

Aircraft *interiors* INTERNATIONAL

MARCH 2019

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How cabin innovation can help airlines better meet the needs of passengers with hidden conditions

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777X

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THE 777X FACTOR

It has involved a long wait, many pleas, escalating excitement and an admirably patient media relations team, but I am delighted to say that you have in your hands exclusive first details of the B777X cabin interiors. As you might expect, Boeing has invested an incredible amount of research, flyer feedback and airline input into the cabin concepts, which are now being brought to life through a huge design, engineering and science effort.

However, there are already a few elements of the aircraft that some might not expect. For example, while the dimensions of the aluminum fuselage are the same as those of the B777, that 'X' factor of the new aircraft has seen larger windows enabled through a sprinkle of secret engineering magic. As another example, extra cabin width has been carved out of the sidewalls to enable new interior design possibilities and a greater sense of space.

Those possibilities are further extended by a range of linings options that enable simple, fast and cost-effective customization for airlines. It has been worth the wait for the first glimpses into this exciting new aircraft, as you can see on page 54. There is a lot more detail to come, and rest assured we will pursue the details of the ongoing B777X design story as the aircraft approaches its first delivery in 2020.

However, while the design community has a fantastic new aircraft type in which to express brand personalities and create innovations, it is also approaching a sad milestone: the end of A380 production in 2021 (p276).

Few aircraft can inspire the imaginations of cabin designers, or even an avid public, quite like the A380, with its huge spaces full of potential. No operator has yet fitted any of the more ambitious, space-decadent ideas mooted for the aircraft in the early 2000s, such as gyms and casinos, but there has been an element of playfulness in several A380 cabin designs, from Korean Air's vodka lounges and onboard shops, to Emirates' showers, and Etihad's quest for new heights of onboard luxury.

A380 production may be ending, but there's still life in the girl yet. Emirates' chairman has stated that the A380 will remain a pillar of its fleet well into the 2030s, which is plenty of time for new onboard products and experiences to be introduced. Meanwhile, the increasing numbers of ex-lease aircraft becoming available on the market may even attract some interesting new operators. It would be fascinating to see an ultra-high-density configuration with an LCC, and equally a super-luxury vacation-spec aircraft.

Such ideas are not as far-fetched as some might think. Over recent years, I have felt privileged to have seen several confidential airline designs that were well developed as concepts but never made it to the skies, ultimately deemed a little too ahead of the market. However, as the A380 continues service and attracts new operators, I'm confident we will feature many more exciting A380 interiors ideas in these pages.

But in the meantime, we have the reveal of Emirates' B777X interiors to look forward to in 2020. I can't wait! ☼

Adam Gavine, editor



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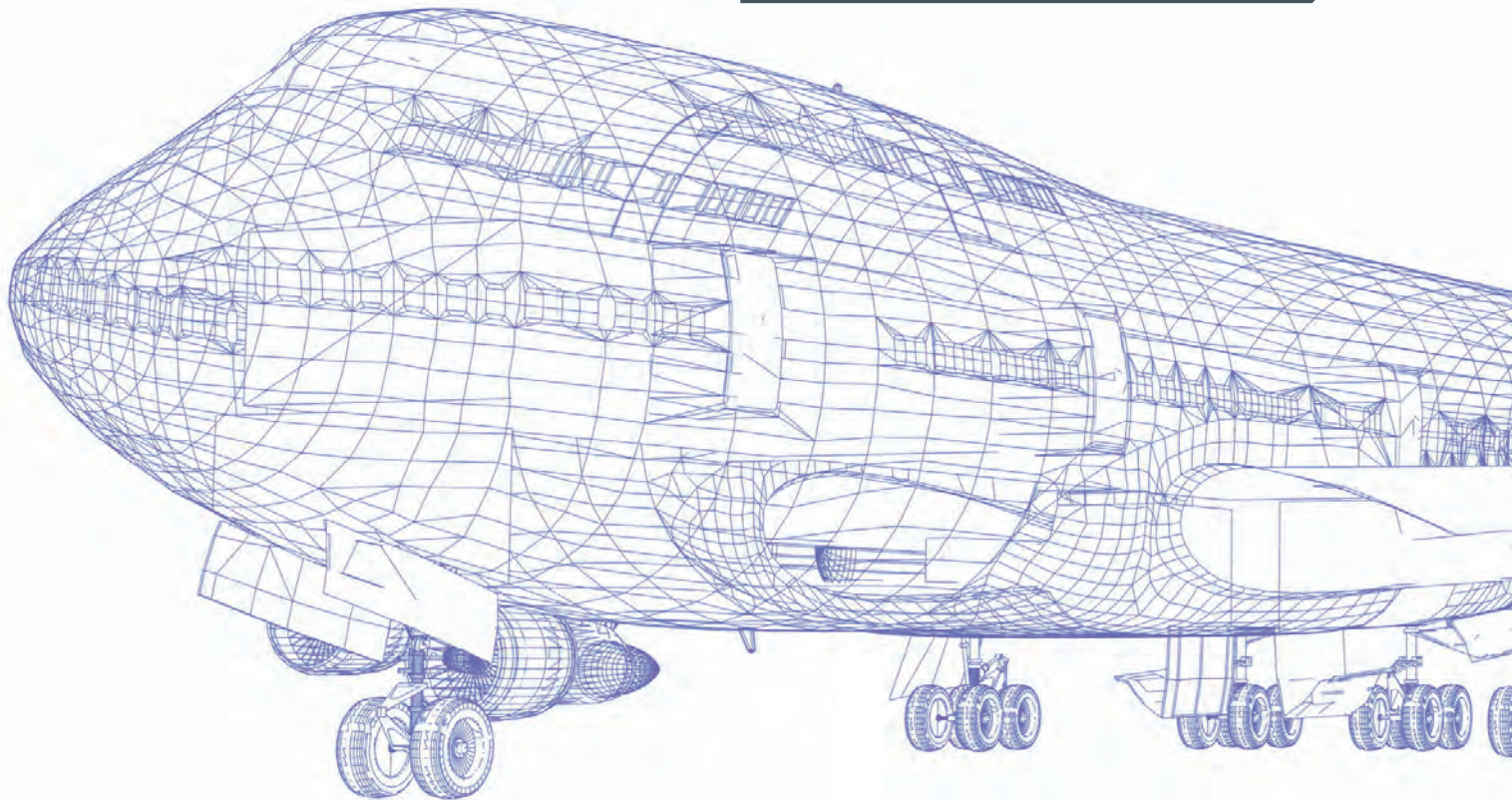
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The difference between a dream
and a goal is simply a date.



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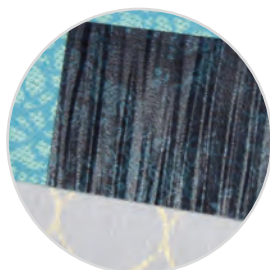
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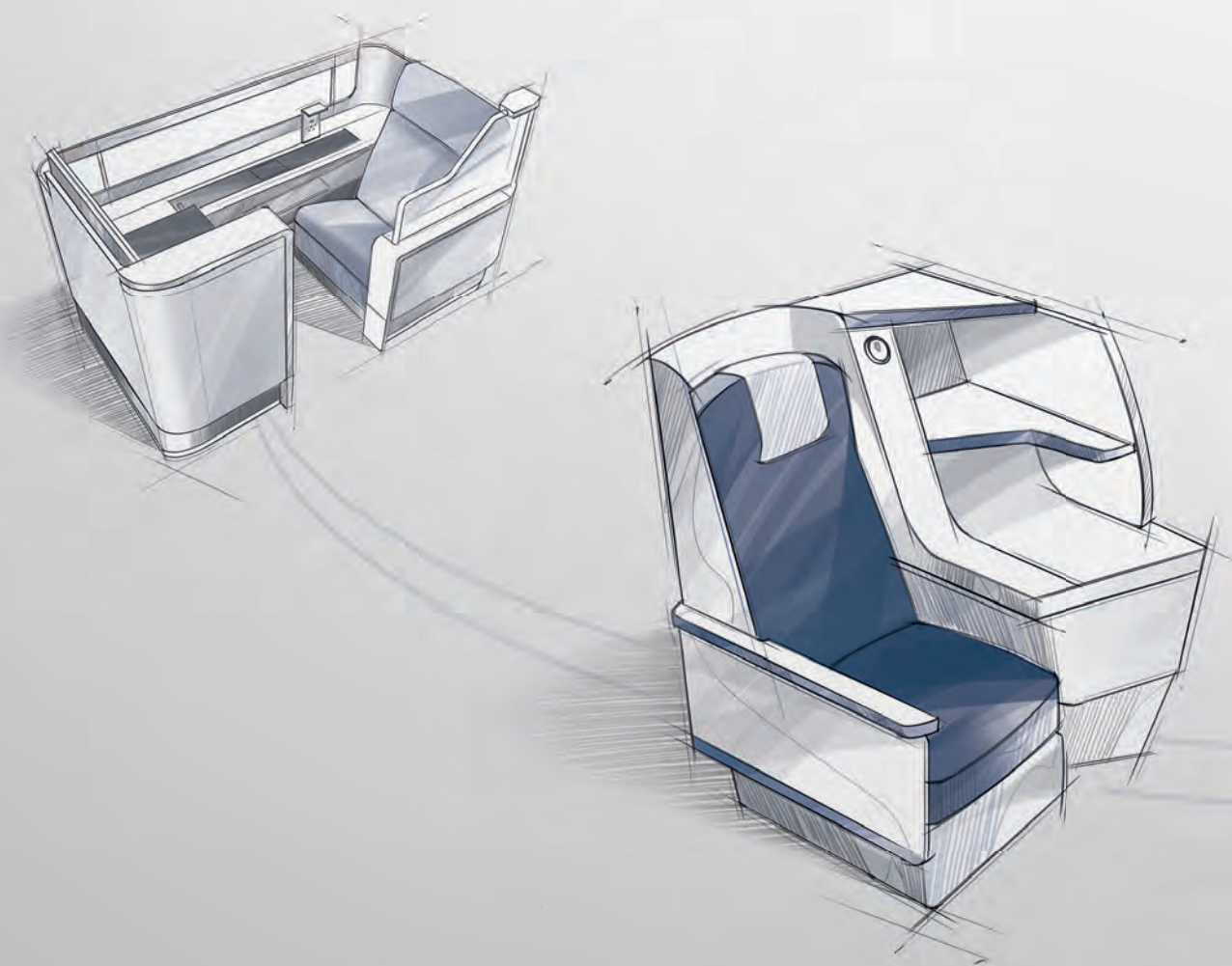
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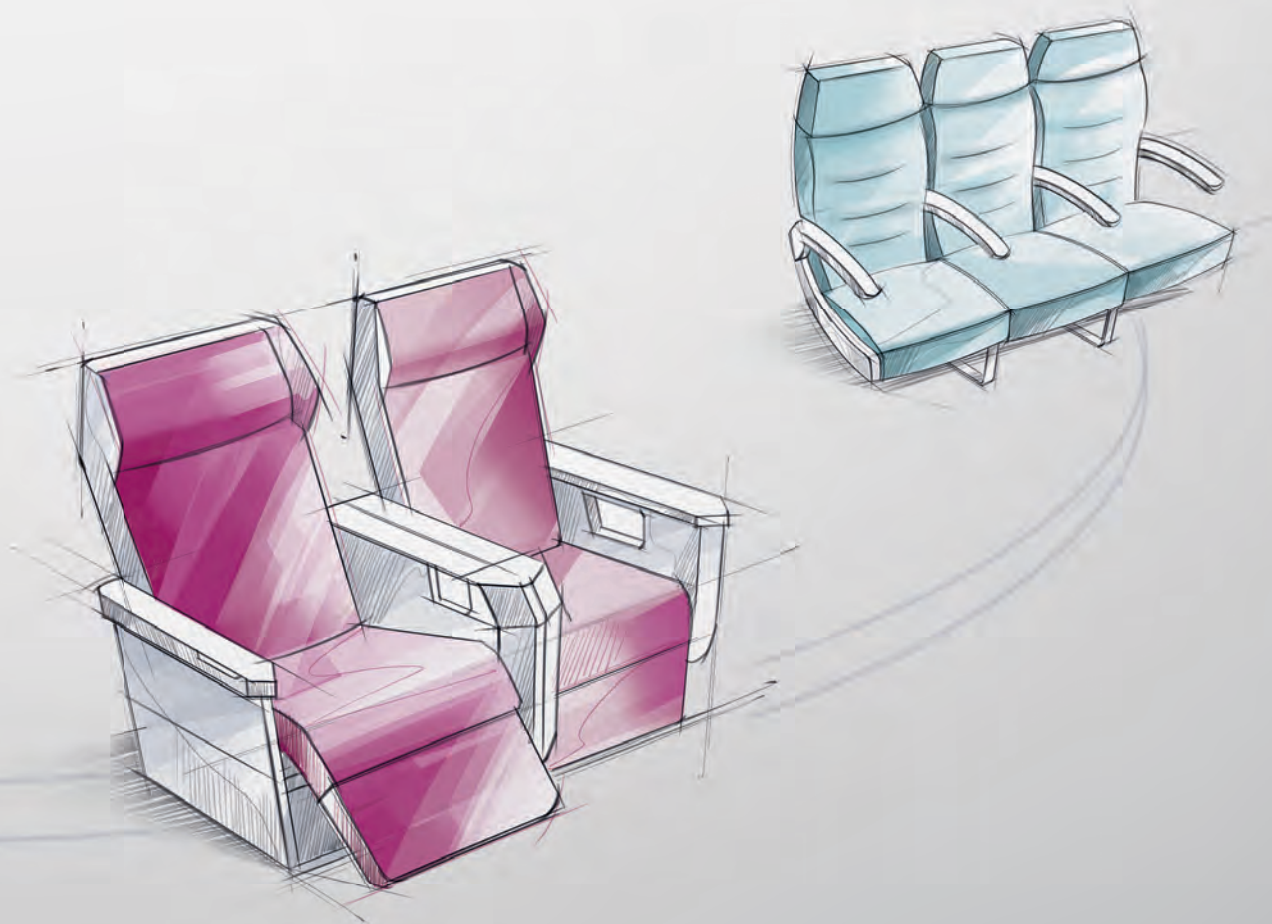
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NATURAL REMEDY

A French consortium is developing bamboo alternatives for cabin composites, with many claimed benefits. The proof of the project is imminent, with prototype readiness projected for 2021

1. BAMBOO COULD HELP MAKE AIRCRAFT INTERIORS MORE ENVIRONMENTALLY FRIENDLY, BEING A MATERIAL THAT IS NATURALLY ABUNDANT, WITH MODEST REQUIREMENTS FOR IMPRESSIVE GROWTH

Aircraft interior components currently made from glass/phenolic composites, such as cover panels, fuselage cladding panels and galleys, could soon be made from a natural but slightly unconventional material: bamboo. Over the past four years a consortium of companies has begun working on the development of bio-sourced technical composites based on long bamboo fibers, and have created a material named BAMCO (bamboo long fiber reinforced bio-based matrix composite), an environmentally friendlier alternative to polymer composites. The team also believe that the use of some polymer composites, including glass/phenolic composites, will soon be impacted by the European REACH regulation, which is driving an urgent need to develop alternatives with equal or improved performance.

Eight research and engineering project partners from France's materials, chemistry and mechanical engineering sector, led by the Expleo engineering consultancy, say they have already validated BAMCO's aerospace credentials in the lab and are now validating the concept on an industrial scale, with the aim of producing the first prototype components in 2021.

Some other research organizations are looking into solutions that use flax or hemp fibers, but the BAMCO consortium is targeting bamboo as the partners believe it offers greatly reduced weight over glass/phenolic composites, along with great thermal resistance, strength and impact/vibration absorption.

NATURAL RIVALS

The notion of using bamboo to replace composites as a cabin material is not new. In 2013 a team of students from the University of Nairobi entered Airbus's biennial Fly Your Ideas competition, which challenges students to innovate for the future of aviation.

Named Team A.B.E. (aero-bamboo engineering), the group proposed a honeycomb structure of bamboo sandwiched between laminated bamboo panels together with a thermal-acoustic foam, bringing benefits including recyclability, strength, reduced weight, reduced noise and even aesthetics. The team felt the structure would be suitable for use on the floor, panels, partitions and possibly the overhead stowage bins.

In the same year of Fly Your Ideas, the Bhardwaja Corona team from St Peter's University in Chennai designed a prototype for the world's lightest aircraft seat, made from a natural composite of bamboo, banana, jute and a modified epoxy resin air-cushioning system.

Neither team won, but Airbus clearly sees some potential in the use of bamboo, as according to Ethiopian bamboo producer Bamboo Star Agro-Forestry, the two companies are in talks concerning the use of its product.

A further benefit is that bamboo grows rapidly without fertilizers or pesticides, and has modest requirements for water and soil. ☒

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FACULTY SCIENCE

United Airlines is the US launch customer for the B787-10, and is marking the occasion by bringing something special on board: a customized embedded IFE system that can better entertain the sight, hearing and mobility-challenged

Every passenger can have individual needs, and every passenger should have an enjoyable flight experience. United Airlines is furthering this sentiment with its latest embedded IFE system, which debuts on the B787-10 fleet and introduces what the airline describes as “the world’s most extensive suite of accessibility features”, accommodating passengers with any level of visual acuity, as well as the hearing- and mobility-challenged.

The system builds on the existing native Android operating system of Panasonic eX3, adding custom accessibility features that open up access to the system for passengers with visual impairment, such as text-to-speech screen reading with various levels of granularity, from reading a paragraph, a sentence or a word, all the way down to individual letters.

Navigating the system is made easy with a custom-defined semantic order

that ensures the screen reader follows a logical pattern. Some further enhancements may be familiar from some smartphone accessibility features, such as having three levels of text size options, high-contrast text, screen magnification using pinch and zoom gestures, and color correction options to benefit those with deuteranomaly, protanomaly and tritanomaly vision, as well as a color inversion function to reduce screen glare. For passengers with low or no vision, the explore-by-touch feature enables user to explore all elements on the screen by moving one finger across the screen, with haptic or audio feedback highlighting each option.

For hearing-impaired – and indeed to benefit non-English speaking passengers – IFE content and inflight notifications can be delivered based on a passenger’s preferences and settings, either with closed captions or subtitles in the language of their choice, from a

WIDER BENEFITS

Broader features introduced in United’s new B787-10 IFE system include recommendations based on remaining flight time, a Relax Mode providing an immersive and customizable inflight relaxation option with soothing videos and relaxing audio playlists, a mini player to enable interactive browsing during content playback, split-screen viewing for multitasking (movie and map, for example), as well as recommendations based on your viewing history, a feature increasingly familiar from web-streaming services such as Netflix.

choice of 15 languages. The volume, speed and pitch of the voice can also be personalized to individual needs.

For passengers with manual dexterity challenges, the system offers the option to navigate the IFE using various gestures, taps and swipe actions.

The features are certainly valuable, but they add complexity to a system that requires frequent updates. However, the product can support wireless and remote updates of content and software elements, including the user interface, without having an impact on the availability and use of the accessibility features.

This system is the culmination of more than three years of work, more than 20,000 hours of research, design, development and testing by United, and the equivalent or more time invested by Panasonic Avionics. And in the quest for a great inflight experience for all, the time and money has been a worthwhile investment. ✕

See p68 for insights from medical experts into the psychology of the user experience



United’s inclusive IFE system is a finalist in the 2019 Crystal Cabin Awards

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This design could help airlines bring their B777s in line with their new B777Xs (see p54)



1. THE ECONOMY VERSION IS A MARKED UPGRADE IN EXPERIENCE

2. THE PREMIUM VERSION. THE SINK DECK AND VANITY UNIT CAN BE SPECIFIED IN MATERIALS SUCH AS STAINLESS STEEL OR CORIAN

MODERN CONVENIENCE

A retrofit bathroom design has been created for the B777, which could be a simple way to improve the passenger experience and add customization options

We have seen progressive innovation in cabin hardware for the B777 in recent years, but one part of the experience has remained fairly static: the bathroom design is now over 25 years old. With many B777 aircraft due for maintenance improvements in the coming years, there is an opportunity to improve the lav experience, and with this in mind, VT Volant has created a stylish upgrade system, the ARC bathroom modification kit, which will soon be available as an on-wing service bulletin.

The space looks better: less aviation, more homely in style, with a greater feeling of space and indeed more actual space. It's a drastic change in appearance from the legacy lav designs, but the engineering is relatively simple. VT Volant worked with design agency Acumen Design Associates and they began work by identifying the immovables in the existing lav space: namely the vacuum-waste system, water heater, baseline electrical installation, and fresh and waste water plumbing. Around those fixed parameters the studio then had relative design freedom.

ARC was originally targeted at Far East airlines, implementing Japanese

design principles such as purity, form, simplicity and refinement, which combine to create beauty and a sense of well-being in small spaces. However, while the design uses Japanese principles, its styling has international appeal.

The integrated sink-deck is at the heart of the space, with the unit combined with the sidewall panel to create an attractive curved feature without split-lines. The vertical curve in the large, single-piece mirror intuitively positions the passenger at the center of the large wash basin, where they will have the most space and the best access to the amenities. A premium cabin version of the kit is also available for business and first class, which dispenses with the over-sink cabinet (not so important with the smaller footfall) to increase headroom and mirror size.

The kit is modular, which enables easy customization, such as panel colors and finishes. Bespoke options can also be specified to apply brand identity without affecting functionality or ease of installation, and at minimal cost.

As Catherine Barber, brand manager at Acumen, explained, "If you consider bespoke elements such as CMF and other

CLEAN IDEAS

The large one-piece panels and curves look good, removing the usual split-lines that detract from a clean aesthetic. Removing split-lines also removes some typical dirt-traps and makes the lav easier to clean.

A common issue is mold and mildew build-up on sealant, and one solution has been to add a deep groove between the sink deck and the splash-black that removes the sealant joint from the passenger eyeline and acts as a drainage gully that helps prevent the build-up of water.

Another hygiene feature is the Schneller one-piece floorpan, which again reduces split lines, while the system of underfloor membranes and filters eliminate odors. Anti-microbial surface finishes and touchless technologies also enhance hygiene.

customization points from the start of a project, they can be applied seamlessly to make exceptional offers."

The flexibility of the design doesn't end there. There are potentially 14 lav locations on a B777, each with a slightly different architecture, such as the curved sidewalls of the outboard locations, the smaller spaces at the rear, and the wider PRM lavs. The ARC kit has been designed to flex in different spaces, simplifying logistics, fitting, parts and tooling. ✕

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NEW GENERATION

Joon's millennial experiment may not have worked, but the success of its family seating concept means it is set to live on with Air France

With the launch of Joon, in December 2017, Air France created a rather unusual subsidiary – an airline marketed at the millennial/generation Y demographic. Indeed Joon is a near-homonym for *jeune*, the French word for young. The brand's focus seemed unclear to many, though, as it was not quite low cost and not quite trendy enough to be highly differentiated in the market – though it did try with craft beer and VR IFE, and a crew dressed in electric blue FA uniforms made from recycled plastic, paired with white sneakers. However, the concept hasn't been deemed a success – perhaps appearing to exclude age demographics isn't a great way of filling airplanes – and by the end of 2019 the airline will become an interesting footnote in aviation history, with operations due to be absorbed into Air France's wider fleet.

However, Joon did have an interesting and successful cabin innovation – a family seating concept introduced on its long-haul fleet of four A340-300s in November 2018, which is going to find new life in Air France's long-haul fleet. Named Cozy Joon, it comprised convertible economy class seats in

SOFÀ SO GOOD

Cozy Joon is based on Geven's Piuma Sofà seat, which has an interesting history. The initial concept was patented by Elidea in 2006 and then steadily refined and updated. We reported on the concept – then named Chameleon – in the September 2013 issue of *Aircraft Interiors International* and interest grew, with Geven taking on the design and creating the Piuma Sofà, with the first order being South African Airways in early 2016. In November 2018 Joon also began flying the seat. An interesting point is that Trevor Lambert, creator of the original concept, has been involved throughout – indeed he is now sales manager at Geven and uniquely placed to offer in-depth demonstrations at Aircraft Interiors Expo this year. As he says, "It's been quite a journey."

the four middle seats of rows 33 to 36, which could be booked in pairs for an additional fee of €20/US\$23 per seat (space permitting).

Feedback from customers and crew has been positive. To convert the seats into Cozy Joon, crew simply raise the armrests, remove the headrests and plug them into the seat pans to create a wide,

flat 105 x 76cm surface that fills the space between the rows, suitable for use as a bed or play area for two children aged two to six. The process is estimated to take as little as 25 seconds per triple and 30 seconds per quad. It's a simple concept, requiring no extra components or actuators – the only extra weight is in the fixing points on the backrest and seat pan, the release mechanism for the headrest and a seat belt extension – and a mattress, if desired.

Air France viewed the Joon brand as an 'innovation laboratory', placing the spotlight on the 'test and learn' principle. And indeed, though Air France has learned some lessons, it has gained an innovation. ✕

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There is a bigger story behind this seating project. See our June 2019 issue for details...

FRENCH TAILORING

In the latest installment of Air France's long-haul refresh, the airline is investing €140m in its A330 interiors, including a third seat variant in business class

As part of the refurbishment program of its long-haul fleet, Air France is redesigning the interiors of its 15 A330s, in a €140m (US\$160m) project due to be completed by 2020. The airline is working with Switzerland-based studio Design Investment to create a cohesive design throughout the aircraft, with custom designs to be found all the way from the tail to the Door 1 entrance area with its new galley zone and self-service bar.

The headline development is the business class seat, a customized version of Stelia Aerospace's Equinox 2D high-density seat from the Airbus catalog, which weighs around 100kg (220 lb) per double. This selection makes Equinox 2D the third seat model flying in the airline's long-haul fleet, which features the Cirrus on the B777 and B787 fleets, and the Optima on the A350s, both from Safran Seats.

With a 2-2-2 configuration – the same as the outgoing seats – this cabin doesn't offer direct aisle access for all 36 passengers, but with a 2m-long (6.5ft), 57cm-wide (22in) lie-flat bed the seats are a big upgrade from the previous angled lie-flats.

As part of the 17-month redesign program, Design Investment has worked to adapt the seats to the specific dimensions of the A330 cabin, with customization work involving ergonomics optimization and space maximization for enhanced passenger comfort within the 62in pitch. The airline has opted for a 20in seat width for the A330, within the 19-22in customization range for the Equinox 2D.

A lot of detail work also went into the project. For example, a cocktail table has been integrated into the meal table, and an illuminated personal stowage area and soft upholstered footwell introduced. The seat has also received a general restyle, with a sleeker look for the reading light, seat control unit and IFE handset, and a more cohesive look for the retractable armrest.

Perhaps the biggest customization project for the seat has been the center console, which has been made less

AND FURTHER BACK...

The 21 seats in premium economy have also been revised, based on Safran Seats' Airgo FX Premium model, which has a 130° seat recline within the fixed shell. This is a good choice of seat, with a 19in seat width, which the airline is fitting at a 40in pitch. Custom features for the Air France A330 application include additional storage space, a wider footrest, a 13.3in HD screen, as well as widened leather armrests and softer seat cushions.

In the 167-seat economy class, the Safran Seats Z300 has been customized with additional comfort measures including a 118° recline, 31in legroom, more space between the armrests, reinforced ergonomic foam in the seat, a larger tray table, an 11.6in 16:9 HD touchscreen IFE display, a personal power outlet and a USB socket.

1. THE CENTER CONSOLE AREA OF THE EQUINOX 2D SEAT HAS BEEN EXTENSIVELY REDESIGNED

2. THE SELF-SERVICE DRINK AND SNACK BAR FOR BUSINESS CLASS CAN BE FOUND AT DOOR 1, WHICH ALSO PROVIDES A MORE WELCOMING FEEL FOR ALL PASSENGERS BOARDING, AND A BRANDING OPPORTUNITY

bulky in appearance, making the in-seat experience more open for passengers flying together. However, given that flying together is the only option in the 2-2-2 LOPA, solo travelers may appreciate the privacy screen, which has been enlarged, and changed from a pull-down unit into one that customers deploy by sliding it horizontally. ☒

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Designer of Air France's
new Airbus A330 Cabin



1. THE 13.3IN IFE DISPLAY IN THE A220 FIRST CLASS IS THE LARGEST IN DELTA'S DOMESTIC FLEET



Delta is also taking cabin modernization programs in-house. See p32 for more details

SELF-INTEREST

Delta is shunning catalog IFE systems, with its interiors innovation subsidiary developing and delivering the airline's very own wireless seatback IFE system

In 2016 Delta launched its wholly owned aircraft interiors subsidiary, Delta Flight Products, with little fanfare. That may have been because the startup innovation arm was indeed rather little itself, having just 10 staff. However, the team has grown somewhat, now boasting more than 230 employees and due to exceed 300 this year, and their work is paying dividends.

The headline project is a seatback IFE system that won't be found in any supplier catalogs. Delta has taken control of its IFE destiny – and budgets – by developing its own IFE systems, designed for the airline's specific needs, with state-of-the-art tablets sourced from Hitachi mounted into the seatbacks and free content from the Delta Studio catalog streamed to them wirelessly, bringing potential benefits in terms of reliability, maintenance, simplicity of future upgrades and weight. Indeed the Delta Flight Products team believes that the switch to wireless streaming saves around 0.45kg (1 lb) of wiring per seat, which extrapolated across Delta's 767-400 fleet could save around 1,330 metric tons of carbon emissions annually.

"Our goal is simple – to deliver a more interactive and cost-effective in-flight entertainment platform that can be easily customized for Delta customers," said Rick Salanitri, president of Delta Flight Products.

He added that as new technology such as upgraded displays comes to market, they can easily be integrated into the Delta system, with its platform-type environment enabling evolution in line with changing passenger expectations. This work is helped by the division's in-house rapid prototyping and design capabilities.

GOGO PARTNERS FOR CS100 IFE

Passengers on Delta's Bombardier CS100 fleet will enjoy a similar experience, but with subtle differences beneath the surface. For these aircraft, the Gogo Vision Touch wireless IFE system is being installed, together with Gogo's in-cabin network technology comprising a server, modem and wireless access points. The system is powered by 2Ku connectivity technology, making these the first C Series aircraft to offer inflight connectivity. According to Gil West, COO of Delta Air Lines, the Delta Flight Products team played a key role in designing the system.

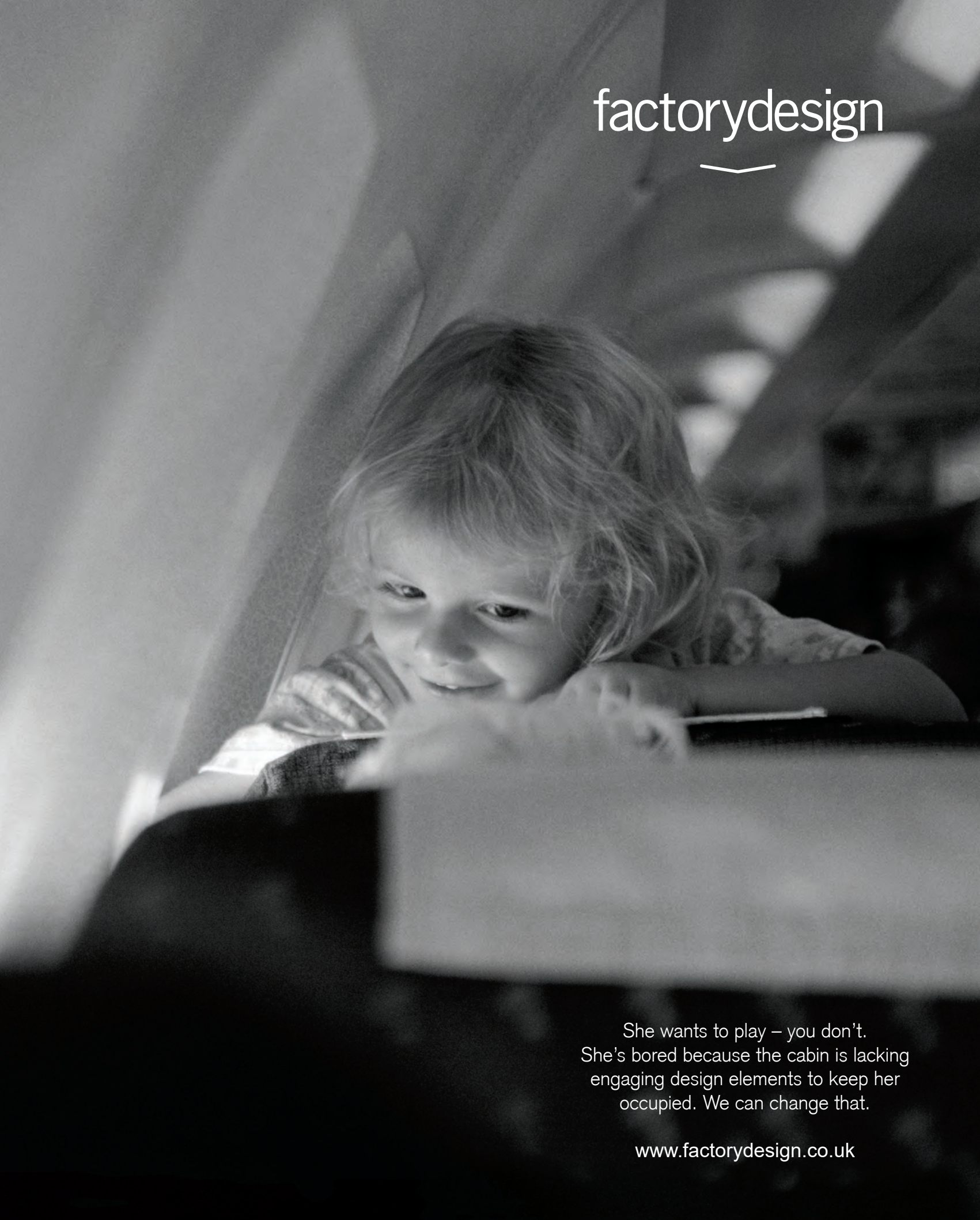
"Delta and Bombardier brought a lot of ingenuity to this program and have enabled it to come to life," added Jon Cobin, Gogo's chief commercial officer. "We're pleased to work so closely with our largest partner to help it realize its goal of redefining the business of in-flight entertainment with a cost-effective solution."

However, passengers will be unaware of the innovation at their fingertips, simply seeing what appears to be a regular seatback monitor, with a similar look and feel to those on the rest of the Delta fleet. All certification issues, such as HIC tests, have been handled directly by Delta Flight Products with the FAA.

"Since the architecture is Delta-developed, it's easier to migrate to new and emerging display technology," Salanitri added.

The wireless IFE system has a fine launch vehicle, with first fitment in the A220-100 before roll-out on Delta's new A330-900neo and A321neo fleets, and retrofit on Delta's 767-400 aircraft during their mid-life interior modernizations beginning this year. These aircraft will also serve as flying showrooms for other airlines that may wish to buy the system. ✕

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IN THE LONG RUN

Qantas is planning to launch the world's longest passenger flights in 2022. But how will passengers want to pass 20 hours on board?

Non-stop flights from the east coast of Australia to New York and London have long been talked about, but with Project Sunrise, Qantas believes they could be a reality in 2022. The airline is in talks with Boeing and Airbus about suitable aircraft, with ultra-long-haul versions of the B777X and A350 being considered. As Qantas CEO Alan Joyce has said, the flights represent "a last frontier in global aviation", with the capability to fly between any two airports in the world in one hop.

However, while end-to-end travel time is reduced (along with the stresses of a stopover), these routes could be around 20 hours – too long for IFE alone to keep passengers occupied. To find solutions, Qantas has been working with Sydney University's Charles Perkins Centre on scientific research that could help shape the customer experience, as well as conducting focus group research into passenger wishes, and surveying customers as they step off the direct London to Perth services.

Asking passengers for their opinion as they step off a long-haul flight could be considered risky, but Alison Webster, CEO of Qantas International, reported that customer feedback exceeded expectations, especially in relation to the time saved by skipping the stopover.

The teams found that passengers don't simply want a bigger IFE catalog; rather they are showing increased interest toward mental and physical well-being at different stages of an ultra-long-haul flight.

Unsurprisingly, one of the most frequent customer suggestions involved cabin space, with a wish for innovative cabin designs, with both seat and non-seat spaces meeting a broad range of traveler needs including comfort, sleep, dining, entertainment and mindfulness. As part of this, passengers expressed a desire for 'sense of separation' experiences that allow them to be social when they're in the mood, but 'zone out' with either

CAON TO DELIVER

The next phase of the project will involve using scientific research from Sydney University's Charles Perkins Centre and ongoing customer feedback, which will be applied by Qantas's industrial designer, David Caon, in creating features for the aircraft cabins.

Caon explained that Project Sunrise is pushing not just the boundaries of distance, but also product innovation. "Customers

are sharing some incredibly imaginative ideas, which is an exciting challenge and helps us to think outside the box to redefine the ultra-long-haul experience," he said.

"Bringing some of these concepts to life will involve an entire rethink around how to be clever about use of all cabin space and what is practically possible, but it may well involve incorporating design elements never before seen on commercial aircraft."

virtual reality relaxation areas, audio mindfulness experiences, or other forms of in-flight entertainment. They would also like onboard spaces where they could do gentle exercise such as stretching or use exercise bikes, promoting circulation and comfort.

An inflight café was also suggested, with some wishing a bar area but many also tuned into the trend for health, wanting a range of juices and snacks.

Ultra-long-haul will require a strong focus on load factors, which may make the provision of non-revenue spaces tricky. However, perhaps the solution could lie in flexible entrance and galley areas.

We probably won't be seeing exercise bikes on board in 2022, but Webster was encouraged by the feedback, stating, "Our job now is to determine where the most demand is and create this cabin in a way that makes it affordable for customers and commercially viable for airlines. Everything is on the table and we are excited about what innovations may come from this research." ✕

Qantas is expected to reveal more Project Sunrise details in 2019, including the aircraft type chosen



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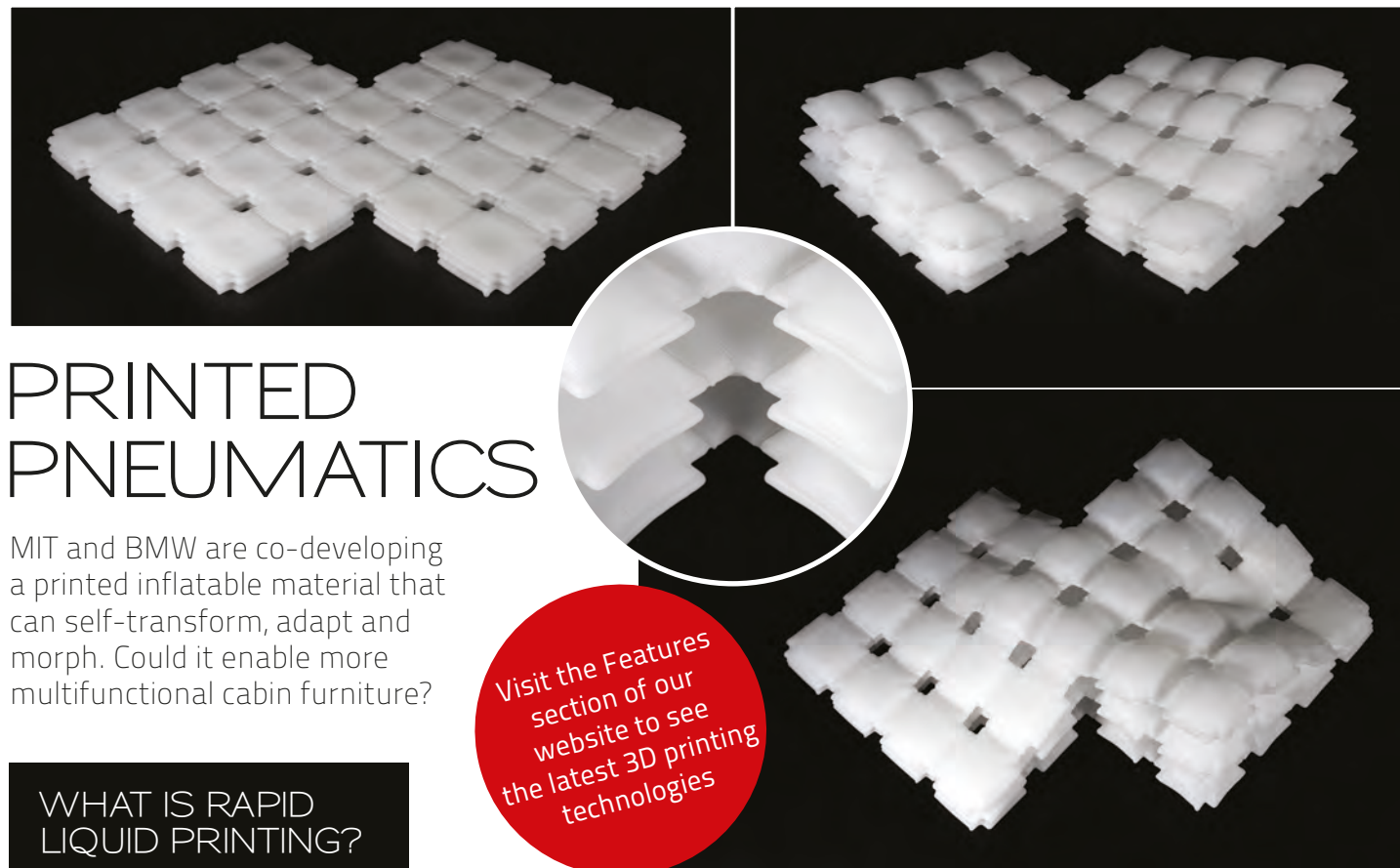


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PRINTED PNEUMATICS

MIT and BMW are co-developing a printed inflatable material that can self-transform, adapt and morph. Could it enable more multifunctional cabin furniture?

Visit the Features section of our website to see the latest 3D printing technologies

WHAT IS RAPID LIQUID PRINTING?

MIT's rapid liquid printing technology is an experimental process the institute describes as "a breakthrough" in 3D printing technology. The process physically creates forms in a 3D space within a gel suspension, and enables large-scale, customized products to be printed from real-world materials.

The main benefits of the process are that it can produce some structures in a matter of minutes, and can produce large-scale products such as a piece of furniture, using real-world, industrial-grade materials. These properties overcome some criticisms of current mainstream 3D printing processes, which include a slow speed compared with conventional processes such as injection molding, casting, milling, etc; production being limited to small components; and construction materials that are typically lower quality than industrial materials.

Imagine hardware in the premium passenger envelope that could interact with passengers' bodies. Imagine the seat, the inner seat walls and indeed any other surface in a suite being able to change form and optimize comfort in response to the occupant's changing needs throughout a flight – and for any shape or size of occupant.

Tailored seating and sleeping surfaces are just the start: the technology could create anything from a focused workspace to a shared dining space, or even a gaming studio or mini cinema – on demand. This dream could be realized following a research project carried out by MIT's self-assembly laboratory in collaboration with BMW's design department, which is claimed to have resulted in a printed inflatable material technology that can self-transform, adapt and morph from one state to another.

The system, fully printed from silicone, can change size, shape, function and stiffness,

depending on the air pressure in the system. A series of airtight and watertight inflatable geometries can be printed, including many complex channels and pockets, all capable of changing shape, and without need for complex electromechanical devices or complex molding or tooling.

"The outcome of this collaboration is that a new material future is imminent," explained Martina Starke, head of brand vision and brand design at BMW Group. "Interiors could even take on malleable, modular uses. This adaptive material technology points toward a future of transformable surfaces for adaptive human comfort, cushioning and impact performance."

BMW sees potential application in the autonomous vehicle sector, where it could smash today's fixed notions of automotive interiors such as front seats and rear seats. Applied to aircraft interior design, this technology could help airlines introduce the next level of passenger personalization and comfort. ✕

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BREATHE EASY

From breathing clean, fresh-smelling air, to enjoying lustrous hair, a module being developed by Panasonic could bring health and wellness benefits to passengers

Nanoe is a Greener Cabin, Health & Environment category finalist in the Crystal Cabin Awards 2019

The low humidity of cabin air (roughly 20%) can be a contributing factor in pathogen transmission between passengers, but Panasonic Avionics is developing a potential solution in the form of a compact, embeddable module designed to eliminate germs and odors and generally improve air quality. Named Nanoe, the module can be integrated into areas such as premium seat structures, onboard lounge areas, galleys and lavatories, giving occupants of these key areas an environment free of offensive smells and pathogens. Even better, the electrostatic atomized water nanoparticles have been found to be beneficial for the condition of hair and skin.

The module works by applying a high voltage between atomizing and counter electrodes to produce electrostatic atomized water nanoparticles, which at 5-20nm in size are around 15,000 times finer than the width of a human hair.

These nanoparticles destroy odor-causing molecules in the air and suppress airborne and surface viruses, bacteria, molds, pollutants and allergens. The cabin would

not have sufficient humidity for the module to draw moisture from, so it is fitted with a removable water reservoir that would be filled daily by crew.

According to Panasonic, experiments by research institutions have proved the effects of the Nanoe modules – indeed recent experiments conducted by Masahiro Sakaguchi, professor of veterinary medicine at Azabu University in Japan, have shown that Nanoe suppresses swine-origin influenza and bird flu viruses.

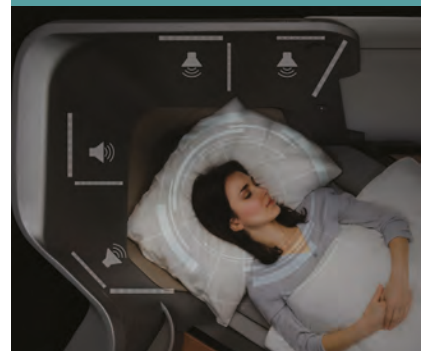
Nanoe could be flying soon, as Panasonic says it is working with a seat manufacturer and a “major international airline” to introduce Nanoe in a line-fit aircraft for entry into service in 2021. ✕

A QUIETER EXPERIENCE

Panasonic Avionics is also working on an active noise-control system for lie-flat first and business class seats, which would reduce background aircraft noise within the passenger envelope without the need for headphones.

The system, which would be integrated into the seats, comprises a controller, microphones and speakers, which can cancel out up to 15dB and intelligently adapt to the noise characteristics of any aircraft type. The system is most effective in the 80-400Hz frequency range.

The directional speakers can also offer passengers in premium seats soothing audio tracks to aid sleep, including the sounds of rain, ocean surf or acoustic guitar, and the highly directional sound will ensure that only the seat occupant passenger hears the audio, leaving their neighbors in peace.



The Features section of aircraftinteriorsinternational.com has insights into cabin air quality

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AIX 2019 | HAMBURG | BOOTH #4A10



1. IT WILL BE INTERESTING TO SEE IF DELTA SHORTENS ITS TIMESCALE BETWEEN CABIN REFRESHES AS A RESULT OF ESTABLISHING ITS IN-HOUSE CAPABILITY

2. IN TOTAL, DFP IS INSTALLING 3,348 BIN LIFT ASSISTS ACROSS DELTA'S B777 FLEET

INTERNAL AFFAIRS

A major development from a major airline: Delta is taking charge of its mid-life cabin modernization programs, bringing design, manufacturing and certification operations in-house

DFP has also developed an in-house wireless IFE system for Delta Air Lines (see p22)

HELPING HANDS

DFP is not just about airline efficiency; the subsidiary is also making life easier for passengers, having partnered with Delta's operations and compliance teams to find a way to make raising a fully loaded overhead bin in the refreshed B777 fleet a little easier. The result is a proprietary mechanism that reduces the lift force required to close the bin, conceived, designed, manufactured and fitted by a team that only had Delta's best interests at heart.

"Bin lift assist is a prime example of why DFP exists," said president Rick Salanitri. "We're able to meet an acute need quickly and effectively."

Since being set up by Delta Air Lines in 2016, cabin innovation subsidiary Delta Flight Products (DFP) has emerged as an in-house powerhouse. The workforce, which has grown from 10 to more than 230 at the facilities just outside Atlanta, Georgia, USA, is managing the airline's mid-life cabin modernizations.

These programs have been spurred by the introduction of the A350 and A220 into Delta's fleet, complete with new flagship cabin product – particularly the A350 with the Delta One business class suite and Delta Premium Select, the airline's new premium economy product. With a sudden inconsistency in the passenger experience across the fleet, the airline required mid-life cabin modernizations to bring the B777 and B767-400 fleets into line. This task involves a laundry list of different parts, all of which need to be designed, integrated, manufactured and certified – and a long list of suppliers to negotiate and liaise with.

However, DFP has been tasked with undertaking the work in-house, and it is capable, with its production shops able to fabricate structural parts, whether forming

on CNC machines, or using milling, turning and cutting hardware. Some cabin hardware such as closets and wall dividers can be made using composite honeycomb sandwich panels, also engineered in-house by DFP for optimized component design and lower weight.

As Gil West, COO of Delta, said, "It's really about innovation and speed to market."

We move more quickly through DFP than we could with other suppliers. The ability to manufacture pulls cost out of the business."

The team can configure aircraft with new lavs, IFE and lighting, and directly manage FAA certification activities. For products that DFP doesn't fabricate, such as seats – for now at least – the team works closely with Delta's suppliers to ensure modification programs are efficient and well coordinated.

"We identified a huge opportunity to save time and manage risk by supplying a seamless, integrated solution for Delta's most complex cabin upgrade programs," said Rick Salanitri, president of DFP. "We can now design, manufacture, produce, refine and FAA-certify Delta interiors, which means Delta can control its own destiny." ✕

10 LABS AND SHOPS

DFP's facility in Clayton County, Georgia, USA, houses 10 specialty shops and labs, namely:

- An electrical fabrication shop
 - A paint shop
- A placard and part marking shop
 - An interior fabrication shop
 - A machine shop
 - A sheet metal shop
 - A flammability lab
 - An IFE lab
 - A static test lab
 - A kit assembly shop

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BELGIUM CALLING

Brussels Airlines is investing €10m in each of its long-haul aircraft to create a uniquely Belgian, boutique hotel feel

Belgian flag carrier Brussels Airlines is relaunching the inflight experience in its long-haul aircraft, with enhancements across all classes aimed at creating a boutique hotel experience. The airline is investing €10m (US\$11.3m) on cabin upgrades for each of its long-haul fleet (four A330-200s and six A330-300s), in a program due to be completed by the beginning of 2020.

A key part of creating that boutique hotel feel is the boarding experience, with passengers entering a warm, wood-paneled space as they board the A330s. This stylish lobby area naturally has mood lighting, but with a Brussels twist, as the dome light in the ceiling features an elegant Art Nouveau design, an art movement that was born in Brussels.

Indeed the design team – JPA Design – draws on the Art Nouveau look throughout the aircraft. Keeping the Belgian theme, the rich 3D textured fabric seats are inspired by the work of famous Belgian designers such as Dries Van Noten.

The A330 business and economy classes are redesigned, and a new class introduced: premium economy. This separate 21-seat cabin is trimmed in

soft purples and blues with flashes of the Brussels Airlines signature red. The PC01 – ZIMmagic seat from ZIM Flugsitz was selected, customized with a 13.3in HD IFE display, a little extra width, more comfortable cushions, a larger headrest and an expanded armrest to help prevent being disturbed by a neighboring passenger. Combined with a 38in pitch and a 140° recline, this is a comfortable proposition.

The Art Nouveau theme is more prominent in the 30-seat business class cabin, such as the carpet pattern inspired by the vaulted roof of historic Antwerp central station. The seats are the popular Vantage model from Thompson Aero Seating, with the distinctive staggered configuration that offers double seats and single 'thrones' for passengers wanting real privacy. Entertainment is supplied by the tiltable 15.6in HD IFE screen and the self-service bar, which offers a choice of eight beers – all Belgian of course.

In economy, the EC01 – ZIMflexible NG from ZIM Flugsitz was chosen, with features including an ergonomic headrest with privacy features and adjustable neck support, a personal USB port and a 10.1in display. The seat is trimmed in what JPA's CMF team describes as a "playful design", inspired by a digital interpretation of sunrise on the North Sea. ✕

BELGIAN STYLE

Victor Horta (1861-1947) was a prominent Belgian, being the creator of the Art Nouveau style, inspired by natural forms and structures, which he introduced to the world in 1892. This was a total art style that could be applied to everything from architecture and interior design, to jewelry, textiles and ceramics – and indeed its influence can be felt in the new Brussels Airlines A330 cabins.

One of Horta's most notable commissions is the Hôtel Tassel, completed in 1893, which featured a groundbreaking semi-open-plan floor layout, adorned with ornate and elaborate designs. This landmark hotel was an inspiration in the A330 designs, and fittingly the reveal of the cabin designs was at a pop-up boutique hotel in the heart of Brussels, where guests enjoyed hospitality from Fiona Morrison, the airline's master of wines, and Belgian star chef Thierry Theys, who is creating the 2019 business class culinary experience.

1. BRUSSELS AIRLINES TEAMS UP WITH A STAR BELGIAN CHEF EVERY YEAR TO DESIGN THE BUSINESS CLASS MENUS ON LONG-HAUL TRIPS

2. PREMIUM ECONOMY IS WELL DIFFERENTIATED BY HAVING ITS OWN INDIVIDUAL CABIN

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ALL FIGURED OUT

Our roundup of the latest industry statistics shows big drops in plastics use, a rise in unruly passengers, and incredible surges in the aircraft interiors, IFEC and ancillary revenue markets



293

travelers were asked if they were concerned about security when using onboard wi-fi:

25% said not at all

48% were somewhat concerned

19% were very concerned

9% never thought about their online security in aircraft

3% have had personal information stolen while using wi-fi in an airplane

28% did not know whether or not they have had information stolen

Survey by The GO Group



Airline ancillary revenue was estimated to reach **US\$92.9bn** in 2018, a 312% increase from 2010 and 13% more than 2017
CarTrawler report



Chinese demand

China will need more than 7,400 new aircraft from 2018 to 2037, worth US\$1.06tn – more than **19%** of total world demand

Airbus China Market Forecast



RECORD BREAKER

In December 2018 the Boeing 777 became the best-selling twin-aisle jet in history, with more than **2,000** orders



The aircraft cabin interiors market is projected to grow from

US\$27bn

in 2018 to US\$40.2bn by 2025
MarketsandMarkets

Inflight broadband has the potential to create a US\$130bn global market within the next 20 years, resulting in US\$30bn of additional revenue for airlines by 2035

Inmarsat

Delta is removing single-use plastics from flights, including 12 million plastic stirrers and 170 million plastic straws, which is expected to eliminate more than **300,000 lb** (135,000kg) in plastic waste annually – more than the weight of two B757s

On December 26, 2018 wet-lease carrier Hi Fly made the first-ever jet-age passenger flight with no single-use plastic airline items loaded on board

DECEMBER

26

On December 13, 2018,
Boeing delivered the

787th
B787 Dreamliner



Delta is installing
3,348
bin lift assist units
across its B777
fleet to make use of
overhead bins easier



The galley trolley
market is set to reach
US\$335m
by 2023
Stratview Research

In 2018 Airbus delivered
800 commercial aircraft,
beating its previous record
of **718** units in 2017

Global traffic

Passenger numbers
could double to

8.2bn

by 2037

IATA forecasts that China could replace the USA as the world's largest aviation market (in terms of traffic) in the mid-2020s. India will take third place after the US, surpassing the UK by 2024. By 2030 Indonesia is forecast to climb from the world's 10th largest aviation market in 2017, to fourth largest



The importance of BYOD:
23% of millennials would
rather lose one of their
five senses than give up
their smartphones. Of
those, 64% would
sacrifice smell

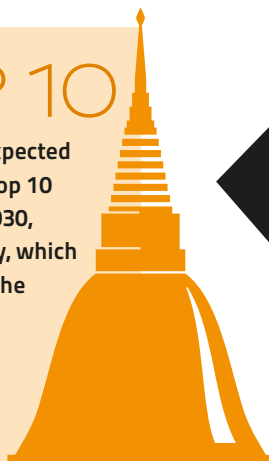
Tappable survey
of more than 500
people aged 8-34



TOP 10

Thailand is expected
to enter the top 10
markets in 2030,
replacing Italy, which
drops out of the
ranking

IATA 20-Year
Air Passenger
Forecast



Feisty flights

In 2017 IATA found that the rate
of unruly passenger incidents
on board aircraft in flight was
one incident for every 1,075
flights (2016: one incident
for every 1,424 flights).

