

Business Jet *interiors* INTERNATIONAL

WWW.BUSINESSJETINTERIORSINTERNATIONAL.COM

JANUARY 2016



INSIDE
THIS ISSUE:
Fresh look and
more features
than ever!

FUTURE SEATS

DESIGNERS REVEAL THEIR
VISIONS FOR 2025 AND WE
ASSESS THE CHALLENGES AHEAD

IFEC RELIABILITY

Experts discuss ways to minimize the chances of systems failing and make maintenance simpler

CERTIFICATION

Examining the industry's efforts to streamline the completion process without compromising safety

SEXYJET

The making of a fun and colorful GV that looks set to make a mark in the VIP charter market



The value of our experience

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

As a VIP Completions and Refurbishment Center

We guarantee the highest levels of craftsmanship from our artisans, supported by the integration of the markets leading technologies. We know that you want to perform maintenance without jeopardizing your treasured interior. That is why we also provide MRO capabilities incorporated in our completion centre. With a heritage of 90 years building aircraft to the highest standards, we will be glad to take care of your Airbus ACJ, Boeing BBJ, Bombardier or Gulfstream as if it were one of our own.

Contact us at +31 164 618 000 or email: johan.vandorst@fokker.com

Fokker Services welcomes the opportunity to serve you

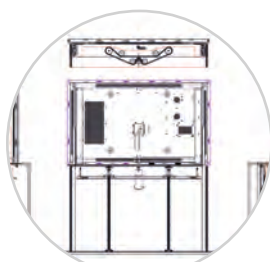
Wheels up

Head down the runway with a selection of the latest cabin designs, product launches, luxury amenities, case study news, completion announcements and material insights

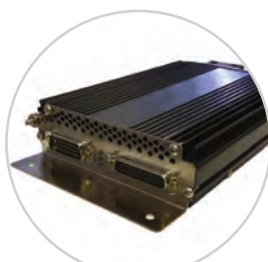
- 006 **Pinboard:** Feast your eyes on a host of BBJ cabins – courtesy of Greenpoint Technologies, BizJet International, Heiko Mahler and Associated Air Center – plus the latest product launches and luxurious finishing touches
- 008 **News in Focus:** TAG Aviation Farnborough Maintenance Services reveals all the details of a recent Rockwell Collins CMS installation on a Global Express
- 010 **Completions Roundup:** This quarter's announcements from completion centers around the world
- 012 **Design Brief:** Tangerine debuts a futuristic cabin involving electrochromic glass and a landscaped floor
- 014 **Design Brief:** Space and light were Pierrejean Design Studio's main concerns on this wide-body design
- 016 **Working With:** An artisan and a designer reveal their ideas on getting the most from a hugely popular VIP material – leather

Features

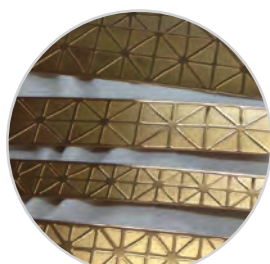
- 20 **SEXYJET**
A first-time aircraft owner and beach tennis aficionado makes an entrance into the charter market with a colorful design that will turn heads
- 28 **SEAT DESIGN CHALLENGE**
Designers present their visions for business/VIP aircraft seating in 2025, and explore the technological hurdles that have to be overcome to reach these goals
- 38 **IFEC RELIABILITY**
With VIPs and business executives expecting to be able to use IFEC at all times, reliability and ease of maintenance are vital goals in these systems' development
- 44 **AIRCRAFT CERTIFICATION**
Certifying a business jet interior is a huge undertaking – but there are ways to make the process more efficient without compromising safety
- 50 **COMLUX ACJ320**
Close collaboration and client involvement led to the creation of an ACJ320 that revolves around the client's work and family life
- 56 **MARKET FORECAST**
Business jet build rates have largely stabilized from the downturn in 2008 and strong growth is forecast across the interiors industry



O64



O66



O68



O70

O63 SUPPLIER SHOWCASE
The latest product news and case studies from our advertisers

O72 DESIGN SPY
Inspiring designs from other sectors that show the potential of mosaics – including a kaleidoscopic restaurant in Indonesia

INDEX TO ADVERTISERS

Actron Manufacturing Inc	71	Garrett Leather	19
Advent Aerospace	Inside Back Cover	Green Hides Leather Studio	58
Aerolux	23, 25, 27	High Tech Finishing.....	58
Air Cabin Engineering Inc.....	62	IDAIR GmbH	3
Aircraft Lighting International	62	Innovative Advantage.....	61
Alto Aviation	67	Jeff Bonner Research & Development Inc.....	43
AMAC Aerospace Switzerland AG.....	5	Pentastar Aviation LLC.....	65
Beadlight Ltd	61	PGA Electronic	Outside Back Cover
Business Jet Interiors International Online Reader Inquiry Service	37, 55	Signature Plating.....	69
Custom Control Concepts Inc.....	11	www.businessjetinteriors international.com.....	49
Fokker Aircraft Services.....	Inside Front Cover		

You can request more details about advertisers in this issue, including the companies and products listed in the Products & Services section, by visiting: www.ukipme.com/info/aimbj

THE TEAM

EDITOR Izzy Kington
isabel.kington@ukipme.com

ART EDITOR Anna Davie

DEPUTY ART EDITOR Louise Adams

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

PRODUCTION EDITOR Alex Bradley

CHIEF SUB EDITOR Andrew Pickering

DEPUTY PRODUCTION EDITOR Nick Shepherd

SENIOR SUB EDITOR Christine Velarde

SUB EDITOR Alasdair Morton

HEAD OF PRODUCTION & LOGISTICS Ian Donovan

DEPUTY PRODUCTION MANAGER Lewis Hopkins

PRODUCTION TEAM
Carole Doran, Cassie Inns, Frank Millard, Robyn Skalsky
CEO Tony Robinson

MANAGING DIRECTOR Graham Johnson

EDITORIAL DIRECTOR Anthony James

ART DIRECTOR James Sutcliffe

PUBLICATION MANAGER Simon Hughes
simon.hughes@ukipme.com

INTERNATIONAL ADVERTISING SALES
Roger Baker
roger.baker@ukipme.com

Sally James
sally.james@ukipme.com

CIRCULATION AND SUBSCRIPTIONS
MANAGER Suzie Matthews

published by UKIP Media & Events Ltd
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



Annual subscriptions (four copies)

Worldwide rate: £47/US\$75

Airfreight and mailing in the USA by agent Air Business Ltd, c/o Worldnet Shipping USA Inc, 155-11 146th Street, Jamaica, New York 11434. Periodicals postage paid at Jamaica, New York 11431. US Postmaster: Send address changes to *Business Jet Interiors International*, c/o Air Business Ltd, c/o Worldnet Shipping USA Inc, 155-11 146th Street, Jamaica, New York 11434. Subscription records are maintained at UKIP Media & Events Ltd, Abinger House, Church Street, Dorking, Surrey, RH4 1DF, UK. Air Business is acting as our mailing agent.

ISSN 1755-8182

Business Jet Interiors International January 2016
This publication is protected by copyright. ©2016

The views expressed in the articles and technical papers are those of the authors and are not endorsed by the publishers. While every care has been taken during production, the publisher does not accept any liability for errors that may have occurred.

Printed by: William Gibbons & Sons Ltd, PO Box 103, 26 Planetary Road, Willenhall, West Midlands, WV13 3XT, UK

Cover image: Cabinet Alberto Pinto



THE GREATEST IDEAS ARE SIMPLE.
THIS ONE ALSO FLIES.

Experience unique intuitiveness with our
IFE, CMS & Communications solutions.

For more information about IDAIR, please visit www.idair.aero

A joint venture between Lufthansa Technik AG and Panasonic Avionics Corporation



IDAIR
simply high-end



CHALLENGE ACCEPTED

In all honesty, I did not expect so many designers to respond with such enthusiasm to the challenge I set them for this issue: to imagine how VIP aircraft seats could look in 10 years' time. What I had envisaged as a five-page feature blossomed into a nine-page extravaganza, with a host of designers picking up their pens and pencils to create brand-new designs. The one on the cover is the work of Cabinet Alberto Pinto.

The results are fascinating – anticipating future demand for everything from integrated body morphology scanners to standing rests and cleaner, simpler lines. The designers also shared their thoughts on current limitations, the technological advances needed to enable their visions to be realized, and what lessons can be taken from seat designs in other sectors. Turn to page 28 to learn more.

Of course, this is not to say that the present day doesn't offer some exciting seat designs –

as the feature on the SexyJet (page 20) proves. A modern and warm cabin is given a hint of edginess by the red hexagonal detailing and piping on the seats.

In case you were wondering about the name, the SexyJet is owned by Mark Bonfigli, an entrepreneur who runs a fun brand of beach tennis goods called Sexy Beach Tennis. Bonfigli commissioned a color-changing livery and a full interior refurbishment for a Gulfstream V, to better reflect his personality and brand. With this aircraft, which he is also offering for charter, Bonfigli wanted to put the romance back into private flight.

As you delve into this issue it should become immediately obvious that *Business Jet Interiors International* has undergone a refresh, which even extends to a new paper size. I hope you will relish getting to know our latest design, and find plenty of details to surprise and delight. I look forward to hearing what you think about it!

Izzy Kington, editor

A large, circular, metallic opening, likely part of an aircraft engine or fuselage, frames the central image. Inside, a male technician wearing a grey t-shirt and blue gloves is focused on a task, holding a circular component. The background shows industrial equipment and a bright, well-lit workshop environment.

Swiss Excellence in Business Aviation

Corporate and private aircraft maintenance, refurbishment
and completion services.

Located at Basel EuroAirport in Switzerland.

AMAC AEROSPACE

AMAC Aerospace Switzerland AG
Henric Petri-Strasse 35
4051 Basel, Switzerland

Telephone +41 58 310 31 31
info@amacaerospace.com
www.amacaerospace.com

PINBOARD



THREE PROPOSALS BY
MAHLER INDUSTRIAL
DESIGN FOR A BBJ LOUNGE



A BBJ WITH AN ADJUSTABLE
LEVELING BED, COMPLETED
BY BIZJET INTERNATIONAL



THE MASTER SUITE ON
A CONCEPTUAL BBJ 787
DESIGN BY AAC



TWO COLOR AND MATERIAL
OPTIONS FOR A BBJ MASTER
STATEROOM CONCEPT BY
GREENPOINT TECHNOLOGIES



THE LOUNGE ON THE
SAME BBJ CONCEPT BY
GREENPOINT TECHNOLOGIES



LUXURY LIVING



1



2



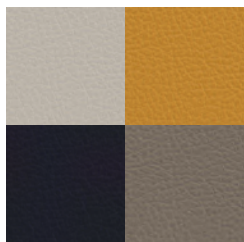
3



4

1. CHIVAS REGAL THE ICON SCOTCH WHISKY, 70CL; US\$3,500
2. JAGUAR BY OLIVER SWEENEY SAYER FORMAL DRIVING SHOES; £295 (US\$452)
3. WOOD GRAPHITE IPHONE 6S 128GB BY FELD & VOLK AND COLETTE; €4,400 (US\$4,848)
4. IWC SCHAFFHAUSEN BIG PILOT'S WATCH, PATROUILLE SUISSE EDITION; £11,500 (US\$17,611)

LAUNCHES



1



2



3



4

1. SUPERSONIC, A NEW LEATHER OFFERING FROM GREEN HIDES
- 2-3. PAC HAS EXPANDED ITS SEAT RANGE. THE LIE-FLAT MODELS SHOWN WERE DESIGNED BY EDESE DORET INDUSTRIAL DESIGN FOR ROYAL JET'S NEWEST BBJs. THEY FEATURE CARBON-FIBER PARTS, PROVIDED BY JCB AERO
4. BRÜEL & KJÆR'S PULSE REFLEX ACOUSTIC CAMERA, FOR REAL-TIME NOISE SOURCE IDENTIFICATION AND DATA RECORDING

Visit businessjetinteriorsinternational.com for full news coverage

CMS UPGRADED ON GLOBAL EXPRESS BY TAG AVIATION FARNBOROUGH

A Global Express owner tasked TAG Aviation Farnborough Maintenance Services with replacing the aircraft's CMS with a new package – Rockwell Collins' Venue CMS and HD IFEC. The owner also opted to have TAG Aviation Farnborough Maintenance Services complete the aircraft's 180-month major maintenance event at the same time.

The company also project-managed the replacement of carpet and modifications to items affected by the upgrade. These changes were performed by vendors, as was the certification.

"Performing this upgrade at the same time as our 180-month major maintenance event made perfect sense as most of the interior had to be removed for the inspection, which has made this modification far easier to achieve," said Paul Burke of PB Engineering Solutions, the customer's on-site technical representative.





Q&A

Darren Birt

CUSTOMER SERVICE ENGINEERING MANAGER, TAG
AVIATION FARNBOROUGH MAINTENANCE SERVICES



To integrate the system in the aircraft, the entertainment cabinet was modified to accept the new equipment, which included storage and charging points for three iPads. Integrated touchscreen monitors were removed from three seats, and iPad stowage was installed instead. Cabin sideledges were modified to accommodate the new switch panels.



Cabin lighting was upgraded throughout, from fluorescent tubes to modern LED lighting from Aircraft Lighting International.



Rockwell Collins' Venue CMS was installed, offering passengers full cabin control, wi-fi, and HD IFE that can be viewed on the cabin monitors and streamed to PEDs. The system features two dual Blu-ray players; one touchscreen controller; two AVOD access points; and one Skybox, which enables access to iTunes and the App store. It also includes the Airshow mobile app, offering 2D and 3D interactive maps. In addition, this upgrade includes three 19in Rosen smart remote monitors and one 22in Rosen smart remote monitor. The system is configured so that different movies can be streamed to each monitor and PED, independently.



The cabin sound system was upgraded by Alto Aviation to offer integrated amplifiers and acoustically tuned speakers. Passengers can select which monitor the sound is synced with.

What were the client's main wishes for the aircraft?

The customer's original CMS was obsolete and a failure in the system would have grounded the aircraft; therefore the brief was focused on the replacement of the obsolete system with a system that could be easily maintained, with built-in redundancy.

What work did you perform on this project?

I was involved throughout the project, starting from the initial request for a quotation through to liaising with external vendors during the installation. Our experienced staff completed the avionics installation while the certification and interior modifications were carried out by carefully selected vendors.

What is really special about this aircraft?

This was our first installation of Rockwell Collins' Venue CMS. It was a fantastic experience and has given us the opportunity to demonstrate to our customers that we can deliver a project of this size and scale, pulling the various vendors together and delivering on all of our commitments.

What was the most challenging aspect of the work?

Projects of this size always have their challenges. The upgrade was completed in conjunction with a large maintenance inspection, which required multiple disciplines to work in one area at once. This, together with some specification changes from the customer, necessitated careful planning and coordination. We needed to ensure that both the upgrade and the maintenance work were completed on time, with minimum disruptions to either aspect of the project.

What was the project timeline?

The flight tests were conducted at week 16, and the project was delivered after 18 weeks with an EASA STC.

How did you ensure the aircraft can meet the client's operational needs?

The dedication of our staff and vendors enabled the project to be completed to the highest quality and within the required timeframe. The customer is delighted with the outcome of the upgrade and the aircraft has been in operation since it departed from Farnborough.

Visit businessjetinteriorsinternational.com for full news coverage



COMPLETIONS ROUNDUP

This quarter's announcements from completion centers around the world

BASEL, SWITZERLAND

Jet Aviation Basel delivered an ACJ320 with a VIP interior designed and outfitted in-house for a governmental client in Europe. The cabin includes a bedroom, bathroom, lounge, office area and executive staff area. It was certified under EASA STC for private use and seats 57 passengers and five crew members. The

company also designed, outfitted and certified an ACJ340-600 for a client in Europe. Able to carry 121 passengers, the ACJ340-600 features a forward galley, dining and lounge areas, a master bedroom and en-suite with shower, a second bedroom with its own bathroom, an office, first class seating and dining areas, a mid-galley complex, a staff seating area and an aft galley. Onboard equipment includes a humidification system, an IFE system incorporating satellite TV, and a wireless local area network linked to primary and alternate satellite communication systems.

INDIANAPOLIS, INDIANA, USA

Boeing Business Jets designated Comlux America an authorized warranty repair facility and service center.

FARNBOROUGH, UK

TAG Aviation Farnborough Maintenance Services installed Rockwell Collins' Venue CMS and HD IFEC on a Global Express. For more details see page 8.

BASEL, SWITZERLAND

AMAC Aerospace inducted a BBJ777-200 for a heavy base maintenance check. The work will also include cabin system modifications and upgrades. In other news, a head-of-state client awarded the company an ACJ340 heavy base maintenance and cabin modification contract. The company also delivered a head-of-state ACJ320 following a heavy base maintenance check and satcom and connectivity upgrade; a BBJ following cabin refurbishment and maintenance work; and a BBJ 737-700 following base maintenance, various cabin rectifications, upholstery work and a TCAS 7.1 upgrade. The company also received an EASA STC for an ACJ319 cabin completion and Part 145 maintenance approval for A340-500 and A340-600 types.

HAMBURG, GERMANY

Lufthansa Technik is to complete two BBJ737-700s for Royal Jet, with interiors designed by Edése Doret. The aircraft are scheduled for redelivery in the third and fourth quarter of 2016, and will each accommodate 34 guests. Lufthansa Technik also delivered a BBJ 747-8 following a completion that lasted more than two years.

The BBJ 747-8 has a conference room, a lounge, bedroom, and several bathrooms with showers. The company also announced that it will begin installing Ka-band satcom technology on VIP aircraft in early 2016.

HOUSTON, TEXAS, USA

StandardAero's MRO at George Bush International Airport has installed its first Gogo Business Aviation UCS-5000 smart router and media server on a Hawker 800XP.

The company also installed an ATG-5000 system. Together, these two systems enable passengers to watch the latest television shows and movies, while also using the internet. StandardAero used a Liberty Partners STC to activate the wi-fi.

TULSA, OKLAHOMA, USA

BizJet International completed a BBJ with two VIP sections and a business class section in the center. The aircraft can carry 29 passengers, and its main purpose is to transport company associates. Highlights include a bed in the VIP section that is customized to enable passengers to level it at altitude. This is BizJet's ninth VIP completion for an East Asian customer.

BERLIN, GERMANY

OHS Aviation Services refurbished a Bombardier Global in under eight weeks. The cabin has new seat leather, divan fabric, seatbelts, carpet, countertops, and sidewall and ceiling coverings. All wooden parts were reworked and varnished. Accessories include monogrammed towels and pillows, and fabrics from Dedar and Hermès. The cabin design is by Tim Callies for ArcosJet Design.

Visit businessjetinteriorsinternational.com for full news coverage

Life is too short not to customize your cabin...



Work, Play, Show Off.

At CCC, we believe that an aircraft cabin's return on investment is fundamentally linked to an ability to personalize the experience. We customize every aspect of your In-Flight Entertainment and Cabin Management Systems to create electronics as luxurious as the aircraft's interior. Whether you're enjoying early window content on 4k Ultra HD displays or dimming your custom configured cabin lighting to set the perfect ambience, every detail feels as VIP as you are. Best of all, every system is backed by our industry leading reliability, warranty and support.



CUSTOM-CONTROL.COM | 206.575.0933



future business



Approached by *Business Jet Interiors International* to create a seat concept looking 10 years into the future,

Tangerine widened its sights to what the cabin as a whole would be like. "Generally, business jet seat design focuses on the function during taxi, take-off and landing, only accounting for around 45 minutes of the passenger's total inflight experience," says Yuichi Ishihara, project and creative lead at Tangerine. "The cruise phase accounts for most of the flight time, so we wanted to look at how to enrich this part of the journey."

