Aircraft *interiors* INTERNATIONAL

In this issue

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The benefits, risks and rewards of creating a bespoke premium class seat

FUTURE GALLEYS

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PASSENGER BEHAVIOR

As badly behaved passengers hit the headlines, we look at what can and should be done to maintain order in the air



MARCH 2015

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Visit our **RECARO stand 7B20** at the Aircraft Interiors Expo 2015 in Hamburg and take a seat!



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REFRESH AND UNWIND

elcome to a rather special March issue; as you can see, we've undertaken a light refurbishment program. As much as we love the magazine, we felt it was time for the livery to receive a subtle update, and for the color and finish in our features to undergo a mild refresh. Coupled with a more seatback pocketfriendly size (though this is our thickest-ever issue), all this adds up – we hope – to an enhanced end-to-end *Aircraft Interiors International* reader experience, with a little of that much sought-after 'surprise and delight'.

Indeed our cover feature (p52) uncovered a few surprises as we ventured outside our usual comfort zone, looking beyond seat factors and into the mental comfort of passengers. Marisa Garcia was sent in pursuit of happiness and she consulted several experts in the field of psychology to find out how the main cabin environment can be made more enjoyable. Clearly, the space constraints in economy mean guests can feel a little more stress than those sitting further forward, but there are ways to improve the headspace of economy passengers. However, if the stress of travel does get too much and a passenger incident flares up, John Walton's report on page 96 explains what crew can and should do to handle the situation. Given how often passenger incidents are making headlines – whether involving shoddily served nuts, histrionic celebrities, or grown-ups who really should know better – this is a hot topic.

Of course we always feature the latest developments and innovative thinking, but a special feature in this issue (p40) considers whether, when it comes to business and first class seating, every airline actually should be innovative, and if so, the risks involved in such a project. I'm happy to report that the costs and risks of introducing a bespoke seat can be lower than one might think, and there are rewards to be had, in terms of passenger comfort, product differentiation, brand perception and loyalty – and of course the bottom line.

As always, the *Aircraft Interiors International* team will be at the Aircraft Interiors Expo in Hamburg, on April 14-16. Please come along to Stand 6A130 to say hello. We'd love to meet you!

Adam Gavine, editor

THE GAME CHANGER.

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Offering home-team advantage at 40,000 ft, the Athlete's Airplane is a custom cabin interior focused on the unique needs and challenges of professional athletes. Find out more at teague.com.

TEAGUE

US\$5.99bn

UPWARDLY MOBILE

The incredible growth of the aircraft interiors industry shows no signs of abating, as these figures gathered during the first quarter of 2015 illustrate. Airlines are rushing to install onboard technologies such as wi-fi and mobile telephony, and passengers are embracing these services

Mile high!

4% of Americans admit to being members of the mile-high club. 25% are willing to join but have not yet had the opportunity. Men are three times more likely to be a member, and those with salaries of over US\$100k are most likely to be members.

- Of the 56% respondents who
- said they never wish to join:
- 25% say it's because the lavs are too small
- 25% say it's because lavs are dirty
- 23% say it's beneath their dignity
- 19% are scared of being caught

Switchfly survey

LIGHT READING

Every day the airline industry loads

copies of newspapers and magazines on to

aircraft, weighing

100,000kg

The aircraft cabin interior market is estimated at US\$12.85bn in 2014, and is expected to reach US\$17.19bn in 2019 at a CAGR of

MarketsandMarkets report /



In 2014, Etihad Airways reported an 80% increase in inflight wi-fi usage compared with 2013, a 62% increase in inflight texts, and a 61% increase in inflight mobile phone calls. The global commercial aircraft seating market is estimated at US\$5.99bn in 2014, and is projected to reach US\$7.91bn in 2019.

Research and Markets forecast

The total IFEC market size is expected to grow from US\$2bn in 2012 to US\$3bn by 2017 at an estimated CAGR of 6.67% from 2012 to 2017, predominantly driven by the increase in deliveries of wide-body and very large aircraft.

MarketsandMarkets report

CALLING THE CHANGES

During 2014, on aircraft equipped with the Mobile OnAir inflight telephony service, 37% of passengers connected with the inflight network. Of those passengers:

- 65% used mobile data 31% sent text messages 21% made phone calls 84% of UK users sent emails 82% of Philippines users sent texts
- 58% of Egyptian users made phone calls



EU consumers would forego most offline media (except TV) before losing mobile internet access. More than half would give up alcohol and almost 50% are willing to forego coffee, movies and exercise to keep their mobile internet access. One in five is willing to give up his or her car and 17% would abstain from sex. 14% are not willing to give up their mobile internet access at any price. Boston Consulting Group research Flyers have at least "some" chance (up to 0.33% chance) of having inflight wi-fi available on **24%** of flights worldwide, with US airlines offering some chance on **66%** of flights system-wide, and non-US airlines offering some chance on **15%** of international flights. Routehappy's Global State of InFlight Wi-Fi Report

Visit aircraftinteriorsinternational.com for regular news updates

For news about more seating reveals at Aircraft Interiors Expo, see p163

HIGHER CALLING

Zodiac Seats' Fusio is designed to meet the ever-increasing expectations of business flyers, while maintaining cabin density

As airlines seek to push business class to ever-higher standards, and with many wishing to remove first class from their aircraft while still retaining those premier customers, Zodiac Seats has devised a new seat in a class it describes as 'business first'.

The seat, which will launch at Aircraft Interiors Expo (Hamburg, April 14-16), is pitched as being a step up from its successful Cirrus model, which features a herringbone layout with direct aisle access, a fully flat bed position, privacy and an optimized LOPA. Zodiac feels that those features are becoming almost a standard in the business class world, and the next stage in the evolution is a bridge between that standard and the new breed of super-luxurious first class, while maintaining good cabin density.

1. AT 34IN WIDE, THE SEAT ALLOWS GUESTS TO CHANGE SEATING POSITION DURING A FLIGHT, WHICH IS KEY TO COMFORT

2. FUSIO OFFERS THE LEVELS OF PRIVACY THAT MANY FIRST CLASS PASSENGERS DESIRE

3. THE PRIVACY SHELL HOUSES A WARDROBE, MEANING PASSENGERS DON'T HAVE TO WAIT FOR CREW TO DELIVER THEIR JACKETS AND COATS Fusio was shown as a concept at 2014's Hamburg show, and over the past 12 months, Zodiac Seats' R&D teams have worked to improve the product and to turn the concept into reality. Zodiac says that the forward/aft Fusio will feature the widest bed in its class (34in wide and 81.5in long), an extra-wide seat (34in), unique 'dynamic seating comfort' innovations including a sofa position, and a large IFE display (up to 27in), all designed to make flying business class as comfortable and enjoyable as being at home. Fusio is intended as a fourabreast configuration on the B777, B787, A330, A350 or A380, with a pitch of 53-57in.

You can find out for yourself by trying out the seat in Hamburg. We will also be revealing further details of Fusio in our web news feed from the show. \otimes



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For a detailed tour of Erik Viking, see the video section of our website

DARK NORSE

Innovative cabin choices raise Scandinavian Airlines' upgraded A330 interiors to another level

Meet Erik Viking, an A330 that is the first of Scandinavian carrier SAS's seven upgraded long-haul aircraft. Erik will be invading the business class market with a new business cabin that represents a real leap in the premium SAS passenger experience. The cabin finishes are of a typically modern and understated Scandinavian style, with an understated gray palette lifted by a few splashes of color.

One source of color is the HelioJet RGBW LED cabin lighting system, for which SAS is the launch customer. A benefit of HelioJet, which was developed by Schott and Lufthansa Technik and certified in December 2014, is that its color doesn't diminish over time.

For the seats, SAS turned to the increasingly popular Vantage range from Thompson Aero Seating, selecting the XL model. SAS is not the first to select the Vantage XL – that was Qantas – but it is the second. Configured 1-2-1, the seats have a seat width of 23-24in between the armrests, a minimum bed length of 77in, and 15.4in HD IFE displays with content provided by Spafax. Comfort is further enhanced by a pneumatic cushion system and a massage function. All in all, this is a major step up from SAS's previous angled lie-flat offer.

The SAS cabin interiors team worked with Thompson Aero's engineers and the Factorydesign consultancy to customize the seat styling, including metallic edging, gold accents and electric blue in-seat lighting. Passengers can enjoy Scandinavian comfort at bedtime, with the mattress, pillows and blankets all sourced from Hästens, the oldest bed manufacturer in Sweden. For a snack or beverage, there is also a walk up 'business buffet' at the galley area to the rear of the cabin.