The top three issues were:

- 49%** Non-compliance with
safety regulations (other than
non-smoking)
- 27%** Alcohol/other intoxication
- 24%** Non-compliance with
smoking regulations



Nearly

60%

of consumers expect airlines
to remember their seating
preferences

Boxever survey of 1,000 US
consumers aged 18-65

More than

23,000

commercial aircraft
will offer connectivity
by 2027, up from
7,400 in 2017

Euroconsult report

Global demand for new
aircraft with up to 150 seats
will reach **10,550** over the next
20 years, worth US\$600bn.
The in-service fleet will be
16,000 aircraft
Embraer research



Dish the dirt

The top 5 dirtiest surfaces in the cabin are:

- 1** Headrest
- 2** Seat pocket
- 3** Washroom handle
- 4** Tray table
- 5** Seatbelt

CBC Marketplace analysis of over 100 samples
on 18 flights in Canada



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PLANE TO SEE



THE BRIEF

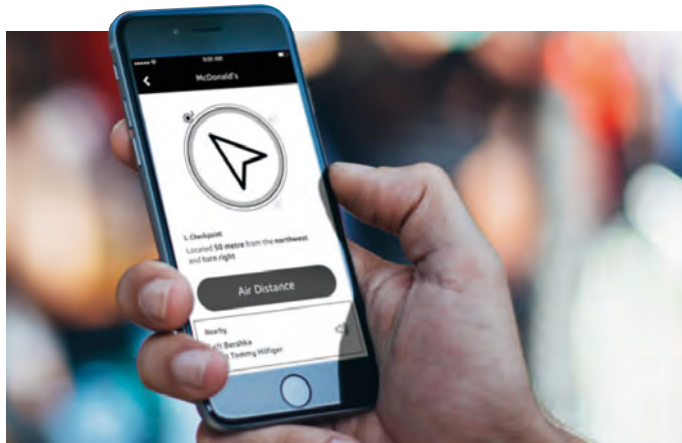
The elderly flying demographic is growing, bringing a natural increase in the number of visually impaired passengers. When traveling alone, the sight-impaired often have to rely on airline staff and crew to help them navigate around the aircraft, but as good as these staff are, it would be great to see these flyers afforded more independence on board. Can technology help?

THE IDEA

Loud Steps is an app-based navigation systems company that develops systems to help blind and visually impaired people independently navigate spaces such as shopping malls and museums. However, with a little inspiration and some help from the Airbus BizLab aerospace startup accelerator, the company has developed an app that gives impaired passengers more autonomy through the airport and on board aircraft.

The app can be integrated as an add-on to airline apps, enabling input via finger gestures and braille. Once on board the aircraft and connected to the wi-fi, the IoT feature of Loud Steps comes into its own, with the app bringing up a virtual plan of the cabin, which locates the user's booked seat and guides them to it via audio or haptic feedback on their device and then informs them where the nearest emergency exits are. A nice touch is that with an IoT-enabled tag on their luggage stowed overhead, they can easily find the bag themselves, again via device feedback. When nature calls, the app can guide the user to the lav, and once inside, a deeper level of detail informs them where features such as the sink are.

The app can connect with the cabin management systems, so the traveler can be informed of flight or cabin status – for example, to check if the lavatory is available. It can also cause the user's device to vibrate as an alert for passenger announcements (and convey the content through the device). The app can also access the most suitable IFE offerings on board, such as music or audiobooks, to give a focused offer with no accessibility disappointments.



VERDICT

In exchange for their fare, every passenger is owed a dignified journey, and this app could really help the growing sight-impaired passenger demographic feel as independent on board as they do in their everyday activities. As an airline bonus, the more autonomous that visually impaired or blind passengers can be, the less staff time and cost is required in looking after them. And of course the improved, less stressful customer experience could lead such passengers to increase their number of bookings.

The initial proposal looks promising, especially as the app can collect anonymous passenger behavior data to analyze the entire passenger journey to enable a continuous process of improvements to the system. In terms of enhancements, Loud Steps has plans to expand the system to benefit other disabled groups such as the deaf and hard of hearing, or people with various mental conditions.

Ideas like this can make a really big improvement to the experience for some passengers without being overly onerous to airlines. Doesn't everyone deserve a pleasant flight? ✕



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THE BRIEF

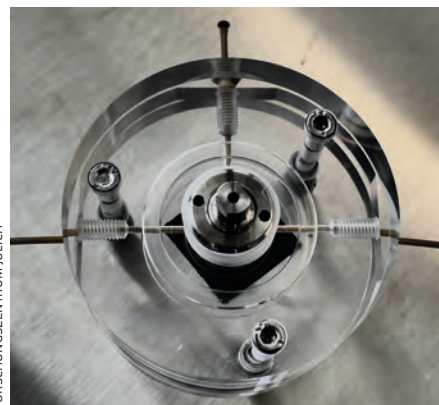
Lithium-ion batteries are a valuable technology, boasting high energy density and low maintenance requirements. They can be found throughout most aircraft, from the electrical/electronics bay, to the IFE tablets some airlines charge in the galley, to the hundreds of devices passengers bring on board. However, these batteries do have downsides, including capacity deterioration, potential scarcity of constituent materials such as cobalt, as well as thermal runaway and other hazards. Can science provide an alternative?

THE IDEA

Scientists at Jülich's Institute of Energy and Climate Research (IEK) in Germany have been developing silicon-air batteries as a promising and cost-effective alternative to Lithium-ion, with higher energy density and resultant smaller and lighter forms. The notion of silicon-air batteries isn't new, but the technology has until now been limited as their flow of current stops after a relatively short time. Solutions have been found in materials science, but they also raised the costs.

However, the IEK team identified electrolyte consumption as the cause for short battery running time. The solution is a pump system that periodically refills the electrolyte fluid. If the silicon anode remains in contact with the electrolyte, the battery will continue running, with more than 1,100 hours, or almost 46 days, achieved in tests so far until the silicon is fully used up. Once this stage is reached, the battery can be recharged by exchanging the anode.

The IEK scientists are now researching how to keep the battery running without having to refill the electrolyte. If the battery self-discharges, the electrolyte fluid is used up, but they believe that additives in the electrolyte could help extend duration.



FORSCHUNGSZENTRUM JÜLICH

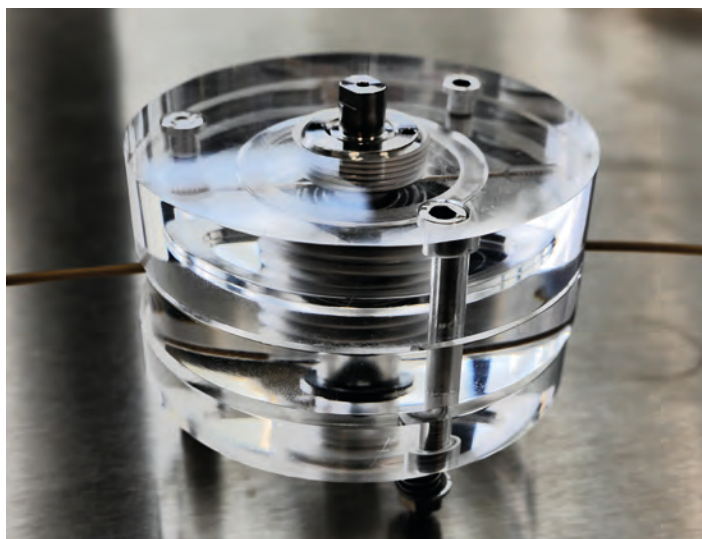


VERDICT

There are many advantages to silicon-air battery technology, from light weight to compact size, insensitivity to external influences, and now longevity. The benefits of using silicon should not be underestimated as it is the second most abundant element in Earth's crust after oxygen – meaning it is cheap and its reserves are practically inexhaustible, helping future-proof the technology.

Silicon-air batteries could also have the potential to benefit aerospace and consumer battery technology, bringing advantages in terms of weight, device sizes, maintenance, safety and cost.

It is impressive work, so much so that Yasin Emre Durmus from the team was recently presented with the Umbrella Award from the Israel Institute of Technology (Technion) for his impressive work on silicon-air batteries. ✕



FORSCHUNGSZENTRUM JÜLICH

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SEMICIRCULAR THINKING



THE BRIEF

Given space at the front of a wide-body aircraft and some free rein with design, what would we like to see? First class suites, a fancy business class, a generous premium economy space – maybe even a multiroom suite akin to Etihad's Residence? The answer is simply 'yes'. Why should the space be limited to one option?

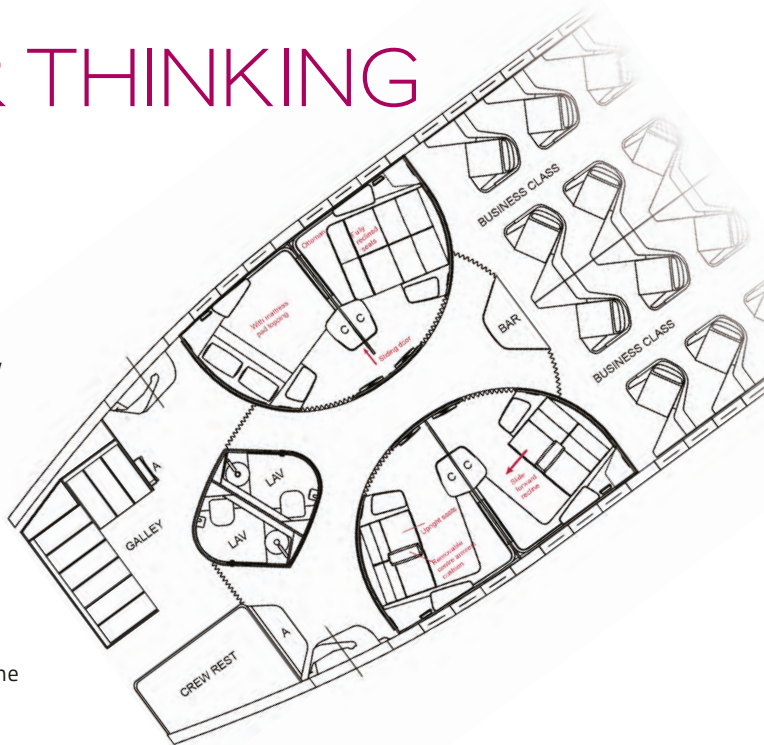
THE IDEA

Flexibility in cabin design is a specialty of Paperclip Design, the Hong Kong studio led by James Lee, perhaps best known for the Paperclip armrest concept. With his latest design, named Peacock, Lee has broadened his scope with a fluid, space-efficient layout that allows the forward cabin of a wide-body aircraft to be quickly transformed and tailored to suit a flight's passenger profile.

The Peacock experience starts from the moment guests enter the aircraft. There's no squeezing through a galley: they are led directly through a curved, converging aisle into a spacious central foyer.

Key to the concept are the two semicircular accommodations on each side of the aisle, each divided into halves, equivalent in size to a first class suite. These spaces are a great proposition, enabling bed lengths of up to 85in. For a higher fare, two adjoining starboard suites can be booked and the sliding doors between them opened to create a two-room apartment, with one of the two lavatories blocked off for private use.

These top-tier spaces only suit certain routes, so to help ensure the spaces generate revenue on every flight, further options are available. For example a shared 'honeymoon' suite brings the price down to business class level. And if the ottomans are certified for TTL, a suite can become a space for a family of four to travel together at a premium economy fare.



VERDICT

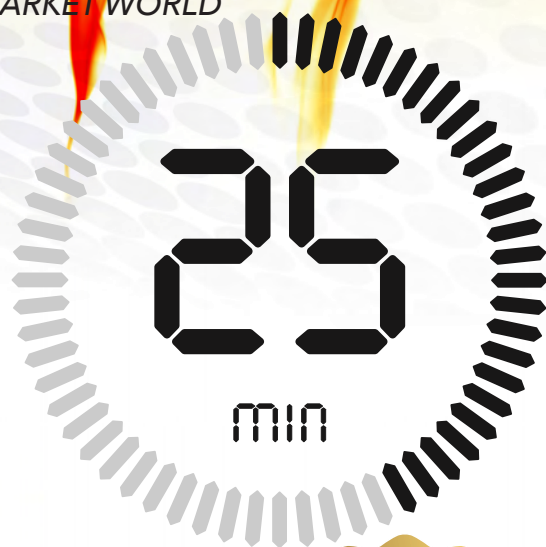
First class can have a halo effect for an airline, but the market for it, and hence its profitability, is dwindling for some carriers, with only a few routes reliably filling the cabin. However, the flexibility of the Peacock concept gives airlines greater revenue-generating potential for the front of the aircraft, enabling operators to configure the space with the right product for each flight. Further simplicity comes from the convertible furniture, as changing between the various configurations can be quickly performed by crew, with no need to store cabin furniture in the hold or at airports.

With potential for increased revenue, and new passenger experiences for business and premium economy class passengers, there's a lot to like about Peacock. ✕



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Mental block?

THOUSANDS OF PEOPLE WITH HIDDEN CONDITIONS SUCH AS MENTAL HEALTH ISSUES, DEMENTIA AND AUTISM TAKE TO THE SKIES EVERY DAY. DOES AIRLINE DESIGN GO FAR ENOUGH TO HELP THESE CUSTOMERS? AIRCRAFT INTERIORS INTERNATIONAL ASKED THE EXPERTS HOW CHANGES IN CABIN DESIGN INNOVATION AND AIRLINE AWARENESS CAN IMPROVE FLYING FOR THESE – AND INDEED ALL – CUSTOMERS

Words by Dr Nicola Davies. Illustration by Lee Hodges



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Aircraft designers strive to accommodate the needs of all passengers, with an increasing focus on those with disabilities. Aisle wheelchairs, passenger assist lifts, special seats and other accommodations have all been designed to help those with physical disabilities enjoy air travel. But what about passengers who are on the autism spectrum, have mental health problems, or are living with other less visible conditions? Are there accommodations or design improvements that could help them?

Absolutely, say campaigners and advocates from the mental health sector. From improved signage to wider seats, there are many small ways to support a successful flight for people with less visible conditions. Even better, such improvements can benefit all passengers, not just people with such conditions.

For example, Daniel Cadey, autism-friendly development manager at the National Autistic Society in the UK, believes that measures taken to benefit passengers with autism can benefit all passengers.

“Airlines can create a more relaxed experience for the majority of their flyers through adjustments such as providing helpful passenger information, improving

staff awareness of autism, and thinking about how the environment might affect an autistic person,” says Cadey. “These adjustments are both reasonable and relatively simple – particularly when you consider that they are beneficial to many other passengers too.”

Awareness about less visible conditions is increasing thanks to a range of educational efforts, not to mention the individual stories shared on social media. Increasingly, attention is being placed on how airports and airlines serve – or fail – these people.

The National Autistic Society estimates that 28% of families traveling with an autistic relative have been asked to leave a public space due to their autistic behaviors. Cadey says that although there is no similar data available specific to air flight, there is enough anecdotal evidence to support the need for increased awareness of, and accommodation for, autistic people and those with mental health conditions.

For example, in October 2018 a story went viral after a five-year-old on the

BEYOND ACCESSIBILITY

According to British Airways, some 50,000 customers with disabilities fly with the airline every month, with 1,500–2,000 customers requiring additional assistance at its hub at London Heathrow Terminal 5 every day. In December 2018, to celebrate International Day of Persons with Disabilities, the airline surprised some of these customers with upgrades and lounge invitations.

This was clearly good for PR and also helped highlight the airline’s Beyond Accessibility campaign, its biggest-ever staff training program, launched in 2018 to provide guidance for customer service hosts to help them ensure a relaxed and stress-free trip for customers with disabilities.

The program, developed in conjunction with specialist charity groups including the National Autistic Society, focuses

firstly on how to help customers with hidden disabilities, including autism, dementia, mental health problems, hearing loss and visual impairment.

Around 600 customers with autism travel with British Airways every month and the airline has been working closely with the National Autistic Society to increase colleague awareness and help customers with autism prepare for their journey.

Daniel Cadey from the Society says, “Our charity knows that the sensory overload and unfamiliar environment of an airport and airplane can make travel incredibly challenging for autistic children and adults, so we were very pleased to work with British Airways to train their staff, alongside other help such as putting clear information designed for autistic people online.”



SUPPORT FOR PASSENGERS WITH SPECIAL REQUIREMENTS CAN COME IN MANY FORMS, WITH ANIMALS SUCH AS SERVICE DOGS AND EVEN CUDDLES THE GUIDE HORSE (CUDDLES PHOTO: DANDEE SHOTS)

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autism spectrum and his family were removed from an American Airlines flight. Although the boy had participated in a Cool to Fly AA program designed to introduce the experience of flying to children on the autism spectrum, he panicked while on the jet bridge and was refused entry to the aircraft. The airline apologized and refunded the miles used to purchase the trip.

Given the sheer number of people with less visible conditions, advocates say that airlines should recognize the business imperative of attending to these passengers. Cadey notes that there are about 700,000 people on the autism spectrum in the UK alone, plus another three million family members and caregivers. Martin Seif PhD, a founder and board member of the Anxiety and Depression Association of America, estimates about 20% of people are sufficiently anxious about flying that it interferes with, and limits, their flights.

“There is a growing disconnect between the needs of the jet industry to survive and therefore pack more



BRITISH AIRWAYS WELCOMES 1,500 TO 2,000 CUSTOMERS WHO REQUIRE ADDITIONAL ASSISTANCE AT ITS HUB AT HEATHROW TERMINAL 5 EVERY DAY

people into the space, and the needs of people with anxiety and panic disorders and similar conditions,” Seif explains. “The industry should try to accommodate this population because it is losing out on potential business.”

RELAX WITH AER LINGUS

Irish carrier Aer Lingus has launched online visual guides designed to help people with autism and similar conditions prepare for air travel. Created in partnership with the Kinney Center for Autism Education and Support at Saint Joseph's University, Philadelphia, Pennsylvania, the guides are intended to ease anxieties around flying for individuals with autism. The guides contain a series of slides that walk the viewer through all the steps involved in preparing for and experiencing air travel and enable caregivers to prepare for travel scenarios that could be challenging for individuals with autism. The guides are available online so caregivers can easily access them on a desktop computer, on-the-go via a mobile device or by printing them out onto portable cards.

The guides capture the entire air travel experience in color photographs with first-person language and are divided into three parts: preflight, on board and post-flight. Aer Lingus recommends going through the guides prior to traveling to prepare for the unknown, which can be anxiety-inducing in individuals with autism. It gives parents and caregivers unprecedented access to visuals that are not normally available given today's security standards.

Adam Harris, founder and director of Irish autism charity As I Am, says, “Airports and airplanes can be stressful environments for everybody, but especially for individuals with autism, and any tools that support those with autism in preparing for travel should be warmly welcomed. For people with autism to be meaningfully included in society, it is essential that the community ensures accessibility.”

DESIGN SOLUTIONS

The first step in meeting the requests of passengers with hidden conditions is understanding the challenges they face when flying. Like all of us, those with less visible conditions are unique, and experience the stressors of flying in a variety of ways. However, some overarching themes appear more frequently and across disorders.

As soon as they walk on board an aircraft, people with mental health conditions are more likely to feel intense claustrophobia. Crowded aisles with little personal space, narrow seats with limited legroom, and small lavatory spaces can intensify this experience. Seif, who has treated more than 2,000 people who have some kind of fear of flying, says one of his patients compares walking into the cabin of an airplane to entering “one long tube of toothpaste”. Color schemes can be an essential tool to add variety and break up a long cabin and reduce the fear of enclosed spaces.

Seif also highlights that his patients most commonly fear having a panic attack and being negatively judged by others. For this reason, increased separation from fellow passengers – achieved via wider seats, armrests with space for two elbows, and more legroom – can reduce the feeling of being trapped and watched.

Indeed, the frustration over cramped cabins is not just reserved for those with mental health conditions, and the aircraft industry appears to be acknowledging the problem. Many of the entries on the shortlist for the 2018 Crystal Cabin Awards addressed the needs of those traveling in economy by using, for example, the noise-



absorbing headrest from seat manufacturer Haeco, which folds across the ears with one movement.

People on the autism spectrum or who have anxiety, obsessive compulsive disorders, dementia and other mental health conditions often have sensory difficulties and are sensitive to bright lights, unusual smells, scratchy textures and loud noises.

"Anything that looks good, feels good, sounds good, smells good or tastes good is helpful to reduce that anxiety," Seif suggests.

To manage their anxiety daily, Seif states that people depend on maintaining routines, following set schedules, and focusing on unchanging facts and surroundings. Flying can be extremely disorienting for people with mental health conditions because they feel a loss of control over their schedule and surroundings. Passengers are often unable to choose where to sit and have no control over when the flight will take off, or even what they eat. Some of this loss of control can be mediated through clear signage and information.

The same signage benefits apply to people on the autism spectrum. "Clear signage can help reassure autistic passengers," explains Cadey. "Making sure they can find the correct seat and know where any facilities are and when they can be used can be very helpful."

Cadey acknowledges that there are limits to signage in an aircraft, however. He suggests providing laminated flight cards that can be stored in seat pockets to clearly illustrate what passengers might expect before take-off, during the flight, and when landing.

Providing passengers with somewhere to focus their attention can greatly alleviate stress, Seif adds. Onboard wi-fi allows people to feel connected and in control. Varied and high-quality entertainment, including music and movies, are invaluable as well. Without tools to remain focused, people with anxiety and panic disorders become overwhelmed with concerns about safety during

WINGS FOR AUTISM

A good idea to relieve travel stress has been devised by The Arc Baltimore, a US charity that assists adults and children with intellectual and developmental disabilities to lead independent and meaningful lives. The charity has been holding special days, called Wings for Autism, which give people with autism or intellectual or developmental disabilities a chance to practice all the aspects of airline travel – from parking and shuttling to the terminal, to checking in, going through security, boarding the aircraft, and interacting with airport personnel along the way.

The venue is BWI Thurgood Marshall Airport, where participants (around 50 families from across Maryland participate in each event) go through the gate and board an airplane, whereafter crew provide the usual preflight instructions and simulate some aspects of the flight experience. After a while, participants depart the aircraft and proceed to pick up their luggage.

The events are co-sponsored by BWI Airport, United Airlines, Fraport, the TSA and the Maryland DOT. Perhaps more areas around the world could arrange similar initiatives.

"Air travel can be challenging, so imagine how difficult dealing with security, the overwhelming noises and the harsh lights can be for individuals with autism or other intellectual or developmental disabilities," says Kathleen Durkin, executive director of The Arc Baltimore. "Wings for Autism aims to alleviate some of the stress these individuals may experience, while educating airport and airline professionals about how best to serve individuals with autism or other intellectual and developmental disabilities."



ABOVE LEFT: CREW CAN BE KEY TO AN IMPROVED TRAVEL EXPERIENCE FOR ANXIOUS PASSENGERS

ABOVE RIGHT: THE WINGS FOR AUTISM EVENTS AT THE ARC BALTIMORE GIVE PARTICIPANTS GREATER CONFIDENCE TO TRAVEL, AND TEACH THEM HOW TO ENJOY THE EXPERIENCE MORE

take-off and landing problems, and every possible danger in-between. "Anxiety lives in the future, fueled by 'what if' thoughts, fears of crashing and worries of all kinds," Seif explains. "So the closer one can stay to the present, the more manageable the anxiety."

BEYOND AIRCRAFT DESIGN

Of course, the process of flying begins long before passengers board the airplane. Anxiety and stress can build early, from packing a suitcase to arranging transportation to the airport.

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VIRGIN'S DEMENTIA INITIATIVE

Virgin Atlantic is working with the Purple Angel Association, a global initiative to help businesses encourage employees to recognize that customers with dementia may have particular needs, and how to help them give employees a greater understanding about dementia and how best to help any passengers with the condition. The airline's staff can access specially made videos and fact sheets via their intranet system and in training sessions.

"And then there's the airport itself," says Cadey. "With the crowds, the rules and the prospect of being separated from items as they go through scanners, there are so many potential issues that can trigger sensory difficulties and high levels of anxiety."

Flight times and locations may change just before boarding. Seating arrangements could be altered, so that a person with a hidden condition might be separated from their caregiver, if they have one. Carefully chosen seats at the bulkhead or back of the aircraft might change.

Many stressors are unavoidable, Cadey acknowledges, which is why airline staff must be transparent about seat changes in advance to allow time for passengers to make informed decisions and prepare accordingly. If possible, the airline should try to find suitable alternative seats if they know about a passenger's autism.

"For the many autistic people who really struggle with unexpected changes, this can be the difference between a good and an awful experience," he adds.

Ideally staff should receive training about hidden conditions and be given proactive tools and strategies to prevent panic attacks or other stress-induced reactions.

"Facts provide reassurance, so any information transmitted to travelers is golden," Seif says. "For example, the pilot announcing turbulence in a sensitive way, or flight attendants checking on people and letting them

know that everything is fine."

The National Autistic Society's Autism Friendly Award has been given to UK airports, including Gatwick, Bristol and Edinburgh. Cadey says he hopes to work with more airports and airlines so that no one is limited in their travel aspirations, including autistic people, even if they are first-time flyers.

"We know from our own work with these airports that there are autistic people who have been helped to go on holiday with their families for the first time because of online visual guides, lanyard schemes and staff trained to understand the needs of autistic travelers," he says.

Cadey believes it is often the small changes that have the biggest impact, such as trained staff who can offer a quiet space for people who appear overwhelmed. "The thing that makes the biggest difference is someone asking 'How can I help you?' and then taking the time to listen and act on the response," says Cadey. "And that is just good customer service." ❖

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THERE'S A LOT TO LOOK FORWARD TO...

Words by Adam Gavine





ABOVE: A BOEING CONCEPT FOR A SEVEN-ABREAST BUSINESS CLASS. EACH SEAT IN THIS LOPA HAS DIRECT AISLE ACCESS

Even 25 years after the B777 was unveiled, it is still a hard act for the Boeing design team to follow. When it was revealed to the world in June 1994 it was the first computer-designed airliner, the first fly-by-wire airliner, and as the aircraft proved itself in service, it has been a commercial success, with more than 1,500 delivered to date. There is a lot of love for the triple-seven, from airlines, crew and passengers alike.

The B777 had another interesting first, being the first Boeing cabin design to be created with significant input from airlines, and this is where the B777X cabin design story begins. However, airline customers put a little more pressure on the Boeing team this time round.

Kent Craver, Boeing's regional director of cabin experience and revenue analysis, recalls the airline feedback at the beginning of the project: "You had a great breakthrough with the Dreamliner cabin interior. You need to do it again with the B777X. The B777

INVISIBLE SPEAKERS

The B777X will be a quieter experience than the B777, achieved through measures such as sidewall insulation with better noise absorption, a redesigned cabin airflow system with more nozzles running at lower velocities, and a quieter nacelle design for the high bypass ratio engines.

However, minimizing aircraft noise is not an ultimate goal, as Kent Craver explains: "At Boeing we're big believers based on research that it's not about sound level: it's about sound quality. There is a certain level of sound masking that is desirable so that you're not hearing doors closing and other passengers' conversations."

One feature that benefits sound quality is what Boeing has provisionally named the 'invisible speaker'. With this technology the ceiling panels themselves function as speakers, with enhanced audio quality and no speaker grills to interrupt the clean lines or lighting schemes.

There are other reasons for the invisible speakers, but Blake Emery is keen to keep them confidential. "There are actually a number of reasons why we have moved to this technology, most of which we won't divulge. The reason is that we really like it when the competition tries to copy what we've done without understanding why we did it."

Multicultural research

Boeing conducted multicultural research during the cabin design process, and learned how to take passengers' psychological needs into account to increase the sense of spaciousness. So what did this involve?

Blake Emery explains, "Because a commercial airplane is a truly global product, you need to understand how the product is perceived everywhere. You don't want to design a cabin according to the values of only one culture, so our designs are based on research into the unarticulated needs of many cultures."

"We discovered some culturally specific values that may be useful to an airline wanting to brand based on its culture, but they were not universal. We made a strategic decision to design in ways that incorporate only those values all cultures can appreciate."

"For example, it turns out that every culture has a slightly different perception of cleanliness, yet all cultures appreciate cleanliness. So our cabin designs take this into consideration, especially through material choices."



ABOVE: A FULLY LADEN STOWAGE BIN WILL REQUIRE 40% LESS FORCE TO LIFT THAN WITH THE OUTGOING B777 UNITS

BELOW: KENT CRAVER LOVES THE FLEXIBILITY CREATED BY THE LININGS PACKAGES



RETROFIT OPTIONS?

The B777X cabin designs may make some airlines' existing B777s feel a little dated. Will there be retrofit packages available to make a more consistent offer?

Kent Craver states, "On our services side, we're always looking at opportunities for retrofit options, so those processes are in the works and I'm confident that if an airline wanted to retrofit its existing B777-300 fleet with some of the amenities that we're rolling out with the B777X, we could come up with a good solution."

cabin is good, the B787 is great, but the B777X needs to be even better."

The B777X cabin is wider, more attractive and more high tech – and dare we say 'better' – than its predecessor's cabin, but the real benefit for airlines is its wider scope for customization, which can be achieved simply and quickly, with the cabin serving as a blank canvas for airline customers to express their brand.

"The B777 cabin is pretty tough to beat," agrees PJ Wilcynski, payloads chief architect, senior technical fellow and 39-year veteran at Boeing. "But with the B777X, we have taken the architecture to the next level."

A BROAD, BLANK CANVAS

The cabin design is an application of Boeing's Sky Interior philosophy, a holistic approach that brings together every aspect of the cabin, with visual aspects such as the architecture, lighting, stowages, ceilings and sidewalls working in harmony with technologies such as pressurization, air filtration and humidity systems, and Smooth Ride Technology features to create a cohesive passenger experience.

That philosophy is applied differently on every platform and optimized for different cabin sizes. Indeed, cabin size is a major aspect of the B777X, with the aircraft having a gain in cabin width over the B777, despite having the same external fuselage cross-section.

By redesigning the sidewalls and fitting thinner insulation, internal cabin width has been carved out from the 231in (587cm) of the B777-300ER, to 235in (597cm). Four inches may not sound like much, but it represents a significant engineering and design effort, and that extra width gives airlines more design flexibility and scope for expression – something that airline customers have indicated to Boeing that they want.



LEFT: A SPACIOUS FEEL IN THE ECONOMY CABIN, AIDED BY THE STOWAGE DESIGNS



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A PLEASANT CLIMATE

Further design flexibility for airlines is enabled by the cabin linings options that have been developed for the B777X.

The various packages give airlines more choices for customizing their cabins, with multiple options for sidewalls, ceiling treatments, stowage bin treatments and bin options – whether the customer wants big bins, small bins or no bins.

Removing the center bins from business and first class cabins has become an increasingly popular trend, enabled by the greater internal stowage of many seats. However, creating a ceiling design that worked in that space hasn't always been easy, adding time, cost and complexity to projects. In response, Boeing added a premium ceiling option for the B777 to simplify the process. However, with the B777X's variable architecture, it is as easy as selecting the required overhead stowage option and then selecting a preferred ceiling from a choice of two, one tapering outward and the other inward. The linings packages are also designed to be quick and easy to install.

Craver states, "For me, as a former airline guy [he was previously manager of onboard product marketing and research at Continental Airlines], having premium style options that aren't true custom options is huge because it gives you a lot of flexibility without having to spend a lot of resources in terms of money and engineering, etc, in getting them onto the aircraft. The goal is to remove as much complexity as possible to make it a simpler, lighter, easier more flexible process."

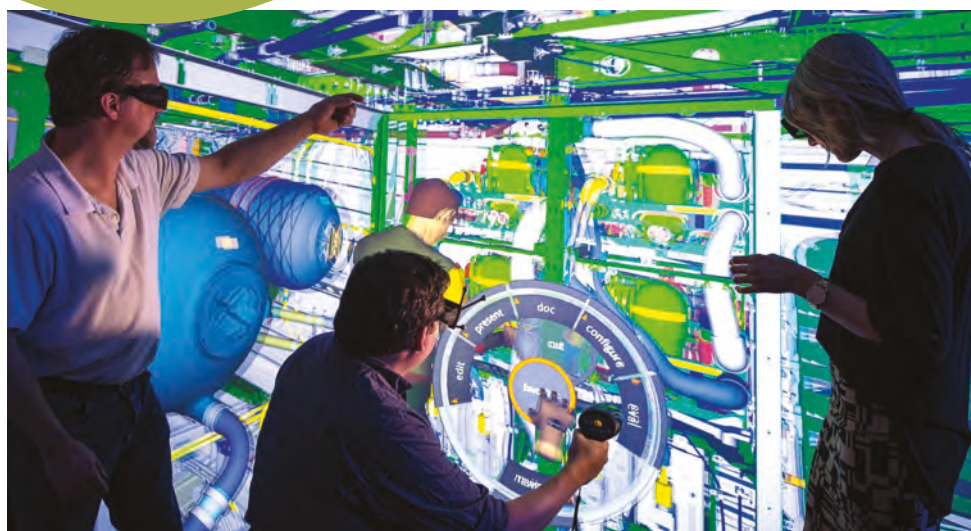
Even better, different interior options can be specified for different cabins on the same aircraft, enabling

A new air nozzle design for the passenger cabins has been designed to improve airflow with reduced noise, which will make it easier to control temperature in the cabin and achieve a uniform temperature throughout.

"The temperature inside the cabin is a challenging issue because you have passengers, who are relatively passive and not moving, and you have flight attendants who are working their tails off," says Blake Emery. "And so you've got a potential situation where passengers could be cold and flight attendants could be warm, all in the same cabin temperature. The airflow through the nozzle system is specifically designed to ameliorate this." The electrochromic window option also helps control cabin temperature.

BELOW: CONSTRUCTION OF THE FIRST B777X FLIGHT TEST AIRCRAFT IS APPROACHING COMPLETION

MAIN IMAGE: VIRTUAL REALITY IS BEING USED IN ELEMENTS OF B777X DESIGN. PHOTO: ESI GROUP



The ABC of cabin design

PJ Wilcynski, Boeing's payloads chief architect, has three guiding principles for designing a great passenger experience.

Airplanes for people. "Always focus on people – the people that come into contact with the airplane. We always design for the full range of passengers and crew.

By design. "We don't just do things because they look good – it's by design. Through research, testing and design

we know a feature will provide value to passengers and crew. For example, the B777X architecture was tested with 4,000 people to ensure their sense of spaciousness in the passenger cabin."

Connected to the sky. "Regardless of the trials and tribulations in the terminal, whenever passengers get on the airplane the flight experience is still magical, still special. That's what it's all about – flight getting people together."

customers to customise stowage in each cabin and create distinct architectural differences between classes.

As Craver explains, "Airlines can also have one ceiling treatment in one part of the aircraft and a different ceiling treatment in another part, with a design cohesion that sees the spaces seamlessly transition from one to the other very elegantly, enabling airlines to specify different linings packages to differentiate each class, with a holistic design philosophy that ties it all together, with lighting, linings, bins, ceilings... everything working together as a system."

Blake Emery, Boeing's director of differentiation strategy, is excited by the possibilities. "With these additional options, we are just as excited as anyone

RIGHT: ALREADY THE
WORLD'S LARGEST
OPERATOR OF THE B777,
EMIRATES HAS ORDERED
150 B777X AIRCRAFT

Emirates IFEC

One of the first IFEC announcements for the program is that Thales has signed an agreement to equip Emirates' 150-strong B777X fleet on order, arriving from 2020. The deal is for the latest generation of broadband inflight connectivity using Inmarsat's GX Global Network, and for a co-developed version of the Avant IFE system.

According to Thales, it will be the first IFE system provider to equip the B777X platform, and the contract is the result of Thales's commitment to strengthening its presence in Dubai. In support of Emirates' long-term ambitions, Thales is setting up Discovery Dubai – a custom innovations center for the passenger experience – in the United Arab Emirates. Managed by Thales, the center will enable Emirates teams to develop and shape their future passenger engagement initiatives and programs. Thales also plans to set up a repair center to provide operational support and services to Emirates.



else to see what the airlines choose to do with them, because it's possible that every time you get on a B777X the experience might be a little different. If you push it to the extreme, an airline could potentially have four bin and ceiling treatments in the same airplane. I doubt that any airline is going to go to that extreme, but that's the kind of possibility that's been opened up."

THE NEW SHAPE OF STOWAGES

The overhead bins are a major part of the architecture, and one of the most noticeable design enhancements. The doors have been resculpted to be concave rather than the typical convex shape, which really gives a greater feeling of space. It is a clear visual enhancement, but Boeing checked this by getting feedback from 4,000 people, and the overriding response was that they were surprised at how much more spacious the cabin felt with concave bins.

The capacity of the standard bins is the same capacity as those in the B787, designed to accommodate one roll-on bag per passenger. This is double the capacity that the first B777 flyers had available in the 1990s (although the roll-on bag wasn't so common then), and another interesting statistic is that the B777X bins take 40% less effort to close when loaded than today's B777 bins.

The concave form of the bins also works well with the ceilings to enable the cabin lighting to work to its best,



accentuating the attractive architecture and enhancing the sense of space. The sculpted forms of the cabin become a canvas for the millions of lighting scene options, easing transition across the stages of a flight and time zones, with finely tuned LED lighting arrays washing over every surface with cascading and dynamic illumination effects.

WINDOWS

The windows are for many the star attraction in a cabin, portals to the wonder of flight, not to mention being important to Boeing's customer satisfaction and preference levels for aircraft types. With

DIMMABLE WINDOWS



The optional electronically dimmable windows (EDWs) of the B777X are a newer generation than those found on the B787, capable of eliminating more than 99.999% of visible light at twice the darkening speed and reducing the load on the air-conditioning. The B777X system has been designed with centralized control, allowing crew to set lighting scenarios for day- or night-time flight without having to reach over passengers to access the control button.

According to Gentex, the EDW supplier, the units will feature a thin-film coating for elimination of harmful IR and UV light, and low maintenance and operation costs.

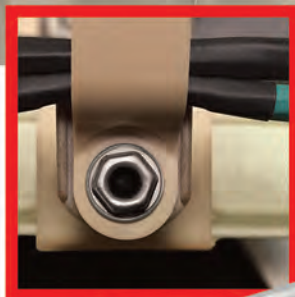
The EDWs are an electrochromic-based sunlight and heat control system consisting of an electrochromic gel sandwiched between two thin glass panels that darken or lighten in response to electricity – whether activated from the personal control fitted under the window or a crew panel. A low-voltage electric current is passed through conductive coatings and across the glass panels to induce an electrochemical reaction in the gel that causes it to darken. Removing the voltage lets the gel return to its natural, transparent state.



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this in mind, the windows of the B777X are large enough to give everyone on board the benefit, and raised by 2.5in to provide a better view outside to passengers in the center of the cabin, giving them a greater connection to sky. As Wilczynski says, "Every seat becomes a window seat."

The 162in² windows are much larger than the B777's 140in² units, in response to the positive public reception to the B787's large windows. However, while the B787's large windows were enabled by the composite fuselage, this was more difficult to achieve in the B777X's aluminum fuselage. The technical details of how this was achieved are under wraps, with Wilczynski only stating that "trades were made". It would be fascinating to discover the secret, especially as the aluminum tube has also been engineered to offer air humidity and higher cabin pressurization to match the Dreamliner experience.

Naturally the B777X has a range of window options, with standard mechanical shades, and options including dimmable windows, and treatments for first class similar to the double window found on British Airways' B777s.

CLASSES

So how does Boeing's research suggest that airlines will configure

Cabin Services System

Panasonic Avionics has been selected to supply the Cabin Services System (CSS) on the B777X, extending its supply deal for CSSs on the B787 and B747-8i. Panasonic's CSS is a scalable, database driven, Ethernet-based network that provides core cabin functions such as passenger address, cabin interphone and environmental controls. CSS directly integrates with external subsystems such as cabin lighting and other aircraft member systems across the airframe networks, including the IFE systems.

LEFT:
LUFTHANSA'S
DISTINCTIVE
1-1-1 SEAT
WILL LAUNCH
IN 2020.
MORE THAN
500 PEOPLE
HAVE BEEN
ASKED FOR
FEEDBACK ON
ITS COMFORT
LEVELS



TECHNICAL SPECS

There are initially two variants of the B777X on offer: the B777-8 and the longer B777-9, with potential for a stretched 450 passenger B777-10 if there is market demand

	B777-8	B777-9
List price	US\$360.5m	US\$388.7m
Seats (two class)	350-375	400-425
Range	8,700nmi (16,110km)	7,600nmi (14,075km)
Length	70m (229ft)	77m (252ft)
Cabin width	235in (597cm)	235in (597cm)

their B777X cabins? For business class, Craver states, "The wider cabin gives airlines a lot of opportunities, up to and including a seven-abreast staggered layout with direct aisle access." At the other end of the scale, Lufthansa has revealed its plans for a business class cabin configured 1-1-1 and 1-2-1. Premium classes are well catered for with the X version, as the length between Doors 1 and 2 is 16.8m (55ft), compared with 10.4m (34ft) on the B777-300ER. And at the other end of the airplane, that wide cabin enables 18in-wide seats at 10 abreast in economy.

"We anticipate various airlines flying any and all potential configurations that are out there. From a general trend perspective, we know that some airlines will have full first class on this aircraft. We also know that airlines will have premium economy, as that is the fastest growing cabin trend that we've seen, so it will be there for sure," says Craver.

"I would anticipate that in the coming years there will probably be new alternatives that are created and installed by airlines. There is no limitation – I think that's probably one of the best things about the B777X: the wide twin-aisle cabin gives a lot of space for airlines to do a lot of different things."

Whatever class passengers are flying, they are in for a grand entrance to the B777X. Boeing's research has found





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that entrance zones are an important part of the experience, as Wilcynski explains: "Our research and preparation for the B777X actually served to reinforce our discoveries during the B787 development. For instance, passengers want a distinct break from the stressful airport experience upon entering the passenger cabin, with welcoming architectural forms and lighting."

This calming feel will be provided by the vaulted entryways at Door 2, which can be specified regardless of galley positioning. The domed entry on the Dreamliner wasn't always possible, depending on galley layout, but that issue has been addressed with the B777X so that regardless of where the galleys are situated in the galley flex zone at Door 2, there is the ability to create what Craver describes as "a very wonderful and grandiose entranceway". He adds that there are options in the space for airlines to be very creative.

Could a further creative option be passenger spaces below the main deck? Wilcynski says only, "We have looked at – and continue to look at – the possibility of providing access to passengers, and the technical requirements for accommodating inflight use."

It would be exciting to see the passenger experience extend below decks, offering even more scope for airlines to express and differentiate their brands, but for now the B777X already opens up new design opportunities for more airlines. As Emery says, "We've placed into the market something that really allows airlines to have the differentiation that they've wanted for a long time." ✕



A 20-year lead-up

PJ Wilcynski, Boeing's payloads chief architect, has been at the company for 39 years. He is also a senior technical fellow, meaning he is in the top 11 of the company's engineering, science and technical talent. He fell in love with aviation during his first flight as a boy, when he was fascinated with the interior of the airplane, how the flight attendant worked efficiently in the galley, and how all the different sections neatly fitted together. "Everything seemed like it was designed for a purpose and there was a place for everything," he recalls. "It was life changing, it really was."

Looking back at major milestones along the path of passenger experience improvements over the past 20 years, he highlights the introduction of the B777.

"That was the first aircraft interior to win an industrial design award. That was the start of really significant recognition by Boeing that a passenger cabin can be beyond the purely functional, that you can take it to the next level from an aesthetic standpoint," he says.

Of course, the B787 Dreamliner has also been a major milestone – its design extending to other Boeing aircraft.

"Shortly after 2000, we started on a journey to develop the B787 interior. What we now call the Boeing Sky interior was then propagated into the B737, the B747-8 Intercontinental, and now we're looking onward from there," Wilcynski says.

"In those 20 years, we've really recognized the value of great cabin design and of embedding appropriate technology to enhance the cabin experience."

Wilcynski also notes that the industry has been evolving during this period, with changing airline brand strategies.

"Over 20 years, we've seen extreme differentiation by airlines, an exploration that has provided opportunities to explore cabin design," he says. He believes that the industry has progressively advanced in its passenger offerings, even though the past 20 years have included 9/11 and the global financial crisis.

"The low times, from an economic standpoint, drove them to consider how to get a larger share of premium passengers. Airlines grew in their understanding that, to attract premium passengers, they really had to differentiate. Some of our customers were differentiating in economy class, but differentiating to gain premium passengers was crucial," Wilcynski says. "They did that primarily in things that we really don't control: seats and other cabin furnishings, quality of materials, onboard services, and services removed from the aircraft, like picking you up at home."

In that push to attract high-revenue flyers, Wilcynski credits airlines for helping spur innovation by raising the stakes. "All of our customers are very demanding – and rightly so. That can be in many different ways, but airlines always find a way. They see opportunities and they push us, which is a good thing."



THE B777X IS INITIALLY BEING SOLD IN -8 AND -9 VERSIONS. AN EXTENDED -10 MODEL COULD BE ADDED IF THERE IS SUFFICIENT MARKET DEMAND

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The background of the entire page is a blue gradient with a pattern of thin, white, curved lines that sweep across the frame. In the bottom right corner, there is a photograph of an aircraft's wing and tail section, viewed from a low angle, suggesting flight and innovation.

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AS THE BYOD IFE MODEL GROWS IN POPULARITY AND AS PASSENGER TASTES EVOLVE, WILL EMBEDDED IFE REMAIN A KEY CUSTOMER EXPECTATION? AND IF SO, HOW COULD SUCH SYSTEMS EVOLVE TO TRULY MEET PASSENGER NEEDS? WE ASKED EXPERTS IN THE PSYCHOLOGY OF THE USER EXPERIENCE WHAT THE FUTURE OF IFE COULD AND SHOULD HOLD IN STORE

Words by Marisa Garcia. Illustration by Karine Faou







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The airline industry has invested heavily in technology as a passenger experience feature over the past two decades, including in-flight entertainment (IFE), wireless streaming entertainment (W-IFE) and internet connectivity. But how effective are each of these technologies at helping passengers mentally escape the confines of the cabin? What psychological factors come into play when incorporating technology as part of the passenger experience?

We consulted two experts on the psychology of user experience and technology design to find out to what extent technology can reduce passenger anxiety and improve cabin comfort.

Dr Susan Weinschenk is a behavioral scientist at The Team W, a US consultancy based in Wisconsin with clients including NASA, Walt Disney, Amazon, Saatchi&Saatchi, Best Buy and Target. She has been working in the field of design and user experience since 1985 and has authored a number of books on the psychology of design. She says that IFE can be a very effective distraction from the cabin environment.

"We can say that IFE helps people escape from anxiety and from the reality of where they are, because it captures and redirects their senses," she says. "Having your eyes and ears focused on something else, and tying-in to the rich imagination of our brains and the types of stories, and so on, it's definitely going to allow people to forget where they physically are, and focus on where they mentally want to be."

This opportunity to escape is limited to the quality of the equipment available: the sound and visual quality, as well as the selection of entertainment content available.

"How good the visual is, how good the sound is, where the device is [an embedded seatback screen or a system



RIGHT: LUFTHANSA IS WORKING WITH 3SPIN TO CREATE VIRTUAL REALITY IFE EXPERIENCES

BELOW: SUSAN WEINSCHENK

BOTTOM: INFLIGHT VR'S SYSTEM WAS TRIALLED WITH GERMANIA, AS WELL AS IBERIA, VOLOTEA AND SMALL PLANET



"Sometimes people focus on the visual and forget the auditory"

that enables people to access IFE on their own devices] and some of the issues around choice can have as big an impact as whether there should be IFE or not," Weinschenk says.

Many suppliers and airlines boast of the quality of their IFE displays, but for Weinschenk, audio quality is more important for passenger pleasure. "The

biggest impact is the quality of sound. The ability to block out sounds is probably more important than visual. There's a lot of vibrational noise on airplanes. That low vibration noise can actually produce quite a lot of anxiety. One of the reasons that noise-canceling headphones can help is that there is a certain low-level vibration that they block. If you have a good pair of headphones that are blocking that out, as well as other extraneous noise, then if the sound coming from whatever you're listening to is good, you can really be quite distracted by that. Sometimes people focus on the visual and forget the auditory. If you have very good auditory quality and relatively good visual quality, it can be a very [nice] distracting experience."

This is why, Weinschenk believes, passengers may want the option of using their own electronic devices.

"For people who have their own devices, and are used to their own device there is a sense of comfort and ease with that device. That can bring a slight reduction in anxiety. I don't have to learn to use an airline device, and I don't have to worry whether that device is working. I don't have to worry whether my headphones are going to fit that device.





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LEFT: THE ULTIMATE IN IFE. AMECO
BEIJING'S CHINESE DRAGON
CONCEPT FOR THE BBJ FEATURES
AN ONBOARD CINEMA

I know how to turn the volume up and down on my device. I know my headphones and I love my headphones. Knowing that I can use the equipment that I am familiar with is going to be a big plus."

This doesn't mean that airlines should take out embedded IFE, but they should offer a choice, letting passengers use whatever equipment will give them the best escape-quality sound and visual stimuli.

"People like having choices. If they have choices, they feel as though they are in control. If they feel they are in control, they have a lot less anxiety. If passengers can decide whether to watch IFE on their phone or laptop, having that choice is going to help make people feel like they like it more," Weinschenk says. "This could be

overridden if the quality of the visual and auditory sound in the IFE system were vastly superior to that of their phone or tablet or laptop."

SHOULD AIRLINES GIVE UP ON EMBEDDED SYSTEMS?

Weinschenk believes that the challenge for airlines is that consumer technology is advancing at a rapid pace. Travelers' expectations are set by their devices at home. "If you can't match that, then you are much better off letting people use their own personal devices," she says.

So does that mean that airlines should give up on trying to keep pace with technology and remove embedded IFE? Not necessarily, Weinschenk says.

Passengers need to feel

BRINGING PASSENGERS TOGETHER

The technology on board could also help passengers interact with each other, building a sense of excitement around the trip and a sense of community.

Pamela Pavliscak of Change Sciences found KLM's Connecting Seats trials to be an interesting example. These concept-demo seats used Google Cloud's Speech API, Translation API and Web Speech API to translate conversations in real time. Trials took place at Schiphol Airport in December 2018, and the experiment hints at future possibilities to help passengers traveling on the same flight better interact with each other.

"I think those kinds of ideas are going to become really compelling," Pavliscak says. "Right now, we have cabins that are designed for comfort and solitude, even the screen experience is solitary, but I think there's an opportunity for more social, communal conversational experiences in flight. Maybe, in future, you'll be able to fuse that with inflight social areas."

It would be about offering a choice to be social by using the technology available. Another example was Virgin America's seat-to-seat drink service, which enabled people to treat fellow passengers to beverages by ordering them via the IFE. Airlines could introduce inflight chat rooms, or virtual lounges.

"Especially now, where we're having trouble having conversations, it would be such an opportunity to build a sense of community and shared experience," Pavliscak says. "What can we do to make it engaging, in a meaningful way? The weird thing about a lot of technology that keeps us on our screens is that it makes us feel robotic instead of more human. That should be switched. We want technology that makes us embrace our humanity. There are tons of possibilities."



they have a choice. Airlines should also consider those who do not travel with their own devices. Taking out IFE equipment, when it has been part of the standard service that passengers expect, can cause them to feel cheated.

"If you're going to take something away, then what they get in place of that feature needs to seem definitely worth not having the thing you're taking away," she says. "You end up in a difficult situation if you are taking something away. You have to offer a big benefit for losing that thing."

That big benefit, Weinschenk believes, would have to be demonstrably greater; for example, if airlines were to noticeably improve the room available to passengers in their seats and offer a much wider range of IFE options. Unless airlines can be confident that passengers would notice a significant improvement, then it is best to offer both embedded and wireless systems, or embedded IFE that connects to consumers' digital devices, giving them greater choice and access to more features.

CONNECTING TO ESCAPE

Inflight connectivity can also serve as an effective escape, Weinschenk believes.

"Not everyone is going to react the same, but in general a lot of people are now used to always being in contact. There's been some interesting research about how cell phones have come to represent a person's entire social network. If you are able to use your phone, you'll have the ability to contact people,"

Weinschenk says. She emphasizes that the device itself doesn't really matter. Consumers may have a preference to use their tablets or their laptops to connect. What matters is being connected.

"We are used to being able to reach out to other people. I think that does reduce anxiety for many people. There are people for whom that causes stress and anxiety, but they don't have to connect."

Connectivity will also offer passengers access to a familiar escape: work.



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“Whether they admit it or not, there are a lot of people who use work as a distraction from anxiety,” she says. “With any one method of distraction, you reach a saturation point. How many movies can you watch flying overseas before you feel like you need to take a break? Being able to get on the internet and catch up with email, and so on, is another form of distraction that is different. I can check my email and then go and watch another movie, and then I can go on the internet and do some work and then watch another movie. It multiplies the options for distraction.”

Having a choice of activities gives passengers the sense that they are in control of their experience. That control is what most helps relieve anxiety and lets passengers escape the confines of the cabin.