The Heroine business jet concept is designed to resemble a modern home or luxury hotel, responding to the changing face of corporate culture. Thus the design features elements such as venetian blinds, a curved divan and a boutique-style walk-in wardrobe.

"The latest trend in the hotel industry is to shake off ostentatious and stuffy trappings to create a more relevant user experience, and the private jet market is set to follow suit," says Ishihara. "Gone are the days of the executive smoking his cigar as the aircraft pushes back. Now he is more likely to request a fruit smoothie before doing 50 bench presses and taking a shower. Also, as more women break through the glass ceiling, so too cabin interiors are starting to change to meet more diverse demands."

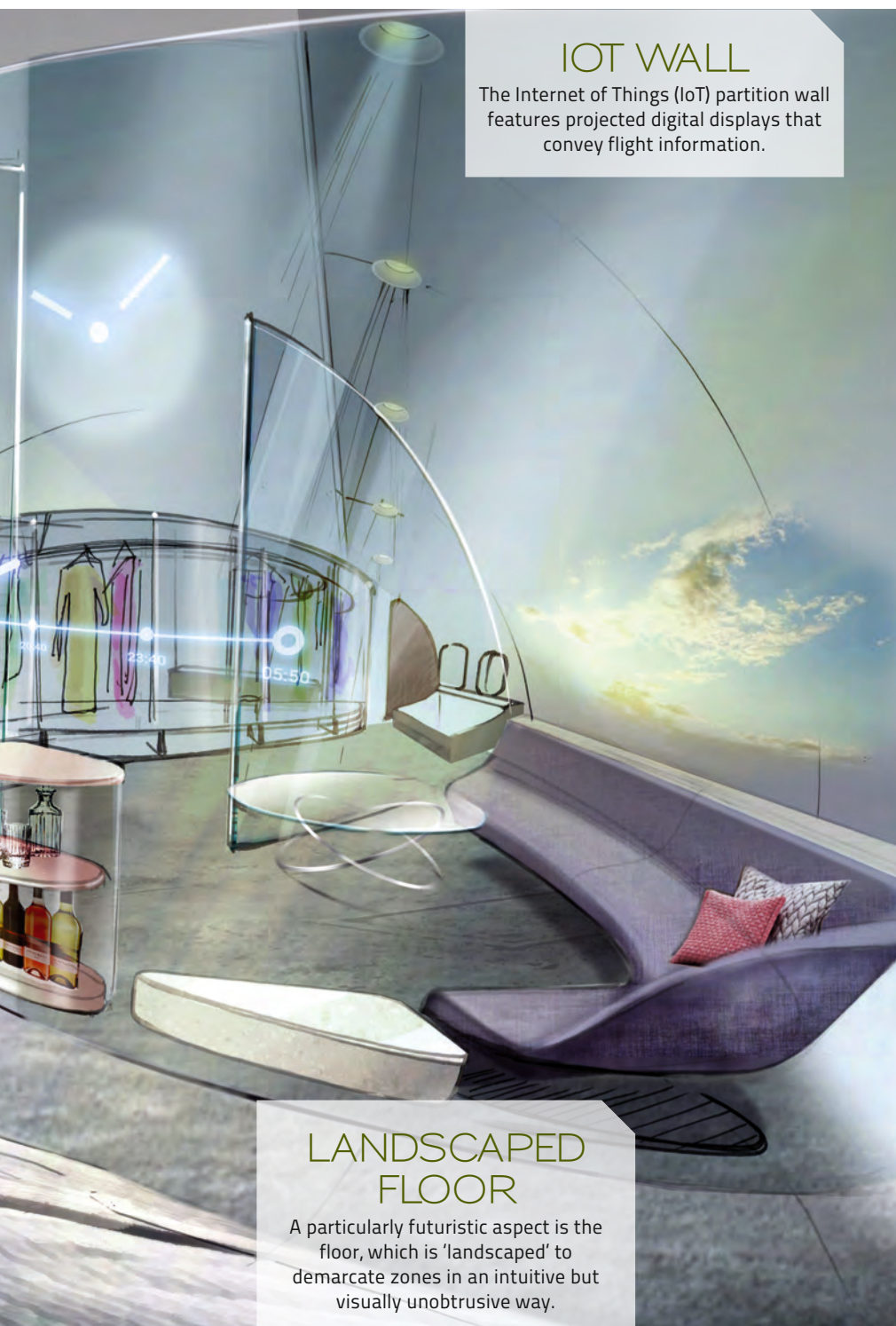
Tangerine wanted to provide a joined-up cabin experience. Transparent walls (made from glass or acrylic) are used to divide the space into zones of activity, while giving the feel of an open and seamless cabin. In addition, the concept makes use of electrochromic glass for the shower and separate changing cubicle/wardrobe area, to enable these to be made into private spaces at the flick of a switch.

The company has also looked at other ways of incorporating technology to improve the passenger experience. For example, one of the sidewalls is imagined as a screen, onto which the video content of the passengers' choice could be projected – whether that is a movie or the sky scene outside. "It could display a live feed of the scenery outside, bridging the dislocation between the interior and exterior environments and making the cabin feel less restrictive, visually connecting passengers to the experience of flying," says Ishihara.

LIGHTING

Backlit OLED lighting in the ceiling voids gives the impression of a skylight. In other areas, ceiling spot lighting helps to emphasize the zonal arrangement of the cabin, and strip lighting is concealed in the divide between the ceiling and walls to create a soft ambiance and emphasize the curve of the fuselage.





IOT WALL

The Internet of Things (IoT) partition wall features projected digital displays that convey flight information.

LANDSCAPED FLOOR

A particularly futuristic aspect is the floor, which is 'landscaped' to demarcate zones in an intuitive but visually unobtrusive way.

GUIDED TOUR

Bedroom

The soft-tension hammock-style bed is inspired by sailors' bunks. The idea is that by elevating the bed from the floor, the sleeper is subjected to less vibration. The bed was also designed to have minimal impact on the cabin space.

Lounge

The lounge includes a sweeping curved divan and light modern furniture designed with a minimal footprint to keep the cabin space feeling light and spacious.

Dressing room

This area includes a walk-in wardrobe inspired by boutiques, where clothes are showcased rather than stored out of sight.

Shower

Natural wood flooring is used in the shower in line with the modern aesthetic, while a sculpted ceramic wall creates a luxury hotel feel. Electrochromic technology enables the wall to become opaque instantly to provide privacy when in use. Information including the water temperature and power can be displayed on the glass.

Vanity area

The vanity unit is separate from the shower, so the two can be used simultaneously. The mirror mimics the shape of an aircraft window and slides horizontally.



light and space



This BBJ 787 was created by Pierrejean Design Studio for a client who chose the aircraft for the width of its fuselage, stating he wanted to fly in a huge space. Therefore the task was to create the largest living space possible, as well as a trendy ambience that could be tailored for day and night.

The studio started by creating the layout. Living areas on board include a dining area, a very big lounge incorporating an office area, two rooms that can be converted into small bedrooms, and a master suite with a large en-suite washroom.

"A new environment also requires new shapes, functions, materials and textures," says Jacques Pierrejean, design office manager at Pierrejean Design Studio. "We are therefore currently working in cooperation with various manufacturers to develop innovative ideas for divans, seats, furniture, fabrics, laminates and carpets, all in compliance with the aeronautical regulations."

One of the most striking aspects of the concept is the lighting design. "We are involved in developing new lighting concepts, which we believe should not only emphasize the space, but also create a peaceful and welcoming atmosphere on board," says Pierrejean. "We have learned a lot from our lighting investigations and it now seems possible to create different atmospheres purely with the lighting. We could configure the system to project subtle combinations of colors that change gradually throughout the flight, in line with the sun's cycle. This idea is pushing the studio to be more creative and to work very closely with lighting manufacturers."

Pierrejean says studies have been conducted in regards to feasibility, and the concept has received positive feedback from the customer.

NEUTRAL CANVAS

A range of neutral materials and colors was chosen to provide a suitable canvas for the lighting concept. "We wanted to avoid bad surprises in terms of the impact of lighting on the materials," says Jacques Pierrejean. "This consideration also meant we paid great attention to the texture of decorative materials and the inks used for printing on the laminates."



CONVERTIBLE TABLES

On this program it was important to study the table mechanism, to enable the conversion of some pieces from trendy coffee tables into sturdy dining tables. "This kind of product is available on the market now," says Jacques Pierrejean.

GUIDED TOUR

Entrance area

The welcome area is a major focus point. "It was important for the owner that this area gave an immediate impression of his style," says Pierrejean. Lighting is important throughout the aircraft, and the entrance area is no exception to this. The lighting can be adapted in line with the time and place of boarding – offering everything from cool to warm ambiances.

Galley

Pierrejean aimed to emulate a luxury domestic kitchen, using a stone countertop, indirect and direct lighting and trim and finishes designed to harmonize with the other parts of the aircraft.

Dining area

The dining area makes use of chair, the configurable seat platform that Pierrejean developed with Lufthansa Technik. For this application, Pierrejean has included a configuration of chair that is smaller than traditional aircraft seats. "It is the ideal dining chair," he says. "It makes it easier for passengers to sit down, easier for crew to serve, and enables us to maximize the number of passengers that can be seated around the table."

Office

The first idea was to create a private room for the office. Little by little, this idea evolved into a large desk incorporated in a corner of the main lounge. Around this space there are a lot of stowages and a large magazine rack.

Master suite

The master bedroom is linked to a private washroom with a large shower. The area also includes a separate space for exercise, incorporating gym equipment for stretching and relaxation. Neutral decorative materials are used to provide a backdrop for the lighting, which can create a cool atmosphere for exercise or a warm ambiance for resting. The bed is articulated to provide a position for reading.



WORKING WITH
leather

Leather is a key part of most VIP interiors. An upholsterer and a designer discuss how to optimize its natural beauty



Jean-Pierre Alfano

CREATIVE DIRECTOR
AT AIRJET DESIGNS



Scott Duncan

DIRECTOR OF INTERIOR
COMPLETIONS AT FLYING
COLOURS CORP



The Artisan SCOTT DUNCAN

DIRECTOR OF INTERIOR COMPLETIONS AT FLYING COLOURS CORP

WHAT DO YOU LOVE ABOUT LEATHER?

Leather can be molded and shaped to suit the specific tasks and demands of the component; this could be a seat, cushion or even cockpit control panels. Its strength, durability and look make leather a fantastic material for interiors. The material is also very versatile from an aesthetic point of view. We can implement so many colors, grains and textures to suit the client's need. On a practical note, it is also easy to clean.

WHAT QUALITIES DO YOU LOOK FOR IN THE RAW MATERIAL?

A high standard of quality without scars, flaws and veins is important. It is also essential that the skins haven't been stretched. Clients like to see consistency in terms of texture and feel, so it is important the grain is consistent, with minimal defects.

WHAT IS CHALLENGING ABOUT LEATHER?

Finding the best area of a hide to use in a high-stress area, so that we don't get a lot of wrinkles or stretching, is always a challenge. You don't want it to lose the consistency of thickness through too much stretching. Another challenge is that with leather you only get one chance to get it right; once there's a hole or stitch, there's no going back.

1. THIS SIKORSKY S-92
REFURBISHMENT BY FLYING
COLOURS CORP INCLUDED BLUE
AND WHITE CROCODILE LEATHER



HOW DO YOU GET THE BEST OUT OF EACH HIDE?

We inspect each hide upon delivery and grade them for imperfections, lines and damaged areas. With this information, we select the best hides for each area. The patterns are then laid out around the flaws, if there are any, to make sure we get the best out of each piece. We don't want to waste such a valuable and beautiful commodity, so careful planning is important.

WHAT EQUIPMENT DO YOU USE?

We use speciality lighting and tools to seek out flaws, inconsistencies or other defects. We hand-craft everything using simple items such as industrial sewing machines, hand tools, scissors, pen, chalk and measuring tapes. Our most valuable tools are actually patience, a good eye, and skills that have been learned over time.

HOW IS LEATHER TYPICALLY USED?

We've used the material on just about every part of the interior, but it's predominantly used for seats. It's also frequently used for lower sidewalls, curtains and divans.

ARE THERE ANY STYLES OR STITCHING TECHNIQUES YOU WOULD LIKE TO USE?

We mainly use French and flat fell seams. Occasionally we use one- and two-step bound seams. In addition, piping with skived leather always adds a special touch to a seating profile.

WHAT HAVE BEEN YOUR MOST MEMORABLE PROJECTS?

We've had a couple of memorable projects. One client wanted a lavatory seat covered with leather that had a hair texture. These seem to be an area where people have some fun as another client wanted a tiger-print lavatory lid and surround.

Earlier in 2015 we worked on the refurbishment of a Sikorsky S-92 helicopter where we had a specific remit to implement a blue-led palette throughout. The client also wanted blue and white crocodile texture leather inlays, which was quite unusual, but we managed to satisfy his requirements.

We have also installed a haired hide on a lower sidewall, which was a departure from the norm.



The Designer

JEAN-PIERRE ALFANO

CREATIVE DIRECTOR AT AIRJET DESIGNS

WHAT DO YOU FIND MOST ATTRACTIVE ABOUT LEATHER?

Leather is attractive because it offers a lot of textures, grains, styles and finishes, and delivers a warm, natural dimension to interior environments. What is also nice about leather is that it feels like a living material, because it changes with time and needs to be cared for.

HAVE YOU NOTICED ANY TRENDS IN TERMS OF POPULAR TYPES, APPLICATIONS AND STITCHES?

I have noticed that more and more attention is given to design and craftsmanship details, even on a single aircraft seat. When leather is the covering material, there is more interest in refined design features such as decorative stitching and contrasting accent features. Also, I have noticed more interest in the use of unusual leathers such as ostrich leather and shagreen, as well as textures such as salmon. Woven leather is also gaining popularity, as it can give volume and rhythm to a design.

HOW DO YOU USE LEATHER IN YOUR VIP INTERIOR DESIGNS?

We typically use plain grain leather for seats and divans, with embossing or stitched decorative inserts. Textured and more bold leather types are used for armrest or seatback surrounding surfaces. We also use decorative leather (Cordoba leather in some cases) on sidewall panels and even to cover cabinet and partition doors.

HOW DO YOU GET THE BEST OUT OF THE RAW MATERIAL?

Knowing how it is made, treated and prepared, and how it ages and can be fixed, is the key to successfully making leather part of an aircraft interior.

WHAT ARE THE CHALLENGING ASPECTS ABOUT USING LEATHER?

The main challenge is to retain the authenticity of the natural material, while ensuring uniformity in terms of grain and patterns.

IF YOU WERE DESIGNING YOUR OWN JET, WOULD YOU USE LEATHER?

If I were designing my own jet, I would design it in exactly the same way as for my clients. Leather would definitely be part of the equation.

1. AIRJET DESIGNS' ACJ340-500 CABIN DESIGN MAKES USE OF WHITE LEATHER TO BALANCE THE USE OF GOLD AND BLUE
2. WITHIN THE SAME DESIGN, SEATBACK LEATHER IS EMBOSSED TO PROVIDE A SUBTLE PATTERN



Garrett

Leather

*Outstanding selection Extremely helpful
Innovative Timely delivery High quality
Terrific Professional Wonderful customer service
Sincerely appreciate their business ethics
First choice Go-to source*



*top
notch
product*

Luxurious Leather. Exceptional Service.
Awe-inspiring Interiors.

*Superb
company,
valued
partner*

*Reliable
Courteous Friendly wonderful
Very pleased wide range of colors and textures
Prompt Flawless, consistent color
Best hides 100% of the time Good Yield*

View inventory, check prices, and place orders online. Apply today.
garrettleather.com/applybj

800.342.7738

SEXYJET





fun & games

A FIRST-TIME AIRCRAFT OWNER AND BEACH TENNIS AFICIONADO IS MAKING AN ENTRANCE IN THE CHARTER MARKET WITH A COLORFUL DESIGN THAT WILL TURN HEADS

Words by Izzy Kington



“Our technicians really jumped at the chance to do something out of the norm”

Mark Bonfigli and his wife Marisa regularly fly around the world to play beach tennis (a hybrid of tennis and beach volleyball) in international tournaments, and run the Sexy Beach Tennis brand of apparel and paddles. For the past couple of years, the couple has counted on the charter services of Metropolitan Aviation. Now Mark Bonfigli has taken the plunge into ownership of a Gulfstream GV, which he also plans to offer for charter through Metropolitan Aviation.

“Mark is a very fun client,” says Jacquie Dalton, chief operating officer at Metropolitan Aviation. “We recognized that the amount of flying he was doing would justify an acquisition, so we spoke to him about it.”

Bonfigli wanted a GV, so Metropolitan Aviation found a suitable example that was manufactured in 1999 and had flown just over 3,000 hours. The design effort started with a desire to convey the essence of the Sexy brand. “It’s about good, clean fun,” says Dalton. “It’s very community minded and environmentally aware; and it’s about going all-out, not doing something by halves. Mark certainly didn’t shy away from expressing who they are and what they’re about when he selected the design.”

Bonfigli took delivery of the aircraft in April 2015, made a few flights on it under Part 91, and began the process of acquiring Part 135 conformity (completed in August 2015). Duncan Aviation was chosen to perform some light interior modifications, to be followed by a full refurbishment and new livery in March 2016.

“We got carried away and it went from replacing carpet and fabric to get us through 2015, to moving forward and getting the exterior done,” says Dalton. “The

ABOVE LEFT: THE NEW SEAT, WHICH IS IN PRODUCTION

ABOVE: THE AIRCRAFT HAS BEEN REDELIVERED WITH THE ORIGINAL SEATS SO THE OWNER CAN USE IT, BUT NEW SEATS WILL BE INSTALLED BEFORE IT ENTERS CHARTER SERVICE

14
passenger
capacity

aircraft had its last paint job in December 2014, with Duncan Aviation, so by no means did it need a new one. The decision was driven purely by design.”

Duncan Aviation was thrilled to be part of the project. “We do about 200 paint jobs a year between our two paint facilities, and a lot of Gulfstream interiors as well,” says George Bajo, technical sales representative at Duncan Aviation. “Typically they have very neutral interiors and paint schemes. Our technicians really jumped at the chance to do something out of the norm.”

The aircraft was delivered to Duncan Aviation in the first week of August 2015. The livery features an eye-catching, color-changing paint, a satin black paint, and butterfly and hexagon motifs. “Mark has a background in automotive marketing and advertising – he has a real eye for that type of craftsmanship,” says Dalton.

POSTAL SERVICE

The aircraft’s owner, Mark Bonfigli, was very involved in the selection of the materials for the refurbishment. “Wherever Mark was at the time, we would have to ship him the material samples,” says Jacquie Dalton, Metropolitan Aviation. “It wasn’t enough to see them on the screen. Duncan Aviation definitely went above and beyond to get him the cuttings. He was piecing things together and sending it back, so it was a pretty interactive, long-range design process.”

George Bajo of Duncan Aviation says this was not a problem, as Bonfigli and Metropolitan provided almost instantaneous feedback. “A lot of times we don’t have that luxury,” he says. “There was no indecision, which is why the whole process was smooth.”

AEROLUX

THE ART OF CUSTOMISATION



From ovens that can roast whole goats, to plate warmers and combination ovens, through to ice makers and ice cream makers, medical refrigeration and even towel warmers, we have made them all for private passenger aircraft and airlines.

