Aircraft interiors INTERNATIONAL

NOVEMBER 2017

In this issue

Small miracles

BIG ADVANCES IN TINY TECHNOLOGY: WHY NANOMATERIALS ARE THE NEXT BIG THING IN AIRCRAFT INTERIORS

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SMALL TIME

There is a distinctly scientific feel to this issue, so let's begin with a demonstration. Just feel this sheet of paper between thumb and forefinger. It feels pretty thin, right? Actually, in the scale of materials we consider in this issue, it is rather hefty. This page is 100,000 nanometers thick, while the carbon nanotubes that could be used in next-generation aircraft interiors measure just 1 nanometer. It's impossible to see something so small with the naked eye, and almost as difficult to imagine just how small something at the nanoscale is – but experts are on hand to help.

On p36, Dr Lisa Friedersdorf, director of the US government's National Nanotechnology Coordination Office, explains how reducing materials science to such a tiny scale can have huge benefits for the cabin environment, from preventing the spread of germs and odors, to increasing fire safety and making windows work more efficiently. Nanotechnology can also enable new ways to increase passenger comfort as it can be used to create the tiniest of sensors, which can be fitted throughout the cabin to monitor passenger wellness and predict their requirements.

It is amazing work, with huge potential to make humans healthier and safer in the air, but there is so much more potential. We also spoke to Dr Michael Meador, a lightweight materials and manufacturing expert from NASA no less, who predicts extraordinary cabin engineering benefits resulting from the development of nanotechnology (p44). Initial predictions include the ability to reduce the cable mass in cabins by as much as 90%, improving data transfer quality, and even the development of seat textiles that could harness the thermal energy from passengers to charge their electronic devices.

The long-term future is full of potential, but we have also gathered insight to help cabin projects in the shorter term. For example, wouldn't you like to know what cabin trims and finishes will please tomorrow's flyers? Our panel of color, materials and finishes experts have explored this year's fashion, furniture, design and motor shows around the world to get a feel of what direction passenger tastes will take: perfect for making sure a cabin design scheme designed today doesn't look outdated by the time it launches (see p80).

We also have details of the latest leathers, textiles, finishes and flooring to add to your materials library (p68), and these quality materials can be complemented by the lighting technology ideas on p96. International lighting experts have shared their ideas of how lighting can be optimized to enhance the business class experience, and they have also considered how to improve lavatory lighting so passengers can feel a little more confident when they gaze in the mirror after a long flight. No more moments of horror before landing: just another positive element of the experience.

Adam Gavine, editor

WORLDWIDE

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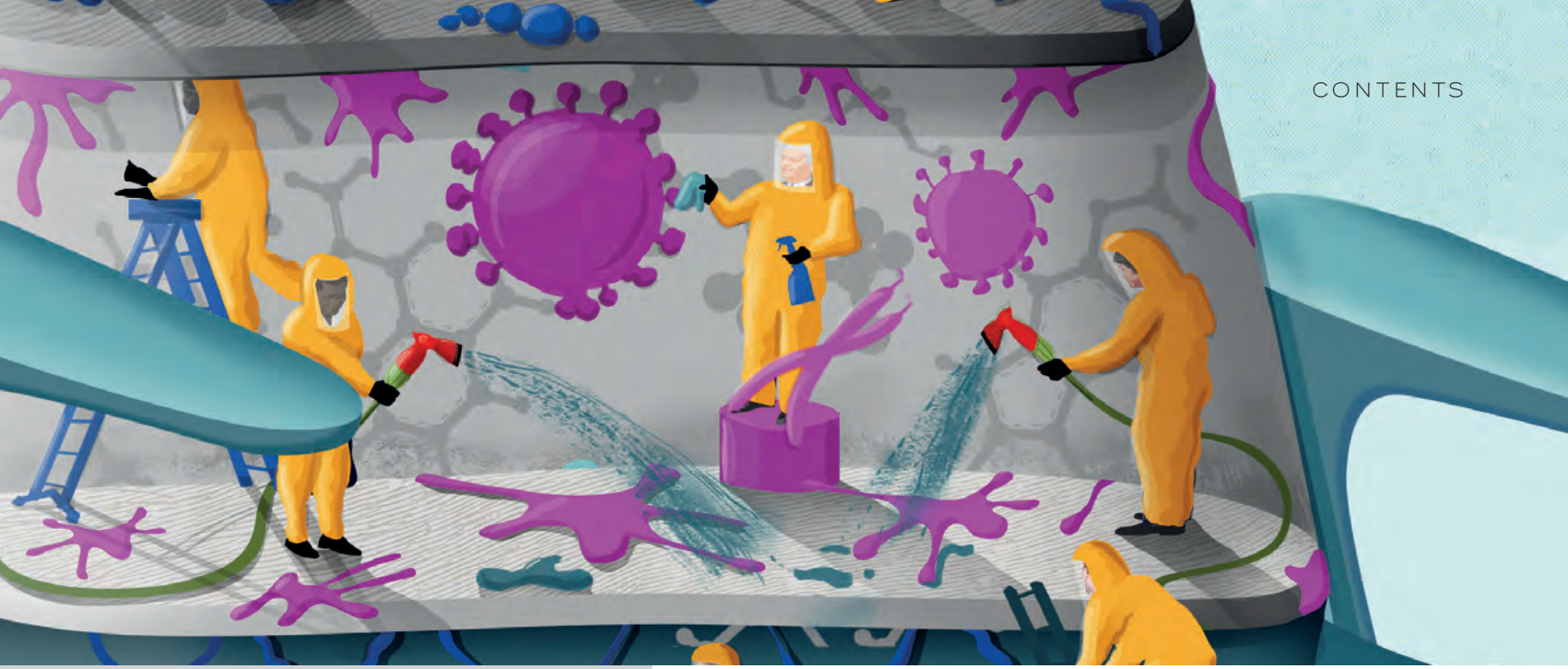
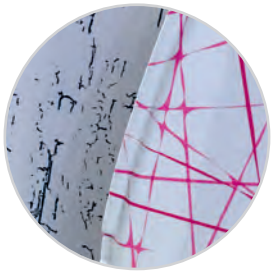


Up front

Features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abc Member of the Audit Bureau of Circulations
Average net circulation per issue for the period January 1, 2016, to December 31, 2016: 13,748

published by UKi Media & Events, a division of UKIP Media & Events Ltd
Aircraft Interiors International
Abinger House, Church Street, Dorking, Surrey RH4 1DF, UK
Tel: +44 1306 743744
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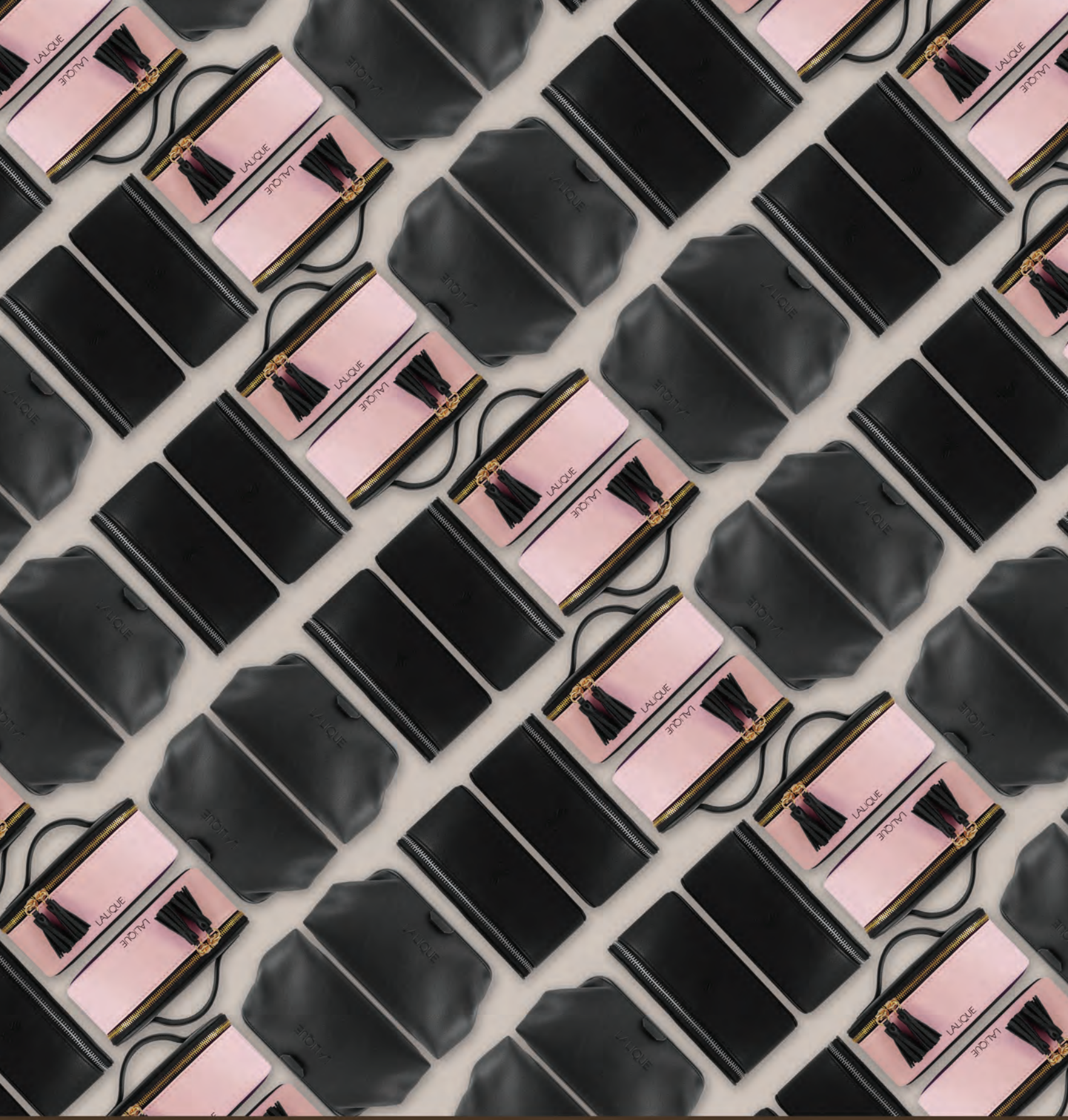
Annual subscriptions (5 issues)
Worldwide rate: £80/US$104

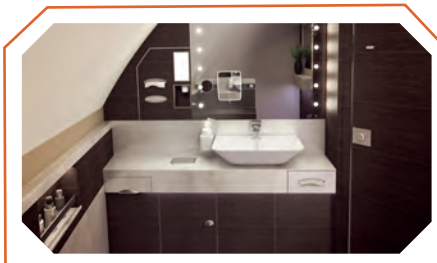
Airfreight and mailing in the USA by agent Air Business Ltd, c/o Worldnet Shipping USA Inc, 155-11 146th Street, Jamaica, New York 11434. Periodicals postage paid at Jamaica, New York 11431. US Postmaster: Send address changes to *Aircraft Interiors International*, c/o Air Business Ltd, c/o Worldnet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

USPS 019-144. ISSN 1463-8932 (print); ISSN 2397-6446 (online)
Aircraft Interiors International November 2017.

Printed by: William Gibbons & Sons Ltd, Willenhall, West Midlands, WV13 3XT, UK

Cover image: Sam Falconer





CLOCKWISE FROM LEFT: THE SUITES OFFER DOUBLE BEDS, STYLISH BATHROOMS AND LUXURY STOWAGE

LIFE IS SUITE

There may be fewer Suites in Singapore Airlines' new A380 configurations, but there is more to enjoy

Being launch customer for the A380, Singapore Airlines has always had a special relationship with the aircraft, and when it revealed its first superjumbo in 2007, its sumptuous Suites class raised the game in first class: indeed it was the beginning of 'super first class'. A decade on, the enclosed suites still compare well against newer competition, even from the Gulf carriers, but the airline decided it was time for a change. The change isn't purely to keep the product contemporary though: the number of suites is being halved to six to better suit the airline's passenger metrics, and is also being relocated from the main deck to the front of the upper deck.

Another change is in the designer of choice, with French luxury yacht designer Jean-Jacques Coste replaced by the Pierrejean Design Studio – a French studio that also designs yachts, as well as commercial aircraft cabins for the likes of Emirates, Qatar Airways and Asiana.

The airline has been working with Pierrejean on the A380 as part of a four-year, US$850m development program to update its fleet of 19 A380s – and the results are striking. Naturally the suites remain enclosed, but slide open the doors and you can instantly see that the space has been significantly altered. The most obvious change is that the extra room given to each suite has been used to swap the convertible fully flat seat for a separate bed and chair. The benefits are myriad, including having furniture optimized for purpose in terms of comfort and function, and not having to disrupt the luxury experience to convert furniture for eating, sleeping or working – and it looks more luxurious, more like the hotel room in the sky that designers aspire to.

In-suite and on-line

Suites flyers can be assured of high-speed wi-fi, as Singapore Airlines will be equipping its A380s with Inmarsat GX Aviation's broadband connectivity system, offered through SitaOnAir – making these aircraft the world's first GX-enabled A380s.

The 'honeymoon' feature whereby the beds in adjoining suites can be converted to form a double bed also remains, but again with a twist: when not in use, the bed can be stowed, creating a private sitting room. There is no social space on the airline's A380s, so this could prove a popular option for meetings and get-togethers.

The seats are as luxurious as the Suites experience demands, upholstered in Poltrona Frau leather, and fully adjustable, with a swivel capability of between 135° and 270°, and recline function up to 45°. To ensure optimal IFE viewing, the 32in HD monitor can swivel to suit the different viewing angles in seat and bed modes.

The Suites, being manufactured by Zodiac Seats UK, also include a full-sized personal wardrobe, a customized handbag stowage compartment, a leather-lined amenity box, a specially designed carpet, and a feature wall with mood lighting.

The new Suites cabin reflects well the airline's image of offering the highest quality in an understated manner, and should serve the airline well for another 10 years.

For the in-depth story about the airline's B777-300ER cabins, visit the Case Studies section of aircraftinteriorsinternational.com

CHIC CHASSIS

Major work has gone into developing an all-new A380 business class cabin that is still an unmistakably Singapore Airlines experience

THE BACK SHELL IS LARGER THAN ON THE OUTGOING MODEL, CREATING A MORE COCOON-LIKE FEEL. A PRIVACY SCREEN DIVIDES THE CENTER SEATS, WHICH CAN BE FULLY LOWERED TO FORM DOUBLE BEDS

The new Suites on Singapore Airlines' A380s (see p9) are a superb offer for the carrier's top customers, and a great halo product for its marketing department, but sitting behind them on the all-luxury upper deck is the real profit engine of the aircraft: business class. Major work has been invested in the cabin to make sure it is a top-tier offer in a highly competitive market, and with an increase in seat count from 66 to 78, any resultant growth in demand can be met.

The seat is entirely new, designed in conjunction with Jamco and JPA Design – the studio it has worked with since 1998. Code-named Monocoque, the seat is arranged in a forward-facing, four-abreast (1-2-1) configuration with direct aisle access. The LOPA has enabled an extra two rows to be fitted, which the studio says has been achieved without compromising passengers' personal space.

"The layout shares some DNA with the Next Generation seat [also designed by JPA and launched in 2013 on the airline's B777-300ERs and its A350s in 2016], but equally has some very distinct changes," explained John Tighe, design director at JPA. "The beds of the center seats point outwards not inwards, there is overlap between the seat and the ottoman, and the bed deploys directly from TTOL to bed, not a flip-over design like Next Generation and the previous A380 seat."

A carbon-fiber composite structure minimizes weight, and this material also forms part of the aesthetic of the seat. As Tighe explained, "We have designed the seat as an organic, flowing structure. It's a super modern form with no gimmicks. The appealing aesthetic is the structure itself."

According to the studio, this base structure – thinner than that of the seat it replaces – allows for better optimization of the design and creates more under-seat stowage space, which is large enough to accommodate a full-sized cabin bag. This under-seat capacity has, in turn, enabled the airline to do without central overhead bins in the cabin, which enhances the feeling of space, and saves substantial weight.

While there have been major developments in the business class hardware, the cabin will still feel familiar to loyal customers. As Tighe explained, "We've evolved elements from the previous Next Generation cabin family, offering a reassuring level of familiarity, but with more dynamic and bold features introduced through the space. The hope is that customers will feel they are getting an upgrade."

Explore the airline's new interiors in the Videos section of our website

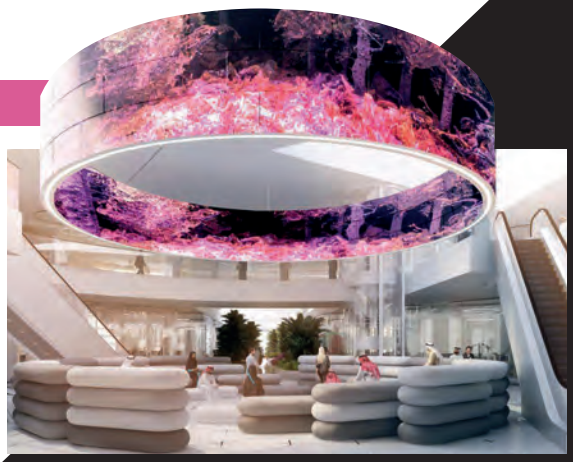
STYLED FOR SERVICE

Customers will also enjoy Singapore Airlines' greatest asset even more: its inflight service. For example, the illuminated cocktail tray is better positioned for crew to serve drinks and snacks without interrupting customers, who in turn can access the tray more easily. "Every element has been carefully considered to ensure it enhances the effortless and elegant service offering," said John Tighe at JPA.

Visit aircraftinteriorsinternational.com for the latest airline cabin news

BETTER TOGETHER

Two innovation spaces are being established to engender open, collaborative research and cultivate disruptive thinking in aviation



Emirates: Aviation X-Lab

Emirates is part of a consortium building the world's first aviation experimental laboratory (Aviation X-Lab) to create what it describes as "the next era of human transportation". The lab will host airlines, manufacturers, ground logistics experts, regulators, engineers, academics and startups under one roof at Area 2071, a technology hub in Dubai billed as an "experimental nucleus" due to open in 2018. The 2071 refers to the UAE government's plan to make the country less reliant on oil revenue by becoming a world leader in technology and engineering by 2071, the year when UAE will celebrate 100 years since its formation.

Regular industry summits are planned for the lab, where issues within the aviation industry will be discussed and challenges for solutions set, which internal teams, independent engineering teams, academics and startups can apply to work on. The solutions created should have real value, as the winning teams will spend a year at the Aviation X-Lab working with senior industry executives and regulators to conceive and develop their technologies and business theories, conduct experiments, and build prototypes.

Sheikh Ahmed bin Saeed Al Maktoum, chairman and CEO of Emirates, said, "We look forward to the Aviation X-Lab initiative, which will enable Emirates to co-create high-impact solutions with our industry partners that will propel the UAE's aviation sector to new heights, and unlock the possibilities of an interconnected world."

ABOVE: EVEN THE AREA 2071 BUILDING IS AN INNOVATIVE DESIGN

BELOW: ROLLS-ROYCE HAS PARTICIPATED AT LE GARAGE

Airbus: Le Garage

Meanwhile, Airbus has opened Le Garage, its new research and technology (R&T) innovation hub located next door to its main manufacturing operations in Toulouse (which helps keep research relevant to the industrial environment). The name may not sound high-tech, but it refers to big names in Silicon Valley that began life in an inventor's garage, such as Apple and Hewlett Packard. However, Le Garage is a rather grander structure, housing around 130 experts in data science, applied mathematics and electromagnetics, with room for around 40 visitors from suppliers, universities, partners and BizLab startups in the near future, all striving to bring new products to market in less time.

The space is very open with few walls, to cultivate values of collaboration, agility, openness and speed, working concurrently rather than linearly, without a culture of hierarchy.

There are four separate spaces, with offices for permanent staff, various areas for project teams, and a Concurrent Design Facility (CDF): a state-of-the-art space equipped with all the tools required to enable teams of experts from across several disciplines to work on design studies.

Pierre Farjournel, Airbus's chief of staff to the CTO explained, "We have to actively combat the 'not invented here' attitude. We're doing this by developing a partner-friendly culture, an openness that means you accept you cannot do it all alone. You have to rely on the outside ecosystem to find expertise and so we want to collaborate with startups, universities, labs. By challenging our processes, we aim to come back to a 'leaner' approach that helps us work faster and more flexibly."

The Le Garage concept has also been adopted at ZAL in Hamburg, and is being rolled out at Airbus's Ottobrunn site in Munich and Filton complex in the UK.

Visit aircraftinteriorsinternational.com for regular updates on aerospace research

CONNECTED WORLD

Around the world, recent technology advances in inflight connectivity are bringing imminent benefits to the passenger experience

1 MOBILE BROADBAND

Prof. Yang Hao, a renowned expert in antennas and electromagnetics from Queen Mary University of London, has been researching a new generation of antennas that use advances such as metamaterials (see p44). One aim of the research is to enable airline passengers to use low-cost, high-throughput satellite communications in flight, with no need to switch their smartphones to flight mode and pay extra to access data – the broadband experience would be seamless from land to air, at no additional cost. Hao has won a US$396,000 prize from the Institution of Engineering and Technology to further his work, and predicts the widespread use of this technology within a short timeframe. He is leveraging local partners to – as he says – "collectively redefine satellite transmission theory with cutting-edge antenna design".

Footage and commentary of the EAN flight test is on the Videos page of our website

2 DIGITAL SUPERHIGHWAY

ViaLight Communications has been engaged to develop and manufacture a hybrid synchronized laser-based communication system to link aircraft and/or ground stations on Airborne Wireless Network's (ABWN) Infinitus Super Highway. The system is intended to provide a low-cost, broadband wireless communication infrastructure by using and modifying existing low-power relay station equipment for installation on board. Thus equipped, each aircraft would have a broadband wireless communication link to one or more neighboring aircraft and/or ground stations, creating a chain of repeaters or routers, providing broadband wireless communication gateways along the entire flight path. The result, says ABWN, will be "a digital superhighway in the sky".

3 50MBPS CONNECTIVITY

UAE-based satellite operator, Yahsat, announced, on October 30, the successful trial of a 50Mbps inflight connection. Using its Al Yah 2 satellite and the latest-generation Ka-band technology, Yahsat and its partners Du (a Dubai-based telecommunications company), Etihad Airways Engineering, Hughes Network Systems and Carlisle Interconnect, tested the system on board an Etihad Airways A320 flying testbed. Following this success, Yahsat and its partners plan to further develop the system, with the aim of making it available to commercial airlines in 2018. The partners also plan to introduce data analytics and back-end systems that will enable airlines to utilize such analytics of user behavior.

4 EUROPEAN TOUR

On October 26, Inmarsat and Deutsche Telekom successfully completed initial flight trials of the satellite and complementary ground network of around 300 LTE-based ground stations for their European Aviation Network (EAN) service. EAN combines space and ground-based components to deliver high-speed broadband. Some 3,000 miles (4,830km) of flight tests were conducted, to test the integration of the Mobile Satellite Services (MSS) and Complementary Ground Component (CGC) terminals. Further flight trials are scheduled ahead of the service entering service with launch customer IAG in the first half of 2018.

5 GO GOGO

On October 31, Gogo reported a successful test flight of its next-generation regional ATG network and related aircraft systems. The network is claimed to bring up to 30 times more bandwidth to an aircraft than the company's original ATG system, and once network upgrades are complete in 2018, Gogo says the network will have peak capacity of more than 100Gbps. The new network uses unlicensed spectrum in the 2.4GHz band, as well as the licensed spectrum from Gogo's original ATG network, to provide greater bandwidth, and also leverages the backhaul and infrastructure of more than 250 cell towers from the existing network. Gogo has also developed a new antenna and modem that will produce peak speeds of more than 100Mbps.

Visit aircraftinteriorsinternational.com for regular connectivity news

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QUIET CONTEMPLATION

A team of German and Canadian engineers is busy at ZAL's labs in Hamburg, creating the next generation of materials to make cabins quieter

ABOVE: ACOUSTIC MATERIALS CAN BE TESTED IN ACCURATE FLYING CONDITIONS WITHOUT THE EXPENSE AND VARIABLES OF ACTUALLY FLYING

ZAL, the Center for Applied Aeronautical Research, has begun a research project with the aim of reducing engine noise in the cabin without increasing weight. Today such sound reduction is most often achieved through the use of acoustic blankets made of glass wools or foams, fitted between the interior trim panels and the fuselage.

However, ZAL engineers believe that conventional acoustic materials such as these have reached their limits in terms of soundproofing, and that the way forward is metamaterials. They may be right, but much research is required before such innovation will be ready for industrialization.

The research project, being conducted by German and Canadian companies and scientific institutions (see box left), sees acoustics and materials experts carrying out the extensive scientific and technological development and validation work necessary to ensure that the next generation of thermoacoustic insulation blankets incorporating metamaterials will be as safe for use in aircraft cabins as it is effective.

Metamaterials are constructed from man-made materials and can be effective in manipulating sound waves, through blocking, absorbing, enhancing or bending the waves as they meet the material. The desired effect is achieved by tailoring the assembly of the elements in terms of their shape, geometry, size, orientation and arrangement.

Exact details of the acoustic metamaterials ZAL intends to integrate into blankets are still being kept under wraps, but the team intends to validate the technology up to the fifth technological readiness level, meaning it will be considered viable for industrialization and commercialization for aerospace application, and the technology will be ready for airborne demonstration and evaluation. It's early days for the program, but we'll keep you up-to-date with progress.

BLANKET BUDDIES

The acoustic blankets project is a German-Canadian venture, jointly managed by ZAL and Mecanum, an acoustic materials specialist from Canada. Other companies and scientific institutions involved include 3M Canada, Airbus Operations, École de Technologie Supérieure, Hamburg University of Applied Science, Hutchinson Aerospace, National Research Council Canada and the Université de Sherbrooke.

A SOUND RESOURCE

The partners benefit from ZAL's 450m² (4,845ft²) Acoustics Lab, which features a semi-anechoic chamber that can accommodate fuselages of up to 8m (26.2ft) high and 15m (49.2ft) long. Such work is typically carried out in the air, but with this lab, research on noise and vibration can be performed in precise conditions, reducing variables and cost. For example, spooling up a jet engine in the lab is clearly a little problematic, but its vibroacoustic properties can be simulated using a curved bank of 128 speakers mounted on rails, which can be rotated around the fuselage to target specific areas.

