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APRIL 2017



EBACE
PREVIEW

Turn to page 77
for the products
and trends to
watch out for

WHAT'S NEXT FOR IFE?

EVERYTHING YOU NEED TO
KNOW ABOUT THE CONSUMER
TECHNOLOGIES PASSENGERS
WANT BROUGHT ON BOARD

CITATION HEMISPHERE

How customers helped to design the interior
of Textron Aviation's first large-cabin jet

SUPERSONIC INTERIORS

The technical challenges facing developers of the
new generation of supersonic business jet interiors

REMANUFACTURING

From a financial standpoint, which aircraft type
is the best candidate to make good as new?



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GAME TIME

In the Whac-a-Mole game of endeavoring to integrate the latest consumer entertainment technologies on board, it can be difficult to know which moles to aim for. Some technologies, which once seemed to be the next big thing, turn out to be a passing fad, and others are all too quickly superseded by superior versions. Still, customers expect a seamless transition of functionality and luxury from their home to their car and aircraft, and so the game continues.

In the feature on page 18 we assess the latest generation of screen and other entertainment technologies and see how best to implement them on board private jets. One of the most exciting trends in the consumer market, particularly in luxury cars, is the advent of gesture and voice control. While we've already seen some sign of the former in the aviation sphere (Vision Systems' gesture-controlled electronically dimmable window springs to

mind), it seems voice control may be trickier to translate into the cabin given the number of passengers that an aircraft can carry. It will be fascinating to see if any developments are unveiled at EBACE this year – turn to page 77 for a preview of what exhibitors have lined up.

One company working to create a truly different entertainment experience on board is Spike Aerospace, with its S-512 supersonic business jet. Massive displays would replace most windows on board, showing everything from a scenic panorama to images from external cameras, IFE content and business presentations. The feature on page 36 examines what particular technical challenges Spike Aerospace – and Aerion with its AS2 – could face in creating interiors for their supersonic business jets, with words of advice from people involved in the development of Concorde. Although it may be challenging to hit the mole on the head, it's always worth going for the highest score.

Izzy Kington, editor



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Wheels up

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

- 008 **Pinboard:** The industry's hottest recent designs presented in one place, plus some exciting product launches
- 010 **News in Focus:** Flying Colours Corp discusses the conversion of two CRJ200s for Resorts World of Malaysia
- 012 **Completions Roundup:** This quarter's announcements from completion centers around the world
- 014 **Cleared for Take-off:** The Dassault Falcon 8X entered service in October 2016. What's on board and what changed during the development?
- 016 **Design Brief:** A BBJ 777-300ER cabin by Unique Aircraft and Boeing Business Jets that incorporates hidden monitors and screens that switch between transparent and opaque

Features

- 18** **IFE DEVELOPMENTS**
What potential do the latest home entertainment technologies hold for private jets?
- 26** **CITATION HEMISPHERE**
Customer feedback was vital to Textron Aviation in its endeavor to expand into the large-cabin segment with a clean-sheet interior
- 36** **SUPERSONIC JETS**
Supersonic business jet developers are promising interiors as enticing as their journey times
- 44** **LEGACY AND LINEAGE**
Recent updates to Embraer's Legacy 650E focus on the practicality of this popular charter and business workhorse, while a more opulent but still business-oriented design has been created for the Lineage 1000E
- 50** **REMANUFACTURING**
A remanufactured aircraft could offer better performance than a used aircraft for millions of dollars less than a new one – but it's not a formula that works for every jet

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- 58** **CRYSTAL AIRCRUISES**
Known for its luxury cruises, Crystal will soon offer around-the-world flights using a Boeing 777-200LR converted by Greenpoint Technologies

- 64** **FALCON 900LX**
The Falcon 900LX has a loyal customer base, so in updating the aircraft's technologies and styling, Dassault had to be careful not to lose its original appeal

- 70** **DESIGN TRENDS**
Ahead of EBACE 2017, leading designers from Europe's VIP design houses, completion centers and an aircraft manufacturer discuss the factors impacting their work

- 77** **EBACE PREVIEW**
Our guide to the innovations not to miss at EBACE 2017, to be held in Geneva, Switzerland, on May 22-24

- 84** **SOFT FURNISHINGS**
The latest and greatest materials to provide a luxurious finish to your private jet – plus the key trends influencing cabin design today



089



092



095

- 089** **PRODUCTS AND SERVICES**
The latest product news from our advertisers

- 103** **INDEX TO ADVERTISERS**

- 104** **DESIGN SPY**
The best designs from other sectors, including a luxury car with interesting upholstery ideas

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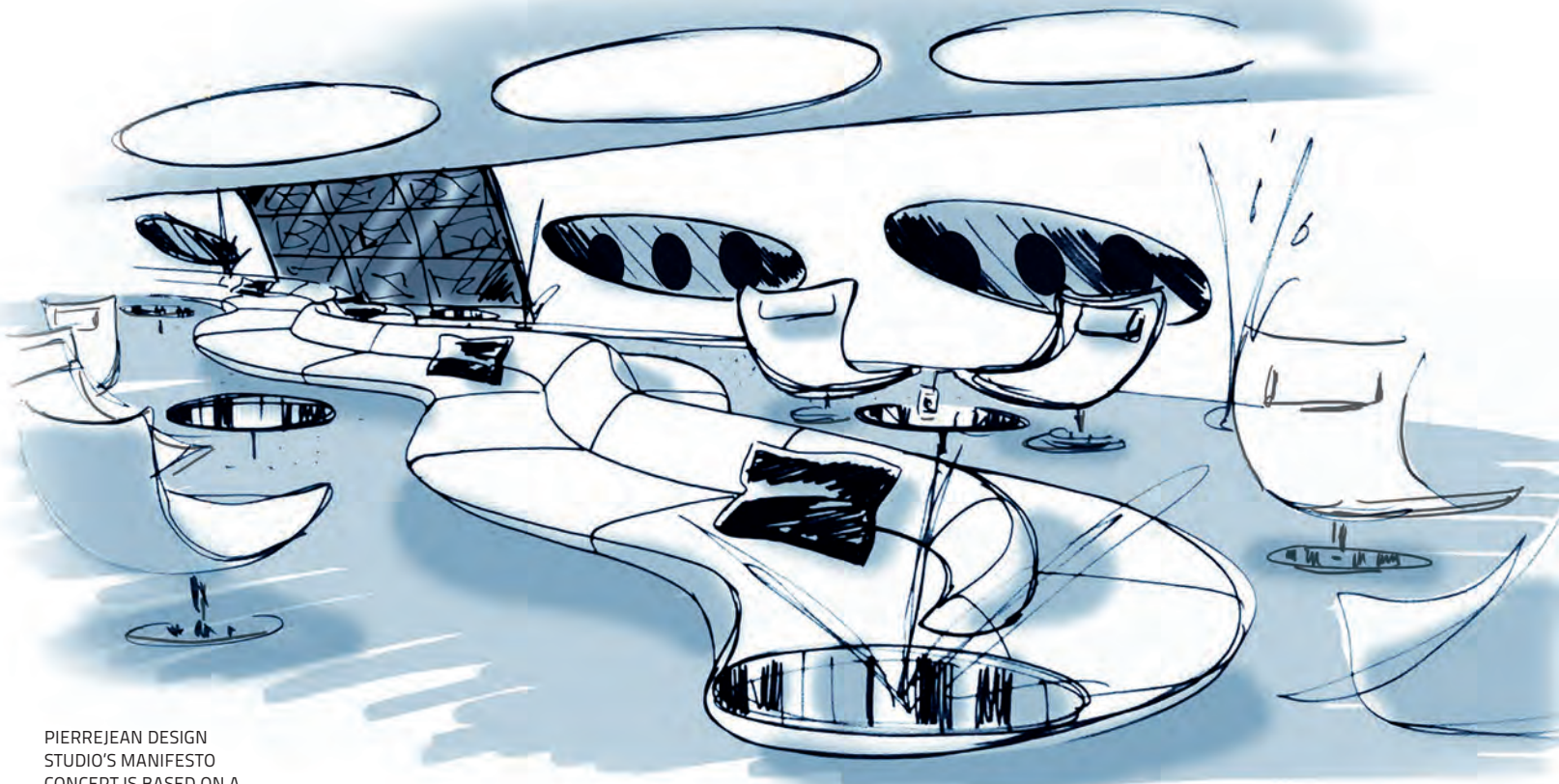
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LAUNCHES



1



2



3

1. USING THE GLASS CABIN 3D MAP FROM FDS AVIONICS, PASSENGERS CAN POINT THEIR TABLETS AND SMARTPHONES LEFT, RIGHT, UP OR DOWN TO SEE THE SURROUNDING TERRAIN IN THAT DIRECTION
2. LUFTHANSA TECHNIK'S FIRST KA-BAND RADOME, ENABLING THE INSTALLATION OF KA-BAND ANTENNAS ON THE BBJ 737-700 AND BBJ 737-800
3. A NEW MECHANICALLY OPERATED TRACK AND SWIVEL SEAT, CERTIFIED FOR 9G AND 16G AIRCRAFT, FROM STARLING AEROSPACE

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TWO CRJ200S CONVERTED FOR RESORTS WORLD OF MALAYSIA

Resorts World of Malaysia is a leisure and hospitality business that required two aircraft capable of transporting its VIP clients in a luxurious environment. The aircraft interiors had to be stylish but also practical and durable, as the company anticipated high usage. The aircraft also had to be acquired within a reasonable budget. The company concluded that Flying Colours' ExecLiner program, whereby the CRJ200 regional airliner aircraft is converted to have an executive VIP format, fitted its needs perfectly.

It was the first time that Flying Colours had worked for this customer. The aircraft were delivered back to the client in August 2016. Flying Colours worked to reproduce similar VIP shuttle interiors for the two aircraft.





Q&A

Scott Duncan

DIRECTOR OF OPERATIONS,
FLYING COLOURS CORP



There are 16 VIP seats, based on new Goodrich VIP seat frames upholstered in-house with contrasting black and white leather. This scheme blends with gray walls and trim to convey a contemporary look. The layout features one club four and a further 12 seats, six on each side of the cabin. All the seats are fully trackable.



A new CMS from Goodrich was installed. It enables control over cabin equipment including the window shades and the new LED color mood-lighting system, which is from B/E Aerospace.



The galley was upgraded to be easy to use for passengers and attendants. Iacobucci is the espresso machine supplier, and there is also an Enflite refrigerator and cabinets for stowing china, crystal and other serving items.



Improvements in the lavatory include a custom stainless countertop and remote eye faucet intended to look smart while ensuring easy upkeep.



The commercial sidewalls were removed and new CL859 sidewall panels were installed that incorporate pleated blinds for the windows. These shades can be operated independently by each passenger, or by the attendant via the CMS.



Custom-made carpets feature in the seating area, and vinyl flooring was laid in the entrance and lavatory areas, for durability.

What was the brief?

The company required reliable, commodious aircraft to convey important guests over short distances between their destinations, so passenger comfort was paramount.

A lot of thought went into what the customers would actually be doing on board. Execliners are often requested by private owners who have a specific design or layout in mind, or for corporate shuttles that need a functional workspace. This project was a mix of the two, which required us to consider what a leisure traveler, who is probably also a busy executive, would need. That's why we created a spacious feel and included a number of storage opportunities. For example, custom-made sideledges were designed to incorporate drink holders as normal, but can also be raised to reveal storage space next to each seat, for a briefcase or small personal bag, as the busy traveler is likely to carry a computer or portable device. We also made sure that the cargo area has ample room for golf clubs, luggage and other sports gear.

We also focused on flexibility – for example, the galley was designed to be easy to use so Resorts World could retain the services of a flight attendant or let passengers help themselves.

How did the aircraft mission influence the materials?

The customer wanted a durable material for the cabinets so we used a custom glossed laminate in gray. They also wanted a durable non-textile flooring for the entrance and lavatory areas – which will take a lot of wear and tear – so we used a decorative vinyl.

How long did the project take?

VIP shuttle conversions usually take between five and six months, depending on maintenance requirements and the interior reconfiguration. These aircraft had already undergone their 48-month inspections, and had overhauled landing gear and numerous service bulletins, so we were able to complete them within five months.

Were any elements particularly challenging?

We have reconfigured more than 30 of these CRJ200 Execliner VIP conversions, so we are very familiar with how to make the most of the space, and marry the client's needs with the opportunities the cabin presents. We didn't have any real challenges as we had worked on these components and monuments before, and we had also generated the required STCs. It's a real benefit for our clients that we can use our experience to reduce the downtime and complete the work on budget.

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COMPLETIONS ROUNDUP

This quarter's announcements from completion centers around the world

FARNBOROUGH, UK

TAG Aviation is working with Zodiac VIP Business Aircraft Interiors to bolster services ranging from smart repairs to cabinet refurbishment and minor modifications.

BORDEAUX, FRANCE

Sabena Technics celebrated its 10-year anniversary, and was selected by AI Atheer for a VIP ACJ310 refurbishment and C-check. As well as replacing soft goods, the project involves an HD screen upgrade.

BASEL, SWITZERLAND

Jet Aviation's completions facility gained EN9100 certification.

BASEL, SWITZERLAND

Sky Prime tasked AMAC with a private A340 project involving cabin reconfiguration, design and refurbishment, including the installation of Live TV and Ka-band broadband. AMAC will also install Ka-band on a head-of-state A340 and a private BBJ, and has many other contracts for maintenance and cabin work.

EMMEN, SWITZERLAND

RUAG Aviation is working on an EASA STC for 4G LTE connectivity on VVIP helicopters. The company also celebrated five years of EASA Part 21J DOA status, and its Bern-Belp, Switzerland, facility was named an authorized service center for the Dornier 228, offering MRO, refurbishment and system upgrades.

ZURICH, SWITZERLAND

A wide-body ACJ underwent a maintenance check at SR Technics involving cabin removal and reinstallation, and monument repairs.

MUNICH, GERMANY

RUAG Aviation modified the layout, IFE and styling of an Indian-registered Global 5000. The company also refurbished a Challenger 604 during a 192-month MRO inspection.

MUNICH, GERMANY

328 Support Services was approved to undertake modifications and repairs on any Canada-registered Dornier 328.

HAMBURG, GERMANY

Lufthansa Technik equipped an ACJ330 with Ka-band broadband, and is now installing the technology on an A340. The company also re-delivered a second BBJ to Royal Jet with an interior by Edése Doret.

DUBAI, UAE

Jet Aviation in Dubai joined the ACJ Service Center Network, covering line maintenance, retrofits, modifications and system upgrades.

MOSES LAKE, WASHINGTON

Two more VVIP BBJ 787 completions were contracted by Greenpoint Technologies, including the first BBJ 787-9. The company is also customizing a VVIP BBJ 787-8.

ST LOUIS, MISSOURI

Jet Aviation installed ATG-8000 internet under an STC on a Lineage 1000. A second ATG-8000 project is scheduled for April 2017.

EAST ALTON, ILLINOIS

Rockwell Collins' Venue CMS was included on a Global Express refurbishment by West Star. The work also included a reconfigured floorplan, new touchscreen controls, upgraded LED cabin lighting, a belted divan, soft goods and wood accents.

CLEVELAND, OHIO

Constant Aviation performed a 96-month inspection, plus refurbishment and paint work, on a Legacy 600 based in Nigeria. It also acquired StarPort of Orlando, Florida, which offers FBO, maintenance, avionics installations, and interior and paint services.

BATTLE CREEK, MICHIGAN

328 Support Services and Duncan Aviation partnered on a Challenger 604 interior. 328 verified the engineering data and certified the modification with an EASA Part 21 minor change approval. Duncan Aviation undertook the production, installation and testing.

PETERBOROUGH, CANADA

Flying Colours Corp installed the Satcom Direct Router as part of a Global 5000 refurbishment, and a Global 5000 completion for a private Middle Eastern owner.

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THE DASSAULT FALCON 8X ENTERED SERVICE IN OCTOBER 2016. WHAT'S ON BOARD AND WHAT CHANGED ALONG THE COURSE OF THE DEVELOPMENT?

PRESSURIZATION

Cabin pressurization is equivalent to 3,900ft while cruising at around 40,000ft

SLEEP

The aircraft can be configured with up to six sleeping berths



THREE ENTRANCE OPTIONS

Dassault says the redefined entryway and galley area is crucial to the aircraft's flexibility. Three galley sizes are available, including one that is 93in long and incorporates a 78in lie-flat crew berth plus appropriate storage to cater for 14-hour flights. The enlarged forward area can also be used as a lounge/bar.

The two other entryway choices permit either a private VIP stateroom at the rear of the aircraft (which can be converted into a media room with a 32in pop-up screen), or a shower and lavatory in the aft private compartment – while keeping a third lounge. There's also space mid-cabin for a six-seat conference grouping.



WINDOWS

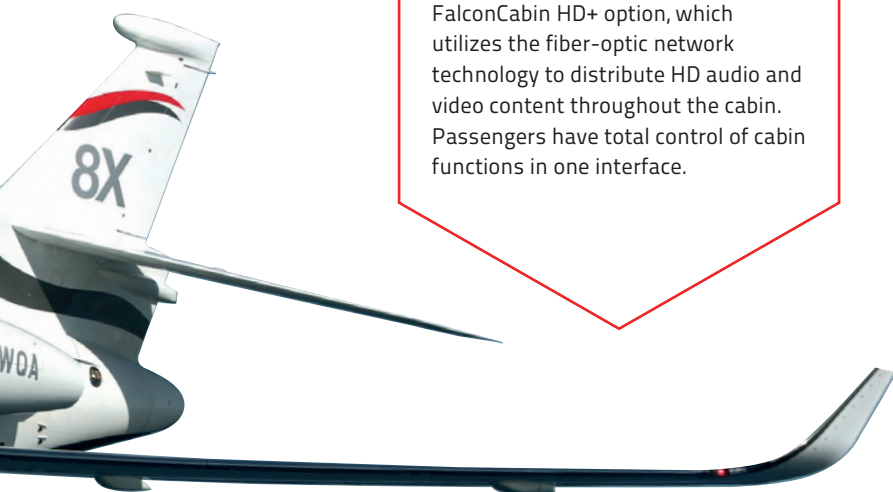
Two additional window rows were incorporated in the forward area (for 32 in total).





CONNECTIVITY

Dassault says its broadband connectivity ensures high-speed access to the internet and corporate networks. The aircraft comes with the Dassault/Rockwell Collins FalconCabin HD+ option, which utilizes the fiber-optic network technology to distribute HD audio and video content throughout the cabin. Passengers have total control of cabin functions in one interface.



CABIN LENGTH

At 42ft 8in, the Falcon 8X's cabin is 3ft 7in longer than that of the 7X, enabling operators to incorporate options they told Dassault they would like in an ultra-long-range business jet: a VIP suite, a variety of seating and conference options, a larger galley work area, and a more comfortable crew rest area. With a width of 7ft 8in and height of 6ft 2in, the cabin has nearly 1,700ft³ of space, allowing Dassault to offer 30 standard configurations.



Q&A



Remi Bachelet

DIRECTOR, AIRCRAFT SPECIFICATION
AND DESIGN, DASSAULT AVIATION

What aspects were particularly challenging about the project?

One challenge was how to integrate the additional cabin space into the baseline Falcon 7X design for maximum passenger and crew work and rest. In effect, the extra 3ft 7in gave us the flexibility for more space in the galley, lounge and VIP areas.

Another challenge of the extra length was weight management. Our engineers shaved nearly 600 lb to balance the additional weight provided by the cabin extension and the extra fuel capacity, while still offering an advantageous payload.

What cabin elements were refined during the development?

We further improved the cabin noise insulation. In fact, the soundproofing improvements engineered into the Falcon 8X make it even quieter than the Falcon 7X, previously the quietest business jet in operation. Dassault engineers created a more effective, yet lighter-weight acoustical insulation package, concentrating noise-absorbing materials at specific locations where the sound levels tend to be the greatest. The result is a further 2dB reduction in cabin sound.

How did you prepare for production?

We added 350,000ft² of production space to the completion facility in Little Rock, Arkansas, a year ago. The centerpiece of this US\$60m project is a new 250,000ft² hangar earmarked for the 8X and the 5X programs.

We delivered the first Falcon 8X in October 2016 to a customer in Athens, Greece, and within almost the first six months we will have delivered aircraft to customers in a dozen countries, including Brazil, Germany, Greece, India, the UAE and the USA. It is quite satisfying to meet the challenge of such a wide range of customers.

emerald aisle



These images are the result of a partnership between Boeing Business Jets, design firm Unique Aircraft and rendering specialist ACA-3D, aimed at showing off the 19ft 3in width and 3,641ft² area of the BBJ 777-300ER cabin, while offering a lively environment. The design alternates between narrow and spacious to exaggerate the effect of the wide fuselage as the passenger enters each new zone.