Equipment can be supplied in multiple voltages from 28V/115V/110V/230V and in a range of frequencies to suit your application and aircraft. Just ask us.

www.aerolux.co.uk

AEROLUX LTD, Chorley Road, Blackpool, Lancashire, FY3 7XQ, England
Tel: +44 1253 396670 • Fax: +44 1253 300074 • Email: sales@aerolux.co.uk • www.aerolux.co.uk



Inside, the layout has not been altered. The aircraft seats 14 passengers. After a forward galley, there is an area with a divan and a club seat, followed by a club four. The next zone can be partitioned off to create private quarters. It features two divans that convert into either a king-size bed or two twin beds. This is followed by a bathroom.

STAGE ONE

The first stage of the interior modification involved the replacement of all soft goods (fabrics, leather and carpet), headliners, window panels, PSU panels and lower sidewalls. The original Gulfstream accordion-style electromechanical window shades were updated with new colors. In addition, the cabinetry was touched up and Quasar multispectrum LED lighting system from B/E Aerospace Lighting & Integrated Systems was fitted. "The Quasar system enables you to change the color spectrum of the upwash and downwash valance lighting," says Bajo. "You can adjust it to whatever color you wish. We modified the CMS to enable control over that lighting."

The aircraft was redelivered to Bonfigli at the end of October 2015, to enable him to fly it to an international beach tennis tournament in Aruba, in the Caribbean. But it will go back to Duncan Aviation in November 2015 for the installation of new seats, which are currently in production. "The physical installation and paperwork will only take a couple of days," says Bajo. "But it takes about 175 hours to complete each seat – to apply the foam and upholster the metal seat frame."

The seats are similar to the production seats in terms of dimensions. "The two major differences are that the new seat frames have an integral headrest and a plush retractable footrest," says Ken Reita, aircraft completions designer at Duncan Aviation. "There's plenty of room in



3,000

man-hours were spent by Duncan Aviation on the livery, from planning to production

ABOVE: WORK ON THE AIRCRAFT'S LIVERY AND INTERIOR WAS PERFORMED AT DUNCAN AVIATION'S FACILITY IN BATTLE CREEK, MICHIGAN, USA

"It takes about 175 hours to complete each seat"

the aircraft to recline, and the seat has a soft quilted area and some support with the bolsters."

CMS AND VENEER

A new CMS (from the same supplier, Rockwell Collins) will be installed at a later date. It was not installed straight away because the downtime needed – Bajo says at least 3 to 4 weeks of engineering work, up to 12 weeks for parts to be delivered, and then the time needed to pull out the existing equipment and install the new system – did not fit with Bonfigli's plans.

Along with the CMS, all the veneer will be changed. "We have to modify the cabinetry because we're putting in larger monitors and different switch panels," says Bajo. "We'll pull out every bit of wood, strip everything down, apply the new laminate and hardwood nosings, then install the new monitors and CMS equipment, and relocate some of the audio-visual equipment"

Duncan Aviation has already worked with Rockwell Collins to customize the Airshow moving map so that the aircraft icon that flies over the map has the same livery as the actual aircraft. The SexyJet logo is displayed on the screen in the entrance area, to reinforce the brand as passengers board. The logo is also embossed on custom throw rugs created by Scott Group Custom Carpets for the entrance area. These rugs feature the same red as the stripes on the livery. "The client wanted to bring in some edginess to complement what's going on outside," says Reita. The red is also used on the seats, for the piping and stitching that repeats the livery's hexagon pattern, and as

COAT OF MANY COLORS

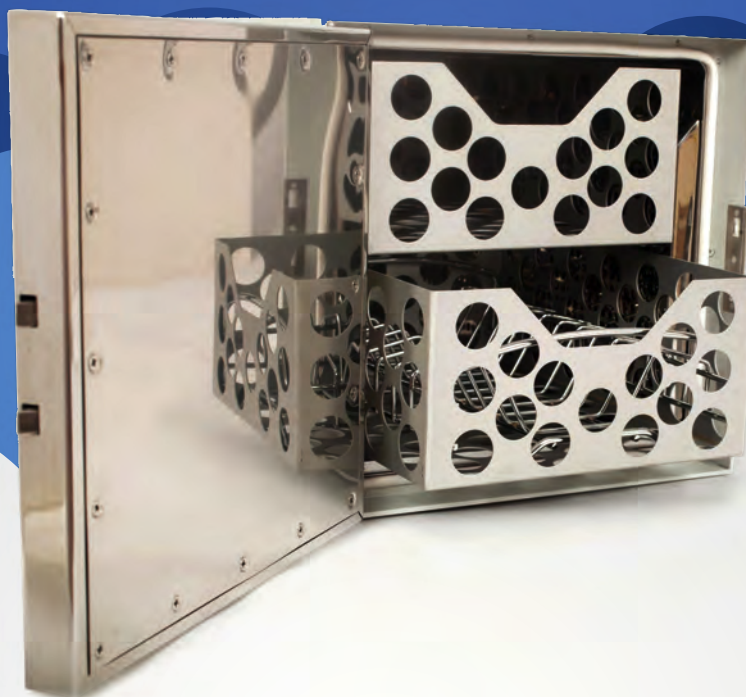
The color-changing livery paint is from Axalta Chromaulon. It is called Jade Green but can also look platinum, purple, blue, teal and yellow.

"When you walk around the aircraft you can see probably six colors," says Ken Reita of Duncan Aviation. "It changes as you walk around and as

you look at the aircraft under different lighting. It's an amazing effect, especially with the aircraft's cylinder shape. When this is out on the ramp, it will just eclipse anything else parked next to it. I doubt whether we could find another application of this paint, at least of this size or magnitude."



AEROLUX BUN WARMER



This compact self-contained unit has been designed specifically for warming buns, bread rolls, croissants etc. Insulated to ensure a cool outer face temperature, the door decor trim can be provided to your needs.

The oven incorporates baskets and crumb tray and the baskets can have plate racks inserted for storage.





RIGHT: 24-CARAT GOLD PLATING WAS USED THROUGHOUT

BELOW RIGHT: THE FORWARD GALLEY HAS BEEN UPDATED WITH TWO NEW CONVECTION OVENS

BELOW: THE BATHROOM FEATURES A FULL-SIZE VANITY WITH STOOL AND MIRROR, A TOILET, SINK AND SECOND VANITY



SEXYJET TIMELINE

SEPTEMBER 2014

Metropolitan Aviation begins search for GV for Mark Bonfigli

APRIL 2015

The aircraft is delivered

AUGUST 2015

The aircraft is granted Part 135 approval and arrives at Duncan Aviation's facility

OCTOBER 2015

Duncan Aviation redelivers the aircraft following application of a new livery, and interior modifications including the replacement of soft goods and panels, the installation of ovens and LED lighting, and light CMS modifications

NOVEMBER 2015

Aircraft scheduled to return to Duncan Aviation for installation of seats

DECEMBER 2015

Aircraft scheduled to enter charter service with Metropolitan Aviation

MARCH 2016

Aircraft scheduled to return to Duncan Aviation for installation of new CMS and replacement of all veneer

an accent line in the warm gray carpet, created by Scott Group Custom Carpet. The seats are a favorite detail of many of those involved in the project. "I've been doing this for 26 years at Duncan Aviation and this seat really stands out above all the others," says Bajo.

The rest of the interior palette is a mix of tans and creams, the aim being to create a warm feel. "We also needed to choose materials that would work well with the new LED lighting system – that would complement rather than absorb the light spectrum," says Reita.

Materials include Tapis Ultraleather Vienna for the window panels, cream Venetian Lace leather by Townsend for the cabin seats and vanity stool in the bathroom, taupe chenille throw pillows, and carbon fiber on the lower sidewalls and vanity stool.

Bonfigli plans to use the aircraft for charter and personal trips. "He's a new aircraft owner, so it's hard



1,669ft³

of space in the GV cabin



to really project, but I think he'll probably run it about 80/20 favoring charter," says Dalton. "He's already talking about purchasing additional aircraft and expanding SexyJet. He really wants to make an impact in the industry and expand this brand."

USER FRIENDLY

Dalton reveals one of the aspects most important to Bonfigli was ensuring a restful experience for charter clients in the sleeping quarters. "He wanted to make sure that those quarters were both very quiet and capable of blackout," she says. "Likewise, the lighting was important not just for himself, but for clients. It's very exciting to work with an owner who's taking a charter aircraft to this level. It's not very often that owners think of the end-user experience in the charter market. Mark says there should be nothing mundane about chartering a private jet; it should be exciting and memorable, and that service and experience should be right up there with safety. I think he's onto something." ❖

AEROLUX

THE ART OF CATERING



REFRIGERATION



RICE COOKERS AND
SOUP WARMERS

TOASTERS



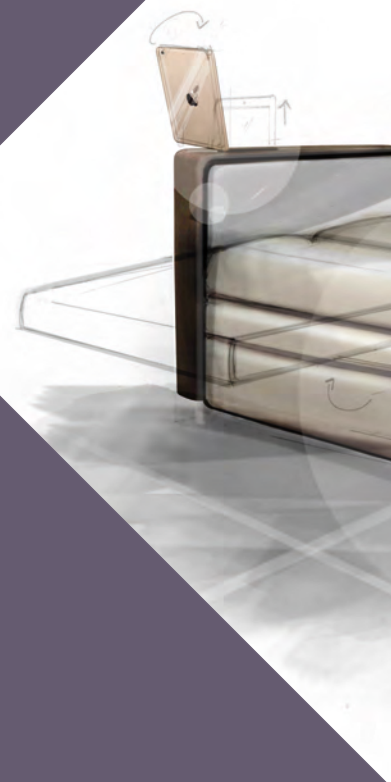
SKILLETS



Unique products and the art of customisation
working together for all of your aircraft galley
equipment requirements.

SEATS OF THE FUTURE

DESIGNERS PRESENT THEIR VISIONS FOR BUSINESS/
VIP SEATING IN THE YEAR 2025, AND LOOK AT WHAT
HAS TO BE OVERCOME TO REACH THESE GOALS



THE PANEL



BEN MAY
director, Interactual



ROBIN DUNLOP
*owner and director,
CTM Design*



RAFAEL TAPIA
*senior lead designer,
Associated Air Center*



YVES PICKARDT
*VIP aircraft interior
designer, Cabinet
Alberto Pinto*



KATE AHRENS
*vice president of
corporate development
and interior design,
Flying Colours Corp*



**ANNIKA SVORE
WICKLUND**
*design director,
Greenpoint
Technologies*

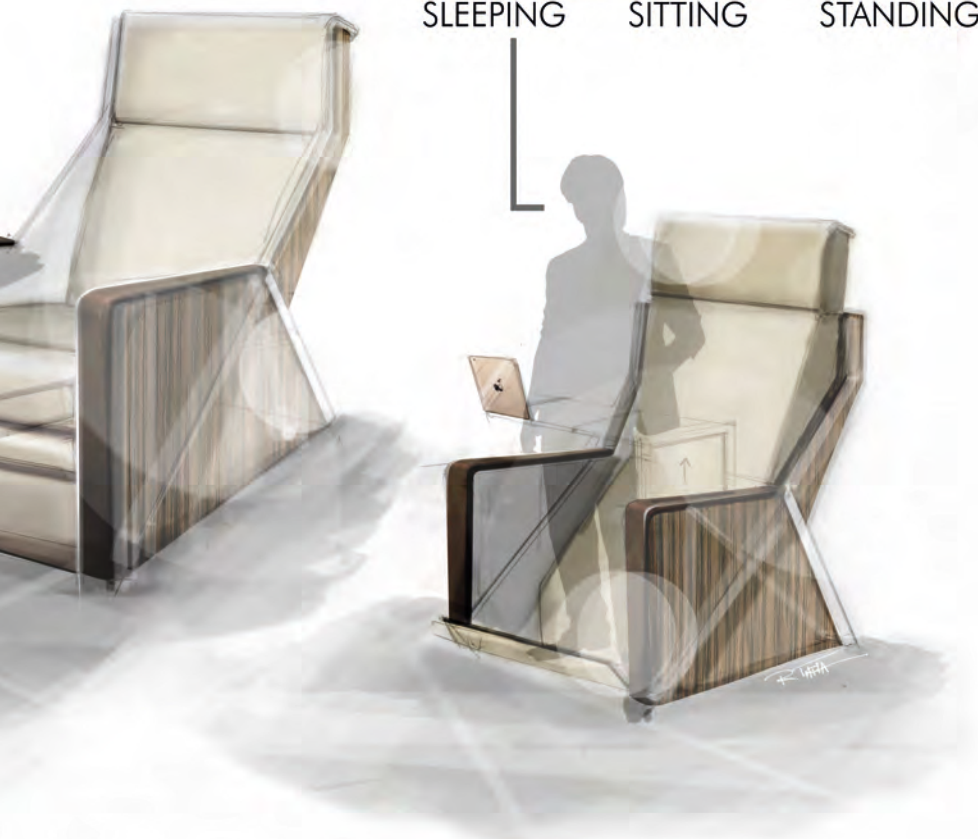


**OLIVER
THOMASCHEWSKI**
*head of Seating and
Structures, Original
Equipment Innovation,
Lufthansa Technik*



WHY NOT STAND?

SLEEPING SITTING STANDING



THE WHY NOT STAND?
CONCEPT BY RAFAEL TAPIA
OF ASSOCIATED AIR CENTER

GAS SPRINGS

Rafael Tapia of Associated Air Center says to ensure smooth transitions, this concept could adopt gas springs, as used in translating beds such as those offered by JBRND for the aircraft market. "Within a gas spring, pressurized nitrogen gas and oil work with a piston to control the movement precisely and allow smooth transitions," says Les Heifner, director of marketing at JBRND. "When incorporated in a bed, the gas spring can be used to control the angle of the bed platform. As the aircraft's angle of attack changes while cruising, our bed can smoothly change the platform angle so the occupants are undisturbed."

THE VISION

The Why Not Stand? concept was created by Rafael Tapia of Associated Air Center. It allows for the passenger to not only seat and sleep, but also supports them in a standing position. "Overseas flights can be demanding to the human body, meaning people are in and out of their seats because of aching in their back, knees and other areas," says Rafael Tapia, senior lead designer at Associated Air Center. "Medical research suggests that excessive sitting is not healthy to the body."

The business class seat allows the passenger to rest against the seat in a reclined standing posture, giving the body a break from sitting.

The design includes three positions (for sleeping, sitting and standing); a slide-out leg rest that will deploy from under the cushion; a fold-down footrest for the standing position; an adjustable in-seat iPad docking station; and a multilevel meal tray for use in the sitting and standing positions, also including a built-in iPad receptacle for use in the standing position.

"This seat design will also create a unique atmosphere in the aircraft, as it enables people to interact in a different way," says Tapia.

THE CHALLENGES

"Technologically this seat is not asking for much," comments Tapia. "We already have electric beds, seats and tables controlled with the push of a button. The main challenge is the track system, which we need to get right to enable seamless transitions when converting from one position to another."

For example, to convert to the seat's standing position, the backrest, including the seat cushion, would need to be pushed up while simultaneously the footrest would fold out. "To achieve this type of movement, we need a guide system where all primary structures are integrated inside the arms," says Tapia. He imagines the conversion to the sleeping position happening in a similar way as a cocoon seat, where the shell remains stationary, the backrest slouches down, the seat cushion translates forward, and the leg rest deploys from under the seat cushion.

"Another challenge will be certification, as with all new product designs," says Tapia. "In my experience with the FAA's Organization Designation Authorization, the best approach when presenting your case is to point to a component that has already been certified. A certification issue that may arise with this design's standing position is the possibility of turbulence. To satisfy the issue, the seat will incorporate a quick-release lever to place the seat back in its taxi, take-off and landing position in an emergency."

RIGHT: THE LIBERTY SEAT BY CTM DESIGN AND INTERACTUAL CAN DOCK AT VARIOUS POINTS IN THE CABIN

MULTIMATERIAL PRINTING

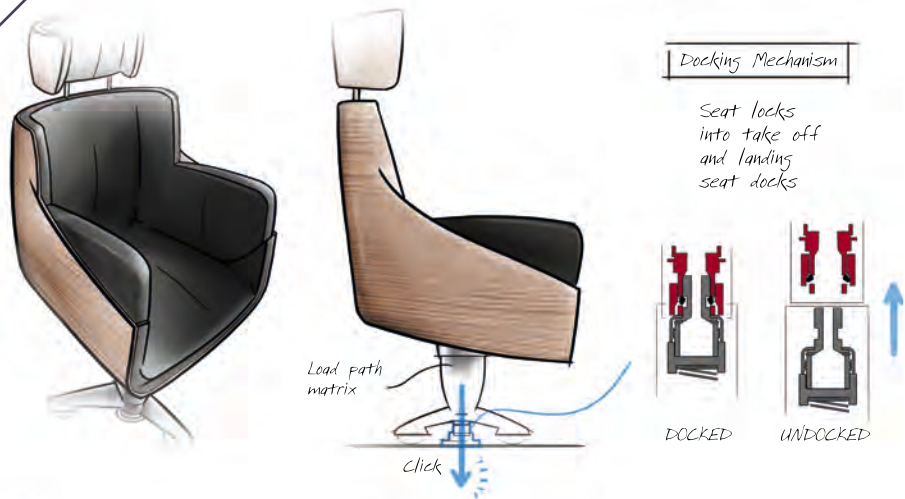
The co-creator of the concepts on this page, Ben May, would like to see technologies such as multimaterial printing utilized in the business aviation world. For example, Markforged's Mark One composite 3D printer (pictured) can print carbon fiber, fiberglass, Kevlar and nylon. "It enables the engineer to precisely control where carbon filaments are positioned for optimized strength over weight and carbon use," says May. "The process requires no tooling and offers the chance to manufacture 'unmanufacturable' geometries. At the moment the machines are small scale, but the technology is completely scalable."



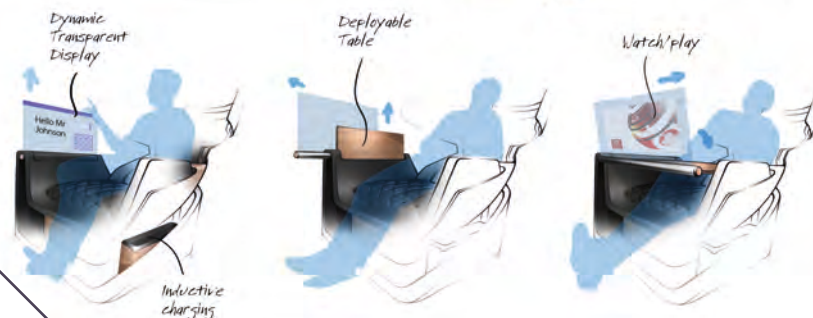
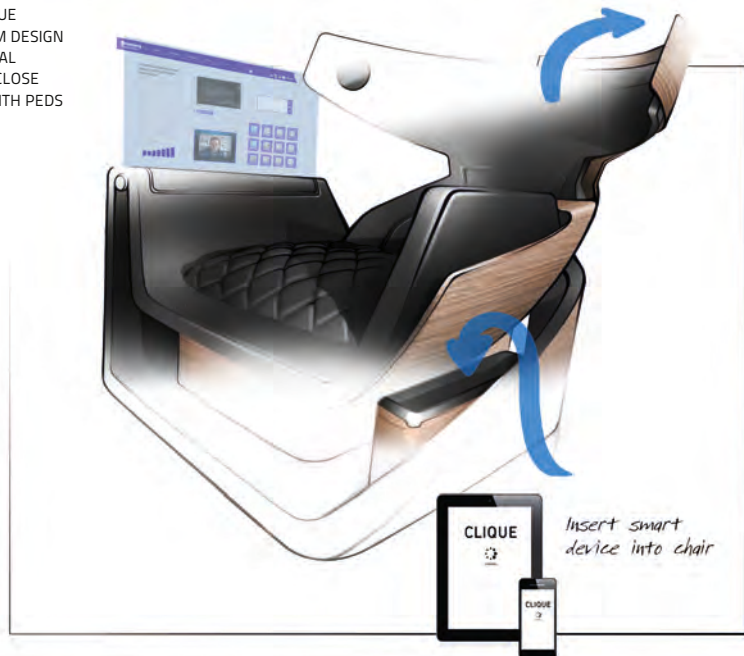
INDUCTIVE CHARGING

Inductive charging, as included in the concept on the right, involves transferring energy using an electromagnetic field to PEDs. Lufthansa Technik says the problem with implementing it on a business jet currently is that different devices would need different solutions.