Join us on a tour of ZAL's facilities in the Articles section of aircraftinteriorsinternational.com

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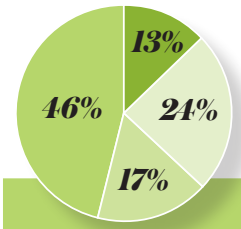
UPWARD CURVE

Almost every aspect of the aircraft interiors sector is in a positive growth phase. The only problem is that passengers are expecting more



EcoMoany

Many flyers love to complain about comfort in economy class, but also love cheap fares. In a poll, *Aircraft Interiors International* readers were asked if they foresee a point in the next 20 years when long-haul economy will be significantly more comfortable

Yes, if higher fares are accepted **13%**

Yes, if there is disruption in seat design **24%**

No, consumer demand will not change **17%**

No, airlines will always pursue higher cabin density **46%**

***Aircraft Interiors International* monthly poll**

In September, the Dreamliner surpassed one million passenger flights since its launch in September 2011. The aircraft type has flown more than 190 million passengers while saving 18bn lb of fuel

Research and Markets

+1,000,000

Inflight broadband could be a

US$130bn

market within 20 years

Inmarsat research

Need for speed

Of passengers who have used fast onboard wi-fi:

61% say it's more important to them than IFE

45% would rather pay for wi-fi than use free IFE

For **56%**, unreliable wi-fi is a major source of frustration

61% say wi-fi takes anxiety out of flying

77% would pay for wi-fi on short-haul leisure flights

89% are willing to pay for wi-fi on long-haul leisure flights

Inmarsat survey

The aircraft lighting market will be worth US$2.55bn by 2021

MarketsandMarkets

US$6.91bn

The IFE systems market is projected to grow from US$3.18bn in 2017 to US$6.91bn by 2022

Research and Markets

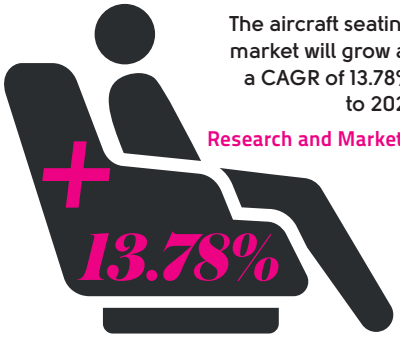
BUMPGATE

Following United's 'bumpgate', the number of bumped passengers in the USA fell to 44 per million between April and June – **29%** lower than the 2016 figure

US DOT

The aircraft seating market will grow at a CAGR of 13.78% to 2021

Research and Markets



+13.78%

1ST PRIORITY

67% of US flyers feel that first class passengers are treated better than other passengers

Clarabridge survey

Growing market

The aircraft interiors market is projected to grow from

US$16.87bn

in 2016 to

US$29.16bn

by 2021

Research and Markets

For the first six months of 2017, the airline industry enjoyed **7.9%** traffic growth (a 12-year high) and a record load factor of **81%**

IATA

7,240

Boeing projects demand for **7,240** new aircraft in China over the next 20 years (5,420 single aisle), valued at nearly

US$1.1tn

Boeing China Current Market Outlook

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ELEGANT THINKING

With supply chain issues being reported in some areas of the aircraft interiors sector, perhaps some sharp ideas could be learned from the fashion industry

The Council of Fashion Designers of America (CFDA) has worked with DHL, its logistics partner, and Accenture, its innovation partner, to analyze the fashion industry supply chain, and its findings could be worth considering in the aircraft interiors industry. The study recommends a human-centered model, which shifts from a sequence of siloed operations, to a more flexible network of participants that enables a more agile and adaptable supply chain.

The model puts designers – in our case, airlines and airframers could take this standpoint – at the center of the supply chain, empowered to build networks through collaboration and by using new digital tools and business models to increase flexibility.

"Today's designers know the frustrations and challenges that occur between the planning of a new design and its ultimate delivery," said Greg Hewitt, CEO of DHL Express US. "Along the way there are communication failures, delays and changes with source materials, manufacturing problems, and changing distribution requirements."

This may sound familiar to some readers, and the idea behind CFDA's supply chain model is to eliminate such challenges by focusing on relationship-building; enabling the sharing of expertise across partners; adopting collaborative approaches and shared communications; employing a networked approach to reduce costs and overall waste; and connecting partners across traditionally siloed steps to increase flexibility. Four key areas of focus have been identified...

1

PROCESS OWNERSHIP

A process with clear communication channels across partners will increase flexibility in sourcing, producing and delivering products, and a well-defined but flexible approach will create more successful refinements. The key is to focus on process as a major component of design, integrating partners early on with clear communication of requirements about traceability and sustainability (for aviation leathers, for example), and including a dedicated step that integrates learnings.

2

RELATIONSHIP BUILDING

Developing and nurturing relationships with supply chain partners, from mentors and experts to like-minded peers, is critical to success. Companies should focus on a relationship-first approach that identifies partners to collaborate with in order to fill gaps in expertise, leverage passion points (such as sustainability or light weight), and create opportunities for sharing and collaboration.

Could these four steps assist the aircraft interiors supply chain?

3

BRAND OPERATIONS

Establishing clear operations and avoiding continual reinvention of the brand has proved to be an effective way to avoid unnecessary costs and confusion for buyers and suppliers. There should be a test-and-learn model for manufacturing partners.

4

ACTIONABLE INFORMATION

Information feedback loops between suppliers and designers (airlines and airframers) enables operational improvements and greater collaboration. Success will require integrating information at every step for more proactive and iterative decision making, with analysis of emerging trends and consumer behaviors from both inside and outside of the industry.

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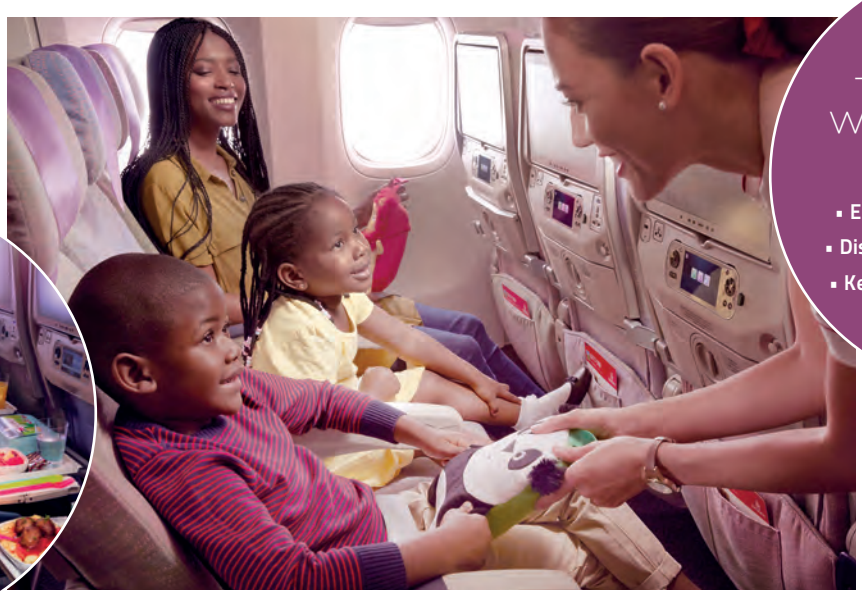
IS THAT A LOOK OF HAPPINESS OR NERVOUS FEAR ON THE PARENTS' FACES? IT'S ONLY A MATTER OF TIME BEFORE THE KIDS WILL BECOME RESTLESS: 49 MINUTES AND 47 SECONDS, TO BE EXACT



PARENTS' TOP 3 WORRIES WHEN FLYING WITH CHILDREN

- **Entertaining their children (64%)**
- **Disturbing other passengers (43%)**
- **Keeping their kids hydrated (23%)**

SAFETY IN NUMBERS

With its Child Boredom Quotient, Emirates believes it has uncovered the secret to keeping kids entertained during flight – and 49 minutes and 47 seconds marks the danger zone

There is a question all parents dread during journeys: "Are we nearly there yet?" And now Emirates believes it knows when parents can expect to hear the question asked: 49 minutes and 47 seconds into a flight. The airline has been working with psychologist Dr Sandi Mann – a boredom specialist, no less – at the University of Central Lancashire in the UK, and together they have applied science to chaos and devised the Child Boredom Quotient (CBQ), based on observation of children during play. Armed with this knowledge, parents – or even fellow travelers keen for a smooth flight – will know when to step in and prevent boredom-related tantrums.

The study – conducted with more than 12,000 parents of under-12s – found travelers aged three or four to be the most volatile, with 41% of parents resorting to bribery such as snacks in exchange for good behavior. Other distraction tactics by parents include employing electronic devices (33%), handing out new toys (27%), or trying to tire out their children by running around the airport before boarding (16%). A rather honest and laid-back 7% stated that they simply don an eye mask and try to relax to block out the disturbance.

"The 'electronic babysitter' [a PED or IFE] may not work for all age groups and parents of younger children will find that they have less attention span for this than older ones," said Dr Sandi Mann. "Breaking up this passive activity for active or creative ones will stop children becoming bored, restless and disruptive."

The study found that movies are the most popular choices for keeping kids occupied, with the youngest (0-2) engaged for around 40 minutes, and the oldest (11-12) for 1 hour 45 minutes. The next most popular distraction is electronic games, either on a device or on the IFE system, which keeps kids occupied from 30 minutes for the youngest, to 1.5 hours for the oldest.

Meanwhile, creative pursuits, such as drawing, was the most popular until age nine, when quizzes and puzzles become more engaging. Coloring and sticker books have most appeal to the younger ages.

Knowledge really is power in the quest for a peaceful inflight experience. Please spread the word!

IS ASPIC THE SOLUTION?

Dr Sandi Mann has suggestions for how to structure a flight for each age range. The activities are categorized as active (A), sensory (S) passive (P), interactive (I) or creative (C) and the idea is that by mixing these up and stopping an activity at the right time, boredom and restlessness will be minimized.

Active: walking up and down the aisle; playing with a pack of cards

Sensory: refreshments

Passive: watching films; listening to music

Interactive: reading a storybook; chatting

Creative: drawing; coloring books

Visit aircraftinteriorsinternational.com for regular research into passenger behavior

UPPER HAND

Qantas is making meaningful improvements to its A380 interiors to enhance passenger comfort and increase revenue potential, with premium seat count increasing by 27%

THE INSTALLATION PHASE WILL START IN Q2 2019, WITH ALL 12 OF QANTAS' A380s DUE TO BE UPGRADED BY "AROUND THE END OF 2020", ACCORDING TO THE AIRLINE

Australian carrier Qantas has decided that its 12 A380s would benefit from a few passenger comfort enhancements, as well as some additional revenue-generating opportunities to meet increased customer demand for premium cabins on its flights to the USA, Europe and Asia. The program involves a thorough rethinking of both decks, with Airbus brought in to work on the upper-deck structural and integration work, the new bespoke monuments and the redesigned lounge. This close work with Airbus will also ease the certification process.

An additional 31 luxury seats will be fitted to the upper deck, the space created by removing the 30-seat economy cabin, with further room created by rearranging partitions and the crew workstation in a more space-effective way. While Qantas's economy passengers will be sad to lose the popular 30-seat upper deck cabin option, they will benefit from new seat cushions and improved IFE. Passengers in the 14-seat first class cabin on the lower deck will enjoy fully refurbished suites, including contoured cushioning and larger, higher-resolution IFE displays.

Business class flyers, meanwhile, will lose the distinctive Marc Newson-designed SkyBeds (see p124), which are being replaced with the latest version of Qantas's Business Suites (a customized version of Thompson's Vantage XL), all with direct aisle access. This platform has been well received by customers on the airline's A330 fleet, and seat count will rise by six suites to a total of 70.

Qantas is also fitting an all-new premium economy seat – again from Thompson – in a 2-3-2 configuration. This seat will debut on the airline's Dreamliner this year and boasts several benefits over the outgoing model, including almost 10% more seat width (now 22.8in), a 30% larger meal table, and a 25% larger IFE display. The airline clearly expects strong demand for these seats, fitting 60 of them in the A380 – an increase of 25 seats.

Qantas is also working with Airbus and its design consultant, David Caon, to rethink the rather underwhelming business lounge at the front of the upper deck. What was a rather basic space with two adjoining sofas will be greatly expanded to become a proper social area worth leaving your suite for.

A380 *at a glance*

Cabin	New	Current
First	14	14
Business	70	64
Premium economy	60	35
Economy	341	371
Total seats	485	484

For an in-depth tour of the outgoing Qantas A380 cabins, visit the Gallery section of aircraftinteriorsinternational.com

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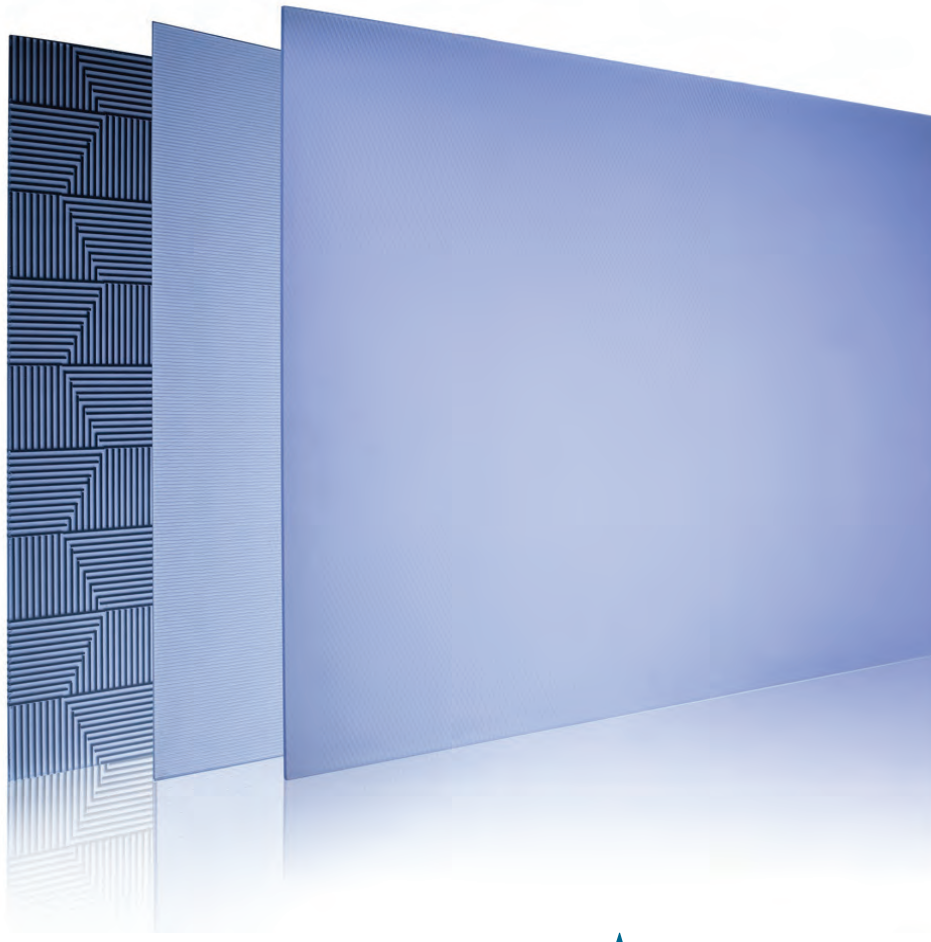

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GROUND FORCE

Competition in the skies is fierce, but airlines also need to monitor the increasingly tempting ground transportation alternatives to short-haul flights

2

TAKE THE TUBE

Airline speeds on the ground could be possible if the Virgin Hyperloop One becomes reality. Based on a concept thought up by Elon Musk, it sees passengers and cargo loaded into a pod within a low-pressure tube, either supported above ground on columns or buried in an underground tunnel. The pod levitates using electromagnetic power and is accelerated gradually via an linear electric motor. The ultra-low aerodynamic drag in the tube creates a dramatic effect, with the pod able to glide smoothly and silently through the tube at 670mph (1,080km/h).

PriestmanGoode has been working on a vision for the passenger experience of the composite fuselage capsules. The initial concept is for pods that accommodate 28-40 passengers – these pods are 98ft (30m) long and 8.9ft (2.7m) in diameter, and weigh 20 tons. The concept interior includes a large dynamic display, virtual windows in the side panels and ceilings for passenger information, food and beverage services, and toilets.

See more options at the at the 2018 Future of Transportation World Conference (see p106)

3

TAKE IN THE SIGHTS

For domestic travelers in Japan seeking ultimate comfort over speed and keen to see the country's beauty, the Shiki-Shima is perfect. Operated by J R East, the journey from Tokyo, through the northeastern region of Tohoku and up into Hokkaido is enjoyed in supreme luxury, the 10 cars including stunning lounge, dining and viewing areas. 34 passengers can be accommodated in the 17 lavish rooms in the remaining six cars, with the flagship suite featuring a beautiful bath made from Japanese cypress. Shiki-Shima isn't quick and it isn't cheap, but it is one of the ultimate passenger experiences.

1

CATCH… THE BUS?

A new option is now available for the popular San Francisco to LA route: the bus. This may not sound glamorous, but the Cabin service is billed as a 'moving hotel experience' that addresses the USA's '500-mile problem' – a regional journey of 500 miles (805km) requires sacrificing an entire day to travel, whether by air, rail or road. By combining transportation and accommodation into one experience, Cabin aims to make sleep time productive time. Passengers step onto the bus at 11:00pm and are assigned a private bunk, and access to a communal bathroom and lounge, wi-fi, and attendant service. Fully rested, they check out in their arrival city at 7:00am. A hotel and travel, all from US$115 each way.

4

FUXING THE OPPOSITION

A fast way to travel directly between the centers of Beijing and Shanghai is set to be introduced by China Railway, with a new higher speed of 218mph (350km/h) enabling the journey to be covered in about 4.5 hours. The speed has been enabled by the new Fuxing (meaning 'rejuvenation') bullet train and may attract additional customers on the route between China's capital and its major financial hub – not that it is struggling, already carrying over 100 million passengers a year. Other improvements introduced with the Fuxing include more advanced safety monitoring systems and shock and energy absorption systems. With two classes and free wi-fi, it's a comfortable, fast and productive way to cover this important route.

5

RAIL BECOMES AN LCC?

Not all railway news is positive, with Amtrak CEO Wick Moorman stating that the US rail operator is considering reducing pitch from 39in to 30-33in. The reason is the pursuit of greater carriage density and revenues – familiar territory for co-CEO Richard Anderson, Delta's ex-chief executive.

Visit aircraftinteriorsinternational.com for regular industry blogs

JIM ZUCKERMAN/ALAMY

CREW SAFETY

When turbulence strikes, it is critical to be safely secured to one's seat. However, crew have to walk the aisles in this dangerous period, to check that passengers have fastened their seatbelts. Remote condition-monitoring technology could enable crew to undertake this task from the safety of their seat. Wireless sensors beneath seats can inform a crew app which seatbelts have been secured, as well as other factors such as temperature and movement, to monitor passenger well-being. Such a system has been developed by FliteTrak, whose ViatorAero system can also lock the overhead bins during TTOL and turbulence. Unfortunately, the task of convincing awkward passengers to buckle up remains a challenge for crew.

SMOOTH OPERATORS

A research program by Boeing and JAXA could help predict air turbulence, giving pilots more time to take evasive action and for passengers and crew to buckle up, helping prevent injury

AIRLINES CAN HELP REDUCE TURBULENCE-RELATED INJURIES BY STRESSING THE IMPORTANCE OF PASSENGERS KEEPING THEIR SEATBELTS FASTENED AT ALL TIMES

According to the FAA, there were 44 turbulence-related injuries in the skies in 2016 – a substantial increase over 2015's 21 reported injuries (although not as bad as 2009's 107). These wounds aren't just minor scrapes or bumps: to count in the official figures, they involve serious trauma, such as bone fractures; hemorrhages; organ damage; nerve, muscle or tendon damage; or burns. A recent example is Aeroflot Flight SU270 from Moscow to Bangkok on May 1, which hit clear air turbulence, the violent effects of which resulted in at least 27 injured people – some with spinal injuries – and hospitalization for several. The aftermath was brutal, as you can see in the video on our website.

Being a clear air turbulence event, the flight crew were given no warning, but such events could be preventable in the future if a joint initiative by Boeing and the Japan Aerospace Exploration Agency (JAXA) is successful. The partners have been collaborating on the integration of lidar technology into a commercial airplane platform since 2010, and are due to begin flight tests of the technology on a Boeing 777 Freighter early next year.

The test program will involve emitting pulses of laser light from the nose of the aircraft, which will then be scattered by any small dust particles and other particulates in the path of the laser beams. The remote-sensing system observes the reflected light in segments, with the pulse providing measurements of the wind speed at increments along the direction of the laser. With an expected measurement accuracy of up to 11 miles (17.5km) ahead of the aircraft, pilots will have sufficient warning of 'invisible' threats such as wind shear and clear air turbulence to take evasive action and to instruct passengers and crew to buckle up.

Should the chop be unavoidable, a gust response/load alleviation system currently under development could help suppress wing vibrations and motion to get through the event more smoothly.

This technology will be evaluated as part of Boeing's ecoDemonstrator flight test research program, a series of flying testbeds used to develop and test technologies that could improve aviation safety and environmental performance. Boeing will be working with FedEx Express for six weeks to flight test the technology, and more than 30 other technologies, fitted on board a new FedEx-owned B777F.

"Boeing's ecoDemonstrator program provides us with a valuable opportunity to evaluate our system's capability on large commercial aircraft, which will help accelerate practical implementation of our system in a real environment," stated Fumikazu Itoh, JAXA's director general.

Post-event footage of the Aeroflot Flight SU270 turbulence is on the Videos section of aircraftinteriorsinternational.com

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plenty of room

Emirates' 100th A380 has three classes, with 14 suites in first class, 76 seats in business and 426 seats in economy, as well as the newly revamped onboard lounge

1 in 3

One in every three A380s in the sky is an Emirates aircraft. Its orders represent over 40% of total A380 orders

hot seats

86.6 million passengers have flown on Emirates' A380s, visiting 71 airports on 95,000 round trips, covering 1.3 billion kilometers

cable miles

There are more than 320 miles of cables in each A380

crew crazy

Emirates employs more than 23,000 A380 cabin crew; 6,000 of them are trained in mixology

big airplane, big orders

Emirates has ordered 142 A380s at a total value of US$61bn at list prices

the price of luxury

Each private suite in first class costs US$500,000 to manufacture

tailor made

To suit specific route profiles, three of Emirates' 100 A380s are a dual-class configuration (business and economy)

Happy 100th

In 2000, Emirates was the first airline to order the A380, and it is now celebrating this happy relationship with Airbus as it takes its 100th delivery of the superjumbo

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FEATHER AND LEATHER

THE BRIEF

A tycoon with a serious approach to business and a youthful approach to life wants a BBJ interior that feels like home when flying with family, but is also suitable for entertaining business guests in style. This isn't the client's first VIP aircraft, so there will be high expectations with regard to quality and elements of 'surprise and delight'.

THE SOLUTION

This real-life brief was answered by Winch Design, which has created a flexible interior that feels intimate for private family flights, and comfortable and spacious for 19-passenger flights.

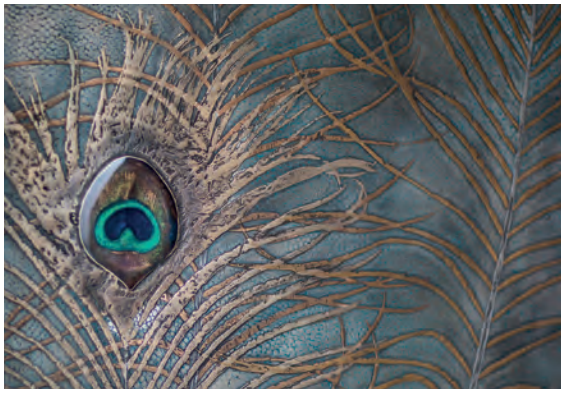
The client's family will have the privilege of flying at the private area to the aft, accessed via an electro-dimmable glass door toward the rear of the cabin, which slides open to reveal a large lounge and work area. The family can relax together and perhaps watch movies from the large, U-shaped sofa arrangement, which can also be converted into two double beds.

Further aft is the owner's sanctum sanctorum, a luxurious master suite with bedroom and bathroom (complete with shower). The double bed would usually be the most notable feature in an aircraft suite, but two special elements stand out even more: the dramatic bathroom with its custom-made blue glass washbasin as the centerpiece; and the 64in TV in the bedroom – the largest currently offered for a certified aircraft interior.

The family can also enjoy supper in the main lounge area, where a rather unusual shagreen-trimmed table can be unfolded to create a five-seat dining table. Should more guests be flying, another four diners can be sat at a second table, and if the buffet counters are unfolded, there is capacity to host a veritable flying banquet.

Naturally there is also a bar area, a stunning under-lit monument featuring high-low bar stools, a hidden champagne cooler, and full-spectrum audio-synced lighting to really ramp up the exclusive inflight experience – ideal to celebrate sealing a big business deal.

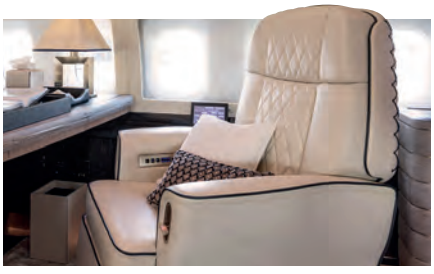
The more mundane parts of the aircraft – the galley, crew facilities and guest bathroom – are all integrated into the forward area. Once the owner steps past this zone, crew can slide shut the precision-engineered doors, which when closed create a beautiful peacock-themed artwork panel.



VERDICT

Beautiful, distinctive, comfortable and spacious: it is hard to imagine the owner not being satisfied with the studio's response to his brief (while the client's details are being kept under wraps, we could confirm his gender). What may have surprised the client, however, is the sheer depth of detail in the finished cabins, with several materials used that the owner won't encounter in his friends' jets.

For example, that shagreen on the dining table, exotic shell materials from the East, and mother-of-pearl accessories complement the finest veneers and leathers. Even more beautiful is the peacock feathers artwork on the forward cabin doors, which shield the owner from the mundane and cocoon him in a beautiful environment.



PLAY SAFE

THE BRIEF

Safety is paramount in aviation, but whether through lack of interest, understanding or simple common sense, many passengers do not pay sufficient attention to safety instructions, videos and demonstrations. Making the safety instructions more interactive could be the key to ensuring that passengers really know what to do if there is an incident, and handheld devices, whether tablets or smartphones, passenger or airline-owned, could be the answer.

THE SOLUTION

The Air Safety World mobile app is the world's first electronic safety card, designed to bring safety procedures to life through two virtual flight attendants. These AI-based crew guide each user through the safety procedures, which they can try out first-hand in high-fidelity 3D aircraft cabins, with interactive training experiences including assuming the brace position, donning life preservers, wearing oxygen masks, finding the emergency exits on most types of airliners, and opening the various types of aircraft doors.