The fleet will be upgraded with the new interior at the rate of one aircraft per month except between June and August, and the first of four brand-new A330 Enhanceds will be ready in the fall. In the next stage, eight A350-900s will be delivered from 2018 onward, with options for an additional six. 🚳



1. SAS SELECTED THE RAVE SYSTEM FROM ZODIAC INFLIGHT INNOVATIONS FOR THE IFE

2. THE BUSINESS BUFFET PROVIDES AN ONBOARD DESTINATION SPACE

3. THE TRIM AND FINISH SCHEME REALLY TURNS THE VANTAGE XL INTO A DISTINCTLY SAS PRODUCT

4. ELECTRIC BLUE MOOD LIGHTING HIGHLIGHTS THE STOWAGE OPTIONS

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SENSATIONAL

Airlines can appeal to all five human senses in the passenger experience, as some of the latest ideas show

TOUCH



For passengers with reduced visual or auditory acuity, or limited hand movement, B/E Aerospace has developed an interesting concept that provides a more usable alternative to capacitive touchscreens for IFE or seat controls. The Haptikos concept integrates large electrostatic surfaces such as films or smart textiles onto seat armrests to give haptic force feedback, so the user can feel textures or read Braille and navigate menus and sub-menus, which will also be designed with larger icons.



Step onto an Iberia aircraft and you'll get a whiff of Spain, as it is the first airline to create its own scent. Named Mediterráneo de Iberia, the scent is billed as a fresh, soft and delicate fragrance that provides a sense of wellbeing, with notes of fruit, flowers and wood, and a touch of citrus. Iberia views this scent as a final step in its upgraded



Read about the psychological aspects of economy cabin

design on p52



TASTE

Having a 'celebrity chef' as an airline menu consultant is nothing new, and KLM has been serving business class meals created by leading Dutch chefs, with wine selected by top sommeliers, for several years now. This year, until October 26, 2015, KLM's business class diners will be served meals created by leading three-star Dutch chef Jonnie Boer on flights departing from Amsterdam. Boer owns Restaurant De Librije in Zwolle, a 3-star restaurant that is ranked among the world's top 50.



SIGHT

You've seen LED cabin lighting systems create sunset and sunrise effects, but Icelandair has recreated a natural phenomenon on board its Hekla Aurora B757: the Aurora Borealis (Northern Lights). Artwork depicting the lights has been painted on the exterior of the

aircraft, but the effect really comes to life inside during the inflight light show, with the cabin lights recreating the Aurora Borealis on board, with Icelandic music as the soundtrack to the experience. You can watch a video of the light show on our website.

brand experience.

SMELL



SOUND

Many airlines play music on boarding and disembarking, carefully chosen to soothe travelers' nerves and give a feeling of the brand's nationality. In October 2014 Virgin Atlantic went a step - a giant step - further for the inaugural flight of the airline's new B787, from London to Atlanta. The flight – with Aircraft Interiors International on board – featured the first ever gig to be live streamed over the Atlantic Ocean, with dance music acts Rudimental and Gorgon City playing back-to-back sets. As the acts spun records, with singers and trumpeters performing down the aisles, the gig was streamed via the onboard wi-fi to fans at home. You can find out more about the B787 interior, and watch clips of the performance, on our website.



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Fancy a Jazz session? You can try out the seat at Aircraft Interiors Expo 2015

ALL THAT JAZZ

Panasonic worked with seat manufacturers and designers from the outset to create the Jazz concept

Panasonic Avionics has been working to bring the IFE innovations found in premium class seats to economy class. With the Jazz long-haul economy seat concept, Panasonic has worked with its design partners – B/E Aerospace, Teague and Formation Design Group – to create a seat that seamlessly integrates IFE from the outset, to bring more efficient design, lighter weight and shorter lead times.

B/E's anthropomorphic research informed the shape of the seat, which uses a slimline Mandrel-free composite seatback construction to free-up more space for the passenger by improving knee clearance, while the innovative

BEACHWARE

Two seatback tray table variants are proposed for Jazz: the Sandbox and the Beachfront. Sandbox is an expandable tray that can be extended sideways to make it smaller or larger, according to need. This table design also enables a tablet to be stowed behind in a portrait orientation, which can be viewed when the table is deployed, and a smaller device such as a smartphone can be secured in a 'peripherals station' alongside, complete with USB and other ports. Beachfront has a more conventional bi-fold table, which doesn't allow for tablet stowage, although a small PED can still be secured.

armrest geometry increases hip clearance. The geometry has been made possible through the use of additive manufacturing.

A 13.3in 1080p LCD touchscreen is integrated into a seamless edge-to-edge glass structure for a clean look, and the wide viewing angle means a tilt mechanism is not required. For quick and simple maintenance, the clever monitor mount means that the display can be removed with just one screw.

As well as enjoying widescreen IFE in comfort, Jazz passengers can also enjoy other in-seat technologies, including mood light control, built-in reading lights, and integrated attendant call lights. AC power, inductive charging, USB ports, Bluetooth 4.0 and NFC payment features can also seamlessly integrate with personal electronic devices (PEDs) for a fully personalized passenger experience. 1. THE SEATBACK OFFERS OPTIONS TO STOW, CHARGE AND CONNECT WITH PASSENGERS' DEVICES

2. AS A RESULT OF WORKING TOGETHER FROM THE OUTSET, THE B/E SEAT FUNCTIONS JUST AS WELL FROM A COMFORT PERSPECTIVE AS PANASONIC'S INPUT WORKS FROM AN IFE PERSPECTIVE

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KIDS' STUFF

a car, so why do so Safety is paramount in aviation, and some of the latest ideas can help ensure even the smallest of passengers fly safe, secure and in comfort



ALL IN ONE

The Multi-functional Bulkhead concept from HAW Hamburg integrates several functions into the bulkhead wall, including a baby bassinet, meal tables, literature pockets and IFE displays - meaning that special bulkhead seats are not required. The bulkhead, constructed from composites, is attached to an existing monument such as a galley or lav wall, and to the seat rails. After take-off, the bassinet – a little like a deep drawer – can be slid out of the bulkhead and secured in the open position. When not in use, all elements can be folded into the 80mm-thick bulkhead for a clean appearance and easy seat row access.



ALL ROUNDER

Gama Engineering's Infant Safety Seat is a safe way for children aged 0-4 to travel in an aircraft seat, with a choice of being mounted forward or backward. Weighing 8kg, the seat features a five-point harness with one-touch release and is suitable for use with conventional or airbag belts, and with most aircraft seats. The seat is 16G certified and can be used during TTOL. Virgin Atlantic and Cathay Pacific are offering the seat, which, when not in use, can be folded flat and stowed overhead.







Another concept comes courtesy of Boyidtech in Mexico. The seat is attached to the bulkhead in front of the window passenger, with an additional footrest option. Suitable for under-twos, the seat faces the parent, helping the infant feel entertained and safe, although there is an option to face the wall. The initial target market is A320s and B787s, and Bovidtech suggests renting the seats and footrests as a source of additional revenue.

HIDDEN BENEFITS

You wouldn't let a child travel unrestrained in

on an aircraft?

Airbus has patented an economy seat design that features an integrated child seat. The seat appears like a regular economy seat, but flip up the seat cushion and a rear-facing child seat is created, complete with restraints. The child seat can even be extended further and folded flat for nap times. Zodiac Seats US has patented a similar idea, whereby the central part of the backrest cushion folds down to create a forward-facing child's booster seat with restraints.



THEIR OWN LITTLE WORLD

The Flycoon concept by Marius Design is a concept for a bassinet for under-twos that can be rented and can be used during TTOL. It consists of a rail system integrated into a reinforced monument wall, to which a seat base is

attached, into which a removable lightweight isofix seat can be secured, all adding up to around the weight of a child's car seat. The seat is mounted in line with the central armrests of the front row to help meet HIC tests. To keep the occupant – and everyone nearby – happy, a full-length IFE screen can be rolled down, with a mini projector and speakers providing the entertainment.



See the case studies section of our website for full details of Qatar's Dreamliner interior

WIDE ANGLE

The cabins of the world's first A350-900 XWB are stunning – but for Qatar Airways, the business cabin is heading for big changes next year

Airbus had a great launch customer for the A350-900 XWB in Qatar Airways, an airline known for only taking delivery of an aircraft when it is perfect, and with interiors that really showcase the aircraft.

Qatar was deeply involved in this project, as CEO Akbar Al Baker stated at the aircraft launch: "Unlike any other aircraft in our fleet, this aircraft was completely architected in a joint manner with Airbus, drawing parallels and

innovations from the manufacturer and operator hand in hand. This is important because we both benefit from efficiencies of engineering design that are completely consumer-led. This means that Qatar Airways acts as an advocate for its passengers and ensures that every feature of this aeroplane is carefully thought out."

The result is a beautiful A350, with a spacious domed entrance that gives a feeling of space upon boarding, especially since there are no central overhead stowage bins in business class.

The 36-seat business cabin features customized reverse herringbone B/E Super Diamonds, giving business passengers direct aisle access; a 22in-wide seat; a 30in-wide, 80in-long flat bed; 17in Thales Avant IFE displays; and 3D audio.