"There is no clear industry consensus on a universal standard," says David Crossett, head of sales and marketing at Lufthansa Technik. "For example, Apple has not committed to a standard. There are some interesting new technologies entering the field that could shake up the current leaders. The fact is, the aviation world has never been an early adopter of technology (it cannot afford to be), because the consumer world takes many turns and changes before a clear standard is established. Once it is, we will certainly take this into consideration for integration on aircraft."



RIGHT: THE CLIQUE CONCEPT BY CTM DESIGN AND INTERACTUAL MAKES USE OF CLOSE INTEGRATION WITH PEDS



3D PRINTING

"The use of additive technologies to create metal components is now commonplace in the aircraft industry," says Ben May of Interactual. "The adoption of 3D printing for plastic components has been slower because of issues around material and process certification. The most utilized material to date is Ultem from Sabic,

used on fused deposition modeling (FDM) machines. Nylon and carbon-filled nylon components are being produced using the selective laser sintering (SLS) process. Machine and material costs have restricted the use of these technologies for larger components, but the recent expiration of critical patents for all of the three

main technologies – stereolithography (SLA), SLS and FDM – is driving down the cost of machines and has encouraged the rapid progression of lower cost and more specialized materials. We expect to see multiple machine and material solutions specifically targeted at aerospace applications in the next two to three years."

INCREMENTAL SHEET FORMING

A manufacturing technique that this concept's creators are interested in is dieless NC (incremental) forming, such as that offered by Amino. The company's machines can form most sheet metals into complex shapes, using CAD data converted to NC data. The panel is contoured from top to bottom, using a spherically tipped tool. Amino says the process is a cost-effective and quick way of producing rapid prototypes, small batches and service parts. The tool can work at up to 100m/min, with panel thicknesses from 0.1mm to 4mm, and lengths from 100mm to 2,000mm. Current limitations include the fact that 90° angles can't be formed, and the finished surface may show tool marks.



THE VISION

Robin Dunlop at CTM Design and Ben May at Interactural developed three seat concepts for this feature.

The Liberty chair concept gives control of the seating arrangement to the passenger. The chair is locked into a special dock for taxi, take-off and landing, and can be released to move freely around the cabin during flight.

With the Clique concept, the passenger docks their smart device (a phone or tablet) into a pocket on the chair, and as well as charging it inductively, the seat integrates the device's functions and apps on a dynamic transparent display. Information from the smart device could be used to personalize the seat's comfort settings.

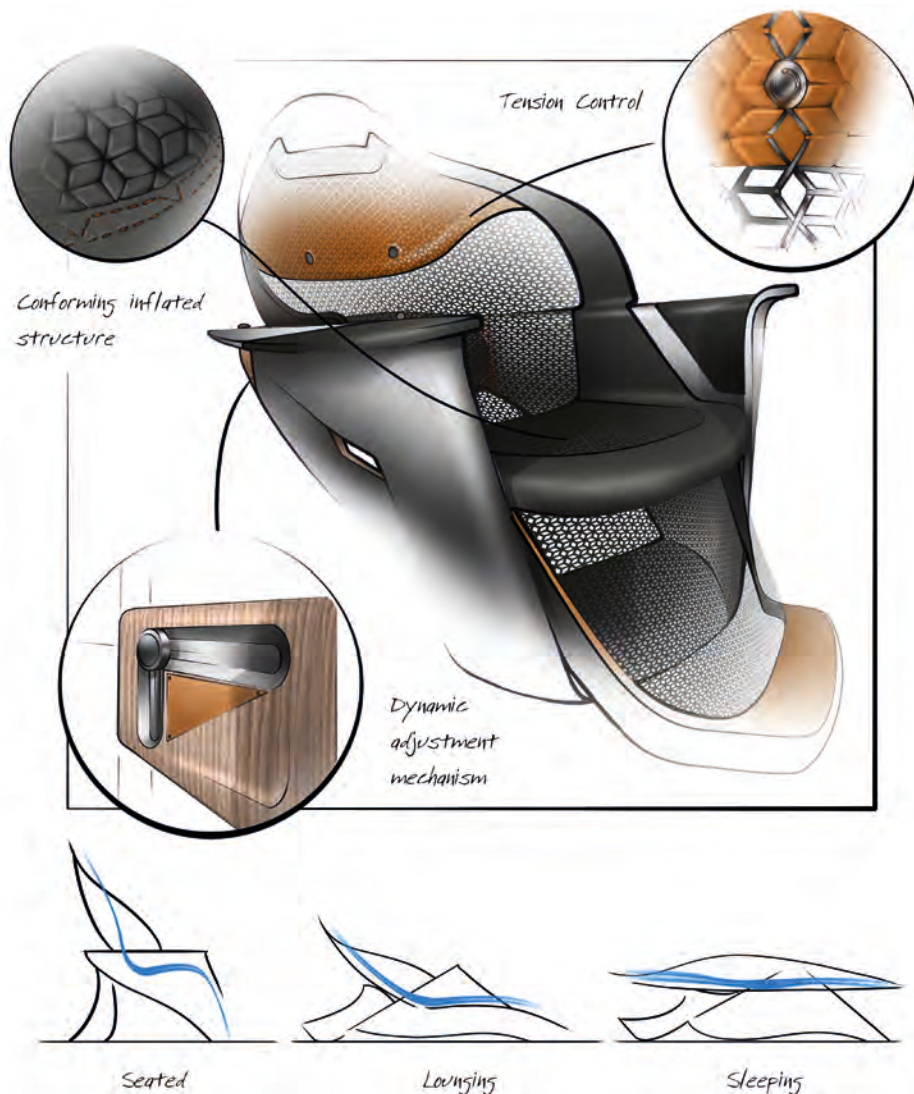
The Fascia concept monitors the user's biometric characteristics and contextual needs, and uses this information to adjust itself to distribute pressure. Smart materials morph to suit the user's anthropometry.

THE CHALLENGES

Dunlop wants the certification process to be revised. "We need to re-appropriate it to nurture innovation and testing without compromising safety," he says.

May says developments in electric motors will be key. "The commercial development of rare earth mineral permanent magnet motors and the replacement of permanent magnet designs with altered designs of traditional inductions motors, relying on the principles of switched or synchronous reluctance to attain high levels of efficiency, will result in motor control opportunities that increase the power to weight and size ratio," he says. "This will enable sophisticated levels of adjustment without a weight penalty."

May also wants to see technologies develop to enable mass-production results in low-volume applications. "For example, being able to 3D print flight-certified materials would give a low weight and high performance without design compromise," he says. "In addition, incremental sheet forming would enable the creation of compound curved sheet metal components without tooling, and multimaterial printing would enable precision positioning of structural elements, for example, an optimally placed carbon filament in a printed matrix."



ABOVE: THE DUO'S THIRD DESIGN, FASCIA, RESPONDS TO THE OCCUPANT'S ANTHROPOMETRY



THE VISION

Cabinet Alberto Pinto's Yves Pickardt has integrated various comfort features into his future seat design – including integrated loudspeakers, a massage system, and an integrated heater and cooler like on luxury cars. The futuristic concept also has an integrated system to scan the body, memorize the user's morphology, and optimize comfort accordingly. The designs also feature carbon fiber shells.

THE CHALLENGES

"The realization of this concept depends on the availability of certified structures from seat manufacturers," says Pickardt. "The seat structure would need to be attached to the floor at one point only, like Lufthansa Technik's chair. The concept also relies on being able to maximize the use of light materials such as magnesium, titanium and carbon fiber. These metals and composite materials are now widely used for Formula 1 cars, sailing ships and bicycles."



BIOMETRIC MONITORING

This concept would respond to the user's body morphology. In a similar vein, Sleep Number beds incorporate biometric monitoring. Sensors inside the bed track the occupant's sleeping patterns, including their heart and breathing rates. This data is presented to the user via a tablet or smartphone app (pictured above), and they can then adjust the firmness of the bed to see what works for them.



TOUCH CONTROLS

The designer of this concept is interested in the idea of integrated touch controls, such as those featured on the Zik headphones by Parrot (pictured left). The entire right earpiece is a capacitive command panel. Users can swipe a finger horizontally to skip a track, vertically to change the volume, and tap to pause or answer a phone call.

How could seats be improved? Are there ideas and technologies from other industries that could be translated into business aviation seat designs?

RAFAEL TAPIA

There is demand from customers for seats to be able to recline and lay flat at a tighter pitch. We usually find ourselves fighting for real estate to maximize the seat recline. The rail industry can offer some inspiration because trains are designed to carry more passengers in a smaller environment. I have found some useful ideas from that industry that it would be interesting to adapt for the VIP aircraft market – for example, a seat concept by Christopher Jenner that features a retractable leg rest under the seat pan.

YVES PICKARDT

We are always interested in new automotive concepts. The car industry, given the huge number of cars manufactured, can afford very sophisticated studies for new seats. My favorite examples are The Aston Martin Rapide, Audi's Prologue concept, the Bentley EXP SUV concept car, the Maserati Alfieri, the Maybach 62 and the Rolls-Royce Wraith. Some car manufacturers are already collaborating with aviation companies – for example Mercedes-Benz worked with Eurocopter for the EC145 helicopter.

KATE AHRENS

Heating is an upgrade option at the moment, but I think it will become a more mainstream choice in the future. I also expect to see more cooling and lumbar support options. We are always looking into the latest trends in the luxury car and yacht industries. Normally aircraft follow rather than lead these trends, mostly because of limitations including expensive certification costs.

OLIVER THOMASCHEWSKI

VIP aircraft seats are multipurpose compromises. In the home, seats fulfill a certain purpose, which enables iconic designs to be created. The lesson is very simple – VIP aircraft seats should have a clear definition according to the situational needs.

ANNIKA SVORE WICKLUND

Seats could evolve into a sleeker, slimmer design by incorporating a flexible, modular seat frame that fits each passenger's comfort needs. Cushions could be adjusted in terms of firmness.

ROBIN DUNLOP

You don't necessarily have to look at other industries; just look at the design and quality of manufacture produced for first class airline seats. It's a lack of economy of scale and the cost of certifying a design that inhibits innovation in VIP aircraft seats. We could also look to high-tech hospital beds that monitor the occupant and adjust to their needs accordingly. Smart textiles and motors linked to biometric monitoring could keep the user comfortable by adjusting everything from physical position to temperature and sound.

ABOVE AND LEFT: A SEAT CONCEPT DESIGNED BY YVES PICKARDT AND DAMIEN CHARLES OF ALBERTO PINTO DESIGN STUDIO, WHICH IS LED BY CEO LINDA PINTO

What are your current limitations when creating new seating designs for business and VIP aircraft?

RAFAEL TAPIA

We have to stay inside the envelope. The customer's requirement is for a luxurious seat, so a lot of components need to be installed. The challenge then becomes to preserve the ergonomics of the seat and meet the design intent with all of these components. Another challenge is the number of seats that the customer requests versus the space available. The customer is usually concerned with the total passenger count, and still expects comfort on a par with or better than first class on an airliner.

YVES PICKARDT

The limitations are weight and overall dimensions; cost; the need to enable all seats to convert to flat positions; and in some cases, the excessive height (from an aesthetic point of view) required for headrests that have to be compliant with taxi, take-off and landing certification requirements.

KATE AHRENS

Our design and build teams need to work within certification constraints issued by the seat manufacturer. Our designs are also restricted by regulations for flammability. This limits overall design options and creativity.

OLIVER THOMASCHEWSKI

VIP seating solutions have remained almost the same for decades – just look at the Air Force One aircraft outfitted in 1959. Traditionally, the layout and design of VIP cabins has been created around seats, rather than a designer being able to select a chair that matches the cabin.

ANNIKA SVORE WICKLUND

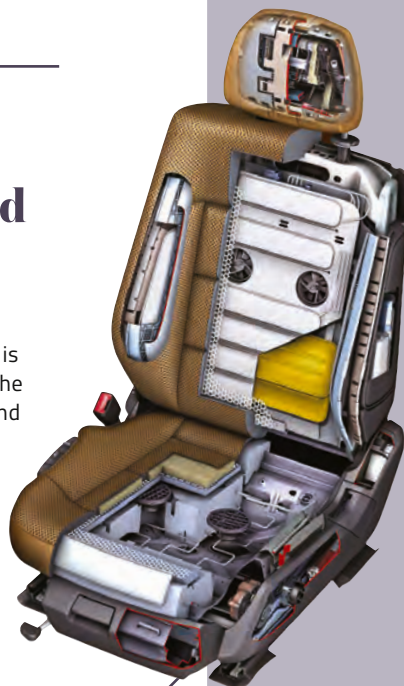
The space limitations within the passenger cabin restrict seat tracking and positions. The bulky base of most seats appears aesthetically boxy, and interferes with track and swivel functions. Heavily cushioned seats and boxy armrests also limit adjustability and interfere with the transitions between seat positions.

ROBIN DUNLOP

There are only a handful of seat suppliers, and each may have limitations at any given time, and from their ranges not all models are suitable for all aircraft types – leaving you with one or two seat structures to choose from. The opportunities to customize these products are limited, and if you want something innovative then it costs a lot to test and certify it, and it could take two years or more.

BEN MAY

There are time constraints and accuracy issues relating to the fact that so much is handmade and relies on craftsmanship. The fundamental limitation is therefore the lack of economy of scale that restricts the use of production technologies.



ADJUSTABILITY, HEATING AND MASSAGE

Mercedes-Benz's Multicontour seat (pictured left) can be adapted to suit the occupant's anatomy, through the adjustment of integrated air chambers. Air is also used to enable the seat's massage functionality – it is let into and out of seven pockets using magnetic valves. The company has even integrated massage with heating on some seats, to recreate the feel of a hot stone massage. The key challenge was to ensure the pneumatic pump was quiet as well as powerful and durable.





THE VISION

The seat concepts designed by the Greenpoint Technologies Design Team, which is led by Annika Svore Wicklund, are based on a sleek, modular seat frame that can be adjusted to fit an individual passenger's needs – the opposite of a 'one size fits all' approach.

"In the future, seats will be made from sustainable materials, they will be slimmer and designed for longer flights," says Svore Wicklund. "Seats will be designed specifically for dining, relaxing or sleeping."

The headrests cradle the head and are designed to offer more flexibility – shifting up, down, left, right, and even forward and aft – to provide personalized comfort. Likewise, the seat bottom grows or shrinks to fit each individual's height, and there are customized footrest and armrest settings. Cushion firmness is adjustable, using a pneumatic system. Heating and cooling systems, massage, built-in audio and in-seat power outlets are incorporated discreetly.

THE CHALLENGES

"On the way to realizing this vision, we will encounter resource and development challenges with engineering, testing and certifying new technologies to prepare them for flight," says Svore Wicklund. "We need to see advances in actuation in terms of reliability, quietness and smoothness. IFE integration will also be a key area for development, with the need to adapt to the latest user interfaces."

THE FUTURE SEAT CONCEPT FROM
GREENPOINT TECHNOLOGIES'
DESIGN TEAM



INNOVATION IN 2015

This modular platform, chair, has passed its 16g tests. Lufthansa Technik collaborated with designer Jacques Pierrejean (pictured right) to create a modular skeleton that can be configured to meet different needs. Seats based on this platform can vary in ETSO weight between 40kg and 100kg. "Carbon fiber was used to enable a slim structure," says Oliver Thomaschewski of Lufthansa Technik. "The modular design and innovative structural approaches mean almost any configuration can be certified as a minor change. This breaks the chains of certification."



What functions, technologies and aesthetics do you think will be desired or expected of seats in the future?

RAFAEL TAPIA

More in-seat versatility in terms of motion and options. The end user expects to have the same comforts in the air as on the ground, including more legroom, the ability to plug and play their personal devices, and a design that gives the passenger a sense of exuberance.

YVES PICKARDT

Future passengers will want the same level of comfort and number of features as offered by the latest first-class commercial airline seats – including full-flat functionality, adjustable partitions and minibars. They will also demand ergonomic curves rather than straight lines, leg rests with footrests, soft armrests, and integrated touch controls such as those on Parrot's leather headphones.

KATE AHRENS

I expect more electrical assist and touch pads. Aesthetics are subjective, but we need to improve our lines and fit – eliminating awkward cut lines, flip-up lids, levers and large buttons. Mercedes-Benz has introduced a nice four-level massage feature integrated in the backrest. Passengers will also demand integrated headrests rather than breadboard types; extending leg rests; one-piece seat, backrest and leg rest constructions; open armrests; and softer materials. I also

think there will be a shift away from metallic structure materials and toward composite structures, to reduce the overall seat weight.

OLIVER THOMASCHEWSKI

Following the approach of situational dedicated chairs, it must be possible to select functions, ergonomics and technologies. It's not about having all options in every seat, but being able to choose the right ones for each position. This will not just improve seating, but also change the way layouts can be designed. For example, smaller chairs could be used around a dining table.

ANNIKA SVORE WICKLUND

Passengers will want more technologies to be incorporated into the seat – for example, heating, cooling and massage, built-in audio and charging points for their devices.

ROBIN DUNLOP

A future seat needs to address our ever-increasing expectations. These range from what can be placed at our fingertips from a technological point of view, to what fits our vision of luxury and gives us true freedom. We also need to create more simplicity – too much clutter exists, mentally and physically.

LEARN MORE ABOUT OUR ADVERTISERS **NOW!**



FREE SERVICE!