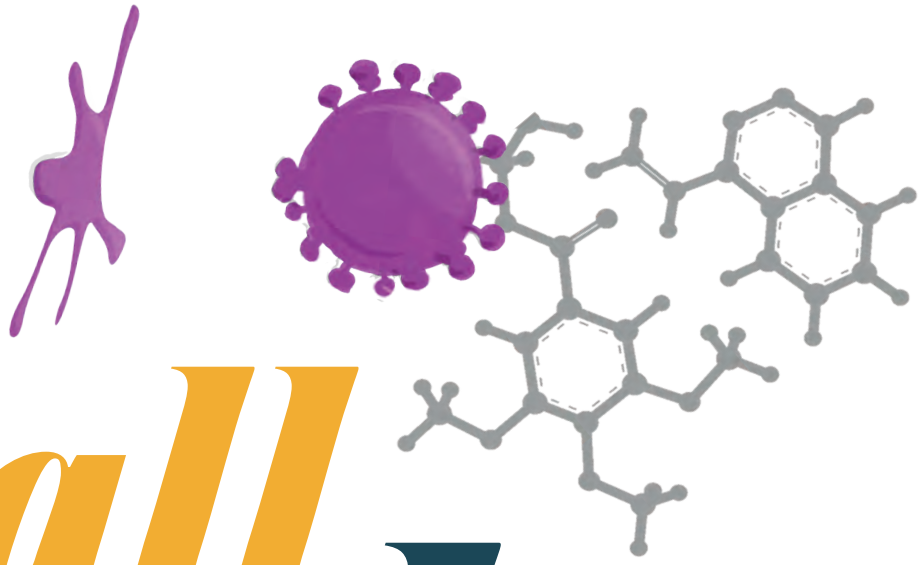
With users' interest in aviation piqued, they can explore the app further, with games available that add entertainment to key aviation safety messages. The games range from simulations of coordinating an aircraft evacuation – which also drives home the importance of leaving baggage behind – to a fast-paced training course that requires aircraft emergency exits to be opened quickly. While playing, users will learn not just how to handle emergency situations, but also the importance of following correct procedures – and the reasons behind some procedures they may find annoying.

VERDICT

The app may be a game, but it addresses a serious subject. It also has serious backing, being the result of an international aviation research collaboration between the Human-Computer Interaction (HCI) Lab of the University of Udine in Italy and the FAA's Cabin Safety Research Team.

As professor Luca Chittaro, director of the HCI Lab, states, "The results of our studies show that making airline safety instructions interactive improves their effectiveness, and passengers who learned airline instructions through an active exploration in 3D worlds made fewer errors and were faster in performing safety procedures, such as donning a life preserver, in the real world."

The app is only suitable as a supplement to today's safety instructions and demonstrations, not a replacement, but it certainly seems beneficial. Even if only one person accesses the app, it could make a difference in an emergency – but since it's free to download, why not give it a try?



small wonder

THE NEXT BIG ADVANCE IN AIRCRAFT INTERIORS COULD BE ABSOLUTELY TINY, WHEN INNOVATIVE NANOMATERIALS RESEARCH BY THE US GOVERNMENT MATURES

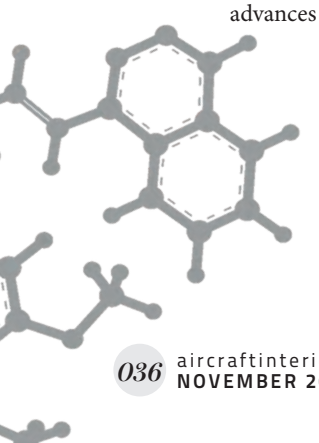
Words by Marisa Garcia
Illustration by Sam Falconer

Materials science has been undergoing an invisible revolution that offers infinite possibilities to improve material properties and develop new products that solve many of life's common problems. Nanotechnology has developed at such a pace in the past decades that it has become pervasive, used in everyday applications from clothing to construction, paints to boots, medicine to oil exploration – and aircraft interiors are the next frontier.

We spoke to Dr Lisa Friedersdorf, director of the National Nanotechnology Coordination Office (NNCO) of the US government, who has spent decades working in this field. She shared her thoughts on nanotechnology advances and the possible applications to solve common cabin interiors challenges, from damage-resistant surfaces to lightweight, power-conserving, in-flight entertainment.

"Nanotechnology really began in the mid-1980s, because we started developing the tools that enabled us to see and manipulate matter on the nanoscale. Since that time, the technique to do this, to imagine and make materials on this scale, and to understand them, has vastly improved," she explains. "Nanotechnology has really become a part of materials science – all of the engineering and chemistry. It's a part of what people do. It's an entirely new toolbox."

This toolbox involves manipulating matter at a truly minuscule scale. A nanometer is one billionth, or 10^{-9} of a meter. To put that into perspective, a standard sheet of



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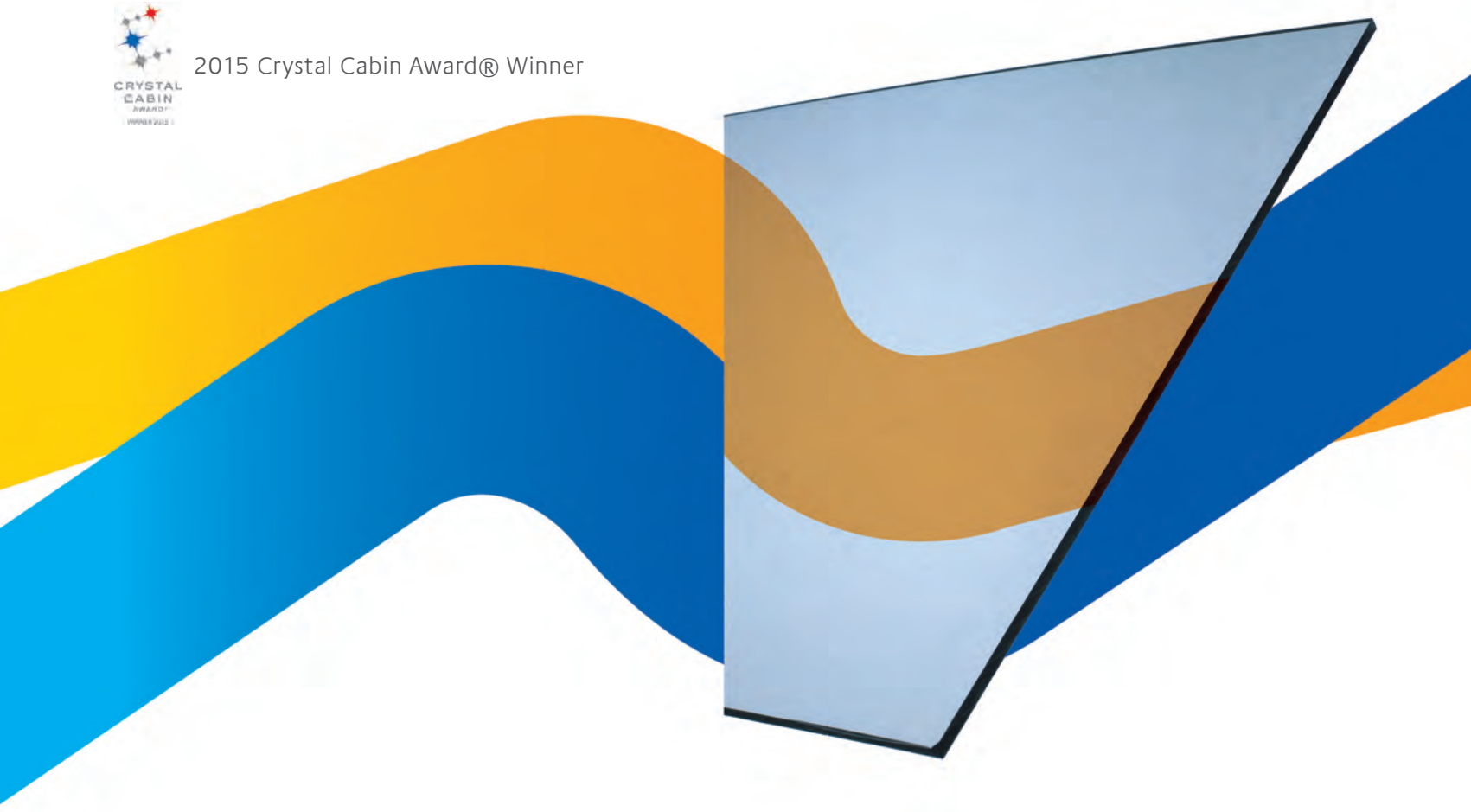

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CARBOXYMETHYLATED NANOCELLULOSE ADSORBED ON A SILICA SURFACE. IMAGE: INNVENTIA

NANOCELLULOSE CAN BE USED AS A SUBSTRATE FOR ELECTRONICS THAT BIODEGRADES AFTER TIME

NANO-SCALE ROBOTS COULD HOLD THE KEY TO CABIN HYGIENE IN THE LONG-TERM FUTURE

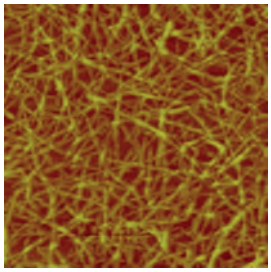
"Embedding materials with nanosilver would add antimicrobial properties"

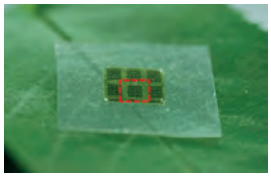
paper is 100,000 nanometers thick; a single gold atom is about one-third of a nanometer in diameter; DNA is 2.5 nanometers in diameter; a strand of human hair is between 80,000 and 100,000 nanometers wide. Nanotechnology developments such as single-walled carbon nanotubes, which can be used to create a number of useful structures for materials applications, are one nanometer in diameter.

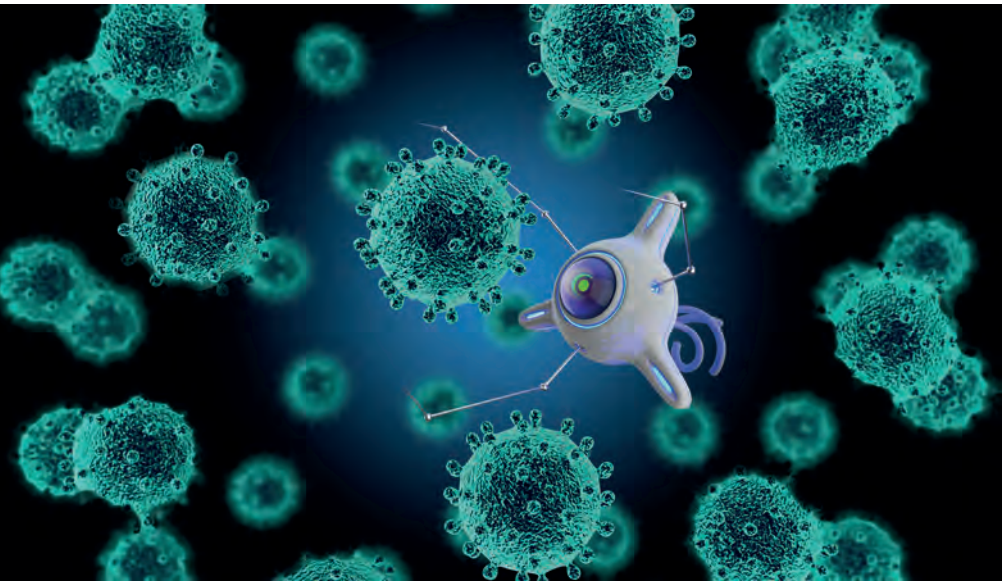
Developing the equipment to see and manipulate materials on this scale turned out to be an expensive and delicate process.

"While we were developing the understanding in the early phase about how to make these materials, and what properties they would have at this size scale, it was time-intensive and instrument-intensive work," Friedersdorf says. "But in a lot of cases we've developed that understanding and there are now mass-market applications of these materials. They've become a part of a lot of many everyday things."

To some degree, the success of this powerful science is not what grabs consumers' attention. They may be more aware of the benefits it yields, like new stain-resistant fabrics, which mean clothes won't retain wine stains, and construction workers' boots that won't be coated in concrete from the worksite, and kids' impromptu artwork on the walls at home that is easy to wash off.







CABIN APPLICATIONS

There are existing and developing applications, in both materials and electronics, that might prove attractive to cabin interiors suppliers and designers.

"There are paints that, if you ding or scratch them, can self-heal," says Friedersdorf. "The self-healing paints are polymer matrix with nanoparticles, and the polymer will flow a little to fill in scratches. I know that these are being used in the automotive industry."

There are different nanotechnology applications that would support better cabin hygiene, and improve cabin air quality. "One strategy is antimicrobial, to try to kill the microbes," says Friedersdorf. For example, embedding materials with nanosilver would add antimicrobial properties.

"Another strategy is creating conditions where microbes can't grow, where it's not favorable for them to live," she adds. "Part of that can be a hydrophobic coating, but there are other strategies used as well. With respect to odors, besides killing things that might create odors, like germs, there are also strategies in nanoscale filters. There are materials such as cellulose nanocrystals that have anti-odor properties. There are filters that would use these types of materials. They would work in a similar way to a HEPA filter, but better."

There are also new developments in water purification using nanotechnology.

Nanotechnology can also offer the aviation industry new alternatives for

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- Coalescence (physics), the merging of two or more droplets, bubbles or particles into one

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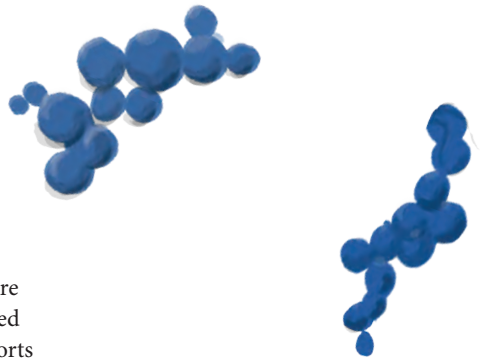
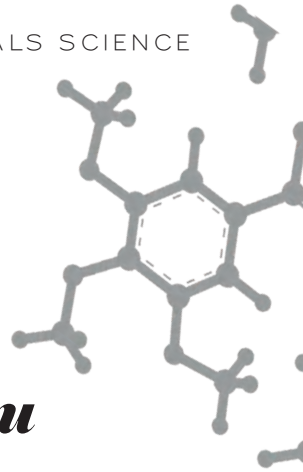




fire-retardant cabin materials that do not require chemical treatment.

"This is a really important area of research. There are coatings being developed that have nanoclays embedded in them that make them flame-retardant. I've seen reports in the automotive industry too, where this is also important. I have colleagues who work with consumer safety, and I'm familiar with the work that they are doing using nano-enabled flame retardants that are more effective and less toxic than some of the chemicals used today," Friedersdorf says.

"It's important work. I think that looking at areas where nanotechnology can help reduce toxicity or reduce other negative effects is another area. For example, sunscreen is better with nanoparticles and less harmful than the chemicals typically used for this."

"Nanostructures give you flexibility in letting through different wavelengths of light"

WELDING BELLS

Researchers at HRL Laboratories have developed a technique for 3D printing high-strength aluminum alloys, including types Al7075 and Al6061, which are very desirable for aircraft parts. An added benefit is that the method can be applied to additional alloy families such as high-strength steels and nickel-based superalloys difficult to process currently in additive manufacturing.

"We're using a 70-year-old nucleation theory to solve a 100-year-old problem with a 21st century machine," explains Hunter Martin, a scientist who co-led the research team.

The process of additive manufacturing with metals typically begins with alloy powders that are applied in thin layers and heated with a laser or other direct heat source to melt and solidify the layers. However, if high-strength unweldable aluminum alloys such as Al7075 or AL6061 are used, the resulting parts suffer severe hot cracking, rendering them useless.

The HRL team has developed a nanoparticle functionalization technique that it claims solves this problem by decorating high-strength unweldable alloy powders with zirconium-based nanoparticles.

The nanoparticle-functionalized powder is fed into a 3D printer, which layers the powder and laser fuses each layer to construct a three-dimensional object. During melting and solidification, the nanoparticles act as 'nucleation sites' for the desired alloy microstructure, preventing hot cracking and allowing for retention of full alloy strength in the manufactured part.

According to the team, its nanoparticle functionalization techniques can also be used to make previously unweldable alloys weldable. Even better, it says the technique is scalable and uses low-cost materials.

NANO BRINGS IN COLOR

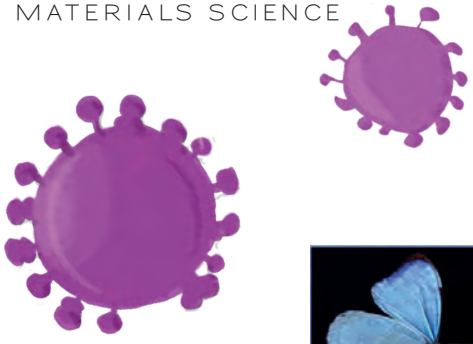
Another interesting possibility in terms of cabin decor is exploring nanopigments, and even nanostructures, which require no pigments but control refraction to create unique polychromatic surfaces that would change color in response to changes in the light source.

"The Morpho butterfly's blue color is not a pigment, it is a structure. That's an example of a nanostructure creating a color based on the mechanical nanostructure," she explains. "There are examples of where you can develop structures that will give you a color, but you have to adjust the wavelength of light based on the structure."

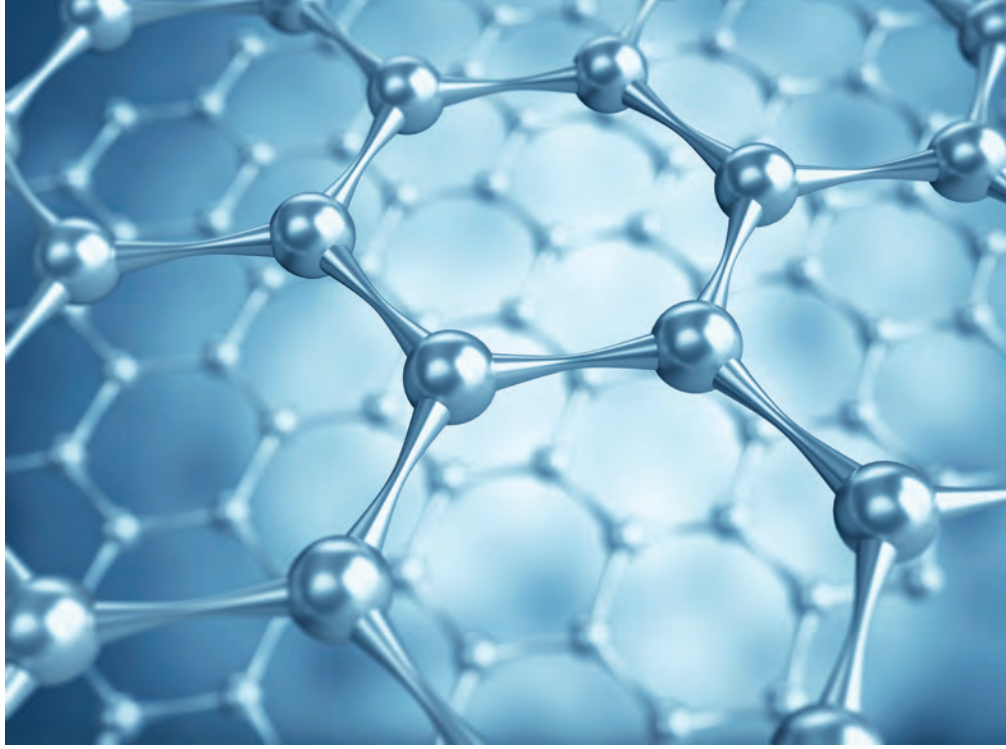
This same ability to manipulate light can be applied to windows – not just for dimmable displays, but for windows that help better regulate cabin temperature.

"We're already seeing the use of electrochromic materials for windows, using the application of an electric voltage for infrared and heat blocking instead of window shades. There are concepts that have a thin nano-crystalline layer. Potential changes to the structure of that layer would make it transparent or opaque," Friedersdorf says.

"Nanostructures give you flexibility in letting through different wavelengths of light. In winter, you might want rays that give you heat as well as light, and in the summer you might want the light without



RIGHT: THE IRIDESCENT COLORS OF THE MORPHO SULKOWSKYI BUTTERFLY ARE CAUSED BY NANOSTRUCTURES ON ITS WINGS



ABOVE RIGHT: EVERY ASPECT OF THE PASSENGER EXPERIENCE CAN BE ENHANCED IN SOME WAY THROUGH THE USE OF NANOTECHNOLOGY

the heat. The technology is advanced enough that you could buy it, but it's probably not something that we could all afford in our homes."

NANO MAKES CABINS CLEVER

Nanotechnology could also make cabin interiors smart, by being applied in embedded biometric sensors. Biometric sensors are already being embedded into the fabrics of high-end athletic clothing, and Friedersdorf believes they might be used to fight the negative effects of sitting or lying in aircraft seats over a prolonged period.

"I can envision a seat that has embedded sensors that can change seat settings on a finer scale. The sensors could detect temperature or your comfort level by whatever measure you want to measure," she says. "I can see there being sensors embedded in the seat that might enable you to reinvent comfort. Maybe there's a way to adjust the seat so that it's more comfortable for the individual. You could imagine having some sort of actuator that could essentially blow the cushion up a little bit more, to change the level of comfort."

NANO ARMOR

Tomorrow's aerospace nanomaterials might also be organic and biodegradable. "One of my favorite materials is cellulosic nano-materials," Friedersdorf says. "They can be made out of waste wood, or different plant materials. What's interesting is that they have a very high strength, but are lightweight. They are similar to what you hear about with carbon nanotube-based composites, but are nanocellulose. They also have interesting optical properties. They are doing things like looking at high-strength and transparent armor, for lightweight bulletproof windows. They are being explored for a number of applications."

MOTORING AHEAD?

Is aerospace really lagging behind a 12-year-old military-inspired pickup truck? The cargo bed of the 2005 Hummer H2 SUT is more than just a handy load space: it is a demonstration of how tough nanocomposites can benefit daily life. The cargo bed of the truck, manufactured by GM, includes around 7 lb (3.2kg) of molded-in color nanocomposite parts.

"We designed this vehicle to use the nanocomposite parts because they are lightweight, and they don't change shape when subjected to temperature changes," stated Bill Knapp, program engineering manager for the H2.

The H2 wasn't GM's first application of nanocomposites: it introduced them on the step assist of the 2002 GMC Safari and Chevrolet Astro vans. In 2004, GM expanded its use of nanocomposites, using them on body moldings for the Chevrolet Impala. In 2004 GM was the biggest user of olefin-based nanocomposite material in the world, using about 660,000 lb (299,370kg) per year.

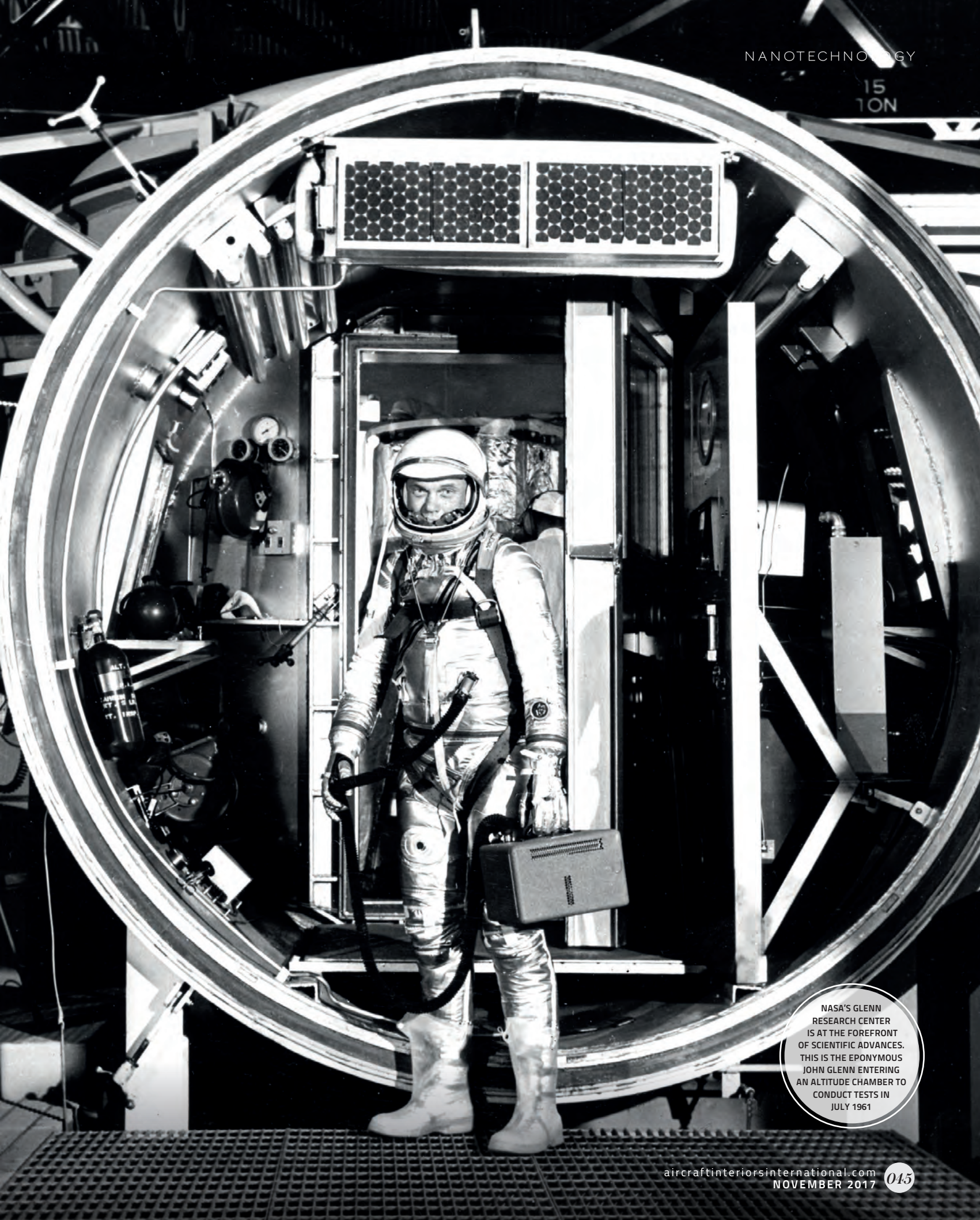
"The virtue of using a nanocomposite is that less filler material is required to provide the same or better performance characteristics when compared to conventional materials," said Will Rodgers, staff scientist, GM R&D.