A fantastic business class offer, especially when complemented by OnAir inflight connectivity and on-demand dining, but just wait... Al Baker revealed at

FOOT LOOSE

In the 247-seat economy cabin, Qatar Airways made the most of the 220in-wide space to offer Recaro CL3620 seats at 18in-wide at up to a 32in pitch. The seats, configured 3-3-3, feature 10.6in HD displays and four-way adjustable headrests, but the most exciting aspect is that they are the first seats to have the IFE boxes integrated into the seat frame for optimal legroom, complementing the A350's flat floor.

the launch that in mid-2016, the current business class seats "will be obsolete" – long before the 10- to 12-year lifetime the airline predicted for the product when it launched in 2012 on the Dreamliner.

The airline is sticking with its 'super business class' strategy, with first class only appearing on the A380. However, its business class product will become even more super, with a new seat in development for which the airline will own proprietary rights: a design that AI Baker stated will offer "a double bed at a business class fare" and which will be "unrivaled in our industry". This new product will be installed in the airline's forthcoming A350-1000s, A380s – and also the freshly launched A350-900s. \otimes

1. THE CABINETRY AT THE DOOR 2 ENTRANCE, DEVELOPED WITH AIM ALTITUDE, IS MORE IN LINE WITH THE AIRLINE'S A380 INTERIORS THAN ITS DREAMLINER CABINS

2. THE DOMED ENTRANCE ALSO SERVES AS A SOCIAL AREA FOR BUSINESS CLASS PASSENGERS

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Love Singapore? Our website has videos, galleries and features about the airline.

SHADES OF GREY

Introducing Singapore Airlines' fourth class of travel: premium economy

Following a US\$80m investment, August 2015 will see Singapore Airlines introduce premium economy. The new travel class will initially be offered as a 28-seat cabin on board 19 of the airline's B777-300ERs, and as a 36-seat cabin on its entire fleet of 19 A380-800s.

Singapore opted for a customized version of the BC-01 business seat from ZIM Flugsitz (as also selected by Lufthansa), configured 2-4-2 at a 38in pitch. Seat width ranges between 18.5 and 19.5in across the aircraft types, and all seats will offer an 8in recline, calf-rest and footbar, a Panasonic eX3 13.3in HD monitor, individual in-seat power supply,

two USB ports, a personal adjustable reading light and a cocktail table, as well as additional stowage space for personal items, including a water bottle holder.

The airline decided to continue its relationship with design agency JPA Design for this project, with conceptualization for the new travel class starting in November 2013. Tim Manson, design director at JPA Design, told *Aircraft Interiors International* that the team "aimed to create a product that was 'the place to be' – more personal, distinctive and instantly recognizable. Defining a striking language for this custom cabin, the design has a more youthful attitude."

A graphite gray leather was selected for the seat cover, complemented by an antimacassar in a slightly darker shade. The color is provided by vibrant orange strips around the center armrest and the seatback

ADDED EXTRAS

The premium economy experience doesn't end with a comfortable seat. Guests are offered the use of active noisecanceling headphones, as well as a more extensive choice of food and beverage offerings. Besides being able to select from a standard menu with three meal choices, customers may, from April 2015, also select from the 'Book the Cook' service featuring popular dishes. Ernest Rapeneau brut champagne will be offered, in addition to a selection of curated wines, throughout the flight. On the ground, priority check-in and baggage handling will be offered, as well as a baggage allowance of 35kg (5kg more than in economy), and a 10% miles bonus for KrisFlyer members flying premium economy.

literature pocket, the color echoed in asymmetric accent stitching on the cushions, and a cool blue used on the water bottle holder and again in accent stitching.

Singapore Airlines' CEO, Goh Choon Phong, said at the product reveal, "Many of our customers' suggestions have been incorporated into the new product, and we are confident it will be well received by travelers who are looking for more features – in the seat design, inflight offerings and exclusive privileges – all underpinned by the exceptional service that SIA is well known for, both on the ground and in the air."

1. THE TRIM AND FINISH IS SUBTLE, BUT THE INJECTION OF COLOR IN THE ARMREST AND STITCHING REALLY LIFTS THE WHOLE PRODUCT

2. THE SEAT HELPS BRIDGE THE GAP BETWEEN ECONOMY CLASS AND THE AIRLINE'S BEAUTIFUL NEW BUSINESS CLASS CABINS

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QUICK CONNECTIONS

The latest developments in satellite and antenna technologies promise an even faster future in IFEC

See p215 for connectivity announcements expected at Aircraft Interiors Expo



ELECTRIC DREAM

SES has commissioned Boeing to build the first all-electric propulsion 702SP satellite, which will enable SES's airline customers to provide wi-fi over North America, Central America and the Caribbean via Kuand Ka-band. Other special features include a hybrid payload (up to 8kW) with wide beams and high throughput capacity, and a low spacecraft mass to take advantage of low-cost launch vehicles. SES-15 will be built in El Segundo, California, and delivery is scheduled for 2017.



4

LOW PROFILE, HIGH PERFORMANCE

Gogo has received regulatory approval from the FCC to operate its 2Ku next-generation antenna technology which, the company says, is expected to deliver peak speeds to aircraft of more than 70Mbps. The antenna, which is only 4.5in-tall and has a low profile, has increased spectral efficiency and is compatible with Ku satellites, including future spot-beam satellites. Because the antenna can be used with any Ku satellite, it increases the reliability of the service, and when future satellite technologies become available, Gogo expects peak speeds for the service to reach in excess of 100Mbps. The initial FCC approval is for 2Ku to operate on 1,000 aircraft, and Gogo expects the service to be available for commercial aviation in the second half of 2015.



THE NEXT STEP FOR IRIDIUM NEXT

Cobham SATCOM has joined Rockwell Collins, L3 and ICG as an official manufacturing partner for Iridium Certus broadband, an L-Band satellite service based on the forthcoming Iridium NEXT constellation. The Iridium NEXT constellation will consist of 66 low-Earth orbit inter-connected satellites with the aim of bringing greater capacity, bandwidth and data speeds (up to 1.4MBPS), while retaining global (pole-to-pole) data services.



XPRESS DELIVERY

February 1 saw a milestone in the development of Inmarsat's US\$1.6bn Global Xpress mobile broadband network, which the company hopes will deliver broadband speeds more than 100-times faster than its fourthgeneration (I-4) constellation. The second Inmarsat-5 satellite, built by Boeing and launched from Kazakhstan, sent its first signals from orbit on launch day, and at the time of going to press, is completing tests and maneuvers before officially beginning service for the Americas and Atlantic Ocean region (the first satellite covers Europe, the Middle East, Africa and Asia). A third Inmarsat-5 satellite is scheduled for launch in the first half of this year and will complete the Global Xpress constellation. Each of the three satellites in the initial GX fleet has 89 beams and six steerable high-power spot beams for multiregional coverage.



GALAXY QEST

Global Eagle Entertainment (GEE) and antenna developer QEST are jointly designing an inflight connectivity antenna that is intended to provide reliable high-speed connectivity at all latitudes, including equatorial regions, where Ku and/ or Ku High Throughput Satellite (Ku HTS) coverage is available. The GEE-QEST antenna, scheduled for launch in mid-2016, will be optimized for use with upcoming Ku-band HTS systems and will also be compatible with existing Ku-band systems. A special feature of the antenna is the steerable pointing system, claimed to optimize coverage anywhere a commercial aircraft flies.

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RHAPSODY IN BLUE

As Brazilian carrier Azul expands its reach into the USA, it is aiming to entice business flyers with its sophisticated new cabins

For those not familiar with Azul, it is definitely an airline worth watching. This Brazilian carrier was founded in 2008 by David Neeleman, who also founded JetBlue (given that azul is Portuguese for 'blue', he seems to like the color). Having secured routes into the USA at Orlando and Fort Lauderdale, with more to follow, the airline is now expanding its reach from being a domestic carrier into lucrative new destinations.

The passenger mix on these US routes will be part leisure, part business, so it is retrofitting its fleet of seven A330-200s with Business Xtra cabins featuring lie-flat beds, and a walk-up bar and social area. The seats are a lightly customized version of the Stelia Solstys, the main change to which is to the stowage in the shoulder area, which has been given a cleaner look, with the trinket tray removed and the literature pocket reconsidered as a simple leather-covered panel, embossed with Azul branding and finished with a headphone hook.

Tangerine, which was the design agency for the project, had the opportunity to design the entire CMF scheme for the interiors. As you would expect from the airline's name, the cabins are finished in blue tones, but in a sophisticated way, particularly the custom striped finish around the Solstys seat shells.

Emma Partridge, who led the CMF team for the project, explains, "The color scheme uses blues in a warm, engaging way, emphasizing the heart of the brand." Subtle Brazilian references include the bulkhead finishes, which echo the pattern on the sidewalks of Rio's Copacabana beach. Tangerine founder Martin Darbyshire adds, "We were looking for things that make the environment feel high quality and sophisticated, with a Brazilian twist."