So how effective can entertainment be at making time fly? “If you’re talking about a two- or four-hour flight, and someone is quite distracted by watching a movie or two, they will feel it was much shorter,” Weinschenk says. “I suspect if it is a really long-haul flight the entertainment would have much less effect because it’s going to be partitioned. Whatever I’m doing, I’m not watching an 18-hour-long movie. Even if I am binge-watching a long TV series, it might help. But every time I get partitioned, every time something begins and ends – like one movie ends and another begins – I am aware of that beginning and ending. This gives me an experience of time.

“On a really long flight, you are going to have a lot of partitions. It might shrink time a little, but it’s not going



RIGHT: SKYLIGHTS IS ENCOURAGING AIRLINES TO TRIAL ITS ALLOSKY PREMIUM VR ENTERTAINMENT

BELOW: PAMELA PAVLISCAK

BOTTOM: CONNECTIVITY AND THE BYOD MODEL IS CHANGING THE SHORT-HAUL EXPERIENCE. PHOTO: UNITED AIRLINES



“I cherish my time during the flight because I don’t go on the wi-fi”



to shrink time as much. Whereas if I’m on a two- or four-hour flight and I’m watching a two-hour movie, then it makes for fewer partitions.”

Our second expert, Pamela Pavliscak of Change Sciences, an NYC-based futurist who consults, speaks and writes about our emotional connection with technology, agrees with Weinschenk that the escapist quality of a story, the ability to suspend time, only works for however long the story continues.

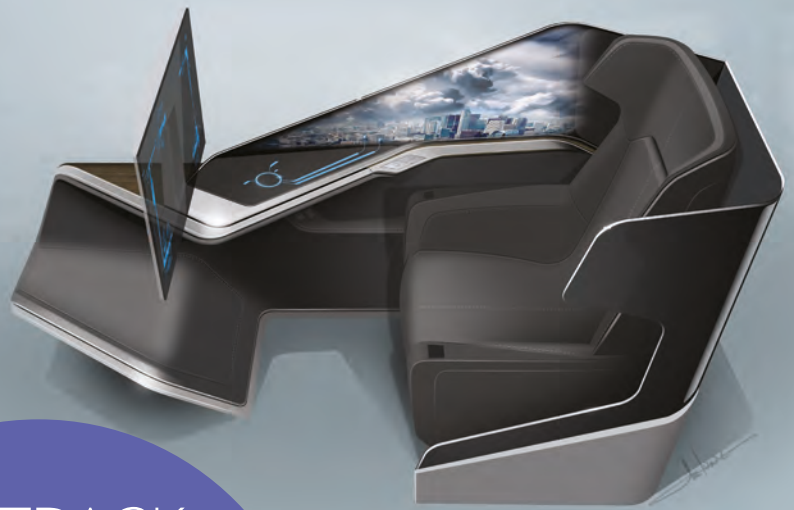
“The problem with watching a movie is that we all know that movies are about an hour or an hour-and-a-half and shows are half an hour, so you are still aware of time,” she says. She believes there are other ways to shrink the sense of time on the airplane and to address’ emotional needs.

Though Pavliscak works in the field of technology (with clients including Google, Virgin and GE), she has a very analog way of coping with the stress of flying. “I cherish my time during the flight because I don’t go on the wi-fi. I am disconnected



RIGHT: THALES' CHAMELEON BUSINESS CLASS SEAT CONCEPT IMMERSSES AND COSSETS THE OCCUPANT IN TECHNOLOGY

BELOW: HAECO'S WAVE CONCEPT FOR A NOISE-CANCELING HEADREST



SEATBACK REIGNS

According to IATA's 2018 Global Passenger Survey, the majority of air passengers would rather watch digital content on a seatback device (54%) than on their own device (36%). These figures have changed in recent years, with the 2015 survey finding that 50% would rather watch digital content on a seatback device, 38% in 2016, and 45% in 2017. In 2015, 39% would have rather watched their own device, 51% in 2016 and 42% in 2017.

and I do a lot of reading," she says. "Time goes very quickly that way. We can think of more activities where you might lose yourself in time."

Pavlisca believes one opportunity to shorten the sense of time is to go back to basics and offer more games, even simple board games, that don't have a set duration. Another opportunity is to play with passengers' excitement about the flying experience, using things like contextualized flight maps that offer more information and a better view of what passengers are flying over. Airlines might offer flight simulator games, especially for children. "Kids get very excited when they meet the pilot. It could be a classic, memorable experience."

Content and activities for passengers, she believes, should enhance the positive aspects of travel.

"Travel lifts you out of yourself," she says. "It takes us out of the routine. We are thrown together with many other people who are having this new experience. It involves thinking through some of those interesting ways to cultivate that awe and wonder. Something really immersive, giving a sense of the place that you're going to. Those are interesting ideas and need to be explored."

EMOTIONAL INTELLIGENCE

It's important for airlines to recognize that the default state of their passengers may be anxious, but the answer may not always be to offer comfort. Sometimes, Pavlisca says, what passengers will need is release. "People cry on airplanes because they feel a little bit anonymous and can show their emotions," Pavlisca says.

Both Weinschenk and Pavlisca believe that having some content available that might make passengers get more in touch with their difficult emotions – and perhaps cry them out – would be good. Some people are soothed by watching horror films or disaster films. Human emotional response to stimuli is not always what we might expect.

Technology gives airlines an opportunity to evoke emotions and to monitor passenger well-being. Rather than developing sensor technologies in the seats, Pavlisca believes that consumers' personal digital devices could integrate with the cabin to help airlines refine their product and services.

"If you look at Fitbit and other health wearables, a lot of those will have the capability to detect emotional states," she says. "I think figuring out how to integrate with existing wearables, platforms and apps is the way to go now."

The key would be to have options available to passengers that would address those emotional states, offering release or comfort.

"Another one would be soothing and de-stressing," Pavlisca says. "Why couldn't I have some kind of soothing, spa-like experience? I'm already in a cone of solitude, so there are opportunities for next-level self-care and personal well-being."

Designing technology to monitor and elicit emotions, to encourage users to engage with the technology more, raises the question: can we rely too much on technology as a cure-all?

"We have to be careful. There's a fine line between evoking motion, helping people cope with an emotion, and developing an unhealthy attachment," Pavlisca says. "We have to think about that balance and how we can tip the balance to favor

people – our customers – instead of over-valuing business goals.

"You don't have to have them on the screen the whole time. You want to cultivate that kind of relationship with your customers where you are supporting them and you're building a long-term relationship that has ebbs and flows," she adds.

"We should be designing technology that is helping people live their lives and be fulfilled, and make their own meaning, and face challenges. That's part of having a great life and a great experience. If people start associating that feeling with your brand, then that's great." ✕





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We have the clear direction that we should all have our own identity”

MELANIE BERRY, DIRECTOR OF INFLIGHT CUSTOMER EXPERIENCE AT IBERIA, SHARES HOW THE AIRLINE MAINTAINS ITS UNIQUE BRAND DNA, WHILE ALIGNING WITH THE VALUES AND OBJECTIVES OF THE IAG GROUP

Words by Marisa Garcia



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“The Iberia brand is captured with ‘vital spirit’ as the driving force”

Spanish flag carrier Iberia is an airline that strives to display its unique brand and a distinctly Spanish flavor, all while fitting in with the operations of its holding company, IAG, and the Oneworld alliance. Ensuring the onboard experience meets these requirements is a potentially tough task for Melanie Berry, Iberia’s director of inflight customer experience, but one she is fully on top of.

“The Iberia brand is captured with ‘vital spirit’ as the driving force and value proposition for the customer experience. It’s vital and expressive at every single contact point,” says Berry. “Vital, because it embraces all the virtues of passion, the unmistakable charisma and the *savoir-vivre* that is legitimately and uniquely Spanish. And

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expressive because it embraces all the virtues of warmth and the colorful character.”

Those guidelines drive the airline’s choice of warm colors in the cabin, with fabrics full of organic details paired with splashes of the distinctive red of the airline’s brand logo.

“It’s not just about the logo and livery; it’s every single customer contact point,” Berry says. “We’ve updated everything – the digital platforms, lounges, aircraft, cabin interiors... Everything reflects the new brand values and personality. The cabin crew uniform is the final element.”

With the introduction of the A350 to the Iberia fleet, the airline balanced the opportunities for improvements afforded by the new aircraft with the aim of maintaining brand continuity, fleet commonality and standardization.

“Because the A350 is wider, we were able to have wider business class seats, which make the experience more comfortable,” Berry says. “We have tried to keep the same look and feel, but we want to continually innovate and push the boundaries of what we are doing.”

For all passenger experience projects, the airline considers existing customer feedback as well as crew



SPANISH *style*

Iberia is working with Spanish designer Teresa Helbig for the new uniforms. Sketches were released last year, though no official launch date has been announced.

"Teresa has been at the airport talking to people and she has also been on board one of our flights to Paris to talk to crew members and get their feedback," Berry says. "We're really trying

to take all the feedback from the crew and all the ground staff that wear the uniform to make sure that we consider everything they experience on a day-to-day basis, or things that would make the uniform more comfortable. For example, for the female cabin crew, having a piece of elastic in the skirt. We're trying to build all that in, which takes a little bit of time."



ABOVE LEFT: THE IBERIA TEAM IS WORKING TO ENSURE THE NEW UNIFORM IS AS FUNCTIONAL AS IT IS STYLISH

INSET ABOVE: UNIFORM DESIGNER TERESA HELBIG

BELOW: A KEY MOMENT IN IBERIA'S HISTORY. IN 1946 THE AIRLINE BEGAN TRANSATLANTIC FLIGHTS TO BUENOS AIRES



feedback. For larger projects, like the introduction of the A350, the airline also organizes customer focus groups to guide its decisions. The results from these focus groups are driving big investments in technology touchpoints.

"The world is changing, because of digitization," Berry adds. "Whether it's online shopping, WhatsApping with friends or online dating, passengers want to carry on their everyday life while in the air. That's what we're working very hard on doing. We're working with our digital partners and wi-fi companies to try to make that experience possible in the air."

Iberia is introducing virtual reality (VR) entertainment on select long-haul flights from Madrid to New York and Tel Aviv. The service, contracted through Inflight VR, came about as a result of the 2018 IAG Hangar 51 startup program, a global initiative to find and nurture disruptive concepts and groundbreaking technologies that could benefit the passenger experience. Based on availability, passengers in all classes can rent Inflight VR's Pico Goblin 2 headsets, loaded with IFE content.

"It's totally new, so we are trialling it for six months to see how our customers feel about it. We've got some really exciting immersive content," Berry says. "For example, on flights to New York you can have a virtual tour of the city. There are lots of diving programs and different things that you can't get from the seatback IFE experience. We're quite excited about that and how our customers see it."

Berry would not say what the price points will be for rental. "Because it's really new and lots of people don't really understand VR, we're going in with an open mind. Let's test the market and see what works and what doesn't," she says.

She finds that the lead time required to specify products presents the biggest challenge to the introduction of new passenger experience products

A woman with long dark hair, wearing a green sweater and white earbuds, is looking out of an airplane window. The background is bright and out of focus, suggesting a view of the sky or clouds. The overall mood is calm and pleasant.

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“The lead times in making decisions are often several years out”

BELOW: THE INAUGURATION OF
IBERIA'S MADRID TO SEVILLE
ROUTE IN 1939



and services. She adds that this gap is proving particularly problematic for the technology touchpoints.

“We start working on the onboard experience for a new aircraft many, many years before it comes into service, and the lead times involved in making decisions are often several years out,” she says. “So it’s very difficult for us to get the latest technology, the latest wi-fi provider, wireless charging in seats and things like that, especially today, when the digital world is moving so quickly. You always have a great wishlist, but because you’re working so far out it’s really difficult to make those items happen unless you do it retrospectively.”

As an IAG airline, some Iberia product decisions are driven by group commonality (with fellow IAG airlines, British Airways, Aer Lingus and Vueling, the Spanish low-cost carrier), but there is room for individual brand differentiation. Iberia has been working on its own transformation program, with decisions guided by its likelihood to increase NPS (net promoter score) and customer satisfaction.

“We have group procurement that works across the whole of the IAG group. We make a lot of decisions together and do a lot of tenders together, but that doesn’t mean that we all have to make the same decision – just that we make decisions together to be sure that they work

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for IAG and also for the individual airlines,” Berry explains.

“We all [IAG airlines] have the clear direction that we should all have our own identity and we have to maintain that. That is taken into account with every decision we make. There are certain things that will be specific for each airline, but there are many things we can do together and that works really well.”

Iberia customers want to feel the difference. For example, the airline opened up a dedicated check-in area in London Heathrow’s Terminal 5, following customer feedback. Iberia customers were previously checking in at British Airways counters, but they now have dedicated staff and familiar Iberia check-in procedures.

Other Iberia brand updates driven by customer feedback include the upcoming introduction of inflight connectivity on short-haul flights powered by Inmarsat, as well as an update of the airline’s amenity kits for business class and premium economy.

“We’ve invested in the kits where they add value – the eye masks, for instance. The feedback from customers is

that they are a really important element, so we’ve invested in having a higher-quality eye mask,” Berry says. The new Iberia kits will also fly the flag.

“We’re using a Spanish cosmetic company called Germaine de Capuccini,” she adds. “We’re really proud to be Spanish, so we’re pushing to have Spanish brands on board.”

Iberia has also introduced a digital press reader service that gives customers access to 6,000 magazines and newspapers in 150 languages, with 24-hour access for economy passengers and up to 10 days of access for the airline’s top-tier frequent flyers.

Iberia has three more aircraft to go to complete the introduction of premium economy, which Berry says has been well received by customers.

Brand definition programs on the ground include the redesign of the airline’s Dalí and Velázquez lounges at Madrid Barajas airport, and the list of projects just keeps on growing.

“We will never stop. It’s a continual evolution, so the minute we finish one thing we’re looking at something else,” concludes Berry. ☒

ABOVE: THE A350 HERALDS A NEW PHASE IN IBERIA’S OPERATIONS

INSET: WHERE IT ALL BEGAN: IBERIA’S FIRST FLIGHT, IN DECEMBER 1927, HAD KING ALFONSO XIII ON BOARD



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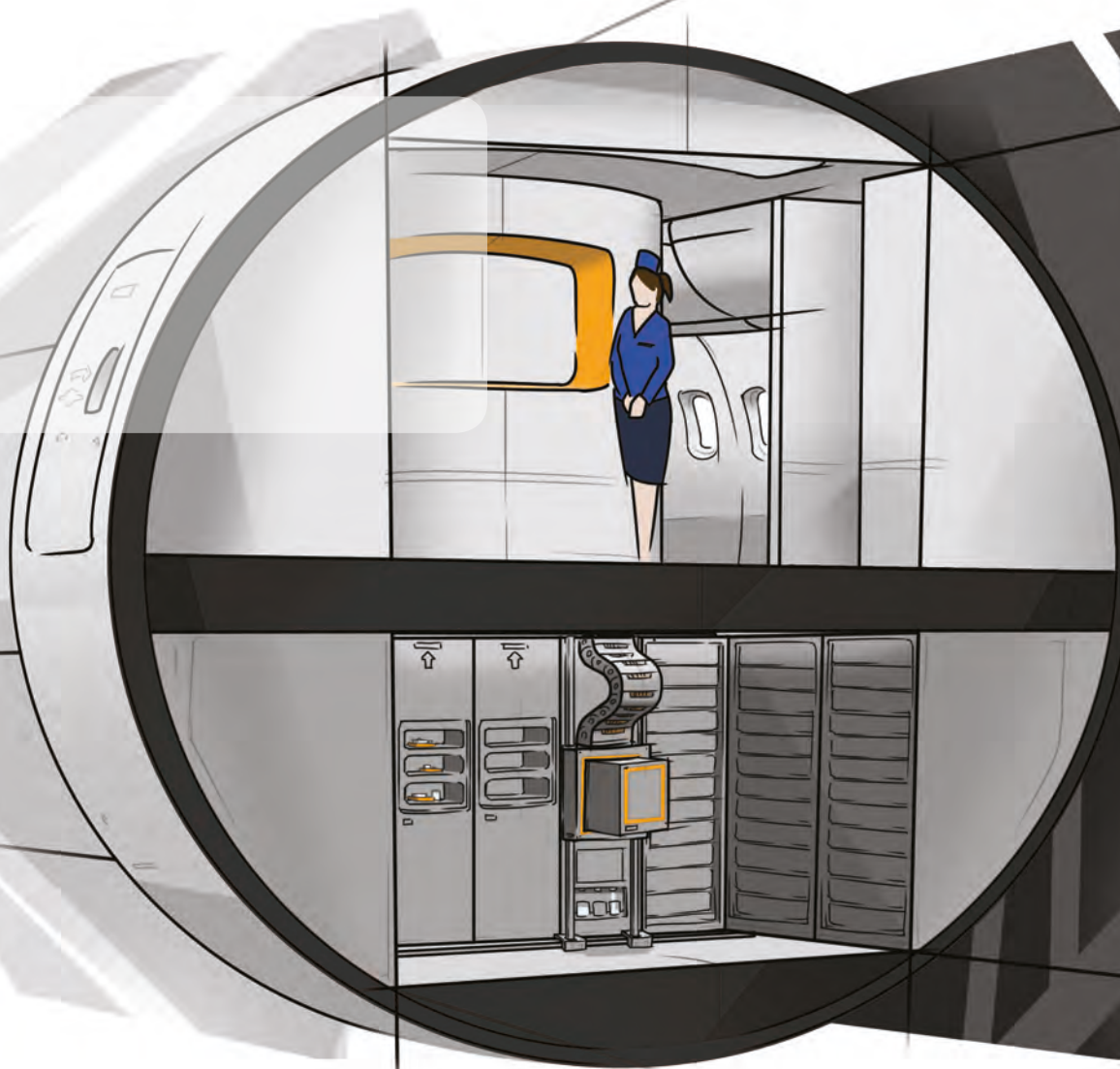


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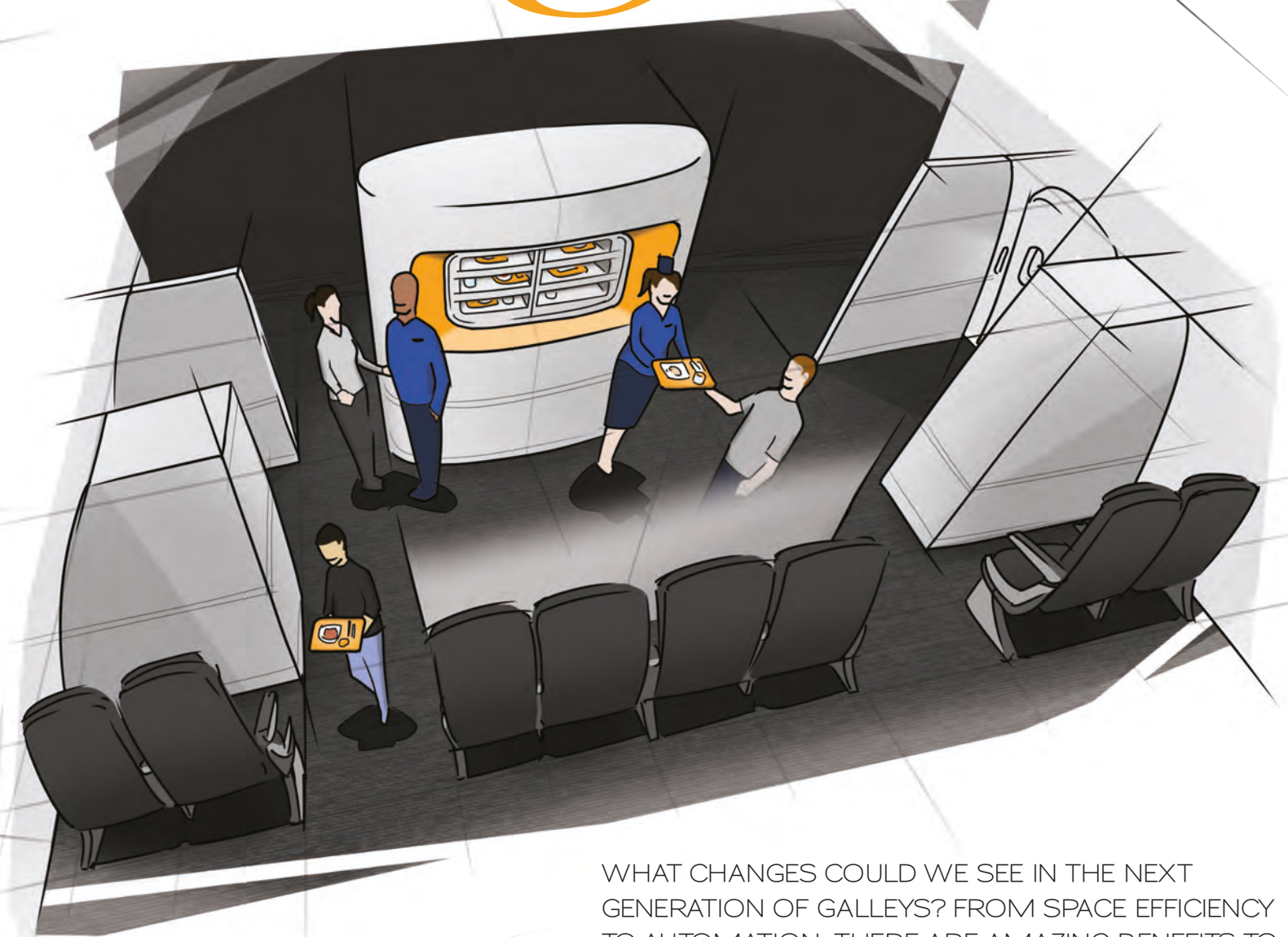


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A MORE OPEN APPROACH

"Historically galleys have been conceived under a hardcore 'form follows function' approach and never received the same level of design treatment as the rest of the passenger cabin," states Cristian Sutter, a cabin design specialist at British Airways.

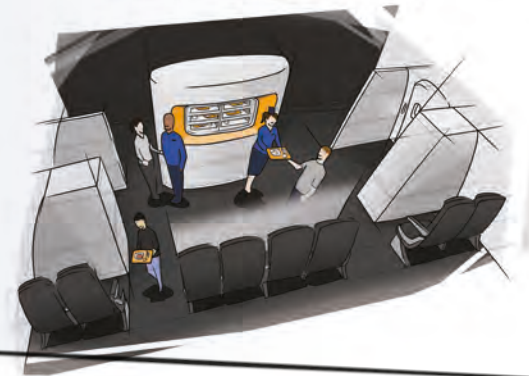
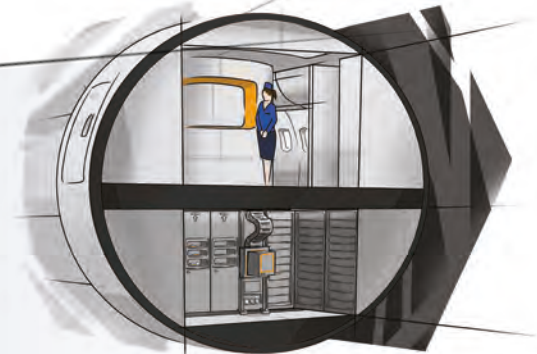
He adds that, being engineered rather than designed, neither ergonomics nor aesthetics have been high on the galley design agenda, mainly due to its utilitarian function being a "behind closed curtains" affair.

Despite recent efforts to turn galleys into architectural features such as bars and social spaces that create a wow factor during boarding, in general the humbler elements of galleys remain hidden away from the passenger eye.



In the future, new galley inserts technology and connected galley architectures could create a more flexible working platform, allowing airlines to reimagine the current service and food prep routines into a more open and theatrical affair that could not only entice but also entertain passengers – emulating the open restaurant kitchen experiences that are proving such a hit worldwide.

After all, when it comes to designing future galleys, the rigid Bauhaus 'Form follows function' mantra could be replaced by a more contemporary 'If you can't hide it, make it stand out.'



Automated meal prep

Static food storage can take up valuable galley floor space, but the team at Teague believe they have a solution. Influenced by the efficiencies of warehouse management and machine learning, future galleys could be automated and below deck.

In the studio's vision, the storing and warming of food will be automated with robotic systems, with the condensed packaging of ready-made food sorted and stored, all in the lower lobe. Without the need for flight attendants to locate and prep food, future galleys below deck can

become incredibly dense, managed through inventory data. Once a meal is ordered by a passenger, a robotic sorter can locate and transport the meal to the prep area for warming. The robotic track would then transport the warmed meal to the elevator and the waiting flight attendant.

On the main deck, the galley is transformed with open floor space. The bulky monuments that once housed inserts are gone, and new opportunities remain for adding additional seats and a welcoming ceiling architecture.



PREMIUM SELF-SERVICE

Flight attendants are burdened with the preparation and delivery of food. When asked what the solution could be, Teague suggested that future galleys will streamline food service, with opportunities for ancillary revenue from premium products.

In the studio's view, galleys as back-of-house kitchens will be transformed into self-service retail spaces. Premium alcohol, ready-made foods, amenity kits and gifts could be browsed and purchased through the airline app, and accessed when the NFC-enabled compartments open. The vision continues that airlines can partner with luxury brands and weave marketing messages across physical and digital media, while the passenger experience is enriched with seamless access to preferred products.

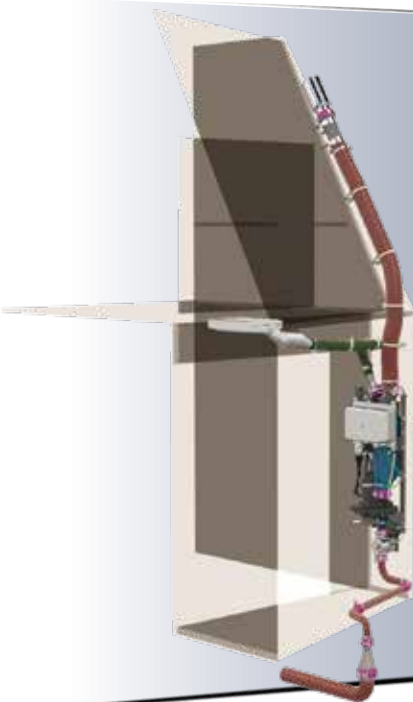
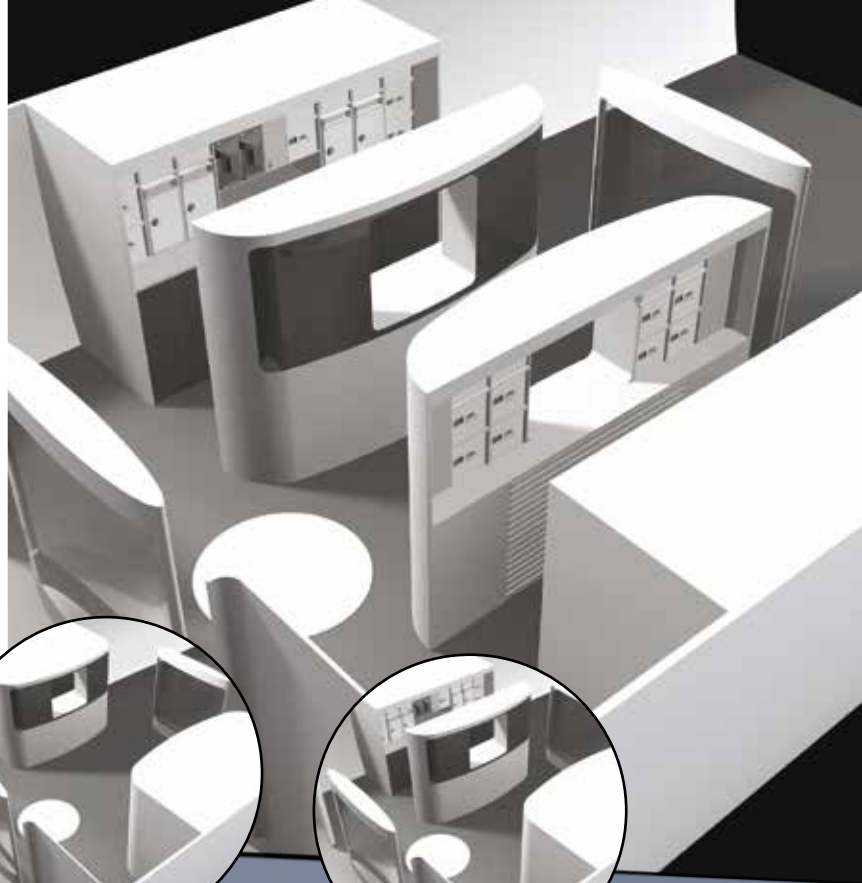
CREATING THEATER

The desire to create an amazing entrance space, a workable galley and a memorable destination space for passenger benefit in flight, puts considerable pressure on the design of the galleys and surrounding spaces. However, Adrian Berry, a director at Factorydesign, has an idea...

"We have looked before, on wide-body aircraft, at creating moveable elements within the galley space. These thoughts have been mocked up, assessed and consequently supported at RFP by leading manufacturers.

"The stowage-based galley fronts, suspended within the key structure, can be moved in and out. They are locked in position in both cases, allowing the space to be adapted as required. This flexibility allows airlines to deal with the complex requirements they have at various flight stages.

"The result is that the entire area then forms part of the 'theater' of the passenger experience, creating unique spaces for the different journey elements required and with a minimal effect on seat count.



Hidden gems

The disposal of food waste and liquids in galleys can present challenges, such as liquid waste clogging drains, food waste disposed of in the toilet causing issues, while waste build-up in the galley area can present a hazard for crew. Safran notes that there are existing solutions, such as the Galley Waste Disposal Unit (GWDU) introduced in 2001, which are effective, but considers them space-intensive.

The company's proposed solution is GEMini (Galley Evacuation Module), a galley waste disposal system that can be integrated

directly into the existing galley sink. Waste poured down the sink (up to a gallon per minute) is then sent into the waste tank using vacuum technology, freeing valuable counter space and helping keep the galley area clean.

Another idea, the GEMini Cube, takes space saving a step further as it is a small version of GEMini housed in a galley container that fits into a standard galley compartment. The design allows cabin crews who don't have work decks or sinks to remove waste from the galley cleanly and efficiently.



FRESH APPROACH

JPA Design's lead industrial designer, William Harbidge, has been inspired by Spyce – a robotic restaurant concept created by four students at MIT that can produce 200 meals per hour.

"Shifting the technology underneath the galley floor frees the prime real-estate above, elevating the theater of food to a full experience instead of today's seat-bound affair," he states. "Passengers' expectations for better nutrition are satisfied as they see crew, flanked by growing vertical farms, picking the finishing touches for each customer's selected (or created!) meal as it arrives from below."

Behind the scenes, the automated kitchen is stocked by AI programming, ensuring the necessary ingredients are on hand for each leg. All produce is vacuum-packed for longer-lasting freshness.



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DON'T HIDE: INVITE

Galleys are – despite what a pilot might say – where much of the hard work is done on board an aircraft. This is the lighthearted but not entirely inaccurate view of Nick Lendon, industrial design lead at Mormedi, the Madrid-based design house.

Lendon has seen evidence of the hard work that takes place in galleys in the form of bashed, dented aluminum carts covered in stickers and “obnoxious” anodized red latches.

“Transforming this area into something more presentable and useful when not required by the crew (such as a self-service kiosk) has been tried in

recent times to varying effect,” states Lendon. “But the approach has always been to hide the working area once it’s finished with, rather than properly integrating both scenarios.

“Looking to the future, we envision galleys where airlines make full use of another opportunity to integrate their brand and vision. An inviting place to help yourself to refreshments, to stretch your legs or take the weight off while you wait for the bathroom to become available. A novel experience for all the senses to break the monotony and refresh the mind.”



Flex your space

Collins Aerospace feels that many of today’s premium self-serve areas require the removal of seats to add differentiated service monuments, which costs airlines revenue – estimated by Collins to be six-figure costs annually.

Thus the company has developed M-Flex Duet, a premium cabin monument that makes use of the underused space in aircraft doorways to provide a flexible

self-service social zone without reducing airline seat revenues.

The monument can be transformed during the phases of flight. During TTL the monuments are stowed, meeting all regulatory egress requirements. In flight, the units can be unfolded to stretch across the doorway, providing a stand up, branded, self-serve social area and additional crew working space.



MULTIFUNCTIONAL ROLE

“A regular aircraft galley should meet several requirements nowadays. It is no longer just a workstation for the crew,” states Jochen Müller, partner at müllerromca, the Germany-based industrial design house.

He has observed that passengers expect a warm welcome when entering an aircraft and the best service during flight. In addition, in his view airlines need customization options such as branding possibilities, innovative ways to present inflight retail, or convenient self-service areas – and all without losing

workspace, trolley capacity or disturbing crew operations.

“And all this needs to be easy to swap during an overnight stay,” adds Müller.

The studio has designed a galley for Bucher Leichtbau that it believes meets these needs. The operator would have the option of displaying its brand, marketing its onboard shopping, supporting catering by having a self-service bar area in place, or any combination of these features. A ‘snap and click’ system enables an easy transition between roles. The concept will be debuted at Aircraft Interiors Expo.



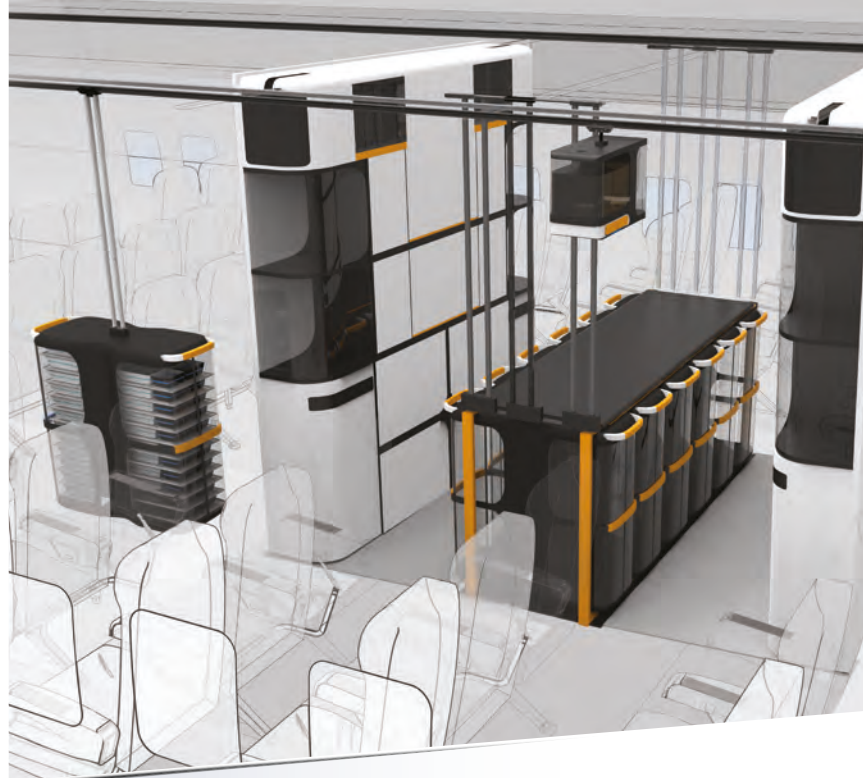
THE RAIL WAY?

During a six-hour flight, Anna Petrova, a student from the Moscow State Stroganov Academy, noted a few discomforts caused by the inflight catering operations, including congestion in the aisles and crew complaining that the repetitive movements of galley service sometimes caused them physical pain.

This got her thinking about a different way for onboard catering to operate, and her idea is the Loose Galley concept, at the heart of which are height-adjustable carts mounted on an overhead guide rail rather than wheels.

Petrova believes this mounting would require less physical effort to move the cart through the cabin and would not require crew to bend over as often to access the meal trays, easing stress on joints. The curved form of the cart design also makes it easier for passengers to move past the unit in the aisles during meal service.

The carts require a slight rethinking of conventional galley design, with them docked in the center of the space, but the design remains fairly familiar, with the usual inserts in the walls.



Flasking for innovation

Many of us own or have used a vacuum flask, whether to fend off the chill with a hot soup or to cool down with an iced tea. It's a useful and simple design that has stood the test of time – and its principle could offer benefits for aircraft galleys. Airbus has been working on a joint project with va-Q-tec, a Germany-based thermal insulation specialist, which in simple terms applies the principle of a typical cylindrical vacuum flask to flat panels to enhance space and energy efficiency in the aircraft cabin.

The panels under development are vacuum insulation panels (VIPs), which are claimed to have an insulation

performance approximately 10 times greater than conventional insulation materials, meaning they can be thinner. For the galley, the partners state that tests of the VIPs have shown a potential reduction in the cooling demand of galleys of 50%, which in turn means that smaller air cooling units can be used, with simpler ducting systems, which brings benefits in terms of weight, chiller noise, maintenance requirements, and crew and passenger well-being as temperatures within galley spaces can be more comfortable. The design is available as flat rectangular panels, as well as flexible panels with cut-outs.



RETROFIT IFE IN MINUTES

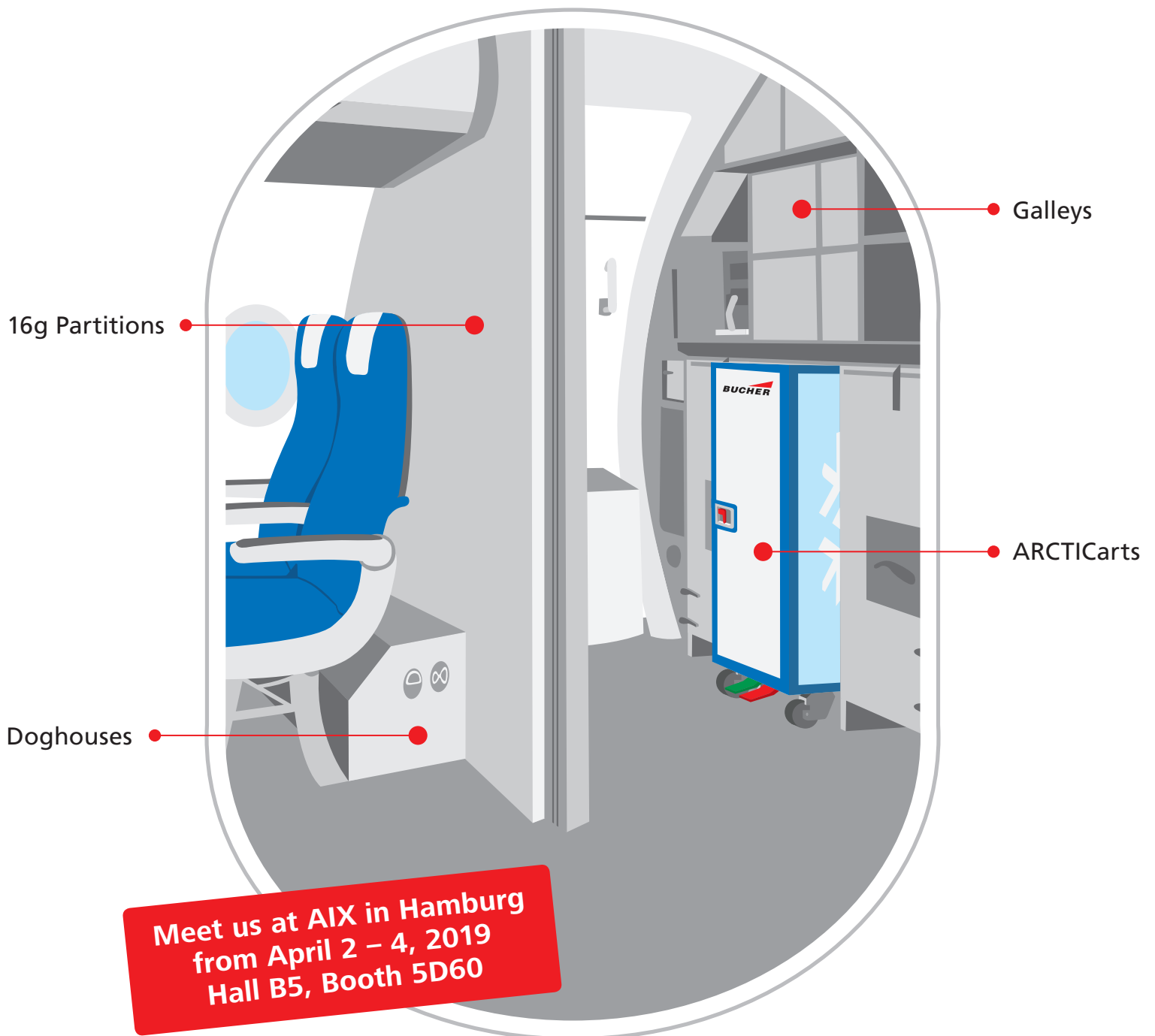
In-seat charging for PEDs is becoming increasingly common and expected, but for airlines unwilling to retrofit these systems, a student at HAW Hamburg (Hamburg's University of Applied Sciences) has come up with an interesting solution, with a little help from Diehl Aviation. The idea is simple: a modular galley insert containing 40 fast-charge power banks (five racks of eight banks), which can be charged independently. Should a passenger require power for their device, crew can deliver a charged power bank to them – whether a

fee is involved is down to the airline. This is a very simple and lightweight means of retrofitting device charging, with key markets seen as high-density A320 and B737 operators and low-cost carriers.

A variant of the design sees things become more interesting still. In addition to power, the bank units can be loaded with customized digital content such as movies, music and advertisements, which can be viewed on passengers' own devices via an airline app, making for a very efficient retrofit IFE system.



A window to a lighter way



Cruise control

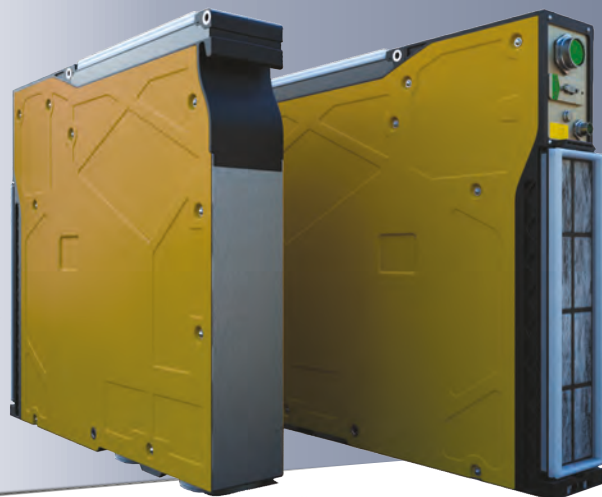
Some galley cooling systems have a lot of part numbers, while older designs don't have features such as digital system integration or predictive maintenance.

The solution could lie with the X-Program Air Chiller, a design created by Airbus in cooperation with Diehl Aviation, which can achieve a target temperature in the galley, with speed-controlled motors that can adapt cooling performance to the changing demands of the galley during a flight. The speed-controlled

motors can also reduce noise and energy consumption, especially for highly insulated galleys, according to Diehl.

In addition, the digital interface allows predictive maintenance and the integration of thermal management systems, whereby the condenser heat-harvesting function can be used to increase thermal galley comfort.

Diehl believes that the unit could be fitted to any aircraft type, and may be ready for entry into service during 2019.



GRAB AND GO

Nordam has developed what it believes will be the future of in-cabin snacking, the SkEYE-Vend, an onboard snack vending machine that can generate airline revenue and please passengers. The machine will be demonstrated by the company at Aircraft Interiors Expo 2019. See p186 for more details.

True efficiency

Catering equipment such as ovens, chillers and coffee makers are the main power consumers in the galley, and with a wide variety of hardware on offer it can be a tough choice for airlines. Airbus has an idea to make selection a little more transparent, however – the Eco Efficiency Index (EEI), a scheme to allow the efficiency of equipment to be compared based on a standardized user profile and environmental conditions.

The EEI contains information about energy consumption, performance and noise levels. The EEI correlates parameters influencing the energy consumption of the equipment (weight, power consumption) to the kerosene consumption, irrespective of the aircraft type. This data can then be used to derive the CO₂ footprint of the proposed equipment in a particular airline's operations. The method is becoming a DIN EN standard and Airbus reports that international suppliers are actively working to support the scheme.

SMART EATING

The food options in business class are generally good, with something for everyone, but students from the University of Cincinnati have come up with a way to please passengers with a really wide variety of tastes, whether they are in the mood for vegan or T-bone, French or Japanese, ice cream or pizza.

Their idea is SkyDining, a process created with a little help from Boeing, which enables passengers to choose meals from airport restaurants. The ordering process takes place through an app, on which passengers can choose their meal, and what time they would like crew to serve it in flight.

So far so good, but storing containers from several restaurants could be problematic. This is where Skybox, a standardized packaging concept, comes in. This packaging, made from

recyclable materials, is attractive enough that meals can be served directly from it – and of course it fits perfectly into the galley carts.

The carts are when things get even more interesting. Named SkyKitchen, each meal storage compartments in the cart has advanced heating and cooling technology, reducing the need for separate ovens in the galley. The clever ideas don't stop there, as when each food package is entered into a compartment, a QR code on the side of the package is read by the cart, activating the appropriate food preparation process for that meal, at the appropriate time. ☒





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IFE-BASED ADVERTISING IS AT A CROSSROADS. WILL IT BECOME AN IMPORTANT COMPONENT IN AN EMERGING GLOBAL ADVERTISING ECOSYSTEM, EMBRACING AN AUTOMATED, RULES-BASED ENVIRONMENT, OR WILL IT PROVE TO BE EPHEMERAL? LET'S CONSIDER THE EMERGING DELIVERY SPECIFICATIONS AND INITIATIVES

*Words by Michael Childers
Illustration by Tracy Worrall*

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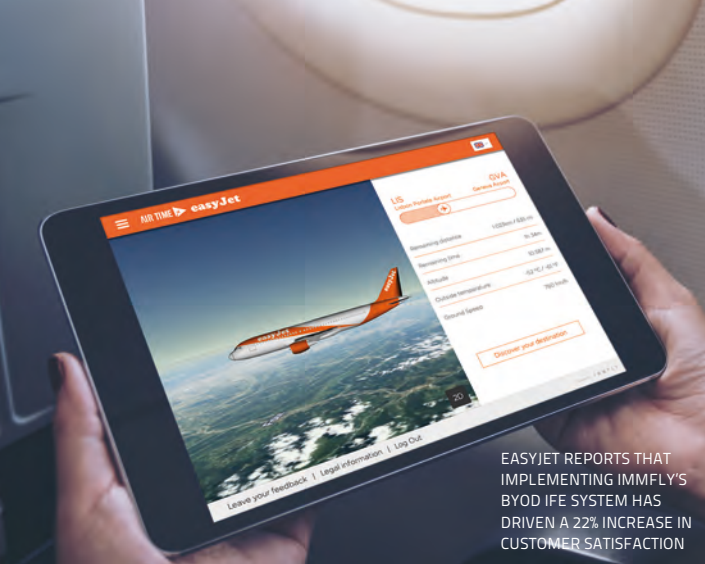


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“Almost every facet of the advertising industry is in upheaval, which has led marketers to agree on one thing, if nothing else – that five years down the road, the landscape is going to look very different than it does today”

Lindsay Rittenhouse, Adweek

Major disruptions that have occurred in the advertising industry over the past few years are likely to generate substantial changes in IFE advertising in the near future. Will IFE become a more important component in the emerging global digital advertising ecosystem, or will it sustain considerably diminished advertising revenues from failure to act?

Historically anchored in broadcast television, video advertising has been displacing print for some time. Market fragmentation has seen the broadcast TV market lose audience share to cable and satellite, as well as to over the top (OTT) media services such as Amazon, Hulu and Netflix, the internet (Facebook and Google for example), and finally to the mobility of content, with increasing consumption of content outside the home. Mobile out-of-home and digital place-based are two emerging segments of the content and advertising markets.

Advertising delivery workflows have become increasingly automated with regard to ad placement, as well as to data capture and reporting of consumers' viewing of such ads. Moreover, ads are increasingly targeted, contextualized and personalized.

Realistically, electronic advertising whose views cannot be verified are of diminishing interest to advertisers – ad fraud is a major concern, with bot traffic at its highest level ever, according to Adweek – and the

According to Immfly the retention rate of advertising on board is 79%

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inability to access 'programmatic' advertising seriously limits potential.

The latest holy grail is a video advertising ecosystem that establishes a global, cross-platform advertising market that combines broadcast, internet, OTT and mobile out-of-home viewing, supports programmatic advertising, and is trackable and verifiable. And although controversies over ad fraud, ad viewability and ad blocking have created challenges for digital advertising, solutions are within reach.

IFE and, by extension, airports have the opportunity to participate in the out-of-home and digital place-based markets, where growth is taking place. Advertisers will potentially turn to IFE, among other mobile out-of-home markets, to offset losses from home viewing – but only if the IFE industry can meet their criteria.

LOCATION-TARGETED MOBILE AD SPEND TO REACH US\$29.5BN IN 2020 IN THE USA ALONE

Ads placed within this ecosystem will be more targeted and focused on the context surrounding the ad,





including content adjacency (which content the ad precedes in pre-roll). This not only means city pairs and destination focus, but things such as seasonal context and even destination weather are all matched with the use of personal data and content adjacency to target and personalize ads.

IFE ads will not – and should not – go to everyone, but to passengers based on their personal demographics as well as flight-specific data in a rules-based environment. This means the use of ad servers with the ability to store and activate a range of ads based on such context, and the ability to enable them dynamically, not constrained by the typical IFE exhibition cycle.

The IFE industry needs to find new ways to capture personal data from passengers in a fair, reasonable and GDPR-compliant way. Such data is fuel for IFE advertising engines, and is potential currency for the traveler. The GDPR governing the use of personal data in Europe severely limits how such data is used, and is quite different from the emerging rules in the USA.

What is programmatic advertising?

Programmatic advertising is the use of software to buy and sell digital advertising. It enables advertisers to better plan, optimize and target their campaigns. It gives publishers (in our case, airlines) an efficient and automated way to sell their inventory at the highest price and volume.

“There are some common misconceptions around programmatic advertising, because of how it came about,” says Matthew Blay, director of Inadvia, a programmatic advertising platform developed specifically for IFEC. “It is often associated with low-yielding advertising because it was born from the online display advertising world, as a way to sell unsold banner ads, etc.”

That view still may be true for the display open marketplace using real-time auctions, but the reality is completely different for premium digital video inventory, which follows the new broadcast TV and VoD trading methods.

In a global advertising market where premium video is severely supply-constrained, we see more and more brands programmatically buying advertising at a fixed price and volume well in advance of campaign delivery. This has the dual benefit of giving a significant revenue uplift opportunity for airlines, as well as allowing them to approve campaigns ahead of time, for peace of mind.

Indeed, digital video advertising is already overwhelmingly sold through programmatic channels: in the USA, for example, that figure has hit 81% this year (source: eMarketer) – and the rest of the world is following suit.

While tapping in to these budgets does not require connectivity in the air, there is the need to trade and deliver this advertising using programmatic workflows and technologies, and to hit a basic media reporting standard that allows advertisers to understand what ads have been seen.

Programmatic advertising platforms

Programmatic advertising space is purchased and ads placed through an auction process. Programmatic advertising platforms use advanced algorithms, historical data and other parameters to calculate bids in real time for each ad placement. Purchasing transactions take place instantly.

Programmatic advertising includes several platforms:

- Demand-Side Platforms (DSP), which facilitate open market ad purchases;
- Supply-Side Platforms (SSP), which manage ad inventory for publishers;
- Data Management Platforms (DMP), which collect and analyze user data to help with targeting and messaging.

Source: Forbes.com



In an effort to develop a cross-platform marketing initiative, and to support search-engine based advertising, Madison Avenue's experts have worked to establish a number of new standards, specifications and spot advertising practices.

The Airline Passenger Experience Association's (APEX) Advertising Delivery Working Group will address these data capture and reporting requirements under the direction of chair Andy Rosen, a digital solutions consultant. Rosen also consults with Lufthansa Systems, which is currently developing a comprehensive approach to these issues.

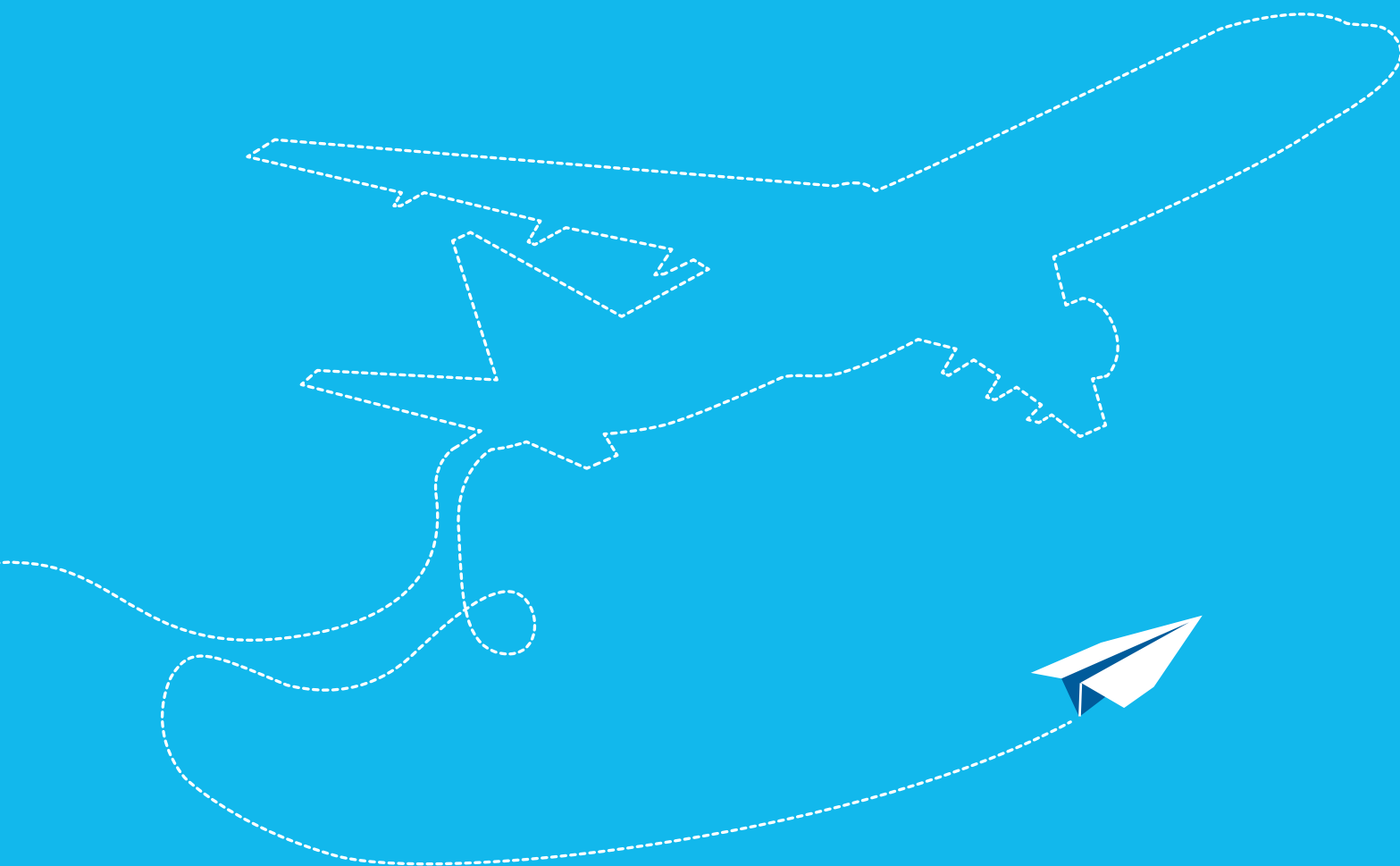
One of the most important changes in the advertising delivery ecosystem is the emergence of programmatic advertising. This is automated, machine-to-machine engagement in which available ad space inventory is put up for bid in a rules-based

TOP LEFT: HOPI, AIR FRANCE'S SHORT-HAUL SUBSIDIARY, IS IMPLEMENTING SKYDEALS' INFLIGHT SHOPPERTAINMENT

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APEX's relationship with CTA

The newest addition to APEX's list of partner entities is CTA – the Consumer Technology Association – which has both client-side and server-side business models for advertising. PEDs will play a very big part in this initiative. The internet delivery of commercial audio-visual

services has become widespread, and standard video formats have proven to work across devices and HTML5 has created a portable application environment across devices.

