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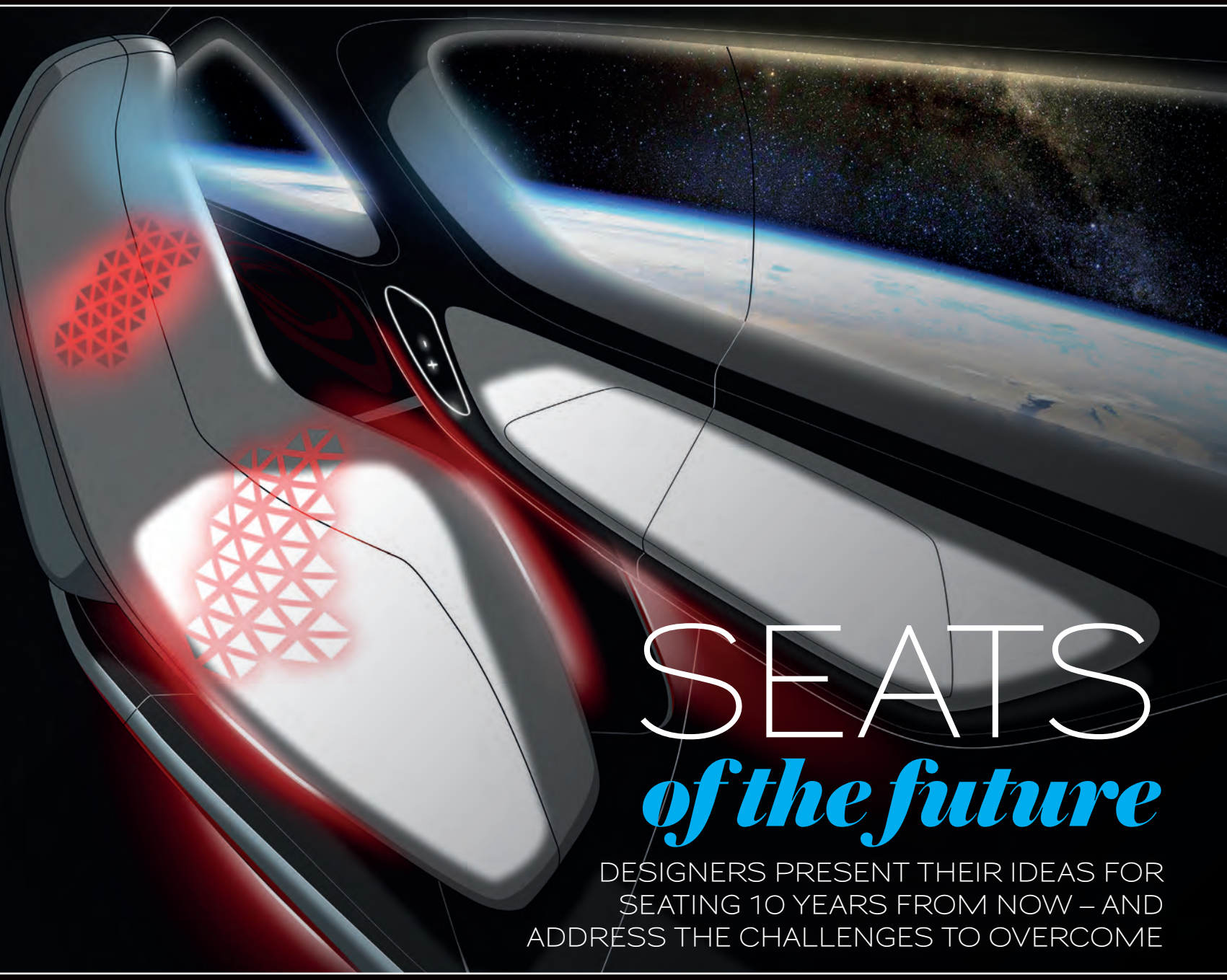

SEATS *of the future*

DESIGNERS PRESENT THEIR IDEAS FOR SEATING 10 YEARS FROM NOW – AND ADDRESS THE CHALLENGES TO OVERCOME

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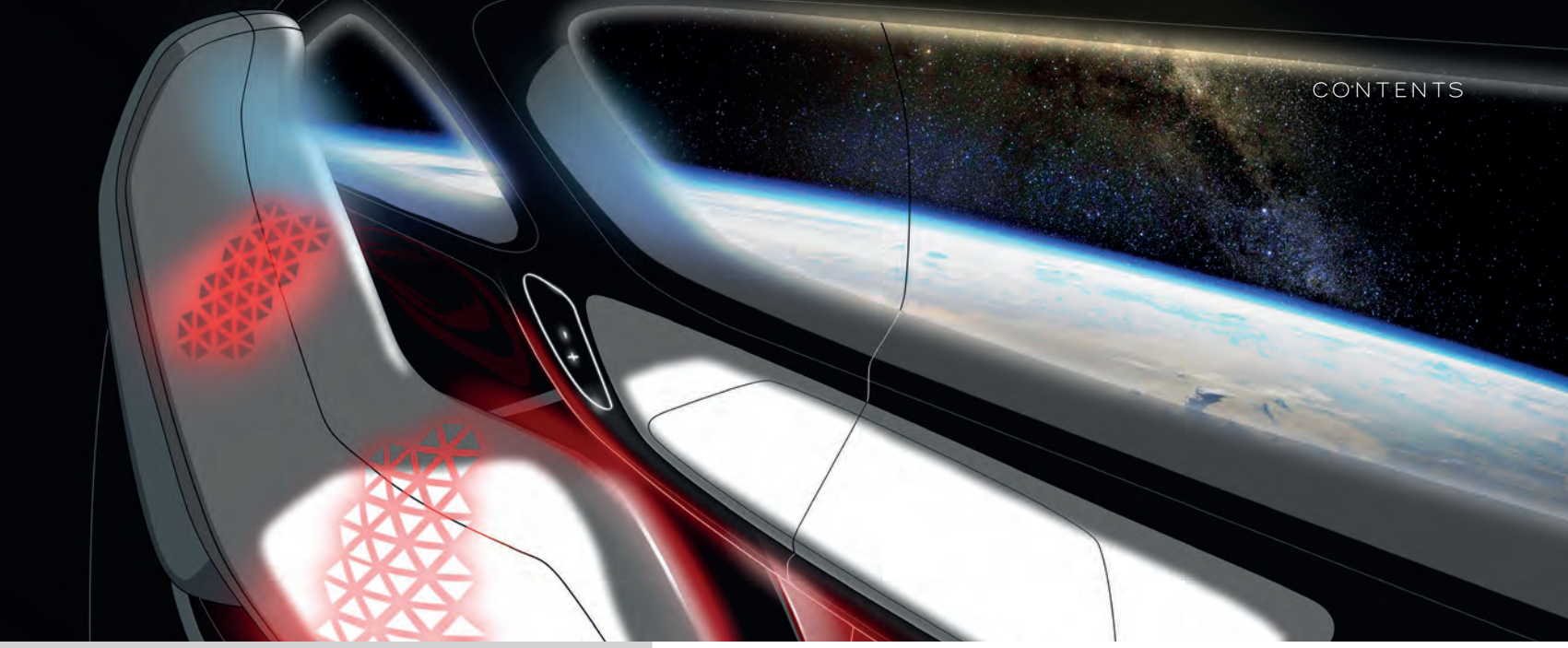
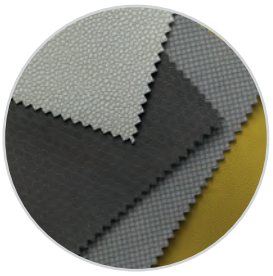
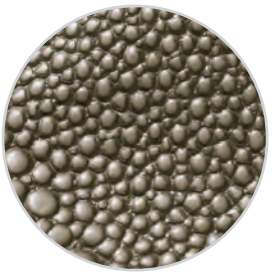


Wheels up

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

Features





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THE TEAM

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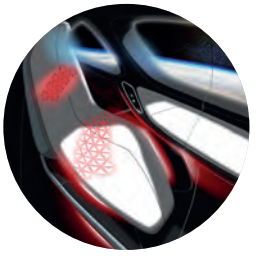

A MATTER OF TIME

Raphael Affonso, design lead at EAST, who created the seat concept pictured on the cover with senior designer Daney Chhang, sees "a universe of evolutionary possibilities" for business jet seats. He's excited about prospects ranging from making basic operations (track, swivel and recline) smarter and more interactive, to using new metal alloys to reduce structural weight, breathable covers with embedded body sensors, 3D-printed decorative panels, foam substitutes, flexible OLED screens that could wrap around seat shells, and even plastic shells that could change shape, color and texture under electric or thermal induction.

There certainly isn't a shortage of ideas in the industry, as you can see for yourself in the feature on page 34, for which we asked designers to imagine business jet seats 10 years from now. That's not to say innovation is easy, even without the need for technological advances in other fields. "Our biggest challenge in creating innovative designs is to meet certification requirements in terms of occupant safety and flammability, while also meeting very strict weight targets," says Affonso.

As Embraer's in-house seating company, EAST has recently been busy creating seats for the new Phenom 300E cabin, which is detailed on page 24. Among the headline-grabbing features are a flush air gasper system and a new application of the Upper Technology Panel first seen on the larger Legacy 500 – notable for its use of gesture control. We explore this and other cabin control technologies in greater detail on page 14. What's interesting is that while they are making inroads in industries that traditionally influence the aviation sphere, not all of these technologies appear suitable for business jets, at least for the time being. But rest assured that we will bring you any developments as they happen!

Izzy Kington, editor

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THIS VIP BBJ WAS DELIVERED TO AN EXPERIENCED PRIVATE JET OWNER DESCRIBED BY CABIN DESIGNER WINCH DESIGN AS "A YOUTHFUL FIGURE IN INTERNATIONAL BUSINESS". HIGHLIGHTS OF THE 19-PASSENGER CABIN INCLUDE PEACOCK-THEMED METALIZED PANELING, AN EXTENDABLE SHAGREEN-FINISHED TABLE, AN UNDER-LIT BAR WITH HIGH-LOW BAR STOOLS AND HIDDEN CHAMPAGNE COOLER, FOLD-AWAY BUFFET COUNTERS, AN ELECTRO-DIMMABLE SLIDING GLASS DOOR, 64IN MONITOR, CUSTOM BLUE GLASS WASHBASIN AND A MIRROR-FACED MONITOR INTEGRATED INTO THE MARBLE VANITY AREA

GULFSTREAM REVEALED A NEW G650ER DEMONSTRATOR AT NBAA-BACE 2017, FEATURING ITS OPULENT INTERIOR DESIGN

A GV-SP AFTER A CABIN REFURBISHMENT BY DUNCAN AVIATION. A CUSTOM PATTERNED CARPET WAS CREATED TO TIE IN WITH THE EXISTING VENEER AND THE NEW BLACK AND CREAM SOFT GOODS

GULFSTREAM ALSO DEBUTED ITS FULLY OUTFITTED G600 AT NBAA-BACE 2017

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TAG AVIATION GENEVA REFRESHES DASSAULT FALCON 7X INTERIOR ALONGSIDE C-CHECK

This Dassault Falcon 7X has been redelivered following a cabin refurbishment by TAG Aviation for a long-term customer. The work was conducted at the same time as a C-check inspection, due maintenance and associated service bulletins, with support from Dassault.

The aircraft arrived at the TAG Aviation Maintenance Services Centre in Geneva, Switzerland, in March 2017 and was redelivered in July 2017.

A highlight was the use of a new off-the-shelf wood veneer revarnishing process, developed by TAG's Part 21 DOA department. Ready-to-go varnishing finishes – ranging from matt to ultra-gloss – are available for all types of wood.

The cabin seats were reupholstered with new leather from Moore & Giles. The inserts feature diamond stitching and perforation, and were created by Aeristo. Cockpit seats were reupholstered using leather from Moore & Giles and sheepskin from Garrett Leather.

The divans were reupholstered with a new fabric from Lelièvre, and new foam, but retain the same design.

Carpet was replaced in the cockpit, entrance area, main cabin and aft toilet. A custom hand-tufted wool and silk carpet was created by Tai Ping.

The cabin's dado panels have been covered in Novasuede from Majilite.

All veneer was revarnished with a satin finish, chosen by the customer from a wide selection that has been pre-certified using TAG's Part 21 Design Organisation Approval.

Q&A

Philippe Rabier

VICE PRESIDENT OF MAINTENANCE SALES, EUROPE, TAG AVIATION

What was the brief?

The client requested a balanced mix of contemporary and classic styles, to give a more modern feel to the cabin that was still in accordance with their lifestyle. There weren't any elements that were especially challenging to implement.

Were any changes made along the way?

The workscope initially consisted of maintenance and the refurbishment of the cabin's soft goods. The project was scheduled to start at the beginning of March 2017 and run until the end of June 2017. However, a month after the aircraft arrived here, the customer approved the wood to be revarnished. This led to the release of the aircraft being postponed by two weeks to mid-July 2017.

What is the benefit of TAG's new wood revarnishing solution?

The new TAG process for wood revarnishing gives customers a choice of off-the-shelf finishes, bypassing specific tests and thus decreasing the cost and time spent on engineering.

Did any other recent developments benefit this refurbishment project?

We are developing a catalog of cabin seat designs, to streamline the reupholstery process. This enabled the customer to choose an off-the-shelf design for the Falcon 7X.

What is your favorite detail?

I really like the new wood varnish. The satin finish gives a subdued and cozy atmosphere.

What other investments are you making?

We now also offer partial refurbishments of exterior paint for Dassault Falcon types. This can be performed alongside major scheduled C-check inspections, to minimize downtime.

In addition, we are utilizing a new 3D cabin configuration tool, which includes the most popular cabin layouts, and allows customers to view realistic representations of their material selections, as well as ambient lighting scenarios.

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COMPLETIONS ROUNDUP

This quarter's announcements from completion centers around the world

BASEL, SWITZERLAND

Recent inductions at AMAC include a private BBJ2 for an annual base maintenance check, and a BBJ1 for annual base maintenance.

NUREMBERG, GERMANY

Aero-Dienst completed the first of two Falcon 7X C inspections for Shell. A third, for another operator, is scheduled for early 2018.

MUNICH, GERMANY

RUAG Aviation redelivered a governmental Challenger 604 following a multiple 48-month inspection, and performed 15- and 30-month heavy maintenance inspections on a G550.

SINGAPORE

With its latest approvals from CAAC, Jet Aviation can support 72-month inspections for ACJ, BBJ, G650 and G650ER types. A third hangar should open at the facility in February 2018. The 3,850m² (41,441ft²) hangar will include an upgraded interior shop with a 300m² (3,229ft²) extension for drying rooms, a wood shop and a soft goods area.

PETERBOROUGH, CANADA

Three Global 120-month (8C) inspections are underway at Flying Colours Corp. The first aircraft is scheduled for redelivery in December 2017. Modifications include CMS, Ku-band, Ka-band and ADS-B Out upgrades, as well as floorplan changes, woodwork touch-ups and upgrades to soft furnishings.

WATERFORD, MICHIGAN

Pentastar Aviation is developing Gogo Avance L5 (4G) STCs for G450 and G550 types.

INDIANAPOLIS, INDIANA

A BBJ Max 8 should arrive for cabin outfitting at Comlux Completion in the fourth quarter of 2018. Redelivery is planned by autumn 2019.

ST LOUIS, MISSOURI

Flying Colours Corp's US facility is adding 3,744m² (40,300ft²) of space, doubling the size of its cabinetry workshop and expanding its workforce by more than 70 workers (30%). The work should complete by mid-December 2017. The cabinetry workshop will include two temperature-controlled spray booths; a CNC room; a machine room; insulated buffing and sanding sections; two varnish and paint mixing rooms; assembly, framing and finishing areas; and a curing room. The project also includes upgrades to upholstery, avionics and engineering workshops.

CHATTANOOGA, TENNESSEE

West Star Aviation's Chattanooga facility is to gain Embraer authorized service center approval for Legacy types in the fourth quarter of 2017, to be followed in 2018 with approval for the Lineage 1000 and 1000E, and Phenom 100 and 300. It will offer refurbishment, avionics installation and repair, inspections and parts services.

GRAND JUNCTION, COLORADO

West Star Aviation is working with Careerwise in Colorado to launch an apprenticeship program. At least two apprentices – for "aviation technology" and paint – will be taken on from August 2018.

MESA, ARIZONA

Constant Aviation opened its fifth service center, specializing in Bombardier, Cessna, Falcon and Hawker/Beechjet models. It will offer MRO to begin with, with interior and paint capabilities to be added.

FORT WORTH, TEXAS

GDC Technics and Boeing announced a project to install live TV on a VIP 787.

FORT WORTH, TEXAS

Robinson Aerospace is now offering green and retrofit completion, MRO, upholstery and veneer replacement from a new campus incorporating hangars, backshops, design showrooms, offices and conference suites. The company already redelivered a Challenger 604 in early September 2017, following an interior refresh and 12/24-month inspection.

SAN ANTONIO, TEXAS

Aeria Luxury Interiors has been incorporated as a subsidiary by VT San Antonio Aerospace, so it can focus fully on VIP completion and refurbishment. Aeria will operate under its own FAA Part 145 Repair Station certificate.

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2017 BBJ Demonstrator Interior. Photo courtesy of Boeing.

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old meets new

This is a speculative conceptual BBJ737 design created by AirJet Designs while exploring options for a private client based in the Middle East.

"The brief was to define a baseline theme for the entrance/lounge area of the aircraft," says Marie Vega, associate director at AirJet Designs. "We are working with the client on different design possibilities for the refurbishment of the cabin, which will include a layout change in the private section at the front of the aircraft."

The goal was to explore design features not yet implemented in aircraft. "We also wanted to create a space that was warm and welcoming, with comfy seating and design elements that speak to the client's sense of aesthetics," says Vega.