GM uses nanotechnology throughout its vehicles today, including in stain-repelling textile treatments.

scaled dozen

THE LATEST NANOTECHNOLOGY RESEARCH COULD BRING MAJOR BENEFITS TO CABIN ELECTRONICS, INCLUDING WEIGHT AND POWER EFFICIENCY, ULTRA-THIN DISPLAYS AND NEW EFFECTS

Words by Marisa Garcia



NASA'S GLENN RESEARCH CENTER IS AT THE FOREFRONT OF SCIENTIFIC ADVANCES. THIS IS THE EPONYMOUS JOHN GLENN ENTERING AN ALTITUDE CHAMBER TO CONDUCT TESTS IN JULY 1961

The exploratory work of NASA and other research centers into advanced lightweight applications of nanomaterials could revolutionize cabin design and dramatically change in-flight entertainment. Indeed, future materials already under development could deliver ultra-lightweight cabling, ultra-thin screens, and even cabin wall projections.

To find out more, we spoke to Dr Michael Meador, the program element manager of lightweight materials and manufacturing for NASA's Game Changing Development Program at the Glenn Research Center in Cleveland, Ohio. Coincidentally, Meador was director of the US National Nanotechnology Coordination Office (NNCO) prior to the appointment of Dr Lisa Friedersdorf to this post (see p36). We also spoke with Dr Friedersdorf about related applications in the commercial electronics field that might carryover into aircraft cabin applications.

The insights from these experts reveal that we are only beginning to properly exploit nanotechnology. New applications could reduce the cable mass by as much as 90%, and also considerably reduce power demand by harnessing power from aircraft vibrations and from the passengers themselves. Nanotechnology-enhanced cabling could also improve data transfer, benefiting both avionics and IFE.

"When you do that, cable mass is reduced 30% to 70%"

TOP: FLEXIBLE DISPLAY TECHNOLOGY DEVELOPED BY ARIZONA STATE UNIVERSITY

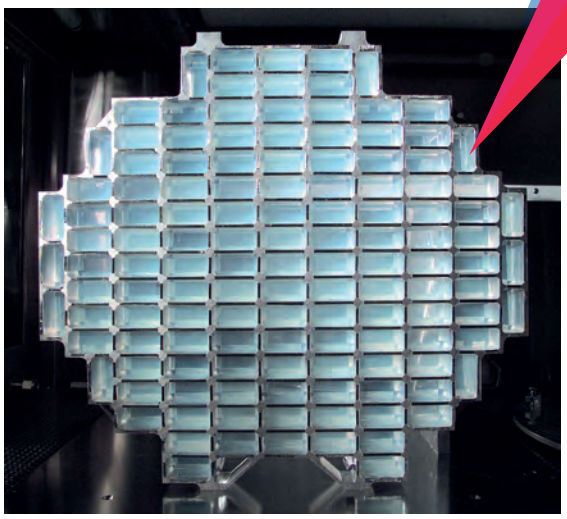
ABOVE: NASA'S PETER TSOU HANDLES AN AEROGEL CUBE

BELOW: NASA'S MAGNETIC RIBBONS CAN BE USED TO MANUFACTURE PARTS THAT EFFICIENTLY GENERATE OR TRANSFORM ELECTRICAL POWER

IT BEGINS WITH CARBON NANOTUBES

"A lot of work has gone into trying to use carbon nanostructures for developing power cables that have good current-carrying capability and are more robust than conventional cables," says Meador.

"You could replace the metallic conductors in conventional coaxial cables with carbon nanotube-based conductors. Carbon nanotubes have one-fifth the density of copper, so you could replace copper core with carbon nanotube wire. You could take the aluminum RF cladding and replace it with nanotube sheets. When you do that, the cable mass is reduced by between 30% and 70%,



AN AEROGEL PARTICLE COLLECTOR GATHERED COMET DUST SAMPLES ON NASA'S STARDUST PROGRAM

depending on the design of the cable. The only thing left in a cable to take more mass out of is the dielectric material. This is where polymer aerogels come in."

NASA's Glenn Research Center has been researching new aerogels made from polymers instead of conventional silica aerogel. There are, in fact, various potential applications of these aerogels in the cabin.

"While silica aerogels are quite fragile, the polymer aerogels are much more robust. They have very good thermal insulation properties, and they are acoustic reflectors, so they could reflect noise away from the cabin. And you can make them out of polymers with the potential for low flammability and low smoke index – all of the qualities that you might want to see in an aircraft interior material," Meador says. "NASA has been working recently to demonstrate that you could replace conventional polymer dielectric materials with this aerogel, which is 10 times lighter, so you could reduce the overall cable mass by as much as 90%.

"The carbon nanotube wires that have been developed have very good characteristics for carrying data signals," Meador adds. "You could see a significant pay-off in using carbon nanotube-based data cables over conventional cables."

So how soon might we see these benefits? "It's still very much in development, but there's a lot of interest

GREEN IS GO

Swiss scientists have been busy developing something valuable: not a means to produce gold, but to create purest green. Chemical engineers from ETH Zurich have succeeded in generating ultra-pure green light – a world first – and they believe this LED will pave the way for visibly improved color quality in ultra HD displays.

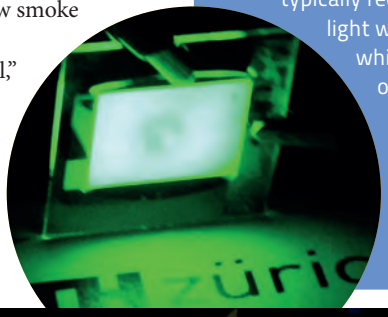
To achieve this higher level of quality, such devices must be able to produce ultra-pure red, blue and green light. The purer those base colors, the broader the range of hues a screen can display. Red and blue light is not considered a problem, but green light has proved rather trickier, since the human eye is able to distinguish between more intermediary green hues than with reds and blues.

The team has developed an ultra-thin, bendable LED able to emit pure green light using simple room-temperature processes, rather than the high-temperature processes typically required to produce pure light with LED technology, which opens up opportunities for simple, low-cost industrial production.

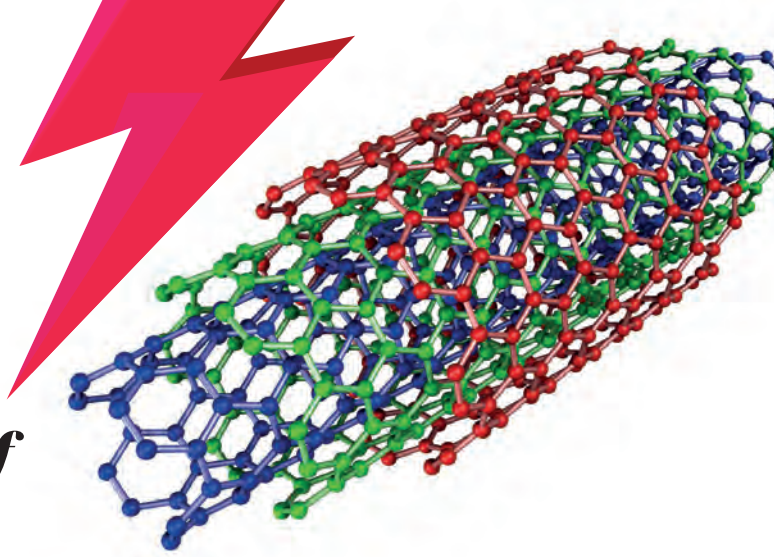
The team used nanomaterials to further develop the LED technology. An LED usually contains a semiconductor crystal that converts the electrical current passed through it into radiant light. The raw material used is typically indium gallium nitride (InGaN); however, the researchers found that this material does not have the ideal properties for of ultra-pure green light. The team instead used perovskite, a material that is also used in the manufacture of solar cells and which can convert electricity into light more efficiently. It is also inexpensive and helps make the manufacturing process simple and fast – it takes just half an hour to chemically clean perovskite and make it ready for use, according to Chih-Jen Shih, professor of chemical engineering at ETH Zurich.

Color quality depends on the thickness and form of the nanocrystal used, and the perovskite material in Shih's LED is 4.8 nanometers in thickness: a precise measure for the desired pure green. These flexible, ultra-thin LEDs are as bendable as a sheet of paper.

The next step is to improve efficiency. The prototype LED works at 3% efficiency when converting electricity into light; in comparison, today's TV screens have 5-10% efficiency. ETH hopes that the next version will be 6-7% more efficient.



"Nanotechnology has opened up an entirely new way of handling displays"



on the part of the Department of Energy, NASA and DOD to look into these new wires," he says.

Now, imagine those ultra-light wires powering electronics that are themselves ultra-lightweight, with lower demands for electricity. Friedersdorf shares some of the possibilities.

"If you think about it, we all carry a supercomputer in our pocket, which is already enabled by nanotechnology," she says. "If you think about flat-panel displays, those are enabled by quantum dots. Nanotechnology has opened up an entirely new way of handling displays. If you look at the efforts to develop flexible electronics, I think that you're going to save a lot of weight. You may perhaps even be able to roll them up. Netflex, a national manufacturing center in the West Coast USA, is focused exclusively on developing flexible electronics."

These flexible screens would also require less power, and as Friedersdorf says, there are alternatives to generating the electricity to power future flexible IFE beyond relying on the power supply of the aircraft, using harvested energy instead.

"There are a number of strategies being pursued. It's essentially trying to use base heat to create electricity. One way to do that is to use thermal gradients; specifically using materials that create electrical signals based on thermal gradients. If your body temperature is warmer than the air, or vice versa, you can use that thermal gradient to generate electricity."

One could imagine seat textiles that would take advantage of these thermal properties to power passengers' future flexible personal electronic devices. In fact, there is already talk of powering personal electronics using clothing made of fabrics with these properties. "If you've ever seen the headline 'Charge your cell phone in your pocket', there are a number of strategies being pursued," Friedersdorf says. "It's essentially trying to use base heat to create electricity."

ABOVE LEFT: NASA'S DR MICHAEL MEADOR

ABOVE RIGHT: A MULTIWALLED CARBON NANOTUBE IMAGE: ERIC WIESER

BELOW: THE NEXT THING IN SMARTPHONES? PAPERPHONE IS A FLEXIBLE, THIN FILM DESIGN THAT USES BEND GESTURES FOR NAVIGATION

BOTTOM: THE UK'S CENTRE FOR PROCESS INNOVATION (CPI) IS DEVELOPING FLEXIBLE HD TECHNOLOGIES THAT COULD LINE THE CABIN WALLS AND DISPLAY LIVE FOOTAGE FROM CAMERAS

Even the naturally occurring vibrations of flight could generate power, or even the motion of passengers shifting in their seats.

"Another strategy is using vibration or mechanical motion, and I think that would probably be a better choice for aviation, using vibration or some sort of mechanical variation that would give you an electrical signal," Friedersdorf adds.

"I've seen a prototype – nobody is using it in a commercial application yet – but I think it's one of the more exciting developments. There is so much wasted heat in any industrial process, and even vibrations, and this can be harvested. The process doesn't require a lot of electricity, especially if you're only trying to light a flexible electronic display that is designed for low power consumption. Then, these concepts are not so far-fetched."

We've seen a number of proposals for projections on aircraft walls, as part of future aircraft design. Nanotechnology might make these possible.

"Thinking about displays on the walls, there are both photo-optic paints, and also more display-focused concepts, where people paint the wall and it becomes fluorescent light. I think that's one step further from flexible electronics," Friedersdorf says.

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We have a very clear objective: to be the first airline of choice"

WITH NEW CONNECTIVITY TECHNOLOGY, NEW CABIN CONFIGURATIONS AND NEW AIRCRAFT JOINING ITS FLEET, THESE ARE EXCITING TIMES FOR GOL AND ITS CHIEF EXPERIENCE OFFICER, PAULO MIRANDA

Words by Adam Gavine

For a relatively young airline that first flew in 2001, Brazilian carrier GOL has grown impressively fast to become the largest low-cost airline in South America and the second-largest Brazilian airline, after LATAM. With 860 daily flights to 63 destinations in 10 countries across Brazil, South America, North America and the Caribbean, the airline has a broad spectrum of passengers immersed in its passenger experience – over 32 million of them a year, according to 2017's figures.

To find out what makes GOL unique, we spoke to Paulo Miranda, the airline's chief experience officer, responsible for product design, customer care and customer insight. Given his role and the name of the airline meaning 'goal', it seems fitting to ask Miranda about his aims for the passenger experience.

"When we think of customer experience and where we're trying to take the company, we have a very clear objective: to be the first airline of choice. Taking that philosophy and that mindset, we then look at different customer profiles. We've been working for the last three to four years to make adjustments to our products and services so that we can better target and better tailor what our offer is and what our experience is, comparing it with the expectations and desires of those different profiles. If we make the correct adjustments, we can see higher rewards."

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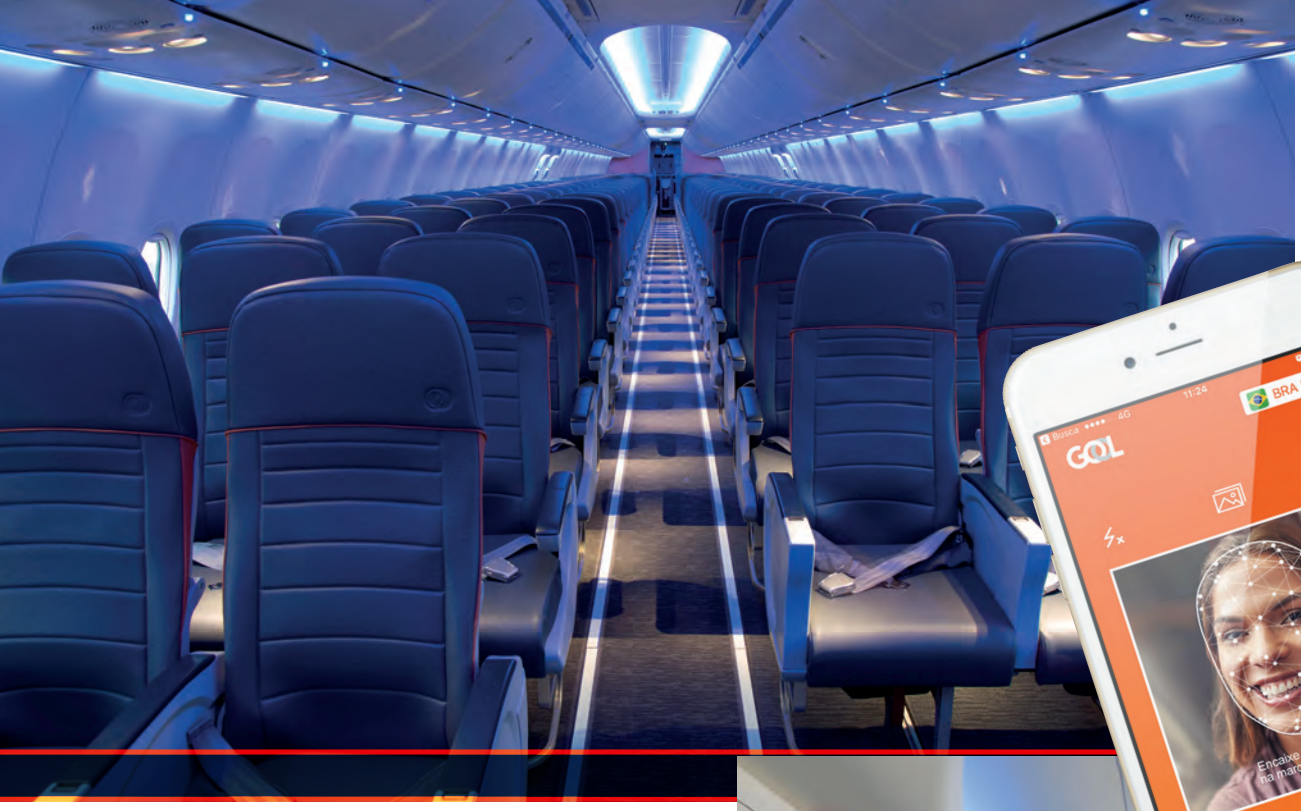


TOP: GOL WAS THE FIRST AIRLINE TO ORDER THE BOEING SKY INTERIOR

ABOVE: GOL+ CONFORTO GUESTS HAVE DEDICATED STOWAGE SPACE

RIGHT: JUNE SAW GOL LAUNCH THE FIRST 'SELFIE CHECK-IN,' APP

We'll come back to how the products are tailored, but first we must address the backbone of the airline: its fleet of 120 aircraft, all of which are Boeing 737s, in -700 and -800 guises. So why has GOL put all its eggs into one airframe?

"When GOL launched, it wanted to be a single fleet airline so that it could optimize and extract all possible efficiencies from the operation. That strategy has proven to be the correct one for us, so we are focused on using the same platform in all markets. It took us from humble beginnings in 2001 with a few aircraft, to where we are today," Miranda states, adding that he is proud of the airline's passenger numbers, RPKs, its large corporate market, and its cost efficiency. "For us, the B737 is a highly successful platform and we will continue down that path."

Miranda is clearly satisfied with GOL's choice of aircraft platform. However, being a Brazilian airline, doesn't Embraer offer a tempting proposition?

"There's always temptation, as with anything. I think that Embraer makes great aircraft, and that some of the other models on the market are also very good, but for our objectives and the vision that we have for the company, we are very comfortable and very happy with the performance we're seeing with the B737."

DESIGN FOCUS

GOL does not have an internal cabin design team per se, according to Miranda, but it does have a customer experience team and a product design team. "Based on feedback that we receive from customer surveys and their suggestions of things that we could work on to improve, we prioritize those points. We then start looking into the many opportunities to enhance the overall experience, and a lot of them are sometimes not that visible to customers, but they improve the overall experience in the aircraft. For example, improvements to the lighting and gasper outlets above the seats: we get down to that level of detail."

The airline also works with Teague, with a current project being the interiors of its 60 B737 MAX-8s, which start entering the fleet next year, representing a US$6bn order that will be complete by 2028. "Teague has been a big part of the program, helping to make sure that we

SKY HIGH

Given the airline's fondness for the B737 platform, GOL was delighted to be one of the first in the world to order the Boeing Sky Interior and in 2010 became the first South American airline to fly with it. Miranda is a fan of the interior, which brings a curving architecture that creates a distinctive entryway, a more open cabin, and many other details such as sculpted sidewalls and window reveals.

"It increases the perception of space, so when you walk into the aircraft, the experience is enhanced and gives a different perception. The bins are curved, so you don't have the same feel as when you walk into a traditional NG interior."

The interior also brings cove lighting and a soft blue sky overhead simulated by LEDs. GOL is satisfied with the Boeing offer and felt no need for custom programming, being happy to explore the functionality of the standard lighting.

Watch GOL's improved 2Ku installation process on the Videos page of our website

"Teague has been a big part of the program, helping define all touchpoints"

define all the touchpoints inside the aircraft to make sure the cabin has a cohesive and welcoming atmosphere."

So will there be anything special in the MAXs – something uniquely GOL? "We have a few things," says Miranda. "For example, a special wallcovering was designed for us that we will use on the rear bulkhead. The design for the seat dress covers is also specific to us, something that we developed with Teague. We also have a specific carpet – although we're going back and forth on that one, so don't hold me to that. It's a trade-off between what looks really good and how it works with the day-to-day maintenance of the aircraft. It's a balancing act."

GOL BOASTS DOMESTIC AND INTERNATIONAL LOUNGES IN RIO AND SÃO PAOLO, WHICH OFFER EVERYTHING FROM SHOWERS AND WI-FI TO COCKTAIL BARS. THEY CAN BE ENJOYED BY GOL'S PREMIUM PASSENGERS AND THOSE OF PARTNERS DELTA AND AIR FRANCE-KLM

BUSINESS CLASS

GOL's passenger profiles include a large number of business travelers, for whom two targeted products have been created.

GOL Premium class is offered on international routes, and is essentially an enhanced economy product found in the front four rows, with Rockwell Collins Spectrum seats (the middle one of which is blocked), 50% more recline, and an extra 4in of seat pitch (34in vs 30in in standard economy, which has Pinnacle seats).

Nowadays, there are more luxurious seating models available for narrow-body aircraft, such as dedicated premium economy seats, or even flat beds. Would GOL consider such options to create a full-blown business class offer? "I think that for the profile of markets we serve and the average length of haul that we're carrying customers, a flat bed seat is a bit too much," says Miranda. Most of our domestic stage lengths are two hours or less and the upper range of our international routes is four to six hours, so a flat bed product is not something customers have been asking us for. GOL Premium has space and privacy and, for the markets that we're serving, is a very competitive product, on a par with most international airlines."

GOL Premium also offers lounge access, reserved overhead stowage space, a reserved lavatory, amenities, food and drink, and a larger baggage allowance.

For domestic routes, GOL+ Conforto is available in the front seven rows and emergency rows, and

"Customers want airlines to anticipate what they need in the travel experience"

includes 3.9in more legroom (33in) and 50% more seat recline than the standard seats, priority boarding and check-in, and reserved overhead stowage.

There are changes afoot though, with GOL altering its cabin configurations to fit changing passenger profiles. The seven rows of GOL+ Conforto on the B737-800 NGs is being reduced to five rows and nine economy seats added, increasing total seat count from 177 to 186. The incoming B737 MAX-8s will have the same configuration.

"This is really big for GOL, in terms of cost efficiency and, of course, the ability to increase our seat offering without having to increase our fleet," says Miranda.

"For the MAX aircraft, there are some new features that we're selecting in there, such as the curved lavatory wall at the rear of the aircraft, which enables us to still offer 30in of pitch on all regular economy seats and 33in for our premium seats."

GETTING CONNECTED

As part of his role, Miranda needs to keep an eye on trends in customer expectations, the biggest of which today is inflight wi-fi. "We hear loud and clear from customers that they want connectivity more than entertainment. People are more concerned about having internet access than having access to traditional IFE."

Thus he has led the airline's adoption of Gogo's 2Ku system, and now almost 60% of the fleet is equipped, with a target to have 100% fitted by mid-2018. This move makes GOL the first commercial airline in South America to offer onboard wi-fi, the occasion marked with a historic first connected flight on October 4, 2016.

ABOVE: THE DÉCOR OF GOL'S LOUNGES IS INSPIRED BY MODERN BRAZILIAN CULTURE

ABOVE RIGHT: AS OF OCTOBER 30, MORE THAN 50% OF GOL'S FLEET IS EQUIPPED WITH GOGO 2KU INTERNET ON BOARD

Since 2016, the airline has become rather adept at fitting 2Ku. "When we started this program, we had to install a prototype to obtain all the necessary certifications from both the US FAA and the Brazilian ANAC regulators. The first aircraft that we fitted at our facilities in October 2016 took about 15 days, but a year later we're averaging about three days per installation."

2Ku is powerful, but Miranda recognized that for maximum customer satisfaction to be gained, in-seat USB power was essential for an uninterrupted experience.

"We need to make sure that we cover that gap, and customers want airlines to anticipate what they need in the context of their travel experience," states Miranda.

The in-seat power is installed during the same three days that 2Ku is installed, and the airline also takes that opportunity to change out the dress covers with environmentally produced ones from Perrone Aerospace.

"It's like a whole makeover session when our aircraft stops; then it comes back connected and with an improved interior."

The investments in aircraft, interiors, connectivity and onboard services is creating increased customer preference, according to Miranda. "We are on a path, and we know where we want to get to, and we remain very focused on making sure that we can deliver the best experience possible."

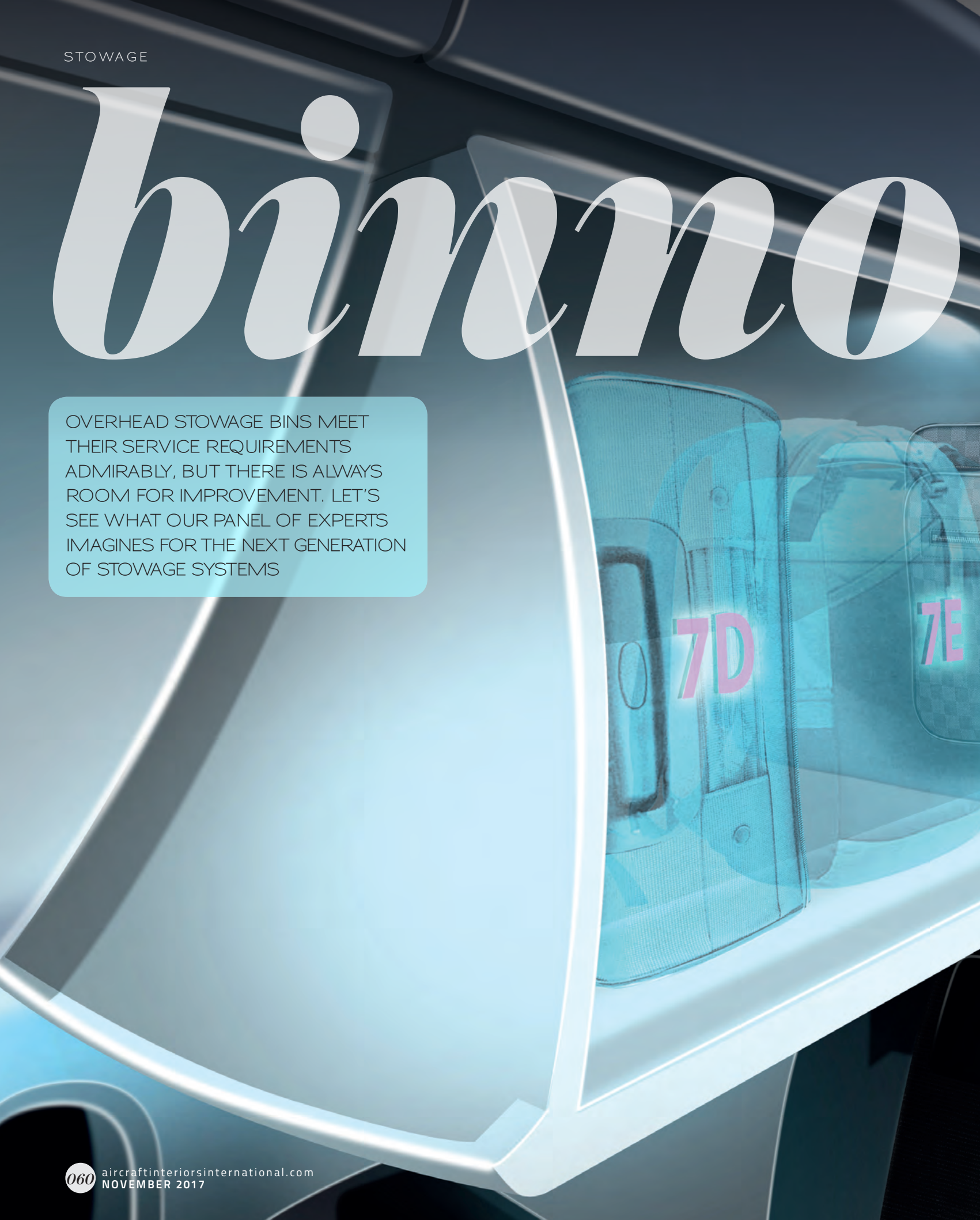
About Paolo

After graduating from the Carlson School of Management at the University of Minnesota, in 1998 Paulo Miranda joined Delta, where he gained experience in revenue accounting and forecasting, finance and alliances, participating in the implementation of the Delta-Air France/KLM joint venture, and the GOL, Aeroméxico and Virgin Atlantic equity investments.