However, not every web device supports the same video formats

or web APIs. CTA has established an open-process, cross-industry engineering effort to identify a standards-based solution to audio-video application interoperability, and APEX is establishing an expanded relationship with CTA that will make IFE part of that initiative.

environment, conforming to data measurement platforms.

Personal electronic devices (PEDs) will be an important part of this ecosystem – even when embedded IFE is involved – and provide the link between a passenger's access to ads on board the aircraft and when traversing the airport. Today's advertising aligns with mobile devices, like small screens, which favor vertically scrolling in-feed units over banner ads.

Therefore, APEX's participation in the Web Application Video Ecosystem (WAVE) as a follow-up to its APEX CMAF specification, and a relationship with the Consumer Technology Association (CTA) that leads the WAVE initiative, is important to both standard content delivery and ad delivery in IFE.

One of the most basic things necessary to the integration of various kinds of ads across all global and technological platforms is to establish



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common identifiers to be contained in metadata. Metadata is the information in a digital file that defines the data.

Ad-ID has emerged as a web-based system for the registration of advertising

and promotional assets, which ensures that all views on all platforms in all locations are attributed to the specific ad that the advertiser or agency wants to track. EIDR (Entertainment ID Registry) is the identifier of choice for entertainment content. Ad-ID and EIDR go side-by-side. Reported jointly, they confirm content adjacency.

Lufthansa Systems' representatives, along with APEX, are working with

WHAT TYPE OF IFE IS BEST FOR MARKETING?

Does seatback, mobile or wireless IFE have a higher ROI for marketers? David Fairand, COO of Adaptive, states that for improving the visibility of promotional content and airline news (including partnerships, new routes, etc), all three IFE solutions are useful "but with varying degrees of success. Like with the development of brand loyalty,

mobile IFE has a small edge for two reasons: first, because it enables you to collect the most data from passengers (which can be used for more effective targeting) and, secondly, mobile gives you the ability to advertise to passengers during the entire day of travel – at the gate, in flight and even once they've arrived in their destination."



MovieLabs on further standardizing IFE metadata using Common Metadata Core. For airlines, there is an absolute aim: to maximize ad revenue – and to achieve this their IFE systems must be capable of supporting Ad-ID and EIDR metadata in the future.

The boards of directors of both the Association of National Advertisers (ANA) and the American Association of Advertising Agencies have unanimously endorsed Ad-ID as the industry standard for web-based universal coding for digital assets.

While originating in North America, Ad-ID is rapidly becoming entrenched on a global basis. A considerable number of the major advertising agencies now require the use of Ad-ID. In the future, it is believed that all mainstream advertisements will automatically be delivered with an Ad-ID identifier, and airline IFE systems must – and will – begin to accommodate them.

HAILING TAXI

Another name to know in the IFE advertising sector is TAXI (Trackable Asset Cross-Platform Identification). This initiative has helped advance industry efforts to establish an open standard audio watermarking system for identifying entertainment and advertising assets across distribution platforms and for setting standards for multichannel asset tracking. Work includes standardized identification of video assets, including ad-ID and EIDR for content and an open standard audio watermark to bind identifiers to remain embedded throughout an entire media distribution ecosystem.

ABOVE LEFT:
PANASONIC'S
CAPTIFY INFLIGHT
ADVERTISING
SYSTEM ENABLES
AIRLINES TO TARGET
BY SEAT CLASS,
ROUTE, DEVICE,
LANGUAGE AND
PASSENGER DATA

CBS SHOWS THE WAY

According to Joseph Ianniello, president and acting CEO of CBS, the US commercial broadcast television and radio network, its All Access OTT service has started using "advanced data and technology both to deliver a higher return on investment for advertisers" and "to monetize our audiences more effectively. To that end, we are rolling out a proprietary new platform."

The platform is DnA, short for Data and Audience, and is designed to enable advertisers to buy specific audience segments.

As Ianniello explains, this is so that, "Our advertisers can target people who like to eat out and drive SUVs rather than just buy the broad demographic of adults between the ages of 25 and 54."

Advertising Delivery Working Group chair Andy Rosen adds that this same kind of targeting will drive IFE advertising, rather than broad demographic buys.

Mobile advertising growth

"This year, mobile will surpass TV ad spend by more than US\$6bn... by 2020, the channel will represent 43% of total media ad spending in the USA – a greater percentage than all traditional media combined," states Martín Utreras, VP of forecasting at market research company eMarketer.

"Even the strongholds of TV, such as live sports and news, are starting to move online, and people are consuming them through mobile devices. Audiences continue to

abandon traditional media, and ad dollars follow.

"Mobile accounted for US\$76.17bn of US media ad spend in 2018. That's more than TV [US\$69.87bn], and more than print [US\$18.74bn], radio [US\$14.41bn] and out-of-home [US\$8.08bn].

"By the end of 2022, mobile ad spend is expected to more than double that of TV. The channel will make up US\$141.36bn of US media ad spending, while TV will account for US\$68.13bn."

Lufthansa Systems is working with the SMPTE Open Binding of IDs Working Group, for which Rosen is a contributor, which will guide the airline industry in its implementation in the IFE environment.

One of the key objectives is to ensure that the IFE industry reporting data conforms to the minimal standards of the advertising industry as promulgated by the Media Rating Council. This will ensure that inflight advertising can qualify for the highest rates (i.e. CPMs) for certified viewing.

There are two simultaneous APEX initiatives involving advertising and ancillary revenue. The APEX Advertising Delivery Working Group (ADWG) will focus on the technology necessary to support the new global advertising landscape. A separate group, authorized under the APEX board of directors, named the Airline Advertising and Ancillary Revenue Committee (ARC), will look at the business issues and the business environment for advertising in IFE. ❖

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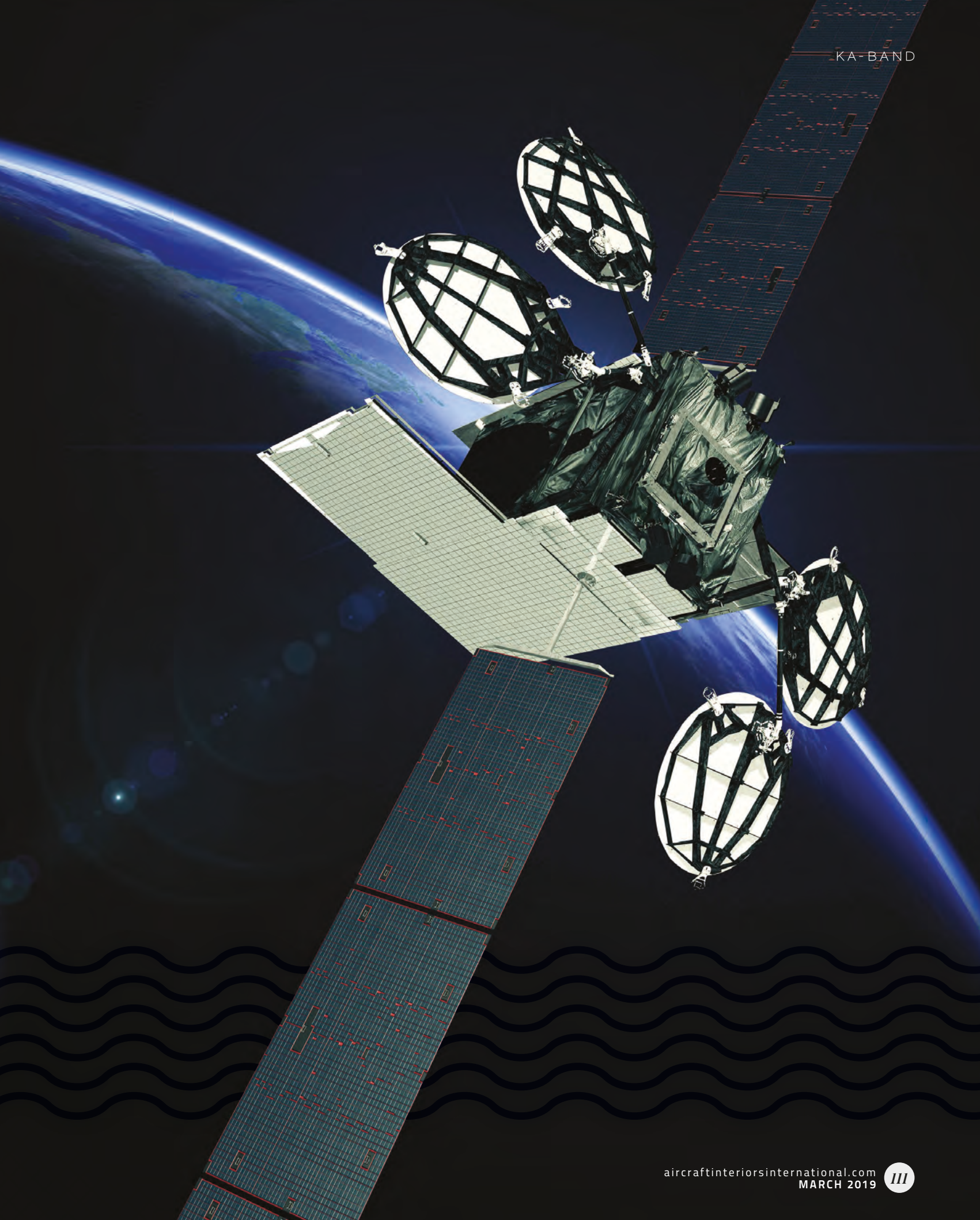
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Words by John Walton

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When JetBlue and ViaSat invited a pack of journalists aboard their first aircraft equipped with Ka-band inflight connectivity in December 2013, they may not have imagined that the experience on board that A320 would set the standard for the connected passenger experience for over half a decade.

Fast, free, inflight wi-fi was still unheard of in the mid-2000s, when the Connexion by Boeing program closed down, but more than a decade later it's a reality on many airlines. But the trick is for wi-fi to be fast, which is not generally a feature of satellite bands other than Ka or commercialized air-to-ground solutions, especially as modern devices – and the expectations of their users – pull down more data than ever before.

With Inmarsat's Global Xpress rolling out on a wide variety of airlines, regional Ka-band solutions being provided by ViaSat in North America, Australia and Europe, and a new set of satellites to be launched over the next few years, Ka-band is about to hit the big leagues.

"Right now, Ka-band can be described as an open highway, compared with Ku-band as a highway with heavy congestion and traffic jams," says Kurt Weidemeyer, VP of strategy and business development, aviation, at Inmarsat. "Ku-band has been used for decades for many purposes, but Ka is only now being employed, so there's a lot more freedom to

mark out territories and make it fit for purpose."

Yet the problem for providers and airlines is joining the on-ramp to that highway, given the relative novelty of global Ka-band connectivity, which arrived only with the completion of the Inmarsat GX constellation in 2015. Previously, and indeed still, Ka-band for aviation was largely limited to regional use, such as US carrier JetBlue on existing ViaSat satellites or Qantas via the Sky Muster satellite, initially created for terrestrial use.

"From our side, we are making sure that those of us that are using Ka are doing a better job of managing frequencies to get the most out of it for our customers. Learning from Ku and from developments in Ka technology, we will only continue to get smarter with the way we use it," Weidemeyer says, but notes contextually that aviation is not the only user of the technology.

"Government and maritime are big users of Ka-band. Access to steerable capacity is important for governments, and is something we can

provide as our current and future satellites are very flexible, focusing energy and moving capacity wherever it is needed most. Maritime is also expected to see high growth, seasonal and regional capacity demand, not only in traditional merchant markets but also in passenger, superyacht, and oil and gas vessels. We predict an even split between aviation and maritime capacity demands in the 2020s."

Demand for fast inflight connectivity is booming worldwide, and not just on long-haul airlines. "From an aviation perspective, we are continuing to deliver great service for customers flying with our Ka-band solution GX Aviation, including Qatar Airways, Air New Zealand and Lufthansa," Weidemeyer explains. "GX installations are also progressing well with Avianca, Air Asia and Citilink, which launched its inflight connectivity service to passengers this month [January 2019]. We are already seeing the improvements that Ka-band has brought to the likes of Qatar Airways and Air New Zealand, with customers claiming a much improved passenger experience."

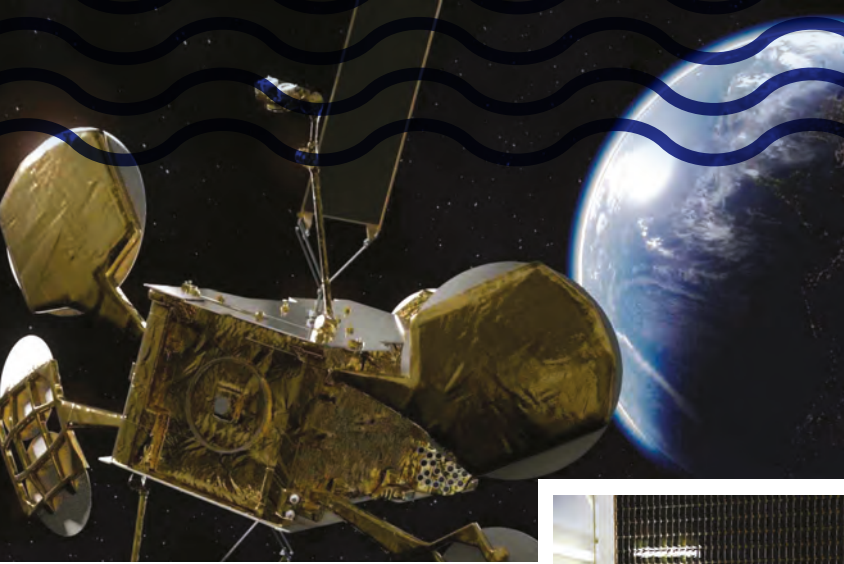
COMPETITIVE TENSION

Finnair is just one example of an airline that is balancing an existing Ku-band long-haul installation base with a new roll-out of Ka-band on its short- and medium-haul fleet, presently using Eutelsat



ALL PHOTOS: PROGRESS IS BEING MADE IN THE STARLINK SATELLITE CONSTELLATION PROJECT UNDERWAY BY SPACEX, A NEW SPACE-BASED INTERNET COMMUNICATION SYSTEM. INITIAL OPERATION OF THE CONSTELLATION COULD BEGIN IN 2020





LEFT AND BELOW: THE EUTELSAT 172B HIGH-CAPACITY SATELLITE WILL DELIVER INCREASED CAPACITY FOR INFLIGHT CONNECTIVITY APPLICATIONS IN THE ASIA-PACIFIC REGION



satellites via ViaSat as its connectivity provider.

“We currently have 29 connected aircraft in the A320 family. We expect the entire narrow-body Airbus fleet to be connected by summer 2019,” explains Tiina Suvanto, Finnair’s customer experience development manager.

Pricing, of course, is key for the airline, which takes a strong internally branded approach to its connectivity, including it as part of the Nordic Sky Portal, offering complimentary internet to business class passengers and high-tier frequent flyers.

“We see that the industry is exploring different business models and we also are testing and learning together with our customers and partners,” says Suvanto, noting that Finnair has the technical capability to include connectivity pricing in tickets as an ancillary at the time of purchase, with free or time-limited access for premium classes, via the portal, or even eventually as a ‘hygiene factor’ like at-seat power.

“We want to test and learn with our customers and partners in this area, and in principle we want to offer a variety of options for customers so that they can tailor their travel to fit their needs.”

From the Inmarsat perspective, “We are currently working with some of our aviation customers to make connectivity available within the ticket at the time of purchase,” says Inmarsat’s Weidemeyer.

“Qatar Airlines already gives free connectivity in business and first for the duration of the flight, and free time-limited access in economy. I predict that before too long, basic browsing will largely be free or freemium, while heavy browsing may come with a small charge. Currently there is an opportunity for airlines to be very creative in how they offer connectivity.”

Price points for passengers can be expected to decrease in the 2020s as capacity increases, although some carriers may seek to recover more of the cost from their passengers – or a subset of their passengers – than others. Expect carriers to seek flexibility in pricing and customer experience models from suppliers and service providers.

“It’s likely that as inflight wi-fi becomes ubiquitous in the next five years, freemium models will begin to enter the market more, as airlines monetize the service through things like e-commerce, advertising and premium content rather than simply through broadband access fees,” Weidemeyer explains.

PANASONIC TIES UP WITH INMARSAT

Inmarsat and Panasonic have entered into a collaboration – with an initial 10-year tie-in – that will see them combine their services to offer inflight connectivity paired with complementary services.

Under the terms of the deal, Inmarsat will become Panasonic’s exclusive provider of Ka-band IFC for commercial aviation, via the GX Aviation connectivity service. Panasonic will continue to invest in its own network, with GX Aviation as a primary offering for new business.

On Inmarsat’s side, the company will now be able to offer Panasonic’s range of services and NEXT solutions.

The collaboration is already being deployed with a mutual customer, according to the companies, and the next stage will be for Inmarsat and Panasonic to collaborate on the development of a next-generation GX Aviation terminal.

“The London School of Economics predicts that inflight wi-fi will bring airlines US\$30bn [€26bn] in additional revenues by 2035 through these routes. The likelihood is that this will in turn lead to a fall in consumer pricing, a rise in passengers using the services and rising ancillary revenues for the airline.”

The crux will be matching passengers’ expectations. As cellular mobile data continues to drop in price, wi-fi continues to become nearly ubiquitous on the ground, and more of people’s experience with their personal electronic devices (PEDs) moves off the device and into the cloud, passengers’ willingness to pay for inflight connectivity will fall. Indeed, with some airlines already offering a free level of connectivity, others’ ability to charge for a similar (or even inferior) service is challenged.

NEW CONSTELLATIONS AND TECHNOLOGIES COMBINE

If one of the benefits of Ka-band connectivity is its relative lack of congestion, one of the drawbacks is



DATA DRIVES DECISIONS

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SEAMLESS IN-CABIN CONNECTIVITY

An alliance has been formed between Airbus, Delta and mobile phone operators that will enable those operators to offer their services within the cabin. Named the Seamless Air Alliance, in addition to Airbus and Delta, members include OneWeb, Sprint, and Bharti Airtel, with Gogo due to join, and more operators invited. Together they will be able to use satellite technology to provide high speed, low-latency connectivity from ground, to air and back again.

According to the alliance, the service will also “significantly reduce” costs for operators and users as it eliminates the costs and hurdles of acquisition, installation and operation of the data access infrastructure by streamlining system integration and certification. The setup will provide open specifications for interoperability, increasing accessibility to the service for passengers, who in turn will benefit from a simple and integrated billing process.

“What if the best internet you ever experienced was in the air? Keeping this goal in mind, together, we will enable an affordable and frictionless experience for passengers everywhere,” says Greg Wyler, founder and executive chairman of OneWeb. “With the launch of our first production satellites set for later this year, we’re one step closer to bridging the global Digital Divide on land and in the air.”



VIASAT IS WORKING WITH BOEING ON A FLEXIBLE BROADBAND SYSTEM THAT COUPLES VIASAT-2'S PAYLOAD WITH BOEING'S 702SP SATELLITE BUS TO MAKE THE SERVICE MORE AFFORDABLE

that there is at present only very limited call-off contract opportunity. Inmarsat has completed and is now supplementing its GX global coverage, while ViaSat will launch the first of its delayed ViaSat-3 generation of satellites this year and the second in 2020, each of which will cover a third of the world over the Americas and EMEA.

For Inmarsat, “In terms of the GX constellation, three core satellites provide global coverage, and a fourth operational satellite adds further capacity where needed. We are continuing to expand the network with flexible high-capacity satellites that will dynamically add and move capacity wherever needed,” says Weidemeyer. “Later this year we will launch GX-5 to provide additional capacity over the Middle East, Europe and the Indian subcontinent, and in the following years we will launch two extra I-6 satellites. The three new satellites will add dense, moveable and flexible capacity to the network.”

Regional solutions at lower cost than global satellites are also in play, even as global coverage is implemented and reinforced. Inmarsat's European Aviation Network combines a ground-to-air network with S-band satellites over Europe, with launch customer installations en route.

“There is room for big constellation expansions, but securing funding and creating cost-effective business plans seem to be proving a challenge to those exploring this area,” Weidemeyer says. “There are several planned large

constellations – OneWeb and Starlink to name two. OneWeb's first six satellites will be launched in February 2019, though the constellation has been downsized to around 600 in lieu of further investment. When fully deployed, the company will need 71 ground stations with more than 700 antennas. With a huge number of potential satellites planned – more than 4,000 – Starlink has a large amount of potential capacity, but there are lots of unknowns with its strategy and tests so far haven't quite run to plan. In both cases, it will be interesting to see how their plans develop.”

New technologies, too, will maximize existing investment. Finnair's Harri Valkama, product owner for IFE & Nordic Sky, explains, “We hope to get digitally steered phased-array antennas, where you can be connected to several beams at the same time to optimize customer experience. It is also interesting to see the development of LEO/MEO technology. Also we hope to be able to benefit from 5G technology if it becomes more mature and commercially viable.

“We see emerging possibilities with Ka-band to offer optimal customer experience for our customers, so we always follow developments in the market closely. In general we are always open for new technologies, which we see developing rapidly. Thus in 10 years we look forward to major improvements in using Ka-band satellites. We see also other areas like aircraft hardware and software developing further, which will benefit the customer experience.” ☒



Riding the Wave of Innovation

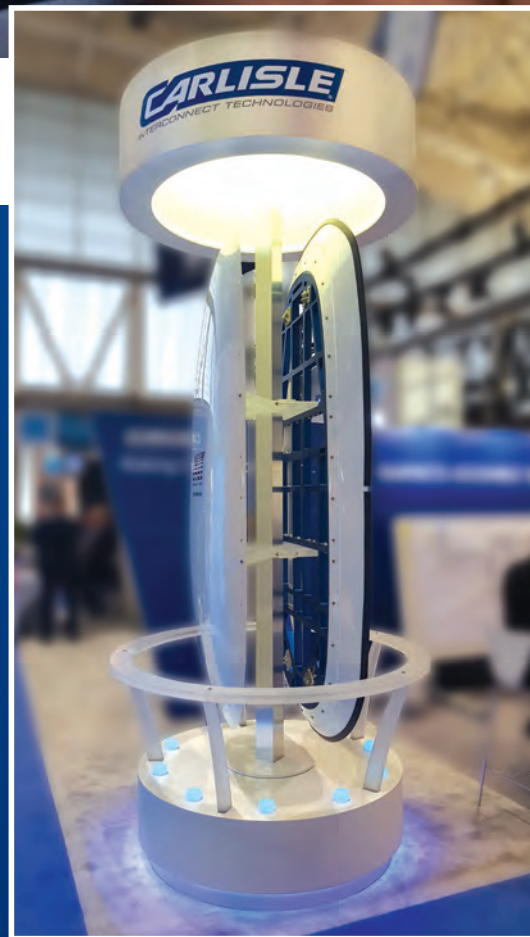
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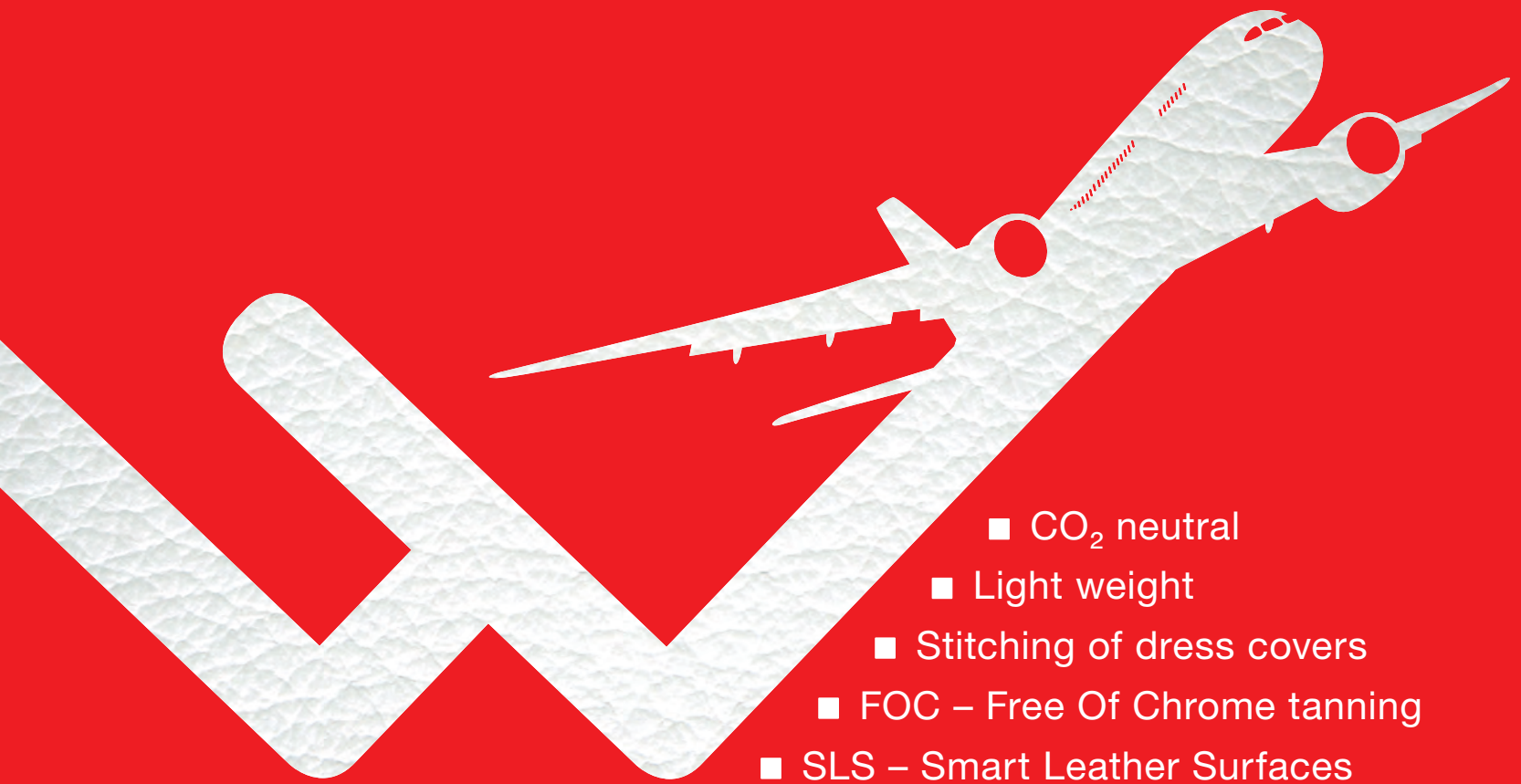
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LEFT: THE AIRY A350 BUSINESS CLASS CABIN, DESIGNED WITH HELSINKI-BASED STUDIO DIGN VERTTI KIVI & CO.

BELOW: THE GREEN-THEMED SOFT PRODUCT LIFTS THE APPEARANCE OF THE CABIN, BUT IS SOON TO BE UPDATED IN BLUE

BUSINESS CLASS ENHANCEMENTS IN THE PIPELINE

Finnair's business class is marked by the quiet exceptionality that also typifies the Nordic carrier more widely. Finland's national airline is small enough to be nimble and carries a sophisticated enough business class segment to drive innovation beyond its size. It's one of the bellwether airlines for pushing the boundaries of the passenger experience, but with a practical, realistic eye on actually delivering on its promises that feels very Finnish indeed.

Finnair's bread and butter is connecting passengers between Asia and Europe via its Helsinki-Vantaa Airport hub. Taking advantage of Helsinki's geographical position, very close to the ideal great circle route between Asia and Europe, the airline's selling point is its ability to transfer passengers with a single stop between secondary European cities and primary Asian cities, secondary Asian cities and primary European cities, or two secondary cities.

"Our focus as an airline is very much on connecting Europe and Asia," explains David Kondo, the airline's head of cabin interior development. "The advantage of our Helsinki hub's location is that we are on the great

Finnair moves slowly with its soft product. The littala glasses have been around for more than 50 years, and the apple green of most items in the Marimekko partnership is no longer as in vogue today as it was at the beginning of this decade. However, change is on the way.

Recent pieces of inflight soft product, such as the coffee service, plus the forthcoming new linens and fabrics, are a fantastic midnight blue, as eye-catching as they are timeless, with new patterns.

On the ground, the airline is in the middle of a heavy revamp of its non-Schengen (essentially UK, Ireland and long-haul) lounges, which feature one business class lounge and one for top-tier frequent flyers. This revamp has led to some substantial disruption while the renovations take place, but the future looks bright.



circle route between a great number of city pairs between Europe and Asia, which allows us to offer some of the fastest journey times in the market. The connecting traffic between long-haul Asian routes and short-haul European routes is absolutely integral to Finnair and accounts for the majority of our growth in recent years."

Finnair is part of the oneworld joint-venture partnership with AA, British Airways and Iberia, and it could well be argued that it provides the best passenger experience of the group.

LONG-HAUL BUSINESS CLASS DESIGN

Finnair's current long-haul business class seat on its flagship Airbus A350 aircraft is the Safran Seats (previously Zodiac Aerospace, and before that Sima Aero Seat) Cirrus, an outward-facing herringbone seat.

The airline's implementation of Cirrus on the A350 is notable for its simplicity: there is no moving footrest, with passengers using the footwell as an ottoman, for example. Similarly, the headphone storage space has no door, unlike other iterations of the seat.

The end result for Finnair is a seat that feels a little less elegant and feature-filled than some of its competitors', but one that

GEOGRAPHICAL ADVANTAGE

The connecting traffic between long-haul Asian routes and short-haul European routes is absolutely integral to Finnair and accounts for the majority of its growth in recent years.

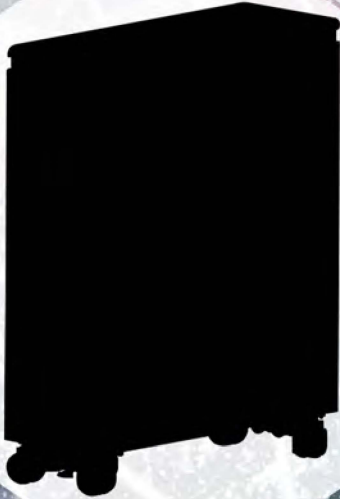
For China, for example, Finnair serves Beijing, Shanghai and Hong Kong, from its Helsinki Airport (HEL) base, as well as Guangzhou, Chongqing and Xi'an. In Japan, Osaka Kansai and Nagoya are served in addition to Tokyo Narita. Thai-bound travelers have the option of flights to Phuket and Krabi and Bangkok. Delhi, Seoul, Ho Chi Minh City and Singapore are also on the network.

Time savings are assisted by the location of most major Asian airports to the east of the continent, and most major European network carriers to the west of the continent, requiring back-tracking for connections – to say nothing of transiting mega-airports not always renowned for their passenger experience.

"The transfer times on our flights between Europe and Asia are designed to suit business travelers," the airline says in its advertising, and indeed the times are usually short, with HEL's minimum connection times as short as 35 minutes.

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the lakes. Finland is known for its lakes, of which there are more than 187,000. Given that the previous scheme was dominated by green, we quickly landed on blue, especially as it is also one of our main brand colors.”

LEFT: THE VANTAGE SEAT ON THE A330 FLEET OFFERS A 'THRONE' SEAT TO SOLO TRAVELERS

BELOW AND BELOW LEFT: FINNAIR'S SERVICEWARE AND AMENITIES ARE AMONG THE MOST COVETED IN THE AIR

INSET BELOW: KIDS TRAVELING WITH FINNAIR USE A SPECIAL MOOMIN CHECK-IN COUNTER AND CHILDREN'S SECURITY CONTROL, AND ALSO RECEIVE MOOMIN-THEMED AMENITIES

has not suffered quite as many quality and wear issues as some other airlines' seating products, which are suffering from ongoing production issues.

Presently the look and feel is a series of grays and off-whites that could charitably be said to resemble a Nordic winter, responding well to the aurora borealis-themed mood lighting. Uncharitably it could be called a bit boring. Cushions and duvets featuring designs from renowned Finnish design house Marimekko enliven the space, but the airline has used the apple green color for so long that it is now feeling a bit staid.

“The green textiles were very fresh and modern... but it's now time for a change,” Kondo explains, noting that a refresh of the soft product is well underway.

“The inspiration for the original Marimekko collaboration came from the green of the Finnish forest and the blue of



A350 AND A330 CONFIGURATIONS

All of Finnair's 11 Airbus A350s have 32 business class seats between doors 1 and 2, and most – with the exception of OH-LWI, -LWK and -LWL – have a further 14 seats in the three-and-a-half rows behind door 2.

Finnair's eight Airbus A330-300 aircraft, meanwhile, are outfitted with Thompson Aero Seating Vantage fully flat beds in a staggered configuration. These are not the Vantage XL seats, which offer direct aisle access to every passenger, although with the alternating 2-2-1, 1-2-1 configuration most passengers will not need to step over a neighbor or be stepped over.

Like the A350s, the A330 fleet consists of two layout subsets: five with 32 seats ahead of door 2, and 13 behind, with



FINNISHNESS IS MORE THAN MOOMINS

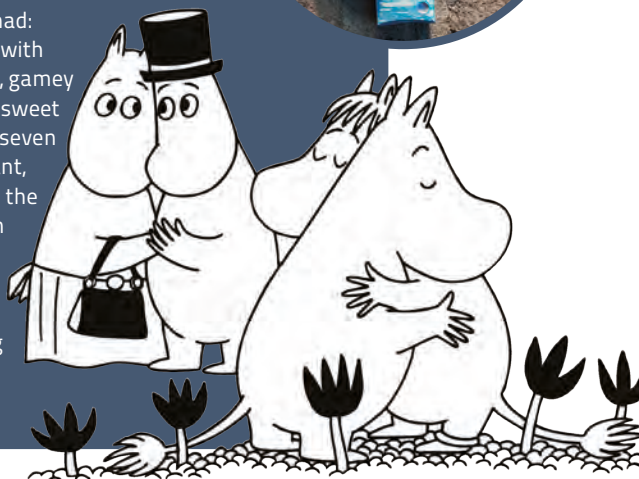
More than the seats, more than the fast connections, more than the once and future advantages of Helsinki Airport, what makes Finnair Finnair is Finnishness. The national airline of this 101-year-old country makes the most of its culture throughout the passenger experience, often flying in the face of the stereotype of gruff and stoic Finns.

Rather, it's the wry smile that characterizes Finnish humor, and a sense of self-aware elegance that characterizes Finnair's business class service. It's flight attendants who don't fawn, but don't forget what you were drinking, or spot that you're still working and never pass by without checking whether your coffee needs a refill.

It's a sense of national pride that a country only winning its independence a century ago can bring, and that pride spurs partnerships galore: from household

international names like Marimekko, Moomins and Iittala, to lesser-known Finnish favorites like chocolatier Fazer, from salty licorice to Karelian pies and cinnamon rolls in flight.

There are many delights to be had: tiny smoked vendace fish packed with umami; salmon myriad ways; rich, gamey roasted reindeer; tart berries and sweet liqueurs; strong coffee and cakes seven ways. It's simple food made elegant, and elegant food made simple, by the Finnair Kitchen catering operation brought back in house in 2017, and now working with chefs from Finland and key markets to create some truly groundbreaking food in the air.



TURBOCHARGING TURBOPROPS

For much of Finnair's extended home market, the airline's 12 ATR 72-200s operated by regional subsidiary Norra, half of which are over 10 years old, are the first and last face of the Finnair experience they see as these aircraft enable connectivity with the long-haul fleet.

"The ATR operation is important for Finnair – in terms of movements it represents a large proportion of our flights in and out of our Helsinki hub that feeds into our mainline operation," explains David Kondo.

As a result, between now and summer 2019 Finnair will kick off a cabin refurbishment exercise to align the ATRs more closely with the rest of the Finnair fleet for greater consistency for those connecting between aircraft types. Work includes more ergonomic seats and a fresh cabin interior design. Refurbishments will roll out by the end of Q1 2020.



RIGHT: THE AIRBUS NARROW-BODY FLEET HAS A TYPICAL 'EUROBIZ' CONFIGURATION



three aircraft being equipped with only the 32 seats ahead of the door.

SHORT-HAUL EUROBUSINESS

Given Helsinki's position in the far northeast of Europe, Finnair could be expected to have an above average short-haul business class, as passengers connecting on its primary Europe-Asia network will spend a greater proportion of their journey time on short-haul aircraft.

Finnair, like almost every European airline, operates a business class consisting of economy seats; the number sold as business class can be varied according to demand. Unlike some airlines, however, the forward rows that can be converted into business class feature extra seat pitch.

"On the Airbus narrow-body fleet the business class zone is 31in," confirms Kondo. "On the E190 we have a mix of 31in and 32in, and on the ATR we will have a mix of 30in and 31in. In economy, the majority of seats are pitched at 30in or 31in, with a limited number at 29in."

On the airline's Airbus narrow-body fleet – the A319, A320 and A321 – the middle seats of the 3-3 configuration are kept free.

On the 12-strong, 100 seat Embraer E190 fleet, as well as the 12 ATR 72-200 turboprops, unlike many airlines Finnair does not keep the adjacent seat free.

"On the Airbus narrow-body fleet the seat next to business customers is blocked for extra space," Kondo says. "The E190 and ATR typically operate much shorter sector lengths and have adequate personal space that does not necessitate blocking adjacent seats. Business class customers on these flights are offered priority ground services and lounge access, which weigh importantly on shorter flights."

However, the extent to which Finnair uses these small jets on relatively long flights, such as its Lyon route, which debuted in late 2018 with a 3hr 10m block time, or Geneva at five minutes less, this is a product weakness, especially given the distance between its Helsinki hub and many destinations in Western Europe. ☒

A LEADER IN IFEC?



On Finnair's short-haul fleet, the only in-flight entertainment is a copy of *Blue Wings Magazine* and the duty-free catalog. Increasingly, however, the Airbus fleet that operates the majority of its domestic and European flights is being equipped with ViaSat-provided Ka-band connectivity, using the Eutelsat constellation in advance of the expected arrival of ViaSat's own connectivity.

The downside of Eutelsat: coverage gaps. The upside: internet that is blisteringly fast for in flight, and not bad for anyone without fiber to their door. This journalist had the opportunity to try it out on three separate flights, and with streaming an option it's a real game-changer – especially since business

class and high-tier frequent flyers receive 30 minutes of complimentary access.

Long-haul, the wide-body fleet offers Panasonic touchscreens, with the older A330s equipped with eX2 and the newer A350s with eX3. Finnair has done a huge amount of work on the user interface of both these products.

Panasonic also provides Ku-band connectivity on the long-haul fleet, which is unfortunately largely saturated by demand at this point, and anything beyond email or text-based messaging is a struggle. On two long-haul flights in 2018 this journalist experienced first hand what it looks like when you try to get two-thirds of the passengers on an A350 on a single connection – and it's not pretty.

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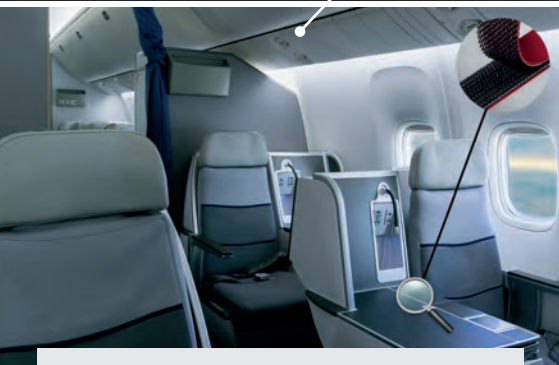
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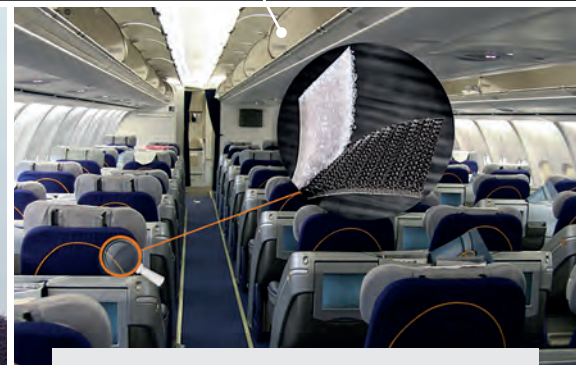
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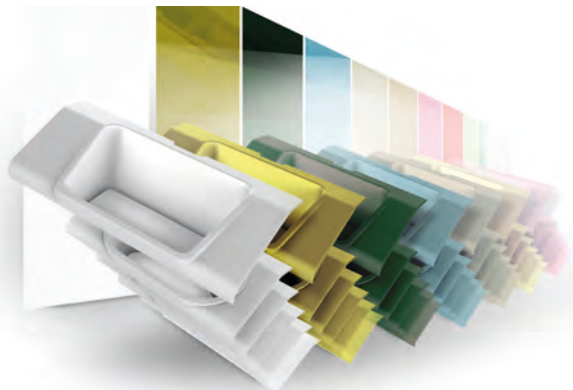


Once of the most unpleasant and hazardous places to be in an aircraft during turbulence is the lav. The aircraft's sudden movements make passenger impact with the hard surfaces in the confined space rather unavoidable, which doesn't make for a pleasant experience.

The solution devised by Miya Ltd, with input from Spekon Sächsische Spezialkonfektion, is to replace all hard surfaces in the lav, such as the walls, ceilings, doors and cupboards, with soft, flame retardant viscoelastic memory foam panels to create a soft and shock-proof surrounding that would lessen or eliminate potential injuries during turbulence.

Even better, the foam would be covered with a quilted metallic-look textile, which helps reflect light to enhance the feeling of space. The textile surface is treated with antimicrobial and antibacterial coatings, which are also water-, dirt- and oil-repellent, so the lav effectively self-cleans.

Particular germ traps are the metals on the flush button, door handle and washbasin. These parts would be coated with antibacterial and anti-mold coatings, created at a nano level by applying zinc oxide to the glassy silica matrix. The aesthetic may not be to everyone's taste, but the safety and sanitary aspects are worth considering.



Swap a basin in five minutes

The K2 EasySwap Future Basin enables airlines to alter their lav color scheme or even revise their lav design. Nothing new there – except this basin can be swapped out in just five minutes, compared with the four hours it can take to swap some units. As well as advantages in terms of maintenance time and cost, the basin enables

frequent changes of unit, whether to create a new appearance, or to keep the basin looking fresh, without the stains and calcification that can appear on units.

However, K2's EasySwap system is modular, with few joints, meaning the washbasin can be replaced without disturbing adjoining components.

THE MULTIPURPOSE LAVATORY

The development team at K2 has been busy creating the Future Lavatory, a design concept intended to address the various needs of families, business travelers, and passengers of different cultures. So how does it work?

The lavatory has been designed to meet the toilet habits of different cultures, which at a basic level can be split into sitting or squatting. The solution is a diagonally positioned toilet that enables both through the provision of footholds at the floor and seat levels. The orientation of the seat also enhances passenger comfort and increases mobility within the space.

The large mirror surfaces also help increase the feeling of space, and can also help passengers from around the world, as a customizable digital display panel to the side of the mirror can display images or text, configured to the



THE FULL-LENGTH MIRROR AND TWO WING MIRRORS OFFER TRAVELERS A NEAR-360° VIEW, AND THE COSMETIC MIRROR ENSURES PERFECT STYLING. THE HANDRAILS ARE A SAFETY FEATURE, AND ALSO USEFUL FOR HANGING BAGS AND CLOTHES

languages of passengers on the manifest, such as safety instructions, flight data

and advertising. When switched off, the surface serves as a standard mirror.

For families flying with small children, onboard diaper-changing tables can be narrow, which can make for an uncomfortable and unhappy child. However, that diagonally positioned toilet allows for a larger changing table to be deployed, on which a child can lie lengthwise. When the changing table is folded down, the room transforms: animations are projected on the wall and accompanying sound effects play, keeping the child entertained and calm.

Opinion: Conflicting needs

Sebastian Tivig, creative lead at Diehl Aviation, has found that OEM, airline and passenger needs do not necessarily align when it comes to lav design. He considers what can be done to please everyone, if it is possible, and whether indeed he wants to fulfill all these needs.

He first considers streamlining developments: “Most suppliers develop primarily for the OEMs, as lavatories have a small retrofit

market. But OEM developments are typically burdened by thousands of non-certification relevant requirements. By developing directly for the retrofit market, we can be three times faster, at half the cost, while improving spaciousness, functionality and innovation.”

Next up, Tivig considers space: “Using smaller [non-OEM] equipment and user-centric, ergonomic designs, we can free-up

5-10in [12.5-25cm] of interior space for the passenger, while also reducing the lav width by the same amount and increasing airline revenue space – at limited or even no additional cost.

“Coupled with well-placed lighting and directed air streams, the shrunk lavatory can feel larger than a current one.”

Read more in the Opinion section of our website.



DENSIFICATION³

Airlines need floor space, so how can lav design deliver without compromising passenger comfort? And how can disabled passengers' needs be met?

“The current meta-trend for lavatories is simple: smaller and smaller – to the point where a slightly bulkier person cannot enter and where even a slim person thinks thrice before using the lav,” says Helge Sachs, SVP of product innovation at Diehl Aviation.

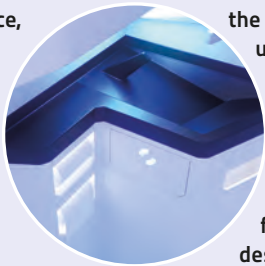
In response, Sachs' team has developed a solution for ultra-dense lavs, paving the way for the mid-term future. In-depth ergonomic analysis and over two decades of experience enabled freeing up to 8in of internal space compared with some conventional lavs and around 3in compared with some current OEM slim lavs, according to Sachs. This was achieved by widening the door at shoulder height for ease of egress and ingress comfort, and PRM-friendly features added, to create what Diehl has named Space³ – in essence three lavs fitted in

the same space as two are usually fitted, which are PRM enabled and can accommodate a 95th percentile US male.

But what does Sachs' team have planned for tomorrow's lav designs? “When it comes to densification, we still have a few tricks up our sleeves and can likely gain another inch or two – but that is the limit,” he states.

“In the end, you still have to fit the passenger in the space. So instead of finding solutions to shrink the space itself, we have to think outside the box, using the lavatory to gain space in other areas: storage during take-off and landing, integrating a front-row monument, collapsible monuments [using door space during flight], under-floor [cargo compartment] monuments and the like,” says Sachs.

Visit the Opinion section of our website to find out about the solutions being developed.



Mr Meier's future flight

Let's indulge in a short story about how Diehl envisages the future lavatory experience, 10 to 20 years from now...

Mr Meier, aged 67, flies a six-hour leg to his vacation destination. He needs to use the lavatory more often than when

he was younger – but he is no longer anxious to do so. While ultra-slim lavs were the norm in the 2020s, the aging population drove changes in cabin design, including making the lav experience actually pleasant.

Mr Meier walks up to the lav door, which opens automatically, revealing a space-optimized, well-lit and clean interior. As he walks in, the door closes and latches behind him. The lights become brighter, more bluish. A soft breeze of warm air blows gently. There are handholds for Mr Meier, coat hooks and symbols showing him where everything is. As he turns toward the toilet, the lid automatically opens to reveal a disinfected, clean seat.

Ablutions complete, the lid closes and the toilet flushes automatically. The light around the faucet becomes brighter, and as Mr Meier washes his hands, automatic air extraction and disinfection systems remove odors, clean the toilet seat and make sure there are no bacteria left.



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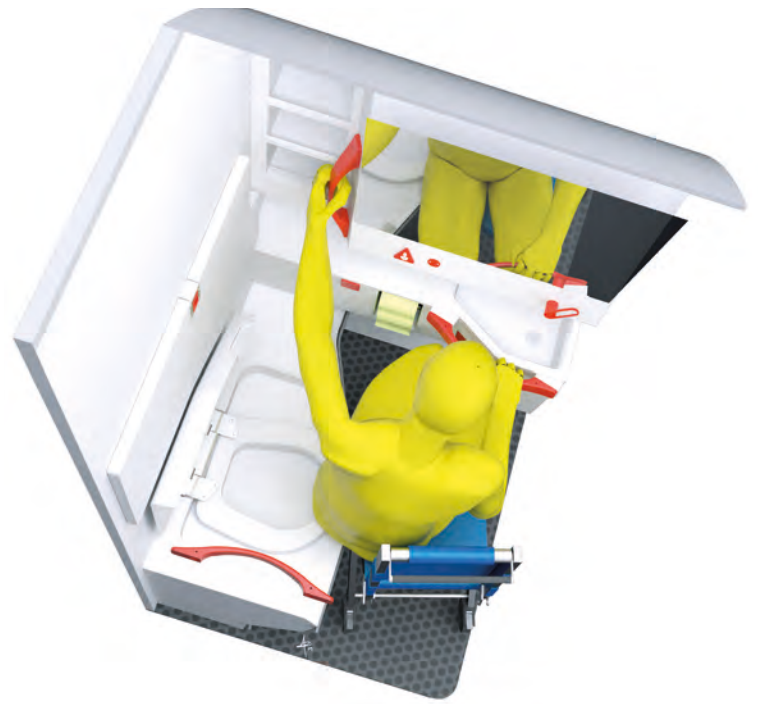
A lavatory for all

For many people with reduced mobility, using the aircraft toilet can still present difficulties. The LAV4All (Lavatory for All) design by FACC has been devised as a solution for various applications, especially for short- or medium-haul flights. Ingress to the lav is improved for passengers in wheelchairs, giving them a wider range of movement, making the transfer to the toilet much easier.

With the toilet located in the rear of the space, the wheelchair can maneuver in the galley area to achieve a good position for ingress into the toilet. The space has been maximized for maneuverability,

such as the positioning of the handles to optimally support all passengers. Likewise, buttons and actuators have been placed to make them as accessible for use by blind people and the elderly as other passengers. They are easy to activate and respond smoothly, especially useful for people with motor skills issues.

The project is being funded by the Federal Ministry for Transport, Innovation and Technology under the Take Off program, with partners Netwiss OG, Rodlauer Consulting, Vienna University of Technology, Raltec and Joanneum University of Applied Sciences.



AIRGLIDE LAVATORY

A team at North Carolina State University has reimagined lavatory layouts to improve accessibility for handicapped passengers entering and exiting the lav, and transferring from chair to toilet. The project, named the AirGlide Lavatory and developed with a little help from Collins Aerospace, is designed to work with a transfer chair.

A relocation of the plumbing systems to the rear of the unit and beside the sink means the AirGlide Seat can be rolled in without crew help. Accessibility is aided by the door: to open it, the user pushes the button on the outside, which activates the automatic door motion, exposing the full width of the space for easy transfer from

seat to lav. The sliding motion also minimizes obstruction in the aisle.

Should an airline not specify automatic actuation or the system develops a fault, the door can also be opened manually by pulling the latch to the side. The first half of the door comes out slightly, before sliding across the front of the second half.

Inclusive design

Safran Cabin is focusing its efforts on future lavatory design to make them more durable, easier to use, and more accommodating for wheelchair users and first-time flyers. The company's biggest advance of late is making PRM-accessible lavs an option for regional jet operators, bucking the trend toward fitting smaller lavatories by offering a larger-size lavatory in the new Atmosphere interior of the Bombardier CRJ Series aircraft, as well as more spacious dual-lavatories that convert into a wheelchair-accessible single in the Airbus A220.

On the usability front, the company's ECOS bifold lavatory door has moved from the concept stage to active

development and introduces innovations including an elastomeric hinge that eliminates the high-tension springs used in conventional doors, saving weight, eliminating maintenance and making the closure motion more natural.

The second innovation is a more intuitive rotary lock, which resembles a conventional doorknob, while the third is a new handle geometry that enables users to open the door with one hand by simply pulling on the handle, eliminating the need to push the door while also trying to slide it, which is a point of confusion for many new travelers.



3 hygiene concepts

WATER DISINFECTION

Some passengers are wary of the water from the lavatory faucet, and are reluctant to drink it or use it when taking pills, brushing their teeth, or washing their face.

However, Diehl Aviation has developed a water disinfection unit based on UVC LEDs, which can be integrated close to the tap or even directly into the faucet without major changes in the potable water system, and can produce different arrays and output profiles. The retrofittable unit also protects the potable water system against microbial contamination and claims to kill 99.99% of germs.



Air purification

The Sedona Pure was developed by the CleanCo Bioscience Group (with input from Rockwell Collins Interior Systems) to improve lav air quality.

The technology is claimed to be able to purify the air of a 320ft² (30m²) space to the cleanliness level of a hospital room. Unlike some air purification systems, the Sedona Pure not only kills bacteria in the air, but also pulls bacteria from the airspace before pathogens can land on the surface. Subsequently, the device helps pull bacteria off the surface and forces it through the system to leave a clean environment.

So how does it work?

The technology combines a three-tier filtration system with the germicidal action of UV. A pre-filter captures dust, hair and larger particles to extend the life of the primary high-performance filter, while an activated carbon filter removes organic vapors, HEPA filtration (high-efficiency particulate air) removes submicron particles down to 0.25µm including pollen and mold spores. Meanwhile, germicidal UV kills germs with energy-efficient, solid-state LEDs – even better, pathogens cannot develop UV resistance.