The interior blends traditional architectural features seen in oriental palaces – for example, a majlis with floor seating – with contemporary design details. The latter include lamps shaped like palm leaves, modern mashrabiya-style partitions, octagonal marble tiles with black inserts and mosaic stone work on the ceiling dome. "The result is a unique interior that is an inspirational blend of old and new," says Vega.

Guests enter through a uniquely shaped doorway, into a vestibule adorned with two credenzas decorated with artwork, followed by the mashrabiya-styled partitions. The lounge area is fitted with a round central ottoman that serves as a receiving area, followed by side-facing divans and a low coffee table.

Vega says all aspects shown in the image are possible now. "The only limitation would be that the lounge seating could not be used for the taxi, take-off and landing flight phases, thus limiting the aircraft's certified seating capacity to the back of the aircraft," she says.

This design may not make it to fruition, as other designs have also been proposed to the client. "However, certain elements could be incorporated into the final design chosen by the client," says Vega. "The next stage of the project is to create the 3D images of the chosen design."

PALM LEAVES

The idea behind the light fixtures was to remind passengers of being at a beach resort, with palm leaves floating overhead. "They give the space architectural lines and seem to wrap the cabin in the lushness of palm trees," says Vega.

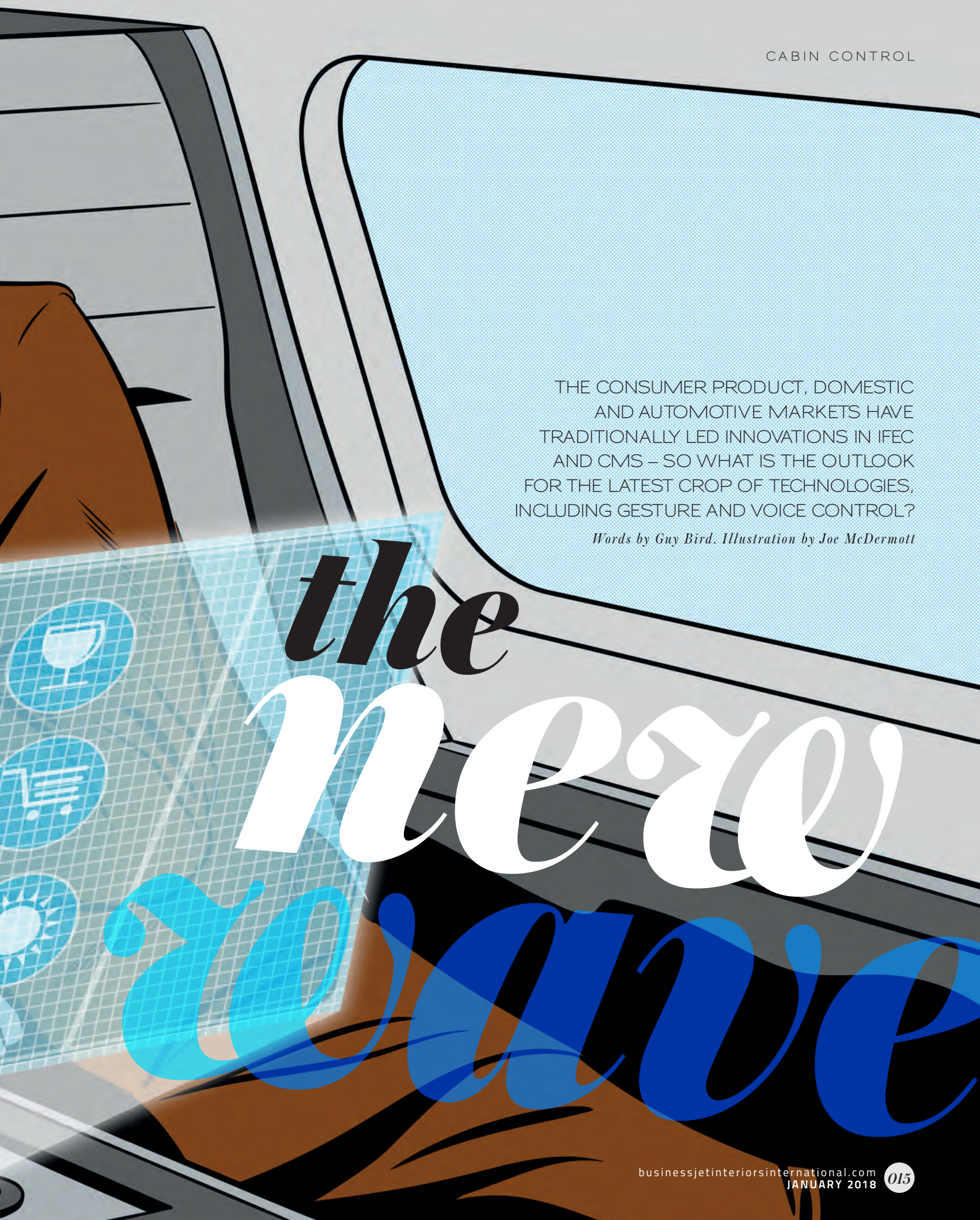
MASHRABIYA

The partitions are inspired by mashrabiya – traditional Arabic oriel windows with latticework carved from wood, sometimes featuring stained glass.

OTTOMAN

The round ottoman serves as extra seating for both the entrance and the conversation areas.


IF ONLY EVERYTHING WAS THIS SIMPLE...



THE CONSUMER PRODUCT, DOMESTIC AND AUTOMOTIVE MARKETS HAVE TRADITIONALLY LED INNOVATIONS IN IFEC AND CMS – SO WHAT IS THE OUTLOOK FOR THE LATEST CROP OF TECHNOLOGIES, INCLUDING GESTURE AND VOICE CONTROL?

Words by Guy Bird. Illustration by Joe McDermott

the new wave

"Having first identified which technologies to develop, it can take three or four years before IFE manufacturers have a saleable product"

Swipe, pinch, wave – the way the various screens in our lives can now be controlled has transformed how we all access information and entertainment. After the truly game-changing 2007 Apple iPhone's capacitive screen, other smartphone makers soon followed and in the past three years or so automotive brands have also got their screen game together.

For example, Volkswagen has a production center console infotainment system with a pop-up menu bar that appears at the base of the touchscreen when it senses a finger close by, and disappears as quickly when the finger moves away, to give the satnav map more room.

Volvo's new central screen also stands out, firstly by following the portrait-orientation of smartphones (rather than landscape, like on most other cars) and secondly by stacking secondary information windows beneath the main screen, accessible just as quickly.

RIGHT: MERCEDES-BENZ'S F 015 AUTONOMOUS CAR CONCEPT HAS HUGE DISPLAYS PASSENGERS CAN INTERACT WITH THROUGH TOUCH, GESTURES AND EYE-TRACKING

BELOW: BMW'S HOLOACTIVE TOUCH SYSTEM, UNVEILED AT CES IN JANUARY 2017, HAS A FREE-FLOATING DISPLAY THAT CAN BE OPERATED BY FINGER GESTURES AND PROVIDES TACTILE FEEDBACK

Robin Page, senior vice president of design at Volvo, is under no illusion as to how hard it is to keep pace with wider technological advances, but is excited about the potential for change. "The whole technology world is moving much quicker than the automotive world, so it's about frequent updates, refreshing the layout and options, but also adding apps and features to your car through your phone. We have apps where you can pre-heat your car in the morning and get deliveries to your car [to your boot when you're not there]. It's about connecting beyond

TEETHING PROBLEMS

One of the control technologies still in its infancy is gesture-based. Although becoming quite common in the automotive sector, results are mixed. For example, many cars now have tailgates that are notionally openable by a gentle sweep of the foot under the rear bumper, but not all work first time, every time. Having to make multiple and increasingly frantic foot waggles when standing on one leg with heavy shopping isn't a great experience.

Inside the car, gesture is starting to be an option to adjust stereo volume, open sunroofs, and more. But it too has its critics, including *Car* magazine, which recently described the gesture control within one recent car review as, "almost impossible to master, merely giving passers-by the impression that there's an angry wasp in the cabin".

Eric Hoegen of AMAC Aerospace says monitor definition is a key focus for improvements on VIP completions. "We were the first completion center to install 4K-capable monitors on an aircraft," he says. "It took time because they hadn't been certified before. We have installed 4K screens up to 46in, although the curvature of the fuselage imposes physical limitations. Installing them also involves a lot of stress engineering and structural work."

the product, to your life, so you continue the journey as you get into the car, with music streaming, preset navigation and more. The next four years, for any interior designer, will probably be the most exciting time since we converted from coaches to cars."

INTEGRATED APPROACH

Automotive HMI supplier ED Group is aiming to go a step further. "Many current HMIs only use a mirror link from your smartphone or something else," says Davide Pizzorno, founder and chairman of ED Group. "What we are developing is not only an interface and new software or hardware, but every single component used in the HMI. The first production cars that will see this approach will be launched in China, for two domestic brands, from

BELOW: AMAC CONTENDS THAT NEW CONTROL TECHNOLOGIES WILL REQUIRE KA-BAND INTERNET, SUCH AS THAT OFFERED BY INMARSAT ON BOMBARDIER GLOBAL AND CHALLENGER 604, 605 AND 650 AIRCRAFT

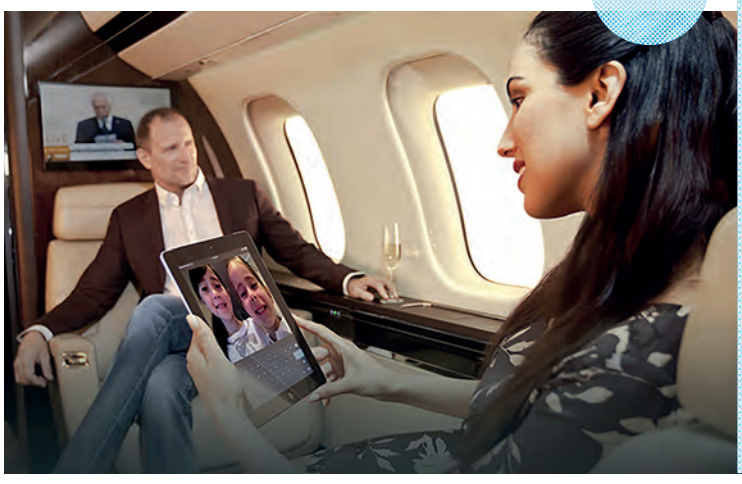


PHOTO: BOMBARDIER

Key connections

One of the keys to unlocking the full potential of CMS is the quality of the inflight internet. "You need strong broadband to use something like voice control," says Eric Hoegen of AMAC. "A lot of aircraft have internet connections, but their reactivity is not the same as on the ground on 4G. But it is solvable; the fastest available for aircraft is a Ka-band system. Inmarsat's I5 geo-stationary satellites became available to aviation a couple of years ago and they fly much higher and stay in the same position, which allows the network to offer almost worldwide coverage. This became available in 2017; we're now installing our sixth system and working on another dozen."

Hoegen estimates there are no more than 50 VIP jets flying with strong broadband connections, so there is still a way to go before recent advances in IFEC and CMS can really filter through.

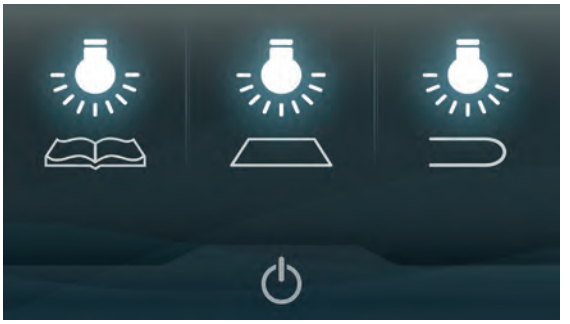
Ease of use

Jay Beever of Embraer Executive Jets is keen to emphasize that any change to the HMI in an aircraft must be made very carefully. "There is a conflict where some individuals truly appreciate a traditional switch, especially those who have been flying private aircraft for decades," he says. "Sometimes it's difficult for them to adapt to an era where things are maturing so fast when it comes to gesture, voice and haptic control; we must be sensitive to that."

For example, on the Legacy 500, and now the Phenom 300E, the light controls – which light up when a hand is near but are operated by touch – are in the same location as traditional light switches would normally be. "The switches are in context," says Beever.

The system is designed to be very intuitive and easy to learn. "You may reach your hand up toward the gasper, and cause the switches to light up," he says. "You may not have known the switches are there, because when not activated you only see the black glass. Very quickly, the technology has taught you how to operate the interior via gesture-based control."

And for those people who really don't want to deal with gesture-based control, the switches can be set to remain illuminated.



2018. After a single touch, the system will register every hand movement, so you can adjust aspects, including your seat and airflow, just by moving your hand."

ABOVE: THE CAPACITIVE LIGHT SWITCHES ON EMBRAER'S UPPER TECHNOLOGY PANEL LIGHT UP WHEN A HAND IS NEAR

BELOW: VISION SYSTEMS HAS PROPOSED GESTURE CONTROL FOR ITS NUANCE TOUCHLESS SPD-SMART ELECTRONICALLY DIMMABLE WINDOW

CERTIFICATION CHALLENGES

In most cases, aircraft IFEC and CMS has struggled to keep pace, because of longer lead times, less regularly refreshed electrical architecture, stringent legislation and weak internet options. This is tough to understand for a customer who's used to the latest technology in their home and is spending millions on a new aircraft.

"You never have the latest technology in aircraft, because of the certification required," says Eric Hoegen, AMAC's sales and key account manager for completions and modifications. "Having first identified which technologies to develop, it can take three or four years before IFE manufacturers have a saleable product."

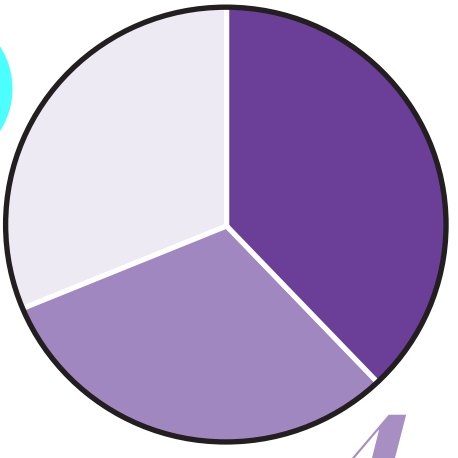
AVIATION ADVANCES

That's not to say there hasn't been screen-tech trailblazing in the aviation sector. "In 2006 we introduced the first wireless 802.11 touchscreen remote controller, featuring a similar shape to the iPad, but before the iPad was introduced in 2010," says David Crossett, head of sales and marketing at Lufthansa Technik. "We've since introduced controllers with animated GUIs, scroll wheels, swipe screens, and web and native iOS and Android apps."

While it seems the business jet market is making progress on touchscreens, what of gesture and voice

Readers' poll

Q **Which new control technology will be the most challenging to implement in aircraft?**
As of publication day, our online readers say...



A

38% Voice control
31% Gesture control
31% Touchscreens with haptic feedback

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JOINED-UP DEVELOPMENT

Too often in aviation design, IFE has been an add-on, rather than a key element, contends David Crossett of Lufthansa Technik. That's one of the reasons the company partnered with F/List to form the Inairvation joint venture.

"We strongly believe cabin interior design and development should also include CMS/IFEC systems," says Crossett. "In the past, manufacturers generally treated interior and electronics separately – which usually meant that an interior supplier was chosen first and a CMS/IFEC system was selected much later. The two were designed and developed without in-depth thought of how the cabin environment and the electronic controls would integrate. The result in many cases was that both would be compromised during integration/installation. The cabin and the CMS should be designed and developed together from the start of the process to produce an aesthetically pleasing cabin with smart and ergonomic user interfaces."

BELOW: VOLKSWAGEN HAS INTEGRATED GESTURE CONTROL IN GOLF CARS

control? "Gesture-based control is alive and well in our aircraft," says Jay Beever, vice president of interior design at Embraer Executive Jets. "We started with the Legacy 450 and 500, and have now brought the technology to the Phenom 300E, via the Upper Technology Panel."

The panel is made from black glass, with control switches, sensors and reading lights mounted to a Nomex substrate behind the glass. When the sensors detect a hand within half of an inch of the glass, the switches are illuminated, guiding the passenger to operate them by touching the glass.

"Capacitive technology enables the clean surfaces and sideledges that designers have long desired"

The capacitive switches on Embraer's Upper Technology Panel don't offer haptic feedback via vibration, but do give a little blink to confirm that they've been activated

CAPACITIVE GLASS

The capacitive aspect was developed with Lufthansa Technik and Birk Aerosystems. Lufthansa Technik has offered capacitive switches since 2010; Crossett says the big departure with this panel is that the GUI appears and disappears as needed. "Capacitive technology enables the clean surfaces and sideledges that designers have long desired, without the need for buttons, switches or traditional touchscreens, and with no moving parts that can break or suffer wear and tear," he says.

Beever doesn't think it will be long before others attempt similar gesture-based concepts. "They won't be able to copy us, but they'll try to find other ways; it's the natural evolution of product development," he says.

Meanwhile, the public has certainly started to embrace voice

STEWARD: "SIR, WOULD YOU LIKE YOUR FRIED EGGS OVER EASY, OVER MEDIUM, OVER HARD OR SUNNY SIDE UP?

PASSENGER: "AHHH, YOU MUST HAVE AN AEROLUX AL-SK15-100 SERIES SKILLET IN THE GALLEY!"

STEWARD: "BUT, OF COURSE, SIR, THIS IS YOUR BUSINESS JET

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"We can't have lights and bells and whistles going off any time anybody says something"

control through products including Amazon's Alexa and Google Home. The trouble is that an aircraft cabin is not as controllable as the interior of a house or a car.