In 2013, Miranda joined GOL as chief experience officer, responsible for the customer viewpoint through the travel experience, with responsibility for product design, customer experience and customer care, surveys and data. He has made his mark already, helping transform GOL's business model with a differentiated strategy, through the introduction of GOL+ Conforto (economy plus), IFEC with live TV, Premium class on international flights, lounges, and new service standards for customer-facing staff.

bimmo

OVERHEAD STOWAGE BINS MEET THEIR SERVICE REQUIREMENTS ADMIRABLY, BUT THERE IS ALWAYS ROOM FOR IMPROVEMENT. LET'S SEE WHAT OUR PANEL OF EXPERTS IMAGINES FOR THE NEXT GENERATION OF STOWAGE SYSTEMS



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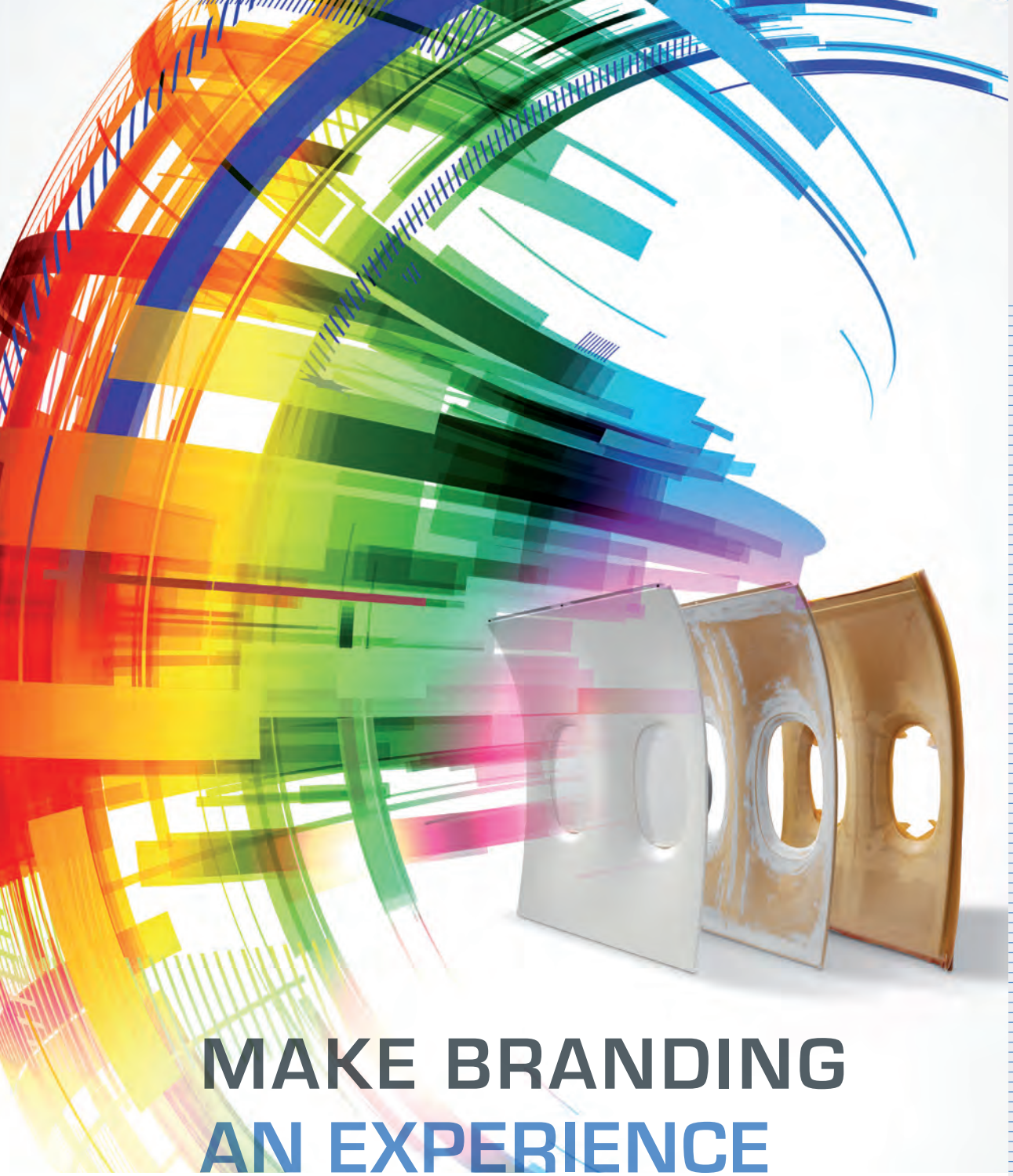

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TIMES ARE A-CHANGING

The perennial issue with stowage is how to make it functional without ruining cabin aesthetics. The default position has been 'up above' for many years, but Anthony Harcup, associate director at Acumen, has been working to create alternatives.

"Historically, business travelers made up more than half of all flights taken. The capability to offer space above the seats where business people could stow an overnight bag easily and avoid the wait for baggage at arrivals, drove much of this thinking.

"Times are changing, though. According to a 2016 survey conducted by Airlines for America, business flights in the USA now constitute less than one-third of all flights.

"The retired and the over-55s are rediscovering their love of travel, driven by longer retirements and more disposable income. They want a stress-free experience getting to the plane and a comfortable experience in the air. While this is a boost for airlines,it is harder for these older people to manipulate luggage into overhead bins. This may drive a rethink in the industry to create more personalized and localized stowage near the seat."

Such thinking was applied when the studio was designing the First Apartments for Etihad. "What would happen if the stow bins were not there?" says Harcup. "We created a layout with only one central aisle and gave the space back to the passengers. These apartments are 39ft^2 [3.6m^2] each, creating more space for in-suite stowage than ever before. Each suite has stowage under the bed, enclosed shoe stowage, a full-length wardrobe, a minibar, a stowage drawer, headphone stowage, a vanity unit, two spaces for documents, and a large pivoting stowage for bedding. With a separate seat and bed they create a room-like feel.

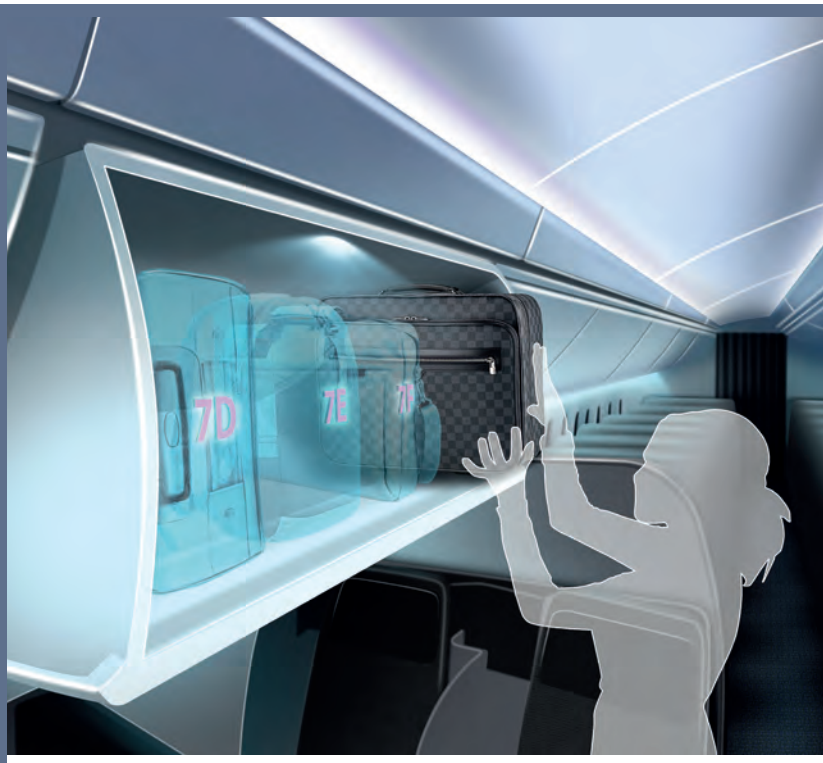
"Other things are changing too. Whereas 20 years ago travelers needed access to little more than a book during a flight, now laptops, tablets and smartphones all need to be easily accessible, along with the fuel to power them. Dedicated laptop stowage would be popular with business travelers and perhaps there should be a rethink of the tray table for short-haul. Passengers would most likely welcome a modular tray table that could be used to stow a device at a helpful viewing angle while still providing flat space for a tray."

Organization is key

"I think most existing overhead lockers in economy class are brilliant. I'm always surprised at how generous the space is," says a highly positive Adam White, director of London-based Factorydesign.

"The problem is human behavior – people stuffing their luggage in inefficiently, while stooping to try to identify the correct row or seat number, and contributing to the tortuous boarding process. Why not allocate each item a designated storage space that ties in with the passenger's seat number? Each piece of hand luggage is already security-scanned, so it could be simultaneously 3D scanned and mapped. Dial in some holographic software linking up to the seat number, and once on board, the bag would appear as a hologram in the locker above the right seat.

"Passengers then just slide their bag into that demarcated slot. Ground crew could send the trolley-bag folk on first, and holograms would show how smaller items could fit around and on top. That would surely make the most of overhead stowage – sometime in the future!"



GET RID OF OVERHEADS!

The newFACE airliner concept uses a 2+2+2 layout, with no overhead bins. So where does Almadesign, the creator of the concept, intend passengers to stow their belongings?

André Castro, design manager at the studio, states, "A flip-up seat enables the storage of a predefined maximum size of hand luggage under the seatpan, which allows faster ingress by removing 'aisle interference' while boarding – passengers do not need to stand in the aisle to store luggage in overhead bins."

The concept uses a raised double cabin floor, which provides extra space for luggage to fit under the seatpan. The height and weight is compensated for by the removal of the overhead bins. Meanwhile the air and lighting systems are integrated into the central upper console. The system allows each passenger's space to be customized, so items can be stowed more quickly and in a more user-friendly way. The seat numbers indicate each passenger's storage space.

Boeing explores space

Boeing has developed larger overhead bins – named Space Bins – as a line-fit option on new B737NGs and B737 MAXs and retrofit on in-service B737NGs. Each Space Bin can accommodate six bags, two more than the current pivot bins installed on next-generation B737s with the Boeing Sky Interior, based on a standard size carry-on bag.

In addition, the lower lip height of the bins provides increased visibility into the back of the bins and makes bag loading easier. They're also as easy to close as the current pivot bins, but require no bin assist mechanism. Alaska Airlines is launch customer for the bins.

Maximum bag capacity based on B737-900ER and B737 MAX 9

Bin type (introduction)	Total number of bags
Standard bins (1998)	77
Big bins (2002)	125
Pivot bins (2010)	132
Space bins (2015)	194

SHRINK OVERHEADS!

"We have reached a point where stowage availability has modified passenger behavior," states Cristian Sutter (left), a cabin design specialist at British Airways.

"Passengers are now bringing more items on board, creating not only boarding delays and reducing vertical space in the cabin, but also impeding emergency evacuations due to passengers retrieving their luggage before jumping to safety via the evacuation slides.

"The vertical dimension has not been fully exploited when it comes to optimizing cabin real estate, and dedicating space for oversized hand luggage stowage instead of using it for comfort-related passenger propositions sounds inefficient, to say the least."

So what does Sutter envision for the future? "Regardless of whether overhead bins become electrically operated, or see-through with smart occupancy indicators, I believe they will decrease in size, releasing cabin space that could be used to create additional services and drive revenue that could justify (and pay) for sending oversized hand luggage to the hold – where it belongs."

Fully automatic

Tempted by bins that open and close at the mere touch of a button? FACC has devised OneTouch bins that do away with mechanical power assistance and its associated size and weight, to create a 30% increase in stowage volume and a weight reduction of 10%, despite having a motor and controller. Other benefits are that the loading sill is lower in the opened state to help facilitate loading and unloading.

According to FACC, the bins are easy to align and can be readily adapted to fuselage contours. As the support structure is pre-assembled, the bins can be attached in just a few manual steps. Even better, when a cabin interior is modernized, the appearance of the bins can be updated by simply replacing the sight panels – a process that can also be used for customization.

BINSIGHT

"We see baggage management, particularly with carry-on baggage, as the most inefficient part of the flying experience, and ripe for step change advances that will have an immense impact on passenger satisfaction and airline productivity, and help to enable new revenues by allowing, comfortably, passengers to bring bags aboard, stress-free," says Scott Savian, EVP of ZEO, Zodiac's design studio.

In pursuit of this belief, Zodiac Aerospace is driving development of the ECOS baggage management system, a system that combines three parts: overhead bins that were designed around actual luggage data to ensure optimum performance in service; Binsight, Zodiac's smart available-space indicators for each bin; and advanced analytics that can predict boarding and turnaround performance.

VOLVO KILLS CLUTTER

Perhaps a few ideas could be derived from the automotive sector, in the shape of the XC40 SUV, for which Volvo declared an end to the problem of a shortage of suitable storage.

Volvo investigated how people store belongings in their cars. Customers were asked how they would like to see car interiors improved, and it turned out that different regions and cities produced remarkably similar results.

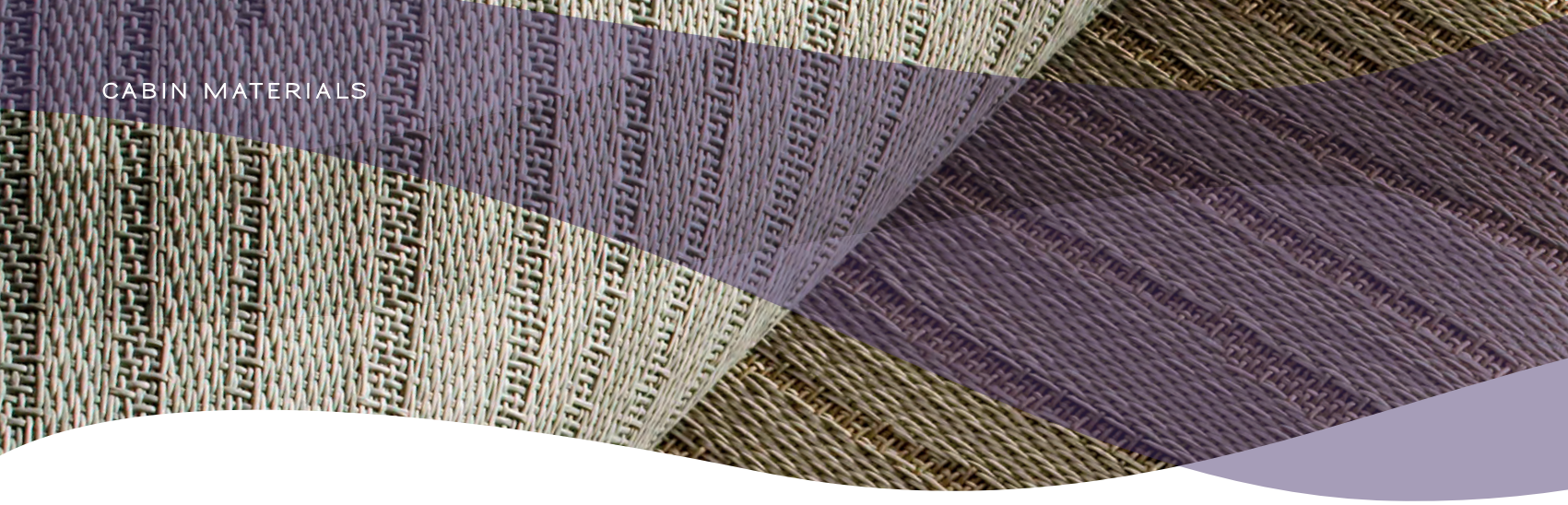
"As we spoke to people about how and where they store the things they carry with them daily, it was quite clear that most of today's cars are falling short in this area. Phones slide around in the mid-console, bags are at risk of falling over and people fumble behind the wheel as they try to get cards out of wallets. We set out to solve these and many other issues," says Louiza Atcheba, brand manager at Volvo Cars.

Considerations included providing areas for coins, cards and charging cables. A usable space for smartphones was added that offers wireless charging as well as USB ports, and there is a small storage area under both front seats.

The interior also offers slots for credit cards that can be inserted into the dashboard, making them readily available. Under the armrest, there is a large storage area with room for a tissue box. A removable bin allows you to discard and quickly get rid of waste.

A private, locking storage compartment has also been added under the load floor.

"With the XC40, we declare the end of clutter, making sure that everything is within arm's reach but also out of sight. It's about clearing clutter so you can clear your mind," adds Atcheba.



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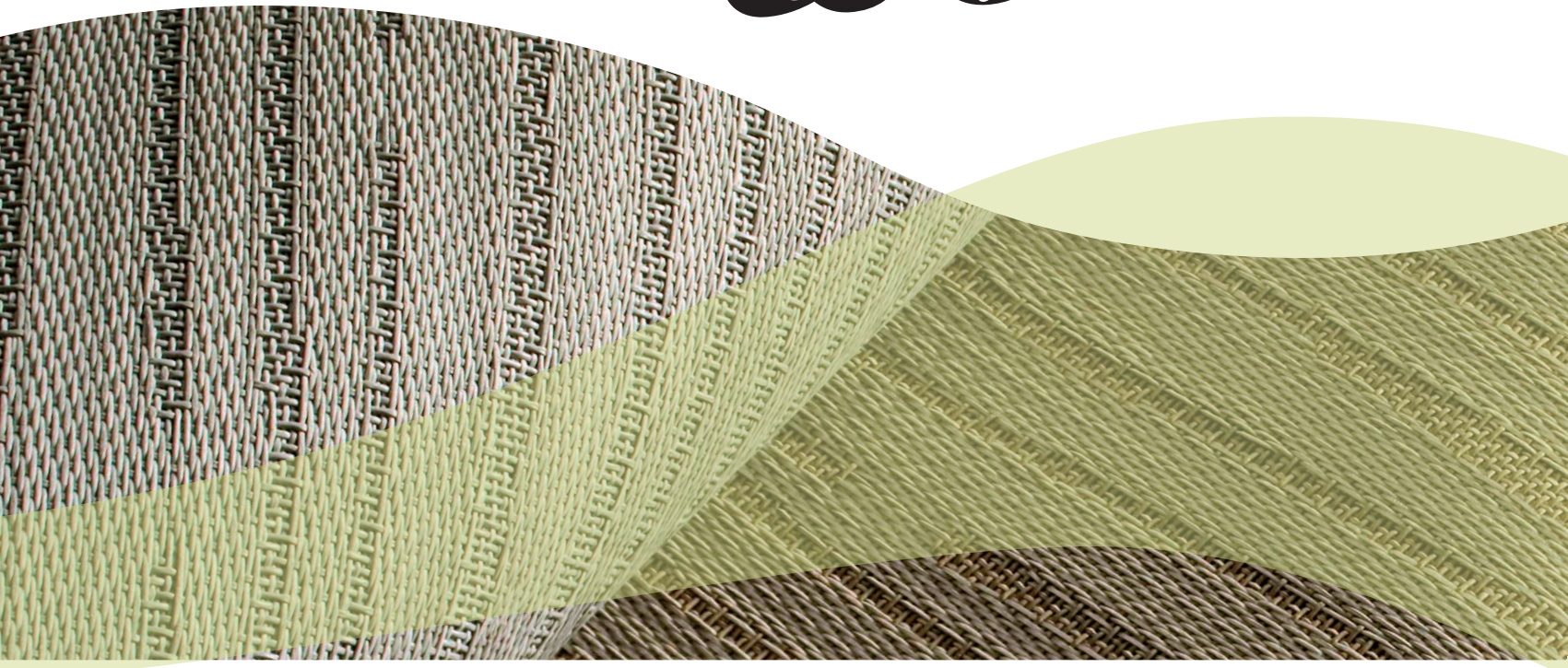

rial

ALL ELEMENTS OF AN AIRLINE'S BRAND AND PASSENGER EXPERIENCE SHOULD MEET OR EXCEED EXPECTATIONS. THE LATEST CABIN MATERIALS AND FINISHES HELP ENSURE THE AIRCRAFT CABIN LOOKS AND FEELS GOOD FOR PASSENGERS, AND PERFORMS WELL FOR THE OPERATOR

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textiles

3D optics for seat covers

Lantal is responding to what it reports as brisk demand among customers for fabrics with an exceptional appearance.

Thus the company's 2017 Conceptual Forecast collection introduced a 3D-style seat fabric with a unique look. The technical yarn used in this fabric gives fullness to the material, with great 3D optics and haptics, which allows the creation of relief-like structured designs that create a lot of visual interest.

Despite the unusual design, the seat cover materials that contain this unique yarn meet all relevant airworthiness standards.

FABRIC INNOVATION

New fabric design concepts have been developed by Replin by Hainsworth for its Eclipse, decorative wall covering, and passenger seating ranges. The company's design team is led by Patsy Gemmell, who has created the concepts around four distinct themes.

As Gemmell explains, "The designs act as a way of inspiring our client partners as to what is possible for a bespoke collection in 2017 in terms of a fabric's potential texture, color, weave and pattern.

"This year all our designs have intricate patterns embedded deep within the weave to showcase the level of craftsmanship we can deliver by having control of all our fabric production stages, from conception to completion, at our mill in Yorkshire, England. The design team operates from a strong technological foundation in terms of fabric quality and adherence to industry and leading aircraft manufacturers' standards."

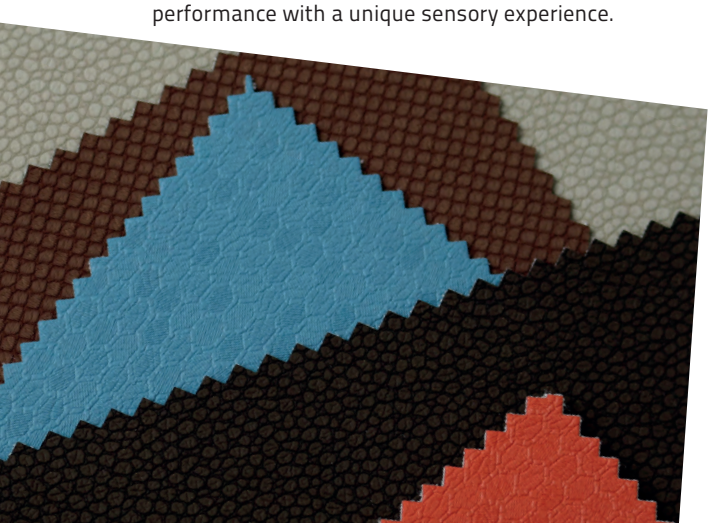
Allied to these designs are innovations such as RFPS (an anti-stain finish), non-pill (a durable woven texture), self-adhesive backing (easy fitting adaption) and fire-retardant treatments.

HIGH-TECH FEEL

Customization is being taken to new heights by Tapis's Ultratech technology. Ultratech represents a new category of seat material beyond the traditional varieties of polyurethane.

Ultratech products feature a proprietary molecular structure and exclusive pigment systems that combine to deliver uniquely refined matte finishes, highlighting an understated look and feel. According to Tapis, airline passengers will get a futuristic level of tactile appeal and softness.

There are five patterns in the range, known as the Tech Collection: Ultratech, Dwell, Eco Tech, Cove and Helix, each of which combine state-of-the-art performance with a unique sensory experience.



Eclectic textile concept

Rohi's design teams have been working to create a completely new feeling in aircraft cabin interiors, with the development of new eclectic textile concepts. These next-generation textiles are intended to allow more individuality in each passenger seat, especially in economy class.

The eclectic cabin design consists of an up to 6.5 yard-long (5.9m) design repeat, which is composed of varying colors, patterns, textures and styles that are strung together endlessly and transition-free. The benefit of this is that they are produced at a minimized lifecycle cost with only one part number.

leathers

BOXMARK'S DUKE LEATHER IS AVAILABLE FROM STOCK AND IN A CHOICE OF 55 COLORS

55 colors

'Those helping quickly help twice'. Leather specialist Boxmark bases its operations on this principle and has thus decided to produce its new Duke range of aircraft leather (a fine grain design) as a stock item in 55 colors.

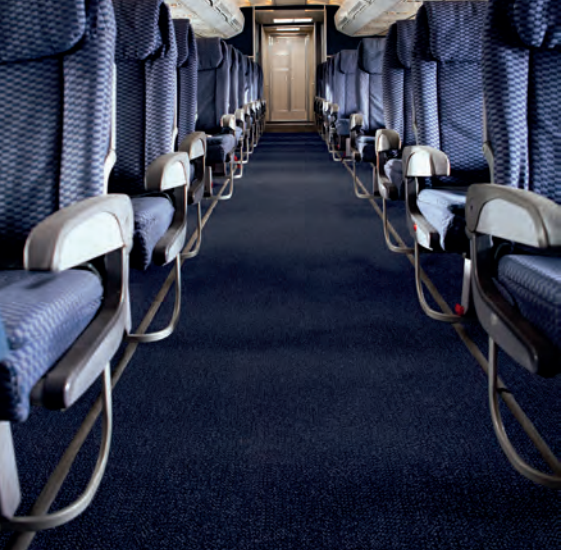
"It happens now and then that our customers require products at short notice. With 55 colors always in stock we can fulfill even the most urgent inquiries," explains Christian Schober, key account manager in Boxmark's aircraft leathers department.

Furthermore, this service-oriented warehousing approach also offers the advantage that the minimum order quantity amounts to only one skin (approximately 5m²) per color.

LIGHTWEIGHT LEATHER

A new lightweight European cattle hide product has been developed by Austrian tannery Wollsdorf Leather. The leather, named Amba Eco, is claimed to be the lightest bovine leather in the world, at 650g/m².

The product benefits from the SPS (Surface Protection System), claimed to enhance the leather's resistance to soiling many times over compared with untreated product. The surface is anti-bacterial and mildew-resistant.

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Special effects

Tisca Tiara has introduced two novel polyamide aircraft carpet lines. The first is Tisca Eco Structure, a carpet engineered for ultimate performance, produced with 100% solution-dyed polyamide yarn. The stepped loop-pile design with an inventive 3D texture makes this carpet an eye-catching and unique flooring proposition.