GERM-KILLING LIGHT

Boeing engineers and designers have developed a self-cleaning lavatory prototype that uses ultraviolet (UV) light to kill a claimed 99.99% of germs. The cleaning system can disinfect all surfaces after every use in just three seconds. Boeing believes this self-cleaning technology, combined with touchless features, will enhance the passenger experience on commercial flights.

The lav uses Far UV (FUV) light that would be activated only when unoccupied. FUV is different from the UVA or UVB light in tanning beds,

and is not harmful to people. Tests on the prototype have shown that this innovation can minimize growth and transmission of microorganisms.

"We're trying to alleviate the anxiety we face when using a restroom that gets a workout during a flight," says Jeanne Yu, Boeing's director of environmental performance. "In the prototype, we position the lights throughout the lav so that it floods the touch surfaces like the toilet seat, sink and countertops with the UV light once a person exits the lav."

The cleaning system, which will require further study before it can be offered to airlines, would lift and close the toilet seat by itself so that all surfaces are exposed during the cleaning cycle.

The design also incorporates a hands-free faucet, soap dispenser, trash flap, toilet lid and seat, and a hand dryer. A hands-free door latch and a vacuum vent system for the floor are also under study, all to keep the lavatory as hygienic as possible between scheduled cleaning operations.



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AGILE *ideas*

Space, weight and water efficiency are key trends in lavatory design, and the Agile vacuum toilet design by Collins Aerospace is on trend, saving a claimed 55% in weight and 45% in water consumption compared with some existing products, as well as an MTBF that is four times higher.

The Spacewall design eliminates 7in of wasted space and the sink design enables passengers to turn comfortably in the lavatory, with plenty of shoulder room.



ZEN *philosophy*

With many B777 aircraft due for maintenance improvements in the coming years, the ARC lavatory upgrade system by VT Volant has been designed in anticipation of strong market demand on the horizon. The kits can be optimized for the slightly different architectures of the 14 potential lavatory locations on a B777, and each one has delivered highly functional 'zen' spaces with hygiene and well-being at the core of the design philosophy. ●

See p16 for more details.





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THERE IS A GROWING TREND TOWARD BUSINESS CLASS SEATS FEATURING PRIVACY DOORS. IS THIS A POSITIVE MOVE FOR THE FUTURE, IN TERMS OF ENGINEERING, OPERATIONS AND PASSENGER EXPERIENCE? HERE'S WHAT THE EXPERTS SAY...

Words by John Walton



investigation

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“There is a continuing trend to upgrade business class with first class features”



This year is shaping up to be the one that will see the introduction of many fully flat business class seats that not only offer direct aisle access, but are also fitted with doors. Qatar Airways’ Qsuite (produced by Collins Aerospace) and Delta Air Lines’ Delta One Suite (based on the Thompson Vantage XL+), after fighting it out for various design awards, have engendered more business class seats with doors.

Airlines not previously expected to be passenger experience trailblazers, such as China Eastern (on its A350) and subsidiary Shanghai Airlines (on its B787) now have doors in business class, in both cases using the Thompson Vantage XL+ platform. Malaysia Airlines, too, is planning to offer the doored front row of its Vantage XL-based business cabin as a non-first-class upgrade.

Yet the needs and expectations of business class flyers on airlines running the gamut of market segmentation are often set by first class products – and by top-tier airlines.

As Tangerine’s chief creative officer, Matt Round, explains, “Privacy is a key desire for premium flyers and is therefore a must in first and business class from a brand

and marketing perspective. First class suites have become very enclosed, and a door is now expected. This trend is filtering from first down into business class, which also happened with the provision of lie-flat beds and individual aisle access in the 2000s.”

“Going to bed with 60 strangers is not a normal activity for most of us,” jokes Tim Manson, design director at JPA Design, highlighting that, as a result, “Privacy is a highly valued characteristic in premium travel. This is amplified for passengers who might be at different life stages or have a less confident, more private mindset. Our relationship with privacy is a variable one though: we all have different proximity tolerances, and these change within a flight and over different journeys.”

One key factor is the ability for passengers to reduce the potential of being disturbed by other travelers. This concern is growing, not necessarily due to a growth in actual disturbances, but by a growth in its visibility, partly driven by the surge of camera phones and social media, which means that behavior by disruptive passengers is more frequently shared, publicized and reported on.

As a result, says Manson, “When considering other passenger types, doors also mean the more thoughtless

passengers have less impact on their neighbors, improving comfort values. In effect, doors enhance the experience for a differing number of passengers at different levels. This has to be a good thing.”

The growth of the space given over to business class within the aircraft cabin, often at the expense of shrinking first class provision in general and space within cabins in particular, is a strong driver for doors in business class.

“There is a continuing trend to upgrade business class with first class features,” says Mark Hiller, CEO of Recaro Aircraft Seating, which has begun

ABOVE AND INSET: FIRST CLASS MINI SUITES SUCH AS THOSE IN OMAN AIR’S DREAMLINER FLEET ARE INSPIRING A NEW GENERATION OF BUSINESS CLASS

BELOW: A DOORED BUSINESS CLASS DESIGN STUDY BY RECARO, WHOSE CEO IS NOTING INTEREST IN THE IDEA



ARE DOORS FOR EVERYONE?

Should we assume that the future of business class has to involve doors for every passenger? Not necessarily, say seat makers and designers.

"Arguments against sliding doors typically involve limited seat width, especially on small fuselages, for example the Airbus A330 and Boeing 787," says Recaro's Mark Hiller. "These doors impact the weight of the aircraft and the seats have a higher complexity, meaning more moving parts, with a potential impact on in-service maintenance."

The alternative, suggests Hiller, is that: "Side-by-side privacy can be adapted individually through moveable privacy dividers. Privacy toward the aisle can be achieved without sliding doors by shaping the seat shell accordingly. There is an ability to shape the upper shell according to individual customer demands."

"A combination of privacy screens and LOPAs such as staggers with individual aisle access can go a

long way to increase privacy while leaving the impression of an open cabin, and keeping weight low and satisfying certification constraints," says PriestmanGoode's Nigel Goode, suggesting that learning from examples in first class may well reap benefits.

"The first class cabin on the Air France A380, which we designed, is another good example. It uses a privacy curtain rather than a door. This provides a very flexible environment, which can be completely open. When closed off, the curtains provide a softer feel to the interiors. There are also huge weight savings with this solution."

However, Goode says, "For me, the main argument [against doors] would be the lack of contact with the crew. We know that great service is an integral part of the passenger experience. Great crew are able to anticipate a passenger's needs. If passengers are closed off behind doors, this becomes more difficult."

THE SKYLounge CORE DESIGN BY SAFRAN SEATS HAS CUSTOMIZABLE LEVELS OF PRIVACY, WHICH MAY SUIT SOME CARRIERS MORE THAN DOORS

BELOW: SLIDING DOORS AND SLIDING PANELS WITH QATAR AIRWAYS' QSUITE



"Many airlines are seeing sliding privacy doors as the next quantum leap in business class"



offering its first doored business class suite, an add-on to its existing CL6710 hybrid staggered herringbone product.

"Doored suites are and will continue to be an important business class feature. This is especially true for 5-star carriers and on flagship routes. Doors on other routes will also be expected to feature no-frills and premium business class cabins."

Indeed, says Hiller, "Sliding aisle-side privacy doors in business have attracted high interest in the aircraft seating industry. Many airlines are seeing them as the next quantum leap in business class after the introduction of all-aisle-access products. Furthermore, doored suites serve to upgrade business class to a first class experience, while first class is fading away from wide-body fleets."

There are technical challenges, however. Adding sliding doors to an existing seating product or creating doors



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“A secondary emergency exit mechanism is required to be integrated”

seats, slowing down service routines, and reducing the width of the passenger space in order to include a door.”

Other design and production tensions within the cabin compete as well. Can doored suites provide additional storage options so that central overhead bins can be removed, providing a more airy feel for center passengers? Do or should all suites require this additional storage, or simply the center ones? And how can airlines design added amenities so that passengers who end up in center seats don't feel hard done by?

These are complex questions to answer – but so are the questions about how to design, certify and manufacture the door mechanisms themselves, as well as the consequences for the cabin environment that adding substantial vertical surfaces engender.

“For the most part,” says PriestmanGoode's director of design house, Nigel Goode, “doored suites are based on a sliding door mechanism. One of the most

complex things is the perfect alignment

of the doors in an aircraft, which is constantly moving. It's a long, complex, rigorous process, so experience is key. We work very closely with manufacturers and test each product extensively to make sure that everyone, regardless of their height or strength, is able to exit the suite in the event of an emergency.”

“Certification requirements must be fulfilled,” emphasizes Recaro's Hiller. “A secondary emergency exit mechanism, a Type-4 emergency exit, is required to be integrated into the doors to ensure secure evacuation, even if the door is blocked. Regular first class suites must have two doors, so if one jams, you can get out through the other one. You must also be able to climb over the door or the suite, to get to the aisle. If there is only one door to the suite, you must be able to take part of it off. Fully closed-off suites – floor to ceiling doors – must have a separate door, which functions as an emergency exit.”

as a fundamental part of a new business class seat is a highly complex task.

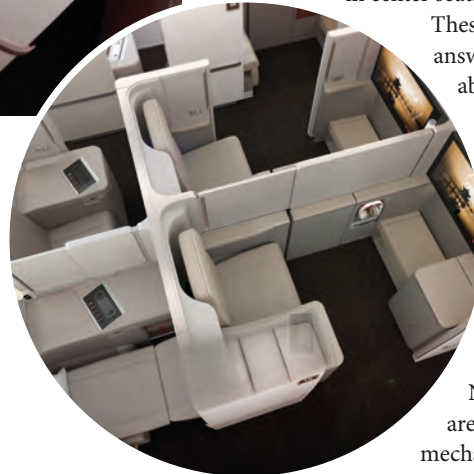
“Sliding doors require integration space, which can compromise passenger living space or aisle width,” says Recaro's Hiller. “The most effective mechanisms work smoothly and reliably, not visible or even perceivable by the passenger. It is not really a challenge in wide fuselages, for example the B777, but it is a tricky task on smaller ones, for example the A330, where seat width in a 1-2-1 business class configuration is already very limited.”

Matt Round at Tangerine elaborates: “There are both regulatory and physical constraints that affect the design of suite doors. Firstly, the frangibility of the door and tight safety requirements define how the door needs to behave in an emergency situation. Secondly, the structure of the object, the way that it moves, and the amount of space that it requires, are practical issues that are tough to resolve in a considered way. The bigger question, though, is, what is the right experience for the passenger?”

This is not an entirely new challenge for airlines, cabin designers and manufacturers of premium class seating. Cathay Pacific's previous-generation inward-facing herringbone seat (built by Contour) was quickly nicknamed ‘coffin class’ for its high walls, which felt claustrophobic for a substantial number of travelers.

“The design challenges to overcome are,” says Round, “the feeling of living in a box, the creation of long and narrow corridors with little natural light on centerline

ABOVE AND INSET: THIS VERSION OF THE THOMPSON VANTAGE XL+ WAS CUSTOMIZED WITH FACTORYDESIGN FOR CHINA EASTERN, WITH THE FRONT SEATS ENCLOSED BY DOORS TO CREATE AN ENHANCED EXPERIENCE



Yet designers, engineers and manufacturers are bumping right up against the limits of certification, as Alastair Hamilton, vice president of sales and marketing for interiors at Collins Aerospace (previously Rockwell Collins and B/E Aerospace), which developed the bespoke Qatar Airways Qsuite (with PriestmanGoode), explains: “The biggest hurdle is that there were no regulations in place for doors to comply with. The use of doors is driving the regulations as we develop and install,” Hamilton says. “We are working closely with EASA and FAA during design reviews and seat evaluations. Regulations do require a secondary escape path and each seat type has installation-specific solutions.”

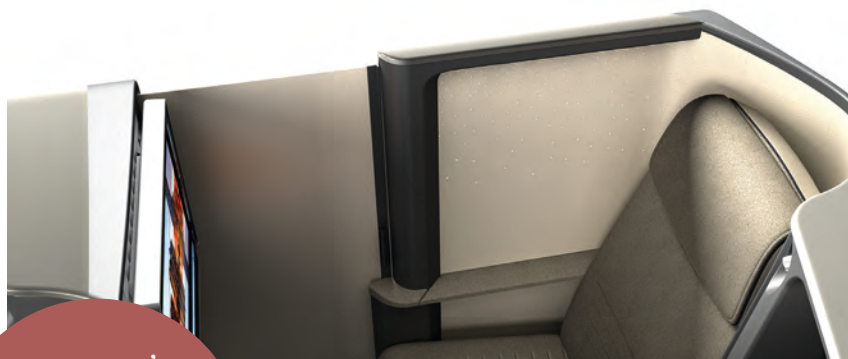
“Another technical issue that doored suites throw up is airflow,” notes Goode, “which is designed for the whole aircraft. If you’re seated in, effectively, a small box within the aircraft, even with low doors, airflow is reduced, which means air quality is reduced. One way to design around that is to have perforations in the door, for example



ABOVE: SAFRAN SEATS HAS DEVISED A FLEXIBLE PULL-OUT AISLE DIVIDER AS A SIMPLE ALTERNATIVE TO A DOOR

LEFT: AN INNOVATOR IN THE FIELD – JETBLUE’S MINT SUITES INTRODUCED DOORS IN 2013

Safran Seats' flexible door concept is a finalist in the 2019 Crystal Cabin Awards



louvers, which provide privacy while allowing airflow, and to have a separate airflow system within the suite.”

On balance, it seems largely unlikely that the trend of creating business seats with doors will reverse. “Arguably,” says JPA’s Tim Manson, “the next qualitative steps are how to make the theater of the door more rewarding.”

Some of this work is already being done, with Safran Seats exhibiting a semi-door screen last year at Aircraft Interiors Expo (then as Zodiac Aerospace), for its SKYLounge product.

Indeed, notes Manson, “We should also consider that ultra-long-haul flights are emerging. It might be expected that these flights have a higher degree of personal demands, and privacy plays a key role in making this type of flight more appealing. Although naturally the designs would need to be on the lighter side for this use on these weight-sensitive aircraft.”

Drawing parallels to previous generational evolution in onboard product, Goode notes, “The development of doored suites is similar to the way in which flat beds or the idea of aisle access for every seat gradually migrated from first class to business, as airlines looked for ways to differentiate themselves from their competitors.”

The challenge of smaller wide-bodies

The complexities of creating doored suites in business class in smaller wide-body aircraft like the B787 and A330 offer a number of specific challenges for designers and manufacturers. A B777 offers a cabin width of 5.86m, whereas an A330 or A340 has a width of 5.26m. A difference of 60cm, particularly spread across a 1-2-1 configuration, is complex.

“The A330 and B787 aircraft are the most challenging fuselages in this aspect,” says Recaro’s Mark Hiller, highlighting the engineering and composite manufacturing expertise that is required to meet the challenges of delivering living space against the competing demands of lower weight and high reliability.

Some of the responses to these challenges are around the angle away from the centerline of the aircraft, but the 18° angle

regulations make substantial changes complex, time-consuming and – as multiple seat makers have found – fraught with certification delays.

More recently, designers and manufacturers are looking at how seats can be made to adjust to the curvature of cabins, and indeed to the human form: how wide does an aisle in business class need to be, and can it be different at foot level, at hip level, and at shoulder level, for example?

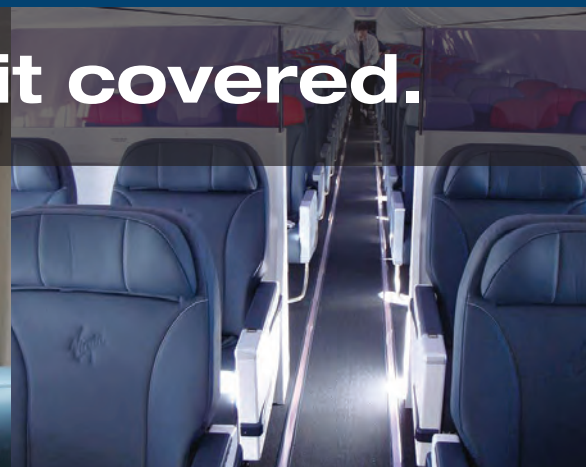
“If doors are used, then however they are designed, they will take up passenger space,” says PriestmanGoode’s Nigel Goode. “The certification requirements for doors are stringent, as they need to be robust. The mechanisms are bulky and weighty. So while it is possible to implement doors on smaller wide-bodies, the first question for airlines should be whether they are necessary.”

Indeed, one question is whether doors are necessary or even desirable on both sides of an aisle. One way for airlines to make center seats more attractive could be to offer doors only on the center seats. Privacy would be achieved for all passengers, but those in the less desirable seats would get an extra perk.

Similarly, the bad seat/good seat juxtaposition of staggered layouts, where seats directly next to an aisle are less private and more prone to disturbance from the aisle when compared with those seats on the other side of a side table/foot cubby from the aisle, could be ameliorated by giving only directly aisle-adjacent seats a door.

Taken together with a big picture view of a LOPA, doored seats could be placed opposite seats without doors, offering privacy and disturbance benefits, while largely halving the weight and space impact.

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TIME, COST AND QUALITY PRESSURES ON AIRCRAFT CABIN MOCK-UP MODELERS ARE GREATER THAN EVER, BUT DEDICATED FIRMS ARE STILL PRODUCING AMAZING RESULTS. WE TALK TO SOME OF THE MOST SWITCHED-ON IN THE INDUSTRY ABOUT THE TRENDS AND CHANGES IN THIS HIGHLY SPECIALIST AREA THAT CAN BENEFIT CABIN DESIGN TEAMS

Words by Guy Bird

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The skills evident within every layer of full-size and three-dimensional physical aircraft interior cabin models – whether on display at global trade and aviation shows, or for internal design evaluation and staff training – never cease to amaze. But specialist model-making companies are reporting a feeling of increased pressure to find new ways to improve quality while keeping a lid on the costs and meeting clients' ever-tighter deadlines.

For Nick Phelps, managing director of Curvature Group, the UK-based company that has created intricate aerospace and automotive prototypes for Safran, AIM Altitude, McLaren and Bentley, among others – the now-normal expectation of next-day delivery in wider society created by the likes of internet giant Amazon is partly responsible.

ABOVE: AIRBUS SHOWED AN A320 AIRSPACE MOCK-UP AT AIRCRAFT INTERIORS EXPO 2018

BELOW RIGHT: THE COMAC C919 MOCK-UP IS A GREAT INTRODUCTION TO THE AIRCRAFT

BELOW LEFT: STEPPING INSIDE THE C919 MOCK-UP GIVES A FEEL FOR THE SPACE

"Timelines are getting so compressed," he says, before qualifying, "The lead times may be comparable to what they were, but the expectation of what's achievable within them is increasing."

Len Martin, managing director at Ogle Models in the UK is of a similar view.

"There is a continual demand to shorten timescales on mock-up delivery, and being the last part of the process they are always being squeezed," he concedes, before seeing a brighter upside. "But having a good relationship with manufacturers and designers, and understanding their requirements and receiving the right quality of 3D data, helps the process."



Timescales really depend on the type, quality and complexity of what's required, but monument mock-ups can take 4 to 12 weeks, seating mock-ups 8 to 16 weeks, and cabin mock-ups 12 to 24 weeks."

Adrian Gander, managing director of Advanced Tooling Systems (ATS) in the UK, adds a third voice to the debate and a sage opinion regarding the consequences of such shortened deadlines. "There is always pressure on timing and there always will be, as people make design decisions later and later, but this is coupled with a desire to have greater functionality and a closer representation of the

RIGHT: THE CABIN MOCK-UPS WITHIN ETIHAD'S INNOVATION CENTER IN ABU DHABI ARE USEFUL FOR TRYING OUT NEW PRODUCT FEATURES AND CREW TRAINING

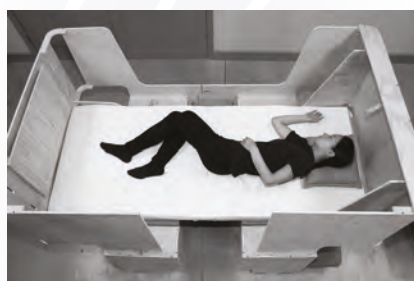
production parts. I have a very simple way of looking at this, and it all comes down to three things: quality, cost and timing. We are normally able to achieve an improvement in two of these by affecting the third, but it is very difficult to improve on all three."

REAL MATERIALS, PLEASE

The point Gander raises about greater functionality and a closer representation to the final production parts is a trend all the model-making managing directors are seeing. For Curvature's Phelps this trend is in part because the designs are becoming more complex.

"Designers have become more ambitious due to the products available to them, and so models are getting harder to make," he says. "For instance, to create more space, designers are making structures thinner, so it's becoming increasingly hard to make a model without using the same materials as the final product.

"We're using a lot more composites and carbon fiber, whereas in the old days we'd make something out of MDF, tooling board, or glass-reinforced plastic. Something that used to be 25mm thick



"Designers have become more ambitious due to the products available"

now has to be 10mm. And if someone leans against a structure [not made out of the real material] it will break."

MANUFACTURING METHODS

In terms of how those specialist parts are being made, the mature processes of stereolithography (SLA) and selective laser sintering (SLS) still seem to be the favored technologies – but for different parts of the model, as Phelps explains: "We use SLS when we want something non-visual, bulky, quick and lower cost. If we want a finished piece – like a reading lamp for a business class seat – we'll use SLA. Both technologies have been around for a while and have become very good."

Computer numerical controlled (CNC) cutting is still prevalent as well. Ogle's Martin discounts selective laser melting (SLM) in favor of CNC, reasoning, "SLM is only for metal parts and is much too expensive for mock-ups. We CNC all our metal parts as it's quicker and more accurate."

ATS's Gander is also an advocate for CNC in the right situation: "CNC parts machined from solid plastic do not sound so sexy, but they give you a very accurate part machined from the correct material, which is good for both testing and finishing. And the cost is very competitive."



ABOVE AND LEFT: A MOCK-UP HAS PROVED A VALUABLE TOOL FOR FORMATION DESIGN IN DESIGNING AND EVALUATING A SEAT WITH AN INNOVATIVE LOPA



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ABOVE AND RIGHT: THIS MOCK-UP HAS PROVED INVALUABLE FOR PROMOTING THE MITSUBISHI REGIONAL JET (MRJ) AT AIRSHOWS AROUND THE WORLD

BELOW: COLLINS AEROSPACE (B/E AEROSPACE AT THE TIME) CREATED THIS BAR MOCK-UP FOR THE A3XX



THE VIRTUAL REALITY EFFECT?

And what of virtual reality (VR) cabin mock-ups in this world of increasing detail and speed? Perhaps understandably, none of the model-making companies are especially big fans of VR, but aside from its potential to take away some of their work, their skepticism seems well reasoned, rather than merely partisan.

Ogle's Martin says the ergonomic problems of virtual over the real are big obstacles. "With designers continually striving to extract and use every little bit of space around a seat, you need a mock-up to see if you can enter the space and fit into the seat without hitting a knee or elbow," he says. "You can't do that with VR. The automotive industry tried using big VR suites years ago, but that seems to have gone now. People want to touch and feel, and to see the perceived quality."

For Curvature's Phelps, the economic risks to the client are high on his list of concerns about VR: "The boundary for VR tech is whether companies are going to commit hundreds of millions of pounds on design, tooling, development and product marketing without anyone ever having touched the real product before it reaches the showroom."

ATS's Gander concurs, but does think there can be a place for VR in limited contexts. "Where I see it having the most benefit is in the color and trim area, as the customer can quickly see the different effects of changing colors and textures, and also as a sales tool. But from what I have seen, we are still a long way from a product that a customer will sign-off on. I am sure VR will advance quickly in quality, but I am still not sure if it will fully replace models."

Certainly it seems that VR might replace some early phases of the development process, and all the

"I am sure VR will advance quickly in quality, but not if it will fully replace models"



model-making experts we spoke to agreed that fewer mock-ups are generally being requested by the client. As a result, the mock-ups that are made are having to do more of the 'design heavy-lifting' in terms of creating a realistic impression. For instance, Curvature's Phelps sees the preliminary or provisional design review (PDR) using real design data becoming the main model, and the later critical design review (CDR) model – which used to add the correct color, trim and finish, and any adjustments made – being jettisoned in some design processes.

"In this day and age, lots of low-cost airlines will make the decision based on rendered images and potentially sign-off on the design with a mood board and swatches – anything to save money," Phelps says. "It's probably the more established airlines such as BA, Lufthansa and Singapore that will continue with the fuller process because they know their brand is everything."

“From what we see, the UK is still a leader in the aircraft mock-up area”

Phelps sees his business mainly doing front-row monuments and seating for aerospace clients and concentrating largely on full-size models. “The logical reason for that is because anything smaller can be done much more cheaply overseas in places like China,” he explains.

Why don’t Chinese companies do the full-scale models too, though? “I think a lot of it is to do with the potential risk of the loss of intellectual property in the early stages of design when the client wants things realized in full-size. When small-scale pieces are done, it’s usually when the design intent is out in the marketplace and you can’t hide it. Secondly, the quality stuff we’re involved with in the UK model sector is for premium automotive, aerospace, and so on, and the UK is known as the place where you design that sort of stuff. The designers don’t want to fly long-haul to China to see something realized for a little less money, but which then costs a fortune to get shipped back here.”

And why is the UK historically so good at model



ABOVE: THIS MOCK-UP PROVED A SUCCESS, WITH THE DESIGN TAKING TO THE AIR. WHAT WAS IT? ANSWER: LUFTHANSA'S FIRST CLASS

BELOW: OGLE CREATED THIS MOCK-UP OF A LUXURY INTERIOR FOR BELL HELICOPTER

making and still such a hotbed for these skills today? “I often ask that myself,” Phelps says, before adding with a hearty laugh, “I think the UK is good at doing what people say can’t be done.”

ATS’s Gander agrees: “From what we see, the UK is still a leader in the aircraft mock-up area, mainly benefited by the fact that the UK hosts the main design companies in this field. Over the past few years there has been a lot of change in ownership of the main manufacturers, which has definitely led to a reduction in development, but it is still a significant marketplace supporting a growing manufacturing area as the quantity of airplanes in the sky grows year-on-year.”

Gander is more reserved about what the future holds for the industry, but still sees an exciting future for the highly skilled model makers within it, as he concludes, “We are engineers, not trendsetters like our design partners, so I will leave the look, feel and colors down to people better qualified than me. But there will be much greater integration with our personal electronic devices, more changes in lighting, and I can also see a time when the humble aircraft window will be replaced with screens and cameras.

“With regard to seating, much has been done over the past 10 years to cram more people into an ever-decreasing space, but I feel the future will be in making these spaces more flexible, all of which will still need testing and modeling, we hope.”



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HOW CAN AN AIRLINE MAKE SURE ITS AMENITY KIT STANDS OUT AGAINST THE COMPETITION?

Petros Sakkis, CMO, Wessco International:

"An outstanding amenity kit fosters the airline-passenger relationship through exceptional brand promise alignment. Airlines achieve this with reliable partners experienced in creating the best ways of saying, "Here's a small token of who we are and what you mean to us."

Cool Canadian

Complementing the recent launch of its Signature Class cabin, Air Canada has introduced new amenity kits that highlight premium Canadian brands Want Les Essentiels and Vitruvi on international flights.

The Air Canada amenity kit, created with Buzz Products, is based on Want Les Essentiels' Midway bag design, which blends a dopp kit and a clutch to offer space and functionality. The compact kits feature a hand strap across the front for comfortable carrying, and the gold and silver zipper is a signature detail of the Want Les

Essentiels brand, with its ethos of 'unity through contrast'.

The bag contains products from skincare brand Vitruvi, a Canadian company focused on creating fresh and modern scents inspired by nature and its West Coast Canadian surroundings. The brand has created a bespoke collection for Air Canada by developing fresh interactions of some of their most popular products.

Each Air Canada kit on international flights contains lip balm, hand cream, a glasses cloth, socks, eye mask, earplugs, toothbrush and toothpaste.



JAL adopts a little Italian style

Japanese airline JAL is introducing pouches by luxury Italian brand Etro in first class. The upscale unisex pouches contain Etro's signature Shantung eau de parfum, scented lip balm and body lotion. JAL collaborated with amenity supplier Wessco International to bring the Italian luxury brand on board an airline for the first time.

Petros Sakkis, CMO at Wessco International, says, "Well-thought-out brand collaborations are key in creating outstanding amenity kit programs. Etro's popularity in Japan, and this being its first onboard amenity program, make for a truly iconic kit."



Eva Air keeps it simple

Taiwanese airline Eva Air has partnered with Danish design brand Georg Jensen to create amenity kits for business class passengers on its long-haul fleet. The unisex kits are very practical, in the form of a black saffiano bag with a detachable chocolate brown bag, with post-flight reuse as a travel organizer in mind.

Each kit contains premium skincare products from US luxury skincare brand 3Lab, comprising hand cream, eye cream and lip balm.

Also included are a Georg Jensen branded dust bag and eyeglass cloth, a comb, socks, eye mask, earplugs and dental kit.



AMENITY KITS



Sleep in style

In other Eva Air news, the airline is launching a partnership with Jason Wu, the Taiwan-born artist and fashion designer based in New York, arranged through Buzz. Wu has designed branded unisex sleeper suits and slippers for long-haul business class

passengers, in soft heathered jersey in blue and gray tones, with a distinctive triple-snap rollover collar and pops of color.

The relaxed fit features minimal seams for sleeping comfort and can be worn from lounge to plane, providing multiple uses, both inflight and beyond.

Wu says of the design, "As a jetsetter myself, one of the most important criteria for my travels is comfort. This collaboration was a great opportunity for me to marry form and function to address something that would improve the experience of the EVA passenger."

HOW CAN AN AIRLINE MAKE SURE ITS AMENITY KIT STANDS OUT AGAINST THE COMPETITION?

Manoj Pradhanani, creative manager, Kaelis:

"The amenity kit is a gift that passengers get to cherish, something that reminds them of their beautiful journey. We use a Four-Feature Formula to bring Amenity Kit Design to another level. One: Face – capture the essence of the Airline. Two: Function – giving it multiple uses with exclusive products. Three: Form – lend a modern defined look; and Four: Feel – explore contemporary textures that care for the environment. Together, these factors make an innovative Amenity kit with a unique character that stands out from the crowd."

Sport b takes off

Eva Air has also launched a new premium economy amenity kit for long-haul routes into Taiwan, in partnership with luxury fashion brand Sport b, a subsidiary of French fashion house Agnès b. Galileo Watermark created this stylish unisex kit, which includes a branded eye mask, dental kit, earplugs and comb, as well as a lip balm and face cream from British skincare brand Scaramouche + Fandango. This partnership marks the Sport b. brand's debut on board an international airline.



KLM couture

KLM worked with Albéa to create its latest amenity kits, which will give a little bit of true glamour to passengers. The kits have been designed with Dutch haute couturier Jan Taminiau, who strived to convey his style into a comparatively low-price, high-volume product – a departure from his usual ‘money no object’ designs worn by the likes of Queen Máxima of the Netherlands. Business class passengers will surely be pleased to leave the flight with a taste of haute couture as well as the high life, with ladies offered a clutch bag and gentlemen a wallet.

A further Dutch touch can be found within the kits, as Albéa worked with lifestyle label Rituals to include a range of cosmetics, all in a special packaging style inspired by the 17th century, when Dutch explorers first began to travel around Asia. Thus while the key fragrance notes reflect this coming together of cultures – Japanese yuzu meets Dutch tulip – the blue and white packaging was inspired by The Lid Vase, an example of Delft Blue pottery from circa 1700. Delft Blue ceramics emerged after the Dutch exploration of Asia, as the nation’s interpretation of Chinese porcelain. And indeed these kits are also sure to be coveted.



HOW CAN AN AIRLINE MAKE SURE ITS AMENITY KIT STANDS OUT AGAINST THE COMPETITION?

Leonard Hamersfeld, director at Buzz:

“Sophisticated travelers expect high levels of comfort and effortlessness. By continually refining the new luxury experience, airlines can provide amenities that encompass meaningful collaborations, first-to-market creations, and engaging stories. Amenity items that are thoughtful gifts are coveted by travelers and become personal keepsakes for the journey and beyond.”

EMIRATES UPS THE LUXURY STAKES

THERE IS ALWAYS SCOPE FOR A LITTLE EXTRA LUXURY, EVEN IN THE SUPER-LUXE ENVIRONS OF EMIRATES’ FIRST CLASS SUITES. THESE TOP-TIER CUSTOMERS ARE NOW OFFERED A WELLNESS POD CONTAINING A RANGE OF SKINCARE PRODUCTS FROM EUROPEAN LUXURY BRAND BYREDO. THE ALLERGEN-FREE COLLECTIONS ARE EXCLUSIVELY CREATED FOR EMIRATES WITH RELAXATION AND HYDRATION IN MIND.

PRODUCTS INCLUDED IN THE POD, WHICH WAS CREATED WITH BUZZ, INCLUDE A FACIAL TONER, EYE CREAM, A CHAMOMILE ROLL-ON SLEEP OIL TO APPLY ON PULSE POINTS AND A CHAMOMILE PILLOW MIST SPRAY.



AIR ASTANA

AIR ASTANA'S PRODUCT DEPARTMENT HAS WORKED WITH KALIS TO DESIGN A NEW ECONOMY CLASS AMENITY KIT FOR MEDIUM- AND LONG-HAUL FLIGHTS. THE COLLECTION CONSISTS OF TWO SETS – NAMED NOWEN AND ZAPPA – EACH AVAILABLE IN FIVE COLORS. THE NOWEN KITS (PICTURED LEFT), WHICH WILL BE GIVEN TO ECONOMY CLASS PASSENGERS FLYING TO KAZAKHSTAN, CONTAIN A SHOE BAG, INFLATABLE NECK PILLOW, TOOTHBRUSH AND TOOTHPASTE, HAND CREAM AND EARPLUGS.



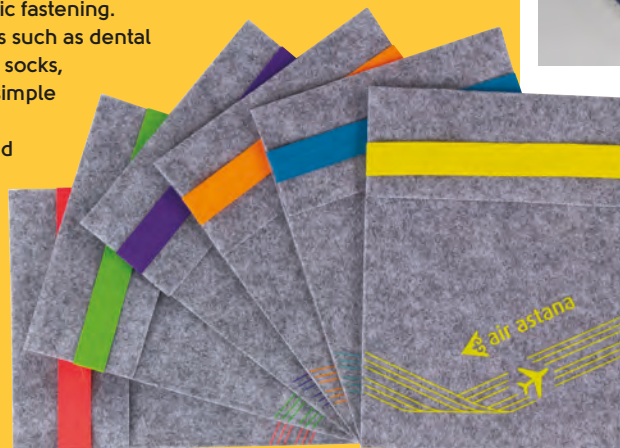
BELOW: THE ZAPPA KITS WILL BE GIVEN TO OUTBOUND ECONOMY PASSENGERS AND CONTAIN A SHOE BAG, SLIPPERS, EYE MASK, HAND CREAM, TOOTHBRUSH AND TOOTHPASTE, AND EARPLUGS.

Astana pouches

Long-haul international economy passengers with Kazakhstani carrier Air Astana now receive a revamped range of amenity kits in the form of a soft felt pouch. The kits, created with Anaik, come in two modern designs, one for inbound and one for outbound flights. Outbound flyers receive a branded pouch, which is handy for keeping together travel essentials such as documents or small electronic devices. On their way back home, inbound passengers receive a similar pouch in a portrait orientation with an elastic fastening.

The kit also includes amenities such as dental kit, reversible eyeshades, a pen, socks, earplugs and hand cream. The simple but stylish kits also feature an inflatable neck pillow for inbound flights and a shoehorn and comb on outbound flights.

Regular Air Astana passengers can collect all six vibrant colors in the range.





Caribbean flavors

French Caribbean regional airline Air Caraïbes has unveiled a colorful new premium economy kit. The pouch is in the form of a miniature version of the pillow available on board, produced in a silky fabric with a greenery pattern, selected to minimize the use of plastics. The airline worked with Anaik to include travel essentials, including an eye mask, tube socks, a comb, a dental kit, earphones and earplugs.

The airline has also created a limited-edition amenity kit for economy and premium economy class, with a distinctly tropical vibe. Inspired by Caribbean beaches, the water-resistant pouches can be repurposed after the flight as a dry bag for watersports fans, or they can be inflated to serve as an inflatable pillow for a seaside siesta.

Visit our website for regular amenity kit updates and a guide to creating a great kit



Unisex style

All of Air Europa's business class passengers can enjoy the same amenity kit, which simplifies airline operations. The unisex bag is finished in neutral gray tones, with a design that can be used folded or unfolded thanks to its integral magnet, with two interior pockets that can help passengers keep their personal belongings well organized. The bag does have a little something extra though, as it can be used as a clutch bag.

The kit, by Kaelis, contains a set of cosmetics from Unicskin, a

luxury brand offering unisex dermocosmetic solutions for all skin types. Unicskin believes the key products offered in the kits are the perfect set for both men and women after a long flight. Passengers can expect a Magic shot beauty vial, an eye contourer, a facial cream, a hand cream and a lip balm.

The amenity also contains the usual essentials for passenger comfort, including travel socks, earplugs, eye mask, toothbrush and toothpaste – all customized for Air Europa.

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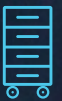
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HOW CAN AN AIRLINE MAKE SURE ITS AMENITY KIT STANDS OUT AGAINST THE COMPETITION?

Amy Bickelmann, director, global brand development, Linstol: "Kits that stand out among the competition and leave a lasting impression with the passenger tie in to a larger story. Whether it is celebrating a commemorative event, cultural heritage, or the launch of a new cosmetic or lifestyle brand on board, kits that successfully contribute to a bigger picture have a higher perceived value and show that an airline is thoughtfully crafting a unique user experience."

United's luxury cowshed

United Airlines' latest amenity kit for Polaris business class furthers the airline's continued partnership with Saks Fifth Avenue, complementing the branded luxury bedding from the New York retailer found on board, all coordinated by amenities specialist Linstol.

The soft-sided, clutch-shaped bag has a structured base for stability and features Saks and United Polaris details, including the chevron pattern from the day blanket on the interior and a logo zipper pull.

The kit contains skincare products from Cowshed, the premium spa and lifestyle brand of Soho House. The skincare products are made in England from organic, wild-crafted and fair-trade plant extracts.



HOW CAN AN AIRLINE MAKE SURE ITS AMENITY KIT STANDS OUT AGAINST THE COMPETITION?

Addy Ng, amenities design director at Spiriant: "It needs to be a unique representation of what the airline stands for."

Two shades of gray

Passengers flying on Asiana Airlines' premium classes have been enjoying two new amenity kits developed by onboard equipment specialist Spiriant. First class guests receive a revamped Salvatore Ferragamo bag with an updated design in two shades of gray, which matches the Tuscan Soul Quintessential range of cosmetics by Bianco di Carrara found inside.



Meanwhile, business class travelers now enjoy a L'Occitane case. Made from padded cotton canvas, it has a wide zippered opening so it can easily be used as a case for an iPad Mini or small tablet. The kit is available in brown and beige to match the Asiana business class cabins, and navy and green to echo the L'Occitane label.





Etihad's upgrades

So how does the most luxurious commercial inflight experience get even better? Etihad Airways has teamed up with Swedish luxury bedding brand Duxiana to introduce a curated experience for the Residence. The program, a collaboration with airline amenities supplier, Wessco International, also includes accessories for passengers on board Etihad's first class cabins, all with styling inspired by the architecture and colors found around Abu Dhabi.

The airline has also worked with Buzz to create new kits for first and business class kits with iconic Italian brand Acqua Di Parma and its signature vibrant yellow.

The first class unisex cylinder bag contains a miniature bottle of Colonia fragrance, as well as body lotion and lip balm. The business class bags are a unisex wallet style kit that can be used as a folio and also be buttoned to create a stylish and useful valet tray and also feature fragrance and skincare from Acqua Di Parma.

AIR FRANCE'S BIRTHDAY TREATS

IN JANUARY 2019, AIR FRANCE INTRODUCED A NEW COMFORT KIT TO MARK ITS 85TH ANNIVERSARY. THE KIT, AVAILABLE ON BOARD BUSINESS AND PREMIUM ECONOMY CABINS UNTIL JULY, IS AVAILABLE IN FOUR DESIGNS FOR BUSINESS CLASS AND TWO FOR PREMIUM ECONOMY, ALL IN A GEOMETRIC DESIGN WITH BRIGHT COLORS.

WTCE in April will showcase many of the latest amenity kit designs. See p224 for details



The great outdoors

As part of its 60th anniversary celebrations this year, China Airlines is releasing a series of new products, including inflight amenity kits for long-haul business class and premium economy. China Airlines is collaborating with outdoors brand The North Face to inject a touch of youth, sports and fashion into its elegant cabins. The red multifunction travel pouch will be introduced in February, and a black pouch will go live in June.

The business class kit is in a water-resistant material with a carabiner-style clip, making it both trendy and practical, while in premium economy the bag is made of lightweight Tyvek material that is supple and durable, water-resistant and reusable. Other colors will be progressively released in the future, making these designs a collector's item.



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Natural attraction

Etihad Airways is refreshing its popular Etihad Explorers children's packs, introducing new characters such as Jamool the Camel and Boo the Panda in an activity booklet developed with leading wildlife charity Born Free. The aim of the packs is to provide younger guests with a greater understanding of animal welfare and how they can play a part in preserving fragile natural habitats, wildlife conservation and wild animal welfare.

Jamal Ahmed Al Awadhi, head of guest experience at Etihad Airways, says, "Our young guests are tremendously important to us and we continuously strive to find more informative, fun and engaging ways to entertain them during their time with us. The refreshed packs are also a way of forming a lasting bond between them and Etihad Airways, making them more aware of who we are and where we fly to and, with the support of Born Free, enhancing their knowledge of important issues facing the planet. We have some exciting developments coming up in this regard."

The packs were created with UK-based agency, Milk Jnr's & Kidworks, and include items such as activity booklets, crayons, card games, coloring-in items, board games, foam toys and note pads.



Flight of fantasy

Is it possible for kids to have fun and learn at the same time on a flight? The Kaelis design team has worked with Air Astana to create something fun and educational that they can also use after the flight.

Two ranges of kits have been developed, the first being a junior kit for kids aged between three and six, with options including

Super Chef, Smashing Super Hero and Voluntary Vet. The second is a senior kit for kids aged between 7 and 11 years, with options for inspiring characters including Amazing Architect, Dangerous Detective and Extreme Explorer. Each of these options gives children a chance to learn more about different career choices.



Pick up a Penguin

Air France is launching a comfort kit for young travelers, dubbed the Penguin collection. Distributed to all parents traveling with a baby on long-haul flights in La Première, business and premium economy, the kit resembles a penguin and contains a plastic bib, adapted spoon, baby wipes and Nivea moisturizing cream for face and body, along with a diaper. This colorful kit made from plush fabric doubles up as a cuddly toy that can be taken home after the flight. ❄️



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In this preview:

This is a special year for the world's largest aircraft interiors event, as it celebrates 20 years at the heart of the industry. More than 1,200 airline buyers and 14,000 aviation decision makers are due to visit Hamburg Messe on April 2, 3 and 4 to see the latest in cabin interiors, IFE and passenger comfort. We bring you the inside track on the launches and reveals you need to know about.



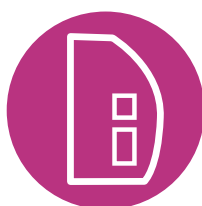
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CABIN DESIGN
ESSENTIALS



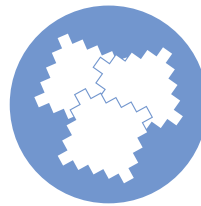
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THE SEAT
DESIGNS YOU
NEED TO
TRY OUT



pl86

MONUMENT
INNOVATIONS



pl92

CREATIVE
NEW CABIN
MATERIALS



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THE LATEST
IFEC AND
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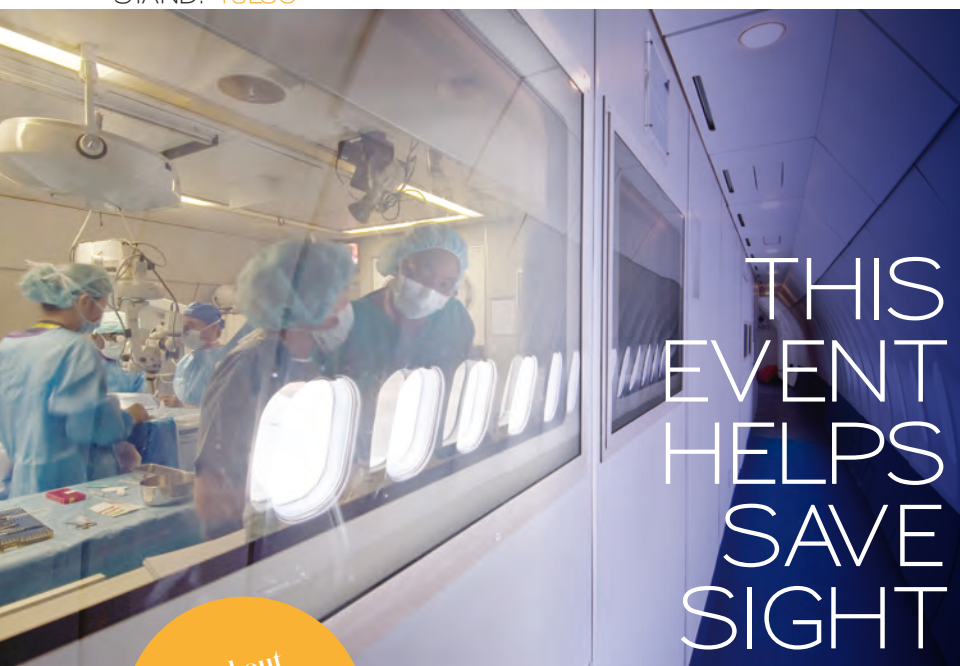


p212

A CELEBRATION
OF TWO
DECADES OF
AIRCRAFT
INTERIORS EXPO

THE BIG PICTURE STORIES

STAND: 4UE30



Find out
how you can
help Orbis at
Stand 4UE30

The organizers of Passenger Experience Week (PEW) are again partnering with Orbis UK, a charity that strives to fight avoidable blindness around the world. With around 18,000 visitors attending PEW's four events – Aircraft Interiors Expo (AIX), the Passenger Experience Conference (PEC), World Travel Catering & Onboard Services Expo (WTCE) and Passenger Technology

Solutions (PTS) – this is a great platform for Orbis to raise awareness of its unique Flying Eye Hospital. This aircraft is an ex-cargo MD-10 that has been customized to become a teaching hospital including an operating theater, recovery room and classroom (with a little help from several AIX exhibitors), which can travel anywhere in the world it is needed, partnering with local hospitals to deliver specialist training, carry out treatments, and raise awareness about the importance of eye health.

Over the past five years alone, Orbis has delivered over 28.6 million medical or optical treatments, over 15.7 million eye exams, and more than 386,000 eye surgeries or laser treatments, either on board the Orbis Flying Eye Hospital or through Orbis-supported health facilities.

This year, the 550+ exhibitors showcasing their services during AIX will again be urged to consider ways in which they can support Orbis UK's vital sight-saving work. Of the 253 million people in the world who are blind or visually impaired, 75% have conditions that are preventable or treatable, so Orbis screens for and treats eye conditions, raises awareness about eye health, and trains and mentors local eye care teams.

As Nilly Sutton, head of corporate partnerships at Orbis UK, says, "Partnering with Passenger Experience Week is a fantastic platform for us to raise awareness of our services among the aviation, rail and cruise industries. We believe that no one should be blind due to lack of quality eye care. With the number of people affected by avoidable blindness due to triple by 2050, our work has never been more vital."

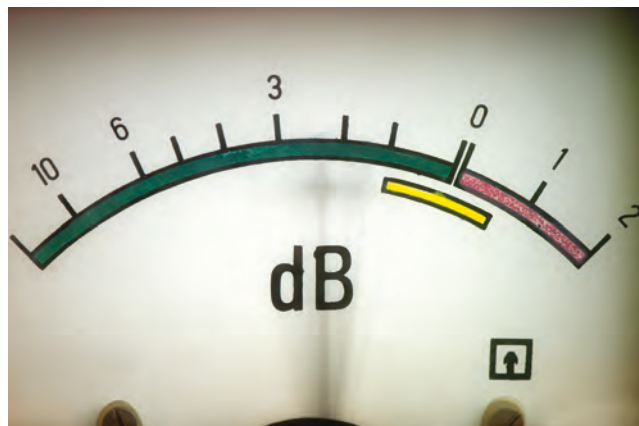
STAND: 1C62

Acoustics engineering

While at the Expo, you can find out more about Hamburg University of Applied Sciences' research center for engineering acoustics, which offers competencies for acoustical engineering. The facility can be booked for education courses, and support is also available for measurement techniques, simulations, passive and active sound reductions means, electroacoustics, psychoacoustics and ultrasound acoustics.

While you're in Hamburg, perhaps you can even visit the university and see its new acoustic laboratory, which

completes the existing experimental and theoretical modeling facilities at the center. This laboratory offers a wide scope of measurement possibilities, including sound path analysis for areas such as fuselage structures or complex modules, sound transmission loss measurements for elements such as cabin walls, sound intensity measurements such as radiated noise from cabin walls, radiated sound power measurement, determination of acoustical direction, sound source localization with microphone arrays, and structure-borne noise transmission.





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STAND: 6C80D

The German aerospace industry has already been working closely together with Canadian aviation companies and research institutions for several years. However, sponsored by the Federal Ministry for Economic Affairs and Energy (BMWi), representatives of SMEs from all over Germany are being invited by the Hamburg Aviation cluster and the German Chamber of Commerce & Industry Toronto to come to Hamburg. At Aircraft Interiors Expo, these visitors can get to know Canadian partners, with a promise of follow-up support for any cooperative projects that result.

Various event formats including information sessions, idea pitches, trade fair tours, company site visits and B2B conversations will provide SMEs with opportunities to make contact with North American Partners, while company site visits in Schleswig-Holstein and Lower Saxony are also planned.

Support for companies in the establishment of German-Canadian partnerships extends

CANADA MEETS GERMAN AVIATION SUPPLIERS

beyond the Expo week. They can draw on the expertise of the German Chamber of Commerce & Industry Toronto (AHK Toronto), which has been supporting small- and medium-sized companies as they enter the Canadian market for more than 50 years. Within the framework of the federal Supply Chain Excellence Initiative (SCE), several regional aviation clusters are working to achieve an increased internationalization of the supplier business.

STAND: 6E80A

Diehl's primary structural solver

A multiyear strategic CAE agreement has been signed whereby Diehl Aviation will use Altair's OptiStruct as a primary solver for structural justification and certification.

Diehl Aviation will replace its legacy solver, instead relying on OptiStruct for structural design, optimization and certification. Diehl Aviation has also chosen the Altair HyperWorks platform as its standard for modeling and visualization, and the Altair AcuSolve package as its preferred solver for CFD.

The overall goal of the agreement is to meet Diehl Aviation's CAE single strategic partner consolidation strategy, while meeting the current and next-generation requirements of Diehl Aviation's growing CAE user base with Altair's CAE systems and expertise in aerospace, as well as furthering its single CAE partner consolidation strategy.

STAND: 1D51

Simplified maintenance

Engineering company Lead Tech has developed what it claims to be a competitively priced and user-friendly tool to manage systems maintenance. The tool, named Lead Maintenance System (LMS) is a team-based authoring tool that can handle development processes in accordance with both the S1000D and ATA iSpec 2200 for aerospace and the DTLS 300 Standard for railway.

The LMS has been developed with the latest development tools to achieve a high level of

security in access management. The main features of the tool are that it is web-based, with no application required; it is open source-based; all data is organized in data modules; and all LMS modules have a data preview, and data can be exported in PDF, XLS or XML format. LMS can also interact with LMS RFID that enables operators of the aircraft as well as MROs, airlines and repair shops to reduce costs and time of the operations according to ATA SPEC 2000 Ch. 9.



STAND: 3U410

WINNING FORMULA

Williams Advanced Engineering and JPA Design will be revealing details about their new partnership, intended to revolutionize future aircraft interiors through the application of world-class design and Formula One-derived technology. Benefits could include new design and lightweight materials innovations using proprietary technologies from both parties to save weight, whilst increasing comfort and space.

"Our work with Williams Advanced Engineering will deliver truly revolutionary advances to the air travel industry, both onboard new aircraft and retrofitted to existing aeroplanes," said James Park, founder of JPA Design. "The fruits of this partnership will offer our customers better use of the space in their cabins, enhanced comfort and functionality for their passengers and a boost to airline profitability."

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THE SEATS YOU NEED TO SEE

STAND: 7A45

Ode to Joy

Rebel.Aero has brought interesting seating designs to the Expo since the company launched in 2015, and has enjoyed success in the Crystal Cabin Awards with its S:4 (shortlisted) and its original folding seat (2016 winner).

Continuing its goal of disrupting the aircraft seating market, this year Rebel.Aero will again be bringing a new economy class seating product to the expo –

and again it will be a little different from the competition.

The company reported high levels of interest in last year's Joy ultra-lightweight economy seat concept, which has led to this year's launch of a more mature design that will focus on the key features that customers have shown the most interest in and requested to see more of. The new version of Joy

will be displayed as a super-lightweight staggered triple seat configuration that the company believes answers all the demands that modern airlines are looking for in a cost-effective and competitive seating solution.

The 2019 Joy seat will be on display alongside Rebel.Aero's Crystal Cabin Award-winning S:two economy seat, which is now certified and on sale.



STAND: 7A05, 7B04

A world of seats in one place

Visitors to Thompson Aero Seating's stand will be able to sample the seats of several airlines, in a short time and an even shorter distance.

Highlights at the stand will include China Eastern's new first class and business class seats for the A350 and B787, which are shared with subsidiary airline Shanghai Airlines.

The seats are based on Thompson's VantageFirst and VantageXL Suite platforms, and this project is the first example of an airline fully embracing the advantages of integration between these two seat platforms. The front row of business class overlaps and integrates with the rear of first class, effectively giving the airlines 'first class for free', as Thompson says.

The center pair of first class seats converts from two private suites into an open, shared space for four people to sit around a large central table; a space promoted by the airline as an Air Living Room. This shared space is envisaged for business travelers wanting to hold meetings, as well as for families and friends to dine, converse, play games or socialize.

Also being displayed will be EVA Airlines' recently launched B787 business class seat, a fully customized version of Thompson's VantageXL product, as well as Thompson's latest A321 customer for the Vantage seat, TAP Portugal.