The next step in Azul's long-haul evolution is the arrival of five A350-900s. These aircraft were considered in the A330 project to ensure that the CMF can be consistent across both aircraft types.

BEDS IN BUSINESS... AND IN ECONOMY

As well as having 7.5in more legroom than in the economy cabin, Azul's Economy Xtra cabin also features a Skycouch arrangement. This means that several of the center quads in the 2-4-2 long-haul cabins can be turned into a Sky Bed.

Available for an additional fee when space is available, the armrests can be raised flush with the seatbacks, the legrests elevated to 90°, and a mattress and bedding added, to create a slim bed.

1. SOME SUBTLE REFINEMENTS HAVE BEEN MADE TO THE SOLSTYS MODEL FOR THIS PROGRAM 2. AZUL IS THE LATEST IN A GROWING LIST OF AIRLINES TO ADOPT A LIE-FLAT SYSTEM IN ECONOMY

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6



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SWIFT PROGRESS

BURCU DOGRUSÖZ, SALES AND MARKETING MANAGER AT TSI AVIATION SEATS, DISCUSSES THE RAPID GROWTH OF THE COMPANY IN THE THREE YEARS SINCE IT WAS SET UP

Some say the aircraft seating industry is facing a supply-chain backlog. How can TSI help airlines?

The industry in Turkey is growing rapidly and we are primarily working with local market suppliers for our procurement. We are in the industrial heartland of the country, where we have access to good-quality supply options and a large pool of qualified workforce. We are young and very dynamic. We have a fully automated production line in our facility. All these factors give us speed in terms of delivery times. We know the need in the market and we are confident that we can fill the gaps.

Having short lead times is one of our strengths and we want to help airlines with their tight schedules, all the way down to six-month lead times.

Your launch customer for Elesa was Turkish Airlines – have you gained any new customers?

Elesa, which has economy class and convertible options for short range, is our first product. We are currently in the RFI and RFQ processes with some other airlines, which we believe will end with contracts.

How are your plans for Elesa to be line-fit offerable on Airbus and Boeing aircraft progressing?

We have two line-fit projects with Boeing: one for long range, one for short. Both projects are going well and we are aiming to be offerable this year.

In 2014 we established TSI Seats Inc. in Utah, USA, which is a 100% subsidiary of TSI Aviation Seats. All Boeing orders will be manufactured in this plant.

With Airbus, we are working on one line-fit project for long-range economy seats. We are proceeding as planned, and likewise the target is to be offerable in 2015.

Are you looking to also be offerable on other aircraft, such as COMAC, Embraer and Bombardier?

Our priority is to complete our product range and to become offerable with Airbus and Boeing. We may consider offerability with other OEMs after that.

We heard that TSI may be launching a seat at Aircraft Interiors Expo this year – can you give more details?

Yes, we will be launching our new long-haul economy seat. The seat will be equipped with an articulated seat bottom, IFE (including an 11.1in smart monitor), footrest, longer armrest, COOKING UP A STORM

Sister company Turkish Cabin Interior (TCI) is another bold new entrant in the aircraft interiors market. Find out more about what TCI has planned for the future on page 193.

and cushions with a special foam developed for improved comfort during long flights. The seats will be installed on B777-300 and A330-300 aircraft types.

Sounds interesting. Are you developing any other models of seat?

Another innovative product that we will launch is a short-range economy seat. It will have an articulated seat bottom, IFE (including 10.6in smart monitor) and will be installed in a B737-800. Thanks to special design features, our products will reduce maintenance costs and increase living space – for example with the slim design of the lower literature pocket.

Our new lightweight seat is another product that will make its debut in Hamburg. We believe that at 10kg per pax, with an ergonomic design and lightweight components, this seat will be a good alternative for low-cost carriers looking for fuel savings without compromising passenger comfort.

What are TSI's other plans for the future?

Our concept design for a mechanical business class seat is complete, and we are planning to enter this product in mass production in two to three years' time. Productwise, the next step would be a full-flat business seat.

With regard to services, in the future we are planning to apply for EASA Part 145 and become a center capable of answering all maintenance needs.

We are looking to gain considerable market share and become the preferred seat supplier for airlines, due to our short lead times, competitive prices, and our tailor-made and sophisticated designs.

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COMFORT KING

AS WELL AS OFFERING COMFORT ADVANTAGES, AEROFOAM INDUSTRIES SAYS ITS SEATING FOAMS CAN HOLD THE ANSWER TO PREVENTING DVT IN ECONOMY CLASS. MATTHEW NICHOLLS SHARES THE LATEST DEVELOPMENTS FROM THE COMPANY'S R&D DEPARTMENT

You may be familiar with Aerofoam Industries, the US-based developer, manufacturer and supplier of aircraft seat cushions, fire-block covers, dress covers, and thermoformed components.

However, you may not be familiar with recent developments in one of its key products – seating foam. According to sales director Matthew Nicholls, the reason for the company's success in this area is down to its priorities.

"The key area that we're focused on is comfort," he explains. "The whole concept of comfort is paramount, and how some people can ignore its importance is crazy as it also has health risks associated with it, such as DVT."

Aerofoam's core product is its flame-retardant, graphite-impregnated foam; a competitor to the "typical DAX products", states Nicholls. While this may be a familiar product within the industry, Aerofoam's unique selling point is that its products are also highresilient foams.

"In a high-resilient foam, all the particles align themselves in a very random orientation, whereas in a normal foam, they all stack up in a row," explains Nicholls. "In theory, you would have thought that normal foam would be the better option of the two, but what high-resilience does is to give that random shape that creates much better grip and adhesion internally, between the cell structures, which means you get a much greater lifespan of the product."

This lifespan is indeed very high, with Aerofoam claiming that its high-resilient foams retain 80% of their original shape after five years.

WIDER MARKET

Aerofoam Industries' technologies are used in everything from motorsport, to aircraft seating, to theaters. See p257 for more details

This attention to detail and long lifespan have seen Aerofoam secure contracts with several seat manufacturers and airlines, often where other suppliers have been unable to meet client demands. "We supply about 85% of all the cushions for Zodiac Aerospace, and a number of airlines too such as Delta and Pegasus Airlines," says Nicholls. "Our foams have been on SpaceShipOne, and they will go on [the second] SpaceShipTwo too. Our product is also used on Lufthansa, but interestingly Lufthansa uses a memory foam version, and we are the only company to offer flame-retardant, graphite-impregnated memory foam; it's like the Tempur of the skies!"

According to Nicholls, there are about to be some major new developments at Aerofoam. "We're just about to launch a new foam at Aircraft Interiors Expo," he says. "Instead of it being graphite-impregnated, it is a very high-tech memory-foam that is impregnated with diamond dust."

While this may sound like the height of comfort indulgence, the diamond content of the foam serves a functional purpose. "Memory foam creates an exothermic reaction when it moves around, which naturally gives off a little bit of heat," Nicholls concludes. "Diamond is incredibly conductive, so it conducts the heat energy away and stops the heat from rising.

"And it has crushed diamond powder in it – you can't get more bling!" \circledast

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AEROLUX BUN WARMER



POINT OF VIEW

THE BRIEF

We've seen immersive IFE concepts for premium seats before, but we want everyone on board to enjoy the latest technology. But that doesn't mean we want economy passengers to have to wear VR goggles to enjoy an immersive IFE experience. Alexandra Moceri, a product design student at the College for Creative Studies in Detroit, Michigan, responds.

DESCRIPTION

The Escape concept is a simple solution, comprising a 'visor' that slides up from the headrest area at the press of a touchpad and pivots over the occupant's head. The visor is height adjustable, so it can be set at the correct eyeline for different-sized passengers. Whether enjoying airline-provided movie content in an IMAX-style experience, plugging in an MP3 player for a private concert, or plunging oneself into a game, the beauty of the concept is that light does not spill out of the visor to disturb your neighbors, and the noise-canceling speakers also help users to maintain friendly neighborly relations. A separate air flow also helps keep things cool while the onscreen action hots up.

For those who prefer more traditional entertainment, the visor also incorporates a reading light, and the noise-canceling speakers create a peaceful environment for a little light reading.



VERDICT

We have a few small concerns with the concept, including its unsuitability for gate-to-gate IFE, potential HIC issues, the potential for feeling claustrophobic, not to mention that a cabin full of immersed passengers could prove a little tiresome for crew. That said, we love seeing economy passengers being included in the premium experience and being able to control their immediate environment in terms of IFE, climate and lighting. Escape certainly provides a new perspective.





AEROLUX BUN WARMER





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There are two sides to everything. A tool, for example, must be practical, but must also inspire the user. One does not automatically give rise to the other, but rather a third aspect is required: understanding. Industrial design projects at 2° focus on the beauty of understanding. Staying with the same example, a good tool gives the user the feeling of beeing understood. As designers and engineers, we are only happy when the end product is exactly what we had imagined in the first place: A tangible product that entices and inspires the user. A product that communicates the fact that it can be intuitively and safely operated, because the user understands it immediately.

www.zweigrad.de

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LIGHT ENTERTAINMENT

THE BRIEF

We would like a new feature in first class that combines simple function with the latest technology, wrapped up in a pleasing form.

