Aircraft interiors INTERNATIONAL

SEPTEMBER2014

THE INTERNATIONAL REVIEW OF AIRCRAFT INTERIOR DESIGN AND CO

theIFEissue

A SPECIAL IFEC FOCUS, FEATURING EVERYTHING FROM BEAM CONDUCTORS, TO NEW IDEAS FOR CONTENT AND FUTURE HARDWARE SYSTEMS

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A GLIMPSE INTO THE MODULAR AND FLEXIBLE CABIN BEING DESIGNED FOR THE 2018 EMBRAER E-JET E2

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INSIGHT INTO TECHNIQUES FOR VALIDATING CABIN PROGRAMS TO HELP ENSURE DESIGN SUCCESS

AIRCRAFT INTERIORS EXPO AMERICAS AND APEX EXPO SHOW ISSUE

STAYING CONNECTED

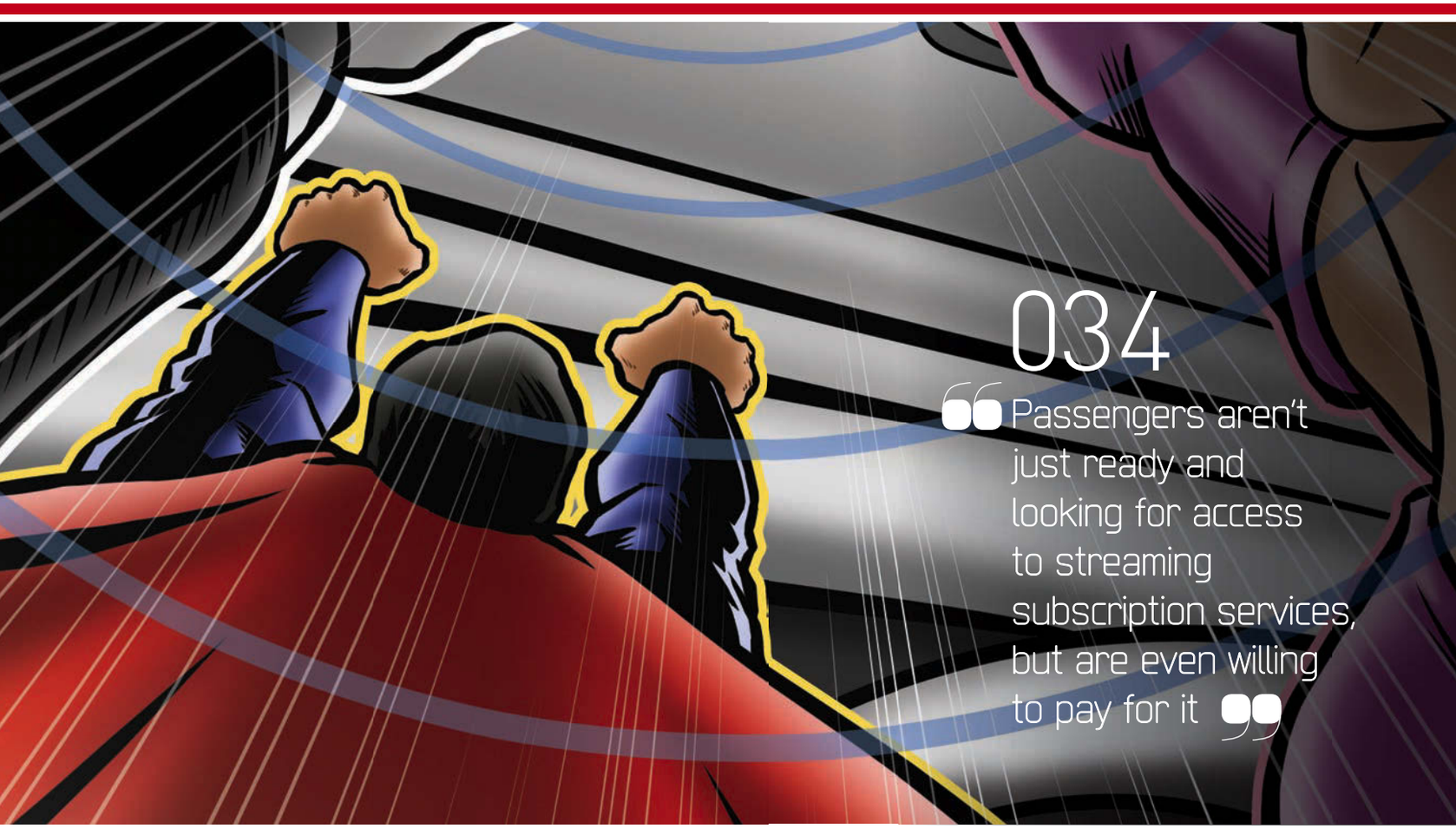
The RECARO innovation BL3530 for the economy class

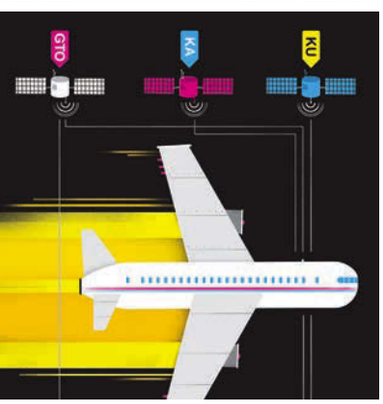
Ingenious design: The new BL3530 combines the outstanding comfort of the successful predecessor with innovative solutions which facilitate the handling of personal electronic devices. Its ingenious design enables ideal ergonomic positioning of all standard-sized tablet devices with an optimal viewing angle. A new pocket for stowing as well as an integrated power supply for charging electronic devices are also provided.

Outstanding comfort: New comfort cushions, a movable headrest, a cup holder and fabric and leather dress covers complete the seat's comfort features.

Less weight: Thanks to design optimizations, the BL3530 weighs just over ten kilograms per seat. In conjunction with its slim, space-saving backrest, the seat enables high-density layouts with pitches from 28 to 34 inches and contributes to reducing fuel consumption and emissions. With its additional emphasis on simplified maintenance and minimized life cycle costs, the BL3530 is the best choice for short- and medium-haul flights.

inthisissue





people'schoice

Whether via L-band, Ku-band, Ka-band, ATG or GTO, or any other means of connectivity to be found along the electromagnetic spectrum, one thing is for sure: airline passengers have never had so many opportunities to become connected during flight. In this issue we explore some of the latest developments in inflight connectivity, from beam conductors, to the resurgence of terrestrial networks for bringing broadband to the cabin, to the possibility of connecting with your home entertainment provider. Some passengers bemoan the fact that a flight – until recently, a great opportunity to truly switch off from the online world – has been spoiled through the availability of email on board, as mundane terrestrial matters intrude at a rarefied 30,000ft.

Perhaps instead they should see this choice – indeed any choice – as luxury. Even in coach, connectivity gives the passenger another option for their space. For example, if they want to communicate with the office, they can treat their seat as a work environment; if they don't, then perhaps they will enjoy the flight all the more knowing they could connect with the office, but have instead chosen to take control of their flight time and make the experience theirs.

Choice is good. Choice is freedom (or at least a greater sense of freedom), and as you can see in the Halo first class concept on page 78, choice can create comfort. By allowing passengers to express themselves as individuals through the making of choices, they can feel comfortable even before sitting down as they have a sense of being in control of their immediate environment. However, the offer of too much choice can be stressful. Thus, to minimize passenger stress for travelers in Asiana's A380 first class suite (see page 106), the range of seat actuation choices offered on the top level of the GUI has been limited, but passengers have the option to explore the system options further. So the key is to give options, but not to overwhelm with options. The difficult part for airlines is the amazing range of interior options they themselves have to choose from, as you'll see throughout this issue. But that is a nice dilemma to have.

Adam Gavine, editor

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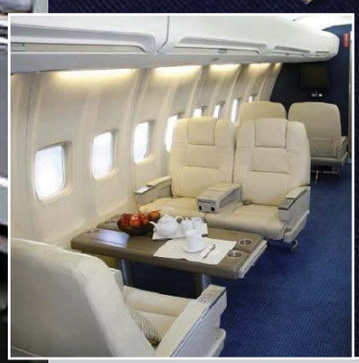

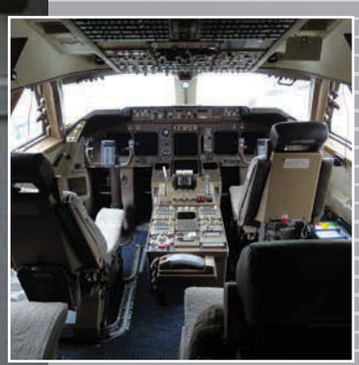

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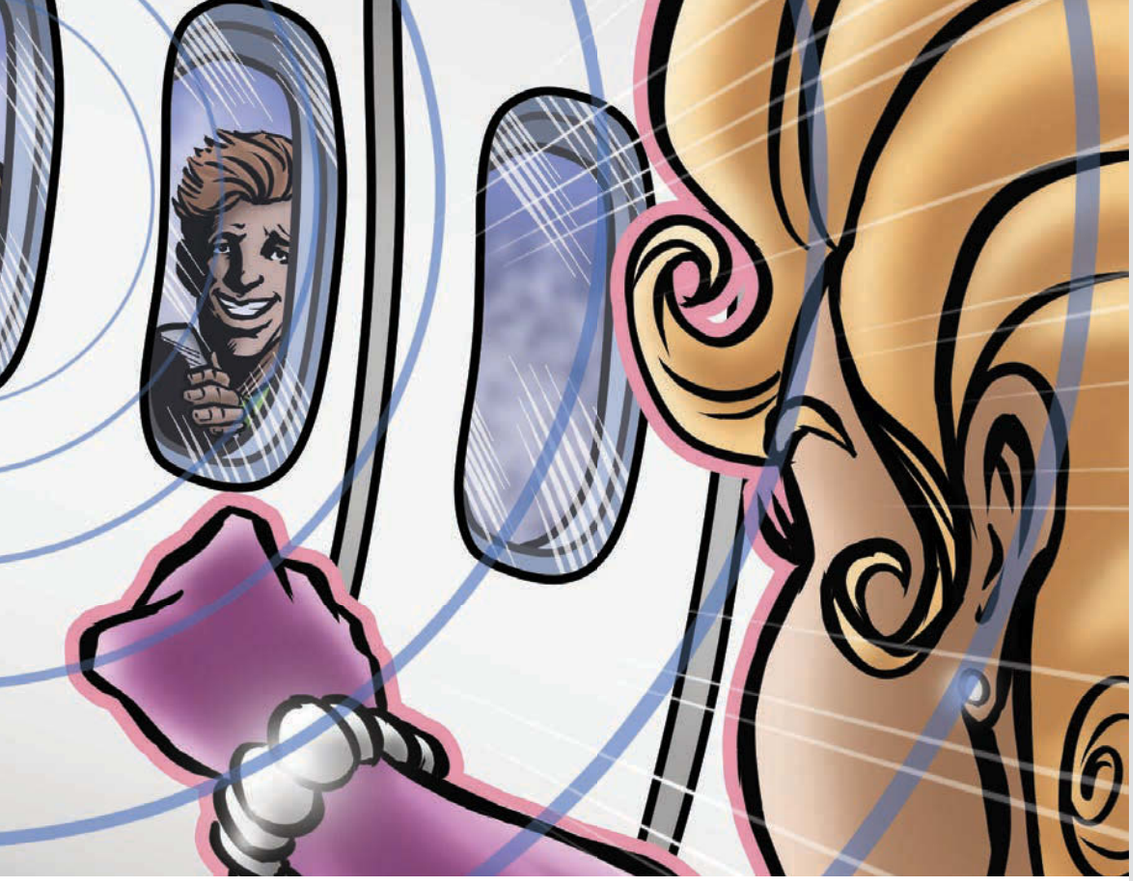

the team

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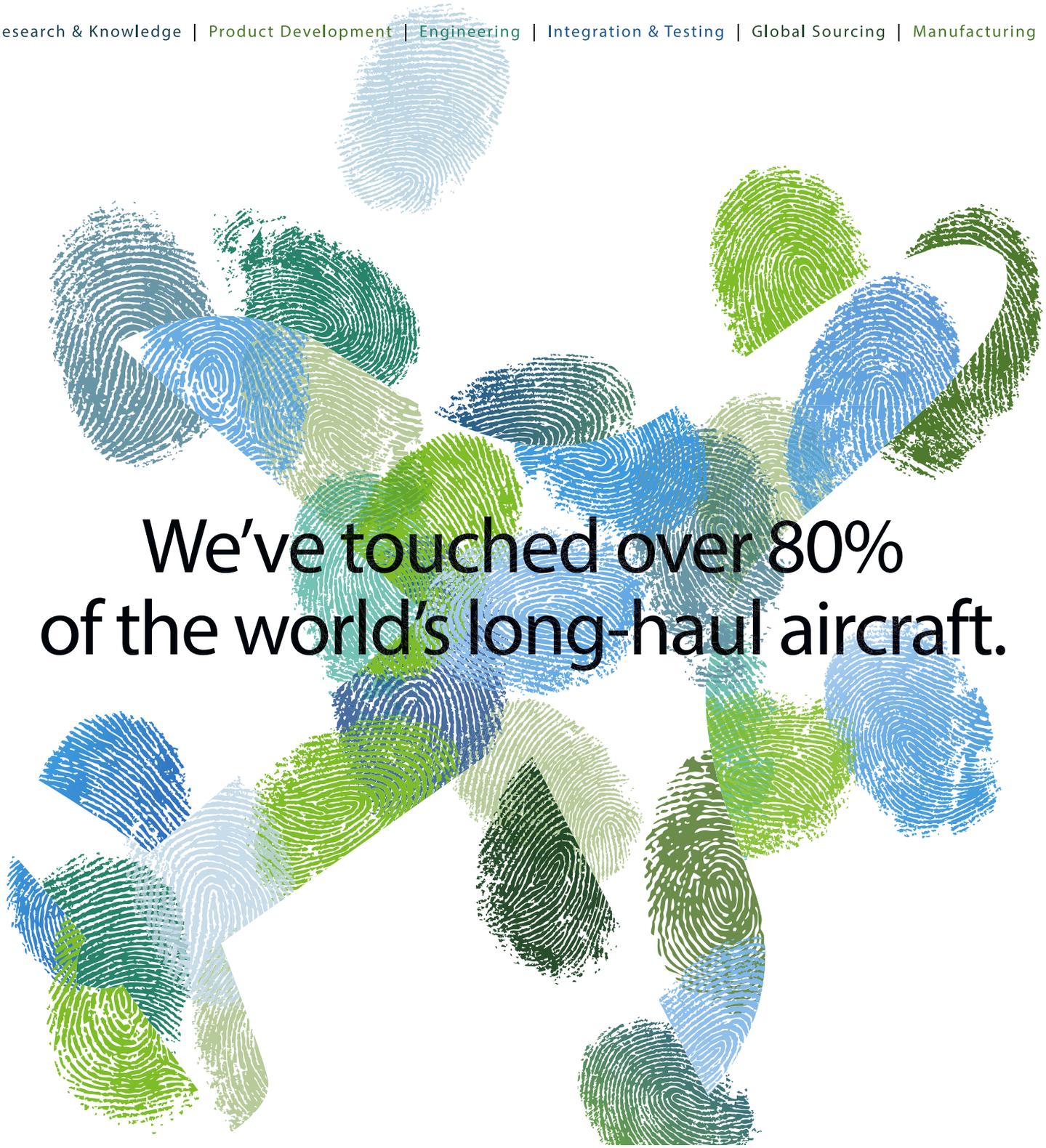

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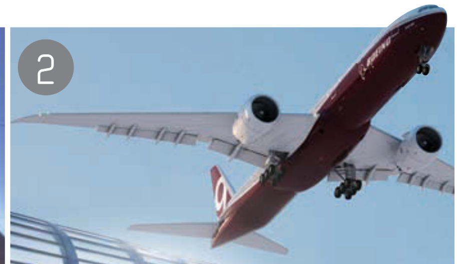

COLOR SCHEME

One of the features of the Dreamliner being carried over into the B777X interior is the color-controllable LED lighting system. However, according to Dennis Eng, director of the B777X interiors program, the capabilities of that system will be taken a step further. The design team recognizes that LED lighting is constantly advancing – not just in terms of color quality, weight and heat, but also in terms of adaptability – and it wants to ensure the B777X can be easily configured to accommodate new systems.

sevenheaven

The B777X will be the best Boeing ever, evolving the best of the B777 and the B787 interiors

Boeing says the cabin is 16in wider than the competition, and 18in seats can be fitted 10-abreast in economy

Design and development of Boeing's B777X, which is expected to begin production in 2017, is continuing apace. The aircraft has already accumulated 300 orders and commitments from six customers worldwide – including Emirates' record-breaking US$56bn order for 150 of the aircraft (with an option for another 50) – and so the industry is curious to see what the interior will offer. We spoke to Dennis Eng, director of B777X interiors, about the program. Although some engineering details are under wraps, such as how Boeing is achieving a cabin altitude of 6,000ft and larger windows in an aluminum fuselage, Eng did reveal some details about the interior and how it will "redefine the total passenger experience".

Eng explained that the interior – being created in partnership with Teague – will include elements from the B777-300ER cabin that have generated positive customer feedback, as well as many of the B787's comfort features, such as the lower cabin altitude and higher cabin humidity. However, the B777X interior will build on these proven ideas and will feature "an all-new cabin architecture", with a brand-new aesthetic and improvements in adaptability, configurability, ease of use and durability, in accordance with customer wishes.

Flexibility is a key feature of the B777X interior – a direct result of feedback from the B777-300ER program that customers want a simple process for configuring their interiors to suit their brand. "It's about how an interior can be customized to create a very different look and feel, but in such a way that reconfiguration doesn't become exorbitantly expensive. That is one of the concerns that has plagued some other twin-aisle aircraft in this category," said Eng.

Thus, the interior interfaces are being designed so that reconfiguration can be accomplished easily and smoothly, including an adaptable suite of parts for overhead ceiling and stow bin configurations, designed to allow airlines to create a distinct and separate feel for different cabins.

Other work confirmed by Eng includes some "very unique experiences for Door 2", extra sound insulation, and advances in LED lighting effects.

The B777X concept cabin in Seattle is currently undergoing a rigorous R&D process that involves passenger testing as well as customer feedback, the results of which are continuing to inform various elements of the cabin design as the interiors team approaches its configuration deadline in the second quarter of 2015.

01. The B777X cabin is shaping up to be the best Boeing passenger experience ever

02. There are two versions at present: the 400-seat B777-9X, and the 350-seat B777-8X. Production begins in 2017, with deliveries from 2020

LEFT IS RIGHT

Of all the B787-9 cabin features, one of the favorites for Victoria Bamford, the airline's aircraft interior manager, is the left turn upon boarding for premium economy passengers. "I'm excited about the opportunity this gives us because it means we can tailor the premium economy service so they have a separate galley and toilets from the business class customers. Also, the premium cabins are all forward of Door 2, which for me is a great configuration because it gives us the ability to really tailor and customize the services by class. Our premium economy passengers turn left: we all know what it means, and it's an old-fashioned saying, but it's nice."

blackbird

Some subtle changes have been made for the interior of Air New Zealand's striking black liveried Boeing 787-9

01. Air New Zealand sees the arrival of the B787-9 as the biggest event in its fleet since it introduced the B747 in 1981
02. The business cabin has its own galley and lavatories – as does premium economy
03. The Zodiac 5810 has been specified as the premium economy seat. Sadly connectivity has not been specified, the airline giving unreliable coverage on its routes as the reason

Air New Zealand, which is the launch customer for the B787-9, has taken delivery of the first of its 10 stretch Dreamliners, intended to replace its B767 fleet. The aircraft was delivered to Auckland on July 11, where it spent weeks being filled with passengers for virtual flights to evaluate the interior and perfect the service. The first commercial flight took place on 9 August on the Auckland-Sydney route, making it the first B787-9 commercial flight, although ANA did take its aircraft on a non-revenue flight over Mount Fuji on August 4. Scheduled service for the Air New Zealand aircraft will commence on October 15, from Auckland to Perth.

The interior is familiar, yet different. There are 14 rows of Skycouch economy seats on board, although the Dreamliner seats are not based on the Recaro CL3510 as in the B777-300 fleet, instead being based on the 5751 model from Zodiac Seats USA (formerly Weber). The reason, according to Victoria Bamford, aircraft interior manager at Air New Zealand, is that her team wanted to fit the ECO monitor for the Panasonic eX3 IFE system, and it was a better fit on the Zodiac seat. But, Bamford told *Aircraft Interiors International*: "All the seat features are the same. From a functional point of view – how you use it, how you deploy the leg rests and armrests – those are consistent, so it doesn't matter what seat model it goes on; the experience is the same for the customer."

A bigger difference is that the Dreamliner does not feature the distinctive Spaceseat from Zodiac Seats UK (formerly Contour) in premium economy, instead having the more conventional 5810 model from Zodiac Seats USA. Bamford explained the decision: "The Spaceseat is just fabulous for the markets the B777-300s are flying. But those aircraft have 44 premium economy seats, and we don't need a premium economy cabin of that size for the markets our B787s will be flying to [the B787-9 has a 21-seat premium economy cabin].

"So we looked for a premium economy seat that would suit that market and decided to customize the 5810 seat. We are the first to install the 11in ECO monitor into that seat and I think we've done a great job of blending it and making it look seamless and well integrated into the seat."

The team has also designed – together with Altitude Aerospace – a partition between the business and premium economy sections, which has enabled them to install IFE monitors on the front row. "We love gate-to-gate IFE, and it's so exciting that this tie-up has given us the ability to offer it to all our customers," stated Bamford.

Something a little surprising is that the airline didn't follow a popular trend and create a boutique hotel-style area at the main Door 2 Dreamliner entrance. "There is always tension between real estate and features, and the need to make sure that when you close the door you can take care of your customers. For us, when flying long sectors, that means we want to do a really great job of catering to the food and beverage needs, so we need galley space. The best way to do it from a density perspective is to put a galley in a cross aisle, which is why the galley is at the entrance," said Bamford.

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Inflight wireless connectivity technologies are advancing rapidly. All are striving for high speed, and some also offer something a little different

1

2

3

4

Internet speeds on board aircraft are beginning to match – or even exceed – home internet speeds

5

1 Good times roll

Zurich-based planBmedia has developed the CUBEEFI concept, a half-size galley cart that can provide a roll-on/roll-off wireless AVOD system that requires little or no aircraft downtime. The half cart contains a server, a wireless access point, and storage space for up to 60 tablet computers. Simply roll the cart on board, distribute the tablets, stow the cart in the galley (where it can also charge devices), and passengers can enjoy WLAN AVOD streaming via the Skyfi system. Depending on the revenue model of the IFE provision, passengers can also access the IFE content via their own personal devices. The cart is currently undergoing the FAA and EASA approval process.

2 Box clever

UK-based AirFi claims to have developed the world's first portable IFE solution, which enables passengers to access services including the internet, IFE content, inflight shopping options and gaming, using their own devices. The portable AirFi box is battery powered, so it is not connected to the aircraft, and it creates a self-scaling wi-fi network. The box is designed to be integrated into existing airline supply chain logistics and to comply with regulatory guidelines for connected devices. AirFi recently signed a partnership agreement with Western Outdoor Interactive (WOI) so that it can distribute WOI content via the box, including magazines, games and newspapers.

3 Very high, very fast

Lufthansa Technik has developed a WAP that supports very high throughput (VHT) to IEEE 802.11ac – the next-generation wi-fi standard that is not yet widely used on the ground – in the aircraft. The company claims transfer speeds of up to 1.3Gbps, and because the antennas are fully integrated, the router is simple to install, maintain and exchange – no space has to be found for cable runs or for antennas that protrude from the equipment. Passengers will be able to put the new high-speed access to use from this summer as Lufthansa has fitted the system to 20 of its Airbus A321s as part of the BoardConnect system, giving passengers a choice of content.

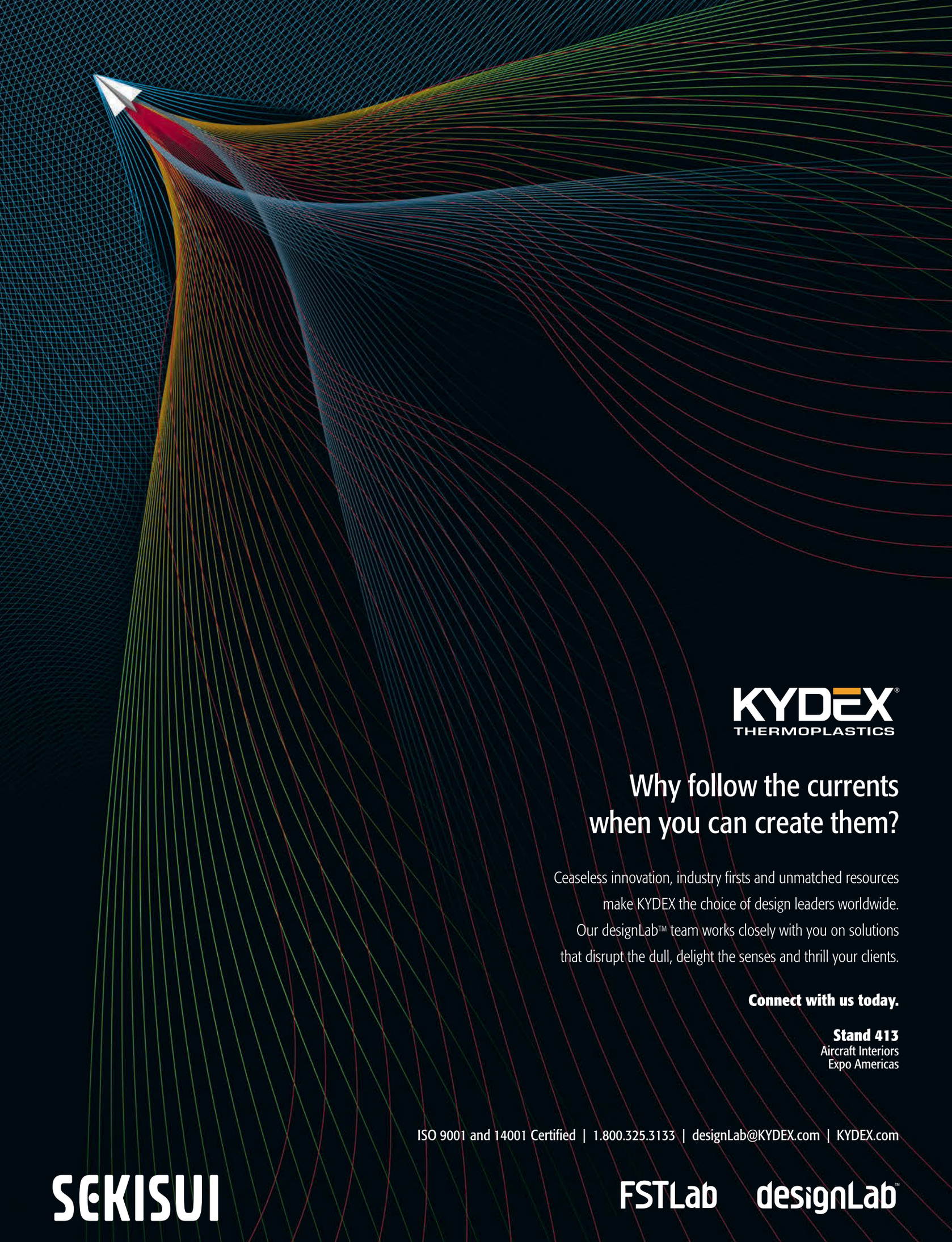
4 Vacation time

UK-based leisure carrier Monarch Airlines has become the launch customer of a new onboard wireless IFE system. The system, supplied by AeroFi, comprises an aircraft server under the flight deck that stores all content and control software, with wireless access points throughout the aircraft. Monarch has named its customized system MPlayer, and it allows customers to connect to the onboard wireless network via their own iOS or Android devices and access a range of free and pay-to-access IFE content. To access the system, passengers need to download the MPlayer app before their flight. The app is available from the AppStore, GooglePlay and Amazon App Store.

5 From one, many

The VisiStream solution recently launched by Vision Systems has been developed in response to the growing demand of customers for simultaneous streaming from a large number of PEDs. The system comprises a single box, which enables AVOD connections for 200 PEDs at the same time. The system also enables the sending of information to passengers' PEDs, with priority data flows for safety videos or announcements. Options include satcom functionalities for internet access, email and SMS (through a Satcom 1 receiver), cabin management, moving map, media content update via wi-fi, and real-time digital video surveillance.

Visit www.AircraftInteriorsInternational.com for the latest IFE news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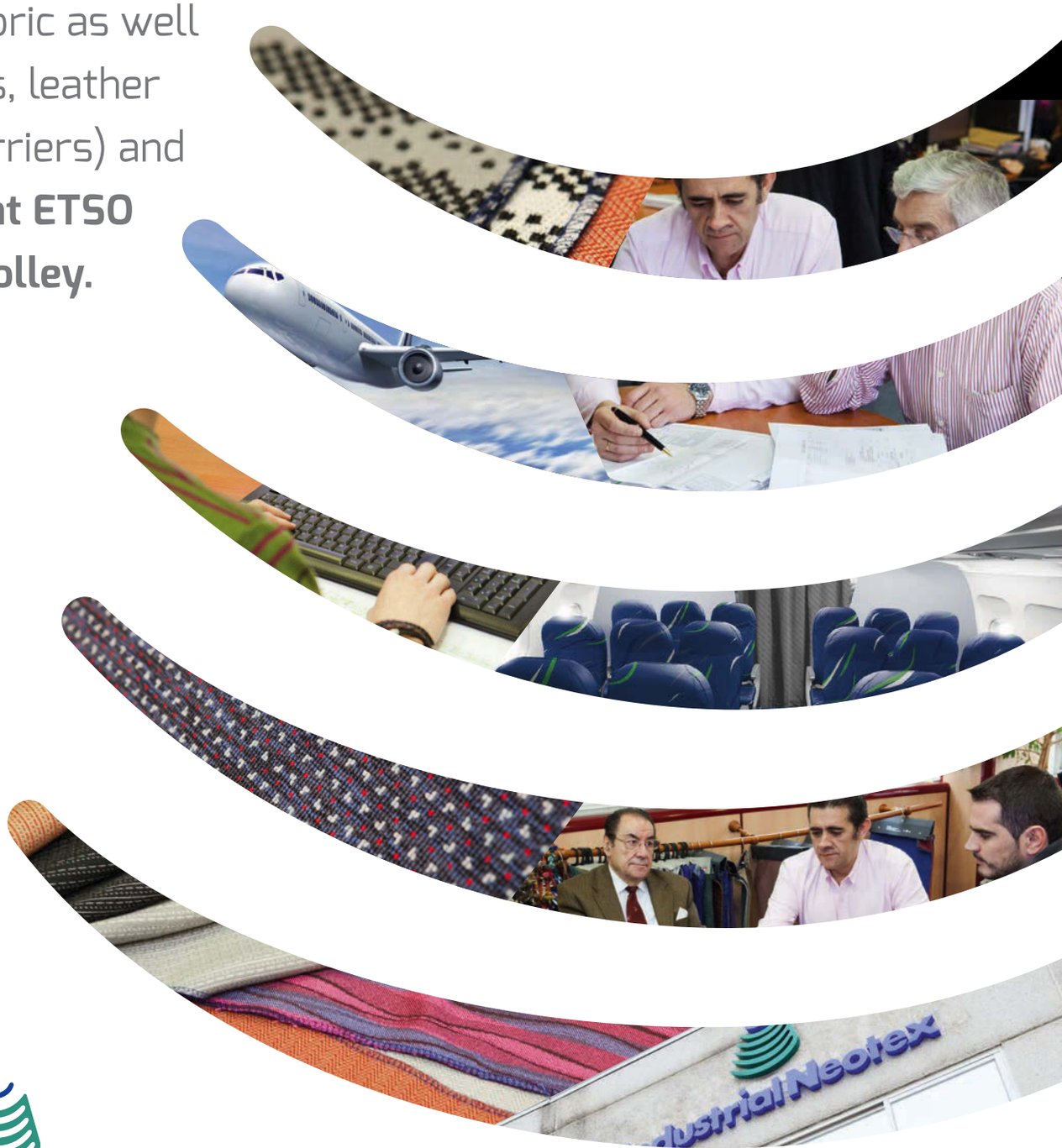

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The commercial aircraft cabin interior market is estimated to grow at a CAGR of **5.99%** during the forecast period 2014 to 2019
MarketsandMarkets report

brightfuture

Industry statistics gathered during Q2 2014 indicate strong confidence and growth in the airframe, airline and interiors industries. And while passengers love wi-fi, they are not so sure about slimline seats

There is a need for
6,250
70-130 seat aircraft over the next 20 years (2,300 in the 70-90 seat segment and 3,950 in the 90-130 seat segment)
Embraer Market Outlook 2014-2033

The total IFEC market is expected to reach **US$3bn** by **2017** with a CAGR of 6.67%

MarketsandMarkets research

Voice calls account for just over **10%** of total inflight use of Mobile OnAir and the average call length is under two minutes
OnAir research on Mobile OnAir usage

The super first class and super business class seating markets will grow at CAGRs of **10.6%** and **8%** respectively from 2013 to 2023
Counterpoint Market Intelligence

BOEING projects a demand for **36,770** new aircraft over the next 20 years worth **US$5.2tn**, an increase of 4.2% from last year's forecast
Boeing Current Market Outlook

Of more than 1,000 adults in the USA surveyed, who have used inflight wi-fi within the past 12 months:

- **66%** said that availability of inflight wi-fi influences their flight selection
- **22%** said they have paid more to get a flight with wi-fi, and 17% have switched from their preferred airline because another carrier had better wi-fi offerings
- **45%** would be willing to endure airport security twice if it meant getting a wi-fi service as fast as at home
- **34%** would show up three hours before boarding time in exchange for having inflight wi-fi as fast as at home
- **29%** would even swap their ticket to fly standby on an aircraft with wi-fi that's as fast as it is at home

Honeywell Aerospace 2014 Wireless survey

The total global commercial aviation aircraft seating market is expected to reach
US$4.86bn
by **2017** with a CAGR of **5.27%**
MarketsandMarkets research

Of survey respondents who have experienced slimline economy seats:

- **65%** said they are less comfortable than traditional airline seats
- **7%** said they are more comfortable than traditional airline seats
- **28%** could not tell the difference

TripAdvisor annual air travel survey

Airline annual ancillary revenue has grown 1,200% since 2007, from **US$2.45bn** to
US$31.5bn
IdeaWorksCompany survey

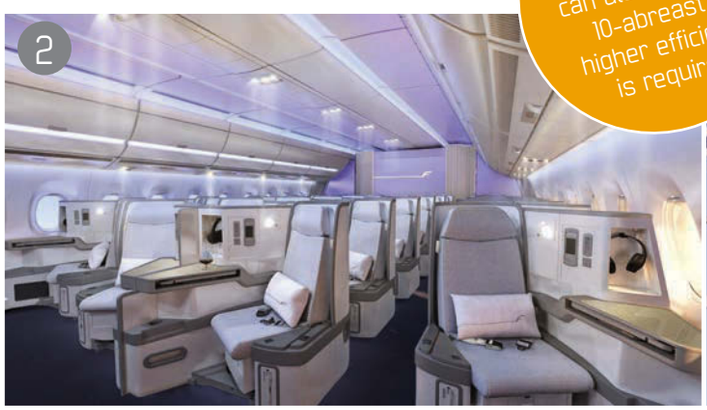
82% of airline CEOs are confident about airline industry revenue growth over the next 12 months (versus **68%** of all CEOs)
Airline CEOs – PwC Global Airline CEO Survey 2014

Orders and commitments for more than 1,100 aircraft totaling
US$152bn
were made at **Farnborough International Airshow**

HOT SPOT

dSign Vertti Kivi & Co also designed Finnair's new 407m² Premium Lounge for its top tier flyers at Helsinki Airport. The lounge is, as you would expect of Finnair, a showcase for classic Nordic design, including furniture such as the Tulip and Womb chairs created by Eero Saarinen. Elements of Finnish nature have also been incorporated, with dynamic changes in light, colors and video projections in tune with the seasons and time of day. Complimentary meals and drinks are plated on Marimekko tableware similar to that found on board Finnair aircraft, or served in Iittala Ultima Thule glasses – first designed for Finnair in 1968 by Tapio Wirkkala. The space can seat up to 122 guests and features different areas for working and relaxation, private shower suites and – of course – a Finnish sauna.

The economy cabin in an A350 can also be made 10-abreast if higher efficiency is required



smoothfinnish

Finnair has revealed the interior schemes for Europe's first A350-900 XWB

01. The cabin has a warm glow when landing in the East...
02. ...and a blue glow when arriving at Helsinki
03. The CMF on the Zodiac Cirrus III seat is subtle, but expect bold colors when the cabin is accessorized
04. How the aircraft will look in the standard Finnair livery, as introduced in 2010

With its strong history of innovative design, it is always exciting when Finnish flag carrier Finnair reveals a new project – even more so when that project is Europe's first A350 XWB. In keeping with its strong sense of Finnish style, the airline selected Helsinki design firm dSign Vertti Kivi & Co to design the interiors of its long-haul flagships. A conservative palette of grays has been selected for the CMF, which will be a backdrop to the airline's colorful crew uniforms, blankets and serviceware, all designed with Finnish design house Marimekko.

The airline decided on a 297-seat configuration for its 11 A350-900s (it also has an option for a further eight), with 46 seats in business class, 43 in economy comfort and 208 in economy.

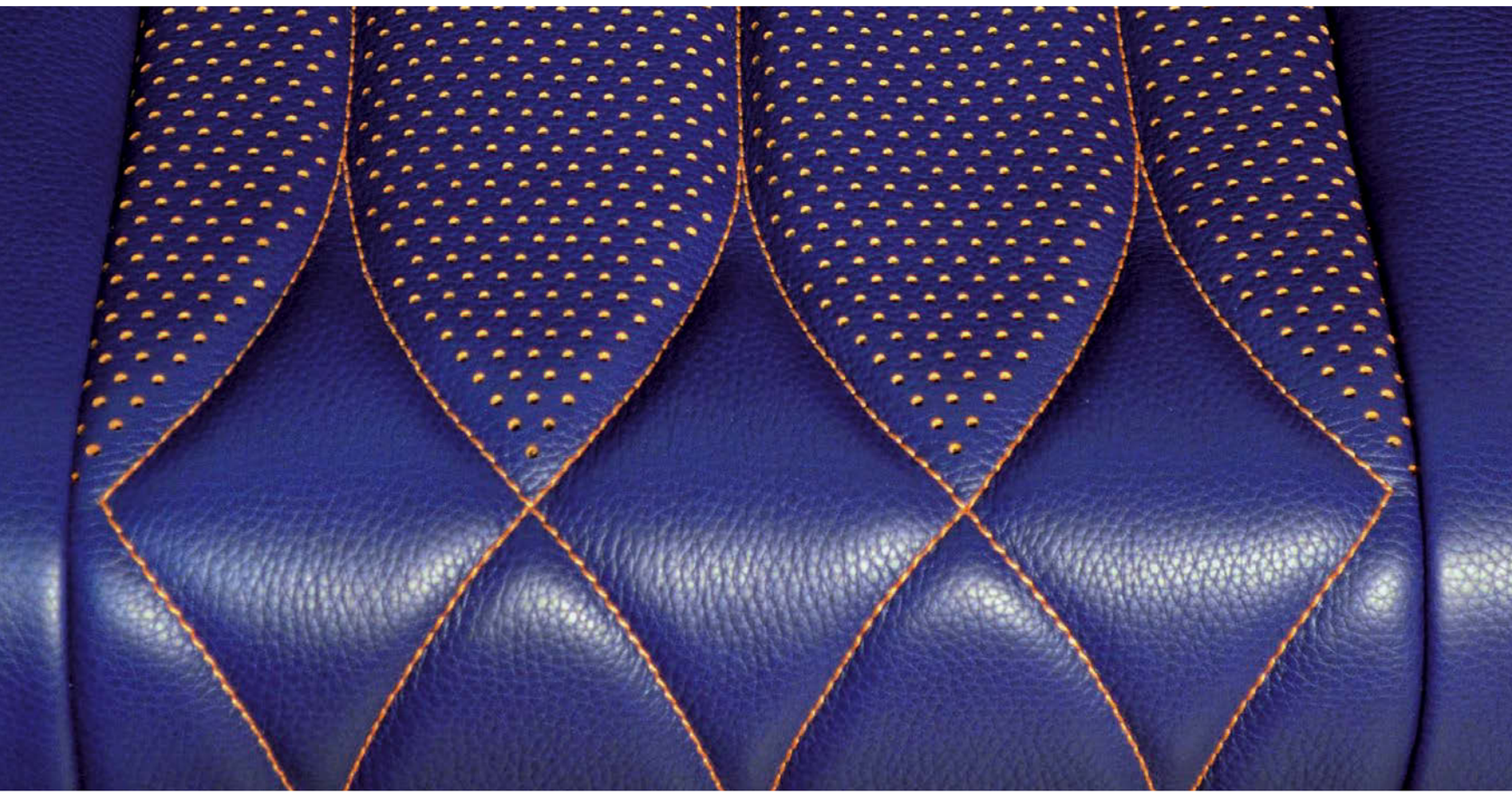
For the business cabin, Finnair has changed its long-haul seat from the Zodiac Seats UK Vantage model fitted to its A330 and A340 fleet, to the Zodiac Cirrus III seat from the A350 catalog. The 1-2-1 layout means direct aisle access for all business passengers, who will also enjoy fully flat beds, a 16in touchscreen IFE display, and AC and USB power outlets.

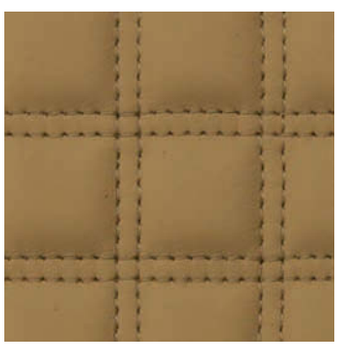
The long-haul economy seat has also changed, from the Recaro BL3510 to the Zodiac Z300 slimline seat, configured 3-3-3 at a 31in pitch. At the front of the economy cabin is a new class for Finnair: economy comfort. Seats in this class offer an extra 4in of legroom over economy seats, plusher headrests and better headphones. All economy seats have an 11in touchscreen IFE display and USB power outlet. Wi-fi is available throughout the aircraft.