Read more
about the China
Eastern seats on
p145

STAND: 1UB30

A NEW MIRUS LAUNCH

This year marks the unveiling of an all-new platform from Mirus: the Kestrel. According to the company, this design focuses all the company's expertise and material

knowledge into a "radical" new product. Mirus is remaining tight-lipped, but has stated that the seat has a number of unique features that equate to a game-

changing product on multiple levels, for passengers and operators. Kestrel will complement the Hawk seat, which will also be on display with new features.



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STAND: 4C20, 7B40

Core values

Visitors to Safran Seats (previously Zodiac Seats in case you missed the memo) should try out the Skylounge Core business class seat. This seat, due to launch in 2019, has already won a design award: the Janus Label of Excellence from the Institut Français du Design (French Institute of Design).

The Skylounge Core seat is optimized for use on the Airbus A330 and Boeing 787, offering a spacious living environment, measuring 20in across, with a flat bed surface. The streamlined controls are designed to be ergonomic for ease of use, with several storage compartments and a versatile space for dining, working or leisure. Safran Seats also offers multiple opportunities for customization, so airlines can convey their

Skylounge
Core has a
privacy option:
see p142



brand image and identity.

The industrial design, engineering and industrialization teams at Safran Seats developed new production processes for the composite materials that comprise the shell of the seat. Production has improved in quality, maturity and speed, thanks in particular to what Safran says is a "significant" number of parts shared between versions.

COMFORT FOCUS

At this year's expo, Recaro Aircraft Seating intends to remind visitors what it views as the most important element of the travel experience: comfort. The seat supplier will be presenting its vision for the future, named Driving Comfort in the Sky, which promises

'ingenious' seat design, creative concepts, and individualized solutions. Visitors to the Recaro booth can also experience the CL6710 business class seat, which offers passengers direct aisle access and a full-flat bed, along with fully customizable lighting and seat position options.

STAND: 7B20

Acro Series 6 expanded

Acro is launching two variants in the Series 6 product family. First up is the Series 6 LC, a simple that incorporates an 'extra-spatial' design. Aimed primarily at the narrow-body fleets of LCCs, the seat has a pre-reclined fixed back, an

upper literature pocket and a sliding table, with options including lower literature pockets and provision for USB A & C. Having minimal moving parts keeps weight minimized without compromising comfort levels, according to Acro.

In an Airbus A320 family configuration, Series 6 LC offers window and aisle passengers 17in between the armrests, while the center seat passengers – usually in what is considered the least popular seat in a row – benefit from an 18in seat width. These seat widths have been designed to widen the aisle for faster boarding and deplaning.

The first delivery of Series 6 LC will be in Q4 2019.

In a further extension of the Series 6 family, Acro will be previewing its first specific twin-aisle seat, offering A330 operators a high comfort, high-density economy class seat for the Airbus wide-body range.

Visit the
Features section
of our website
for PRM
content



STAND: 1C16

THE LIGHTEST TRANSIT WHEELCHAIR

Visitors to AIX will have the opportunity to experience the Airchair, which at 6kg is claimed to be the lightest onboard transit chair on the market.

With demand growing for the aviation industry to improve passenger safety and the flying experience for PRMs, airlines and airports are under increased pressure to adapt their service offering to suit all passengers, regardless of their mobility.

Moving passengers from an airline chair to a wheelchair, or around the aircraft during a flight, requires the highest level of care, and both the transit experience received and the quality of the products used on board have a huge impact on the overall passenger experience for PRMs.

Thus several functions have been built into the chair design by Mercury Products, including a retractable backrest, which enables the aircrew or carer to move close to the passenger to assist a safe and smooth transfer of the passenger from one seat to another, and swivel castors, which make maneuvering in tight spaces easy.

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STAND: 5A30

Artists in residence

Every year, Aviointeriors brings something new worth seeing to Hamburg. For 2019, the Italian seating company is bringing four particularly noteworthy designs.

One of these is Michelangelo, a new economy class seating family for the medium- and long-haul narrow-body market. It's a slim and lightweight design with a focus on reliability, comfort and integrated technology.

The component count has been minimized to reduce weight, as well as to reduce maintenance costs and spare parts requirements. Optional items such as USB/AC ports can be installed on the rear backrest or below the seat pan.

A long-range version of Michelangelo will also be exhibited in Hamburg, featuring a 13.3in IFE monitor, several additional stowage spaces, and restyled bumpers and armrests.

STAND: 5A30

SKYRIDER 2.0

Visitors should try out Aviointeriors' Skyrider 2.0, the saddle-style seat that is often the most talked about each year and which often garners the most mainstream media coverage. This innovative seat can be installed at a 23in pitch and is engineered with a minimal number of components, allowing for minimum maintenance costs and a weight claimed to be half that of most standard economy class seats currently available in the market. If you haven't tried the seat, it is worth doing so to form your own opinion of the design.



Skyrider has been a highlight of Aircraft Interiors Expo before. See p219

STAND: 5A30



STAND: 5A30

ADAGIO

Aviointeriors is showcasing its 47 years of experience in aircraft seat manufacturing with the Adagio high-density, fully flat business class seat. This model can be fitted eight abreast on a B777/B787 and seven abreast on the A330.

The Adagio seat is also available as a single-aisle model for the A320, and this configuration will be exhibited at Hamburg. The A320 Adagio features a 43in seat pitch, a 23in seat width, a 76in-long bed, and a 23in-wide, 15in-high ottoman.

Caravaggio

Aviointeriors' new premium economy seat, the Caravaggio, will be on show, designed with comfort levels, component quality and storage space that the company says will offer a passenger experience similar to that of some business class seats.



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Soisa Suites is a customized tailoring shop that develops unique premium interiors components for first class suites and VVIP seats combining innovation, superior craftsmanship, luxury and sophisticated finishes to meet the needs of global aviation community.



STAND: 7A30

TRY OUT THE CONNECTED SEAT

Stelia Aerospace will be presenting the latest work from its research and development team, as well as its full range of premium seating products. In addition to the SmartSeat concept unveiled at last year's expo (with additional developments for this year), for the 2019 event the company is collaborating with Airbus to show the Opal seat within the Connected Cabin on the Airbus stand.

Another highlight will be the ConnectedSeat, which integrates into the digital environment, with intelligent systems informing and assisting the cabin and maintenance crews in their daily work. The seats' sensors allow crew to easily verify the security of the cabin and passengers through monitoring elements such as seat belts or seat recline position. In addition to the ConnectedSeat functions that support crew, novel passenger interfaces will also be showcased, such as PED-based apps that can be used to control the seat and allow passengers to save favorite seating positions from one flight to the next.

The ConnectedSeat is based on the new-generation Opal seat platform which entered into service early in 2019. Through intelligent application of high-tech and digital solutions, Stelia aims to improve the environment of all who interact with the seats.

Subscribe to our weekly news for all the latest seating updates

STAND: 1UB50

MOLON LABE TAKES FLIGHT

Molon Labe has exciting news: the company has completed FAA Certification of the S1 staggered, slimline seat. The certification was achieved after seven years of development and testing, during which eight full design iterations were completed.

"As a small, new player in the seating scene it was very important to us that the first seats to fly be

comfortable, durable and reliable. With our certification and testing partners at NIAR, we have been able to complete all testing digitally before successfully passing all dynamic and HIC tests, first time," says Hank Scott, CEO of Molon Labe.

The launch customer for the seat will be announced at AIX, with first flights of the S1 due in May 2019.



STAND: 5D10

The Eclipse revolution?

HAECO Cabin Solutions will be debuting a seat suitable for use in short-haul business class or long-haul premium economy, which the company says could revolutionize the way passengers travel in those cabins. Named Eclipse, the seat uses a business class design approach while incorporating the space utilization techniques usually found in economy class, into a hybrid design. The result is a premium passenger experience, coupled with yield maximization for operators of both single- and twin-aisle aircraft.

HAECO says that the staggered arrangement of Eclipse provides a level of luxury comparable to that found on long-haul business class flights,

a feeling enhanced through features such as a privacy shell, ultra-quiet zero-g seat kinematics, and a wide range of IFE screen sizes – all while improving route economics.

The staggered layout, according to HAECO, means that without compromising seat width, pitch or egress, B787 operators can move from a 2-3-2 premium economy cabin to a 2-4-2 configuration, increasing passenger density by up to 14%. A320 operators can enjoy similar benefits by keeping their existing 2-2 business class (but enhancing the passenger space) or moving to a 2-3 configuration with added storage and economy seating.



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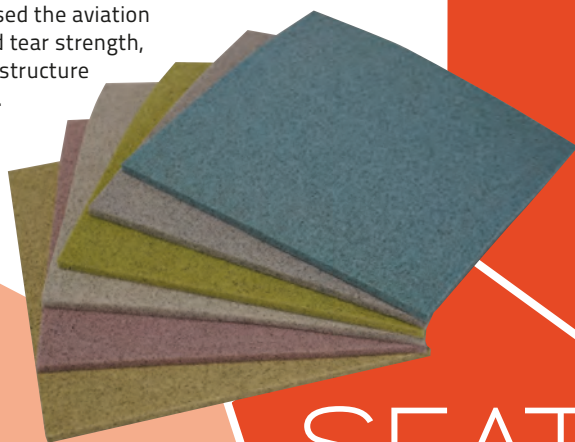
www.zim-flugsitz.de

STAND: 5A50

LAMINATION FOAMS

Aerofoam Industries has finished development of its full range of highly resilient lamination foams, with the technology due to be released at the Expo. Six grades of lamination foams, ranging from a very low indentation load deflection (soft) to a high ILD (firm), will be available, of which two of the grades will be viscoelastic (memory foam).

According to Aerofoam Industries, the foams have been tested with a wide variety of dress cover materials, including fabrics, natural leathers and synthetic blends. This broad range of lamination foams gives the ability to fine-tune not only the appearance of dress covers, but also the initial comfort layer. These foams were formulated specifically for lamination and have addressed the aviation industry's need for increased tear strength, elongation and a tighter cell structure for more conclusive bonding.



STAND: 6A71

Online seating marketplace



After five successful years, aviaticscouts GmbH's online marketplace for surplus aircraft seats (aviationgate.com) is introducing a new

look and a simpler user interface that is now mobile friendly. Buyers and sellers of surplus aircraft passenger seats are now able to search and list products globally much faster and more comfortably than before, according to the company.

aviationgate.com is a marketplace for buying and selling aircraft passenger seats and interiors. Sellers can use the site as an additional sales channel and list their products in a simple step-by-step process. Buyers can then search, filter, sort and compare offers and request proposals online.

aviationgate.com has more than 100 seat models online and more than 12,000 pax places in stock at its facilities in Germany.

SEAT SUPPORT

STAND: 6C41

Soisa Suites launches

Soisa Aircraft Interiors, known for its interiors expertise in seat covers and cushions, is now introducing Soisa Suites, a new business unit that specializes in premium and interiors components for first class suites and VVIP seats, including engineering, product development, designing and manufacturing. The main objective of the division is luxury design, high quality and making each part unique.

As an aircraft seat supplier, Soisa Suites offers a product portfolio that is custom-made to fulfill customers' unique expectations, from bed extensions, ottomans, armrests and tailored parts, to special customer requests.

Soisa Suites is a fit-to-perfection tailoring shop that develops first-class seat pieces combining innovation, craftsmanship, luxury and sophisticated finishes.



STAND: 5E35

Lightweight seatbelts

AnjouAero's seatbelt is the first on the market to be offered with a customized, colored finish to its buckle, which is particularly suitable for business class and premium economy seats. 2018 has been a very successful year for the company, during which it has noticed a notable increase (+30%) in the volume of lightweight seatbelts delivered to the worldwide market.



STAND: 1C40

Linear guide rails

Rollon plans to present its custom-designed range of solutions for linear motion applications in the aerospace sector. The company's engineers precisely calculate the optimal weight reduction for each telescoping rail and linear guide rail that can be achieved without influencing other characteristics. Extensive tests are then conducted for each component to determine the best design.

The Curviline sliders are adapted for aerospace use and other applications.

These lightweight sliders and rails are designed to be used for Rollon constant-radius Curviline rails.

They offer advantages such as low weight (39-138g per single slider) and the possibility of three-way mounting. The Curviline sliders are designed to be as compact and small as possible and are applicable to nearly all constant-radius Curviline rails.

*Efficiency
shouldn't
compromise
Comfort*



At HAECO we understand space is a finite, precious thing, and so is passenger experience. Backed by our extensive MRO heritage, our stowage solutions offer innovative designs and features for both passengers and operators alike. Coupled with our in-house engineering and installation services make HAECO your **Network of One.**

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9 BIG CABIN IDEAS TO SEE

Monuments

STAND: 7B01, 7B08

Visionary ultra-long-haul concept

AIM Altitude has designed Ultraflex, a visionary lifestyle concept space for AIX 2019. Aimed at the growing ultra-long-haul market, the themes of health and well-being have been applied by the design team to create a vision for the future of premium travel.

While ultra-long-haul flights are still in their infancy, AIM Altitude predicts that they will become commonplace, and that technology and comfort levels on board will progress. The associated cost savings of ultra-long-haul routes outweigh the additional fuel bills and,

along with our fast-paced requirements as a society, this is likely to make ultra-long-haul increasingly popular.

Although still very much under wraps, AIM Altitude's says that its exhibit at AIX 2019 will meet the demands of ultra-long-haul passengers and crew alike, and will make the whole idea much more appealing. The concept interior will allow movement around the cabin and is intended to have a positive impact on well-being, creating a destination feature on board.

You should also see our galley (p88) and lav (p126) design features



As Ross Burns, industrial design manager explains, "This design demonstrates the possibilities for a new era of flight. Although a creative project, we ensured that all aspects are feasible in the aircraft environment and hope to enable elements of the concept to emerge in the marketplace very soon."

STAND: 7A75

Snacking technology

The future of in-cabin snacking will be on show at Nordam's stand. Visitors can see the launch of SkEYE-Vend, the aviation industry's first combination of composite cabinetry, user selection and artificial intelligence into a single solution specifically designed, engineered, built and certified for use on board commercial aircraft, giving passengers the flexibility and control to purchase snacks on board.

Nordam has collaborated with e-payment specialist and vending advisor Vagabond to deliver this self-managing, onboard storefront that generates airline revenue and promises to resolve the "I wish I'd grabbed a bite in the terminal" hungry passenger predicament.

SkEYE-Vend does not require users to press buttons or handle cash. Simply access the airline's app on a smartphone, open the transparent door, retrieve your snack, and your e-payment will be processed.



STAND: 2D60

DIMMABLE WINDOW

Dimmable solutions developer Vision Systems will present its latest innovation, a multizone dimmable window that combines its SPD-based Nuance shading system with an electroluminescent, transparent control panel.

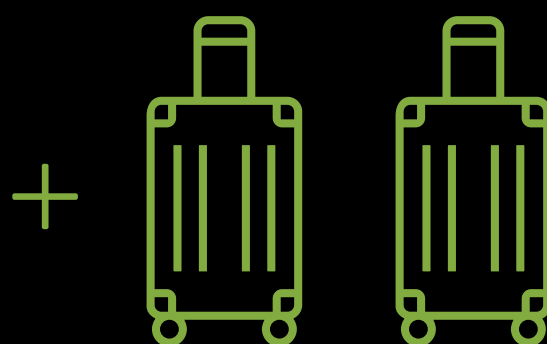
This digital shade provides opacity control of each zone through discreet illuminated buttons directly integrated into the window. The multizone dimmable solution eliminates shades, which can clutter up the space, block the view and require regular maintenance, and enables passengers to enjoy the view while protecting them from unwanted daylight and glare.

The system allows for a reduction in heat gain that contributes to a considerable decrease of air-conditioning consumption and greater comfort for passengers when entering the cabin. Its fabrication also includes noise barriers for a better acoustic insulation.

The solution has no moving parts as the electronics are integrated, reducing maintenance costs and downtime, and making installation easier for the aftermarket.



GET MORE SPACE



PASSENGER LUGGAGE SPACE **UPGRADE**

The new retrofit doors for classic cabin interior of A318, A319, A320, A321 aircrafts to increase overhead baggage capacity. For other aircraft types available on request.



STAND: 5B20

CLEVER MATERIALS

The Pexco Aerospace team has been busy in their new R&D and materials science labs and will be revealing two innovations at AIX.

The first is Pexcel, a diffused lens material for LED lighting designed to create a smooth, diffused light array that eliminates LED hot spots.

The second development is self-terminating trim profiles. The team has found that trim components such as rub strips require injection-molded end caps to close out the assembly, which can create appearance issues with varying color and luster between components, as well as additional seams. For the airline this leads to increased part count, and durability issues. Pexco's solution is a single extruded part that can eliminate the need for unique end caps.

STAND: 7B03, 7B06



A320 Airspace entrance

For several years, FACC has supplied Airspace XL bins and ceiling panels to Airbus. Now Airbus has expanded its strategic partnership with FACC, which is now supplying the entrance area for the entire A320 aircraft family, as you can see in Hamburg.

For the A320 entrance area, FACC develops and manufactures ready-to-install assembly modules equipped with various system components such as lighting systems, audio systems and oxygen connections. The A320 cabins feature the Airspace design, which gives the cabin an open and modern aesthetic, giving A320 passengers the feel of a wide-body aircraft, consistent with the A330neo and an

A350XWB cabins. The entrance areas also offer a welcoming feeling to passengers.

To ensure efficient production of these entrance areas for Airbus, FACC is investing in highly automated production lines and is introducing a new manufacturing technology.

"We will invest several million euros in expanding our production, mostly in highly automated technologies," says Robert Machtlinger, CEO.

Production will focus on SMC (sheet molding compound) technology, which generates a noticeable cost reduction compared with similar products manufactured using conventional processes.

STAND: 6A80A

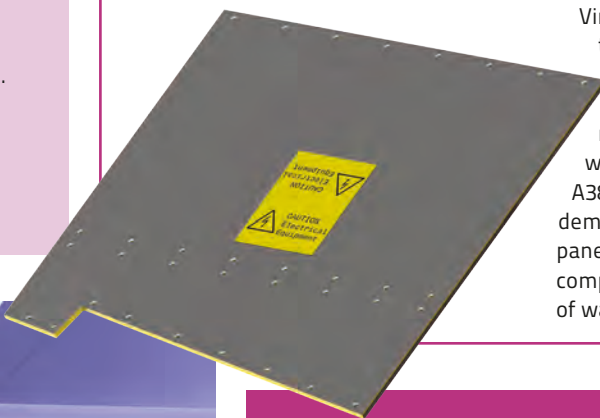
Let's heat things up

For airlines looking to enhance comfort in door and galley areas, Vincorion's showcase of new heated floor panels may be of interest. The company says they are the first to use a composite panel structure with an aluminum core and special PTC heat coating.

According to Vincorion this design principle increases the resilience of the floor panels and, in combination

with the self-regulating heat coating, ensures reliable and safe functioning. The circumferential, closed fiberglass edge enhances durability and, together with a special aluminum alloy normally used in shipbuilding, offers protection against corrosion. This lightweight construction can contribute to increased safety and comfort in aircraft cabins and help save fuel costs.

Vincorion is a brand of the Jenoptik technology group, and has aviation experience in multilayer composite structures, including radomes for military aircraft as well as the lift systems for the A380. AIX visitors can experience live demonstrations of the heated floor panels as well as new solutions for composite illumination and heating of wall coverings at booth 6A80A.

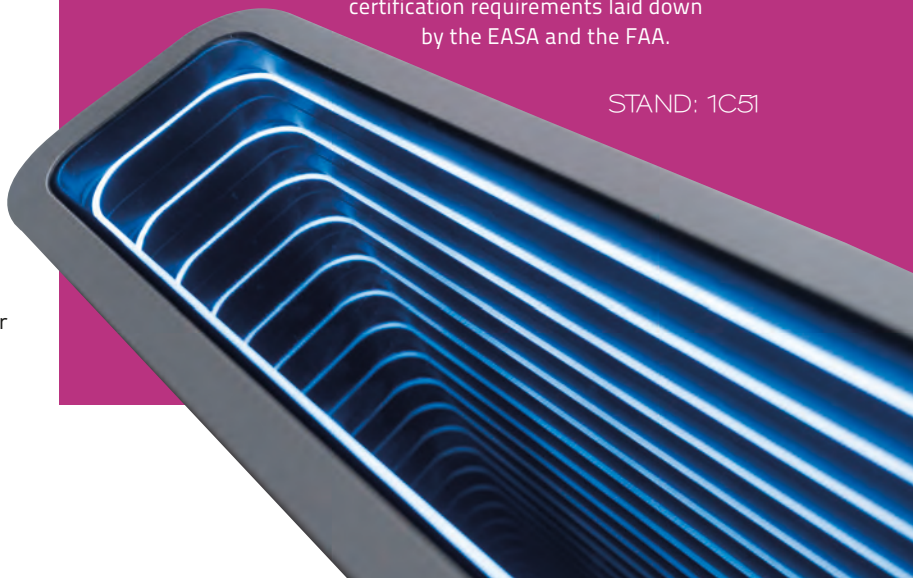


INFINITE REFLECTIONS

Aviation Glass & Technology (AG&T), a Dutch company specialized in the development and production of glass products for the aviation industry, will launch its new AeroGlass Infinity Mirror at the Expo. This 3D illusion mirror is designed to increase decoration possibilities, such as room accents that provide the cabin with a spacious and futuristic feel. Its reflection is an illusion that displays endless rows of lights fading into the darkness, bringing a sense of high-tech to the cabin and providing a superior onboard experience for business jet owners and commercial airline passengers.

According to AG&T the Infinity Mirror is crystal-clear, ultra-thin and ultra-strong, and is fully customizable. It is available in every color, shape and size and is offered advanced branding features which contribute to exclusive aircraft interior designs. The mirror meets all aviation safety standards and complies with the certification requirements laid down by the EASA and the FAA.

STAND: 1C51





“ALL LED” CABIN LIGHTING INTEGRATIONS

Defining a brand and creating the optimum customer experience is a common goal of airline marketing departments and industrial design firms. LED cabin lighting is a key element in those airline marketing efforts.

Bruce Aerospace LED Lighting Systems are offered in all-white, bi-color or full color spectrum, and are certified on many Boeing and Airbus platforms and flying today on leading airlines. The Full Color Mood Lighting is a vibrant, customer-programmable “plug and play” system providing rich colors and illumination levels tailored to suit each airline’s distinctive brand. The Bruce design is easy to install and provides long-term cost-of-ownership savings as the LED systems weigh less than the original fluorescent systems and produce less heat in the cabin. Also, since the LED systems require less power draw than fluorescent systems, this frees-up power for other uses such as IFE, Wi-Fi, and in-seat power.

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See p88 for
more future
thinking in
galley design

STAND: 5D60

Insulated galley cart

The development team at Bucher Aerospace Corporation, the Seattle-based branch of the international Bucher Group, is celebrating, as after more than three year's work, its ARCTICart thermally insulated galley cart design has been granted Technical Standard Order (TSO) authorization from the FAA.

Bucher Aerospace CEO Francisco Aguilera says, "The ARCTICart program was launched with the ambitious and clear objective to present aircraft operators with a solution to significantly reduce weight and fuel consumption of airplanes by allowing the removal of chillers from commercial aircraft." Following the TSO approval, aircraft operators can now find out if these claims are true by testing it during flight.

The most distinctive feature of the cart is its thermal insulation performance, claimed to be able to keep contents below 4°C (39°F) for up to 20 hours without the use of chillers or any other active cooling, and associated ducting and wiring, which reduces weight and maintenance requirements,

as well as power and fuel consumption, aircraft emissions and galley noise.

The ARCTICart design incorporates insulation technology used in pharmaceutical and human organ transportation and an innovative non-metallic structural design, claimed to be a first for the airline industry.

ARCTICart does not reduce the internal usable space of an ATLAS-size cart, nor does it require any dry ice, power supply or operating fluids. The 20-hour capability is necessary to enable airlines to disregard chillers on intercontinental flights. It also allows airlines to reduce operational expenses by reducing the number of catering stations used in continental or domestic networks.

But will food quality diminish without a chiller? According to Bucher, food quality will actually be improved, as unlike active refrigeration methods, such as through-air chilling or dry ice, temperature differences within the cart are minimal, regardless of whether meals are stored in the top front drawer or the bottom back tray.

The ongoing industrialization and setup of the ARCTICart assembly line in Everett, Washington, has seen the first serial units produced, with a ramp-up due in 2019, as well as the launch of a half-size version.



Bucher Aerospace has also developed a new range of high-end mechanisms for super first class, first class, business class and private and business jets, named Minneapolis, Savannah and Nairobi.

The Savannah divan table is optimized to deploy out of the side of a loveseat, with controlled motions for comfort and ergonomics, while Minneapolis is a table optimized for consoles in smaller cabins. Both table designs include damped motions, quiet motion and well-balanced operating forces.

Meanwhile Nairobi is a pillar-free conference table, with force-assisted adjustability in height (34cm) and lateral position (48cm), combined with a fully mechanical mechanism for less weight and minimum maintenance.

This year Bucher's stand has been designed to have a homey appearance to welcome customers, including spaces with the feel of a kitchen and living room.

The stand will also feature an Innovation Galley showcasing many of the company's technologies, including a new shopping window, a rotating device and an upgraded inventory management system. What will all these new features do? Visit the Bucher stand and follow the Expo updates on our website to find out.

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14 CABIN MATERIALS INNOVATIONS

Flat is dead!

As it does every year, Tisca will unveil an inspirational new trend collection of carefully harmonized seat cover fabrics, carpets and curtains at the show. A hint for the 2019 event: flat is dead!

The new collection will be all about 3D structures, reliefs, low-high textures, volume in the surfaces, and textiles inspired by deep, buttoned seat cushions, all in elegant and dark colors, mixed with whisky shades and deep red hues. Think of sitting in a 19th century gentlemen's room smoking a cigar.

This holistic collection reflects global trends in terms of patterns, textures, materials and color combinations. It is intended to inspire designers, specifiers, airlines and OEMs alike. As an all-inclusive manufacturer, Tisca designs, develops and manufactures all these product groups under one roof in Switzerland without needing to subcontract to other companies, making everything faster, easier, more reliable and cheaper for its customers.

Tisca will also introduce visitors to its new collection for business jets and VIP aircraft, consisting of handmade and embroidered carpets, and a wide range of upholstery, curtain, decorative and sidewall fabrics.

STAND: 5D02

Find out
about Sekisui
SPI's Infused
Imaging process
on p239



STAND: 5D40



LIGHT FANTASTIC

Visitors can experience the newest addition to the Kydex Thermoplastics commercial aviation interiors portfolio, Kydex Lumina. Designed with LED aircraft lighting and the customer experience in mind, Lumina sparks expanded design and branding options, giving decorative freedom for designers to paint with light on backlit panels and accents in aviation interiors.

Manufactured with Infused Imaging technology, Lumina can illuminate interior design, including privacy screens, class dividers, galley and bar space accents, light diffusers, backlit décor and more. Moving beyond traditional translucent materials, this specially thermoplastic selectively allows light to pass through the material, creating silhouettes.

Adding intrigue to aviation interior design is not Lumina's only attraction. This material is a low heat release, compliant aviation sheet created specifically to support innovative ideas for backlit applications. Lumina meets flammability, heat release and smoke development requirements outlined in FAR 25.853 (a) and (d) in all thicknesses. It also has excellent formability characteristics and is resistant to chemical reagents and cleaners commonly used in aviation interiors.

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STAND: 7C20

KONNICHIWA FROM TAPIS

This year will see Tapis Corporation, a specialist in high-performance fabrics for seating and vertical surface applications, celebrating its Japanese manufacturing origins throughout booth 7C20 at Hamburg.

Jason Estes, VP of sales and marketing, comments, "This year at AIX we wanted to showcase our Japanese manufacturing roots, and celebrate the unique culture and impact it's had on high-performance fabrics throughout our booth."

The booth will feature Japanese-inspired design throughout the full cabin mock-up, which will feature every class of service, leading to a color and trim laboratory where customers can explore their creative instincts. The materials lab will allow customers to experiment with texture, color and contrast, and to experience the materials' unique haptics and aesthetics, customized for their interior.

After your working session, relax and sample their seating products over lunch at the Japanese sushi bar, and make your show experience a refreshingly comfortable one.

Find out
more about
Mankiewicz
paints on p267

STAND: 7E40

Smooth surfaces for 3D printing

More and more components used to make aircraft are being produced by a 3D-printing process. While previously the technique was mostly used for producing spare parts, increasingly manufacturers are working with 3D-printed components from the outset.

However, as with any new technology, it brings new challenges to overcome. 3D-printing techniques often produce furrows, which pose a particular problem for subsequent coating, because for a

shiny and smooth paint surface it is necessary to first eliminate the furrows with fillers.

This filling process is not as easy as it sounds. As the furrows made by a 3D printer are deeper than the unevenness normally found on aircraft components, a larger amount of filler material is needed. When applied in thicker layers, many fillers no longer pass the heat release rate tests and so are unsuitable for the aviation industry.

Paint manufacturer Mankiewicz has responded to this challenge with a new generation of fillers that has been specially developed for use on 3D-printed components and passes the heat release rate tests, even in cases of deep furrows – and consequently a thicker layer of the product – without any problem. The filler is specially adapted to the demands of the aviation industry and enables unhindered exploitation of 3D-printed components.

AIRDEC *plus*-L1

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hall B6 - 6E60

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COMPOSITE REPAIR SYSTEM



Satto Solutions is launching Sollux, an EASA/FAA approved and compliant fast-cure repair system for aircraft interior composite components. According to the company, the system has already been proved to bring huge savings to airlines and MROs by reducing repair times by 70-80% (repair time is one hour) and also the costs associated with labor, AOG, logistics and maintenance. The Sollux repair process uses limited tooling and

equipment, and the composite repair resin is available in one-shot Semkits. No hot bonders, heating mats or expensive bagging systems are required in the process.

Satto admits that Sollux is neither the first, nor the only repair solution for composites, but points out that it is the first fast-cure system to respect all the quality requirements of the aviation market and is fully compliant with REACH and MSDS requirements.

Deconstructionist design

Schneller is introducing its 2019 design collection, which has been titled Deconstructionism. Deconstructionism is intended to change passengers' personal experience simply by modifying their perspective. It is based on the idea of questioning all traditional assumptions of construction and perceived value by digging down to the raw base elements, embracing natural imperfections and asymmetries.

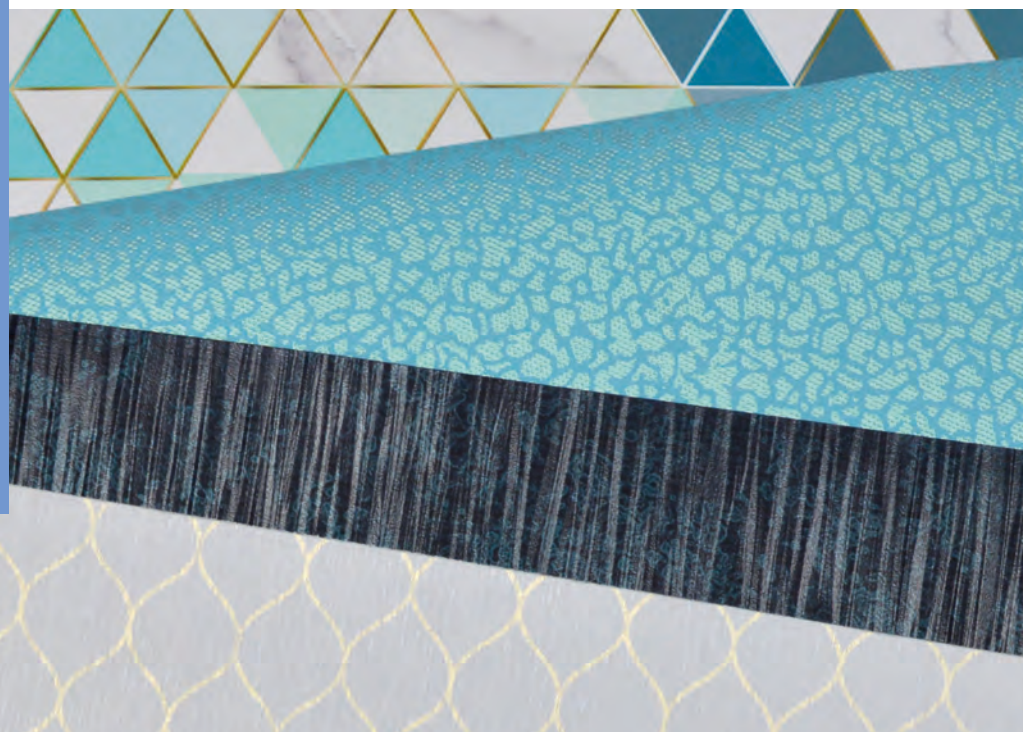
Visit the
Features section
of our website
for a CMF
trends forecast

One of the most defining characteristics of the Deconstructionism collection is that it will challenge conventional ideas about form and order, as if the designs are trying to liberate viewers from preconceived rules.

Layers of color and pattern have been combined with abstract geometric details, meant to draw the eye from any viewing position. Through what Schneller describes as 'controlled chaos', the company's designers hope to take you on an inspirational journey of potential additions to your next aircraft interior, from floor to ceiling.

Schneller invites you to allow its designers to guide you on an immersive journey through an interactive passageway on their expo stand, intended to alter your perspective. The team warns that you may walk away questioning all traditional assumptions of cabin design and perceived notions, while embracing the beauty that can be found in imperfections and asymmetry.

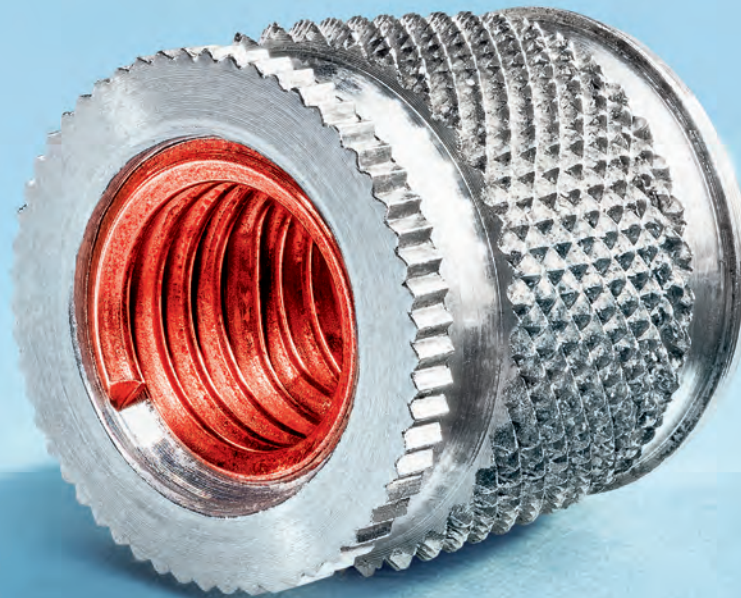
Also on the stand, Schneller has partnered with Bruce Aerospace, pairing its decorative laminates, thermoplastics and non-textile flooring with Bruce's cabin and mood lighting to create a completely different experience.



STAND: 5B02, 5B10, 5B20

HITSERT® Screwlock

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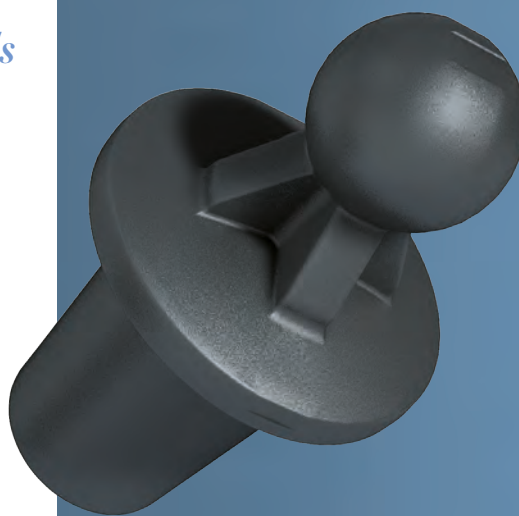
Advanced foams

Zotefoams, a specialist in cellular materials technology, is reporting a sustained increase in demand for Zotek F, a foam suitable for advanced lightweighting applications in the aviation sector. Available in flexible, semi-rigid and rigid grades, the foam is manufactured from specialist PVDF engineering polymers to meet the exacting standards of aviation manufacturers, and its flexibility of manufacturing and compatibility with thermoforming processes means it can be used for the production of complex shapes for soft-touch trims, including dual-foam soft-touch panels and composite panels.

Zotek F also offers outstanding performance in applications requiring high durability, such as armrests, due to the material's ability to be bake molded, which is an increasingly popular manufacturing method.

With densities starting at just 33kg/m³, Zotek F is a lightweight material. In addition to weight and cost savings due to part integration, Zotek F is claimed to offer excellent fire, smoke and toxicity (FST) properties that meet the stringent aviation interior flammability requirements.

STAND: 3UB30



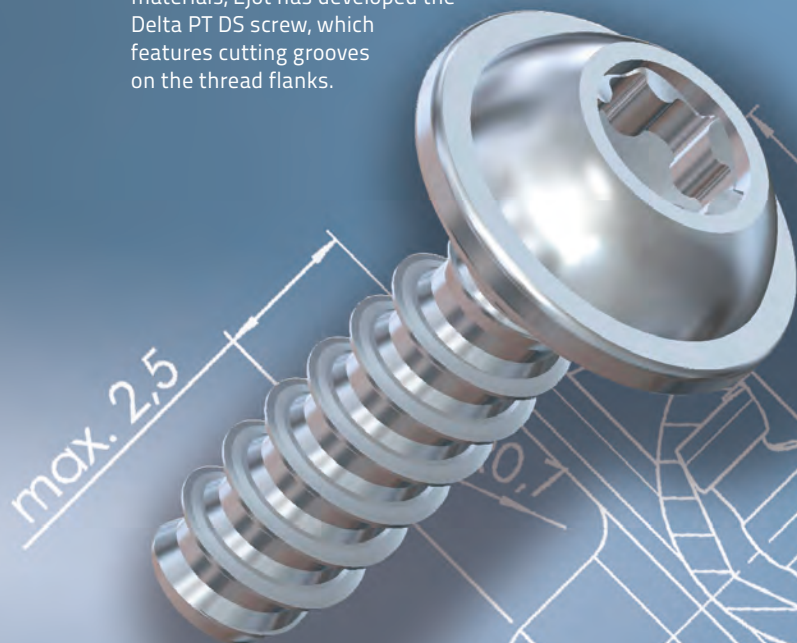
STAND: 6B90G

FASTENER INNOVATION

Driven by the trend for lightweight automotive construction, Ejot develops special fastening solutions for sandwich materials. With the TSSD and the corresponding joining process, the fastening technology specialist has developed an innovative solution with which components can be securely fastened to these lightweight construction materials. The TSSD is also ideal for aircraft interiors.

In aviation, fixing points in sandwich materials are largely created using glued inserts. With the use of the TSSD element (TSSD in German stands for Thermischer Stoff-Schluss-Dom, which translates into English as a thermal adhesive bonding boss) the necessary process steps are reduced to just one. The plastic bosses may be used as a boss hole (dimensioned for an Ejot Delta PT screw) or as a direct fastening element.

The Delta PT is a self-tapping screw for thermoplastic materials and is characterized by a high vibration resistance and long-life performance. For the screw to be reliably screwed into thermoset materials, Ejot has developed the Delta PT DS screw, which features cutting grooves on the thread flanks.





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STAND: 5C61

Color range tripled

Sherwin-Williams Aerospace is introducing its most comprehensive interior color selection program to design specifiers and paint shops in the aviation marketplace. The new Interior Color Selector book and fan deck set includes 107 colors – almost three times more than the previous interior selector.

The new interior topcoat selector and fan deck set feature the latest opaques, effects and textures for all Sherwin-Williams cabin coatings including JetFlex, JetFlex WR, JetFlex Elite, Polane L and the new Jet Suede Soft Feel.

New interior colors will provide cabin designers with a choice, from bright whites and neutral colors, to warm hue effects. Each

provides aircraft interior surfaces with outstanding stain, abrasion and scratch resistance.

For example, Jet Flex Elite is an OEM-qualified paint ideal for commercial and private aircraft interiors. It provides improved appearance and application features, as is available as a single-stage interior product (for colors) or a two-stage system (for whites and light colors).

Designed to offer subtle sophistication and mood enhancement to aircraft interiors, Jet Flex Elite colors are responsive to LED lighting. These coatings create a subtle glow with highlights and colored shadows not seen with current interior cabin coatings.



A SUEDE FEEL

Sherwin-Williams Aerospace is also introducing Jet Suede, a two-component urethane topcoat designed to enhance the feel of aircraft interior surfaces with an upscale, textured feel. Perfect for application on rigid and flexible plastics and substrates, Jet Suede is a durable finish that will look great for years to come.

Jet Suede is offered in low gloss, solid colors, including an array of OEM colors displayed in Sherwin-Williams' new Interior Color Selector Book and Fan Deck set. These neutral colors are commonly used in aircraft cabins, while providing an interior surface with stain, abrasion and scratch resistance.

Jet Suede is appropriate for application by both OEMs and MROs. While the expense of replacing or repairing leather armrests, cockpit yokes or cabin fabrics is considerable, Jet Suede achieves the same effect faster, easier and with less expense. A simple 3:1 mixing ratio and high-solids, low-bake characteristics make Jet Suede an efficient alternative to painting interior plastic parts.

Using an interior cabin coating like Jet Suede is a cost-effective way to improve the passenger experience in the economy and premium class sections of an aircraft, as well in high traffic areas or throughout the cockpit.



STAND: 5C61

DESIRE FROM DESIGN

ELeather's recently appointed in-house designer, Nicky Fox, has been working together with a well-known CMF expert and product designer from the aviation industry to deliver this year's theme, which is centered around touch and feel.

The company will show off its engineered leather materials in a way that it believes will make people want to interact with the product, demonstrating that how something feels to a person is more than just the result of touch. Shape, color, texture and design all awaken the senses to evoke a feeling about a product, and that's what ELeather aims to prove at its stand this April.

Nico DenOuden, transportation business unit director at ELeather comments, "We did something totally different in 2018 in terms of the look of the stand and the type of exhibits we shared. The success was phenomenal and easily measured in the type of visitors we attracted and the number of meetings we held with key brands. The feedback on our new approach has meant we needed to raise the bar again this year, and I'm confident people coming to see us won't be disappointed."

STAND: 6B21

ELeather will also have an 'inspiration room' for VIP guests





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Natural materials are on trend. See the trends forecast on our website

STAND: 6A93

Luxury flooring

Designing the interior of an airplane requires both art and science. The interior design of a cabin space has to have the right balance of aesthetics, comfort and functionality for it to be successful, and every feature inside an aircraft cabin must meet precise safety standards without compromising luxury. Today's private aircraft cabins have a dazzling display of creative designs, intended to create an environment similar to the owner's home decor. A wood pattern is often sought to create that feel; however, strict regulations in the aviation industry prevent many beautiful

woods being used in designs.

Lonseal Flooring has found a way.

The company's newest line of aircraft flooring, Loncontrail, resembles a natural, striated wood-look with a thick, combed design. In addition to creating a warm and familiar design, there is a strong belief that wood creates a healthy-feeling environment.

Loncontrail was designed with uncluttered, flowing lines and no sharp edges. The continuous brushstroke soothes an environment that may otherwise be filled with anxiety and stress, creating order in a demanding space and bringing in a sense of harmony and balance.

Our September 2018 issue (available online) features all the latest materials

STAND: 4UD71

STICKING POINT

Chemique Adhesives will be showcasing a new range of specialist adhesives that have been developed specifically to meet the needs of the aircraft interiors industry. Named Aerotak, the range includes solvent-based and water-based adhesives for use in the manufacture of aircraft seat covers and cushions, and provides users with versatile, reliable and easy-to-use options for bonding a wide range of material combinations including fabrics, leathers, foams, e-leathers and scrim.

The range includes both flammable and non-flammable formulations that are particularly well suited for use in the manufacture of style pads, and the Aerotak CAS 201FR adhesive is specified worldwide by many leading airlines for bonding seat covers. Also included in the range is a foam and fabric adhesive that supports aircraft seat fabrication as the exceptional spray coverage results in a high-quality adhesive that provides a resilient, permanent bond.

STAND: 6A15

INSPIRED BY THE SUN

Mohawk Group's new Shadow Pass carpeting draws influence from the notion of shadows being nature's handiwork. Now available for aircraft specification, the woven nylon features a grand linear ombré shadow

that transitions along the loom and, therefore, the floor. The lightweight floor covering is designed to deliver unmatched safety and durability, offering customers value, proven performance and a low cost of ownership, while meeting all requirements for aviation design.

Shadow Pass builds on Mohawk's woven heritage and is produced in North Carolina, USA. The carpet integrates nylon fiber, backed by the Duracolor promise, making it forever stain-free, sustainable and attractive. Duracolor fiber translates to soft surface flooring that is easy to maintain, with inherent stain resistance and water-only stain removal.





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EIGHT GREAT IFEC ADVANCES

STAND: 2A10, 2C30

1 *Positive trends at Inmarsat*

Following a milestone year for Inmarsat, the satellite communications company returns to AIX in 2019 with another landmark exhibit. Over the past 12 months Inmarsat has continued to raise the bar for the inflight connectivity market. Having announced high-profile strategic partnerships with both Panasonic and Honeywell, combining expertise to deliver innovative connectivity solutions and services, the company was named World's Leading Inflight Internet Service Provider for the second year running at the World Travel Awards.

The adoption of Inmarsat's passenger wi-fi services, GX Aviation and the European Aviation Network (EAN), continues apace, with more than 1,400 aircraft now expected to feature the systems. Contracts have been signed with airlines including Lufthansa, Qatar Airways, Air New Zealand, Singapore Airlines, Norwegian and Avianca, among others.

As Philip Balaam, president of Inmarsat states, "In 2018 we laid the foundations for our next phase of growth – from

Inmarsat is
promising an
"exciting new
chapter"



collaborations with industry leaders, to bringing more airlines on board with commitments to offer high-speed inflight wi-fi to passengers. With more developments in the pipeline, AIX marks the beginning of an exciting new chapter for Inmarsat."

W-IFE TO COVER 360° ONBOARD SERVICE

Passengers' entertainment expectations during travel have evolved. Passengers are looking for a similar experience in the cabin to what they get on the ground, so what if making passengers' flights more enjoyable could also contribute to better business results for airlines?

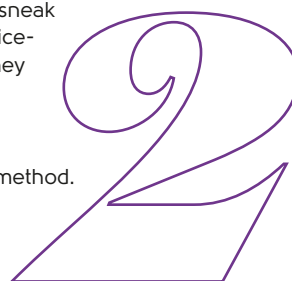
To answer this question the product team at Display Interactive came up with a roadmap that has transformed UGO, the company's legacy wireless IFE (W-IFE) system, into an entertainment and 360° onboard services solution that covers a complete range of services: retail, connectivity, advertising, cabin management, flight reports and big data.

At this year's AIX, Display Interactive's team of experts will be revealing key partnerships and product features integrated in UGO, with the goal of providing airlines with new service levels, innovative and secure options to explore, all under the promise of delivering an end-to-end solution installed and ready to leverage in just three months.

The details will be revealed in Hamburg, but – as a sneak peek of the new service-focused features – they will include a next-generation in-seat ordering system with integrated payment method.

STAND: 2E70

Expect to
see an in-seat
ordering system
at AIX



Visit us at AIX booth no 4D11

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BoardConnect **The IFEC platform for** **the digital journey**

Passengers have come to expect the anytime, anywhere availability of a broad range of entertainment options, comprehensive service, shopping opportunities and access to the Internet. BoardConnect makes flying with your airline a digital experience.

STAND: 4B11

SPONSORED IFEC SOLUTION

There is increasing demand for partially or fully financed IFEC solutions in the airline industry, which Lufthansa Systems is aiming to meet through its BoardConnect open IT platform. The platform enables industry stakeholders to apply financing models with hosted applications in an open and flexible environment, as the company will demonstrate at the Expo.

Lufthansa Systems develops standardized but still tailored business models, which can be partially or fully

financed, depending on the airline customer's demographics. As part of an evaluation carried out with each airline customer, an individual solution can be applied. One example is the cooperation with Mahata Aero Teknologi, which has introduced connectivity services to two Indonesian airlines – Citilink and Garuda Indonesia.

The BoardConnect open IT platform allows the integration of different partner solutions and can be installed in close cooperation with Lufthansa Technik.

Widening
airline access
to IFEC
systems

3



STAND: 4B20

Integrated peripherals

Inflight peripheral specialist IFPL will be demonstrating its latest integrated peripherals solutions and power products at AIX, ranging from USB power delivery solutions to integrated audio and USB technology.

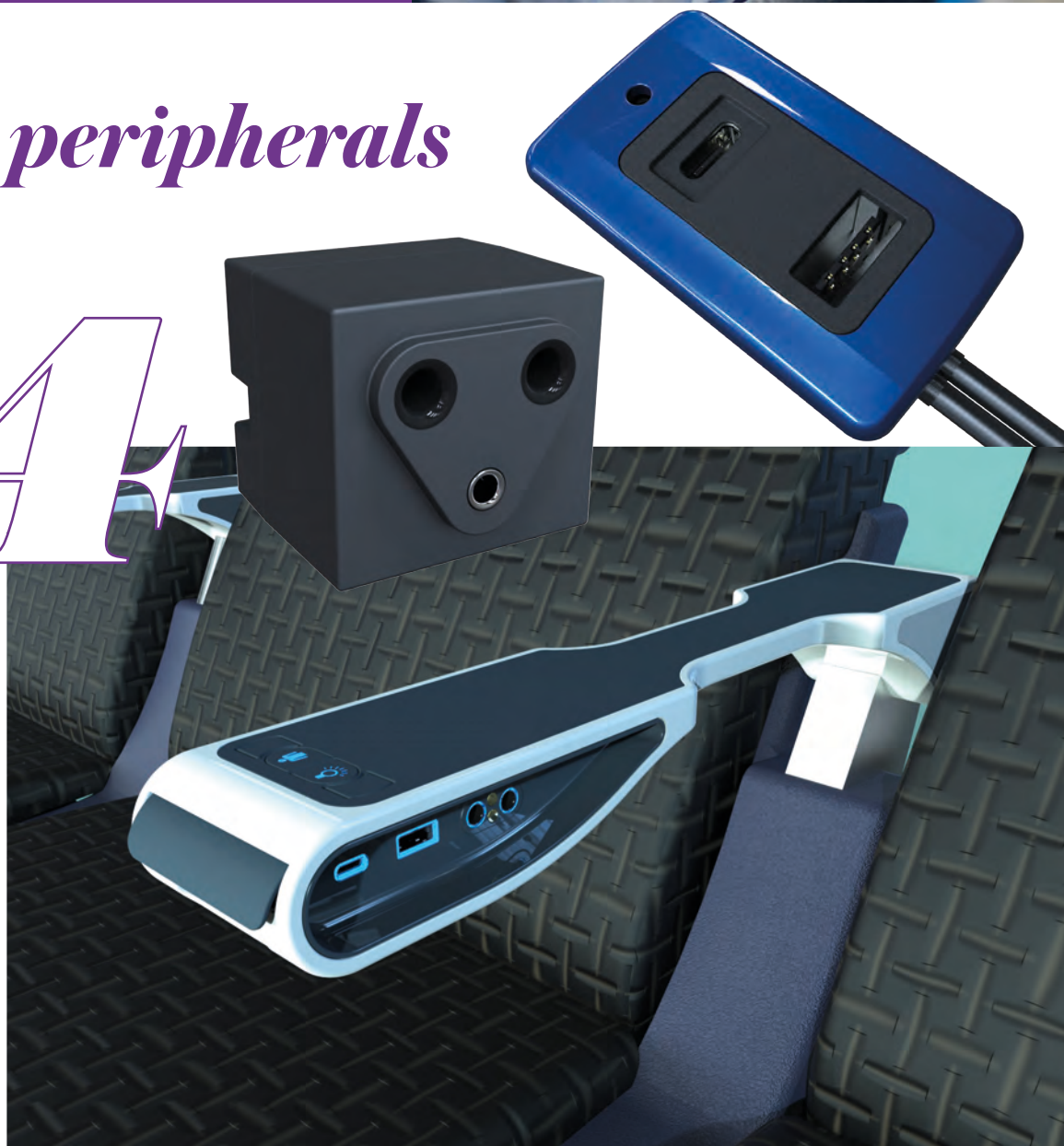
IFPL has delivered over 2.5 million products to date and will be showcasing Charge to Charge, a smart way to monetize USB power.

Powering passengers' personal electronic devices (PEDs) has become an important requirement in the passenger experience. With consumer devices increasingly adopting USB-C as standard, AIX visitors can experience IFPL's USB-C and USB-A units, which provide high-speed data and power for PEDs.

These units can be seamlessly integrated within the seat. Visitors can also see IFPL's integrated seat concept, which supports the design language, aesthetics and ergonomics required for true IFE and seat integration.

The company will also be showing an inductive charging solution that delivers wireless charging at the seat, and the MagSignal audio jack, which solves the problem of broken headphone sockets for passengers and airlines.

4



EXPERIENCE REDEFINED



RAVE
ULTRA

Visit us at AIX Hamburg. IFE Hall booth 4C20

RAVE ULTRA is a beautiful, lightweight 4K display that rivals consumer televisions in image quality and resolution. Ultra has an integrated Bluetooth headset for your wireless audio capabilities and supports new payment solutions. This innovative new display proudly adheres to our legacy of characteristics that have always been important to you as an airline: **Reliable**, **Affordable**, and **Very Easy**."



DIGITIZED CREW MEMBER ALERTS

5

STAND: 3C10

SITAOnAir's cabin experts are looking forward to showcasing the company's latest innovations for the cabin space. This includes updates to CrewTab, the tablet interface for cabin crews that digitizes processes and information, empowering them to deliver their most effective, personalized service.

CrewTab's new Crew Member Alerts feature digitizes paper-based alerting for everything from extra customer care requests, to changes in destination, to welfare matters. Airline departments spanning everything from guest relations and reservations to airport operations can easily create and send alerts to multiple crew members and flights, based on various distribution patterns, via

SITAOnAir's web-based admin portal.

The CrewTab Server now automatically pushes those alerts to specified recipients, mapping a flight with a note, instead of crews having to use printed briefing documents. Cabin crews can view the specific alerts relevant to their flight under the Notes & Remarks section.

In providing a digital, automated solution for greater operational awareness and efficiencies, the Crew Member Alerts feature ensures that specific information for each flight is easily accessible to relevant crew so that they can focus on using CrewTab to enhance their service through digital business intelligence.