The design offers a large variety of passenger accommodation – from a private suite to a grand lounge, dining room, guest lounge, private first class mini-suites and a business class area – bringing the total passenger count up to about 75.

Warja Borges, owner, Unique Aircraft, says inspiration came from contemporary luxury hotels: “The timeless design makes use of floor-to-ceiling panels covered with a variety of fabrics, wood, stone and paint: a design language we translated from hotel design into aviation.”

Some of these panels can be switched from opaque to transparent to close off each space or enable the whole width of the fuselage to be seen as required. Light is also used as a space divider. “In lieu of physical separations, floor-mounted lamps create isles of functions throughout the cabin and have a big impact on the ambiance,” comments Borges.

A lot of thought also went into the illuminated ‘design objects’ – particularly a classically inspired multicylinder chandelier in the entrance hall; an arrangement of minimalist overlapping circle fixtures over the dining table; and at the entrance to the guest lounge, a group of illuminated oval rings encircling a central column. Further kit includes whole cabin humidification, curved/hidden OLED monitors, a full cooking top and time-release fragrances.

“New, novel structures such as the transparent panels and the special light fixtures may be the most challenging aspects from an engineering and certification standpoint,” says Borges. “However, none of them are impossible to translate into aviation regulations. In addition, to my knowledge, OLED monitors have not yet been used in business aviation. I am sure this will change relatively quickly, as OLED technology offers lighter weight, a better picture, and the ability to form screens to the often curved walls of aircraft.”

TRANSPARENT DIVIDERS

Ceiling-height transparent dividers separate the lounge from the aisle, while at the same time maintaining a full view across the width of the aircraft. These panels can be changed from transparent to translucent for privacy.



HIDDEN MONITORS

A switched-off 55in screen can dominate a room. To solve this problem in the lounge, the OLED monitors are hidden behind ceiling-height decorative sliding panels. Similarly, in the bedroom the OLED monitor is integrated directly into the transparent room divider and is invisible when switched off.

CARPET

The carpet is designed to visually group elements while maintaining a flowing concept. In the lounge, the swirling carpet design circulates around the center monument, which hosts a hidden pop-up bar.

GUIDED TOUR

Private suite

A king-sized bed is framed by a ceiling-height headboard and two monuments with softly lit cut-outs for treasured items. A curved glass wall with a 65in OLED monitor provides separation from the dressing area. The private bathroom has a curved double-sink washstand, backlit swiveling mirror and a walk-in bisazza-covered shower with steam bath functions.

Grand lounge

This is designed around three seating groups. Floor-mounted lamps provide shoulder-level light. Light cut-outs in the headliner mirror the curvature of the walls.

Dining area

This almost oval-shaped room is dominated by a six-seat centrally mounted dining table. As the space is designed for dinners and meetings, where the focus is inward, lighting fades toward the sparingly mood-lit walls, which are covered in dark fabric to enhance the effect. Priva-lite filled cut-outs in the wall can be opaque or transparent.

Guest lounge/movie room

With two L-shaped divans and two 55in monitors, this lounge doubles as a movie room. The buffet at the aft end of the room can be served directly from the galley behind.

Aft section

The aft features private first-class compartments and lie-flat business seating.





Virtual reality gaming

Passengers are free to take consumer virtual reality (VR) gaming systems including Oculus Rift, HTC Vive and PlayStation VR on board as loose equipment – and these can even be interfaced with the CMS. One of the biggest challenges to overcome is VR sickness. Susceptibility varies between users, but even a short time in VR can induce nausea and other symptoms of motion sickness.

IMPLEMENTATION

High image refresh rates and reduced latency offer at least a partial fix to the problem of VR sickness. "Gulfstream's Audio/Video Distribution System uses fiber-optic cabling to provide HD video content with no data compression or signal latency," says William Gay, director of completion configuration and program management at Gulfstream. "As we look at VR gaming, we should be able to use that technology and avoid signal latency issues."

Dave Crossett, head of sales and marketing for Lufthansa Technik's Original Equipment Innovation division, says the company has not seen much demand for VR gaming, and would not embed VR games on its own IFE offering. "We would provide a platform to allow an operator to run a VR solution, or an interface to a display, but because this technology changes more than once a year – software changes happen all the time – it should never be considered as an embedded solution."

future vision

WHAT POTENTIAL DO THE LATEST HOME ENTERTAINMENT TECHNOLOGIES HOLD FOR PRIVATE JETS?

Words by Paul Eden. Illustration by Katharine Asher/illustrationweb.com

4K and UHD

Screen design is advancing along several lines in the home entertainment market, as manufacturers compete to offer improvements in resolution, color rendition, brightness and form. Employing 4096x2160 resolution, a 4K screen has twice as many pixels as a 1920x1080 full high-definition (HD) screen, an increase designed to ensure improved image clarity and definition.

Although 4K technology has been available for a while, only now is it reaching the mainstream. Several major TV manufacturers launched 4K models at the latest Consumer Electronics Show, held in January 2016.

The technology was introduced in digital cinemas, but with its adoption for TV screens, the 4K term has commonly been grouped together with Ultra HD (UHD). The latter employs a 3840x2160 resolution for 16:9 ratio screens and is therefore technically not 4K, but the labels UHD and 4K have essentially become interchangeable in the marketplace.

IMPLEMENTATION

Although the enhanced quality of 4K is apparently perceivable from greater distances, a viewing position fairly close to the screen is recommended. Experts agree that the effect is most apparent on large screens – 65in or more is recommended – although the quality is likely to be evident with a screen of virtually any size.

As well as Ultra HD Blu-ray discs, 4K/UHD content is available from Amazon, Netflix, Sky and some YouTube channels. It is expected that IFE servers will start to support the streaming of 4K/UHD content in the near future.

Work is also underway to support 4K/UHD, as William Gay of Gulfstream reports: “As we make plans to introduce 4K/UHD monitors, we’re also ensuring that there are 4K sources to play back on the monitors,” says Gay. “We’re working with the suppliers of our onboard servers to make sure those components also support 4K.”



TOP RIGHT: LG'S NEW SUPER UHD TV WITH NANO CELL DISPLAY

RIGHT: SONY'S XE93 4K HDR SCREEN

HDR

UHD and 4K screens should not be confused with High Dynamic Range (HDR) screens. Growing in availability in the consumer market through 2016, HDR is delivered through the new HDMI 2.0a standard, achieved through software upgrade rather than physical changes to ports.

The technology is designed to deliver richer colors, as well as improved contrast through its use of darker blacks and brighter whites. Some high-performance screens already support HDR and it is usually a feature of 4K/UHD devices, which are then typically labeled Ultra HD Premium. HDR sources are similar to those for UHD.

IMPLEMENTATION

Completion centers and OEMs are already moving to meet customer demand for 4K/UHD and HDR. “It’s still very early, but we’re working with our suppliers to offer this technology,” says Eric Gillespie, executive vice president at Flying Colours Corp. “The screens will have to go through testing before we’re able to procure and install them, but we’re not anticipating complications with integration or certification.”

William Gay at Gulfstream has a similar take on the prospect for these technologies: “We’re working with suppliers to get the technology ready. There will be no impact on integration, but we’ll have to do a new certification, because the screen is a new part number.”

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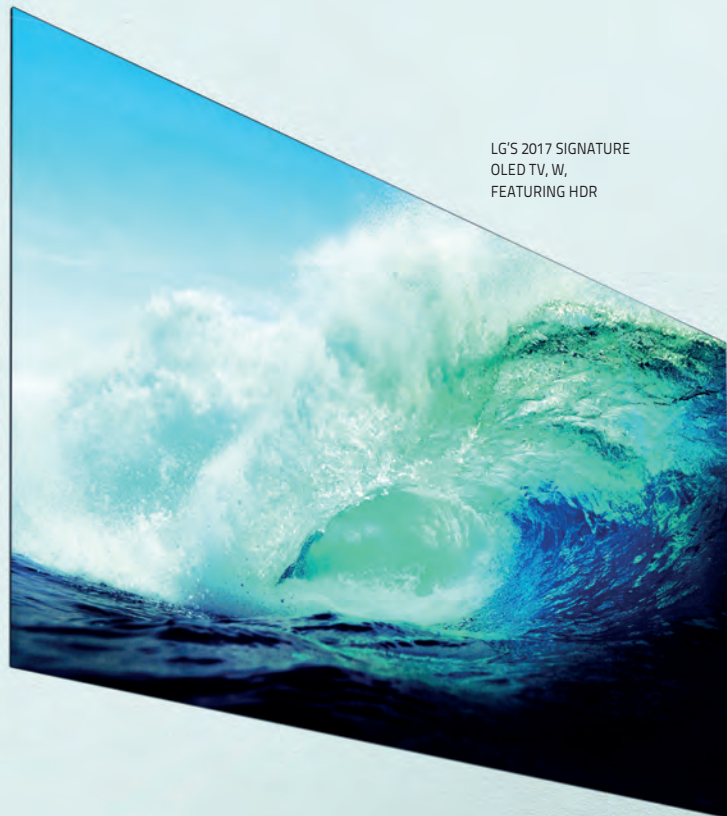
OLED

Today's leading screens employ liquid-crystal displays (LCD) lit by light-emitting diodes (LED). Usually the LED light source illuminates the display from its edges, but in the very best screens it sits behind the display. With the new organic LED (OLED) technology, each of the illuminating LEDs creates its own light source. Proponents claim this improves contrast greatly, because the black areas of an image are generated by the OLEDs in that area effectively switching off. Light levels across an LED screen are controlled less accurately and the 'no light' condition is impossible to achieve. The best LED screen should therefore never match the contrast capabilities of an OLED unit, because there will always be residual illumination behind the black.

IMPLEMENTATION

Both LED and OLED technologies are capable of supporting HDR, leaving customer choice down to viewing environment. Today, the best OLED displays generate less than half the brightness of top-end LED units, leaving LED the technology of choice for brighter environments. Where viewing in a darkened space is possible, however, LED will never match OLED in terms of image contrast. Even with the rise in higher definition, and improved color and contrast, OLED is making only limited inroads into private jet cabins. Flying Colours Corp has seen a little interest, but Wassef Ayadi, CEO of IDAIR, says his customers have not shown a real demand for it.

LG'S 2017 SIGNATURE
OLED TV, W,
FEATURING HDR



Curved screens

Curved screens are widely available in the consumer market, but there seems no consensus on their value. A curved screen ought to optimize the visual experience, because from the correct viewing position every part of the screen is equidistant from the eye.

Counterintuitively, the way that light is distributed from a curved screen's LED sources also means that it is viewable from more extreme angles than a flat screen. Looking at a regular LCD panel from an increasing sideways angle rapidly generates a fall-off in quality.

Some suggest the curved edges wrap the viewer in the image for a more immersive experience, as well as creating an impression of depth that fools the eye into perceiving 3D images from a 2D source.

IMPLEMENTATION

The benefits of curved screens may only become relevant with larger units, which require considerable space to mount. "Until an effective smaller curved screen is developed, it is difficult to justify their installation in smaller aircraft," says Eric Gillespie at Flying Colours Corp. He warns that curved screens are also more prone to reflection and best used in combination with a system controlling cabin light levels. William Gay at Gulfstream also notes "waning interest" in the technology.

SAMSUNG'S CH711 QUANTUM DOT
CURVED MONITOR, UNVEILED AT CES
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Bezel-less screens

A bezel is the frame around a screen. In the consumer market, bezels have become increasingly narrow to maximize viewing area. However, they remain important for mounting essential control buttons and equipment including camera lenses, microphones and speakers.

The current crop of bezel-less smartphones tends to feature screens that wrap around the sides of the device, but with bezels retained above and below for controls and equipment.

Truly bezel-less devices will arrive when manufacturers successfully mount these items below the screen. Apple is working on a technology where spaces between pixels might act as windows for items including cameras and its fingerprint recognition feature.

IMPLEMENTATION

While the trend for smaller bezels may touch some cabin applications in the future, William Gay of Gulfstream does not see it making a large impact in most cases. "The majority of our monitors are flush-mounted, so the bezels are hidden behind veneer and hardwood trim, giving the appearance of a bezel-less unit," he says.

BELOW: AMAZON'S ECHO DEVICE IS BRINGING THE ALEXA VIRTUAL ASSISTANT INTO HOMES



Cabin control

The means of controlling an integrated cabin IFE system is an important aspect that could evolve dramatically. Will voice-activated virtual assistants, like Amazon's Alexa, find a place on board as they have at home? Or do gesture control or eye control offer greater potential?

IMPLEMENTATION

Gulfstream's William Gay is certain that virtual assistants will appear in cabins. "We've found voice recognition technology is more appealing than gesture control," he says.

Eric Gillespie of Flying Colours Corp has the opposite opinion, reporting little interest in virtual assistants. He thinks gesture control may simplify IFE interaction. "However, I would imagine it being used initially on mid- to large-size aircraft, where cabins offer similar environments to sitting rooms."

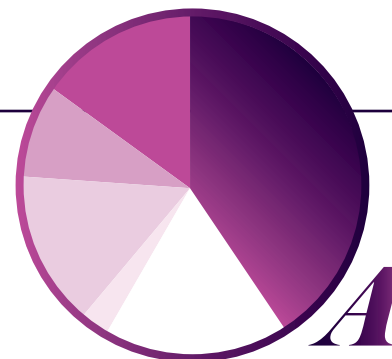
Wassef Ayadi of IDAIR sees hand gesture and eye movement control as useful possibilities, but cautions that "the technology needs to reach greater maturity for employment in cabins". He says in-aircraft applications for virtual assistants remain to be proven. "Voice recognition and priority might be the challenge," he says. "Who is allowed to give an order, and when?"

THE SONY XE90 DEMONSTRATES THE INCREASING FOCUS ON NARROW BEZELS



Readers' poll

Q What should IFEC manufacturers be most focused on developing or refining for onboard use? As of publication day, our online readers say...



- 41% 4K HDR screens
- 15% Virtual reality gaming
- 9% Ultra HD Blu-ray players
- 15% OLED screens
- 3% Curved screens
- 18% Bezel-less screens

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CITATION HEMISPHERE

Grand en

CUSTOMER FEEDBACK WAS VITAL
TO TEXTRON AVIATION IN ITS ENDEAVOR
TO EXPAND INTO THE LARGE-CABIN
SEGMENT WITH A CLEAN-SHEET INTERIOR

Words by Christine Velarde

trance

The luggage area is fully accessible at all altitudes of flight

Although Textron Aviation has a very broad line of products, one thing it didn't have until recently was a large-cabin jet. "Many of our clients start with a smaller aircraft, such as a CJ or an M2, and move up to larger aircraft as their business or family expands," says Christi Tannahill, senior vice president of interior design and engineering at Textron Aviation. "Our customers told us that they wanted to be able to continue to grow within our family, but at the time they didn't have that option."

The Citation Hemisphere is set to change that. To ensure it got the clean sheet design just right, the company sought extensive feedback from current and potential customers. "It was vital for us to understand clients' needs, because this would be a completely new market for us," says Tannahill. "We've spent the past year listening to customers about their ideal aircraft design. We formed a customer advisory board, which met at least quarterly."

ACROSS THE BOARD

As well as customers, the board included everyone from pilots to CEOs, flight attendants, maintenance technicians, and sales and marketing specialists. "We had many conference calls with everyone together, and breakout areas with different teams, for example the interior design team, maintenance crew or flight attendants."

Tannahill says the advisory board's priorities were comfort, flexibility and quality, and that they "left no detail undone". Once their feedback had been incorporated, a full-scale mock-up was displayed at NBAA in November 2016 for attendees to evaluate. "Everyone involved approved the mock-up prior to it being presented at NBAA," says Tannahill. "We had what the customer advisory board thought was important, and we needed to take it to the aviation community to

understand how we can make changes that customers value. It was a different process for us, but we feel we got to understand what some of the interior pain points are prior to design. At NBAA, many people told us 'You have thought of everything,' and that was due to the advisory board. The board made us feel confident we're going to be very competitive in this space."

With its 7ft 11in wide, 6ft 2in tall, flat-floor cabin, the Citation Hemisphere is quite a bit bigger than its closest-in-age sibling, the Citation Longitude, which is set to enter the market at the end of 2017.

AIR QUALITY

The Hemisphere's air quality will be something of note, according to Kelly Orton, director of engineering, interiors, at Textron Aviation. "We are incorporating some things for the first time to improve air quality. There will be a full aircraft humidifier in the system, so we'll be able to control the moisture content, especially on longer flights. We're also looking to incorporate some things that will improve the perception of air quality. For example, jet

fuel fumes sometimes get into the cabin, but we're working on some technologies to ensure that doesn't happen. The system will keep the air clean and humidified well, which will make for a more enjoyable experience."

Christi Tannahill adds that the company is aiming to make the Hemisphere the quietest aircraft in its category "by using materials differently. These are all things we're going to continue to work through as we progress."

ABOVE: THE AFT LAVATORY, WHICH IS HOME TO ONE OF THE AIRCRAFT'S TWO SKYLIGHTS

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TEXTRON AVIATION



“The Hemisphere has the largest seats in its class, and they have heating and cooling elements”

The Hemisphere will have three zones and seat up to 19 passengers. “It was important for this product to be flexible,” says Tannahill. “Large fleet operators will use it for transportation, families will travel, and companies will use it for international and domestic work trips. All these require different configurations. One size does not fit all.”

Ahead of the three living zones is the galley. “All the hard surfaces are granite,” says Tannahill. “We had flight attendants help us design what the galley should look like, and they wanted it to be functional and use every inch of space. There is also the option for a flight attendant’s seat that folds down when not in use to become worktop space.”

WINDOW TO THE WORLD

The galley is also home to one of the jet’s most striking features – a skylight. There is another in the aft lavatory. “The feedback we had from the customer advisory board was that from the moment you walk into the aircraft you want to feel there’s a differentiator,” says Tannahill. “It’s more like walking into a luxury hotel than an aircraft; the visuals and the lighting are unique.”

Cabin altitude is maintained at 5,000ft

Ambient lighting and window placement in general were important to the board.

“The aircraft has 20 windows, and they are the largest we make by 25%,” says Tannahill. “Regardless of where they sit, customers get an amazing view.”

There is also a lavatory in this forward section, again incorporated in response to advisory board feedback.

WARM RECEPTION

Moving aft, there are multiple furniture configurations for zone one, including club seating. “The Hemisphere has the largest seats in its class, and they have heating and cooling elements, which is unique in this class, along with lumbar support,” says Tannahill. “The seat cushion is 22in wide, with 4in armrests on each side that are designed to

incorporate technologies such as chargers, but can be customized. They’re hand-stitched and beautiful; the feedback is that we have scored a home run.”

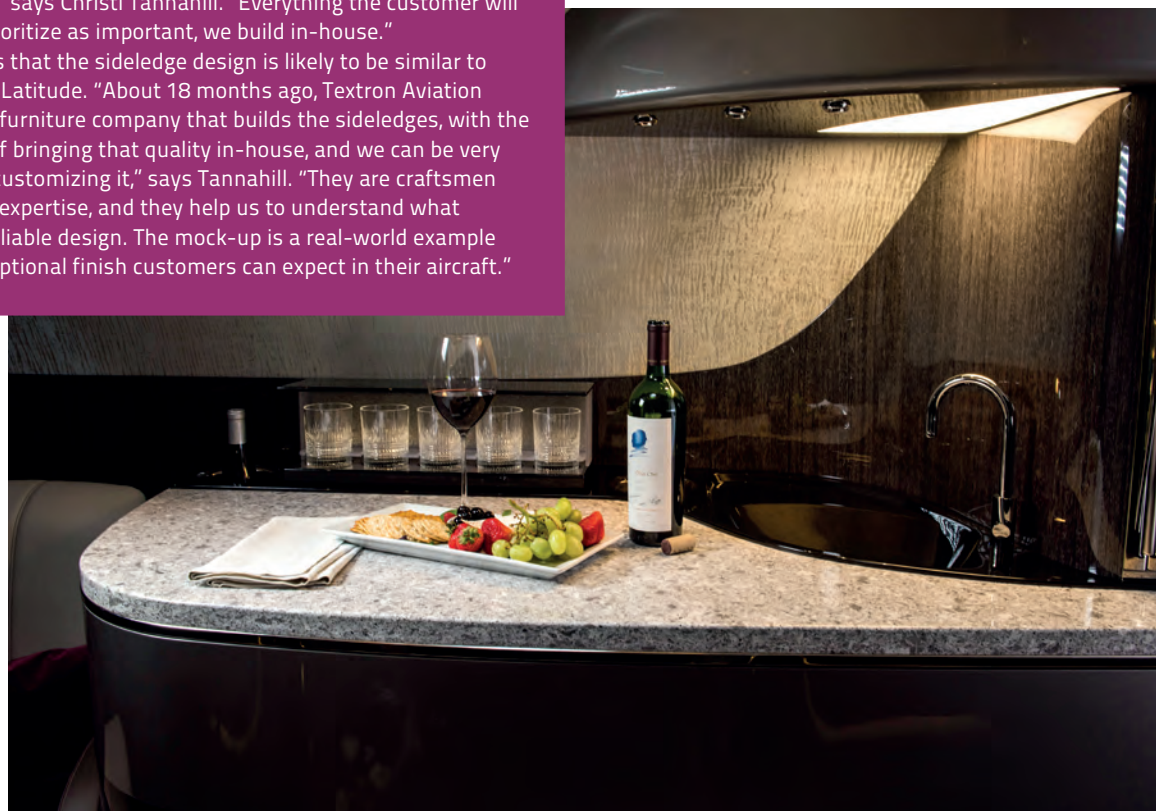
Possibilities for zone two include conference seating that could also be used for dining and entertaining. “The table also pushes down and folds into a sleeping area,” says Tannahill. There is also a credenza that can be transformed into another seat.