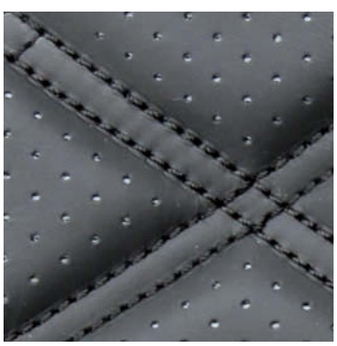
Vertti Kivi, CEO of the design house, explained the cabins: "We have worked hard to create a special customer experience on board the new A350 XWB aircraft and are proud to bring Finnish design to Finnair's passengers. Our Space Alive concept means dynamic lighting, colors and moods to suit the time of day, destination or season. For example, when descending in the East the aircraft can be awash in warm orange tones, and surface interiors may glow in fresh blue hues when arriving in Helsinki."

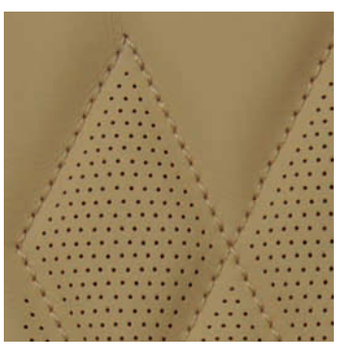
When Finnair begins operating its first A350s in Q2 2015, they will initially serve Shanghai, Bangkok and Beijing, with Hong Kong and Singapore to be added in 2016.

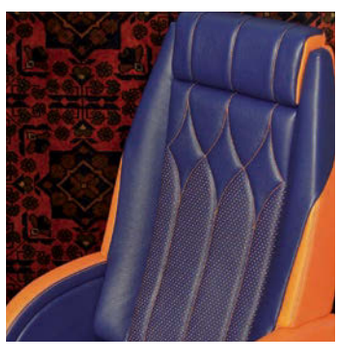
bespoke leather design for the ultimate interior











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AERISTOCRAFT

The latest Solstys installation is in Asiana's A380 business class – see page 106

thirdbase

A new variant of the popular and easily customizable Solstys seat has been developed

01. The features that made Solstys popular have been retained and enhanced for Solstys III

02. This third version of Solstys has a capacity for an 18in IFE display

There is now a third member of Sogerma's Solstys range of business seats. The original Solstys seat has proved a popular model, with almost 7,000 orders placed, and more than 3,900 delivered to date, to customers including Etihad, Emirates, China Southern, Thai Airways and Asiana – as well as a place in the A350 XWB catalog. The second model – Solstys Enhanced – began flying with Iberia last year, with a wider seat, longer bed, and a few enhancements, such as extra stowage. The Iberia seat was designed with Madrid-based design consultancy Mormedi, which Sogerma brought in to work on the latest model – Solstys III.

This third version features a refined shell shape, retractable armrests, a 26in-wide seat (3in wider than Solstys), a 76in-long bed, capacity for a larger IFE display (an extra 2in, at 18in), increased storage space, enhanced privacy, improved access, and greater use of composites. Mormedi says the shape of the seat gives the overall cabin a more spacious feel, and the seat has been designed for easy customization and maintenance.

According to Mormedi, when it was tasked with developing the seat, the main challenge was in creating a design that provided improved comfort points, while staying within the given technical and budget restrictions. An early investigation phase was undertaken in order to gain key insights into the characteristics of different seat products and their relative experience, quality and competitive advantages. Having established its boundaries and researched rival products, the Mormedi team identified strategic areas of improvement that they felt would make Solstys III a strong competitor in the business seat marketplace.

Seat quality was evaluated by applying a framework of criteria that covered not only passenger comfort factors, such as seat comfort, privacy, IFE and ease of access, but also the needs of other important stakeholders, such as airlines' need for easy installation, maintenance and certification, and fast reconfiguration; the seat manufacturer's need for ease of assembly and customization; and aircraft manufacturers' need for 'plug-and-play solutions' and capacity management.

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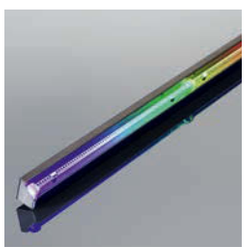

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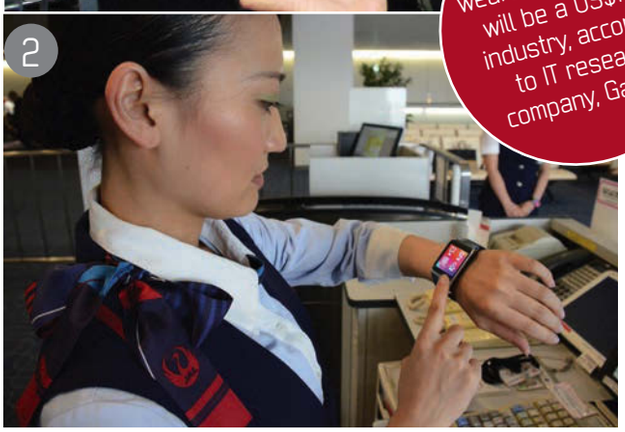
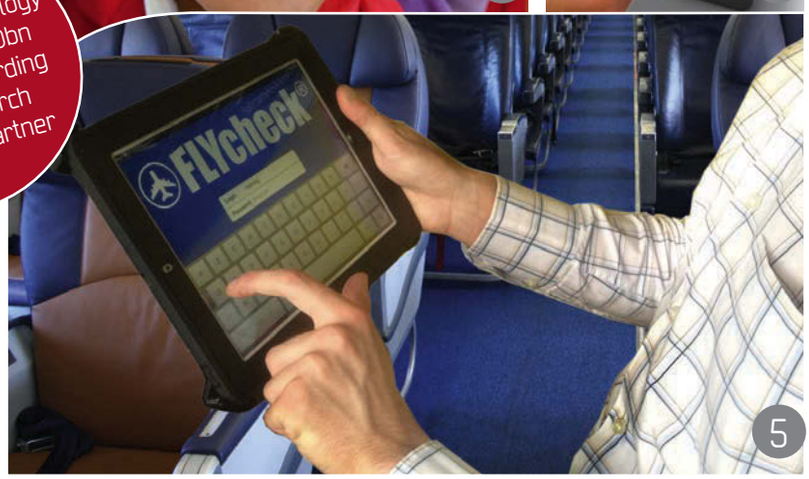
From smartwatches to RFID tags, the latest electronics are benefiting crew and customers alike



By 2016, wearable technology will be a US$10bn industry, according to IT research company, Gartner



1 Appy go lucky

Following trials by airlines such as British Airways and Delta, JetBlue is the latest airline to take tablets. The airline is issuing its cabin crew with iPad Minis, to be used as a point of sale and document management devices. The tablets are only half the story though, as the iPads run In-Flight Service Assistant (IfSA), a purpose-built app and crew portal through which crew members can access key applications, such as an electronic manifest that shows if there are customers with special needs onboard and identifies valued customers; an app that makes the iPad function as a point of sale device; and an app that can translate questions, comments or concerns from customers in any language.

2 Watch it

Japan Airlines (JAL) and the Nomura Research Institute have begun tests to see how iBeacon and smartwatches can improve the airline's airport passenger service. At Haneda Airport's Domestic Terminal 1, a beacon installed at each boarding gate can pinpoint the location of any JAL gate staff who have Bluetooth Low Energy devices. This information can be coordinated by an operator at the control desk, to ensure front-line staff are in the right place to best serve passengers. Front-line staff can check and share information by using wearable devices, such as a smartwatch. JAL is not the only airline to be investigating smartwatches, as Vueling, Iberia and airberlin are also conducting trials.

3 Eye to the future

Concierge staff at Virgin Atlantic's Upper Class Wing in London Heathrow are using wearable technology to further personalize customer service. Working with SITA, Virgin is the first airline to trial Google Glass (China's Spring Airlines has followed suit) to improve the travel experience. When Upper Class passengers step out of their car at Heathrow's T3, they are greeted by staff wearing Google Glasses, who can greet them by name and start the check-in process. At the same time, staff will be able to update passengers on flight information, and translate any foreign language information. In future, the technology could go further, for example, telling staff their passengers' dietary preferences.

4 No touching

Rather than having cabin crew spending time sorting out card or cash payments for inflight purchases, Near Field Communication (NFC) can be used as a solution. As credit and debit cards are increasingly being issued with NFC contactless payment functionality built-in, a company named IFPL has developed an in-seat NFC payment system. The system does not require any in-seat wiring for installation, and can be integrated seamlessly with existing on-board payment servers. Alternatively, it can be a standalone system that will run for up to 24 months on the optional built-in battery. The system also enables easy catalog updates over wi-fi for special offers or to update food menu options.

5 Tag team

MAINtag, a company that specializes in RFID technology for the aerospace industry, has launched a 3D iPad-based assets management solution for inventory and maintenance of cabin passenger and security equipment. Whereas manual safety inspection of cabin equipment is time-intensive, the company claims that its FLYcheck RFID solution allows a technician to scan and verify cabin equipment in a matter of minutes. The interface delivers a 3D view of an aircraft cabin, and provides data, graphics and animation for multiple viewing angles. The system complies with ATA Spec 2000, and shows which parts are approved or reported, or if a part is missing or expired.

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TEAGUE

STRONG SELLER

Airbus predicts receiving more than 1,000 orders for the A330neo, and has already secured a Letter of Intent from Transaero for 12 aircraft, an MoU from AirAsia X for 50 -900s, an MoU from Air Lease Corporation for 25 -900s, and Hawaiian Airlines has swapped its order for six A350-800s for six A330-800neos.

The A330neo will have 95% spares commonality with the current A330

neoclassic

Meet the A330neo, Airbus's latest – yet familiar – Dreamliner challenger

01. Airbus is a champion of the 18in-wide economy seat
02. Spot the difference: the A330neo cabins draw from the A350 designs

There are two new members of the Airbus wide-body family – the A330-800neo and the A330-900neo, which, through the use of the latest-generation Rolls-Royce Trent 7000 engines, aerodynamic enhancements and denser cabin options, are claimed by the airframe maker to be the most cost-efficient, medium-range wide-bodies on the market.

The aircraft has been announced amid rumors that it could take the place of the A350-800, the 276-seat variant (in a two-class configuration) of the A350 range, which has not attracted strong orders, as many customers converted their orders to the larger -900 variant.

Airbus revealed at July's Farnborough International Airshow that the A330neo interior is being developed to create an environment that is harmonized with that of the A350, with features including LED mood lighting and full connectivity. Airbus has also stated that the aircraft will have capability for 'fourth generation' IFE, meaning 3D entertainment (for expert views on 3D in IFE, see our feature on page 58).

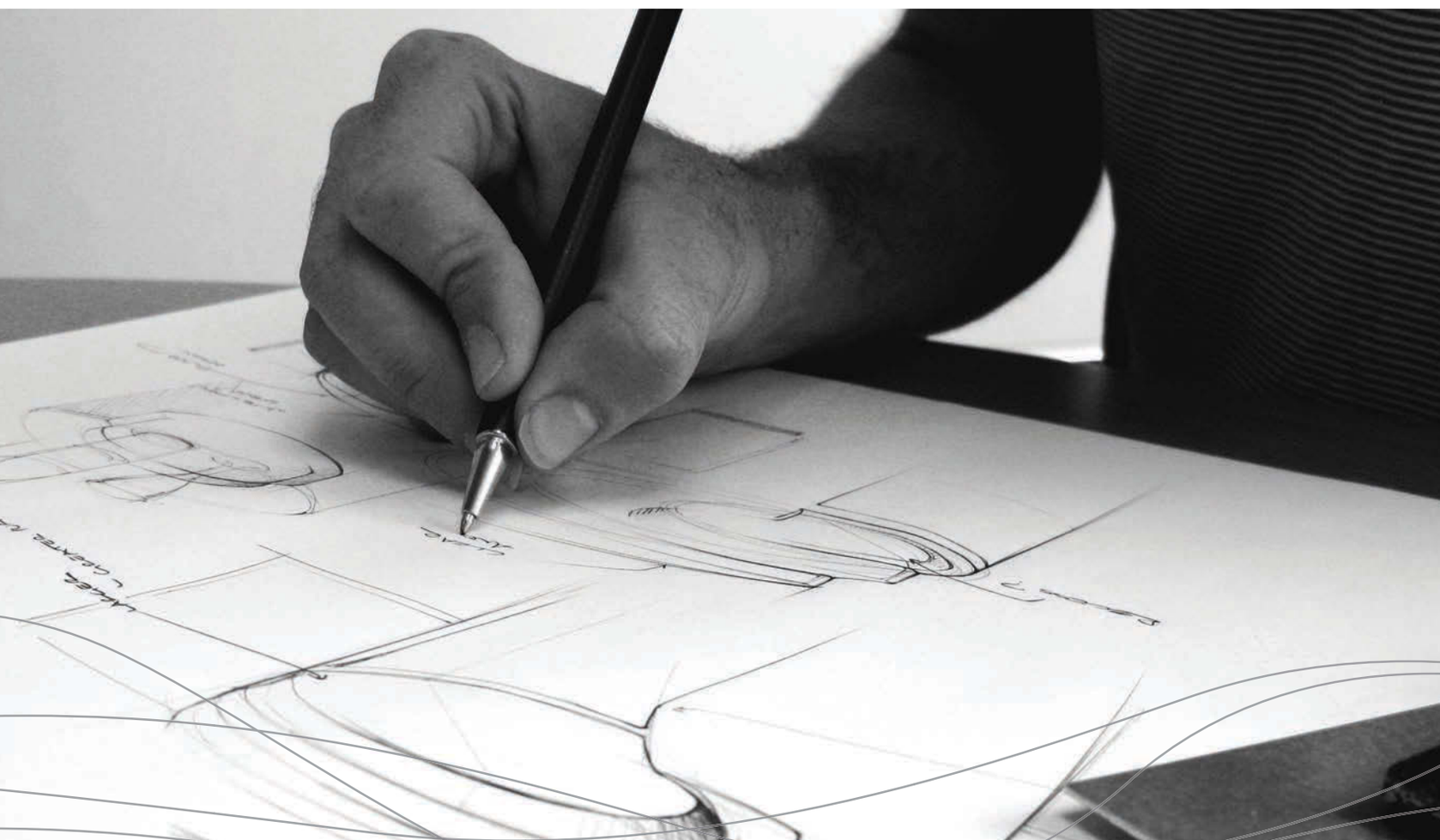
There will be some clever reconfiguration of the cabin, including an adaptation of space-saving ideas originally developed for the A320, such as the Space-Flex rear lavatory and galley concept, and the tightly sculpted Smart-Lav lavatory monument. Also, the flight crew rest and cabin crew rest will be segregated in the lower-deck mobile crew-rest compartment.

The result is extra seating: Airbus expects the A330-900neo to be able to accommodate up to 10 seats more than the A330-300ceo, which has the same fuselage length (increasing from 300 to 310 seats – 36 in business and 274 in economy). Meanwhile, the A330-800neo is expected to seat up to six more passengers than the A330-200ceo of the same fuselage length (increasing from 246 to 252 seats – 36 in business and 216 in economy). Airbus has stated that this increase in cabin density will be achieved while retaining the same comfort standard as today's A330s, and the economy seats will be 18in wide – an inch wider than those on the B787, which Airbus views as a major advantage over the Dreamliner.

A major challenge may lie ahead for Airbus engineers, though, as the company has stated that design freeze for the A330neo is in 2015, and first deliveries are expected in Q4 2017.

ALTITUDE

AEROSPACE INTERIORS



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AIRBUS

COMMENT

BA's short-haul interiors, at around 20 years old, were in need of a refresh, and the new interiors look contemporary. The slimline seats also make great sense as a way to increase cabin density without detracting from comfort. However, Club World will require careful marketing, as the popularity of airline seat comparison websites means that seats are often judged on hard numbers rather than subjective comfort, and the new Club World will have the same seat pitch as a standard economy seat on low-cost carrier Ryanair.

With lighter seats, and more of them, BA says the cabins will save 5% CO_2 per passenger kilometer

slimmingclub

In the latest stage of its evolution, British Airways is revamping its Club Europe cabins with slimline seats

01. A folding-style tablet case is required in order to use the holder
02. The console table features leather mats and recesses for holding small items
03. The Club Europe seats also have a four-way moveable headrest

Following the launch of its A380 and B787 interiors, British Airways has turned its attention to its short-haul European and domestic fleet flying from London Heathrow and Gatwick. The airline's aim is to strengthen its position on these highly competitive routes, having already introduced new fare options, including hand-baggage only, semi-flex and day returns, to stay competitive against rivals such as Lufthansa and EasyJet.

Fit-out work began in June on the first of the carrier's 95 Airbus short-haul aircraft, beginning with the 51-strong A320 fleet, and work will then progress to its 33 A319s and 11 A321s. The new cabin designs feature a silver British Airways speedmarque on the front wall, as well as an LED mood lighting system that emits blue tones for boarding, a 'candlelit' mood for dining, and a gentle white for cruising and landing. The Club Europe rows retain the 2-2 'Euro biz' configuration of seat triples with the middle seat free, which can be quickly converted back to economy triples if required.

The cabin has been designed by the Forpeople agency whose founder, Richard Stevens, is also BA's interim creative director. BA is emphasizing the comfort features of the Club Europe seats – customized Pinnacle slimline seats from B/E Aerospace in Northern Ireland – which are clad in charcoal gray leather from Glasgow-based Andrew Muirhead & Son with decorative stitching by Prototrim, a UK-based car seat design and dressing specialist. The sculpted seatbacks are designed to provide more knee space for the customer behind, while the upper part features an eye-level seatback tablet-holder, as well as magazine storage. That tablet-holder may prove useful, as BA is in discussions with Inmarsat about offering Europe's first ground-based 4G inflight broadband network, starting with UK domestic routes. To aid laptop users, recline has been reduced from 4.5in to 3in (it has also been reduced in economy, from 4.5in to 2in). The 'empty' middle seats are bridged with a console table, which is pulled up from the base (or clipped in on the front row) and features leather mats and wood-lined recesses, freeing up the main table for working or dining.

The seats are, of course, also intended to maximize revenue. The slimline design has enabled seat pitch in Club Europe to be reduced from 34in to 30in (the same as in economy), raising the A320's seat count from 162 to 168, and the A319's seat count from 132 to 143. This added density is achieved without any detriment to comfort for business travelers, according to BA, although there is a reduction in some seat widths from 18in to 17.5in, and there is no extra stowage for the extra passengers.

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spaceacademy

BRIEF: Alaska Airlines would like greater overhead bin capacity in its B737s without detracting from the appearance of the Boeing Sky Interior. Can they work with Boeing to create a solution?

DESCRIPTION: Boeing was happy to take on this challenge, and sent engineers on fact-finding flights to observe how Alaska Airlines passengers put luggage in the B737 bins. Following this research, the team set to work on creating some new ideas.

One observation from the research was that some passengers struggled to raise their bags to reach the current bins, so the lower edge of the bin was changed so that it is 2in lower, which also aids visibility into the bins.

And by redesigning the bins to add more depth, more bags could be stowed, and in less time. In fact, each of the new bins – named Space Bins – can accommodate six standard-sized carry-on bags (9 x 14 x 22in), which is two more than the bins found in B737NGs. And all this without spoiling the look of the Sky Interior, and without being any more difficult to close than the current pivot bins, even though there is no bin assist mechanism.

Boeing invited Alaska Airlines staff, including flight attendants, to its design center to try out the prototypes; the attendants felt that customers would appreciate the improved capacity and access, while they would enjoy spending less time during the busy boarding period helping to stow and rearrange bags. The Alaska executives were also happy with the potential boarding time benefits.

The final design means that up to 194 bags can now be stowed overhead on a next-generation B737-900ER, which is a 48% increase over the standard bins on that aircraft, which can hold up to 132 bags. If a flight isn't too busy, the overhead bins can also accommodate some of the more unusually shaped items passengers like to take on board, such as guitar cases.

VERDICT: Superb. A great example of an airframe maker listening to customer needs and responding appropriately. It's amazing to see how the maximum overhead stowage capacity of the B737-900ER has developed from 77 in its Standard Bins introduced in 1998; to 125 in its BigBins introduced in 2002; to 132 in the current Pivot Bins introduced in 2010; to 194 with this latest revision. Better still, Boeing is offering the Space Bins as an option on new B737NG and B737 MAX aircraft, and the first production models will be available in late 2015 – with Alaska Airlines as the launch customer, naturally, on all 66 of its new-delivery B737s. Space Bins will also be available for retrofit on in-service B737NGs.

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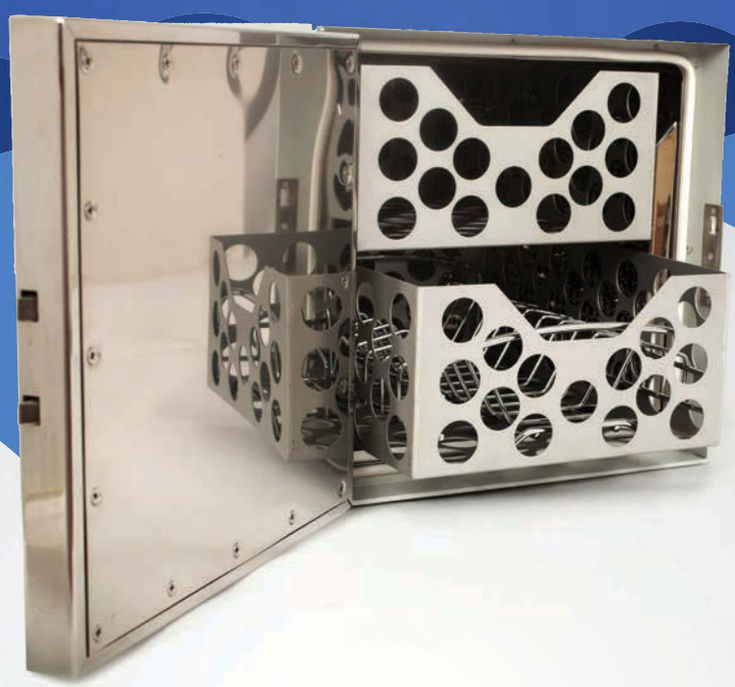
BUN WARMER



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appydays

BRIEF: Everyone loves the moving map, but as passengers are accustomed to using feature-rich, slickly presented apps on their devices, we'd like to see a similar approach taken with the map.

DESCRIPTION: Recognizing that passengers might want more from their map, Neutral Digital, a multidisciplinary digital media agency based in London, has created the 3D Fleet App, which is designed to make IFE map systems more interactive and immersive, using the power of the latest IFE systems.

If passengers want to track their journey, the infotainment app can of course let them do that, with the flight tracked across the globe in 3D, showing information about major cities along the route, journey time elapsed and time to destination. So far it's familiar territory, but add in a geosocial element so users can connect and chat via the system, and things get a little more interesting.

However, the real benefit for airlines is the opportunity to promote their brand, their passenger experience and their aerospace technology, via the app. The GUI is customizable for an airline, so its brand colors and logos can form part of the experience. Passengers can use the system to find out more about their seat's features, as well as those of the overall cabin, exploring the space using full 3D models. If they're curious about what their fellow passengers sitting forward, aft, upstairs or downstairs are experiencing, they can also explore those spaces without having to leave their seat or sneak past any class dividers.

For the more engineering-minded user, the app can let them explore the workings of the aircraft and learn how the aircraft flies and how the engines work (complete with exploded diagrams), and enjoy key facts and fun figures.

VERDICT: The most popular show in the air could be about to get better – especially for aviation geeks. We're really excited that aircraft interior design is combining with IFE to create more customer interest – and indeed to meet some customers' interests. We also like the engineering features, which can help passengers learn more about the mechanics that allow them to be sitting comfortably at 30,000ft in the air. It looks like the app will become available soon, and Neutral is currently future-proofing the app by integrating available APIs, such as flight data, advertising, social media and geotagged information. The app can be deployed not only on future Android-centric systems, but also on iOS and other Android devices for integration into other airline-specific apps.

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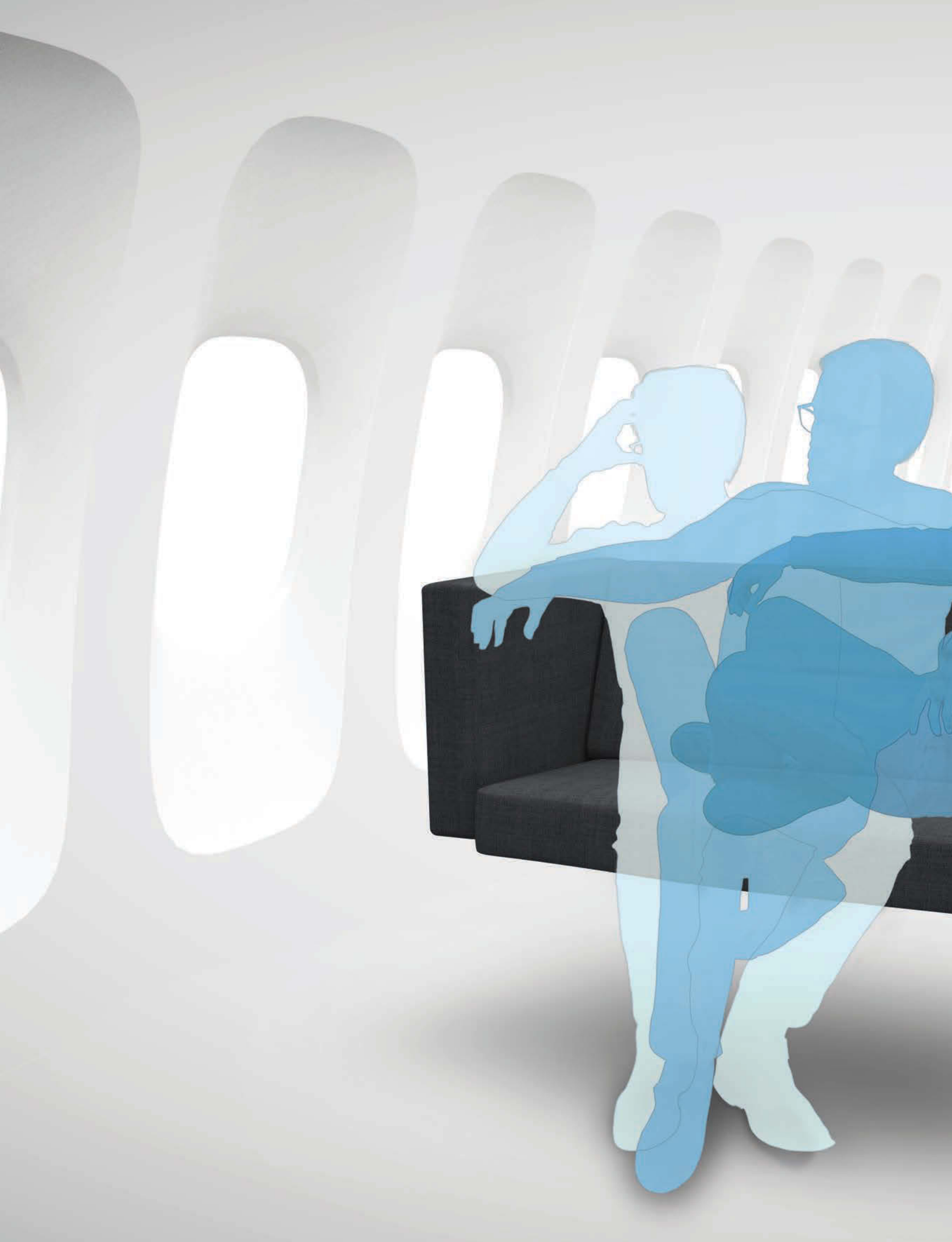

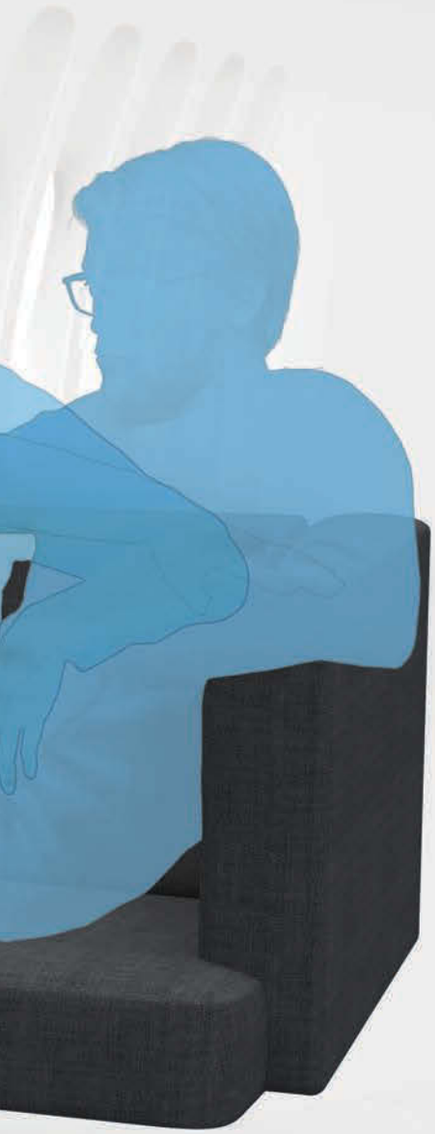

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impossiblestream?

Is the streaming of subscription service content ready for take-off or grounded for life?

TOMÁS ROMERO

On a recent flight from LAX to JFK, my five-year-old daughter took her seat and promptly set about exploring the wonders of the seatback IFE screen before her. The touchscreen interface was gorgeous, the array of kid-friendly movies and TV shows on offer was amazing, and the ability to personalize her screen wallpaper was even cooler. But, inevitably, the dreaded question came: "Daddy, do they have Netflix?"

As I launched into a deep, measured response based on years spent covering the ins and outs of the IFE industry, my daughter quickly cut me off with another question: "What about Amazon Prime?"

Fumbling for a response, I started again from the top. And again, she cut me off: "Do they have wi-fi?" Relieved, I finally nodded yes. "Cool! So, can I watch Netflix or Amazon Prime on Mommy's iPad?"

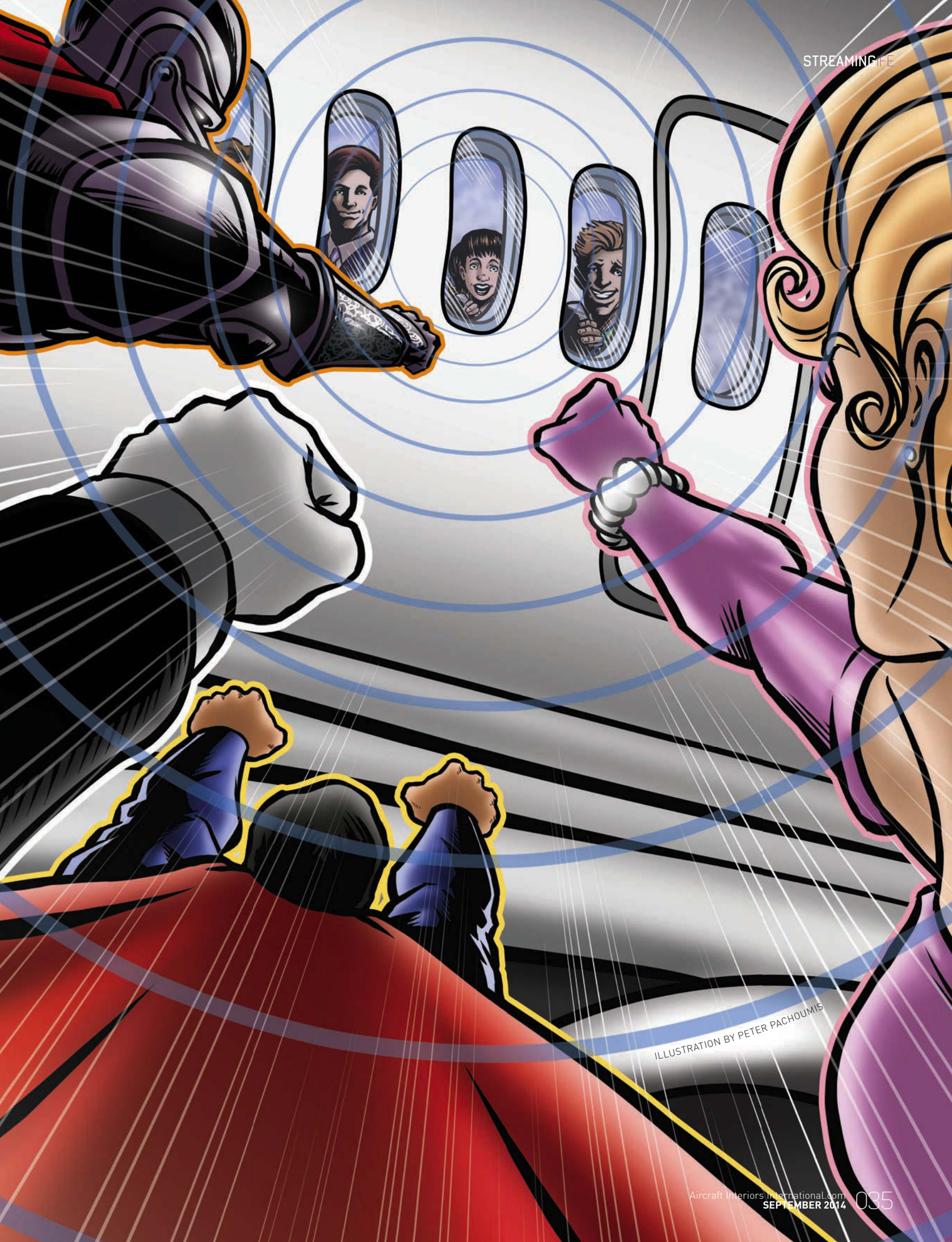
This time I was speechless. We had a long flight ahead of us and disappointing my daughter before take-off was definitely not on my itinerary. Finally, I broke down and told her that, sadly, she could not stream either service on Mommy's iPad. Genuinely confused, she furrowed her tiny brow and asked perhaps the toughest question of all: "Why not?"

Why not, indeed? In an era of almost ubiquitous connectivity, why can't a five-year-old girl (or anyone for that matter) watch the subscription service shows and movies they pay for and enjoy in the comfort of their living rooms, on an aircraft?

EVER-EVOLVING PROCESS

"Our objective with providing inflight wi-fi has always been to provide an 'at-home or office-like experience,' with access to all the things you need and enjoy on the ground, in the air," explains Angela Vargo, Southwest Airlines' manager of product innovation. And although Vargo says that, ideally, the best inflight wi-fi would be an "all-you-can-stream experience" with unfettered access to streaming subscription services, such as Netflix, HBO GO, and Hulu Plus, she also freely admits that the challenges and costs associated with connectivity at 35,000ft make the venture an "ever-evolving process" at best.

And Vargo does have a point. Although inflight connectivity speeds have more than doubled over the past decade (they currently average somewhere between 9Mbps and 10Mbps on most carriers), even the fastest wi-fi flying lags far behind the 26.1Mbps average broadband speed



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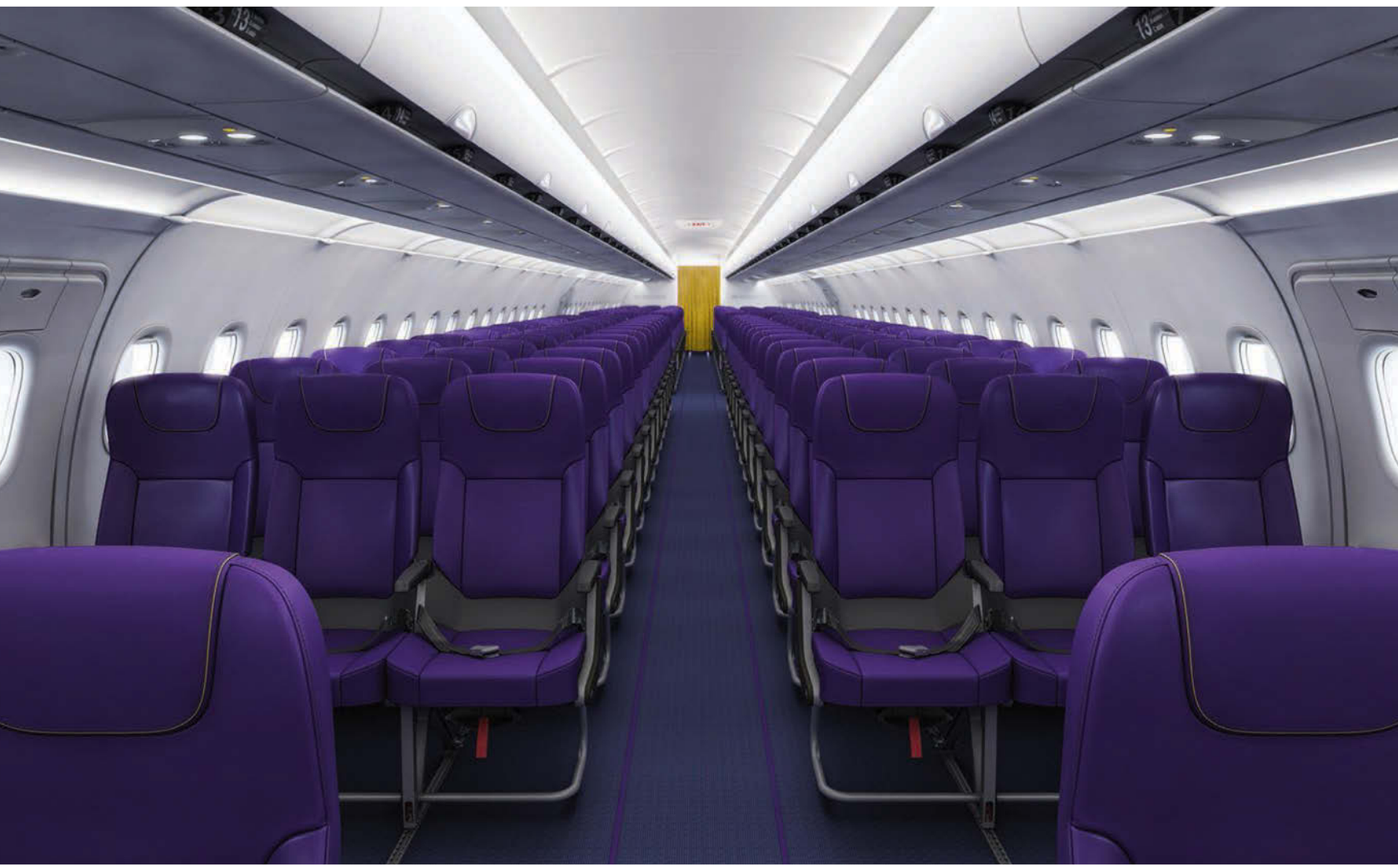

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boxing champion

Asked whether onboard content – be it streamed or embedded – would be superior to an onboard subscribed content, Richard Barsby, managing director of IFE services provider, Skyline IFE, says, "My view is that streaming movies on demand from the ground would need a large slice of satellite bandwidth to each aircraft to accommodate potentially hundreds of concurrent connections. I believe that the cost of that bandwidth would be far greater than the cost of uploading movies to a hard drive on the aircraft's wireless router, and so on purely commercial terms that idea is not going to fly, and streaming from a box in the aircraft is the way ahead for the time being."

that most American consumers enjoy at home. And although the technology is evolving at a rapid clip – with heady talk of peak speeds as high as 70Mbps coming soon from providers like Gogo – progress on the streaming subscription services front has been maddeningly slow.

So slow, in fact, that some critics and tech-savvy passengers are starting to wonder if it's even a question of bandwidth at all anymore. Pointing to the fact that carriers on even the lowest end of the connectivity average (9.0Mbps) should, in theory, be able to easily accommodate Netflix's posted internet connection speed recommendations of 3Mbps for SD content and 5Mbps for HD, some critics feel there is something else afoot. And lately, it's hard not to agree with them.

SETTING LIMITS Admitting that supporting the appropriate bandwidth is just one part of a larger inflight connectivity puzzle that is rife with both "challenges and opportunities", Vargo goes on to say, "It all comes down to finding the perfect balance of allowing [passengers] access to the things that matter – checking email and social media, etc – while preserving a great wi-fi experience for all on board."

"The technology is rapidly improving, and I think more and more passengers will opt for their own content in the coming years… it will be inevitable at some point," says Vargo. "But how and when is still up for debate."

Leading inflight connectivity provider Gogo seems to agree. Referencing the company's somewhat controversial decision to block access to streaming subscription services like Netflix and Amazon Prime on its current ATG service, Gogo's support page suggests that it all boils down to two simple words: passenger experience.

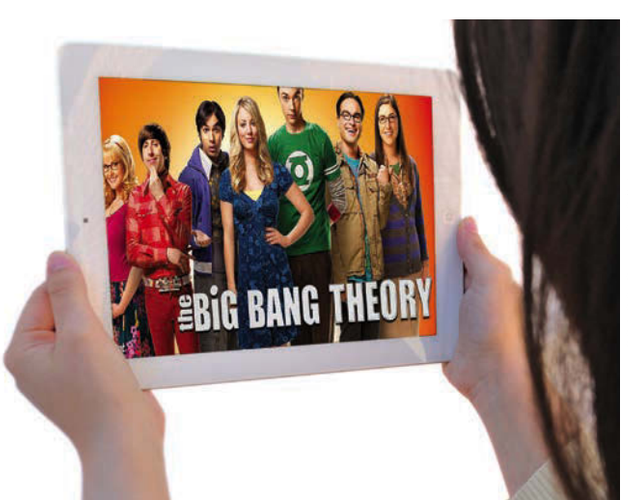
"Bandwidth at 30,000+ feet is inherently limited, and heavy-load activities like streaming videos from the ground can weigh down our network," says Gogo on its support page. "That means playback is subject to poor video quality, buffering and slower connection speeds for your fellow passengers." In other words, the more passengers you have using wi-fi on any given aircraft, the worse the connected experience will be.

And though limits of this sort do make sense, one has to wonder how long those limits will hold in an era of unbridled UX innovations in the consumer world; where passengers are accustomed to being able to watch whatever content they want, whenever and wherever they want to.

PASSENGER DEMAND "Our 2014 Passenger Survey data shows that passengers aren't just ready and looking for access to streaming subscription services, but are even willing to pay for it," says Ben Fuller, director of sales and marketing at leading IFE solutions provider digEcor.

"At digEcor, we are all about enabling airlines to create extraordinary travel experiences for their passengers," explains Fuller. "If the passenger is demanding it and the ability to stream subscription service content to a PED

01. Through a partnership with Dish Network, Southwest Airlines offers live TV streaming to PEDs, and has trialled offering the service for free to passengers in exchange for showing adverts on their devices



CHRISTIAN BERTRAND/SHUTTERSTOCK.COM

> "PASSENGERS AREN'T JUST READY AND LOOKING FOR ACCESS TO STREAMING SUBSCRIPTION SERVICES, BUT ARE EVEN WILLING TO PAY FOR IT"

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AD212

drives an enhanced overall satisfaction level for a traveler, then its time has arrived."

And while some carriers and content providers have expressed concerns about the potentially crippling impact that wi-fi access to such services could have on traditional carrier-branded IFE, Fuller says there is still definitely room for both.