DESCRIPTION

Zweigrad Industrial Design in Hamburg has a philosophy that there are two sides to everything: for example, a tool must be practical and must also inspire the user. The L.IFE lamp concept is true to that philosophy; in fact it has four sides, literally and figuratively. The four-sided lampshade combines the lamp function with PCU function and IFE control, and adds something special to the cabin design.

Each side of the 'lampshade' is an OLED touchscreen. On one side the flight information and PCU functions can be controlled, rotate it and you can access video content, rotate again for audio content and again for communications. Not forgetting its lamp function, L.IFE can be a mood light, reading light or table lamp. The angle of each touchscreen can also be adjusted to change the angle of operation and the light beam.

Recognizing that first class passengers may be of an older demographic, or that they may just enjoy simple luxuries, the lamp is designed to be easy to use, with no more than one sub-menu per side.



VERDICT

We like it, and indeed we've never seen anything quite like it. Particularly pleasing is that the design is not a translation of a product found in domestic or hospitality design, but rather something unique for the aviation market. An unexpected feature like the L.IFE can make the most exclusive flying experience even more special.







1938 | Fluorescent tube



1802 | Incandescent light bulb



3000 BC | Candle light



2014 | HelioJet[®] Spectrum^{cc}





1980 | Compact fluorescent lamp



2009 | LED stripe



2012 | HelioJet® White

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INNOVATION

"British Airways Club World has a highly efficient cabin density that is still class leading, even 15 years on"

irlines are striving to introduce exceptional and innovative premium cabin products to differentiate themselves in a highly competitive marketplace. In the premium class seating sector, we've seen the introduction of many innovations, including apartments, double beds and unique layouts, but for those seeking to innovate, what are the risks, what are the costs and does it really bring a return on the investment?

BY POPULAR DEMAND?

Let's begin by considering the expectations of business and first class passengers. Is it worth developing truly innovative seating products when passengers can be perfectly satisfied with quality catalog offerings?

We asked Martin Darbyshire, CEO of design agency Tangerine, if innovation is essential in luring the lucrative frequent premium flyer. Tangerine has considerable experience in this area, with one of its landmark projects being the design of British Airways' Club World seat, which introduced a flat bed into the business class world, with a highly efficient cabin density that is still class leading, even 15 years on.

"People who fly a lot appreciate the differences," he says. "Business class travelers are intelligent, experienced and not afraid to voice opinions, so airlines can really benefit by creating optimized solutions that deliver big differences in comfort. It is not just about the cushions, it is about the design of the whole comfort system, the seat geometry; there are very big differences to the whole passenger experience.

"If you don't travel often and you're in any business class cabin, you're likely to be happy. But if you travel every week and want to go to work after the flight, and if the airline wants to be a leader in the market, that level of innovation is necessary," adds Darbyshire. "It helps airlines maintain their position and competitive advantage."

NON-RECURRING COSTS

If an airline can't place large-volume orders, many seating manufacturers will be hesitant to invest a large amount in non-recurring engineering to develop a unique product. For smaller carriers, the catalogs provide great options,



ABOVE: MARTIN DARBYSHIRE, CEO OF TANGERINE, CREATORS OF BA CLUB WORLD (PICTURED LEFT) BELOW: AIR NEW ZEALAND'S SKYCOUCH SHOWS THAT THERE IS POTENTIAL FOR INNOVATION IN ECONOMY SEATING but for the bigger players, opportunity beckons for innovation and differentiation.

We asked the opinion of JPA Design, a consultancy with experience in this field, particularly from its design of the Cirrus seat and Singapore Airlines' next-generation business seats. John Tighe, the studio's design director for transport, confirms that non-recurring costs for bespoke seats could be two to three times higher than for a more standard product.

However, there may be a little wriggle room with suppliers for non-recurrings – for the right customer. As Chris Pirie, director of business development at Teague explains, "Airlines will say that with a sizable order, they expect the non-recurring costs to be built into the price of the seating product. A lot of heavy negotiating goes on in exchange for that chunk of business, and it's not just about the premium end. There's a lot of money to be made in selling economy seats, so there is some negotiation when a seat manufacturer wants to win the contract for the front end of the aircraft and also win the back, because it keeps revenue coming into the company. Those economy products have more stable demand and hopefully the tooling for them is already paid for."



THE BOTTOM LINE

So how much extra expenditure are we really talking about for a bespoke seat? Pirie says that the cost increase is "significant" – 25-40% more than a catalog seat, depending on order size and how keen the seating manufacturer is to win the business. "If you want to differentiate through innovation, you've got to be willing to spend the money," he says.

Darbyshire adds that, "The actual cost of the seat itself may not be significantly higher [than a standard seat] if the airline is buying large quantities, as it has purchasing power. Quantity is a crucial aspect in the equation, and once you get beyond a certain point the non-recurring expenditure shouldn't necessarily shut the door to product innovation."

According to Tighe, while the non-recurring cost is up to three times higher than with a more standard option, the recurring costs are not such a huge leap. "Once you've made the tooling, generally speaking the costs are fairly similar. If that buys you some extra loyalty and fills your aircraft, then it's well worth it."

We also spoke to Luke Hawes, a director at PriestmanGoode. "Any designer can come up with something amazing if they blow the budget and double the investment. A bespoke seat costs probably 10-20%





more per unit, and the design investment is probably 50% more," he says.

"The design investment is naturally higher because of our investment in our own resources. However, in terms of running an airline, design investment is very small. If you think of the budget to get an A330 or B777 off the ground, design fees are minuscule," adds Hawes. "Design investment is rewarded very quickly."

A financial benefit of bespoke seats has also been identified by Ben Orson, managing director at JPA Design's London office: "They can remain in service and attractive to customers for a decade or more, whereas there seems to be a far more frequent turnover of catalog products. If you're using a blue-sky seat for twice as long, then that extra cost starts to work out."

"If you want to differentiate through innovation, you've got to be willing to spend the money"

CAN YOU AFFORD NOT TO TAKE THE RISK?

"Having an aircraft on the ground with the seats not ready is a bad thing. But having an aircraft up in the sky for 15 years with a mediocre product is another risk," says John Tighe from JPA Design.

Indeed being late might mean an aircraft not generating revenue for a few weeks, but rushing through the wrong product could harm passenger perception, the life of the interior, and the longer-term profitability of that aircraft. That sounds like real risk.

"The scale of money you're talking about for a seating program compared with the overall costs of an airline is actually quite small – but getting the seat wrong can cost you an awful lot," cautions Tighe. Chris Pirie from Teague is in agreement: "If you don't innovate and your competitors do, you will be perceived as either being unable or unwilling to innovate. That might cost you future revenue and future business, even in the back end of the airplane."

However, Pirie adds that a little caution is still required: "The last thing you want to do is design a product and find that people are upset that you didn't take some key features from the previous seat that made it successful. You've got to find these things out before you start.

"The biggest expense of chasing innovation is the risk of getting it wrong. You can go out on a limb and develop a unique seat that your little leadership team at your airline thinks is wonderful, then throw it on the airplane and have a bad market response. There's something to be said for buying a proven seat that's well accepted and has had the bugs worked out."

INTELLECTUAL APPROACH

Beyond volume orders and price bargaining, another way to reduce costs is to surrender a little intellectual property during the innovation process. As seat manufacturers undertake product development, they look to create things they can reuse as much as possible to take advantage of economies of scale. If the development of an innovative product gives them new assets to use for further commercial benefit, then they may be willing to undertake particularly onerous projects, and even sell that product for a palatable price.

TOP: TEAGUE'S CHRIS PIRIE BELOW: LUFTHANSA CREATED A BESPOKE BUSINESS CLASS SEAT WITH B/E AEROSPACE



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The design house may even cut a deal if there's an element of *quid pro quo*. "Sometimes when working with a vendor or an airline, we might come up with an idea, and if we own the IP, then we can make things easier for whoever we're working with, investing some of our own time and resources," says Hawes.

THE BIG PAYBACK

So will airlines see a greater return for this higher expenditure? With tight profit margins, airlines need

A HAPPY MEDIUM

Of course there is the middle ground of customization, with many seat manufacturers developing modular products with options that can make them a little more tailored to an airline.

Some airlines have taken the proven mechanisms from a catalog seat and installed them in a bespoke shell, which is a cost-effective way of creating something special. As John Tighe of JPA Design says, "Don't reinvent the wheel if you don't have to, but if you do, reinvent the right bits of it."

However, he adds that for the tier of airlines who can innovate, simply offering a flat bed is not enough. "Most long-haul business classes now have fully flat beds, but so have most hotel rooms. It doesn't mean hotels have just said, 'We've all got flat beds, so there's no point trying to differentiate.' "You can make a better bed and you can make a better quality environment. When you look at most catalog products, from a design perspective there is room for improvement."