BELOW: THE GALLEY IS FINISHED WITH GRANITE WORKTOPS

IN-HOUSE CABINETRY

Interior furnishings, including seats and cabinetry, will be designed and handcrafted in-house. “Textron Aviation takes pride in the quality of the product, and we want to be responsible for all of it,” says Christi Tannahill. “Everything the customer will see and prioritize as important, we build in-house.”

She adds that the sideledge design is likely to be similar to that in the Latitude. “About 18 months ago, Textron Aviation acquired a furniture company that builds the sideledges, with the intention of bringing that quality in-house, and we can be very flexible in customizing it,” says Tannahill. “They are craftsmen with great expertise, and they help us to understand what makes a reliable design. The mock-up is a real-world example of the exceptional finish customers can expect in their aircraft.”



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RIGHT: ZONE ONE CAN BE FITTED WITH CLUB SEATING; EACH SEAT MEASURES 30IN WIDE

BELOW RIGHT: ZONE THREE CAN BE CLOSED OFF IF REQUIRED



RESIDENTIAL INFLUENCE

Textron Aviation has created trim and finish designs to show off the possibilities for customization in the cabin. "The interior options incorporate multiple colors of wood," says Christi Tannahill. "We wanted to show that you could configure each zone differently, just like you might have different colors in each room of your house. We've incorporated themes, so for example in zone one the seats are light with dark beading and hand-stitching, and in zones further along they are dark with light beading and hand-stitching. So customers can define their zones purely by color and design, and be very creative."

"Zone three, as we have it set up today, sees a change in the color palette and is intended to be a very relaxing area, with a couch that folds into a bed and 30in monitors for IFE," says Tannahill. "One of the differentiators in this product is that we have hard partitioning with closing doors to this zone, so it can be completely closed off and used as a stateroom. There's also a large lavatory with closets."

CUSTOM CAPABILITIES

But flexibility is key: "In zone three, for example, you could have two couches or club seating; one customer requested an exercise area with a stationary bike," says Tannahill. "We estimate that the options we have outlined will serve about 75% of our customers, and the other 25% of the aircraft will be fully customized and completely unique, for example with a shower in the rear lavatory."

Textron Aviation also listened to the board's request that cabin lighting should be able to adapt to suit what passengers are doing on board. "We have overhead lighting and side sconces, which are decorative and dimmable, and accent lighting throughout the aircraft as well – all of which

The aircraft will have a range of 4,500 nautical miles with four passengers



can change to suit working or relaxing and can be different in each zone," explains Tannahill. "So far, all work on the lighting design has been conducted by us in-house."

Textron Aviation is targeting 2019 for the Hemisphere's first flight, with deliveries due to begin shortly afterward. There is no date for the design freeze, as customer feedback continues to be considered.

"The team is most proud of listening and incorporating what the customers want, not what we think they want or what our competitors are doing," says Tannahill. "We've developed strong relationships with the people on the review board, which is especially important as many of them are currently customers of our competitors, because the Hemisphere will be our first aircraft in that class. It's really a customer-designed aircraft." ❖

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SUPERSONIC JETS



think

SUPERSONIC BUSINESS JET DEVELOPERS
ARE PROMISING INTERIORS AS
ENTICING AS THEIR JOURNEY TIMES

Words by Rob Copping

The return of supersonic travel has surfaced in the media many times since the retirement of the Concorde fleets in 2003. While various sons of Concorde have been proposed, two are being offered for purchase in the 2020s that are envisaged for VIP use – Aerion's AS2 and Spike Aerospace's S-512.

Vik Kachoria, president and CEO at Spike Aerospace, says the first subscale, subsonic demonstrator will fly by the end of summer 2017, followed by a series of larger and faster demonstrators, with a service entry target of 2023. The AS2's first test flight is planned for 2022.

Aerion says the AS2 will cruise at Mach 1.4, offering a range just below 5,000 nautical miles, but will have a top speed of Mach 1.5. At Mach 0.98 it could offer a range of almost 5,500 nautical miles. The aircraft is designed with relatively short, thin wings and a long 170ft fuselage, to reduce friction drag and supersonic shockwave drag.

The S-512 should have a cruise speed of Mach 1.6 at 50,000ft, and a range of 6,200 nautical miles. Spike sees a worldwide market for 700 supersonic business jets.

Both Spike and Aerion have selected partners to help with the interior development. Spike called in Greenpoint

fast



CABIN STATS



Aerion AS2

Cabin width: 7ft 6in
Cabin height: 6ft 2in
Cabin length: 30ft
Seats: 2 crew + 8-12 passengers
Range: 4,750 nautical miles at Mach 1.4 cruise speed
Maximum speed: Mach 1.5
Maximum altitude: 51,000ft
Price: US\$120m



TOP: AERION AND INAIRVATION ARE USING A FULL-SCALE MOCK-UP OF THE AS2 TO ASSESS CONFIGURATIONS FOR THE COCKPIT AND CABIN

ABOVE: AN ENGINEERING DRAWING OF THE AS2

“We’re likely to see fairly typical floorplans for 8-12 passengers”

Technologies, while Inairvation – a joint venture between Lufthansa Technik and F/List, with Design Q on board for design and Schott for lighting – has been enlisted for the AS2. A full-scale engineering mock-up of the AS2’s interior has been built at Design Q’s studio.

While both companies have shown concept interiors, they are less ready to give details. “Our interior design efforts are at a very preliminary stage and the first flight is five years away,” says Miller. But he also says that “we’ll work with customers to design unique and exquisite cabins to meet their specific wishes. From a practical standpoint, we’re likely to see fairly typical floorplan arrangements for 8-12 passengers, striking a good balance between individual comfort and productivity.”

The AS2’s cabin will be 6ft 2in tall, 7ft 6in wide and 30ft long. Kachoria declined to give dimensions for the S-512’s cabin, but the aircraft is envisaged to carry up to 18 passengers.

STRETCH LIMO

One of the biggest technical challenges for a supersonic aircraft is that fuselages heat up and can lengthen when subject to the intense friction of the atmosphere against the aircraft’s exterior at a certain speed. For

example, Concorde’s developers had to design a floor to cope with the heat-induced elongation, connecting the galley and toilet units in such a way that the heat expansion would not make them detach or move. The carpet was joined with overlaps at cross-aisle positions so that it could expand along with the floor.

Jeff Miller, vice president of marketing and communications at Aerion, says that this is one of the reasons behind the AS2’s projected speed. “The AS2 will not be

QUIET AND CALM

VIP passengers on the Aerion AS2 and the Spike S-512 will expect a serene experience, and the developers of both are working to deliver just that, starting with cabin sound levels. Miller says Aerion is aiming for a level “similar to today’s large cabin business jets”, which could be as low as 45dB or as high as 65dB. Spike states that its window-light design will ensure a cabin noise level of 60-65dB.

Stability will also be important. With the altitude that Concorde cruised at, turbulence was not a problem, according to Kit Mitchell, principal scientific officer at Royal Aeronautical Establishment when Concorde was developed. “Turbulence wasn’t a problem with Concorde, it behaved like other aircraft,” he says. “However, the cockpit got shaken more in turbulence than on a subsonic airliner, but it wasn’t anything out of the usual.”



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CABIN STATS



Spike S-512

Cabin width: Not available
 Cabin height: Not available
 Cabin length: Not available
 Seats: 2 crew + 18 passengers
 Range: 6,200 nautical miles at Mach 1.6 cruise speed
 Maximum speed: Mach 1.8
 Maximum altitude: 40,000ft
 Price: Not available

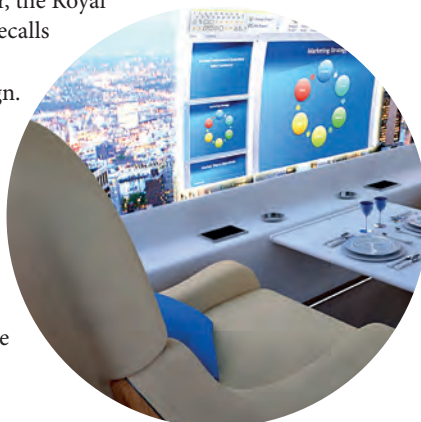
subject to this sort of heating issue, because of its lower cruise speed,” he explains. “The AS2’s maximum speed is Mach 1.5, versus Mach 2 for Concorde.”

WINDOW OF OPPORTUNITY

Kit Mitchell, who was involved in the original certification of Concorde when he was principal scientific officer at the UK’s then aerospace research center, the Royal Aeronautical Establishment, recalls that the heat issue also had implications for window design. “Cabin windows had to be insulated to stop the inside getting too hot,” he says. “But at lower speeds that won’t be a problem.”

At Mach 1.6, the S-512’s cruise speed is similar to the AS2’s. While heating should be less of a problem than for Concorde, Spike’s answer is to

ABOVE AND BELOW: INSTEAD OF WINDOWS, THE SPIKE S-512 WOULD HAVE CAMERA-FED DISPLAYS THAT COULD ALSO BE USED TO VIEW BUSINESS PRESENTATIONS AND OTHER CONTENT



replace most of the windows with screens that will run the length of the cabin and display views from external cameras. “However, there will also be glass windows to accommodate passengers that need a reality check,” says Kachoria. Spike says that minimizing the number of windows will also make the S-512 more aerodynamic and give a fuel saving.

The screens are part of what Spike calls the Multiplex Digital Cabin. As well as showing views from cameras surrounding the aircraft, including below it, the screens could display movies, pictures, documents and presentations. “We’ll have a demo at trade shows where folk can try it out in the near future,” says Kachoria.

Tours of the AS2’s cabin were given at NBAA 2015 using a Samsung virtual reality system. The AS2’s windows are “about the size of the Boeing 787’s,” says Miller.

Both developers are also promising high-speed wireless internet access. A key challenge here could be the satellite communications radome, which could introduce a bump into the otherwise smooth fuselage, introducing fuel-consuming drag.

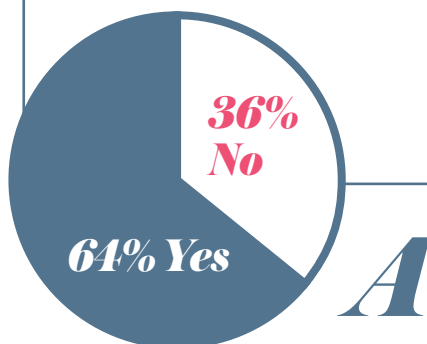
THE LONG AND WINDING ROAD

The supersonic business jet passenger will also want a smooth ride that could require a special type of undercarriage. Mitchell explains that because of Concorde’s long slim shape, the cockpit in particular was susceptible to vibrations caused by unevenness in the runway. “You had to design the undercarriage to be a good suspension system running along on the ground and then make it absorb energy for the landing,” he says. “New developers will need to be doing their calculations.”

Concorde was 204ft long and the AS2 will be 170ft. Although the S-512 will be shorter at 122ft, this is still 26ft (27%) longer than a

Readers' poll

Q Will supersonic VIP jets need lie-flat seats given the shorter travel times?
As of publication day, our online readers say...



subsonic business jet that can carry as many passengers, the Gulfstream G500 series.

Another issue with Concorde's long fuselage was that it could visibly bend during turbulence. "That's a minor reason why there was a bulkhead and galley in the middle of the cabin on Air France's Concorde, so the bend wasn't visible," says Mitchell.

AIR SUPPORT

Spike is touting higher oxygen levels in the S-512 cabin, but Kachoria declined to explain how this would be achieved. Concorde had a cabin altitude of 6,000ft, 2,000ft lower than a typical subsonic airliner, and only equaled in recent years by the Boeing 787. Current

business jets can have cabin altitudes as low as 4,500ft, so it will be interesting to see what can be achieved on the AS2 and S-512.

One possible boon supersonic travel could yield for developers is that with the short journey times – three hours to cross the Atlantic – the full-flat beds of subsonic travel are not wanted or needed. However, Miller says the AS2 will have berthing options.

When Factorydesign redesigned the interior of British Airways' Concorde fleet a few years before it was retired in 2003, the company opted for something "akin to a seat in an Aston Martin, in terms of appearance," says Adam White, a director at the design firm. It was a one-piece composite bucket seat incorporating very few of the typical aircraft design techniques, he adds.

ABOVE: FACTORYDESIGN'S INTERIOR FOR BRITISH AIRWAYS' CONCORDES

OTHER SUPERSONIC JETS

With commercial flights planned for the early 2020s, Boom's XB-1 two-person demonstrator jet for its 45-passenger airliner is planned to fly later in 2017. The jet will have a cruise speed of Mach 2.2 and Boom states that it could also be used as a business aircraft.

There have been other supersonic airliner efforts in recent years. There was Supersonic Aerospace's proposed airliner a few years ago, plus Hyperstar's Hypermach, a Mach 4 business jet that the firm claimed would fly in 2021.

Other supersonic business jet concepts that have been made public include the Gulfstream/Sukhoi joint venture, the S-21, and the Tupolev Tu-444. A supersonic airliner concept developed by Lockheed Martin under a NASA program has also been publicized.

BEST SHOW ON EARTH

White also sees no need for IFE or a full meal service; he says what satisfies the supersonic passenger is the fact that "you can see the curve of the Earth."

This is a common sentiment from those who worked on Concorde. "The passenger experience is almost unimportant," says William Lowe, former British Airways captain and Concorde commercial director. "Providing it's comfortable, what they want is speed and elitism. All these passengers want is time; they want to save time and that's what supersonic travel gives you." He also sees a need for good air and curbside services at airports for the supersonic business jet user. Mitchell thinks that being able to fly supersonically over land will be critical to the jets' success. Finally, White says the AS2 and S-512 interior designers need to make sure that "everything in the interior celebrates the fact that you're going at a terrific speed to the other side of the world".

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RECENT UPDATES TO EMBRAER'S
LEGACY 650E FOCUS ON THE
PRACTICALITY OF THIS POPULAR
CHARTER AND BUSINESS WORKHORSE,
WHILE A MORE OPULENT BUT STILL
BUSINESS-ORIENTED DESIGN HAS BEEN
CREATED FOR THE LINEAGE 1000E

Words by Izzy Kington

pa

business returners



The original Legacy 650 interior was created in 2009

RIGHT: THE LEGACY 650E CABIN IS 6FT 11IN WIDE AND 6FT TALL



“The answer wasn’t to redo the whole interior, but to add functional features”

Reliability is the key word being used by Embraer in connection with its updated Legacy 650E, the headline being a 10-year warranty for non-interior systems and components (OEM and supplier) – the same length as that already offered for the aircraft structure. “The 650E has a 99.5% dispatch reliability, with over 25 million hours on the system thanks to its commercial heritage,” says Jay Beever, vice president of interior design at Embraer.

While there are private customers for this aircraft, Beever says it is primarily a business transportation and charter tool. This is why, rather than changing the price point by investing in a completely new cabin, Embraer focused on the areas customers indicated were practical priorities. “The answer wasn’t to redo the whole interior, because it was already great, but to add functional features to position it in line with charter companies’ practical considerations,” says Beever.

DIAMOND DETAILS

Beyond such additions as auto-throttle in the cockpit, new interior features include Honeywell’s Ovation CMS/IFE, which can be controlled wirelessly using PEDs and also enables Apple TV. There are new seat foam inserts and stitching styles including diamond stitching, and increased trim capabilities, particularly more durable materials added with the charter market in mind.

Beever says greater durability has been achieved by leather suppliers including Townsend, Aeristo and House of Leather, through advances in the tanning process itself. Suppliers also use a chrome-free process to ensure a

EXCESS BAGGAGE

There is roughly 36-40in of space between each of the seat groups on the Legacy 650E, which Jay Beever says is vital both for recline and storage of carry-on bags.

As well as this in-cabin space, the Legacy 650E offers plenty of storage in its 240ft³ baggage compartment. “The industry doesn’t like to go over 200ft³ for a baggage compartment because there’s an expense involved – as soon as you go over that size you have to have a fire suppression system,” says Beever.



THE LEGACY 650E'S GALLEY, WITH
STONE FLOORING FROM F/LIST

RIGHT: A DIAMOND STITCH PATTERN
IS NOW AVAILABLE FOR THE LEGACY
650E'S SEATS

Embraer says
the Legacy 650E
costs US\$2,800
per hour to
operate

sustainable afterlife. "That was part of a push to make sure the materials were biodegradable," says Beever.

Alcantara is also available. "A lot of anti-burn and stain-guard applications have been certified, so we can now use materials that may have been considered more delicate in the past," says Beever.

PROTECTIVE NATURE

Veneered surfaces are finished with a scratch-protective layer that Beever says is very similar to what some automotive companies put on car headlamps to protect them from whatever the road throws up.

Another option is F/List's stone flooring. Beever indicates that F/List's new heated stone flooring product, while not offered by Embraer yet, could be a natural progression in the future.

The four layout options are the same as previously available. "You can have a straight aisle with a divan and club seats in the back; you could have an offset aisle with a conference grouping and then the divan and two seats in the back; or you could have either of those aisle options with two divans in the back," says Beever. "The option of a straight aisle without the conference group is very desirable for charter operations."

Layout/cabinetry modifications will not be possible, but customers have full control over color and trim. "As long as the aircraft is specified by the customer ahead of time, and the materials are certified for aerospace use, they can choose whatever they like," says Beever.

Customers are already ordering the aircraft – the first should be delivered in the second half of 2017.

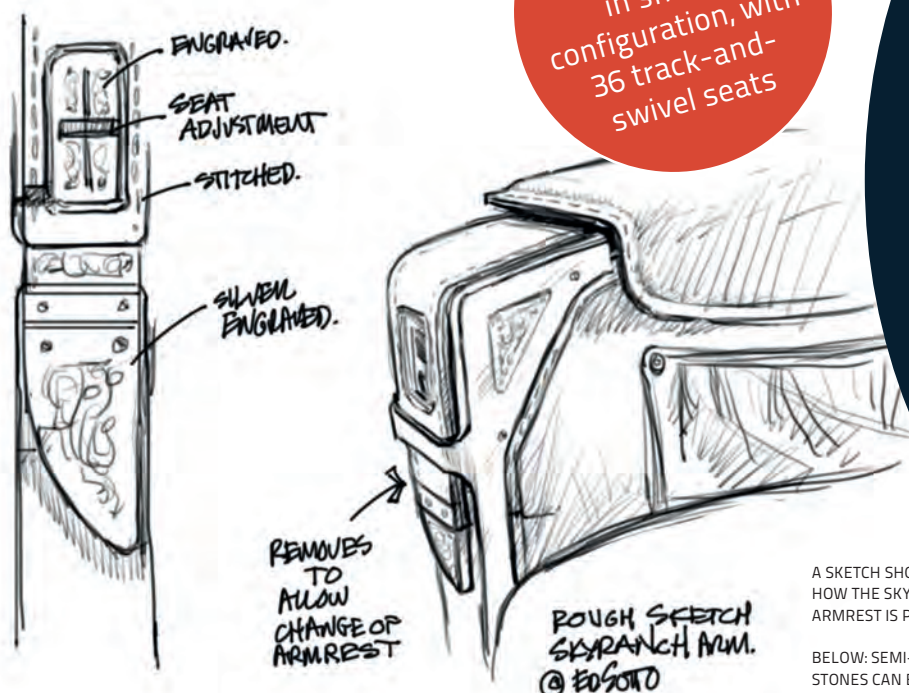
RANCH IN THE SKY

Meanwhile, opulent new designs were recently unveiled for the Lineage 1000E that would appear to have little in common with the Legacy 650E. However, Beever says the Lineage 1000E's Skyranch One interior is also business-oriented. "The Skyranch is a high-end business tool for the individual who wants a true office-and-home combination," he explains. "Rather than a business jet that takes you to a meeting in the city, you can actually bring the meeting to the aircraft, because you have this space."