"Noise levels in an aircraft are quite high," explains Hoegen of AMAC. "In a regular airline cabin the decibel level can be in the high-60s to early-70s, which is a challenge for voice recognition. You would need a microphone very close to you. But we're putting a lot of engineering effort into keeping VIP cabins as quiet as possible – 46-48dB. This allows normal conversation."

ABOVE: AT CES 2017, BMW DEMONSTRATED HOW MICROSOFT'S CORTANA VOICE-CONTROLLED PERSONAL DIGITAL ASSISTANT COULD BE INTEGRATED IN ITS CARS

BELOW: THE CENTRAL SCREEN IN THE 2017 VOLVO XC40 HAS A PORTRAIT ORIENTATION AND STACKED INFORMATION WINDOWS

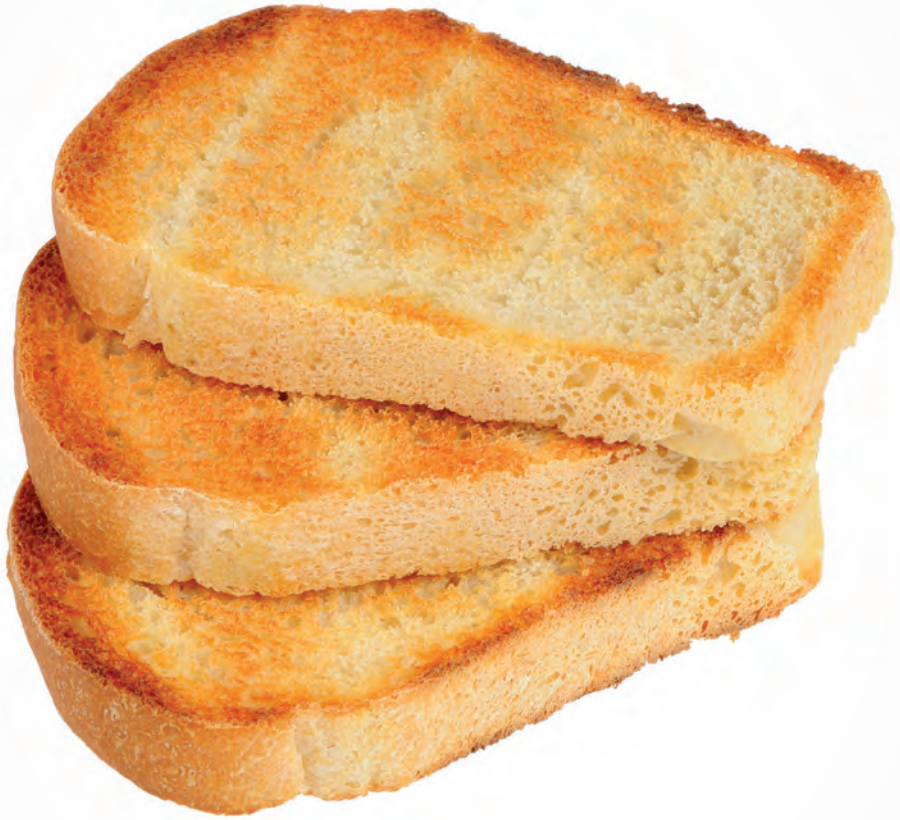
INSET: GESTURE CONTROL ON THE MERCEDES-BENZ F 015 CONCEPT

CACOPHONY OF VOICES

Beever of Embraer points out that there are other important departures from the automotive environment that limit the viability of voice control on aircraft. "Firstly, in an aircraft there is the opportunity to sleep, and secondly, you are likely to have a lot more people present," says Beever. "We can't have lights and bells and whistles going off any time anybody says something. We also don't want things to be operated inadvertently because the system picks up a voice from another area. I'm not saying voice control won't appear on aircraft in the future, but right now it doesn't seem appropriate."

Beever says homes and offices are more comparable to the aircraft than cars. "I'm watching to see how voice control works in those environments," he says. "If we find it works there, then we can start considering how it might be applied in an aircraft."

SOMETIMES IT'S THE SIMPLE THINGS DONE SUPERBLY



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family

EMBRAER REVEALS HOW IT TRANSFERRED ITS DESIGN DNA, CREATED FOR THE LEGACY 500, TO ITS LIGHT JET SISTER, THE PHENOM 300E

Words by Izzy Kington

values

Jay Beever cites Aston Martin cars, baseball mitts and the new Apple Watch as influences on the design DNA

The Phenom 300E has 84ft³ (2.38m³) of baggage capacity, including a 66ft³ (1.87m³) aft compartment with optional heating

Jay Beever, vice president of interior design at Embraer Executive Jets, worked for many years in the automotive industry and is keen to transfer every good idea he can. One thing he thinks luxury car makers such as Aston Martin do very well is to instill a design DNA into every model they produce. "Even though each car looks a little different, you can still tell they're part of the same family," he says.

Embraer has committed to doing the same, as is evident with the recently unveiled Phenom 300E. The design draws on a DNA developed for the Legacy 500 – Beever's first project upon joining the company in 2012. It has also been applied to the Legacy 450.

Perhaps the most noticeable element to have made the transition is the Upper Technology Panel. While on the Legacy 500 and 450 – mid-size cabin jets – there are two

BIRTH OF A DESIGN DNA

Embraer's design DNA was created when Jay Beever's team redesigned the Legacy 500, prior to service entry but after the original designs had been approved. It had to be pretty special to convince management to green-light the new tooling needed to bring the redesign to life, only 18 months from delivery.

Aesthetically, the focus was on removing clutter and making the aircraft comfortable and timeless. "The industry tradition seems to be to pepper miscellaneous suppliers' parts throughout the interior without a real plan," explains Beever. "We asked questions such as why the cupholder and touchscreen bezels were different shapes, if we could hide touchscreens, and how to bring in consumer technologies in a way that doesn't date. We also wanted to appeal to people with more modern or contemporary tastes, so we didn't go too old-school in terms of trim and finishing."

The second aspect of the DNA relates to craftsmanship – how parts are assembled. In this regard, notable advances with the Legacy 500 include Embraer's use of geometric dimensioning and tolerancing and 'floating gaps'. A four-way locator bracket holds the bulkhead and the sidewall together. The sidewall has two-way locators that allow it to slide fore and aft, in and out of a trough in the bulkhead. The trough is finished in the customer's choice of plating.

"We were bold and ended up with no loss of package space, improved headspace and flush gaspers that really give a different experience"

PHENOM 300 TIMELINE

MAY 2005
Phenom 300 announced

APRIL 2008
First flight

DECEMBER 2009
ANAC and FAA type certification, first delivery

MAY 2010
EASA type certification

MARCH 2011
IFE/CMS upgrade certified

MAY 2012
Two-place divan option certified

JANUARY 2014
Interior redesign initiated

MAY 2016
Introduction of limited interior updates

JULY 2017
First Phenom 300E interior installation begins

OCTOBER 2017
Phenom 300E unveiled at NBAA-BACE

JANUARY 2018
Expected Phenom 300E service entry

of these glass panels, one on each side of the cabin, on the light Phenom 300E, there is a single panel in the middle.

GESTURE ACTIVATION

As well as gaspers and reading lights, the Upper Technology Panel integrates capacitive controls for the table and reading lights. The controls respond to gestures, appearing when a hand is near. There is also the option of two 7in swing-down displays for AVOD IFE. "When the monitors fold down they automatically trigger audio/video sourcing," says Beever. "When they are stowed, they return to giving flight information. They are also touchscreens, so you can control the cabin from there if you want."

One benefit of the panel is ease of maintenance, Beever says. "All the critical system pieces are in the same spot," he explains. "Removing the glass gives easy access to all parts, so they can be serviced in minutes, rather than hours and days."

ABOVE: SEATS, TABLES, SIDELEDGES, SIDEWALLS AND VALANCES HAVE ALL BEEN REDESIGNED

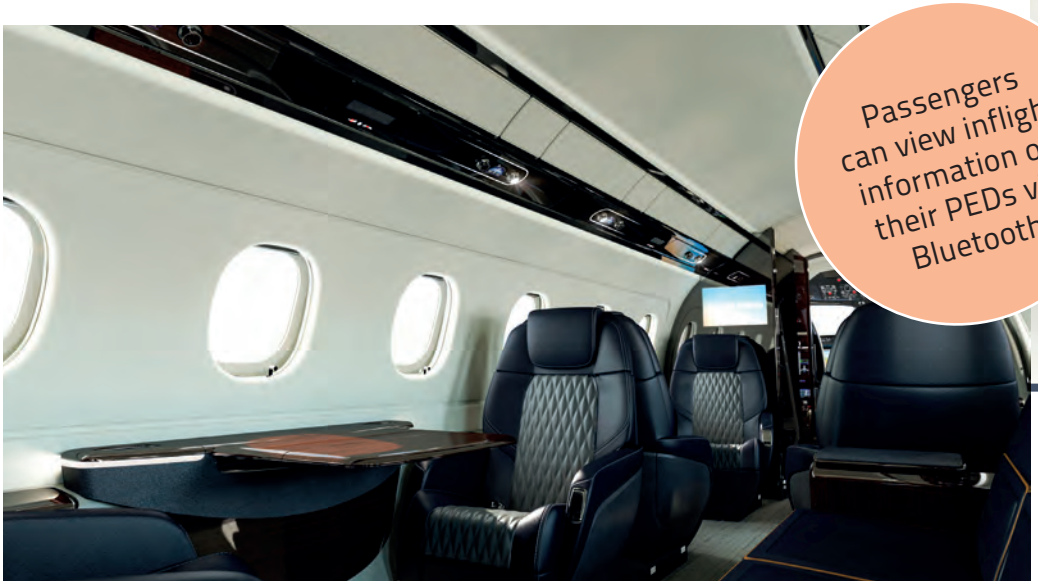
TOP LEFT: AN EARLY DESIGN FOR THE LEGACY 500'S UPPER TECHNOLOGY PANEL

LEFT: CUSTOMERS CAN OPT FOR DROP-DOWN SCREENS

TAKING A RISK

By relocating the gaspers and reading lights, Embraer was able to push the headliner up, giving 18mm (0.7in) more headroom. The patented new gasper system was invented and engineered in-house. "It's flush, so it no longer steals headspace," says Beever. "It was such a risk though. The whole interior is based on getting more headroom over the seats.

"If a customer ordered a Phenom 300E and a Legacy 500, they could now have similar trim and execution for them, even though we have two different supply bases"



Passengers can view inflight information on their PEDs via Bluetooth

I thought, 'If I'm forced to put round gaspers back in at the last minute, I'm going to have head-knockers down the middle of the aircraft.' But we were bold and ended up with no loss of package space, improved headspace and flush gaspers that really give a different experience."

ABOVE RIGHT: EMBRAER'S NEW SEAT DESIGNS FOR THE LEGACY 500

ABOVE: THE LEGACY 500 CABIN

BELOW RIGHT: THE PHENOM 300E'S SEATS SHARE A DESIGN DNA WITH THE LEGACY 500'S, DESPITE HAVING DIFFERENT FRAMES

BREATH OF FRESH AIR

Beever says the gasper technology is like the Dyson fan in that there are no blades. "We applied an aerofoil section to the back of a disk," he reveals. "You point the Embraer bird symbol toward your head and air washes over you. It's not a pinpoint of air; we've accelerated the airflow. Because of the aerofoil the gaspers are quieter and more powerful, even though they use the same air supply as today."

As well as through the drop-down screens, CMS functions can be controlled via touchscreens hidden in the sideledges and divan armrests. The IFE/CMS is a version of Lufthansa Technik's nice, with an Embraer-designed GUI. "We felt that, no matter what screen you are on in the interface, you should always be able to turn on a reading light or access audio and video," says Beever. "Those icons are always there; you don't have to scroll through layers to get to them."

SUBTLE SUPPORT

The icons are transparent, so you can always see the background, which displays images of places the aircraft is flying over. "This gives you an idea of how much flight time is left, so you can decide if you have time for another drink, for example," says Beever. "The aircraft gives decision-making tools without you having to ask for them. On the Legacy 500, flight information is presented at a glance on the Upper Technology Panel. We've taken it to the next level on the Phenom 300E, by providing it on the sideledge CMS control screens."

Space crusaders

Gaining space was a key goal with the design. For example, extra headroom has been wrested by incorporating gaspers and reading lights into the Upper Technology Panel.

There is also 3in more aisle space, gained by creating seat arms that stow fully. In addition the seat headrest can be moved up and down, which Jay Beever says creates better visibility through the cabin so that it looks larger. "We've had people sit in the aircraft and say it's bigger, despite having the same fuselage and wider seatback cushions," he says.

This goes back to a key part of the design DNA – the idea of the aircraft being a 'butler with wings' that provides or hides technology and information as required.

IN-HOUSE SEAT DESIGN

Embraer has also worked to create similarities between the seats it has developed for the Phenom 300E and those on the Legacy 500. This was complicated by the fact that the Legacy 500 seats are made by B/E Aerospace, now part of Rockwell Collins, while the Phenom 300E will be the first Embraer aircraft to feature seats manufactured in-house by Embraer Aero Seating Technologies (EAST), formerly Aero Seating Technologies.

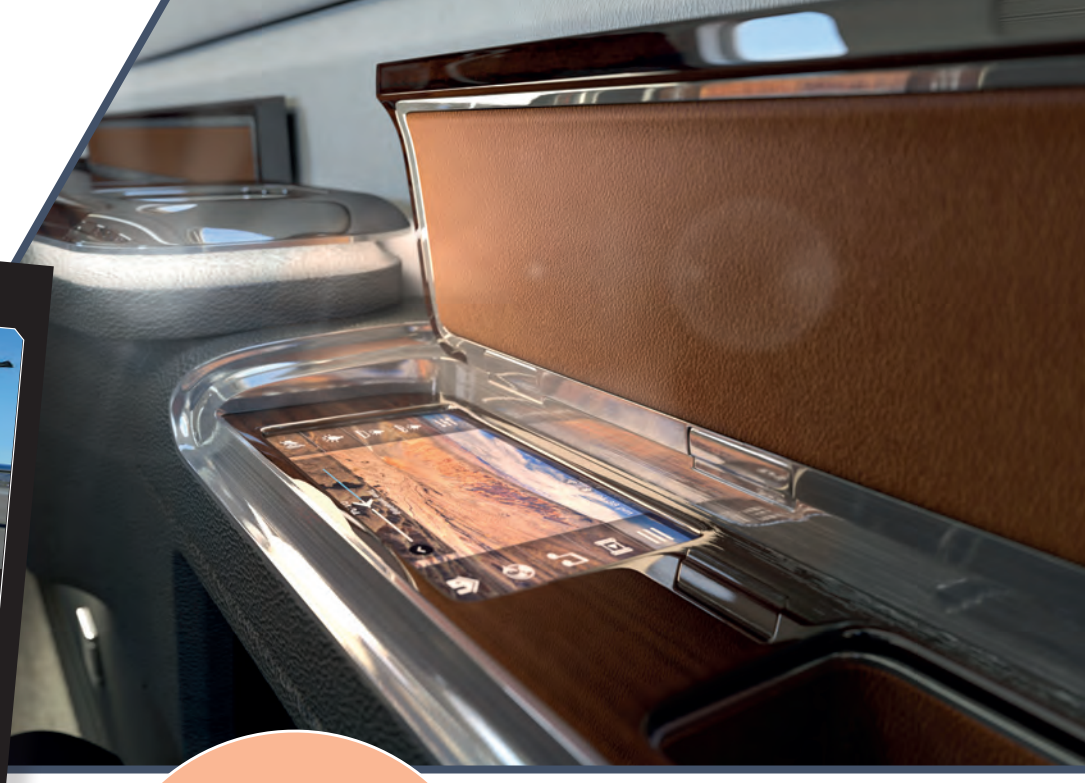
Beever's team worked with B/E Aerospace and EAST to match the seats aesthetically. "If a customer ordered a Phenom 300E and a Legacy 500 for their flight

WHY IT'S HARD TO INNOVATE

The most challenging thing about innovating, according to Jay Beever, is the need to engage with suppliers very early in the development. "A big risk with new product development is that you are forced to release your design plans to maybe three suppliers during the bidding process – two of which you will not use," he explains.

The challenge is to create a design requirement document that's generic enough not to give away intellectual property, but descriptive enough to lead to accurate quotes. "It's the most difficult thing in the world, and the quotes are never accurate – suppliers come back later to say it's going to cost more," says Beever. "Then I have to ask for more budget, which is not forthcoming. What it means is that you really have to sell the design internally, but this does help the team sharpen its game. The actual execution is easy: we've created the drawings and the CAD data, signed up enthusiastic suppliers and made a prototyping plan."

Another challenge is to coordinate the design execution with various suppliers to ensure a cohesive look throughout. "We want to make sure our fingerprint and DNA is visible no matter which suppliers we work with," says Beever.



CABIN STATS

Phenom 300E

Cabin width: 5ft 1in (1.55m)
Cabin height: 4ft 11in (1.5m)
Cabin length: 17ft 2in (5.23m)
Seats: 1-2 crew + 7-10 passengers
Range: 1,971 nautical miles with six occupants and NBAA IFR reserves
Maximum cruise speed: Mach 0.78
Maximum altitude: 45,000ft
Price: US$9.45m

department, they could now have similar trim and execution, even though we have two different supply bases and the structure is completely different," says Beever.

Part of the design DNA is to layer three materials in certain areas. The leather-covered headrest offers a good example of this – when it is extended it reveals a layer of metal and another section of leather in a contrasting color underneath.

AUTOMOTIVE AIMS

The Phenom 300E seat is the result of three-and-a-half years of development and certification. "It is finally the seat – long promised in the aviation sector – that's truly taken inspiration from automotive designs," says a proud Beever. "This is about more than just leather; it's about the details and the comfort and adjustability of the seat."