Tisca is offering this product with lead times of just one to two weeks, with a minimum order quantity of just 60m². Moreover the total lifetime costs for operators are minimized thanks to the carpet's superior durability, long service life, ultra-lightweight construction and easy maintenance. Still, high passenger comfort is ensured thanks to its soft and noise-absorbing 3D texture.

The other new polyamide carpet line is Tisca Eco Premium, which is available in three different weight classes. As the name suggests, it is a high-end product. Designers and airlines face no restrictions when it comes to customizing the carpet, as it is available in any customized design, pattern and color.

Another novelty is Tisca's new luxurious upholstery stock range collection Mira X Canto. By weaving high-end chenille yarn in multiple colors in the weft of the material in combination with a different warp yarn, a very special 3D effect is achieved, resulting in an intriguing texture characterized by a very soft, pleasant and cozy touch. This product is perfectly suited for first and business class seats, as well as for business jets.

Thirteen colors are available from stock with no minimum order quantity, and are ready for immediate shipment with design, development and manufacture taking place all under one roof. Moreover any customized color is possible.

Tisca has also introduced a new Trend collection of harmonized seat cover fabrics, curtains and carpets. This holistic collection reflects the latest global trends in patterns, textures, materials and color combinations.

Vinyl virtuoso

Lonseal has been providing the aviation industry with resilient vinyl flooring for more than 45 years, and the company's latest aircraft flooring collection includes new colors, 6ft- and 8ft-wide (1.8m and 2.4m) roll availability, low VOCs and REACH compliance. All product lines in the collections meet FAR 25.853a and FAR 25.793 requirements, while the Loncoin II Featherweight line meets Boeing D643A504.

The Featherweight formulation is claimed to be more than 30% lighter than standard NTF aircraft products, which, combined with a high strength-to-weight ratio, means it is often specified by aircraft designers and aircraft manufacturers. Lonseal's distinctive selection of embossed and smooth designs comes in four collections: Axis, Cirrus, Halo and Mirage.

REPOSITIONABLE FLOORING

For almost two years, Schneller's product engineers and designers have been working on a new flooring material for the aviation market, and the result is AerFusion Fit.

This repositionable flooring product can be applied in entrances, aisles, galleys and lavatories. With possible retrofits in mind, Schneller also expects to make it available for refurbishments through aftermarket channels.

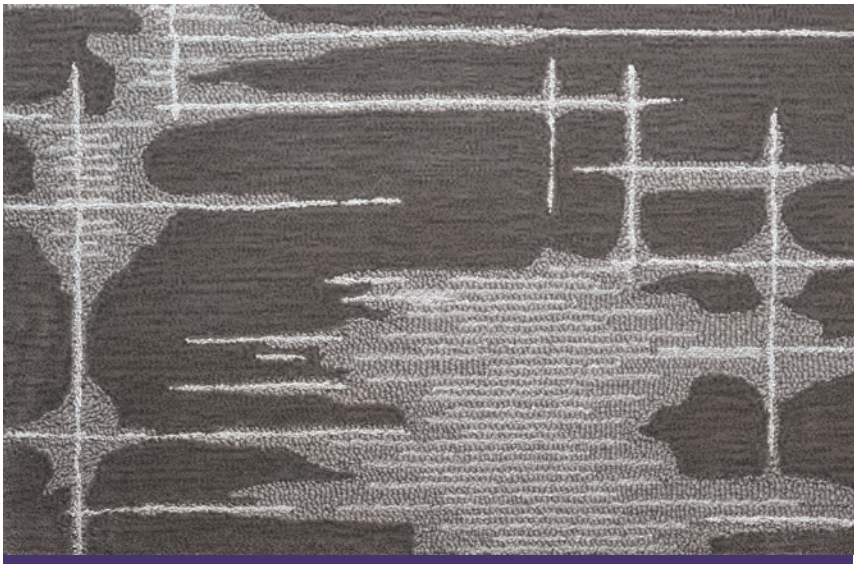
The product contains an integral repositionable adhesive system that allows precise correction where needed. That means it can be cleanly removed from floors at the time of installation, or indeed long after it is originally installed. AerFusion Fit is easy to clean and maintain, and also offers superior buckling and telegraphing resistance, and a high level of dimensional stability.

flooring

A game-changing carpet guarantee?

SkyPaxxx Interior Repairs and Interface has announced that Sky-Tiles – the eco-friendly modular aircraft carpet – now has guaranteed replacement rates and in-service life for finished and installed carpet. This installation and in-service life guarantee is in addition to the three-year warranty that Sky-Tiles already carries against manufacturing defects, shrinking, stretching, fraying and excessive wear. SkyPaxxx claims that Sky-Tiles is the only aircraft carpet in the world to guarantee in-service life and replacement rates for finished and installed carpet.

"This is a game changer for aircraft flooring," says Rick Lockhart, president of SkyPaxxx. "The unique and patented design and manufacturing process enable Sky-Tiles to stay installed in the aircraft for longer than other carpets, and now we are attaching a guarantee to back this up. This unprecedented guarantee will enable all airlines of any size and fleet type to keep carpet installed longer, creating significant savings and efficiencies and providing their passengers with a more appealing and fresher cabin while protecting the environment."



THE SKY UNDERFOOT

Aerial, the newest aviation offering from Scott Group Studio, is made up of 17 diverse styles of luxury carpeting for interior cabin furnishings. The intricate patterns of each design are meant to emulate the earth's complex surface views from the sky, bringing the vista from above underfoot. Very stylish and equally durable, each carpet is composed of the finest silk-wool mix and is fully customizable to the customer's specifications.

Carpeting completely reconceived

Traditional woven carpet specialist Anker has developed Flooro, a flooring product the company is billing as a "revolutionary" new textile carpet for the aviation industry. The carpet is claimed to weigh 30-70% less than conventional aviation carpeting while also being extremely hard wearing and 'green', with 50% of this new-generation textile flooring made using recycled Econyl yarns. This combination of properties has been made possible by a newly developed high-tech woven system.

Woven vinyl – Infinity

Each cabin interior is a new tapestry where fashion-forward looks and superior performance are imperative, and Infinity designed its Luxury Woven Vinyl (LWV) flooring with this in mind. Heavy traffic rated, lighter weight than carpet and easy to clean, LWV provides practical utility while also offering endless opportunity for unique designs in weave, texture and color. As the manufacturer of the product, Infinity controls the entire process, from raw materials to finished flooring, and offers pre-cut pieces as well as rolled goods. Infinity flooring exceeds slip and abrasion requirements, offering peace of mind when selecting from a wide selection of colorways and patterns.

materials

COHESIVE WHOLE

When faced with the daunting task of creating an ideal space for passengers, there are multiple facets to explore. It is crucial to convey a cohesive experience that allows customers to discover your brand. The team at Schneller – a leader in providing hard-surface laminates, thermoplastic sheets and non-textile floor coverings – has the capability to meet airlines' aesthetic needs, from floor to ceiling.

During 2017 Schneller has explored the idea of forging traditionally opposing concepts into a beautifully blended experience. By showcasing new materials alongside traditional items transformed into innovative concepts, one can begin to see how harmony can be achieved.

The company is demonstrating flexibility blended with rigid, softness with resilience, complexity with simplicity, and decadence with modesty. Concepts of rambunctiousness, modernity and audacity can be paired with tranquility, classicality and poise.

High-impact thermoplastics

Aviation thermoplastics giant Sekisui SPI has launched two cabin products designed to help the airline industry reduce weight and improve efficiency while exceeding safety requirements.

The two launches – Kydex 6523HI and 6565HI – are both high-impact products, designed to absorb more impact energy prior to failure, and benefiting from featuring a ductile failure mode rather than the brittle failure mode more common in PVC/PMMA materials.

This improved ductile failure characteristic increases the likelihood that thermoformed parts made with the new Kydex materials will pass HIC testing when used on demanding geometries in the passenger head injury criterion (HIC) zone and meet FAR 25.853 (a) and (d) requirements.

Kydex 6523HI is a high-impact material with integral pearlescent finish. The material was specifically engineered to improve passenger safety when used in components requiring the HIC test. Kydex 6523HI expands the company's portfolio of high-impact materials, and complements the Kydex 6565HI product.

A PART FORMED USING KYDEX 6523HI, WITH AN INTEGRAL PEARLESCENT FINISH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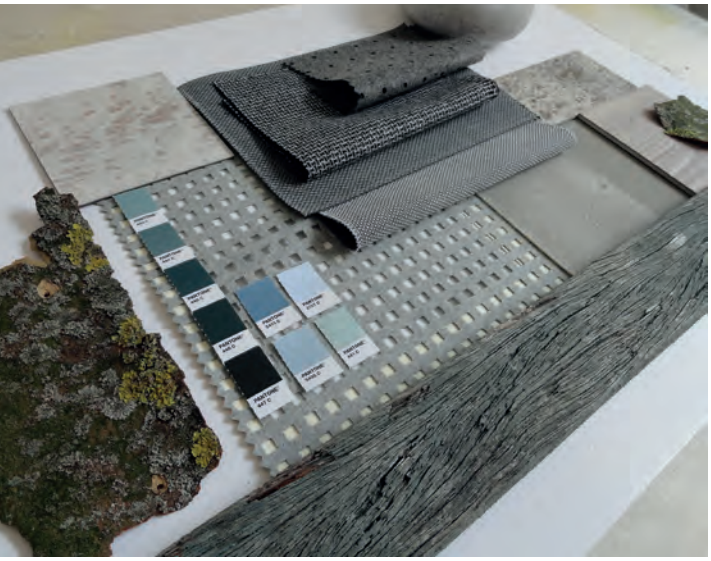
PLAIN FABRICS, REAL STONE AND METALLICS ARE THE WAY FORWARD, SAYS CATHERINE BARBER, CMF CONSULTANT AT ACUMEN DESIGN ASSOCIATES

BARBER HAS BEEN INVOLVED IN HIGH-PROFILE PROJECTS INCLUDING ETIHAD'S INTERIORS



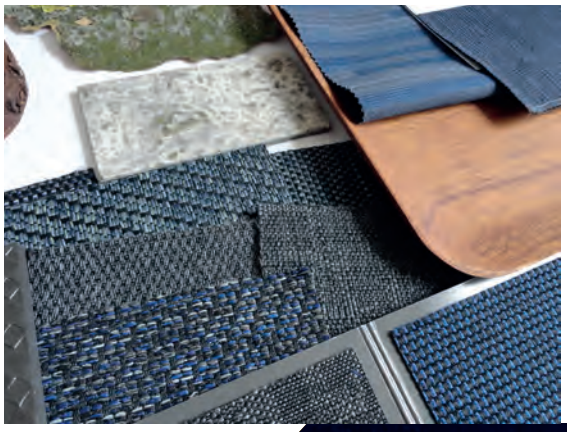
There has been a move to much darker, moodier, slightly nostalgic interiors. Perversely, this is in contradiction to developments at Boeing and Airbus, which are aimed at making cabins lighter.

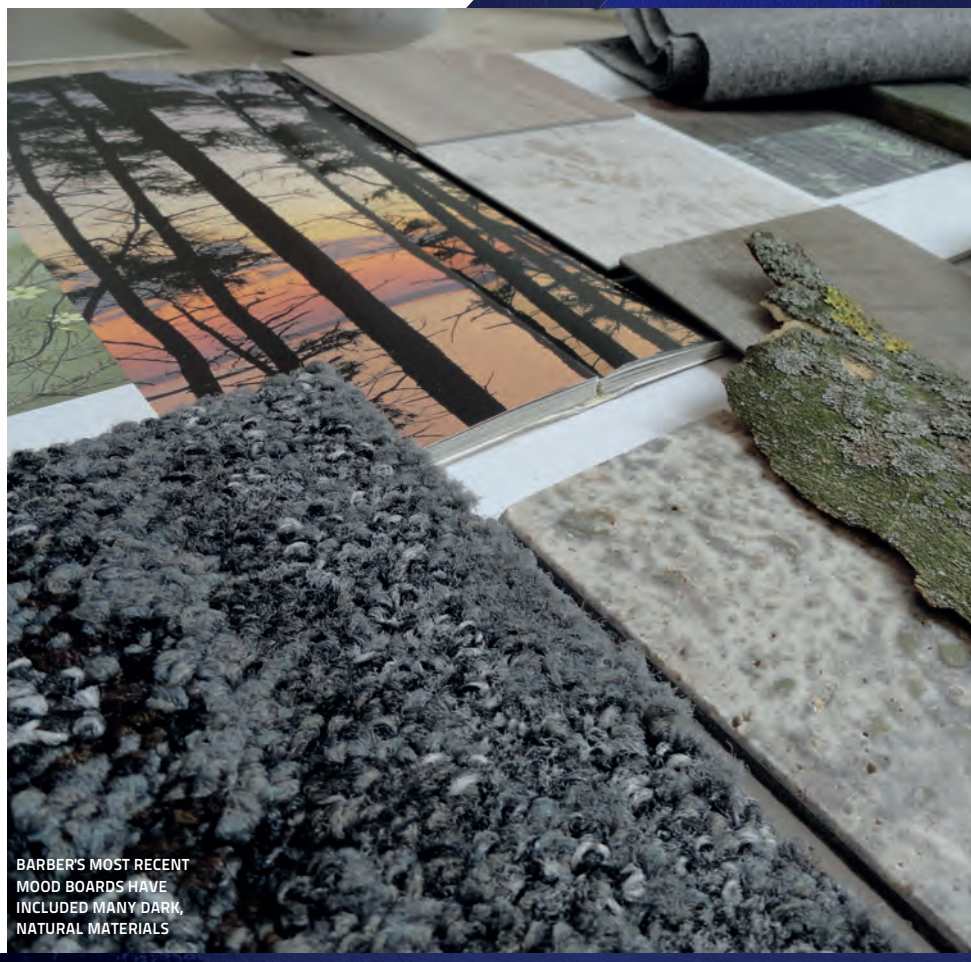
Creating a dark cabin scheme would alter the perceptions of airlines and passengers that darker walls would make a cabin seem smaller; they would make it feel more intimate, but not less spacious. Etihad's first class lavatories are a fantastic example of this, and it would be nice to apply the same principles in the main cabin.

The trend for marble and stone surfaces and floors has led to the development of thin stone veneers. These nanostone materials can be bonded to 3D surfaces to create a stone effect. We are trying to introduce these veneers into cabins, as real materials are ideal; we currently use imitation stone effects on floors and acrylic-based imitation stone in the cabins.

Metals such as copper, brass and, more recently, dark gunmetal, have been important in land-based interior design. While we have had some success introducing such metals into the cabin, there is an issue of durability with these types of finishes. We would love to see someone develop durable metallic finishes.

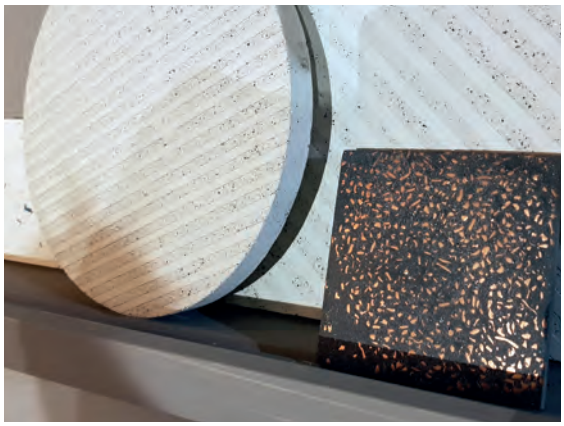
In recent years, fabrics have had a big Scandinavian influence: it seems like Kvadrat is the supplier of choice for European designers and manufacturers – as seen on the majority of furniture ranges and even in the new Range Rover at Milan Design Week. While they are plain, these fabrics vary, from felted to very crisp, and as cabin designers, it is our challenge to capture this iconic look, but also make them more durable, as plain fabrics show stains badly.





BARBER'S MOST RECENT MOOD BOARDS HAVE INCLUDED MANY DARK, NATURAL MATERIALS

WE COULD BE ENTERING A WONDERFUL STONE AGE IN CABIN DESIGN, SAYS LINDSAY BOSONOTTO, SENIOR DESIGNER AND CMF SPECIALIST AT FACTORYDESIGN



I've noticed a huge trend for stone – particularly marble – a trend that derives from the home interiors sector. A lot of airlines are bringing stone in for surfaces and console tops, or want to do so. Their idea is to use different types of stone as a way of standing out from their rivals. I'd like to see the use of stone on other surfaces such as splashbacks and walls.

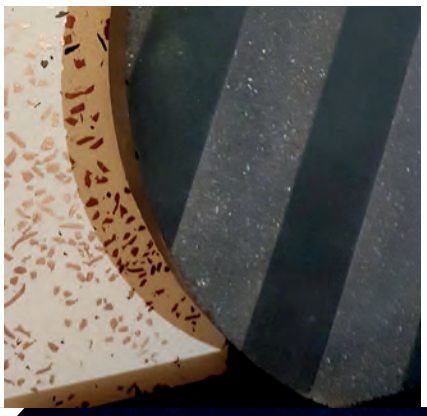
There are a number of other clever ways of getting a stone effect. One material going down well at the moment is the poured resin Polystone. Meanwhile, aquagraphics (or hydrographics) is the process of transferring ink designs to 2D or 3D surfaces. The automotive industry decorates vehicle interiors like dashboards and steering wheels with it. The design variations are limitless – including woods, stones and carbon fiber – so an airline can 'own' something unique to them. What's more, a stone design on a metal substrate is a very convincing facsimile of real stone, because it's cold to the touch.

Another new material with a lot of potential for the airline industry is Jesmonite, which was named Material of the Year at the 2017 London Design Festival. Jesmonite is a water-based composite material, used in the building trade. It can be manipulated to replicate the appearance and texture of any surface finish in a variety of colors.

Surface designer Katie Gillies, based in Nottingham, UK, exhibited her Freckled Collection at this year's Clerkenwell Design Week in London and at the London Design Festival. She mixes Jesmonite with aggregates such as pigment, glass, iron and copper, and then sands, polishes and seals each surface to achieve a high-quality finish.

Jesmonite has weight properties lighter than stone, and strength properties that offer high impact resistance. It seems like a perfect material to be developed for use on board an aircraft. It gives designers control over the finest details, and it can mimic natural materials, so the stone trend would lend itself well to this material. The possibilities are endless. I would love to work with it – it would really unlock my creativity.

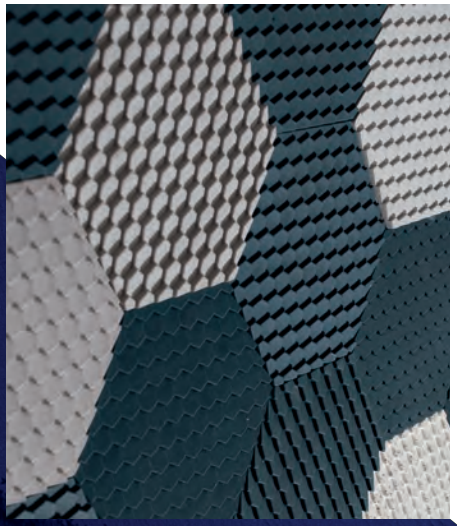
BOSONOTTO RECENTLY WORKED ON THE DELTA A350 PROJECT



BOSONOTTO HAS BEEN IMPRESSED BY THE POSSIBILITIES OF JESMONITE (ABOVE AND RIGHT) AND THE DIFFERENT SCALES OF MARBLE SHOWN BY DOMUS (FAR RIGHT)

RECENT PROJECTS BY OXLEY INCLUDE SINGAPORE AIRLINES' NEW A380 INTERIORS

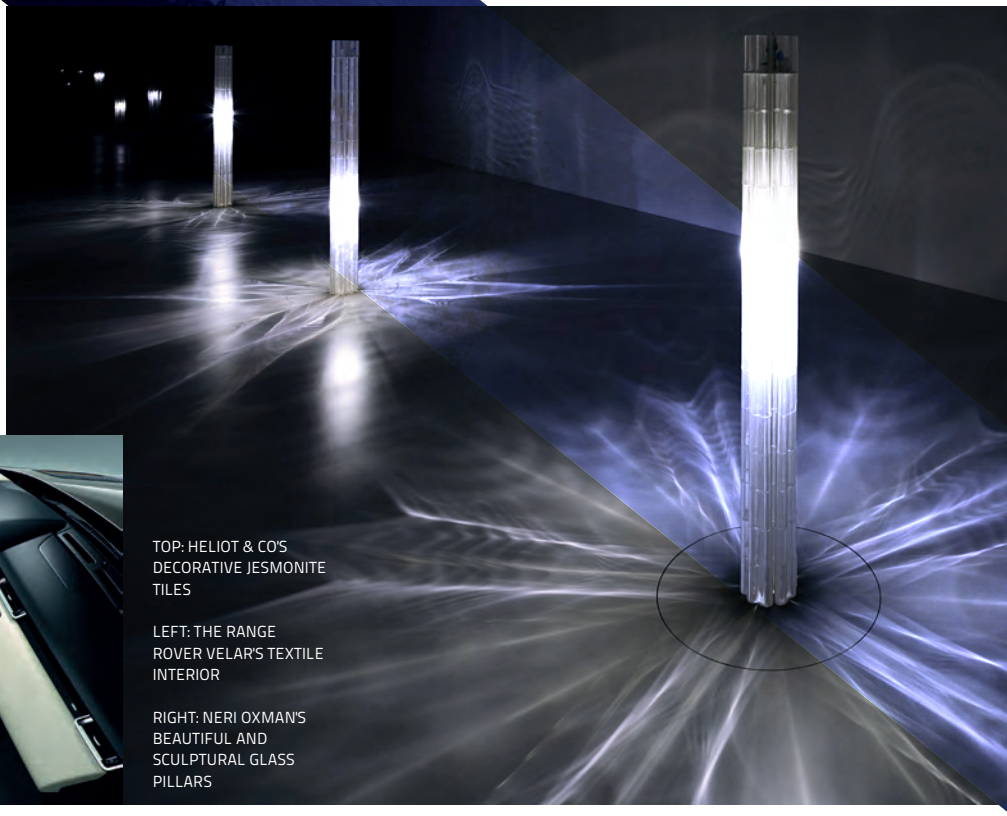
DEMELZA OXLEY, LEAD DESIGNER FOR COLOR, MATERIALS, TREND AND BRAND AT JPA DESIGN, FOCUSES ON SOFT, HARD AND DIGITAL ELEMENTS



For soft materials, a key observation within the fabrics sector is the mélange effect created by Danish textile company Kvadrat. This woollen mélange effect feels organic and soft, and can be found within lifestyle products, such as the textile interior of the Range Rover Velar, Bang and Olufsen's BeoSound Shape speakers, and Vifa's wireless speakers. The extensive and subtle color range adds to the contemporary aesthetic. Both Vifa and Bang and Olufsen make technology look and feel welcoming within the home by using simplified forms and blending technology within the interior space. This approach of looking less like traditional consumer electronics products is a trend we keep a close eye on.

Jesmonite, a branded composite material made from resin and gypsum powder, was named Material of the Year at the London Design Festival. Here, designers have experimented and produced unique, texture-rich hard surfaces that can be plain, speckled or marbled, and cast into textured molds. Heliot & Co. designed a decorative surface tile collection suitable for hospitality design, with the positioning of the 3D tile producing a graphic composition and emphasizing the directional texture. Another company, Polystone, has translated the tactility and visual quality of Jesmonite into an aviation-approved composite, increasing the opportunity to achieve bespoke finishes for cocktail tables and console surfaces.

During Milan Design Week, innovative processes and materials, alongside digital effects, were artfully curated. Neri Oxman and MIT Media Lab for Lexus blended these three elements and created 3D-printed sculptural glass pillars. These intricate surfaces are optically transparent and cast bespoke shadows and light effects as the light moves slowly up and down inside each column. It creates an intriguing spectacle. Light and how it affects the surrounding space is going to become more important as onboard lighting systems advance and airlines become more ambitious. Exploring this theme, airlines will be able to curate bespoke digital atmospheres, just as they currently do with physical materials.



TOP: HELIOT & CO'S DECORATIVE JESMONITE TILES

LEFT: THE RANGE ROVER VELAR'S TEXTILE INTERIOR

RIGHT: NERI OXMAN'S BEAUTIFUL AND SCULPTURAL GLASS PILLARS

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TACTILITY AND RELIEF ARE THE KEY TRENDS TO WATCH, OBSERVES EMMA PARTRIDGE, HEAD OF CMF AT TANGERINE

THE USE OF ULTRA-THIN MATERIALS, SOFT PASTEL COLORS AND SEMI-TRANSPARENT DIVIDING PANELS HAS BECOME A FAVORITE TREND FOR PARTRIDGE

Forget the rules of how to use traditional materials. Brands are now reacting against consumerism, mass production and waste management. They are seeking new applications for pre-used materials, and adapting methods of production toward sustainability to redefine the way we recycle and reuse materials. Glass, fabrics and plastic recycled materials are being combined with resins to create Terrazzo composites that mimic the rich natural mix of elements found in raw materials such as stone. Exciting new textures, patterns and colors can be formed within this versatile composite mix.

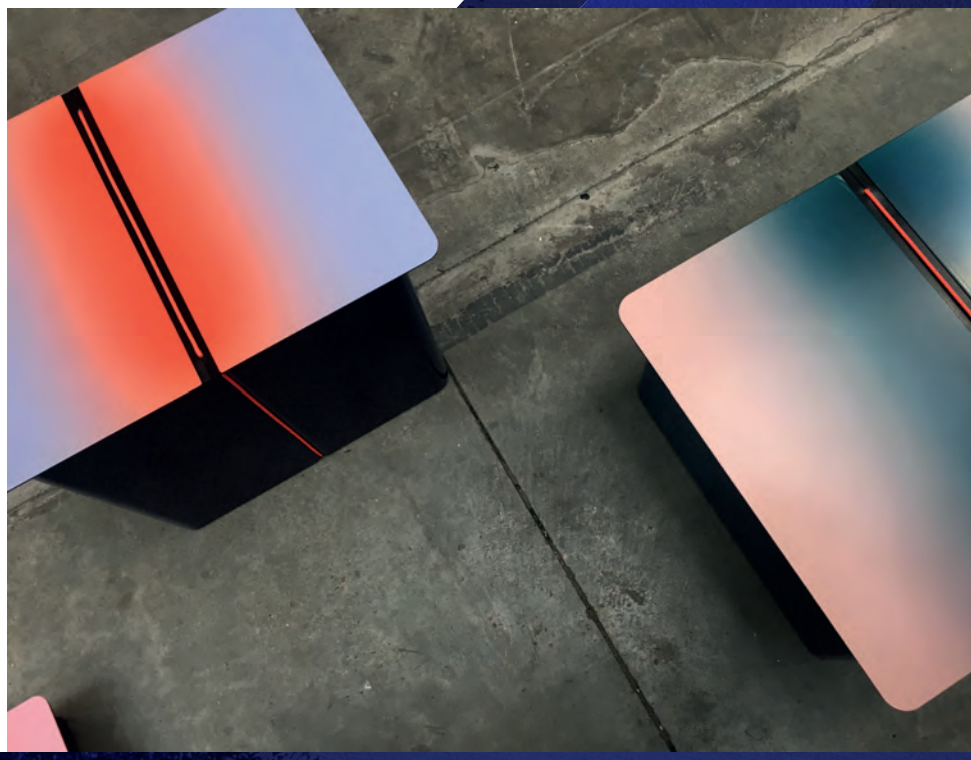
A key emerging trend is tactility, leading to material-focused design. Surface textures are important across all product categories and customer experience touchpoints. Tactility is expressed in 3D relief, handmade craft, subtle machined finishes, strong coarse fabrics, and carved and sculpted surfaces.