Visit **www.ukipme.com/info/aimbj** to request exclusive and rapid information about the latest technologies and services featured in this issue

www.ukipme.com/info/aimbj

Business Jet
interiors
INTERNATIONAL



WITH VIPs AND BUSINESS EXECUTIVES EXPECTING TO BE ABLE TO USE IFEC AT ALL TIMES, RELIABILITY AND EASE OF MAINTENANCE ARE VITAL GOALS IN THESE SYSTEMS' DEVELOPMENT

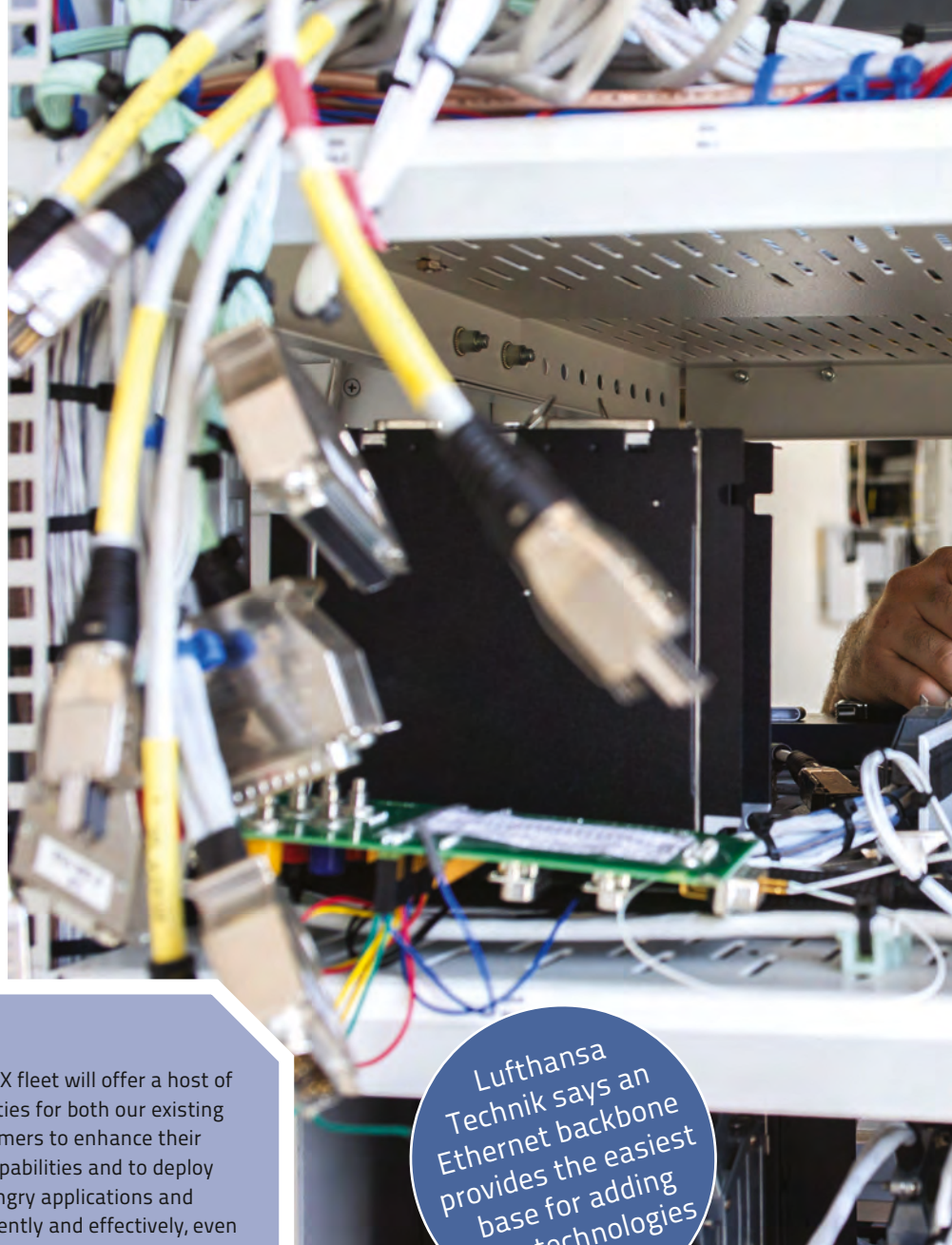
Words by Kirby Harrison

always on

Asked about the importance of reliability and maintainability for IFEC systems, Dave Crossett, head of sales and marketing for Lufthansa Technik's Original Equipment Innovation division had a blunt reply: "I'll give you the same answer now that I would have given you when I started working with these systems 30 years ago – the system must be reliable, easy to maintain and easy to use."

More than 500 aircraft have been delivered with Lufthansa Technik's Nice and Nice HD CMS/IFEC systems. Reliability was an important consideration in the development of the original Nice, and improvements were made with Nice HD. "We reduced the parts count by 40%, while increasing functionality," says Crossett. "We also greatly reduced the number of LRU cooling fans and employed convection cooling for all components. Reducing heat and the LRU count enhanced reliability."

The team employed highly accelerated life testing (HALT) during the development phase, and uses highly accelerated stress screening (HASS) during manufacturing, "to improve our already quantified system reliability," says Crossett. All Nice systems are based on an Ethernet network with IP industry standards. "This means if a problem arises, the system can be easily



Lufthansa Technik says an Ethernet backbone provides the easiest base for adding new technologies

GLOBAL COVERAGE

System failures are to be avoided at all cost, because business and VIP jet users want to be able to use IFEC systems without interruption in service. This also means seamless connectivity is required.

Inmarsat aims to offer seamless high-speed mobile broadband coverage, globally, by the end of 2015. This is when the third satellite in its Global Xpress (GX) constellation is scheduled to come on line. The first two GX satellites are already providing coverage for Europe, the Middle East, Africa, Asia, the Americas, and the Atlantic Ocean.

"Global Xpress will deliver broadband speeds that are an order of magnitude faster than our fourth generation (I-4) constellation, to customers on the move on land, at sea and in the air, globally," says Rupert Pearce, CEO of Inmarsat.

"As such, the GX fleet will offer a host of new opportunities for both our existing and new customers to enhance their connectivity capabilities and to deploy bandwidth-hungry applications and solutions efficiently and effectively, even in the remotest and most inaccessible parts of the world."

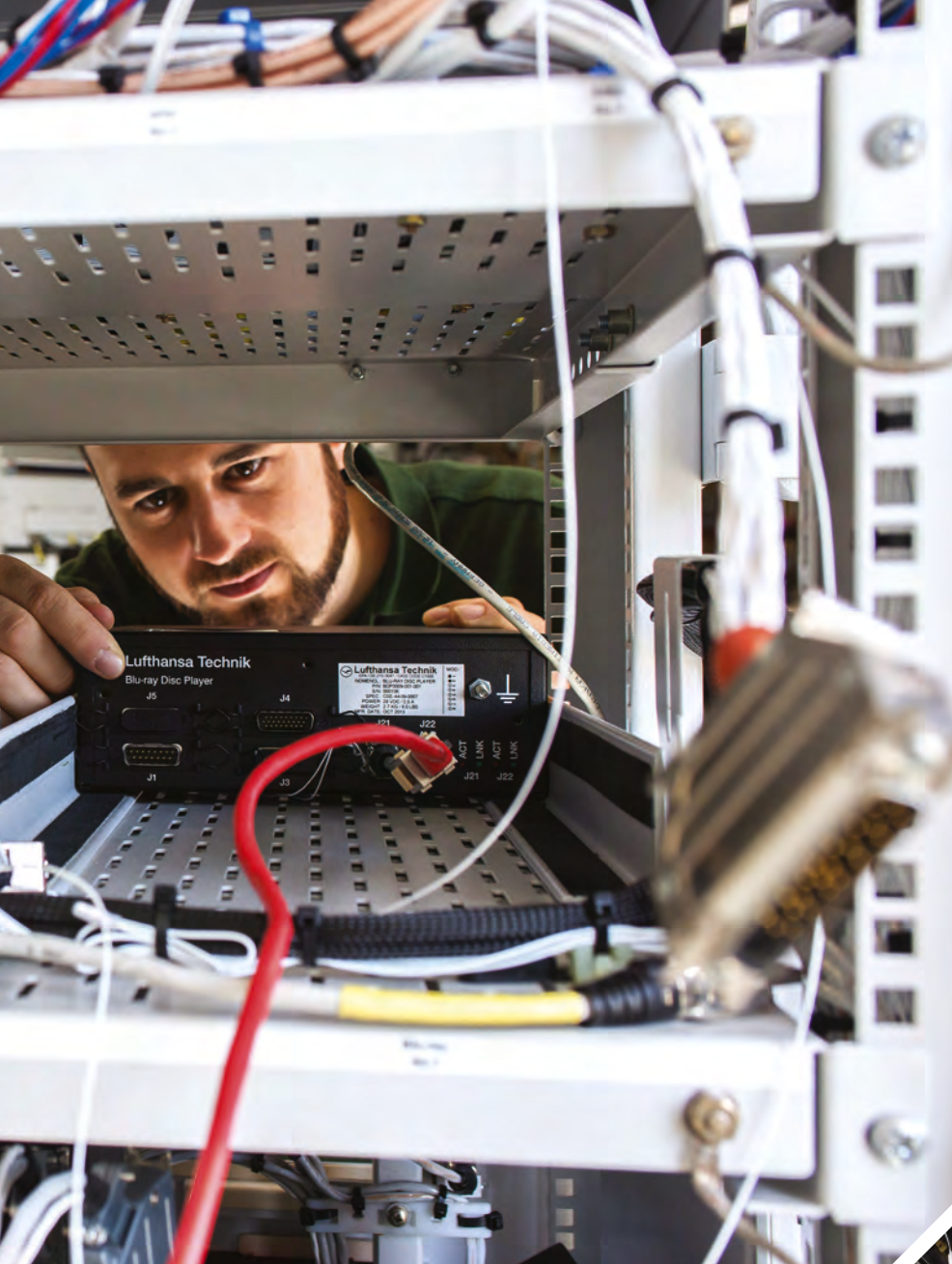


reconfigured via a USB connection on the galley control panel," says Crossett.

TrueNorth Avionics' Optelity app-based system also uses an Ethernet backbone, with the aim of making it future-proof. The software can be updated, and customers can add third-party apps, including curated content, as required. The Optelity Cabin Gateway is designed for modular upgrades.

REDUNDANCY

Chris Christianson, technical representative at Duncan Aviation, says the unique nature of each VIP aircraft makes IFEC integration a challenge. Incorporating new or custom features means adding hardware and creating one-off base software to support it. "Code writing tends to be on the fly when projects reach critical mass," he says. "Until there is better code writing, and simpler integration



LEFT: LUFTHANSA TECHNIK WILL INCREASE PRODUCTION OF NICE HD TO 180 SYSTEMS A YEAR FROM 2017

BELOW: DUNCAN AVIATION OFTEN COLLABORATES WITH IFEC SUPPLIERS ON NEW STCs FOR AIRCRAFT IT IS MODIFYING

CONSUMER DEMAND

One of the biggest maintenance challenges, according to Duncan Aviation's Chris Christianson, is the demand for consumer technologies to be integrated in the cabin. "At the time of certification for use in the aircraft, it is kept under control through regulatory requirements," he says. "However, the supporting technology tends to dry up where maintenance is involved."

Questioned as to whether the demand for the latest technology is a threat to reliability, Lufthansa Technik's Dave Crossett says this is only the case if it forms the system's foundations. "The system should be based on a solid, sustainable technology such as Ethernet," he says. "Any cutting-edge consumer technology should only augment the system. We only deliver components that we build, so we can control the technology. We do not rely on consumer technology, but we do support its use."

for this type of modification, reliability will continue to be something that business aviation struggles with."

One approach to ensuring reliability is redundancy. "Redundancy is now built into equipment in the form of all-inclusive software, whereas in the past it was fragmented among several pieces of equipment, depending on the systems installed," says Christianson.

He also says a plug-and-play approach makes maintenance easier. If a piece of equipment fails, the replacement unit will come pre-loaded with the software required, or the existing units will contain the software needed by the replacement unit.

At Custom Control Concepts (CCC), all equipment is tested in the factory to verify it is working properly, using specialized equipment and software designed and built in-house. "Equipment is developed for new designs to ensure all functionalities are tested," says Ed Lowney, vice





Systems Integration Labs are used to ensure component parts work perfectly together

“Units go through functional testing again to ensure they were able to withstand the rigors of HASS”

president of manufacturing at CCC. “We also use a variety of audio and video sources, switching and routing equipment and power supplies to simulate the wide range of electronic configurations units may face in the field.”

After functional testing, units are put through HASS. This involves placing the units in a Hanse Environmental VTC-9 chamber for high-frequency vibration and temperature cycling from -30°C to 60°C. “Units then go through functional testing again to ensure they were able to withstand the rigors of HASS,” says Lowney. “Finally, units are brought together with the entire shipset of equipment and tested as a single entity in our Systems Integration Lab (SIL). In the SIL, both CCC and customer technicians put the equipment through its paces to verify it is exactly what was ordered and functions flawlessly as a single platform.”

On average, company technicians spend four weeks testing a narrow-body

ABOVE: GULFSTREAM'S SYSTEMS INTEGRATION BENCH IS USED TO INTEGRATE AVIONICS AND OTHER SYSTEMS WITH THE AIRCRAFT'S DATA CONCENTRATION NETWORK

ABOVE LEFT: AN ENGINEER TESTS AN UPGRADE TO TRUENORTH'S OPTELITY CABIN GATEWAY

package and eight weeks on a wide-body project. At this point, it doesn't just replicate the owner's system; it is the complete system – incorporating everything from monitors to remotes and LED lighting.

POST-DELIVERY SUPPORT

Inflight diagnostics and support are a critical piece in the puzzle of reliability and maintenance. CCC offers remote monitoring and troubleshooting as part of its post-delivery support program. “We can hook up from anywhere in the world with an internet connection, in the air or on the ground,” says Richard Wuensche, vice president of program management at CCC.

“Diagnostics including performance, electricity consumption, heat and functionality can be monitored and modified by our engineers at the customer's request, day or night, around the world,” adds Lowney.

With Lufthansa Technik's Nice, all components are connected to the network and give diagnostic feedback. A control panel, placed in the galley, for example, gives the operator on board an indication of how each component is functioning.

Lufthansa used to offer remote maintenance via a direct off-aircraft communications link, but it was not widely used. Certain operators and OEMs are now looking at remote maintenance reporting systems covering the whole aircraft. “When this is available for CMS, we can provide an interface from our network to report maintenance issues,” says Crossett. “But so far, our systems have been highly reliable and customers have not seen the need to invest in a specific remote maintenance capability.” ☒

GULFSTREAM TESTING

At Gulfstream, all ground testing starts in the Systems Integration Bench, where new hardware and software are connected to the data concentration network, and tested for network compatibility and general operation.

New hardware and software are then loaded into the integration test facility (ITF) and the Iron Bird, where integration test procedures are executed to verify that the requirements for each system and subsystem are met.

The ITF for the G500 program includes an outfitted cabin to test the galley, the Gulfstream CMS, and other interior elements.

PRODUCTS MENU

SHOWERS

HEADLINERS

WINDOW SHADES

POCKET DOORS

CABIN LIGHTING

LAMPS / SCONCES

CHANDELIERS

BEDS

TABLES

TOILETS / BIDETS

TV LIFTS

IR SENSORS

SINKS

FUTURE PRODUCTS
(PASSWORD REQUIRED)

ELECTRIC SYNCDRIVE WINDOW SHADE SYSTEM



JBRND WINDOW SOLUTIONS

From small to large aircraft every JBRND window goes through the most rigorous testing in the industry and features some of the most advanced technology available.

MANUAL "SLIDEDRIVE" OR ELECTRIC "SYNCDRIVE" VERSIONS

FOR WEIGHT REFERENCE: ELECTRIC SYNCDRIVE SINGLE CASSETTE UNITS WEIGH JUST 5 LBS FOR A 787 DREAMLINER AND JUST 8 LBS FOR AN AIRBUS A319.

JOIN JBRND IN
HAMBURG, GERMANY

BOOTH 1D54

Aircraft EXPO®
interiors
5-7 APRIL 2016
HAMBURG MESSE | GERMANY

JBRND

Visit JBRND.COM/DOWNLOADS for brochures & more.

AS9100C - ISO9001 - FAA REPAIR STATION #J70R164Y

JBRND.COM

10525 MOPAC DRIVE
SAN ANTONIO, TX 78217-3827
210.590.3133

paper trail

CERTIFYING A BUSINESS JET INTERIOR IS A HUGE UNDERTAKING – BUT THERE ARE WAYS TO MAKE THE PROCESS MORE EFFICIENT WITHOUT COMPROMISING SAFETY

Words by Izzy Kington. Illustration by Phil Hackett





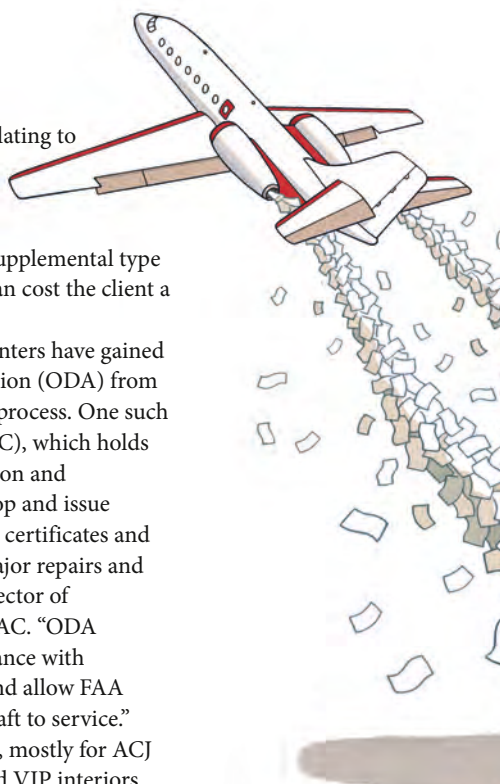
There are thousands of rules relating to the certification of transport category aircraft (those weighing 12,500 lb and over, i.e. most business jets). The process of gaining supplemental type certification (STC) for a VIP interior can cost the client a lot of time and money.

In the USA, several modification centers have gained Organizational Designation Authorization (ODA) from the FAA, in an effort to streamline the process. One such company is Associated Air Center (AAC), which holds ODA for STC and major repair, alteration and airworthiness (MRA). "AAC can develop and issue aircraft STCs and related airworthiness certificates and approvals, and also approve data for major repairs and alterations," says Jose Mora-Vargas, director of certification/ODA administration at AAC. "ODA approvals represent findings of compliance with applicable airworthiness regulations, and allow FAA repair stations to return modified aircraft to service."

AAC has issued more than 50 STCs, mostly for ACJ and BBJ aircraft with highly customized VIP interiors. "The certification time is greatly reduced compared with an FAA-managed project," says Mora-Vargas. "We work weekends, holidays and whatever hours it takes to complete the job within the customer's timeframe, dramatically reducing downtime."

INDEPENDENCE

In Europe, organizations can be granted Design Organisation Approval (DOA) by EASA. Depending on the organization's demonstrated competence, EASA can grant a certain level of independence to approve changes and repairs. "In the future, EASA will grant even more independence to organizations demonstrating proper



CHANGE IN THE AIR

The Executive Interiors Rule Making Group (EASA RMT.0264) has been tasked by EASA with creating new certification specifications for executive interior aircraft. The group was launched in September 2011 and is comprised of authority members (EASA, FAA, TCCA, Austro Control) and industry stakeholders. "The group's objective is to reduce the burden of mainly administrative tasks, remove variation in interpretation and introduce new opportunities," says Julian Woodhouse of Jet Aviation Basel, a participating member. "Notification to the public of the proposed new rules is expected to be made by the end of 2015, with implementation of the rules into CS 25 by the first quarter of 2016. The new rules will be introduced into EASA's regulatory system, however one of the objectives is to have harmonization across authorities. The involvement of other national authority members is expected to ease acceptance."

ABOVE: A JET AVIATION BASEL ENGINEER ENSURING THE VALIDITY AND PERFORMANCE OF MEASURING TOOLS AND EQUIPMENT IN ACCORDANCE WITH THE EASA 145.A.40 (A) & (B) REGULATION





performance – so EASA would be involved only for tasks with a high impact on safety,” says Dominique Fouda, head of communication and quality at EASA.

Jet Aviation Basel’s DOA enables it to classify changes to type design and repairs as major or minor, approve minor changes to type design and minor repairs, approve minor revisions to the flight manual and supplements, and approve the design of major repairs to products for which it holds the STC. “We can also approve the conditions under which a permit to fly can be issued, which allows us greater control over our flight testing activities,” says Julian Woodhouse, head of design, chief office of airworthiness, Jet Aviation Basel Completions Center.

Woodhouse says Jet Aviation Basel has developed a requirements management tool that has greatly reduced the time taken to prepare compliance data. However, he believes the biggest key to streamlining certification is to build a strong relationship with EASA. “We have found that the more trust the agency has with us, the smoother the route to certification,” he says.