Skyranch One was created with Eddie Sotto of SottoStudios, following on from their previous collaboration on the Skyacht One interior, unveiled in 2013. "There's so much emphasis on the USA being in recovery financially,"

TECH TRENDS

The Lineage is also available in shuttle configuration, with 36 track-and-swivel seats



A SKETCH SHOWING HOW THE SKYRANCH ONE ARMREST IS PUT TOGETHER

BELOW: SEMI-PRECIOUS STONES CAN BE SET INTO THE SEAT RELEASE CONTROL

says Beever. "Big business is being talked about again, so we decided to come up with a concept that is a business tool, giving it a 'Southwestern meets Brazilian rancher' feel. This is the ultimate business tool."

VIEW FROM THE TOP

The concept has a private cabin at the back and an office space at the front, dominated by a statement-making portrait-view window. This window was first devised for the Kyoto Airship Lineage 1000 concept, created with superyacht designer Patrick Knowles at the request of a Japanese customer who wanted to dine seated on the floor. "I worked with the engineers in Brazil, and lo and behold, we already had drawings made up for the ERJ 145 (a Legacy 650-sized aircraft) with an observer window in this shape, for a coastguard mission," says Beever. "All the engineering drawings were already in place."

The window has already been requested by customers. "This window, though not the SkyRanch One design, has been put into Lineage proposals as recently as December 2016," says Beever. "As long as we stay forward of the wing, we're good, structurally. It's not difficult because it's smaller than a Type III emergency exit, and the fuselage is already reinforced to handle that, so why not make it a window? Glass technology is also already there to make that size of window."

Although he wouldn't disclose the cost of the window, Beever believes it to be modest for the size of the aircraft, and that "as volume increases, the price can be adjusted".

The SkyRanch One styling was created by Sotto, with Embraer's team on hand to ensure that the company's design DNA was retained and it was all feasible. "We made sure that those seats could actually be made with those multiple layers of saddle-like leather, and that the trim panels behind the

seats have a floating gap around them, just like in our Legacy 500 and 450," says Beever. "When people need to service the aircraft, there's a removable panel that affords them access, but the panel is also fancy in terms of design."

ONE FOR ALL

The Lineage 1000E is sold as a green aircraft to be completed by an external completion center, under Embraer's management, and thus the interior is fully customizable. As well as showcasing the possibilities, the SkyRanch One interior could also be implemented in its entirety, or a part-custom version could be created. It's all part of Embraer's strategy of creating a business tool for every possible customer. ✕



THE ENTRANCE AREA OF SKYRANCH ONE

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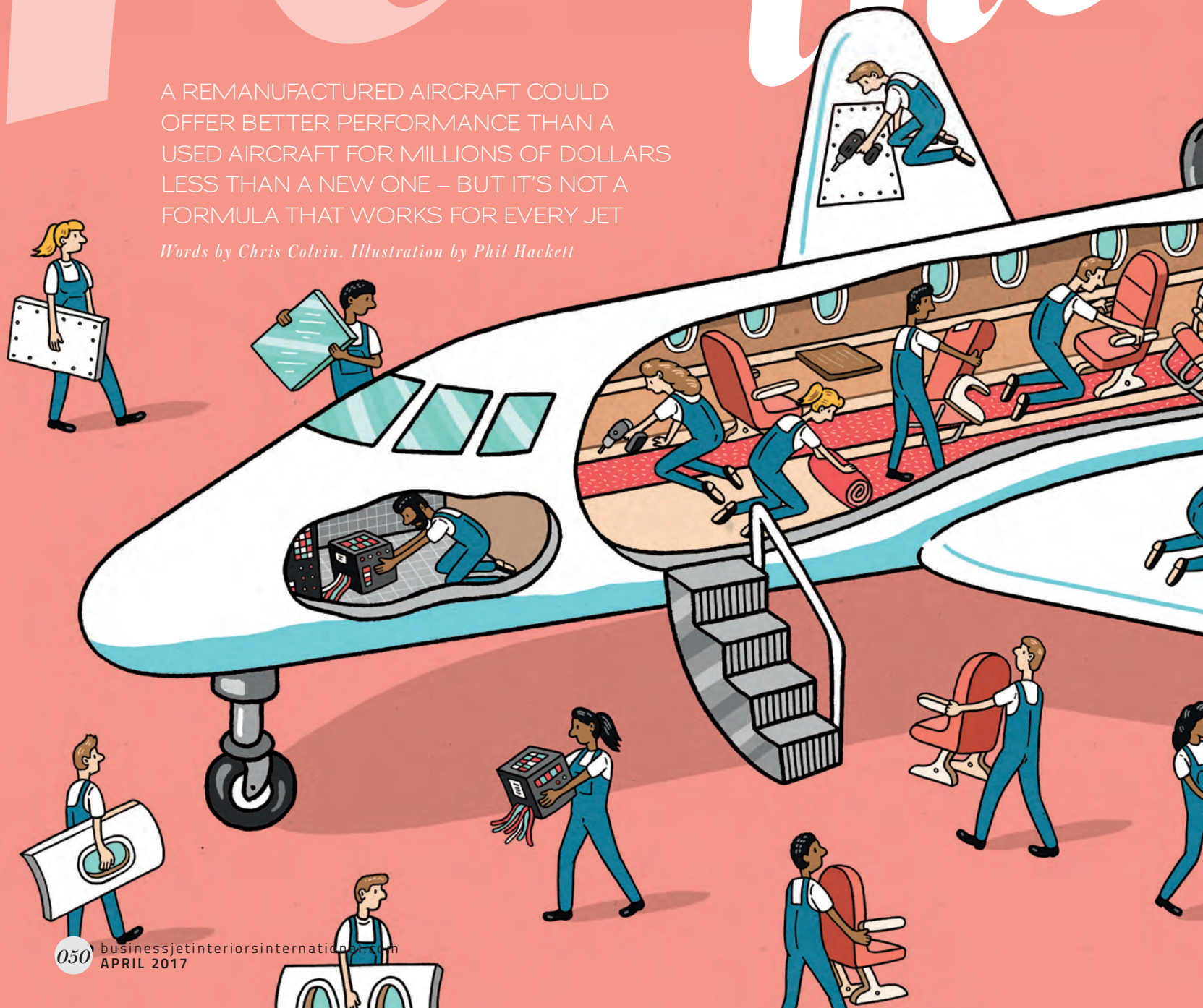
BAE Systems is honored to receive the 2017 Aviation Week Technology Laureate – along with Gulfstream Aerospace Corporation – for the first commercial active control sidesticks on the Gulfstream B500 and B600 business jets.



reset the

A REMANUFACTURED AIRCRAFT COULD OFFER BETTER PERFORMANCE THAN A USED AIRCRAFT FOR MILLIONS OF DOLLARS LESS THAN A NEW ONE – BUT IT'S NOT A FORMULA THAT WORKS FOR EVERY JET

Words by Chris Colvin. Illustration by Phil Hackett



clock



Shinking big bucks into an aging airframe typically makes lenders and underwriters nervous and very few airframes justify the investment of remanufacture. Those that do share common characteristics: they are plentiful, structurally robust, have stood the test of time, and continue to fulfill their missions well when stacked against new aircraft. Updated with new technologies, they are more cost-effective than new aircraft, both in acquisition price and often in direct operating costs.

Still, the price delta has to be compelling, typically 30-50% less than a new aircraft. Which is why, for years, full remanufacture didn't really happen. New engines, avionics, winglets, paint and interiors were available, but not all together. And these were programs for aircraft typically flown by owner pilots, arguably emotionally skewed enthusiasts for types long since out of production, such as the original Cessna Conquest turboprops or Citation 500 series fan jets, Mitsubishi MU-2 turboprops and Piper Cheyennes. It wasn't until Nextant entered the game in 2007 with a strategy to strip Beechjets down to the bare metal and offer the 'full Cleveland' that true assembly line remanufacture was brought to business jets.

The Beechjet (and later versions known as the Hawker 400XP) is a great candidate for remanufacture. More than 600 were produced during a run that spanned

A truly remanufactured aircraft has had all its time-limited components replaced, and is considered to be a new aircraft type

ABOVE: TEXTRON AVIATION NOW OFFERS A FULL CONVERSION PROGRAM FOR BEECHJET 400A AND HAWKER 400XP TYPES

from 1990 to 2010. The aircraft has excellent bones for a light jet. While most Beechjets on the market have between 5,000 and 7,000 hours on the clock, structurally Nextant says they could last perhaps four or five times longer. Certified to the stringent Part 25 standards, the aircraft can carry two pilots and 7-9 passengers. With four passengers it can make 1,400 nautical miles and hit 465kts. Vintage models from between 2000 and 2006 are readily available for between US\$1m and US\$1.5m.

LIFE'S A BEECH

If you were to take such an aircraft to Nextant for remanufacture as a 400XTi, US\$2.9m would buy new turbofan engines, engine nacelles, avionics, wiring and winglets. Another US\$600,000 secures a new interior and paint scheme. Over a stock Beechjet, Nextant promises a 50% range increase (to 2,003 nautical miles with four passengers), 32% better fuel efficiency and 29% lower operating costs – plus the engines meet Stage IV anti-noise requirements. The company also says that against comparable new light jets, a 400XTi costs about half as much to acquire (including paint and

THE G90XT

Nextant has attempted to replicate the success of the 400XTi with the King Air turboprop. FAA-certified in November 2015, the G90XT was recently updated, with its new cabin shown at NBAA 2016.

Three interiors are available. Sticking with the 400XTi formula, a new composite shell boosts cabin height and width. There is also an acoustic package that Nextant says reduces noise by 50%; an environmental system designed to improve cooling on the ground; a fully articulating seat; LED lighting; and light controls at each seat.





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LEFT: THE 400XTI, A BEECHJET REBUILT BY NEXTANT, COMES WITH A TWO-YEAR WARRANTY



interior), cruises marginally faster, and has lower per-mile operating costs.

INSIDE STORY

Inside, an original Beechjet already has much to recommend it, including a flat floor and a squared oval fuselage designed to give passengers more shoulder room. Stock cabins are 4ft 9in tall, 4ft 11in wide and 15ft 6in long, with a 26.4ft³ external luggage hold. The pressurization system maintains a sea level cabin up to 24,000ft.

In Nextant's version, the seat foam and coverings, headliner, window lines, drink rails, sidewalls, carpeting and veneer are all replaced. Various floorplans are available, but 90% of the 70 remanufactured to date have shared just one. It features a forward three-place divan opposite a galley followed by a club-four setup and then the lav, which is expanded by 4in. Below-divan stowage provides a place to stash the life raft. The standard revised galley has room for dual hot cup containers (from Midwest Aircraft Products), dual ice containers, waste containers and storage for refreshments. Customers can specify additional optional equipment including an espresso machine, warming ovens and microwaves. One Chinese customer ordered a rice warmer.

"The most consequential thing we did was throw out the original

interior shell," says Jay Heublein, vice president at Nextant. "By adapting new acoustic and thermal insulation materials, where there used to be a void between the material and the shell, we can now pack it all the way out against the aluminum hull. That adds about 3.5in of width at shoulder level and 2.5in of height in the seated position."

Nextant says the revised thermoacoustic blanket insulation system drops ambient noise levels by 9dB – around 50% from a standard Beechjet.

SOFA SO GOOD

Heublein also stressed the need to create the impression of openness when you walk onto the aircraft. "On the stock Beechjet, there is a seat right in the entryway, along with a bulky cabinet that you walk right into," he says. "By putting the three-place divan in, it opens up the interior dramatically and allows us to use what was a dead space. I can't put a fixed seat in front of an emergency exit, but I can put in a divan with a back that collapses."

LEDs are used for upwash, downwash and aisle lighting.

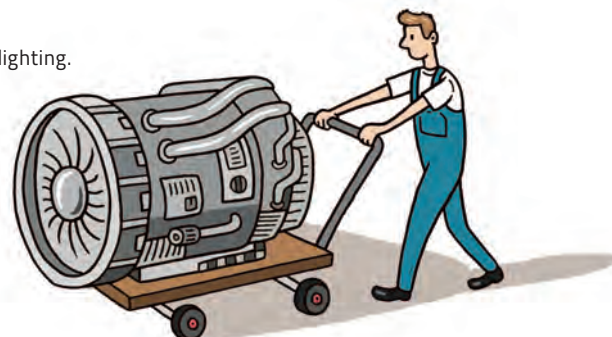
"We also open up the windows," says Heublein. "By changing the way the shell overlays the window, we give the perception that the window is almost 30% bigger."

Other highlights include Scott carpeting. Most US customers opt for the Gogo Biz wi-fi solution.

FAR LEFT: ABOUT 80% OF NEXTANT'S CUSTOMERS OPERATE THEIR AIRCRAFT ON COMMERCIAL CERTIFICATES, FLYING THEM AROUND 700 HOURS A YEAR

ABOVE AND ABOVE LEFT: THE STANDARD 400XTI INTERIOR INCLUDES A NEW CABIN SHELL, SOFT GOODS, SEAT FOAM, VENEER AND DRINK RAILS

"The most consequential thing we did was throw out the original shell"



The 400XTi process takes 16 weeks – the interior accounting for 8-10 weeks of that.

FACTORY FITTING

Others have taken notice of the market for updated Beechjets. Textron Aviation offers the Hawker 400XPR conversion program, a bring-your-own-airframe, menu-driven rebuild program with extensive offerings for systems and the interior. It can be completed in stages or in unison, in as little as 12 weeks. The package includes Genuine Hawker Winglets, Williams International FJ44-4A-32 engines, and the option of retaining the aircraft's Rockwell Collins Pro Line 4 avionics or upgrading with Pro Line 21 or Garmin's G5000. The combination is billed as yielding a 33% range increase, along with improvements in runway and hot/high performance.

"We offer the best – and the only factory-approved – upgrade solution for Beechjet 400A/Hawker 400XP owners, significantly improving their aircraft's performance, operating cost and resale value," says Brad Thress, senior vice president of engineering at Textron Aviation.

Interior options include multiple floorplans and cabinetry choices including two- and three-place divans, interior shell and headliner options, many levels of refurbishment for soft goods (carpet, seating, sidewall) and hard goods (cabinetry and bulkhead), electronic window shades, LED lighting, and wired and wireless CMS and IFE.



THE TWIN OTTER X2

The Beechjet is not the only aircraft type to have received the remanufacturing treatment. For example, Ikhana's predecessor company, RW Martin, started down the 're-life' road in 1996, offering a re-life wing box. Now Ikhana offers the Twin Otter X2, a full package completed under STC.

As well as a new interior, the aircraft has new engines, avionics and wiring, and increased gross weight. The aircraft can be fully customized. All 'fatigue critical' components are replaced, resetting the aircraft's usable life to a new 66,000 hours or 132,000 cycles.

avionics, new paint and a new interior. It began enrolling aircraft in the program in 2016. Customers can order items à la carte or as a package. Full-up, everything is around US\$700,000 plus the aircraft.

The interior includes a new cabin shell with recessed headliner for more headroom, a bigger forward baggage cabinet, LED/RGB lighting, electronically dimmable window shades, a redesigned drink rail, bigger window reveals, and electric window shades. Vendors can include Air Source One, AWR, Belt Makers, Booth Veneers, Dallas Airmotive, Gogo, High-Tech Finishing, JBRND, Luma Technologies, Scott Group Studio, Tapis, and Townsend Leather.

Clearly there are many options to keep the Beechjet economically viable and flying for decades to come. ☒



FLEXIBLE UPGRADE

Meanwhile, Elliott Aviation offers the 400E package, which retains the original engines, but adds Garmin G5000 touchscreen

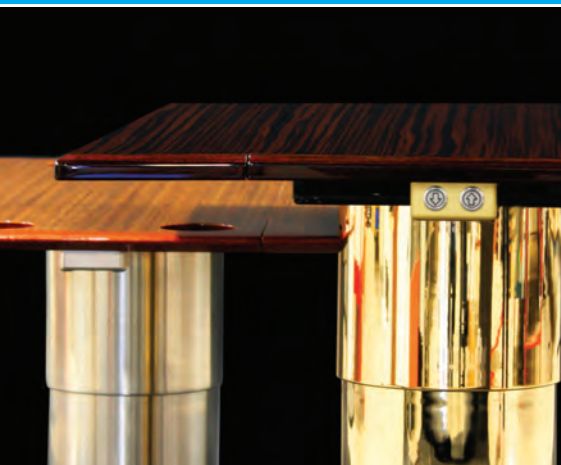


ABOVE AND RIGHT: ELLIOTT AVIATION BEGAN OFFERING ITS VERSION OF THE BEECHJET IN 2016



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Words by Izzy Kington



All interior components – excluding seats, IFE and systems – will be built in-house by Greenpoint

BAR AND LOUNGE

Passengers will enter the aircraft at Door 2 on the left-hand side and can head aft to their seats or left to enter the Skye bar and lounge – a chief requirement from Crystal. The bar and lounge is an expansive, open social area that accommodates 30 guests comfortably. It features a focal bar, custom coved ceilings, 24 seats and two three-place divans. "The vision is for guests to feel the comforts of a hotel with a main lounge/lobby area in which to eat, socialize and relax," says Annika Wicklund, design director at Greenpoint Technologies.

"The forward bar is a key feature, complete with colored LED lighting and the signature Crystal logo," adds Steve Daschel, senior director of engineering at Greenpoint Technologies. "In addition, tables equipped with embedded tablets and state-of-the-art software allow gaming with virtual chips."

Another requirement from Crystal was to include a wine cellar. "While we explored all avenues, including access to the lower deck for storage, we concluded on a beautiful and unique compartment filled with crystal glass storage, wine racks and a chiller," says Wicklund.

view

Finally...

THERMAL COMFORT LIKE AT HOME



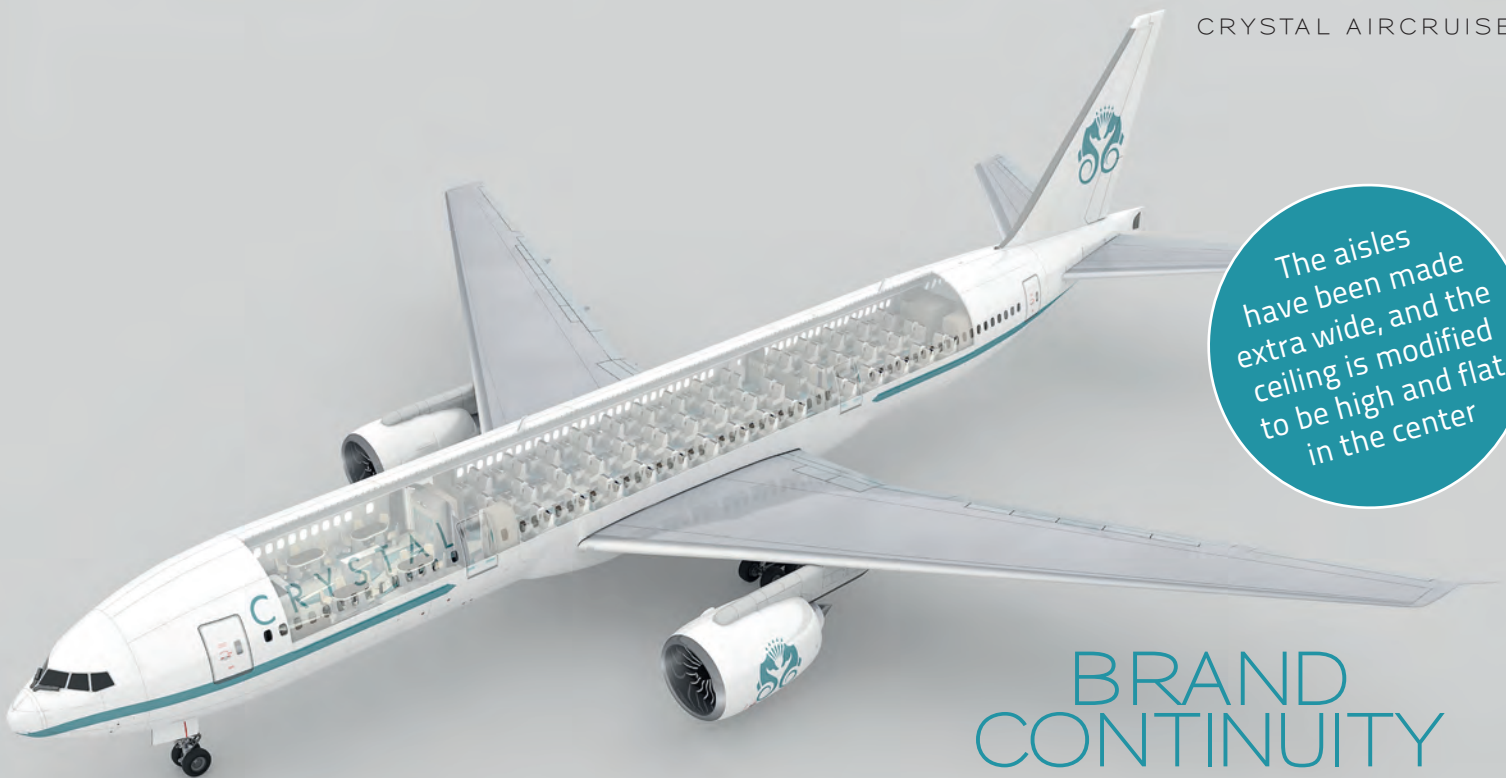
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The aisles have been made extra wide, and the ceiling is modified to be high and flat in the center

BRAND CONTINUITY

A key focus was to create an aesthetic with similarities to Crystal's VIP cruise ships, yachts and riverboats. "We teamed closely with Crystal's design team to understand their ships' designs, brand value and mission to redefine luxury travel," says Wicklund. "The brand is light and bright, a more transitional design theme compared with the traditional earth tones common in VIP aviation. The lighter colors, with accents of blue and teal, are modern, inviting and blend nicely with Crystal's spirit of travel."