With furniture, there has been a lot of development in seating for communal work spaces. Noise-absorption materials are being used to create portable booths that provide quiet meeting areas in the midst of busy public spaces. Wrap-around headrests on armchairs are also prevalent, reducing ambient sound, and improving privacy and comfort.

We can see some of this thinking coming into the aircraft, as carriers seek new ways to tailor and differentiate their cabins. Personalization of space is a key theme in aircraft interiors at the moment. By physically and digitally manipulating aspects of the seat and the surfaces in the cabin, people gain a sense of ownership that makes them feel at home. This trend is most evident in business class, but is seeping into economy too.

While some furniture companies are expressing themselves through color and patterns, others are looking in a different direction, with simple shapes inspired by Scandinavia and Japan. Monocolor and single material-use harks back to a time of living with less, where goods were better-made and less fussy to use.

Tactility and relief in textures can be pushed into existing and approved materials for aircraft cabins, by adding structure and 3D form. Pattern and Terrazzo effects can be developed with approved material suppliers; however, transparency and ultra-delicate screens are harder to achieve, but some progress is being made in this area.



RIGHT: LIGA'S STORAGE FURNITURE CAN FUNCTION AS A BOX, A BEDSIDE AND A COFFEE TABLE

LEFT: CLEVER SURFACE DESIGNS BY KATIE GILLIES

TOP: HELLA JONGERIUS' COLOR CATCHER COLLECTION MAKES TACTILE COLORS VISIBLE IN VARYING LIGHTING ATMOSPHERES

ALL IMAGES: TANGERINE

AS THE VARIOUS ELEMENTS OF CONSUMERS' LIVES CONVERGE, THESE ELEMENTS WILL ALSO INFLUENCE AVIATION TEXTILES, FINDS TOM LLOYD, DIRECTOR OF PEARSONLLOYD

LLOYD NOTES WITH INTEREST NIKE'S NEW DESIGN LAB IN EAST LONDON, DEDICATED TO THE DEVELOPMENT OF NEW AND ADVANCED TEXTILES

Current trends in aviation materials reflect wider themes dominated by the idea of convergence – a key word of our times.

Convergence: our work life meets with our family life, our business trips with leisure, the sports club becomes a space for socializing, and the café an office on the go. Being at home, at work or on the move becomes less relevant, giving space to the overall experience. By making the user the focal point of the design process and combining knowledge gained from a range of projects to cross-pollinate sectors, the boundaries between aviation and workplace, transportation or hospitality design are eliminated, and this is also reflected in recent developments in textiles.

There are several examples of companies and brands collaborating across disciplines to broaden their audience and introduce their product in different environments.

Earlier this year, the Range Rover Velar was revealed, featuring an interior dressed with a textile, especially developed by Kvadrat. The wool-based textile was chosen to add warmth to the vehicle's high-tech interior, by bringing elements of a domestic environment, while meeting specific quality and durability demands.

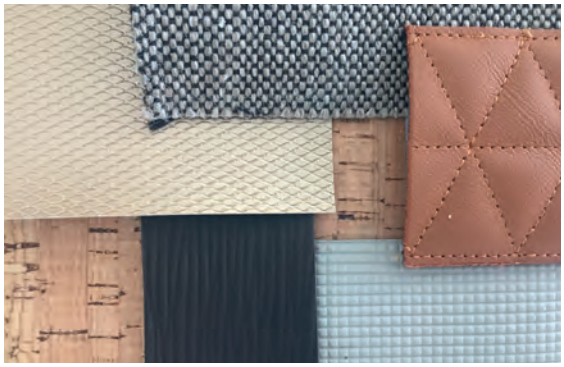
Land Rover is not the first car manufacturer to turn to an interior or fashion design company to dress the interior of a vehicle. In 2016, Maserati launched its first luxury SUV, with a leather and silk interior, designed by the Italian furniture maker Poltrona Frau, and the Italian luxury fashion house Ermenegildo Zegna.

Examples like the above outline the convergence of areas that wouldn't have been met easily a few years ago. Craftsmanship meets with technology, lifestyle with performance, experience with functionality, and domesticity with high-tech mobility. Through this process, textiles act like the bridging element of otherwise distinct fields and are treated with new techniques to bring advanced characteristics and meet with current market demands.

Textiles today are designed not only to dress a design, but, more importantly, to attribute to it specific characteristics that will define its purpose and use – and aviation textiles are no exemption of this new market trend. Breathability, durability, acoustic integration, and the feel of domesticity are just a few characteristics dictated today in the aviation sector, and we are expecting this list to grow longer.

THE FUTURE WILL FEATURE BOTH BEAUTIFUL NATURAL MATERIALS AND HIGH-TECH 'SMART' MATERIALS, PREDICTS ALMADESIGN'S CMF EXPERT, CATARINA FERREIRA

FERREIRA SEES POTENTIAL IN A MAJOR PORTUGUESE MATERIAL: CORK

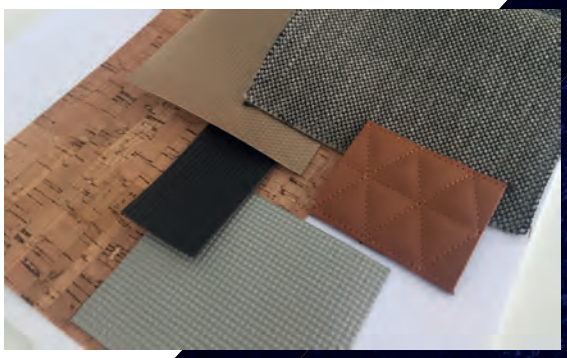


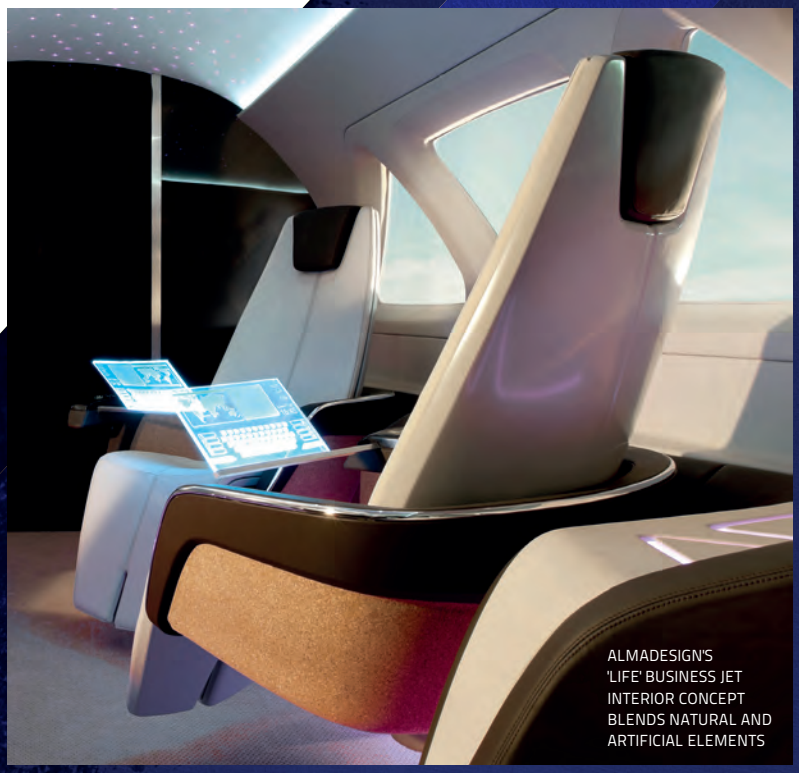
Cabin interiors will be influenced by the search for greater efficiencies, whether environmental, energetic or operational. We can foresee general trends for CMF, some resulting from incremental innovation of existing products, some from new processes such as new ways of combining materials or new ways of producing them. Lightweight materials, novel composite solutions, smart solutions, additive manufacturing processes, higher levels of complexity in detail and the increasing possibility of mass customization to match different users' expectations… all will contribute to improve operational efficiency and differentiate the passenger experience.

In the leather industry we see a move into ecological chrome-free leather, a natural anti-allergenic product that enables the development of all shades of finishes, matt or metallic colors, perforated double-layered patterns and increasingly technical textures. We are now able to introduce different technologies in the leather lamination processes, such as embedded electronics, sensor technologies, and skin-to-skin interfaces, in order to produce 'smart leather' solutions. On the other hand, the simple quality of natural leather, with its beautiful aging and material honesty, will be more and more important in the development of sustainable, long-lasting solutions for cabin interiors.

In the textile industry we see an increasing possibility to customize solutions with new printing technologies that allow for the customization in low-volume production, and a revolution in the nanotechnologies required to produce smart materials that can be self-cleanable, with embedded sensors for temperature, pressure, connectivity, etc. New sustainable solutions are being developed, such as bio-colored substrates free from synthetic dyes, and customization with fragrance fibers, all of which can radically increase brand differentiation and improve the passenger experience.

We always seek to use local products with cultural heritage. In Portugal, cork offers great potential for CMF solutions and we have been developing natural and composite combinations in different projects, which will enable the use of this material for the development of novel and sustainable CMF solutions using a 100% natural, recyclable product.





ALMADESIGN'S 'LIFE' BUSINESS JET INTERIOR CONCEPT BLENDS NATURAL AND ARTIFICIAL ELEMENTS

HIGH-PERFORMANCE SPORTS MATERIALS, HIGH-TECH VEHICLES AND CONNECTED FASHION COULD FIND THEIR WAY INTO THE CABIN, SAYS ELINA KOPOLA, FOUNDER OF TRENDWORKS

Can trend-driven material choices in the aircraft cabin attract passengers, improve the travel experience and reduce overall operational cost? Currently, we are tracking three important trends that impact hospitality brands and consumer goods: influence of sports, renaissance of fashion and smart technology.

Sports, in particular performance sports, has captured consumers' appetites. In the search for performance, Nike adopted E-Leather as its partner for Flyleather, with the strapline '50% leather fiber, 100% performance'. Another Nike innovation is the NikeLab Nike A.A.E. 1.0 T-shirt, which uses computational design to merge a series of body maps and form a motion-led knit pattern, creating a fabric that is thick where required and lightweight in areas that need breathability. This method removes traditional cut and sew operation to make a T-shirt and results in an elegant and seamless garment. The ability to specify the thickness and resistance of the cloth at an individual thread level to provide improved performance in key abrasion sections is ideally suited to aviation seats.

ABOVE RIGHT: THE XIM18'S SMART INTERIOR SURFACES BLEND IN WITH THE FLOOR CONSOLES, INSTRUMENTS AND DOOR PANELS
RIGHT: NIKE'S A.A.E. T-SHIRT

In fashion, young consumers have rediscovered the joy of dressing to express individuality. During Milan Fashion Week SS18, we saw multiple layers of varying material qualities used on one garment. We can learn from this haptic approach to further differentiate the cabin and appeal to younger passengers.

Interesting commercial applications of smart materials are finally appearing. In Yanfeng Automotive's XiM18 concept car, smart interior surfaces have been inspired by the increased technology needs in vehicle interiors. As more solutions become commercially available, it will be easier to transfer the technology into the aircraft cabin.

PERFORATED LEATHER ADDS TEXTURE, PATTERN, PERFORMANCE AND INDIVIDUALITY, SAYS CMF AND TEXTILE SPECIALIST EMMA RICKARDS FROM WEST 6

This season, we're very excited about a surge of perforations applied to fashion and lifestyle accessories, bringing a fresh appeal to everyday items. Many luxury brands have introduced perforated hides into this season's newest products, and today's perforations are all about creating modern textural effects and exciting, unique surfaces.

This trend for perforation is very appropriate to the aircraft cabin interior. Leather seat covers may smack of top performance and luxury, but some can be uncomfortably hot for the long-haul passenger. Breathability, enhanced through perforation, can improve passenger comfort, create a spirit of indulgence, and at the same time promote an airline's brand values and support its unique identity. Furthermore, in the automotive industry it is already widely acknowledged that perforated hides add value to purchase price by a considerable amount, protecting your investment.

Bespoke perforations can be used all-over to create a new textural surface, or used with restraint to accentuate the curving line of a junction between surfaces, or to create focus on a special detail. No longer do perforations need to be round! Dots become lines, lines become geometric shapes, and spacing and grouping become key. Add some clever intricate stitching lines in more than one color and you'll be onto something that can really make your cabin stand out. Backing the perforated areas with a contrasting color creates added visual impact.

PERFORATIONS CAN BE SEEN TODAY ON EVERYTHING FROM CHRISTIAN LOUBOUTIN BROGUES TO WATCH STRAPS. STUDS CAN EVEN BE ADDED FOR EFFECT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BRILLIANT IDEAS

HOW COULD LIGHTING ENHANCE THE IN-SEAT EXPERIENCE FOR LONG-HAUL BUSINESS CLASS? GIVEN THE INCREASINGLY PRIVATE NATURE OF SUCH SEATS, AND A TREND TOWARD FURTHER PERSONALIZATION OF THE PASSENGER EXPERIENCE, WE ASKED LIGHTING EXPERTS HOW THE SYSTEMS SHOULD BE APPLIED

LED AND FIBER OPTIC LIGHTING IDEAS BY SCHOTT CAN IMPROVE AESTHETICS AND SAFETY

BEAUTY IN SMALL SPACES

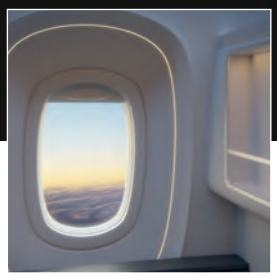
Modern business class seats have to fulfill a wide range of requirements, with some travelers wanting to be cocooned in an oasis of comfort, while others want a flying office space.

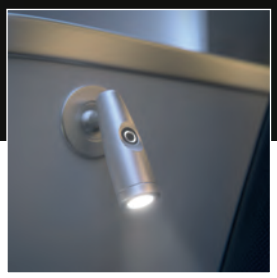
"In-seat lighting is a very powerful tool for guiding the transition between different seating situations based on individual needs as well as on an overall balanced lighting impression," says Andreas Uthmann, head of lighting and imaging marketing at Schott. "In particular, the combination of LED and fiber-optic technology enables in-seat lighting that is cool and clever. Colored contour lighting with side-emitting fibers make seat spaces such as armrests, toe kick areas and panels look nicer and add safety.

"Fiber-optic spotlights can be placed into seating, even when space is very limited, by using the full scope of a modern LED lighting engine. This allows for very individual in-seat lighting solutions that are both functionally and aesthetically sound."

The market for commercial aircraft interiors lighting is predicted to grow at a CAGR of 5.56% from 2018-2023

Research and Markets





Multi-tasking lighting

"Lighting works best when it has been tailored for the application," says Nigel Duncan, CEO of STG Aerospace. The challenge is that the cabin has to serve different people in different ways, and needs to perform a number of functions, from creating a relaxing ambience that enables passengers to relax, to making food look more appetizing, and providing bright and uniform light for reading, all while creating a restful environment for those sleeping."

Duncan believes that the solution lies in a human-centric approach to lighting, as applied in its liTeMood LED reading lights.

CONTROL AT HAND

"For long-haul flights, comfort is key and not having to think about other passengers' preferences is a luxury." This is the view of T J Pope, director of marketing for lighting at Honeywell Aerospace. "For this reason, lighting can be tied into the overall delivery of cabin management. For example, using a fully digital system can improve the in-seat experience by making use of touchscreen, discreet switches and handheld remote applications for personal devices. These features enable passengers to control lighting around their seats at the touch of a button, whether on a smartphone, laptop or tablet."

True harmony

"Individual lighting in seat monuments accentuates the ambience found in first class while also increasing onboard comfort. However the challenge comes in ensuring that the lighting of one seat does not affect the lighting of its neighboring seat," says Marc Renz , head of business development for cabin systems at Diehl Aerosystems.

"This demands particular skill during the design process. A comprehensive approach is essential: when designing seating, the lighting element needs to be taken into consideration right from the start. If not, then the only solution is the later integration of lighting elements into leftover spaces, rather than where it makes sense for the lights to be."

PRECISION ENGINEERING

"Individuality is becoming more and more important in the aviation business, and it significantly influences passenger cabin styling. While a lighting concept for the entire cabin creates an atmosphere of comfort and is indispensable to underlining an airline's branding, individual lighting is of at least the same importance," states Rolf Broelemann, from the lighting systems division of UTC Aerospace Systems.

The company has developed a range of ceiling and in-seat-mounted reading lights that are individually adjustable in terms of brightness and light beam. "Several years ago, our design engineers recognized how much scattered light can disturb neighboring passengers. Therefore, our reading lights feature a very sharp-edged light spot, reducing any reflections and stray light."

Asked about the ability to choose the color of lighting within the seat, Broelemann was not keen: "We recommend colored mood lighting only for large areas of the cabin, rather than as an individual offering. This avoids, for example, undesired color-mixing effects from passenger to passenger."

LUXURY LEARNINGS

Today's long-haul business class is often influenced by automotive design. For its new flagship A8 model, Audi's design team paid particular attention to the reading lights for passengers in the rear, the result being what they call the matrix LED reading light and "a small technical work of art that transfers classic Audi precision into the digital world".

The module consists of seven white LEDs on each side of a black panel, with light guides taking the form of flowing lines. Passengers can configure the lighting using a handset, with which they can set the brightness to preset levels, or dim it to their individual tasted via a slider that extinguishes up to eight of the 14 LEDs. Each LED can also be dimmed individually. The size of the light cone can also be adjusted, whether enlarged, reduced or offset.

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ETIHAD HAS USED SOME FANTASTIC LIGHTING IN ITS A380 FIRST CLASS LAVS

Natural choice

"LEDs with a high color-rendering index make high-class cabin interior materials such as precious veneers and leather, executive carpets and wall coverings look very natural. They also improve the appearance of human skin tones," states Rolf Broelemann from the lighting systems division of UTC Aerospace Systems.

The company has implemented this thinking into the design of its business jet cabin lighting products, including general illumination ceiling and sidewall wash lights featuring a high color-rendering index.

"This is especially critical in bathrooms. When refreshing at the end of a long flight, passengers can see themselves in a very natural light and can, for example, make the right choice for their make-up without running the risk of applying too much. The same principle can also be used for mirror lights."

BRIGHT AND FRESH

Discussing the lighting of lavatories, Marc Renz, head of business development for cabin systems at Diehl Aerosystems believes the overall ambiance of the passenger cabin should be harmonious.

"Lighting is a very important factor when it comes to creating a harmonious cabin. If the door to the hygiene compartment is open, the internal lighting of the compartment needs to complement that of the rest of the cabin, for example by mirroring the colors and tones. This also has the added advantage of bringing branding accents into lavatories," he states.

"The lavatory is a very private room – often the only possibility of a little bubble of privacy for passengers on long-haul flights. So the passenger needs to feel comfortable in this area, while also not remaining too long in the space – after all, there are several other passengers on board who will also need to make use of the facility.

"A high-quality, warm white light with a good spectrum [similar to sunlight] ensures that the passenger's reflection in the mirror appears as it does in the mirror at home. However, a brighter, cooler light in the lavatory makes the lavatory appear a little bit larger and gives a greater appearance of cleanliness. After all, hygiene is a very important subject – both in terms of reality as well as perception."

Color matching

Research conducted by Rockwell Collins shows that there is a correlation between cabin lighting and mood. This thinking is factored into the company's lighting products, and now with LED lighting, lighting can be fine-tuned for all aspects of flying.

"In lavatories, there is opportunity for moving away from the bright white light present now. A step has been taken in that direction with cabin-matching lighting when the lavatory doors are open, so that seated passengers' environments are not disrupted," states Steve Scover, vice president and general manager, lighting, interior systems at Rockwell Collins.

TOP TIER EMIRATES PASSENGERS LEAVE THE A380 FEELING GREAT, PARTLY DUE TO THE SHOWER, PARTLY DUE TO THE LIGHTING

TRUE REFLECTION?

A company in California is selling a lie, but a lie that could leave some passengers feeling better about the passenger experience. By adding a gentle curve to the mirror glass, the company believes it can make people look about 10 lb (4.5kg) thinner – which can be good for self esteem, or indeed for sales if hung in a shop's fitting room.

"When I first saw my reflection in the prototype, I felt a surge of energy. The slimming effect was subtle, but most importantly, it was believable. I stood up taller, felt more attractive, and all the areas of concern with my body that I had before didn't exist anymore. For the first time in a long time, I actually liked what I saw in the mirror," states Belinda Jasmine, founder of The Skinny Mirror.

It may be slightly dishonest, but it could make passengers feel better about themselves, and more positive as they leave the flight to start their day.

TRUE TO LIFE

"Modifying the mood of the lighting within the bathroom can provide the environment desired by the airline, whether it is a cool lighting scheme to provide a more clinical environment, providing a high level of blue light to wake passengers prior to landing, or a warm scheme to keep passengers relaxed on a night flight," states Dr Sean O'Kell, director of innovation at STG Aerospace (left).

"Or high-quality color rendering can ensure that skin tones are accurate and colors are presented correctly, for example when applying make-up [poor lavatory lighting is a common complaint from female passengers]. A high quality, simple LED system can do all of these things by tailoring light to make people feel warmer, fresher and true to life."

EXPANSION LEADS TO INNOVATION

Sekisui SPI's growth strategy is focusing on creating new aircraft interior design opportunities for customers

The aviation industry is flying high, and Sekisui Polymer Innovations (Sekisui SPI) is on top of the trend with a major expansion of its headquarters in Bloomsburg, Pennsylvania. The company is investing in its plant and its people at a rate unmatched in the thermoplastics industry, including a custom aviation-specific extrusion line that will begin operating on its South Campus in the new year.

"The power of Sekisui SPI is the power of innovation," says aviation market business manager Ben Smalley. "We've been a leader in aviation interiors, but that doesn't mean we can relax. Continuing leadership means investing in our organization and our customers."

Sekisui SPI's second aviation-specific production line is being installed, not only in anticipation of market growth, but also for new products and materials.

"Continued expansion with another specialized aviation production line will enable us to deliver products that meet higher aesthetic demands, with more unique materials – products that aren't even on the market yet," says Smalley.

"The goal is to give our customers more options, and more design freedom. Designers will have an expanded portfolio of available materials," Smalley adds. "This will open up their palettes and let them push what's possible in interiors. It's an exciting moment for the industry."

One of Sekisui SPI's growth areas is Infused Imaging, winner of a 2016 Crystal Cabin Award, a proprietary technology that delivers opportunities for bespoke designs and branding.

"We're doubling our Infused Imaging capacity, and we have the ability to quadruple it if needed," explains Smalley. "The additional custom Infused Imaging line will allow us to meet increasing market demands and improve lead times."

Another development is the increased collaboration with materials companies. The company has been exploring bonded build-up techniques with leather, fabric, foam and carpet manufacturers, making it easier to combine materials in new ways. Sekisui SPI is working with these partners to ensure flammability and certification requirements are met when materials are combined.

That focus on collaboration is showcased in Sekisui SPI's hands-on labs, where its experts work directly with customers on product innovations. In the DesignLab they experiment with colors, textures and patterns to give customers more choices. In the FSTLab, products are made safer, more sustainable, and compliant with industry regulations.

"You'll be hearing about a truly groundbreaking innovation in 2018 – the AppLab," says Smalley. "It's still in the development phase, but we're excited to introduce another customer-focused resource that will be an incubator for new ideas. This is a great example of how committed we are to collaboration. It's such an important part of who we are, and how we've succeeded."

Concludes Smalley: "Our ultimate goal is to make our customers heroes by giving them the tools to innovate. This expansion is about serving customers better by providing the resources to think and design differently."

Sekisui Chemical Group is celebrating its 70th anniversary this year

1. THERMOFORMED KYDEX THERMOPLASTICS PARTS FEATURING INFUSED IMAGING

2. A WOODGRAIN PATTERN MADE WITH KYDEX THERMOPLASTICS AND INFUSED IMAGING

3. SEKISUI SPI'S SECOND CAMPUS IN BLOOMSBURG, WHERE IT CONTINUES TO EXPAND

BRIGHT FUTURE

Having secured DOA from EASA, STG Aerospace is investing in its product development capabilities

Design Organisation Approval (DOA) from EASA is part of STG Aerospace's continuous growth strategy, and is also core to the company's philosophy. The EASA DOA puts STG Aerospace in control of its own destiny by extending its in-house capabilities to further streamline its product development process, meeting and exceeding customer expectations.