Reducing
printed
documents saves
weight



6

Router gaining market acceptance

STAND: 2E24

According to Kontron, its ACE Flight 1600 Gateway Router has gained market acceptance as demonstrated by several hundred installations on multiple airlines and types of aircraft. The company says that airlines, business jet operators and service providers are attracted by the connectivity features of the router, which include 4G LTE Advanced-Pro cellular, which supports worldwide on-ground connectivity. This integrated platform also supplies 802.11ac wi-fi for passenger, crew, pilot and ground operations, supports routing for both wireless and wired network connections, and has an internal L2-managed Gigabit Ethernet Switch. The router is also claimed to accelerate time-to-market by providing integration-ready network functionality to the connected aircraft.

The ACE Flight 1600 is a single, compact platform that delivers enterprise-class security

and connectivity to and throughout the aircraft. By effectively consolidating wireless connectivity, switching, routing and security, it economically streamlines the ability to deliver the applications and services that are most in demand. The small and fanless design gives installers maximum flexibility while helping to speed integration with quick installation locking connectors for I/O and wi-fi RF interfaces.

See p110 for
analysis on the
expected progress of
Ka-band connectivity
over the next year





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AND LET **EVERYBODY ENJOY**
THEIR TRAVEL EXPERIENCE ...AND EVEN MORE!



DONICA PROGRESS

Donica Aviation Engineering has noted "significant" progress in 2018 in marketing its W6000 cabin wi-fi solution globally. After the successful deployment on A320 fleet with a Middle Eastern airline in early 2018, Donica won and deployed the same solution on Air Macau's A320 fleet. The deployment started in September and will continue into 2019 to cover a total of 18 aircraft. Meanwhile the same W6000 solution was selected by COMAC as the only line-fit cabin wi-fi BFE solution on its ARJ21 aircraft.

Furthermore, Donica has recently formed a strategic partnership with seatmaker AVIC Jiatai and started integration of its third-generation Smart LCD monitors. The latest electronics technology has been integrated in these monitors, which are now bigger, with lighter weight, lower power consumption and an

The only line-fit
wi-fi system for
the COMAC
ARJ21



overall better passenger experience. Equipped with wi-fi capability, along with the W6000 cabin wi-fi server, the Smart LCD monitors are the key part of Donica's latest WAVOD solution.

STAND: 2D80

Standalone display unit

The Cloud Lounge W-IFE system from SR Technics due to be shown at AIX is a fully distributed solution. With this system, each seat display unit (SDU) in the cabin is a complete standalone entertainment player that stores its own movies, music, games, shopping and other applications. Content updates are carried out using the wireless network without passengers even realizing it.

In addition the same network can also be used for wireless streaming to passengers' PEDs.

The system comprises different sizes of players, controllers and accessories that meet a wide range of user and airline needs. The SDUs are designed with removable modules for easy maintenance. Modules can be replaced in the field without removing the SDU from the seat.

The SDUs can be mounted as seatbacks, seat arms or furniture by inserting the SDU into the appropriate mounting enclosure. The SDU removal tool can be used to easily remove the units, which facilitates maintenance and repair, as it can be carried out by crew members. ☒

STAND: 5E18



Standalone
displays
simplify IFE
maintenance



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A jubilee IN GERMANY

2019 IS A LANDMARK YEAR FOR AIRCRAFT INTERIORS EXPO, BEING ITS 20TH YEAR AT THE HEART OF THE CABIN COMMUNITY. LET'S CELEBRATE WITH SOME MEMORABLE MOMENTS FROM PAST EVENTS...

The first years

Many visitors to the first Aircraft Interiors Expo in 2000 can scarcely believe how the event has grown. In that first year, in the glamorous French coastal city of Cannes, 60 exhibitors showed their cabin innovations to 1,600 visitors.

Becci Crook, PR manager at show founder UKi Media & Events, said at the time, "If you want to see the future of air travel and what it has in store for corporate aircraft owners, passengers and airline owners, this is the show to attend."

And Crook was right, as the numbers grew rapidly to more than 160 exhibitors the following year, attracting 2,600 visitors. When the event moved to Hamburg in 2002 and more than 4,000 visitors walked through the doors, it was decided that Hamburg should be the event's new home – a sound decision given that this year the event has more than 500 exhibitors and is due to welcome more than 16,000 attendees. A tenfold increase in visitors in 20 years is pretty impressive!



AIRBUS

AN EADS COMPANY

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AIRBUS

2007

saw the launch of the first Crystal Cabin Awards, donated by the Free and Hanseatic City of Hamburg, and supported by *Aircraft Interiors International* magazine. The awards celebrate the very best in cabin innovation and design across several individual category awards and one outright winner, and have grown in stature every year since.

20 COMPANIES WHO HAVE EXHIBITED FOR 20 YEARS

1 ACM	8 FH Lambert	15 Rohi
2 Adhetec	9 Innovint	16 Sela
3 Muirhead Leather	10 KID-Systeme	17 Eircom
4 Anker	11 Lantal	18 Wollsdorf
5 Collins Aerospace	12 MGR Foamtex	19 AIP
6 Aerolux	13 Sabeti	20 Belgraver
7 Cascade Designs	14 Replin Fabrics	



2008

Boeing's director of passenger satisfaction and revenue, Klaus Brauer, stated at the opening of the 2008 Expo that airlines need to diversify their economy cabins to appeal to the differing needs of tourists on the one hand, and business travelers on a budget on the other. "My vision of the future is that there will be a lot more premium economy cabins as we see a division between tourist economy passengers and premium economy passengers."

2007

REED EXHIBITIONS ACQUIRED THE SHOW, HOWEVER UKIP MEDIA & EVENTS MANAGED THE 2007 APRIL SHOW.

A DECADE AGO, IN 2009...

- The 10th edition of AIX took place in 2009, with the anniversary party hosting the first live World Airline Awards, based on Skytrax's world airline survey.
- To improve on the show and to help shape the future direction of the expo, a steering committee was formed with participants from suppliers and airline buyers, and a new Inflight Services Zone and a VIP Airline Lounge also launched the same year. The Airline VIP Lounge was a base exclusively for airline personnel visiting the show.

Memories from an exhibitor for two decades

Transportation textiles company Lantal exhibited at the first Aircraft Interiors Expo, and has exhibited at every Hamburg event ever since. We asked the company for memories from the 2000 expo, and the overriding memory was having many visitors – and losing a carpet.

In 2000, Lantal was uncertain whether it would be worth participating at AIX at all. However, as this was the first trade fair in the aircraft sector to show only interiors, interest was sparked. The beginnings were very modest, with a 15m² (160ft²) stand – about 15 times smaller than Lantal's stand for 2019 – and comparatively sparsely equipped.

As Stefan Naef, Lantal's market director, recalls with a grin, "Our booth carpet went missing at our first trade fair appearance, which as a carpet-producing company, was suboptimal to say the least. It probably got stuck somewhere in customs. Despite the initial difficulties, however, the first trade fair was such a great and surprising success that renewed participation for the following year was immediately confirmed."



20 cabin innovations

OVER 20 YEARS

2005

Airbus showed a full-scale A380 cabin mock-up – the first public showing of the cabin. Visitors could explore sections of both decks – accessed by the forward stairs – complete with fully functional lighting and delivery-standard wall and ceiling shapes.



2003

Britax showed a vending machine concept that would enable passengers to purchase snacks, drinks and other items during a flight. The idea was partly inspired by America West's recently introduced no-frills, low-cost service that gave passengers a choice between snacks at US\$5 or US\$10.

2003

Bucher unveiled Airbus's first lower-deck galley, developed in association with Lufthansa for the A340-600.

This year saw visitors treated to an A340 long-range cabin demonstrator, complete with a Tenzing inflight email system and a Diehl mood lighting system.

There was also a hint of what was to come, with a virtual reality version of the A380 interior.

2004



Airbus wowed crowds at Aircraft Interiors Expo again, this time with the first ever display of an A350 cabin mock-up.

2006

BMW DesignworksUSA was challenged by Boeing to design a private B787 for a young, fictitious Russian client. They created a visually simplified interior with semi-translucent walls and a vertical architecture that used the cargo space.

2007

2008

A big talking point was Airbus's SPICE galley concept that replaced trolleys with lightweight boxes and foldable carts. Airbus said that the space efficiency of the concept could enable an airline to add from 2 to 11 seats in a wide-body aircraft, with weight savings of 10-20%.



Heath Tecna (now Safran Cabin) showed Ful/Fil (left), a refreshment bar and social zone seating concept designed for use within a door area, integrated with the interior sidewall curvature. During boarding, the bar could be used as a welcome area; during flight, passengers could access compartments to help themselves to refreshments.

B/E Aerospace celebrated the 100th anniversary of its oven products.

Boeing's centerpiece was a stairway from the B747-8, designed to create a strong first impression on passengers, as well as to facilitate improved passenger flow during boarding and deplaning.

2008

2009

Dasell intrigued visitors with its newly developed shower spa for Emirates' A380. Emirates now has two shower/spa units on certain A380s, positioned at either side of the stairwell in first class, which include a vanity unit and washbasin, along with amenities including a full-length mirror, and 15.4in LCD monitor displaying Airshow and the tail camera. Passengers have five minutes to enjoy the running water, with a traffic light system to indicate how much time they have left.



2011

Airbus presented a mock-up of a space-saving rear lav and galley concept for the A320. The Space-Flex concept sees two lavs and a galley in this space, offering airlines the possibility to install up to three more seats in the cabin and/or to improve seat pitch.

One for the shopaholics! AIM Aviation caused a stir with the reveal of the duty-free shop it developed for Korean Air's A380s. The fully staffed shop was set to be positioned at the back of the main cabin, where passengers could browse and buy in style.



2012

Lufthansa Technik was peddling the Skycycle, an exercise bike certified for installation in the cabin.



Research into production processes and environmentally responsible products led to Scocchetti's cork collection. The company found that cork, the outer bark of the cork oak tree, is suitable for seat covers, panels, floors, and more. With more than 40 million natural 'cushion cells' per cubic centimeter, cork is a natural sound and thermal insulator.

2015

2016

Bucher Group showcased a stylish center galley design for the B777. The design team went a step further with its entry area complex, with a new design approach, including a galley with a space-saving combination of self-service counter and front-row business class monument.

Airbus revealed a mock-up of its Airspace by Airbus cabin scheme, a blank canvas, finished in floor-to-floor white, which works well with any of the 16.7 million LED lighting color variations available, and works well for leasing companies. Airlines can differentiate their cabins with their seat designs, trim and finish, galleys and social areas.

2018

AIM Altitude revealed a prototype galley with functional enhancements that included a table that could be recessed away when not needed, sinks that sit flush with the working area, while items like a semi-transparent cover for the electrical systems panel made the galley more visually appealing. A clip-on trim system enables elements to be quickly refreshed.

BOEING HAS INDICATED THAT IT MAY BE FEATURING A B777X MOCK-UP.

2019

2017

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20 seating highlights

OVER 20 YEARS

Sicma Aero Seat (now Safran Seats) unveiled the Majesty seat, developed with the Pierrejean Design Studio as successor to the Goldwing first class seat – the first 180° fully flat 16g-certified seat on the market. Shortly after, ANA selected Majesty for its first class cabins.

2002

2007

Premium Aircraft Interior Group (PAIG) and Acumen Design Associates gathered feedback on their Freedom economy class seating concept. Freedom positioned passengers in opposing directions, so their shoulders overlapped, minimizing armrest width to create extra

2003

A company called C&D Aerospace was doing well with its regional jet seating products, being the OEM manufacturer for Bombardier and Embraer, but was keen to get the message out that it wanted to become a bigger player. Now Safran Seats, it seems this was rather successful!

space for an additional column of seats.

B/E Aerospace showed the redesigned British Airways Club World seat, refined by Tangerine for greater living space and comfort.



2004

W.E.T. Automotive Systems (now Gentherm) presented “the first-ever air-conditioned aircraft seat”. Developed in cooperation with EADS, the seats featured fans for ventilation, air-permeable leather covers, and a system that could warm or cool the seat.

2009

EADS Sogerma (now Stelia Aerospace) invited airlines for a private viewing of Ultimate 17, its super-first class seat designed for great passenger space and comfort, privacy and storage. The company also unveiled its Solstys premium business class seat, which has proved a success.

2014

Airbus was showing how it is seeking to future-proof its wide-bodies by building in the ability to please passengers who, on average, are getting taller and wider. The argument was that Airbus offers at least 18in-wide seats in economy (18.5in for the A380) – and an extra inch of seat width can contribute to a 53% improvement in sleep quality.

2013

Wide cabins, with 18in-wide seats in economy, are a big Airbus marketing tool. However, in 2013 Airbus revealed the Extra Wide Seat for the A320. In a triple, two seats were made an inch narrower (17in) and those inches added to the aisle seat (20in), which could be sold at a higher fare.

Among Recaro’s seating concepts was a further developed version of the CL6710 long-haul business model, which demonstrated how an intelligent seat can independently recognize its operating status and transmit data such as maintenance issues or seatbelt status to airline staff. The passenger’s seat functions could be controlled via an app.

2017

2015

Panasonic’s Jazz seat concept, developed with B/E Aerospace and Teague, impressed the crowds with its clean-sheet slimline seat design featuring the latest IFEC technology.

Lift by EnCore entered the aircraft seating market with a statement of intent to “change the way the industry thinks about tourist class seats”. Inspired by furniture design, simplicity was seen as key to creating a comfortable experience in economy.

Another new entrant to the market, Rebel.Aero revealed a striking short-haul economy seat. The composite monocoque design featured a folding mechanism and a three-point harness, which proved comfortable at a 28in pitch.

2005

Thompson Solutions (now Thompson Aero Seating) showed Cozy Suite, a staggered economy seat designed with passenger privacy and cabin density in mind. The design was ready for certification and weighed in at 11.5kg (25 lb) per pax place. The seat has



received many design and engineering updates in the years since, and we hope to see it flying soon.

2010

Optimares entered the aircraft seating market with five new seats, one each for single-aisle economy class, twin-aisle economy class, and premium economy; a ‘mini’ business class seat for single-aisle aircraft; and a twin-aisle business/first class seat.

a new design that reduces parts by more than 25%.

Contour Premium Aircraft Seating (now Safran Seats) announced it had been awarded the contract to manufacture Spaceseat, Air New Zealand’s new premium economy seat. The striking herringbone design offered two options – an angled double seat suitable for couples traveling together, or a more private option for single travelers.



B/E Aerospace unveiled the Pinnacle economy class seating platform.

The company said the seat offered a 15% weight saving over the lightest seat on the market at the time, achieved through an increased use of composites, an integrated lightweight comfort suspension system, and



2018

Aviointeriors’ unique Sky rider ‘saddle’ seat first revealed in 2010 was updated to version 2.0. The semi-standing seat enables a very high-density cabin configuration and can accommodate fifth-percentile passengers at a 23in pitch to create SuperEco class, suitable for LCCs flying short-haul.

A major newcomer joined the aircraft seating market in 2018. Adient Aerospace is keeping its designs quiet, but we can confirm that they look good, and could well become popular on international airlines.

Stelia Aerospace partnered with a VR headset company and interactive massage system supplier to create a 4D immersive IFE system for its Opal business seat.

2019

You’ll see many new seats at Aircraft Interiors Expo 2019, including Molon Labe’s recently FAA-certified S1 staggered, slimline seat, due to fly with its launch customer in May 2019. See page 176 for more of this year’s seating highlights.

15 IFEC highlights

OVER 20 YEARS

2004

Matsushita Avionics Systems (now Panasonic Avionics) presented the next-generation eX2 IFE system – a common sight in today's long-haul aircraft.

2009

In 2009, connectivity really came of age. But it brought disappointment for one aspiring Ku-band satellite broadband supplier. T-Mobile and its partners finally came out of the closet at the 2009 show, revealing they were in contention to replace Connexion By Boeing with a Lufthansa system. However, in the weeks following the show, the German carrier decided in favor of Panasonic's eXconnect.



Lufthansa Systems presented the BoardConnect wireless IFE system, which can be fitted during routine overnight layovers or maintenance checks. Condor and Virgin America were announced as the first airlines to choose the system.

PGA Electronic introduced an HD 3D IFE monitor that enables passengers to watch 3D movies in high resolution without special glasses, as well as a massive 64in full HD monitor.

OnAir partnered with Airbus to develop the world's first system for cell phones on board aircraft. Airbus and OnAir planned to design, develop and certify a system ready for installation or retrofit on A320s flying in Western Europe by mid-2006.

2005

Thales unveiled its new TopSeries IFE system, TopSeries Avant, which combined the strengths of earlier generation systems with new technologies such as HD video, solid-state hard drives and faster processors. "We are in high gear now with our new-generation system. The market will see Thales maneuver into new market segments and deliver new innovation for the latest aircraft types," said Alan Pellegrini, MD for Thales' IFE activities, at the launch.



Inmarsat introduced its Global Xpress (GX) Aviation high-speed connectivity service, with airline customers including Lufthansa, Singapore Airlines and Jazeera Airways. The company also shared that it had achieved global Commercial Service Introduction (CSI) with its fifth-generation GX constellation, which

consists of three Ka-band, high-speed mobile broadband comms satellites.

Lufthansa Systems launched a new version of its BoardConnect Portable IFE solution, suitable for carriers wishing to avoid high capital outlay in permanently installed hardware for single-aisle aircraft. All the technical

ViaSat said it offered "the best wi-fi in the sky". While traditional inflight services share bandwidth among passengers, Exede In The Air delivers 12Mbps per passenger, regardless of how many connect – ideal for media streaming. JetBlue Airways and United are early adopters of the service, with Israeli carrier El Al soon to follow.

2015

2006

Teague celebrated 60 years working with the aviation business, and the work it had conducted with Boeing since 1946. The Seattle-based studio showed its latest project, a partnership with Panasonic, to design the new Personal Media Player (PMP), which entered into service

with Mexican Airlines in April 2006.

A big one: Panasonic announced it was entering the broadband communications market. The company showed an antenna system housed in a small, light and low-drag radome, which could also be paired with a direct broadcast TV antenna to simplify installation.

In the same year, Panasonic revealed the latest evolution of its X Series IFEC portfolio – eX3. Headline features include solid-state storage, proximity sensors, touchscreen handsets, next-generation processors, broadband connectivity and GSM services, and social networking. Premium passengers can enjoy large HD and even 3D displays, productivity tools such as video conferencing, and a "home theater experience".

2007

The loss of Connexion By Boeing prompted many newcomers into the Ku-band connectivity market. Panasonic reiterated its commitment to provide its Ku-band service (cell phone, internet and live television), delivered courtesy of Starling's Mijet antenna, which was going through final certification. Panasonic confirmed it was in discussions with three carriers interested in its Ku-band connectivity.



2011

Honeywell and Inmarsat announced they have been working to create a faster, more consistent, and global inflight internet experience with Honeywell's JetWave and Inmarsat's Global Xpress Ka-band service. JetWave allows passengers to connect to Inmarsat's GX Aviation broadband service, which, as well as cabin connectivity, creates indirect passenger benefits. The airline data analytics allow for predictive maintenance, which translates into fewer delays and increased safety, and more intuitive runway navigation guides so that take-offs and landings can be smoother. ✕

2016

2017

VR IFE company SkyLights revealed it was participating in the YCombinator program, where executives met investors from Silicon Valley and initiated a first seed round of fund-raising. The company was also celebrating the first commercial deployment of its immersive headsets the previous year, on board the French charter company XL Airways.

2018



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Fond memories

IF YOU HAVE EVER BEEN TO AN AIRCRAFT INTERIORS EXPO, YOU MAY WELL HAVE MET BEN BETTELL, ONE OF THE BEST-KNOWN, BEST-INFORMED AND MOST POPULAR CHARACTERS IN THE INDUSTRY. HE'S ATTENDED ALL 20 SHOWS; HERE ARE A FEW OF HIS FAVORITE RECOLLECTIONS...

Q HOW DID YOUR RELATIONSHIP WITH THE EVENT START?

The first year in Cannes [when he worked at Rumbold] I was only a curious visitor. The second year, John Higgins and I drove behind the Rumbold truck to Cannes with a secret angled lie-flat seat, and a couple of other seats in the back, with a roll of carpet and walls to build a storage room in what could be described as a stand that was made in the Rumbold mock-up shop. At the time it was an uphill struggle to get a budget of £5,000 or £6,000 [approximately equivalent to US\$10,000-US\$12,000 in today's money] for the show, as the company's last exhibition was the Paris Air Show in 1989, and it was concluded to be an expensive waste of time for interiors suppliers. Nowadays, stands can be in the US\$1m-plus range.

I do remember that we all thought that we should pack summer clothes, but the weather in Cannes changed to sleet and ice, and we froze while loading the truck. With only one elevator to service all the floors, it was miserable during the stand breakdown. Having said that, the popularity of the show demonstrated there was a demand for a specialized interiors expo to showcase new products and ideas.

When it was announced that the expo was moving to Hamburg, we had a bigger budget, but not enough to hire a stand builder. So yet again I, John Higgins and several volunteers from the mock-up shop were recruited with the promise we could drink Hamburg dry at night, provided we were on hand to make sure

the seats and exhibits all worked during the show. When I think back, the first Hamburg expo was in only halls 1 to 4, but the number of international visitors was amazing.

The die was cast and each year the budget was raised, but we still kept building the stand ourselves until we realized, like New York City, we could not spread out, but we could build up. This is when we bit the bullet and hired a stand builder, and Britax Aircraft Interiors was the first to build a double-decker stand. The following year many stands were double deckers and the rest is history – stands have got bigger and better but unfortunately more enclosed.

Ben Bettell has worked in the aircraft industry in senior positions for 35 years, including being group business development director for Premium Aircraft Interiors Group (PAIG), responsible for marketing and product development. Ben has been engaged in almost all aspects of interiors, including the manufacture and sales of crew seats, galleys and inserts, lavatories, water and waste, stow bins and monuments. He has been involved in all classes of seating design, development and certification. Since retirement from PAIG in 2010, Ben is still a popular figure in the industry, working with companies including Acumen Design and Counterpoint Market Intelligence for clients around the world on the design and development of new interiors, market research and M&A.

WHAT ARE YOUR FONDEST MEMORIES FROM THE SHOW?

In the second year at Cannes, we had a small, home-built 6 x 6m stand [20 x 20ft] that included a pillar at least 1.5m in diameter [5ft] right in dead center of the stand, but it seeded the requirement for a much bigger event.

In the third year, at Hamburg, customers and friends on our stand enjoyed beer that we brought from the home country of each company in the group. This beer formula has been very successful, and the spirit of this has been carried on by Thompson Aero Seating.

I think it was 2001 when we rented the Rickmer Rickmers static sailboat for an evening party. We thought we had hired the whole venue judging by the price, only to find out on the evening that B/E Aerospace were on one half of the boat and we were on the other, with a glass-panelled wall between us. After several customers suffered dislocated shoulders from being pulled from one side to the other, Bob Khoury, Ian Oswald and I got together and agreed to open the doors so customers could go freely between parties. This turned out to be one of the best parties.

Finally, in 2010 it was my retirement party. It was a complete surprise to me that they had organized a presentation video by [racing driver] Stirling Moss, and what seemed like several hundred people joined me on the stand for a drink. ☼

B/E Aerospace were on one half of the boat and we were on the other, with a glass-panelled wall between us

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- Coalescence (genetics), the merging of genetic lineages backwards to a most recent common ancestor
- Coalescence (linguistics), the merging of two or more phonological segments into one
- Coalescence (physics), the merging of two or more droplets, bubbles or particles into one



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10

REASONS TO VISIT WTCE

The World Travel Catering & Onboard Services Expo (WTCE) returns to Hamburg Messe from April 2-4, 2019, bringing together the latest onboard products and services from more than 350 brands from across the travel retail, catering and passenger comfort industries. More than 4,000 industry professionals, including over 800 buyers from airlines, rail companies and cruise lines, are due to attend. Here are 10 good reasons to join them...

WTCE IS
FREE TO
ATTEND!

1 *What's New Onboard*

The show will include various designated areas that enable visitors to easily identify products and services that are of interest to them. Giving airtime to new products will be the What's New Onboard showcase area, which will feature products and innovations launched to the market within the past 12 months.

2 VISIT THE NEW EXHIBITOR VILLAGE

This dedicated, stand-out area on the show floor is a platform for new companies in the travel and catering industry to market their services and products. Companies already signed up to showcase their products in the Village include Belberry Preserves, a Belgium-based purveyor of fruit preserves; Chum Fruit Snacks, which makes healthy fruit snacks from pure ingredients; Farmhouse Biscuits, which bakes biscuits using traditional family recipes; Nature Frais, an agri-food company that specializes in the cutting of fresh vegetables and fruits; and Novepan, a producer of frozen bread.

3

Business spaces

As ever, relationship building is a key focus for WTCE, and the 2019 event will see the return of the Business Meeting Hub, which provides a place to do business at the show. Private meeting rooms will be available, enabling VIP airline and rail attendees to arrange team meetings or hold business conversations with existing or new suppliers. Also aiding relationship building is the improved My Event tool, which enables

visitors and exhibitors to prearrange meetings so that they can make maximum use of their time at the show. The VIP Buyers Lounge is a dedicated area for professional meetings, with this exclusive area set aside for VIP guests to relax and enjoy time out from the busy show floor, and unwind while taking advantage of the complimentary facilities available, including breakfast, lunch and refreshments throughout the day.

LOOKING GOOD

The Spotlight on Travel Apparel feature, sponsored by Egret Aviation and MODUS, will return to the exhibition's central entrance to showcase the latest onboard clothing ranges. Operators looking to update their brand or source new uniforms will find plenty of inspiration and ideas in this area. Further examples of the latest uniforms, crew luggage and travel accessories can be found on the show floor, with new companies Creation & Image Paris, Gate8 Luggage, Ox'Bridge and Sky Soles joining the exhibition.

4





5

A REFRESHING WORLD FOCUS

The Focus on World Travel Retail zone will return to Hall A4 to showcase products that can help drive revenue-raising opportunities on board. In the cut-throat travel retail industry, operators need that all-important competitive edge to set their business apart from the rest and win customers.

Exhibitors taking part this year include: Schäfer Travel Retail, a supplier of a wide selection of brands and products to over 60 airlines and 40 airports worldwide;

Chateau d'Esclans Whispering Angel, a producer of a range of Côtes de Provence rosés; Lemonaid Beverages, fairtrade lemonade made from fresh, organically grown ingredients; MeMento, a blend of distilled aromatic waters filled with the scents of the Mediterranean; and

Gebr. Heinemann, one of the top players in the international travel retail market.

Visitors will also have an opportunity to sample new products and engage with other industry professionals at the Gebr. Heinemann networking bar.



6

A learning opportunity

The Passenger Experience Conference is an opportunity to gain key industry knowledge and expand your network of contacts. The conference brings together experts and visionaries from airlines, airframers, OEMs, suppliers and design organizations with key responsibility for the passenger experience, who will share and discuss new ideas, innovative solutions and the next steps in the evolution of the passenger experience, onboard environments, and services.

This one-day Conference opens on April 1, the day before WTCE begins, and the program includes Anaïs Marzo da Costa, head of aircraft interiors marketing at Airbus, discussing the future for cabin digitization; Luc Van Stiphout, head of music and brands, at MassiveMusic explaining how music can build a stronger bond with customers; and Peter Azzouni, Etihad Airways' senior manager of guest experience for cabin interiors talking about the importance of sleep quality as a brand differentiator, as will PJ Wilczynski, Boeing's payloads chief architect.

7

Party time!

An annual favorite, the Industry Networking Party will take place after the Passenger Experience Conference on Monday, April 1, providing an opportunity for professionals in the industry to meet new people and build new business connections.

This networking event has what some describe as a 'who's who' of the industry all present under one roof – and this is your chance to network with them before the exhibitions open the following day.

When: April 1, 6:00-9:30pm

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8

A taste of the high life

A little more inspiration may be found at the Taste of Travel Theatre, featuring presentations and live demonstrations delivered by leading consultants, industry experts and award-winning chefs. These catering pros aim to educate the audience about the future of the sector, encourage them to think about current and upcoming trends, and urge them to understand how they can best enhance the passenger experience. Taking place across all three days of the show, the sessions will focus on a diverse range of trends, including sustainability, packaging, food waste, pre-ordering and well-being.

Sustainability in the air is an industry hot topic and will feature prominently in this year's program. Matt Rance of MNH Sustainable Cabin Services will lead this debate in the 'Sustainable Thinking' session as he examines how suppliers and airlines can provide cradle-to-grave thinking for onboard products.

There will also be a debate around the challenges of plastic and sustainability, in a session entitled 'Less Plastic in the Air'. Taking a look at packaging innovations, the 'Best Sustainable Packaging' session will invite five exhibitors to give a quick-fire pitch to three expert

judges on how their solutions are the most environmentally friendly.

Well-being is another topic that is sure to provoke lively debate in the forum. Tied to this is the theme of gut health, which will be addressed by Marc Warde, culinary consultant to the airline rail and cruise industries, as he explores the new generation of meat-free, gluten-free and allergy-friendly meals. Ariane Van Mancius of Now/New/Next will also examine the habits and hang-ups of passenger eating habits in her session entitled 'How generations Y and Z eat'. She will look at the influences of these people, and how the rules are being rewritten through social media.

Other themes include 'Dine on demand' by Werner Kimmeringer and Craig Devoy of Yates+Partners; how consumers are using technology to personalize their food, health, travel and lifestyle, by Mariette Abrahams of Mariette Abrahams Consulting; 'Pre-ordering' by Delta Airlines executive chef Christian Hallowell; and a session on 'Best rail dining in Europe'.

In celebration of British Airways' centenary year, representatives from the airline will also present some of the airline's new menus, along with samples.

Drinks Reception

Join your friends and colleagues at the free to attend Drinks Reception at the Taste of Travel Theatre, sponsored by Heineken.

Tuesday 2 April
5:00-7:00pm

THE MY EVENT TOOL (AVAILABLE ON THE WTCE WEBSITE) ALLOWS ATTENDEES TO PLAN AHEAD OF THE SHOW BY FLAGGING KEY EXHIBITORS TO VISIT, OR TASTE OF TRAVEL SESSIONS TO ATTEND. VISITORS AND EXHIBITORS CAN EXPLORE THE LIST OF PARTICIPATING COMPANIES AND ATTENDEES, TO ESTABLISH CONTACT AND ARRANGE MEETINGS TO MAKE THE MAXIMUM USE OF THEIR TIME AT THE SHOW.





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10

Thirsty for more?

According to research by the show's organizers, 40% of VIP visitors attending WTCE are seeking out new beverage products for passengers – thus the 2019 event will feature a brand-new Beverages Pavilion.

Recent research by Euromonitor International has found that bottled water continues to lead the soft drinks race and buyers from the onboard industry are increasingly keen to get their hands on the latest launches. One of the exhibitors at WTCE looking to capitalize on this is MeMento, which will showcase its blend of distilled aromatic waters filled with the scents of the Mediterranean, while Radnor Hills will present its range of spring waters and soft drinks.

Clean label, organic and functional flavors are also capturing the imagination and taste buds of consumers, according to Euromonitor. And an increasing number of travelers, from abstemious millennials to health-conscious weight-watchers, are increasingly ditching alcoholic beverages for soft drinks.

Catering to this growing trend, exhibitors in the pavilion will demonstrate products with functional flavors, including Fentimans, an expert in natural botanical drinks; and Folklington's, which manufactures premium natural mixers, crafted from small-batch citrus and floral botanical extracts. They will be joined by Bless International Group, which will offer attendees a wide range of cold-pressed juices, including its R54 Eye Protector Juice, featuring pear, red grape, red dragon fruit and blueberry.

However, alcohol remains an essential category on board. A survey by UK newspaper *The Daily Telegraph* revealed that passengers generally order between two and four alcohol-based drinks on a long-haul flight, while Hawaiian Airlines' alcoholic beverage program still accounts for nearly 40% of annual onboard revenue.

And it's not just airlines that are still investing in alcohol. Last year, Cunard added a 'Gin & Fizz' menu on both the Queen Elizabeth and Queen Victoria, while it also worked with Jack Daniels and The Savoy to bring a 300-liter Jack Daniels barrel aboard the Queen Mary 2.

More than 20 alcohol brands are confirmed to exhibit at WTCE, with Thistly Cross Cider bringing its range, including Whisky Cask (6.9%), Original (6.2%), and Elderflower (4%) varieties; Chateau d'Esclans Whispering Angel, a producer of a range of Côtes de Provence Rosé; and FBS International, a distributor of spirits, wines and champagnes. ☘

9

A GREAT EXHIBITION

The free-to-attend exhibition houses over 350 suppliers of onboard products and services, including more than 180 dedicated to food and drink. Exhibitors include Barilla Group, which will showcase its dedicated line of Italian food solutions for food-service professionals under its most famous brands, Barilla and Mulino Bianco. Cuisine Solutions, which develops and manufactures premium, fully cooked foods using the sous-vide method, will also be present, demonstrating its slow-cooking technique that was pioneered and perfected by its chief scientist, Dr Bruno Goussault.

WTCE will also be a chance for visitors to see and try a host of new products for complimentary inflight and buy onboard menus, from cheeses to chocolates. Companies such as Brazzale Spa, the oldest Italian family business in the dairy and cheese-making industry; Butlers Chocolates, an Irish family-owned firm dedicated to the craft of chocolate-making; and Dr Schär Group, a European expert in gluten-free products, will all present the latest food and beverages suitable for onboard consumption.

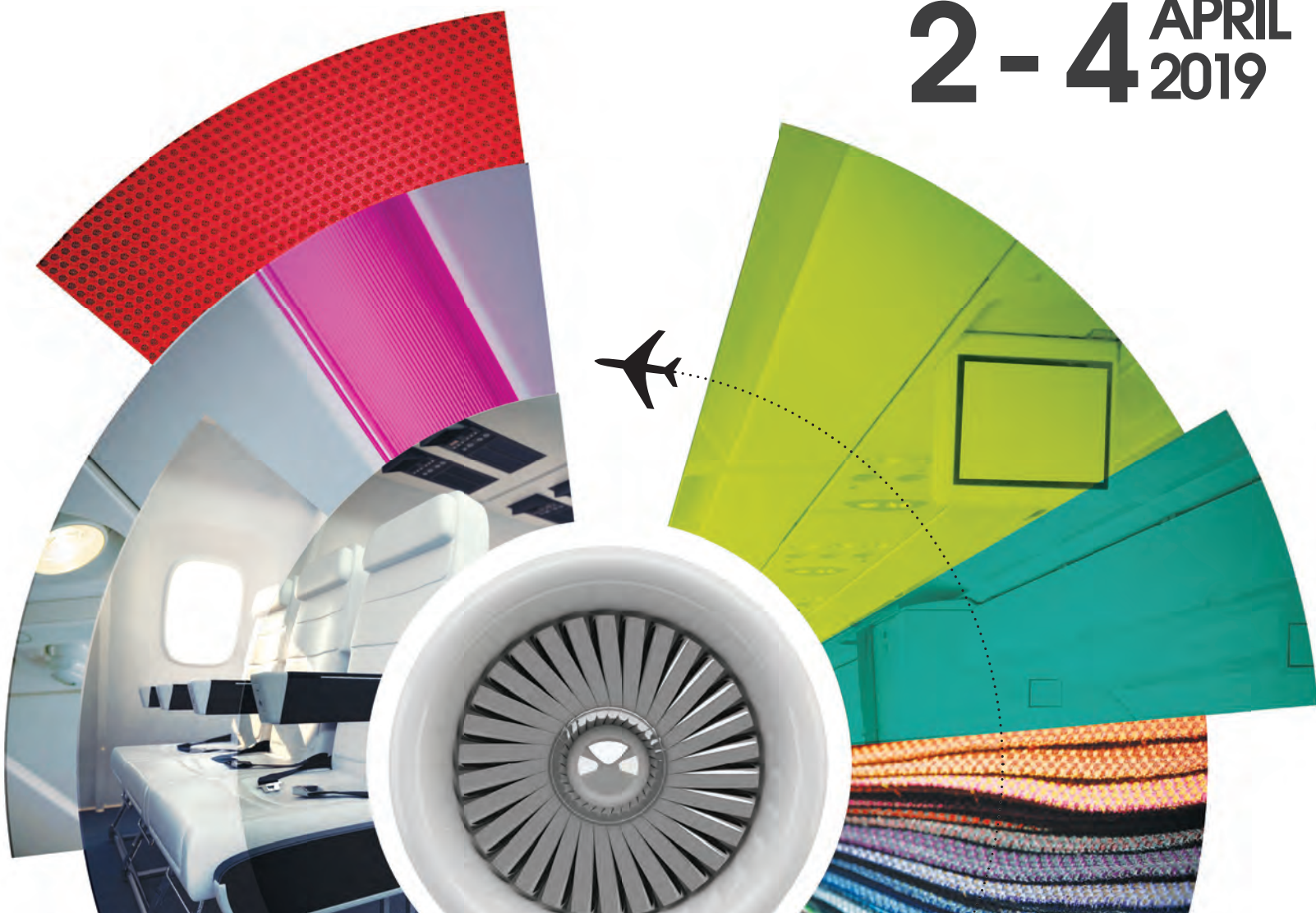
Visitors can also see products from a broader range of categories, including hygiene, transportation and logistics, packaging, travel retail, passenger comfort, and toys and games, with many launching products never been seen before. Visitors will have the opportunity to view products from the full spectrum of airline and rail suppliers – large and small – including LSG Group, Matrix, Bayart Innovations, Dnata and Gategroup, as well as those from more than 100 new exhibitors that have not previously launched into the industry.



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Cabin branding panels from ABC International can add a little beauty



get your aircraft configuration off the ground –
the **ACE** way!

TYING THE DIGITAL THREAD

Clever configuration software enables aircraft buyers, manufacturers and suppliers to collaborate and define aircraft and cabins in a single, streamlined workflow

Technology is fundamentally changing the way we communicate, work and interact with other people, and it shapes our expectations of how things should be done. If you have used online configurators to customize your car or your kitchen, or if you use a smartphone to share documents or bounce ideas off friends and colleagues all over the world, you can't help but feel a little frustration with the detours, delays and miscommunications that overwhelm the aircraft definition process.

Inherently complex and multifaceted, the configuration of aircraft and passenger cabins is a massive undertaking – and not only because of the sheer number of available options and the highly consequential decisions required at every turn. The process also involves different work tribes with different professional cultures, which must find some common ground to collaborate efficiently.

To help aircraft buyers, manufacturers and suppliers on their journey, veteran configuration software provider PACE has launched a comprehensive digital environment that manages the definition of aircraft and passenger cabins in a single, clearly structured workflow.

Marketed as Pacelab ACE, the set of interoperating tools combines server-based business logic, web-based client applications and industry-proven configuration capabilities with the latest communication and collaboration technologies to create a modern user experience that can be accessed on tablets, smartphones and other mobile devices.

Pacelab ACE has been designed to encourage aircraft manufacturers and suppliers to reinvent their business processes, for example by giving airlines

access to browser-based configuration tools, which increase customer engagement and eliminate time and distance as obstacles to effective communication. Airline buyers can choose their preferred options from intuitive, easy-to-browse digital catalogs and combine them interactively in 3D view to find the configuration that best reflects their brand and commercial strategy. This not only creates a new kind of customer experience but also ensures an uninterrupted flow of configuration information, from initial contact to purchase decision and beyond, which helps all parties involved.

Always looking to harness emerging technologies for product enhancements, PACE is currently participating in Microsoft's Mixed Reality Partner Program through its parent company TXT e-solutions, whose program-related R&D efforts focus on aircraft configuration, pilot and cabin crew training and technical field support. Supported by Microsoft mixed-reality experts and

engineers, PACE is exploring how Microsoft HoloLens headsets can be used to give airline buyers a better understanding of the appearance and spatial quality of the cabin and how to streamline real-time collaboration between geographically dispersed teams.

The launch of Pacelab ACE is the latest milestone in PACE's long-term vision of tightly integrating the cabin definition phase into the wider product lifecycle management context as it adds to the digital thread with consistent and comprehensive configuration information, which is vital for subsequent stages including aircraft manufacturing and maintenance. The accumulated data also enables manufacturers and suppliers to anticipate new or changing customer needs and identify upselling opportunities. ☒

Pacelab ACE will be presented to the wider public for the first time at Aircraft Interiors Expo 2019

PACELAB ACE DELIVERS A CONTINUOUS DIGITAL USER EXPERIENCE ON DEVICES, MAKING IT EASY TO COLLABORATE AND ALIGN ON CONFIGURATION DECISIONS



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DIABLO W



focused on the detail.

INFUSED IMAGING

Infused Imaging from Sekisui SPI is enabling artistry, advanced by technology

Inspiration can come from a piece of wood, a chunk of stone, a color or a pattern," says Becky Gallup, Infused Imaging graphic artist at Sekisui SPI, who has been integral to the success of the technology since its launch with Air China in 2014.

"Our wood grain for a leading European airline was a first," she explains. "It looks like wood, but it is actually Kydex thermoplastic, which is smooth, light, durable, stain resistant and cleanable."

Infused Imaging, winner of a 2016 Crystal Cabin Award, embeds design into thermoplastic sheets, thereby avoiding the peeling, cracking, staining and wear that often comes with capping or printing.

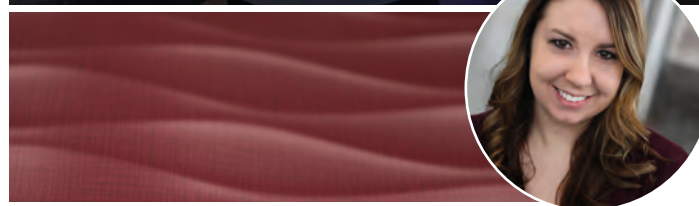
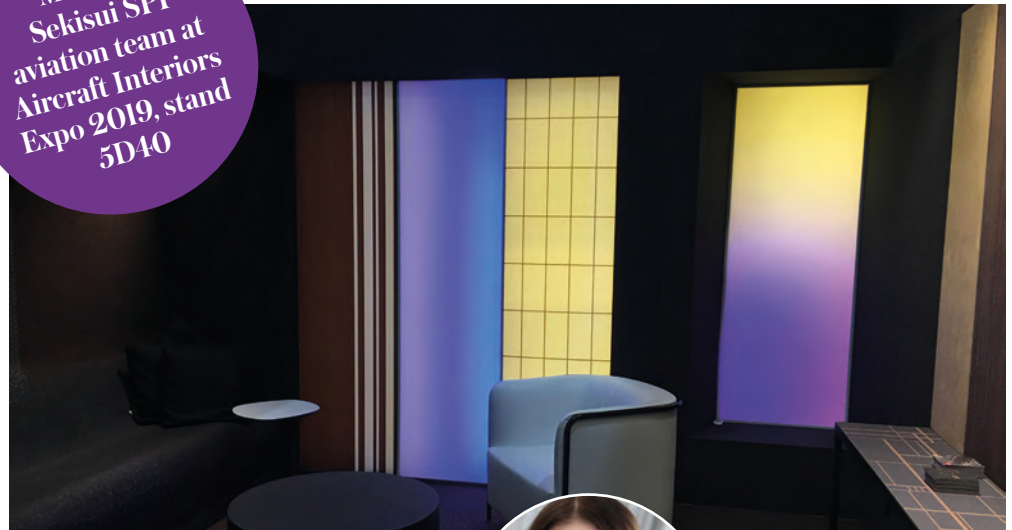
The technology has exciting potential for airlines, as Gallup says: "Fabric design, developed in appLab, Sekisui SPI's innovation workshop, is another recent breakthrough. We gave thermoplastic the look of fabric that looks so much like fabric, you have to touch it to realize it's Kydex material."

By using Kydex thermoplastic material with Infused Imaging, designers have the power to create solutions that enhance the passenger experience.

For Sekisui SPI, it's a matter of craftsmanship and collaboration. When a designer envisions a textured look, they work with the Sekisui SPI team to bring their design to life.

Ben Smalley, Sekisui SPI's aviation market business manager, has experienced this first hand. "For one airline, we worked with its designer and seat OEM to find a breakthrough solution. The designer called for a section of the seat to be pressure-formed to deliver a custom texture, but the seat manufacturer was unable to

Meet the
Sekisui SPI
aviation team at
Aircraft Interiors
Expo 2019, stand
5D40



LEFT: BECKY GALLUP,
GRAPHIC ARTIST FOR
INFUSED IMAGING

FAR LEFT: A PANEL
FEATURING INFUSED
IMAGING

accommodate the process. We collaborated with all parties to use Kydex 6503 with Infused Imaging. The result was exactly what the designer intended."

In addition to aesthetic benefits, Kydex thermoplastics resist staining more than competitive products and are easier to clean. While it may sound minor, airline replacement costs and cleaning efforts are reduced as a result of the durability and design of Kydex thermoplastics.

According to Karyn McAlphin, Sekisui SPI's design strategist, "Infused Imaging makes a superior customer experience through design possible. It's tempting to think this is just a way to make thermoplastic look like wood, stone, fabric or even florals. It is really much more than that. Designers are now able to pioneer what they believe aircraft interiors should look like. It allows an

airline's brand to come through while elevating the passenger experience."

PAINTING WITH LIGHT

The newest advance in Infused Imaging is Kydex Lumina, a fully compliant, backlit material that lets thermoplastics interplay with light.

"The results are impressive, and the technology advance is shortlisted for a 2019 Crystal Cabin Award," says Smalley. "Lumina is the next step – a blank canvas for bespoke design. It can be used for branding panels, dividers, almost anywhere. It allows a cabin atmosphere to be customized using light." ✖

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BELOW: KYDEX LUMINA WITH
INFUSED IMAGING UPSTAIRS AT
SEKISUI'S STAND AT AIRCRAFT
INTERIORS EXPO IN 2018



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TRY THE RANGE

Aviointeriors invites you to try out its wide range of current and future seating products at Aircraft Interiors Expo 2019

At Aircraft Interiors Expo 2019 in Hamburg, you are invited to Aviointeriors' booth (5A30) for an in-depth presentation of a wide range of aircraft seats. Aviointeriors has been a leader in the aircraft seating sector for 47 years and will be displaying all its latest products, from concepts, going through short- and long-range economy class, up to mechanical and electrical business class seats. Aviointeriors' booth is a must-visit for all major airlines.

For example, the company's new Michelangelo range of economy class seating will be on display, which has been developed to be reliable and comfortable, with integrated technology, a slim design, and lightweight engineering.

Engineering skills linked with productive efforts led to the creation of the Michelangelo economy class seating family, which is intended to match and exceed airline expectations and will include seats for the medium-and long-haul markets.

As well as looking good, Michelangelo is lightweight, with a small component count in order to reduce maintenance costs and spare-parts requirements, as well as to reduce the time required to change replaceable units. The long-range version can be fitted with an IFE monitor of up to 13.3in, and offers numerous stowage spaces, and restyled bumpers and armrests.

Aviointeriors' innovation does not stop with economy class, as the company is continuing to improve its already wide range of premium economy and business class seats. For example, the new Caravaggio premium economy seat has all the technical requirements needed to compete with – and possibly outmatch – competitor products in this category.

One of Aviointeriors' skills is in being able to work across the airline market,

and being able to serve even the most demanding requests from carriers.

Aviointeriors' experience is even more visible in its business class seats, characterized by Italian design, comfort and quality. Adagio, the high-density, full flat business class seat, represents the latest advance in the challenging business class seating market. Adagio can be fitted eight-abreast on a B777/ B787 and seven-abreast on the A330. A version of Adagio for single-aisle aircraft (A320) will be on display in Hamburg.

Furthermore, Adagio can be integrated with wireless charging technology, with further recent improvements including the possibility to select the adhesive films to be applied on privacy panels.

And don't forget about Skyriders, the innovative passenger transportation



Visit
Aviointeriors at
Aircraft Interiors
Expo 2019,
Booth 5A30

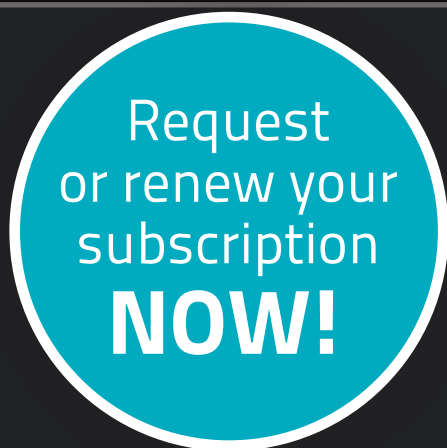
YOU CAN TRY OUT THE HIGH-DENSITY ADAGIO SEAT FOR YOURSELF AT AIX IN HAMBURG

system, which can be installed at a reduced pitch (23in). This striking design is engineered with a reduced number of components, delivering minimum maintenance costs and weighing 50% less than many standard economy class seats currently available in the market.

Last but not least, the Zero Gravity seat is a step into the future – fully electrically operated, light and comfortable. At Aircraft Interiors Expo, you can try the Zero Gravity and find your ideal position, as well as all the advantages the seat offers. ☒

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FUNCTIONAL STYLE

Who says that galleys can't be stylish? Lonseal continues to focus on creating a better passenger experience and making a visual statement through its flooring ranges

It is fair to say that the most unmemorable space in any passenger aircraft is the galley area. Most passengers usually overlook this area, but when passengers take that first step from the jet bridge onto the aircraft, they are often looking down, which makes the galley floor the first thing they see when boarding.

Lonseal takes airline passengers' first impressions of an aircraft seriously, which is why the company's designs are created specifically to provide a better experience by contributing to an aesthetically pleasing environment. The entirety of an aircraft cabin is a visual representation of an airline's brand, and the galley plays a part in delivering that passenger experience.

Lonseal has designed and manufactured sheet vinyl flooring for a wide range of commercial, private and corporate aircraft. The latest Axis Collection is a series of embossed products that feature differently scaled coin stampings, providing a variety of color and design options. The flooring also has outstanding traction, which helps reduce the risk of slipping.

A proven multilayer technology protects product color and pattern fidelity from the toughest traffic and the test of time. This ensures Lonseal's resilient finishes are durable in every kind of environment so they do not develop that dull, worn-down appearance that is often seen in older cabins.

The Axis Collection consists of four ranges. The Original LonCoin II Featherweight is constructed in three layers, with excellent slip resistance, sound absorption and dimensional stability properties, and is up to 30% lighter than standard NTF (non-textile floor covering) products, which helps to increase fuel efficiency.



Visit Lonseal at
Aircraft Interiors
Expo 2019 on April
2, 3, 4 in Hamburg,
booth 6A93

CLOCKWISE FROM ABOVE RIGHT:
THE LONPOLARIS WITH COIN
EMBOSSING; LONEQUATOR; THE
COLORFUL LONCOMPASS RANGE;
THE LONCOIN II FEATHERWEIGHT

LonPolaris is a multicolored fleck pattern that adds a unique sense of style to the coin embossing and helps mask dirt and scuffing. LonCompass has a wider coin spacing pattern and bolder colors that make it an eye-catching option for both large and small spaces.

LonEquator offers a twist on Lonseal's coin-stamp offerings by featuring a matt surface and smaller patterning for greater subtlety and a more contemporary elegance.

Lonseal products also meet the criteria outlined by REACH, the European Union regulation that addresses the production and use of chemical substances. The aircraft flooring also meets FAA requirements FAR 25.853a (12-second vertical flammability test) and FAR 25.793 (factor of sliding friction).

Lastly, all the product lines in the company's aircraft collections come with GreenMedic and GreenAir. Both exclusive to Lonseal, GreenMedic is an antimicrobial formulation that increases infection control, while GreenAir is a feature that provides low VOC for better air cabin quality.

Lonseal has provided the aviation industry with products and services for more than 46 years. The company has a wide range of commercial flooring products, many of which it has modified to meet all applicable aviation safety and performance requirements.

Lonseal became an aviation industry leader because of the Featherweight feature in its aircraft flooring products. The company claims that its aircraft flooring ranges are up to 30% lighter than standard NTF products. ✖

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inside that
counts



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POSITIVE NEWS

2018 was very successful for TSI Aviation Seats.
Managing director Suat Sağiroğlu shares his thoughts

For TSI Aviation Seats, 2018 was a very strong year, with several positive events. In May, the first deliveries of TSI's new economy seat – the Epianka model – were completed for the A321neo ACF and B737MAX. A321neo ACF is the first Airbus Cabin Flex series aircraft, a specification that includes applying modifications to the fuselage, enabling flexible cabin configurations for up to 240 passengers.

Epianka is a creative and competitive economy seating design, and is one of the best solutions available for airlines. The seat is comfortable and practical, and can be fitted with 12in IFE monitors. Epianka's functional lower literature pocket with multiple pockets is useful, enabling passengers to stow their small items such as wallets and cell phones.

As well as being delivered for the narrow-body A321 and B737, in 2019 Epianka will also be delivered for A350 and B787 wide-body line-fit projects, for Turkish Airlines. TSI Aviation Seats is one of the first companies to certify 13.3in IFE monitors for the A350 and B787. This is a remarkable development, not only for TSI, but also for the aviation industry.

Epianka will be certified for the A320, A350, B737, B787 and B777, and being able to use the same seat platform for different aircraft types will provide advantages to airlines in terms of maintenance and operation through commonality of parts.



ABOVE: EPIANKA WILL FLY WITH SEVERAL OF TURKISH AIRLINES' AIRCRAFT TYPES

BELOW LEFT: OPENING THE NEW ISTANBUL FACILITY

In 2018, TSI also made its first step into narrow-body business class seating, with the launch of the Royalux model. A prototype of the seat was showcased at Aircraft Interiors Expo last year, where it received a great deal of attention.

Royalux will be offered in three different variants, with the option of electrical or mechanical controls. The design project will be completed by the end of 2019.

In other news, the last quarter of 2018 saw TSI make considerable investments in its production facilities, increasing their size by 325%. Intensive work has seen the company's production facility at Sabiha Gökçen International Airport in Istanbul, Turkey, move to a new 3,400m² (37,000ft²) facility with two production lines.

This move has increased TSI's seat manufacturing capacity from 10,000 units to 25,000 pax per year, on a single working shift basis. In the third

Epianka seats with 13.3in IFE monitors will be showcased at Aircraft Interiors Expo 2019

BELOW: YOUR FAVORITE MAGAZINE CAN BE STOWED IN EPIANKA'S LOWER LITERATURE POCKET



quarter of 2019, a new production line for business class seats will also be established.

Last year also saw the number of TSI employees expand by 30%. Manpower will continue to rise enormously in 2019 in both of TSI's locations – its headquarters and production facility in Sabiha Gökçen International Airport and its production facility in Utah, USA – to grow and develop TSI into one of the leading aircraft seat manufacturers.