SEATING

As many passengers will travel in pairs, but ample space is vital, a staggered 2-2-2 configuration and 74in pitch was chosen for the seating area, which accommodates 84 passengers. The Crystal Exclusive Class seats are a bespoke version of Zodiac Aerospace's Aura model.

Seat width has been increased to 24in between armrests. Each seat has electrically actuated adjustable lumbar support and reclines to become a 70.5in-long lie-flat bed. Other features include a custom privacy surround, centerline privacy partition, four-way adjustable headrest, individual storage ottoman, cocktail table, console-mounted single-leaf meal tray, personal reading light and custom Welsh handcrafted leather upholstery.

Technological equipment at each seat includes a seatback-mounted 24in HD video monitor (ottoman-mounted in the front row) for access to the AVOD, touchscreen switch panel with IFE and cabin controls, headphone jack, in-seat power outlet and USB charging port. "Guests will also enjoy complementary high-speed internet access," says Wicklund.

Suppliers include Zodiac Seats UK, Zodiac Water and Waste, and Zodiac Business Aircraft Interiors for seat upholstery in the lounge





The customized lavatories feature stained gray veneer oak cabinetry, large mirrors and premium fixtures



Food will be prepared by a dedicated chef in a galley at the aft, designed with capacity for multiple meals

TOP: A SENIOR TEST ENGINEER TESTS A COMPONENT OF THE MONUMENT ISOLATION ATTACHMENT SYSTEM USED ON GREENPOINT'S VIP COMPLETIONS

MATERIALS

Wicklund says one of the most challenging aspects of this completion is the need to certify the aircraft for private charter operation. "FAA regulations required Greenpoint to develop and certify unique interior decorative materials that comply with stricter requirements than used on a typical BBJ," she explains. "After much research and development, we selected bespoke, high-end fabrics and materials, including quilted leather for the seating, soft mohair for the divan, and a mix of reflective, shimmering materials and highly durable and stain-resistant whites, which make the space feel bigger and brighter. Meanwhile, the carpet is completely hand-tufted with a soft, plush feel and vibrant design."

TIMELINE

AUGUST 2015
Greenpoint Technologies appointed to design and complete the aircraft

SEPTEMBER 2015
Initial interior design review

OCTOBER 2016
Design finalized, aircraft inducted at Greenpoint's facility in Moses Lake, Washington, USA

SEPTEMBER 2017
Scheduled maiden voyage

LIGHTING

Colored mood lighting is used to create a social ambiance in the multipurpose lounge. "Accent and wash lighting scenes can be set to enhance any mood or setting, from fine dining to exuberant gaming," says Wicklund. "Meanwhile, lavatories are customized with updated vanity lighting to enable guests to feel refreshed and at home."



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FALCON 900LX

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UPDATES TO THE FALCON 900LX'S
TECHNOLOGIES AND STYLING REFLECT
DASSAULT'S FOCUS ON USER EXPERIENCE
AND PERCEIVED QUALITY

Words by Izzy Kington

control



CABIN STATS

**Falcon 900LX**

Cabin width: 7ft 8in
 Cabin height: 6ft 2in
 Cabin length: 33ft 2in
 Seats: 2 crew + 14 passengers
 Range: 4,750 nautical miles
 Maximum cruise speed: Mach 0.84
 Maximum altitude: 51,000ft
 Price: US\$44.3m

“User experience has been the main focus; it has been considered right from the start of the design process”

Customers can opt for a new paint that adds a metallic or iridescent finish to PSU parts

SOUND AND LIGHT

The new LED lighting can output both white light and programmable mood lighting scenarios. Cabin noise has been reduced by 2dB SIL by integrating lessons learned from both the Falcon 8X and the Falcon 2000LX.

“We now have such a good way of working on sound in terms of the engineering and design of cabinetry and materials that we had to implement all those technologies and tricks in this cabin too,” says Agnès Gervais.

These acoustic tricks include a certain way of mounting cabinetry and other components to better absorb shocks, the invisible integration of noise-trapping shapes, and the use of noise-absorbing fabrics in the cabin.

BELOW:
DASSAULT HAS
WORKED TO
IMPROVE THE
ERGONOMICS
OF THE
EXISTING SEATS



The seven models in the Falcon 900 family have accumulated a combined sales book of more than 500 aircraft. In mid-2014 Dassault decided it was time to update the latest in the line, the Falcon 900LX, which had achieved type certification in 2010. Fresh styling and technological upgrades were unveiled at NBAA in October 2016.

No changes have been made in terms of floorplan options or the level of color and trim customization available. A typical layout comprises a forward galley, followed by a club four, four-place dining setup, two facing three-place divans and aft lavatory. Agnès Gervais, an industrial designer at Dassault, says 900LX owners are particularly loyal to the product, so care had to be taken not to ruin a winning formula. “The Falcon 900 had not been touched in terms of style for a while,” she says. “We didn’t want to degrade anything in terms of usage. For a lot of our customers, it’s exactly what they need and they are used to it. The goal was to refresh the cabin and bring it into line with modern

Most of the
500+ Falcon
900 aircraft
delivered are
still in service

design trends and codes, which we've achieved, but we've made sure the customer won't be lost."

Gervais says one of the two biggest priorities for customers is comfort. "That's why we worked a lot on the design and ergonomics of the seats, improving cabin sound levels, and improving the sensory design with the lights, color and trim," she explains. "Comfort is not only physical, it's also about feeling secure and being able to change the atmosphere of the cabin so that it's never a stressful environment."

SEAMLESS CONNECTIONS

The other huge priority for passengers is IFEC. Satcom voice and broadband data systems are optional and the FalconCabin HD+ IFE/CMS is included as standard on the 900LX. Based on a fiber-optic network, FalconCabin HD+ enables passengers to control HD audio and video content, as well as cabin functions, through individual touchscreens and PEDs. As part of the offering, iTunes content is stored on the Skybox wireless media server.

The trend for streaming TV and PEDs posed an integration challenge. "Some

ABOVE: THE NEW CANDY BOX DESIGN CAN BE SEEN ON THE DIVANS' ARMRESTS

customers are used to the latest technology, for example watching movies on their iPad wherever they are, or sharing their screen through Bluetooth or some other technology," comments Gervais. "However, some are more conservative, and they just want to watch a movie on a screen, selected via a simple user interface or buttons. So now we have to integrate all of those needs."

STORING PEDS

Dassault has included dedicated 'candy boxes' in the sideledge next to each seat, for storing and charging PEDs. Gervais says there used to be an ergonomic problem with these boxes: when you wanted to use a phone that was plugged in, you couldn't close the lid and rest your elbow or arm on top. This has now been rectified. "There is now this little metallic trim that creates a small gap for all the cables to go out, so you can charge your computer or phone and use it, and still rest your elbow on the candy box."

This solution is illustrative of Dassault's growing focus on industrial design, says Gervais, whose position was created in 2013. "Our team has changed the way Dassault looks at the cabin," she says. "On the Falcon 900LX, user experience has been the main focus; it has been

ABOVE: THE THREE LIVING AREAS ARE CONFIGURABLE WITH LAYOUT OPTIONS THAT REMAIN UNCHANGED FROM THE ORIGINAL DESIGN



ABOVE AND LEFT: DASSAULT TOOK A LOT OF CARE IN THE ERGONOMIC PLACEMENT OF TOUCHSCREENS AND IN THE DESIGN OF CLEAR SHORTCUT BUTTONS

MEET AGNÈS GERVAIS

Industrial design was Agnès Gervais' first specialty and it is a focus she has helped to bring to the fore at Dassault.

Having graduated as an industrial designer from the École Nationale Supérieure de Création Industrielle in Paris, France, Gervais then spent two years working on public space furniture and modular train stations. She joined Dassault in 2008 as an interior designer tasked with helping VIP customers to customize their aircraft cabins.

After around four years, Gervais switched to working on the design of standard aircraft.

"At this point I started to go back to industrial design, working on the Falcon 5X following on from the industrialization, helping to develop the cabin interior mock-up we presented at NBAA 2013," she explains. "Since then, my position was created as an industrial designer in charge of new programs and innovation."

considered right from the start of the design process."

A lot of work went into ensuring the most ergonomic position for plug-in monitors and cabin control touchscreens, partly inspired by the automotive, transportation and residential furniture sectors. "What we took was the concept of having everything within the customer's reach," explains Gervais. "For example, we worked on all the buttons so that the customer has shortcuts for controlling lights and the crew call function – it's not inside an interface. In addition, some of the buttons we already had were sometimes perceived as small and difficult to read, meaning some people were afraid to touch the wrong one. Now we have ergonomic and clear buttons with nice illuminated pictograms."

STAR QUALITY

Overall, Gervais is most proud of the cooperation between the various teams on the project. "The engineering team lead was impressive – he understood what we wanted very well in terms of design and perceived quality," she says. "In addition, the production team was always bringing new ways of looking at problems, and

were really open to changing some details, so that the perceived quality was better and the shapes were nicer."

For Dassault, perceived quality is about a combination of the aesthetics, quality and usage of a component. "We worked a lot to simplify shapes, reduce seams and simplify mechanisms for robustness," says Gervais. "The Dassault DNA is about integrated shapes, fluidity and sleekness. We try to integrate elements in a seamless way. In addition, everything has to have the right feel. Going back to those buttons, they had to have the right pressure and the right sound."

VISUAL AIDS

At the start of the development, the various teams converged at the company's immersive reality center in Saint-Cloud, France, to review the existing cabin. The center was also used to check the new design, as an extra tool to the standard 3D renderings created in CATIA.

Lots of physical mock-ups and scale-one prototypes were also built to test complex shapes and ergonomics, while a 3D printer was used to test small parts including buttons and handles. "All the teams were involved in each step of the process, and that's why it worked very well in terms of perceived quality," says Gervais. "It's a whole new way of working, which is now part of all our projects. We started to formulate these new design processes on the 5X, but this way of thinking about the user experience is being implemented more and more." ✕

The aircraft seats up to 14 passengers, with berthing for six



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Ahead of EBACE 2017, leading designers from Europe's VIP design houses, completion centers and an aircraft manufacturer discuss the factors impacting their work

Big asks



Sylvain Mariat

HEAD OF CREATIVE CABIN DESIGN,
AIRBUS CORPORATE JETS



Jean-Pierre Alfano

FOUNDER AND CREATIVE
DIRECTOR, AIRJET DESIGNS



Warja Borges

OWNER, UNIQUE AIRCRAFT



Michael Bork

AIRCRAFT INTERIOR ARCHITECT,
VIP & SPECIAL MISSION AIRCRAFT
SERVICES, LUFTHANSA TECHNIK



Christian Schirlin

DIRECTOR OF VIP COMPLETIONS
AND HEAD OF PROJECT
MANAGEMENT, AMAC AEROSPACE



Jacques Pierrejean

OFFICE GENERAL MANAGER
AND DIRECTOR, PIERREJEAN
DESIGN STUDIO

SYLVAIN MARIAT

Different cultures have different tastes, so we do our best to reflect these, as well as customizing ACJ cabins to suit individual preferences and lifestyles, so it's hard to generalize. Today's cabins tend to feature more curves – in seats, tables and walls – than those of previous decades.

JEAN-PIERRE ALFANO

From recent modern interiors that use basic two-tone color contrasts with modern finishes such as white lacquered surfaces adorned with metal inlays, I see a shift to demand for warmer interiors with simple lines and delicate materials and finishes that are reviving old-world craftsmanship. For example, on one project we are using straw marquetry for the tabletops and door design, to give the furniture a subtle touch of luxury inspired by 1930s modernist French designer Jean-Michel Frank.

*How would you
describe the most
popular design style
at the moment?*

JACQUES PIERREJEAN

Nothing exceptionally exciting – most of the time it's a combination of white, black, beige and honey tones, with wood and material contrasts. Different atmospheres are given by using various materials and textures, but the architecture is too often very similar; the aircraft is divided into small rooms, filled with molded furniture with overlaps everywhere to give a classic style.

MICHAEL BORK

In general, I see demand for design that works for many years, with a value beyond that of mayfly fashion. Look, for instance, at the work of Otl Aicher: he created Lufthansa's corporate design more than 50 years ago, but it still works.

CHRISTIAN SCHIRLIN

There is a trend for neutral ambiances and natural colors. Carbon fiber and customized special effects are replacing wood slowly. If wood is applied, there is a tendency toward light natural colors or reconstructed wood veneers. Nowadays, interiors are designed more often using the maximum available space with a minimum of break lines.



Sleek, Modern Interior

"It was important to incorporate the owner's preference for a sleek, modern interior with a flair unique to his tastes in high-end automobiles. This was accomplished by using non-traditional finishes such as blue carbon fiber, brushed aluminum mixed with highly polished chrome, silver metallic painted cabinetry and granite," says Senior Completions Designer Mary Lee.



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MICHAEL BORK

I saw a great collection of plaited Asian bamboo baskets and antique armors – awesome constructions made with techniques refined over many generations. I was impressed by their well-balanced proportions, efficient details, respect for materials, and combination of aesthetics and function.

CHRISTIAN SCHIRLIN

Mirrors made from real glass, as well as residential tables and decorative lamps, are impacting today's aircraft interior designs. These items are designed and modified using rapid prototyping to meet aviation certification standards.

What – potentially non-aviation – designs, materials and technologies have inspired you recently?

SYLVAIN MARIAT

Nature always inspires us. You can see this in our Melody concept, created to accompany our new ACJ320neo family. Melody echoes the curves of nature – such as hilly horizons and rolling rivers – with the path through the cabin and the walls. Nature also inspires our aircraft structures. For example, we are looking at adopting the structure of water lily leaves in wing spoilers, because of the efficient way in which they handle loads.

JEAN-PIERRE ALFANO

Marble mosaics, stone flooring and straw marquetry.

JACQUES PIERREJEAN

A combination of natural and artificial materials inspire me. My ideas include using real grass to create green walls, leather or stone for the floor, textured metal for different applications, and integrating lighting in carpet.

WARJA BORGES

For a recent BBJ777 concept I was inspired by contemporary 5-star hotels. Wallpaper-thin stone panels and OLED technology are two of the non-aviation features I incorporated.

CHRISTIAN SCHIRLIN

New inner cabin shells and layouts are shaped to produce a smooth transition room to room, and smart adaption to windows. Another trend is a focus on optimizing natural light coming into the cabin. Panoramic windows will be the next challenge.

MICHAEL BORK

I see a growing interest in good design in general. This may have to do with everyday experiences, for example the difference a well-designed phone interface can make. Is it clean, comprehensive and intuitive, or confusing and frustrating, covering shortcomings with visual gimmicks? Are functions, style and aesthetics all working well and together? At Lufthansa Technik we are aware of such qualities and focus them in our interior architecture.

What other trends have you noticed?

SYLVAIN MARIAT

One trend is toward wider and longer cabins in the emerging generation of business jets.

JACQUES PIERREJEAN

We focus on customizing stowage spaces on most projects. The dressing area must be able to accommodate various suits, shoes and other items, for example, long coats, Arabic dress, cold-weather clothing, and so on. Another trend is that seat upholstery is evolving to be more comfortable.

SYLVAIN MARIAT

We have already helped customers take the latest technologies they have on the ground – including HD TV screens, theater-quality sound, mood lighting, connectivity, and so on – into the sky. We have also enabled the use of personal devices to control lighting and window shades, as well as to play music and videos. We are now implementing new technologies, including even better internet speeds via Ka-band.

JEAN-PIERRE ALFANO

One of our clients recently had issues with his onboard wi-fi/satcom system. Looking into it, it appeared the system had a maximum bandwidth of 432Kbps; with today's software and content evolution, this is clearly not enough compared with what most of us now have in our homes.

WARJA BORGES

Connectivity for more flexibility on board is of high interest. But health is also an important topic: customers are requesting space to exercise or meditate, or even special equipment such as training bikes.

*What
technologies do
clients want on
board now?*

JACQUES PIERREJEAN

Clients are looking for great IFE, large TV screens and even home cinemas. Concerning seating, they are very happy when we can offer them an ergonomic study and customized comfort. Each passenger is different, but seat width and height can be adjusted to their size with Chair, our new seat concept designed for Lufthansa Technik. Sound insulation is also a general request: all clients are asking for a quiet atmosphere.

CHRISTIAN SCHIRLIN

Customers expect remote control via iPad or touchscreen. They also need their online services to work as seamlessly in the air as they do on the ground, so they are requesting the latest Ka-band system. Lighting panels with customized effects are also in demand.

MICHAEL BORK

They want all kinds of connectivity and communication, entertainment and inflight information. We also deliver fresh cooking technologies, and those supporting health and well-being, for example with onboard spas. There is also growing interest in upgrading older aircraft with technologies that were not available when the aircraft was originally delivered.



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BBJ 787 MODIFICATIONS

GDC Technics is looking forward to releasing details of projects that have pushed its backlog into 2022. During the first quarter of 2017, GDC installed Honeywell's Ka-band JetWave on both of the BBJ 787-8s undergoing modification at its headquarters in Fort Worth, Texas. After being awarded its ODA in January 2017, GDC was able to complete the installations entirely in-house.

GDC Technics has also begun maintenance work on an ACJ319 that arrived at its 840,000ft² facility in early April. Along with standard maintenance procedures, GDC has bundled its maintenance solutions with another Ka-band installation to increase the aircraft's availability.



INFLIGHT BROADBAND

With Jet ConneX achieving commercial service introduction in 2016, the inflight broadband solution will be center stage on Inmarsat's booth. "Market response has been phenomenal," says Kurt Weidemeyer, Inmarsat's vice president of business aviation. "We offer unprecedented high-speed connectivity over 100% of major aircraft routes and every island globally, off major routes. There is enough speed to stream Netflix, browse the internet, send emails and text messages simultaneously."

The company will also host a drinks reception at its stand on the second day.



"I will look out for new technologies and features such as the panoramic windows and hidden oxygen boxes"

Warja Borges, VIP aircraft interior designer, Unique Aircraft

G500 DEBUT

The first fully outfitted G500 will join Gulfstream's static display. The design includes ergonomic seat enhancements and various seat styles. The G500 on display also includes new backlighting, contrasting veneers that highlight different areas, and increased storage.

In addition to a newly designed G280 and the G550, Gulfstream's static display will also feature the G650ER, which has four living areas, with distinct galley, entertainment, conference/dining and stateroom spaces, as well as forward and aft lavatories and a crew rest. The galley can be located either forward or aft.

