPORT YOUR NEW RECRUITS?

Odyssey uses a mentoring training process that is closely monitored by management. This enables new team members to feel comfortable from the start, learn quickly and rapidly begin making meaningful contributions. Additionally, all employees have regular and formal one-on-one meetings with their direct report leader to ensure they have everything they need to be successful. Being new myself, I've experienced first-hand the effectiveness of our training.

### WHAT ARE YOU CURRENTLY WORKING ON?

We are working on Boeing and Airbus wide-body VIP interiors, as well as smaller business jet interior programmes.

### WHAT WILL BE THE KEY CHALLENGES FOR THE COMPANY IN THE FUTURE?

There are many wide- and narrow-body business jets delivering, and a key challenge is having the capacity to meet our customers' demands. There are only a few manufacturers that can deliver on their promises, and having the right skills available when required is always a challenge in this industry.

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# LOG BOOK

**Event:** Business Jet Interiors World Expo 2013

**When:** 19-21 March 2013

**Where:** London Farnborough, UK

This year's Business Jet Interiors World Expo 2013 was held at London Farnborough. The event is dedicated to showcasing luxury jet and helicopter interior design and technologies to a global community of executive jet owners, operators and completion centres. It is held alongside the FBO and destinations exhibition Business Airport World Expo.

Products highlighted included a Nespresso coffee machine from Aerolux; the new Skybox system by Rockwell Collins; fire-retardant lacquer finishes from duro-lak; Zotek F foam by Zotefoams; 17in and 32in IFE monitors by Imagik; five new leathers from Yarwood Leather; an aircraft wheelchair from Mercury Products; and a new visco-elastic foam from Skandia.

The event also included the Business Aviation World Conference. One highlight was the presentation by Joe Decrescenzo (leader of the customer account management team at Bombardier's Global Completion Center), in which he detailed new technological tools Bombardier is developing to improve the business jet interior definition process still further. Another speaker, David Velupillai (marketing director at Airbus Corporate Jets), outlined some of the major advances in large corporate jets over the last 40 years, particularly in terms of cabin comfort, technology and options.

**Postscript:** Business Jet Interiors World Expo will return to London Farnborough on 19-20 March 2014.



A VIP catering trolley shown by Dahlgren Duck and Silverlining

IM Kelly Aerospace said a lot of designers had expressed interest in its range of non-standard upholstery stitch patterns



## EDITOR'S PICK

As part of his conference presentation, Jean-Pierre Alfano (creative director at Airjet Designs) revealed a new ACJ340-500 cabin design. The Oasis was commissioned by a Middle Eastern client. The aircraft includes a majlis with a dining area for eight in the forward section, a master bedroom and VIP lavatory with a medical room next to it, a guest bedroom with private lavatory, and guest and staff seating in the aft section. The design takes into account the client's cultural connection to the desert – with a custom-made carpet representing sand dunes, golden decorative elements resembling the trunk of a palm tree, tables supported by a structure made of two golden palm leaves, and mood lighting designed to give the ceiling a blue glow reminiscent of the desert night sky. The owner also has a passion for falconry, which is reflected by the use of René Lalique crystal falcons.



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# RARE BIRD

Sylvain Mariat, head of the creative design studio at Airbus Corporate Jet Centre (ACJC), created this design – the Bluejay – to show what can be achieved in the space offered by the ACJ319. Although intentionally realistic, the contemporary design has been inspired by the avant-gardism, shapes and colours of the Stanley Kubrick film *2001: A Space Odyssey*.

The keystone of the cabin is its use of translucent partitions between the forward lounge and the dining area. The partitions are made of a glass that can switch between transparent and translucent modes at the press of a button. “This produces a flexible cabin arrangement that can be modified on demand, enabling social interaction or privacy, depending on the passengers’ mood,” says Mariat. The partitions also take the role of loudspeaker, using a technology that makes the glass vibrate like a diaphragm, amplifying the sound. “I imagined how fantastic it would be for listening to the opening of Richard Strauss’s *Also Sprach Zarathustra*, from 2001’s soundtrack,” he adds.

Rather than filling the cabin with lots of colours and opulent materials, Mariat has tried to produce a refined atmosphere through differences in texture, “clear” tones and “noble” materials. “My goal is to create a place where luxury is not only about precious materials and opulence, but refinement, *bon ton* and elegance,” he says. The carpet is made from silk and wool; the VIP seats are upholstered in high-quality leather; and surfaces feature smoked oak with a satin varnish, or gloss paint.

“Each design I produce is a one-of-a-kind product that provides the best balance between the owner’s taste, functionality and technical constraints such as weight, balance, certification, systems and safety,” Mariat concludes.



## TRUNK

To offset the cabin’s contemporary atmosphere, Mariat has included a traditional symbol of travel: a trunk. “I wanted to represent the age-old French craft of trunk manufacture, using nubuck leather, wood and crystal inserts,” he says. Mariat envisages this trunk protecting precious items such as glassware from French company Baccarat, which has also designed a carbon and crystal decorative light for the cabin.

## GUIDED TOUR

## EXTERIOR

The concept takes its name from the elegant blue and silver livery. "As I used cold colours in the cabin, I wanted to extend this concept to the external livery," says Mariat. "I was directly inspired by the plumage of a beautiful bird – the Blue Jay."

## ENTRANCE

Perhaps the strongest evidence of the cabin's futuristic inspiration is the hologram display in the entrance area. "This new system, never seen before on a corporate jet, displays the name of the arriving guests in soft blue tones, offering a modern complement to the crew's classical welcoming," says Mariat.

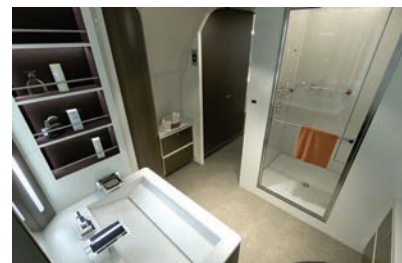


## GALLEY

The concept has a spacious U-shaped galley separated from the main cabin, to enable the crew to prepare gastronomic delights. "We have developed a U-shaped galley for an ACJ before, but I wanted to improve it again to offer a real kitchen," says Mariat.

## WASHROOM

Mariat's goals for the private washroom were to produce a very contemporary design that was spacious and ergonomical. "That's why I designed a large square shower, with glossy paint and metal," he says.



## CONTACT:

[acjc.sales@airbus.com](mailto:acjc.sales@airbus.com)

[www.airbuscorporatejetcentre.com](http://www.airbuscorporatejetcentre.com)



## TABLE

Social interactions were one of the main concerns for Mariat. In the dining area he has created a hi-lo dining table with special extensions at its extremities. When folded up the table accommodates four, but with the extensions deployed it caters for five, without adding another seat.

## SEATS

For the VIP seats, Mariat was inspired by the famous lounge chair and ottoman created by American designer Charles Eames.

# DESIGN PANEL: SHOWERS

FOUR EXPERTS DISCUSS THE CHALLENGES INVOLVED IN INSTALLING SHOWERS ON BUSINESS JETS, THE SOLUTIONS THEY HAVE FOUND, AND WHAT THE FUTURE COULD HOLD



**BRIAN ULRICH:** People expect the experience of showering on their aircraft to be as nice as showering at home, even if the pressure, volume, quality and temperature are not the same. Most importantly, the shower must never go cold. The main challenge in meeting these demands is that there is a limited supply of water on an aircraft and in addition there are restrictions on the weight of the equipment and on the pressure and power available.

**ED HARRIS:** The custom nature of the completion industry makes every shower a challenge. I designed the first self-standing shower needing only seat track mounting provisions back in 1990. Prior to that, when I worked for Page Gulfstream we would buy an Italian-made shower and modify it to work in the aircraft. Burn testing was a problem with using a commercial off-the-shelf shower. So today, weight, custom features (because no one uses the same decorative fixtures), burn testing, and getting it through the aircraft door and in position during room build, are all critical factors. In terms of the certification requirements, I have made showers that pass 65/65 burn testing (FAA Reg 25.853(a) App F, Part IV and Part V) and passed the smoke and Dräger toxicity tests – this is the toughest part of certification. Other than that, there are the standard FAA regulatory requirements.

WHAT ARE THE CHALLENGES IN DESIGNING/INCORPORATING SHOWERS ON BUSINESS JETS?

**SEBASTIAN MAINUSCH:** Household-originated equipment is very often adapted for VIP aircraft use. This increases time and effort for the completion centre as individual qualification and certification are required. Luxury faucets and taps significantly increase water consumption on board as their water flow is often greater than from those armatures especially designed for aircraft. Therefore, larger potable water and sometimes wastewater tanks have to be integrated, and special equipment such as high-capacity heaters have to be installed.

Also, the location of showers on board VIP aircraft is dependent on the customer's wishes and is often not based on the best technical option for integration. This creates a lot of engineering and installation work.

**ZACH GRIGGS:** The biggest challenge is designing a product that is held to extremely high standards on a condensed timeline. Others include draining water in flight and on the ground, maximising interior height and designing in modularity so components can easily disassemble and fit through small aircraft doors. In terms of certification, some common denominators include flammability, fluid susceptibility, structural substantiation and weight restrictions.

## THE PANEL

**ED HARRIS:** Since the early 1980s we have made showers in multiple pieces, which makes the finishing and installation process easier. We have also started using a standard shower valve set and adapting the customer's decorative fixtures to our design.

## HOW DO YOU OVERCOME THESE CHALLENGES?

**ZACH GRIGGS:** By designing and building concurrently, with design always staying one step ahead of production. My advice is not to overdesign – stick to simplistic principles that can easily be modified down the road if necessary. This approach helps you conform to the extremely tight timelines required.

**BRIAN ULRICH:** We address the challenges of limited hot water, weight restrictions and short shower durations by providing tankless water heaters that can provide continuous hot water without ever going cold.

## IF YOU HAD THE OPPORTUNITY TO DO SOMETHING REALLY DIFFERENT WITH A SHOWER DESIGN, WHAT WOULD YOU DO?

**ED HARRIS:** We recently manufactured a self-contained shower and water system for the Gulfstream G650. You can actually take a shower outside the aircraft, with a small generator and some batteries powering it. By making the complete shower system, the completion centre doesn't have to worry about the extra water and systems. Also, I am surprised that cabin entertainment has not made its way into the shower. I like listening to music while showering. Our showers are the perfect listening environment, kind of like the stereo Egg Chair in the 1970s!

**ZACH GRIGGS:** I would use water systems that create water from the atmosphere by condensing water vapour, thus eliminating bulky water tanks and providing water as needed. This technology already exists for disaster relief applications, it could simply be adapted for aircraft use.



**ED HARRIS**

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



**ZACH GRIGGS**

design engineer at AeroQuest



**SEBASTIAN MAINUSCH**

design engineering, mechanical systems at Lufthansa Technik



**BRIAN ULRICH**

vice president of engineering and business development at International Water-Guard Industries

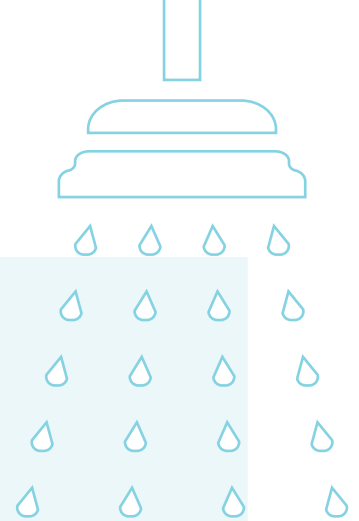
**SEBASTIAN MAINUSCH:** The integration of steam showers on board, plus new technologies for system surveillance, for example leakage detection and water flow limitation. By the integration of water recycling services, water consumption would significantly decrease – but taking this step is very much dependent on customer acceptance.

**ZACH GRIGGS:** More complex systems where a shower cabin, water tanks, heaters and pumps are combined into a self-sustaining turnkey package that is integrated with the ECS. We are currently doing this and also seeing more extravagant accessories such as steam generators, teak flooring, LED mood lighting and multiple showerheads.

WHAT DO YOU THINK THE FUTURE HOLDS?  
HOW COULD BUSINESS JET SHOWERS BE IMPROVED?

**BRIAN ULRICH:** Aircraft showers in the future will use digital controls to reduce plumbing components and will employ clever ways to deliver the experience, such as using aeration to make low water flow feel like a higher flow residential shower.

**ED HARRIS:** Showers will always be wanted on transcontinental business jets, but there will be very few on mid-continental jets. They may not get used very often from our studies, which is why we put clothes rods in some, but when the principal jumps on the aircraft in Scotland from a day golfing and heads to a meeting in Dubai, a shower is the perfect means of relaxing and freshening up.



THE MASTER BATHROOM ON A BBJ 787 CONCEPT BY ANDREW WINCH DESIGNS, RENDERED BY 3D VIZ AND LUFTHANSA TECHNIK

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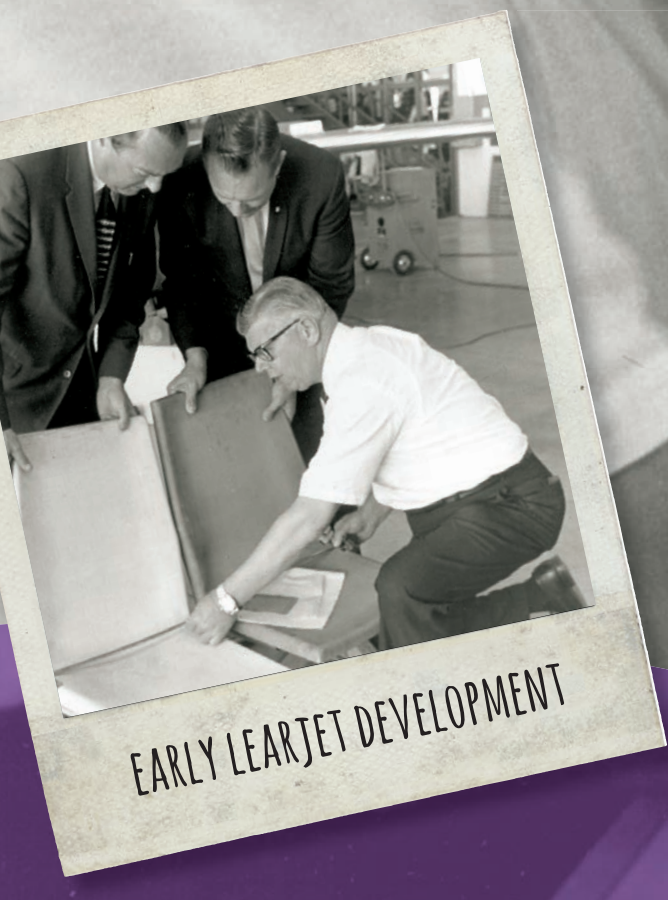
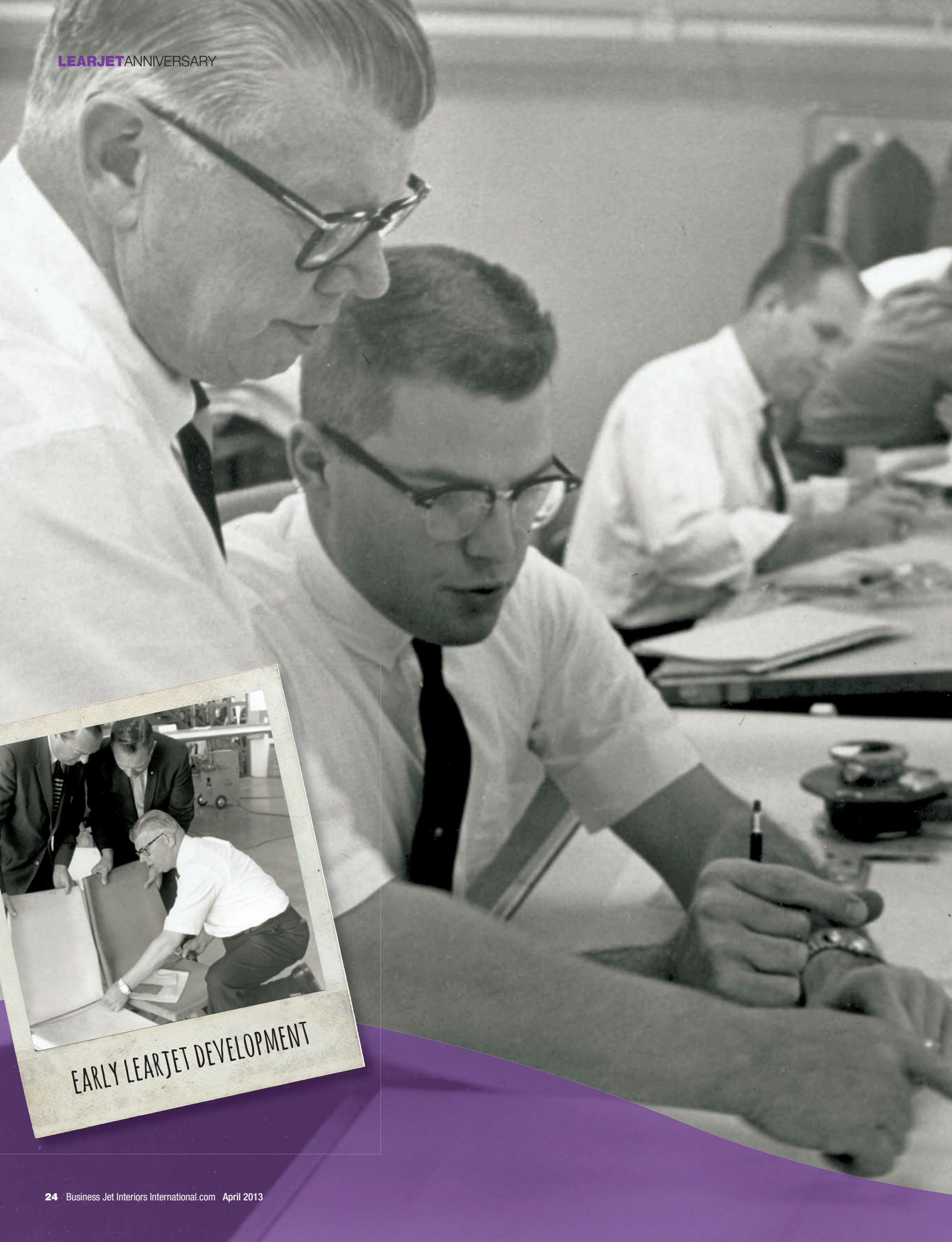
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EARLY LEARJET DEVELOPMENT



# kinglear

Fifty years on Learjets are still going strong, thanks in part to the vision and marketing genius of their creator, Bill Lear

**T**he 1960s are not short of cultural associations. The moon landing, the Beatles and pop art – all captured the public imagination at the time, and stayed there.

The Learjet could easily be added to that list. Arguably the most famous business jet ever built, the Learjet made its first flight on 7 October 1963, and in 2013 celebrates its 50<sup>th</sup> anniversary in fine fettle.

We look with nostalgic warmth at early Learjets – at the simple luxury conveyed by expensive leathers and cloth; the 6g seats, without side or head support; the low ceilings; the limited cabin configurations. The small cabin was dictated by aerodynamics, power and cost. Although passengers had more room than the pilots, they sat in a necessarily small space.

The recipe for jet aircraft was pretty well established by 1960; proof is evident in today's fighter aircraft, which have advanced not so much in terms of speed or ceiling, but in features such as avionics, stealth and weapons systems. Likewise in private jets, most progress has been made in the panel, economy, survivability, comfort, environmental parameters (such as cabin noise and ergonomics) and ease of operation, but not so much in raw performance. In other words, the first Learjets boasted what is still high performance.

The first three Learjets had interiors fitted by Dee Howard, and these were demo aircraft. The first had just seats – cushions only, no upholstery. The lure of the 'pencil jet' was its speed.

Clay Lacy (who would become 1970 Reno Air Races Unlimited-class champion) was selling the Learjet. "I



## 50 YEARS OF LEARJETS

Bill Lear born in Hannibal, Missouri, USA	First flight of the Learjet	Model 23 type certificate awarded	First flight of Learjet Model 35 prototype	500 <sup>th</sup> Learjet (a Model 24D) delivered; groundbreaking for manufacturing and service facility in Tucson, Arizona, USA	Model 28/29 certified by the FAA; first flight of Model 55	1,000 <sup>th</sup> Learjet delivered	1,500 <sup>th</sup> Learjet delivered
1902	1963	1964	1973	1975	1979	1980	1986



## BY MID-DECEMBER 1964 I TOLD BILL LEAR WE REALLY NEEDED AN INTERIOR

loved the aircraft; it had a lot of potential,” he says. “I gave a lot of rides in it, but by mid-December 1964 I told Bill Lear we really needed an interior. And he had an interior by the end of March 1965 – all by Dee Howard. They weren’t bad – I think they used some plywood; this was before honeycomb. It was a combination of cloth and leather, with little window curtains. For the day, it wasn’t bad at all.”

Lear soon brought the interior fabrication in-house. “By about number 100 they were pretty good,” Lacy remembers. Lear was fanatical about weight. “He put out a request for proposal for the swivel chair – it had to be 20 lb or less,” Lacy says. “The best bid weighed 22 lb. ‘You mean you can’t get 2 lb out of this?’ he asked. They said it was impossible. So Bill built them himself. They weighed 20 lb and they were okay.”

Lear often said he wasn’t that smart, but he knew who the smart guys were. Lacy thinks that uncharacteristically

1. The latest Learjet, the Model 85, which should enter service in 2014
2. The Model 75, one of two new Learjets set to debut in 2013
3. The interior of a Model 23, the first Learjet type to fly



Models 31 and 55C certified by the FAA

Bombardier acquires Learjet Corporation

First flight of Model 60

First flight of Model 45 prototype

2,000<sup>th</sup> Learjet (a Model 45) delivered

Models 40 and 45XR launched

Interior completions moved from Tucson to Wichita, Kansas, USA

First Model 40XR delivered

Model 85 launched

1988

1990

1991

1995

1999

2002

2004

2005

2007





4. The Model 45, the second Learjet launched under Bombardier's leadership

## SEVERAL GOOD IDEAS WOULD COME FORWARD – BILL ALWAYS PICKED THE RIGHT ONE

humble: “He was smart enough to know who they were, I’ll tell you. I’ve seen meetings with five or six engineers making presentations. Several good ideas would come forward – Bill always picked the right one.” Sometimes this idea would be accepted wholesale and sometimes Lear would supplement it with ideas of his own, or from others at the meeting.