"Not every passenger subscribes to the services and not every passenger is ready to pay for services inflight," adds Fuller. "There is also a large group of passengers who don't like to take anything on board with them, including PEDs, who rely completely on airline-provided IFE."

But perhaps the biggest selling point for airlines moving forward, says Fuller, is the impact that supporting such offerings could have on a carrier's bottom line.

"Most airlines charge for internet access inflight, so if this can drive more passengers to get online, then it obviously also drives ancillary revenue because a passenger is typically driven through an airline portal to get started, creating another branding touchpoint," says Fuller.

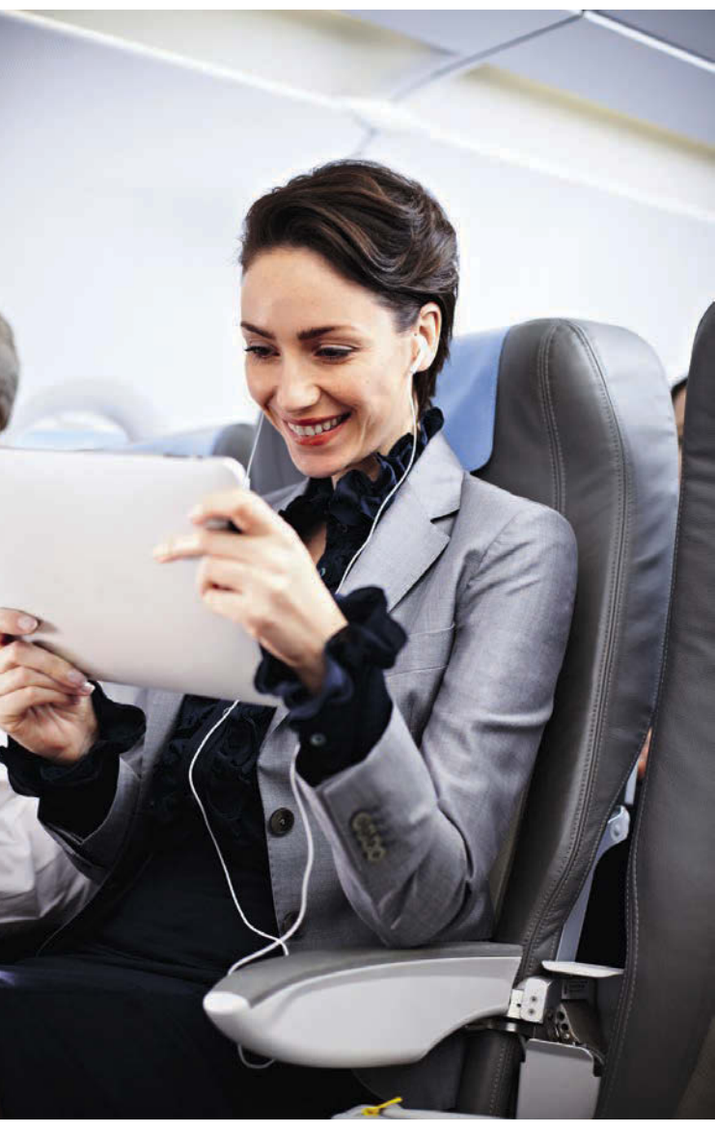
That said, Fuller cautions that it's important to remember that all this talk of increasing bandwidth and streaming subscription services is, for the moment, just talk.

02. Carrier-operated services, such as Lufthansa Systems' BoardConnect, may offer a greater opportunity to brand the IFE experience

> NOT EVERY PASSENGER SUBSCRIBES TO SERVICES AND NOT EVERY PASSENGER IS READY TO PAY FOR SERVICES INFLIGHT

cultural opportunity

On the subject of onboard content being king, Jovita Toh, CEO of content distribution specialist Encore Inflight states, "When a personal streamed service such as Netflix is available inflight, it will definitely create an opportunity for airlines to provide superior content and possibly at a much lower cost. Airlines can then feature content that is not readily available to passengers through the traditional platforms, such as theaters, DVD, cable or internet; content that is created with passion and art, content that wins festival awards. Airlines will be defined by the content they select and present. Passengers will be treated to more than just entertainment, passengers will be rewarded with an experience. Not everyone has the opportunity to attend a film festival, but airlines can bring film festivals to their passengers."



02

global view

Walé Adepoju, chief commercial officer at IFE services giant Global Eagle Entertainment, offers his view on the possibilities of offboard streamed content: "While streaming services have become more popular on the ground, airlines will continue to provide their own entertainment content using service and technology providers, such as Global Eagle Entertainment, driven by a number of factors. First, we supply early-window and home-video blockbuster movies to airlines, which are unavailable to the traditional streaming services, providing us with access to a significantly larger library and timely content. Second, airlines want specific and customized content to provide an onboard experience relevant to the airline's brand and its passengers. By offering content in nearly 50 languages and being able to manage the post-production process, we tailor content packages to passenger demographics and specific regions around the world with differing cultural tastes and languages. Further, we supply other key elements of the inflight experience, such as digital publications, interactive moving maps and retail shopping platforms, providing an enhanced experience that ground-based streaming services do not offer."

early window is key

Ben Fuller, sales director at IFE specialist digEcor, lends his opinion on the offboard content issue: "From our perspective and understanding of how the studios are currently positioning their content, streaming from any source to a personally owned device will have less access to Early-Window Content than streaming to an airline controlled/owned device. If the passenger demographic desires the latest and greatest from Hollywood, then airline provided content should be superior based on that alone. That being said, an airline can only provide so much content and therefore cannot hit the sweet spot for every passenger – that's unrealistic. Being able to stream from a service, such as Netflix or Hulu, can broaden the amount of content available and therefore captivate a larger audience. It comes down to the experience an airline is driving for its passengers – there are positive aspects for both scenarios."

> PASSENGERS WANT AN EXPERIENCE THAT MIMICS WHAT THEY GET ON THE GROUND

"There are different ideas on this, and everybody's uptake numbers are different… but if these services help generate a more satisfying passenger experience, then supporting it is a no brainer," Fuller says, adding that, "It's definitely coming as passengers want an in-air experience that mimics what they get on the ground. 'How fast?' is the real question, and the answer is yet to be determined."

Or is it? According to Gogo's chief commercial officer, Ash ElDifrawi, the future is, if not now, then just around the corner.

THE FUTURE "We expect that Gogo's next-generation solutions… technology like Gogo's 2Ku and GTO, which we expect will deliver peak speeds of 70+ Mbps, will get the needed bandwidth to the aircraft… and be able to deliver enough capacity for passengers to stream subscription services like Netflix in the future," says ElDifrawi.

"That being said, we don't see a point in time in the near future where access to that level of capacity becomes free to consumers," he adds. "So for the foreseeable future, Gogo Vision is a much more affordable way to bring video content to an aircraft."

Launched in 2011, Gogo Vision is Gogo's award-winning streaming video service that lets passengers stream movies and TV shows from an internal server on the aircraft to their own wi-fi enabled devices. And while the Gogo Vision library is vast and features stellar content from most of the major Hollywood studios and indie film purveyors like Miramax and IFC Films, tech-savvy flyers harp that it's just not the same as having unlimited access to the content on their Netflix queues.

Noting that it's still too early to talk specifics, ElDifrawi says that one solution Gogo is considering is a tiered pricing system. "We might offer tiered services, so if a passenger wanted access to the internet to stream videos, they would pay a premium for access to that level of bandwidth," says ElDifrawi. "And if they just wanted to check email and browse the web, there would be a different price point for access to that level of service."

And while that should come as good news to Netflix users everywhere, ElDifrawi suggests that inflight access to streaming subscription services is merely the tip of the iceberg right now, and that the real IFE revolution is just getting underway.

"Gogo's 2Ku and GTO are truly game-changing in that the amount of capacity they will bring to the aircraft opens the door to many different opportunities," explains ElDifrawi. "We are just in the beginning stages of this evolution and we've created a technology platform that will take advantage of increased capacity. It goes way beyond IFE."

Sounds exciting, really. But, as my daughter would ask, "Does it have Netflix?" ☒

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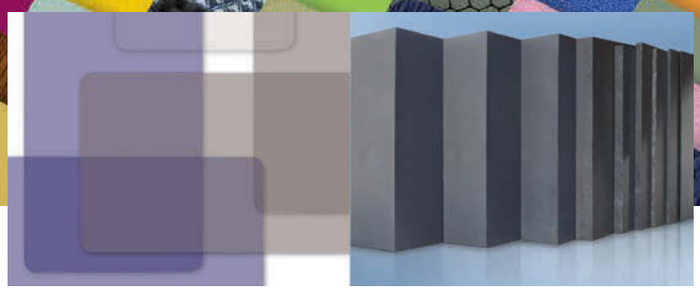

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Air New Zealand is a carrier with a strong culture of innovation and differentiation. Victoria Bamford, aircraft interior manager, discusses the benefits of innovation for the airline and its customers

ADAM GAVINE

From dramatic Hobbit-themed liveries, to ebony Dreamliners, to beautifully produced safety videos, to inflight same-sex marriages, Air New Zealand frequently has ideas that make the headlines. The airline has a sense of innovation that runs far deeper than fun marketing schemes though, with products like the striking Spaceseat and the accessible luxury of the Skycouch offering real quality, comfort and a sense of occasion to passengers.

It all adds up to a distinctive airline. Explaining its aircraft interior strategy, Victoria Bamford, aircraft interior manager, describes it as "bringing something that will make our customers keep coming back to us, something that will deliver an outstanding experience to them, and do it in a really efficient way. Skycouch illustrates that beautifully."

It's an admirable strategy, but transforming innovative ideas into reality is a difficult process. For Bamford, tenacity is key: "There are requirements we have to meet such as flame and toxicity tests, but really we are only limited by our imagination. You need to be tenacious. And you need to innovate, not just for the sake of innovation, but because there's a true need you'll be meeting by realizing those innovations. It is often just simple things that add a tremendous amount of value. Yes it's difficult, but that's probably quite good in some respects. Only the strong survive the innovation process."

Some may say that only the strong can afford the innovation process, but Bamford is confident that "if you're truly giving a customer value, any investment will be worth it."

Given her zeal for innovation, Bamford is an unexpected supporter of the airframer catalogs. "I haven't worked on Airbus programs, so I'm not familiar with its catalogs, but the catalog concept in general is a really great idea," she says. "It was always going to be a challenge [to implement a catalog] and catalogs could possibly create tension because airlines do like to differentiate themselves. But as long as the catalog system also offers an opportunity to step outside of it, then it's a very good system."

So what trends is Air New Zealand keeping track of for its next generation of interiors? "For a long time, horizontal lie-flat seats have been the norm in the premium cabins, and now many airlines are turning all-aisle access into the new norm [Air New Zealand has both features in its Business Premier class]. Also, airlines are looking for opportunities to enhance the experience, not

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> ONE OF THE THINGS THAT ALL AIRLINES ARE LOOKING FOR – BUT HAVEN'T QUITE FOUND – IS THE NEXT BIG THING IN IFE

01

just on the aircraft but also on the ground. This is a great trend because travel should be a package experience, because customers spend a lot of time in the airport and on the journey to the aircraft itself before they have that lovely 'aha' moment when they step onboard. Airlines are putting a focus on lounges and that's great. I also see airlines putting a lot of effort into food and beverage, with trends being organic and fresh produce."

Another key focus of Air New Zealand's creative team is currently the inflight entertainment offer. "I think one of the things that all airlines are looking for – but haven't quite found – is the next big thing in IFE. We're all wondering what it's going to be," she says. [Some hot contenders are in our IFE feature on page 58.]

Current research at the airline has indicated a potential passenger desire though, as Bamford explains: "One thing we have found during our insight process is that there are definitely some customers who really do want to actively engage with other passengers, whether in person or through the IFE system, and that is true whether they are traveling with someone or by themselves. They are really seeking an opportunity to engage with people. That doesn't necessarily mean rocking up to a bar and having a drink and a conversation with somebody – although things like that do exist to give customers the opportunity to make choices – it could also involve the IFE."

Ways to address this trend are being explored, and the airline's decision to install the Panasonic eX3 IFE system on its new B787-9s, with retrofits on its B77-300 and -200s will serve as a good platform for future innovations. Passengers will not be able to engage with people outside the aircraft, though, as the airline has decided against offering connectivity for the time being, citing unreliable satellite coverage on its routes as the reason.

01. The flexibility and value of Air New Zealand's Skycouch has been praised by parents traveling with children

IFE swipes the floor with old system

Air New Zealand is launching a new IFE experience for customers flying on its new Boeing 787-9, to coincide with its first installation of Panasonic Avionics' eX3 system. The airline's creative team worked with Panasonic to create a new graphical user interface for the eX3 system that can be controlled by 'swiping' as well as by pressing buttons.

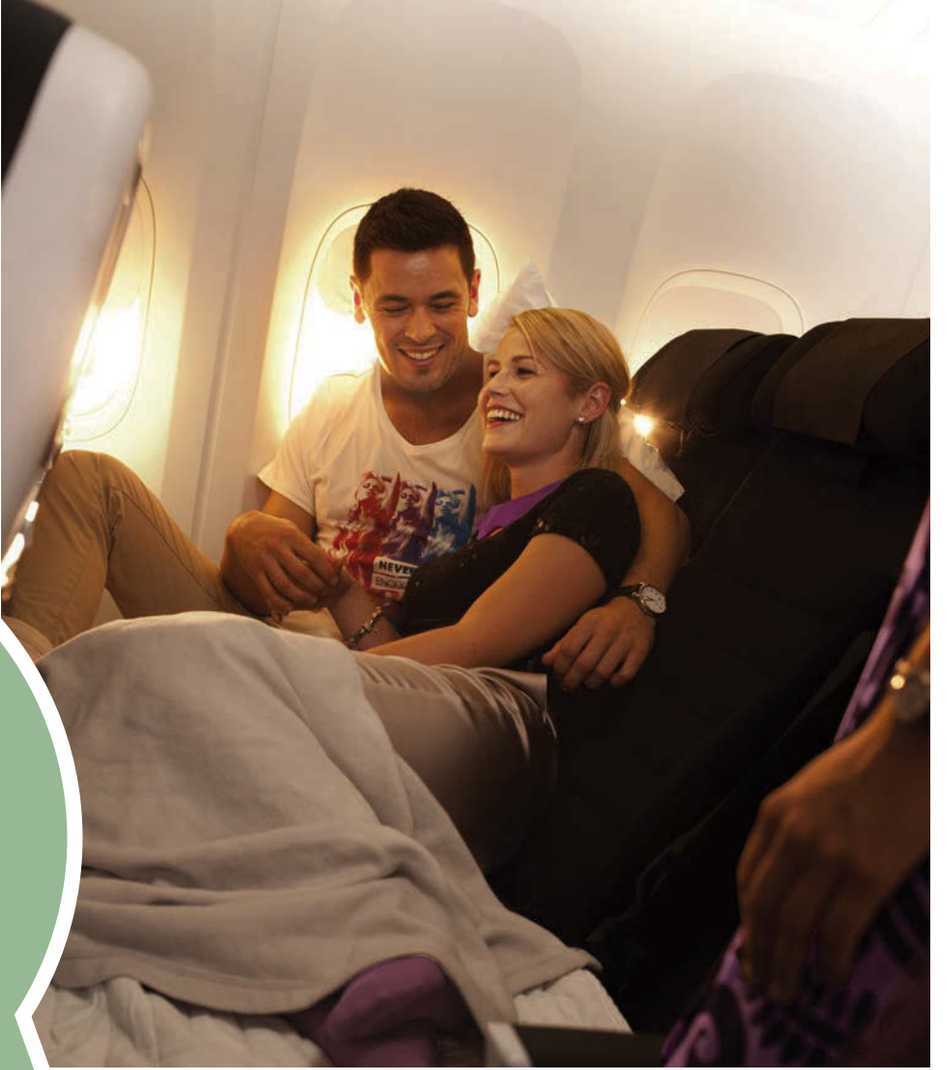
Designed in New Zealand in partnership with Panasonic, the app-based touchscreen system – named Kia Ora after its inflight magazine – is designed to be intuitive, with the aim of making the system easy to navigate, which in turn may lead passengers to delve deeper into the system's more than 2,000 hours of content. Content is also grouped in ways the airline hopes will appeal to its customers, such as genre or gender – categories include 'Man cave' and 'Chick flicks'.

Other features include a simple search system that works across all types of content; a crew call button that lets you specify what you need, from a drink or snack to an arrival document (meaning the crew member only needs to visit the seat once); a TripAdvisor app (an airline first) that lets you research your destination; as well as an option to 'live chat' with the crew, which could be useful if an inquiry is sensitive.

There are also videos that demonstrate the functions of your seat and how to make the most of it. The airline has said that some passengers do not fully understand the functions of the Spaceseat, for example, which will make this function particularly useful when it is made available as the IFE systems are upgraded on the B777-300 and -200 fleet.

02

> WE'RE REALLY PLEASED THAT AIRLINES ARE SHOWING INTEREST IN SKYCOUCH... THE MORE SKYCOUCHES THAT ARE FLYING THE BETTER



03

02. The premium economy Spaceseat, as found on its B777-300s, is another distinctive Air New Zealand product. However, this stylish seat didn't make it onto the carrier's new B787-9 interiors. Find out why on page 10

03. It's easy to see why Skycouch is sometimes nicknamed 'cuddle class'

SKYCOUCH One of Air New Zealand's most famous innovations is of course the Skycouch, introduced in 2011 on its B777-300s. A few triples at the front of the economy cabin are available – if there are sufficient empty seats to allow it – to be purchased for the price of two standard fares plus an additional half fare for the third seat. Flip up the armrests and footrests and you have a cosy couch suitable for two – hence its affectionate moniker of 'cuddle class'. A lie-flat bed (61in x 29in), complete with bedding, at a premium potentially as low as US$300, really is an innovation, especially when the space can also be used for young children to curl up or stretch out on.

Now the product has had some time to be evaluated in service, is it performing well for the airline? "Skycouch is a good product for us. It works nicely in the suite of products we offer," says Bamford. "I can't talk of the financials, but based on what we're hearing from our customers from a satisfaction point of view, it is certainly paying off for us. Families traveling on Skycouch are so grateful to have the flexibility and space it offers. A mother said to me recently, 'You've given me a way of being able to travel and visit my family in comfort.' And it's not just physical comfort but psychological comfort, which is of tremendous value.

"But it is not just a product for families, it is also for couples who just want a little bit of extra space. It gives them some affordable choices within the economy footprint without having to make that step up financially to premium economy. That's why it's so good, and at a 33in pitch it's also a good option in an economy cabin LOPA."

With some carriers considering family areas at the rear of the economy cabin, Skycouch would be ideal for such duties. However, since it isn't solely a family product, and isn't always available or booked, it is going to remain at the front, according to Bamford. "We like to put the Skycouch at a 33in pitch, so finding the right place to put it can be a challenge. When we're not selling these seats as Skycouches, we like to see our high-value customers in them, so we like those seats to be at front of the cabin, so those passengers can enjoy the benefit of the leg rest at 60°, or being able to tuck their feet up in the outboard seats."

The latest Skycouch news is that Air New Zealand has licensed the seat design to China Airlines for use on its B777-300ERs and is currently in talks with other carriers who are considering introducing it on non-competing routes. But will having the product on other carriers dilute Air New Zealand's innovative image? "No, we feel really pleased that airlines are taking an interest in the Skycouch. We're not worried that everyone else has business class or premium economy – it's a package experience. We're really pleased that airlines are showing interest in Skycouch, and now it's in the global distribution system it's becoming easier for customers to buy it, which is definitely a good thing. We are actively talking with airlines about licenses, so yes, the more Skycouches that are flying the better, for all our customers." ☒

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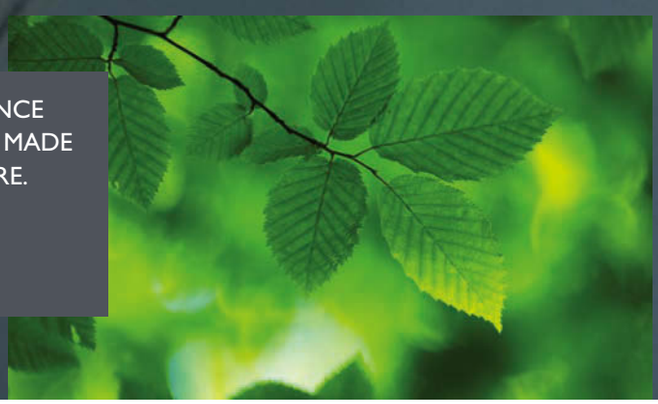

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designintelligence

Airlines and design agencies embarking on new interiors programs must validate their concepts against passenger preferences. However, the process of product testing and passenger preference querying can be time-consuming and costly – and invaluable

MARISA GARCIA

Successful planning of cabin interiors programs must include a validation of design concepts against passenger preferences. The process of this product testing and passenger preference querying can be time-consuming and costly. So what is the best method to conduct trials for an aircraft interior design that would yield the airline a distinct competitive advantage and provide passengers with an enhanced in-flight product?

"Depending on what stage the airline is in when creating product or service innovation," explains Chris Nurko, global chairman of FutureBrand, "the 'fuzzy front-end' approach works well for early idea brainstorming or concept planning. For making decisions about investment, pricing, prototypes, ergonomics or adaptations, a qualitative approach is more useful."

Ben Hayman is head of innovation at Promise Communispace, a company that specializes in innovation consulting and marketing, brand and insight planning, and has conducted some major research for major airline projects, such as Etihad's new A380 and B787 interiors, as well as British Airways' lie-flat business seat proposal in the 1990s. Hayman believes the best starting place for what Nurko describes as "the fuzzy front-end" is to get feedback from the traveling public in large study groups. As Hayman explains, the groups are gathered "to communicate and participate in experiments and exercises" in "collaborative design exercises".

"We begin with a hypothesis on what solutions might best meet the needs of those consumers," he says, "with a really open brief to avoid leading questions. We involve a large base of consumers."

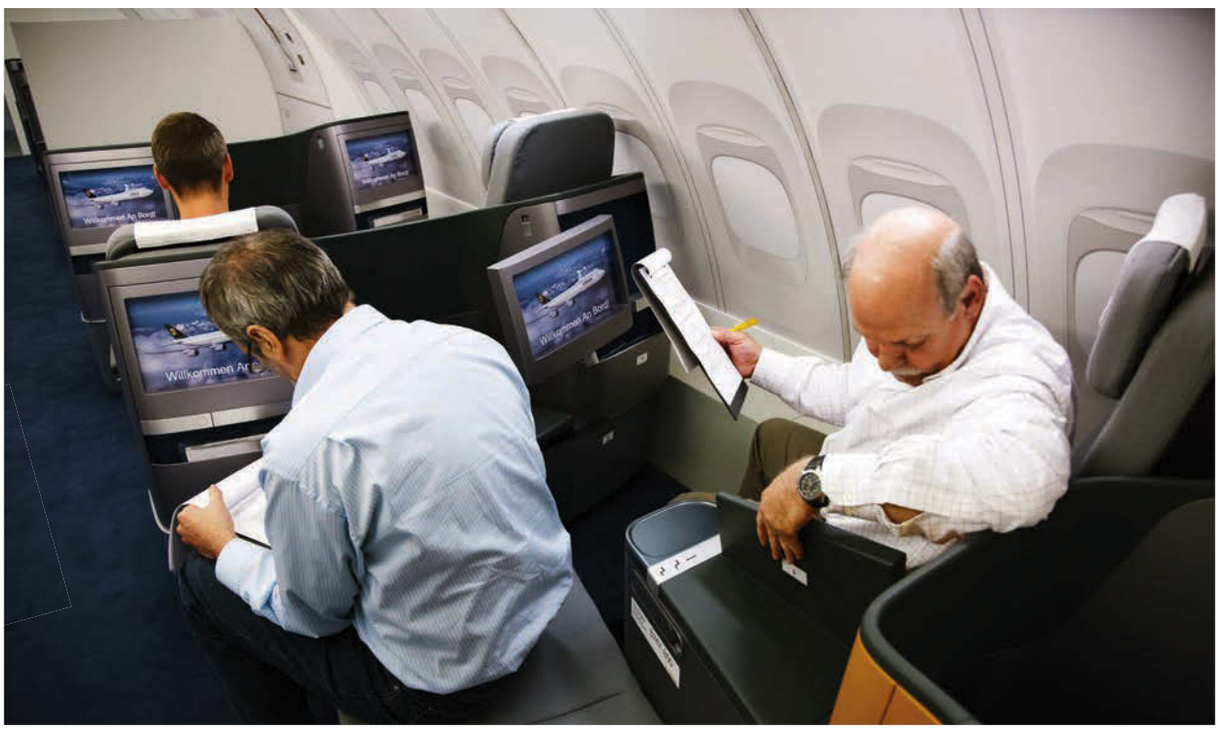
Hayman describes the process as "extremely broad", adding, "We don't just ask product-related questions. We start by finding out about the consumers: their lives, the products they interact with everyday. We do contextual trials, observing how they feel in a particular related environment. It can be going to a hotel or a restaurant, seeing what works for them there, or on another form of transport. It can be as simple as going to a sofa shop and finding out what they like."

To Hayman, the importance of this approach is that it creates relationships between the airline, the designers and the consumers. "With this open process you don't know where it will lead you. There are no preconceptions, no leading questions, no bias introduced."

Ben Orson, managing director at JPA Design, also cautions that being mindful of bias is critical to the success of a study. "You get out of studies what you put into them. It's important to be careful not to introduce a bias, to ensure the data gathered is valuable," he says.

Bias, introduced by the study or inherent in the passenger, is a factor that concerns Blake Emery, director of differentiation strategy at Boeing, when formulating and conducting passenger studies. "For new ideas," he says, "a


NY
WHAT IS YOUR OPINION?
DO YOU PREFER OPTION A, B OR C?
WHICH IS YOUR PREFERENCE?
FREQUENT FLYERS
NY



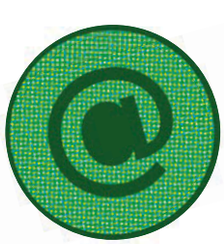
01. Lufthansa brought in valued frequent flyers to give feedback on the mock-up of its new business class product

> GAUGING THE PREFERENCE OF THE FLYING PUBLIC IS AN EXPERIMENTAL PROCESS

survey is worthless because it forces you to ask a direct question. Direct questions can be leading questions."

Emery believes this is due to an unavoidable human factor: how our brains function. "Once you give the brain a question, it comes up with an answer. An unanswered question is like an open loop for the brain. It wants to resolve it. The problem is that the answer may not have any basis in reality. Take, for example, figures that say that 26% would pay to have an empty middle seat next to them. Saying you would pay for a feature is very different from actually paying for it when you book. When it's a concept on a survey, it's easy to say 'Yes'."

Emery also points out a different psychological dynamic that can skew survey results, reducing their value. The problem lies in the questions themselves: "Some responses to questions may simply be facetious if the participant feels the question is ridiculous," Emery says. "Take a survey that asked whether passengers would prefer not to pay baggage fees. You'd think the answer would be 100% 'Yes'. Who wants to pay baggage fees? But there are always a few who respond the opposite way, not because they want to pay fees, but because they didn't consider the question serious and may just have responded accordingly."

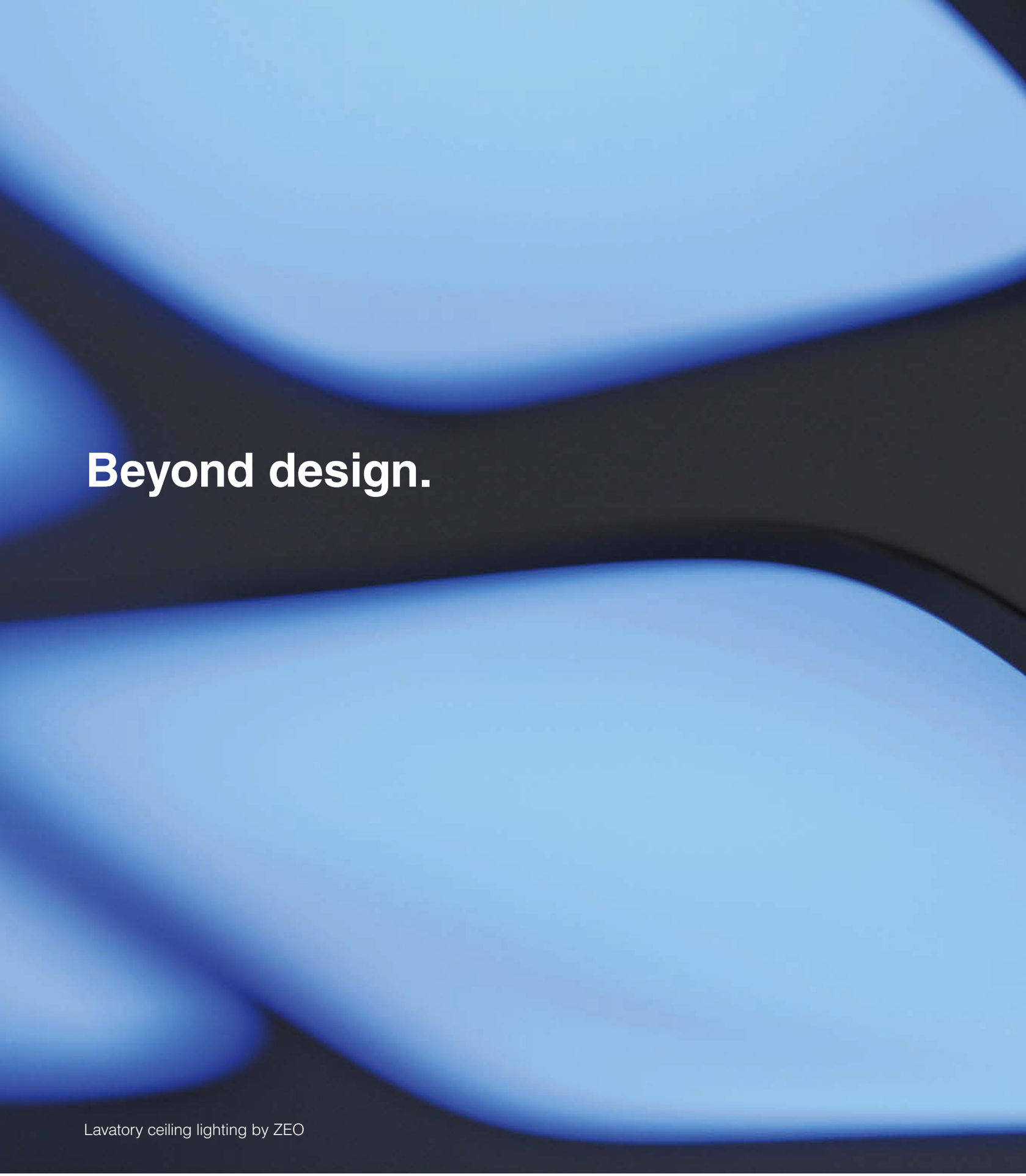


Emery also questions just how qualified consumers are to answer questions on their preferences. "As consumers, we don't know why we make consumer decisions," he explains. "We think we do, but we don't. There are a lot of factors that go into our decision making, some of which we are not aware and couldn't reflect in a survey. That's why we try to avoid question-based studies."

FutureBrand's Nurko also recognizes this disconnect between our stated desires as consumers and our true drivers for product selection when it is time to buy. Further, he points out that the imagination of consumers may not be open-ended, that the ideas proposed are more based on preconceptions of what is possible. "To ask a consumer to create new or unknown innovations is tough – they can't articulate or imagine what they don't know they want or need. They are often constrained by today's paradigm or lack of knowledge as to what is possible or potential," Nurko says.

Hayman's perspective differs on this point, at least with regard to the creative phase of the study. "With open studies the ideas will always be relevant, he suggests. "You can start with pie-in-the-sky ideas, but the test process allows those ideas to be validated."

Validating those creative ideas, in Emery's experience, requires careful structuring of the studies. "Gauging the preferences of the flying public is part of an experimental process," he suggests. "It has to follow a scientific method. For example, when we want to test the impact of cabin pressurization or air-filtration systems or windows, we develop models, with small incremental changes applied until we can identify whether or not a change had a marked effect on the test participants' experience. Once we make that small change, and we note a difference in the answers the participants give to repeated questions, we can know whether something we did was important in improving the passenger experience. It's a process of slight manipulation of the conditions, making small changes and asking repetitive questions to see whether something triggers a change in the customer response."



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Hayman recognizes that our natural tendency to respond to trials in a particular way presents challenges to the study process. He suggests that these factors are less relevant during the creative design phase of a passenger preference study and belong more to the final decision phase – when selecting which, among the many creative suggestions generated, should move forward. This, he believes, is ultimately the client's domain.

"One of the most difficult things to do is to get into the psyche of the buying moment," Hayman says. "Decisions made by the consumer at that time are contextual, driven by the day, the market, perceived value… a number of factors. It is possible to volumetrically test concepts in this manner, but it is highly complex. We do ask people to think about pricing, but it's more an art for the business, as the client decides how to best resolve this issue."

GATHERING GUINEA PIGS Any trial requires a pool of participants, and gathering those participants can not only present a challenge to those organizing the trial, but also has the potential to skew the results. Nonetheless, many trials in the aircraft interiors industry are based on an airline's existing database of frequent flyers.

Unfortunately, loyal passengers' urge to help may not be as helpful as we think. Emery cautions against limiting studies to the airline's database of frequent flyers precisely because they "may actually enter the study predisposed to give particular answers". He suggests that frequent flyers may "have some predisposition to evaluate the product in a particular way", making their feedback less reliable.

However, Emery recognizes that there are valid reasons for many airlines and their designers to resort to this existing pool of trial participants. "For airlines, frequent flyers are the most efficient way to get a lot of feedback from their customers," he states. "It's easy to send out a survey to those frequent flyers in your airline's database to get feedback for the product. But you have to factor-in the frequent flyer predisposition."

As an alternative, he suggests selecting a more neutral pool, less likely to enter the study with preconceived notions. "For some studies we use road warriors, for others we use naïve subjects. For example, we did a study in India where 50% of the participants had never even been on an aircraft."

Seattle-based design agency Teague has recognized the need for that neutral pool, and spearheaded an effort to improve the pool of participants available to evaluate design and prototype products for the aircraft cabin. Teague's new Flying Aces program gathers a wide base of potential test subjects from product users around the world, who are available to provide feedback on a variety of programs and products – on demand.

Julie Anne Séguin, a design researcher at Teague, explains that this group consists of travelers and crew who

> LOYAL PASSENGERS' URGE TO HELP MAY NOT BE AS HELPFUL AS WE THINK

central intelligence

Our experts offer some sage advice that can help deliver valuable and relevant research:

Chris Nurko, global chairman, FutureBrand: "The more strategic and important it is to create a breakthrough product, the more creative and brave the client must be. And the more structured and rigorous you must be in planning the approach and process/ methods. Clients must be involved!"

Ben Hayman, head of innovation, Promise Communispace: "Flip the idea of testing on its head, giving consumers a blank slate to work on, empowering them to create solutions rather than just answer questions. And have the designers present to observe and be inspired by that feedback from the consumers."

Blake Emery, director of differentiation strategy, Boeing: "One good way to get into people's brains is by having participants write about experiences, then trial those factors via experimentation factors that seem promising. That will give you a guide as to what factors determine a preference."

Ben Orson, managing director, JPA Design: "One of our directors specializes in consumer research, so we always have the capability in the firm, but on particularly large programs we may bring people onboard who specialize in consumer research. Full-time practitioners of consumer testing can help structure the study. The methodology must suit the type of data you want to gather."

Chris Nurko: "Concept trials can be used to discover opportunities, pain points, dissatisfaction or competitive disadvantages. Ideation is used to envisage ideas, alternatives, features and attraction. Prototype trials test assumptions, utility, functionality, relevance and practicality. And finally, evaluation trials test preference, value, ROI, sustainability and differentiation."

Blake Emery: "At our Passenger Experience Research Center, we ask people taking the tour of the Boeing facility to give input on their flying preferences. It has been pointed out that a bias exists because the subjects are people who have an affinity with flying or with Boeing since they're touring the Boeing facility – but if everyone has the same bias then it makes no difference to the data gathered. It's a common denominator."

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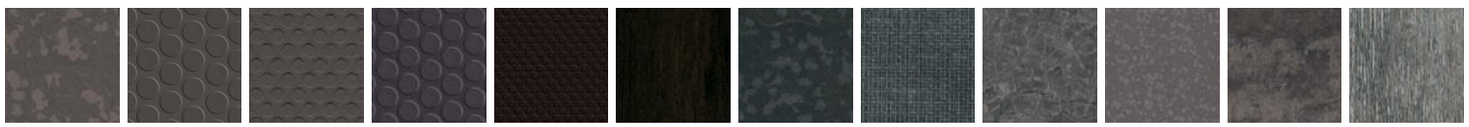

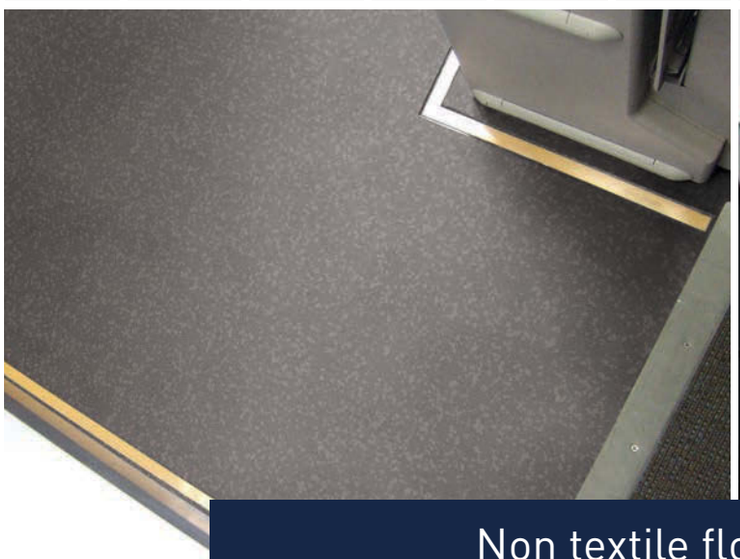

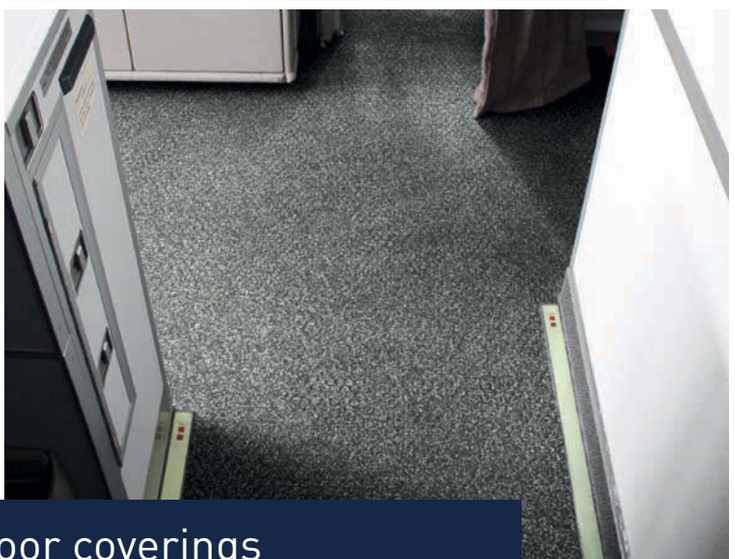

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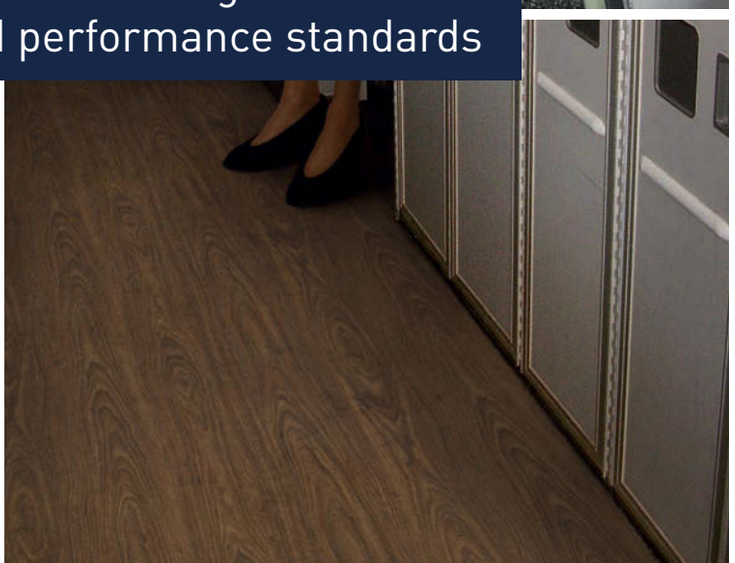

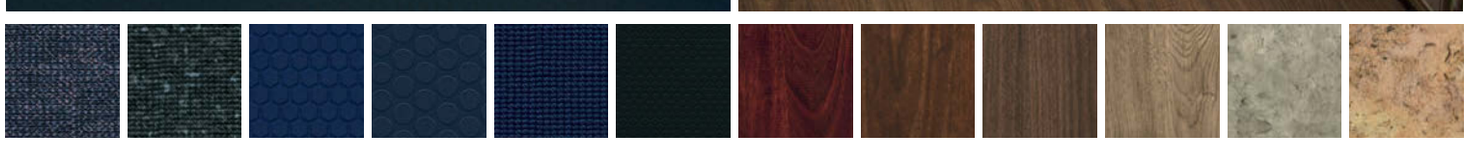

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resident experts

Etihad did not take the bold step of specifying the Residence – a private suite with bedroom and shower room on its A380s – without making absolutely sure it was a feature its target customers would want to use and be willing to pay for.

The Etihad Design Consortium (EDC) brought in brand and insight planning specialist Promise Communispace to help find out what travelers from around the world wanted from their passenger experience. As Ben Hayman, head of innovation at Promise Communispace recalls, "The Etihad study was five months of working with Etihad hand-in-hand, as part of one team with the EDC. It was a co-creative approach and provided us with a lot of valuable information. It was then a matter of determining what made sense for the business. Applying design decisions based on this customer feedback was an iterative process of developing ideas using the passengers as inspiration. Creativity is ideally fostered by such an approach. Putting together the strengths of Etihad's team, the EDC team and the consumers yielded an ideal platform to generate creative tensions, with different ideas inspiring the team."

In a series of two-day workshops – the Etihad Big Talks – held in New York, London, Sydney and Abu Dhabi, people from a range of backgrounds were brought together to discuss travel. Etihad's frequent flyers were also included, as were top-tier flyers from competitor airlines. Participants were split into groups and given a space to delineate the cabin footprint of a given class, and invited to demonstrate their ideas using materials such as cardboard and tape. The events weren't expected to provide actual solutions, but they did provide some valuable direction.

voluntarily sign up to be part of studies whenever they are required. "Flying Aces came out of a need for upcoming projects," she says.