Chris Pirie from Teague has taken an interest in this middle ground, noting that even the likes of Qatar Airways is flying a customized catalog product in business. "Basically the manufacturers are willing to incur the costs of making those changes, in exchange for a decent-size order," he says. "There's a lot to be said for taking some good existing products and making them yours. We've done that with a number of clients, where the seat is by name similar to that of other airlines, but we've added unique features and touch points that culturally match that airline."



ABOVE: VIRGIN ATLANTIC'S UPPER CLASS SUITE HAS BECOME AN INSTANTLY RECOGNIZABLE PART OF THE BRAND BELOW: BEN ORSON FROM JPA HAS EXPERIENCE WORKING FOR BOTH A DESIGN HOUSE AND A SEAT MANUFACTURER



everything on board to earn its square footage. Thus the best seating innovations will blend comfort and brand experience with a highly efficient LOPA. A prime example is BA's Club World, which saw a £200 million investment recouped in just 12 months.

The key to Club World's success was that groundbreaking LOPA, combined with the compelling offer of a flat bed. Success relies on efficiency: there is no 'halo product' thinking as in the automotive industry, which would see a premium feature run at a loss to sell more seats in the less expensive cabins.

"The past 10 years have forced the whole industry to be fitter and smarter, with airlines becoming very keen on managing risk and return on investment," says Tighe. "However, once passengers see the product is better and are prepared to spend more for it, that's when the return on investment will be far clearer and more direct."

TIME RISK

So when should a program start? JPA's Orson has experience from the design world, as well as the manufacturing side, having worked as design director at Zodiac Seatshells until 2013 According to Orson, 18 months is a comfortable lead time for a catalog customization program, though it could be done slightly sooner, depending on the level of work required. For a heavily customized or bespoke seat, he recommends allowing at least 30 months, if possible.

Luke Hawes recommends a minimum of six months for the design process, then a further 24-30 months for the development and certification.

With on-time delivery critical, how can so much be done in so little time? The key is good program management. The four key stakeholders – airline, airframer, design house and seat manufacturer – together need to ensure the project has been given sufficient time for success, and to make the key decisions early on.

As Pirie explains, "Many airlines say they want to innovate, but there are very few savvy enough to give themselves the time they need to do it properly. A few of them do, and we know the ones that do, because they're the ones with innovative products."

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For an example of how a truly innovative product was developed in a truly tight timeframe, look again to Club World. Tangerine worked on the design with Contour (now Zodiac Seats UK) for five months, and the finished seat was flying in the upper deck of a B747 within 15 months.

"Nowadays you can barely get a catalog seat with some level of customization to market in 12 months. We went from literally nothing," recalls Darbyshire.

CERTIFICATION RISK

Perhaps the most unpredictable part of the process is certification, which is why it receives particular attention. As Pirie says, "The number one thing we talk about in our meetings is, 'How are we going to pass certification with that? Then the first questions you get from the OEMs when you show them the seat is, 'How are you going to pass? Is this going to delay the aircraft?' You're always facing these challenges of certification. It's like *Groundhog Day.*"

Darbyshire adds that for smaller airlines the costs and risks associated with the certification of something new can be very substantial.

The solution seems to be to know the regulations, design for them, and allow time. Some have expressed frustration with the certification process and inconsistencies between agencies, such as the FAA and EASA. As Pirie says, "Certification is definitely stifling innovation. The problem is that it seems to be inconsistently applied."

However, he adds, "I think as innovative products come to market, and continually push the envelope, it's going to push Boeing and Airbus to look at their certification requirements, and of course the FAA and EASA as well."





JPA DESIGN'S JOHN TIGHE WAS A KEY FIGURE IN SINGAPORE AIRLINES' NEXT-GENERATION BUSINESS CLASS SEATS



CULTURE OF INNOVATION

For an airline to successfully create innovative product, it must have a culture of innovation. As Darbyshire says, "Does the business have the appetite for innovation and the culture to deliver it? For those that don't, it's not what they should be doing. But for airlines for whom innovation is central to their strategy and culture, it's a fantastic opportunity to get a huge competitive advantage, so they should grab it."

The key to success isn't just about the strength of the seat design, it also comes down to passion. As Hawes says, "Success depends on who you work with. You have to go with an established seat vendor, a design company that has been there and knows the ropes, and the supplier base has to be on the ball. If you sell an idea, you have to deliver it."

So for medium-to-large carriers thinking of their next wide-body line-fit or retrofit premium seating program the message is clear: innovate. There may be a little more cost and risk, but they can be minimized with the right approach and partners. After all, if an airline is completely risk-averse, how does it quantify the risk of being the same as somebody else?

ETIHAD INNOVATES TO ACCUMULATE

We spoke to Peter Baumgartner, CCO of Etihad Airways, at the launch of its Boeing 787, a catalog aircraft that the airline pushed to make its own through custom interior options, including bespoke premium seating (see p64).

"To bring out a bird like this with that amount of customization and innovation meant there were constant issues to work on. But the aircraft has gone online on time.

"If we had just picked from the catalog we would probably have had no issues at all, but we very consciously picked a different route as we were willing to go through these issues," he explains.

"We have embarked on an ambitious route of creating best-in-class product to sustain our reputation of being one of the most – if not the most – innovative airlines ever," he adds. "To do this, we have to make a commitment and be willing to make the effort. Otherwise you make the conscious decision just to be mediocre and not state of the art."

So does Baumgartner believe that this route will have financial benefits for the airline to match the comfort benefits to the passenger? "Of course. Customer choice will be driven by value for money, and these aircraft [the B787 and the A380, also being revealed] really do provide great value for money. They will shift our percentage of market share.

"We have not spent unlimited money. We had a capital investment budget, a seat count target and a weight target. It's a profit calculation. We believe these aircraft will be very popular. We won't charge more for a ticket, but we truly believe that we will have better yields with these aircraft because of demand and supply. These aircraft will be very popular, and when an aircraft is very popular there is high demand, and if there is high demand, that yields benefit."



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here is wasted space in the cabin – space that every passenger brings onboard. It is the space of the mind. Considering the psychology of design can help us improve the long-haul economy travel experience, address negative perceptions of air travel, and reduce stress factors that plague passengers and lead to the chronic disruptive behavior that IATA characterizes as the "unruly passenger crisis". Before we can work on the cabin space, we must understand that mind space.

Dr Toby Israel, of Princeton, New Jersey, a noted expert with over 25 years of experience in design, psychology, the arts and education, is a pioneer in the field of design psychology, author of *Some Place Like Home: Design Psychology to Create Ideal Environments*, and maintains a design psychology consultancy dedicated to creating healing spaces. She believes the stress that passengers carry throughout the journey runs deep.

"I think something else is going on in the journey, either above or below the consciousness," she says. "A great anxiety about flying and safety is at play. There's a great sense of lack of control, a sense of stress caused by uncertainty about how the whole journey will work out."

Previous negative flying experiences, she tells us, can become fixed in passengers' subconscious. "It's also about the stories that people carry with them and relate to what is going on in the news," Israel adds. "The more they hear about planes crashing and terrorism, what becomes important is not so much configuration of the space as building in a positive experience that helps ease anxiety."

Anxiety can also stem from other personal experiences of air travel, and from reporting on the discomforts of air travel. This can lead passengers to anticipate discomfort and inconvenience. This experiential bias can predispose passengers toward dissatisfaction, aggravated by the irritations they encounter.

Dr Don Norman, author of the *Design of Everyday Things*, co-founder of the Nielsen Norman Group and director of the Design Laboratory at the University of

"One of the most frustrating parts of the journey is lack of control. It can be incredibly stressful"

California, San Diego, agrees with Israel that passenger anxiety can have invisible origins. He believes we may make some of the stresses of air travel worse with certain industry standard procedures.

The practice of updating passengers on the status of the flight, for example, which might be viewed as a passenger touchpoint, an opportunity to reassure passengers, can have the opposite effect. "I would like to see some studies on announcements," he says. "When I fly internationally I hear the same announcement in various languages." The problem, he suggests, is that the announcement can be difficult to hear, even confusing, or simply too loud, shocking and disturbing passengers from whatever restful state they've achieved.

Neuroscientist Joe Leech, author of *Psychology for Designers*, who specializes in improving user interfaces, and has helped brands including Disney, Marriott, TUI Travel and Virgin to improve the methodology with which they interact with customers, agrees with Norman on cabin announcements. He suggests that, along with other common cabin practices, they can be replaced by a more positive, empowering exchange of information.

"One of the most frustrating parts of the journey is lack of control," he states. "It can be incredibly stressful." He suggests that airlines capitalize on the IFE system to create an empowering space, with flight information only a touch away.

"A simple level of information, such as when the meal service is going to begin, helps people know what's going on and can be available through the screen," he suggests.