**Listening to the customer** Lear’s original idea was to make all the floorplans and interior equipment uniform. “Lear wanted pilots to ask, ‘What happened to the magazines?’ when they switched aircraft,” explains Lacy. “Customers didn’t agree. Porsche importer Johnny Von Neumann ordered an interior with leather seats all in different colours. He’d assign passengers by seat colour.”

One customer wanted a bar in the cabin, rather than behind the pilots. So

they built that, too. “They did a pretty good job, considering the time,” says Lacy. “Not only had Lear never built an aircraft, he had never built an interior.” The small size of the early Learjets made custom touches such as gold fittings more practical. There were fewer things to address, and they were small. And because they were always in view, the effect was well appreciated.

Lear knew he had a little aircraft, and was prepared for the detractors. People would say, “You can’t stand up?” He would answer, “Do you stand up in your Rolls-Royce?” They’d ask, “Does it have a lav?” He’d retort, “It’s very fast. You won’t need one.”

Lear wanted the feeling of space, however. The big passenger windows on the Model 24 were extremely popular, even among those who didn’t specifically notice. Lear’s obsession with weight, though, brought an end to big windows with the Model 25. For a

### Who was Bill Lear?

The original Model 23 design featured a cruciform tail. But Lear decided he didn’t like the look of it, preferring the T-tail sported by the then-modern Lockheed F-104 Starfighter and Boeing 727. According to a friend who was there, “Lear sketched out the T-tail on a stray piece of cardboard box.” This idea did not sit well with chief engineer Gordon Israel. He quit over it, in fact – although he returned soon after and stayed. The potential drawbacks noted by Israel (problems with stall warning, specifically) were met as in the Boeing 727 – Lear integrated a stick shaker into the controls ahead of the first flight in 1963.

Lear as a person was known as eccentric. He was born in Hannibal, Missouri, in June 1902. During his 76 years he was married four times and had seven children. Like his friends and fellow engineers Ed Swearingen and Dee Howard, Lear had a grade-school formal education. He invented the Motorola, the first practical car radio, at 24, followed by an aero-navigation radio, an autopilot, an autoland system, a steam-powered Vapordyne racer for the 1969 Indianapolis 500, and the eight-track tape deck in 1964.

His final project remained unfinished, despite the efforts of his widow, Moya. When Lear died of leukaemia in 1978, the LearAvia Lear Fan (LearFan 2100) – a composite-built pressurised pusher featuring a Y-tail – was in construction. On 1 January 1981 (officially noted by the sponsoring British government as ‘32 December 1980’, to avoid a financing glitch), the LearAvia made its first flight. However the FAA, unconvinced by the twin-turbine (PT-6B-35F) aircraft’s special gearbox, never certified it. The project was abandoned in 1985 after three were built. One prototype, N327ML (painted as 626BL), hangs in the Museum of Flight in Seattle, Washington. The original, N626BL, is in the Frontiers of Flight Museum in Dallas, Texas. The final of the trio, N838BL, has been deregistered; its whereabouts are unknown.



### 50 YEARS OF LEARJETS

100th Model 40XR delivered	400th Model 60XR enters service; Models 70 and 75 launched	Models 70 and 75 due to enter service	Model 85 due to enter service
2008	2012	2013	2014

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5

5. A Model 23 Learjet, featuring the popular clamshell door

while. The smaller windows saved about 30 lb, but customer demand changed his mind. "Everybody loved the big windows. We converted about 30 Learjets from Model 23 to 24," recalls Lacy. "Likewise, Gulfstream passengers notice the big windows on the G650 today."

Lear also understood that aircraft belong in the air, not on the ground. Learjets were designed from the beginning with service, inspection and maintenance in mind. As problems inevitably surfaced, Lear and his engineers got ahead of them. "As soon as they found something wrong, Bill would have it corrected in three days, and he'd call all the customers and tell them to bring the aircraft to Wichita, Kansas," says Lacy. "They hardly ever had an airworthiness directive, because Bill would have the thing fixed before the FAA got wind of it."

The clamshell door was another of Lear's ideas; the original reason being to keep rain off the carpet. In practice, it worked even better. "As soon as your

## THE CLAMSHELL DOOR WAS ANOTHER OF LEAR'S IDEAS; THE ORIGINAL REASON BEING TO KEEP RAIN OFF THE CARPET

head started up, you were already in the aircraft. You didn't hit your head," comments Lacy, adding that the 3ft-wide door "was really easy to put a stretcher in. The disadvantage was that it took away a little cabin space." Charlie Gates bought Learjet in 1969 (changing its name to Gates Learjet), and one of his ideas was an 'Executive Door' that was 2ft wide. This allowed a longer wall, but only about 20% of customers opted for it.

**Evolution** As the models progressed, so the Learjets grew. The Model 25 was a little longer than the original Model 23;

the breakthrough Model 35 was fully 1ft longer; and you could stand up in the Model 55.

Gates Learjet changed ownership in 1987 and became Learjet Corporation the following year. It was acquired by Bombardier in 1990, and since then the Canadian company has grown the boutique small jet manufacturer into a world-class purveyor of a wide range of luxury jets. With the introduction in 1990 of the Model 60, the 1991 commercial operation of the Model 45, continuing through 2013's new Models 70 and 75 and the planned 2014 introduction of the Model 85, Learjets,

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6



7



## NON-AVIATION PEOPLE THOUGHT EVERY SMALL JET WAS A LEARJET

with Bombardier at the helm, continue to evolve with the times. And not only in terms of the product, but in the whole customer experience. The cabin of the latest Learjet, the Model 85, is even available for anyone to customise online, with various floorplans, trims and materials to choose from.

Customers can work with dedicated designers to customise their aircraft. The Learjet completion centre is in Wichita and its showroom facilities are well equipped with 3D design (including texture mapping and pattern flattening), modelling and digital animation software.

Options don't stop at the factory door. Brian McPherson, completions manager at King Aerospace in Ardmore, Oklahoma, notes that a customer can now contract to buy a green Learjet and arrange for a fully customised cabin completion to be done independently.

**Star power** However, the lure of a Learjet is not only about the cabin and the performance. Part of Lear's genius was to ensure his product made the right associations. The main expenses in flying the Model 23 were about US\$85 (£56) an hour reserve for engines and US\$35 (£23) for fuel. Lear

- 6. The galley area on the new Model 75
- 7. The Model 70's modern washroom
- 8. The Model 85 is the roomiest Learjet ever, enabling a double-club layout

said to Lacy, "I'll pay you US\$170 (£112) an hour to fly everybody in Hollywood." The demo flights were a shrewd investment. Frank Sinatra, an early customer, even mentioned his 1965 Model 24 on his TV special, and impressed other A-list friends with it (notably, Elvis and Priscilla eloped in Sinatra's Learjet in 1967).

Learjet became a household name. Lacy, a frequent pilot of Sinatra's Learjet, remembers: "I got it on TV and into movies. It was always mentioned as the luxury transportation for *The Dating Game*, a popular TV show. We did lots of product placement – executives on TV always had model Learjets on their desks. Non-aviation people thought every small jet was a Learjet." An icon was born. **END**

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# inspiredchoices

European business jet interior designers reveal the top three inspirations that they draw on to achieve each client's particular vision



**ELISABETH HARVEY**

"By learning from our design history, I believe we become more capable designers, able to develop not only aesthetically pleasing designs but also ones that perform functionally and are comfortable"



**ERIC JAN**

"I grew up surrounded by stories of old aircraft, and these fascinated me. I remember once feeling an old wooden propeller and really sensing its power. It was simple in its design, but so well made"



**JACQUES PIERREJEAN**

"A jog or a bike ride are auspicious moments for my research and reflection. My mind is relaxed and in a prime state for an idea to take seed. Like a puzzle, ideas assemble themselves"





## ELISABETH HARVEY

Head of the interior design studio at Jet Aviation in Basel, Switzerland

### THE V&A MUSEUM

With more than 2.2 million items in its display and reference collections (as of March 2012), the V&A in London, UK, is a treasure trove of art and design spanning 5,000 years. I'm particularly inspired by the furniture gallery, which has more than 200 pieces ranging from the present day to 600 years ago.

By learning from our design history, I believe we become more capable designers, able to develop not only aesthetically pleasing designs but also ones that perform functionally and are comfortable. With inspiration from the past, we can give a timeless feel to our modern design styles. This approach is reflected in a design we created in 2012 (top right), which was inspired by classical residential spaces.



### DAME ZAHA HADID

Nowhere more than in an aircraft interior does Zaha Hadid's belief that "space should enrich your life" seem more appropriate. She has a dramatic and graceful style. I admire her capacity for bridging different worlds – using both traditional perspective drawings and computer-generated imagery – and for her prominence as a female architect in what is often a man's world.

It is a challenge to be innovative with aircraft interiors, but it is essential to provide clients with a visionary approach. Recently we designed a concept (right) to push the boundaries, emphasising light and shade within a contemporary and puristic backdrop.

### BAUHAUS AND LUDWIG MIES VAN DER ROHE

The Bauhaus movement is all about integrating art and craft with technology. I particularly admire the pioneering architect Ludwig Mies van der Rohe, for his elegant use of modern materials such as steel and glass, and the way he defined interior spaces within an open plan. But perhaps most of all, his rational approach – typified by his oft-quoted assertion that "God is in the details" – is something I regularly draw on for inspiration.

Van der Rohe's approach is often echoed in our design studio in Basel, for above all, an aviation interior must link art and technology. To create the quality expected by clients, an aircraft designer must think through the integration of concepts down to the last detail.



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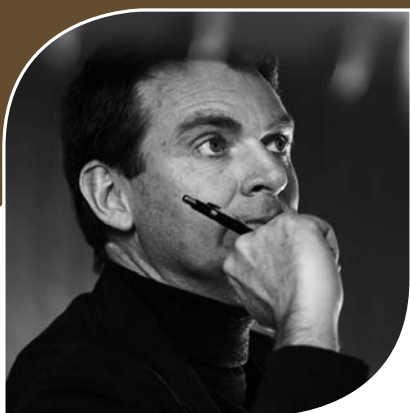


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## ERIC JAN

Head of interior design at  
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### OLD AIRCRAFT AND YACHTS

In 1926 my grandfather flew non-stop for more than 30 hours from Paris to Bandar Abbas, Iran. It is therefore not surprising that I grew up surrounded by stories of old aircraft. They fascinated me. I remember once feeling an old wooden propeller and really sensing its power. It was so simple in its design, but so well made. I still have it, hanging on a wall at home.

I am full of admiration for the artisan workmanship of yesteryear. Without the benefits of today's technology, these craftsmen created quality pieces with passion and full attention to detail. I saw this in person working as part of the Martin Francis design team in the 1990s on the restoration of the Shenandoah, a triple-masted 181ft schooner. There was no corner cutting – inside a cupboard or under a table, the quality and the level of detail was the same.

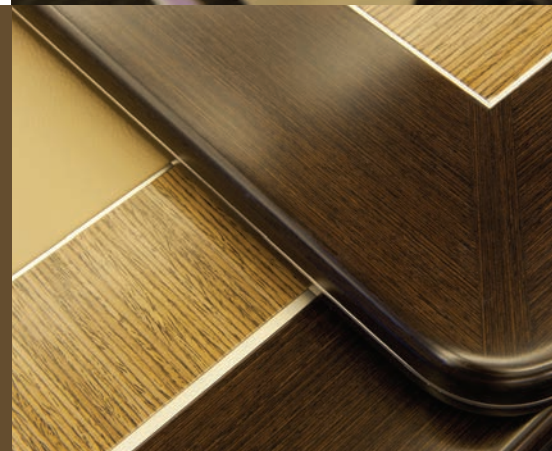
### HIGH-TECH CONTEMPORARY ARCHITECTURE AND DESIGN

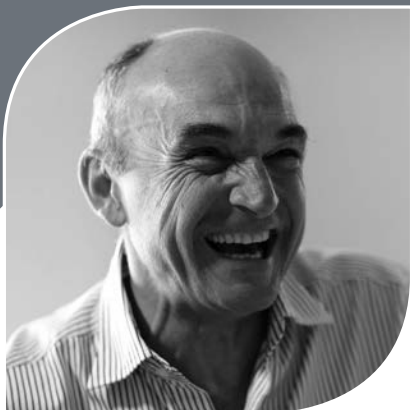
The best solutions are the simplest ones, but to make them a reality requires expertise and knowledge. In this respect there are five people who stand out for me – Jean Prouvé, Renzo Piano, Sir Norman Foster, Peter Rice and Antonio Citterio. These architects and designers all adopt what I call honest design with an innovative twist. They think holistically, taking everything into consideration. There is a socially and environmentally sensitive approach to their designs. They challenge how their buildings or furniture will be used today or in the future, how to incorporate recycling, and they foster young talent.

### NATURAL LIGHT

Nature is very important to me, and in particular natural light, which is very powerful in design. The impressionist painter, Claude Monet, captured this well in *Haystacks*. This series of 25 paintings shows differences in the perception of light through the seasons, times of day and weather conditions. You can see how a cloudy day has its own beauty, making everything appear more delicate, while sunny conditions strengthen colours and make greys flashy.

The way light affects our perceptions and moods, and the way it changes an item's appearance, is very powerful. This is why it is so vital for me that the whole team, including the customer, has a shared perception of what they want to achieve through design.





## JACQUES PIERREJEAN

Principal of Pierrejean Design  
Studio in Paris and Corsica, France

### NATURE

When I am in my office in Corsica I have the habit of unwinding by walking along the seashore. It's a unique and privileged place of its kind, where the very jagged, rocky coast – white in the north and south, red to the west – causes me to reflect on an infinity of materials. It is like a series of natural sculptures, where the forms intermingle in a harmonious and peaceful way. I have the impression of a seat designing itself around the rocks; a carpet appears to me through the vision of seaweed in the depths of the water. Creativity very often stems from a natural source and through making connections, and it creates a state of well-being and observation propitious for inspiration.

### PHYSICAL EXERCISE

A jog or a bike ride are auspicious moments for my research and reflection. My mind is relaxed and in a prime state for an idea to take seed. Like a puzzle, ideas assemble themselves. A concept is born, imagined and developed free from all constraints, and spurred by the physical effort, the project becomes clearer and reaches the next phase of fruition. What might seem to be fleeting, idealist or even unrealistic takes shape through games of reflection adapted to the project.

### CULTURE

A visit to a museum, an exhibition or going shopping are also privileged moments when I am sure to find information and make discoveries. Through the emotion and intellectual exchange of a dance or a play, my vision of elements is transformed. The harmony felt during these moments makes me receptive to the sensations that will later bring ideas to maturity. These moments of relaxation are a true mine of inspiration. The suppleness demonstrated by the dancers, moments of theatrical emotion, or the opening of an *haute couture* fashion show, always gives me a rhythm that enables me to endlessly renew myself and thus claim to be always at the cusp of creativity.





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## bundle of fun

Airbus has enhanced its packaged cabin, the ACJ318

**T**he Elite interior that Airbus Corporate Jets developed with Lufthansa Technik back in 2005/2006 for its ACJ318 is being retired. The replacement, the ACJ318 Enhanced, goes well beyond a simple facelift.

“A facelift would suggest the previous cabin is old and needed to be fixed, which is not exactly the case, as it is performing very well on the second-hand market,” says François Chazelle, VP of commercial activity for Airbus Corporate Jets. “What we’re doing with the Enhanced model is upgrading the standard with the latest features. Cabins have evolved in the past few years and how we decided what to add on to the ACJ318 was to look at what customers were putting on fully customised aircraft such as the ACJ319 and ACJ320.”

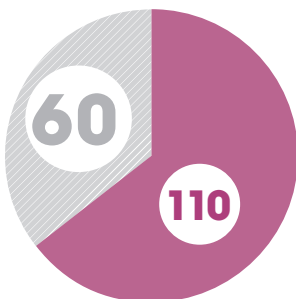
The long and impressive list of improvements ranges from domed ceilings to mood lighting and humidifiers to wi-fi – all of which have become either standard or catalogue options on the ACJ318. This time

around it was Lufthansa Technik’s US subsidiary BizJet International that did much of the development, with input from Lufthansa in Hamburg and Airbus, according to Karsten Döge, senior sales executive for Lufthansa Technik VIP & Executive Jet Services. The Enhanced is also one of the first fruits of the rearranged Airbus Corporate Jets organisation – sales, programmes and customer support were regrouped into a single entity in January 2012.

The ACJ318 Enhanced is the smallest ACJ but still boasts a very wide and tall cabin. The way the aircraft has been designed means it remains competitive. Eight completion partners are listed on the Airbus Corporate Jets website, but for the ACJ318 only one was chosen.

“For the ACJ318 we have a single source – Lufthansa Technik,” explains Chazelle. “That’s how we achieve a very attractive cabin price, to allow us to compete with much smaller jets. The secret of the quality and price is not so much about Lufthansa, but about the concept itself. Rather than going from

## ACJ SALES

**110 single-aisle**(ACJ318, ACJ319,  
ACJ320 and ACJ321)**60 wide-bodies**(ACJ330, ACJ340,  
ACJ350 and ACJ380)

a blank sheet and engineering a cabin on a fully customised basis, we have a number of pre-engineered options, which are reused from one aircraft to another. From the start of our relationship with Lufthansa – the first deals were closed in 2005 and first deliveries made in 2007 – we immediately committed to a first batch of 10 aircraft which were identical from an engineering basis, so we knew we were going to save a lot on price.”

The repetition of similar designs within a template has also reduced delivery times, to the benefit of the customer. “At one point, Lufthansa had it down to four and a half months in Hamburg,” says Chazelle. “When we transferred the programme to its BizJet facility in Tulsa, Oklahoma, they needed a bit more time to get their arms around it, but now they’re down to five months and should be able to reduce downwards even further.”

Considering a fully customised big iron cabin can take 10-12 months from a green aircraft to completion of the interior, it’s a big saving. Doing more of the work in-house can save still more time. “Overall, the ratio of our in-house designing and manufacturing – especially in Hamburg – is much higher than in the wider industry,” says Döge. “So any quality aspect is controlled by us. This leads to very stable design and production principles, and results in a high-quality, more or less failure-free product.”

**What’s new?** Tracing when the design process of the Enhanced started is tricky because of the organic nature of the changes. “It was more an ongoing process,” Chazelle recalls. “We’d been making cabins for the ACJ318, ACJ319 and ACJ320 on a regular basis – at least a couple a year – so all we’ve done is taken the best of what has already been



**WE HAVE A NUMBER  
OF PRE-ENGINEERED  
OPTIONS, WHICH ARE  
REUSED FROM ONE  
AIRCRAFT TO ANOTHER**

1. Dramatic domed ceilings feature throughout the ACJ318 Enhanced
2. The entrance area
3. A cinema option is available for the aft lounge area

3





SIDEWALL  
DESIGN

LIGHTING  
DESIGN

CEILING  
SYSTEMS

MATERIAL  
SELECTION

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5



**15** ACJs currently available for charter

**6** training centres

**7** spares centres

**170** field service teams

**8** centres approved for ACJ completions

**59,000** Airbus employees

**1** cockpit shared by all ACJs

done on other aircraft. We just made a collection of things we already knew.”

The basic fuselage hasn't altered from the Elite, but the team did have a chance to tweak the linings to help the design flow better. “In some places where there were two pieces, now it's only one piece, so it's more fluid,” elaborates Chazelle.

The domed ceilings – designed and made by Airbus – are among the most impressive and obvious visual defining features, and come as standard on most parts of the Enhanced interior. Previously, they were optional in some areas of the Elite. “Technically, the domes make use of the space in the ceiling,” explains Chazelle. “We don't have any systems in that area, so you can use the round shape of the aircraft to maximise space.”

There's also now a U-shaped layout (instead of an L-shaped one) in the aft lounge, which comes complete with

## Wider options

While the ACJ318 is currently the only ACJ available as a pre-designed cabin with various catalogue options, Airbus Corporate Jets' marketing director David Velupillai doesn't discount the idea of other ACJ types following suit.