Both AAC and Jet Aviation Basel have invested a lot in in-house testing facilities to support their certification services. AAC can conduct ground and flight testing for

TOP: AVIONICS COMPONENTS ARE TESTED AS PART OF THE CERTIFICATION PROCESS AT JET AVIATION BASEL

ABOVE: THE OVERHAUL INSPECTION OF AN AIRCRAFT LIFE RAFT AT JET AVIATION BASEL

lighting, oxygen, water and waste systems; cabin smoke; equipment cooling/ventilation; EMI/RFI; flammability in a dedicated facility; and human factors. It can also perform structural testing of monuments; dynamic testing of seats, including side-facing seats; flammability testing; compliance inspection; and fatigue and damage tolerance evaluation.

Jet Aviation Basel has its own flammability test lab, which allows it to perform CS 25.853 App F Part 1 testing and waste container fire containment tests. It can also perform non-textile flooring anti-slip testing, oxygen and water system pressure testing, and qualification testing for real glass in cabin interiors. The company tests installed systems both on the ground and in flight to provide full certification of its designs.

FORWARD PLANNING

Gerard Castellanos, head of the office of airworthiness at Aero Experts Group, contends that involving an integrated design and engineering company right from the start of a project can ease the route to certification. “We have the technical ability to define a budget and timeline for any project, so our clients know what to expect,” he says. “Sometimes, the conceptual design sold to the owner has to be amended to comply with certification requirements – for example when there are problems with the layout’s emergency escape path, or missing decompression panels. If we are involved from the start of a project, all certification aspects will be properly looked at and there will be no need to rework the design when we enter the completion phase.”

The Aero Experts Group gained its DOA approval in September 2015, having invested in extensive training for its engineering division, and undergoing an in-depth audit. The company can now classify modifications, approve minor modifications, and handle EASA STCs directly. “The DOA allows us to be much more agile and responsive to our clients’ needs,” says Castellanos.

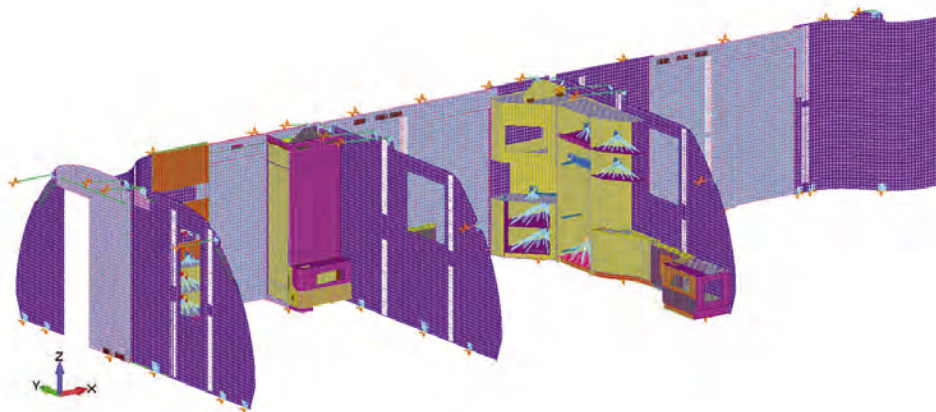
The company provides program management and engineering services for cabin interior, satcom and livery modification projects for large and small aircraft, and also supports cabin component OEMs in gaining airworthiness compliance for equipment.

CHALLENGING ELEMENTS

The Aero Experts Group has designed a narrow-body seat, which Castellanos believes is one of the most challenging cabin elements to certify. “More generally, it is always a challenge to work on a modification that calls for major airframe changes, whether to the windows or the floor structure,” he says. “But if the certification plan is done correctly at the start of a project, most challenges can be overcome.”

Jet Aviation Basel’s Woodhouse says one of the most challenging things to certify is a passenger oxygen system,

“Special Condition processing can be time-consuming and necessitate additional tests”



ABOVE: A STRESS ANALYSIS FOR THE VIP AREA BULKHEADS ON AN ACJ340, BY THE AERO EXPERTS GROUP

because of the required transient pressure testing and oxygen hazard assessment. “Demonstrating exit egress in unusual or complex interior arrangements, and certifying new or novel design features for which regulations do not exist, is also challenging,” he says.

This last point is echoed by AAC’s Mora-Vargas. If an element is not covered by current rules, a Special Condition (SC) has to be created by the regulatory body to enable its installation on a specific aircraft type. “SC processing can be time-consuming and necessitate additional tests,” adds Mora-Vargas.

The regulatory body works out a standard for the SC, and publishes it for comment before implementation. The length of the process depends on how novel the aspect is. For example, the FAA recently created an SC for oblique seats – seats that are not forward or side facing, but at an angle. These were seen as a variation on existing

equipment, so although a number of issues had to be addressed, it was not a matter of starting from scratch.

PRE-CERTIFIED EQUIPMENT

Mora-Vargas says the use of components from suppliers with ODA status for Parts Manufacturer Approval (PMA) can greatly reduce cost and certification effort. The equivalent in Europe is Production Organisation Approval (POA). In addition, Mora-Vargas, Woodhouse and Castellanos all point to Technical Standard Order (TSO) components, as they are already certified for use.

“EASA Part 21J requires links in the form of contractual framework agreements between approved design organizations and suppliers to prevent misunderstandings during the certification process,” says Castellanos. “Respecting these arrangements will ensure successful completion of the assigned tasks within the expected time and guarantee airworthiness. The best way to certify changes when working with suppliers is to foster a good working relationship with them.” ☘

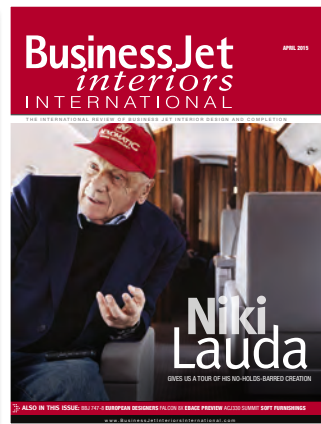
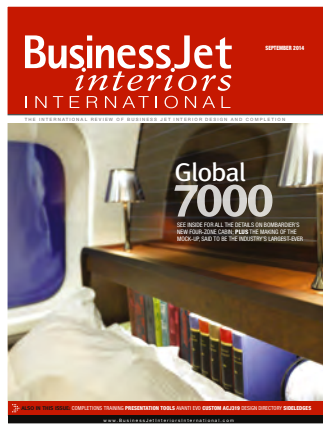
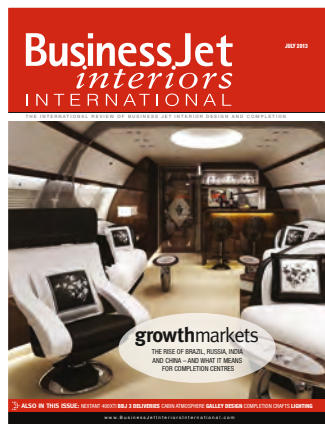


MONITORING

DOA organizations are overseen by EASA experts, usually on a yearly basis. As well as monitoring processes, the team looks at a sample of the DOA’s work. A full review is made every three years.

“If something is found not to have been performed properly, the DOA organization will be requested to implement corrective actions,” says Dominique Fouda

of EASA. “In the worst scenarios, the finding can lead to a (partial) limitation and/or (partial) suspension of the approval. On the other hand, when the DOA is committed to work following the approved procedures, showing a high degree of responsiveness even when corrective action is necessary, EASA is keen to grant more privileges.”



Business Jet interiors INTERNATIONAL

WWW.BUSINESSJETINTERIORSINTERNATIONAL.COM JANUARY 2016

INSIDE THIS ISSUE:

Fresh look and more features than ever!

FUTURE SEATS

DESIGNERS REVEAL THEIR VISIONS FOR 2025 AND WE ASSESS THE CHALLENGES AHEAD

<p>IFEC RELIABILITY</p> <p>Experts discuss ways to minimize the chances of systems failing and make maintenance simpler</p>	<p>CERTIFICATION</p> <p>Examining the industry's efforts to streamline the completion process without compromising safety</p>	<p>SEXYJET</p> <p>The making of a fun and colorful GV that looks set to make a mark in the VIP charter market</p>
--	--	--

www.businessjetinteriorsinternational.com

The **Business Jet Interiors** website includes a digital version of the current magazine, plus a digital archive of past issues and all the latest news – helping you stay one step ahead of the market.

You can also register online to receive future issues and use our **online reader enquiry service** to discover more about our advertisers' products and services.

www.businessjetinteriorsinternational.com

team effort

CLOSE COLLABORATION AND
CLIENT INVOLVEMENT LED TO THE
CREATION OF AN ACJ320 THAT
REVOLVES AROUND THE CLIENT'S
WORK AND FAMILY LIFE

Words by Paul Eden





A strong partnership was the driving force behind Comlux America's latest green completion – an ACJ320 delivered to a private customer in July 2015. The client's representative on the project was Fiona Riddle of Inflight Cabin Solutions. She and Lauri Church, head of Comlux Creatives (a sister company to Comlux America), developed an instant rapport that proved very helpful during the joint design.

Rich Byfield, program manager at Comlux America, coordinated the cabin's construction. "This experience fostered one of the most open working relationships I've encountered in my 15 years in aviation," he says.

Cabin definition work began in November 2013. "Fiona and Lauri began reviewing design concepts, drawing on various inspirations, to develop the overall cabin ambience," says Byfield. "These loose concepts evolved into our design in a very short amount of time thanks to the close partnership between Comlux and the team representing the client."

TRANSPARENT PROCESS

He says it was at the preliminary design review stage that the collaborative spirit of the build really took hold. "The traditional approach involves collecting information to feed the design and re-approaching the client a few weeks later for final approvals. However, on this project, we let the client's team into sessions that are normally closed-door, to discuss the pros and cons of suggestions or requests, so that they could see our challenges and work with us to find solutions that worked best for both parties," says Byfield. "We reviewed the elevations as a team, red-lined the drawings for changes and sent them out the door to be incorporated into revised drawings, before moving on to the next section of the aircraft. The

9
VIP aircraft interiors
have been completed by
Comlux America



ABOVE: THE FORWARD LOUNGE, WHICH CAN BE CONVERTED INTO A BEDROOM OR DINING ROOM

FAR LEFT: RICH BYFIELD

LEFT: DARON DRYER

SOUND ADVICE

"The client travels on a frequent basis, so the noise level needed to be minimal to ensure a comfortable and restful journey," says Fiona Riddle. Comlux teamed with aircraft acoustic technology experts to integrate systems using an optimized material stack up. "By optimizing not only the density (weight) of the materials, but also the means by which they are layered together, one can achieve a much higher noise reduction to system weight ratio," says Daron Dryer, vice president of engineering and certification at Comlux America.

The company's in-house engineering department also worked on various noise-reduction efforts as part of this project. "Our

proprietary weight reduction technology ensure that neither sound nor weight is compromised in the interest of the other," says Lauri Church.

"Noise treatment typically correlates to a weight increase, but this is not the case with a Comlux air-conditioning modification," says Dryer, by way of an example. "Laboratory testing has confirmed that our systems are up to 10dB SIL3 quieter than the factory-delivered system and just 67% of the weight. For an ACJ320, this means the passenger cabin would have to be at 40dB SIL3 before air outlet noise could be perceived. Interior weight is reduced by 25kg."



revised drawings were delivered back to our meeting room for review and approval. This approach allowed us to reduce the time needed to create the final design package that would ultimately serve as the basis for our build. We gained critical design review approval just eight days after beginning the preliminary design review.”

FAMILY AND BUSINESS

Church says the customer was heavily involved in the design, probably more so than most customers, and therefore the floorplan is exactly tailored to his requirements. “It was important for the interior to be comfortable for family use as well as for business meetings,” says Riddle. “The layout allows both to happen at the same time without compromising the overall look and comfort.”

There are two multifunctional compartments, in the forward and mid-cabin sections. The forward section can be transformed from a private lounge to a dining area or private sleeping quarters. There is a table that can be configured as a small coffee table or a large dining table. It telescopes down into a very compact size that can be stowed 7in off the floor. This allows easy deployment of a queen-size bed from under the three-place divan. This room is primarily for family use.

CUSTOM ACJ320 TIMELINE

NOVEMBER 2013
Cabin definition

MARCH 2014
Preliminary design review; critical design review

APRIL 2014
Installation of water systems; structural preparation

MAY 2014
Beginning of cabinet fabrication, cabin system wiring and soundproofing work

NOVEMBER 2014
Installation of first cabinet

MAY 2015
Installation of final cabinet; cabin testing and validation

JUNE 1, 2015
Completed aircraft flies for the first time

JULY 16, 2015
Aircraft delivered to customer, one month early

ABOVE RIGHT: THE QUASAR MOOD LIGHTING SYSTEM FROM B/E AEROSPACE LIGHTING & INTEGRATED SYSTEMS WAS USED

4

narrow-bodies can be accommodated at Comlux America, but an expansion to add capacity for a wide-body is underway

“The aircraft can be transformed from having one bedroom to having three, all with queen-sized beds”



The mid-section compartment is a dining/conference area that can be converted into sleeping quarters. “The aircraft can be transformed from having one bedroom to having three, all with queen-sized beds,” says Church.

There is a separate master bedroom suite, finished in muted tones to create a calm and restful atmosphere, plus a large bathroom with a shower and two floor-length wardrobes. The aircraft also has a business class section, a staff area and two galleys. To provide the privacy necessitated by the aircraft’s business role, each zone can be completely closed off from other areas.

DESIGN CHALLENGES

“Some of the unique requests included galleys that have a more residential look and feel, but are still able to withstand the rigors of regular long flights,” says Church. “Another challenge was to find storage space; Fiona was very particular about having excess storage. We accommodated both these requests and found storage in every possible space.”



Weight was also a key parameter on the project. “We achieved a lighter-weight cabin by the collaborative efforts of our design and engineering departments,” says Church. “We also used certain materials that are new to the market to help us reduce weight.”

Overall, Church says Riddle was instrumental in defining the aircraft’s functionality and aesthetics. “Most of the material selections were guided by her direction and the modern European style she expected,” Church explains. “It was very important to her that it be a warm and inviting environment.”

“Textures and materials were a key part of the design process,” says Riddle. “Lauri and I hand-picked the most beautiful wood veneers and fabrics – heavy linens, classic



ABOVE: THE MASTER SUITE FEATURES A BEDROOM WITH A QUEEN-SIZE BED AND A LARGE SHOWER ROOM



4

ACJ interiors have been completed by Comlux America



DREAM TEAM

Assigning the project to a pair of creative minds might have led to conflict and delay, but according to Fiona Riddle, it could not have worked better. “We worked extremely well together,” she says. “Lauri and I understood that this was an extremely special project. I had strong ideas that I wanted incorporated into the design. While I was keen for the aircraft to have a residential feel, I also wanted to include standalone pieces of bespoke furniture, without compromising cabin comfort. Lauri saw my vision very clearly and I believe our mutual understanding was crucial in creating the interior we have today.”

“It was truly a pleasure to work with Fiona,” says Lauri Church. “It was so easy to understand her design inspirations and the overall look she wanted to achieve. Fiona knew exactly what she wanted and never wavered.”

ABOVE FAR LEFT: FIONA RIDDLE

ABOVE LEFT: LAURI CHURCH

mohair and glove-soft leathers – to capture a residential ambience. I also commissioned a few pieces of wall art for the forward lounge and dining room.”

Byfield describes the cabin as blending classic details and modern lines. “Wenge and quarter-cut Khaya veneers provide a stark contrast to the light tones of the silk fabrics that adorn the bulkheads throughout the aircraft, without overpowering the senses,” he says. “This balance of color, coupled with the comforts the interior provides, strikes a sense of familiarity as soon as you walk in.”

IFE AND CMS

Rockwell Collins’ Venue IFE system was installed, complete with Airshow moving map. The IFE can be watched on installed screens or streamed wirelessly to iPads. “There are three 42in monitors throughout the aircraft,” says Riddle. “In addition, each passenger has their own iPad Air 3, which they can use to control everything from the lighting and window shades to the movies they watch on the monitors or iPad. I designed personalized cases for the devices, adding to the homely feel.”

Airbus delivered the aircraft green to Comlux America’s completion facility in Indianapolis, Indiana, USA. Structural and water system components were installed first, and then the OEM’s thermoacoustic insulation was removed (to be replaced later with a custom system) as cabinet making got underway. The first cabinet was installed in November 2014, and the aircraft was redelivered in July 2015. ☒

LEARN MORE ABOUT OUR ADVERTISERS **NOW!**



FREE SERVICE!

Visit **www.ukipme.com/info/aimbj** to request exclusive and rapid information about the latest technologies and services featured in this issue

www.ukipme.com/info/aimbj

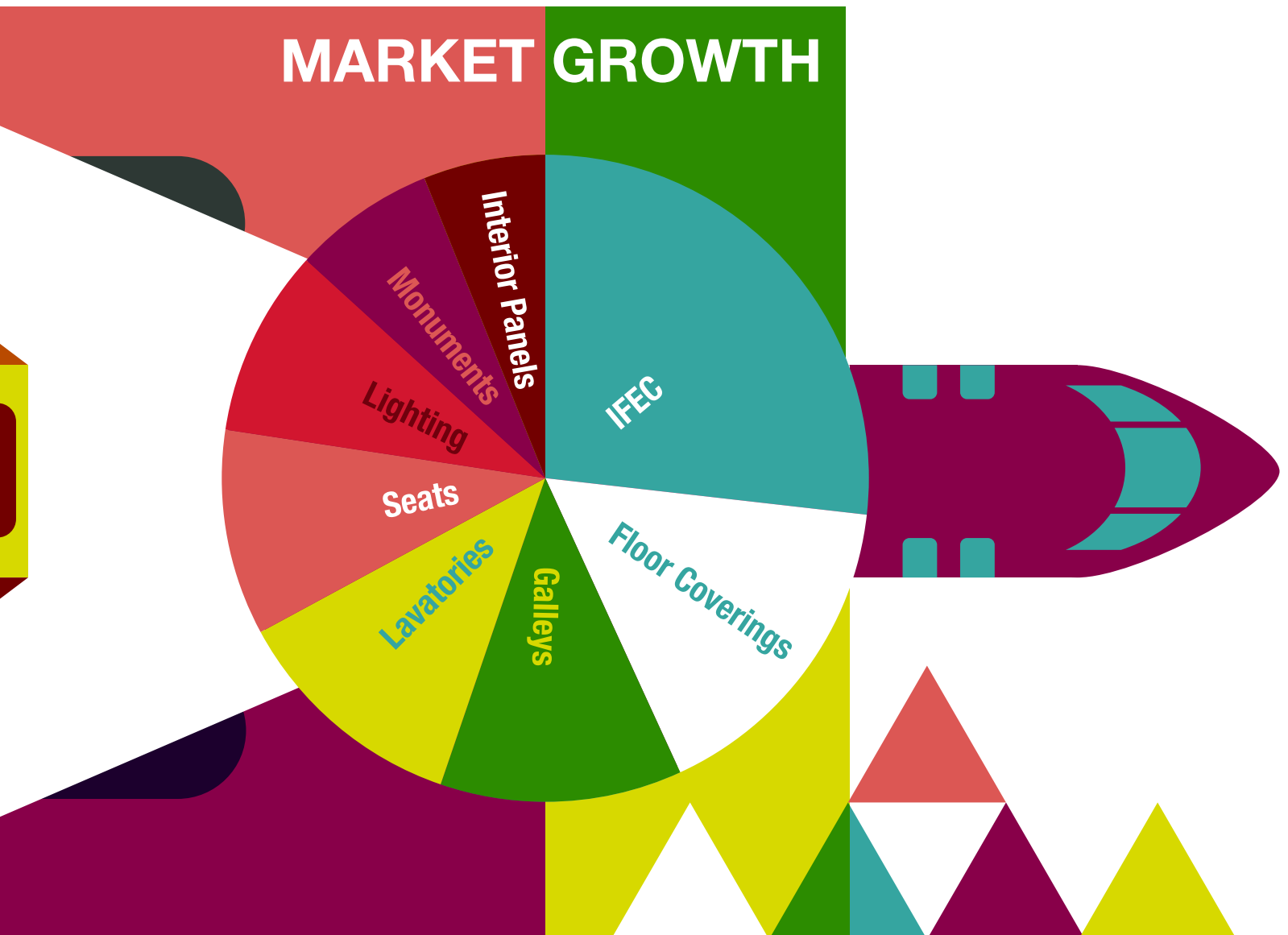
Business Jet
interiors
INTERNATIONAL



growth

BUSINESS JET BUILD RATES HAVE LARGELY STABILIZED FROM THE DOWNTURN EXPERIENCED IN 2008 AND STRONG GROWTH IS FORECASTED ACROSS THE INTERIORS INDUSTRY

*Words by Jon Lundberg and Ben Bettell, Counterpoint Market Intelligence
Illustration by Patrick Hruby*



market

There are reasons to be optimistic about the state of the business jet interiors market. More business jets were produced in 2014 than in the past four years. Suppliers of interior products are achieving record profits. Demand for completion centers is holding steady. VIP interior refurbishment remains an attractive market, with more than 350 narrow-body and wide-body VIP aircraft in service.