As Séguin explains, this pool of subjects adds value to Teague and its customers. "We need dialog to make sure designers have quick access to people who would be the end users of the product." The dialog carried out with Flying Aces gives Teague a broad perspective from a variety of candidates who experience the aircraft cabin, including crew. "We want to make sure every product is ideal for the users – the passengers and the flight attendants."

Participants in Flying Aces sign up by first taking a quick online survey, which allows Teague to generate a database of potential trial participants. "We're able to look in the database," Séguin tells us, "establish the goals of the study, and select the participants from the pool."

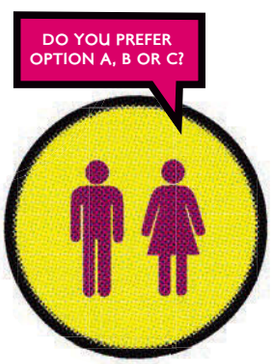
Any predisposition of participants is neutralized by their random and voluntary participation, and also because the survey serves to qualify the participants for membership in the Flying Aces program, with questions more specific to the project under review asked later, once the study is organized. The survey results do not, therefore, form the sole basis of the insights Teague gains from its Flying Aces. "The survey is only a first step. Through the survey, we develop the test market to test potential developments," Séguin says. "We have participants signing up from all over the world."

Teague queries the Flying Aces pool for a number of programs with different objectives. "Sometimes we get big-picture insights from Flying Aces, then give that to an airline," Séguin adds. "Other times we work with an airline directly on a specific project in an iterative process. We always have project-related goals, and align questions with that project."

Nurko also mentions the value of reaching out to a greater and more diverse pool of participants. "Co-creation and crowd source research has a role, particularly for loyal users, communities and specialists." He recommends that airlines consider tracking feedback to their brand on social media more closely, as an alternative crowdsource strategy. "In social media, you can get very good opinion and preference insights, tracking and validation. And this should involve external and internal audiences."

"We believe a co-creative and multi-stakeholder approach, with mixed techniques and methods, creates the most effective creative and future-oriented ideas and outcomes," Nurko continues. "For innovation this is vital. We don't undertake pure preference studies, but prefer to use independent experts – especially if it is to research our work. We have to be neutral and remain open to understanding and adapting."

Outside feedback is invaluable, but Nurko emphasizes that getting feedback from in-house stakeholders is vital to



> CO-CREATION AND CROWD SOURCE RESEARCH HAS A ROLE

ILLUSTRATION BY ANNA DAVIE

> ON ANYTHING THAT INVOLVES CHANGE, CHECK WITH THE LOYALISTS EARLY ON

the ultimate success of any product or branding initiative. "On anything that involves change, or something highly emotive – which brand, logo and design often is – check with the loyalists early on. And that means the CEO/owner and their loved ones, friends and family – that group can often be the 'show stopper' that no focus group or junior research analyst can predict or foresee."

METHODOLOGIES Nurko puts stock in ethnography and user experience immersion studies, stating that they are "more aligned for prototype and tangible features and usage research". He also suggests that, "Envisioning and projection or lateral user studies are perfect for concepting and future mapping."

"The methods," he explains, "need to be tailored depending on whether the client is looking to understand or to make a decision. Too often, research is used poorly in place of ideas, decision making or business focus. Good techniques involve projection (imagination), synesthetics (using senses) or design-and-build prototypes."

Emery recommends simulations. "You can use controlled simulations effectively. For example, if you simulate an environment to test cabin pressurization, you can reliably assume that the results will be similar in the cabin." But he advocates "a scientific approach, beginning with a hypothesis and then trialing experimentally".

"For example," he says, "we had feedback that 42% of passengers would prefer dedicated bin space. Of course, if every passenger had dedicated bin space then the bin space available to all passengers would be smaller, but trial survey participants cannot relate to such repercussions. By asking participants to bring whatever they would normally pack for a trip and actually simulate baggage loading, they can actually see the results of changes to the product."

Hayman points out that passenger studies are key to guiding the design process, and for "relevance, buy-in and to foster creativity".

Meanwhile JPA's Orson still sees value in surveys. "Sometimes web-based surveys can be helpful, because the sample size can be enormous." But, he adds, "The majority of our studies are based around physical prototypes. These can range from simple spatial mock-ups to complex fully functional prototypes."

The prototype phase presents its own challenges for airlines and aviation designers, because of the costs involved and the practical limitations of creating the mock-ups required.

As Orson explains, the initial costs of can be recovered over time. "Developing a full mock-up can be relatively expensive, but it can also be extremely valuable. It can be used not just to trial the product in real conditions, but also for marketing and staff training afterward."

Orson points to the great value of physical mock-ups in a number of design projects JPA Design has carried out. "There are some sophisticated CAD and virtual testing programs in the market," Orson adds, "but there is nothing that yields the quality and breadth of feedback and the confidence in an idea that is afforded by direct human engagement with a physical mock-up."

Boeing conducts extensive studies on its products, through prototypes and models. Emery says, "We test all interior ideas as thoroughly as we can before they go into revenue service. And of course, ideas are thoroughly tested according to all safety and reliability factors."

Emery also points out a key limitation for final product trials for the aviation industry, compared with other industries, is that waiting for the entire aircraft to be completed prior to moving forward with testing is not practical. For this reason, mock-ups play an important part in the trials process for aircraft interiors. "You want to carry this out in a way the industry can afford," he says, "and building mock-ups makes testing feasible."

But, as Emery points out, the results of all these studies must be ultimately be validated after the product is in service. He concludes, "One of the things we try to do, and it's very important, is conduct inflight research to verify the results of preliminary studies. It's the best way to know whether all the marketing promises came true." ☒

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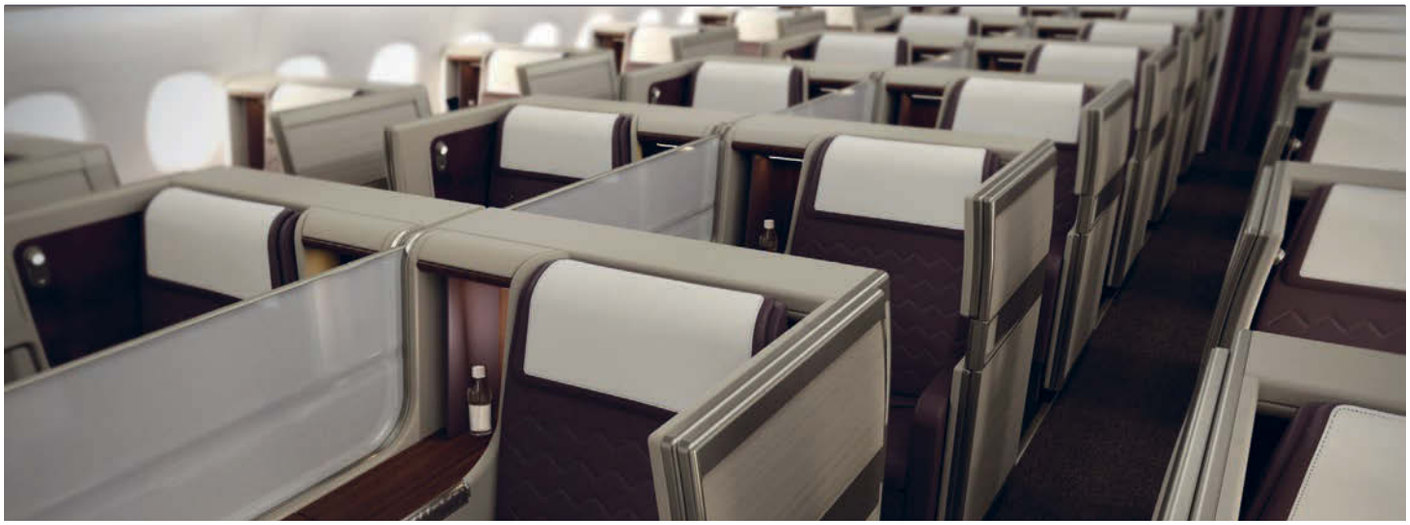
An intelligent approach to design



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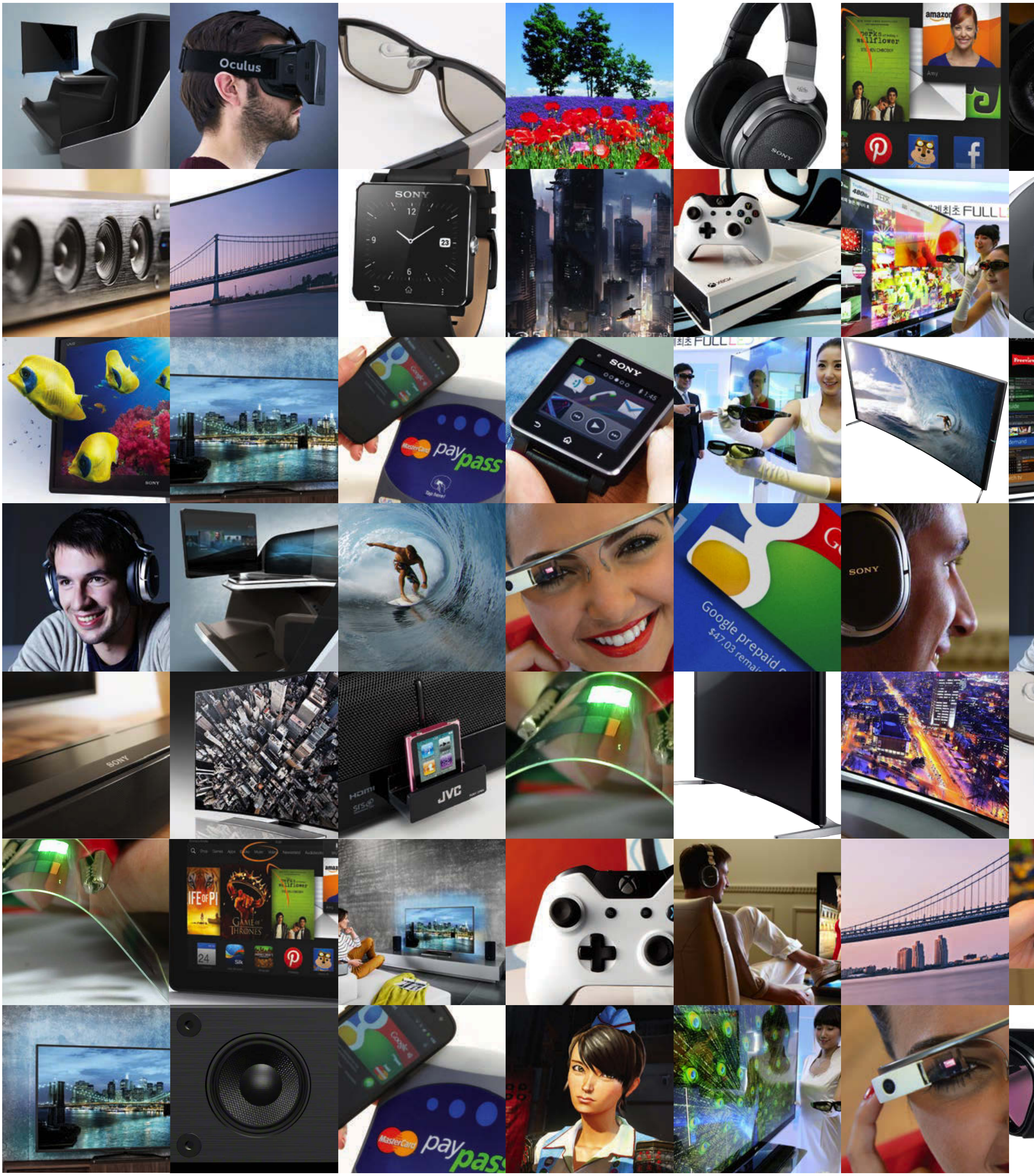
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comingsoon

The next generations of IFE hardware are already being tested by millions of people in their living rooms. As the success of home entertainment technologies ultimately drives the IFE technologies we see on board, which are looking like the strongest contenders?

Consumer behavior and consumer experience drive passengers' expectations of IFE systems, especially as carriers strive to create a home experience in the air. However, the difficulty of leveraging consumer products in the air is their much shorter lifetimes compared with inflight products – 2-5 years, versus 7-15 years.

This is where analysis of the latest home entertainment technologies – and the technologies still being developed for that market – is essential, in order to have similar technology ready for IFE application when it proves popular, allowing for the longer development cycles of aircraft hardware.

Take a look at some of the latest home entertainment technologies – and a couple that are ahead of the curve – and whether IFE experts from Thales, Panasonic and Lufthansa Systems predict them being used in the next generation of IFE systems. ☒

01. Brett Bleacher, Thales
02. Steve Sizelove, Panasonic
03. Dr Jörg Liebe, Lufthansa Systems

ULTRAHIGHDEFINITIONTV

The latest UHD display technology – available in both 4K and 8K resolutions – compares well with the already impressive 1080p displays, with 4- to 16-times higher resolution, better contrast ratio, improved color spectrum and higher frame rate.

STEVE SIZELOVE, CORPORATE STRATEGIC INNOVATIONS, **PANASONIC AVIONICS**
We absolutely see this coming to the IFE market in the very near future, first in premium seats. There are three issues that remain to be addressed: the first is content availability; the second is compression techniques; and the third is panel availability. In time, the content problem will be resolved, as it has with every other new standard. The compression techniques issue is important with respect to content storage and content distribution throughout the cabin. New standards such as H.265 will help to resolve this issue, and Panasonic is developing solutions based on these standards. Although size selections will be limited at first, the challenge of panel availability will tend to resolve itself once general adoption in our market and in terrestrial markets increases. We believe this will penetrate our market within two years.

BRETT BLEACHER, DIRECTOR OF ADVANCED TECHNOLOGIES AND R&D, **THALES AVIONICS IFE**
UHD helps to create the immersive viewing experience, because with 4K, you are supposed to view it from around half the distance you would a 1080p display, so it takes up more of your peripheral vision. This is particularly good as seat pitches are getting smaller while IFE displays are getting bigger. But UHD is not just about improved resolution – it also displays more of the color gambit.

DR JÖRG LIEBE, CHIEF INFORMATION OFFICER, **LUFTHANSA SYSTEMS**
The ability of most IFE screens to benefit from increased resolution is limited by the size of the screen. At some point, HD will reach a level at which it cannot be differentiated on a small screen. What is perhaps more meaningful for IFE screens – particularly smaller screens – is High Dynamic Range (HDR), which isn't so limited by screen size. With regard to 4K/UHD in IFE, the greater the resolution, the higher the security requirements. An airline using 4K and UHD systems risks losing the availability of Early Window Content unless systems have more robust content security.

CURVEDOLED

Not having a backlight means OLED displays are ultra-thin and can show rich, deep blacks. The latest development in OLED is a curved display, claimed to reduce distortion and add immersiveness as it takes up more of your peripheral vision, creating an IMAX-like experience in miniature.

LIEBE, LUFTHANSA SYSTEMS For the small screens in an aircraft, the virtue of curved screens is not obvious. On the other hand, OLED technology represents a possibility to reduce the power consumption of displays. In addition, OLEDs could be used to cover ceilings and wall panels, opening the potential to create new passenger experiences. For example, the ceilings and walls could depict the destination city and show live images of TTOL.

SIZELOVE, PANASONIC Panasonic is actively developing solutions that utilize curved display technologies. These technologies will open doors for new experiences – not just in general viewing, but as the technology matures, it will offer solutions for the wider cabin environment as well. For general viewing (IFE monitors) we should see market penetration of curved displays in two to three years – perhaps sooner. Other adaptations will take a bit longer.

BLEACHER, THALES Curved displays would be suitable for premium cabins, but not for the economy cabin, as the monitor would have to be deeper to allow for the curve, while we're trying to make economy monitors thinner.

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tablet time

Lufthansa Systems has developed a way to introduce common-off-the-shelf tablet technology as a seatback display, which will be showcased for the first time at APEX Expo 2014 in Anaheim. The company says that this design will enable the airline industry to use the newest off-the-shelf display and tablet technology, with almost the same development cycle and price as the consumer arena. This will also enable airlines to recreate the home entertainment experience for their passengers on board.

3DTV

Whether active shutter or polarized systems that require glasses, or autostereoscopic systems that don't, 3D created a stir in the consumer market. However, as sales of 3D TVs have gone into decline, has the market decided that the technology is best reserved for movie theaters?

SIZELOVE, PANASONIC 3D is likely to remain as a novelty for theatrical experiences, and isn't likely to take to the mainstream until we can enjoy it without eyewear. We also believe that studies need to be done to evaluate motion sickness. We had some customers who were very interested in this technology as we have monitors that can support 3D, but none of our customers have followed through. We don't predict adoption by our industry in the near term.

BLEACHER, THALES 3D is pretty much dead in home entertainment – it's only really alive in movie theaters. In fact I think a couple of TV manufacturers have decided to completely dump 3D. 3D is no more, and 4K has taken its place.

LIEBE, LUFTHANSA SYSTEMS A couple of years ago, the APEX Technology Committee took a close look at 3D in IFE, and interest has waned. The biggest issue with 3D in IFE is that 3D requires a particular viewing angle – one that isn't easily accessible in most economy seats. Therefore 3D is more likely to be a premium cabin product than an economy cabin product. With premium passengers sitting in a defined space in front of the screen, that opens up opportunities for a 3D experience without glasses. Again, that would depend on the availability of content and devices. So if the 3D market grows in the consumer space, it can certainly be implemented in IFE.

The Sony Vaio L multimedia PC can convert 2D movies into 3D

The Kindle Fire HDX is the first consumer device to feature Quantum Dot technology

otherdisplaysystems

Our experts' opinions on other display technologies that are set to enter the next generation of home entertainment systems, including Field Emission Displays (FED), Surface-conduction Electron-emitter Displays (SED), Dolby Vision, and Technicolor HDR.

SIZELOVE, PANASONIC We are continuously evaluating new display technologies for things like better power management, higher resolution, and better viewability. We have developed solutions aimed at improving brightness and contrast, and some will be working their way into our product line very soon. Unlike some technologies, these improvements won't hit the industry as a 'Big Bang' but instead passengers will see incremental improvements in eye strain, viewing fatigue and general viewing pleasure.

BLEACHER, THALES The Society for Information Display (SID) is pushing Quantum Dot [Quantum dot displays can emit light in specific gaussian distributions, which means that colors the human eye can perceive are accurately rendered]. Color gradations will be vivid, but Quantum Dot is still expensive and is hard to create. It's like OLED technology was 10 years ago – expensive, experimental and high end – but eventually the technology will improve and become cheaper. What is incredible is that after all these years, when everyone thought LCD technology would die, manufacturers keep making major improvements which mean it is still king.

LIEBE, LUFTHANSA SYSTEMS Technicolor's HDR, as well as Dolby Vision – both increase the dynamic range, meaning increased brightness and more colors. Both Technicolor HDR and Dolby Vision can be used with 4K and UHD, but can also be used with HD. HDR and Dolby Vision do more to enhance the viewing experience than 4K or UHD. Technicolor is lobbying MPEG to include its HDR in the HEVC spec, and if that is how HDR enters IFE, then it's two years or more away. SED and FED are both technologies that realize a thin, flat display with CRT-like qualities of fast response time and high efficiency, brightness and contrast ratio. The market direction for both technologies is the large-screen HDTV. Primarily, fast response times and a high contrast ratio are the reason why FED/SED technology seems to be making a comeback for HDTV. However, OLED has similar features and may be the technology of choice.

VIRTUALREALITY

As VR technologies continue to advance, could passengers soon be able to make every flight a dream journey?

LIEBE, LUFTHANSA SYSTEMS There are high expectations at the consumer level for virtual reality. Facebook paid US$2bn to acquire VR firm Oculus, and there seem to be promising opportunities for VR in IFE. This may be one of the ways to overcome some of the physical limitations of the aircraft cabin with regard to viewing angle, screen size, and distance from the screen. But VR seems to be far into the future from an IFE perspective. Wearable technology, like VR headsets, holds a lot of potential in the future for IFE. While there are issues about how to address passengers wearing VR headsets, there is no difference between having headsets as part of the IFE system and passengers who already wear such headsets as personal entertainment devices during flights. Again, once VR goggles become a widespread consumer feature, they are going to be available within IFE systems – delivering information and content as well as giving additional options to passengers using these headsets.

SIZELOVE, PANASONIC The products coming from companies like Oculus are technically very capable and, as evidenced by their acquisition by Facebook, offer compelling possibilities for uses related to gaming, social networking and more. Mainstream adoption in our market doesn't appear likely at the moment as the experience – while incredible – can also be disorienting, fatiguing and overwhelming for many. When coupled with a moving platform like an aircraft, we are concerned that these effects could lead to unpleasant experiences such as motion sickness and headaches. We believe that more research is required here, and we will continue to explore and identify tangential things that could be relevant for our market as a whole instead of VR goggles.

BLEACHER, THALES VR headsets are getting better and cheaper, but the problem is the delay factor between what you feel and what you see. NASA has been looking at VR technology for astronauts, but they have found that if the body doesn't feel what it sees, then you get unpleasant side effects.

Facebook has invested US$2bn into acquiring Oculus Rift's VR technology

HDaudio

High definition isn't just an ever-heightening goal for the visual experience; it is also being developed to improve the audio experience.

LIEBE, LUFTHANSA SYSTEMS With new consumer devices like the Kindle offering Dolby Digital Plus, consumers are carrying around audio capabilities that often exceed the capabilities of the audio in the content being delivered. While Intel offered an HD audio spec in 2004, Sony has been pushing high-resolution (HR) audio since 2013 – although the Consumer Electronics Association (CEA) doesn't have a specific definition for HR audio. In IFE, there has always been a stand-off between quality and storage, and in IFE, storage usually wins. Therefore, high-efficiency audio might be considered in IFE before HD audio or HR audio. Having stated that, we are going to see the limitations of storage/storage space diminish, and at the same time we are going to see new methods of delivering content onto those storage spaces in the aircraft becoming much more efficient and automated. This advance will enable both higher definition content, and a weekly or even daily update cycle. Given the level of ambient noise inside an aircraft, the question is whether the benefits of HD audio are perceptible in that environment. And we still deliver movies in IFE with composite dialog/music/effects tracks versus separate DMEs with dynamic range adjustment.

SIZELOVE, PANASONIC Panasonic introduced HD Audio earlier this year. With these headsets, passengers benefit from sound quality that is free of clicks, pops and interference; digital surround sound; a passenger-controlled equalizer; noise cancellation; Bluetooth integration with other devices; seat to seat, seat to ground and multipassenger voice calls; and the ability to converse naturally with a flight attendant or other passengers without having to remove the headphones.

HOLOGRAPHIC VISION

Looking further ahead, could holographic technology be developed to have a role in the aircraft cabin or IFE system of the future?

SIZELOVE, PANASONIC Holographic vision is a novelty that requires a very complex ecosystem to make possible without glasses. While it's certainly easier with 3D glasses, there are a range of other issues to overcome, such as people not wanting to wear them. As there is currently no compelling business or use case, holographic vision is not a priority area for our development plans. We will continue to track developments closely and explore use cases, but we don't anticipate true adoption in the foreseeable future.

BLEACHER, THALES We are still researching projected holography. I have had issues trying to implement such systems as they need a lot of depth in the device – around 15in – and we didn't really get enough interest when we showed it to people. So the only place I can put such a system is in a first class seat pod. Holography is cool and has a wow factor, but we need to improve the technology. We need better resolution and we need it to operate in a high-light environment. In a dark environment it looks good, but in a high brightness area we have issues. We're still looking into projected holography, but it's on the backburner in terms of R&D. We have also been looking at projecting an image of a flight attendant into the cabin to perform the safety video, but it will probably take 10-15 years to get to the point when it is ready. We're researching it, but I think we need to let technology catch up before we can implement something that will be really effective in the cabin.

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SPATIAL 3D SURROUND SOUND/DIRECTIONAL SOUND

The manipulation of sound is becoming popular in home theaters, whether through soundbars that fool the ear, or directional sound that beamforms sound toward the viewer so they can enjoy a movie without disturbing others – and without headphones. What audio technology could enter the cabin environment?

SIZELOVE, PANASONIC We've been evaluating and even developing directional sound since 2003. Our investigations continue to lead us to the conclusion that directional sound is not ideally suited to the cabin environment – or at least not as a primary solution for audio, although use cases are being considered for ancillary audio solutions. Issues that currently inhibit widespread adoption as a primary audio solution include volume, reflection, distortion, dynamic range and installation complexities, not to mention cost. We believe there is a possibility for ancillary audio in the next five years, but we don't see adoption as a primary solution for at least 10 years or more.

BLEACHER, THALES 3D spatial surround sound uses 5.1 surround sound simulation to phase-shift sound from two speakers so it seems like sound is coming from in front or behind. We're doing that already with headphones, but we could apply it to a seat system. We have been working on directional sound, where you beamform sound to your ears, but it needs more work, especially as it is currently only capable of stereo. Directional sound is usually used in a situation where speakers are positioned way in front or above the viewer (for example, in the cabin ceiling). We will pursue directional sound, but in the interim we have developed 3D spatial sound concepts with speakers built into the headrest, closer to the ears. It's a bit like a soundbar which only has a few speakers, but produces 5.1 3D surround sound. When the technology improves and speakers get smaller we may be able to put spatial surround-sound in coach, but the environment is more compact and could create crosstalk issues.

LIEBE, LUFTHANSA SYSTEMS There seem to be very interesting opportunities utilizing directional sound. One could create sound walls and sound spaces to differentiate various areas of an aircraft, i.e. cabin seating compartments, servicing areas, common areas, and lavatories. Ultimately, it depends on the product an airline is going to deliver to its passengers and how they want to differentiate it. IFE systems are going to provide the required architecture which enables the delivery of content to various directional sound speakers to create the desired effects.

wearabletechnology

As wearable technologies such as Google Glass and smartwatches are poised to become the Next Big Thing in the consumer electronics world, how will they influence the aircraft cabin?

SIZELOVE, PANASONIC We see a number of use cases in our industry throughout the 'bed-to-bed' travel experience. Adoption of wearable devices such as fitness sensors, bio sensors and smartwatches continues to grow. These devices offer valuable services to the user and – importantly – can be worn and used inconspicuously. Adoption of devices such as smartglasses is slower to catch on, primarily due to cost and the cyborg effect. In time, design solutions will diminish this problem. We believe that wearable devices will have an impact on the travel experience and IFE in general (passenger and cabin/ground crew), which is why Panasonic takes opportunities to make our systems capable of enabling future device interaction. Widespread adoption will be limited in our industry, not just by general consumer adoption, but by infrastructure as well. Wearable devices won't work to their maximum potential without widespread, interconnected sensor networks and meaningful, accepted Big Data solutions. This means NFC, Bluetooth Low Energy, global communications networks and reputable data management. Once these are in place (home, auto, hospitality, airports, aircraft, etc), we believe the use cases and market for wearables will grow.

Virgin Atlantic is trialing Google Glass

BLEACHER, THALES We're looking at wearable technology. It is related to the Internet of Things where people will want to connect to every device around them. It won't be in our next IFE system, but in the two or three systems following that, we will have an option to interface with smartwatches or fitness bands so you can monitor health or other inputs through the IFE system. Having all these small wireless technologies will be a big challenge to the IFE industry though. Do you want them all connecting and trying to parse data? You don't want to be overloaded with data.

NFC

As Near Field Communication (NFC) advances, enabling devices to communicate with each other, new opportunities are being opened up in the cabin.

SIZELOVE, PANASONIC NFC technologies have matured, as evidenced in hotels and point-of-sale terminals. NFC implies a very specific technology with fairly specific implementation criteria. We prefer to refer to this technology as 'proximity sensing', and we believe it will have a place in our industry relatively soon. The questions that remain to be answered center on choosing the most apt solutions for the anticipated use case scenarios. The adaptation of Bluetooth Low Energy (BLE) and the proliferation of devices like iBeacon show that the sector is rapidly evolving. Panasonic is leveraging internal and external resources to develop solutions, and we believe there will be entry-level adoption of proximity solutions within the next couple of years.

LIEBE, LUFTHANSA SYSTEMS NFC and BLE as an implementation of the 'digital wallet' is overdue in IFE. Travelers want the ability to use their smartphones to facilitate multiple aspects of the travel experience, and that should not stop at the aircraft door. It is not difficult to imagine that NFC and BLE will be ubiquitous on board aircraft, facilitating inflight purchases, within the next two to three years.

Google Wallet with Paypass is making NFC technology more popular

Going wireless IFE?
Unfortunately, everything is not wireless

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gaming

While entertaining, the gaming options currently available in IFE systems are a long way behind the home gaming experience. What could the next generation of onboard gaming bring?

SIZELOVE, PANASONIC As IFE systems migrate from closed systems to open platforms, you will witness an expanding ecosystem of content, applications and service solutions. Gaming is one aspect that can be improved with this transition. The second is that, although still relevant, the closed gaming platform is diminishing in dominance. We are seeing an increase in more open solutions, coupled with relatively easy and advanced game creation software platforms (such as Unity). This trend, along with the acceptance of relatively simplified gaming on mobile devices, will influence our industry and facilitate implementation of advanced game play. Cell phone games have lowered expectations of game control and this will work to our advantage. While we may never reach PS4 or Xbox controller levels, we will begin to see marked improvements in gaming within the next three to five years.

Console controllers are superior

BLEACHER, THALES We have developed some advanced gaming controls. We can control games through hand gesture, in a similar way to an Xbox. We have also developed one of the first games to be controlled via eye tracking. Another cool thing is because our TopSeries Avant system is Android-based, we have opened an app portal where developers can create apps and games for the system.

ANYTHING ELSE?

Are any other technologies being monitored?

BLEACHER, THALES TransferJet is a short-range wireless technology being developed by Toshiba for the high-speed transmission of data. The technology is meant more for cell phones, but we'll investigate it for IFE as it could be used to upload and download movies to and from a PED very quickly. It could also be used to upload a film from a PED to the larger IFE screen, or to rent or purchase a movie through the IFE system and download it to a personal device.

LIEBE, LUFTHANSA SYSTEMS High Efficiency Video Encoding (HEVC) isn't quite ready for prime time, but it offers the ability to nearly double the video compression rate with essentially the same quality as the APEX 0403 MPEG-4, AVC standard. With content sets increasing, but storage and transmission often nearing maximum capacity, the IFE industry is hungry for this technology, and it is being tracked closely by the APEX Technology Committee. It may be as close as two years away from an APEX standard. And yes, this goes hand in hand with high-efficiency audio compression.

For an airframer perspective, we also asked **BRAD NOLEN, DIRECTOR OF PRODUCT PLANNING AND STRATEGY, BOMBARDIER BUSINESS AIRCRAFT:** While Bombardier currently offers air-to-ground connectivity solutions of up to 3Mbps in some regions, the explosion of airborne bandwidth usage, driven mainly by video, shows no signs of slowing down. Audio streaming services will soon be the preferred method of enjoying music, and Cloud services are taking over the storage of personal content on mobile devices. High-speed, streaming-capable airborne internet connectivity is therefore becoming a key factor in the overall IFE experience. Thankfully, upcoming worldwide technologies such as Ka-band will provide passengers with an environment similar to the one enjoyed in their living rooms.

try out the next generation

The latest version of Thales' Immersive seat has been developed with BMW DesignworksUSA and B/E Aerospace

Thales has installed many of its forward-thinking technologies in its Immersive Seat concept, which has been developed over the past few years to gauge customer reactions to the various features. The latest version, shown at Aircraft Interiors Expo 2014 in Hamburg back in April, featured hand gesture control; eye-tracking (Thales believes that while eye-tracking is not widely adopted in home entertainment at the moment, it will grow in popularity); NFC technology to pair a smartphone with the system for a personalized experience; UHD; 3D spatial surround sound; and audio-based vibration feedback through the seat.

The seat has been further refined over the last few months, and when it is demonstrated at the APEX show in Anaheim on September 15-18, it will boast a few new features.

Some adjustments have been made to algorithms in the spatial surround sound system to improve the experience, and the eye-tracking system has also been updated, so instead of selection being based on dwell, with which people have been found to worry about making accidental selections, users now look at the icon for the desired content to select it, and then confirm their selection using the touchpad. A 'swipe' command has also been added for swift navigation of menus. The GUI has been redesigned, so whether using the touchpad, swipe or eye-tracking to browse content menus, the GUI helps the user to navigate the menu system more quickly and intuitively.

Another feature, which may be ready in time for APEX, is voice command, inspired by home technologies such as the Xbox and certain Samsung smart TVs. Noise generators can be used to simulate cabin noise of 75-85dB, to show that voice command and spatial 3D surround sound work in that environment, without cross-talk or interference. According to Brett Bleacher at Thales, the seat will also have a couple of additional new features that are being kept secret until the show.


Try the seat for yourself at APEX Expo

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For its second-generation E-Jet cabin, Embraer has gone all-out, creating a modular and easily customizable design with several innovations

ADAM GAVINE

Don't think of the E2 interior concept as a mere evolution of Embraer's E-Jet cabins – rather it is an all-new blueprint for the next-generation Embraer passenger experience. From the moment you step on board, you are immersed in an environment that has been designed to be uniquely Embraer, and to maintain and strengthen the Brazilian airframer's strong position in the 70-130 seat narrow-body market.

The cabin design has been created over the past two years in a close partnership between Embraer's in-house engineering team and the Priestmangoode design agency, with a brief for the E2 to achieve clear differentiation from its competitors. This really is a clean-sheet approach, with everything from the sidewall panels, ceiling panels, overhead bins, PSUs, lighting, IFE, seating, galley and lavatory all conceived to enhance the passenger experience and make the E2 an efficient aircraft to maintain. Key to this second factor is that the entire cabin is modular, allowing for quick and low-cost reconfiguration – attractive qualities to the key customer demographic of banks and leasing companies.

As André Stein from Embraer's commercial aviation market intelligence department explains, "We want E2 to be the benchmark for the next generation of narrow-body cabins. We also wanted to have a more modular cabin, particularly as leasing companies are becoming more and more relevant in our market. Being able to play with different interiors without the burden of customization was a big deal for us."

PERSONAL SERVICE A small but vital element of the swift reconfiguration capability is a reconsidering of PSU design. Whether you wish to add or remove premium seats, or alter economy seat pitch – perhaps to accommodate extra-legroom seats – the innovative PSU design makes the process simple, and gives each passenger in every class their own PSU directly overhead, complete with reading light, oxygen mask and air vent.

When seats are moved forward or backward for a cabin reconfiguration, engineers need only slide the PSUs – developed with Diehl – along a concealed rail into the optimal position and clip in an infill panel to restore the


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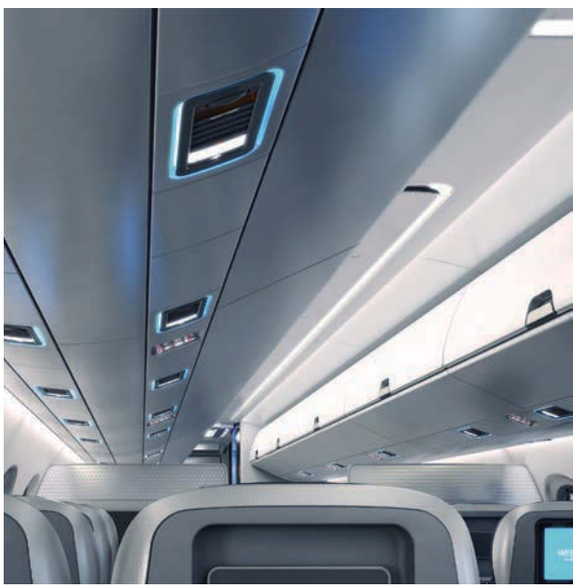

01

02

01. The ceilings have been designed to create a clean, uncluttered look

02. Four carry-on bags can be stowed wheels-first in each bin

clean look overhead. It is clear to see that the styling of the air vent and its control wheel was inspired by automotive cockpit vents.

This approach to PSU design is the first of its kind, and in addition to its benefits for operators, it means passengers don't have to reach over their neighbor to use the units, giving every passenger on board a defined personal space.

As Daniel MacInnes, Priestmangoode's project head for E2, explained during our tour of the cabin mock-up at Farnborough International Airshow, "The PSU is something we're really keen on pushing and it makes it so easy to reconfigure the aircraft. You don't have to move the stowage bins, as the PSUs move along a localized strip. It's a key feature of the E2 cabin for me, more than anything else. The keenness of Embraer to try something new has been fantastic; they're willing to push the boundaries of what they want from an aircraft."

THOUGHTS FROM ABOVE The idea of simple modification and maintenance was also carried through to the ceiling, which MacInnes describes as 'a wow feature' in terms of both styling and function. The ceiling undoubtedly looks very cool – almost *Tron*-like with the mock-up's LED lighting set to an electric blue – and the panels can be pulled down to give maintenance crews easy access to electricals and pipes, and replaced just as easily.

The team has been working with Zodiac Aerospace on the ceilings, and they have also strived to give the ceilings in the work areas a cleaner look than those of the first E-Jet. At the rear of the cabin, by the lavatory, where exit signs, work lights and speakers were scattered around the ceiling area in the E-Jet, they are now all integrated into a single ceiling pelmet for a cleaner aesthetic, with a technology strip that again eases access to electrical components and pipework.

PUT IT AWAY The clean surfaces of the ceiling are complemented by the overhead bin design, which blends with the ceiling pelmet to create a seamless integration between bin and ceiling for a cleaner, more spacious-looking cabin as you enter the aircraft – whether the bins are open or closed. The effect is accentuated by the open design of the bin dividing walls, which extend the sightline down the cabin upon boarding. The effect really works, giving a surprisingly open, spacious and welcoming feel for a narrow-body aircraft.

More surprising is that while the bins look sleeker than the current E-Jet units, they actually have around 40% more capacity, without taking any extra cabin space. This means that every passenger can stow a typical airline carry-on bag (of IATA's maximum recommended size of 22 x 18 x 10in). In the current E-jet bins, bags are typically stowed sideways, but in the new design, four bags can be stowed wheels-first in each bin.

Embraer, Priestmangoode and ZEO are currently halfway through the development program for the stowage bins and are confident the final design will be faithful to the mock-up.

The overall push for modularity is explained by Embraer's Stein: "We got the designers together with our engineering team to make sure the cabin design was really functional and robust, and easy to maintain. The Embraer engineering team was involved from the beginning and they came up with some clever solutions to make access to the systems behind easier. Sometimes it's easy to make something that looks good, but this cabin combines form and function. The main drivers were increasing personal space and stowage space, without compromising cabin space. That was a big challenge, but we managed to do it and came up with some very clever solutions to make better use of the space. Our engineers came up with good solutions behind what you see, to make sure all the systems are updated and maximize the use of the space."

PREMIUM CLASS In keeping with the flexible theme of the E2, the cabin can be configured to include any combination of economy, economy plus, or a premium

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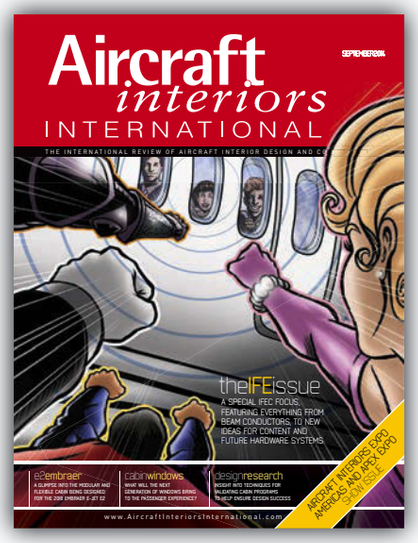

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class. For the latter, Priestmangoode has developed two options with California-based Aero Seating Technologies (AST), a company in which Embraer is a shareholder, and which already supplies seats for Embraer's Lineage business jet. The first option is a 2-1 configuration with 'lazyboy' recliners, a layout that will be familiar to current E-Jet flyers. The big difference is that the E2 cabin does not require any bin modifications on the single side, thus maintaining the clean and consistent appearance.

The second option is something rather different: a staggered configuration that adds a really modern, upscale appearance to the narrow-body premium experience – as well as a 50in seat pitch. The seats have been designed as a fully optionable product to offer airlines great flexibility to put their stamp on the cabin without requiring extensive customization – think personalization rather than customization. Options available to staggered seat customers include a one-piece table, a pull-out drawer for a laptop, and a leg rest.

The stagger also strengthens the premium feel by giving an enhanced sense of space and privacy, more space around the shoulder area, easier aisle access for window passengers, and cleaner sightlines.

Even better, whether you select a 2-1 or staggered layout, the premium seats are mounted on the same seat tracks as the economy seats, which simplifies fit-out and maintenance, saves weight, and makes any cabin reconfiguration work quick and simple.

Overall, the space really does have a premium feel. As MacInnes says, "We're giving some wide-body feel to a narrow-body cabin."

ECONOMY OFFER As with the current E-Jet, the E2's economy seats are two-by-two, as passengers appreciate that every seat is either a window or aisle seat. By pushing the seats as close to the fuselage as possible in the new cabin, they are now 18.5in-wide – 0.2in wider than the E-Jet's already generous seats. The slimline seats can be fitted at a 28-36in pitch (which can be changed easily, thanks to those trick PSUs), and are being developed with Zodiac using Embraer's data. The seats are currently three months into development, although Embraer says that the prototype designs are indicative of the final production version.

The legs of the seats have been designed to look more like a piece of furniture, and as there are no under-seat support rails, there is more space to stow cabin baggage or stretch out legs. Further elegance is achieved by creating a two-part molding on the side of the seat to make it appear as thin as possible. The backshell is also slimmed down and has the minimum of parts for a clean appearance.

03

Options for the economy seats include a footrest, seatback bezels for a 12in or 9in IFE monitor, or a simple high-level storage compartment. A really interesting option being investigated is an electrostatic pad that can hold a smartphone or tablet on the seatback. The pad is currently in development and works in a similar principle to the sticky pads on a gecko's feet – the longer you keep a device in place, the stronger the grip becomes. It is an unusual feature, and for those nervous of entrusting their beloved device to the pad, Embraer is planning to add a small lip for added security. If the pad option is selected, there is sufficient space left on the seatback to also have an upper stowage pocket and a lower literature pocket.

"We're 10% into the development work with Zodiac, and will be making a lot of refinements to the seats over the next year to make them as lightweight and robust as possible and to keep most of the prototype's features," explains MacInnes.