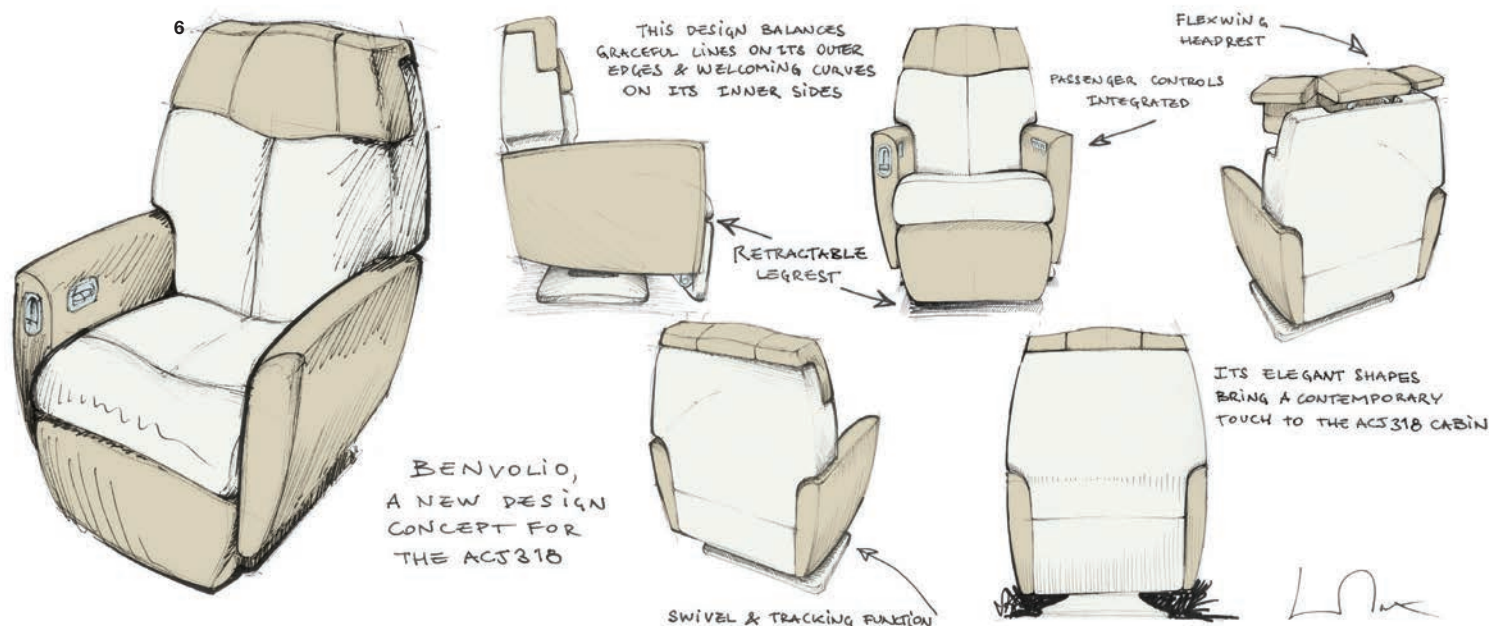
The recent Gala concept is an obvious pointer. “We developed the Gala for wide-body aircraft,” he says. “Take any of the ACJ330s, ACJ340-500s or ACJ340-600s. With similar space between doors two and three, they're perfect areas to place your VVIP section. On the concept, business or first class could be at the front of the aircraft, the VVIP Gala section in the middle, and then business and/or economy in the back. The VVIP section has a bedroom, lavatory and a shower, office, lounge and a dining/meeting area. That's something we've asked the outfitters to quote on and we can then offer to our customers.”

## THE DOMES MAKE USE OF SPACE IN THE CEILING; WE DON'T HAVE ANY SYSTEMS IN THAT AREA

4. Improvements include enhanced cabin linings, HD IFE and Accordia window shades
5. Upgrades in the washroom include a new washbasin

a cinema screen; plus a shower option – potentially useful for residual values on bigger aircraft at resale time, even if not always used that much by the customer, according to Chazelle.

**Technology and aesthetics** Such is the rapid speed of change in consumer smartphone and tablet design, poor interfaces elsewhere can age more quickly than ever. In response, the Enhanced's screens have got bigger, the DVD players are now Blu-ray,



6. The new Benvolio seat option, designed in-house

## IN CHINA THE ABILITY TO TAKE UP TO 19 PASSENGERS VERY COMFORTABLY IS IMPORTANT

interaction with iPads and iPods has been made easier, and wi-fi and GSM are now on board too, meaning owners and their guests can make calls on their own mobile phones, rather than using a satellite phone. Chazelle argues that aside from being more convenient, this makes billing less complicated.

Beyond technology, the team also wanted aesthetic change. A third seat option, Benvolio, was designed in-house with curves in every direction and a more comfortable rounded base “like you’d find on great modern seat designs on the ground”, Chazelle enthuses. The basic seat structure was retained, but Benvolio offers new foam and colour and trim options.

Accordia shades on the windows are another upmarket touch, and with LED illumination throughout, it all adds to a feeling of joined-up luxury. Colour and trim options are unchanged. “There’s still full freedom within a certain range,” says Chazelle. “It’s up to the customer what fabric they want to use, and up to us to check it passes the same capability tests as before.”

The first Enhanced cabin should be ready for delivery in the first quarter

of 2014, according to Chazelle. If a customer were to order one today it should be ready at the end of 2014. Five months is still the time needed to finish the Enhanced version, despite the extra features over the Elite.

**Supply and demand** Airbus expects strong demand from the Middle East, Europe and China. “Out of the Middle East, the Enhanced allows you to fly anywhere in Europe or Asia with fantastic storage,” says Chazelle. “We’ve kept a huge area for baggage, which is very important for Middle Eastern customers. In China, the aircraft’s ability to take up to 19 passengers very comfortably is also important. Four to eight tends to be the size in other areas, but Chinese customers tend to travel in larger groups and you wouldn’t want to try that in some of the smaller jets.”

With its upgraded technology and new aesthetics, the ACJ318 Enhanced seems well-equipped to live up to its name. **END**

**Web** [www.airbus.com](http://www.airbus.com); [www.bizjet.com](http://www.bizjet.com); [www.lufthansa-technik.com](http://www.lufthansa-technik.com)

**CABIN STATS**

**ACJ318 Enhanced**

**Cabin width:** 12ft 1in

**Cabin height:** 7ft 4in

**Cabin length:** 70ft 11in

**Seats:** 2 + 2 crew + 19 passengers

**Range:** 4,200 nautical miles with NBAA IFR

**High-speed cruise:** 485kts

**Max altitude:** 41,000ft

**Price:** US\$72m (€56m) including cabin

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# qualitydrive

Advances in touchscreen, 3D, OLED, HD, LCD and other consumer technologies are pushing the development of ever thinner, lighter, brighter, more functional IFE solutions

**T**he task of keeping business jet cabin technology on a par with consumer technology is relentless. Smartphones and tablets are revolutionising the way passengers interact. Meanwhile, the more staple IFE equipment is enjoying its own revolution.

“Our VIP clients have fantastic entertainment systems in their homes, and expect that the latest displays can be replicated on their aircraft easily – but you can’t just put a consumer display on an aircraft. Instead we have vertical integration and in-house design and certification teams to enable us to quickly integrate the latest technologies into systems designed specifically for aircraft,” says Austin

Campbell, project coordinator at Custom Control Concepts.

“Bulkhead and mounted displays need to be ruggedised to be aircraft qualified,” adds David Gray, president of Flight Display Systems. “DO-160 testing and aircraft integration needs to be assured. This creates the need for larger enclosures and lexan display coverings, to allow for abusive loads and crash survivability.”

Large screens create their own problems. “A big display in a relatively small cabin has to be more aesthetically pleasing because it takes up so much space; it really becomes part of the interior design,” says Dave Crossett, principal executive for strategic sales and marketing at Lufthansa Technik’s Innovation business unit.





1. An HD (1080p) monitor with 3D capability, from IDAIR

## Arm in arm

As monitors become thinner, in-arm deployment solutions are changing accordingly. Bucher Aerospace is now providing pop-up solutions enabling monitors to be stowed in envelopes as thin as 2in. As the weight of the screens decreases, so can the mechanisms that hold them. “Bucher is incorporating new structural reinforced plastics. With these new lightweight materials – which still meet flammability requirements – parts that were previously aluminium can be manufactured in plastic, saving cost and weight,” says Bucher Aerospace’s Taisha Fernandez.

One of the company’s recent projects involved collaborating with industry partners on a pop-up IFE deployment concept. “Together we were able to incorporate our partner’s IFE electronics into our enclosure and deployment system, and so were able to meet all of the customer’s functional and aesthetic goals despite very restrictive side-ledge geometry,” comments Fernandez. “To ensure reliability and consistent operation, the pop-up mechanism uses a gas spring mechanism that has been repeatedly tested over 100,000 cycles and has a temperature range of -40°C to 90°C. The system also features full 90° rotation and 30° tilt, while shaving up to about 4 lb off of the original design.”



2

# THE NEWEST LED-BACKLIT LCDS ARE SLIM AND LIGHTWEIGHT, LENDING THEMSELVES TO CLEANER INTERIOR DESIGNS

It isn’t just the size of bulkhead-mounted displays that is increasing; the dimensions of in-seat and in-arm displays are also going up. “The latest offerings from Panasonic, Thales, Lufthansa Technik, Custom Control Concepts, and so on, range between 10-16in – much larger displays than just a few years ago,” comments Taisha Fernandez, marketing and sales associate at Bucher Aerospace, which collaborates with monitor suppliers and other partners to develop deployment solutions.

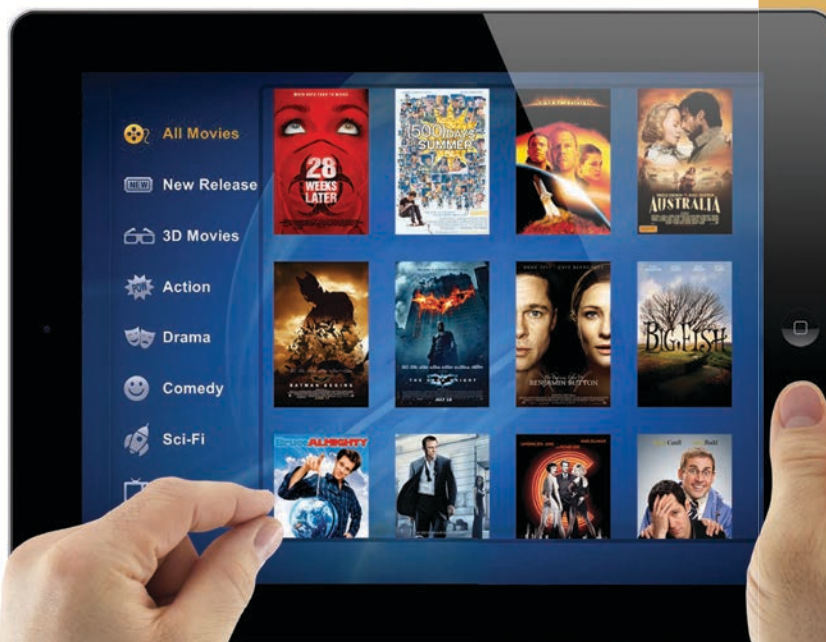
**Gold standard** So what is the current gold standard for bulkhead-mounted displays? “Full HD, high-performance LCD and LED backlighting,” says Crossett. “The biggest that can fit in the cabin. The newest LED-backlit LCDs are slim and lightweight, in turn lending themselves to cleaner interior designs.” Campbell echoes these thoughts, but also makes a case for 3D: “For the private aircraft market, the current gold standard is probably a 1080p display with built-in AVOD, LED backlighting and 3D technology, with HD films displayed at the same quality you would enjoy at home. Of course we’re also watching OLED

technology in the consumer marketplace, although we haven’t had a request for it yet.”

**Wall of sound** Display advances often grab the headlines, but aural technologies are progressing too. “Complaints about audio quality on digital devices have bedeviled

manufacturers since the early days of the iPod,” says Campbell. “With higher-capacity storage, CCC’s system delivers higher quality audio, often nearing CD quality. The small loss in quality perceptible with any encryption has led some audiophiles to turn to lossless audio codecs, which have grown in popularity. Although the vast

2. A 64in HD (1080p) integrated monitor from CCC with built-in AVOD and 3D capabilities
3. CCC’s iPlane app for Apple and Android devices, with AVOD



3

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# PEOPLE WILL WANT TO WATCH A MOVIE ON THE LARGEST DISPLAY THEY CAN GET WHILE USING THEIR TABLETS LIKE THEY DO AT HOME



4

majority of consumers are pleased at the high-quality sound they find in digital audio, the gold standard may be creeping towards lossless digital audio in the coming year.”

Surround sound is another oft-lauded feature, but Crossett says it has severe shortcomings in practice. “Finding the sweet spot – in the round tube that is the aircraft cabin, and to provide the surround-sound experience for more than one person – is difficult to say the least,” he says. “Also, a lot of time and effort goes into the design, development, calibration and installation of sound systems in aircraft on the ground. While this is understandable, once the aircraft is in the air the ambient sound conditions change dramatically. It is noisy no matter what noise-dampening measures are taken. So what happens in the air? The volume must be cranked up to counter the cabin noise, and those next to speakers get blown away, while those sitting away from them cannot hear.”

Lufthansa Technik’s solution to this problem is its trim panel speaker technology, which it has used on installations since 2004. “We place



5

4. UTC Aerospace Systems’ line of HD monitors
5. Rockwell Collins has responded to the trend for using consumer devices on board with its Skybox solution

transducers on the interior panels,” says Crossett. “That makes the panel a speaker with a digital amplifier. The sound is diffused uniformly throughout the cabin, meaning the audio doesn’t need to be turned up, because no matter where you are, you are next to the panel. We have also developed a surround-sound processor that works

well with the system and we are happy to install it wherever required, but we don’t really see a great advantage to surround sound in a business aircraft.”

**Bitter pill?** While it may seem logical to assume that the latest consumer tablets could render arm-mounted or even bulkhead monitors redundant, the second screen phenomenon suggests that this may not be borne out in practice. “People use their tablets while watching their big-screen TV,” explains Crossett. “They sit at home on their sofa and watch their 50in LCD while using their iPad to send emails, go on social networking sites, buy things and use the internet to find out more about something they just saw on TV. People like to watch entertainment on fixed displays and use their tablets for information gathering.”

It is a behaviour he imagines will be mimicked in the cabin. “People will want to watch a movie on the largest display they can get while using their tablets like they do at home,” contends Crossett. “In smaller cabins they will want to watch their movie on the pop-up 10in screen and use their iPads as they do at home. Although we offer



## Jargon-busting

**LCD:** A liquid crystal display (LCD) screen has to be backlit by cold cathode fluorescent lamps (CCFL) or more commonly now by a row of white light-emitting diodes (EL-WLED) or a full array of red, green and blue light-emitting diodes (RGB-LED).

**OLED:** Organic light-emitting diodes (OLEDs) can be applied in very thin films. An OLED screen doesn't need backlights, so can be thinner and lighter than a LCD, and better for deep black tones.

**1080p:** Displays categorised as 1080p have 1080 horizontal lines of vertical resolution. Also known as full high-definition (full HD).

**3DTV:** Three-dimensional television (3DTV) screens using an active shutter 3D system or polarised 3D system require the viewer to wear special glasses. Autostereoscopic screens work without glasses.

**Touchscreens:** There are many types of touchscreen. Capacitive touchscreens can only be operated with bare hands or through the use of capacitive gloves or capacitive styluses.



# THE WAY IN WHICH WE USE SCREENS MAY CHANGE IN THE NEAR FUTURE

both wireless and wired distribution, I believe people will only use their tablets for entertainment if they are forced to, and would prefer to use them as they are accustomed to, and I believe that OEMs want to make the cabin feel more like home."

**On the horizon** "The most important technology that will change displays in the long term is the large OLED display," contends Gray. "This will allow very slim, low-power, high-quality displays to be mounted in places we haven't been able to before." Campbell is also excited about the

- 6. The Samsung SUR40 table with Microsoft PixelSense technology
- 7. A Gulfstream IV with CMS from Flight Display Systems

potential of OLED technology. "It will increase viewing angles in the aircraft cabin," he adds.

In the meantime, he is impressed by advances in 3D technology: "Our new 64in 3D LED display has a passive-style LCD that can switch between 2D and 3D modes as the user desires. When put into 3D mode, it places an extra line of pixels between what the left and right eyes see. The result is a totally seamless 3D experience."

It's also possible that the way in which we use screens may change in the near future. The touchscreen revolution that lifted off with

smartphones is finding traction in the business world. Microsoft's PixelSense table is a case in point. "It's hard to imagine that technology like that won't be moving into aircraft in the next year or two," says Campbell. "Multi-touch integration on tables will revolutionise business meetings and entertainment on personal aircraft." **END**

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# wildchild

Interior customisation will help to distinguish the Falcon 2000LXS from its packaged sibling, the Falcon 2000S

In 2009, Dassault unveiled its first packaged interior – an option created with BMW Group DesignworksUSA for the Falcon 7X. But as that is at the top of Dassault's line, the package is optional, and offered alongside the opportunity for full customisation.

The idea of packaged interiors found a perhaps more natural home in the super-mid-size Falcon 2000S. Pre-engineered interiors mean Dassault can offer a more competitive price. "The intent of the original 2000S was to make the Falcon 2000 platform more affordable to prospective customers looking for an aircraft priced in the super-mid-size segment, competing with the Bombardier Challenger 300

and the Gulfstream G280," says Vadim Feldzer, spokesperson for Dassault.

Again partnering with BMW Group DesignworksUSA, Dassault developed three 2000S cabins, and revealed them upon unveiling the aircraft in 2011. It is due to enter service in 2013.

Dassault is taking a different approach with its replacement for the 2000LX, the 2000LXS: there will be no packaged interiors, standard or optional. Perhaps one explanation is that the 2000S and the more expensive 2000LXS share cabin dimensions – enabling 2000LXS customers to go beyond packaged interiors helps to differentiate the models.

This is not the only difference between the aircraft types however. The





4

aircraft in the current Falcon family – the 7X, 900LX, 2000LXS and 2000S

1,800

employed at Dassault's facility in Little Rock, Arkansas

2000+

Falcons delivered

2,300+

total employed by Dassault Falcon Jet

2000LXS can fly 650 nautical miles further than the 2000S (4,000 versus 3,350 nautical miles). Dassault has also improved on the 2000LX's performance by adding inboard wing slats to the 2000LXS that will enable it to land at more airports, matching the 2000S. "The 2000LXS will be EASA/FAA certified for steep approach and London City Airport operations," says Feldzer. While the 2000S competes with the Challenger 300 and G280 in the mid-size segment, the 2000LXS is intended to compete with the Challenger 605 and G450.

**Design parameters** Thus the 2000LXS cabin will be tailored to each customer's specification. However, Remi Bachelet, Dassault's head of specifications and design, expects the vast majority of buyers will work within the range of fabrics, veneers and interior appointments found in Dassault's design centre catalogues. "Typically, 80% of clients choose leather seats, light-coloured walls, medium-to-dark wood veneers and carpeted floors," he says. "This ensures that the aircraft will fetch a good price in the resale market, by meeting most people's preconceptions of what a business jet interior should be like."

Although Dassault does not offer completely pre-engineered interiors for the 2000LXS, there are some pre-set seating and cabinetry layouts, to save time (and therefore money) in the completion stage. Possible layouts and

## TWO THIRDS OF ORDERS WILL BE FOR 10-SEAT LAYOUTS

1. The Falcon 2000LXS cabin, which will be completely customisable
2. The 2000LXS should enter service in 2014

décor schemes will be visualised using a computer program, to make decisions easier for customers.

Dassault expects two thirds of orders will be for 10-seat layouts; most of the other third being for a double club and a dining group. The company projects that very few customers will opt for a divan in the aft lounge.

At the same time, Dassault is also open to 2000LXS clients bringing in their own preferred designer. "Some of our customers want to use their own designer because they are familiar with their work on the customer's apartment or yacht," Feldzer says. "In such cases, our internal design studio works closely with the customer's designer, to ease the process and to find the best materials and equipment."

Occasionally, Dassault has to rein in customers' design fantasies. "We can't install marble floors and fittings because of weight and balance considerations," says Bachelet. "But we





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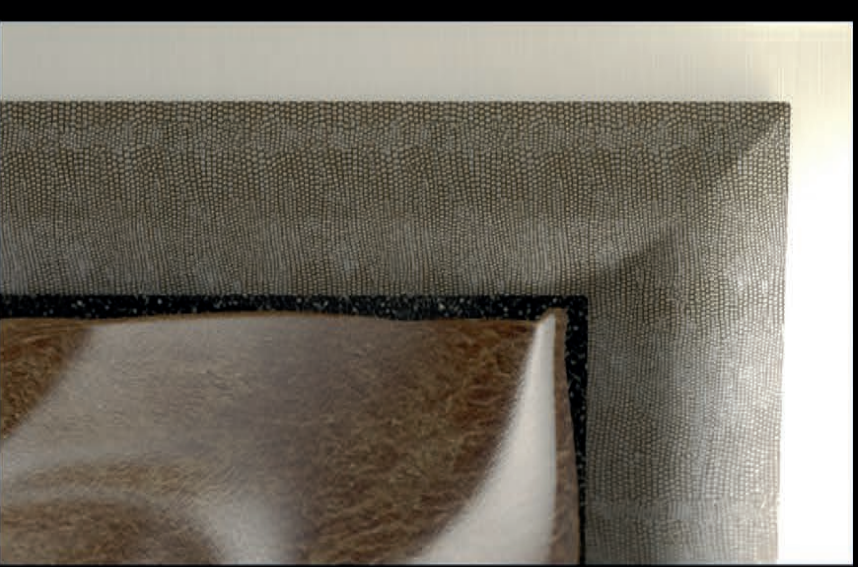
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## 50 YEARS OF FALCONS

**1963**

Mystère 20 prototype makes first flight; Pan Am creates division to market and support it

**1965**

Mystère 20 certified and enters service

**1966**

Mystère 20 renamed Fan Jet Falcon, later Falcon 20

**1972**

Dassault and Pan Am form Falcon Jet Corporation

**1973**

Falcon 10 certified

**1979**

Falcon 50 certified and enters service

**1980**

Dassault purchases Pan Am's interest in Falcon Jet

**1981**

Falcon 100 announced, as replacement for 10

**1982/3**

Falcon 900 announced

**1985**

10 certified with carbon-fibre wings

**1986**

900 certified and enters service

**1988**

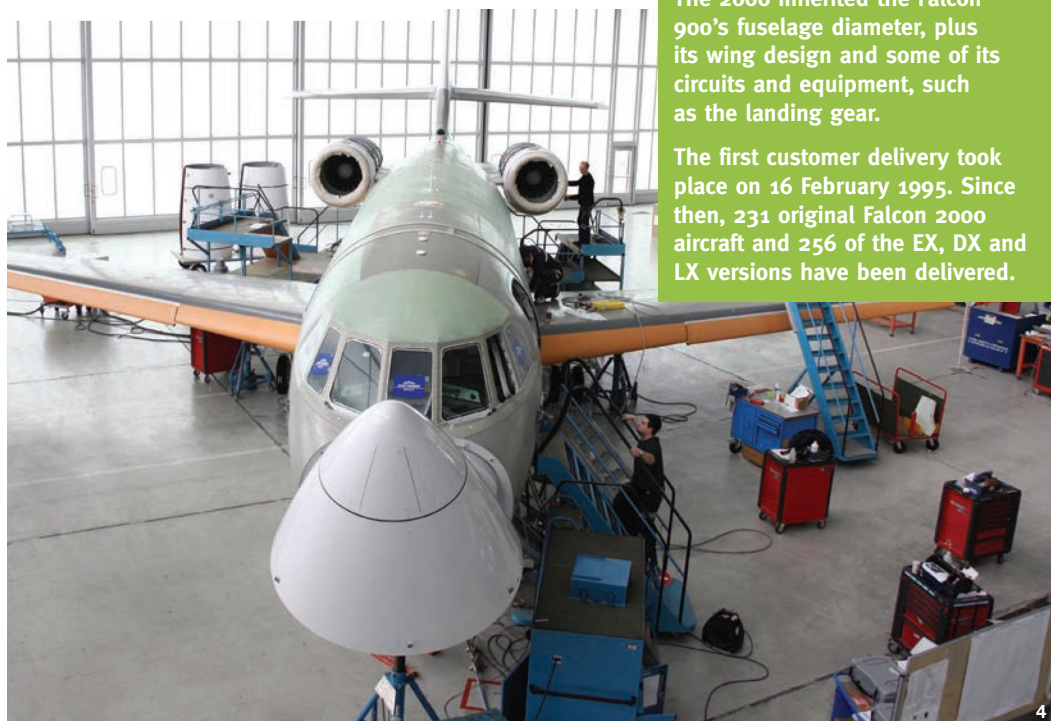
1,000<sup>th</sup> Falcon (a 900) delivered

**1991**

CATIA replaces physical mock-ups, on the Falcon 2000 programme

**1995**

2000 and 900EX certified; 50EX announced; Dassault Falcon Jet Corp formed



can provide a wide degree of customisation to suit our clients' varying tastes." Materials must meet fireproofing and strength standards, elements such as structural partitions are mandatory, and emergency exits have to be accessible.