The team concentrated on saving weight in certain areas so that it could add features that make a difference to comfort and maintenance. "We've eliminated leather and foam where we don't need it – on the shrouds for example – and added a carbon-fiber cap to save weight," says Beever. "This enabled us to add features such as our leg extender. Pulled forward it gives more knee and leg support for taller individuals, yet is retractable for those who are shorter."

The seat is wider at the top, to give more shoulder support for larger people. It also features perforated leather in areas including the headrest, to allow air to escape from the foam. "It feels like the headrest captures you, rather than your head bouncing off it," says Beever.

The cushion can be removed and reassembled instantly. "It doesn't involve a service operation," says Beever. "Customers can give us their serial number and we will order a new cushion from our seating company."

Other highlights include an externally serviced lavatory, 6,600ft maximum cabin altitude, and temperature zones for cockpit and cabin

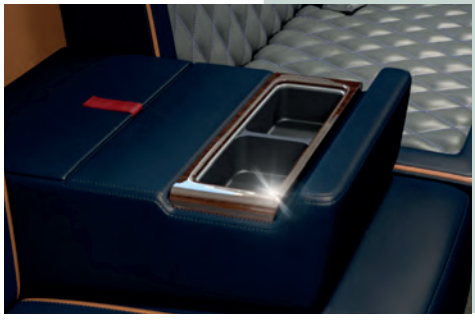
The whole cabin is designed to be easy to disassemble, which Beever notes has made testing aspects including the new IFEC system a whole lot easier. "I'm always afraid new technologies might be glitchy at first, but the aircraft's systems are very robust because we – together with Lufthansa Technik – have spent a couple of months maturing them on the bench and in the aircraft. Making the cabin so easy to disassemble has taken the headache out of this process."

Embraer has certainly succeeded in infusing its latest cabin with noticeable similarities to its siblings. Deliveries are scheduled to begin in January 2018. Beever reveals that Embraer is "very happy" with the undisclosed number of pre-orders it has received.

ABOVE: CMS CONTROL TOUCHSCREENS ARE INCORPORATED SUBTLY IN THE SIDELEDGES

BELOW: THE DIVAN'S FOLD-DOWN ARMREST INCLUDES CUPHOLDERS AND CAN BE USED TO SUPPORT PASSENGERS' TABLETS

My cup runneth over



Jay Beever is delighted to report how Embraer Design Ops squeezed another function out of an existing element – the divan's cupholder. Passengers can use the gap between the front of the cupholder and the armrest as a sturdy holder for their tablets and smartphones.

"It sits at a 20° angle and allows you to have a TV when seated on the divan," says Beever. "It doesn't look as if it should be an iPad holder. It's a clever use of existing geometry."

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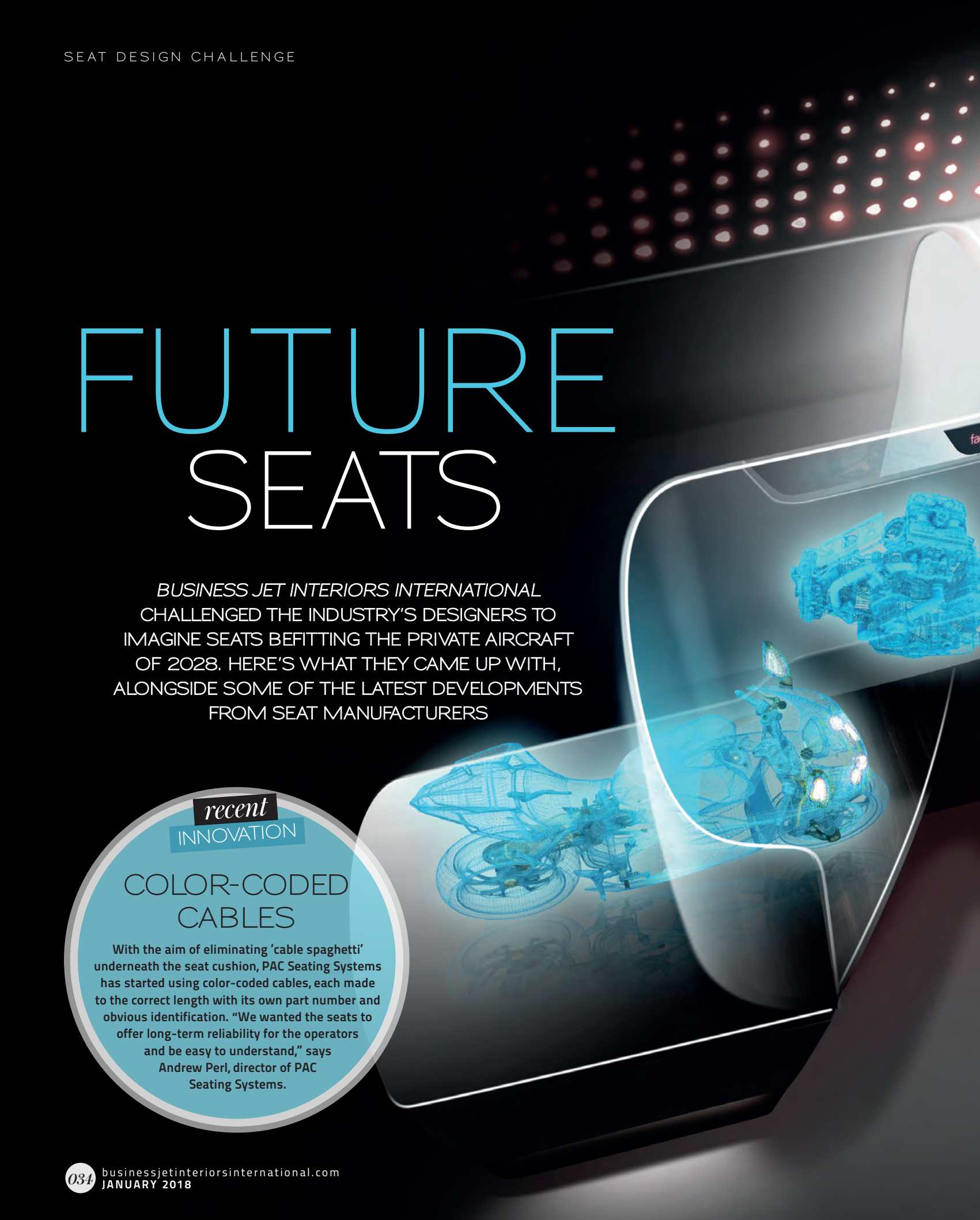
FUTURE SEATS

BUSINESS JET INTERIORS INTERNATIONAL CHALLENGED THE INDUSTRY'S DESIGNERS TO IMAGINE SEATS BEFITTING THE PRIVATE AIRCRAFT OF 2028. HERE'S WHAT THEY CAME UP WITH, ALONGSIDE SOME OF THE LATEST DEVELOPMENTS FROM SEAT MANUFACTURERS



recent INNOVATION

COLOR-CODED CABLES

With the aim of eliminating 'cable spaghetti' underneath the seat cushion, PAC Seating Systems has started using color-coded cables, each made to the correct length with its own part number and obvious identification. "We wanted the seats to offer long-term reliability for the operators and be easy to understand," says Andrew Perl, director of PAC Seating Systems.

THE VISION

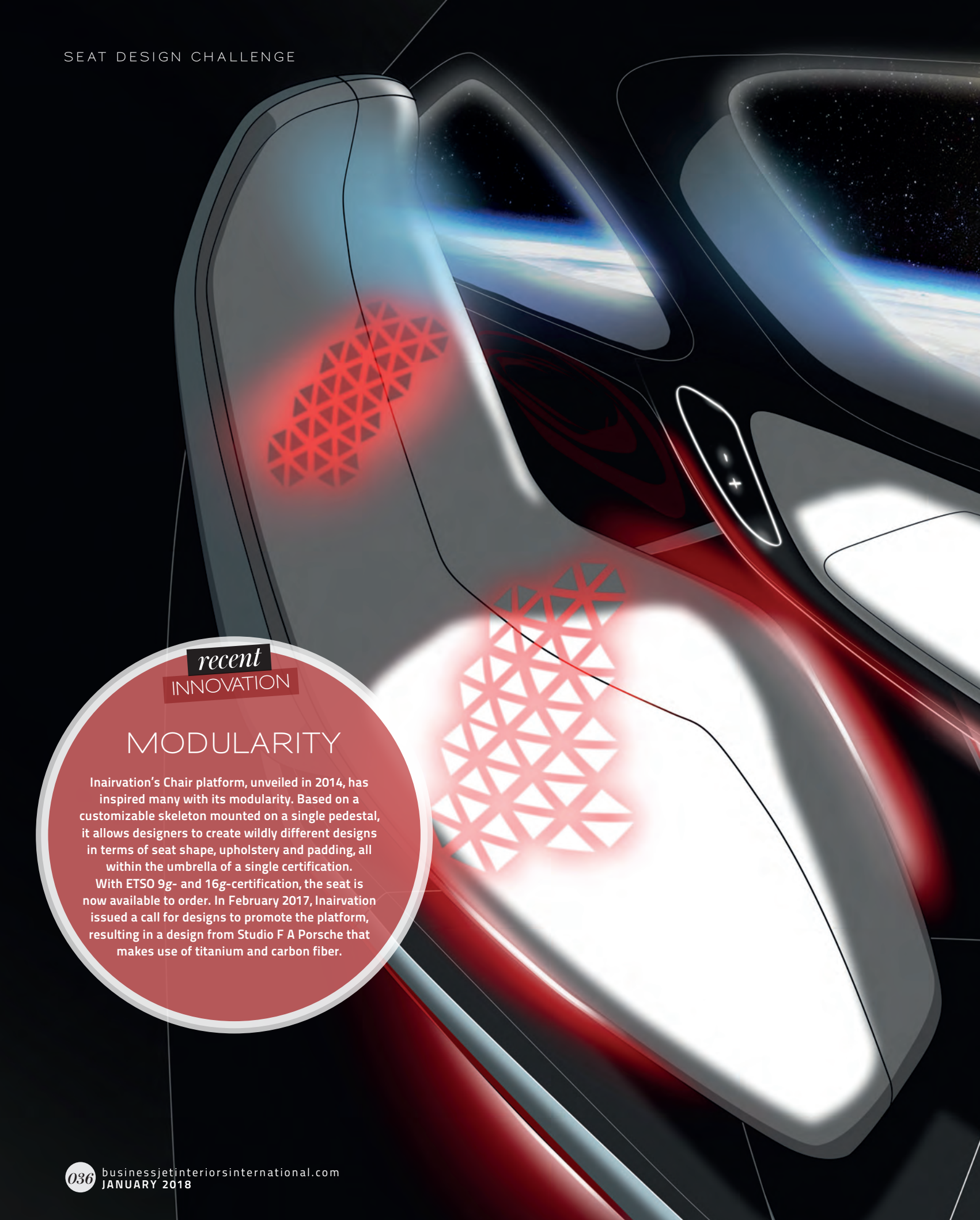
While the focus for business jets is mostly luxury, Factorydesign thinks there is a parallel opportunity to implement the very latest technology on board for those who enjoy their work.

"Our vision is for the ultimate 3D viewing workstation – a really comfortable seat that allows you to immerse yourself in your latest vision," says Adam White, owner of Factorydesign. "This is particularly exciting for those in the creative world, where 3D visualization is getting closer. The popularity of VR headsets has shown how compelling 3D images are to view, and holographic displays using lasers are having some success. While not available on the high street today, tomorrow is just around the corner."

THE CHALLENGES

White thinks it "unlikely" that the concept would fall short of any particular certification challenges, although some further developments are required in projection technology and curved and 3D screens.

He believes seat vendors should think carefully about whether their innovations are what people actually want. "Seats are getting more sophisticated every year, but we need to avoid complexity for the sake of it – a trend we are already seeing every year at Aircraft Interiors Expo," he says.



recent
INNOVATION

MODULARITY

Inairvation's Chair platform, unveiled in 2014, has inspired many with its modularity. Based on a customizable skeleton mounted on a single pedestal, it allows designers to create wildly different designs in terms of seat shape, upholstery and padding, all within the umbrella of a single certification. With ETSO 9*g*- and 16*g*-certification, the seat is now available to order. In February 2017, Inairvation issued a call for designs to promote the platform, resulting in a design from Studio F A Porsche that makes use of titanium and carbon fiber.

THE VISION

"Judging by the latest news in areas such as AI, robotics, space travel, communication, materials and production processes, we are close to another technological revolution," says Raphael Affonso, design lead at EAST, Embraer's seat company. "We envisioned a hypothetical future where all these industries succeed."

EAST was inspired by Hollywood Studios of California to design a shape-changing seat that would react to its user. The seat frame will be made out of lightweight 3D-printed metal alloys and wrapped in a flexible material that enables it to unfold when a passenger is near, as if it were awaiting their arrival, then change to TTL, Zero G, lounge or full-flat positions.

"A woven mesh of synthetic fibers works like muscles when submitted to electric and thermal stimuli, so it contracts and expands to move the seat," says Affonso. "In 10 years, control levers will be obsolete. Seats will use body sensors to predict passengers' intentions through their movements and gradually release the locks for seat operations including track, swivel and recline, as well as leg rest, headrest and height adjustments," says Affonso. "If required, confirmation can be made through voice commands or a device worn on the wrist. The CMS can also learn from the data to improve its response time."

OLED technology is used on the walls, floor and seats to provide an immersive experience.

THE CHALLENGES

"As new methods for 3D-printing metal evolve and scale up, we should be able to develop complex structural frames made out of organic 3D mesh, using dynamic simulation software to achieve optimal efficiency and weight," says Affonso.

New airbag systems might also contribute to the absorption of impact energy during emergency events, requiring less from the frame itself.

"Several of the technological solutions mentioned here are about to be available, within three years at most, but their adoption also depends on the business jet sales scenario over the next few years and how much customers are willing to pay for these developments," concludes Affonso.

recent INNOVATION

DUST GUARD

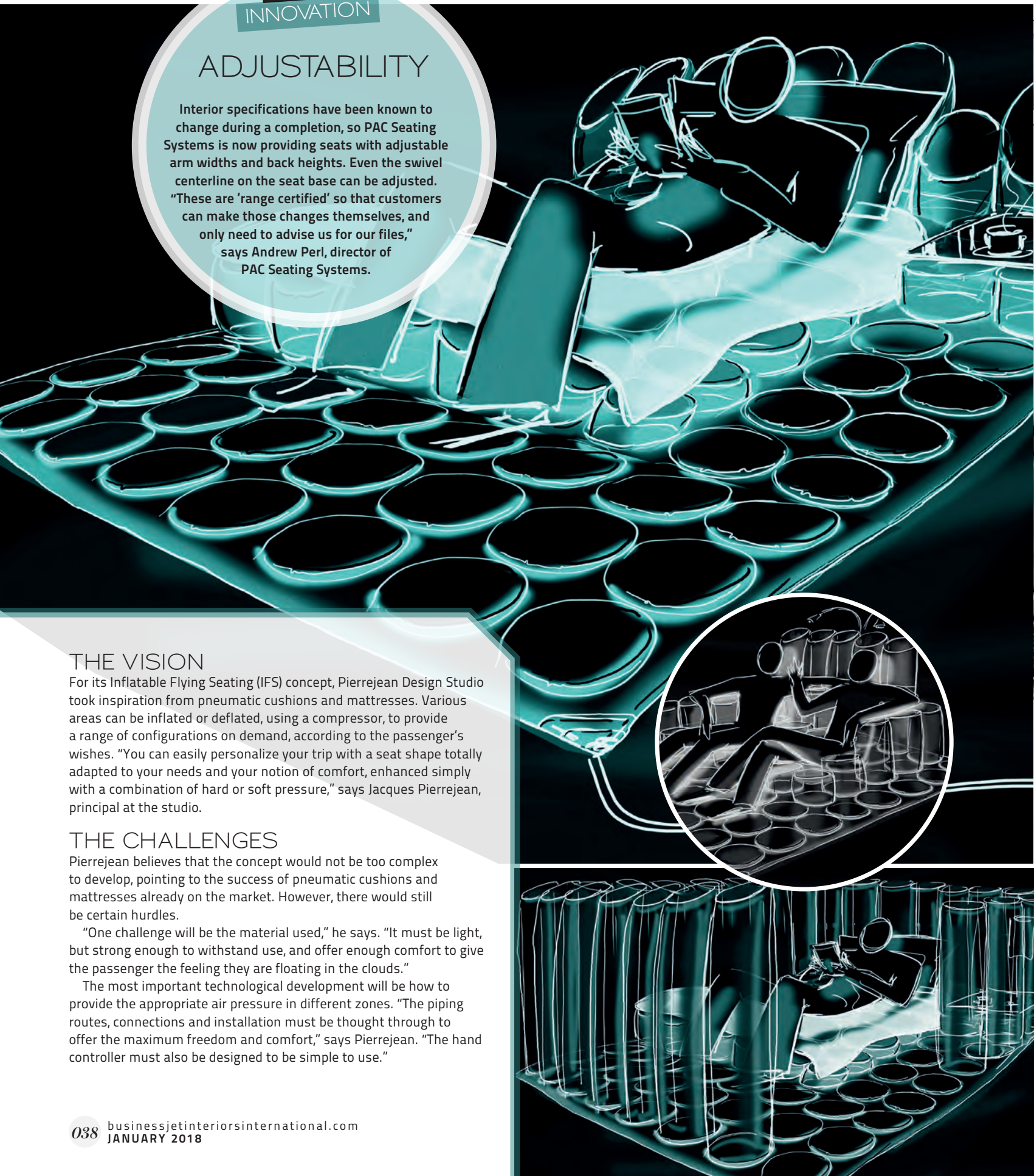
Jay Beever, vice president of interior design at Embraer Executive Jets, says the 2015 acquisition of Aero Seating Technologies, renamed Embraer Aero Seating Technologies (EAST), has enabled Embraer to reinvent how seats go together. "It was our opportunity to completely jump the competition," he says. "Aircraft seats often feature foam sitting right on top of the metal seat pan, which has holes cut in it to save weight. The problem is that the foam rubs on the sharp edges of the holes, creating dust, which falls into the mechanism and causes it to fail."