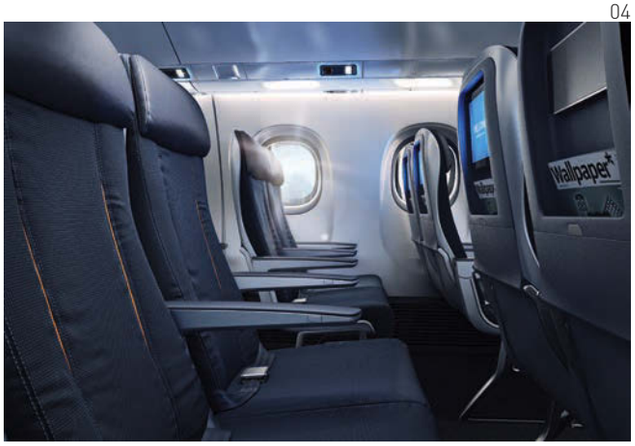
A GRAND ENTRANCE A further option is the modular galley, located at the Door 1 entrance. The design teams

03. The optional IFE monitor for the premium seats is 15in in the prototype, with 10in and 12in variants expected. As the cabin will be e-enabled, Embraer expects most carriers to select connectivity over embedded IFE

04. Every passenger on the E2 is in either an aisle or a window seat

05. There are several options available for the economy seatbacks

04



05

bespoke touches

Priestmangoode designed a family of details for the E2 such as stowage bin handles, galley latches and bathroom fittings. These bespoke items, unique to Embraer, help create a consistent feel throughout the aircraft.

As Daniel MacInnes from Priestmangoode explains, "All these parts will be owned by Embraer, like Boeing does with its touchpoints, so it all ties in and the detail becomes synonymous with Embraer."

felt that there was nowhere at the E-Jet entrance to give a strong branding message, and decided that a plug-and-play modular galley that is fully optional and customizable was a good solution for the E2. Airlines can put their branding down the side of the unit, or can use an optional large display – 32in or 36in – to display a logo, flight information, or even offers from the inflight catalog.

All the electrics and hard points for the various options will be fitted as standard to the galley units, so if the airline decides after delivery that they want to add a display, it is simple to retrofit and create that 'wow' entrance. The galley unit is currently in development, but is expected to be ready for manufacture within two years.

BRIGHT OUTLOOK Changing the size of the windows was not an option for the E2 project, but Embraer did want to achieve a feeling that the internal windows are larger. An optical illusion was created, with the internal window increased in size and pulled further inward, so passengers feel that the windows are bigger.

Again, the design goes deeper than clever styling. With the E-Jet, if maintenance crew need to clean or repair the window, they have to take the seats out and then the window panels, and then put them back again, all of which takes up valuable time on the ground. With the E2 windows, the bezel simply pops out, so the window can be cleaned or repaired and then clipped back in again.

Another interesting feature is the dots printed around the glass. Many aircraft manufacturers have problems with misaligned glass, which can mean that cabin trim can be seen from outside. To solve this problem, Priestmangoode employed a trick used in the automotive world, with graduated dots printed on the back of the windscreen covering up any minor misalignment. It's a simple but effective solution.

AT YOUR CONVENIENCE The walls of the lavatories have been pushed back to create more space and remove dirt traps, and the fittings were inspired by contemporary hotel bathroom design – especially the tiled back wall. The feeling created is more homely and contemporary than that of a typical 'white box' lavatory, and the back wall is a customizable part, which could feature a bright color, a pattern, a logo – whatever the customer wants. Fittings include a mirror, an air purifier, a touchless soap dispenser and a touchless faucet.

There are also integrated handrails for PRMs, and to further help such passengers, an acoustic curtain can be drawn across the entrance area to create a larger, private and soundproof space for accessing the lavatory.

CONCLUSION It's a great design, and as the cabin is currently in the CDR phase, with design freeze expected by the end of the year, the cabin you see here is likely to be very similar to that of the first E190-E2 when it launches in early 2018. Indeed, according to MacInnes, the floor-to-floor elements are 90% complete.

And most importantly, Embraer and its customers are happy with the E2 cabin. As Stein states, "We have been getting very positive feedback for the concept, from operational people as well as senior management. In terms of the concept, we're nearly there. It's just a matter of doing some fine-tuning and development, but we're going in the right direction." ☒

06. The sinktop has an integrated baby-changing surface
07. The louvers on the PSU were inspired by automotive air vents

06

07

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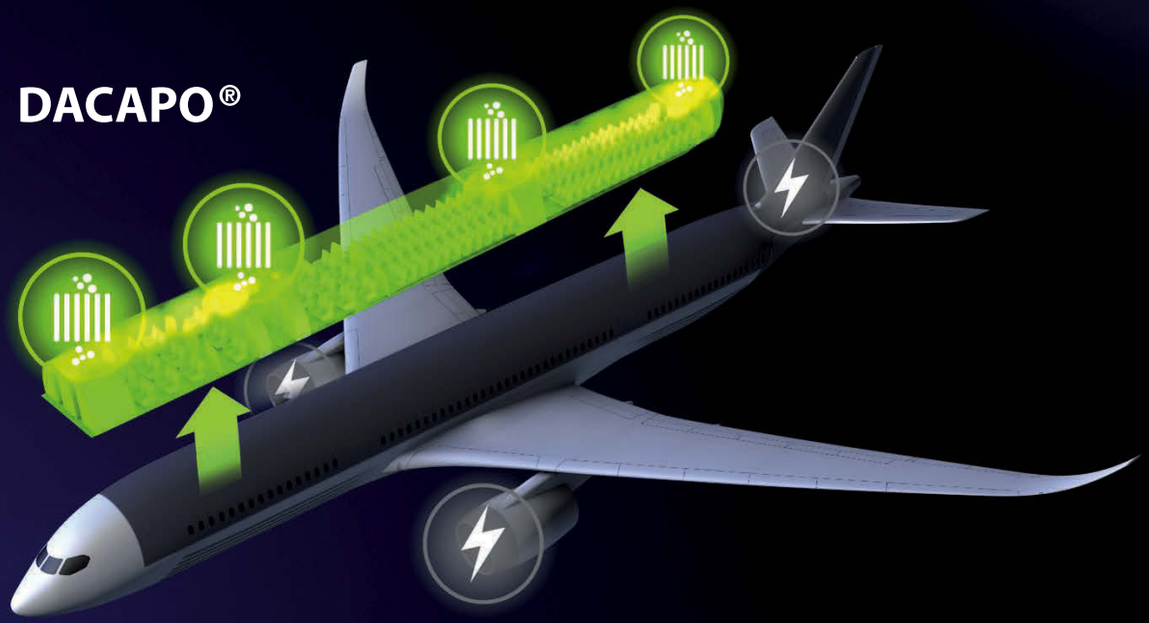

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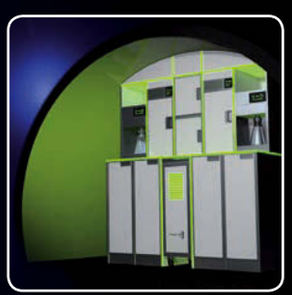

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personaleffects

Halo is Zodiac Aerospace's laboratory for the next generation of first class suites, packed with technology that enables passengers to tailor the experience to their individual needs

ADAM GAVINE

01

There are some tremendous first class suites available to today's well-heeled traveler, from the curtained elegance of Air France's B777-300 La Première, to the ritzy Emirates A380 suites. But whatever the styling, whatever the service, most suites involve a passenger sitting down in a predetermined position and selecting from IFE and dining options, possibly with access to an onboard destination space such as a bar.

However, Dr Udo Schultheis, director of human factors and ergonomics at Zodiac Seats, discovered during his research that one of the most important factors in passenger comfort is control. This psychological aspect of comfort means that if you feel in control of your environment, then you are already comfortable, before you have even sat in your seat. For example, offering choices of how and where to sit creates a psychological benefit. If you then give the passenger options to control heating and lighting, for example, it makes them even more comfortable.

This sense of offering not just seat comfort, but also psychological comfort through choice, is a keystone of Halo, a concept first class suite created by Zodiac Aerospace, which serves as a demonstrator for many technologies that have been developed across the company's business units by an internal organization called the Technology Roadmap Team. This team is formed of representatives from the various divisions, who monitor technologies from around the world, with a view to predicting what would be suitable for aircraft cabins in 10 years, and report their findings every few months.

Zodiac Aerospace is not looking to sell Halo as a product, but rather to use it as a means to research and showcase ways in which the first class cabin space could be used differently in the future, combining many ideas into one suite to see how they work together and to gauge market reaction. It also represents Zodiac Aerospace's vision of how the travel experience can extend more naturally, from being picked up in a limo, being met

01. Now you see it... The spa unit lets you freshen up in privacy
02. ...now you don't: At the press of a button the TV slides down. Here the display is showing tempting dining options

02

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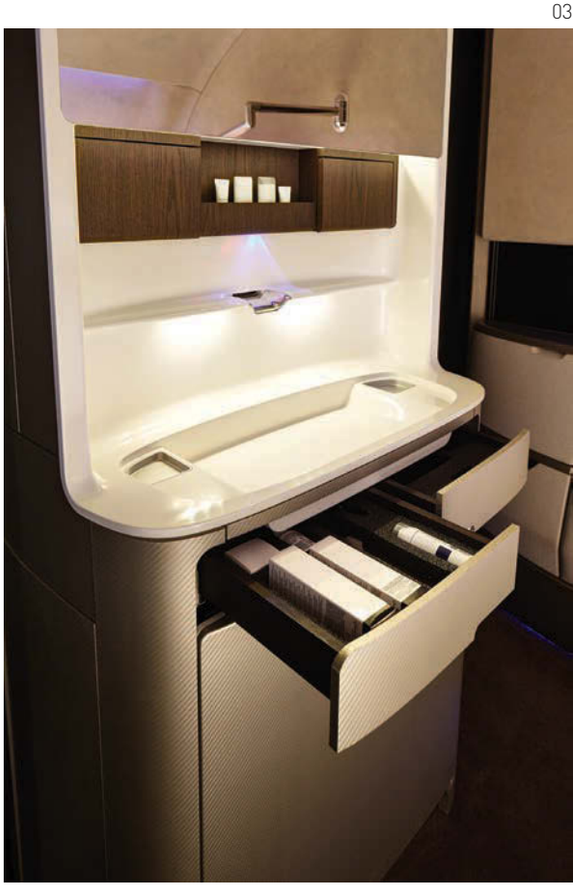
curbside at the airport and escorted into a fantastic lounge with showers and a bar, and then escorted to an aircraft space that is more than just a box – however nice that first class box might be. The suite becomes an extension of the airline lounge experience.

The concept suite would be suitable for any wide-body commercial aircraft larger than a Boeing 767. Almost every division of Zodiac Aerospace had some input in the project, whether for a seat design or a technology, and ZEO set the design brief for Antwerp-based Yellow Window to create the styling.

TWO BLINDS TO SEE IT In line with safety requirements for an enclosed suite, there are two entrance doors to the 92.5 x 91in space. For the mock-up version, the doors are vertical blinds made of soundproof and lightproof material, which gives several options. They can be stowed in the central 'garage' and slid across for privacy and sound deadening, or deployed but with the slats open for a more open feeling during flight (the slats are fixed at the bottom and rotate at the top). This style of door was chosen rather than solid doors mainly for aesthetic reasons, but also because the design teams felt that in the event of an evacuation they would be easy to get past, even if broken, increasing the safety of the suite.

Following some intensive traffic in and out of the suite at its April reveal at Aircraft Interiors Expo in Hamburg, Zodiac Aerospace has decided that the doors would need a little further engineering to be ready for production.

03



working together

The collaborative nature of Halo is something being carried across to all of Zodiac Aerospace's seating projects, all of which are now designed and developed by a combination of the group's industrial and creative teams from France, the UK and the USA, as well as ZEO, Zodiac's design outfit based in California. The Aries wide-body business seat is the first design to emerge from this collaboration, with the business seat concepts shown in Hamburg in April following – and of course Halo. Zodiac Seats plans to display a new collaborative premium economy seat concept during Aircraft Interiors Expo Americas.

FRESH IDEAS The central column between the doors is used as a multifunctional space, featuring a large fold-out dining table cum desk and a large IFE display. Even better, at the press of a button the display slides up to reveal a 'mini spa', complete with running water.

This feature was installed in order to gauge market reaction to first class suites having their own facilities for freshening up. Zodiac Aerospace expected a strong positive response to this idea – and received it – with some airlines even identifying a cost- and weight-saving opportunity as they could potentially reduce the number of first class lavatories, since much of their occupied time is with passengers getting ready for bed or arrival.

The design team did investigate the idea of having a lavatory in the suite, but decided against it, believing that problems of hygiene, odor and potentially some cultural issues outweighed the advantage over having the lavatory just a few steps outside the suite.

The sink is clean, private and sanitary, and a nice feature is the touchless faucet; simply choose which temperature looks suitable from the scale printed on the unit, place your hands under that point, and your chosen temperature of water flows automatically.

It is a challenge to fit a sink into a suite, but by pulling together the vast resources of the group – especially Zodiac Cabin Controls in the case of the spa – all the concept features could be built, certified, delivered and fitted within a couple of years.

03. The drawers under the mini spa can be used to store airline and personal amenities

FINE DINING Another feature of the center column is a large fold-out table – at 25 x 25in, it's the largest in commercial aviation. With two TTL seats and a three-seat sofa (more on that later), there is room for five to dine together. However, feedback has found that it is the idea of two passengers enjoying a proper dining environment that has really resonated well with airlines The design takes the idea of dining together a step beyond the facilities on some carriers today, where one passenger has a full seat while their guest sits on the ottoman.

VARIETY SHOW The final feature of the center column is a 32in IFE display. Halo occupants will of course be able to watch a wide variety of airline-provided content on the display, but the system goes a step further, also offering

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video conferencing for those wishing to run their empire from the sky. Passengers can also connect their own devices, and sound can be enjoyed through headphones or from the directional speakers overhead. All this technology comes courtesy of Zodiac Inflight Innovations

For multitasking, or just to get a better view from a different seating position, there is also a second 32in display on the aft wall, which can show duplicate content or whatever you wish. It's all very nice, but nothing groundbreaking; the panoramic window on the sidewall, however, is an amazing addition to the IFE system.

OLED screens are fitted in front of the windows, and they are clear by default, so occupants can simply look out of the windows if they are not in the mood for technology. If they want to see the view without stretching over, external cameras can feed the view from outside on to the displays. Going a step further, the screens can display IFE content, or the external view can be manipulated a little, so if you wish to adapt to your destination time zone, the view can be made lighter or darker, to fool your brain into thinking it is earlier or later, as appropriate.

The screens can take the IFE experience beyond mere entertainment, instead taking the occupants on a journey – possibly a different journey from the one they are actually undertaking. Going back to the research of Dr Schultheis, he realized that a person – not a person on an aircraft – might relax by doing something peaceful such as going for a walk in the woods. What they wouldn't choose to do, he suspects, is to walk down a square tube from the airport and then into a round tube.

The system can thus be used to create mood and ambience. When dining, for example, you might like to enjoy a pavement view in Paris, or see pictures of loved ones. When enjoying a drink, you might like the view to show a helicopter trip down the Las Vegas strip. When reading, you might enjoy feeling as if your suite is a cabin in the woods.

The control is in the passenger's hands, and even better, if Halo suites were installed in an A380, for example, with two aisles, the screens could show the view from the windows, giving central suite customers the same view as those in the outboard suites.

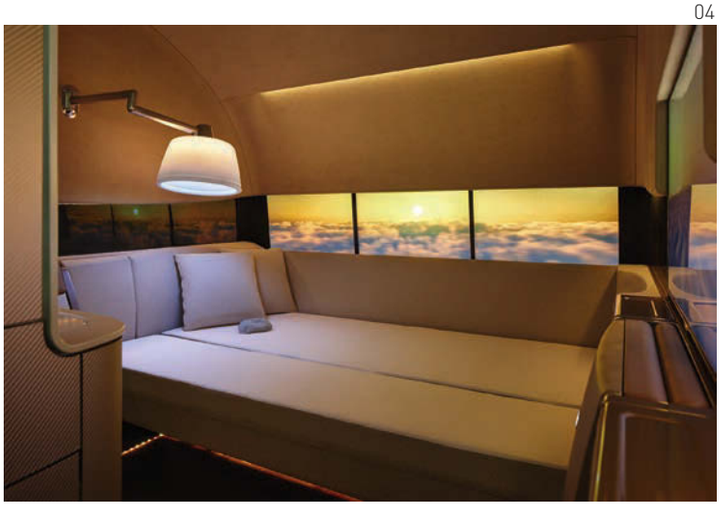
> CENTRAL SUITE CUSTOMERS COULD HAVE THE SAME VIEW AS OUTBOARD SUITES

GET IN THE MOOD The directional sound units in the ceiling also incorporate the air-conditioning outlets and a mood lighting system – which can of course be adjusted to personal needs and preferences. On boarding, you have the option of setting a plan for your flight. For example, on a long flight from Frankfurt to Tokyo, it is difficult to cross that many time zones and arrive refreshed, however comfortable the bed is. The Zodiac Aerospace teams have thus been working on ways to get circadian rhythms to match those of the destination time zone. With Halo, you can tell the system that you want to have six hours of sleep and to wake up two hours before landing. The suite can then calculate that if you are going to bed eight hours before you land, then you might want to have dinner an hour before that, and you might want to freshen up before dinner. The system will then adjust the mood lighting as appropriate for each stage of the flight, perhaps highlighting the table area for dinner, and gradually darkening as bedtime approaches. Or of course you can simply elect to have full manual control of the lighting as you see fit.

The system itself is similar to those already found in modern aircraft, and indeed in cars such as the Mini, but it has been applied in a new way and adds to the idea of control enhancing comfort. For customers interested in the system, it may be best suited to an enclosed suite where it won't affect other passengers. If the system were applied in a more open cabin, it would have to be at a low intensity, to avoid the first class cabin resembling the aurora borealis when the cabin lights are dimmed.

JOIN THE FOLD The two TTL seats – one forward-facing, one aft-facing – can also be used as dining chairs, and when not in use, can be folded away to create more space.

04



05

04. Whatever the time of day, Halo guests can view a sunset before bed

05. Even in broad daylight, the suite can show appropriate images to help adjust circadian rhythms to the destination

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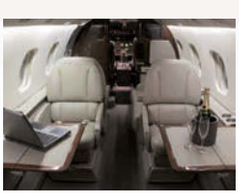

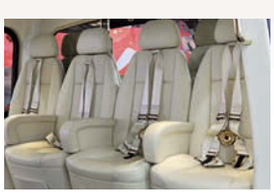


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06

> THE SOFA GIVES PASSENGERS AN ALMOST INFINITE NUMBER OF SEATING POSITIONS

The aft-facing seat has a high backrest to meet qualification requirements, but again, with the broad expertise of the Zodiac Aerospace group, this was a relatively simple seat to design, in this case borrowing from its crew seat divisions. Indeed there are already seats in the range that can automatically raise the backrest when the seat is deployed, and with the seats far enough apart to remove the risk of foot strike, they present no certification challenges.

SPREAD OUT The final – and potentially the most used – feature of the suite is the sofa. Zodiac Aerospace recognized that when relaxing, people don't just sit in one position – they also like to get up and move around, or switch seating position. It seems obvious, but in some cases, sitting in a single seat is the only real option for a passenger, even in first class. Thus, in addition to the TTL seats, the suite has a three-person sofa with an open end that gives passengers an almost infinite number of seating positions to choose from.

The company's human factors experts have found that the most comfortable seat is one in which you can move, and their studies have found that people move every couple of minutes, even if just slightly. They recommend that in any seat, passengers should be able to move a little, so various parts of the body can come into contact with the seat and relieve pressure on other parts, creating a much more comfortable experience. Halo takes this idea further, giving passengers a choice of seat, and having the two IFE displays means that passengers can be entertained from any seating position.

Then we come to the main event: the bed. For Halo, Zodiac Seats didn't want a seat that is also a bed; it wanted a sofa that is optimized for comfort as a place to sit, and a separate bed surface that is a fantastic place to sleep. At the press of a button, the sofa rotates and moves back (courtesy of Zodiac Actuation Systems) to reveal a double bed with a memory foam mattress, to which crew can add a mattress topper and bed linen for even greater comfort. The feedback for the sofa has been very positive, and the team is currently resolving some certification issues. The main issue is with two people in bed having to undo their safety belts, get into the TTL seats and fasten their belts again. However, the team is confident, as some seats flying

06. A chiller lets passengers keep something cool and refreshing in their suite, should they wish privacy rather than crew service

07

07. The two 32in IFE displays give options of how and where to watch content, or to multi-task

today require the passenger to stand while they convert the bed back into a seat; a Halo occupant need only jump into the TTL seat, with no waiting for a seat to convert.

Those Halo guests may be quite sound asleep though, having been lulled by the suite's features. To ensure the optimal body temperature for rest, the seat and bed fabrics have integrated temperature sensors which, combined with filaments woven through the fabric, can raise body temperature directly at the skin or draw air past the body for cooling. This is far more efficient than trying to heat or cool the entire suite, which would affect the overall cabin air-conditioning.

The technology was inspired by iSpace (innovative Systems for Personalized Aircraft Cabin Environment), a project launched in 2009 by a consortium of 10 European research institutions and companies (including Airbus, Fraunhofer Institute for Building Physics, and Zodiac Seats UK, with the aim of developing a climate system that allows each passenger to control the ambient conditions of their immediate environment.

When it comes time to wake up, to avoid the groggy effects of an abrupt awakening, sensors in the suite monitor body temperature, blood pressure and eye movement. If the suite senses that you are in a deep sleep, it can wait until you emerge from the REM phase before waking you, whether by gentle sounds through the directional speakers, by showing blue sky and sun on the panoramic window, or by activating the cabin lighting. The idea is to fool the mind and minimize the physical and mental stresses of flying, helping you to wake up feeling refreshed and ready for the day ahead. It may sound futuristic, but iPhone apps already exist that can monitor the face and respiration to see what phase of sleep the user is in. A more commercial technology is also available from companies in the medical field.

The team is also looking at humidification to reduce the tiring effects of dry cabin air. There are some issues with a humidifying system working in parallel with cabin air drying systems, but because the mini spa means there is already a water supply being fed into the Halo suite, Zodiac Aerospace believes it could be possible.

CONCLUSION Halo is a great showcase for the technologies Zodiac Aerospace can offer, and it will be interesting to see if any parts of the project make it into first class cabins in the coming years – as well as to see how Halo develops as new Zodiac technologies are added to the suite. But remember, however high-tech the suite is, you can simply turn up the lights, crank up the music and party for 14 hours in soundproofed splendor – or switch off the lights and have a low-tech night's sleep. That's the point – Halo is not just a space, it is your space. ☒

team works

Paul Wills, technical sales manager at Zodiac Seats UK, was very busy at Aircraft Interiors Expo in Hamburg back in April, showing the Halo prototype to many visitors.

Wills explains the thinking behind the Halo concept: "It's a worldwide effort. The UK team pulled it together at first, but as time goes on we are going to start building different things into it as our sister organizations mature their technologies and we can see how they work in the demonstrator.

"We're calling Halo a development vehicle because we want to add new ideas to the suite as they mature. So some things the Technology Roadmap Team is working on, like the panoramic window, is maybe five to seven years away from being fitted to a commercial aircraft. But some other ideas, such as the heating and cooling systems, could be with us within three to five years.

"The great thing is that since we have been owned by Zodiac (Zodiac Seats UK was previously Contour), we now have access to all this clever stuff from around the world – and we get access to it early. So while our sister businesses are developing their technology, we can be building it into our product, meaning that as soon as it is mature, our products are ready for it. Before this, we had to wait for a technology to mature, then investigate it, buy it and integrate it, which meant that an innovation could be around for two or three years before it showed up in a first class seat. Any concept the Technology Roadmap Team has that we might want to use is never more than three months old before we find out about it.

"The key message for Halo is that we are not selling it as a product; we are using it to look at and get feedback for ideas: do the ideas hang together, are they valuable, would people use them? We think that in five to seven years we'll see technologies from Halo flying, especially with Middle Eastern airlines. We have had a couple of airlines asking if they can buy Halo as a unit for VIP aircraft though, which was a surprise."

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Bigger, branded and technology rich: Design experts from around the world are predicting great things for the next generation of aircraft windows

ADAM GAVINE

01. The window bezels in Embraer's E-Jet E2 cabin have been designed to make the window look larger, and to allow easy access for repairs and maintenance

When Boeing launched the 787 Dreamliner, the aircraft featured many innovations to benefit the passenger experience, but one seemed to resonate particularly well with those who flew on the first ANA aircraft: the electrochromic smart windows. The windows are set higher in the cabin than in other commercial aircraft and are also the largest, at 10.7in x 18.4in. However, what passengers really liked was the ability to select their own level of window opacity from five options, possibly because they had never been able to physically engage with an aircraft before. Almost three years have passed since ANA's first Dreamliner flights, and the windows are still adding an element of that 'surprise and delight' quality that airlines seek to create during a journey. What could the next generation of windows bring to the passenger experience?

With regard to the two biggest airframers, Boeing is looking into fitting electrochromic windows to other models of aircraft and it has been solving some minor reliability issues with the windows, such as photochromic gel leaks due to cracking of the internal electrochromic layer. Airbus meanwhile, has fitted its A350 XWB with windows measuring 9.5in x 13.5in – more modestly sized than those of its Seattle rival, but the largest in its range, indicating an upsizing trend. Airbus, however, has not opted for electrochromic technology, instead going with conventional window shades or optional electro-mechanical blinds, which an Airbus spokesperson described to us as "simply the best solution for the foreseeable future".

The system has two blinds. One is thin and can be lowered to reduce glare; the second completely blocks out light. The reasons for this decision are reliability (the blinds are good for 70,000 cycles or 20 years), and because until electrochromic windows offer 100% light blocking, Airbus will not consider them to be a mature technology. However, if Airbus decides to switch to such technology, the clever window bezel system, which was designed with the swift replacement of damaged windows in mind, means that electrochromic windows could be retrofitted fairly quickly, especially on aircraft with the electromechanical blinds option. And of course the electric blinds still give passengers that all-important opportunity to engage with the aircraft and customize their experience.

TO LOOK FORWARD, LOOK BACK Many of the design agencies we spoke to are working on ideas for the windows of the future: some for the next generation of aircraft, some as blue-sky research. One such agency is Geneva-based Design Investment, which counts Airbus, Air France, Lufthansa Technik and KLM among its clients. Co-founder and managing director Alexandra Collins couldn't disclose details of the company's current work with windows, but she did share some of her thoughts, based on passenger research.

"Everybody says aircraft windows are too small, so we asked people all over the world why they think that, and their answers all came back to wanting more daylight. It also has a lot to do with cabin lighting, which can be a bit outdated compared with other interior spaces, where it

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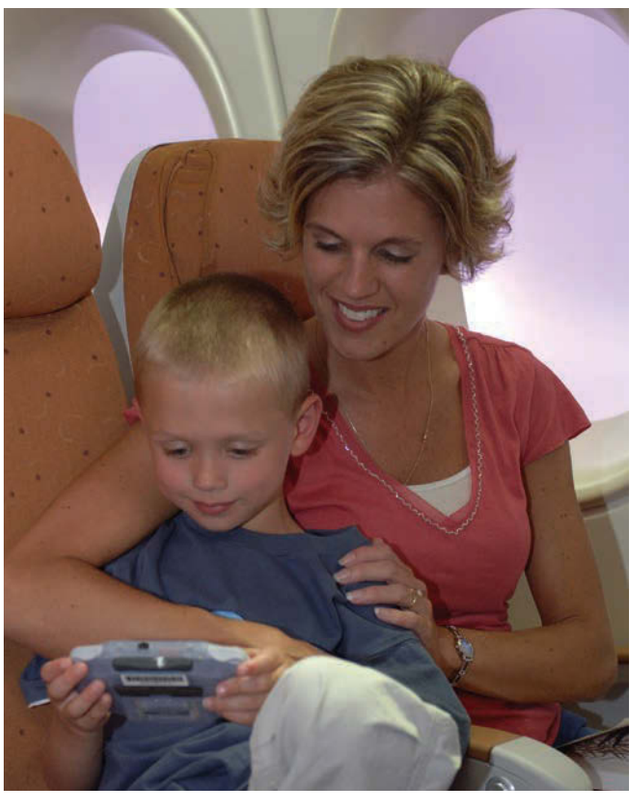

02

03

02. Passengers have responded very positively to the brighter feel the large windows give the B787 cabin

03. The A350 XWB follows the trend for fitting larger windows

The global commercial aircraft windows and windshields market is expected to grow to US$635.3m by 2017

can be used to help give a feeling of airiness and light. But passengers want bigger windows."

The Design Investment team appreciate that a fundamental airframe change like enlarged window apertures isn't going to happen soon: "All the OEMs know we would like to have windows in the ceiling and floor, but for the near future the key is to work with current window sizes and make a feature out of them," says Collins.

The team is investigating ways to make the cabin window seem bigger. The first solution is to apply a different design treatment to the window panels, inspired by architectural techniques. Collins has been particularly inspired by some of the architectural solutions already found in historic buildings such as churches and fortifications, which often have thick walls and very small windows. Taking a medieval arrow slit as the most extreme example, while the aperture is small from the outside, the space around it on the inside is wider to aid an archer's access to the window, which also makes it appear larger and lets in more daylight. "I think using architecture and light could be the secret," Collins says.

In practice, says Collins, this could be done by giving the impression of having a wider window frame, while working within the dimensions of the existing window cutout. By adding light features or indirect lighting, the size of the window can be exaggerated, for example by integrating a light strip above and below the window panel. "The space is there and the cabling will fit. It makes the whole window panel into a system part. We have had deep discussions and concluded that the design is feasible," states Collins.

Collins adds that it is important for commercial aircraft applications that the system is a single panel in order to optimize weight, rather than adding an additional panel, as has been done in many business jet window projects. The system could also create a range of lighting effects, such as enhanced daylight to give the impression that the cabin is airier and brighter, and other mood lighting possibilities.

Internal creative discussions at Design Investment have also found that window panels are currently part of the ceiling architecture in terms of look, feel and surface treatment. "This comes from the history of window panels being SFE parts," explains Collins.

The team would like to change that way of thinking, so that window panels are not considered an extension of the ceiling but rather an additional cabin wall – similar to a bulkhead – to which the same thinking can be applied in terms of individualization. This would create an integrated solution, taking customization beyond the seating areas into the entire space.

"There are ways to achieve this, though it would be difficult," says Collins. "But the difference between SFE and BFE parts is enormous and that spoils the work the airline has done to create a fantastic seat environment. The VIP world has tried to address this, but there is more to be

> WINDOW PANELS ARE CURRENTLY PART OF THE CEILING ARCHITECTURE

04

05

panoramic window

Fokker Services, in an exploratory collaboration with Boeing Business Jets (BBJ), has created a 'panoramic window' concept, which will be the first of its kind to be developed and certified for the business aviation community and will be offered to Boeing Business Jet owners and operators.

The window measures 54.5in wide, slightly larger than three window bays and will be 19.5in high, approximately 40% taller than the existing windows. It is being designed for the BBJ, based on the B737-700 NG aircraft, and would also be available for the upcoming BBJ MAX.

04. Fokker's SkyView concept window is as wide as three standard BBJ 737 window bays

05. The Ixion business jet concept by Technicon Design has no windows, creating weight and aerodynamic benefits, but with flexible display panels on the walls and ceiling, the view can be anything the passenger wants

done. In first class the trend is going in this direction, but there we are talking about just one or two window panels."

BRANDING VIEW In New Zealand, Altitude Aerospace Interiors has also been evaluating window trends as part of its design consultation work. "The style, shapes and materials used in aircraft windows have remained much the same for years, offering an occasional small portal of visibility, balanced by annoying bright light when you least desire it. Airbus and Boeing's latest generation aircraft have challenged the norm, and the world of aircraft windows seems to have expanded with even more possibilities," states Baden Smith, head of airline business at Altitude.

The company says it has been encouraged by the scope of change in window design in recent years, which it believes reflects a strong move from both OEMs and airlines, who are thinking laterally in their quest to create the best possible inflight experience.

"In the future we expect to see a progression of change in the design of cabin windows, as they evolve from their previous form as a practical viewing portal, to something that blends in with the individual interior of the cabins," continues Smith. "Aircraft windows in the future will be even more diverse, changeable in tone, and possibly incorporate subtle branding and colors to reflect the airline. Within the next 10 years, we expect windows will continue to get larger and offer more flexibility for an airline to add its own individual sense of style. This is in keeping with the growing demand from airlines to create interiors that ensure that each passenger is fully aware of the airline they fly with, and ultimately develop a relationship with that brand. They could even incorporate special visual features as an option – it will be interesting to watch the window evolution unfold."

QUIET CONTEMPLATION For Daniel Baron, managing director of Lift Strategic Design, which has clients including Skymark, LAN, HK Express and China Airlines, windows are critically important for bringing natural light into the cabin and enhancing space perception. They also allow him to indulge in the romance of travel: "Economy class can be very high density these days, so we need reminders that flying is still an amazing experience. Windows, and the views they reveal, create those reminders. For me, there is absolutely nothing better than listening to soft music while gazing out at an exquisite sunset or cloud formation. These are quiet, magical moments of introspection and inspiration."

Baron is a fan of the taller, wider windows of the B787 and A350, but would like to see them extend further down the sidewall panel. In Baron's view that would address a social issue, enabling neighboring passengers to look out of the window without their body crossing that invisible boundary into the window seat passenger's space. He adds that this would also help any claustrophobic people in the middle seats, by giving them the ability to view outside, which would help to make their trip more bearable.

Baron is a keen follower of technology trends in Tokyo (where Lift is based), and has identified ways in which technology could enter window design. "The aircraft windows of the future will be multipurpose displays," he states. "Of course they will still enable passengers to see out and will allow natural light in. But at the same time

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06

07

they will be programmable, to display the airline's brand color to the outside world (while on the tarmac at night), display a message or advertising to passengers, and display real-time information about the area the aircraft is flying over, similar to a head-up display in the flight deck. The windows themselves will be connected devices, with content delivered via the onboard server."

For a nearer-term idea, he adds, "Usually on a long-haul flight from Japan, the window shades get pulled down the moment the meal trays have been cleared. Not wanting to bother people, I leave my shade down, but I would love the ability to enjoy the view out of the window in real time on the IFE system or my iPad, in a similar way to a tail- or nose-mounted camera."

THE GREAT OUTDOORS David Caon, creative director of Caon Studio in Sydney, has a varied background, having worked with everyone from Marc Newson to Dom Perignon, to Qantas, which is one of his biggest clients.

"I am real window person," he says. "I like to fly in a window seat every time – basically because it's the only analog connection one gets with what is going on in the immediate surroundings while flying. Plus it is a real opportunity to see vistas that we just can't enjoy elsewhere."

So how does Caon see his favorite aircraft feature developing over the next 5-10 years? "We see the ability to offer larger size and digital control to aircraft windows as probably the most key issues. The digitalization of the window also opens up a lot of possibilities, among which we see windows being integrated into mood lighting schemes. The digital shades on the Dreamliner give overall control to the crew, but if the shades could affect the color and texture of the natural light coming in, it could transform the cabin mood lighting scenarios. For example, a transparent and animated fluid digital pattern projected across the windows in a rose tint could give a water reflection effect to the cabin and add a new dimension to mood lighting.

"Augmented reality projections are also interesting and present some intriguing commercial and intellectual possibilities in the window space, albeit potentially a little gimmicky in the immediate future," he adds.

Looking further into the future, Caon is excited by the architectural possibilities of having larger window apertures. "When the design, materials and technology are cost-effective enough, I think we'll see whole areas of aircraft become fully transparent, immersive spaces. Imagine a communal viewing platform, like you might see on an ocean liner, where you could lean up against the 'glass' and experience what it might feel like to fly unassisted. A moon-roof on the upper deck of a B747-8 for passengers flying fully flat would equate to an evening spent camping in the countryside, devoid of light pollution. The ability to open up whole sections of the aircraft like this would provide so many opportunities to transform the flight experience for all passengers, and therefore transform how designers approach cabin

06. The simple window reminds passengers that they are flying, connecting them with the experience

07. The windows on Zodiac Aerospace's Halo concept can show everything from a movie, to a sunset, to the view outside

go windowless

Spike Aerospace's Spike S-512 Supersonic Jet is being designed with a windowless passenger cabin. The interior walls will be covered with embedded thin display screens, and the panoramic views captured by the cameras surrounding the entire aircraft will be displayed on those screens. Passengers will be able to dim the screens to catch some sleep, or change it to one of the many scenic images stored in the system.

"Fuselage walls are complex structures made even more complicated by the additional structures needed to support cabin windows. Eliminating the windows allows us to simplify the fuselage design, reduce the parts count and lower manufacturing costs. It also results in a smoother exterior skin that reduces the aircraft's drag, resulting in increased fuel efficiency," explains Vik Kachoria, president of Spike Aerospace.

08

> AIRLINES COULD CHARGE A PREMIUM FOR WINDOW SEATS, GENERATING REVENUE

08. The SPD-Smart Energia dimmable window from Vision Systems gets its energy from light, so it operates independently of an aircraft's electrical system

interiors as a whole. Obviously the possibilities for the private and luxury sectors are awe inspiring."

For Caon, such a vision would be the next big step in aircraft interior design, creating a real experience – though it could present more of a challenge to those afraid of flying.

OUTSIDE INSIDE What if the aircraft structure was of a less conventional design – a blended wing body, for example? Ben Orson, managing director of JPA Design's London office, sees windows as a key reason why such aircraft might not succeed. "According to a senior Boeing employee I met once, one of the reasons that blended wing aircraft had not been developed further by them was because passengers seated in the mid-section of the aircraft were extremely uncomfortable with the idea of not being close to a window," he explains. "However big a part of the decision this was, it underlines our belief that the window has a psychological significance that is a core element of the flight experience."

JPA has worked on several projects that have brought home and hotel comfort to the cabin, with airlines including Cathay Pacific, Singapore Airlines and American Airlines. However, while enjoying that comfort and serenity, a glimpse out of the window reminds the passenger of the high-velocity, high-altitude journey taking place.

"It often feels that there is a tension in aviation design between a desire to recreate reassuring, ground-level spaces such as one's home or a high-end hotel, and the inescapable reality that you're being transported very fast and very high in a cutting-edge piece of technology," he explains. "In this context, the window becomes the focus for this sensation. The divergence of approaches to developing window aesthetics, from dressing them in extravagant burr-wood finishes, to new technologies whereby their greater size becomes an aircraft USP, or even replacing them with giant screens, seems to indicate that the importance and meaning of windows as part of the overall flight experience is still a vital element of the discussion about what flying should be like in the future."

loud and proud

The panel surrounding the window could even serve another purpose. The Flat Panel Speaker concept by Lufthansa Technik works by controlled actuation of a flat panel of metal, glass or plastic. A minimum of two drivers move the panel. Unlike conventional speakers containing a piston diaphragm movement, here the speaker diaphragm vibrates randomly across its surface. Thanks to this innovative technology, the frequency characteristic is nearly linear and the distortion is very low. The drive system is only 2in deep and very light.

TECHNOLOGICAL VISION According to Cristian Sutter, a cabin design specialist with experience at Thomson Airways, British Airways and Jet Aviation Basel, windows in future commercial aircraft will not only be bigger and include a next-generation electrochromic system, but they will also incorporate the convergence of several technologies widely used in personal communication devices and consumer electronics to create a truly enhanced passenger experience.

"The push button to darken the windows, as installed in the B787, will be replaced by a touch system that will support gesture control so that passengers will be able to change the transparency settings simply by swiping or rotating their fingers directly over the window area," Sutter predicts.

This technology could even reduce energy and fuel consumption, as Sutter also envisages transparent solar cells being built into the windows, which will harvest solar energy to power the touch electrochromic system.

Beyond an evolution of current tinting technology, Sutter believes that windows could also complement the IFE system: "Augmented reality with zoom-in features will overlay on to the windows real-time information about landmarks the aircraft is flying over, creating a virtual tour that will make moving maps look really old fashioned.

"Using a built-in Bluetooth system, the information displayed on the window could be sent via a drag-and-drop gesture control to passengers' tablets, smartphones and even to the IFE screen in front of the passenger, showing further in-depth content of the area over which the aircraft is currently flying," he adds.

Identifying a financial opportunity, Sutter suggests that as these features would be for window seat passengers, it would not be far fetched to think that airlines with this technology could charge a premium for window seats, creating a new way of generating ancillary revenue.

"Which of these technological gizmos will become a reality for the next generation of windows remains to be seen. However, the window will potentially become a centerpiece in creating an interactive user experience that will reconnect passengers with the joy of flying." ☒

"The cabin is the living space in the air. Everything has to work for you. You need to be able to work, to meet, to converse, to dine, to relax and to sleep. To achieve this, the cabin environment must be completely controllable – and this is impossible without the power to control light – especially natural light."

Mauricio Cabal, President, Mauricio Cabal Design

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battleofthebands

Commercial aviation is on the cusp of a bandwidth revolution, and satellite antennas are set to lead the charge. Beam conductors are the new disruptors

MARYANN SIMSON

It happens in every industry. Now and then an invention or an idea will surface and forever redefine the rules of play. The ripples of change brought on by 'disruptive' innovations can come hard and fast or slowly over time. In the beginning, the individuals and organizations invested in maintaining the status quo are often cynical about the dangerous idea, seeking its flaws, mocking it publicly or laughing it off as foolish. Yet a disruptive technology is like a fuse that's been lit, and regardless of whether that fuse is long or short, the result of its ignition is inevitable.

In her March 2013 Forbes piece '*Disruption vs. Innovation: What's The Difference?*', Caroline Howard nicely summarized the hot-button topic of disruption in the business world when she wrote: "Looking at the world with the eyes of our disruptors, no one company is so essential that it can't be replaced and no single business model or sector are off-limits to a raw burst of change."

In much the same way that gunpowder forever changed the tactics of war, automobiles and aircraft enhanced our mobility and the magnetic strip card shifted the business of banking and spending, our dependence on the internet and the availability of inflight connectivity are revolutionizing the airline passenger experience.

FIRST BURST One might say the 2008 launch of Gogo's air-to-ground (ATG) connectivity solution marked a major turning point in the race to bring broadband to the passenger. "I think ATG disrupted the market," says Steve Nolan, director of communications and PR at Gogo. "It provided the mass adoption of connectivity in aircraft. What we did was a pretty big feat in bringing connectivity to the air."

Nolan admits that being first out of the gate is not without its perils. With a bullseye on its back and a host of highly motivated competitors at the door, Gogo knew it had to evolve to stay ahead, and that meant offering satellite-based connectivity.

At the APEX trade show in 2013, Gogo pulled back the curtain on GTO (Ground to Orbit). With Virgin America signed up as launch partner, this innovation brought Gogo into the wider world of satellite connectivity – sort of. GTO would use Gogo's next-gen ATG 4 antenna for quick transmission from the aircraft to ground-based servers via cell towers. The results would then be received at the aircraft via Ku-band satellite. On paper, using a 36MHz transponder, GTO increases potential data speeds from a maximum of 9.8Mbps (ATG-4) to 60Mbps.