"Even when all these conditions are met, there are some items clients ask for that are possible, but just don't make sense in an aircraft," Bachelet notes. "We had one client who wanted wooden floors in their aircraft. This would have compromised the aircraft's noise suppression and provided a very cold surface to walk on. Eventually, they agreed that soundproofed thick carpet was best."

Quiet is a key selling point for the 2000LXS – the cabin's improved

3. The packaged interior option developed with BMW Group DesignworksUSA for the Falcon 7X
4. Most 2000LXS cabins will be fitted at Dassault's main facility in Little Rock, Arkansas

**Falcon 2000 reaches 20**

On 4 March 2013, Dassault celebrated a milestone for the Falcon 2000 – the aircraft made its maiden flight 20 years previously.

The 2000 lays claims to being the first aircraft to have progressed from computer-aided design to production without an intermediate physical mock-up. It was also the company's first design-to-cost aircraft – whereby the price was determined in advance, and its design and manufacturing conducted accordingly.

The 2000 inherited the Falcon 900's fuselage diameter, plus its wing design and some of its circuits and equipment, such as the landing gear.

The first customer delivery took place on 16 February 1995. Since then, 231 original Falcon 2000 aircraft and 256 of the EX, DX and LX versions have been delivered.

soundproofing means it is 2dB quieter than its predecessor.

**High technology** The 2000LXS cabin also has some impressive technology, such as the new FalconCabin HD+ CMS, which comes as standard. "FalconCabin HD+ was developed using Rockwell Collins' Venue CMS architecture," says Lupita Ho, principal CMS marketing manager at Rockwell Collins. "Dassault wanted to provide its customers with the latest technologies and be first to offer unique capabilities, such as our Skybox, which enables passengers to share digitally protected Hollywood content with ease on cabin displays and iPads."

Operating over a fibre optic network, FalconCabin HD+ supports

5



## COMPLETION IS EXPECTED TO TAKE FOUR TO SIX MONTHS

narrowband data services. The system can be configured as an in-aircraft private branch exchange to enable call routing, call waiting and conference calling. Axxess II can also be used for fax messaging, graphical weather services and cockpit flight information.

2000LXS interiors will be finished at Dassault's main completion centre in Little Rock, Arkansas. Each cabin completion is expected to take between four and six months, depending on its complexity.

Work on the first 2000LXS interior is scheduled to begin in 2013, with delivery planned for 2014. "If someone were to order a 2000LXS today, we could have it ready for them by the end of 2014," says Feldzer. **END**

**Web** [www.aircell.com](http://www.aircell.com);  
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[www.rockwellcollins.com](http://www.rockwellcollins.com)

HDTV on monitors up to 24in wide. Playback is controlled using iPad, iPhone or iPod Touch devices. Passengers can use the system to adjust lights, temperature and other cabin parameters as desired. Touchscreen control of electronic window shades is available as an option. The system also enables passengers to view the Airshow interactive map on monitors and iPads. "Every person can monitor the flight as they see fit," Ho says.

Another standard feature is Aircell's Axxess II satcom system. This connects to two iridium satellite channels at a time, supporting global voice and

5. The 2000LXS cockpit

## 50 YEARS OF FALCONS

### 1996

50EX certified; 900EX enters service

### 1997

50EX enters service and ceases production

### 2001

Falcon 7X announced as FNX; 1,500<sup>th</sup> Falcon (a 2000) delivered

### 2002

'Visual plateau' software established for collaborative development of 7X

### 2003

EASy flight deck certified

### 2004

900DX announced

### 2005

900DX certified

### 2006

First Falcon delivered to China

### 2007

7X certified; 2000LX launched

### 2008

900LX announced

### 2009

2000LX certified and enters service; packaged option announced for 7X; 2,000<sup>th</sup> Falcon (a 2000LX) delivered

### 2010

900LX certified and enters service, replacing 900EX; 2000LX replaces 2000EX

### 2011

2000S launched

### 2013

2000S due to enter service

### 2014

2000LXS due to enter service

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# team effort

Getting the green light to install Greenpoint's Aeroloft on the BBJ 747-8 required close coordination between the supplier, installer, integrator and regulators

The new BBJ 747-8 is a giant. It can carry 100 passengers 8,820 nautical miles non-stop in a 4,786ft<sup>2</sup> cabin at a cruising speed of 492kts. All these impressive stats have a price to match: US\$330m (£219m) for one of the green Goliaths. If you add a head-of-state cabin interior with opulent finishes, secure communications and anti-missile countermeasures, the price easily reaches US\$500-600m (£332-398m). BBJ 747-8 customers can also add another feature if they need still more sleeping space for their entourage – Greenpoint Technologies' Aeroloft.

Aeroloft incorporates a cabin attendant station, lounge, bunks, wardrobe and a changing room for the principal's staff. On paper, installing it looked like an easy exercise. It is designed to slot in front of the in-ceiling crew rest module, ahead of door five, adding another 393ft<sup>2</sup> of usable room.

The modular Aeroloft system is constructed from honeycomb panels that are bonded with aluminium edge reinforcements using commercial aircraft manufacturing techniques. It uses new structural attachments to fix it to the airframe.

The Aeroloft contains eight curtained-off lie-flat bunks connected by a 20in-wide aisle. Each of these bunks has its own storage shelf, passenger control unit, drop-down oxygen, light, gasper, no smoking and fasten seatbelt signs, mirror and coat hook. It is a nice-looking and comfortable space that for the first installation generated much paperwork and took considerable coordination between Greenpoint, EASA, Boeing,

1. Greenpoint's Aeroloft installation for the BBJ 747-8



2. Greenpoint's design team created the Aeroloft concept
3. Aeroloft's amenities include a wardrobe and changing room

2



3

the customer's completion centre and certification organisation, SWS Certification Services. In other words, multiple layers of company protocol and myriad considerations had to be negotiated – not least among them, the need to safeguard proprietary data.

**Dramatis personae** The Aeroloft was designed by Greenpoint, based near Seattle, Washington, and won its first

order in 2010. At this point SWS, based in Bristol, UK, was charged with obtaining an EASA STC for the design and installation and therefore had to coordinate the certification effort. Greenpoint subsidiary Greenpoint Products and Services (GPS) was tasked with the procurement and manufacture of the Aeroloft's parts, and assembling the kit. The green BBJ 747-8 airframe was built by Boeing in Everett, Washington, then flown to Greenpoint's subcontracted installation facility, Boeing in Wichita, Kansas. There Boeing had to install and test the Aeroloft, and SWS and Greenpoint had to complete the initial phase one certification process, resulting in the EASA STC.

The aircraft then had to obtain a Certificate of Airworthiness from the country of registry (which required Phase I STC approval of the Aeroloft

installation) and fly to the customer's designated completion centre, in Europe. This transfer was completed in August 2012. There the aircraft is now being completed under a separate STC.

Once the customer's completion centre has finished installing the main cabin, it will re-establish electrical, smoke detection, communication, oxygen and ECS connections to the Aeroloft. The Aeroloft has to be fully integrated with all the aircraft's systems and certified for inflight occupancy with final STC approval.

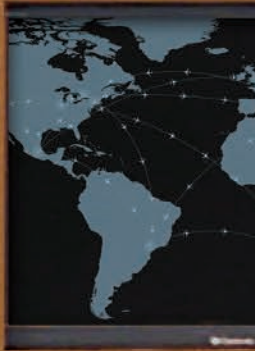
**International cooperation** The transatlantic nature of the project added a further layer of complexity to the task of certification. "When we first started this in 2010 there was no bilateral agreement between EASA and the FAA," says Nigel Smith, managing director at SWS. "So it was purely an

## Lift off

Another option on the BBJ 747-8 is a lift. Greenpoint Technologies and L-3 have both designed lifts for the BBJ 747-8, although no orders have been announced. Greenpoint's Aerolift would transport up to four passengers (or one passenger in a wheelchair and their attendant) from the ground to the main deck.

Meanwhile L-3 says its lift can be used between the ground and the main deck for boarding, and between the cargo deck and the main deck in flight.

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#### AeroLoft orders

Greenpoint Technologies has delivered three BBJ 747-8 AeroLoft kits and has announced orders for two more. Although the first three installations were performed at Boeing's facility in Wichita, Kansas, the latest customer has chosen to install the AeroLoft at another – undisclosed – facility.

Greenpoint Products and Services plans to deliver the fourth BBJ 747-8 AeroLoft kit in May 2013. The company recently boosted its offering by acquiring a five-axis CNC router and expanding its in-house engineering.

4. Greenpoint's AeroLoft features eight bunks

EASA STC. We weren't in a position to work easily with the US companies with assistance from the FAA at that time. So the biggest challenge for us was to coordinate with EASA, Greenpoint, Boeing and the operator to work out how to get the parts manufactured, conformed and delivered to Boeing in Wichita for installation. All of this activity had to happen while complying with the regulatory requirements and ensuring manufacturing conformity and configuration control, in order to gain final approval. Boeing and Greenpoint worked wherever possible within their existing FAA procedures."

There was need for diplomacy in this dance. "With our EASA Part 21 Design Organization Approval we have certain procedures, but we didn't want to disrupt Greenpoint's or Boeing's working procedures too much," Smith comments. "So part of our task was the harmonisation of all three organisations' procedures and processes and making sure the end result was EASA compliant. Boeing is an EASA Part 145 maintenance organisation and has to comply with its procedures. So in the beginning

## BECAUSE OF PROPRIETARY DATA, WE HAD TO GET BOEING AND EASA WORKING TOGETHER DIRECTLY

we had to establish and coordinate the conformity process and get it approved by EASA."

An EASA/FAA bilateral agreement came into force about halfway through the programme, creating additional challenges for GPS in securing the near-completed EASA Production Organisation Approval. Product conformity was the biggest issue in this, because under the bilateral agreement GPS was required to utilise an FAA Request for Conformity process that had yet to be used with regard to EASA STCs.

The AeroLoft was the first STC on the BBJ 747-8 and was subject to special regulatory conditions because of its unique design and application, as well as being subject to the bilateral agreement. This was also the first installation for Boeing under its EASA Part 145 approval. EASA imposed

additional requirements concerning the size of the blowout aperture and the effects of AeroLoft on the local aircraft structure. Other details of analysis, data and rationale were restricted to EASA and Boeing to protect the latter's proprietary information.

**Proprietary data** "Decompression was substantiated by Greenpoint and SWS analysis and testing," Smith says. "We then submitted our analysis to Boeing for approval. Eventually, everything was agreed between Boeing and EASA. Because of the issue of protection of proprietary data, we had to get Boeing and EASA working together directly and then wait for the outcome."

The STC was applied for under EASA CS-25 and the AeroLoft programme had to wait for the issuance of the aircraft's type certificates from EASA and the FAA. The BBJ 747-8 was



subject to change revisions, all of which had to be reviewed and considered by SWS and Greenpoint to demonstrate compliance with the airworthiness requirements. There were no direct FAA regulatory requirements for AeroLoft because it was an EASA STC, except indirectly through the involvement of Boeing experts and their type certificate requirements and company procedures.

**Safety briefing** The STC came with special terms and conditions for use of the AeroLoft. It is restricted to inflight use only – as with lavatories and cabin crew rest compartments – and passengers can occupy it only when a member of the cabin crew is present. The crew must conduct a separate briefing on emergency procedures and equipment for passengers staying in sleeping compartments.

“It’s a safety requirement,” explains Smith. “Passengers who occupy the AeroLoft have a separate safety briefing. Greenpoint and SWS have developed an amended crew manual supplement and an amendment to the aircraft flight

## THERE HAS TO BE A SEPARATE BRIEFING FOR AEROLOFT USERS – THAT IS ONE OF THE REASONS WE HAVE AN ATTENDANT STATION THERE

5. Nigel Smith, MD and head of design (left) and Phil Williams, director and head of aircraft electrical systems (right) at SWS

manual to advise the crew that there has to be a separate briefing for AeroLoft users – that is one of the reasons we have a small cabin attendant station up there.”

In emergencies the AeroLoft can be accessed or vacated through the adjacent crew rest lounge. However, under normal operations it is accessed via its own staircase. “There’s plenty of room up there, you can easily stand up straight,” says Smith.

The AeroLoft received its EASA STC in August 2012. Smith says that the FAA could be involved with subsequent installations. “Generally what the FAA would do is validate the compliance data, as it is an EASA STC. We would initially make an application to EASA, which sets everything up and

**8** green BBJ 747-8s were delivered by Boeing Business Jets to completion centres in 2012

**6** completion centres are known to have secured BBJ 747-8 cabin completion contracts – AMAC Aerospace, Associated Air Center, Greenpoint Technologies, Jet Aviation Basel, L-3 and Lufthansa Technik

**2** completion centres have confirmed two BBJ 747-8 contracts each – L-3 and Lufthansa Technik

**18-24** months is Boeing Business Jets’ estimate for a BBJ 747-8 cabin completion

starts the validation process and any other FAA requests. If they have questions they come back to EASA or us. If they have any compliance issues, this is addressed regulator to regulator, as EASA has already approved it. Once they are satisfied they will issue the FAA STC.”

Although the aircraft is still in completion (it is due to enter service in 2014), for Greenpoint, SWS and the rest of the team that worked together in Seattle, Wichita and Europe, the hardest part is over. “An installation as unique as AeroLoft has not been done before,” Smith concludes. **END**

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1. The New Citation  
Sovereign's  
washroom



# royal treatment

Improvements developed for the New Citation X are being translated to keep the Citation Sovereign in the running

Since its certification in 2004, the US\$17.6m (£11.7m) mid-size Citation Sovereign has become one of Cessna's most popular models, selling more than 300 units, with more than 50% of those sold outside the USA. What makes it so popular? The answer may be its simple systems and good operating economics mated to fast climbing ability, respectable range and the ability to use runways shorter than 4,000ft – sometimes a lot shorter.

The Sovereign borrows from several Citations. It has the same 5ft 6in tube width at the shoulders as the smaller Citation XLS and the faster and longer Mach 0.92 legacy Citation X. The trenched drop-floor centre aisle provides 5ft 8in of headroom. The passenger cabin is just over 25ft long. Eight sliding, swivelling and reclining passenger seats are arranged in two facing club-four configurations, although owners can substitute two- and three-place divans for some of these seats at additional cost. There is also room for an additional side-facing seat opposite the entry door if owners

select the shorter refreshment centre – which is 31in wide and holds two hot-beverage tanks, an ice drawer, a trash receptacle and storage.

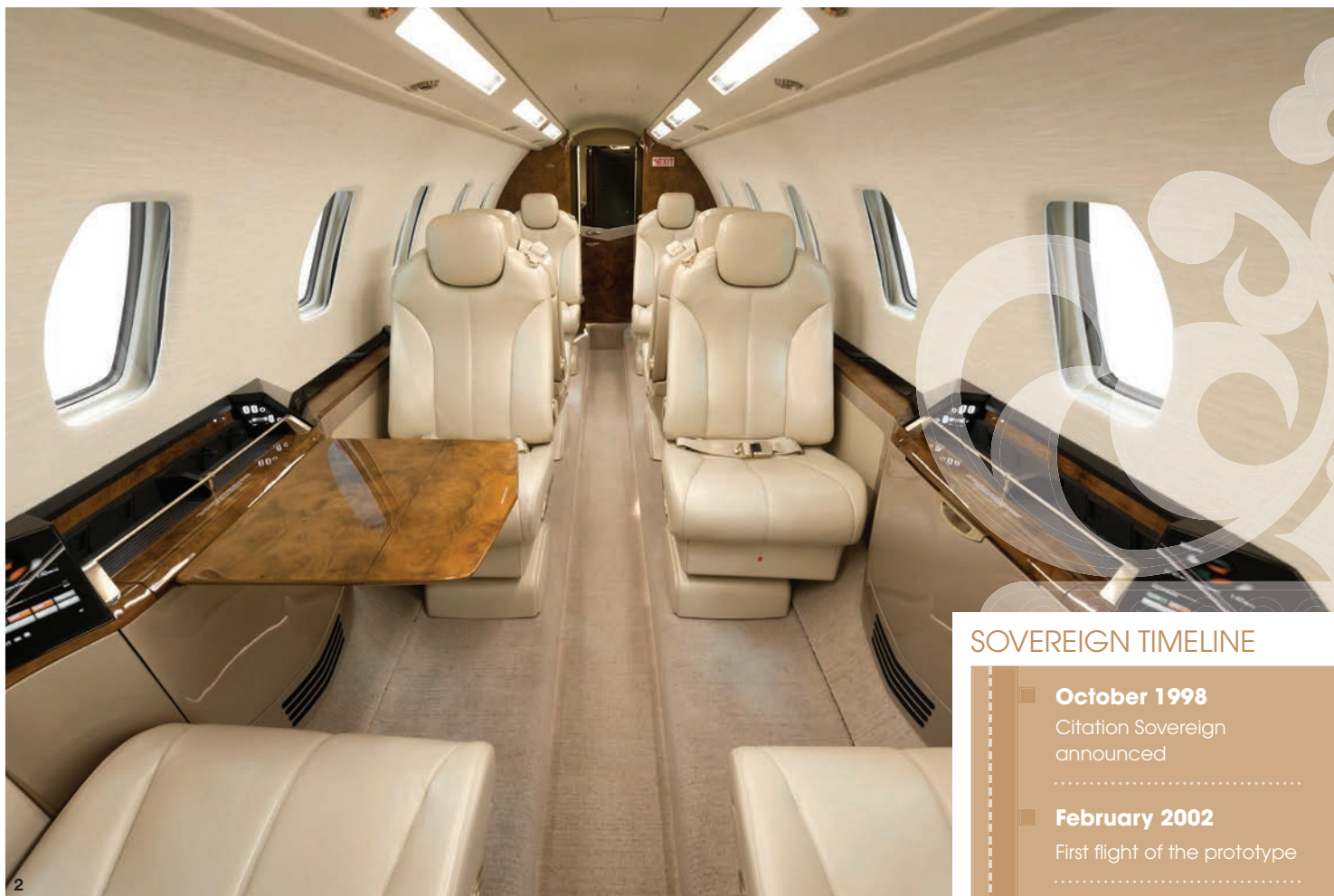
In fact there is lots of stowage space on board, including an 8ft<sup>3</sup> coat closet (that can hold 140 lb) opposite the refreshment centre; a 27ft<sup>3</sup> hanging closet (that can accommodate 415 lb) in the lavatory; and an externally accessed 100ft<sup>3</sup> baggage hold (rated for 1,000 lb) in the tail section. The utilitarian lavatory is at the aft of the aircraft, separated from the main cabin by a pair of sliding doors. It features an externally serviced flushing toilet, sink, vanity unit and sundry storage.

**Family heirlooms** This amalgamation has worked well for Cessna, but after nearly a decade it decided to give the Sovereign a makeover. In late 2012 the company announced that it was migrating much of the cabin interior developed for the New Citation X to its slower sibling. The New Citation Sovereign will also get new Garmin G5000 avionics, winglets and new Pratt & Whitney Canada PW306D engines, giving it 150 nautical miles more range.

Cessna displayed a Sovereign with the new interior at NBAA 2012 and expects to begin deliveries later in 2013. That display aircraft is currently in the flight-test programme.

The New Citation Sovereign will get the New Citation X's Clarity CMS and connectivity features, including PED, USB and media sharing ports; new LED lighting; the relaxed-pitch executive single seat developed for the New Citation X, Latitude and Longitude; restyled cabinets; and better air-conditioning.

Cessna developed the proprietary Clarity CMS with Heads Up Technologies. The CMS integrates the cabin's electrical system, avionics and communications through a fibre-optic backbone. The interactive touchscreen controller at each seat, about the size of an iPhone, has a built-in internet browser (internet service is required) and controls digital audio and video (a Blu-ray player is positioned in the forward closet); lights; window shades; temperature; the interactive moving map; and cabin diagnostics. Texts can be sent from seat to seat and the VIP controls can be assigned to any seat in



2. The Citation Sovereign interior shares a lot of styling details with the New Citation X

the cabin. The CMS trip computer has a global database and can display flight data, location, points of interest and other information. While the control screen is large enough to view video media, Cessna does plan to offer other monitor options. The CMS is also scalable for future growth. Phone service will be provided through Aircell's Axxess II system, with optional internet service via Aircell (for flights over the USA) and Inmarsat SwiftBroadband (for international flights). Wi-fi, high-speed internet and satellite radio will be available as options. Five 110V outlets are positioned throughout the cabin, with jacks at each club grouping. The 110V outlets can be added at each seat position as an option, and USB ports are standard at each seat.