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"It can let you know if the bathroom is engaged, or if there's a big queue. It can update passengers on cabin service, letting them know exactly what's happening."

Norman warns that the industry must strive to improve the user experience on IFE, and Leech agrees. A failure to keep up with technology, they say, and a bad user experience (UX) design in IFE, can cause stress.

The cabin environment as a whole, with all its sensory stimuli, both Israel and Norman suggest, should be considered for its impact on passengers' mood and overall sense of well being. As Israel says, "Elements such as light, color, sound, aroma and texture" all elicit an emotional response, and each to a degree influences memory and perception of the product. Because this perception travels with passengers, it can cross from one carrier to another, meaning airlines must not only contend with the effect of their own products on passengers, but also the larger impact of cumulative flying experience. Passenger anxiety and stress are factors that the industry should consider.

Israel suggests creating people-friendly spaces, with a design approach that considers the long-term effects on the psychological and physical state of passengers.

Norman believes that designing for the sake of design, or holding fast to established practices when developing onboard products and services, without taking the time to study the interaction of passengers with the cabin space, hampers the ability to design people-friendly cabins.

"Don't rush to the solution," he warns. Observe first. Fly the flights. Study the passengers and talk to them. Try to empathize." Passenger surveys, he tells us, are inadequate because they rely on a conscious response to set questions. He recommends "experiential and concrete" analysis of the space. "Many people don't comment about



"We must design for people the way they are. Logic is an invention"

things they assume are necessary elements of the space," he says. "If I ask somebody to describe everything in an environment, they won't include the ceiling or the floor because they assume they must be there, as they are."

To Norman, the best solution is a "practice of humancentered design through extensive observation". As he puts it, "to understand human behavior, we must study people". He recognizes the constraints on aviation. "Trying to maximize the space is understandable," he says, "but we try to deal with people in a very logical way. We must design for people the way they are. Logic is an invention. It does not describe what people do."

These and other experts we spoke to about the psychology of design emphasize that selective improvements, without considering the whole of the experience, and a sweeping brush of quick fixes, are insufficient to address these psychological factors.

Though there were many suggestions for improvement, the greatest emphasis was on giving passengers ownership of their limited space and allowing them to tailor the on-board experience to suit their tastes and priorities. As Israel says, "Deliver experiences that they can create, so that passengers feel they have control."

IN FOCUS: IFE

In-flight entertainment can be the ultimate escape and can soothe stressed passengers, our experts suggest.

"The IFE is the flight for them," Leech says. "They're spending more time engaging with that screen than with any other part of the experience." He identifies certain key stress points, "If the system has bad usability, for example touchscreens with touch targets that are tiny and hard to hit. The menu can be frustrating for people to navigate. Passengers often have to go through six pages of content to find what they want. The menu design may make theoretical sense, but it's not always easy to use the unit."



DESIGNER INSIGHT: PAUL PRIESTMAN

Paul Priestman, designer and co-founding director at Priestmangoode, gives his views.

On Boarding and Deplaning: "Boarding is stressful, with passengers stopping to put luggage above their heads and people putting bags on their seats. The boarding process can be designed to eliminate those stress points. When you board an aeroplane, it's like you go through the back door of a hotel. In many bar designs, we've created welcome areas against the wall or something to make a more welcoming space that is used for other things in flight. These are areas which are stress points for crew as well. They can be designed to be seamless and pleasant."

On Crew: "People often remember the people that serve them, so a high level of service is an important requirement. It's important to make the job that crew do as seamless as possible. We do everything we can to make it an easier job, so that they can focus on passengers."

"Enabling passengers to unhook from the difficult moments can be wonderful"

Leech suggests that we "simplify everything so that it takes fewer clicks for passengers to get to what they want" and that the size of text and buttons is increased.

He proposes that content that generates "familiarity and nostalgia, a feeling of being at home" can also be a tonic to soothe frayed nerves. This can include programs or games that hark back to childhood. Perhaps a channel of classic shows and films, even video games, that help passengers travel back in time and find escape in happy memories of simpler times and "effectively forget about the world around them".

Leech also believes the IFE interface should enable passengers to help themselves during the flight, and could serve as a welcome source of revenue for airlines, with well-planned in-flight shopping. He suggests that airlines are missing a trick by not considering what passengers will most want to buy during the journey: solutions. "Selling passengers things that are useful for them while they are on the flight would be good: a better inflatable pillow, eye masks, batteries, amenity kits, etc."

Israel believes that the negative experience of air travel can be converted into a positive and enriching one through therapeutic entertainment. "Airlines can create an oasis



for passengers to escape to, a place they can imagine themselves into," she says. "It could be an audio visual channel that gives passengers a number of options. In my healing spaces practice I've experimented with a technique involving a moving painting, collaborating with the artist who produced the work. It's an animated

painting, in which images appear before you. Using these visuals and sounds has been effective in reducing stress in certain work I've done with the military, helping soldiers who suffer from post-traumatic stress disorder. It could be similarly applied to an oasis IFE channel by an airline, providing soothing sounds, visuals and guided meditation. Enabling passengers to unhook from all the difficult moments can be a wonderful experience."

IN FOCUS: MEALS,

BEVERAGES AND CABIN SERVICES Israel suggests that there is some value in the theory of comfort food. The industry has put a great deal of work into analyzing the effects of elevation on the palate, and improving recipes so that inflight meals taste better, but Israel is convinced that aroma and presentation are of critical importance.

"Emotion is closely tied to aroma, as is memory," she says. "If you make the food look good and smell wonderful that can be very pleasing. Which foods are particularly comforting may vary by passenger demographic, but the idea of being nurtured in some way is positive."



DESIGNER INSIGHT: JOHN TIGHE

John Tighe, design director at JPA Design, shares his thoughts on psychological aspects of the passenger journey.

On boarding: "For some passengers, the initial stages of flights are about absorbing the cabin environment, and the space in which they will spend the coming hours. This is an important opportunity for the airline to portray its brand values in an impactful way."

On IFE: "Passenger approval ratings for IFE can go up if the design of the seat and surrounding environment improve, despite there being no change in the IFE content! This is the 'halo effect', a psychological tendency for happier people to rate everything better, even if some elements haven't altered."

On sleep: "For many, trying to sleep in a tube with hundreds of other people is about protection and feeling that you have sufficient personal space. Hooded arrangements at the top of the seat, the ears and wings of headrests can help that... but for other

passengers that wouldn't be desirable, so it needs to be optional."

Creative solutions: "People now have wearable devices which provide them information on their health. JPA is working on understanding how airlines can apply that kind of data to evaluate the physical effects of the journey and improve the experience. It's one area where the industry is just scratching the surface of the opportunities."

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Norman believes that the process and timing of cabin services can be a stressor. He points to the nuisance caused by "difficulty going up and down the aisles", when meals are served. Passengers, he tells us, are "not responsible for carts blocking the aisles", but they must contend with them. He suggests that the industry study the process of meal service to lessen this nuisance factor.

Israel suggests cabin crew can have the most positive psychological impact on passengers. "My grandfather used to say that the most important furniture in any room is the people," she recalls. "You can tweak the airline seat, change the menu, but what's really crucial is how the cabin crew and flight crew connect with you – how they address fear, anxiety or stress."

IN FOCUS: COLOR THEORY AND VISUAL STIMULI

Dr Zena O'Connor, senior lecturer, research associate and member of the Faculty of Architecture, Design and Planning in the Architectural Design and Science Department of the University of Sydney, cautions that "there is no evidence that humans are 'hard wired' in terms of environmental color and particular judgmental and/or emotional states."

"Notions regarding harmonious color combinations are now considered overly simplistic and out-dated," she says. "Color preference varies considerably according to variations in personal subjectivity, individual differences such as age and gender, cultural influence as well as context and temporal factors."

However, color plays a role in improving the cabin experience, she says, with a positive psychological impact on passengers.



"A diverse array of colors in an interior can add a sense of visual variety, thereby helping to relieve the boredom of long-haul flights. However, the existence of a strong level of visual variety can become problematic due to the mechanics of human visual perception.

"Color schemes and patterns that feature more simplicity and less variety may contribute to a sense of calm because the eye is not constantly being drawn to variations in color contrast," O'Connor says. "However, a simple color scheme needs to be effective in terms of using color as a wayfinding device, so a balance between variety and simplicity is ideal. To use color as a wayfinding device, it is advisable to use a range of colors that contrast in terms of hue as well as light-dark," she states. "The light-dark component of contrast is important when aircraft cabins use nighttime ambient lighting."

Israel comments that the psychological impact of design stimuli can have a marked physical effect on passengers. "People feel cooler in cool toned rooms and warmer in warm toned rooms, even though the temperature is the same. Noise can affect heart rate and it can also lower blood pressure." She suggests that having appropriate mood-setting music during boarding can put passengers in the right frame of mind for the trip.