With the 21 shipsets delivered in 2018, the total number of delivered shipsets by TSI has now reached 101. This number will reach over 1,000 through 2023, with orders secured from many of the world's leading airlines. ✪

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VITAL SIGNS

Luminator Aerospace is ramping up its backlit sign testing procedures using imaging colorimeters from Radiant Vision Systems

Since 1942 Luminator Aerospace has been providing lighting products for aircraft. Backlit exit signs, 'fasten seatbelt' signs, lavatory signs, and other types of signs make up a large part of the company's portfolio. These products must meet strict tolerances for brightness and color as defined by customers, as well as stringent industrial regulations, making quality control a major focus of Luminator's operations.

Luminator performs light and color measurement on each sign the company manufactures, to ensure the values precisely meet customer specifications. The measurement criteria include tolerances for luminance (Lv), color accuracy based on precise CIE color coordinates (Cx, Cy), and other requirements for uniformity of light, color and contrast ratios.

"Consistency is key for customers," explains Luminator electrical engineer Chris Wooten. "For example with a 'fasten seatbelt' sign... if you're standing at the rear of the airplane, you can see the signs in every row, on both sides of the airplane. We want to make sure we give our customers a quality product and that all products look the same."

Luminator's original testing operations employed a spectroradiometer, a device that calculates CIE tristimulus values from spectral data, which can then be used to calculate CIE chromaticity coordinates and luminosity with extreme accuracy. This system enabled Luminator to



Radiant's light and color measurement systems have the precision required for R&D

LEFT: ACHIEVING CONSISTENCY FOR ALL SYMBOLS WITHIN AN ILLUMINATED SIGN REQUIRES PRECISE DIGITAL MEASUREMENTS

BELOW LEFT: THE TRUETEST PLATFORM MEASURES LUMINANCE, CHROMATICITY AND CCT FOR ALL WHITE REGIONS OF A SIGN

BOTTOM LEFT: A PHOTOMETRIC-IMAGING CAMERA



meet quality expectations while providing an auditable record of tests performed.

Beyond expectations for product quality, however, Luminator was also concerned with on-time delivery. Every day airplanes are stalled due to component delays, which costs OEMs millions of dollars a year in lost revenue. Although highly accurate, spectroradiometers are only able to measure one spot on a component at one time. This makes comprehensive quality testing extremely time-consuming, taking up to one hour per sign.

However, imaging solutions can improve throughput. Unlike the spot-based measurements performed by the spectroradiometer, solutions that rely on two-dimensional imaging are able to capture data from all areas of a sign at once. To improve throughput, Luminator switched to an imaging solution,

replacing the spectroradiometer with a ProMetric imaging colorimeter from Radiant Vision Systems.

"We looked at this solution because it's faster and completes all measurements in a single image," states Luminator test engineer Olaf Scholz. Since implementing the system in its operations, Luminator has reduced its testing time from more than one hour per sign to as little as three minutes. The imaging colorimeter system can evaluate as many as eight signs tested in a single measurement, allowing Luminator to keep up with demand and accept more component orders while still meeting demand for on-time delivery.

"When you think about how many signs we were testing before, versus how many we are testing now – and all the different varieties – there's no way we could do that today [without the imaging system]," comments Luminator's manager of optical engineering, Jaime Castilleja. "It is a night and day comparison." ☒

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PASSENGER POWER

USB and wall-outlet power is fast becoming a passenger expectation. True Blue Power has developed some enabling technologies

From accessing charts and up-to-date weather data, to downloading passenger information and assisting with food and drink selections, pilots and flight attendants are increasingly turning to tablets, electronic flight bags (EFBs), point-of-service card readers and other electronic devices. This reliance on technology, plus the traditional need to power galley equipment – including coffee makers and conventional ovens – has pilots and crew members in need of reliable USB and wall-outlet power.

True Blue Power inverters, voltage converters and USB charging ports are the answer. They supply this much-needed power and are designed to be compact and highly efficient. FAA/EASA certified, and typically installed as a minor alteration, True Blue Power products offer non-stop productivity on the fly, providing power to the crew and passengers of more than 50 airlines around the world.

250W OF WALL OUTLET POWER

True Blue Power's TI250 delivers 250W of AC power from the aircraft's 28V DC input. The 250W inverter is TSO/ETSO certified and ideal for EFBs and the power-hungry electronics found in cockpits. Engineered to run cooler and featuring a fanless design, the highly efficient TI250 saves energy and reduces weight.



BELOW: THE TA202 HIGH-POWER USB CHARGING PORT



ABOVE: THE TI250 DELIVERS 250W OF AC POWER FROM THE AIRCRAFT'S 28V DC INPUT

RIGHT: TA102 USB CHARGING PORT

2,000W OF WALL OUTLET POWER

The TI2000 inverter provides 2,000W of wall-outlet power to cabin and galley equipment, including personal electronic devices, microwave ovens and coffee makers. This TSO/ETSO-certified inverter is smaller, lighter and more efficient than competing products.

2,000W OF DC POWER

The TC2000 delivers 2,000W of DC power for in-flight entertainment systems, interior and exterior lighting, and in-seat, cabin USB power. Just one TC2000 can power more than 100 single True Blue Power USB charging ports. This voltage converter is TSO/ETSO certified, lightweight and easy to install.

280W OF DC POWER

Weighing just 2 lb (0.9kg), the TSO/ETSO certified 280W voltage converter delivers enough energy to power 18 single-port or nine dual-port USB chargers. The TC280 is currently installed on board several Boeing 737 aircraft, supplying power to

True Blue Power will be at Aircraft Interiors Expo 2019 in Hamburg, stand 4D41



LED cabin lighting, and can be found on board many European airlines, providing power to in-seat USBs on A320, B767 and B757 aircraft.

USB CHARGING PORTS

True Blue Power's TA202 high-power USB charging port provides a cutting-edge power source for devices. With the option of single and dual USB Type-A and Type-C configurations, each unit delivers 3.0A per port.

The TA102 USB charging port can simultaneously charge two USB devices at full power, keeping tablets, iPads and EFBs charged and connected. Sealed units offer protection against spills and surface cleaners. True Blue Power's USB charging ports are TSO/ETSO certified and RTCA DO-160G qualified. ☒

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MANUFACTURING INNOVATION

Simulation, 3D printing and casting can create the perfect symbiosis for large aerospace structures

Additive manufacturing (AM) is becoming increasingly important to the aerospace industry, where reducing mass and fuel consumption is a major goal. However, as a relatively new method in aeronautics, AM suffers from certification and qualification issues and is restrained by the size of 3D-printing machines. Airplane door optimization, due to its complexity and function integration, is a promising application when it comes to potential cost reduction, but manufacturing challenges are still present due to the part's size.

In a study, engineers from Sogecclair Aerospace SAS, a France-based partner in aerospace engineering and a prime contractor for the industry, explored a development process combining AM and casting using Altair's HyperWorks software suite.

The focus was an Ebay access door located at the nose fuselage, used by operators for airplane inspection and maintenance. The team faced some tricky engineering challenges with this project: the door is too big to be feasible using DMLS; it is made of AS7G06 aluminum, which is not yet qualified in aeronautics using DMLS; and it has a very thin skin that must fulfill very tight dimensional and geometrical tolerances.

Investment casting and pattern 3D printing proved to be a viable solution, as the material and process has already been qualified. By combining the two technologies and the topological optimization of the organic structure, manufacturing of a functionally integrated part becomes possible at an attractive cost.

At the beginning of the study, topology optimization was used in the concept phase of the design process to optimize the material layout within a given design



SOGECLAIR'S EBAY ACCESS DOOR DESIGN WAS OPTIMIZED USING THE HYPERWORKS SOFTWARE SUITE

space. In a subsequent finite element analysis, the engineers investigated the optimized design. The ensuing casting simulation enabled the engineers to improve the design of the part and to minimize the presence of defects (shrinkage, cracks, etc).

Filling and solidification simulations were run to accurately predict the position and size of certain defects such as incomplete filling areas or air bubbles. Then, feasibility samples were made for representative areas of the aircraft access door. Based on these samples, Sogecclair Aerospace manufactured the access door at real scale, then 3D printed it in PMMA resin using binder jetting technology. The result was an optimized access door that fulfilled all the important requirements of this project.

While a lot remains to be done on the certification and qualification side before such a solution will fly in a future aircraft,

Advantages of the package include savings in weight, and in design and development time

using Altair HyperWorks solutions enabled Sogecclair engineers to efficiently optimize the door design, particularly regarding weight savings. Altair solutions also enabled Sogecclair to reduce design cycles and development time, as it would have been much more time-consuming to achieve the same results without the help of simulation.

As soon as the certification of the parts manufactured with this method is set, Sogecclair Aerospace will have an advanced simulation process in place that can be applied to many more potential components to further optimize the overall aircraft characteristics. ✖

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HAPPY DAYS IN ECONOMY

The Boeing 747-100 main deck lounges flown in the 1970s by airlines such as Pan Am and Continental were a special passenger experience

Amid great fanfare, the Boeing 747-100 was introduced into commercial service by Pan Am in January 1970. But during the early part of the decade airlines found it difficult to fill their aircraft due to problems relating to the economic recession and the first oil crisis. Between October 1973 and March 1974 oil prices quadrupled, and all industrial sectors were directly affected.

To address the challenge of unused cabin space in its jumbos, in 1971 Pan Am tested an innovative marketing concept in B Zone: an economy class convertible lounge with fore- and aft-facing seats certified for use during take-off and landing. Depending on the specific route, day of the week and time of day, these seats could be sold or made available free of charge for lounge access.

Other airlines moved ahead with creative marketing programs, such as Continental with its 'pub'. Vern Alg, formerly senior manager for interiors engineering at Continental Airlines explains, "On the main deck of its B747-100s, Continental installed a stand-up bar, complete with brass rail, where crew served drinks and organized wine tastings. Economy passengers could circulate or sit at elegant cocktail tables – or just stand at the bar and enjoy



See the November 2018 issue of *Aircraft Interiors* to read more about Pan Am's 'dining in the sky'

destination-themed snacks. Even after its B747s were retired, the pubs continued to fly on Continental's DC-10 fleet until the early 1990s, when they were removed during the airline's BusinessFirst conversion."

American Airlines developed glamorous economy class lounges featuring an ethnic menu of snacks, and even positioned a Wurlitzer electric organ near the back of the aircraft, presided over by a keyboard entertainer who led group singalongs.

In 1972, with a focus on premium-class revenue streams, Pan Am reconfigured B Zone to enable first-class passengers that were seated in A Zone to eat 'at table' (dining reservations had to be made in advance).

Advertisements proclaimed (referring to the pre-jet era): "There was a time when we were the only airline with dining rooms in our planes. And now we're the only one with them again."

The legendary dining service became immensely popular on the B747-100s and, in 1973, it was extended to the upper deck, replacing the exclusive first-class cocktail lounge. In 1979 Pan Am refurbished B Zone as a quiet area for

Jennifer Coutts Clay

Jennifer Coutts Clay has worked on the refurbishment and upgrades of several B747 fleets, across all classes of service. Jennifer is the author of the e-book *Jetliner Cabins: Evolution & Innovation*, available on Amazon, Apple iTunes and Google Play (more information at www.jetlinercabins.com).

frequent and business travelers. This pioneering upgrade was the forerunner of the airline's iconic Clipper Class, the first branded, dedicated business-class cabin in aviation history.

For those passengers who preferred not to participate in the delights of the main deck lounges, there were other options. Economy class seats had flip-up armrests, so for the price of an economy-class fare it was possible to stretch out comfortably across three or four seat positions and snooze contentedly for the duration of the flight. Ah, yes, those were the glory days of flying! ✈

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FASTEN YOUR WORLD

A wide range of fasteners is produced by Gottlieb Binder, offering benefits in terms of safety, cost, weight and choice

Aircraft interior designers and engineers face many issues today. Passenger and crew safety is of course not negotiable, but these experts also have to contend with growing demands from passengers for enhancements in comfort, space, IFE and aesthetics. These demands need to be balanced with airline customers' requirements for value, weight savings, and modern, exciting designs.

Interior designers have unprecedented access to a whole host of thin and lightweight composite materials, which are always under constant development: but how should they be fixed? Conventional metallic fixings can be used, but they are expensive, unsightly and time-consuming to use.

More and more interior companies are calling on the expertise of Gottlieb Binder GmbH & Co., which is based in Germany. For instance, to replace the fasteners typically used for interior panels and hard seat components such as seatbacks and side panels, the company's Duotec 50 FR is a product of choice. This fastener is a concealed, strong, single-component, interlocking mushroom design, which closes with a precise 'click lock' action. Duotec 50 FR fulfills vertical burn requirements, including 60-second tests in combination with composites, as per the requirement for 'worst case' testing.



As the unit is fully FR compliant, engineers can deploy it throughout the aircraft without hesitation, thus avoiding small part certification restrictions.

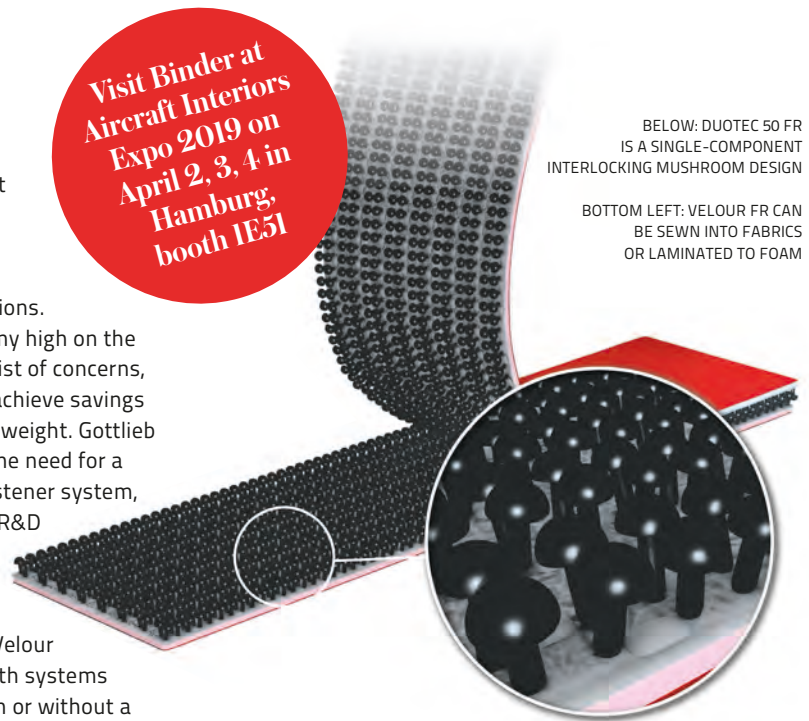
With fuel economy high on the aviation industry's list of concerns, the easiest way to achieve savings is to reduce aircraft weight. Gottlieb Binder recognized the need for a new, lightweight fastener system, and the company's R&D team worked tirelessly and came up with Pressogrip FR and Velour FR. These wide-width systems can be supplied with or without a high-quality FR self-adhesive system.

Both systems are around 16-20% lighter than most hook-and-loop designs and also thinner. They can be supplied in almost any width, ranging from 20mm right up to a maximum width of 1,500mm. Also, as Velour FR is hook receptive, it can be sewn into fabrics or laminated to foam to enhance existing seat cover applications.

More aircraft interior and seat manufacturers are relying on Gottlieb Binder's fire-retardant, self-adhesive Klettostar hook-and-loop systems. Like the company's other FR fastener systems, these meet the requirements of FAR § 25.853 (a) App. F. Part 1, (a) (1) (ii) and DIN ISO 6941, as well as the smoke and toxicity requirements of ABD 0031, and worst-case testing with composites.

The reason for the rapid industry uptake is that, following customer trials, Binder's adhesives outperformed similar systems. The in-house development team found that the adhesives achieve

Visit Binder at
Aircraft Interiors
Expo 2019 on
April 2, 3, 4 in
Hamburg,
booth IE51



BELOW: DUOTEC 50 FR IS A SINGLE-COMPONENT INTERLOCKING MUSHROOM DESIGN

BOTTOM LEFT: VELOUR FR CAN BE SEWN INTO FABRICS OR LAMINATED TO FOAM

higher initial bond and longevity in use, and meet the ever-increasing fire-retardancy criteria.

Binder manufactures a comprehensive range of reusable, reclosable aircraft interior fastener systems. The company can offer almost any of its fastener systems as a fire-retardant unit to meet the most demanding applications, be it a strong closure, a thin system, a high-temperature-resistant system, or a lightweight system.

All the systems are manufactured at Gottlieb Binder's facilities in Germany, and the products are supplied globally, including through a network of subsidiary companies that can offer on-site support in the local language and currency. ☒

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PULLING OFF ENGINEERING

A client challenged Actron to develop a drawer slide extractor with durability for 15,000 pull cycles. With some engineering expertise, the challenge was met



When it was recently approached by a globally recognized cabin manufacturer, Actron was tasked with designing a drawer slide extractor that could survive 15,000 pull cycles. In response, the engineering team enhanced the already well-designed A52510 extractor to provide greater durability.

The cabin manufacturer had previously been using an extractor produced by a competitor which, in their words, consistently experienced failures at between 4,500 and 5,000 pull cycles. The high number of failures resulted in increased warranty replacement costs, crew fatigue and a damaged reputation.

Actron's engineers set out to improve the A52510 extractor, which was already delivering 9,000 pull cycles. An FDA requirement for mitigating food retention

on the slide was also added to the scope of the redesign.

Using some engineering ingenuity, a design was conceived that could deliver on the 15,000 pull cycle requirement. Upon design approval by the customer, Actron was able to use its in-house rapid prototyping center to create finished samples with which it could begin the testing process.

Multiple datapoints were gathered during the manufacturer's test program. The final datapoint resulted in a cycle count of 29,000, confirming the integrity of the new design. With the combination of greatly improved durability, adherence to the FDA requirement, and certification

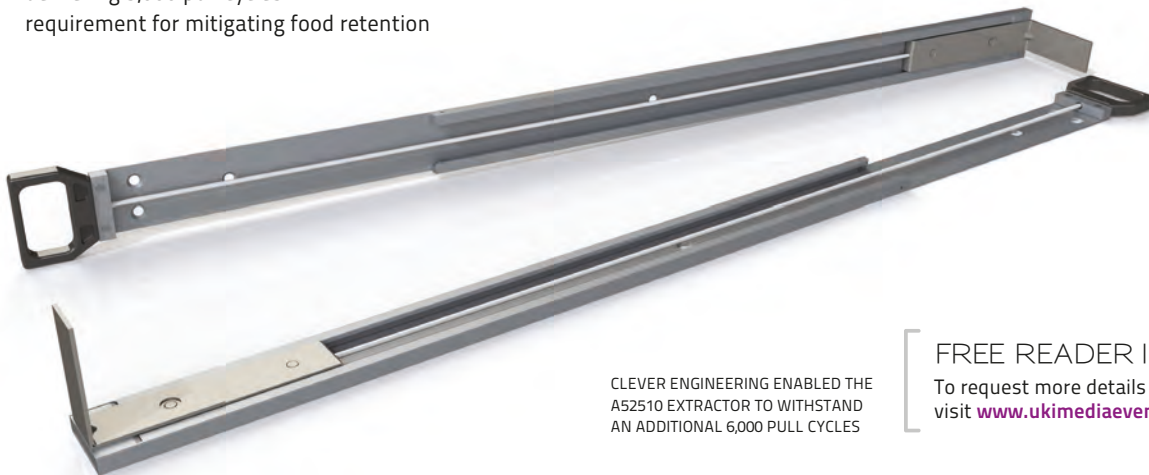
The Actron A52510 will be presented to the public for the first time at Aircraft Interiors Expo 2019

from the airframer based in Seattle, the project was deemed a success. As can often be the case, the cheapest price does not always equate to the best value.

Actron will be displaying the new A52510 (patent pending) extractor and other hardware at Aircraft Interiors Expo, in Hamburg, Germany, on April 2, 3, 4, 2019.

The company will also be showing other products from its range, including a headphone hook that fits flush with its mounting surface when not in use, as well as a range of latches, door bolting systems, handles and pulls, coat hooks and other interior components found on commercial and business jets.

Add Actron at Booth 1B54 to your list of companies to visit at Hamburg. ✕



CLEVER ENGINEERING ENABLED THE A52510 EXTRACTOR TO WITHSTAND AN ADDITIONAL 6,000 PULL CYCLES

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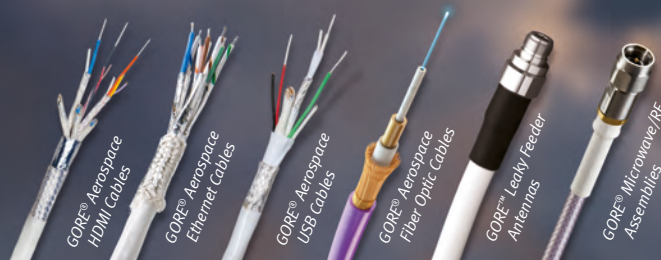
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LED LIGHTING INTEGRATION

LED cabin lighting from Bruce Aerospace offers a major benefit to cabin aesthetics

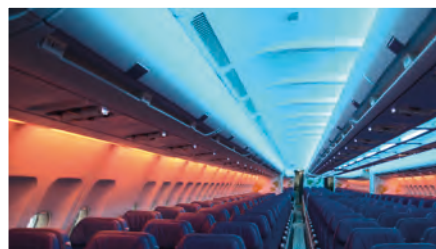
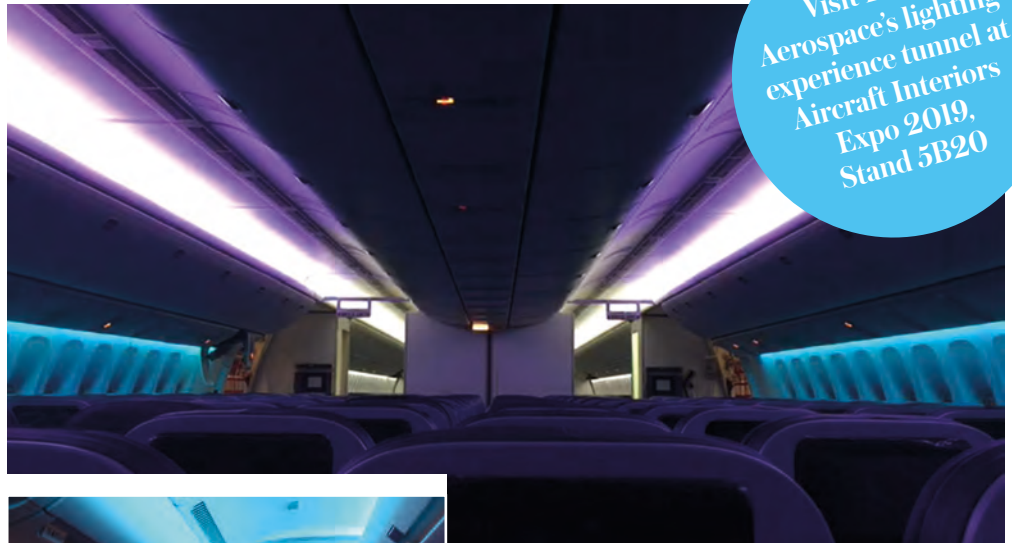
Defining a brand and creating the optimum customer experience are common goals of airline marketing departments and industrial design firms the world over. These teams make careful selections of seat cover materials, IFE, flooring, decorative laminates and other individual elements, which all combine in the cabin to create the look and the passenger experience that each airline is targeting.

However, one design element that is not always considered in a cabin upgrade program also happens to have one of the most noticeable effects on the overall design: cabin lighting. Lighting is a truly integrating element, which brings together all the colors, textures and features in a cabin.

As a supplier of the All-LED brand of plug-and-play cabin lighting systems, Bruce Aerospace has worked with airlines and industrial designers around the world to add the lighting element that adds the final touch to cabin integration. The positive impact on the passenger experience, and the relative economy of the lighting, means that LED lighting gives a good 'bang for the buck'.

As the founder and CEO of an airline (that has installed Bruce Aerospace's full-color spectrum mood lighting comments, "I spent a lot of money on new seats and IFE, yet the positive comments I get from passengers are always about the great lighting."

The LED lighting systems from Bruce Aerospace are offered in all-white, bicolor or full-color spectrum, and are already certified on Boeing and Airbus platforms and flying today with leading airlines. The full-color mood lighting is a vibrant, customer-programmable plug-and-play system providing rich colors and illumination levels tailored to suit each airline's distinctive brand.



MYRIAD LIGHTING EFFECTS CAN BE ACHIEVED USING THE SYSTEMS, WHICH ALSO SAVE WEIGHT

The Bruce design is easy to install in aircraft, and also provides long-term cost-of-ownership savings as the LED systems weigh less than the original fluorescent systems and produce less heat in the cabin. Also, since the LED systems require less power draw than fluorescent systems, this frees up power for other uses such as IFE, wi-fi and in-seat power.

With more than 60 years of experience in the aerospace lighting industry, Bruce Aerospace continues to create new solutions for cabin lighting. Its Gen 3 LED lighting system is an example of how to bring together the latest in high-resolution LED technology into a highly reliable, lightweight, low power consumption, airline-programmable lighting system that is easy and quick to install.

The Gen 3 system complements the other All-LED cabin products offered by Bruce, such as work lights, passenger reading lights, emergency lights, signage, lavatory lights, entry and galley lights, branding panel and accessory lighting.

The fully user-programmable LED lighting systems offer industrial designers and airline marketing departments a low-cost tool to bring all the cabin design elements together. By varying the illumination level, the colors, and the transition timing from one lighting scenario to the next, the customer experience is elevated to an entirely new level. ✖

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Visit Bruce Aerospace's lighting experience tunnel at Aircraft Interiors Expo 2019, Stand 5B20

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COMFORT IN FLIGHT

LIFE VEST POUCHES:

Trenchard Aviation Group shares how, with its range of life vest pouches, putting security first can add value

The tragedy of 9/11 inevitably brought about a sea change in airline and aircraft security. The life vest pouch industry was one of the areas affected as these under-seat stowage bags were quickly identified as potential hiding places for explosive devices.

In the aftermath of the tragedy, the US Transportation Security Administration (TSA) issued an emergency amendment to cover all international flights into and out of the country. This amendment stated that on each first flight in or out of the USA, 100% of all the life vest pouches on board must be searched by physically removing the vest from the pouch. There was a further requirement that a certain percentage of the pouches must also be searched on any turnaround flight.

As a result, airlines were initially faced with having to introduce some very time-consuming inspection procedures. However, there was a caveat in the directive which stated that if the pouches had a tamper-evident seal, only the integrity of the seal needed to be checked; the life vest did not need to be removed from the pouch. At that time, most pouches were made from a very coarse material that made it difficult to incorporate an effective, tamper-evident seal. So, the search began for a new approach.

At Servecorp, part of Trenchard Aviation Group and a company long associated with innovative aircraft security products, this search led to the development of a completely new pouch concept with a design that combined both flexibility of installation and the integration of security features that would meet the requirements of the US TSA. This was the first of the Servestow ultra-lightweight, security-compliant life vest stowage range.



LIFE VEST POUCHES MUST BE LIGHT WEIGHT AND MEET TSA REQUIREMENTS



Serial production of the Servestow LVS88, an oval-fronted pouch with large security seals, began in 2006 and was later followed by new patent-protected designs, the LVS99 and LVS99S, which feature different types of seal in one pouch design, including a truly tamper-evident seal. The benefits of these developments for airlines were hugely important. The time taken to conduct a fully compliant search of a single aircraft was reduced by a matter of hours, resulting in major operational cost savings across an entire fleet.

Perhaps the key point to make here is that Servecorp has been able to make the

breakthroughs it has precisely because of its security heritage. The company approached the problem not simply as a pouch-manufacturing issue, but as an aircraft safety issue. In other words, by putting security first, Servecorp was able to add value.

Far from being the end of the story, however, there are more developments in the pipeline – developments that continue to integrate the latest technology into the design of the pouch and promise to further increase aircraft security at the same time as further reducing airline costs.

Servecorp is looking forward to launching its latest addition to the Servestow range at Aircraft Interiors Expo in April. ☒

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Visit Trenchard Aviation Group at Aircraft Interiors Expo 2019, Booth 6F74

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DARE TO DREAM

Design Q has created a luxury airship interior that adds an amazing new travel option. Just imagine if some of its social features were translated into a commercial airplane galley

Recently Design Q embarked on a project that allowed the team to think outside the box (or cart) and investigate a way of providing an experience that has never been truly achieved on a commercial flight. Imagine a galley space that is a place of sanctuary with the feel of a coffee shop or bistro. The program is for the world's largest aircraft which, over the coming years, will become the world's largest first-class luxury hybrid aircraft: the Airlander 10.

The airship can provide unique experiences such as lingering over the ocean to watch the natural spectacle below, such as humpback whales breaching the surface or manta rays gliding over the waves, all from opulent surroundings.

Designing for this type of aircraft provides some alleviation in certification requirements compared with airplanes (after all, the top speed will only be around 90 knots, so no 16g certification is needed), which opens up greater freedom to invent new spaces.

Having said that, Design Q has discovered over its 22 years in business that revolutionizing one thing often leads to significant progress in other areas – hybrid aircraft today, airliners tomorrow!

Bar areas are not new on long haul, but they still have design difficulties with space restrictions and TTL requirements, so we looked at ways to create a bistro/coffee shop feel using bar stools. The focus was to make the galley equipment a nice part of the décor – something to be admired and not hidden away. Coffee machines are wonderful-looking things, although some are more wonderful than others, and the same goes for their coffee-making abilities.



See the Aircraft Interiors International website for further details and images of Airlander 10

Our wish list starts with a to-die-for polished stainless-steel coffee machine taking pride of place – the more gauges, pipes and handles the better! It should look as if it belongs in your favorite Italian coffee shop.

Design Q took a commercial espresso machine, took it apart and rebuilt it to certify it for commercial flight. This beautiful machine becomes the focal point of the bar and seemingly has its own 3m x 3m (10ft x 10ft) zone – the zone of reassurance, if you like.

The next big 'wow' comes from an effect used in many contemporary bars, namely using lighting to create a cascade of colors, light and shapes as light shines through the various bottles.

The clean layout of the galley allows two adjacent worktop areas with around 3m² (33ft²) of space, and two sinks. There is also display space for 45 bottles and refrigerated storage for a further 24, as well as two food refrigerators and two combination oven/microwaves, storage cupboards and drawers.

A dedicated trash zone is hidden from view, while overhead a drinks glasses rack contributes to the light show above as LEDs shine down on each of the glasses, making it the most stunning aviation chandelier on the planet.

The most important point here is that this zone is not only fit for purpose from a drinks and food preparation requirement, but becomes a coveted place to linger as a traveler and to enjoy an occasion that adds to the list of life experiences that are fondly remembered and talked about. A good life is made up of experiences like these.

Looking to the future, we are already incorporating some of the philosophies from our Airlander experience back into mainstream aircraft, working out clever ways to incorporate the necessary practical stuff while accentuating the travelers' enjoyment of the journey. ✪

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PERFECT RICE

If rice or congee is on your first class menu, you need to ensure it is easy to prepare freshly and perfectly. The answer is an Aerolux rice cooker

The rice cooker has long been one of Aerolux's most popular items. Ever since it became available 20 years ago, it has been delivering perfectly cooked rice and congee to first class passengers, and providing Aerolux with a constant stream of happy airline customers, including Cathay Pacific, China Airlines, China East and Lufthansa, as well as Gulfstream.

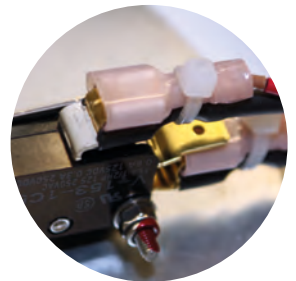
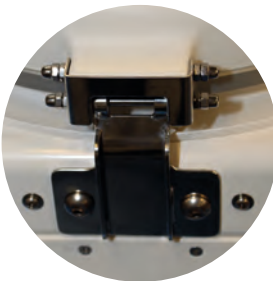
The rice cooker was an Aerolux 'first' when Cathay Pacific asked the company's founder, Ken Metcalfe, to design a rice

cooker. It has deservedly been one of Aerolux's best-selling items of galley equipment, and although most of the units the company has produced and delivered are still in operation, the order book for the unit is still full. Aerolux has recently agreed a new contract with Hainan Airlines to deliver 20 units, with an option for 60 more.

The rice cooker has remained largely unchanged during its 20 years of production, with only minimal updates that include a lock-down lid to satisfy

Aerolux has introduced 3D printing into its production. See the FDM blog on our website for details

AEROLUX HAS PUT A GREAT DEAL OF ENGINEERING, TESTING AND TECHNOLOGY INTO ENSURING PERFECT RICE ON BOARD



cooker that would be part of something exceptional: a shipset of rice cooker, skillet, toaster and blender for the airline's first class galleys. Metcalfe got together with his design team and produced the rice cooker for the airline market in early 1998. It was quickly accepted by the industry and acknowledged as a top-quality product.

Cathay Pacific took the shipset, except for the blender. The idea had been to use it as an ice crusher, but the problem of the noise of crushing ice was never solved to everyone's satisfaction, so Cathay Pacific and Metcalfe agreed to shelve the idea.

The rice cooker has been an outstanding success for Cathay Pacific, one that has stood the test of time, and the test of reliability and durability too.

new safety regulations, and upgraded circuitry and software as improvements became available. The modifications are backward-compatible, meaning that every unit in commission can stay in commission.

Clever functions of the unit include fully automatic operation for cooking rice, with the unit switching off when the rice is ready, so there is no risk of overcooking. When preparing congee, the unit again offers easy operation, with constant temperature control to ensure no spills and perfect preparation.

The unit is fully self-contained, with an aluminum body that is powder coated, offering strength as well as utility. The cooker comes with an insulated, lockable lid for safety, and a Teflon coated, replaceable internal bowl.

Aerolux's production manager, Peter Robinson, relates the story about a recent trip to Beijing. When the steward asked him if he wanted coffee, Robinson explained who he was and asked if he could see inside the galley. The coffee maker was an Aerolux unit, and when he asked about the rice cooker, the steward became quite enthusiastic, saying it was faultless, always producing perfect rice and very easy to operate.

If rice or congee are on your first class menu, your galley should have an Aerolux AL-RC25-100 Series rice cooker to make it fresh on board. ☒

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Tray Tables and Armrests for Aircraft Seating

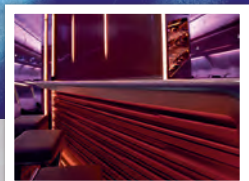


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FIT FOR THE FUTURE

Ebco has launched Industry 4.0 processes to improve its production of tray tables

Ebco, an experienced supplier of tray tables for well-known manufacturers of aircraft seating, has launched Industry 4.0. The company adopted Toyota management methods nine years ago with the aim of eliminating time wastage in production and administration and creating continuous improvements throughout the entire company.

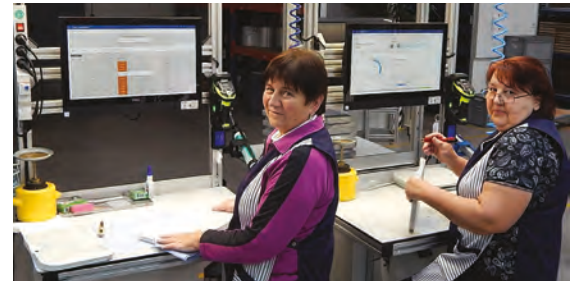
The next step on the company's path to Industry 4.0 was to optimize, redesign and synchronize all processes and workstations on the tray table assembly lines, along with a reduction of working time from two shifts into a single-shift operation with a greater concentration of specialists and capacities.

Ebco's overall aim is to achieve greater transparency in terms of costs and use in real time.

Each workstation is now equipped with a monitor showing technical details of the job currently being done, and a handheld scanner for transferring all operations directly into the system. By this method, the employee receives all relevant data for the production order, and any special instructions and assistance, making for a smooth production process and an optimal one-piece flow. The result is efficient use of production resources, a reduction of scrap, higher output and real-time inventory data.

Disruptions in the assembly line are reported by SMS to the person responsible and the fault repair time is displayed to workers on a central screen.

After a three-month training and testing phase with various adjustments,



Industry 4.0 was implemented in January 2019. The full implementation of Industry 4.0 was possible with the support of ANT, a Polish consulting company, which had previously worked on many projects in the aviation industry. ☒

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NEW GERM-REDUCING COATINGS

An interior paint with antimicrobial additives prevents mold and odors, which helps improve inflight hygiene

If passengers were to think about how many microbes and bacteria accumulate in an aircraft over the course of a day, they would be wary of touching anything in the cabin. Luckily paint manufacturer Mankiewicz has further developed its solution to cabin hygiene issues.

This year sees Mankiewicz present a new generation of its Alexit PureGuard interior paint, which contains active antimicrobial agents to protect the dried paint film. The product contains chemicals that hinder the spread of mold and odors, and in this way the paint makes a contribution toward improving the hygiene of surfaces in the cabin.

More good news is that the paint is also available as a clear coat. This opens



up new possibilities for use, as the clear coat can be applied to almost any surface or substrate – no matter whether the surface is a foil, existing paint or plastic. As the clear coat is colorless it does not affect aircraft cabin designs.

As with all Mankiewicz aircraft paints, Alexit PureGuard is compliant with the

aviation FST regulations. Mankiewicz will present this paint and further products on stand 7E40 at Aircraft Interiors Expo 2019. ☒

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DIGITIZATION IN AVIATION

Patrick Schrot, general manager of TQ Aviation, discusses the challenges that await digitization in aviation

In this era of digitization, the need for a comprehensive infrastructure of cabin systems and cabin electronics is growing tremendously. This requirement applies to both air and ground operations. As the entire aviation industry is engaged in a battle for data supremacy of all systems related to the aircraft, crew and passengers, there is a perception that the reliability, availability and compatibility of the components needed to succeed in this effort are self-evident. However, this is the area that will in fact pose the greatest challenge.

The difficulty is that the standard for competitiveness – in terms of function, weight, capacity, availability, service life and total cost of ownership – continues to grow, along with the demand for the greatest possible customization or flexibility in customer-specific designs

and options. There is as yet no end in sight.

These requirements can only be fulfilled based on consumer and industry standards. The answer lies in what are known as 'smart' modular solutions. In their basic form, smart modular solutions have already been tested in a lot of applications and solutions. Their modularity enables a broad range of applications in many industries, with the production volumes needed for suitable pricing, and the required robustness.

TQ Systems is taking precisely this approach. As an electronics service provider and technology partner for many businesses in a wide variety of



industries, the company is able to offer its customers a broad range of experience and extensive competencies.

In the process, TQ can call upon proven in-house embedded solutions to deliver complete electronic systems for communications, drive control, HMI, electrical supply, electrical distribution, sensors, and of course the interplay of complex mechanical and electronic components. ☒

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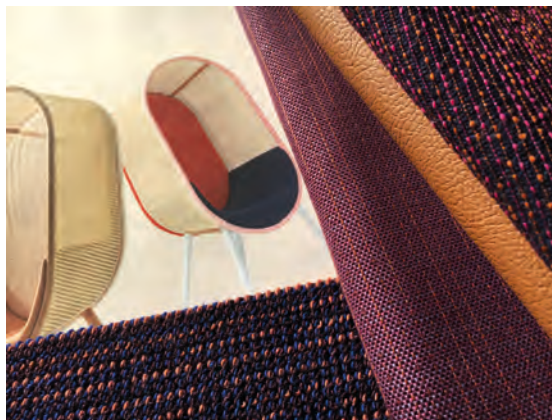
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CONCEPTUAL FORECAST 2019

A future-oriented collection is the inspiration for Lantal's Conceptual Forecast 2019

The new Conceptual Forecast collection from Lantal Textiles offers a glimpse into the future of aircraft cabin interiors. Lantal's design team has been keeping up with the megatrends in society, design and civil aviation, and key insights have been distilled into the new Lantal Trendletter, along with the emergence of three themes that will influence aircraft cabin interiors in the near future. These observations led to the development of special pieces for this collection.

The highlights of Lantal's seat cover fabrics are gradual relief effects, which give the material a convincing 3D look and the appearance of two different interwoven fabrics. This 3D effect can also be found in the carpets. These



unusual surface textures will have customers asking, "How did they do that?"

This year's collection includes some of the lightest carpets Lantal has ever

LANTAL'S SEAT COVERS CAN BE SPECIFIED WITH A 3D APPEARANCE, OR THAT OF TWO DIFFERENT INTERWOVEN FABRICS

developed and manufactured. Some have patterns that look hand painted, but are in fact created using special weaving techniques.

Uniquely detailed curtains round out the collection, some of which are designed to be reversible. With these cutting-edge products, Lantal helps forward-looking airlines create aesthetically pleasing cabin interiors. ☒

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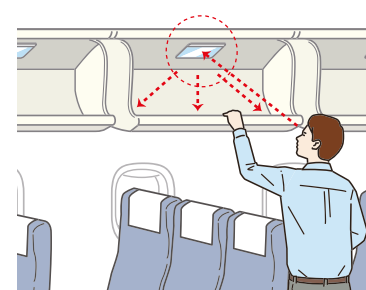
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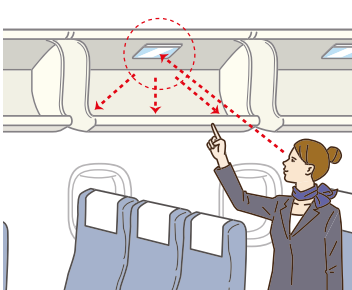
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R72: INNOVATION FOR SEATING

epsotech UK has launched its new R72 product for the aerospace sector which meets JAR25.853 (d)

epsotech Group, a leading producer of engineered polymer sheets and rolls, has long enjoyed links to the aviation market sector with its approved and established flame retardant R57 sheet, which meets the JAR25.853 (a) specification. However, following extensive research and development, the company has now introduced a new product into its range with R72, which meets the stringent JAR25.853 (d) (Ex HCl) specification



for the demands of aircraft seating applications.

Greg Shaw, managing director of epsotech UK (pictured left), states, "This is an exciting time for epsotech as the business brings a renewed focus of our strengths to key industry sectors. We are delighted to

have added the R72 product to our range, which now makes our portfolio even more robust. Our new ability to meet the higher specification criteria, beyond our R57 product, will now add to

our reputation as a European supplier that can service the market with very short lead times, minimal order quantities, and which has an excellent technical and customer service team to back up our offering to the market."

epsotech UK, based in Scotland, is one of eight production locations within epsotech Group. The UK arm has a strong history of serving the aerospace sector, having facilitated products within this sector for more than 60 years. ☒

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NON-HALON EQUIPMENT

New regulations for onboard safety are seeing halon-based fire suppressants phased out. This Proponent has launched a non-halon portable fire extinguisher

Halons are a family of chemicals similar to chlorofluorocarbons (CFCs), which can be very unreactive, non-toxic and non-flammable. These qualities have led to the main use of these chemicals being for fire suppressants in fire extinguishers. However, because halon products are known to actively deplete the ozone layer, which reduces the protection it offers the Earth from harmful UV rays and contributes to global warming through the greenhouse effect, such products are being phased out.

As a result of this change in the market, EASA and ICAO have mandated new regulations, which stipulate that all newly built



aircraft as of December 31, 2018, and all aircraft in operation as of December 31, 2025, will be required to carry only non-halon handheld portable fire extinguishers on board.

To meet this requirement, Proponent has become the global aftermarket distributor of the P3 UL 5B:C Hafex Non-Halon handheld extinguisher, which

is claimed to be the smallest and lightest product of its kind.

Proponent remains focused on offering innovative solutions to its partners and to the aerospace industry, offering not only support for preparing for the upcoming regulation mandate, but also providing new solutions designed to accommodate customers' specific needs.

Proponent's high-quality products make the regulatory transition as simple as switching products. In the fast-growing and changing aerospace market, Proponent is nimble and responsive so its partners can be the same. ☒

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FABRICS INNOVATION

Discover the world of inflight beauty and comfort with the Kets range of fabrics

While a general sense of comfort and feeling at home may have been enough to create a good passenger experience in the past, today's travelers look for a more cosy atmosphere and a more personalized inflight experience.

As a brand that has inspired and improved the world of home textiles and technical fabrics for decades, Kets now offers its vast design and production experience to premium airlines too.

The company is proud to announce that Turkish Airlines has selected fabrics produced by Kets for the seats on its new B787-9 and A350-900 aircraft. The Kets brand was chosen due to the strength of its colors and designs, and its rich product portfolio.

In addition to creating a home-like inflight experience with rich colors and



textures, the company's fabrics can help airlines improve their cost of ownership, service quality and safety, thanks to their value-adding properties.

Fuel and cost efficiency can be improved through the use of lightweight fabrics with high durability. Cabin cleaning times can also be reduced by Kets Easy Life stain-release technology, while antibacterial fabrics can suppress

bacterial growth – these are just a few examples of Kets fabrics that can make life easier and safer for airlines.

Achieving this level of innovation has required a strong vision, passion and a lot of hard work from the Kets team. A significant portion of the company's revenue is invested into R&D every year, and its large team of talented designers continue to inspire and improve the world of transportation. Looking for a reliable, responsive and collaborative partner that can offer custom-made solutions? How about a global brand known for its design power and rich product variety? ☒

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TRACK AND TRACE

Brady has developed a new ultra-thin RFID label for non-metal surfaces

Brady's new RFID Air Label for aircraft and the general aerospace industry is ultra-thin and has an industry-leading read range of up to 8m (26ft). By attaching the RFID label to non-metal components, and safety and medical equipment, any non-metal aircraft item or component can be easily tracked and traced during assembly or before take-off.

Easy tracking

Non-metal components or items can be tracked quickly and easily if they are equipped with the RFID Air Label. Where in the supply line are the composite parts we need? How many life vests are on board? Do any oxygen masks need to be replaced? To check, simply use a mounted or handheld scanner to pick up the 'birth records' of every labeled item. The scan

will tell you where items are and how many there are, keeping you compliant with a number of EASA requirements.

Ultra-lightweight RFID labels

The RFID Air Label weighs less than 2g and is available in three sizes. The label is able to withstand extreme environmental conditions without the use of an overlaminate and is ATA2000 and AS7578 certified. The RFID Air Label is part of Brady's RFID label range, which also includes an RFID Alloy Label for metal surfaces and components, an RFID Flag Label to apply to wires and cables, and RFID Rigid Tags for indoor and outdoor applications on both metal and non-metal aircraft components.

Print and program on-site

Brady's on-site RFID print and program



solution enables users to simultaneously program the RFID chip and print information on the labels at 600dpi. The intuitive printer software is fully compliant with ATA Spec 2000, and allows for manual or fully automated data entry and an integrated validation process.

The on-site RFID setup should enable aerospace manufacturers and airline maintenance crews to print and program an RFID label in less than 10 seconds. ☒

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BRANDING ELEMENTS

Branding elements are a key factor in achieving effective customer retention, says ABC International

The continuing growth in commercial aviation, the number of new entrants to the market, and the consequent need for airlines to create a trusted relationship with passengers in a competitive market, serve to illustrate the importance of a strong brand image on board.

ABC International is a pioneer in the cabin branding market. The company has foreseen from its first project in 2010 how attention in the cabin interior needs to focus on widening operators' brand awareness through the installation of highly customized 3D panels and logos.

With a blend of engineering capabilities and aesthetic talents, ABC International develops quality products that comply with all technical aspects required by airworthiness regulations.

The company is building on its long-established collaborations with Air Canada, Etihad Airways, TAP Air Portugal and Ethiopian Airlines, steadily enlarging its market base and applying its branding know-how all around the world. It is also developing panels and logos for some of the latest aircraft models, such as the A320neo, B737Max, A330neo and A220.

The latest cabin branding partnership with Brazilian low-cost carrier GOL has strengthened ABC International's presence in the South American region. The airline's logo was manufactured using CNC machine tools and then painted as per the customer's corporate image guidelines, together with a special resin script that informs passengers about the connectivity service on board.



Cabin interiors are the environment by which passengers evaluate an airline. Strong customization is the key to boosting the intangible elements relevant to the passenger flight experience. Your brand is your identity – take care of it. ✖

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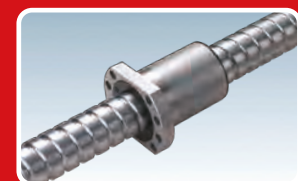
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Valentine's Day was a little heartbreaking for the *Aircraft Interiors International* team this year. For a magazine that adores the A380 – a big airplane with a big heart, even bigger cabins and the potential to feature the ultimate in interior designs – receiving a Dear John letter saying that production of your sweetheart will end in 2021 was not a happy moment.

Our relationship began in 1998 when Noel Forgeard, then-managing director of Airbus, said to us of the emerging A3XX program, "We are undeterred by the doomsayers who are trying to convince others that it is not wise for Airbus Industrie to develop such an aircraft." It was a rocky start to the relationship, but it has since blossomed and we have featured some amazing A380 interiors over the years: the first luxury Singapore Airlines aircraft, the supercool Korean Air, Air France's chic first class, and Etihad's luxury upper deck that dispensed with the rulebook – and the catalog.

Special mention goes to Emirates though, with the airline flying around half of all A380s ever made, a scale of ordering that has made it the backbone of the program, and interiors that are a pride of the program, especially the onboard showers that people still talk about, a decade after launch. What Emirates giveth, it has taken away though, with a reduction in orders meaning just 14 more A380s will be delivered to the airline up to late 2021. An order for 14 superjumbos is a big deal, but it also represents a reduction in its orders of some 39 aircraft – a reduction in backlog that makes production unsustainable.

We can take some solace that we're not the only people disappointed, with Sheikh Ahmed bin Saeed Al Maktoum, chairman of Emirates Airline, saying, "For us, the A380 is a wonderful

A380 FANS SHOULD VISIT THE FEATURES SECTION OF THE AIRCRAFT INTERIORS INTERNATIONAL WEBSITE TO SEE FEATURES ON OUR FAVORITE A380 CABINS

aircraft loved by our customers and our crew. It is a differentiator for Emirates. We have shown how people can truly fly better on the A380."

Indeed Airbus conducted a survey of travelers and found that 60% would pay extra to fly on an A380.

Noel Forgeard will also be disappointed, as is current Airbus CEO Tom Enders, who stated, "The A380 is not only an outstanding engineering and industrial achievement. Passengers all over the world love to fly on this great aircraft. Hence this announcement is painful for us and the A380 communities worldwide."

Never a truer word spoken, but our relationship with the A380 still has a lot of life in it. Emirates has stated that the airline will continue to invest in its A380 onboard product and services well into the 2030s, and other airlines will do likewise, while new operators will take on ex-lease aircraft and apply their own visions.

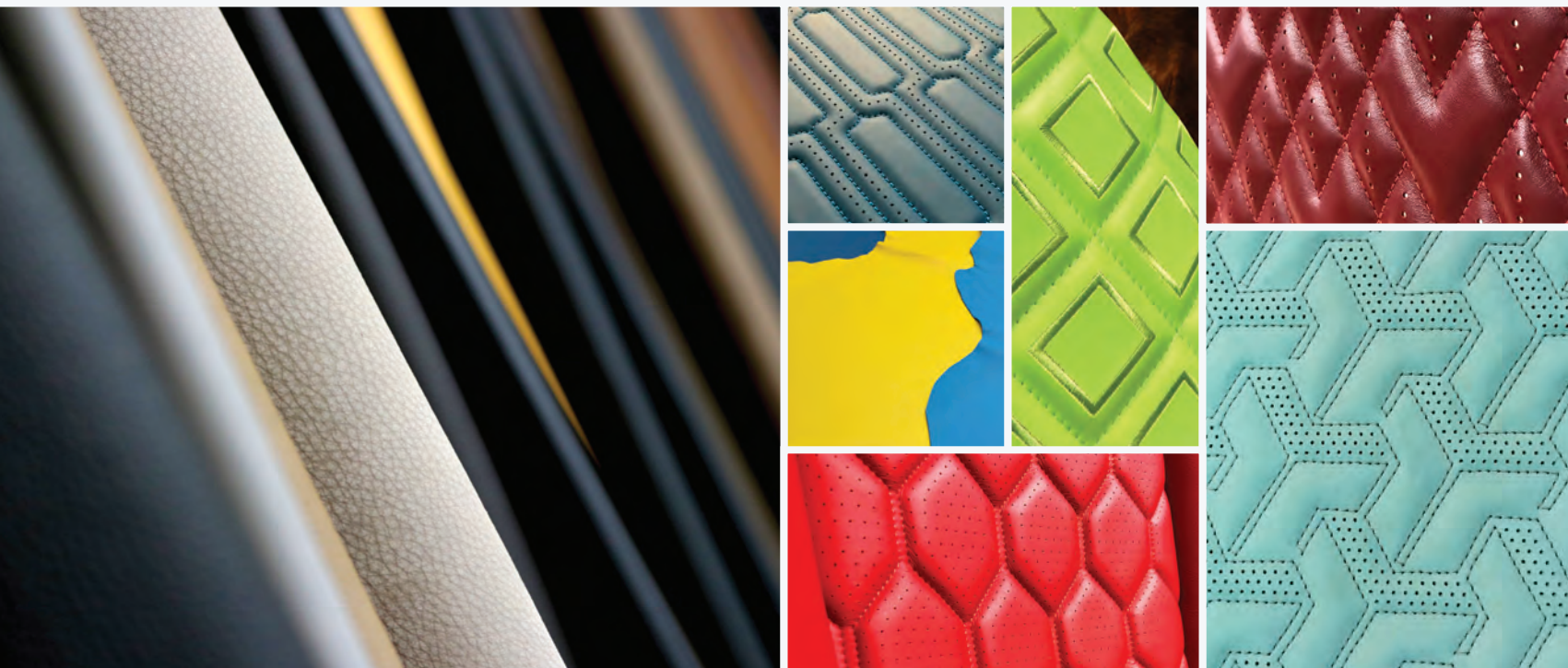
Could we finally see A380s enter the private sector? Saudi Prince Alwaleed bin Talal-al Saud's jaw-dropping plans for a flying palace fell through, but Sparfell & Partners is now marketing four ex-SIA aircraft as VVIP 'royal yachts', with amazing interiors by Winch Design.

Certainly the VVIP sector is the closest we will see to the launch ideas of leisure facilities such as casinos, gyms and spas – even if only the world's 0.01% richest get to enjoy them, it would be amazing to know they were in the sky. At the other end of the scale, perhaps super-high-density versions could shuttle between the new Chinese megacities.

We will move on and continue loving relationships with other wide-bodies, whether it be the A380's smaller A330 and A350 siblings, the CRAIC CR929, Boeing's B747 (it's complicated) and B787, or the new airplane on the block, the B777X, but there will always be a place in our hearts for the A380. ✕



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