Unfortunately, GTO's groundlink reliance still confines the solution to functionality over North America, essentially making it more an 'evolution' of ATG than a real disruption. What the solution did do, was highlight Gogo's ability to think creatively and pave the technological way for the launch of its even more exciting 2Ku solution. 2Ku ditches the ATG-4 antenna for a second Ku-band antenna (one for transmitting a signal from and one for reception to the aircraft) and frees Gogo's birds from their North American cage.

Though 2Ku installations have yet to begin, the format promises massive improvements in broadband speed and

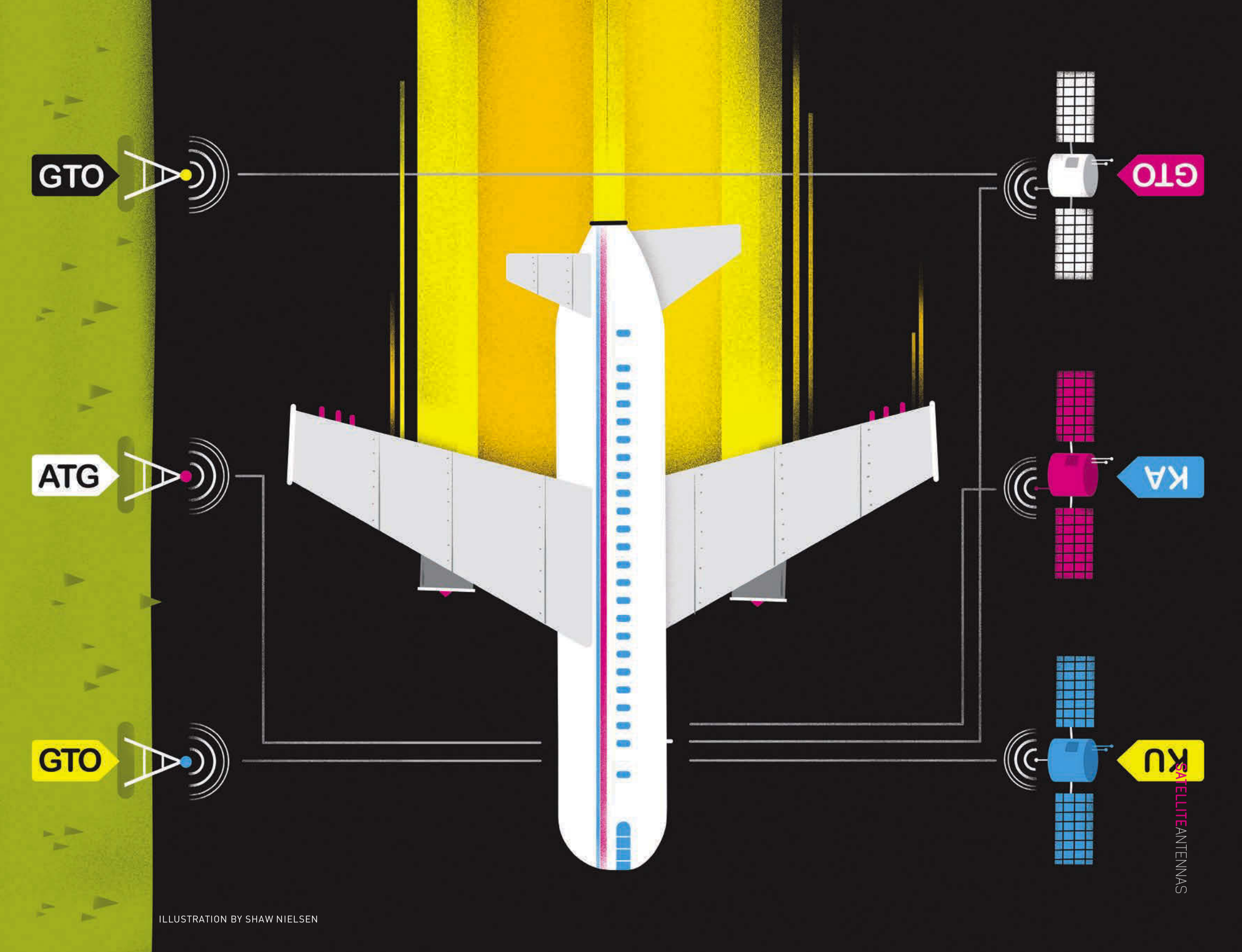
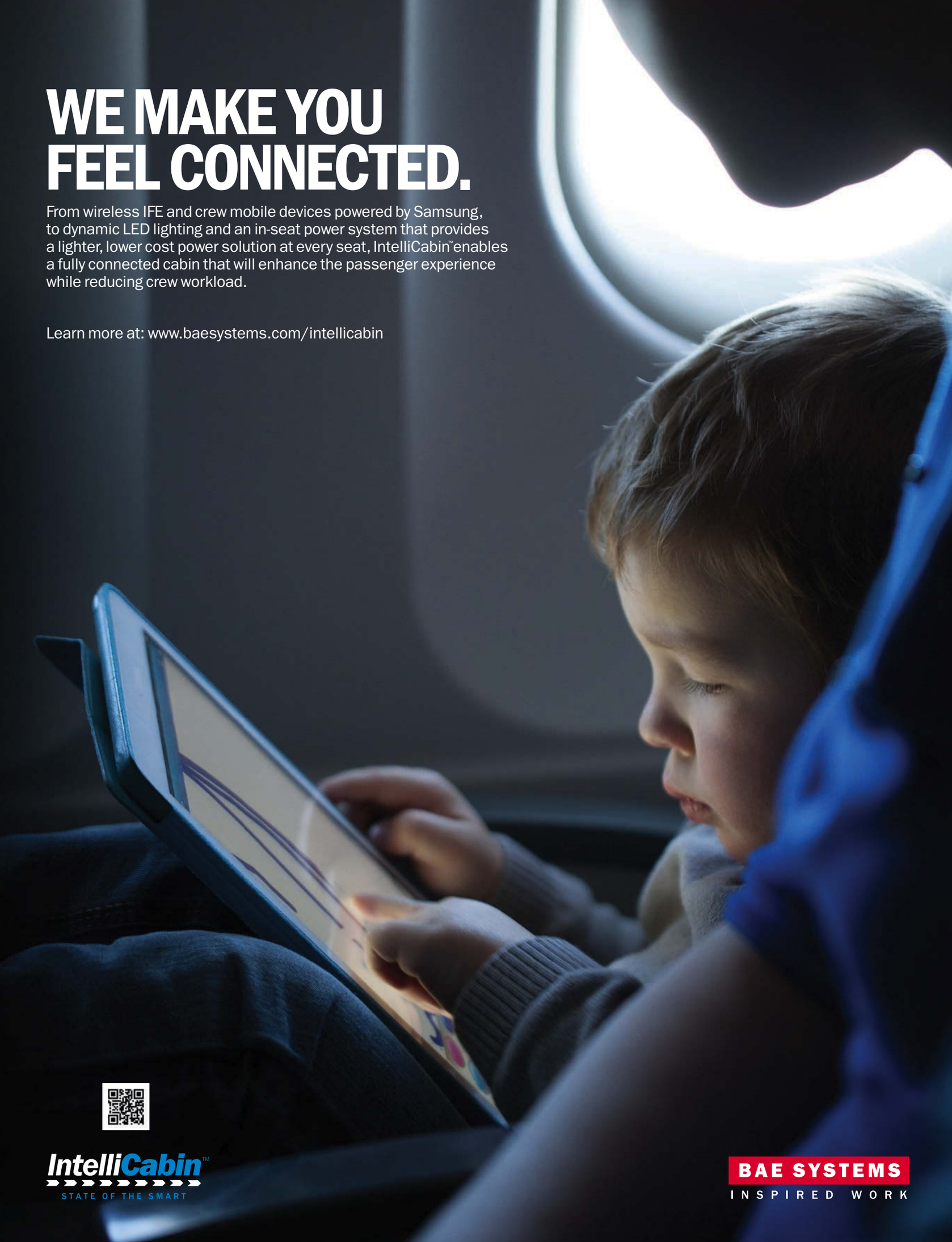


ILLUSTRATION BY SHAW NIELSEN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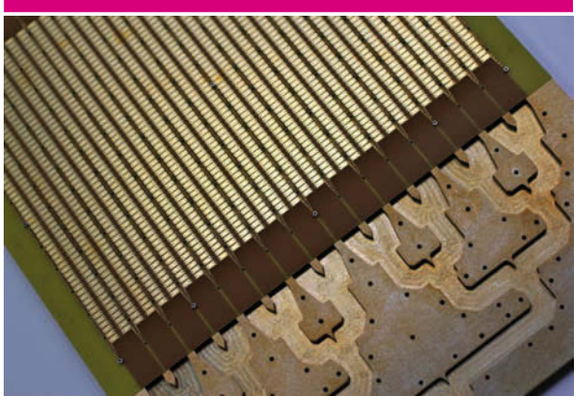
what is a metamaterial?

"An artificially structured material that exhibits extraordinary electromagnetic properties ... remarkably different from natural materials, whose properties are mainly determined by their chemical constituents and bonds. The primary reason for the intensive interest in metamaterials is their unusual effect on light propagating through them." – Encyclopedia Britannica



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> WHAT IS COOL IS THAT THE BEAM PATTERN DOESN'T DEGRADE TO THE SAME EXTENT AS WITH OTHER ANTENNAS

volume, with peak speeds to the aircraft reported at up to 70Mbps. Additionally, the attention generated by the advanced Ku-band antenna, developed for GTO and 2Ku by ThinKom, underscores a widely held belief that the next space to watch for disruptors on the connectivity front will be antenna manufacturers.

THE SWEET SPOT "The size of the antenna's aperture – or effective area – and how well formed it is, plays a big role in how well we can operate on airlines. Frankly, in the satellite world, aircraft antennas are disadvantaged in that they typically operate at a fraction of the performance commonly found in residential broadcasting," explains Peter Lemme, chairman of the Airlines Electronic Engineering Committee (AEEC) Ku/Ka-band Satcom Subcommittee and respected satcom guru. "We would love to install a 1m dish on top of the fuselage, but the fuel penalties would be enormous, so we are forced to work within a very low profile."

Gogo touts its ThinKom antenna as being approximately twice as spectrally efficient as other antennas in the commercial aviation market. Also, at just 4.5in-tall, drag on the aircraft is much less.

The Gogo/ThinKom antenna design is also a breakthrough in regard to the issue of skew angle, a major concern for carriers trying to support Central America or who fly routes connecting the northern and southern hemispheres. "A large, flat plate antenna does develop an oval beam pattern as the satellite moves down toward the horizon," says Lemme about Gogo's new terminal. "What is cool about it is that the beam pattern doesn't degrade to the same extent as with other antennas, and the effect is held off until the satellite is pretty low to the horizon."

ON THE HORIZON Competition also looms on the horizon for Gogo and ThinKom in the geostationary satellite sector. However, with GTO and 2Ku, Gogo is first out of the gate with a new technology and exciting antenna. It will enjoy the benefit of being first to market and will undoubtedly seal up a number of multiyear contracts as quickly as it can. However, the rest of the pack is not far behind and we now are on the cusp of seeing the entry to market of powerful, electronically steered, flat-panel antennas that are lighter, thinner and (hypothetically) cheaper to maintain than anything we have seen yet. The raw burst of change is coming.

In June this year, CNBC named Kymeta, a Redmond, Washington-based next-generation satcom antenna developer, one of the world's 50 most disruptive companies for the second consecutive year.

Thomas Kerr, director of aero programs at Kymeta, says that the ThinKom antenna's use of a single gimbal array (using just one pivoted support to give mechanically controlled beam direction) is a key step away from the mechanically complex multi-gimballed antenna constructions now commonly used by providers such as Panasonic, Row 44, ViaSat and others. The main argument for the simpler version is that fewer moving parts equals fewer opportunities for malfunction and expensive, inconvenient hangar visits for maintenance.

"But a single gimbal is still a moving part," Kerr explains. "It is still a phased array (like multi-gimballed antennas), so it is mechanically powered and the two dishes rotate on top of one another to get the off-access angles it needs."

By leveraging the metamaterial medium principle of placing numerous electromagnetic resonators in sub-wavelength proximity, Kymeta is developing

01. In December 2013, Kymeta successfully demonstrated bidirectional high-speed internet connectivity with a Ka-band satellite

02

02. Gogo's 2Ku technology was announced with fanfare at Aircraft Interiors Expo 2014

high-throughput flat-panel satellite antennas (focusing on Ka-band for the aviation sector) for the fixed, portable and mobile markets. Kerr says that the ability to independently control the resonators' scattering amplitude enables dynamic beam forming, with accuracy to a tenth of a degree. All this allows a low-cost, low-power, high-gain antenna.

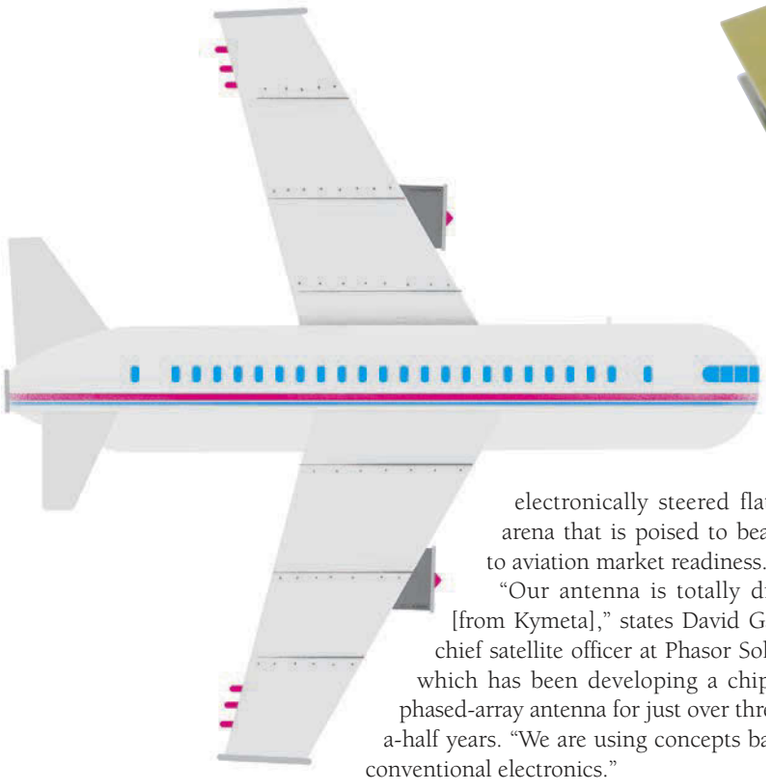
Should Kymeta's claims turn out to be true, it means the Kymeta antenna will present very high spectral efficiency and will also fare better than multi-gimballed arrays in that pesky equatorial zone. The Kymeta antenna has no moving parts and its slimline design is lightweight with a gentle curve to fit an aircraft's fuselage. At an estimated depth of just 30mm including radome cover and thermal insulation (if required), the drag created by Kymeta's antenna should be negligible, while the scalability of the slender solution should make it ideal for small business jets, which cannot be served by bulkier mechanical terminals.

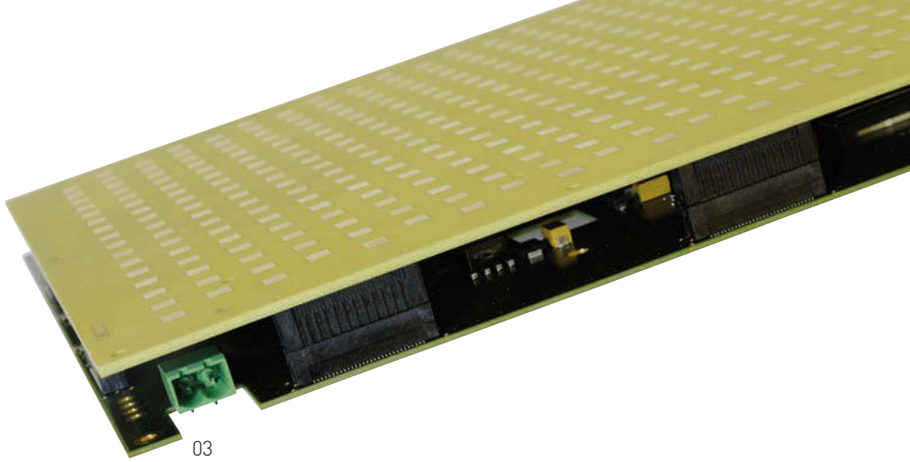
> ALL THIS ALLOWS A LOW-COST, LOW-POWER, HIGH-GAIN ANTENNA

If initial scorn from industry stakeholders is indeed a characteristic of disruption, then Kymeta can consider itself disruptive. Some experts suggest that it is far too early for the company, which has no service experience yet, to make some of the claims it is making. Kerr is confident, however, in Kymeta's technology and its ability to convert the doubtful. "We have had some very senior people, who were definitely the technology leaders for their companies, come in and be pretty skeptical about the technology at the beginning of a meeting," he says. "But after receiving the detailed technical briefings, they're always in a collaborative and helpful stance at the end."

Kymeta says that it has tested the technology with a high-throughput Ka-band satellite in a static environment with better-than-expected results. Also, the company reports that a new strategic relationship should see mass-produced land-based Kymeta antennas available commercially in 2015. While the firm has yet to announce a timeline for aeronautical deployment, a high-profile agreement with Inmarsat and Global Express program terminal unit provider, Honeywell, should facilitate smooth passage into the business aviation segment once the product has come of age. A strategy for the commercial aviation market has yet to be announced.

PHASE FIRST Key partnerships, mysterious metamaterials and a keen PR sense has kept Kymeta in the public eye. However there is another, quieter competitor in the





03

electronically steered flat panel arena that is poised to beat them to aviation market readiness.

"Our antenna is totally different [from Kymeta]," states David Garrood, chief satellite officer at Phasor Solutions, which has been developing a chip-based phased-array antenna for just over three-and-a-half years. "We are using concepts based on conventional electronics."

While the hardware itself is conventional, the team at Phasor has developed and patented an algorithm that gives accurate electronic control of a proprietary application specific integrated circuit (ASIC). Depending on the size of the aircraft, the 1in-thick, scalable Phasor antenna could contain between 2,000 and 4,000 of these ASICs, together controlling a beam and guiding it toward the moving-target satellite. This technology can be made to work at any frequency. Phasor is beginning with the Ku-band frequency and has done the preparatory work for Ka, planning to focus on that strategy more next year.

"The physical size of the antenna is huge and the reliability you get from a non-moving part solution will make it a very strong contender, apart from drag and cost advent," says Garrood, explaining why his antenna is a 'disruptor'. "People are looking for such high data rates and the gimbal-based antennas really can't get much bigger than they are already are. Also, to get the higher capacity through a multi-gimballed antenna, they can only use the satellite more inefficiently, which is very expensive for the downstream and there is an absolute limitation on the return channel because you cannot transmit any more than you're allowed to transmit while complying with adjacent satellite interference regulations."

Phasor says it is looking to have working systems by Q2 2015 and anticipates that in-service operations could begin shortly after that, assuming airworthiness certifications are granted without any problems.

SOONER RATHER THAN LATER Todd Hill, director of GCS product management and capacity at Panasonic Avionics, supports the notion that antennas will be driving industry disruptions over the next 5-10 years. "The next big jump will be in electrically steered antennas that will reduce the drag and weight without paying a large penalty in performance or being expensive to acquire," he says.

Panasonic currently uses a total of three antennas, all of which are mechanically steered. The first group, installed on a just a handful of older Lufthansa aircraft, are actually repurposed equipment from the terminated Connexion by Boeing project. The firm's primary terminal is called the Dual Panel and uses two apertures to provide "great performance, even when crossing the equator". According to Panasonic, the performance of a newly introduced single panel unit, which uses the same mounting and radome as the Dual Panel antenna, is also exciting.

Although the firm is generally satisfied by the efficacy of its current suite of equipment, Panasonic continues to investigate new solutions that will reduce the cost of services while increasing the bandwidth available to users.

"Everyone agrees that it is only a matter of time until a commercially feasible electrically steered antenna will be available for commercial airliners," says Hill. "Panasonic believes this will happen sooner rather than later." ☒

03. In October 2013, Phasor's technology successfully formed and auto-pointed an RF beam to acquire the signal emitted from a Ku-band satellite, supporting an HD video transmission

04. The Phasor antenna is less than 1in thick

04

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For its A380 interiors, Asiana Airlines has taken a delicate approach, striving for a calm, high-quality environment

ADAM GAVINE

A common conundrum for airlines embarking on A380 interiors projects is whether to let their imagination and enthusiasm run free for their flagship aircraft, or to simply maintain fleet consistency. And when the airline is South Korean carrier Asiana Airlines, how will it compete with the fully tricked out A380s of key rival Korean Air? Should its aircraft include shops, a spa, a cinema, shower rooms, an art gallery? The answer for Asiana was to stick with the calm and conservative approach that its customers already know and appreciate, and simply focus on creating a comfortable environment, complemented by excellent service – albeit in a larger space. No mold breaking, no gimmicks – just a pleasant experience based on high-quality interior choices.

Asiana started work on specifying the interiors for its six A380s around three years ago, and within a year had defined the LOPA and selected the seat models. A year later, prior to the contractual definition freeze, there was still room for a little customization of the seats and monuments and the Tangerine design agency was brought in, partly because the London-based company also has an office in Seoul, with staff who understand and are immersed in South Korean culture.

FIRST SUITES With a positive response to the enclosed suites introduced on its B777-200s, Asiana wanted a similar experience on the A380s, and selected the BFE option of the Oasis suite from B/E Aerospace. The upper deck was considered a tight fit for the 12 suites, so instead they are at the front of the main deck, in a 1-2-1 layout at an 83in pitch. The only problem with that location is that if Door 1 is used for boarding the main deck, the first class passengers board first, and then a potential 311 curious economy passengers pass through the cabin. Feedback from passengers in Korean Air's more open first class cabin highlighted this situation as a problem, especially since


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privacy is of cultural importance to South Korea's top-tier flyers. This research made Asiana confident in its decision to specify the high-walled suites rather than create a more open cabin.

Vien McArthur, Tangerine's senior designer on the Asiana project, describes the challenge of customizing the suite: "We had to create a suite that is on-brand, and feels private while also feeling light, open and not isolated from the rest of the cabin."

Tangerine worked with B/E's first class division in Arizona to achieve these aims, one of the main solutions being to install louvers in the twin doors to allow in layers of light when the doors are closed.

The team also worked with B/E to make some more subtle refinements to the suite. One change was to lower the seat a little to better fit the 95th percentile of its target market, a position that also makes the passenger feel more immersed in the suite. The change is not so big that you will notice it visually, but it took a lot of work to lower a seat containing a complex actuation system, and the team is confident that passengers will feel more comfortable. Tangerine made this decision based on what it learned from its first class and business seat work for British Airways, during which it was found that the lower the initial seat position, the greater the comfort.

A seat's comfort can also be enhanced through simplicity of operation, so the team repositioned some of the features in the suite to make their operation more intuitive. For example, the seat control unit – a touchscreen that is usually fitted on the credenza – was relocated next to the passenger and integrated with the literature pocket. The controls themselves have also been simplified, so instead of immediately being presented with the almost infinite adjustment options available via the eight motors, the top layer of the interface instead shows an initial four presets for the seat actuation (TTOL, lounging, dining and bed mode), with the full range of adjustment controls available a step beyond, as is a memory function to save your favorite positions. The seat control unit and its GUI were customized by Tangerine in conjunction with the supplier, WASP, and together they developed a clean and calm interface intended to strike a balance between showing off the new technology and it being simple to understand if a tired passenger just wants to recline the seat.

Another refinement is that the power socket under the ottoman has been angled more toward the passenger, making it easier to locate and use. These are examples of seemingly minor changes, but by making sure all features fall easily to hand, the suite becomes more relaxing and comfortable, even if only at a subconscious level.

The CMF of the suite is also quietly considered. The carpets and seat fabric choices were already defined by Asiana, in line with its B777 interiors, though Tangerine still had scope to make some subtle changes to finishes, such as the timber aquagraphic on the credenza, which was made a little lighter and more contemporary – in itself a mini project that took months to get right.

It's so relaxing that first class passengers may never want to leave their suites; indeed Asiana's research has found that its first class customers do like to stay in their

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01. First class passengers in the center seats can drop the privacy screen to create a shared space

02. The doors of the suites give Asiana's first class passengers the privacy they desire during boarding

A new book, 'Tangerine: 25 insights into extraordinary innovation & design' will be out on November 6 and is available for pre-order at Amazon

03

suites. Thus it was decided that a bar or social area was not required, though guests are welcome to use the business class lounge area upstairs.

IFE AND GUI A bigger opportunity to expand the color palette in first class came through the GUI on the IFE monitor – bigger as in 32in. This display, as with the 32in display in its B777-200 suites, is the largest to be found on any carrier in the world, and when installed complete with a bezel, it fills the entire width of the suite. This large piece of high-definition real estate was used to apply bolder Asiana branding to the GUI, and to incorporate a wider range of the airline's corporate color palette, which is derived from traditional Korean colors, including warm gray, champagne gold, fresh white for the buttons, and highlights in a deep pink.

"The GUI doesn't scream Asiana, but you can see how the airline's color palettes harmonize across all areas," says Young Choo, Tangerine's project director in charge of the GUI and IFE elements.

The system itself is the Panasonic eX2, and Choo, as well as staff from Tangerine's Korean office, visited Panasonic's facility in Forest Hills, California, to look at new possibilities for the system. One idea they explored was an iPad/iPhone-style swipe control, but they decided that the typically older demographic of Asiana's first class passengers would prefer a more conventional button interface. Some other innovative GUIs with new ways of browsing and selecting content were also explored, but while they worked really well on the 32in display in first class, Asiana wanted a common interface in all seats, and the GUIs were considered to be a little too 'busy' when viewed on the 11.1in displays in economy.

Choo was a little disappointed, saying that, "Because its an A380, we wanted to celebrate with a more futuristic GUI look and feel." However, she did update the icons and buttons on the GUI to make them more intuitive and organized. Also, all features now show up on the main page to give passengers easy access to a broad range of content, and a 'wheel' type GUI allows users to spin through options.

BUSINESS CLASS For business class (Business Smartium), Asiana had already selected the Sogerma Solstys seat, a product it is familiar and happy with from its B777-200 application, largely due to its direct aisle access. There was a little scope for customization of the 66 seats though, all of which are located on the upper deck in a 1-2-1 configuration. The biggest change is that the armrest mechanism now automatically drops both arms as the seat reclines, to provide comfort in all positions, as well as increasing bed width.

The team decided to redesign the shell, with Sogerma changing its tooling to allow a reduction of the curve at the front shell to make it a little squarer, while keeping most of the larger curve at the back. Also, the rub strips have been narrowed, the positions of the headphone socket, cocktail table and bottle storage altered for easier access, and the seat wings enlarged to enhance privacy.

The refinements Asiana made to the meal table on the B777 – which was viewed as standing too proud of the

04

03. The Solstys seat gives Asiana good cabin density with direct aisle access

04. Note how the seat folds over the toilet seat to make the space feel less like a lavatory and more like a changing room

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05. The lounge is designed to be a relaxation area than a party destination
06. The console unit has a finish consistent with the business class seats

shell, with a too-prominent hinge mechanism – have been taken further for the A380. The table – again finished with a more contemporary timber effect – has been recessed further into the shell for a cleaner look in the stowed position, and the visual profile of the hinge reduced.

Some work also went into combining the aesthetic of Asiana's predefined CMF, with a slightly more contemporary look. Again, the carpet and upholstery were predefined, but a more angular appearance has been achieved through a new Tedlar finish on the shell. The Tedlar pattern was created by senior Tangerine designer Monica Sogn and manufactured by Isovolta, and Sogn describes the pattern as "iridescent and stripey. The effect is a little like wallpaper."

Overall, Sogerma was impressed with the work on Solstys, with Patrice Boursiquot, the company's general manager for Asia Pacific, stating that the Asiana seat is "one of the very best Solstys designs, and the best cooperation we've had with a customer and designer".

ECONOMY Again, Asiana had selected its economy seat in advance, choosing the slimline 5751 model from Zodiac Seats US. For the A380, the seats are standard models, with the optional footrest and 11.1in IFE display, trimmed in Asiana's existing CMF schemes. It's a simple solution, but the 417 economy passengers (311 on the main deck and 106 on the upper deck) will be happy with the 34in seat pitch and 18in seat width.

COMFORT ROOMS The first and business lavatories are SFE items, so the team was constrained in the extent of its creativity. However, though 95% of the hard points were already set, including the position of the toilet, there was scope to add a few new details, such as a restyled bottle aperture and a coat hanger on the back of the door, with a small tray on the top to hold a cell phone or keys. A particularly nice addition, designed with Diehl, the supplier of the lavs, is a portion of the bench that folds over the toilet seat to make the area feel more like a changing room than a lavatory when using the space to change clothes.

Tangerine decided on a fresh rather than calm feel for the bathrooms, with the bench trimmed in coral white leather and the floor covered in mock timber – the textures and colors were again designed in-house at Tangerine, and created by Isovolta. The team strived to create a domestic bathroom feel, enhancing the feeling of space through lighting and mirrors, and creating more contrast using the wood effects.

LOUNGE AREA Some surprisingly bold ideas were initially suggested for the business class lounge area at the front of the upper deck. However, with Asiana's customer base considered conservative, and with business passengers sitting just beyond the space, it was decided that the area should be more of an area for relaxing than partying.

The console at the top of the stairs is not used as a bar, but rather as a welcome area with some small snacks. If guests want a drink, they simply order it from a crew member, who will prepare it in the galley and deliver it.

A rather adventurous color and trim application was considered for the console, but it did not make it through the design process, as Emma Partridge, Tangerine's CMF expert explains, "We wanted to install a striking, back-lit, onyx surface in the bar, but the complexity and risk of cracking meant we ended up choosing a laminate bar top lit from above with bronze paint finishes that give it gloss and shine."

Overall, the Asiana A380 interior achieves the airline's aim of creating a calm and comfortable environment, complemented by a well-trained crew who strive to create efficient, respectful and individual service. As befits the airline, Asiana's A380 exudes a quiet confidence. ☒

> THE ASIANA BUSINESS SEAT IS ONE OF THE VERY BEST SOLSTYS DESIGNS

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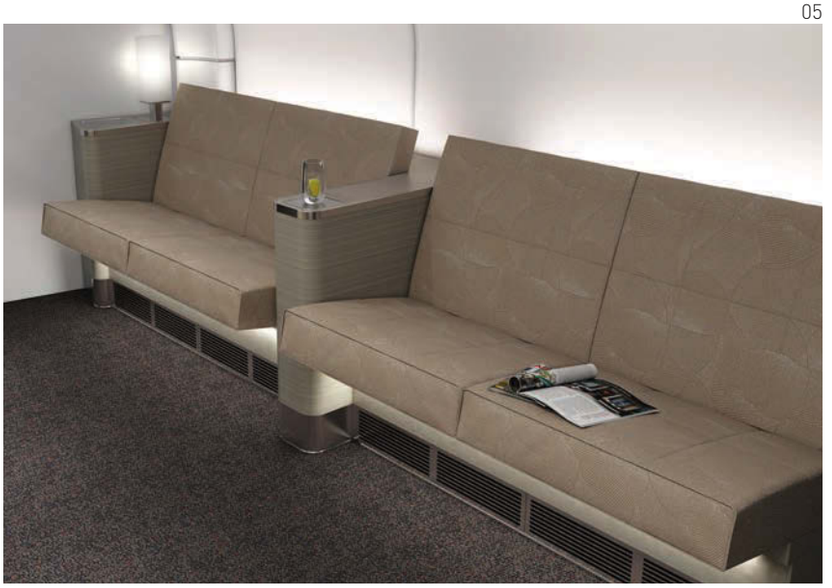

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SEATTLE PREVIEW

Aircraft interiors EXPO® AMERICAS

Coming to America

Visitors to Aircraft Interiors Expo Americas 2014, which will be held on October 14-16 in Seattle, Washington, will enjoy the only dedicated aircraft interiors event in the Americas region. This focused event showcases the best in aircraft interior design, cabin engineering and management systems, seating products, soft furnishings, leather and textiles, galley equipment, lighting and more. The event is expected to welcome over 2,000 visitors and has attracted more than 120 exhibiting companies. Many major airlines have already confirmed their attendance at the show, including American Airlines, Delta, Alaska Airlines, Hawaiian Airlines, Japan Airlines, jetBlue Airways, Qantas, Virgin America, Thai Airways and Korean Air.

Aircraft Interiors Expo Americas consistently delivers the latest innovations and hosts a number of new product unveilings every year. This year will see this trend continue and evolve as several exhibitors are preparing to reveal a wide range of new products and announce major commercial agreements. Here are just a few highlights you can expect to see in Seattle.

Download the Aircraft Interiors Expo app from the official website

GEVEN LANDS IN SOUTH AMERICA, VIA MEXICO

Following its recent success, having been awarded two important projects for the supply of economy class seats on Aerolineas Argentinas' Airbus A330 and A340 fleet, Italian seat manufacturer Geven will be flying a new product to the expo.

The company will be bringing its Piuma Evo ultra-lightweight seat, which is cost effective due to its low cost of ownership. The Piuma Evo is an enhanced version of the company's existing Piuma seat, and even sports the same styling but with improved performance, thanks to its reduced weight. All these features make the Piuma Evo an ultra-competitive seat, especially for ultra-low cost carriers (ULCCs), who are always looking for ways to reduce fuel costs.

This competitive design led to Geven signing – after a long negotiation – two further important contracts, which will bring the company's products to the Mexican market, through two well-known South American ULCCs, for a total of 110 aircraft.

"The competition was fierce, but the innovation achieved through intensive R&D work and a well-planned commercial strategy has allowed Geven to position itself as a better option for the two airlines," explains Massimiliano Guerriero, Geven's sales manager for the Americas.

This achievement, together with the completion of its range of state-of-the-art seats and the launch of Bacio, its first long-range, fully electric business class seat, puts Geven in a position to better meet all the challenges and requirements of an industry that is often looking for suppliers able to offer seats for all travel classes.

Below: Geven's Piuma Evo ultra-lighweight seating

Meet the Canova family

After enjoying a successful Aircraft Interiors Expo this year in Hamburg, Aviointeriors is proud to be presenting Canova, an evolution of its new family of modular seating at the Americas event.

Designed to be extremely versatile, with options selected by the customer, Canova can be specified as a premium economy seat or a full business class product. The aim of the design is to achieve the right combination of production costs and airline investment.

The Canova Smart premium economy version is characterized by its lightweight structure, easy maintenance and the ability to be installed at a very reduced pitch (down to 36in).

Canova Comfort meets all the requirements of a very comfortable business seat. It also allows installation at a minimum pitch of 44in.

Finally, the Canova Superior model is designed as a brand new business class reclining seat, combining eye-catching smooth lines with a real sense for detail.

Acro makes Seattle debut

This year is the first Americas showing for award-winning aircraft seat manufacturer Acro Aircraft Seating. The company enjoys regular success at Aircraft Interiors Expo in Hamburg, and will be attending this year's Americas event following a highly successful 18 months that included an order for the retrofitting of five Spirit Airlines' Airbus A319 aircraft with its Acro Superlight seat. Furthermore, in 2015, Spirit will commence installations on 35 new A320s and A321s. This order, which equates to around 5,000 economy class seats, is Acro's second from a major US airline.

Visitors to the Acro stand can try out the Superlight seat, as well as Acro's in-arm tray table, which was a Crystal Cabin Awards finalist in 2013. The table is self-cleaning, lightweight and line replaceable in under 60 seconds.

Acro believes that good design comes from the application of common sense, engineering rigor and practical experience of the service environment. In April 2014, the UK-based manufacturer won a prestigious *Design Week* award in the Industrial Product Design category for its Acro Ultra XC seat.

The company designs, certifies and manufactures lightweight, robust and comfortable economy seats for regional, legacy, low-cost and traditional carriers, and Acro seats can now be found with more than 25 airlines globally. Cameron Allan, Acro's commercial director, will be present at the expo for all three days.

ORIGINAL INNOVATION

The success of Lufthansa Technik's Innovation Business Unit has led to the creation of a new product division named Original Equipment Innovation. This division expands the company's position as a manufacturing organization.

One of the division's products is named GuideU. Available in numerous colors and variants, this product consists of photo-luminescent lighting strips that guide passengers to exits in an emergency. Designed to fit every common cabin floor material, GuideU is easy to install and has low maintenance costs.

Another product is the HelioJet SpectrumCC (color control) color LED cabin lighting system, which employs about 80% fewer diodes than competing systems. The system's homogeneous light pattern means there are no hot LED spots, and the company claims a mean time between failures for the system of more than 50,000 operating hours.

Another product is Lufthansa Technik's new 802.11ac WAP with integrated antennas, which is based on the latest developments from Aruba Networks, a leading provider of network solutions for the mobile enterprise market.

Finally, with Aerosight, Lufthansa Technik offers a single-box cabin surveillance camera system that enables pilots to monitor cockpit access, cabin and cargo areas during the day as well as at night.

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FAST service for FST shapes

Quantum Polymers of Newark, Delaware, knows very well the daunting task faced by many aircraft design engineers seeking higher performance parts for aircraft interiors – how to quickly procure small quantities of solid rod or plate stock that can be machined to size then tested before molds are built for eventual injection molding.

From fasteners to hinge assemblies and panel latches, the need for small quantities and fast turnaround is apparent and growing. Quantum's new FAST service for FST shapes offers design engineers the ability to choose extruded rods or plates from typical FST resin families, such as PC, PEI, PEEK or PVDF in neat or custom formulations in three weeks or less without the penalty of large minimum order requirements.

Rods from 3/8in to 2in diameter and plate stock from 3/8in to 1in thick are available in 50 lb order quantities or less. Quality is representative of long-run production stock, and shapes are supplied oversized in diameter and thickness for precision finish machining. Annealing is included for critical dimensional stability, which is required during machining. Characterization of the shapes' critical properties (tensile, flexural and compressive strength) is available on a custom quotation.

Below: Quantum's range of HPM stock shapes

Don't miss the Industry Networking Reception on October 14 from 5-7:30pm

CUSTOMIZED PRODUCT DEVELOPMENT

Matzen & Timm specializes in the development and production of complex connection and hose systems made of caoutchouc materials.

As a long-term certified partner in the aviation industry, the company can deliver high-temperature hoses, as well as suction hoses and coolant hoses for air-conditioning systems, vacuum toilets or bleed-air systems.

The main characteristics of all the company's products are lightweight construction in combination with high mechanical strength, flexibility, temperature resistance and the latest safety properties (flame, smoke, toxicity).

Many high-temperature lightweight hoses or multiforms are produced to very specific requirements for a particular application profile, and are essentially hand-made products. For the future, Matzen & Timm plans to sharpen its focus on customized product development and test equipment – and also for prototypes.

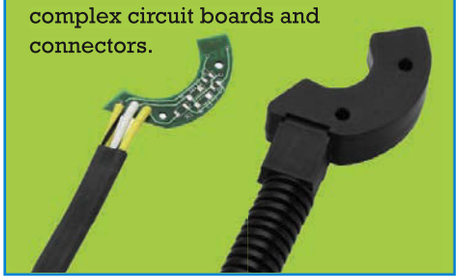
The company recognizes that another important factor in the aviation industry is the weight reduction of products. As a result, the company is currently working on innovations, including lightweight bellows for air distribution in the cabin.

Meter mix and overmolding

Ellsworth Adhesives, a global distributor of adhesives, specialty chemicals and dispensing equipment, has announced the addition of Fluid Research Corporation (FRC) and Mold-Man Machines LLC, to its family of companies. The addition of these companies furthers Ellsworth Adhesives' goal of becoming a premier supplier of adhesives, associated equipment and related products worldwide.

FRC is progressing the design of cavity metering pumps to deliver precise, consistent and reliable dispensing of a wide variety of fluid media. Systems include metering, mixing and dispensing equipment for both single and plural component reactive materials, including epoxies, polyurethanes, silicones, acrylics, urethanes, adhesives, pastes and abrasive materials. FRC equipment is used in potting, encapsulation, coating, resin transfer molding (RTM), structural bonding, gasket forming, filter manufacturing, doming and sealing operations, plus many other applications.

Mold-Man Machines specializes in low-pressure injection molding for customers requiring protection for electronic devices aimed at markets including transportation, medical, defense and consumer products. Mold-Man Machines allows manufacturers to achieve instant potting and protection of circuit boards from harsh environments, such as water and dust by using thermoplastic materials and low-pressure injection molding. This method gives higher output than casting applications, with cycle times averaging 10 to 50 seconds. The high-speed electronic encapsulation offers the flexibility to over-mold complex circuit boards and connectors.



Victrex Peek added to leading modeling database

Victrex has added three thermoplastics to Digimat-MX, a leading material modeling database, to accelerate the application development process while delivering lightweight, cost-effective components. The polymers are used in place of metal parts on commercial aircraft. The software suite from e-Xstream engineering, a MSC Software Company, contains information on Victrex Peek 150CA30, Victrex Peek 90HMF40 and Victrex Peek 150GL30.

Photo: Victrex plc

Victrex Peek 150CA30 is qualified by Boeing and Airbus, and is typically used in place of metals, such as aluminum, titanium and stainless steel. The 30% carbon fiber-filled, high-flow material offers high stiffness and strength as well as very low flame, smoke and toxicity (FST) emission ratings.

Victrex Peek 90HMF40 is a high-modulus, high-flow injection-molding material that has recently been qualified by Airbus. It delivers up to 100-times longer fatigue life and up to 20% higher specific strength and stiffness than aluminum 7075-T6.

Victrex Peek 150GL30 is a 30% glass fiber-filled polymer that delivers a good balance between strength and ductility, is resistant to galvanic corrosion, and has excellent FST properties.

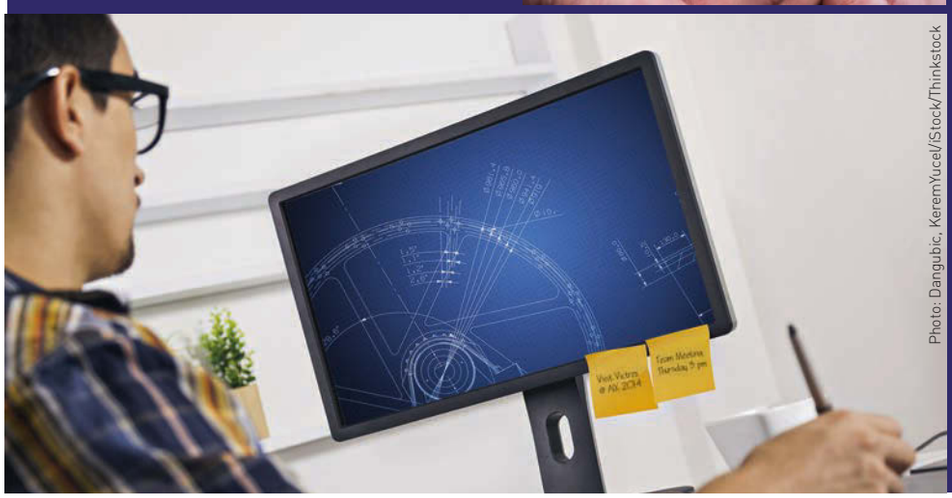


Photo: Dangubic, KeremYucel/iStock/Thinkstock

Innovative leather trends

In addition to the exclusive ambience that leather creates in aircraft interiors, the material also offers extraordinarily good hygienic properties as well as easy care and resistance. With its XLight and XTreme leather innovations, Boxmark is looking to set trends for the aircraft interiors of the future and to make a valuable contribution to sustainability.