EBACE 2017

Make the most of your time on the 50,000m² exhibition floor and adjacent static display with our guide to the innovations to make a beeline for at EBACE, to be held on May 22-24, 2017, in Geneva, Switzerland

EBACE 2017 organizers say there should be more than 500 exhibitors

Home comforts

Emphasizing the importance of ease of use, IDAIR will showcase a new cabin app for iOS and Android devices, for use by crew and passengers. The passenger-facing mobile app will allow users to use a personal device to control lighting, audio, movies and speakers.

There are customizable preset scenarios to make it easier to set the mood. Passengers can select simple scenarios, for example movie mode, to make the shades lower, lights dim and speakers set to a preferred audio level.

Crew can also use the same app, making their response time even quicker.

IDAIR says the ability for crew to answer crew calls, change the lighting, shades and volume, and even pause a movie from their mobile devices or wearable technology enables the high-end service passengers expect.



DECORATIVE PLATE

Those looking to beautify metal components will find a selection of 135 decorative plating options at HighTech Finishing's stand. "We work continuously on new offerings," says Rick Niefeld, vice president of sales and marketing at the company. "Our newest is a variation of Rose Gold, but slightly more intense – Sangria Gold."

There is also a new clear coat process designed specifically for sinks – intended to increase durability and reduce the need for maintenance.



Around 13,000 attendees are expected at EBACE 2017

Expanded stock

Just in time for EBACE, Townsend has added 21 colors to its existing stock program of Classic Cowhide leathers. Classic Cowhide – a lightly finished leather made from European hides averaging 60ft² – is Townsend's most popular leather for aviation seating.

Because it requires the very best raw material, Classic colors and custom colors have typically been made to order with a four-week lead time. In the past year, Townsend has noticed an increase in demand for expanded options for quick-ship leathers. In response, the company has invested in producing and stocking an additional 21 colors for immediate shipment. Colors include creams, beiges, browns, tans and grays. Townsend says all the hides are flame-treated and will meet aviation standards for burn certification and other performance standards.



"The main challenge for every completion center is lowering the weight of a cabin, to maximize range. Therefore, I would like to see lightweight solutions"

Christian Schirlin, director of VIP completions and head of project management, AMAC Aerospace

BBJ 787 WORK

Its expertise on the BBJ 787 airframe will be the focus for Greenpoint Technologies. The company recently won a contract for two further VVIP completions on the type, following the industry's first VVIP BBJ 787-8 interior in 2016. The interior design is also a Greenpoint effort, in partnership with the client.

"Our on-time delivery performance and over 315,000 hours of 787 engineering design and development experience assure our clients we will perform," says Bret Neely, executive vice president at Greenpoint.



HEATED FLOORING

The beauty of real natural stone and the comfort of underfloor heating are now available for business and private jet cabins in a single product. F/List's Heated Stone Flooring is a certifiable real stone flooring product with integrated heating. As well as a standard range of 11 polished or brushed natural stone varieties, customers can specify special stone types. All surfaces can be finished with custom laser engravings.

The floor can be heated to any preset from 23-33°C, bringing cabin temperature to 20°C in 20 minutes. It has an installation height of 0.67in and is only negligibly heavier than an unheated version.



Q&A



Anita Gradwohl

BUSINESS DEVELOPMENT
AND SALES, F/LIST

What were the challenges in creating heated flooring?

It was a challenge to develop it in such a way that it can be integrated into the CMS and onboard electronics of the numerous aircraft platforms available, because they all are set up differently, in terms of voltage, for example.

What other products have you been working on?

Laser engraving is one of the highlights this year. With this minutely precise technology it is possible to engrave logos, structures, ornaments and images on wood or stone surfaces, and more application areas are being tested. In combination with additional treatments, varnishing or fillings, for example, this allows endless design possibilities.

What trends have you noticed?

Timeless high-quality natural materials are always in fashion, with variations between countries and cultures.

How is F/List expanding?

This year is a very exciting year for our international expansion. In Montreal, Canada, we open a new production site, with an expected 100 employees in the mid-term. Meanwhile, F/List USA was recently founded, encompassing multiple service facilities all over the country, coordinating support teams for our OEM customers, and serving as bases for prospected aftermarket and completion business. There will also be an F/List location in Dubai, UAE, with a special focus on aftermarket services, including a sample showroom to demonstrate all F/List capabilities, also for the yachting and luxury residence sectors. In the short term, an additional aftermarket location is planned for Europe.



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IFEC support

Satcom Direct (SD) will highlight how it powers Lufthansa Technik's nicemedia SmartBox to bring a varied and changing selection of movies and TV shows to business jet cabins. The portable memory device, connected to the onboard router, enables passengers to view content via the cabin monitors or stream it to PEDs including Apple and Android smartphones and tablets. It is available for all platforms via the nicemedia SmartBox.

Visitors can also find out about GlobalVT connectivity, which enables passengers to use their own smartphones and numbers during all phases of flight, anywhere in the world, for texts and calls. Flight departments will also be interested in a demonstration of SD Pro – a digital dashboard that provides integrated information for the entire flight operation, via a single interface.



60 aircraft will be on static display at EBACE 2017



"I'd like to see glass technology that can display images, holograms, lighter yet larger bulkheads, galley equipment that enables home-like cooking, and more!"

Jacques Pierrejean, design office manager, Pierrejean Design Studio

CABIN UPGRADES

Owners and operators looking for a summer slot for a cabin upgrade should seek out SR Technics. The MRO company offers tailored solutions ranging from refurbishment to system modifications and IFE upgrades, often combined with maintenance. It prides itself on offering technical expertise, short downtimes, Swiss quality and a guarantee to deliver the aircraft on the date scheduled.

SR Technics has created a lean setup and process landscape that enables flexibility in terms of capacity. It can ramp up to a 24-hour shift model if required to meet a tight deadline.

Since its VIP service was launched in Zurich, Switzerland, SR Technics has conducted many governmental, VIP and VVIP aircraft maintenance projects, often also incorporating refurbishment work.



REFURB SERVICES

With maintenance centers in Geneva and Sion (Switzerland), Farnborough (UK), Madrid (Spain), Paris (France), Lisbon (Portugal) and Lomé (Togo), and a staff of factory-trained technicians, TAG Aviation is certified to work on more than 60 aircraft types. TAG Farnborough Maintenance Services' capabilities include airframe work, airworthiness management, avionics and IFE upgrades, logistics, ramp services and structural work. In conjunction with Zodiac VIP Business Aircraft Interiors, the center can now provide specialist workshops on-site including improved interior capabilities – spanning furniture, carpets, seats and cabin periphery products.

TAG's Geneva facility offers full interior refurbishments, with services ranging from smart repairs to discreet and minor cabin modifications.



IFEC, RADOME AND GALLEY KIT

The Two-In-One Solution (TIOS) on Lufthansa Technik's stand received EASA STC and FAA validation in December 2016. The radome has a special material layer structure that makes it possible to install Ka-, L- or Ku-band antennas on BBJ 1 and BBJ 2 types, providing high-speed internet and TV connections.

Another product on display is the Induction Cooking Platform, which can integrate a pan, toaster and a rice cooker/pot, enabling fresh food to be prepared in a limited space.

DishwashAir will also be highlighted. It is designed to use the minimum of fresh water and have a reasonable electrical power consumption, completing cycles in six minutes.

Other products to see include the Patient Transport Unit, and niceview mobile, a fully interactive 3D moving map for passengers' PEDs.



TEXTILE TRENDS

An inspirational new collection of carefully harmonized upholstery fabrics, carpets, curtains and sidewall fabrics will be unveiled by Tisca Tiara. The Trend collection has been curated to reflect the latest trends in terms of patterns, textures, materials and color combinations. Tisca Tiara designs, develops and manufactures all these product groups under one roof in Switzerland, without subcontracting, which it says makes everything faster, easier, more reliable and cheaper for operators and OEMs.

The company will also introduce Mira X Canto, a stock range of upholstery textiles. A 3D effect is achieved by weaving chenille yarn in multiple colors in the weft in combination with a different warp yarn.



Custom cabins

The focus at the Flying Colours Corp (FCC) stand will be the world's first cabin conversion that blends the company's interior design, engineering and installation skills with pre-engineered components from Inairvation, the joint venture between Lufthansa Technik and F/List.

The private Global Express has undergone refurbishment at FCC's facility in Peterborough, Canada, and now incorporates new seats, exotic leathers, granite floors and carbon fiber veneers. The new mood lighting is controlled by the nice HD CMS/IFE system from Lufthansa Technik and

integrated into sideledges made by F/List. FCC can now install these components on Gulfstream aircraft, as well as Bombardier Global and Challenger types.

Delegates will also discover more about the company's special-mission capabilities, as well as its completion, paint and maintenance offerings. With the deadline to install ADS-B Out on the horizon, FCC will also encourage visitors to sign up for outfitting as it expects competition for slots to increase, especially as it achieves more approvals for the systems.



"I am interested in seeing the latest CMS technologies, as well as new material finishes, and, as always, cool things"

Jean-Pierre Alfano, founder and creative director, AirJet Designs

GLOBAL IFE

The studio-licensed movies and TV episodes on Gogo Business Aviation's IFE service, Gogo Vision, are now available in seven languages: English, French, German, Italian, Russian, Spanish and Swedish. Content is updated automatically using Gogo Cloud, now available at select European FBOs.

Gogo will also highlight the signing of its first business aviation customer for 2Ku, a connectivity solution originally for commercial aircraft but now also available on large VVIP types. The dual-antenna system uses a global satellite network to enable streaming video and audio, face-to-face video conferencing with a user's favorite application, email with large attachments, and web browsing. It offers global coverage.



INSIDE AND OUT

The ability to optimize maintenance downtime by performing interior work simultaneously will be showcased by RUAG Aviation. For example, the company's facility in Munich, Germany, recently refurbished a Challenger 604 during a 192-month MRO inspection.

The aircraft, which is registered in the Middle East, was delivered on time following 10 weeks' work. All the soft goods – including leathers, fabrics and carpeting – were updated. "The owner was looking to update and refresh a dated interior," says Robin Freigang, director of cabin interior services and design at RUAG Aviation. "The existing cabin was actually in excellent condition. Yet, the more modern color scheme lightened the interior dramatically."



Q&A



Werner Kartner

CO-CEO, INAIRVATION

What are your plans for the show this year?

We will show a new option for G450/550 refurbishment and a new Chair design. We hope to garner a lot of interest and potential customers.

What have you learned from your first refurbishment project?

Flying Colours Corp (FCC) is a perfect partner for Inairvation. Whether you talk to the management or to employees – you always feel this special spirit. There were some typical challenges, but we had a solution-focused way of working, which was the key to success. We aim to industrialize the whole retrofit business. After the great cooperation with FCC, we expect more mutual projects and hope to attract other customers as well.

What are your plans for Chair?

Many renowned designers have expressed interest in developing seating concepts with us, the first VVIP project is in progress, and OEM customers are interested in using Chair for their business jets. We have very high growth expectations, because Chair offers clear advantages over conventional seats.

What other areas offer possibilities for innovation?

We are working on the smart cabin – integrating all the components we supply with IFE/CMS. There is also the potential to reduce maintenance costs by incorporating RFID chips and software into our products. Like a car's onboard diagnostics system, this technology would monitor usage and warn owners and technicians about potential damage. In addition, there is scope for increased personalization, for example with automated temperature and light regulation, and IFE controls that correlate with pre-determined preferences.

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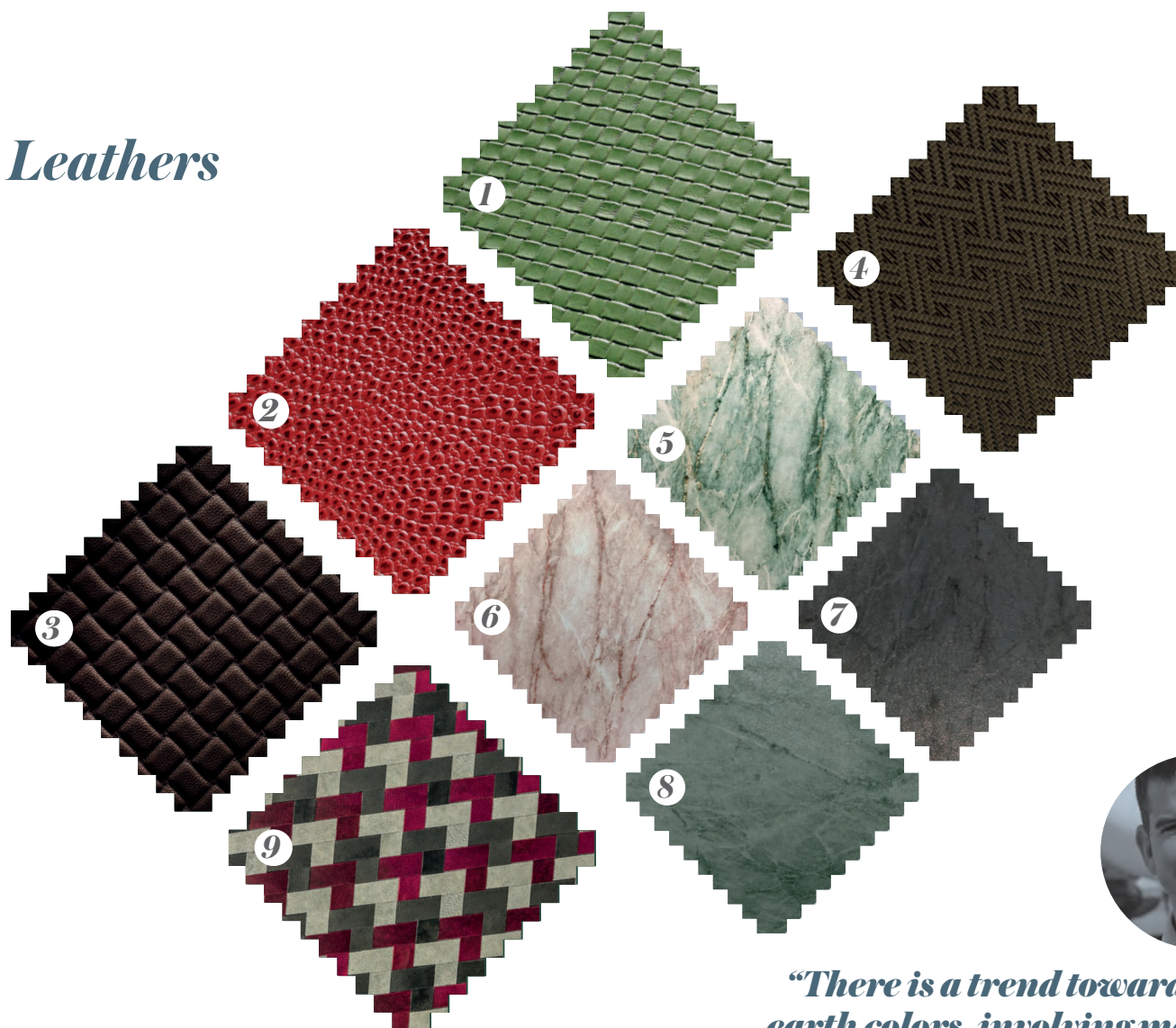
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Leathers



1. Emotions Brighton in Royal Laurel, by Boxmark
2. Emotions Essex in Royal Fire wiped with dye and gloss varnish, by Boxmark
3. Soft-touch wall covering in King Buffalo, by Boxmark
4. Intrigo in Brown, by Foglizzo Leather
5. Marble Suede in Ocean Mysteries, by Townsend Leather
6. Marble Suede in Seashell Blush, by Townsend Leather
7. Marble Suede in Dark Grey, by Townsend Leather
8. Marble Suede in Secluded Creek, by Townsend Leather
9. Hand-woven dyed parchment, by Foglizzo Atelier

“There is a trend toward classic earth colors, involving materials such as wood, stone, cork and metals – especially brass and copper. Good combinations might include concrete and gold as well as the more traditional wood and marble”

Sylvain Mariat, head of creative cabin design, ACJ

Faux leathers



“Blue is the new black. Intense and deep hues of blue add some animation to classic designs. The trick is knowing how much to add. Recently I’ve also been inspired by terrazzo patterns, velvet and copper and pink-gold metallic finishes”

Muriel Schoumacher, head of trim and finish, Plus 33 Design Studio



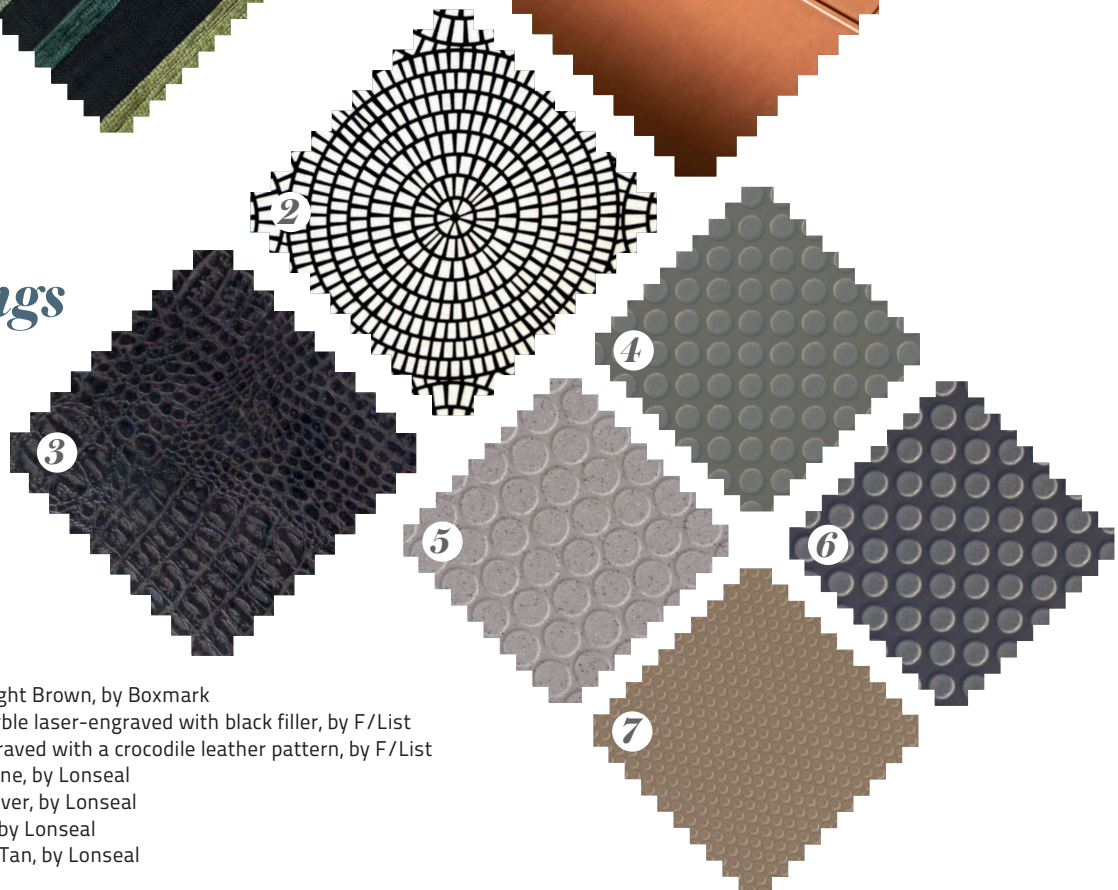
1. Ultraleather Ecotech in Limestone, by Tapis
2. Ultraleather Helix in Paradise, by Tapis
3. Ultraleather in Cove Marlin, by Tapis
4. Ultraleather in Cove Sleet, by Tapis
5. Ultraleather Ecotech in Brownstone, by Tapis
6. Ultrasuede in French Grey, by Tapis
7. Izit Leather Platinum FR in Espresso, by Willow Tex
8. Izit Leather Platinum FR in Flaxen, by Willow Tex
9. Izit Leather Platinum FR in Nut Brown, by Willow Tex

Fabrics



1. 50498 upholstery fabric, by Lantal
2. 14235 curtain fabric, by Lantal
3. Davenport 9103 upholstery fabric in color 61, by Tisca Tiara
4. Mira X Fiona 7317 curtain fabric in color 30, by Tisca Tiara
5. Lukka 8586 upholstery fabric in color 18, by Tisca Tiara