**Changing faces** However, not all of the New Citation X's styling has been translated to the New Citation Sovereign. Elements such as the RGB

lighting and carbon fibre accents, for example, have not made the transition (although RGB lighting is available as an option).

"It's a great aircraft that wears a lot of faces," explains Cindy Halsey, Cessna's vice president for interior design, engineering and development. "We have a lot of people who use the Sovereign in a very utilitarian way and others who use it more luxuriously. So depending on what that owner's intended purpose is for the aircraft, we need to tailor it to meet those needs and expectations. But we have a lot of Sovereigns that are multiconfigurable working aircraft and can be used for special missions. People use the Sovereign in a lot of ways so we chose the path of keeping it like the new X, but easy to change."

The interior will be capable of being changed quickly between passenger, cargo and combination modes. "The Sovereign tends to be used more in a business application, almost like a

## SOVEREIGN TIMELINE

### October 1998

Citation Sovereign announced

### February 2002

First flight of the prototype

### June 2002

First flight of the first production aircraft

### August 2003

First production rollout

### June 2004

FAA type certification

### September 2004

First delivery

### April 2005

EASA and Joint Aviation Authorities certification

### October 2012

New Citation Sovereign announced

### March 2013

First production rollout of New Citation Sovereign



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## WE LOOKED AT THE AUTOMOTIVE SECTOR AND HOW THEY ARE MORPHING THE CUPHOLDERS INTO HOLDING MORE THAN JUST CUPS



corporate shuttle,” says Halsey. Consequently the most frequently requested configuration is for the double club plus a single side seat next to the refreshment centre, as opposed to a large galley and a divan.

Other new aspects include a more robust side table and a multifunctional storage shelf instead of the traditional cupholders. This shelf rests above the table shroud and is intended for keys, mobile phones and beverages. It also contains the CMS controls. “If you watch how people use aircraft, you always see the passengers empty their pockets,” says Halsey. “The mobile phone goes in one cupholder and the keys in another, and then they hold their drink, even when there is a pocket below for these other items, because they don’t want to get off and leave them there. They want to charge

their phones, watch a movie or check the moving map. We looked at the automotive sector and how they are morphing the cupholders into holding more than just cups. It was a natural evolution for us to provide this ‘ditty’ storage. It’s a place to put your stuff.”

The space is constructed from a non-skid material surrounded by black glass with a decorative rail around it. The sidewall table can be deployed without disturbing this area. The table mechanism also has new kinematics to make deployment almost effortless. “You don’t have to worry about banging the table lid or moving your drinks,” says Halsey.

**Seat plans** Inevitably Halsey comes back to the new passenger seats, long the focus of her attention. “The team really did a great job taking the comfort

### Lights up

While RGB lighting will be an option, as standard the New Citation Sovereign will have the LED lighting system developed for the New Citation X. “There are no visible reading lights on this aircraft,” says Cindy Halsey, Cessna’s vice president for interior design, engineering and development. “There is a strip of LEDs that goes behind the lens and they are programmed to shine a concentrated beam right on the reading area. They do not shine on top of your head. There are algorithms programmed into the LED strip so that it will shine as a table light or a reading light, all out of the same bank. It continues that really clean look.”

The system is currently being put through its paces in actual conditions (including night flying) on test aircraft.



3. The multifunctional storage shelf
4. The New Citation X’s seats have been redeveloped for the smaller Citation Sovereign

of a large aircraft seat and translating it into a mid-size seat,” she enthuses. “It’s fantastic. You feel as if you have a lot more room.”

The armrests fold away into the seatback, a feature designed to increase comfort for larger passengers. When fully upright the seat has an 8° pitch, allowing passengers to lean further back in the take-off and landing positions. The seat cushion has been lowered overall, but its front is pitched up slightly to give passengers the sensation of sitting in, as opposed to



5. Clairity CMS touchscreen controllers will be at every seat



## CABIN STATS

## New Citation Sovereign

**Cabin width:** 5ft 6in

**Cabin height:** 5ft 8in

**Cabin length:** 25ft 3in

**Seats:** 2 crew + 9 passengers

**Range:** 3,000 nautical miles with NBAA IFR fuel reserves and at maximum takeoff weight

**High-speed cruise:** 458kts

**Max altitude:** 47,000ft

**Price:** US\$17.6m (£11.7m)

on, the seat. Power-on options will not be offered, but mechanical lumbar adjustment will be available.

Colour palettes for the interior have yet to be finalised, but Halsey says they will be extensive and incorporate the latest trends – which she identifies as lighter colours, fewer patterns and more textures.

Overall, Halsey says that the process of integrating many of the New Citation X's cabin features into the New Citation Sovereign interior was fairly straightforward. "We have always shared a lot of cabin engineering between the X and the Sovereign," she elaborates. "Obviously, they do look somewhat the same, but there are differences between them."

So from later in 2013 the emperor will have new clothes, a fashion advance that should enable the New Citation Sovereign to keep its crown a while longer. **END**

**Web** [www.cessna.com](http://www.cessna.com)

**6** new or updated Cessna aircraft are expected to hit the market in 2013 – the Citation M2, New Citation X, New Citation Sovereign, Turbo Skylane JT-A, TTx and Grand Caravan EX

**2** more Citations – the Latitude and Longitude – are currently in development and expected in 2015 and 2017 respectively

**64** Citation Sovereigns were delivered in 2007

**323** Citation Sovereigns have been delivered as of January 2012

**565,000+** hours of flight had been accumulated by the Citation Sovereign fleet as of January 2012

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**A**lan Klapmeier began building aircraft more than 30 years ago in a barn in Wisconsin. That effort eventually grew into Cirrus Design, a company that stood the light aircraft business on its head, bringing to market a revolutionary piston-engine single with comfortable seating, glass panel avionics in an ergonomic cockpit, advanced safety systems (including a whole-aircraft ballistic parachute), composite construction and sleek styling. In other words, heresy. Today, more than 5,000 Cirrus SR-20/22 aircraft are flying and the company is working on a single-engine jet. When Klapmeier left Cirrus in 2009, the industry wondered what he would do next.

The answer wasn't long in arriving – Klapmeier threw in with Kestrel in 2010 – and it was a bit of a shock to some. This was a company, after all, building a turboprop; technology that for many stopped being sexy around 1959. Justly or not, associations include slowness, cramped cabins and vibrations. A prototype F1 Kestrel had been flying since 2006 and promised



# highhopes

A luxurious new mock-up may indicate a renaissance for Kestrel and the wider turboprop market



speeds of 350kts. Alas, performance was never verified and the funding was not there.

**Phoenix rising** Kestrel Aircraft was formed to resurrect the F1, but Klapmeier and his team immediately noticed improvements that could be made and set about editing the design – changing the engine and the propeller; enlarging the fuselage, windows and cabin; tweaking the airfoils; and enlarging the cockpit. “It is easier to come in and edit an existing design; the hard work is writing it the first time,” Klapmeier says. “While everything on the aircraft has been changed since the F1, it hasn’t changed that much. The gross weight has gone up on the aircraft, the fuselage is rounder and longer, and the tail is much bigger to improve handling.”

The fuselage is 9in wider at the aft pressure bulkhead, expanding luggage and modular space, and at least 4in wider at the centre of the cabin. The cockpit is much larger, with easier seat egress and more elbow room. Much of the extra room comes from using a rounder fuselage, which is also better for cabin pressurisation and reducing





### Cloud nine

Kestrel is developing nine interior configurations for the aircraft, ranging from cargo to medevac and a high-density airline design.

“We know we want to be able to reconfigure the cabin,” says industrial designer Ray Mattison, pointing to the seat tracking system’s ability to facilitate quick changes.

Company president and CEO Alan Klapmeier suspects most owner pilots will opt for the executive interior. “This aircraft has a lot of utility and we have thought about that from an interior point of view,” he says. “One element of that is this whole modular back section – cabinets and a lavatory that are very easily reconfigurable into extra seats and cargo space.”

1. The Kestrel’s cockpit, featuring wraparound windscreen
2. The team is prioritising seated comfort over headroom when moving around



structural loads. “The loft – the outside aerodynamics – are basically done,” says Klapmeier of the redesign, but he does acknowledge that work on many of the details is ongoing among Kestrel’s 100+ design team, which is headquartered in Superior, Wisconsin.

The result is an aircraft that should be capable of at least 320kts, have a range of 1,300 nautical miles, be able to use very short runways, and sell for around US\$3m (£1.87m). But those are just the broad strokes. Kestrel has worked hard to give passengers more cabin space – both real and perceived.

**Head first** It starts with getting inside the customer’s head. “We think very much about the product from the customer’s point of view,” says Klapmeier. “It is critical that you think like a user in the environment. Functionality is important, but so are design, style, refinement and thoughtful features. That is part of what the customer is paying for. We don’t think it is about being expensive, it is about spending a lot of time

thinking about what is important to the customer – the size of the window, choices of material, where your hand fits when it is in the armrest, where you put your foot, is there a trenched centre aisle or not. All of these little things don’t happen by accident.”

**Trying it out for size** Klapmeier says the best thinking happens in the mock-ups: “We spend a lot of time building and sitting in the mock-ups, watching things like where you put your feet, how you reposition your body after an hour, what are you looking at? That process gets to this design that hopefully surprises people.”

One immediate surprise is the flat-floor cabin. “A step-down (trenched) floor means you can report a larger headroom number, and given the type of aircraft, that can be more or less important given how many times you get up and how long the aisle is. In this aircraft, you spend a short amount of time getting to the seat, but a much longer time sitting in it – especially if you are flying longer missions. The

Are you inspired by nature?

Inspiration - Birch tree bark photograph

Results of that inspiration - River Birch

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### Debi Cunningham

Interior Design Director  
over 20 years of experience



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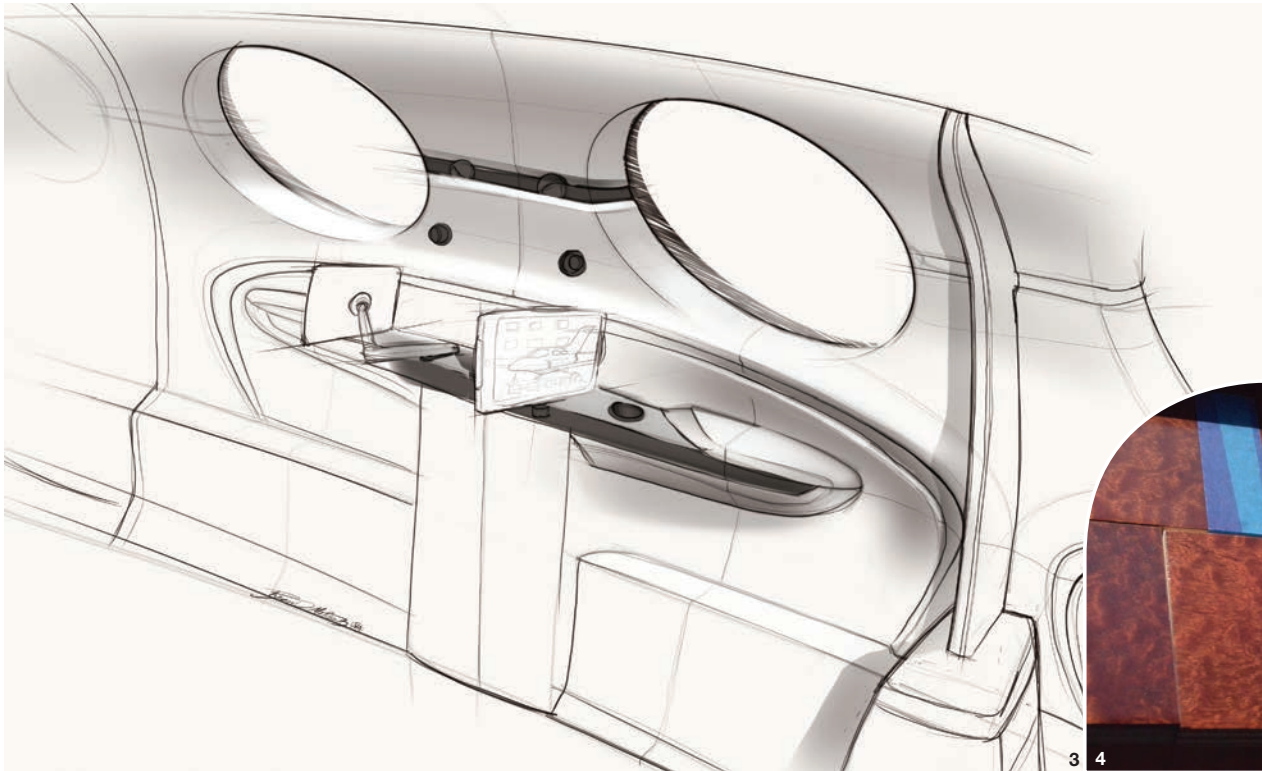
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## THE WOODS AND THE CONTRASTING ELEMENTS AFFECT HOW YOUR EYES SEE THE VOLUME

important thing is not the headroom number, the important thing is how the customer feels when he is sitting in the seat,” Klapmeier says. “In the passenger cabin, the step-down aisle gets in the way. It reduces the number of places you can put your feet and not feel conflicted with the person facing you.”

A flat floor also negates the need for executive passenger seats that swivel so that legs can rest in the trenched aisle, “which gets heavy and expensive”, Klapmeier says.

**Photo finish** Besides punching out the fuselage, Kestrel also spent a lot of time developing visual cues to enhance the feeling of spaciousness. Much of this is the handiwork of industrial designer Ray Mattison, including the executive interior in the company’s current display mock-up. If not for the prop in front, you might think you were walking into a US\$25m (£15.54m)

3. Cabin highlights will include a flat floor, large oval windows and a split sidewall
4. Real wood veneers will add to the high-end aesthetic

business jet. “The woods and the contrasting elements affect how your eyes see the volume,” says Klapmeier.

Entering through the main door aft of the wing, passengers can deposit their luggage to the right and help themselves to drinks and snacks from the elegant cabinet stack opposite the entrance. The lower drawer of the stack can be fitted with an electric flushing toilet. A privacy screen can be drawn across the entry to the cabin.

In place of the cabinet stack, two cantilevered seats can be added to increase the passenger capacity to seven (with the seventh passenger in the co-pilot seat). The cabin boasts club-four seating and luxurious materials and is dominated by large oval windows.

The cockpit is spacious and flowing, featuring a wraparound windscreen, side stick controls and a low-slung instrument panel with huge flat-panel

## KESTREL TIMELINE

**1998**

The idea is born

**2006**

First test flight

**2007**

Proof-of-concept displayed

**2009**

Alan Klapmeier joins and develops the design

**2011**

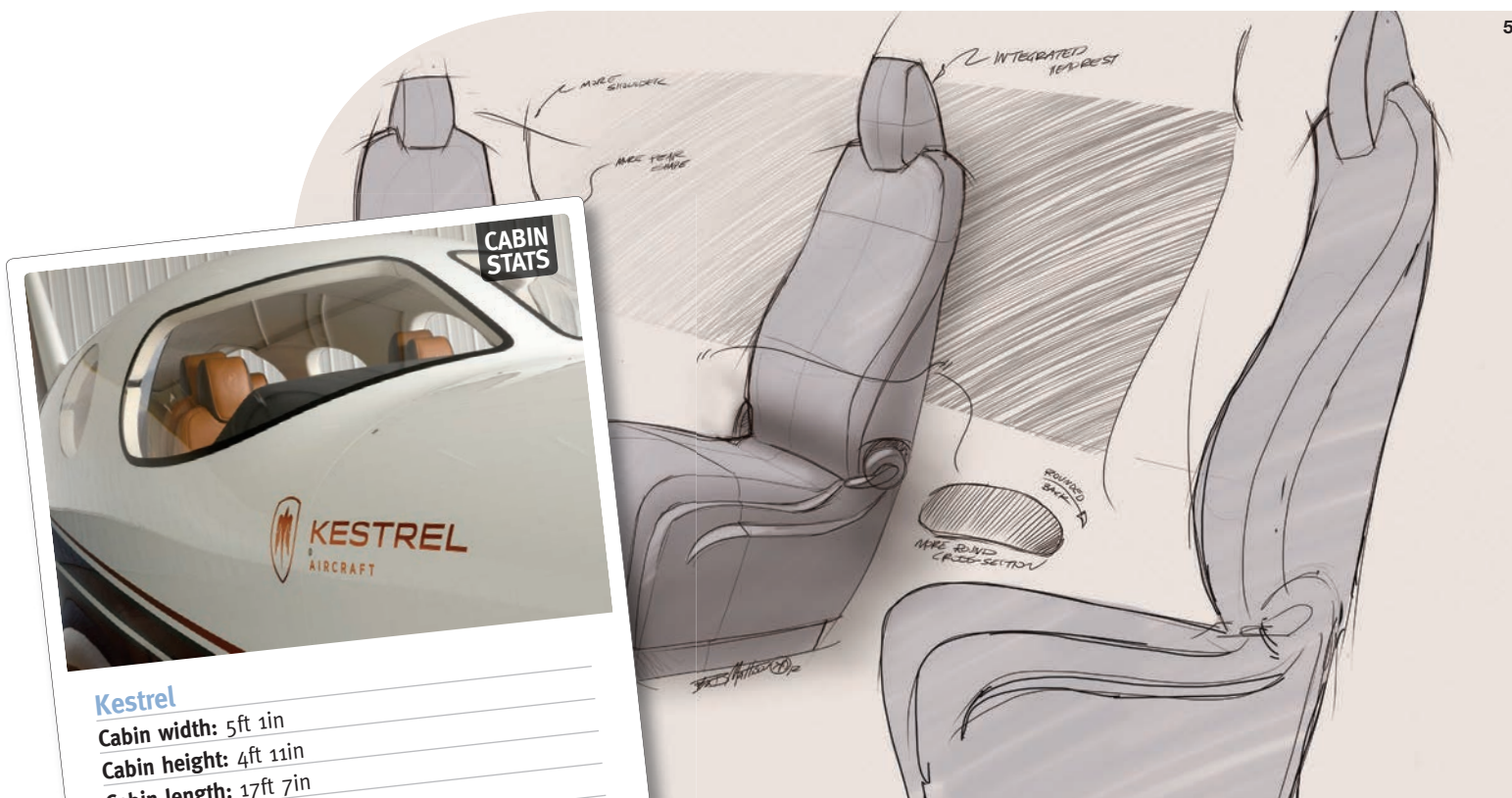
Production facilities open in Maine; cabin mock-up displayed; Honeywell TPE331-14GR turbine chosen

**2012**

Production facilities open in Wisconsin; another mock-up displayed

**2014**

First flight of the revised prototype?



### Kestrel

**Cabin width:** 5ft 1in

**Cabin height:** 4ft 11in

**Cabin length:** 17ft 7in

**Seats:** 1 crew + 6 + 1 passengers

**Range:** 1,300 nautical miles (at 31,000ft and maximum cruise power with six on board and NBAA IFR reserves)

**High-speed cruise:** 320kts

**Max altitude:** 31,000ft

**Price:** Around US\$3m (£1.87m)

## THINGS SUCH AS WINDOW PLACEMENT ARE FROZEN, AND THE SEAT PLACEMENT IS ABOUT 80% DONE

displays. Notably absent is the radio and flight management system stack typically wedged between the pilot seats, which often forces awkward manoeuvres on the way to strapping in.

**Small wonders** The cabin is full of lovely small touches such as high-end stitching on the seats; a split sidewall that serves as a natural light catcher; and materials such as exotic African woods, Alcantara and upper-echelon leathers. “We used really high-end materials throughout the cabin,” emphasises Mattison. “I really dislike fake materials. We spent a lot of time working on how exactly these different cabin surfaces influence each other in a way that is pleasing to the eye.”

Other developments are more engineered. The wiring and ventilation ducts were kept out of the ceiling to create more headroom for passengers. The environmental control system will

5. Development sketches for the seats

be dual-zone. The CMS will be able to interface with the latest personal electronics – although a firm decision on that is some years away, given the pace of technological change.

The first revised prototype is unlikely to fly until 2014, according to Steve Serfling, the company's executive vice president of engineering. “We just started the detail design,” says Serfling. “In these early stages it is all about aesthetics. Certain things such as the window placement are frozen, and the seat placement is about 80% done. We are also focusing on taking weight out of the aircraft through material selection and construction methods.”

**Statement piece** Serfling says the mock-up will continue to evolve in the coming months with the addition of functional features such as reclining seats, deployable sidewall tables and iPod docking stations. “Generally, what

you see in the mock-up is our intent,” he says. “I’m pretty proud of what the team has done.”

Klapmeier believes aircraft such as the Kestrel will naturally expand the market for turboprop singles. “Right products grow markets,” he says. “We expect the single-engine turboprop segment will grow because of our aircraft and its utility and elegance. People who would have never thought about buying this category of aircraft will look at it again.”

So can the Kestrel do for turboprops what Cirrus did for piston singles in terms of raising the bar across an entire market segment? Can Klapmeier catch lightning in a bottle twice? Of course, only time will tell, but if the latest mock-up is an indicator, there is a really good chance. **END**

**Web** [www.kestrel.aero](http://www.kestrel.aero)

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Duncan Aviation has also rolled out mobile apps for its parts search, its emergency aircraft services and its myDuncan online project management system, which streamlines communication about complex aircraft projects and helps to ensure on-time project completions.

As always, Duncan Aviation looks for inventive and inspiring ways to provide customers with their perfect aircraft, from exterior paint to interior refurbishment and modifications. Find out for yourself the quality a Duncan Aviation project can provide and see why Duncan Aviation provides an experience unlike any other.