XLight is a leather, which, compared with other leading aircraft leathers, makes a convincing case due to its laminated weight of ±600g/m². XLight reduces the total weight of each aircraft, resulting in fuel savings and consequently lower pollutant emissions – meaning cost savings and a contribution to sustainability. XTreme is a hard-wearing leather that offers maximum values through its technical properties. This material meets the highest quality standards and has certificates that prove excellent resistance to mold, bacteria, disinfectants, insulation, dirt, chlorine, seawater, oil, alcohol and water. It has high resistance to stretching, tearing, abrasion and breaking (even at sub-zero temperatures). It is also flame retardant. XLight and XTreme fulfill all international standards and are also available combined in a leather product.

Boxmark offers custom-made product services and a full range of leather refining and processing for commercial aircraft, as well as for VIP and business aircraft.

BIOLINK TAKES TO THE FLOOR

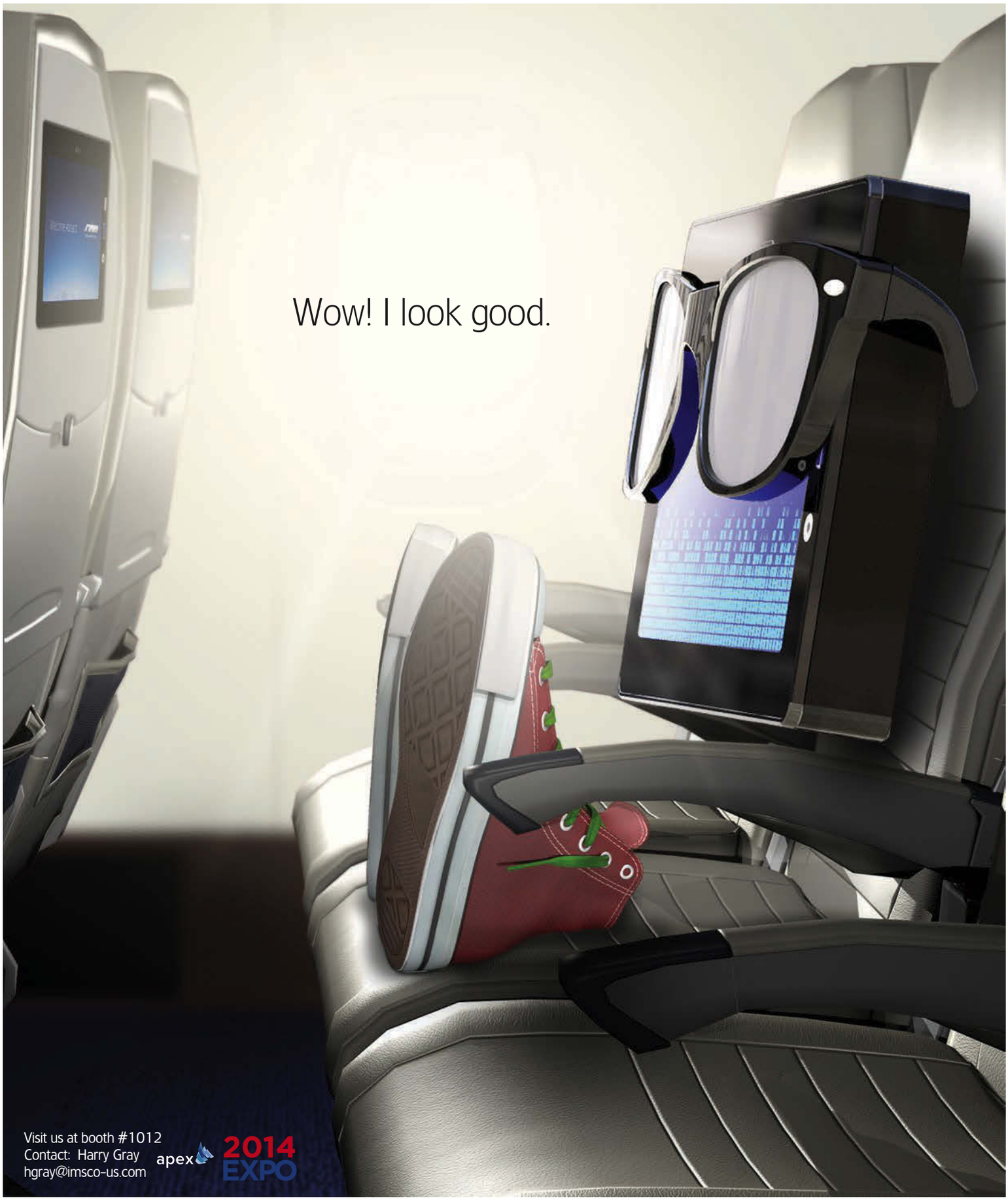
Biolink Tape Solutions, a leading supplier of pressure-sensitive adhesive tapes, films and foils, will present its aero flooring solutions at the expo. Biolink is headquartered in Waakirchen in Upper Bavaria, Germany, and is a subsidiary of the Planatol Group, based in Rohrdorf near Rosenheim.

Biolink's proprietary solvent-free adhesive technology is used to produce a wide variety of high-performance adhesive tape solutions for many industries and critical applications, such as aircraft flooring.

The company's Airbus-approved and specified carpet tape, Relink 2318, continues to build sales among leading airlines and MRO companies around the world.

Relink 2318 is a high-performance carpet tape that provides cabin engineers with the benefits of quick installation, secure and lift-free fixation across all carpet backing types, and rapid residue and damage-free removal as it comes away in one piece. These translate into quantifiable cost savings for the customer.

Biolink will also present two new products at the show. Prolink 130r is a transfer adhesive for safety labels, fascia panels and non-textile floors, which is qualified by Airbus according to ABS5768B. Relink 2319 is a black, flame-retardant carpet tape, qualified according to FAR and BMS specifications.



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IntelliCabin on approach

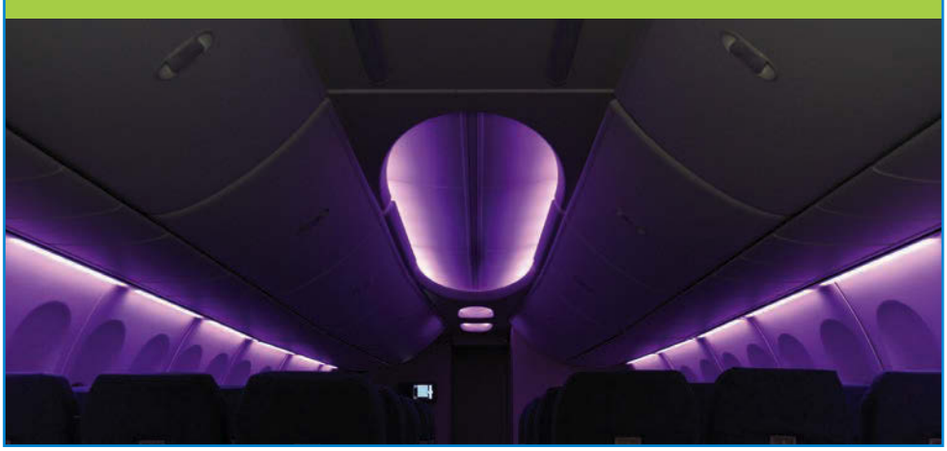
BAE Systems' Commercial Aircraft Solutions business has a history of excellence and innovation in manufacturing high-integrity avionics, flight and engines controls, and a broad range of cabin and cockpit electronics.

BAE Systems' newest product for commercial aircraft is IntelliCabin, a highly integrated approach to cabin management that provides a unique flying experience for passengers and crew members. IntelliCabin, which could be on commercial airlines as early as 2015, is flexible, adaptable and scalable, providing in-seat power, LED lighting, wireless tablet-based IFE and dimmable windows, all managed via a centralized attendant control panel or a crew handheld device.

For passengers, IntelliCabin means comfort and flexibility. By removing bulky power boxes under the seats and in the overhead bins, passengers receive more legroom and space for luggage. IntelliCabin also provides tablet-based IFE, generating a more personalized user experience that is unparalleled in the industry. Finally, the system offers cutting-edge LED lighting, creating a more relaxed ambience for travelers.

For the flight crew, IntelliCabin will simplify and reduce workload, since the system automates many tasks. By using either the centralized control panel or handheld devices that can be operated anywhere in the aircraft, crew members are able to easily adjust the temperature and light settings, take refreshment orders, and interact with other crew members to provide better service to passengers.

Airlines will also benefit from this cabin of the future. IntelliCabin reduces the number of components for installation, creating a lighter system that will help airlines save on fuel and operating costs. As IntelliCabin can be seamlessly integrated into existing onboard systems, it also doesn't depend on other buyer-furnished equipment or OEM installations.



CLEAN SHEET DESIGN

Sabic's aerospace portfolio, which includes two new Lexan sheet solutions for aircraft interiors, will be displayed in a small-scale aircraft cabin model featuring applications using Sabic materials. The first of the new products, a clear Lexan XHR2000 sheet with 80% light transmission – also meets typical industry FST requirements (FAR25.853, BSS7239, ABD0031). The second product, the patent-pending Lexan Light F6L300 sheet, is the lightest thermoplastic sheet option available today and is designed to help provide solutions to airlines' quest for differentiated cabin interior designs while helping to reduce weight.

Design engineers will benefit from these lightweight, durable materials, which can help to reduce system costs, offer ease of fabrication and comply with the industry's strict regulatory standards.

Sabic's focus on customer needs for regulatory-compliant solutions for cabin interiors, seating, galleys and monuments, as well as for hidden spaces inspires the company's ongoing development of high-performance materials and technologies.

"Sabic continues to be a trusted partner for aerospace tiers and OEMs because of our commitment to supporting the innovations that help our customers meet their most challenging demands," states Kim Choate, marketing director for Sabic's Innovative Plastics business.

DRESS COVER FIRE BLOCKER

National Nonwovens has announced that it will introduce Ultra-ProTechtor, the first fire-blocker for all aircraft seating dress covers. The product is a non-woven lightweight flame barrier employing Ultem polymer and newly developed Ultem fibers by Sabic Innovative Plastics.

"Ultra-ProTechtor is engineered to provide ultra-flammability protection at a lower weight and cost," says Anthony Centofanti, CEO and president of National Nonwovens.

The enhanced construction of the product provides increased stability along with major property improvements, including low smoke density and toxicity, water repellency, low heat release, high puncture resistance and improved fire-blocking protection at a lighter weight. In addition it has excellent seam, tear and tensile strength, resulting in less stretch, and is formaldehyde free. The product was also tested and met FAR25-853-A and C amendments 25-116-appendix F part II by two independent US laboratories.

Ultra-ProTechtor combines the National Nonwovens advanced engineering with Ultem fiber technology and the result is material that is more fire-resistant than aramids. It has a higher limiting oxygen index (LOI) rating than Nomex and Kevlar; Ultra-ProTechtor has an LOI of 44 while Nomex and Kevlar are 26 and 31 respectively.

Top coatings

After its recent success in obtaining qualification by Boeing for its fast-drying waterborne cabin primer, French coatings manufacturer Mapaero is announcing a new line of waterborne cabin finishes.

The new line of extra-cleanable paints, developed under the name FRX, will combine all the advantages of its second-generation, fast-drying finish FR6/55 qualified by Airbus in terms of low VOC and fire retardancy, with an enhanced cleaning ability designed to pass the toughest tests in the industry, including mustard, lipstick and beverage stain resistance.

"All the basic formulation is now done," says Jean-François Brachotte, CEO of Mapaero, "and the full color palette should be available in a year."

Mapaero will also offer the new paint as a direct-texture topcoat, a proprietary concept designed to halve the time it takes to paint textured parts while greatly improving texture consistency between parts.

A qualification program has been initiated with an undisclosed aircraft manufacturer for both the smooth and self-texture versions, and the paint is currently available to other OEMs for trials.

Elsewhere, FR4-45, the company's latest generation cabin primer, has been qualified by Boeing in the material specification BMS 10-83 Type IV. This specification applies to commercial aircraft at manufacturing stage and maintenance.

FR4-45 is a fast-drying, waterborne fire-retardant sprayable and sandable primer used to perfect the surface of cabin parts prior to applying a finish. Already qualified by Airbus and other OEMs, it has one of the lowest VOC (volatile organic compounds) ratings on the market, at 50g/l or 0.42 lb/gal (ASTM D3960), which can help users comply with VOC emissions caps.

Living color

Visitors to Aircraft Interiors Expo Americas can experience the always growing collection of design-forward Kydex thermoplastic sheets, encounter in-development materials and finish trials from the Kydex designLab, and share their ambitions, plans and challenges with the Kydex sales and design team.

The next generation of the acclaimed Kydex 6503 product will also be on show at the company's stand. This product, still in development, brings even more to the pearlescent system engineered for reflecting and refracting light by enhancing geometric plane and direction. The color shifts when the object or viewer moves. And the effect has an amazing range, with designers being able to choose how much the effect highlights a feature in a finished part – from a fine pencil line to a bold, bright outline, to a subtle glow.

RFID technology

Servecorp will be introducing a new Stowlok RFID solution for its ultra-lightweight, secure life vest stowage range. Life vest stowages typically weigh only 60g and comply with US TSA requirements for sealed stowage. Tamper evident security seals have been used successfully with life vest stowages for some years, and over 300,000 life vest stowages are now deployed.

The Stowlok RFID solution has been developed to ease and accelerate the process of life vest inspections. A handheld RFID reader can interrogate the cabin for tampered RFID seals and report any seat numbers that need further investigation. A read range of up to 3m enables search times of minutes rather than hours. The device is 'click to fit' and incorporates industry-standard, low-cost RFID labels. The RFID tag breaks and disables RF interrogation when a stowage is opened or tampered with. The system is compliant with aviation industry standard ATA Spec 2000, so it can be integrated into existing RFID cabin security programs.

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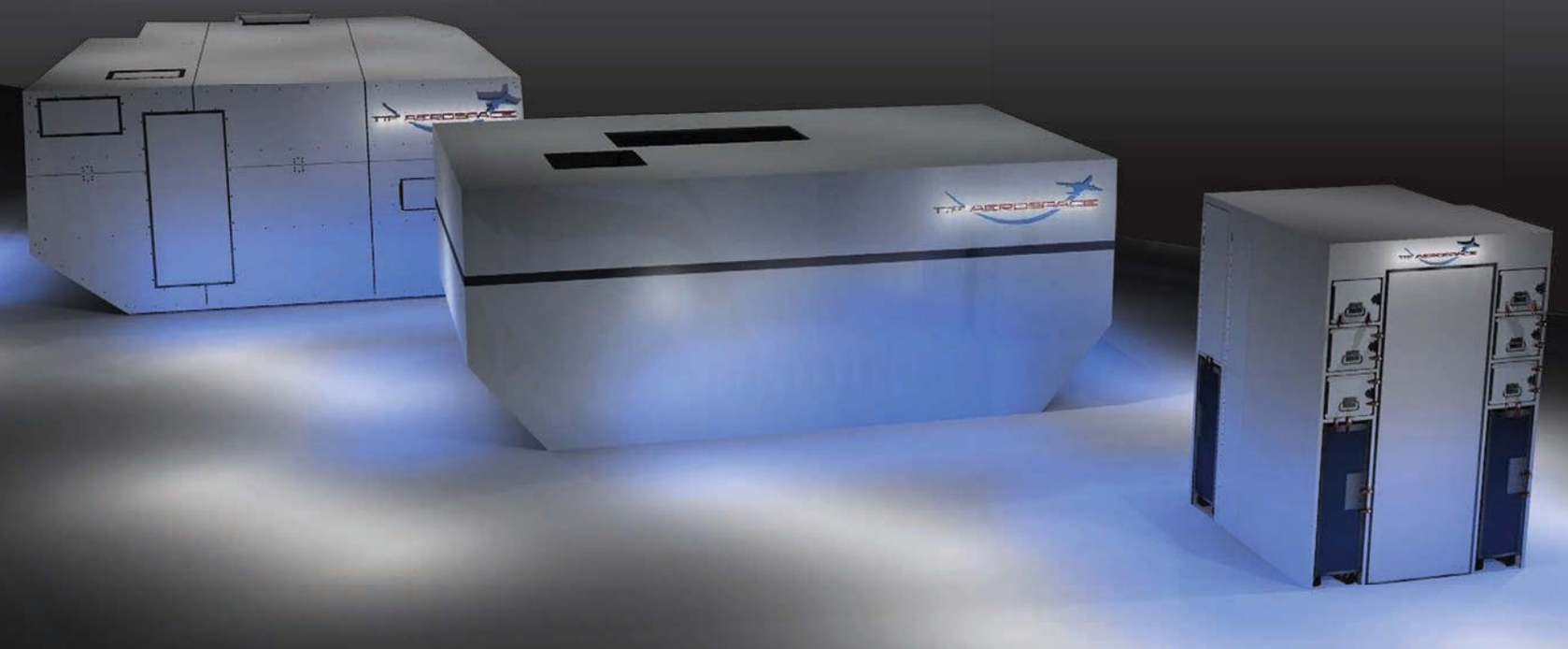

WTCE Americas launch event

World Travel Catering & Onboard Services Expo Americas

New for 2014 is the WTCE Americas launch event, co-located with Aircraft Interiors Expo Americas. Having successfully established itself as a hub for industry expertise across Europe over the last three years, the World Travel Catering & Onboard Services Expo (WTCE) is now tapping into the Americas, offering a unique window into the diverse and expanding onboard services industry, including travel catering, passenger comfort and buy-on-board products. WTCE Americas will be the number one route to food on the move, as well as the ancillaries of the whole passenger travel experience.

With passenger numbers increasing across air, rail and cruise, the launch of WTCE Americas is geared toward showcasing the latest and greatest of the industry's wares, as well as insight into the hottest topics and trends impacting the industry today. Visitors will have the opportunity to liaise and network with exhibitors supplying a full range of services, including food and drink, toys, hygiene products, packaging, galley equipment, amenities and much more.

Taste of Travel Theater

With interactive and thought-provoking presentations from leading industry experts, and inspirational demonstrations from world-class chefs, this exciting demonstration area will challenge the way you think about airline meals, snacks and onboard services. There will be plenty of opportunities to ask questions, taste and sample, so don't miss these free-to-attend sessions taking place each day on the show floor.

Opening times

Exhibition

Tuesday October 14: 9:00am-5:00pm*

Wednesday October 15: 9:00am-5:00pm

Thursday October 16: 9:00am-4:00pm

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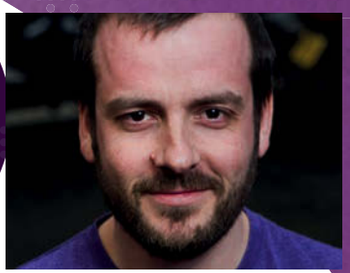

Jeremy White
Head of Transport Design, Seymourpowell

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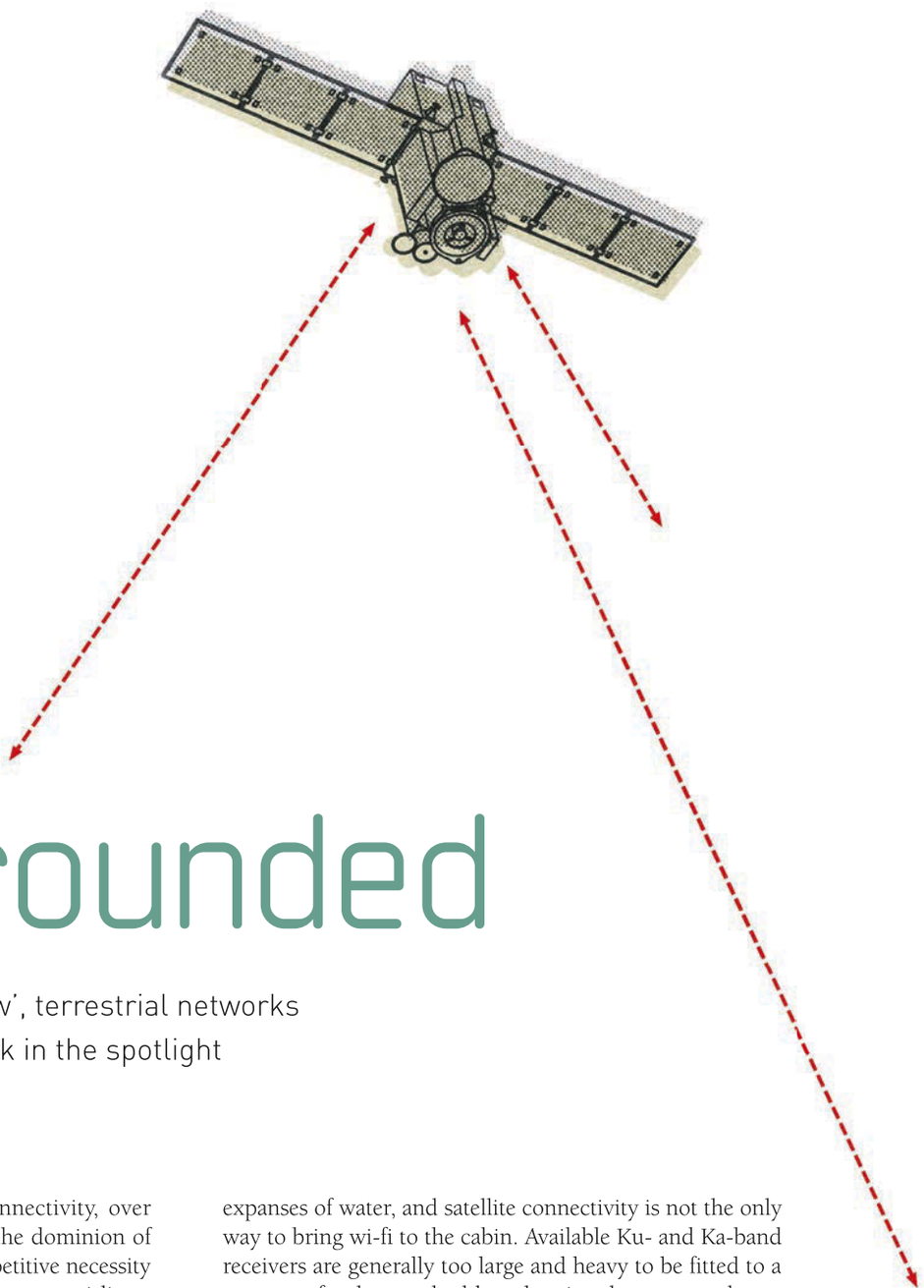


stay**grounded**

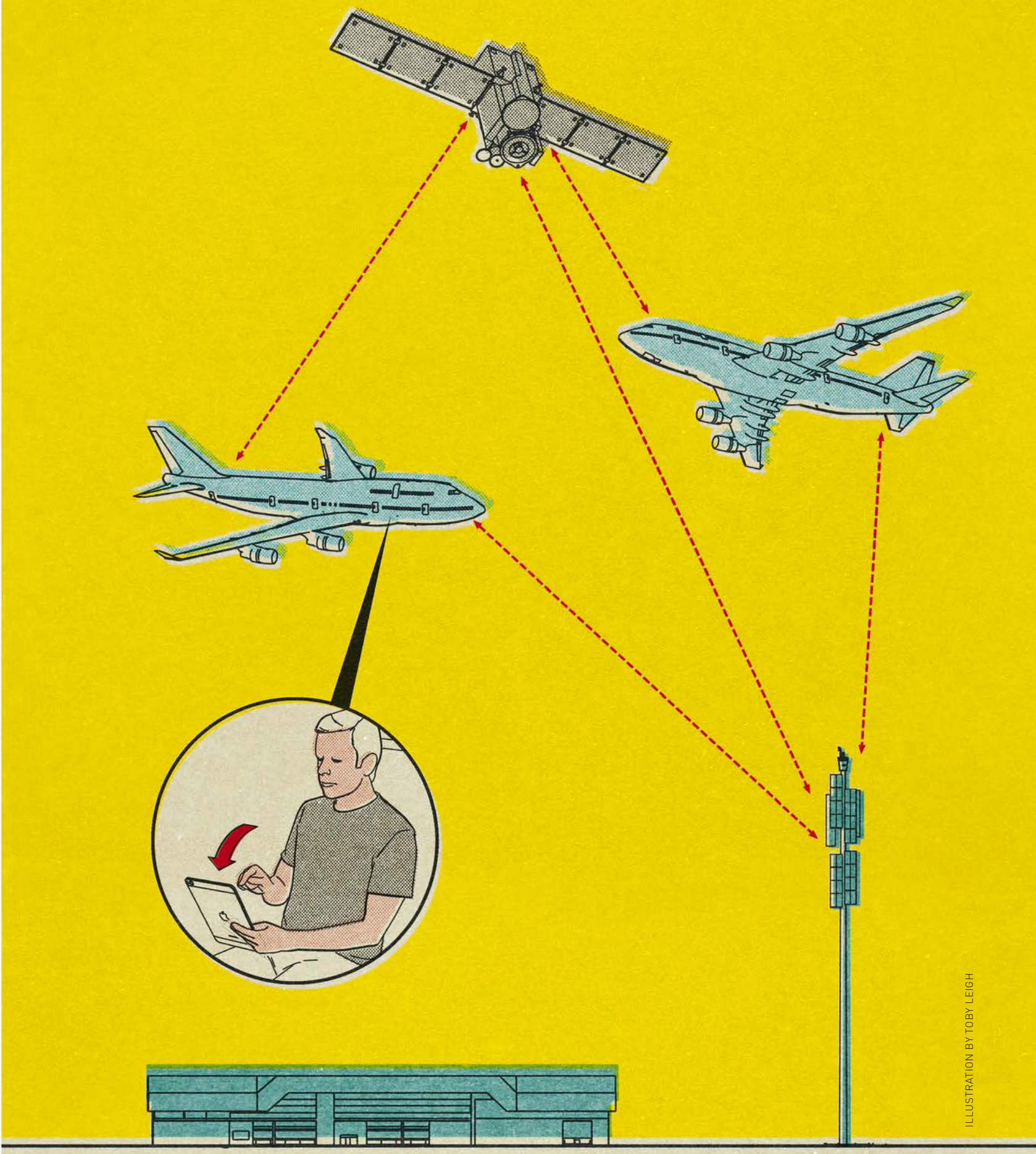
No longer a 'one-supplier show', terrestrial networks for inflight connectivity are back in the spotlight

MARYANN SIMSON

Global and seamless inflight connectivity, over both land and sea, has now left the dominion of novelty, becoming instead a competitive necessity for any full-service carrier worth its salt. Low-cost airlines, too, want to get in on the action. In terms of solutions for long-haul aircraft, high-throughput satellites with broadband-boosting spot beams and game-changing antennas (for more details, see our feature on page 98) are poised to produce the same in-cabin wi-fi speeds we can enjoy at home today.

We would do well to remember, however, that not every aircraft is a long-haul wide-body traversing great expanses of water, and satellite connectivity is not the only way to bring wi-fi to the cabin. Available Ku- and Ka-band receivers are generally too large and heavy to be fitted to a narrower fuselage and, although prices have come down, the business case for satellite connectivity is simply not compelling enough for some operators with lean business models or small networks. So, while the space-race to connectivity leadership has had many eyes fixed on the heavens, a number of noteworthy players have been quietly working to fill a niche on the mainland.

A technology that some may have thought was edging along toward obscurity, air-to-ground (ATG) networks are



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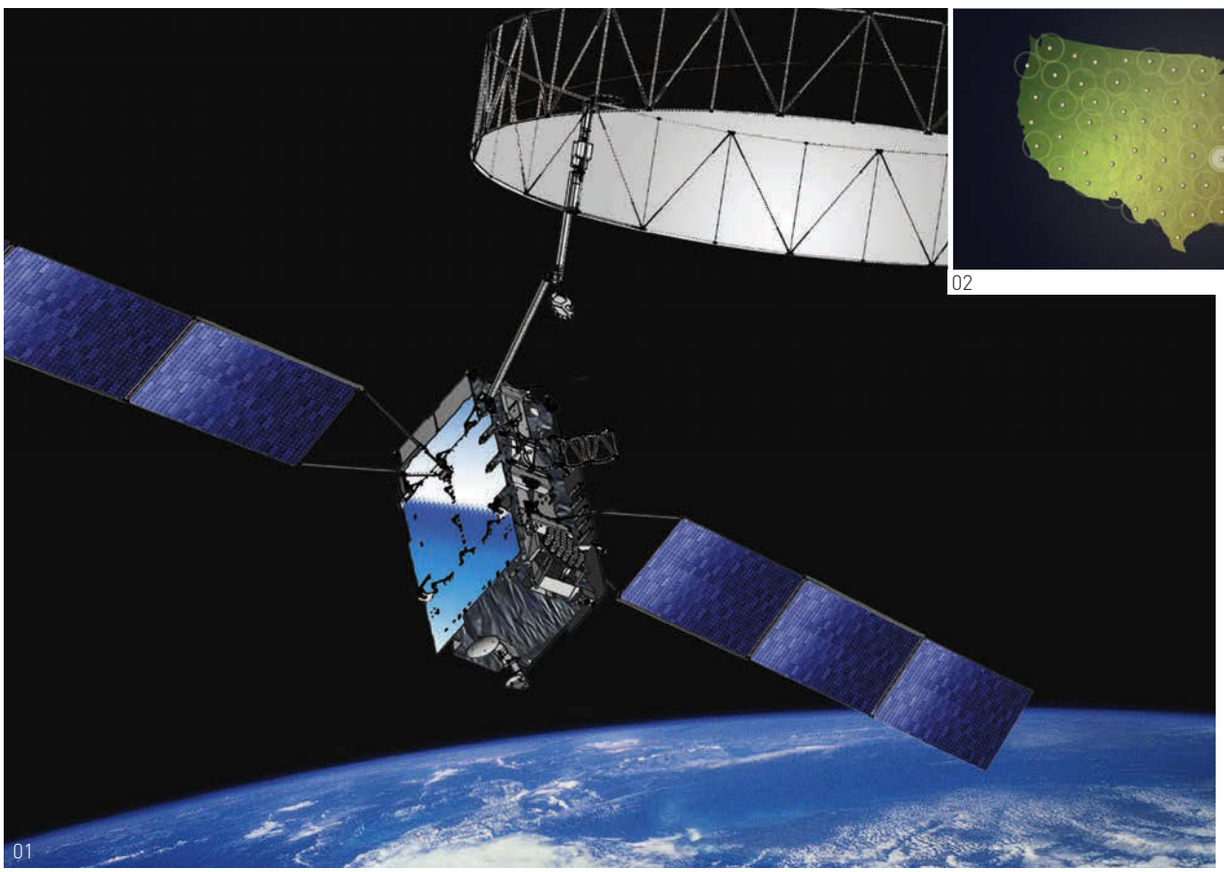


01

02

01. Inmarsat's Europasat is a 4G communications network operating over 30MHz of the S-band

02. In the few years since this graphic was produced, Aircell's North American coverage has become more comprehensive

back on the front-burner – and the heat is on. "The ATG platform is having a rebirth in some ways," explains Seth Miller, IFEC and loyalty marketing analyst. "Gogo built it up first and has more or less done as much as it can with the bandwidth and spectrum that it has been allotted. Now we are seeing growth from the other vendors who are finally convinced it makes sense."

In this year alone, two major competitors have announced an intention to launch their own ATG inflight connectivity networks: first AT&T, then Inmarsat.

"There is no concern these days about whether we will consume connectivity; it's just about finding the optimal way to deploy it," says David Coiley, vice president of aviation at Inmarsat, a world-leader in operational and passenger satellite communications that is now preparing to activate an ATG-hybrid network in Europe. "What we have recognized, looking at what happened with Gogo in North America, is that there are certain parts of the world where there is a concentration of high-density aviation activity that makes a ground-based system cost-effective with regard to the deployment of cell towers."

Revealed in early June, Inmarsat's integrated ATG solution will make use of a harmonized European spectrum that was granted by the European Commission back in 2009. Approximately 300 cell towers will be erected across all the 28 EU-member states and these will be supported by the launch of an S-band satellite. 'Europsat' is to be constructed by Thales Alenia Space and

> THE ATG PLATFORM IS HAVING A REBIRTH IN SOME WAYS

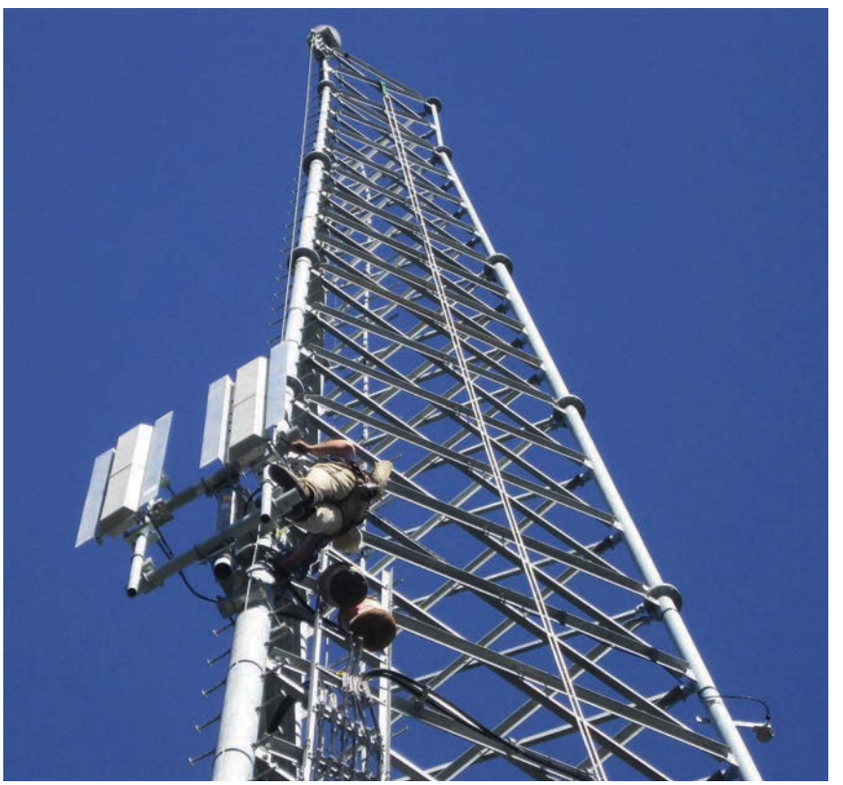
should be ready by the end of 2016. An agreement with Hellas-Sat, a non-competing European satellite operator, will allow for capital investments to be split by the two companies, which will each retain exclusive rights to independent payload. Inmarsat has told its investors that the total outlay for the network should be in the neighborhood of £450m (US$764m).

Inmarsat currently sits in the enviable position of being the only entity with capacity to offer a seamless, integrated spectrum across the EU.

"I don't believe there's anyone who has got bandwidth and spectrum the way that Inmarsat does to be able to provide anything remotely close to a competitive network," says Miller. "There is just no way that a national network, as opposed to multinational, will be of any value in Europe."

According to Coiley, the industry is as long as four years away from seeing the availability of another similar coordinated spectrum across large swathes of the European continent. "This is going to frustrate the hell out of people

03



04

> INMARSAT CLAIMS IT WILL SOON BE ABLE TO DELIVER MORE THAN 40 GBPS

03. Gogo's ATG network has more than 160 towers in the continental USA, as well as Alaska, with Canada to follow

04. Gogo's ATG towers are cell phone towers that point their signals at the sky rather than along the ground

who have been looking at that," he declares. "On the other hand, satellite businesses, including ourselves with Global Xpress, will also be casualties. We are acutely aware of all the ups and downs. We are going to cannibalize some of our Global Xpress prospects, but satellite will still have a role to play."

Inmarsat claims that through this European ATG-hybrid network it will be able to deliver more than 40 gigabits per second – enough for every passenger in an aircraft to connect and use simultaneously. Additionally, the company says that aircraft will be able switch automatically from the S-band/ATG network to the Global Xpress Ka-band network for broadband delivery when operating in non-European airspace.

Online news sources have reported that Inmarsat may be willing to explore new opportunities with Gogo, and also with AT&T if it moves into providing 4G LTE inflight connectivity. However, Inmarsat has yet to announce whether it plans to wholesale this new variety of broadband to other providers (as was done with Global Express) or if it may perhaps be eyeing a move into the 'end-to-end' provision of its own branded service, which would effectively seal out all other players.

While Inmarsat sets about establishing a neat little ATG monopoly in Europe, Gogo is preparing for the loss of its own in North America. However, Gogo spokesman Steve Nolan tells *Aircraft Interiors International* that he considers newcomer AT&T's ambitions more an endorsement than a threat. "To have a big organization enter the space validates what we've been trying to build over the past few years. In some ways it's flattering. They haven't put out a whole lot of information so it is hard for us to say exactly what they're trying to do. Our feeling is that, for them, it's probably too little, too late," he says.

Market-watchers are also avidly following the slow-but-steady progress of a 2011 proposal submitted to the FCC by Qualcomm, a world-leading provider of wireless technologies and services. In the proposal, Qualcomm requests permission to develop a tower-based North American network operating on frequencies between 14.0GHz and 14.5GHz in the Ku-band spectrum. Acceptance of this proposal by the FCC could see up to 500MHz of spectrum auctioned in two, three or four separate spectrum licenses to the highest bidders.

Ku-band satellite stakeholders, such as Panasonic Avionics and ViaSat, as well as the Satellite Industry Association, strongly oppose the Qualcomm proposal on the grounds that a Ku-band ATG network would create interference for existing Ku-band satellite signals. Recent reports suggest, however, that the FCC is now softening to the proposition. With that kind of spectrum up for grabs, things would get very interesting, very fast. ☒

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The APEX experience

APEX Expo, taking place in Anaheim, California, from September 15-18, is an event tailored to the needs of experts and decision makers who are seeking new ways to elevate the level of the airline passenger experience. This four-day event, coordinated by the Airline Passenger Experience Association (APEX), features educational sessions, networking events, and an exhibition focused on the latest airline-related technologies, products and services across core areas of comfort and ambience, and entertainment and connectivity.

A further core aspect of the event is catering and services, which will be covered by IFSA Expo, which is taking place on the same dates in a neighboring hall. Arranged by the International Flight Services Association (IFSA), this complementary event covers everything from galley equipment to catering and retail.

Here are some of the highlights you can expect to experience if you visit the APEX event...

APEX VISITORS CAN ALSO ENJOY THE IFSA EXHIBITION

APEX/IFSA Expo is for members only!

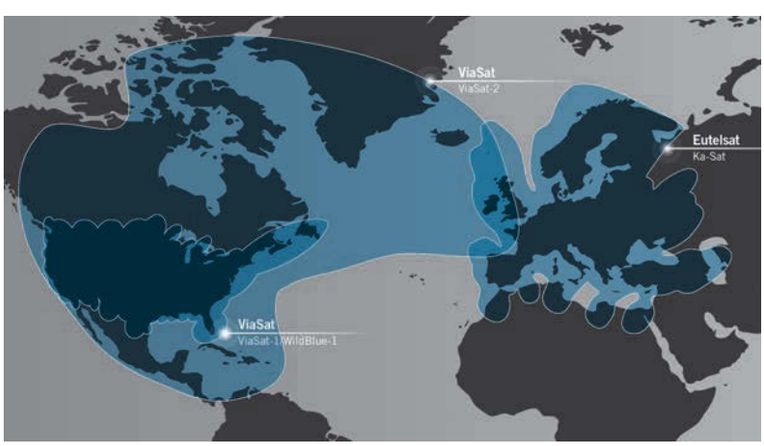
Ka-band tie-up for ViaSat and Eutelsat

ViaSat and Eutelsat will be discussing the effects and benefits of an agreement the two companies have signed, which will enable service access and roaming on each other's high-capacity satellite networks (ViaSat-1 for ViaSat and KA-SAT for Eutelsat).

Both Ka-band networks, representing well over half of all Ka-band capacity on orbit worldwide, share the same ViaSat high-capacity satellite networking system, along with other ground infrastructure owned and operated by ViaSat and Eutelsat.

With this first interconnection agreement between high-throughput satellites, ViaSat and Eutelsat customers will be able to roam between North America and Europe. The resulting high-capacity service area will span North America, Europe, and the Mediterranean Basin. In addition, customers will be able to operate an array of fixed and mobile services, including inflight connectivity, anywhere within the combined coverage areas.

The agreement also includes provisions for future satellites and follow-on technologies. That future includes ViaSat-2, which is scheduled for launch in 2016, and is designed to bridge the North Atlantic between the two coverage areas, as well as covering a broader footprint in North America, Central America, the Gulf of Mexico and the Caribbean.



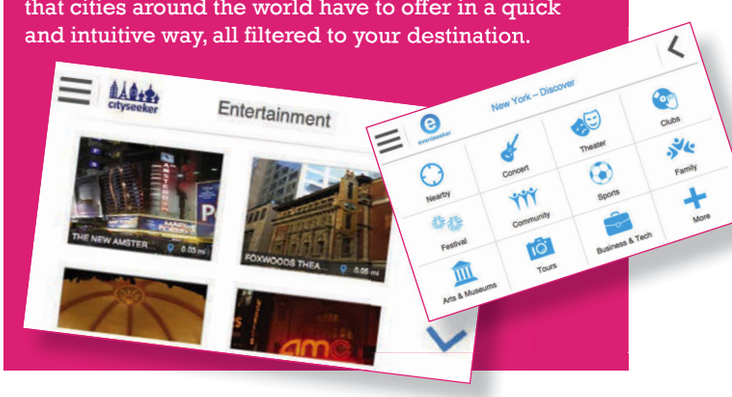
Your seatback travel guide

Wcities will be announcing the availability of two new service options for in-flight entertainment systems: Cityseeker and Eventseeker.

Cityseeker is a personalized travel guide, offering advice on things to do, places to eat, where to shop and where to go out. Rich descriptions and vivid imagery take the guesswork out of choosing what to do at your destination.

Eventseeker is a personalized event guide that offers the latest events, from concerts and sports, to theater and more. The extensive guide provides a host of options that will help keep passengers entertained.