Non-textile floor coverings



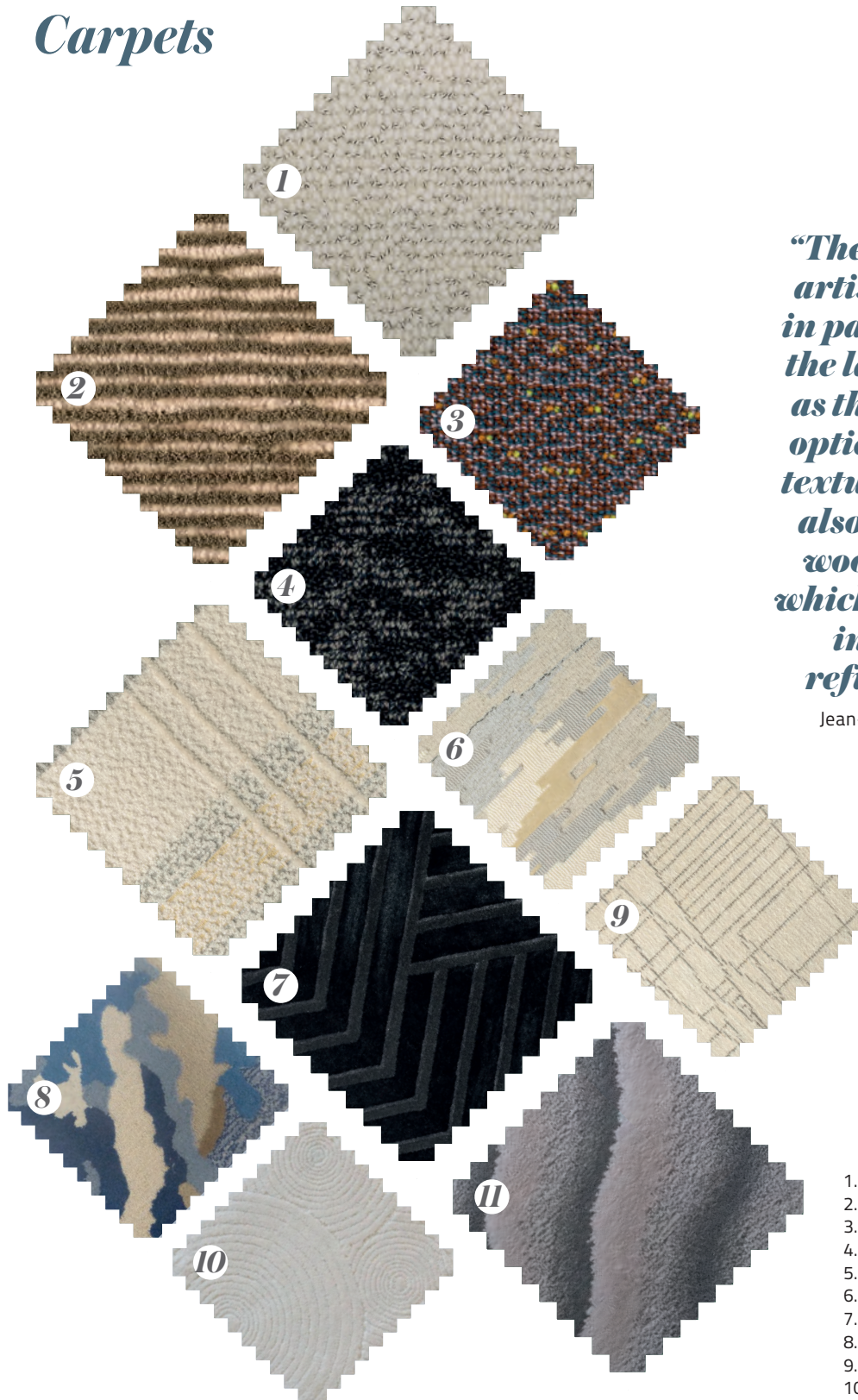
1. F/List Leather Flooring in King Light Brown, by Boxmark
2. Heated Stone Flooring, white marble laser-engraved with black filler, by F/List
3. Heated Stone Flooring, laser-engraved with a crocodile leather pattern, by F/List
4. Axis Loncompass vinyl in Graystone, by Lonseal
5. Axis Lonpolaris vinyl in Roman Silver, by Lonseal
6. Axis Loncompass vinyl in Denim, by Lonseal
7. Axis Lonequator vinyl in Hillcrest Tan, by Lonseal

Carpets



“The demand for high-end artisanship is increasing, in parallel with a desire for the latest technologies such as the integration of fiber-optic accents and modern, textured metal finishes. We also see a lot of interest in wood and stone flooring, which we are implementing in one of our current refurbishment projects”

Jean-Pierre Alfano, designer, AirJet Designs



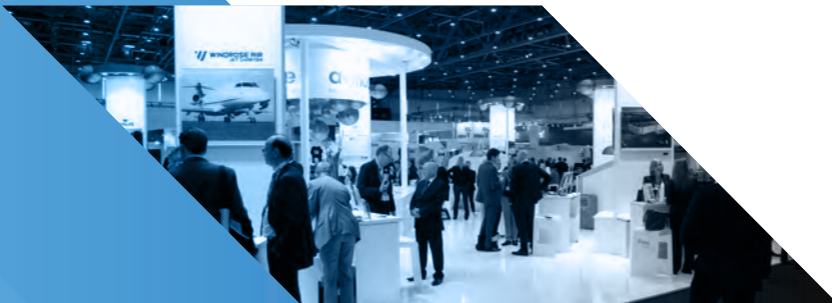
1. Delight, hand-tufted, by Lantal
2. Stripes, hand-tufted, by Lantal
3. Wilton 2344, by Lantal
4. Wilton 2367, by Lantal
5. Roush II with silk, by Scott Group Custom Carpets
6. Lykke with silk, by Scott Group Custom Carpets
7. Auna with silk, by Scott Group Custom Carpets
8. Lune, hand-tufted, by Tisca Tiara
9. Majken with silk, by Scott Group Custom Carpets
10. Ricochets, hand-tufted, by Tisca Tiara
11. Dégradé Vagues, hand-tufted, by Tisca Tiara

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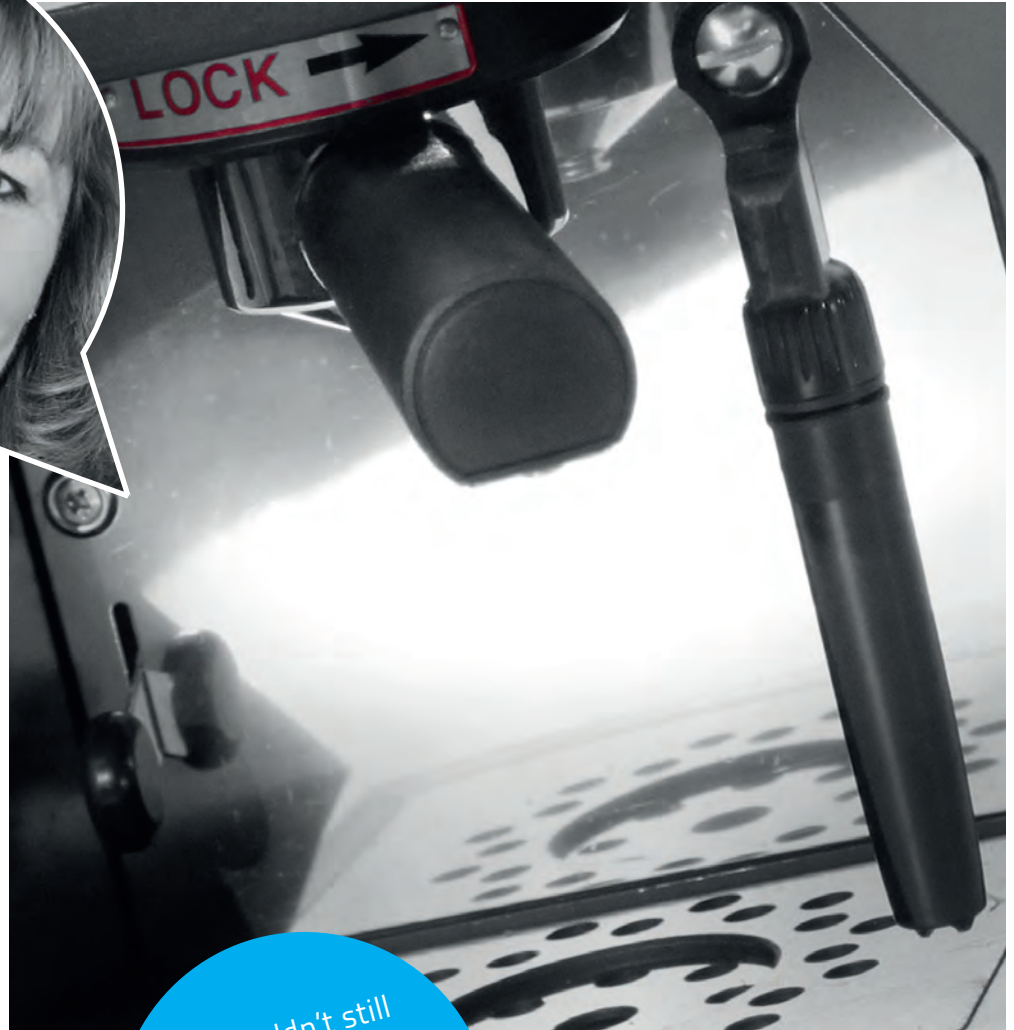
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EXCITEMENT BREWING

As galley insert manufacturer Aerolux approaches its 30th anniversary, director Jane Robinson discusses longevity of product and future developments



AEROLUX HAS A WIDE RANGE OF INSERTS IN ITS RANGE, BUT PERHAPS THE BEST KNOWN IS THE ESPRESSO MAKER. WHAT HAS MADE THIS MACHINE SUCH A SUCCESS?

Initially the espresso maker's success was down to pure innovation. It was something new, a quality offering that everyone wanted, and needed, to be able to drink a good cup of coffee. In the private jet arena it was an instant success for the simple reason that a good cup of coffee is one of life's must-haves.

As other machines came onto the market, the success of the AL-EX15-200E Espresso Maker continued, quite simply because our espresso maker makes better espresso.

WHAT SETS AEROLUX APART FROM OTHER GALLEY INSERT MANUFACTURERS?

It's the attention to detail, as much as anything else, that defines Aerolux. Everything is designed and made

We wouldn't still be in business if we didn't build kit that works as well on day 7,305 as it did on day one

in-house. We provide a bespoke product in a mass-produced world. We invite customers to talk to us about their galley insert dreams and fantasies.

Of course, durability and reliability are essential. We wouldn't still be in business if we didn't build kit that works as well on day 7,305 as it did on day one.

We've built our reputation by supplying our customers with world-class quality, design and craftsmanship.



If a client, or their customers, want a particular shape or size of galley insert, we will work with them to achieve it

WHAT COMPANIES DOES AEROLUX SUPPLY WITH INSERTS?

In the private jet sector, our customers include Airbus Corporate Jets, AMAC Aerospace, Associated Air Center, Bombardier, Dassault, Duncan Aviation, Embraer, Gulfstream, Jet Aviation, Lufthansa Technik, Sabena Technics and SR Technics.

AEROLUX WILL TURN 30 NEXT YEAR: SHOULD WE EXPECT ANY EXCITING ANNOUNCEMENTS?

Thirty years? Is it really that long since we made our first coffee maker? That's back at the birth of Aerolux, the reason we came into being. We followed up 10 years later with our award-winning espresso maker – which really upped the ante for coffee aficionados!

Coming up, we've developed a better, even more versatile espresso maker, which can be adapted for use with any coffee system.

We also have an interesting improvement for those serving chilled wine, and we have a new refrigerator coming off the drawing board.

WHAT TRENDS ARE YOU NOTICING IN THE GALLEY SECTOR?

There's a big move toward software-assisted appliances, with almost every galley product having some computer-assisted features.

On the equipment front, everyone wants something new. Clear-view combination oven cooking and clear-view wine coolers are becoming popular, along with microwaves and kettles. We've talked about a juicer and some other alternative products, but nothing we can go public with right now. We're always looking to make the next development and, being Aerolux, we are looking to get there first.

ARE YOU NOTICING GROWTH IN DEMAND FROM ANY MARKETS IN PARTICULAR?

Aerolux continues to work primarily in the private/business jet market, as well as serving airlines offering first and business class travel. The growth in demand we see is in the search for new

products and innovations to make those everyday luxury lifestyle necessities available at 40,000ft.

HOW CAN AEROLUX INSERTS GIVE END USERS A BETTER SERVICE?

Aerolux works with each customer as a partner to ensure the best end-user experience possible. If a client, or its customers, want a particular shape or size of galley insert, we will work with them to achieve it. At the moment we're working on a three-way coffee maker compatible with fresh ground coffee, capsules and pods. As in the past, we'll design and produce one-offs – for example, ice cream fridges, cake fridges, and combination and steam ovens of any size – even one that will cook a whole goat! We've also made a blood plasma fridge and – for that ultimate touch of luxury – we've produced galley inserts with gold and rare metal plated finishes. ☒

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GOLD SERVICE

Merging the latest design elements with functionality is the challenge Dahlgren Duck & Associates undertakes when providing the finishing touches for a modern business jet

One of the ongoing challenges for design in the private aviation industry is combining beautiful personalization with practicality. Designers are consistently tested to adhere to specifications while bringing a customer's style to life in the sky.

Dahlgren Duck & Associates (DDA) has developed a 30-year-old business merging these two needs. It supplies leading private aviation companies, major OEMs and completion centers with an extensive offering of fine crystal, china, flatware, linens and amenities, as well as customized services, to meet any space or style. "Our consultants work alongside private aircraft teams to define and realize the unique design of hundreds of interiors by procuring the finest products and patterns from top luxury brands," says Scott Ritter, CEO at the company.

DDA continues to build upon the legacy of high customer service that its namesake founders, Jim Dahlgren and Allan Duck, committed to on establishing the business in 1983. "Experts of luxury and unmatched in service is more than a tagline for us," says Ritter. "We are personal purveyors of product who carefully strategize and consult to enhance an overall vision."

RESEARCHING THE MARKET

To respond to demand for modern luxury, the company says it is vital to dedicate time to keep up with the ever-changing aviation landscape, as well as trends, and the strengths and limitations of certain products. To source amenities, DDA must first discuss the scope of the project with the customer, and discern the best luxury brand to pair the project with. When working with an aviation team, the

DDA also serves the yacht, residential and hospitality markets



company endeavors to present amenities that work with the interior so that the project is not held up by products having dimensions or specifications that do not work within the space.

"Understanding the customers' needs is vital, but bringing the vision to reality is what we truly want to do," says Ritter. "We cannot be editors of spaces without knowing both sides of the business – our customers' needs and our luxury brand's products – as thoroughly as possible."

This aspect is what Ritter describes as the secret of the business: working with the most exclusive luxury vendors. DDA has fostered these relationships for the past 30 years so diligently that many times, the vendors (many who are heritage brands) have developed special pieces to meet aviation needs and requirements, from personalizing the dimensions of a crystal wine glass and manufacturing microwave-safe products, to adapting lead times and adding logos.

To take products a step further, DDA also has a bespoke design division, comprised of a network of project consultants, artisans and boutique

craftspeople who are eager to bring the extraordinary to life. These items include unique *objets d'art* and personalized pieces developed with luxury brands.

EASE OF ORDERING

The company is also aware of the need to meet market demands in terms of technology. In May 2016 DDA unveiled a new look for its branding and continues to improve its back-end ordering system to streamline the specification, selection, ordering and reordering process.

"Our service, breadth of product offerings and full knowledge of specifications create an unparalleled service in the industry," says Ritter. "We always welcome the discussion of new challenges in the industry and how we can continue to bridge the gap between design and functionality." ❖



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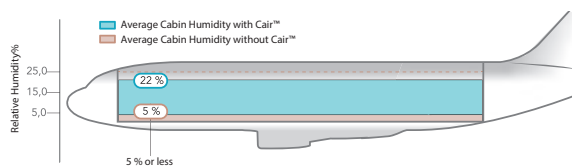
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SMART UPDATE

Installing a reliable and modern CMS can be simple and affordable with the right solution, and by taking full advantage of upcoming scheduled maintenance

An aircraft provides value only if it is available to fly. A grounded jet results in lost revenue. Scott DeSmet, director of communications at DPI Labs, encourages operators to make the most of scheduled maintenance by including system and interior upgrades into mandated downtime. According to DeSmet, many operators are surprised at just how simple a retrofit is when built into the standard C-check, for example.

"Taking an aircraft out of service for cabin upgrades is not cost-effective for

"Whether an operator chooses to restore or replace worn out, obsolete or unrepairable systems, upgrading to an integrated system can be done quickly, efficiently and with limited or no interior retrofit work," says DeSmet. "The engineering team at DPI Labs has created customized touchscreen panels that match the sizing and placement of older, vintage systems. This is a cost-effective solution for operators not ready for a complete cabin re-rag."

owner or operator so wish. If a new veneer is desired, DPI may further reduce costs by supplying a SmartLink CMS that requires minimal switch panels, touchscreens and other hardware.

PLANNING IS KEY

All aircraft systems comprise complex technology that requires planning and preparation to install. "Project management is an essential component in a CMS upgrade," says DeSmet. "Providers should

DPI Labs' CMS solutions are integrated on commercial, military and private jets, including Air Force One



operators," says DeSmet. "CMS upgrades, retrofits or repairs can be completed during scheduled service. Operators can maximize downtime and ultimately enhance revenue by offering passengers modern conveniences and luxuries."

GREAT EXPECTATIONS

Business jet users expect high-end systems that maximize their experience, whether for productivity, entertainment or leisure. CMS upgrades are often the most effective way to provide passengers with the luxury they expect. DeSmet says retrofitting a vintage CMS may be the best option for many operators with older fleets, including GIV or GV aircraft. Today, operators can retrofit a vintage system with one specifically designed to be a form, fit and functional replacement.

Modern touchscreen panels replace dated switches with no cosmetic damage or alterations to the surrounding infrastructure and veneers. Essentially, DPI Labs has created a drop-in replacement that adds a modern look, feel and functionality without any structural changes.

"With no need to replace woodwork or surfaces, the system upgrade is simple, straightforward and easily completed within a standard check timeframe," says DeSmet. "Planning ahead to schedule the upgrade in concert with your mandated maintenance is all that is required."

Although such changes are not necessary with this CMS solution, DPI Labs can also partner with companies that will upgrade interior surfaces at the same time as the CMS retrofit, should an

LEFT: DPI LABS ALSO OFFERS DROP-IN LED SOLUTIONS

CENTER: CMS CAN BE REFRESHED DURING MAINTENANCE DOWNTIME

RIGHT: A DROP-IN SWITCH PANEL AND TOUCHSCREEN PASSENGER CONTROL UNIT

be just as adept at the process as they are at the technology."

For 35 years, DPI Labs has pushed the boundaries of CMS solutions in its quest to provide passengers with modern technology, and operators with unparalleled system reliability and performance. "Any aircraft system must be measured on its reliability and quality," says DeSmet. "CMS hardware and software are no exception. Operators should review the technology, long-term performance and the manufacturer's maintenance commitments carefully before investing in an upgrade." ❌

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To request more details from DPI Labs, visit www.ukimediaevents.com/info/aimbj

TREND REPORT

ExecuJet's Kevin Fincham sheds light on current trends in the business jet interior market

ExecuJet has operations in six regions – Africa, Asia-Pacific, the Caribbean, Europe, Latin America and the Middle East

With 12 years of experience working in business aviation, Kevin Fincham, key account manager and former head of completions management at ExecuJet, is well placed to reflect on the components that clients expect to see on new aircraft today. "These range from HD screens with touchscreen interfaces, to mass storage systems and multiport connections for charging laptops, tablets and smartphones," he says.

Connectivity is a key factor when it comes to passenger expectations. "They expect to be able to make and receive calls, check emails, browse the internet, and even stream movies and TV programs," says Fincham. "A common installation option is the Satcom Direct Router, which can keep you connected to the ground while in the air, seamlessly."

Although challenging given the continual nature of technological change, Fincham stresses that it is vital for business jet manufacturers keep up-to-date, as these facilities will be expected by their passengers.

LIFT THE MOOD

Lighting is one area in which great improvements have been won in recent years. "LED lighting is a more attractive alternative to traditional incandescent systems because it offers a range of options," says Fincham. "LEDs can be multicolored and fully customized; they also create a more sophisticated environment, with mood lighting arrangements controlled via touchscreen or wireless controller."

Recent developments in connectivity have also improved the cabin experience for passengers. "In the past, media such as movies and music could only be played through a DVD player built into the galley closet and shown through an onboard



A FULL INTERIOR REFIT COMPLETED BY EXECUJET

INSET: KEVIN FINCHAM

monitor," says Fincham. "Today's systems give passengers full control over what they can access, from a port in their seat or a wireless handheld device. Passengers can connect their personal devices and stream content directly to a monitor, or control the cabin's lighting, sound and temperature."