Beever came to Embraer from the automotive world, where he says seats always have a plastic or membrane barrier between the foam and the metal. Embraer-made seats on the new Phenom 300E now have a black Kydex substrate between the foam and the metal frame.

recent INNOVATION

ADJUSTABILITY

Interior specifications have been known to change during a completion, so PAC Seating Systems is now providing seats with adjustable arm widths and back heights. Even the swivel centerline on the seat base can be adjusted. "These are 'range certified' so that customers can make those changes themselves, and only need to advise us for our files," says Andrew Perl, director of PAC Seating Systems.



THE VISION

For its Inflatable Flying Seating (IFS) concept, Pierrejean Design Studio took inspiration from pneumatic cushions and mattresses. Various areas can be inflated or deflated, using a compressor, to provide a range of configurations on demand, according to the passenger's wishes. "You can easily personalize your trip with a seat shape totally adapted to your needs and your notion of comfort, enhanced simply with a combination of hard or soft pressure," says Jacques Pierrejean, principal at the studio.

THE CHALLENGES

Pierrejean believes that the concept would not be too complex to develop, pointing to the success of pneumatic cushions and mattresses already on the market. However, there would still be certain hurdles.

"One challenge will be the material used," he says. "It must be light, but strong enough to withstand use, and offer enough comfort to give the passenger the feeling they are floating in the clouds."

The most important technological development will be how to provide the appropriate air pressure in different zones. "The piping routes, connections and installation must be thought through to offer the maximum freedom and comfort," says Pierrejean. "The hand controller must also be designed to be simple to use."

THE VISION

The team at Alberto Pinto International Interior Design, managed by Linda Pinto, has tried to reconcile technology and ergonomics with beauty, preserving the company's style while focusing on the avant garde. Ensuring durability was also a key aim.

The main structural frame combines aluminum and carbon fiber, giving the seat its distinctive look. "Carbon fiber, which is now indispensable, is used for its structural virtues, lightness and decorative qualities," says Yves Pickardt, head of VIP aircraft interior design at Alberto Pinto International Interior Design. "Natural wood is also used, for its warmth, color and timeless elegance."

The leather upholstery will be vacuum sealed, while the wooden ovoid half shells will be thermomolded and assembled around the master frame. The chair berths to fully flat, and offers massage, thermal adjustment, an adjustable headrest with built-in speakers, and fully digital controls with a control panel that opens automatically when you push on it. There is also storage in the armrests.

THE CHALLENGES

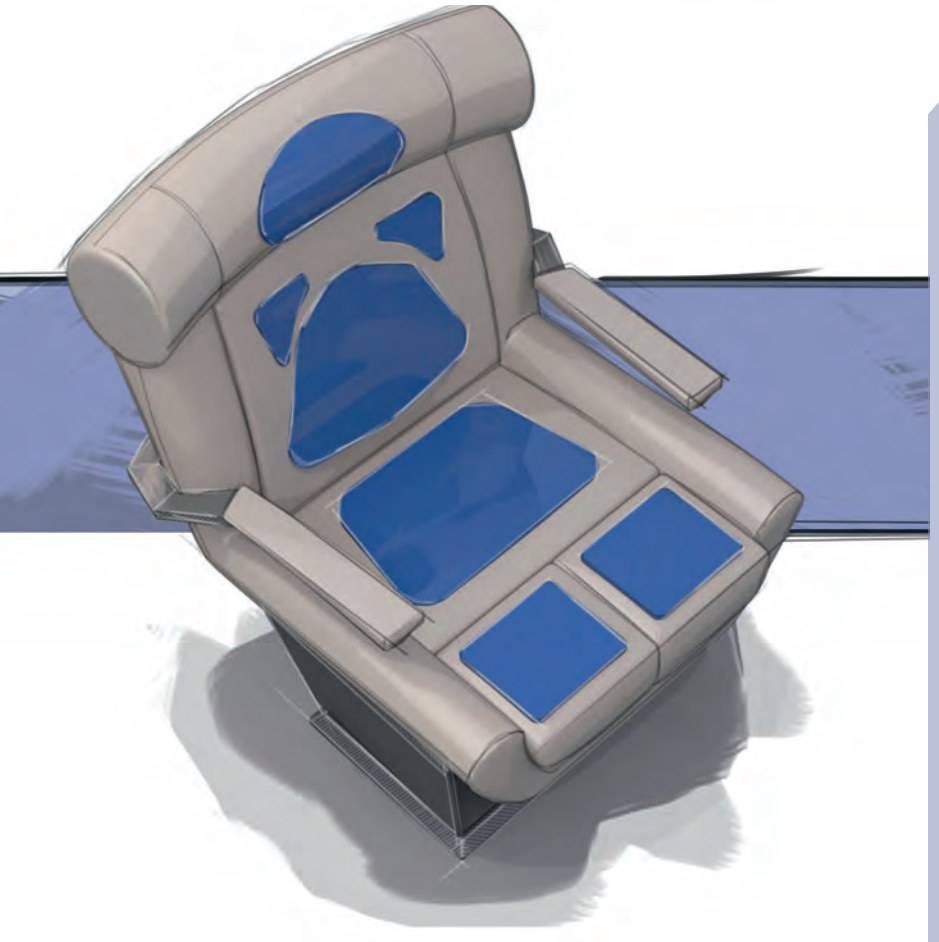
"The progress in this design stems from the way the chair is attached to the floor," says Pickardt. "It relies on the development of a new solution to get rid of the old square base, to be replaced by a single foot, an innovation now being introduced in the market."

Pickardt says the chief difficulty in designing a seat for 2028 was trying to imagine things that do not yet exist. "Our creation combines the most advanced construction technologies, such as we believe will be available in 10 years' time, with timeless styling and finishes," he says.

recent INNOVATION

SIMPLIFIED UPHOLSTERY

PAC Seating Systems has developed several key features that it says contribute to a 20% decrease in upholstering time for completion centers. For example, a quick-disconnect cable system for seat arms is designed to simplify upholstering while preserving factory-set cable positions.



THE VISION

Greenpoint has focused on modularity and comfort customization with its vision for 2028. "The seat is based on a vertical spine," says Annika Wicklund, design director at Greenpoint. "The frame provides optimal support and allows latitude for a designer to alter the cushion contour and shape."

It is not only the modular frame that adjusts to fit individual needs. "The headrest provides personalized head and neck support," says Wicklund. "Meanwhile, the seat bottom expands or shrinks and foot and armrest settings can be customized."

The cushions are made of a material foam with gel inserts, which enables firmness to be adjusted. "The inserts reduce vibrations and offer cooling and heating technology," says Wicklund. "Massage functionality is provided at 11 pressure points."

THE CHALLENGES

"Certification requirements pose the greatest challenge to seat innovation," says Wicklund. "The cost to introduce innovations while meeting requirements encourages many to use the same TSO seat frame with hard foam build-ups. But the 2028 business jet traveler will expect an organically tailored design made from lightweight engineered materials to accommodate their personal frame and comfort preferences."

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COMPLETION CENTERS REPORT HEALTHY DEMAND FOR INTERIOR REFURBISHMENT PROJECTS, BUT CERTIFICATION COSTS LIMIT MANY CUSTOMERS' AMBITIONS TO SOFT GOODS AND IFE UPGRADES

Words by Marisa Garcia

surgery

"Across the board, the main requests are for changes to seat foam, seat covers and carpet"

The business jet interior refurbishment market is alive and well. Alexis Ott, senior manager of sales and key accounts at AMAC Aerospace, says the company has seen at least 50% more demand for refurbishments than a couple of years ago. Ott says this spike is in part driven by clients ordering new aircraft, for which they may have to wait two to three years. "They want to keep the standard of their existing aircraft in good shape while they wait for the new one," he explains. "Therefore, they ask to change the carpet, refurbish seats, and so on."

Many of AMAC's clients also see refurbishment as an investment that will protect resale value.

SINGLE CONTACT

A long-standing part of F/List's offering is the manufacture of custom interiors for OEMs. Gerhard Eckhardt, executive director of sales for the aircraft interiors aftermarket at the company, says demand for refurbishments is stronger than ever. "Many manufacturers have proceeded to renew cabins in-house because it is a lucrative business for them," he explains. "To continue to rank among the best in this highly competitive business, we have extended our portfolio. It has become imperative to offer almost the entire cabin – which is what we do. The customer wants to have a single contact for the project."

F/List can also perform refurbishments independently of OEMs, thanks to the April 2017 acquisition of OHS Aviation Services, a company with more than a decade of refurbishment experience. In July 2017 the company completed its first large-scale refurbishment under its new F/List Germany branding – a Challenger 850.

Michael Gringmuth, sales director for the VIP segment at SR Technics, describes refurbishment business as "fairly strong", seeing most demand for soft goods and IFE upgrades, and some exterior paintwork.

GAMA statistics show that new business jet deliveries have slipped from a peak of 1,317 in 2008 to 661 in 2016, the lowest figure since 1998

Billings totaled US$21.9bn in 2008 and US$18.3bn in 2016, with 656 more units being sold in 2008, GAMA's data shows

LEFT, FAR LEFT AND PREVIOUS PAGE: F/LIST'S FIRST LARGE-SCALE REFURBISHMENT – A CHALLENGER 850 OPERATED BY AIR X

BELOW LEFT: F/LIST REPORTS STRONG DEMAND FOR THE REFURBISHMENT OF WOOD VENEER

Most of AMAC's refurbishment and base maintenance work comes from private owners. "With commercial and charter operators, their aim is to maximize flight hours – they don't tend to opt for refurbishment unless the aircraft is in very bad shape," says Ott. "Across the board, the main requests are for changes to seat foam, seat covers and carpet. A few customers also wish to recover walls or the headliner with Alcantara or Ultrasuede, and a few want IFE upgrades – for example, to replace HD-ready screens with 4K displays, Blu-ray and video on demand."

Other specialists reported common demand for soft material and IFE

F/List's Eckhardt notes that there is more frequent demand for charter jets to be repaired and refurbished, because of their higher utilization. "Operators try to distinguish themselves from the competition with fancy designs," he says.

However, he adds that charter aircraft updates are mostly superficial: "These customers are generally more unwilling to invest significant amounts of money."

PRIVATE LIVES

It's a different story with private jet owners. "They spend more money, primarily to satisfy their own demand for quality and luxury," says Eckhardt. "One of the main reasons for a refurbishment is to counter the natural wear and tear of upholstery, carpets and wood. These are the items we refurbish most frequently."

As-new airframes

There were several announcements at NBAA 2017 relevant to those interested in new, packaged takes on existing airframes. For example, Nextant Aerospace is developing a new interior for its Challenger 604XT, as well as working to increase range by 500 nautical miles. It hopes to gain certification in 18 to 24 months.

"The new cabin will feature a redesigned entryway that includes a solid door closure between the air stair and the galley, designed to help reduce exterior wind noise," said Jay Heublein, executive vice president at Nextant Aerospace. "Once in the entryway, the well-lit galley will transition directly into an all-new, ultra-modern media room in the forward half of the cabin, which takes advantage of the latest in connectivity technology. The rear half of the cabin will be separated from the forward half and will feature new VIP seating with a full-width conference/dining table. The interior will also benefit from an all-new composite shell and acoustic/thermal insulation kit."

The company also announced the completion of the certification program for the G90XT turboprop, which includes a new interior, new environmental system and cockpit.

Meanwhile, Global Aviation Technologies (GAT) is working on a version of the Premier 1A, the Premier Elite, which should be available from the fourth quarter of 2018, for US$479,632. As well as cabin upgrades, the company is targeting improved payload, fuel capacity, range and time to climb.

"A test aircraft will begin structural modification, verification and certification testing in April 2018," said Woody Cottner, vice president of business development at GAT. "The modification of an existing Premier airframe should take approximately six to eight weeks."

Avionics and interior upgrades could include a Rockwell Collins package with ADS-B and WAAS/LPV guidance, IFE and fabric and leather upholstery, carpets and custom cabinetry.

GAMA's data reveals that North America accounted for 62% of business jet deliveries in 2016, with Europe in second place with 18.8%

"A full refit with floorplan changes is often as costly as a green completion, and so is rarely done on used aircraft"

upgrades. They said the FAA requirement to install ADS-B by January 2020 has not directly influenced business, because most avionics changes are done separately from interior ones, and sometimes consist only of software upgrades.

Some refurbishment work comes from the buyers of second-hand jets. "The new owner wants to see their own taste realized inside their aircraft," says Eckhardt of F/List. "In most cases the interior is adapted to contemporary trends. For example, the seat design is changed or the color palettes of seats, carpets and sidewalls is harmonized. One trend that has persisted for years is the application of natural materials including wood, leather and stone."

BELOW AND BOTTOM LEFT: AMAC'S CABINETRY WORKSHOP

CERTIFICATION HURDLES

None of the completions shops involved in this article saw high demand for full cabin refits involving big changes to the floorplan or major structures – citing the fact that major changes are time-consuming and expensive. "Many customers are deterred by the high certification costs," says Eckhardt. "The difficulty is that an existing STC has to be amended, which entails a lot of effort and drives up the costs very quickly."

"Acquiring data from the original outfitting, to satisfy the certification requirements, is very difficult and expensive," says Gringmuth of SR Technics. "A full refit with floorplan changes is often as costly as a green completion, and so is rarely done on used aircraft, from what we've seen."

Ott agrees that the need to apply for an STC often discourages major structural changes, but AMAC does see some such requests. "Most floorplan changes happen on a second-hand acquisition, where the client is willing to change the full interior," he says. "About 50% of repurchased aircraft refurbishment projects involve a configuration change."

One common challenge is to minimize aircraft downtime without compromising craftsmanship. "Everything is done manually, everything is individual and every detail is perfected," says Eckhardt of F/List. "Much has been invested to keep downtimes to a minimum. New processes and materials have, for example, made it possible for us to conduct a full refurbishment within the timeframe of a heavy maintenance check, which guarantees that no additional time is needed for the cabin."

PLAN TO SUCCEED

For AMAC, planning is vital. "If a customer wants a cabin refurbishment or upgrade six months down the line, they must use that time to prepare," says Ott. "They must decide exactly what they want done, and select the equipment they want installed. The key is to purchase those products far enough ahead that the work is not held up by delivery delays when the aircraft is at the facility. Ensuring that the specification is completed up-front is the most important thing."

SR Technics' Gringmuth also emphasizes planning. "Two key elements are access to the aircraft data, and defining the tasks and design in advance," he says. "Experience, proper preparation and dedication are the key to success."

ALL CHANGE AT F/LIST

The recent acquisition of OHS Aviation Services – a refurbishment specialist – has expanded F/List's aftermarket capabilities. Through its cooperation agreements with Lufthansa Bombardier Aviation Services and Inairvation, the newly founded F/List Germany can offer everything from maintenance to full retrofits and IFE/CMS upgrades at Berlin Schönefeld Airport, Germany.

The acquisition of OHS's EASA Part 145 certification enabled F/List to add capabilities including seat repairs, reupholstery and paintwork. Meanwhile, OHS's EASA Part 21J DOA certification has simplified the process of designing and clearing plans for interior components.

F/List Germany completed its first large-scale refurbishment in July 2017. Air-X, a charter company based in Malta, tasked F/List Germany with replacing or reworking all the upholstery, linings, PSU panels, carpets and wooden surfaces on a Challenger 850. The cabin now features cream leather seats, grape-colored carpet, and reworked oak surfaces in a matt finish.

Lufthansa Bombardier Aviation Services performed fuselage and engine checks on the aircraft at the same time, keeping the downtime to six weeks.

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Contents

FRONT LINES

Having been involved in some of the most exciting projects of the past decade, Design Q intends to be at the forefront of a revolution in business jet interior design, which it expects over the next few years

In recent months Design Q has been busy designing and building elements for The Jet Business's new facility on Park Lane in London, UK. The jet interior that Design Q designed and constructed as a focal point for the brokerage, nearly six years ago, has undergone an extension and upgrade. The interior is implemented in a 50ft (15.2m) wide-body fuselage section, also built by Design Q, which fills the front windows. "On the street side, the jet's windows have been made larger than in real life, so passers-by can see inside," says Howard Guy, Design Q's CEO. "One highlight is the black high-gloss ceiling, which reflects the unique crystal lights. These contrast beautifully with the light suede sidewalls and silk carpet. Highly polished metals give dynamic reflections as you pass the window."

MAIN AND INSET: THE REPRESENTATIVE BUSINESS JET INTERIOR CREATED AS A SPECIAL MEETING ROOM FOR STEVE VARSANO'S THE JET BUSINESS

TRADING PLACES

Meanwhile, the trading floor has doubled in size to include 10 desks purpose-built to resemble flight decks. "Each is capped with a glare shield, and upholstered in heavy-grain tan leather, with contrast stitching wrapping around the desk all the way down to the floor," says Guy. "This zone is a technological paradise, with multiple screens, switches and clocks fighting for attention. All this combines with black glossy surfaces to provide an unforgettable experience."

ABOVE: DESIGN Q CREATED TRADING DESKS INSPIRED BY FLIGHT DECKS FOR THE JET BUSINESS

Guy believes there is no other facility quite like this office. "Anyone wanting to buy or trade a business jet will have more fun doing so here than anywhere else in the world," he contends. "This very exciting project clearly demonstrates our ability to design and produce fully prototyped and innovative new interiors."

Another notable project was seen for the first time at NBAA-BACE in October 2017, which saw the arrival of Bombardier's first Global 7000. The aircraft was shown alongside the full-size marketing mock-up that was built by Design Q for EBACE 2014.