Using passengers' destination locations and other information from their travel itineraries, Wcities provides relevant advice based on trip duration, destination and type of travel – all available from the seatback display. The Wcities team of in-house and local content curators provides the latest and greatest that cities around the world have to offer in a quick and intuitive way, all filtered to your destination.



Prototype seat-integrated IFE

Lufthansa Systems is bringing two brand-new products to APEX. For the first time, the company will showcase a prototype installation of the Seat Integrated Tablet Solution, which is another big step forward for the company's BoardConnect infotainment platform.

The idea behind the solution is to make the wireless BoardConnect service available to customers relying on in-seat screen-based IFE. The solution embraces the rapid technology enhancements taking place in the tablet market by enabling airlines to integrate the latest devices into the seatback. This means the IFE system can run on state-of-the-art hardware and with continuously enhanced software features. Existing in-seat screens have operating lives of 10 years on average, resulting in rapid over-aging and weak performance. The new system is fully compatible with the wireless BoardConnect infotainment solution.

Lufthansa Systems is also planning to demonstrate – for the first time – the high-speed broadband connectivity enabled by the BoardConnect platform. The connectivity services are an additional feature of the wireless onboard platform, which sets new standards at the interface between airline and passengers. With superfast broadband internet access during a flight, passengers can surf the web on their own smartphones and tablets, or on devices provided by the airline.

Make tracks

Railway and travel enthusiasts alike will enjoy *Great Railway Journeys of Europe*, a new offering from Pilot Film and Television Productions. In this series, historian Julian Davidson travels from the fjords of Norway to the dramatic Adriatic coast, taking in some of Europe's most scenic railway journeys.

In Norway he explores the capital Oslo, before boarding the superfast intercity express train to Bergen, taking him high into the ice fields, crossing the highest point of any European railway.

Vienna is the next port of call. Hopping onto one of Austria's advanced Railjet passenger trains, Davidson is whisked into the Alps and the breathtaking mountain line known as the Semmering pass.

Glasgow, Scotland, is the starting point of Davidson's journey north into the western Highlands. On his journey he discovers the The Jacobite, an old steam train that takes him on same route as the Hogwarts Express in the *Harry Potter* movies. The Scottish episode ends in Malaig, the hop-off point for the Western Isles.

Budapest is a heady cultural mix and he takes a trip to its world-famous Opera House, a synagogue and a Turkish bath. Davidson's train takes him out of Hungary's capital, north through Slovenia and into the Polish city of Krakow. Pausing to learn more about the history of the Jewish population, he travels on to Warsaw, where that episode in history concludes.

Below: Railway fans can enjoy the dramatic scenery of Norway

No boundaries: There is open access between the APEX and the IFSA exhibitions

Zii to reveal new IFEC technologies

Zodiac Inflight Innovations (Zii) is planning to reveal advances in its RAVE IFEC products. In addition to the RAVE Centric IFE system, Zii's range of IFEC products includes wireless, cellular, and broadband. These capabilities are modular so RAVE products can be mixed/matched to an airline's preferences.

RAVE Wireless has recently been installed along with RAVE Centric on a long-haul operation providing full-featured AVOD in business class and streamed wireless entertainment in economy. RAVE Wireless has also been chosen by another airline (to be announced soon) for its large fleet of single-aisle aircraft. By adding a wireless network, passengers can easily access the moving map, movies, TV and audio programs on their own device, as well as navigate the RAVE Centric display. Cellular services (voice and text) as well as broadband capability can also be easily added for an integrated package of passenger services.

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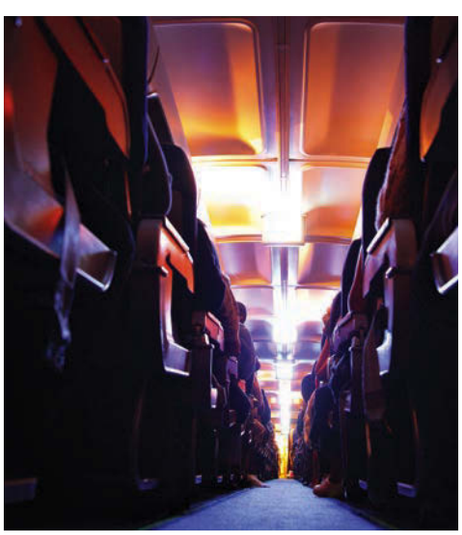
INTELLICABIN ON APPROACH

Visit BAE Systems to see its newest product for commercial aircraft. IntelliCabin is a highly integrated approach to cabin management that provides a unique flying experience for passengers and crew members. The technology, which could be flying with commercial airlines as early as 2015, is flexible, adaptable and scalable, providing in-seat power, LED lighting, wireless tablet-based IFE, and dimmable windows, all managed via a centralized attendant control panel or a crew handheld device.

For passengers, IntelliCabin means comfort and flexibility. By removing bulky power boxes under the seats and in the overhead bins, passengers receive more legroom and space for luggage. Additionally, it provides power solutions for all seat classes. IntelliCabin also provides tablet-based IFE, generating a more personalized user experience that is unparalleled in the industry. Finally, the system offers cutting-edge LED lighting, creating a more relaxed ambience for travelers.

For the flight crew, IntelliCabin will simplify and reduce workload, since the system automates many tasks. By using either the centralized control panel or handheld devices that can be used from anywhere in the aircraft, crew members are able to easily adjust the temperature and light settings, take refreshment orders, and interact with other crew members to provide better service to passengers.

Airlines will also benefit from BAE's cabin of the future. IntelliCabin reduces the number of components required for installation, creating a lighter system that will help airlines save on fuel and operating costs. Additionally, because IntelliCabin can be seamlessly integrated into existing onboard systems, it doesn't depend on other buyer-furnished equipment or OEM installations.



EWC integration with wi-fi to debut

In Anaheim this year, Bluebox Avionics will unveil the newest addition to its roster of portable IFEC solutions. Bluebox Hybrid marks an evolutionary milestone for the company's versatile content platform – interfacing now with connectivity and streaming services from all significant technology providers.

Airline enthusiasm for wi-fi is clear and well founded but, with no permissions in place to stream Hollywood Early Window Content (EWC) to passenger devices, its value within a consistent fleet-wide IFEC product is compromised. EWC remains the key entertainment category for airline audiences worldwide.

The Bluebox Ai app for the iPad is already on more than 14,000 units flying, and was named Best Handheld IFE System at the 2014 Inflight Awards. It comes pre-approved by Hollywood for pre-loaded EWC movies, and on the best, most popular consumer platform available. It integrates seamlessly with any wi-fi solution, hosting premium pre-retail movies and receiving whatever streamed IFE the airline offers, plus online access when connectivity is provided.

"Hybrid can enable wi-fi and the internet for passengers not carrying a digital device, and upgrade even those who are with EWC," explains Bluebox's joint MD, John Howe. "It's ideal for a premium service enhancement or as a source of ancillary revenue."

Bluebox apps also deliver future-proof accessibility options to help hearing and visually impaired passengers, including closed-caption capability as standard.

Digiredoo all the way home

DMD is preparing to launch a new addition to its groundbreaking digital service suite, Digiredoo. The company, a leading provider of newspapers, magazines and digital press content to airlines and other travel operators, has rolled out three iterations of Digiredoo to date. Now it is expanding its comprehensive out-of-home service to enable in-home access too.

"Our Digiredoo Online product distributes premium newsstand titles, securely and verifiably, to airside lounge passengers across the globe," says DMD's head of technology, Kevin Birchmore. "Now an airline can deliver free digital downloads to its eligible customers, direct from portal to portable device, before they even leave for the airport."

The company is working with a current Digiredoo customer to launch the secure pre-departure service this year, and will be talking up the marketing benefits to many more of its 150-plus airline clients at the APEX Expo in Anaheim.

Digiredoo complements DMD's print service in an integrated suite of physical and digital delivery and protected publisher relationships. Digiredoo Inseat, for fitted IFEC systems, enables all-seat access to every title on board. Digiredoo Direct, a service for airlines, CSPs, IFEC systems and connectivity providers, supplies premium press content for wireless cabin streaming.

New system halves legacy connector count

TE Connectivity's new 16-02 insert for Deutsch DMC-M single-module connectors enables in-flight entertainment and other passenger cabin systems providers to replace two large, legacy connectors with a single, lightweight miniature connector. This insert and connector combination increases signal speed, while saving space and weight, and reducing overall system cost.

The 16-02 insert and Deutsch DMC-M single-module connector system has been fully qualified to meet the requirements stipulated in ARINC 800, and is field repairable, enabling cabin system providers to make a repair to the connector after system installation.

Passenger cabin systems have been predominantly using the same legacy connectors for the past 20 years, and while these connectors have an excellent track record, TE's 16-02 insert (when combined with the Deutsch DMC-M single-module shell) offers a 50% reduction in connector count in most IFEC systems by combining power and GbE in a single connector.

Ideal applications for the insert and connector system include IFE, seat power, inflight connectivity and other passenger systems.

Enriched IFE and additional income

PXCom's Air Transport Division will be offering airlines a way of enriching their IFE by including PXApp, a full-scale inflight media that enables interactive and multimedia content. The content is mostly destination-related content such as city guides, and airport information, including multimedia, non-intrusive advertising.

PXCom's PXFramework technological solution, associated with an integrated media sales system, can generate additional airline revenue.

Advantages include seamless access content; media content updates compatible with all existing market solutions; production of destination guides in multimedia format; and additional options such as passenger profiling, CRM-related solutions and onboard branded entertainment

Using one of these solutions, PXCom claims that airlines can expect up to a 40% increase in net income per passenger in a revenue-sharing business model including IFE manufacturers.

Don't miss the educational sessions taking place on Monday, September 15

In other news…

TELEFONIX is a design, manufacturing and management company that is celebrating 25 years of innovation this year. To mark this milestone, Telefonix team members will be hosting a cocktail hour on the Wednesday afternoon during the APEX event. In the weeks leading up to the show, a new corporate site will also be launched. The new website offers a refreshed online experience featuring updated content on products and services offered by Telefonix and sister company, PDT. Telefonix and PDT officially joined forces last summer, expanding the suite of product development services offered. Both the new site and the company's booth at APEX will feature more details on the Cabin Ace product line of airborne servers and wireless access point (WAP) solutions.

DIGECOR will be introducing APEX visitors to a new member of staff. Paul Thorpe has joined the digEcor team as the new president of Europe, Middle East and Africa. Thorpe will be based in the UK and will direct all activities in the region. Thorpe began his aviation career more than 20 years ago in the business jet sector; he then held a range of sales and marketing management roles in avionics and IFE. He joins digEcor from Rockwell Collins, where he was most recently the sales director for northern Europe. As digEcor's CEO David Withers said, "The EMEA region has always been an important market for digEcor and Paul's appointment, and the team he will be putting in place in our new London office, marks our commitment to our existing and future customers in this region."

ONAIR will be discussing why the next stage in the development of the inflight connectivity market is the e-Aircraft, with nose-to-tail connectivity solutions. Connectivity provides airlines with more control, by providing real-time data to improve decision making. For example, it can help airlines increase aircraft availability by around 1%. The data is already available on A350s and B787s, covering everything to do with an aircraft's operation, including customer relationship and inventory management in the cabin. OnAir predicts only 30% of connectivity will be used by passengers in the future; the rest will be used by the airline. OnAir will be on hand to discuss how to use the data to improve operations, and the need for the aviation industry to work together to identify how best it can capture and exploit information.

CNBC passes programming milestone

CNBC, the business and financial television news network, now has a catalog of more than 160 hours of programming available to airlines across Europe, with more series and documentaries being added each month.

The network has more than 180 episodes of CNBC feature programming now available and more than 100 CNBC Originals to choose from. Recent additions include the documentary *Amazon Rising*, in which presenter David Faber details how Jeff Bezos created the Amazon empire. The network has also released a new episode from its *CNBC Meets* series, with an up-close-and-personal interview with Tania Bryer and the American beauty heiress Aerin Lauder, granddaughter of Estée Lauder.

CNBC has also produced a new series, *One Second In…*, which offers a revealing look inside Formula 1 racing. Each episode goes behind the scenes to look at all the technology, innovation and teamwork that goes into each moment on the track, where every second counts and makes the difference between victory and defeat.

Power to the people

Astronics Advanced Electronic Systems (AES), a specialist in intelligently managed in-seat power systems, continues to meet the increasing demand for its Empower products as passengers demand power on board to charge their carry-on devices.

Further, the 2013 FAA ruling allowing passenger electronic devices (PEDs) to be fully operational gate-to-gate as well as the continued growth of onboard wi-fi connectivity is driving the increase in adoption rate of in-seat power. To ensure airlines can meet passenger demand, Astronics has developed a high-power USB charging system capable of charging multiple USB devices simultaneously while they are in use. This system, which is installed and flying today, provides power for charging passenger devices such as smartphones, iPods, iPads, cameras, and most other popular tablet devices. System configuration models include a standalone USB charging outlet, or a combination 110VAC/high-power USB charging outlet.

AES will be showcasing its full range of in-seat power and intelligent power solution products.

Above: Astronics can help airlines meet growing demand for USB charging

NEW JACK CITY

IFPL will be showcasing its latest IFEC product designs and demonstrating how you can Break Free, Charge, Pay Up and Go. 'Break Free!', a breakaway jack, solves the problem of broken headphone plugs. Leading on from the single-pin jack, the Breakaway Triple Jack (1272) is a new concept for use with powered noise-canceling headsets. The use of the 1272 Triple Jack requires no physical modification to the seatback. Meanwhile, 'Charge!' is a standalone USB outlet with 2A output; 'Pay Up!' is a contactless retail system using NFC; and the 'Go!' self-testing jack enables quick and easy visual system audio check, verified at a glance.

Enriched IFE and additional income

NHK Global Media Services will be announcing the expansion of its inflight programs list for 2014. NHK Global Media Services is well known for the inflight distribution of Japanese daily news, and at APEX the company will be reaching out internationally to gain a firm and influential part in the global society.

The company has monthly documentaries available in English and Japanese, weekly news programs covering finance, and current affairs programs featuring topics within the Asia Pacific region broadcasted in English. These multilingual monthly programs are now making their way onboard international airlines.

In one program, named *J-Tech*, viewers can discover unique products and technologies, the people who pioneered their development, and the strategies behind their success. The program features state-of-the-art technologies and products from a wide range of industries such as satellite technology, preserved cuisines, medical equipment, earthquake-resistant architecture, revolutionary tunneling technology and more.

Another program is *Asia Insight*, an in-depth portrait of Asia today, covering its dynamism as a center of growth, as well as its traditions tossed around by the advance of globalization.

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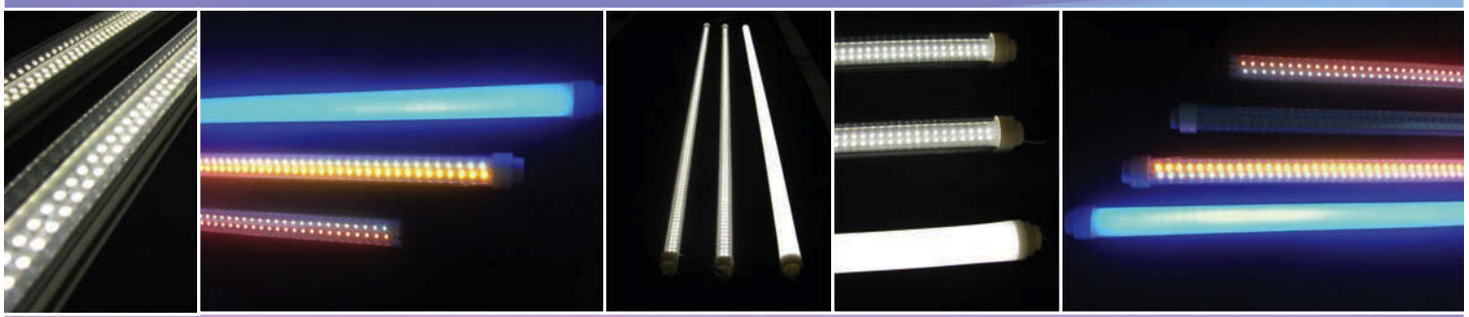

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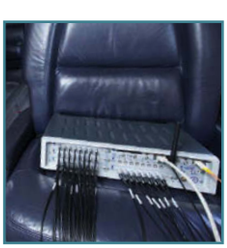

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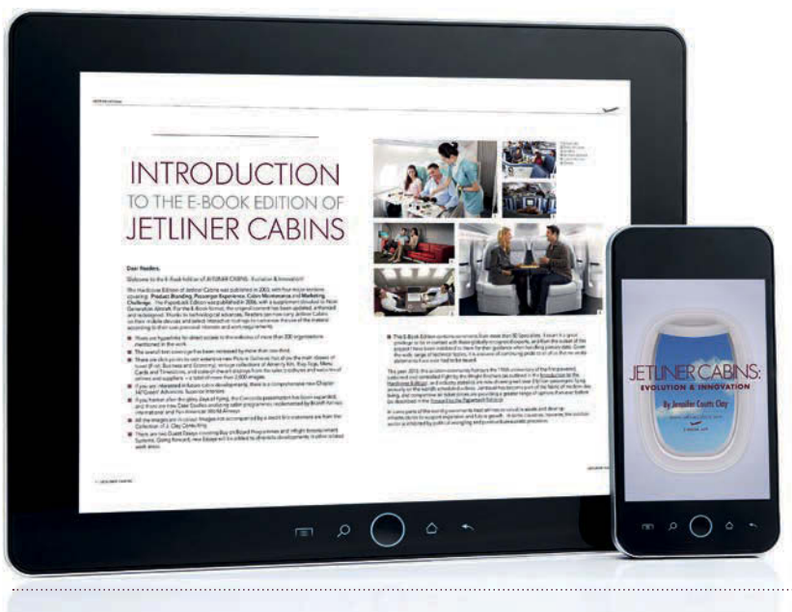

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AIR CANADA HAS TEAMED UP WITH TEAGUE TO CREATE ITS FUTURE ONBOARD EXPERIENCE

When Air Canada, Canada's flag carrier and largest airline, began an expansive fleet modernization program following its announced purchase of 60 Boeing 787 Dreamliner aircraft, the company seized on the unique opportunity to re-assess its brand and re-imagine how the brand is expressed through the onboard passenger experience. For this comprehensive effort, Air Canada partnered with global design consultancy Teague, and they worked together to co-create the future of the brand. Working from Seattle and Montreal, the integrated team set out to develop a distinctly Canadian design language and bring it to life holistically throughout the cabin. This was a high-profile project with many internal stakeholders. So, to ensure this brand innovation project was successful, Air Canada and Teague aligned all design activities around three principles.

Teague and Air Canada used three key principles to make each touchpoint part of a cohesive brand experience

VISION FIRST Too many design projects lack a clear strategy. To clarify its driving purpose, the team defined the status quo of the Air Canada brand and, critically, the key ways it wanted to outperform that standard. Research revealed that passengers respected Air Canada, but didn't feel a strong emotional connection to the brand. So moving the brand from 'respected' to 'loved' became the project's mantra and essential outcome, anchoring all decisions to what would best achieve this objective.

EXPERIENCE BEFORE ELEMENTS In aviation, decisions are often dictated by the design of individual elements beforehand, such as a business class seat or monument structure. But Air Canada and Teague knew that this sequence interferes with creating a cohesive spatial experience and emphasizes dissonant details rather than an orchestrated, singular impression. To avoid this problem, the team worked to define the overall perception of the cabin first, and then designed the elements – seats, monuments, fabrics, etc – that would collectively create that experience.

MAKE THE RED SPECIAL The team wanted to be reserved in the ways in which Air Canada's signature red was used. Rather than overwhelming the passenger with swathes of red and logos plastered everywhere, the team instead created 'jewel' moments of surprise and delight – behind the headrest in economy class, under the espresso mug in business class, inside the amenity kits, on leather seat tags, and in the leaf motif inside the lavatories. The resulting effect balances boldness with warmth, honoring the signature red in a way that invites discovery.

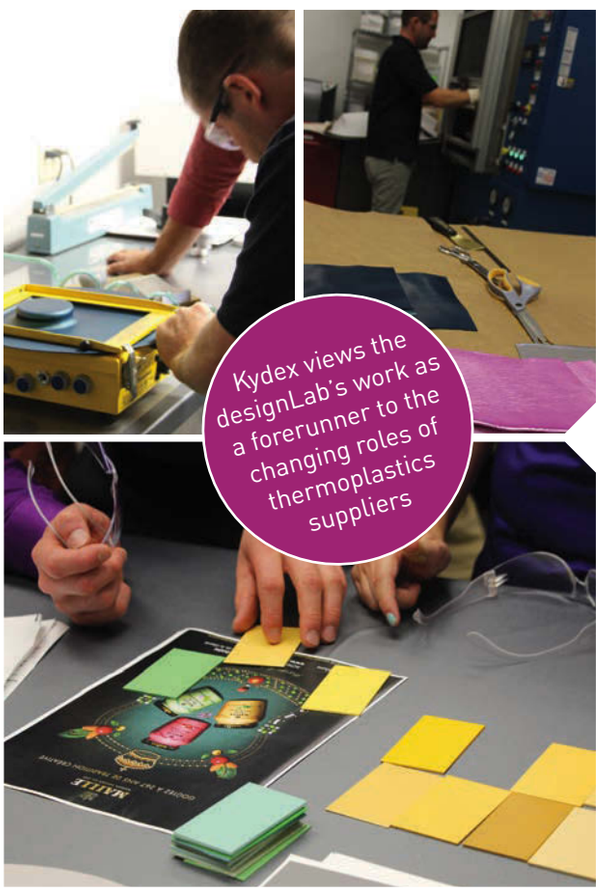
Using these principles, the Air Canada-Teague team created every touchpoint in the cabin – from seats and monuments to lavatories and lighting, with each element being part of a cohesive brand experience that was inspired by a singular vision to connect more emotionally with passengers. After four years in development, the new interiors for Air Canada's entire 787 Dreamliner fleet premiered to passengers in May. ☒

materialgain

THERE IS A MATERIAL SUPPLIERS RENAISSANCE, SAYS JOHN MARTINO, AVIATION BUSINESS MANAGER AT KYDEX

In its role as a materials supplier for aviation interiors, Kydex LLC converses with professionals with widely different roles in the business of building commercial aircraft cabins: from airlines, to designers, to OEMs, to project managers, to fabricators. In the past five years, the company has perceived a notable difference in the tenor and type of conversations it is having with customers. These conversations are intriguing. Even more intriguing, perhaps, is what is driving the conversations and what changes they are bringing to the industry.

They clearly indicate different customer expectations of material suppliers than just five years ago: passengers are expecting a customized look, feel, and finish, which influences what the airlines are expecting, and in turn this is changing the role of material suppliers and their relationships with their customers. Material suppliers such as Kydex have to do more than fulfill requests; they have to create materials that customers tell them they want to use, and collaborate in order to do so.



Kydex views the designLab's work as a forerunner to the changing roles of thermoplastics suppliers

EXPECTATIONS INSPIRE IDEAS AND PRODUCT INNOVATION So, what could these conversations possibly accomplish when we all have project deadlines and profit margins to meet? Of course every material supplier has to have solutions for immediate needs in the marketplace to remain in business. But conversations that question what is possible and imagine the future are also truly necessary because they inspire exchange of ideas and provoke product innovation.

A common conversation theme we have been hearing explores how to meet the demands of consumers as they become increasingly sophisticated. Designers are continuously sourcing alternative materials for finish and effect. They present these to the airlines in mock-up presentations, which are sourced from all types of fields. This generates an excitement with the airlines. The challenge for material suppliers at this point, is to create a new look and feel in new materials that are aircraft compliant.

David Scott, global creative at Kydex explains, "In recent years, this challenge has been answered with solid colors and pearlescent effects. This has introduced a whole new option of possibilities when paired with new LED lighting technologies. But as airlines seek to develop their own bespoke look, we are hearing a lot more about pattern-in-product."

What if the material you were using for an aircraft seat back or side panel could have the ability to have an individual design in it? It could take on a decorative personality of its own. It can be a part of an entire decorative concept that over time becomes part of the company or brand signature. New materials that allow for increasing the decorative possibilities take brand recognition far beyond a name or a color.

TECHNOLOGY PROVIDES NEW DESIGN POSSIBILITIES Inspiring new design is often achieved through technology. Pressure forming, which provides complete customization of texture finish, has become more widely used in thermoplastics in a number of industries because manufacturers and designers are realizing they can accomplish so much more with it. We predict we are soon going to see some answers to the question, "How can we use pressure forming and combine texture with imagery?" Realizing a strong visual application and a subtle tactile effect creates a well-rounded experience that embraces color, imagery, and touch.

A SEA CHANGE FOR MATERIAL SUPPLIERS As the role of material suppliers changes, we have the obligation and privilege to imagine what is possible. As we have the means of executing the ideas that come from asking the questions, it will result in new products for customers to use. ☒

innovationworkshop

INVESTMENTS INTO ITS RESEARCH AND DEVELOPMENT FACILITIES MEAN BOXMARK CAN DELIVER PRECISE AND LIGHTWEIGHT LEATHER PRODUCTS IN SHORT TIMESCALES

At Boxmark in Slovenia, visions converge with innovations and merge to form customized product solutions. The R&D center develops trendsetting leathers in addition to offering corresponding serial production.

"It is our passion to bring out the best qualities and characteristics within each piece of leather and to convert them into extraordinary quality," says Marjan Trobiš, managing director of Boxmark Slovenia. From leather hides to leather-covered components, be they prototypes, serial products or customized workpieces – each creation is a combination of masterful craftsmanship and industrial manufacturing technology.

As an international supplier of complete solutions, Boxmark's R&D center has for decades played a crucial role in the automotive industry in terms of developing and producing automotive interiors. Concrete results, and the considerable investments made, illustrate the particular importance that R&D is awarded at the company. Due to increased demand from the airline, shipping, railway and furniture industries, it became necessary to expand the Slovenian facility.

In addition to expansion of the production areas and modernization of the machinery, numerous new technical installations were acquired. They include 3D scanners and state-of-the-art computing systems, which enable virtual development of prototypes, as well as CNC-controlled machines, band saws and milling machines. Boxmark is also able to create foam models, perform foam reconstructions and add upholstery to existing seat systems and add-on components. "Every customer requirement is unique and brings its own challenges, for which we need to find timely and customized solutions. With our manufacturing facilities and machines, which were custom-made for us, we can fulfill even unusual requirements reliably and on schedule. Together with scientific institutes, we are always working on new machines and processing technologies in order to continue being one of the best," explains Alexander Mesaric, head of the engineering center.

Boxmark has expanded its Slovenian facility, with enhanced production, research and quality equipment

Due to the successful projects in other sectors of the leather industry, Boxmark was able to win over airline customers for the implementation of development and serial production projects. Currently the company is developing and mass-producing interior components for several makers and owners of aircraft. In the airline industry, weight is of crucial importance, which is why in this area the company uses its self-developed lightweight Xlight leather, weighing a mere 600gsm (already laminated). This low weight is achieved through changes to the formulation used in the tannery, which leave the chemical and physical characteristics, as well as the strength of the leather, unchanged. As Xlight includes the characteristics of its sister product Xtreme, which as well as being antibacterial and antimicrobial is oil, water, alcohol and soil repellent, and flame, sunlight and sweat resistant, the leather is easy to clean and extremely durable.

With its Production Organisation Approval certificate, which was granted in 2013, Boxmark is now authorized as a certified producer for aeronautics and thus a supplier to the international aircraft industry. ☒

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realsteel

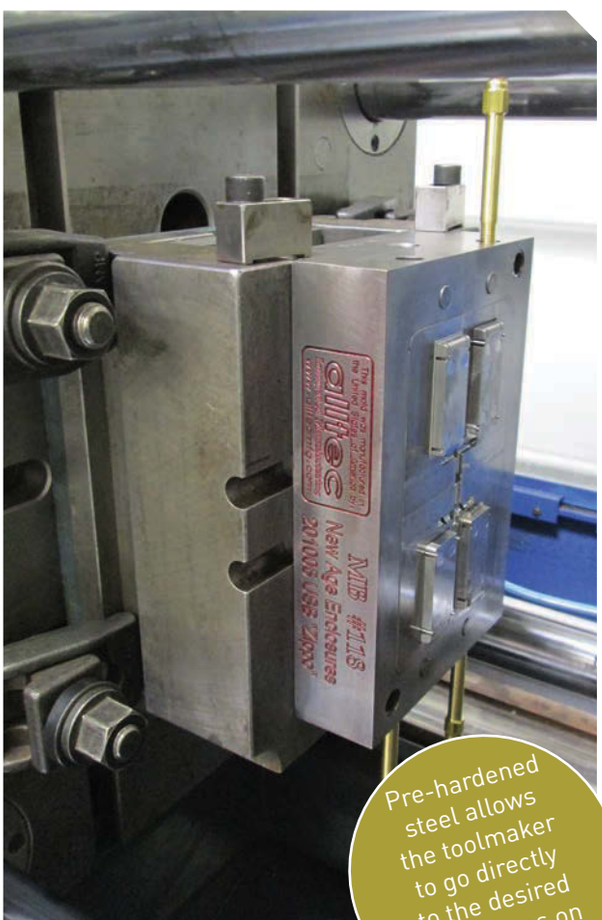
YOU CAN LOWER INJECTION MOLD TOOLING COSTS WITHOUT GIVING UP PRODUCTION CAPABILITIES AND QUALITY

The aerospace industry needs the benefits that injection molding brings: low piece price, lighter parts and consistent quality. However, the cost of molds remains a major barrier to entry. So what are the best options to lower mold costs?

Some companies look to prototype tooling for a solution. Prototype tooling is generally intended for low quantities of parts (commonly 1 to 1,000, though it can go up to 10,000 parts). This type of tooling may be constructed in aluminum or steel. The cavity and core will often be directly cut into a mold base or master unit die (MUD) frame to save the cost and time of building separate inserts. However, CNC cutting leaves machining marks. If a higher quality surface finish is required, the cavities may be bead blasted, but high-end specific MoldTech finishes are typically reserved for production tooling only. In aerospace, many applications only require a couple of hundred parts per year, but the tool must be robust enough to make parts for 10 to 20 years.

Therefore some people look to aluminum production tools as a solution. Aluminum tooling can be less expensive than hardened steel tooling, but the challenge is finding mold makers capable of making aluminum molds able to endure the longevity required for aerospace programs. Then there is the issue of finding an injection molder familiar with using them, as the majority of molders are only experienced in steel tooling.

Aluminum tooling requires specific experience as the metal dissipates heat approximately five times faster than steel and requires different techniques and equipment during processing. Due to the processing differences between the two metals, they have different shrink, sink, warp and dimensional properties in the parts they yield. So much of the processing and part dimensional information learned during an aluminum trial is lost when the transfer is made to steel production tooling. Plus, one needs to consider how soft aluminum tooling is. Most aerospace materials are hard, engineering-grade resins like Ultem's polyetherimide, Lexan's polycarbonate and Victrex's PEEK (polyetheretherketone), and they may contain glass or other reinforced fibers, which require very high heat to process correctly. These materials can quickly damage and wear the tool out.



Pre-hardened steel allows the toolmaker to go directly to the desired dimensions on the first pass

When you try to repair or modify an aluminum tool you are soon reminded that aluminum is not easily welded. It is a challenge to find a welder experienced in welding aluminum, with the fine attention to detail required for mold tooling revision or repair.

The good news is that there is a solution more durable than aluminum, with more production capabilities than prototype tooling, and is less expensive than hardened steel production tooling.

Tool maker and injection molding company Alltec has integrated manufacturing works with pre-hardened steel for a lower cost solution. Using pre-hardened steel in the Rockwell hardness range of 32-34HRC reduces time and cost compared with having to work the steel twice, as is the case with hardened steel. With hardened steel, the toolmaker will EDM burn or machine the tooling cavities to 'near' completion. The steel is then heat treated, during which the metal will suffer some warp and distortion. After the steel settles the toolmaker works it to its final dimensions and fit.

Pre-hardend steel allows the toolmaker to go directly to the desired dimensions on the first pass. In addition, pre-hardened steel is capable of molding over 100,000 shots, which covers the life of a typical aerospace program. Further benefits include steel's greater durability than aluminum, ease of welding if damaged or if modifications are desired, and the fact that most injection molders are familiar with processing steel molds. ☒

capacitivecontrol

A new capacitive seat control from WASP has been designed to mimic the familiar feel and operation of a conventional touchscreen, such as those found on tablets and other mobile devices.

The control is the result of continued development into the use of capacitive switching and uses a conventional printed graphic overlay that can be protected by either a clear acrylic or polycarbonate face, behind which is a circuit design that operates a switch via the user's natural body capacitance. The switch panel uses a proprietary capacitive sensor IC.

The 'keys' in the new control are positioned a sensible distance from the edge to improve ESD performance, and WASP has also created a feel similar to that experienced when using a high-end tablet/mobile device, but with a simple membrane construction.

The IC's sense fields project (from conductive sensors) up through a translucent dielectric material. The use of capacitive switching enables designers to backlight the switch positions while enabling clear material to be used in capacitive touchscreen assembly. The use of such materials means that the switch is easily cleaned and impervious to liquid spillage.

Through continuous self calibration, capacitive sensors can take into account many conditions before the switch is activated. This capability is achieved by changing the duration of the capacitive charge burst and allows the product to be used in almost any environment.

A complete lack of moving parts means that mechanical failure is eliminated and the operational sensitivity of the switch is easily adjusted to overcome a wide variety of environmental conditions.

WASP engineers are currently working on a new range of touch operated products that will be seen for the first time at Aircraft Interiors Expo 2015 in Hamburg.

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cabinmodification

In today's competitive aviation industry, strong performance and reliability in terms of time to market and cost effectiveness are crucial for success. Since ABC International was established, it has equipped itself to face this challenge by tailoring its services to satisfy real customer needs in order to create value.

The past year has seen advances in ABC International's growth strategy, including increased turnover, new technical staff hires, the successful completion of prestigious projects, and the establishment and consolidation of long-term partnerships with airlines. Indeed many customers have selected ABC International as a preferred supplier in terms of engineering services for cabin modification and related products. ABC International's strong belief is that in cabin engineering modification services, long-term cooperation between customer and supplier can offer real and bigger added value to aircraft operations. In this endeavor, the company has tailored the specific service packages it offers to airlines, which can be easily accessed through the definition of a GTA, electing ABC as a preferred but not exclusive partner for cabin modification services under certain advantageous terms and conditions for the customer.

The company has also continued to invest in engineering services in order to more specifically respond to leasing company requirements. Aircraft leasing companies and their airline customers have to face aircraft turnover, light-heavy maintenance checks and cabin refurbishment programs during phase-in/phase-out. Added complications come from the compression of leasing agreement durations and the increasing pressures on lead-times associated with the higher level of cabin customization required by airlines. ABC International offers a full-package approach meeting the above constraints, and the company is able to proactively and effectively support leasing companies in pursuing their business in re-marketing their fleet portfolio.

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ABC INTERNATIONAL

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noiseandvibration

Of the various testing and evaluation methods available, flight testing is one of the most important in the development, design and validation of an aircraft. Safety, comfort and performance targets are verified through testing each aircraft system under real flight conditions. An aircraft cabin interior is also part of this test, checking for comfort and acceptable noise levels.

Within this often volatile measurement environment, perhaps the most demanding of flight test instrumentation challenges is the successful acquisition of dynamic measurements, such as vibration data, which is typically achieved via accelerometers. By far the most popular PCB Piezotronics sensor for flight tests is the piezoelectric triaxial accelerometer. The single mounting allows flight test engineers to determine whether an aircraft cabin's vibration levels is within acceptable limits before delivering the aircraft to the customer.

Standardization of triaxial packages for flight testing has driven smaller, lighter and more robust designs. The smaller size of triaxial accelerometers offers engineers the ruggedness and survivability of titanium housings and weight savings. At the extremes, there are 0.25in (6.35mm) cube triaxial accelerometers with built-in ICP electronics having a 10mV/g sensitivity and weight of only 1g. At the other end of the sensitivity spectrum are seismic-grade triaxial units with 1,000mV/g sensitivity and as small as a 0.8in (20.3mm) cube, weighing 25g, yet having 50µg resolution.

When accelerometers are combined with acoustic microphones, a complete flight test picture of the aircraft cabin is obtained. The data is used to certify the noise and comfort requirements prior to delivery.

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firstclasscooking

Founded in 1988, Aerolux has become well known for producing quality custom-engineered galley inserts for commercial and corporate/business aircraft. Starting off in the early days with a range of refrigeration products, and in particular a wine chiller, at the request of its customers Aerolux has developed specific products to enable differentiation of the cabin service, not only for the standard and premium galleys, but also from airline to airline. These products include an award-winning espresso coffee maker, a skillet, a rice cooker, warming ovens and fridge/freezers.

The Aerolux coffee maker is a self-contained unit specifically designed for inflight preparation of espresso. This is the only coffee machine approved for aircraft use to carry the Nespresso brand name, using its patented coffee capsules. Aerolux has also designed a unit to provide toast or even a toasted sandwich for preparation in the galley. Just like at home, the Aerolux toaster will toast two or four slices of bread, lightly toasted or dark. The unit has been designed and built from food-grade materials. It enables easy cleaning, and features a removable crumb tray.

For the complete breakfast in the air, Aerolux has developed the Aero-Skillet – a safe and easy-to-use hot-plate, which is suitable for cooking eggs or hash browns. The rice cooker unit, initially designed for the preparation of rice on Asian routes, has also been adapted for heating liquid food, such as consommé. The unit has been designed and built to maintain hygiene and be easy to clean, especially in an aircraft environment.

Designed to warm bread rolls or plates, the warming oven is adaptable to suit the particular requirements of the airline. A range of ovens is also available to heat prepared food, with available models including high-speed convection ovens and steam ovens. To keep food chilled or liquids cold before serving, the fridge units have also been adapted to keep medical supplies cold for long-term use. To keep ice cream frozen or to stop ice from melting, Aerolux's freezer products have been designed to meet the exacting requirements of airlines globally.

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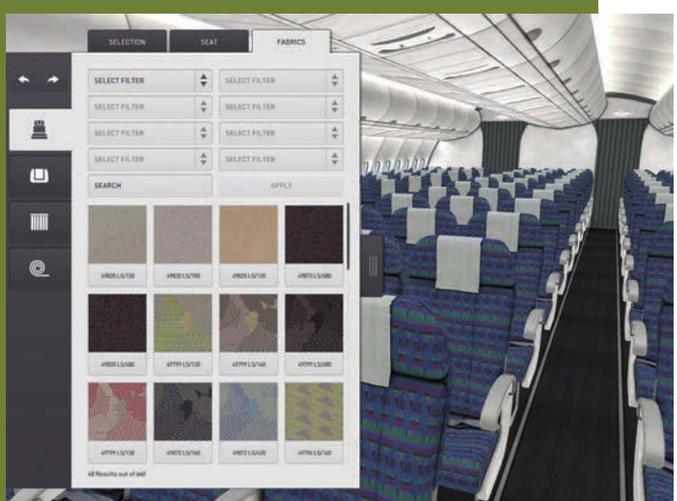
landmarkyear

In 2014, the aircraft unit of Lantal Textiles – the unit that has become a fundamentally important part of this traditional Swiss mill – turned a youthful 60 years old. Aircraft cabin design has always been very important to Lantal, whose vision is to provide complete soft interior solutions that ensure the ultimate in well-being for passengers.

It was in 1954 that the Dutch representative of Möbelstoffweberei Langenthal called on KLM, hoping to sell seat cover fabrics for the airline's office furniture. Although this deal did not materialize, he returned to Langenthal with the mill's first order for aircraft seat covers. It was a first step into the transportation textiles market, and it changed everything. The order put the Swiss company among the world's first textile mills to enter the field of soft interiors for passenger aircraft.

Since then much more has changed, with Lantal evolving from being a yardage supplier to a provider of all-in-one solutions. Lantal's global leadership position in textiles, parts and services for the passenger transportation industries has been attained because the company repeatedly implements innovative ideas and consistently offers high-quality products.

An interactive online configurator is one of Lantal's latest innovations. With just a few clicks, users can appoint an interior to suit their personal taste. Once the aircraft type and class have been defined, cabins can be outfitted individually with Lantal's seat cover fabrics, curtains, leathers and carpets. In just seconds, the aircraft configurator will visualize the resulting interior. The gyroscope function is a highlight of the configurator system, enabling iPad users to navigate the cabin through 360° by simply moving their device. This creates a vivid three-dimensional impression of taking a nice walk through the user-customized interior.



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indextoadvertisers

The 1970s was a golden era for the Boeing 747, with many airlines fitting the upper deck with groovy lounges. They weren't space efficient, but they were cool

1972: tiger lounge

Lovers of 1970s kitsch cannot fail to love the Tiger Lounge, Boeing and Teague's vision of a social space for premium passengers in the disco era. As excitement built around the 1970 launch of the Boeing 747 jumbo, airlines and designers were getting creative about what to do with its big spaces – just like the buzz that surrounded the A380, when myriad concepts were generated to show off the possibilities its large spaces created for the passenger experience. A mock-up of the Tiger Lounge was created and photographed in 1972 to gauge airline interest, and it certainly attracted a lot of curiosity around the world – indeed it still does, even from those who aren't aviation enthusiasts.

Looking at pictures of the lounge, the space was so rich in color and texture that one always finds a new detail. Beyond the orange shag-pile carpet and the jungle textiles on the banquette seating, the most eye-catching feature was the spiral staircase. One would imagine the upper deck bubble would be the perfect space for a funky lounge, but the Tiger Lounge was actually envisaged as a space in the lower lobe. This location was exploited with a really cool feature, for the glass top of the faux leopard-skin-wrapped cocktail bar was a window on the world below. Nervous flyers might have needed a drink after peering through the portal!

The lounge had a strong architectural style, with sculpted ceilings, and bold arches that broke up the space. The arches were particularly distinctive as they were covered in mirrors framed in Pucci-esque textiles – essentially creating a mirrored ceiling! As well as the bar area, the lounge also featured a reading area complete with swivel chairs clad in buttoned-back leather, and a small cinema area.

This space was the vision of Teague's Frank Del Giudice, who joined Teague in 1946 and spent his entire career at the company, his talent driving him to the position of president in 1972 until he retired in 1982 (although he retained a chairman position until 1987). Del Giudice had a vision and drive to make aircraft interiors more comfortable, and his designs included the PSU as we know it today, the Stratocruiser interior and the B707 and B747 interiors.

Sadly, the Tiger Lounge never made it beyond the mock-up stage, as no airlines specified a lower-lobe B747 lounge, but it did help inspire a few of the amazing upper-deck lounges that emerged in the 1970s. The Tiger Lounge is a wonderful moment in aircraft interior design and a colorful tribute to the talented del Giudice, who sadly passed away in 1993. ☒

No animals were harmed in the trimming of the Tiger Lounge.

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