EACH TO THEIR OWN

ExecuJet offers a diverse range of services, including aircraft management for private and commercial registered aircraft, charter, maintenance, completions management and FBO services. Over the years, and particularly in his former role in completions management, Fincham has seen some interesting things. "I have certainly encountered some bizarre requests from clients," he says. "The most notable are for modifications to existing cabins,

rather than full bespoke interiors, and include things such as installing a 40in LED TV in the cabin or a 260kg safe in the galley – two items that are excessively large and heavy for a business jet. One of the more amusing requests I recall was to replace a seat with a bespoke dog bed. Another request that stands out was for a toaster to be installed in the galley. Materials, labor, engineering and certification meant that installing this simple device would cost in excess of US\$100,000. The client went ahead and the toaster went on to become the most used item on board. Ultimately, what a jet is kitted out with depends on the client's preferences and budget." ☒

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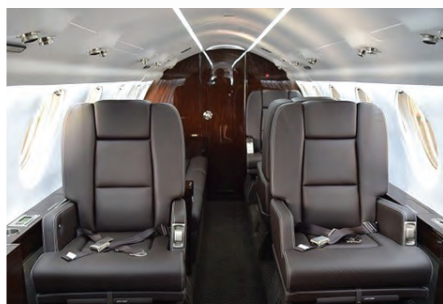
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WARM WELCOME

Villinger's LiteHeat infrared radiation cabin heating system can provide the same level of thermal comfort on board that you would expect at home

With LiteHeat, the Villinger Group has set a new comfort standard for the future of aviation. Until now, not even business jet passengers had access to a high-quality thermal environment, Villinger reports. While other aspects of the cabin seem to improve each year, cabin heating technology has in fact not been improved in decades – until now.

Today's state-of-the-art cabin heating systems use hot air, vented through a number of small openings in the cabin. High-volume airflow is necessary to maintain comfortable cabin temperatures, which sometimes creates unpleasant drafts and often results in passengers having to resort to using blankets to stay warm.

The bottom line is that today's forced-air heating solutions are simply not capable of providing the type of thermal comfort you would expect in a business jet or first class cabin.

LiteHeat is a new energy-efficient electrical heating technology for aircraft cabins that creates the same thermal environment and comfort levels that you'd expect to find in your home.

Utilizing a unique, electrically heated coating technology (referred to as the 'heater layer') that can be applied on a variety of surfaces in the cabin, it is the first cabin heating system to rely on infrared (IR) radiation rather than convective heating.

An IR source transfers heat to a body or object at a distance, just like the sun warms Earth. It is therefore a pleasant and comfortable experience for passengers. If contact heat is required, LiteHeat systems can be manufactured to reduce the infrared emissions and generate contact heat only.

The installation of LiteHeat is simple. The heater layer is applied on a chosen



The LiteHeat system has been shortlisted for a Crystal Cabin Award 2017

THE ORANGE MARKED AREAS DEPICT THE SURFACES THAT EMIT IR HEAT RADIATION. ON REQUEST THE CEILING AND OTHER PARTS CAN ALSO BE EQUIPPED WITH VILLINGER'S LITEHEAT SYSTEMS

surface as an ultra-thin coating (<0.2mm thick; <150g/m² added weight) and formed to match the exact shape and geometry of the part. Once covered with any kind of finishing material chosen by the customer, LiteHeat heaters become completely imperceptible.

When applied to the back of a sidewall panel, for example, the outward appearance of the panel is unchanged. As voltage is applied to the heater layer, an even, full-face heat is generated instantly and the passenger immediately experiences pleasant IR heating.

As well as highly increased cabin comfort, another advantage of LiteHeat systems is their self-controlling effect that prevents surface hot spots or uncontrolled local heat build-up. Furthermore, LiteHeat systems have a very high damage tolerance and can

easily be repaired or replaced in the event of severe damage.

Put simply, the application of LiteHeat can convert various parts and surface areas in the cabin, such as sidewall panels, ceilings, floors, doors, instrument panels and more, into large-scale infrared radiators, without changing their shape or appearance in any way.

Whether LiteHeat technology is used to improve passenger comfort, to simply get rid of cold spots inside the cabin, or even to fully replace bleed air in the aircraft, finally someone is able to provide the thermal comfort passengers have always dreamed of. ☒

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SET IN MOTION

Noting that customers require tables to be stable, quiet and easy to operate, safe, and in some cases, have advanced movement, control and expansion options, Aersolution set about the development of its latest hi-lo table

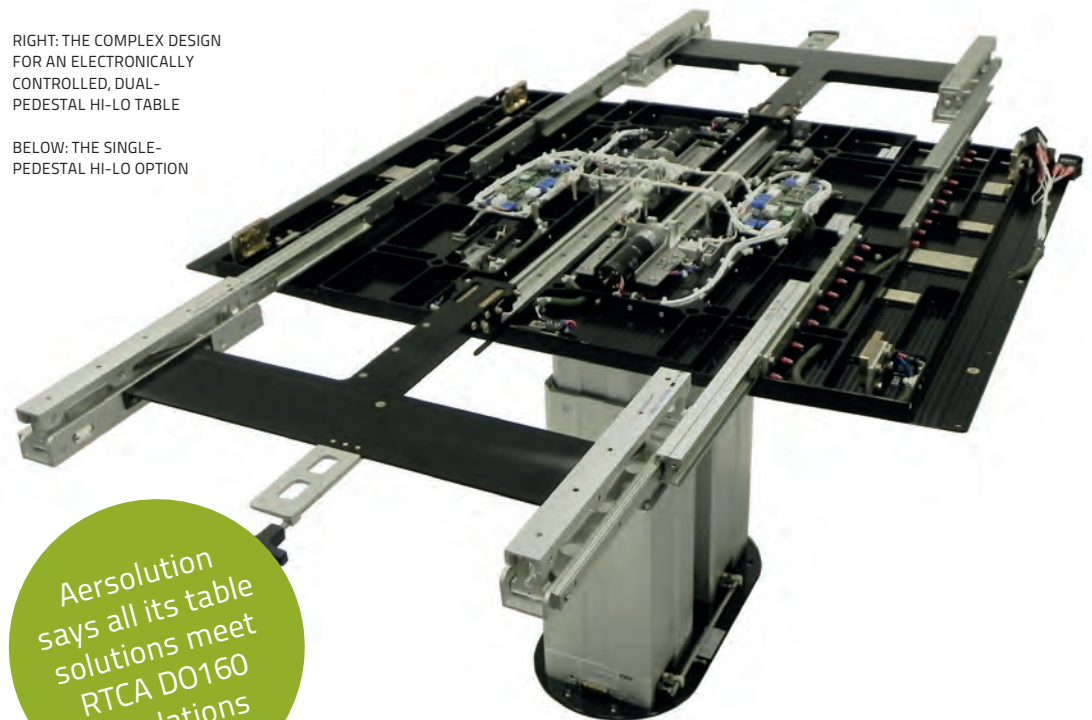
Tables in their various guises are key elements in a VIP interior, because they are one of the main things with which the principal and guests interact directly. Tables will be operated by the passengers and therefore they must be stable, easy to operate, quiet and safe. "Few things are more annoying than a rattling or instable table," says Roger Bünter, CEO at Aersolution Interior. "Therefore, it is astonishing that these requirements are often not achieved."

Another frequent requirement is to implement electrical or manual hi-lo features to move heavy tabletops up and down. Electrical table extensions and plug-in features can also be used, to enlarge the table size on demand.

"The accompanying safety requirements of these features are turning tables into more and more complex systems," says Bünter.

RIGHT: THE COMPLEX DESIGN FOR AN ELECTRONICALLY CONTROLLED, DUAL-PEDESTAL HI-LO TABLE

BELOW: THE SINGLE-PEDESTAL HI-LO OPTION



Aersolution says all its table solutions meet RTCA DO160 regulations

Faced with these very demanding requirements from completion centers, Aersolution developed a new hi-lo table system. "The key development requirements concerned stability, deployment noise, speed, force and safety," comments Bünter. "After a development process spanning almost two years, we achieved all our targets with this second generation of our hi-lo table system."

PILLARS OF SUCCESS

The key element of the system is an electronically controlled and hydraulically driven hi-lo table pedestal. For single-pillar applications it can support a tabletop up to 70kg, and it can also be used for double- and triple-pillar tables with multiple capacities.

The built-in Single Motion Controller (SMC) synchronizes the pillars and safety features. The SMC has been designed and optimized for table applications. It can be used to control all the electrical features of the table, including the hi-lo movement and electrical extensions.

"With this modular system, we can build electrical tables that fulfill the very high demands of VVIP customers – from a simple single hi-lo table up to complex customized multiple-pillar systems with electrical table extensions, plug-in tables, built-in light control and the ability to be controlled via CMS," says Bünter. ☒

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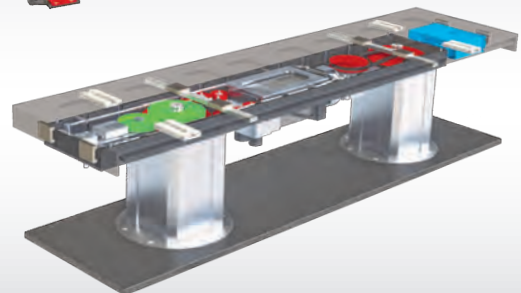
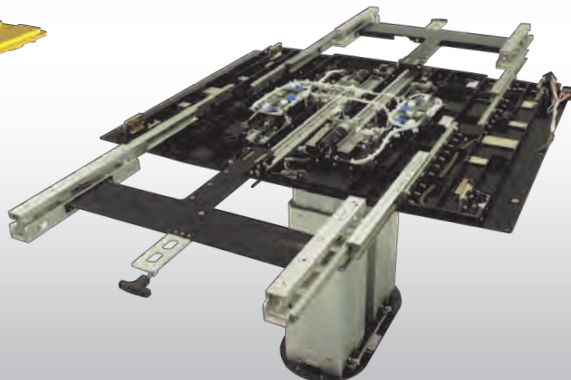
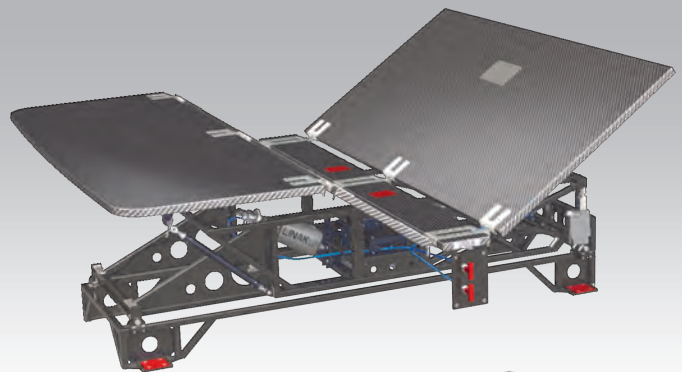
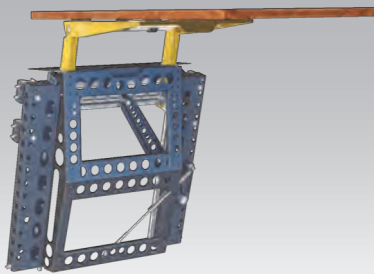
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BALANCING ACT

With their low passenger density, private jets could benefit the most from humidification solutions, says CTT Systems

The problem of low humidity on board aircraft is particularly acute on private jets, thanks to their lower passenger density, according to Swedish specialist CTT Systems. "All business jets experience extremely low humidity levels – dropping to single-digit values close to zero," says Peter Landquist, vice president of sales and marketing at the company. "This dry environment – drier even than Death Valley, generally accepted as the driest place on Earth – results in myriad unpleasant symptoms for the passenger, including increased fatigue and jet lag, dry skin, sore eyes, aches and pains and upset sleep patterns. Even the finest haute cuisine and fine wines become tasteless and bland to the palate in such conditions."

CTT's solution is the Cair humidification system, which maintains a relative humidity of at least 20%. Cair

embraces evaporative cooling technology, using a method designed to effectively preclude the transfer of bacteria and reduce the spread of viral diseases. "It means the traveler can now arrive at his distant destination in a better physical, and thus mental, state than when he took off," says Landquist. "The system complements all the other luxury amenities demanded on board. It is well within the accepted human comfort zone and, importantly, flight deck and crew rest areas share the same benefits."

Nearly 100 Cair systems have been ordered to date. CTT offers Cair for retrofit or on-line installation on aircraft types



including the ACJ350, BBJ 787 and BBJ 777. A smaller version is under development for small and midsize business jets, at the request of manufacturers.

Mindful of the need for day-in, day-out reliability, CTT Systems has also paid a lot of attention to product support, both in terms of spares and consumables provisioning and field support. As well as its base in Nyköping, south of Stockholm, the company supports its products through partners in other parts of Europe, as well as in North America, the Asia-Pacific region and elsewhere. ✕

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ALL-SEEING EYE

Camera feeds can be added as an aftermarket upgrade to help pilots and entertain passengers

HD cameras are available from a variety of manufacturers, offering a myriad of mounting possibilities. They can be fitted on an aircraft's belly, vertical stabilizer and in the cockpit. The video can be fed to pilots to help them see flight control surfaces, gears and so on. The footage is often available to passengers as well.

"Recent data shows that as much as 10% of aircraft accidents occur when the aircraft is moving around the airport before and after take-off or landing," says Dave Garing, responsible for business development at Innovative Advantage. "Cameras can help the crew see and avoid poles, trucks and fences while maneuvering on the ground."

Innovative Advantage has added the capability to bring in camera feeds and overlay fences on video. Much like a backup camera system in a car, the fences present lines that project forward and give pilots a relative idea of their clearance ahead. HD outputs are available for monitors in the cockpit or for distribution by IFE/CMS to the cabin.

"A real-time encoder in the AVDS node streams the camera inputs at very low latency to iPads," explains Garing. "The low latency stream allows the pilots to use their electronic flight bags and select the camera view to assist them in maneuvering the aircraft safely while on the ground." ✕



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BRIGHT IDEA

The direct replacement and self-ballasted LED solutions offered by ALI are designed to minimize the cost of popular lighting upgrades

Making the switch from fluorescent to LED cabin lighting has become a priority for many business jet owners and operators. Aircraft Lighting International (ALI) is a specialist in this area, having helped many clients to upgrade their lighting systems since the company was founded in 1998.

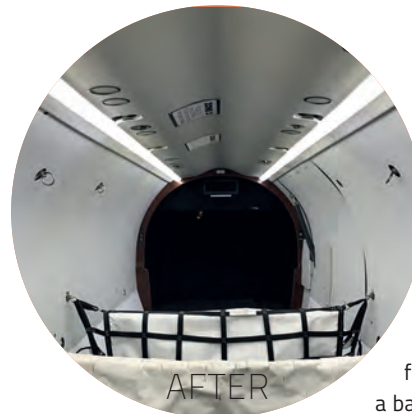
"LED lighting is now leading the charge in the aircraft interiors renaissance," reports Shervin Rezaie, general manager at ALI. "Owners and operators recognize that the value of the improved ambience offered by LEDs is amplified by their longer lifespan, which translates into tremendous savings."

There are many options to choose from in this field. One of the important aspects to consider when picking a lighting solution is if it will necessitate a system overhaul. Aircraft owners and operators should ask if they will need new fixtures, CMS or wiring. Rezaie warns that if the answer to any of these



questions is yes, that could cost the owner/operator dearly.

ALI's direct-replacement LED solutions enable the existing CMS, fixtures and assemblies to be retained. "They are truly plug-and-play solutions," says Rezaie. "You simply remove the fluorescent lamp, plug in our LED lamp and get on with your life. You can forget about the additional cost of plating, cumbersome installation, rewiring and certification."



The company also offers self-ballasted LED lighting systems.

"These offer all the advantages of our direct-replacement lamps, while also eliminating the need for ballasts," explains Rezaie. "Generally, fluorescent systems need

a ballast per fluorescent lamp. Our self-ballasted LED

system combines the functions of the ballast and fluorescent lamp into one LED lamp. Fewer parts means less can go wrong. You might also elect to remove the ballasts to save weight, which in turn results in fuel savings." ✕

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INDEX TO ADVERTISERS

Aeristo	Inside Back Cover	DPI Labs	Outside Back Cover	Moore and Giles Inc.....	75
Aerolux	21, 23, 25	Duncan Aviation	72	MSB	57
Aersolution Interior AG	101	EBACE 2017	88	New United Goderich Inc	54
Air Cabin Engineering Inc.....	94	ExecuJet Europe AG	79	Perrone Aerospace.....	69
Aircraft Lighting International	97	F/LIST GMBH.....	Inside Front Cover	Saint Louis Designs Inc.....	98
Alto Aviation	40	Flying Colours Corp	39	Signature Plating.....	98
AMAC Aerospace Switzerland AG.....	7	Garrett Leather.....	53	Textron Aviation- Service	29
Aviation Glass & Technology BV.....	76	High Tech Finishing.....	97	The Future of Transportation	
BAE Systems	49	IDAIR GmbH	5	World Conference 2017	31, 33, 34
Cobham Satcom	83	Inairvation GmbH.....	43	Townsend Leather Company Inc.....	63
CTT Systems AB.....	94	Innovative Advantage.....	101	TrueNorth Avionics	13
Dahlgren Duck & Associates.....	93	Jet Aviation Management AG	80	Villinger Research & Development.....	60
Design Q	2	Mente Group.....	91		

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track and field

A MID-SIZE PREMIUM SUV CONCEPT FROM INFINITI INCLUDES SOME INTERESTING UPHOLSTERY IDEAS

The QX50 concept, revealed by Infiniti at the North American International Auto Show in Detroit in January 2017, is intended to showcase a modern and handcrafted aesthetic.

Semi-aniline and synthetic nubuck leathers are used to create visual contrast. Infiniti hints at a "widening range" of interior finishes to choose from, including a three-tone scheme consisting of brown leather on the upper part of the cabin and white leather on the seats, lower dashboard and door trim, with the white and brown separated by a

line of navy blue synthetic nubuck, which is also used on the front of the center console.

Upholstery details include close twin stitching and a 'dot quilting' technique inspired by Chesterfield leather sofas that Infiniti is attempting to patent. The seats themselves have an almost hexagonal shape, designed to support the back and shoulders.

Moving away from the trend for glossy woods in luxury cars, the QX50 features real, open-pore ash that Infiniti endeavored to keep looking and feeling as natural as possible. ☒



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



1 The Bentley Continental Supersports car features a three-tone interior scheme highlighted by diamond-quilted Alcantara on the seats and door panels, and chequered carbon-fiber fascia panels. In all, 10 veneers and technical finishes are available.

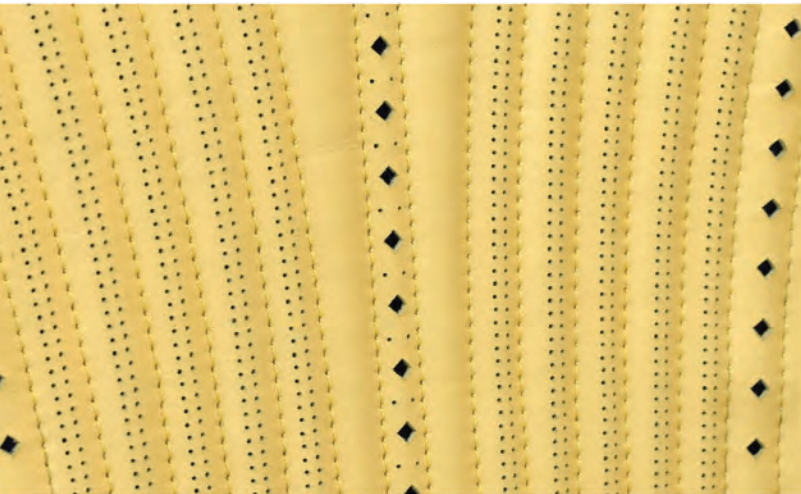


2 The Lexus brand has been applied to a 42ft sports yacht concept in cooperation with Toyota Marine. With room for six to eight passengers, the yacht features an upper deck with power-adjustable captain's seat, and a cabin with seating for six, a galley and shower.



3 Aston Martin's Vantage AMR Pro is the pinnacle of its new AMR brand. The interior uses lots of carbon fiber, Dark Knight Alcantara upholstery with lime green accents, and a custom roll cage. No more than seven of these cars will be produced.

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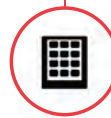
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