TEAM EFFORT

Design Q had worked closely with Bombardier, providing design direction and solutions. These ideas were sifted

Design Q celebrated its 20th anniversary at NBAA-BACE in October 2017

A SIDELEDGE WITH INTEGRATED LIGHTING, PROPOSED FOR THE BOMBARDIER LEARJET 85

and developed within Bombardier's Global design department in Montreal, Canada. The Bombardier team, headed by Tim Fagan, produced the final design and specified the interior finishes that would adorn what is thought to be the largest complete business aircraft mock-up ever produced. Design Q accommodated the 110ft (33.5m) fuselage at its UK facility during the Christmas period in 2013.

The entire interior was built by Design Q's team from scratch. "Literally everything on this mock-up was new and specifically designed for it," says Guy. "The brief set by Bombardier was simple: this had to be the best business jet interior anyone had ever seen. Using our vast knowledge and experience, we met the brief and deadline, prototyping and producing the fully finished interior for a world reveal within 10 months."

For Guy, part of the joy in undertaking such an immense responsibility was in witnessing the spirit exemplified by his small team. "They believed that this project could not only be delivered in the timeframe, but that the final product would be of the highest possible quality," he says. "I don't think Bombardier really believed it could be possible, but the spirit of this British consultancy drove the project, hand-in-hand with experienced craftsmen and women. The fit and finish and the quality of the upholstery had to be of a standard equal to the finest luxury car manufacturers."

WORKABLE IDEAS

Ideas and concepts are crucial, but equally so is being able to convert concepts into working products. "Design Q has the courage and tenacity to successfully convert any innovative concept into a viable product," says Guy.

Design Q's first program with Bombardier was the Global Vision flight deck. The OEM tasked Design Q with producing a design and a full-size marketing prototype of the flight deck within a front nose section, so that it could be unveiled at NBAA 2007. This front nose section was grafted onto the 7000 fuselage mock-up seven years later.

"The flight deck includes many design features that were a first in the business jet industry at the time and are all now present in the production 6000 and 7000 flight decks," says Guy.

LEARJET 85

A further illustrious project was the Learjet 85. "Unfortunately, this became a casualty of the change in the financial climate and the need for Bombardier to focus on its new C Series commercial jet, but many innovations were showcased as part of the 85 program," comments Guy. "It is a credit to Bombardier that it continued to push the boundaries of design. When the mock-up was unveiled, it became an instant success with lifestyle magazines and potential customers, who saw the bold white interior with minimal black features as something incredibly refreshing compared with the usual beige leather and brown veneers prevalent throughout the rest of the industry. Beige leather is widely used due to the belief that it protects resale value. That line of thinking has proved to be flawed, with those interiors now looking very dated."

Trend Talk

"The near future is going to see some radical changes, with new technology transforming flight decks and a visionary rethink of galleys. However, seating is always a primary focus because the passenger's comfort should be paramount. So many commercial seats do not comply with this basic need, and business jet seating doesn't offer much more. This lack of comfortable seating will facilitate a revolution, so keep your eyes peeled for new products appearing from unlikely sources."

Howard Guy, CEO, Design Q

DESIGN Q'S LATEST DESIGN FOR THE AERION AS2 SUPERSONIC JET INCLUDES 'SKYSCREENS'

Many new features were proposed for the Learjet 85, including a moveable armrest that folded into the seatback to provide the option of a wider seat when required. "The seats had to be sexy, well proportioned, perfectly executed and contemporary," says Guy. "Business jet seats often look old, uncomfortable and truly uninspiring, especially with beige still rearing its ugly head. There is no excuse for badly designed seats and it must be said that the industry does have some real howlers."

RETHINKING SEATS

Storage around the seats was a key requirement on the Learjet 85. "In this period, most business aircraft had little or no storage around the seats, with the industry obviously not understanding the basic needs of passengers," says Guy. "That all changed with the Learjet 85. It came with glass holders, bottle chillers, a purse holder, handbag or briefcase stowage and lockable laptop storage in a drawer under the seat – which was another first in the industry."

AERION AS2

Another company to seek Design Q's advice is Aerion, for its exciting AS2 supersonic business jet. "Although the AS2 program is still in its early stages, some pioneering design features and details have been created already," says Guy. "Design Q has the opportunity to prototype some of these ideas, to prove them long before even Aerion sees them. Design Q can then develop them with specialist manufacturers so that they can be offered to airframe makers and completion centers."

In fact, Design Q is involved in multiple projects that are ripe for changing the rules, allowing it to take concepts in new and exciting directions. "It is a very inspiring time to be an aviation and automotive design consultancy," says Guy. "Some current projects make *Blade Runner* look dull – projects where you must pinch yourself and ask 'is this is really happening?'"

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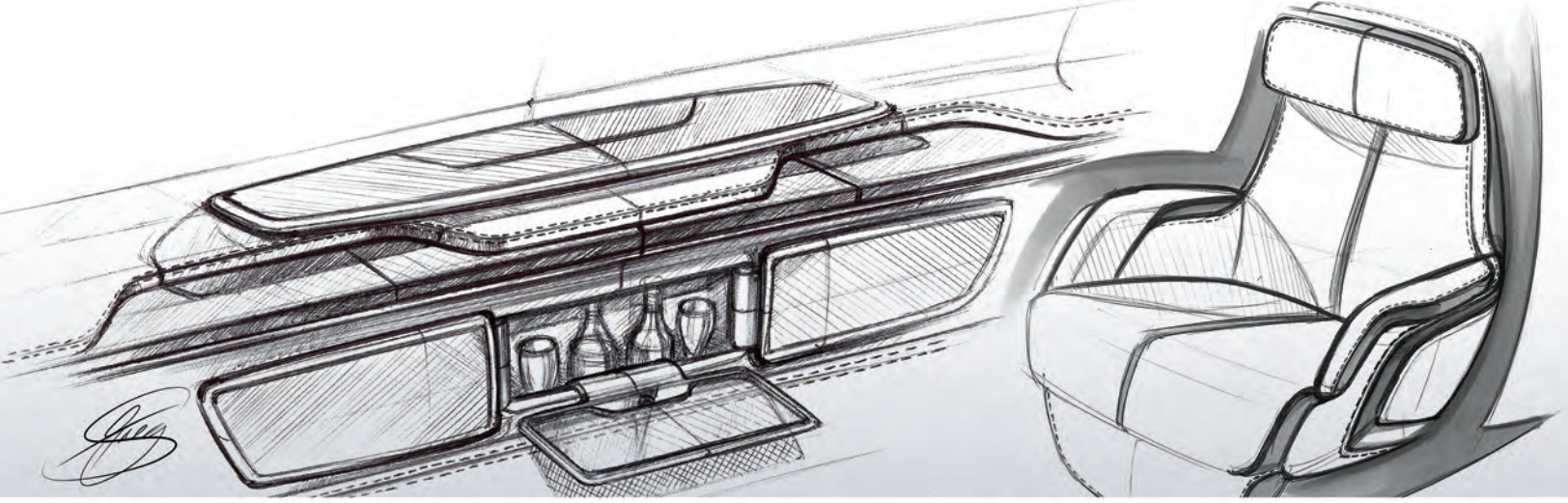

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DESIGN BRANDING VISUALISATION PROTOTYPES

SOFT FOCUS

Ultratech is the latest in a long line of faux leather products Tapis has developed specifically for the aviation market

Noting increasing demand for technical matt finishes, Tapis recently expanded its Tech Collection. Ultratech was developed by Ultrafabrics to represent a new category beyond traditional polyurethane varieties – combining great performance with an unmatched sensory experience.

"This technology has been very well received," says Jason Estes, vice president of global sales and marketing at Tapis. "Ultratech takes customization to new heights and responds to demand for an understated, matt look with a softness that must be felt to be believed."

Ultratech features a proprietary molecular structure and is dyed using a special process. "Tailoring easily, this futuristic surface makes a unique statement in aircraft interior applications," says Estes.

PRODUCT DEVELOPMENT

Tapis was established in 1977 as a carpet supplier to VIP aircraft. Since then the company has continually added to its range, with Ultraleather, Ultrasuede and TapiSuede faux suedes, Grospoint and Geneve wool fabrics for bulkheads and chair bases, and various silks and woven fabrics. "Responding to the evolving needs of this specialized design market has been critical to our success," says Estes.

"Our innovations have included one of the first AN61 heat-release fabrics and appliquéd, embroidered and screen-printed ceiling panels for VIP interiors," says Kevin O'Brien, vice president of operations and technical services at Tapis. "We were also one of the first companies to provide qualified soft furnishings for vertical applications in the commercial aviation market, in 1986."

Tapis has its headquarters in Armonk, New York, another facility in Dallas, Texas, and showrooms and representatives in Asia, Europe and South America. Its operations are certified to the AS 9100 and ISO 9001 international quality system standards

One of the company's biggest hits in the luxury sector is Ultrasuede. The product is designed to marry luxuriousness with practical attributes including durability and stain resistance. "We can also transform Ultrasuede to fulfill any design vision," says O'Brien. "Customers can control colors and detail using resin printing, dye printing, laser etching, dye sublimation, the pinsonic method and embossing."

ECO-FRIENDLY OPTION

Meanwhile, TapiSuede has been used for luxury aircraft interiors for more than 30 years. "It is made in an ecologically friendly manner without harmful solvents and contains post-consumer polyester," says O'Brien. "This fabric is recognized for its richness of color and texture, making it a popular choice for designers. The product line comes in three main textures: TapiSuede, a luxurious solid coordinate; TapiSuede Flannel, a high-end, performance-oriented wool look-alike;

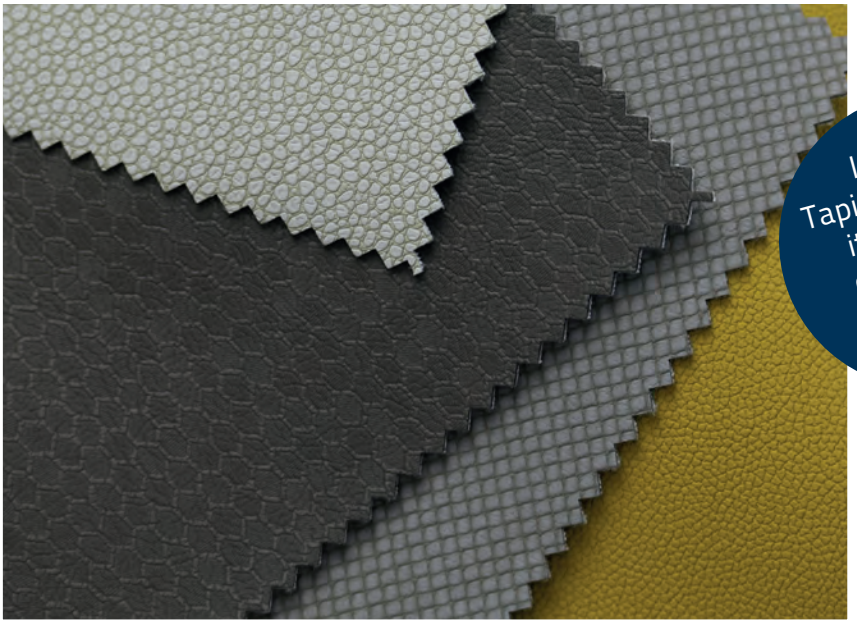
Trend Talk

"As well as more technical matt finishes, there is growing demand for more advanced engineered textiles that are even lighter, more durable and offer more flame resistance"

Jason Estes, vice president of global sales and marketing, Tapis

LEFT: TAPIS OFFERS A WIDE RANGE OF FABRICS FOR AIRCRAFT

BELOW: ULTRATECH IS PART OF THE ULTRALEATHER TECH COLLECTION



In 2017, Tapis celebrated its 40th year of servicing the aviation industry

and TapiSuede Strie, a fabric that has a cut-velvet-like quality."

NON-BURNING AMBITION

While continuing to add new products through the years, Tapis has maintained the ability to comply with updated flammability requirements. The company has established a new test lab at its facility in Dallas, Texas, equipped with kit made by Marlin Engineering. The lab has been approved to produce test data for use in FAA type-certification projects. The facility's bunsen burner test capabilities include 12- and 60-second vertical burn, 12- and 60-second horizontal burn, 45° burn and 60° burn.

"The testing laboratory enables us to work direct with seat manufacturers to develop customized solutions for their specific project needs," says O'Brien. "We are able to run treatment trials and test materials in their build-ups through confidence testing to ensure they can move through the certification process smoothly. Our lab can also support the certification process."

Looking ahead, the company intends to stick to its focus on consistent leadership, customer service and high-quality products – under the direction of founder Al Caputo's daughter Karen and son Bob. Karen Caputo has been with the company since its inception 40 years ago and has been president for 30 years.

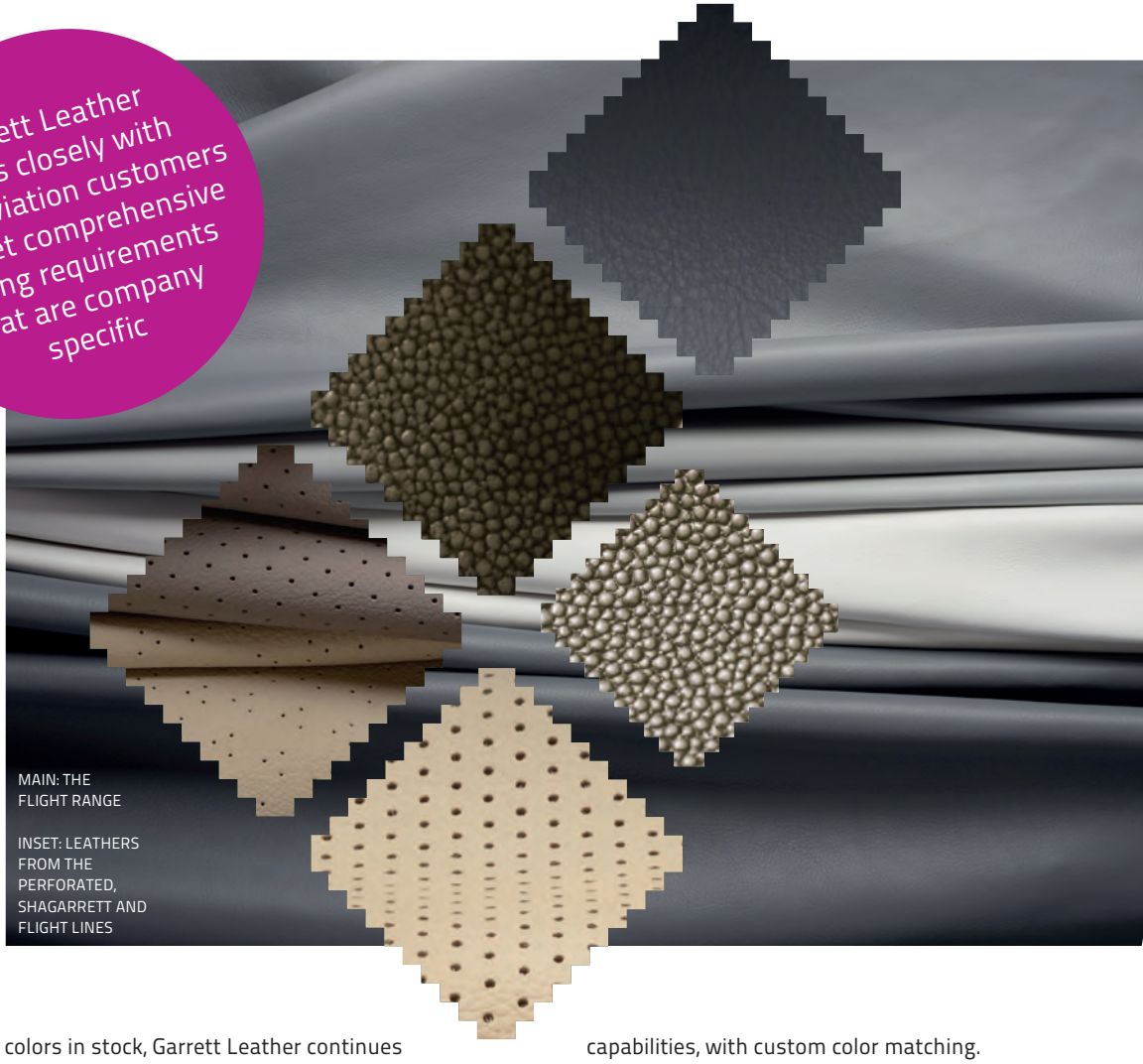
MANY HAPPY RETURNS

A focus on aviation designers' unique requirements has propelled Garrett Leather to three decades of success in the industry

Aviation interior design has seen many changes over the past three decades, but leather remains widely popular and demand for reliable vendors endures.

In 1988 Garrett Leather began selling a handful of aviation-driven colors. In 2018 the company celebrates its 30th anniversary as a leading supplier to the global aviation market. This privately owned company has grown massively – a classic American Dream success story. Garrett Leather puts this down to its focus on building loyal relationships, supplying products of consistently high quality and keeping pace with changing trends.

Garrett Leather works closely with many aviation customers to meet comprehensive testing requirements that are company specific



MAIN: THE FLIGHT RANGE

INSET: LEATHERS FROM THE PERFORATED, SHAGARRETT AND FLIGHT LINES

COLOR TRENDS

For example, the company has responded to changing color preferences, although it has always seen demand for light, neutral tones. "In the 1990s, shades of taupe and khaki were the most popular in aviation," says Jennifer Coleman, director of aviation sales at Garrett Leather. "Later that decade, designers gravitated more toward blues and grays. By 2000, warmer hues of light beige, cream and brown grew in popularity. Recently both warm and cool grays have reemerged as dominant colors."