The aircraft interiors market is perhaps the most dynamic sector in aerospace. Innovations are proceeding at a rapid pace. Business jets have been early adopters of both LED lighting and inflight connectivity, which are now seen as almost standard equipment throughout the industry. Although much of the attention is focused on commercial aircraft, the business jet interior industry is also forecasted to achieve respectable growth.

HighTech Finishing

Uncompromising Quality / Breathtaking Beauty



HighTech Finishing is the industry leader for truly exquisite aircraft interior decorative plating. Backed by our stringent ISO9001/ AS9100 quality system, HighTech delivers unmatched beauty and lasting durability to any interior project. With 25 years of experience and a wide array of gorgeous finishes, operators across the globe select HighTech for truly superb decorative plating results.

Why risk your decorative plating needs to anyone else? Trust HighTech Finishing and you'll see why the world's aircraft manufacturers, completion centers and interior designers choose HighTech Finishing as their "go to" source for aviation's premier decorative plating.

- *Fastest turn times in the industry*
- *Over 135 finishes to choose from*
- *Exceptional beauty and unmatched durability*



**HIGHTECH
FINISHING**

AVIATION'S INTERIOR PLATING SPECIALISTS

HighTech Finishing | 6201 Royalton | Houston, TX 77081
(713) 666-0550 | (713) 666-3340 fax | (800) 949-0124
Email: sales@htf.net | FAA RS #Q9HR088B

www.htf.net

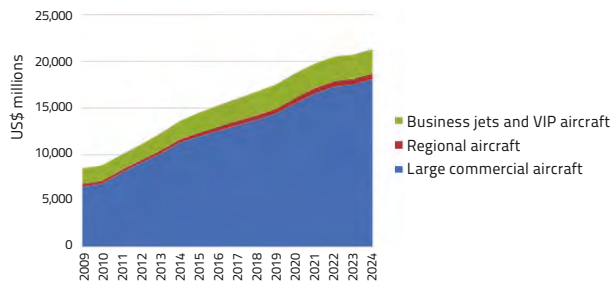


Quality
Craftsmanship
Tradition
Service

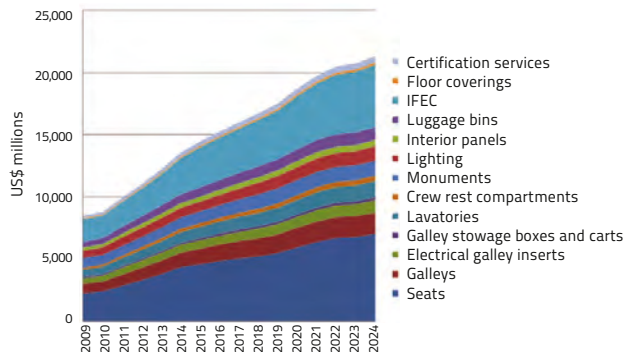
green hides®
LEATHER STUDIO

greenhides.com

THE AIRCRAFT INTERIORS MARKET



THE COMBINED AIRLINE AND BUSINESS AVIATION MARKET BY SEGMENT



THE FIGURES

Following *Commercial Aircraft Interiors 2014*, Counterpoint Market Intelligence has released a new report on the aircraft interiors industry – *Aircraft Interiors 2015*. Overall, the aircraft interiors market is valued at US\$13.5bn, with the business jet and VIP interiors market making up US\$1.9bn of this.

Aircraft Interiors 2015 segments the interiors market into seats, galleys, galley inserts, lavatories, crew rest compartments, monuments, lighting, interior panels, luggage bins, IFEC and floor coverings. The 10-year forecasts for these segments are shown in the graph above.

Counterpoint forecasts that the business jet and VIP interiors market will grow at a compound annual growth rate (CAGR) of 2.9% over the next 10 years – roughly in line with the anticipated growth in other aerospace sectors such as aerostructures. During the same period, Counterpoint forecasts that aerostructures will have a CAGR of 2.8%. Counterpoint forecasts that the overall interiors market will grow at a CAGR of 4.6% over the next 10 years.

SECTOR DIFFERENCES

The differing CAGRs for the various sectors are driven by different aftermarket drivers, different



growth rates by class of aircraft (for example, single aisle versus twin aisle) and increasing market penetration for certain types of system. This explains why IFEC is the fastest-growing sector.

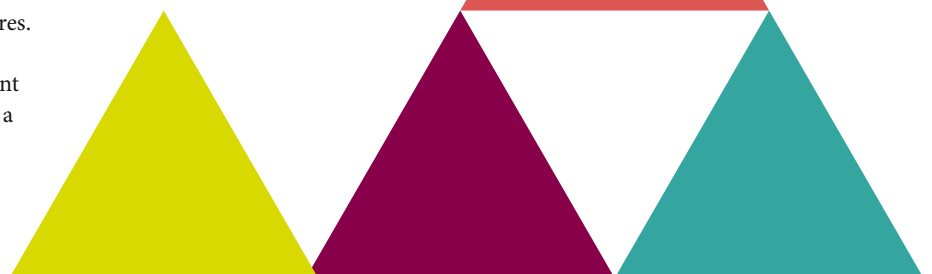
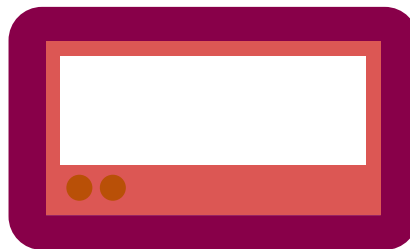
Furthermore, sector growth rates within the business jet and VIP interiors market are often quite different from their counterparts in the commercial aircraft interiors industry. For instance, Counterpoint estimates the total seat market to be worth US\$4.4bn in 2014, comprising commercial aircraft seating at US\$4,155m and business jet and VIP aircraft seating at US\$214m.

The overall business jet seating market shows a CAGR of 1.9% over the period 2014 to 2024. This is considerably less than the commercial aircraft sector and reflects two main factors: the smaller aftermarket in this sector; and the relatively conservative forecasts for growth in the business and VIP jet markets.

ENTERTAINMENT REVOLUTION

Perhaps the most dynamic of the business jet interiors markets analyzed is the US\$642m IFEC market. The past

“The most dynamic of the business jet interiors markets is the US\$642m IFEC market”



“In comparison with many other segments, change is more rapid in aircraft interiors and CAGRs can be a lot higher”



A few years have brought a revolution in consumer electronics, with the success of iPads, smartphones and 4G internet. The IFEC revolution is well underway in business jet interiors, further ahead than the commercial aircraft market.

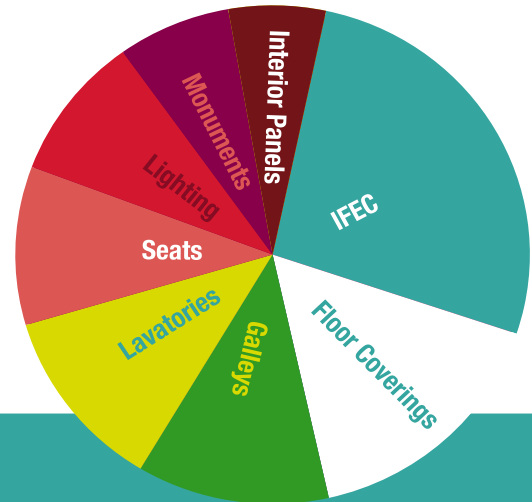
The demand for executives and VIPs to be connected to the internet at all times is relentless. Business flights are seen as productivity enhancers, with executives expecting to have the same degree of connectivity in the air as on the ground. As a result, business jets and VIP aircraft are being turned into virtual offices through the integration of IFEC with CMS.

Passengers on business and VIP jets want to be able to control their environment. Increasingly, the CMS is being used for virtual office applications, whereby passengers can sync their smartphones or tablets with the CMS. This enables passengers to pull up presentations on one of the aircraft displays and to control their environment through their smartphone. Many CMS suppliers have also developed an app for smartphones to enable this.

Instead of an optional extra, IFEC is now considered to be an important standard feature on business jets. As a result of this, the business and VIP jet IFEC market is forecasted to achieve an impressive CAGR of 4.9% between 2014 and 2024.

OPTIMISTIC OUTLOOK

In comparison with many other segments, change is more rapid in aircraft interiors and CAGRs can be a lot higher. While the figures are not as impressive as for the commercial aircraft interiors market, there is plenty of room for optimism as the business jet interiors market recovers from the depressed market conditions that have prevailed since the global economic downturn of 2008. ☒



HOW THESE FIGURES WERE CALCULATED

The growth rates outlined in this article are based on a detailed market model. Counterpoint constructed its model of the aircraft interiors market based on an analysis of all commercial aircraft in service (by type and year of construction) and forecasts for new aircraft deliveries over the next 10 years.

Counterpoint calculated the new aircraft delivery forecast by creating a demand model and reconciled this with the short- to medium-term production plans of the aircraft OEMs and their aircraft order books.

To obtain estimates for the size of the aircraft interiors market and its segments, Counterpoint obtained estimates for the prices of the various interior parts and then estimated the aftermarket both in terms of the frequency of interior retrofits and the rate of demand for spares, which was then applied to Counterpoint's aircraft fleet data and aircraft delivery forecast to give the aftermarket demand by year.

Counterpoint then analyzed the players in the market, identifying their annual sales, contracts, number of employees and floor space, enabling validation of the market sizes and estimation of market shares. Counterpoint tested its assumptions, dependencies and forecasts through discussions with many people across the global aircraft interiors industry.





getabackbone

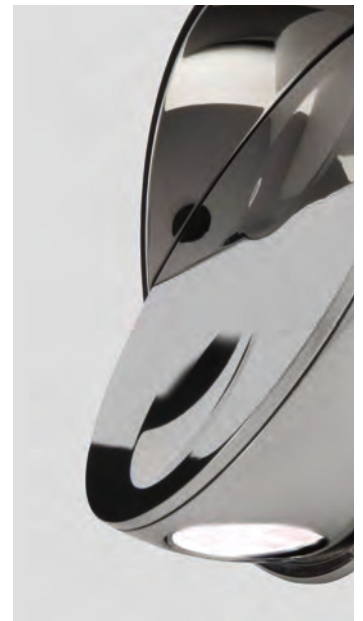
AVDS Streaming

DRM protected streaming; replace personal monitors; add-on to nearly any system, PED IFE bliss. inquiries to sales@in-advantage.com

1080P, 4K, Audio and Gigabit Ethernet over fiber

500+ AVDS Aircraft and Counting

www.in-advantage.com



WE DESIGN, ENGINEER AND MANUFACTURE
THE ULTIMATE AEROSPACE READING LIGHTS.

Beadlight®

A E R O S P A C E

Tel: +441993 868866
Web: www.beadlight.com
Email: contact@beadlight.com
Located: Oxfordshire, Great Britain

COME SEE US!

AIX AMERICAS STAND 122 - NOV. 4-5

NBAA LAS VEGAS BOOTH C6829 - NOV. 17-19

PMA APPROVED LAMPS FOR THE AIRCRAFT BELOW:

Cessna 560XL
Bombardier CL600
New Learjet 35
Gulfstream 100
EMB 120
G IV
Falcon 2000
Learjet 31
Cessna 750
Sabreliner 265
Falcon 50
Hawker 700
New Learjet 45
Bombardier CL601
Hawker 600
Cessna 551

New Hawker 900XP
Cessna 550
New Global Express
Learjet 25
Pilatus PC-12
Beechcraft 400A
Cessna 552
Learjet 55
Hawker 800
Gulfstream 200

Falcon 900
Astra SPX
New Cessna 525A
Hawker 1000
New Gulfstream GV
1125 Westwind
Hawker 800

New Hawker 800XP
New Cessna 560
New Hawker 850XP
New Learjet 36

SAAB 340
Bombardier CL604

WWW.AIRCRAFTLIGHTING.COM

TEL: (631) 474-2254 FAX: (631) 474-0355 E-MAIL: SALES@AIRCRAFTLIGHTING.COM



ACE
AIR CABIN ENGINEERING, INC.
Specializing in Custom Aircraft Interiors Since 1981.
231 W. Blueridge Ave. Orange, California 92865
(714) 637-4111 Fax: (714) 637-4188
info@aircabin.com
FAA Repair Station Certificate QTVR227Y

ACE Product Line

- Powered Hi Lo Tables
- Manual Hi Lo Tables
- Flat Pocket Doors
- Curved Pocket Doors
- Bulkhead/Partition Systems
- Removable Deco Panels
- Refrigerator/Freezer Units
- Turn Key Custom Galleys
- Plug In Sideedge Tables
- Sideedge Pullout Tables

www.aircabin.com

CONTENTS

064

The interior design team at Pentastar Aviation recently developed a lift mechanism for a 42in monitor

066

Developing a great audio system integration starts with Alto Aviation's commitment to wow each of its clients

068

A focus on delivering top quality and excellent customer service drives all of Signature Plating's projects

070

In-house rapid prototype and testing capabilities, and a willingness to collaborate with customers, led to two recent hardware innovations by Actron Manufacturing

LIFT OFF

The interior design team at Pentastar Aviation recently developed a lift mechanism for a 42in monitor

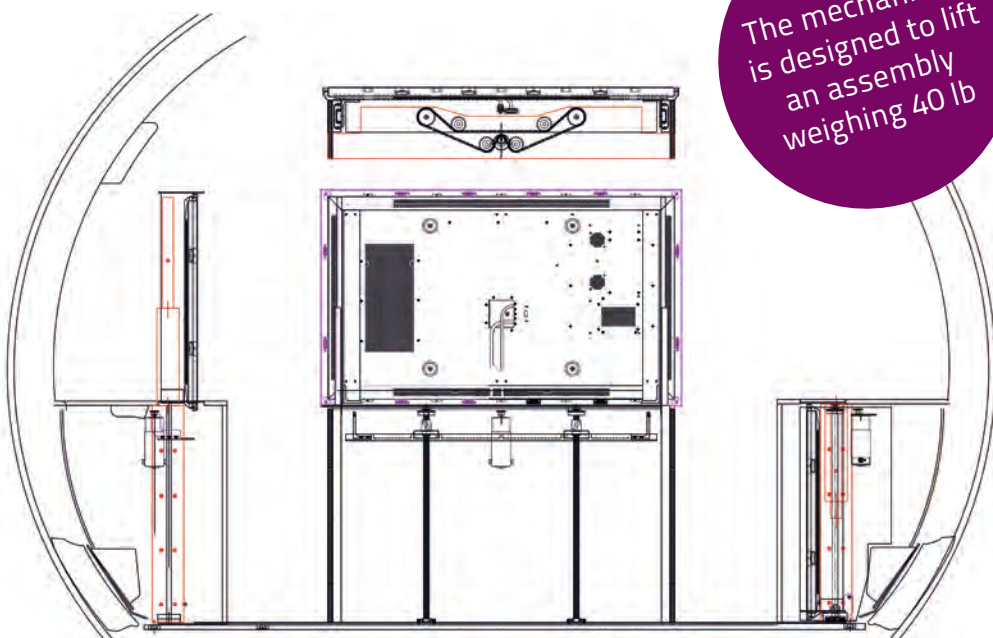
Customers sometimes ask for impossible-to-execute features for their aircraft interiors, and sometimes they ask for what only seems to be impossible. The aircraft interior design team at Pentastar Aviation in Waterford, Michigan, USA, recently encountered the latter case. The team was approached by a customer who was having trouble finding a company to install a 42in TV monitor on his G550. The customer wanted the monitor to emerge from a credenza.

"As the industry standard for a lift screen is typically 32in, the customer was left to think it would be impossible," says Gordon Ross, director of interiors at Pentastar Aviation. "But our interior design team looks at such obstacles as exciting challenges and works to find the right solution. After taking some measurements, the project lead, the design engineer and I concluded that this installation could indeed be done, and with several options in hand, we approached the customer."

The team began the research and development phase. "We reviewed the designs, made the necessary modifications and were approved to move forward," says Ross. "It took us about six weeks to go from a concept to a working prototype. The installation is going to take about four weeks."

The assembly is made of a combination of composites and billet aluminum. An electric, quiet-drive motor will lift the 40 lb assembly out of the credenza using less than 1A of power. Full electric deployment and stow is achieved in under 20 seconds. It also has a fast-release capability to quickly stow the unit in case of an emergency.

The lift mechanism uses the structure of the airframe and the credenza for stability. All wires are hidden and the assembly structure is concealed by



ABOVE: A DRAWING SHOWING HOW THE MONITOR LIFT WOULD BE PLACED WITHIN THE G550 CABIN

LEFT: PENTASTAR AVIATION'S IN-HOUSE CAPABILITIES INCLUDE CABINETRY AND UPHOLSTERY

panels that match the aircraft's interior. It is activated by the CMS, operated from control pads within the cabin.

"The mechanism works just as we anticipated," comments Ross. "To be able to do this with a 40 lb, 42in monitor is an achievement. There are only a few monitor lift mechanisms available in the business jet industry – produced by specialized companies – and usually a 32in monitor is the limit."

Pentastar Aviation is a full-service aviation company. Therefore, while the G550 is in the shop for the monitor installation, it will be possible to have

scheduled maintenance or other work done concurrently, minimizing downtime.

"We are known in the industry for being a boutique shop with extensive capabilities on aircraft of all sizes," says Ross. "This sort of project shows that we have the engineering and design ingenuity to do things that other companies don't think are possible or aren't willing to attempt." ❖

FREE READER INQUIRY SERVICE

To request more details from Pentastar Aviation, visit www.ukipme.com/info/aimbj

Insights of Experience

from Pentastar Aviation®

"In this industry, you'll succeed if you have a true passion for your work. Our success lies in the pride we take in the little things. You can tell a true craftsman by the details. We work one-on-one with our customers to ensure every detail of their project exceeds their standards, and ours – from the first stitch to the last."

Gordon Ross, Affiliate IIDA
Director of Aircraft Interiors
25 years of experience



PRIVATE JET CHARTER ■ AIRCRAFT MANAGEMENT ■ ADVISORY SERVICES
AIRCRAFT MAINTENANCE ■ AVIONICS SERVICES ■ INTERIOR SERVICES ■ FBO SERVICES

©2015 Pentastar Aviation. Private jet charter services provided by Pentastar Aviation Charter, Inc.