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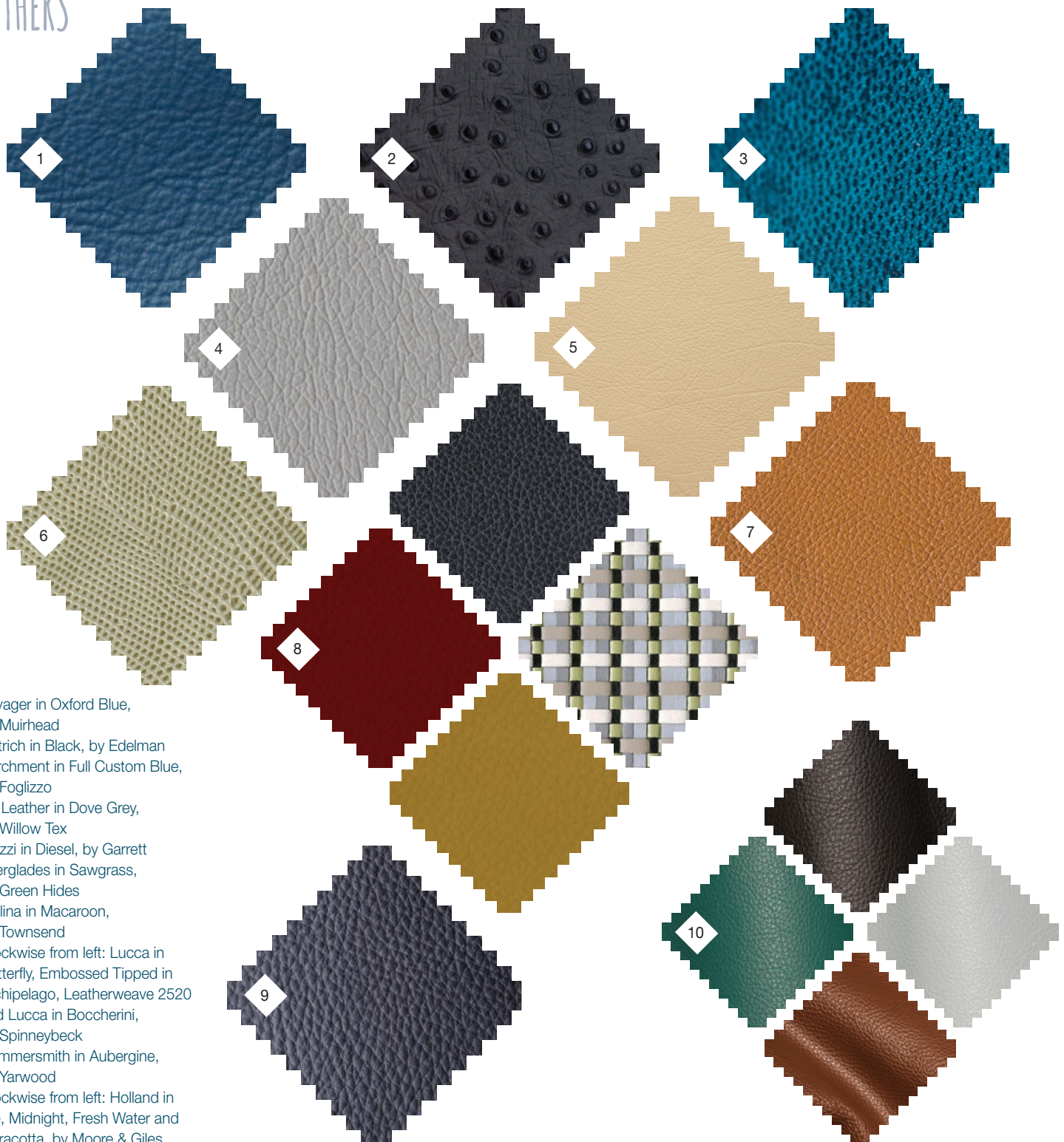
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# tasting menu

Pick and mix all the leathers, faux leathers, textiles and carpets you need,  
from the latest aircraft interior collections

## LEATHERS



1. Voyager in Oxford Blue,  
by Muirhead
2. Ostrich in Black, by Edelman
3. Parchment in Full Custom Blue,  
by Foglizzo
4. Izit Leather in Dove Grey,  
by Willow Tex
5. Mazzi in Diesel, by Garrett
6. Everglades in Sawgrass,  
by Green Hides
7. Bellina in Macaroon,  
by Townsend
8. Clockwise from left: Lucca in  
Butterfly, Embossed Tipped in  
Archipelago, Leatherweave 2520  
and Lucca in Boccherini,  
by Spinneybeck
9. Hammersmith in Aubergine,  
by Yarwood
10. Clockwise from left: Holland in  
Isle, Midnight, Fresh Water and  
Terracotta, by Moore & Giles

## CARPETS AND TEXTILES



1. Arlanda carpet in Bordeaux, by Tisca Tiara
2. Arlanda carpet in Hazel, by Tisca Tiara
3. Marquis textile in Pumpkin Cream, by Perrone
4. Arlanda carpet in Aubergine, by Tisca Tiara
5. Brussels textile in Straw, by Tapis
6. 2013 Conceptual Forecast carpet, by Lantal
7. Vestige carpet in Ransik pattern, by Scott Group Custom Carpets
8. Vestige carpet in Mirador pattern, by Scott Group Custom Carpets



## WHAT CUSTOMERS WANT

### Debi Cunningham,

interior design director at West Star Aviation, helps clients specify their aircraft interiors. What has she found they want and need from their textiles?

We have been in a cycle of creams, tans and beiges for the last few years, and it doesn't look like that will change any time soon. Earth tones are always popular and always will be.

It seems that customers are going back to incorporating their company colours into the aircraft more and more – whether that be for an accent or a focal point.

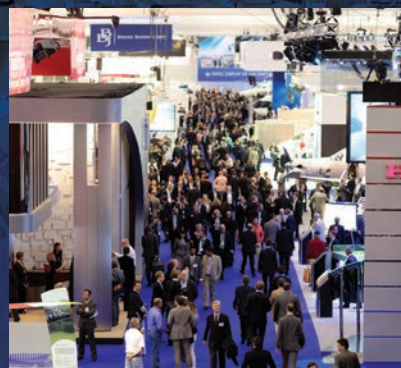
For a family-oriented aircraft, I tend to recommend a lot of soft fabrics and warm colours. For a corporate aircraft, textiles need to be easy to clean and maintain, in a different way than for a family.

I always try to ensure the materials used are as eco-friendly and maintenance-friendly as possible. Plus, I avoid showing customers anything that wouldn't pass the aircraft fire-blocking requirements.

Customers are open to ideas, especially if they initially want to put something in the aircraft that we know may be outdated within a year or so.

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## EBACE 2013

The niceview moving map integrated in a screen from the nice range



Running on 21-23 May, EBACE 2013 is expected to fill Geneva's Palexpo with nearly 500 exhibitors, plus more than 60 aircraft on the static display next door. In this preview, a selection of exhibitors reveal the products and services they will showcase at the event

# 3

### SPECIAL EVENTS

(which may require separate registration fees) will be held at EBACE 2013 – the International Aircraft Transaction Conference; the EBACE Safety Workshop; and the EBACE Cabin Crew Symposium

## NICE WORK

A highlight on Lufthansa Technik's booth will be its HD CMS/IFE solution, nice, and the Niceview 3D moving map (pictured above). The nice system distributes HD video to 7in or 10in pop-up HD displays at each seat and features USB, Apple and HDMI interfaces. It has also been developed for the legal streaming of HD content with integrated digital rights management and Hollywood-approved encryption.

Also on display will be Nicemood, a system developed with Schott that controls cabin light distribution. Nicemood consists of Schott's HelioJetTCS, a four-colour LED element, a steering unit (smartphone or touchscreen), a wireless access point and an interface unit.

Further exhibits include Guideline non-electrical floorpath-marking system, which offers a weight reduction of 35% compared with the current generation and is also available in a coloured curved version.



## Full stream ahead

The Skybox solution from Rockwell Collins will make its EBACE debut. Skybox is designed to stream Hollywood-protected content wirelessly and securely on demand. It features 1TB storage for

HD movies, music and images, and the ability to display content on up to 10 iOS devices (such as iPads, iPhones and iPods).

Other products on display will include the Venue HD CMS and IFE system, which is now flying on nearly 200 aircraft, ranging from turboprops to large VIP jets; and the Airshow 3D moving map.



## Boosted bandwidth

A recently augmented satellite network will be the focus on ViaSat's stand. In January 2013 the company announced four new contracts that increase the

Ku-band capacity of its global mobility network by more than 60%. This investment in additional bandwidth is reserved for government and general aviation business growth and customer requirements for high data rates for mobile satellite communications.



## Soft spot

Tisca Tiara will showcase its all-inclusive services by displaying a selection from every product category it manufactures: hand-tufted and hand-woven carpets; embroidered carpets; pass-machine tufted carpets; machine-woven and tufted carpets; upholstery; curtain fabrics; and decorative fabrics. Steam-pleated,

ready-to-install curtains will also be on display.

The company manufactures its carpets and fabrics exactly according to customers' designs and other requirements. In addition, it maintains a huge stock programme – all sorts of carpets, upholsteries and curtain fabrics are available with no minimum order quantity and ready for immediate shipment.

Founded in 1940, the Swiss company manufactures carpets and fabrics for the entire business jet interior, all under one roof.



## Cutting edge

The focal point of Garrett Leather's booth will be its new automated cut-to-pattern programme. It means the company can provide custom pre-cut patterns, and deliver the leather in clearly labelled

packages to customers' exact specifications. Garrett says further benefits include maximised cutting yields; precise results; improved efficiency and inventory management; condensed packaging; and simple ordering. The cutting machine uses a cutting wheel, hole punch, notch tool and drag knife. Every cut piece is inspected to ensure it meets the specifications and Garrett's quality standards.



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## FULL PELT

Foglizzo Leather will present all its new First Class non-flammable leathers – including bovine, crocodile, python, embossed galuchat, sole and parchment varieties. The company says that these are all treated to comply with the main international fireproof standards (UNI 8456/FAR 'a', FAR 'b'; Jar 25853; UNI VF 9175; IMO 653; DIN 5510; BS 6853; etc). First Class bovine leather is fully customisable. The client can select a hide, then choose any colour (or combination of two

colours), effect (antique, shine or matt), embossing pattern (from a selection of 500) and finish with oil-repelling and hydro-repelling treatments. In fact, all the First Class leathers are customisable by Pantone code. Meanwhile, the company says its parchment product offers an evanescent texture and subtle chromatic distinctions while complying with the FAR 'a' 60-second vertical test.

Foglizzo will also display a new VIP kit comprising bespoke leather goods made in Italy.



## European growth

Flying Colours Corp reports it has seen increased business from European aircraft owners since EBACE 2012. With its US subsidiary JetCorp Technical

Services, Flying Colours Corp will use the 2013 event to showcase completion, refurbishment and maintenance expertise built over three decades. Flying Colours Corp will also present its Bombardier Authorized Service Facilities (ASF) status, having gained the approval in October 2012.

Also highlighted on the stand will be stone flooring, galley and bathroom surface products from List, which Flying Colours Corp continues to supply and install.

## Artist's model

A 1/20<sup>th</sup>-scale BBJ 747-8 model will be on display at Greenpoint Technologies' stand. The model features the Aerolift and Aeroloft products, as well as a master suite, lounge areas, dining room and an office.

"The interior celebrates the irresistible dynamics of the power of flight with the artistry of timeless design," says Julie Myers, Greenpoint's lead designer. "Artful and functional, the interior expresses the complexities of the 21<sup>st</sup> century balanced with the legacy of travel."

VIP cabinetry manufacturer Odyssey Aerospace Components will co-exhibit on Greenpoint's stand. The companies are currently working on a BBJ 747-8 completion, as well as other interior programmes.



# 491

exhibitors  
participated at  
EBACE 2012



**Q&A:**  
**Matthew Woollaston**  
head of commercial –  
VIP aircraft, Altitude

## What will you be showcasing on your stand?

This will be our fifth year exhibiting at EBACE. We will showcase our BBJ 737 and BBJ 787 completion, maintenance and refurbishment capabilities.

## What will you be looking for at the show?

The team attending the show will also be using this event to research some of the latest materials, technologies and components offered by other exhibitors.

## What VIP completion projects are you working on at the moment?

We are well under way with our first green BBJ completion, which is scheduled for redelivery in the third quarter of 2013.

## Is Europe an important market for you?

As a market for Altitude, Europe is continuing to grow in importance. In recent months Altitude has been having discussions with several Europe-based BBJ owners to undertake activity for them from our location in New Zealand. European owners are able to benefit from both the excellent labour rates in New Zealand and a selection of VIP-quality vendors usually accustomed to servicing the luxury yachting industry that New Zealand is renowned for.



An ACJ320 project by  
Fokker Services

## CREATIVE COMPLETIONS

Fokker Services will showcase its VVIP completion and refurbishment services. Creative solutions on past projects include the installation of a direct view camera system and the inclusion of an AVOD rack in the cargo hold, designed to enable the use of commercially available IFE equipment. The company also has STC approval to fit out VIP aircraft for dual (private and commercial) use, with a combination of pocket doors and curtains for privacy. Other successes include a recently gained FAA STC that enables the use of cooking tops in the VIP pantry; and the completion of an ACJ320 with a lavish interior for 28 (smoking) VVIP passengers. The company reports that this aircraft has proved very successful in the VVIP charter business – used by heads of state.



**Q&A:**  
Howard Guy,  
CEO of Design Q

# 12,638

people from 99 countries  
attended EBACE 2012

### What do you have planned for the show?

We do not have a stand at the show, but we will be revealing some new and exciting products. We will also be looking for people and companies to help with new design development and manufacturing.

### What new materials, technologies or components have caught your eye recently?

There are some interesting new plastics, as the suppliers try ever harder to have materials that deliver all the certification requirements and also look good. There is a massive surge in carbon fibre development and more recently we have found a process using traditional metals other than aluminium that seriously challenges the idea that aluminium is the lightest and strongest for certain applications. We have found a process from the automotive industry that manipulates stainless steel and produces parts that are significantly stronger, but a fraction of the weight of the usual rivals.

### What projects are you working on?

We have several interesting programmes under development and all of them feature new inventions and technology. Two will be shown at EBACE and past projects will also be visible at the show. We are opening a new facility in the Midlands, UK, that is focused on new technology and low-volume production for customers requiring special design features and products. We continue to work for Pitch Aircraft Seating, which is funding some of this research, but other projects are now also resident in this facility.



## Window shopping

Lou Martin & Associates will present a wide variety of pleated shade systems – including manually operated single and

dual shades; electrically operated shades with mechanical override systems; roman shades; wood blind shades; and large bulkhead room divider shades.

The company's newest innovation is the E-3 window shade system that combines a pleated shade with an electrochromatic outer lens. Lou Martin controls all of the composite manufacturing for the product and says the delivery times are exceptional.

The company's design engineers will also custom-design speciality shades, for example to make bulkhead shades that offer selective privacy for an individual compartment.



## Hide and seek

Bellina (pictured) a full-grain leather reminiscent of shrunken cowhide, will be launched by Townsend Leather at the event. One-of-a-kind handcrafted hides from a new series called Abstract Art will

also be on display. The Striations look, in particular, has already received a lot of interest pre-market. Townsend will also give demonstrations of its sample webstore.

In addition, finished-leather cleaning wipes from The Leather Institute are available again after being off the market for several months while improvements were made. The wipes are now packaged with 10 wipes per pouch, instead of eight.

Visitors to the stand can also learn about Studio Vizto, an upholstery shop in Orlando, Florida, USA, that recently opened up to VIP and corporate aircraft accounts. The team has more than 30 years of experience in head-of-state completions.

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## about

The Transportation Weight Loss Diet Conference will bring together designers, engineers, program leaders and heads of industry from the global aerospace, automotive and rail industries for a two-day conference dedicated to cutting-edge research and technologies aimed at reducing weight and decreasing carbon footprint, without compromising safety, efficiency or operational ability.

The Transportation Weight Loss Diet Conference is a two-day conference that will operate using three separate conference rooms in order to accommodate the amount of content and discussion available. Every care has been taken to avoid certain content being scheduled together, but on occasions unfortunately choices will need to be made. To avoid disappointment we will issue conference proceedings and, with the consent of the speakers, make the slides of all sessions available to all registered delegates.

## Speakers include

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

**Jacques Belley** director R&D Standardization and Innovation, Bombardier Transportation North America, CANADA

**Gulsen Oncul** senior expert, Turkish Aerospace Industries Inc., Turkey

**Jody Shaw** director, Technical Marketing and Product Development, United States Steel Corporation, USA

**Ian Donaldson** director R&D, Auburn Hills Tech Center & Materials Engineering Americas, GKN Sinter Metals, USA

**Dr James Njuguna** lecturer – Transport Lightweight Structures, Cranfield University, UK

**Prof. Santiago Hernandez** professor, University of Coruna, Spain

**Dr Alexander Kling** head of Structural Mechanics Department, DLR, Institute of Composite Structures and Adaptive Systems, Germany



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**DAY 1, WEDNESDAY JUNE 5, ROOM 1**

**Opening keynote session**

**Aerospace vs automotive – perspectives on composites needs and requirements**

*Dr Robert Yancey, senior director – Global Aerospace, Energy, and Marine, Altair, USA*

**DAY 1  
ROOM 1 – MORNING**

**Increasing composite potential:  
affordability, lifecycle and  
thermal properties**

*This session will look at the developments in composite materials to make them more useful to OEMs. Some of the limiting factors have been the cost, issues concerning lifecycle, as well as thermal properties that limit their application. session will look at developments in processing techniques aimed at reducing the cost, recycling and using recycled composites, and increases in thermal resistance that enable them to be used in new applications.*

**The development of processing  
techniques for affordable carbon  
composite materials**

*Prof. Nicholas Warrior, head of Polymer Composites Research Group, University of Nottingham, UK*

**Cradle-to-cradle use of carbon fiber**  
*James Stike, president and CEO, MIT LLC, USA*

**Thermo-impact resistance of PA66  
composites for automotive structural  
application**

*Ian Butterworth, researcher, Automotive Polymer Composites, Cranfield University, UK*

**Competitive lightweight structures with  
increased thermal stability**

*Patrick Weichand, researcher Fiber-Reinforced Materials, Institute for Manufacturing Technologies of Ceramic Components and Composites, University of Stuttgart, Germany*

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**DAY 1  
ROOM 1 – AFTERNOON**

**Designing and creating  
composite structures**

*This session will investigate developments in optimizing composite structures using examples from aerospace and motorsport to demonstrate how composite structures can be improved and the potential the composite structure has for weight reduction by incorporating electrical conduction into the structure.*

**Weight reduction by optimized  
reinforcement structures**

*Fredrik Ohlsson, product development director, Oxeon AB, Sweden*

**Effect of fiber treatments on mechanical  
properties of flax/tannin composites**

*Dr James Njuguna, lecturer – Transport Lightweight Structures, Cranfield University, UK*

**Composite honeycombs for weight  
savings in aerospace and ground  
transportation**

*Mikhail Levit, global technical leader, Aerospace and Mass Transportation, DuPont Protection Technologies, USA*

**Low-density thermoset composites for  
transportation**

*Vincent Banton, Thermoset Development Technical Support, IDI Composites Europe, France*

**The relative value of weight: how much  
is a kilogram reduction actually worth?**

**Panel**

- *Ingo Wuggetzer, vice president, Cabin Innovation and Design, Airbus Operations GmbH, Germany*
- *Jacques Belley, director R&D, Standardization and Innovation, Bombardier Transportation North America, Canada*
- *Nicolas Meilhan, senior consultant, Frost & Sullivan, France*

**DAY 1  
ROOM 2 – MORNING**

**Challenges in aerospace  
mass reduction**

*The highest value gain for mass reduction has been in aerospace. Unsurprisingly this sector has been where most investment and innovation in mass reduction has occurred. Challenges still remain, and this session looks at some of them.*

**Cabin Concept 2050 based on a bionic  
structure**

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

**Advanced methodologies for weight  
minimization of aircraft structures**

*Prof. Santiago Hernandez, professor, University of Coruna, Spain*

**Design solutions to reduce weight  
during assembly operations**

*Gulsen Oncul, senior expert, Turkish Aerospace Industries Inc., Turkey*

**Validation approach for robust primary  
thin-walled CFRP structures**

*Dr Alexander Kling, head of Structural Mechanics Department, DLR, Institute of Composite Structures and Adaptive Systems, Germany*

**DAY 1  
ROOM 2 – AFTERNOON**

**Lightweight electric vehicle  
design and materials**

*This session will look at the challenges of designing and building actual modern lightweight electric vehicles.*

**BMW i3: a battery electric vehicle from  
the beginning**

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

# transportation weight loss diet conference 2013

## Strategies of global OEMs to reduce future car weight

*Nicolas Meilhan, senior consultant, Frost & Sullivan, France*

## Advanced light architectures specifically designed for electric vehicles

*Javier Romo, project manager, Cidaut Foundation, Spain*

## Automotive solar applications changing the rules in car design

*Norman Starke, CEO, Proof Technologies, Germany*

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

*Mogens Løkke, CEO, ECOMove ApS, Denmark*

## DAY 1 ROOM 3 – MORNING

### Optimizing manufacturing processes

*This session will look at the process developments needed for mass reduction to be a key driver in the design and manufacturing process of volume production vehicles.*

## Automated multidisciplinary optimization (MDO) process development for vehicle weight reduction

*Giri Nammalwar, head of Global CAE Strategy Planning, Ford Motor Company, USA*

## A multidisciplinary stochastic optimization (MDSO) approach to reduce vehicle weight and meet performance targets

*Dr Simon Xu, engineering group manager for Vehicle Optimization, General Motors, USA*

## High pressure meets lightweight

*Jens Winiarz, product manager Lightweight, Hennecke GmbH, Germany*

## DAY 1 ROOM 3 – AFTERNOON

### Growing lighter: how to benefit from additive manufacturing techniques

*Additive manufacturing enables a parts manufacturer to 'grow' high-value, custom-designed parts layer by layer – enabling the manufacture of complex shapes from a wide range of materials without the need for new tools or machinery. Even using extremely lightweight materials, additional mass reduction can be achieved by minimizing the use of those materials. This is an exciting technology for mass reduction and this session will look at case studies to demonstrate its value.*

## Additive manufacturing technologies for producing innovative lightweight structured components

*Dr Stéphane Abed, CEO, Poly-Shape 3D Generative Manufacturing, France*

## Lightweight design and laser additive manufacturing: exploiting new potentials

*Jannis Kranz, researcher, Lightweight Design for Laser Additive Manufacturing, Technical University Hamburg-Harburg, Germany*

## Lightweight fiber- and particle-reinforced Al-metal matrix composite structures

*Richard Adams, CTO & senior vice president, CPS Technologies Corporation, USA*

## Powder metallurgy delivers weight savings in automotive powertrain applications

*Ian Donaldson, director R&D Auburn Hills Tech Centre & Materials Engineering Americas, GKN Sinter Metals, USA*

## DAY 2 – THURSDAY JUNE 6 ROOM 1 – MORNING

### Will steel still be relevant? Futuresteelvehicle – special presentation

## FutureSteelVehicle: innovative development and mass-reduction strategies

*Akbar Farahani, vice president, Engineering, ETA Inc, USA; Jody Shaw, director, Technical Marketing and Product Development, United States Steel Corporation, USA*

### Mixed material design challenges

*This session will look at the practical experience of integrating different materials into the design of a vehicle in order to fully exploit and optimize the mass reduction potential of each material.*

## Daimler hybrid transmission: making it better through weight optimization

*Gaurav Kumar, senior lead engineer, MBRDI, India*

## Lightening the way ahead

*Phil Hall, managing director, Caterham Composites, Germany*

## Achieving 40% BIW mass reduction through mixed material design

*Peter Morgan, senior product manager - Lightweight Vehicles, Lotus Engineering, UK*

## DAY 2 ROOM 1 – AFTERNOON

### Innovations for lighter interiors

## Silicone foam allowing weight reduction through thinner cushion

*Tom Winters, market development manager Mass Transit High Performance Foams, Rogers Corporation, USA*

## Big windows, light weight

*Phillip Bell, product line manager, Corning Incorporated, USA*

## Low-weight, low-energy infotainment

*Ashutosh Tomar, senior research engineer, Jaguar Land Rover, UK*

## Suspension fabrics – a new era in seating

*Jeffrey Gross, director of product development, The Acme Group, USA*



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**Intelligent design: lighter materials are a requirement but not all that is necessary**

This session will consider some of the more philosophical issues concerning the lightweighting of vehicles. As well as the question of whether the change is best achieved incrementally or through a complete paradigm shift, it will also focus on the need for designers to think less about using lighter materials merely to replace vehicle structures and components and more toward appreciating the potential of new materials to completely change the way vehicles are designed and assembled.