Last year Coleman saw a growing trend for contrasting color combinations, including classic black and white. "Darker shades, including deep charcoals and black, are making their way into aviation interior design," she adds. "While neutral colors are still the most popular, there are always special projects that go against the mainstream. Many private corporations, sports teams and entertainers prefer to incorporate bolder colors in the aircraft. With more than 600 colors in stock, Garrett Leather continues to follow changing color trends and supply the colors that designers and their clients desire."

Garrett Leather has always maintained an extensive inventory so that leather is readily available to ship as needed, saving time and money. "Designers face tight deadlines and that trend continues," says Coleman.

Another trend that has grown over the years is the demand for customization. Over the past decade, Garrett Leather has vastly improved its customization capabilities, with custom color matching. The company has matched carpet samples, veneers, paint chips and fabrics.

TEXTURE AND PATTERN

Adding texture is also a growing trend. "Perforated leather is popular for both pilot and passenger seats," says Coleman. "It's a classic way to add design and pattern to traditional leather, with many patterns and styles available."

Garrett Leather also offers a wide variety of embossing patterns, including animal prints, geometric shapes and

BELOW: SHAGARRETT, ITALIAN LEATHER WITH AN EMBOSSED STINGRAY TEXTURE

BELOW RIGHT: GARRETT'S PERFORATED LEATHER

Quality standards

In 2017 Garrett Leather's quality management system earned ISO 9001:2015 certification. According to Gary Williams, president of Garrett Leather, the company pursued this internationally recognized certification for numerous reasons: "It keeps our quality standards at the forefront, holds us accountable for our actions, and propels our continuous improvement efforts." ISO 9001:2015 certification means that, "Customers can expect the highest quality with every purchase," says Williams. Qualified customers may request a copy of Garrett Leather's updated quality manual. The company monitors and analyzes all areas of the business closely to ensure its quality standards are consistently met.

floral patterns. Embossed leather can be produced in almost any color. Demand for two-toned leathers has also grown. "Woven, hand-tipped leather and stingray-embossed leather are often used in aviation interiors to add texture and depth," says Coleman. "In 2011 Garrett revolutionized stingray-embossed leather by providing full hides without any plate lines."

STRICT TESTING

The aviation industry has strict regulations and demanding testing requirements. Garrett Leather works closely with tanneries to ensure all requirements are met. The company collaborates with clients to discuss new requirements and develop products specifically for this market.

"Meeting the FAR 12-second vertical burn test usually requires additional treatment and delays in shipping," says Coleman. Garrett Leather introduced the Avion collection in 2000 to eliminate such delay. Avion leathers are treated during the tanning process to meet FAR requirements, meaning the collection is available for immediate shipping upon purchase. "Furthermore, Avion passes numerous durability standards for high-traffic applications," says Coleman.

FIRST FLIGHT

In response to more recent customer requests, a range called Flight was introduced in 2016. "Flight is treated during the tanning process to pass the 60-second vertical burn test," says Coleman. "When designers specify this product, they can be confident that the leather will pass this demanding

LEFT: PERFORATED LEATHER IS INCREASINGLY POPULAR

BELOW: MORE THAN 600 COLORS ARE STOCKED

The Avion range proved so popular that in 2012 the company expanded it to 65 colors

Loyal relationships

Garrett Leather focuses not only on selling quality products, but also on building lasting relationships with customers.

"We have been doing business with Garrett Leather since we both began business in 1988," says Dixie Radicke at Southstar Aircraft Interiors. "The quality and consistency of its leather, along with competitive pricing, speaks for itself. Great customer service is provided as they go out of their way to meet our needs. I personally and professionally recommend Garrett Leather for all your leather needs. Superb company!"

Sharon Duncan of Duncan Interiors agrees: "I have been buying Garrett leather for 30 years," she explains. "I always experience top-notch quality and service. They are my go-to first choice."

Two former customers are now part of the Garrett Leather sales team. Wendy Burton in San Francisco and Robert Stockton in Dallas were aviation designers who regularly specified the company's products. They were so impressed with the quality and service they received, that they decided to make a career change and join the team.

composite test. All 30 colors are in stock for immediate shipment."

TECHNOLOGICAL ADVANCES

Technological trends have also impacted the company. "Designers are working longer hours, mobile devices are rapidly replacing desktop computers, and projects are moving at lightning speed," says Coleman.

Garrett Leather redesigned its website in 2014 to be more accessible to aircraft designers, who can apply for online membership. Upon approval, they can look up inventory, check prices and place orders online, 24 hours a day, seven days a week. Orders are processed the same or the next business day.

Overall, Garrett Leather strives to be much more than a leather company. Its mission is to build loyal relationships with customers by providing the highest quality leather and the best customer experience, while remaining true to its core values.

Trend Talk

"Some clients are requesting designers to move toward a more contemporary look for their aircraft interior. Hard clean lines, coupled with contrasting light and dark tones, have become popular. Smooth leathers with very little grain seem to be in line with what VVIP clients desire.

"On the contrary, we also see designers adding a slight amount of texture to bring more of a softness to an interior. Many customers are asking for embossed patterns, pebble grain leathers, and quilted or perforated inserts, often in the same tone as the rest of the interior."

Jennifer Coleman, director of aviation sales, Garrett Leather

GARRETT LEATHER OFFERS CUSTOM COLOR MATCHING

"Integrity, quality, respect, caring, accountability and innovation will continue to be the foundation of the company for the next 30 years and beyond," says Coleman. "The future of aviation design looks bright, with many new creative solutions on the horizon. Whatever changes the future holds, Garrett Leather will continue to be a trusted resource."

Garrett

Leather

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FOOD FOR THE EYES

There is no excuse for galleys to be a boring mix of off-white plastic and gray aluminum, as Aerolux can tailor its galley inserts products with a variety of exciting colors, textures and other finishes

In 1927, when Charles Lindbergh first flew across the Atlantic, he took some sandwiches wrapped in paper, some emergency army rations, and some water to keep himself going. Amelia Earhart's solo Atlantic crossing in 1932 was supported mainly on tomato juice and hard-boiled eggs.

With the advent of galleys, inflight dining has come a long way. Beyond functionality improvements, today's corporate and private jet galleys are expected to have sophisticated design concepts and finishes of the like seen in the world's finest apartments. Aerolux is helping to make this a reality.

BESPOKE LUXURY

"Many of our clients are focusing on the design elements; they want an enhanced flight experience and are creating an individual onboard environment to provide it," comments Glenn McQuire, engineering manager at Aerolux. "Although there's never enough space in the galley for all the specialist equipment most of us have in our homes, there's every opportunity to give visible surfaces extravagant and beautiful finishes."

Trend Talk

"Aerolux has built its reputation on constructing bespoke, high-quality galley equipment, and being the first to spot an opportunity for a game-changing new product. Now the demand for new, interesting and individual surface treatments and finishes is fanning the Aerolux flame. Every new development makes our life more interesting. When a customer asks for something we haven't done before, and we say 'Yes, we can do that for you', I experience a solid buzz of satisfaction, and so does everyone involved with Aerolux."

Glenn McQuire, engineering manager, Aerolux

BELOW LEFT AND CENTER: AEROLUX INSERTS FINISHED WITH GOLD-PLATED DETAILS

BELOW RIGHT: A CUSTOMIZED CONTROL PANEL

Aerolux recently celebrated its 25th anniversary

LEFT: AN OVEN FINISHED IN WOOD VENEER TO MATCH THE REST OF THE CABIN

ABOVE: GALLEY INSERT DOOR PANELS CAN BE COVERED IN AVIATION-GRADE LEATHER

Aerolux works closely with specialist companies to ensure customers get anything they desire. "Our equipment is frequently modified or adapted to suit a particular size or space constraint," says McQuire. "Now the Chameleon process allows us to offer the same level of tailoring for surface finishes, while ensuring they are hard-wearing enough to withstand the rigors of galley life. The Chameleon process, a trademarked technique, can be applied to components of any shape. The luxurious finishes come in 95 wood effects, 72 burls, 72 marbles, 34 natural and 92 technical finishes."

Aerolux also offers photo-anodized finishes, which have no design constraints. The company says photo-anodization is great for producing bright and vivid colors with a great resistance to UV, making the technique perfect for logos and decals displaying branding.

FRUITS OF THE FOREST

Meanwhile, wood veneers are available for those who prefer a more natural feel and appearance. "It is also a great choice from a weight aspect," says McQuire. "Wood veneer is available in an amazing variety of tones, from subtle to bold. It is also possible to dye veneers to enhance the grain – the process is like that used on leather, which we have also provided for customers."

Leather can be used for panel finishes on items including doors, but the surround must be a metal finish. Aerolux says almost any metal and other exotic finishes are quite usual. "It is quite possible to have a one-of-a-kind galley on your business jet," says McQuire. "Of course, we are always limited by safety issues. All supplied finishes must be fit for purpose, tested for flammability, structurally competent and approved."

FREE READER INQUIRY SERVICE

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

PERSONAL STORY

The latest development from Townsend Leather illustrates its passion for bringing out the beauty and individuality of each hide

With its newest range, Townsend Leather is focusing on combining the benefits of technology and handicraft to bring out the best of each hide.

"The trend we see for the year ahead is for our designer customers to select leathers that combine precision industrial design with craft and artistry," says Alison Martin, sales and marketing director at the company. "We are ahead of the trend with the launch of new stock programs in our Rapture Cowhide line. We source the finest raw material in the world and then aniline dye, finish and emboss it in Upstate New York."

Rapture has an embossed grain that is enhanced with two choices of hand effects. With hand-tipping, the color sits on top of the grain, whereas with the handiwork rub-off effect, the color sits in the valley of the grain. "Both effects highlight the hide's natural markings, emphasizing the beauty and uniqueness of this natural product," says Martin. "Each hide has its own story to tell."

Rapture Cowhide is made from European raw material

Trend Talk

"We are seeing a growing desire for small touches of customization with our leathers. Fulfilling many of these requests requires advanced technology or specialty craftsmanship. Examples include custom perforation, laser-etching of logos and other images, embossing plates, digital printing and foil applications, along with a variety of customized hand applications."

Alison Martin, sales and marketing director, Townsend Leather

RAPTURE COWHIDE LEATHERS FINISHED WITH THE HANDIWORK RUB-OFF EFFECT

TEXTURAL DEPTH

Designers are using Rapture for various applications in the aircraft – including sidewalls and ledges, dado panels, seat inserts, decorative trim and pillows. "It's being used anywhere the pronounced and highlighted grain can add aesthetic value and textural depth to the overall design," says Martin.

Likewise, the company is offering a new pattern called Foundation, which has a geometric design and is available in metallic colors, giving an industrial feel.

"We are continually investing in new machinery and production processes to create unique aviation leathers that will adapt to interior designs while retaining the luxuriousness and organic characteristics of leather," says Martin.

"As a manufacturer rather than simply a supplier, Townsend can conduct extensive research and qualification work up-front, to ensure that these new developments will perform well and look beautiful in every application."

STORYTELLING

Townsend Leather is a third-generation, family business based in the USA that has been manufacturing leather for close to 50 years. The company has evolved from a high-volume commodity leather producer to a high-end specialty manufacturer. In 2018, it will be focusing on sharing the stories of its employees, vendors, suppliers and customers – as well as its own progress – through its newsletter, 2018 calendar, website, blog and in-person visits.

"We believe that every person who touches a hide of our leather, in and outside of the company, has a compelling story to tell," says Martin.

"For example, our customers create stories with their designs, and our leather helps them to do this. Sharing these stories of passion, design and craft can open minds."

Townsend Leather believes there are ***stories everywhere.***

Stories of passion, of design, of craft, stories that should be shared.

What is the story of your design?

When it begins with Townsend Leather, you know it has a happy ending.

Find more of the story of our leather, your designs, and our passion at:
www.townsendleather.com/story
#TownsendLeatherStories

townsend® LEATHER

JOINT DEVELOPMENTS

Responding to designers' wishes, High Tech Finishing has expanded both its capabilities and capacity over the past year

In recent years, High Tech Finishing has seen all sorts of design possibilities open up. "In the past, we could really only offer a limited assortment of plating options," says Rick Niefield, vice president of sales and marketing, High Tech Finishing. "Colors and textures were based on the technology of the day and designers depended on how well the plater could modify existing methods. Technological changes now allow designers to better dictate what they would like to see."

The company now provides paint applications, offering enhanced matching options with new colors and textures to augment the range of electroplating offerings designers can select. "We are constantly monitoring industry developments and ways to better satisfy customer needs, whether that is with new plastic materials, metals or exotic polycarbonates," says Niefield.

High Tech Finishing's standard line includes 135 finishes

HIGH-USE CLEAR COAT

For a recent wide-body project, the R&D team developed a clear coat application designed to hold up extremely well for high-use sinks. "No issues have been reported by any of the many customers supplied with sinks utilizing the new process," says Ricardo Gonzalez, quality assurance manager at High Tech Finishing. "We now use it for all plated sinks leaving the facility."

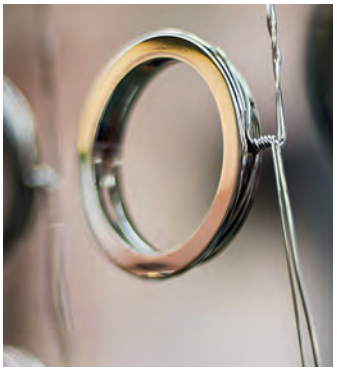
The company has also seen an across-the-board increase in requests for custom-painted finishes to match leather or woodgrain colors. "We've adapted many of the proven techniques found in electroplating to the application of paint on various substrates," says Niefield.

As well as creating new products, the company has boosted its capacity over the past year. In addition to a new plating line, ancillary facilities – including the receiving area, quality assurance, production control, polishing stations and laboratory – have been expanded. "We've also invested heavily in equipment and personnel to ensure on-time deliveries and superior quality," says Niefield.

LARGER TANKS

The expansion included the addition of 15ft (4.6m)-long tanks that enable larger parts to be plated. "The industry continues to build larger aircraft, and designers want to specify larger interior elements to utilize the space, but plating options have been a limiting factor," says Niefield. "Larger tanks enable designers and manufacturers to introduce longer trim pieces of a single length, larger monument trim and custom-designed pieces that couldn't be plated in the past. In addition, larger tanks allow for more parts to be plated at once, saving time."

The company is now developing special tanks for incoming big iron work, as well as custom racking equipment to better process unique assemblies.



FAR LEFT: EVERY PART IS WIRED BY HAND TO ENSURE ACCURATE PLATING COVERAGE

LEFT: CUSTOM RACKS DESIGNED TO INCREASE PRODUCTION AND DECREASE PROCESSING TURN TIMES

Trend Talk

"Continued customer interest in plating materials, including plastic and carbon fiber, will necessitate continued research. There is also an increasing demand to match painted parts to headliners, leather and other fabrics. We have been doing this type of coating for years and are well positioned to accommodate these requests. We expect continued emphasis on finishes including HT172 Almond Gold – Satin, and HT189 Crescent Gold – Pearllite, which have a soothing feel. The bright, polished finishes like 24kt gold, popular years ago, probably won't be back for a while."

Rick Niefield, vice president of sales and marketing, High Tech Finishing

ABOVE: HIGH TECH FINISHING OFFERS NEXT-DAY SAMPLES THAT ACCURATELY REPRESENT ITS FULL PRODUCT LINE

"Decorative plating for aircraft is our sole focus, so we are always looking at ways to enhance that position and not dilute it with non-core endeavors," says Niefield.

However the company expands, it is careful to maintain quality. "We've always had stringent quality standards in place, well before the implementation of ISO and other quality programs," says Niefield. "As a result, the transition to ISO900:AS9100 and FAR Part145 was simply a matter of filling out a few forms; we had zero non-conformances."

The company has even designed and fabricated special tooling to enhance the processing of some difficult parts, to provide superior quality.

FREE READER INQUIRY SERVICE

To request more details from High Tech Finishing, visit www.ukimediaevents.com/info/aimbj

AHEAD OF THE PACK

Demanding passenger expectations can be met with a cabin upgrade, but achieving this on time and on budget requires careful planning

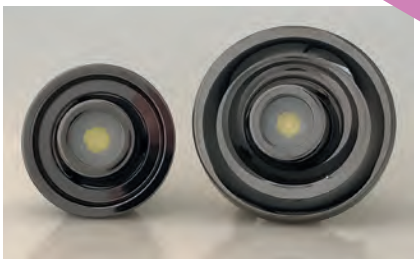
End customers have numerous options when selecting a business jet operator. "While this makes it imperative for operators to keep their fleets looking great, a cabin upgrade is a major decision that requires a lot of planning," says Scott DeSmet, director of communications at DPI Labs. "Making informed and strategic decisions up-front will prevent costly challenges along the way."

The first step is choosing from the industry's many upgrade providers. "Find a company that becomes not just a provider, but a partner," says DeSmet. "Work with that partner to craft a cabin equipped with technology that will remain reliable, serviceable and adaptable. Modernizing is a big project and your equipment shouldn't become obsolete in five or 10 years."

DPI Labs has specialized in cabin system integration and interiors for more than 35 years. "We work with our customers to design the most efficient plan for their update requirements," says DeSmet. "We work to their scheduled downtimes and budget to ensure no surprises in terms of the process or outcome."

A common demand from passengers is for productivity and entertainment options that mirror their counterparts on the ground in terms of quality and availability. "Gone are the days when passengers were resigned to downtime, lost productivity and limited entertainment options," says DeSmet. "Customers expect the business jet to be an extension of the work environment; they need a fully connected cabin so they can maintain contact with their offices, customers and colleagues. Meanwhile, HD entertainment options, the ability for passengers to use their own devices, and mood-enhancing, full-color LED lighting provide the experience and modern elegance expected by these discerning customers. Connectivity, entertainment and lighting options are a straightforward and cost-effective path to modernity."