Learn more about what the exceptional people at Pentastar Aviation have to offer. www.pentastaraviation.com/insights 1-800-662-9612



IN CONCERT

Developing a great audio system integration starts with Alto Aviation's commitment to wow each one of its clients

It is Alto's mission to design and manufacture premium cabin entertainment systems capable of providing the most amazing sonic experiences on board any size of aircraft. At the start of each project, Alto's engineers team up with MRO and OEM engineers, aircraft managers, directors of maintenance, pilots and interior designers to ensure that the optimal audio components are specified in terms of functional and aesthetic requirements.

The optimum audio system will ensure great stereo imaging and proper sound balance throughout the cabin. The placement of speakers is very important in achieving this. "It is always desirable to keep the main speakers in front of the passenger's seating positions and to avoid placing speakers close to the passenger's ear," says Steve Scarlata, co-founder of Alto Aviation.

The company also distributes several subwoofers, with the aim of achieving bass balance in all listening positions and avoiding bass weak spots. "A good rule is to install at least one subwoofer for every four seats," reveals Scarlata. "Placing them between opposite-facing seat rows works well."

The company places surround-sound speakers behind the seats. "The nVelop digital surround sound system ensures a superb surround sound experience in every seat of the cabin," says Scarlata.

For small aircraft of 4-8 seats, space is at a premium. "In addition, the budget for

Equipment, its placement and tuning are all vital in creating optimum sound

RIGHT: ALTO OFFERS EVERY COMPONENT NEEDED FOR ONBOARD AUDIO SYSTEMS

BELOW: ALTO ACAPELLA KEYPADS



IFE is often much more constrained than for larger aircraft," says Scarlata. "Small aircraft also tend to have more cabin noise during flight. It can be a particular challenge to find locations to mount speakers that provide a good sound balance throughout the cabin."

The Alto Acapella series of amplifiers is designed to offer easy-to-install components optimized for smaller cabins. Surface mount speakers and keypad controls are designed to allow for perfect integration without the need for panel or woodwork modifications. Diverse subwoofer models provide many options for under-seat, bulkhead, divan or side-panel mounting. "A family of amplifiers with high-power speaker outputs and headphone outputs, and multiple source inputs, provides the backbone for a flexible and cost-effective solution without compromise," says Kevin Hayes, vice president of sales at Alto.

An alternative for customers choosing not to install cabin loudspeakers is the Alto Acapella headphone system. "Combined with the Alto-Bose QC-15 noise-canceling headphones, this system offers every passenger a crystal clear, noise-free audio environment with adaptable, elegant controls," says Hayes.

For medium to large aircraft with 8-16 seats, it is common to find CMS with

integrated audio. Alto has a diverse line of products to interface with any CMS. The Forte line of amplifiers offers AC- and DC-powered models with eight channels of speaker outputs, optional integrated page/chime modules and custom interfaces. Alto also offers more than 100 loudspeaker models, including many direct-replacement units.

For big iron aircraft, which are highly customized, Alto works closely with the interior designers to insure that speaker placement doesn't interfere with ceiling fixtures or monuments, but still achieves the sound experience required.

"Achieving a superb audio experience is about more than using the right components," says Scarlata. "Every cabin is a unique and complex acoustic environment. Each audio system requires careful tuning and acoustic alignment to bring out the magic."

Alto's engineers create a complete acoustic map for every installation, measuring the acoustic response of every speaker in every seat, and carefully adjusting every parameter in their efforts to ensure the best results possible. ✕



FREE READER INQUIRY SERVICE

To request more details from Alto Aviation, visit www.ukipme.com/info/aimbj



Premium Cabin Entertainment Systems from King Air to Boeing 777 and every aircraft in between.



Let us welcome your aircraft to the ALTO Sound™ experience.

ALTO Aviation offers a complete line of loudspeakers, amplifiers, subwoofers, surround sound, passenger controls and page/chime systems, tuned by ALTO engineers to provide each cabin with the most powerful sonic experience.

From full turnkey audio systems optimized for smaller cabins to our signature ALTO nVELOP™ digital surround sound, all ALTO installations are scalable to any size aircraft, from turboprops to the biggest irons, and every aircraft in between.



ALTO ACAPELLA™ SERIES

IFE • LOUDSPEAKERS • SUBWOOFERS • AMPLIFIERS • SURROUND • PAGE/CHIME • HEADPHONES • PASSENGER CONTROL SYSTEMS



800 • 814 • 0123



sales@altoaviation.com



altoaviation.com



CENTER OF ATTENTION

A focus on delivering top quality and customer service drives all of Signature Plating's projects

When Signature Plating opened its doors for production 15 years ago, it was with the goal of providing both superb quality and excellent customer service. The founders have more than 90 years of combined experience in such areas as interior design and the manufacture of aircraft seatbelts. "We were confident we could learn plating and believed that our customer service would give us the edge," says Frank McKnight, chief financial officer and co-owner of the company.

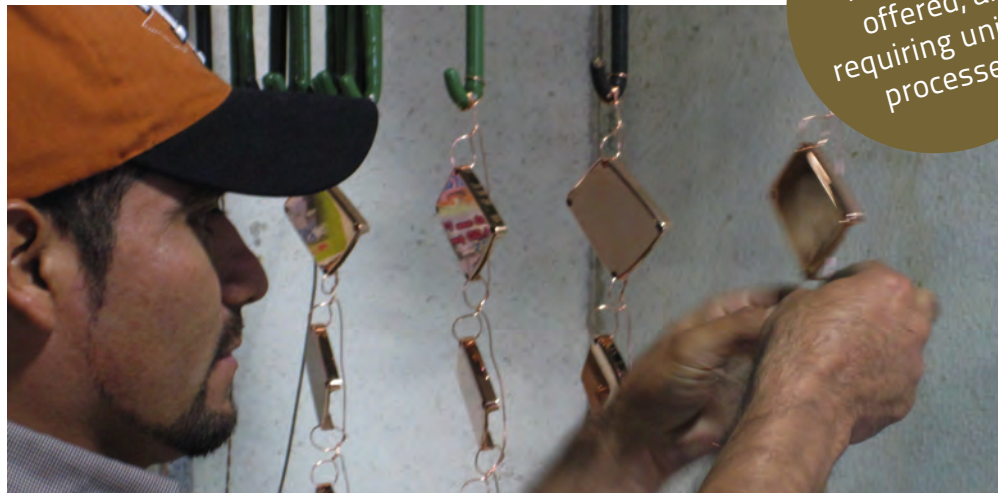
In the early years, Signature dealt with the bumps and bruises of learning a completely different area of the industry than it was accustomed to. Ensuring all equipment and baths worked optimally was a big part of this. Attracting top-notch experienced staff was equally challenging. "There's a reason why there are so few platers specializing in this area," says Larry Donoho, president and co-owner at Signature. "Our personnel need to be like artists."

ATTRACTING TALENT

Signature spread the word that it was building its team. "People began showing interest because our previous venture had a strong reputation as a great place to work," says Donoho. "In our previous company, which made seatbelts for 25 years, the average employee stayed 13 years, which is unheard of in today's world of work."

The wide range of benefits offered to Signature employees includes having their birthday off, paid. Signature says more than 50 seasoned individuals are on a waiting list to join the team. "This aligns beautifully with our growth plans," says Paul Sahanek, vice president and production manager at the company.

Signature usually operates at about 30% of its facility's capacity. "This has



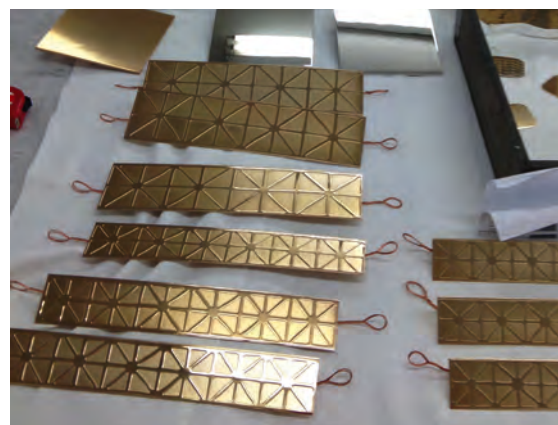
More than 150 finishes are offered, all requiring unique processes

been one of our top selling tools," says Christopher Donoho, director of business development at the company. "There are some other great platers out there, but customers tell us these vendors are often fully booked and cannot meet their turn times. As we are never working at full capacity, we can take on these projects. It gives us a golden opportunity, because once a customer experiences our quality and customer service, they are convinced, and a true partnership is started."

Within the last nine months, Signature has completed work for multiple ACJs and BBJs, including a BBJ 747-8 and a BBJ 747 refurbishment; several Gulfstreams and Dassault Falcons; and Bombardier Learjet refurbishments, along with partial refurbishment projects. It is also nearing the completion of a BBJ 787 project.

THE PLATING PROCESS

There are many challenges to face in creating beauty and durability of decorative plating. DC electricity is passed through the part (which has to either be placed on a rack or wired) and a metallic solution to make the deposit adhere to the base material.



Maintaining optimal baths is critical to providing a consistent color and luster. "Ensuring the chemistry of the bath, along with the entire electrical process, requires constant attention," says Francisco Diaz, a senior plater at the company, with more than 40 years of plating experience. A seasoned chemist is responsible for the titration and chemical maintenance of each bath.

Up to 70% of parts have to be disassembled before the plating process and then reassembled afterward. Tolerances have to be maintained to ensure proper fit and maintain the



RIGHT: SIGNATURE PLATING CAN UNDERTAKE COMPLEX AND CUSTOM PROJECTS SUCH AS THIS BOWL

integrity of the part. Safety-critical parts are processed in a special way, with tolerance checks after each step.

COMMUNICATION SKILLS

Customer service is a key focus, which makes detailed production planning a necessity. Customers are provided with a status update and shipping report every evening, in preparation for the next day. This process is managed by three customer liaisons.

The company says detailed planning is the key to delivering a project on time and to the required quality. The team is empowered with real-time order status

tools on their smartphones and desktops. Order status and relevant issues are instantly available to all pertinent staff the moment an order progresses or an issue is identified. The company says this order status tool has improved its productivity threefold.

Large projects, for ACJ and BBJ aircraft, require a lot more management. Signature makes detailed plating projections down to the last screw, and makes regular on-site visits throughout the project. "The plater interacts with most, if not all, the other interior vendors on a project, and Signature truly exemplifies the partnership that should

be between the completion center, their suppliers and the plater," says McKnight.

The company is prepared to grow the team to increase capacity, but it will be done strategically. "It's important that we build the team with security for our employees," says McKnight. "We want to avoid massive layoffs. If that means our bottom line is impacted a little, so be it. People work better knowing they have a job to come to each and every day." ❖

FREE READER INQUIRY SERVICE

To request more details from Signature Plating, visit www.ukipme.com/info/aimbj



SIGNATURE PLATING

We're honest, dependable and dedicated. We'll give you the best product available. And we'll impress you with our customer service. But most importantly, your job will be done right – on time and on budget – every time. These qualities set us apart in the plating industry.

- **Aviation's Most Celebrated Decorative Plating**
- **Beautiful Quality**
- **Industry leading turn time**
- **Unmatched customer service**
- **24 hour AOG service**



DUAL DEVELOPMENTS

In-house rapid prototype and testing capabilities and a willingness to collaborate with customers led to two recent hardware innovations by Actron Manufacturing

Rather than focus on one distinct hardware application, Actron Manufacturing specializes in slides, latches and strikers. Recently, the company's new wire strike system was chosen by a large OEM. "Fascia panel damage has plagued furniture manufacturers for years," says Jason Rechberg, vice president at the company. "Our customers spend tens of thousands of dollars repairing cracked panels."

Conventional wire strikes consist of a formed stainless-steel wire sandwiched between two aluminum plates. "Over time, this assembly loosens and the wire migrates," says Rechberg. "Eventually the wire sticks out too far and prevents the drawer from closing. The owner's initial reaction is to slam the drawer harder, which cracks the laminate. The only remedy is to replace the entire panel."

The new wire strike is designed to prevent façade damage and to be much easier to install. "Our customer wanted to retrofit the wire strike, so we designed the inner mechanism to work within their parameters," says Rechberg. "Parameters including depth, wire length and adjustability were fine-tuned to eliminate the need for multiple configurations."

The new striker features two mounting holes in the center, which match the exact pattern of conventional strikers. Installers are able to adjust the wire length and stop distance from the front using two precision adjustable socket screws, then tighten a set screw to lock the socket screw in place. "This patented design creates a robust mechanism capable of meeting high load requirements," says Rechberg.

RAPID PROTOTYPING

During the project, Actron made use of its in-house rapid prototype capability. "We have a designated prototype work cell,



Actron has more than 40 years' experience in the aerospace hardware business



ABOVE LEFT: A CONVENTIONAL WIRE STRIKE FOR AIRCRAFT CABINTRY

ABOVE: THE NEW, ADJUSTABLE WIRE STRIKE

outside of our production line," says Rechberg. "This means we can provide a fully functional prototype in as little as a week. In addition, these prototypes are test-ready because they are made from their intended design material, often aluminum or stainless steel. Additive layer rapid prototyping machines are not capable of providing the same results."

Actron then proceeded to the testing phase, using an in-house test lab capable of running multiple endurance and abuse tests simultaneously. The customer requirement for the striker was for it to take a load of 200 lb. "Using our load cell machine, we applied a tension load directly to the wire," says Rechberg. "The striker showed no signs of deformation after applying 300 lb, surpassing the initial target. We continued to test until failure. Surprisingly, the striker continued

to hold (though there was some deformation to the wire) until 650 lb, which is when the wire finally broke. After additional endurance testing, the design was proven to be effective; the customer's mock-up showed absolutely no signs of damage."

LIGHTWEIGHT SLIDE

Actron was also recently chosen by another large jet manufacturer to develop a new slide design. "Our A5210 and A5510 series have been the standard for the aerospace industry," says Rechberg.



ABOVE: THE NEW SLIDES, WHICH ARE DESIGNED TO WEIGH LESS AND OPERATE MORE QUIETLY THAN CURRENT SOLUTIONS

"Recently, we introduced versions of these that offer the same strength but weigh 19% less."

The customer was also looking for noise reduction. "When the current slide is fully extended, the ball bearings and spacers hit the metal stop pins, creating a loud clicking noise," says Rechberg. "We have developed a durable rubber spacer that eliminates the metal to plastic contact points. The result is a muted sound and dampened feel when the slide is extended and retracted."

As with the wire strike, additional abuse testing was required. Engineers were also concerned with safety loads during a possible impact. Actron performed multiple safety load tests (slowly applying 100 lb increments and holding for one minute) in the extended and closed position. "Both slides performed well," says Rechberg. "One was tested to 1,500 lb in the retracted position without sign of permanent set."

Both designs were made possible through close collaboration with the

customers' engineering teams. "Thanks to our in-house prototype and testing capabilities, we were able to provide results and the final product quickly," says Rechberg. "Furthermore, our focus on high quality, competitive pricing and short lead time helped to secure the confidence of our customers." ❖

FREE READER INQUIRY SERVICE

To request more details from Actron Manufacturing, visit www.ukipme.com/info/aimbj



Actron
Quality Engineered Hardware

**The # 1 Choice for Superior Quality
Aircraft Interior Hardware**



www.actronmfginc.com
Actron® Manufacturing Inc.
1841 Railroad St., Corona, CA 92880
tel: 951.371.0885 fax: 951.371.1288

**Visit us at Aircraft Interiors Expo-
Hamburg, Germany - April 5-7, 2016**

**Custom-Engineered • Robust Designs • Endurance-Tested
Full Range of Sizes, Styles, and Finishes • Made in the U.S.A.**



tile style

INDONESIAN RESTAURANT LEMONGRASS ACHIEVES MUCH OF ITS VIBRANCY FROM ITS BEAUTIFUL USE OF MOSAICS

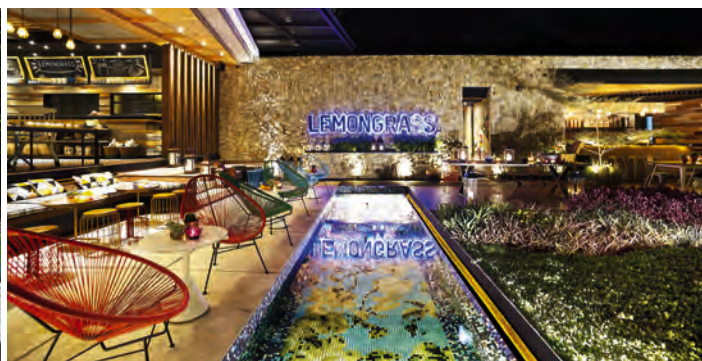
This colorful restaurant, which opened in February 2015, takes its inspiration from its location in Bogor, West Java, Indonesia. Designer Leo Einstein Franciscus, of Einstein & Associates, set out to design a tropical paradise.

The 1,300m² restaurant is set at the center of a tropical garden, and diners must make their way through a narrow 'jungle corridor' to access it. There are indoor and outdoor dining spaces on both levels, and tropical plants break down the boundaries between inside and out. A relaxed ambience is cultivated through an

open-plan design, including an open kitchen.

Franciscus's favorite detail is the peacock mosaic floor, which is used on the ground level to mark a path between the main and alfresco dining areas. Mosaics were also used to create blue floral designs for the outdoor pool and on the second floor.

Terracotta tiles, cream terrazzo stone and raw concrete create a neutral backdrop for the restaurant's vibrant colors. Other details include a birdcage chandelier, recycled plywood walls and brass accents. ☒



PHOTOS: WILLIAM KALENGKONGAN

OTHER EYE-CATCHING DESIGNS FROM VARIOUS INDUSTRIES...



- 1 This spa concept was designed by Trend to showcase its Murrine collection of pre-formatted mosaic panels. Each panel is compiled from 1cm x 1cm glass tiles. The compositions were inspired by historic Venetian murrine.



- 2 A retail concept featuring Artai's Cloudburst Deep Turquoise tile pattern from the Splash! mosaic collection, showing how a mosaic composition could be used to create a striking design feature. The pattern here is created from 3/4in vitreous glass tiles.



- 3 A tiled mirror creates a subtle pattern in the dining area of the 47m M/Y Entourage yacht. The interior was designed by Dragana Maznic in collaboration with the manufacturer, Admiral Centro Stile. The design is light and modern, making good use of a variety of textures.

Jormac Aerospace and Cabin Innovations are now...



Advent Aerospace, Inc.

A More Experienced Team in a Competitive World.

At Advent Aerospace, we've brought the best of what Jormac Aerospace and Cabin Innovations have to offer under one name, with singular focus.

Whether you are looking for installation fittings, ECS parts, metallic or composite tie-rods, latches and hinges, or VIP aircraft monuments, liner systems and complete turnkey galleys, Advent Aerospace is committed to providing you with superior quality and workmanship.

Advent's program management capabilities eliminate the challenges associated with scope creep, schedule overruns and profit drain. Our seasoned designers, engineers and craftsmen work with you to define your needs precisely, so your project finishes on-time, on-budget, with no surprises at the end. When you want your project done right,

Make Sure It's Advent.

www.AdventAerospace.com



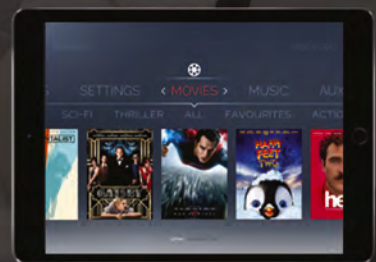
Advent Aerospace, Inc.

DRM Approved AVOD System



CMS

HD Inflight
Entertainment
Connectivity



FULL IP
Get access to Early Window Content



ASTRONICS
PGA AVIONICS