**Automotive body-in-white mass reduction philosophy**

**Dr Donald Baskin, senior associate, Exponent, USA**

**Lightweight – the paradigm shift**

**Sébastien Stassin, managing partner, Kiska GmbH, Austria**

**Composite structure is not making a black sheet metal structure**

**Andrew Rich, president, Element 6 Consulting, USA**

**Truck of the future – evolve or leap?**

**Jörn Buss, partner, Oliver Wyman, USA**

**DAY 2  
ROOM 2 – MORNING**

**Innovative uses of composite materials**

This session will look at innovations in the uses of composite materials for major reductions in mass, for example to replace heavy components such as engines, springs and bearings.

**PM2 engine concept – a composite innovation**

**Hendrik De Keyser, technology officer, Vyncolit NV, Belgium**

**Weight-loss potential of composite spring elements**

**Richard Zemann, head, Fiber-Reinforced Polymers Activities, TU Vienna, Austria**

**Using plastic bearings in automotive applications**

**Mark Watkins, automotive plastic bearing development manager, BNL (UK) Limited, UK**

**GFC leaf-spring: approved technology in a new form of appearance**

**Dr Anna Schwarz, general manager, Danto Invention, Germany**

**Conductive connection of carbon structures for failure detection safety and repair**

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

**DAY 2  
ROOM 2 – AFTERNOON**

**Advances in bonding/ joining technology**

The use of new materials in lightweight vehicles requires a revision of bonding and joining techniques for efficient and cost-effective vehicle assembly as well as consideration for aftermarket repair. This session will look at advances in bonding and joining materials and techniques.

**Adhesives for composite assembly**

**Terry Gordon, epoxy development chemist, Permabond, UK**

**Durability testing for adhesive joints in the vehicle industry**

**Dr Isabel Van de Weyenberg, research engineer, Flanders' Drive, Belgium**

**Shedding weight while ensuring maintainability and recyclability with threaded fasteners**

**Michael Mowins, president, Global Licensing, Phillips Screw Company, USA**

**Sustainable laser surface cleaning for joining preparation in lightweight production**

**Edwin Buechter, CEO/president, Clean-Lasersysteme GmbH, Germany**

**Coating and painting developments for composites**

This session will look at developments in the techniques and materials that will enable composite vehicles to be coated and painted effectively and affordably, making their use by OEMs easier to integrate.

**Lightweight fiberglass composites for automotive**

**Robert Langlois, CEO, Powder Coating Solutions, Canada**

**SMC composite material for automotive on-line painted body panels**

**Guillaume Cledat, key market developer, CCP Composites, France**

**DAY 2  
ROOM 3 – MORNING**

**Advances in lightweight metals**

**Heat treatment of light alloy structural castings for automotive applications**

**Dr Dan Dragulin, head of R&D, Belte AG, Germany**

**Weight savings with castings in iron, aluminum and magnesium**

**Klaus Decking, product segment manager Lightweight, Georg Fischer Automotive AG, Switzerland**

**Stable inlay aluminum tubes for HPDC and other casting processes**

**Frank Heppes, head of Research & Development, Drahtzug Stein Combicore GmbH & Co. KG, Germany**

**Replace die-cast in control modules for dramatic weight savings**

**Randall Wilburn, global manager Automotive Sector, Molex Inc, USA**

**DAY 2  
ROOM 3 – AFTERNOON**

**Advances in lightweight metals 2**

**A new stainless-steel material for weight reduction**

**Quaranta Lorenzo, development manager, Sandvik AB, France**

**New material concept for weight reduction**

**Armin Schneider, product applications manager, Carpenter Technologies GmbH, Germany**

**Enabling lightweight high-load bearings**

**Sarah Banfield, research manager, Tecvac Ltd, UK**

**Titanium extrusion, fatigue and fracture behavior**

**Gail Hite, market development director, RTI International Metals Inc, USA**

**Magnesium/MnE21 lightweight solutions: the eco-friendly solution of the future?**

**Dr Stephen Rudzewski, head of Technics and Innovation, Semcon Holding GmbH & Co. KG, Germany**

**Q&A**

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Stemming from a major MRO means completion centre Aeria can offer complete maintenance services at the same time as cabin refurbishment



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# life-long ambition

Whatever the aircraft type, Hiller prides itself on providing excellent craftsmanship that will last for years

1. Hiller makes a huge range of monuments
2. A vanity unit for the Bombardier Learjet 45XR
3. The Bombardier Learjet 60XR interior



In a recent issue of *Vanity Fair*, author Michael Lewis interviewed President Barack Obama on board Air Force One. Beside the article, a picture shows the two seated in the executive office. "The desk and corner table featured in that picture were manufactured by Hiller, along with the majority of furniture on Air Force One," says Marc Hiller, vice president at the company. "After four presidents and more than 20 years, the furniture has stood the test of time. It is examples like this that make us very proud."

Today in its 41<sup>st</sup> year, Hiller, based in Wichita, Kansas, continues to design, manufacture and certify interiors for aircraft ranging from the single-engine Pilatus PC-12 to mid-size Learjets, Challengers and head-of-state wide-bodies.

The company was founded by Horst Hiller, whose vision was to blend European craftsmanship with US technology. "One of the first in the industry to use CAD and build furniture from composite materials, the company has always looked for ways to make interiors lighter, stronger and more durable, while not sacrificing the elegant refined details required," says vice president Hiller. "Every pound shaved leads to cost savings in fuel and maintenance, as well as extending the life of the aircraft."

One example of this approach was when Hiller generated a 14 lb saving in the Learjet 60XR interior by using a new syntactic. "Hiller's

expertise in the field helped make the Learjet Models 45 and 60 very successful, providing the quality and service expected from the Bombardier family," says Hiller. "More than 700 shipsets have been delivered to Learjet alone." The company has also supplied components for Beechcraft, Cessna, Dassault, Pilatus and other platforms, totalling thousands of interiors.

Hiller believes the company's in-house manufacturing ability is key to the company's success, because it results in a streamlined production flow. "A reputation for being on time is not taken lightly internally, and a continued focus on that is important," he says.

Part of the process involves working with design teams and end customers to select veneers, leathers, plating and other finishes. In this role Hiller has noticed certain trends. "It's nice to see designers and customers selecting different types of colour schemes," he reflects. "Reconstituted dyed veneers are very popular now, and we are seeing more modern styles with black veneers and white contrasts. The industry has come a long way from offering just a choice of browns. Matt finishes have become more popular as well."

Hiller also reports that many OEMs now expect suppliers to be integrators, supplying aircraft management systems, peripherals and other components in one package. "It's not just about supplying monuments, but any items that are required to complete an interior," he says. "It's all part of being flexible, helping customers meet the schedule and doing whatever it takes to support them."

Whether it is a special-mission aircraft for the military or standard monuments for OEMs, the company takes the same approach – attention to detail. "Owners and operators of aircraft with our interiors can attest, they truly stand the test of time," says Hiller.

Hiller

Reader Enquiry No. 501

# familytree

From its Dornier 328 roots, the family of companies that make up the 328 Group has branched out to offer bespoke interiors for a variety of aircraft – large or small, retrofit or green

During the past eight years of building interiors for Dornier 328 aircraft, the 328 Group has quietly been building up its VIP capabilities, and amassing a list of Part 145 maintenance approvals. It can now design, build, install, test and certify interiors on aircraft ranging from the Hawker 125 series through Bombardier Challengers and Dassault Falcons up to larger types such as the ACJ320 and BBJ 737.

With specialist support from 328 Design – an EASA Level One design organisation with STC privileges – and its production organisation, 328 Support Services (328SSG), the 328 Group has positioned itself as a one-stop shop offering quality made in Germany. 328 Design and 328SSG are based at Munich Executive Airport in Oberpfaffenhofen.

The 328 Group's interior designers work with customers to capture their style preferences, using materials that are all tested and certified. The group also offers upgrade options for IFE, electronic flight bags and satcom systems with various antennas to suit all aircraft; as well as special mission services and full STC certification for all its modifications.

As well as full conversions, the group supplies major sub-assemblies to larger completion centres, especially for very large aircraft. It also says some clients enquire about green aircraft. However, a lot of its business involves the complete or partial transformation of in-service business jets. IFE modernisation is a

common request. The group can retrofit not only Dornier jets, but also ACJs, BBJs, Bombardier CRJs, Gulfstream models and even Agusta helicopters. "If an aircraft is too large for our hangar we can design and build the interior here in Germany and fit it at the client's base," says Ray Mosses, director of sales at 328SSG. "This suits many clients who want more flexibility and do not want to fly to the completion centre for every minor change. Indeed, after our article in *Business Jet Interiors International's* April 2012 issue we received interest in our 16g seat certification service, as 16g is now a standard requirement for some aviation authorities."

All of the 328 Group's VIP conversions have 16g furniture fitted as standard. The 16g VIP seats are dynamically tested to meet head injury criteria. "Indeed the 328 Group did away many years ago with the dog boxes supposed to assist a 9g seat meet the head injury regulations," says Mosses. "This makes for a more spacious and uncluttered interior, with the added bonus of a weight saving."

Most recently, the 328 Group expanded with the purchase of an FBO and MRO facility at Biggin Hill Airport, 12 miles from central London in the UK. JETS Biggin Hill joins JETS Bournemouth, enabling the group to offer scheduled maintenance on more aircraft types. The sister companies will have a shared stand at EBACE 2013.

328 Group

Reader Enquiry No. 502



1. 328SSG's capabilities include upholstery
- 2-3. A recent project – the manufacture of a galley
4. A Dornier 328 interior





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# rest assured

When designing its wide range of seats, AST aims for quality, comfort, style and a plethora of passenger-pleasing features

From its base in San Gabriel, California, Aero Seating Technologies (AST) provides 9g and 16g executive aircraft seating solutions for a wide range of customers worldwide. The company is committed to providing high-quality products designed for maximum ergonomic comfort, lightweight construction and luxurious VIP aesthetics, in addition to integrating innovative features.

For example, the company's next-generation 16g-certified Master Class seat is loaded with features designed to ensure ultimate seating comfort, including vertical adjustment for 3in of vertical recline. Fore, aft and lateral translation – including 360° swivel and full-flat berthing (with drop-down armrests) – is provided as standard on all AST's 9g and 16g Master Class seats. Other 16g seats include a power-assist feature for track and swivel, mechanical vertical lift and floor tracking. Interactive massage, electric lumbar support systems and leg rests are also available as options.

Meanwhile, the Serenity seat – a fully flat, powered model available for narrow- and wide-body jets – features an audio massage feature that interacts with the aircraft's IFE. This means the massage movements correspond to audio from the movie or music the passenger is experiencing. Recent enhancements also increased the system's compatibility with plug-and-play hardware.

AST also offers a 16g VIP seat for light jets, which when upholstered, weighs less than 93 lb (44kg). Standard features include fore, aft and lateral translation (9 x 5in) – including 360° swivel and full-flat berthing. Additional features include electric lumbar support and leg rests. Optional power-assist mechanical controls are also available.

With its 16g lightweight divan, AST offers a modular design. Single- and two-place sections enable customers to specify a divan in the configuration of their choice. The cushion design is also flexible, to enable various upholstery styles. Other features include a storage drawer and doors, fold-down arms and a low back designed to avoid obscuring windows.

The company's range also includes 9g Master Class VIP seats and breathable divans. Again, seats can be customised for comfort, style and ergonomics.

AST's seats can be used on narrow- and wide-body business and VIP jets. Past successes include single and double 16g Master Class seats installed on Global 5000 and 6000 aircraft, and VIP seats installed recently on a BBJ and an executive DC-8. AST seats have also been selected for CRJ-200 and CRJ-900 completions, and other VVIP aircraft.

Some of the company's newest developments include 16g VIP seats designed for forward- and aft-facing installations. AST says these offer favourable head injury criterion (HIC) values, with up to 15in between seatback and bulkhead for aft-facing installations. A 16g three-place divan is also certified to accommodate multiple interior configurations.

Current projects include customising seats for an executive/head of state's BBJ 757; two BBJ 737s belonging to a VVIP customer; and a VVIP ACJ319. There is also a collaboration with Flying Colours Corp to supply fully loaded VIP seats with massage, heat and vertical lift, plus full iPhone-integrated seat controls. AST is also developing a custom operator seat for a special-mission Global 6000.

1. A seat concept by AST



Aero Seating Technologies

Reader Enquiry No. 503

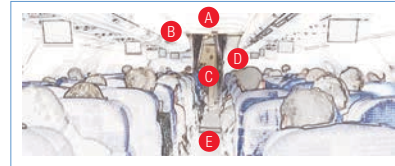
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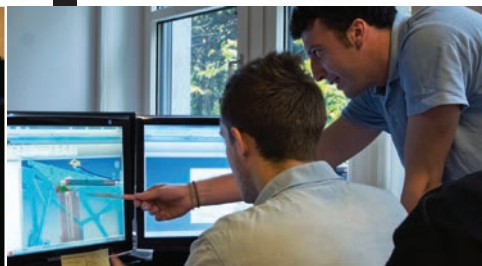
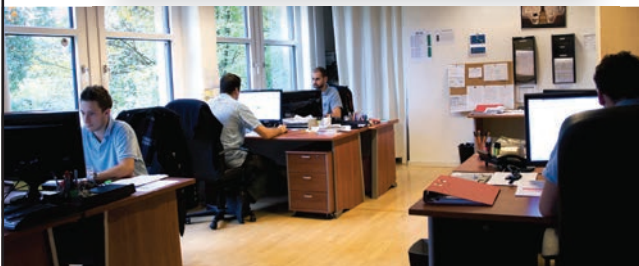
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# secondlife

Cost and downtime were minimised by Duncan Aviation on a recent Challenger refurbishment by retaining seats and refinishing the woodwork

1-3. The Challenger after its nose-to-tail transformation

Tasked with sourcing and managing the refurbishment of a jet for a recent client, Ernie Sturm, president of Aircraft Management Solutions, quickly decided he wanted to work with Duncan Aviation again. The hard part was tracking down the right aircraft – one with intercontinental range, a cabin that could comfortably carry up to 10 passengers, and a basic equipment platform that could be upgraded in line with today's navigation and communication standards.

After a three-month search, Sturm tracked down a Bombardier Challenger 601-3A for sale that met those requirements, but it needed a substantial amount of maintenance, complete interior refurbishment and new paintwork. Sturm asked an airframe team from Duncan Aviation's facility in Battle Creek, Michigan, USA, to conduct a thorough pre-purchase evaluation to determine the physical condition of the aircraft and review its records.

After the evaluation, Duncan Aviation got to work and handled everything for the Challenger in-house, the aim being to minimise the cost and transformation timeline. "We touched every inch of the aircraft," says Tracy Hein, the project manager from Duncan Aviation assigned to the project. "We did paintwork, an airframe inspection, a new interior, added wi-fi, upgraded cockpit avionics, rewired outlets, added lighting, designed custom wine racks – the company was represented from nose to tail."

While Duncan Aviation's design team loves to build new interiors, in this instance it created a plan to keep all the existing wood and simply refinish it to save time, money and be a bit more environmentally friendly. "When I suggested it, I thought I'd get some pushback, but the team embraced the concept," says Sturm.

Working with Duncan Aviation's interior design department, Sturm and his client chose new carpet, new wood and metal finishes and new counter surfaces. The Challenger traded a light-coloured wood for a much darker, high-gloss finish that transformed the cabin with a superficial swap. The team decided to keep the leather seats because they were in great shape and meshed well with the design. The paint shop retained the aircraft registration number in a rich, earthy paint scheme. Areas such as the galley/refreshment centre saw more change. "A little extra planning and research also enabled us to soundproof the aircraft for nearly half the price with the same effect," says Hein.

Although they kept some of the old, Sturm and his customer wanted the Challenger to look and feel like it had just made its first landing. "When an aircraft is owned by an individual, it ends up being a statement of their style and that often involves some customisation," says Sturm. "For example, the customer wanted a certain type of crystal in the galley. We bought it and Duncan Aviation refashioned a cabinet just to house it. Everything was one of a kind."

"At the end of the day, Duncan Aviation team members combine all their skills and efforts to please the customer. They don't produce a product that just looks the part – it delivers as well," says Hein. "A complete overhaul on a jet for private use is an extremely personal experience. It needs to be functional, fiscally reasonable and really represent the owner."

Duncan Aviation

Reader Enquiry No. 504



1



2



3

# innervisions

Design, engineering, certification and manufacturing firm EAD Aerospace works hard to bring designers' imaginings to life, however avant garde they may be

Some companies maintain that they have a 'mission'. EAD Aerospace prefers the term 'vision'. "By its very nature, a vision does not yet exist," explains Pierre Mauger, CEO of the company. "It is not even a predetermined future. It is a future yet to be invented, yet to be modelled. It is a future with fluid contours. This is what we do. We invent new contours for cabin concepts that have never been made before."

The company was created 15 years ago and evolved from offering systems engineering to the complete design, certification and completion of VIP aircraft, from selection to redelivery. Its design office in Toulouse, France, holds EASA Design Organization Approval (DOA), covering modifications and repairs for aircraft and helicopter cabins, structures and avionics. It has an office in Chicago, Illinois, offering FAA certification services. Interior kits are manufactured in Aix en Provence, France, under EASA Production Organization Approval (POA). The company also has a dedicated engineering group for retrofit projects.

"Our job description is simple," says Mauger. "Our clients give us a new or used aircraft and we give it back fully refurbished with all certificates in place, ready to fly. In the mid-term, we fabricate monuments, engineer and build electrical wire harnesses, cut and fold metal, varnish,

paint, lacquer, plate, cut and sew leather, stingray, silk, or whatever material the client might opt for."

Mauger describes his firm as a team of artistic engineers. These engineers are committed to listening to designers, and instead of telling them that their dreams are not technically feasible, work through the complications to make it happen. "We come from a highly regulated industry, where the designer's dreams are confined within a rigid envelope," says Mauger. "Our vision is to use aeronautical technologies as a back-up to the designer's vision for the decoration, instead of enslaving the decoration within technological or regulatory constraints. Knowing technology by heart, we believe that it is nothing but a tool to be devoted to designers' use, ultimately to the benefit of customers. We could talk forever about engineering details and the complexity of certification for novel designs, but let's face it – who cares?"

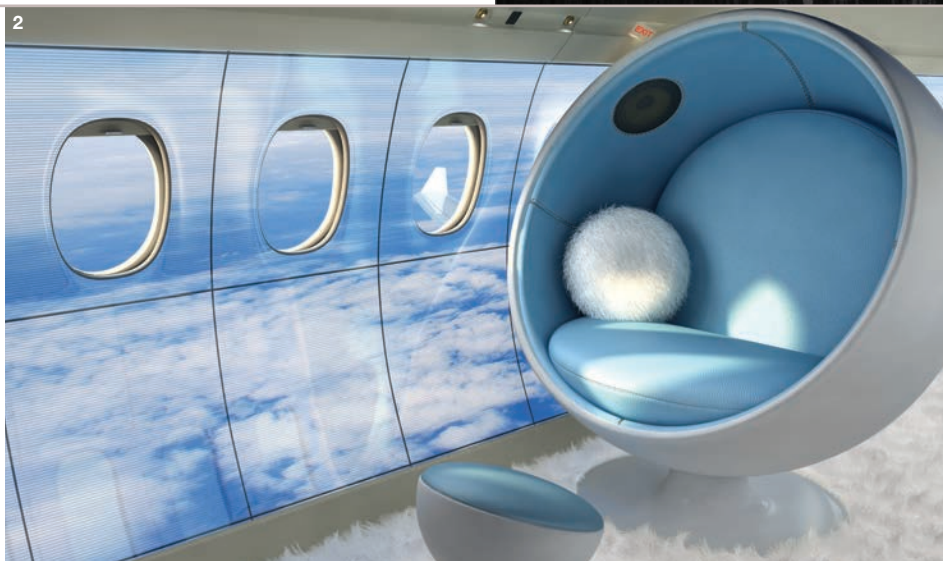
Mauger says that the most important thing is how a passenger feels in the aircraft. "That has nothing to do with technical skills and little to do with decorative skills," he adds. "Instead it is reliant on the subtle alchemy between engineering, creativity, art, taste, decoration and daring."