At its site, DPI Labs has sound and light laboratories, rapid 3D prototyping and CNC machining equipment, and facilities for vibration, environmental and EMI testing



CABIN ELECTRONICS

These upgrades require the replacement of the aircraft's existing electronic components. "When replacing this kind of equipment, finding the least invasive method – including drop-in and front-mount systems – will provide a more cost-effective solution," says DeSmet.

DPI Labs provides CMS, IFE, lighting and air distribution systems and components

MAIN AND ABOVE: DPI LABS REPLACED CMS/IFE EQUIPMENT ON THIS GULFSTREAM

INSET: SCOTT DESMET

BOTTOM LEFT: THE COMPANY ALSO PROVIDES LED LIGHTING UPGRADES

"This limits the amount of interior and woodwork redesign and results in a quicker update that can be completed during standard maintenance periods."

Further advantages that can be achieved in replacing cabin electronics include reduced power consumption and maintenance – providing a long-lasting positive impact for fleet operators. "Be sure to consider the potential future savings and reduced downtime in your update decision," says DeSmet. "Good providers can help quantify these benefits as you plan your updates."

DeSmet advises that an upgrade provider should provide an integrated approach to managing cabin electronics. "Standalone systems may result in higher maintenance costs, reliability issues and an outdated cabin environment," he says. "Choose a flexible system that allows for adaptation when needed. A system that integrates advanced electronics while remaining lightweight and compact is often the best solution for business jet installations."

In terms of CMS choice, DeSmet recommends systems with proven reliability, a self-diagnosis capability and an intuitive operating system. "Ease of use, ease of maintenance and adaptability are essential," he says.

INTERIOR UPDATES

The majority of the cabin interior can be maintained by opting for system replacements that are specifically sized to replace older systems. "Be sure the selected update partner can provide the distinctive finishing touches needed to provide a cohesive cabin look," says DeSmet. "Even with minimal interior rework, an update should include final decorative and bezel enhancements to add elegance. At DPI Labs we offer a variety of decorative designs and finishes to ensure a cohesive match to your existing or updated interior."

Along with safety and reliability, business jet customers expect elegance and quality in the cabin. "Choosing a partner who understands that cabin electronic updates should marry elegant customer-facing elements with advanced back-end technology will result in a renovation that feels complete at all levels," says DeSmet.

PROCESS MANAGEMENT

DeSmet believes that with the right partner, the update of a business jet cabin can be straightforward, delivered on time and within budget. "Consider your provider as a partner and ensure that you are informed and educated about your choices and timeline," he advises. "Process and project management is as big an element as any in your update decision and execution. There is a lot at stake for operators and you must get it right the first time."

LIGHT WORK

Direct-replacement solutions offer the benefits of an LED upgrade in the most cost-effective manner, says ALI

Incandescent reading lights have been a source of frustration since the beginning of the business aviation industry, says Shervin Rezaie, general manager of Aircraft Lighting International (ALI).

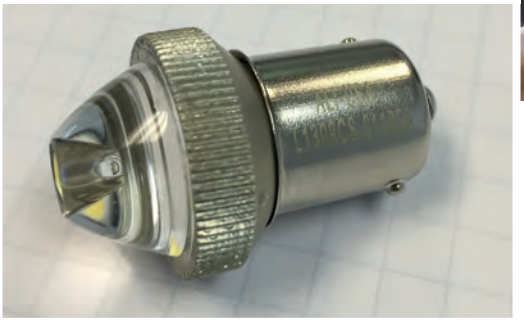
"The heat produced by the traditional incandescent bulbs is enough to burn one's finger and increases the overall temperature of the cabin," he explains. "Also, the relatively short lifespan of incandescent bulbs meant additional maintenance hours and expense for aircraft owners."

NO REWIRING

With these concerns in mind, ALI set out to provide a plug-and-play replacement for incandescent bulbs. Rather than producing new assemblies that require wiring work, ALI followed the philosophy of 'less is more' – the result being the L1309X range of PMA-certified plug-and-play LED reader bulbs.

The L1309X is a direct replacement for standard incandescent bulbs including the 1308, 1309 and 2232 models. "It could not be a more straightforward LED upgrade," says Rezaie. "You simply remove the incandescent bulb and plug in the L1309X LED bulb. No new assemblies, switches or plating are required, there is no need for rewiring and there are no polarity issues."

All ALI's LED products come with a three-year manufacturer's warranty



ABOVE: L1309X READER LIGHTS ON A GIV-SP AIRCRAFT

LEFT: AN L1309XS LED BULB IN A CARGO ASSEMBLY

BOTTOM LEFT: THE L1309XS IS DESIGNED TO REFRACT ITS OUTPUT IN THE REQUIRED DIRECTION

ALI designed the L1309X LED bulb to offer further benefits than simply improved lighting. For example, it says the power draw of the L1309X is roughly one-tenth that of a standard incandescent bulb. "In other words, 10 L1309Xs will have the same current draw as one incandescent 1309/1308," says Rezaie. "This is critical in an age when passengers are increasingly using their own entertainment devices, which require USB power. The current-draw savings that ALI's LED readers and wash light systems provide mean more current can be used by PEDs, without depleting the aircraft's power. Additionally, less current draw means less heat, so you can now touch reading light fixtures without getting burned."

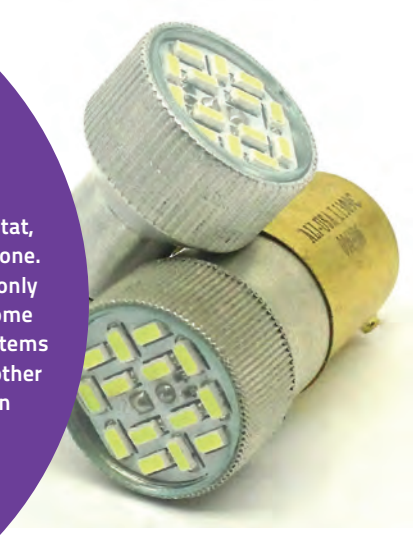
PLENTY OF CHOICE

The L1309X is available in cool or warm color temperatures to complement existing wash-lighting systems. It is just one member of a wide product line of direct replacement readers. There are LED replacements to be used everywhere from air stairs to cargo bays. The range also includes table lights and LEDs to replace 9mm bayonet incandescent bulbs such as the GE 1495. ALI also offers LED bulbs that refract or bend their output to go in a certain direction. For example, cargo assemblies would use the L1309XS,

Trend Talk

"People are now accustomed to controlling their thermostat, door locks, entertainment system and lights from their phone. With such a powerful tool literally in everyone's hands, it only serves to reason that the control of aircraft CMS will become part of the smartphone control center and complicated systems requiring the installation of numerous touchscreens and other pieces of hardware will be a thing of the past. Simple on and off switches will suffice."

Shervin Rezaie, general manager, Aircraft Lighting International



ABOVE: THE L1495X AND L1309X LED DIRECT REPLACEMENT BULBS

which has a coned lens to properly bend the light output.

REDUCED DOWNTIME

"The biggest saving offered by a direct-replacement LED, aside from its longer life and reduced maintenance requirement, results from its use of existing assemblies, as opposed to LED reader assemblies, which require plating and wiring to fit into the cabin," says Rezaie. "That extra work means greater costs and more downtime, something no one ever wants. It makes sense for aircraft owners looking to upgrade their lighting to use a replacement LED bulb rather than an LED assembly."

FREE READER INQUIRY SERVICE

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

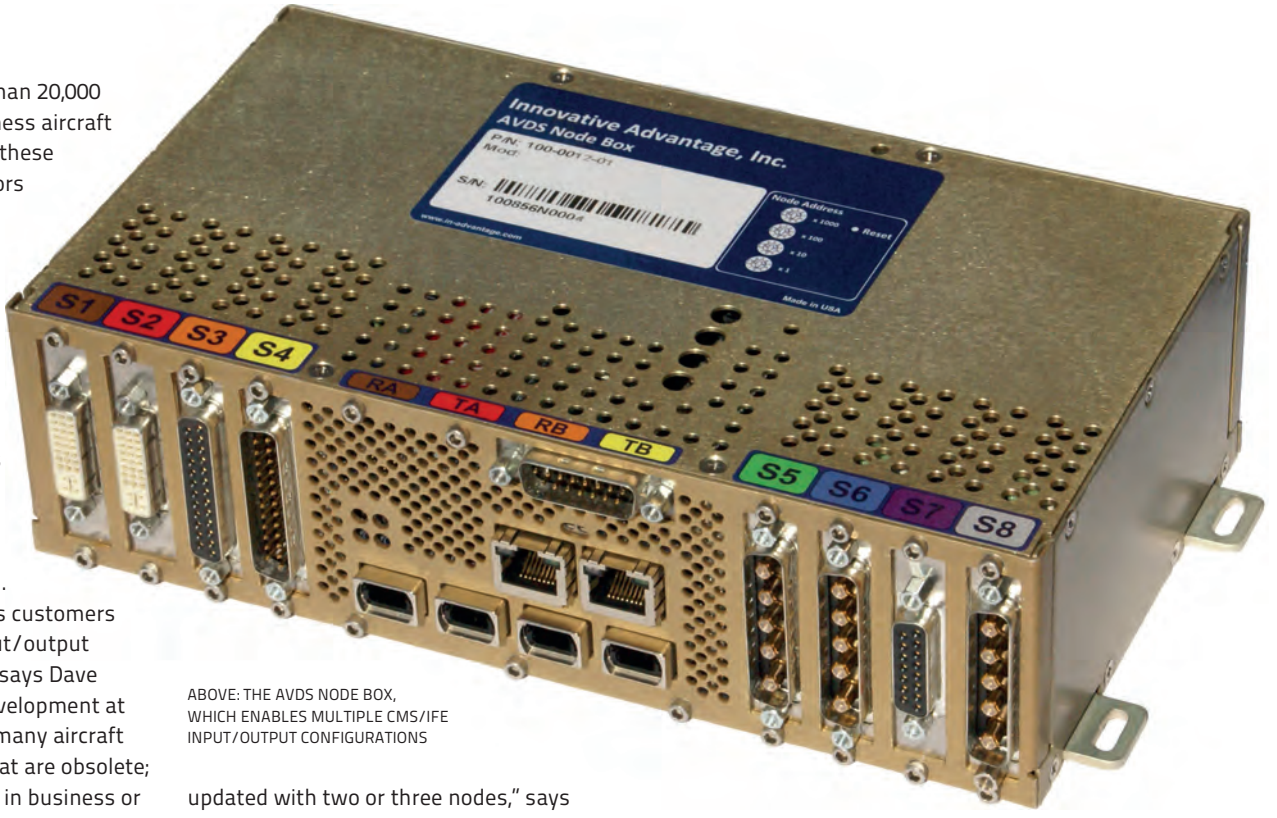
SWIFT SHIFT

The AVDS modular backbone is designed to enable clients to upgrade their IFE/CMS equipment quickly and easily

There are more than 20,000 registered business aircraft flying today. As these aircraft age, many operators are looking to enhance or replace their CMS/IFE systems. Rework can be a costly affair when it necessitates the removal of the interior and reworking cabinetry and drink rails.

Innovative Advantage's Audio Video Distribution System (AVDS) has been designed to integrate perfectly with any system. "Our flexible design allows customers to choose exactly the input/output configuration they need," says Dave Garing, VP of business development at the company. "There are many aircraft with CMS/IFE systems that are obsolete; the vendors are no longer in business or parts are simply not available anymore."

In addition Garing says most older aircraft don't support HD video. "A growing portion of our business is replacing the AV switches in these systems while allowing the operator to retain the primary CMS control system and switches," he says. "This minimizes woodworking and shortens installation time. Customer can choose at this point to add HDMI ports so that they can connect their computers, Apple TVs and Chromecast sticks."



ABOVE: THE AVDS NODE BOX, WHICH ENABLES MULTIPLE CMS/IFE INPUT/OUTPUT CONFIGURATIONS

FREEDOM OF CHOICE

The owners can decide what they want to do – whether to update some or all monitors, update cameras, go HD – whatever makes sense for their operation and the value of the aircraft. "A simple system only requires one AVDS, while a large-cabin business jet is usually updated with two or three nodes," says Garing. "Modification center engineers can offer a custom AVDS to support exactly what their customers require."

The AVDS is designed to integrate easily with most CMS/IFE systems. "This is a big advantage to the owner and even the existing CMS supplier," says Garing. "Usually we can figure out a way to upgrade or maintain the current system without having to rip everything out and install a new one. This is the only option that makes financial sense for some lower-value hulls. With AVDS, Innovative Advantage has been providing a solution that keeps many of these aircraft current and maintainable."

QUICK SMART

Garing says a further advantage is that upgrades can be performed quickly. "When an aircraft goes in for service, the owner might decide right then to update or fix part of the CMS/IFE," he says. "If we can get a part to them in two to four weeks, the modification centers can often get the job done in that cycle."

Another part of being quick is providing the tools to enable workers on the shop floor to install and troubleshoot the system quickly.

"Innovative Advantage provides a powerful software package that enables installers to control the AVDS completely without any CMS/IFE package," says Garing. "On these short lead-time jobs, the CMS/IFE software is usually not completed or updated until after the hardware is installed. AVDS Client software is invaluable in checking out wiring as soon as possible."

The latest hardware includes built-in test-pattern generators, enabling health monitoring and the validation of output

wiring, independent of the CMS. The system is also scalable; the modification center can add units with a lightweight fiber-optic harness.

FORWARD FIT

The AVDS's core architecture allows engineers to build an essentially custom part quickly from a growing library of more than 20 input/output cards that can be assembled in an AVDS node. Cards include Ethernet ports, digital and analog audio, HDMI inputs, fiber in/out, video conversion and H.264 encode/decode.

"New aircraft programs benefit by reusing existing cards," says Richard Morris, president at Innovative Advantage. "We can usually provide customers with what they need from our library of parts – and new development is limited to the design of a new input/output card if required."

The company says this means that new programs don't have to invest in huge development costs and can benefit from the existing core AVDS backbone.

Almost every major CMS provider has interfaced with an AVDS network in some manner

LEFT: AN AUDIO CARD THAT CAN BE PLUGGED INTO THE AVDS NODE BOX

FREE READER INQUIRY SERVICE

To request more details from Innovative Advantage, visit www.ukimediaevents.com/info/aimbj

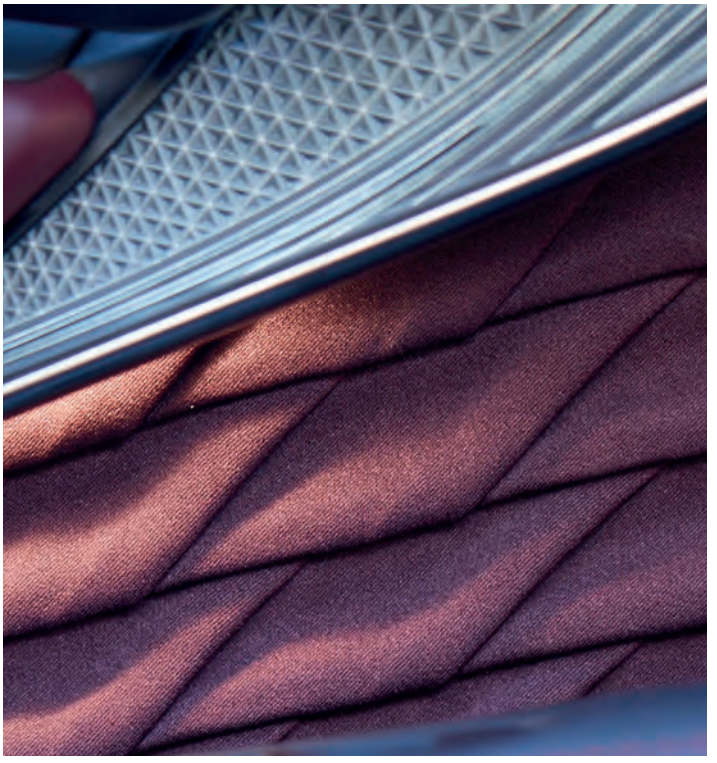
bold folds

TRADITIONAL JAPANESE CRAFTSMANSHIP INSPIRED SOME BEAUTIFUL DETAILS IN THE 2018 LEXUS LS SEDAN

The origami-inspired fabric pleating that adorns the door panels of the 2018 Lexus LS took four years to perfect. Chief designer Koichi Suga worked with a color designer and a fabric artisan from Kyoto to develop the technique, whereby strips of cloth are folded and overlapped. The pleating is created by hand, so will not be available in all markets.

Other details in the sedan include hand-cut glass inspired by Kiriko glassware and three types of 'Art Wood'. Art Wood Organic, intended to evoke the look of flickering flames, is created by layering sheets of Agathis veneer, slicing across the grain and finishing with a gloss coat.

The interior is also notable for its seats. For example, the new front seat can be adjusted in 28 ways. Lexus consulted with Japanese Shiatsu masseurs to improve massage functions, resulting in the integration of air bladders that apply pressure to the occupant's back and lower-hip area. There are seven 15-minute programs to choose from. Lexus also integrated heaters that provide targeted heat to the shoulders and lower back.



OTHER EYE-CATCHING DESIGNS FROM VARIOUS INDUSTRIES...

1 This 120m (394ft) yacht concept from Sinot Exclusive Yacht Design is called Nature. As well as a climate-controlled inner garden, it has an upper-deck observatory with floor-to-ceiling windows, to make the most of the view.

2 The new Range Rover has front seats featuring 24-way movement and heated armrests; a gesture-controlled sunblind; cabin air ionization; and two HD 10in touchscreens that allow information to be swiped from one to the other.

3 The standout feature of this luxurious kitchen is the island unit, with its illuminated sliding onyx countertop from Elite Stone. The E-Light panel is constructed from a 3mm-thick sheet of rigid glass and a 5mm sheet of onyx, and is backlit with LEDs.

the bench seat

by the benchmark

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