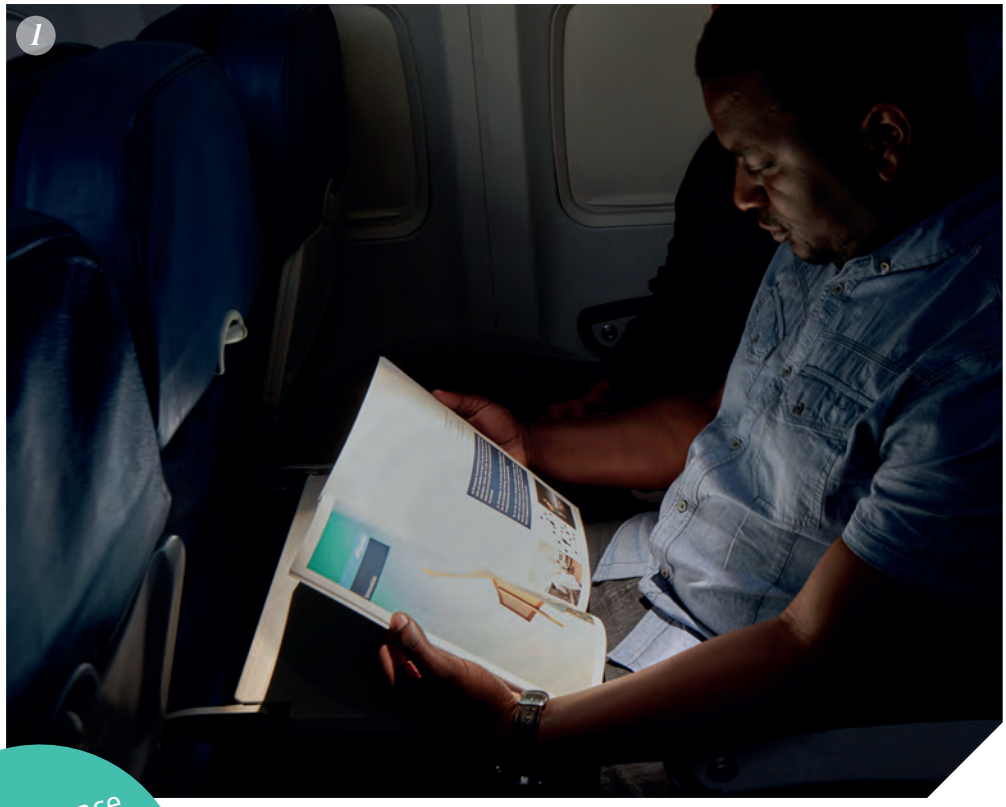
"Take saf-Tglo blu and liTeMood LED reading lights as our latest examples," says Dr Sean O'Kell, director of innovation and EASA DOA head of design at STG Aerospace. "From the initial concept generation, we have complete control of the design, development, manufacturing and certification process, without any reliance on external DOAs. Both products are now award-winning innovations that are EASA and FAA approved, delivering passenger benefits across multiple airlines around the globe.

"It is unusual for a company our size to have EASA DOA/POA and FAA PMA status, along with our AS9100 and ISO 9001 quality approvals – it gives us a distinct competitive advantage," adds O'Kell.

He heads up Innovation and DOA activities at the company, so he is uniquely placed to understand the capability and approvability of new product ideas, and is supported by teams of senior research and development scientists and senior certification engineers.

With many new innovative cabin lighting technologies continuing to develop and emerge in both LED and photoluminescence, STG Aerospace sees protecting its intellectual property rights as core to the business future. Over the past five years, STG Aerospace has doubled the number of internationally approved patent families for new product innovations, a trend that is set to continue in the coming years.

As a Tier 1 supplier to Boeing since 2000, STG Aerospace has won a number of supplier awards in recognition of its high-performance aircraft cabin lighting technologies. This year, STG Aerospace won its eighth consecutive Boeing Performance Excellence Award, reinforcing the company's position as a trusted advisor within the lighting arena, whether it is related to STG lighting products or not.



STG Aerospace experts share their thoughts on lighting on p99 and p104

1. THE LITEMOOD LED READING LIGHT MINIMIZES LIGHT SPILL INTO NEIGHBORING SEATS

2. DR SEAN O'KELL DEVISES MANY TECHNOLOGIES IN STG'S IN-HOUSE LABORATORIES

LOVE CONNECTION

Astronics' new aircraft connectivity solutions keep passengers and flight crews connected and informed

Connectivity to avionics data gives airlines valuable insight

While passengers enjoy rich seat upholstery, personal lighting, and the other comfortable appointments of an aircraft's interior, behind-the-scenes technologies support a safe and pleasurable journey. Among them is connectivity. Whether passenger or crew, staying connected is critical in today's competitive airline industry.

Astronics is working to enhance both passenger and crew connectivity with a fresh look at new technologies, and has recently rolled out two new products. "Over the years we've developed several technologies for our customers to incorporate in aircraft connectivity solutions," said Peter Gundermann, Astronics Corporation's CEO. "We continue to invest strategically in connectivity product development to provide value to this growing market and customer base."

IMPROVING CONNECTIVITY FOR THE AIRCRAFT

Next-generation Ku-band high-throughput satellite (HTS) networks will rely on spot-beam technology for connectivity, providing faster, more seamless connections than those offered by conventional wide-beam technology. To help aircraft take advantage of these advancements, Astronics AeroSat – the connectivity subsidiary of Astronics – recently launched the FliteStream F-310 fuselage-mount satellite antenna.

The antenna provides Ku-band HTS connectivity with new technology that minimizes service interruptions when switching from beam to beam during flight. Coupled with Rexolite lens technology, this sensitive and spectrum-efficient antenna excels at maintaining low-angle satellite coverage while flying at higher latitudes. It is also compliant with RTCA/DO-160 and RTCA/DO-178.

Matthew Harrah, president of Astronics AeroSat, explains, "The evolution of our fuselage-mounted antennae for commercial and VVIP aircraft illustrates Astronics' focus on providing industry-leading airborne connectivity solutions. We are offering an improved user experience for inflight connectivity that bridges the gap, to match the wi-fi performance that passengers experience at home and work."

CONNECTIVITY MATTERS

Meanwhile, connectivity to avionics data provides airlines with valuable insight into the performance of their fleets. Gaining access to existing aircraft data empowers flight crews to improve situational awareness, gives passengers an optimal flight experience, and reduces operational costs.

Astronics Ballard Technology – the company's avionics division – recently introduced a unique device, the webFB, to enable connectivity to avionics data simply, safely and securely. Ultra-compact, the webFB fits in the palm of the hand yet incorporates the capabilities of both an aircraft interface device (AID) and a wireless server. Using a wireless connection to portable electronic flight bag (EFB) tablets, the webFB delivers important data to the crew's fingertips.

Along with FAA approval, Astronics recently received EASA, Transport Canada and DGAC Mexico approval for the use of the webFB on Boeing 737s.

Jon Neal, VP and general manager of Astronics Ballard Technology, adds, "This approval is exciting because the webFB is a game changer in terms of size, cost and ease of installation. With the webFB, a fleet-wide upgrade can be completed in days rather than years, enabling airlines to realize benefits immediately."

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BOLD IDEAS

2017 has been a huge year for Aviointeriors, featuring organizational restructuring, engineering challenges and ambitious designs

Ermanno De Vecchi was appointed as the new president and CEO of Aviointeriors in 2016 with a view to restructuring the organization and managing its growth. A program of change is now underway; its implementation enables Aviointeriors to grow and adapt to the ever-changing seating requirements of airlines and OEMs around the world.

The latest development at the company is that it is reviewing how it can provide optimal product support to its growing customer base, with a fresh new approach being applied to how Aviointeriors tackles and improves spares delivery performance, technical support, in-service refresh kits and distribution channels. The team is also looking at creating partnerships within its supply chain, taking the opportunity to expand the number of parts that are outsourced and to better manage delivery to help ensure that the build dates in the production schedule are met.

Product development is a constant process at Aviointeriors, with new design ideas being generated all the time to support the growing needs of the aircraft interiors industry. In 2016 the company launched the Columbus C4 economy plus seat for wide-body applications based on the successful Columbus C3 seat. The C4 – suitable for pitches starting from 36in to 40in – offers improved comfort compared with the C3, with a greater degree of seat recline and the addition of a leg rest.

Another major product for the company is the Adagio high-density business class seat, which was designed in cooperation with Tangerine in 2016. The seat offers B777 and B787 operators eight-abreast configurations, with 100% direct aisle access, and with all seats offering a fully flat bed function. Add more pitch and some doors, and the seat can also be offered as a first class suite. Adagio can even be used as a premium economy seat by reducing the pitch and adjusting the seat positioning.

Visit Aviointeriors at Stand 5A30 at Aircraft Interiors Expo 2018

Aviointeriors is also continuing the development of a new super first class suite, based on its Mona Lisa first class seat platform. The design team intends the suite to offer a combined bed and seat solution in one suite in a 1-1-1 layout for a typical B777 configuration.

Aviointeriors has been established as a manufacturer of seating products since 1972, with more than 85% of all manufacturing being undertaken in-house. This scenario will change as the company develops into an assembly plant for seating products and as it grows its supply chain globally to support seat assembly plans in the future. The use of strategic partnerships with suppliers will also increase, as will the company's involvement with robotic technologies for optimizing seat assembly.

Furthermore, Aviointeriors has drawn up a manpower plan, outlining the number of engineering, production and quality staff required to meet the expectations of its 2017 operational plan.

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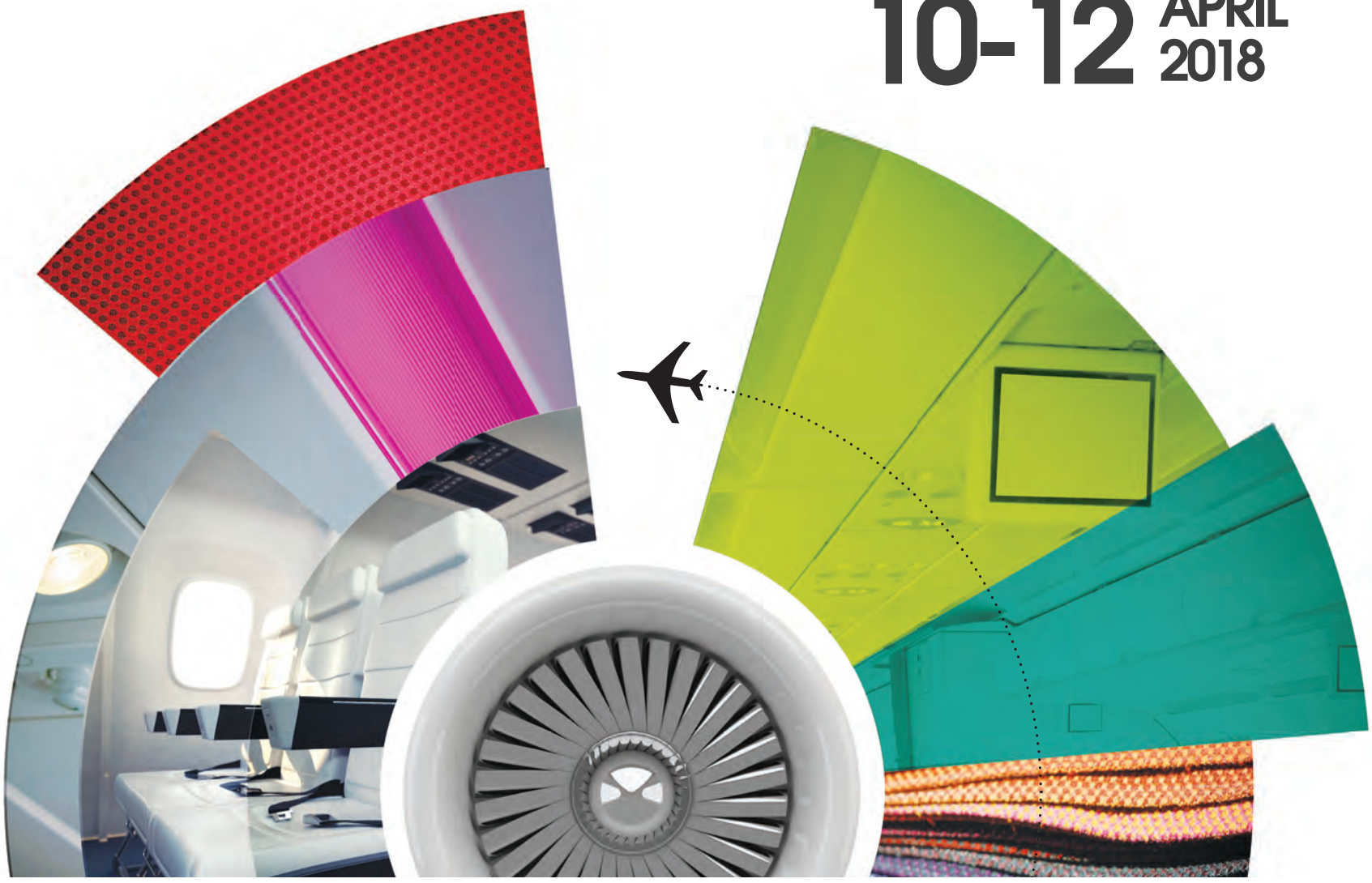

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A WALK IN THE CLOUDS

Lonseal is introducing a new aircraft flooring collection that can add a feeling of quality and serenity to aircraft cabins

Visit Lonseal at Stand 6A93 at Aircraft Interiors Expo 2018

1: THE AXIS COIN-STAMPED FLOORING COLLECTION

2: THE MIRAGE COLLECTION OF WOVEN-STYLE DESIGNS

3: REALISTIC WOOD EFFECTS WITH THE CIRRUS COLLECTION

4: THE ZEN-LIKE HALO COLLECTION

Lonseal has provided the aviation industry with unparalleled products and service for over 45 years, leading to the company becoming a leader in resilient vinyl flooring. 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.

The Lonseal Aircraft Flooring Collection is a selection of the company's most popular products, specifically geared for aircraft use. Some of the features to be found in the collection are additional colors, 6ft- and 8ft-wide roll availability, and REACH compliance. All product lines in the collections meet FAR 25.853a and FAR 25.793, and the Loncoin II Featherweight product meets Boeing D643A504.

Lonseal became a leader in the aviation industry when it decided to rise above conventional standards of aircraft flooring and launch its Featherweight formulation, which is more than 30% lighter than standard NTF aircraft products. The light weight and high strength-to-weight ratio of this aircraft flooring material is often specified by cabin designers and aircraft manufacturers. Lonseal's aircraft-standard products were specifically designed to support the increasing demands of today's aircraft industry.

The Lonseal Aircraft Flooring Collection became available in June 2017, with a distinctive selection of embossed and smooth designs in four collections: Axis, Cirrus, Halo and Mirage.

AXIS COLLECTION

Axis is an embossed product collection featuring differently scaled coin stampings that provide a variety of choice in terms of color and design options, as well as outstanding traction, which aids in reducing the risk of slipping. The Axis Collection consists of the Loncoin II Featherweight, Lonpolaris, Loncompass and Lonequator products.

CIRRUS COLLECTION

The Cirrus Collection comprises a variety of realistic wood effects. From the intricate grain details to the unique characteristics of real woods, Lonseal creates flooring that is luxurious in style and delivers high performance and quality. The Cirrus Collection provides the timeless beauty of wood, which can enhance the aesthetic environment of an aircraft cabin space.

HALO COLLECTION

The Halo Collection is a series of urban, earthy, raw designs that can make aircraft cabins a more relaxing, inspiring and beautiful environment. The natural look of the collection is inspired by Japanese Zen principles, to reflect balance, harmony and relaxation. The color scheme of the Halo Collection incorporates organic accents and creates an emotionally satisfying inflight experience.

MIRAGE COLLECTION

The Mirage Collection features woven-style designs that give a classic, timeless touch to any aircraft space. An abstracted take on fabric, the Mirage Collection's hue variations and slightly stubbled texture provide a sense of strength and durability.

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LITTLE LUXURIES

Formia is introducing the Lalique luxury brand to Singapore Airlines' first class passengers

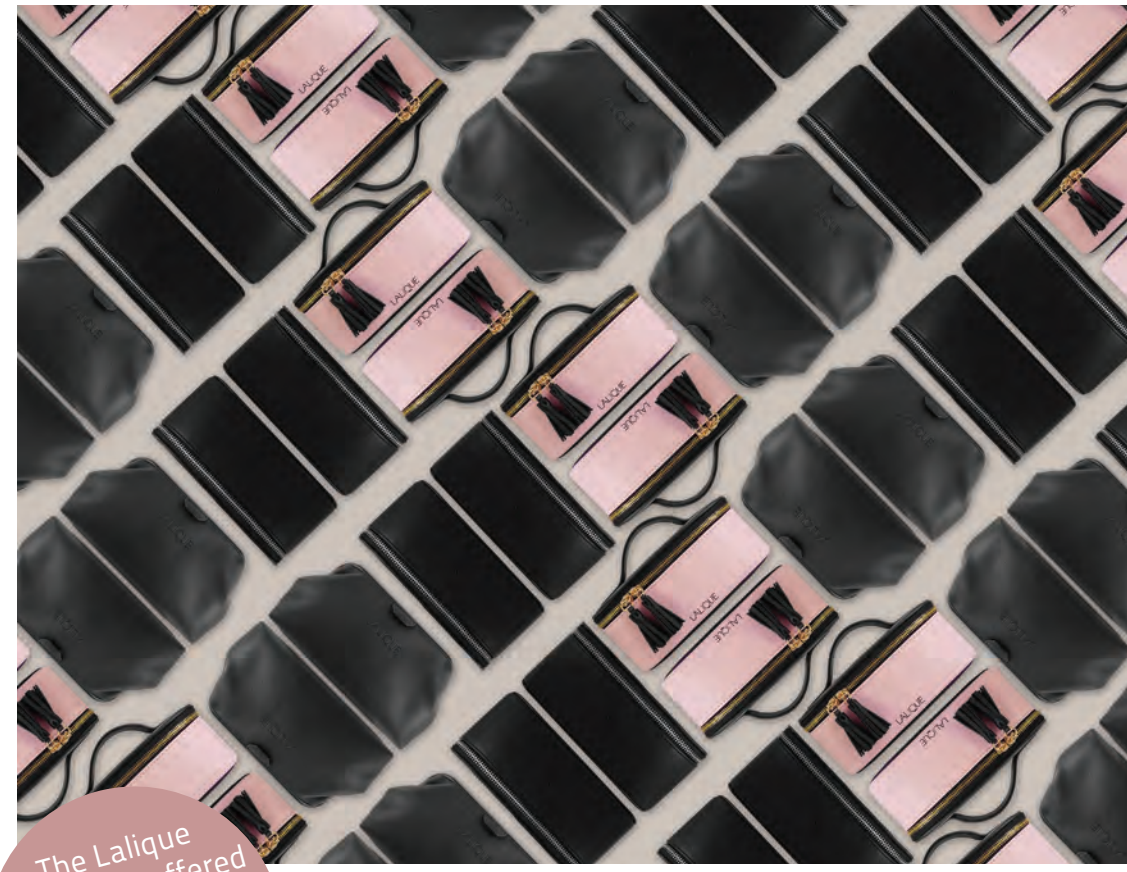
International guest amenity and hospitality specialist Formia has entered into an agreement with new customer Singapore Airlines to supply luxury onboard amenity kits for the indulgence of the airline's First Class passengers.

Under the terms of the contract, Formia will bring a range of high-quality, Lalique-branded bags onboard Singapore Airlines flights, individually designed for male and female travelers.

Bearing the Lalique name and the brand's rondial birds logo, each bag will feature the latest in modern, discreet fashion aimed at delighting discerning travelers who expect the very highest levels of luxury, elegant style and quality.

The bags will contain a selection of cosmetic items from the Lalique range and some remarkable products from the brand's own collection.

Formia's managing director, Roland Grohmann, comments, "Naturally, we are absolutely delighted to welcome Singapore Airlines, one of the world's most respected airlines, to the list of our valued customers. This contract is an outstanding example of Formia's service 'sweet spot' in operation; with Singapore and Lalique, we have brought together two of the world's greatest luxury brands in a unique collaboration that beautifully reflects both companies' approach to matchless quality and customer delight. That is what Formia specializes in, and this announcement exemplifies our approach, which places top priority on the pleasure, comfort and delight of our customers' passengers."



The Lalique kits will be offered to passengers in the airline's new A380 Suites: see p9

1. THESE DISTINCTIVE AND HIGH-QUALITY KITS CAN BE KEPT AS A STYLISH MEMENTO OF A FANTASTIC SINGAPORE AIRLINES FLIGHT

ABOUT FORMIA

Formia offers the travel industry a full range of quality, bespoke amenity kits, bags, cosmetics and comfort items, as well as tailor-made inflight service concepts. Over the past three decades, Formia has forged a unique product expertise in working with hotels and airlines. The company operates globally and brings a professional and distinctive approach to premium guest and inflight service amenities.

Formia's partnerships with luxury brands focus on identifying the most profitable strategic fit, providing the client brand with more visibility and impact – and consequently adding value to the airline's proposition.

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HELPING HAND

A new lift-assist mechanism for overhead stowage bins can improve safety and comfort for passengers and crew

A load-sensing passenger overhead stowage bin lift-assist mechanism has been developed by ITT Enidine. It is fully mechanical and automatically engages when the weight of luggage placed in the bin exceeds the 11.3kg (25 lb) of force that a person would have to exert to close the bin. The mechanism is designed in such a manner that it does not require flight attendant or passenger interaction to engage the lift assist, relying solely on the weight of the contents of the bin to activate lift assist. The lift assist will then automatically disengage when the weight removed from the bin results in the force required to close the bin dropping to less than 11.3kg.

"This product is what the industry has been asking for, for a long period of time, and we're proud to be the first company to bring it to the market. With our more than 30 years of experience in stowage bin rate control and actuation, we know our product will provide the results our customers expect and passengers deserve", says Ryan Evans, aerospace product manager for ITT Enidine.

The load sensing lift-assist mechanism can be engineered to suit specific aircraft overhead bin applications, depending on each specific customer requirement and within certain bin geometry constraints.

ITT Enidine designs and develops innovative products for the aerospace market; engineering technologies that operate reliably and efficiently. These products help increase flight operations and enhance the passengers' inflight experience. The company continues to expand its customized product offerings with new technologies.

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EVERYTHING FROM ONE SOURCE

How can manufacturers of premium economy seats source high-quality leather armrests economically?

As an experienced supplier of tray tables, PUR armcaps and leather-covered armrests for aircraft seating, Ebco offers armrest assemblies according to customer specifications, using its own special flame-retardant foams.

Ebco supports many manufacturers of aircraft seating with their planning requirements, by providing all components from a single source.

The company has manufactured leather armrests since 2006. Ebco is responsible for everything from the armrest structure and specially developed flame-retardant PUR foam, right up to the high-quality leather processing.

Workmanship quality with perfect seams and an eye for even the smallest detail means Ebco can supply even low batch sizes economically.

With its armrest production carried out in line with customers' individual wishes, Ebco is able to offer passenger armrests with good damping features and comfortable haptics. The perfect combination of foam with the excellently processed leather guarantees a long operating life.

To avoid leather defects during the production process, Ebco places a focus on the incoming inspection of leather by means of a specially developed test device. This approach means that defects will be detected prior to production – defects which otherwise would be visible only after completion of the production process.

The PUR foam used for the armcaps is manufactured in-house, which enables Ebco to adapt and optimize the design of the armcap for being covered with leather during the development process. Ebco's PUR meets aviation standards ABD0031 and FAR 25.853b.

Customers benefit from well-trained Ebco specialists with many years of expertise, who provide substantial support, from the planning phase until the serial delivery.

"Leather armrests represent the exclusivity and unique comfort of our portfolio, rounding off our range of high-quality tray tables and PUR armrests", says Hanspeter Ebner, CEO of Ebco.

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CLEAN COVERINGS

There are many benefits to using E-Leather – and not just for the environment

This has been a landmark year for E-Leather, as it celebrates 10 years of recycling traditional leather waste through its unique clean technology process to create high-performance leather fiber composites.

Since starting production in 2007, E-Leather has helped save the sending of more than 5,000 tons of traditional leather waste to landfill sites – equivalent to the weight of over 100 narrow-body aircraft. Sustainability is at the core of the E-Leather philosophy and is demonstrated through a number of environmental measures, including the 100% zero-carbon electricity used in its production process, as well as recycling 95% of the process water and converting the waste streams into energy, which is fed back into the process.

The attributes of E-Leather, including enhanced durability, light weight and low maintenance (without the need for often harmful cleaning chemicals), means that customers can benefit from an efficient and long-lasting material that doesn't cost the earth.

An independent study, carried out by environmental consultancies Oakdene Hollins and PRé Sustainability, identified that the use of E-Leather over traditional leather materials has a lower impact on the environment – often more than 90% lower. This study looked at a number of metrics, including global warming potential, non-renewable resource use and agricultural land use.

E-Leather has received awards and recognitions for its contribution to sustainable manufacturing and clean-tech innovation. The company has been nominated for three awards in 2017, including a Global Cleantech 100 Award for the third consecutive year, and the ACM Greener Pathways Award for zero waste to landfill.

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If you're quick, you can try out this design classic on Qantas's A380s before they are replaced in 2018 (see p24)

Qantas SkyBed

In 2001 Qantas was looking to make its international flat-bed business class completely different from anything else in the sky, and as a sign of its commitment, had earmarked A$385m (US$295m) to realize this ambition. The airline had also invested in securing a serious Australian talent for the project, in the shape of global design superstar Marc Newson.

Newson's international client list means he is a frequent flyer, something he felt he did not have in common with aircraft seat designers: "I found the people who design the seats are people sitting at their desks. They might go on holiday once or twice a year, but that's probably all the air travel they do."

This combination of first-hand experience of the design shortfalls of aircraft seating, combined with a sharp eye for detail and an unswerving commitment to achieving it, made Newson a great choice for Qantas, and a challenge for suppliers.

Newson finally had an opportunity to fix many of the shortfalls he perceived in aircraft seating design, and started from a base of three focus points: privacy, comfort and flexibility. Thus his idea was for a seat that offered an open space in the upright position, with a sliding screen between seats for privacy, if wanted. In bed mode, the head moves inside the cosseting cocoon of the fixed seat surround, shielded from noise and movement in the aisles, creating a feeling of warmth and security that is conducive to better sleep.

B/E Aerospace was the seat manufacturer for the project, and while Glenn Johnson, the company's head of industrial design, has an eye for detail, he admitted he was pushed by Newson's quest for perfection.

QANTAS STILL WORKS WITH MARC NEWSON (BELOW) AND FELLOW AUSTRALIAN DESIGNER, DAVID CAON

"His fastidiousness is astonishing – Newson once worked as a jewelry designer in Japan, and it shows. Every tiny piece had to have a certain look. Even the coat hook on the back of the seat is finished in brushed aluminum," said Johnson at the time.

Newson scrutinized the color and texture of every surface, and ensured haptic pleasure and long-term durability in areas such as the side-mounted literature pocket latching mechanism and cocktail table through the specification of solid machined-aluminum, which was cycle-tested 50,000 times, just to be sure.

To further increase the workload, optimizing the LOPA for the fuselage meant that a number of seats required specific parts, requiring the design and manufacture of eight different armrests and four different center consoles. Naturally this all pushed up costs, but for its routes, Qantas felt the functionality and reliability were worth paying for.

Newson was clear in his vision for the seat, and when the first units were installed in a three-class B747-400 in September 2003 he was satisfied to see that the final design had not suffered any great level of compromise during the development phase – although the bed was not quite as horizontal as he had envisioned.

"Ultimately I want it to be timeless," said Newson of the seat. "I think it's one of the very first airline seats to have been consciously designed."

The SkyBed is now coming to the end of its life, having flown millions of passengers millions of miles on board B747s, A330s and A380s in style and comfort. Many airlines can boast luxury, but not many can boast that they have commissioned a design classic.

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