EAD Aerospace

Reader Enquiry No. 505



1-2. Conceptual cabin designs by EAD Aerospace





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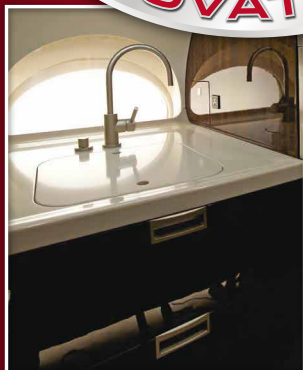


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# fullworks

Stemming from a major MRO means completion centre Aeria can offer complete maintenance services at the same time as cabin refurbishment

1. A BBJ 787 concept by Aeria  
2-3. A design for the ACJ319



At the Singapore Airshow in February 2012, Aeria Luxury Interiors (Aeria) officially launched itself as a business jet maintenance and cabin refurbishment partner. Aeria is a division of STA San Antonio, and both companies are marketed under ST Aerospace's global engineering and maintenance network.

The concept of developing a VIP completion centre from an MRO foundation was in the planning stages for many years. The company believes the combination of STA San Antonio's skilled maintenance workforce and the highly experienced management team assembled for Aeria will provide a logical place for owners of the early ACJs and BBJs to have their maintenance and interior work accomplished simultaneously. Aeria can call on a workforce of more than 1,200 experienced personnel for maintenance support.

"We felt there was an opportunity to tap into the market as the early ACJs and BBJs become eligible for their first major maintenance visits," says Chye Kiat Ang, executive vice president of ST Aerospace's Aircraft Maintenance and Modification business segment.

Aeria believes it will attract a lot of these early ACJs and BBJs because some other completion centres are focusing on green completions. "As an example, Boeing produced approximately 60 BBJs between 1999 and

2003," explains Ang. "These aircraft are all coming up for their 12-year maintenance visit. With many of the existing completion centres full of green completion work, the early BBJ customers need to find a place to have their checks done. Aeria, as part of STA San Antonio, is the perfect solution."

STA San Antonio has provided maintenance services for more than 2,100 aircraft, and is well versed in virtually every Airbus and Boeing model, handling everything from the light A check through to the heavy D check. Aeria's management team has been involved in more than 50 green aircraft completions and numerous refurbishment projects. "Needless to say, the expertise and knowledge is there to provide a tremendous one-stop facility for all heavy and light maintenance, while providing updates to the interior, be that replacing soft goods and IFE, or adding wi-fi and SwiftBroadband," says Ang.

Aeria's 9,300m<sup>2</sup> hangar is located at San Antonio International Airport in Texas, USA. Remodelled in 2012, the hangar houses all of Aeria's administration and customer offices, an upholstery shop and an avionics/electrical shop. The MRO side of the business supports sheet metal and systems work.

In July 2012, Aeria welcomed its inaugural aircraft, a BBJ, for maintenance and interior work. After a successful visit, this led to the next customer – a B767 in VIP configuration. This project involves a heavy maintenance check and a substantial interior refit. In addition to updating the IFE and replacing nearly all the soft goods, the majority of the cabinetry is being refinished. Aeria is also in discussion with other customers that have similar work scopes.

Aeria Luxury Interiors

Reader Enquiry No. 506

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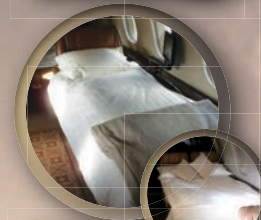
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# wellconnected



Dassault Aviation/Philippe Stroppa

What is the tipping point when something becomes mainstream? Could it be sheer numbers, when x% of the market has adopted it? Could it be psychological, when x% of potential users expect it? Or could it be when major OEMs offer it as standard?

OnAir's inflight connectivity products are available for line-fit on many commercial aircraft types. From 2014 they will also be available for line-fit on the Dassault Falcon 7X.

The Falcon 7X has been flying since 2007 and the 200<sup>th</sup> aircraft is due to be delivered in 2013, making it one of the most successful large-cabin business jets. Of course, Dassault is developing the aircraft all the time, and the introduction of inflight wi-fi and GSM is a big part of recent cabin upgrades. Two OnAir products will be in the Falcon 7X catalogue – Mobile OnAir and Internet OnAir.

Mobile OnAir enables passengers and crew to make and receive calls, text messages and emails, as well as surf the

internet using their mobile phones. It works in the same way as international roaming – users simply turn on their phones and start using it. All charges are included in the user's standard mobile phone bill, for simplicity and transparency. Meanwhile Internet OnAir creates a wi-fi network in the aircraft, providing internet access through any wi-fi enabled device, including smartphones, tablets and laptops.

OnAir's inflight connectivity is available throughout the world. "Flying no longer means being out of touch with the office, missing calls or having to play catch-up on social media when you land," comments David Bony, head of VIP, corporate and governmental aircraft at OnAir. "Very possibly, history will show right now as the tipping point for connectivity in the business jet market."

OnAir

Reader Enquiry No. 507

# climatechange

Solving the problem of low cabin humidity on corporate and head-of-state aircraft has long been the mission of CTT Systems, and the Swedish company believes the issue will only become more pressing as non-stop distances increase. On long-distance flights, CTT has found that humidity levels can drop to 3-5% – making airborne VIP suites drier than the Arizona desert.

"As natural humidity drops in the passenger cabin, flight deck and crew rest areas, so our immune system begins to lose its effect, leading to a growing loss of resistance to omnipresent germs, incipient diseases and other illnesses," says Peter Landquist, vice president of sales, marketing and customer support at CTT. "In addition, pains afflict passengers and crew, tiredness sets in and sleep patterns become disturbed. Skin becomes taught, sore throats

occur and lips crack – all occurrences taken for granted on flights that can last for 15 hours or more. Even food and drink lose their appealing taste."

CTT devised its Cair solution to boost cabin humidity to 20% or more. The system injects purified water vapour into areas of low humidity, and is designed to do so intangibly. The company's Zonal Drying System is also provided as part of the installation, to prevent condensation collecting within the aircraft fuselage.

Landquist reports that Cair has been selected by more than 50 corporate jet clients so far, and is now installed on BBJ 737, ACJ320, BBJ 777 and ACJ340 aircraft, among others. The system has also been chosen for seven of the BBJ 747-8s currently being fitted with VIP cabins by completion centres in North America and Europe.



Most recently, CTT's research and development department in Sweden began work on a miniaturised version of Cair. This is being designed for smaller corporate jets, to combat the same low humidity problems.

CTT Systems

Reader Enquiry No. 508

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# new heights



Since branching out from luxury automotive design, UK-based Design Q's business aviation commissions have included six concepts for Boeing Business Jets, the Global flight deck and support on the Learjet 85 for Bombardier, Avro Business Jet concepts for BAE Systems, and the design and build of an on-ground ACJ320 interior for The Jet Business.

All these designs are united by the company's determination to push boundaries. "The prime objective for our design team is to be different and better at very high-quality interior solutions – cabins that flow and provide logical living and working spaces, and unique features, layouts and overall impressions that wow the onlooker," explains Howard Guy, CEO of Design Q. "Our objective is to make the customer's aircraft the best and to provide the knowledge and vision that takes it to a level beyond all the competition. Our engineering personnel and negotiators work hard to provide the

customer with something that is special and impossible for others. Our only partners are companies that accept the challenge to push boundaries and enable us to create wonderfully unique aircraft interiors."

Design Q's designers pursue solutions that work within the certification and engineering parameters, but in a way that is seen as new, exciting and clever. "This is the greatest joy in the whole process and yet the most challenging, to blend efficient industrial design for manufacture with the magic of fresh new ideas, ultimately converting the onlooker from just an interested party to a committed customer," says Guy.

The company certainly has an interesting and busy 2013 lined up, with several aircraft projects now taking shape, some rebranding work, and automotive design commissions that are taking direct inspiration from the private jet industry.

**Design Q**

Reader Enquiry No. 509

# change is in the air

For Karina Bergstrøm Larsen, CEO at satellite service provider Satcom1, this is a revolutionary era for onboard satellite networks. "We are entering a phase of change in the industry that will greatly benefit people who want to use services such as the internet, email, smartphone VoIP calling and IPTV on board," she says.

Part of this revolution is down to increases in satellite network capacity. Bergstrøm Larsen points to an upcoming satellite launch by Inmarsat, which she says will provide more data capacity for the EMEA region, plus growing satellite coverage and data capacity from Ku-band providers such as ViaSat, with its Yonder service.

Within the onboard network itself, Bergstrøm Larsen says the latest generation of hardware – from a range of manufacturers – provides new features, improves network functions and reduces the number of hardware boxes needed in a cabin from between three and five to just one. "Combining

features such as satcom router functionality, CMS, IFE and IP private branch exchange – used for switching between phones and analogue and VoIP solutions – in one box is revolutionary," she says.

Satcom1 provides a number of extra customer services for these new hardware offerings. They include data aggregation, which is achieved by combining two SwiftBroadband channels, resulting in data speeds of up to 1MB/s. Bergstrøm Larsen says this solution enables users to access higher-bandwidth applications such as AvioTV by Satcom1. Another service is the acceleration of data transmission, which is achieved through AvioBoost by XipLink Technology and enables users to send and receive more data in a given time.

Other products offered by Satcom1 include a VoIP smartphone app called AvioPhone, which is designed to optimise the quality of smartphone VoIP calls in the air.



Then there is its new Flight Billing solution, which means charter operators no longer need to estimate airtime use on board but can actually charge per credit card for just the cabin network, or sell a voucher to open up the cabin network for internet, email and VoIP use. This means they only pay for their own crew's use and can still provide customers with a good satcom network experience. "It is truly an exciting time within the field of aero satcom," says Bergstrøm Larsen.

**Satcom1**

Reader Enquiry No. 510



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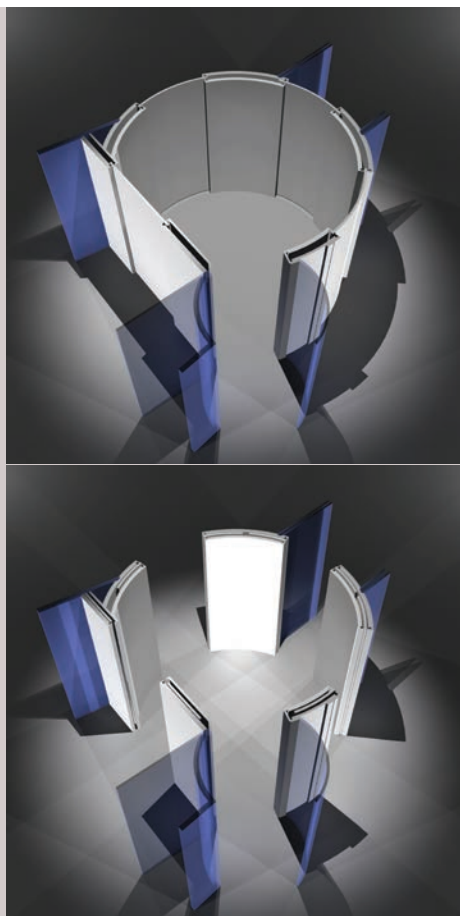
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# meet your maker



More than 30 years of expertise goes into every interior component, be it a custom or a repeated design, manufactured by Air Cabin Engineering (ACE). All the company's design, engineering, production and final assembly work is accomplished at its 2,800m<sup>2</sup> facility in Orange, California – the aim being to control the product realisation process from start to finish.

ACE's primary focus is on privately owned aircraft ranging from the ACJ319 and BBJ 737 up to the BBJ 747-8, but it also designs customised systems for NASA and military clients. ACE is an FAA-certified repair station.

During the conceptual stages of design and development, ACE works very closely with interior designers to ensure the realisation of their vision – identifying engineering issues ahead of time and defining ways to address complex requirements in the early stages of development.

ACE's standard product line consists of dual-panel and single-panel pocket doors (flat and curved); bulkhead partition systems; manual and electric hi-lo tables built to specification; divan-stowable hi-lo tables;

pull-out sideedge tables; plug-in armrest and cabinet tables; refrigerator and freezer units; cart-replacement refrigerator and freezer units; turnkey custom galley installations; and custom headliner and grid assemblies. It can also apply its design and engineering services to interior projects not covered by its standard product offering.

Recently completed programmes include two Lower Lobe refrigerator and freezer galley systems for head-of-state BBJ 747-200s; a customer-specified dual refrigerator and freezer wet-bar galley with microwaves and coffee makers; and a customised package for a head-of-state BBJ 737 consisting of a headliner, ceiling grid, galley, bulkhead, pocket doors and hi-lo tables. ACE has also designed and manufactured a fully functional BBJ 747 bulkhead rotunda using flat, dual-curved and single-curved pocket doors. The company welcomes designers and potential customers to visit its facility, where it can demonstrate this system as well as other examples of its broad product range.

**Air Cabin Engineering**

Reader Enquiry No. 511

# swiftshift

Until recently the task of updating a jet with a Blu-ray player, Apple TV or HD monitors could entail a complete retrofit of the CMS and IFE system. "With cabinetry this works out more like a full rerag – crazy until you look deeper," says Dave Garing, vice president of business development at Innovative Advantage. "On a jet maybe two, three or four years old, the current CMS may not support HD signals. To install a new CMS will require throwing everything out and replacing it with new parts – and that means a lot of cabinetry work is needed to install them."

Garing reports that customers are asking completion centres how to upgrade or refresh their CMS in a way that makes financial sense – essentially, how they can leave their switches alone and minimise cabinetry work while getting new functionality.

Innovative Advantage's AVDS nodes can be configured as an addition to or replacement for older CMS video switches. "The small footprint confers flexibility in mounting," comments Garing. Video signals



are lifted from the installed CMS and moved to the AVDS node, where they are digitised and sent to the new HD monitors. The existing CMS can control the AVDS via serial or Ethernet. All the existing audio wiring and PCUs can be left alone.

"An upgrade can be as simple as replacing an existing DVD with a Blu-ray player, replacing the bulkhead displays with HD monitors and adding an AVDS node," says Garing. "And we know the solution scales – we've implemented it in everything from a G150 to a BBJ 737."

**Innovative Advantage**

Reader Enquiry No. 512



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See [www.ctt.se](http://www.ctt.se)

**CTT**  
SYSTEMS

# firm foundations



From the dawn of flight there has been a need for high-quality aircraft hardware. From the nuts to the bolts and the screws, hardware has to be manufactured to the tightest of tolerances for flight. The industry has developed Mil-Specs, NAD specs and more, all in an effort to ensure the quality of every piece of hardware, with no exceptions.

"When most people think of business jet interiors, they visualise custom cabinets, plush seats and state-of-the-art electronics," says Wade Radke, COO and director of engineering at Galley Support Innovations (GSI). "The very last thing they think about is the hardware that can be found in every area. The hardware is often seen as a necessary evil for convenience and safety – basic, industrial, and let's be honest, unattractive. In reality, interior hardware – those locks,

latches, and hinges – are the icing on the cake."

Radke believes the business of locks, latches and retainers is the next frontier in modern aircraft interior design and development. "It's no longer necessary to settle for the same old thing," he contends. "These are not products that can be a last-minute thought in a great interior design, or purchased from just any supplier. To be truly innovative, products must be outside the scope of current imagination. GSI combines the philosophy of creating innovative and unique designs with quality that exceeds industry standards. The company is transforming the industry to the next level of luxury and innovation, leading the way in this new frontier."

GSI

Reader Enquiry No. 513

# panelpartner

Over the past two years, Technical Composite Corporation (TCC) has seen its flat panel business double, with prospects looking good for more growth during 2013.

The company began producing FAA-approved panels in late 2009, for use in the construction of cabinetry, bulkheads and headliners. TCC produces flat panels with a variety of cores, such as Nomex honeycomb, aluminium honeycomb and foam. These can be finished with fibreglass, phenolic or aluminium skins to produce panels customised for specific projects.

Lou Martin, founder and owner of TCC, attributes the company's newfound success to focusing on each customer's needs and providing timely turnaround on purchase orders. "Our minimum order has been and always will be one panel," Martin says. "As a small business we understand that sometimes you don't need to order 100 panels at a time. That does not make that order any less important."

TCC has been in business since 1998 providing custom-made fibreglass panels, and operates out of a 2,300m<sup>2</sup> manufacturing facility in San Antonio, Texas. Seeing a market need for flat panels in 2009, Martin decided to expand the scope of his business.

"We have invested a lot of capital in equipment, testing, marketing, and research and development," Martin says. "We knew the investment would pay off



for both TCC and our customers. As the new kid on the block, we had to prove ourselves, provide quality service and get people accustomed to having another option for their flat panel needs."

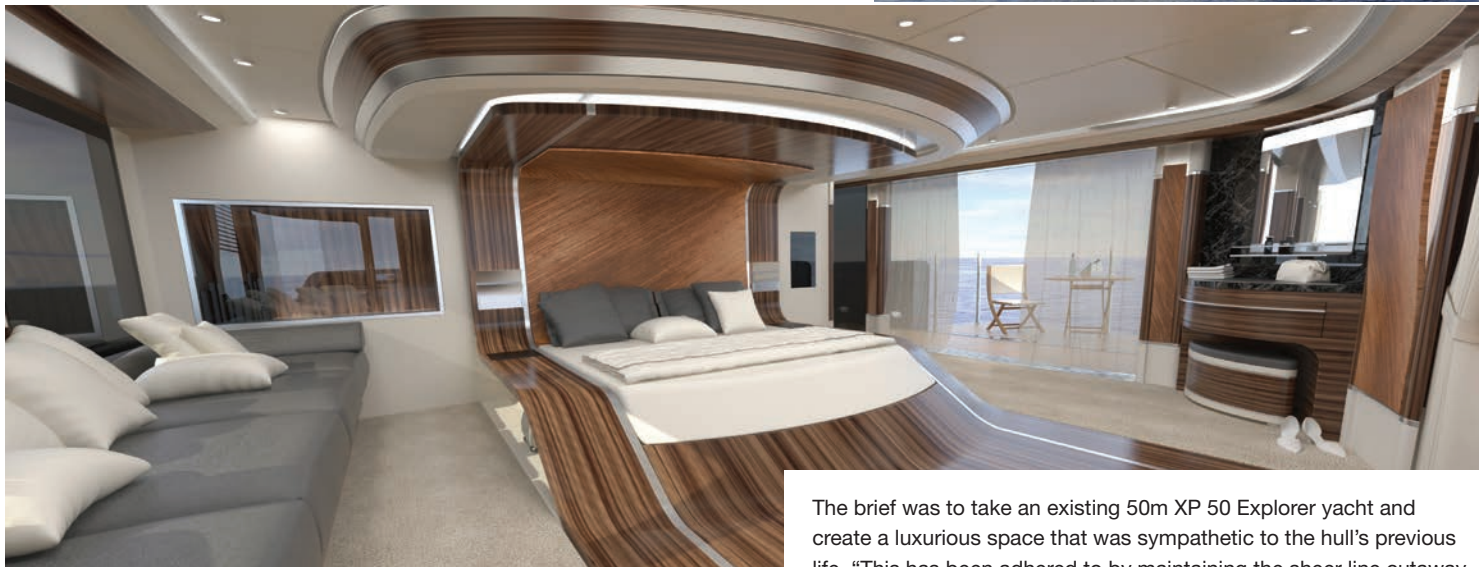
TCC now has a customer base of more than 50 companies, to which it provides aircraft cabinetry, modification work, marine cabinetry, military and defence work, aircraft seating and experimental applications. The company's panels have been used on a wide range of aircraft, from single-propeller types to the C-130 and BBJ and ACJ models.

TCC

Reader Enquiry No. 514

# livingmemory

A yacht refit concept by CTM Design that retains echoes of the vessel's former life



The brief was to take an existing 50m XP 50 Explorer yacht and create a luxurious space that was sympathetic to the hull's previous life. "This has been adhered to by maintaining the sheer line cutaway on the foredeck and the vertical exhaust funnel running through each deck, creating a feature in the main saloon and dining room," says Robin Dunlop, owner of CTM Design.

Aft-facing and open plan, the main living space features a bar surrounded by a lowered saloon area. "The dual height creates a feeling of two rooms, yet provides an intimate atmosphere for entertaining," says Dunlop. "A ceiling made from electrochromatic smart glass optimises control over the flow of light."

More than half the perimeter of the dining area is open to the adjacent deck. "This brings in the feeling of outdoor dining while providing all the luxuries of indoor entertaining," says Dunlop. Floor-to-ceiling sliding windows mean the area can be enclosed during inclement weather.

The master cabin has large windows and fold-down beach platforms for the best viewing aspect. A walk-in wardrobe and dressing area provide extra luxury.



## OTHER EYE-CATCHING DESIGNS FROM VARIOUS INDUSTRIES...



Seats in the new McLaren P1 supercar



A whale-shaped suite carved from ice and snow, designed by Andrew Winch Designs for Sweden's ICEHOTEL



A super-luxurious gondola, including heated massage seats, developed by Leitner ropeways and BMW Individual for Hochzillertal ski resort in Austria



BMW Group DesignworksUSA's design for the US Olympic team's bobsled



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+33 254 079 090

+33 254 079 191

RCS Châteauroux B 350 534 939