However, O'Connor believes, "People differ in their sensitivity to environmental factors. High screeners can reduce the influence of environmental stimuli on their mood, behavior, arousal level, etc, and effectively screen out environmental stimuli. Low screeners are less able to screen out environmental stimuli and more likely to respond."



DESIGNER INSIGHT: ADAM WHITE

Adam White, director at Factorydesign, shares his thoughts.

On personalization: "When you are in economy, you lose your sense of identity and become one of 300 people. The biggest impact on people's comfort is them being aware that, in some way, there's attention paid to them as a person. If you take the recent campaign KLM did on the headrests of the seats with messages left from family and close friends, the product was the same but the point of difference was that everyone had a little message. That was all it took for people to feel special." On the emotional experience: "Psychologically, there are a lot of big moments which make the heart sink. One is when you enter the economy cabin and you see rows of identical seats and a big, exposed environment. Some airlines have done good work to divide a space up by breaking up colors, and zoning with colors and different material choices. It's one thing that helps to make an environment less hostile. Improving the process of actually getting to your seat, any additional clarity for passengers so they are not walking down the



row looking right and left is helpful. It can take stress away from the process."

On cleanliness: "You have basic sensitivities and reactions to an environment based on cleanliness and tidiness. If you are onboard an older aircraft, you look at the tatty seat covers and tatty aircraft and have a very uncomfortable experience. Because it is a public service vehicle, the environment comes under intense scrutiny. There's a sense of well-being from tidy seatback." THE ORIGINAL HIGH PERFORMANCE COMPOSITION LEATHER Anything else is a compromise

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LEARRNING COURCE ETHAD AIRWAYS WORKED WITH BOEING TO DEVELOP BOLD AND DECIDEDLY NON-CATALOG INTERIORS FOR ITS DREAMLINERS. THIS LANDMARK PROJECT EVEN HAS BENEFITS FOR OTHER CUSTOMERS

Words by Adam Gavine

ccording to its CEO, James Hogan, UAE carrier Etihad Airways has become the fastest-growing carrier in commercial aviation history for one main reason: "Rewriting the rulebook."

The airline has applied the same bold philosophy with the interiors of its B787s, pushing the airframer beyond its intent to offer the model as a catalog aircraft. As CCO Peter Baumgartner recalls, "We looked at the catalog and said, 'Goodness me, this is not what we want."

His message to Boeing was, "We don't accept your catalog, you have to move away from that idea of us just picking from it. You can imagine, that was not easy."

Etihad had a little leverage, with 71 Dreamliners on order (41 B787-9s and 30 -10s). A little further convincing came when the airline showed Boeing some proposals for its A380 interiors and suggested a little flexibility in the catalog approach was required to make the B787s of a comparable standard, as well as a great advert for the Dreamliner. A five-year research, design and implementation project followed, conducted by the airline and the Etihad Design Consortium (EDC), comprising Honour Branding, Acumen Design Associates and Factorydesign. The result of this work you see on these pages and in the A380, with the lighting, trim and finish inspired by contemporary modern Arabian design and the colors of the desert, complementing the new 'Facets of Abu Dhabi' design identity.

From the moment first class passengers enter Door 1, the level of innovation in this aircraft is clear. Clearly the level of 'wow' factor achieved in the A380 entrance areas isn't possible within the smaller Door 1 area of the B787, but by altering the layout of the galley monuments to create a cross aisle at the front of the first class cabin, starboard guests don't have to walk through the galley area to access their aisle. By the simple act of turning right, directly into the first class cabin, the appropriate tone is set for the journey.






PREMIUM CEILING

Perhaps the most significant example of Etihad pushing the design envelope is the ceiling in first class. To create a luxurious and spacious environment, Etihad did not want any overhead bins. Some airlines have opted not to have central bins, but not having outboard bins was not a Boeing option – at the time.

Following a week-long workshop in Seattle with Boeing, Teague and other stakeholders, a feature known as the Premium Ceiling was created – a clean and elegant design that makes the cabin feel extra spacious. Boeing was prepared to undertake the project on the agreement that it was subsequently offerable to future customers.

Michael Crump, a partner at Honour Branding, explains the reason for the project: "Etihad wanted to achieve brand synergy across its fleet. It has a feature ceiling in the A380 first class and wanted to maintain that point of difference." BY SLIDING ACROSS THE CENTRAL DIVIDER, THE CENTER SUITES CAN BECOME A PRIVATE SPACE FOR TWO Of course stowage space is lost, but with only eight seats, and room under the ottomans to stow carry-on bags, stowage is not a problem. If more space is required, there are also large stowages at the front of the cabin.

Boeing managed to incorporate all the existing ventilation systems into the new ceiling, but there were a few challenges with the lighting systems. One problem was that part of the system is designed to shine light across the cabin, which is distributed further by bouncing off the bins. Without those bins, shadows were created, so extra care had to be taken in adjusting the scenarios for the decorative sconce lighting to make sure that shadows did not appear where they are not wanted.

FIRST SUITES

A further challenge was how to make the eight First Suites on the B787 a comparable premium experience to those on the much larger A380. The suites may be smaller, but they are truly luxurious; indeed this is the most luxurious experience to be found on a B787. The team achieved a 26in-wide seat and an 80.5in rectangular bed by devising a forward/aft-facing LOPA, which maximizes the width of the suites at the shoulder area where the space is really appreciated, while the foot end tapers.

This configuration was fundamental not only to achieving efficient and luxurious accommodation, but also to the suites' integration with the B787 itself, as Richard Nicholas, senior designer at Acumen, explains: "Because the B787 is a catalog aircraft, there are certain elements like the shape of the lavatories in the front that we couldn't adjust. So in order to get the aisle width and the clearances, the flaring and tapering of the suite had to happen in order to physically fit the suites in the aircraft and make them legal."



ECONOMY SMARTS

Even the 199 economy seats are customized, based on the Weber 5751 model from Zodiac Seats US. Passengers in these Economy Smart Seats get a 31-33in pitch, 6in recline, adjustable lumbar support, 11.1in IFE display, and a distinctive 'fixed wing' headrest upholstered in camel leather. The seat is the same as that found on the A380, but configured 3-3-3 rather than 3-4-3, and with a seat width of 17.2in rather than 18.95in to fit the narrower fuselage.

For long-haul flights, Etihad has designed a pillow which, with a simple tug, converts from a standard pillow into a neck pillow. A cotton drawstring amenity kit is also provided, which includes a reversible eye-mask with 'Do not disturb' and 'Wake me for meals' printed on each side. Everyone is also given a blanket bag that doubles up as a 'cabin tidy bag', or a shoe bag.

067

"No existing seat mechanism was suitable for the first class seat design"

A further challenge came from the nature of the Dreamliner itself, as its flex requirements had to be taken into account for the outboard suite dividers. The EDC had to satisfy Boeing that the suites were a realistic proposition, as Nigel Lawson, a director at Acumen recalls: "For the installation process, we had to go through the Boeing failure mode analysis process and prove that the seats could be installed in a certain time requirement. So we made mock-ups at Boeing's facility in Seattle and proved the seats could be installed within the time requirements."

AHEAD WITH THE CURVE

That flaring and tapering, combined with the 56in-high suite walls, gives a distinctive curved shape to the aisle. Of course, Boeing had to conduct a study of the design to ensure there were no issues with crew sightlines and emergency egress down the aisle. A slight straightening of the curve was required from the initial proposal, but the design was soon approved.

As Crump recalls, "The initial curve was more substantial as we were trying to maximize the seat width and shoulder room, but the initial curve was too significant from a certification and safety perspective, so we eventually compromised."

The curve wouldn't work so well with a trolley service, but with Etihad's restaurant-style tray service it works perfectly.

TAILOR-MADE

The seat itself is bespoke, created by Acumen in collaboration with B/E Aerospace. With the seat pushed far back against the rear wall of the suite to maximize space, no existing seat mechanism was suitable for this design, so it really is all-new. The forward/aft configuration meant that a lot of ergonomic work went into getting the seat angles right so the seat is comfortable for passengers during take-off in either direction, and for a very broad percentile range of passenger heights and widths, with particular care taken to ensure that

SETTING THE MOOD

As well as the lighting issues with the Premium Ceiling, the EDC worked hard on creating the right lighting scenarios. Factorydesign's Tanner explains, "We did a lot of work on human aspects. For example, the standard Boeing scenarios tend to fill the cabin with a lot of blue light, and our research suggests that blue light inhibits sleep. Thus we stripped blue light from all the scenarios except the waking scenario, so passengers feel refreshed when they leave the aircraft. "We did a lot of work on lighting to simulate walking into a hotel. The eating scenario is set up to feel like in a restaurant in the daytime for lunch, and like an intimate restaurant for dinner, while still providing enough light to work by. The cruise setting is light enough to read a book by, but not so bright that you can't sleep. It takes a lot of harshness out of scenarios that airlines often use, as well as putting branding into lighting scenarios. For example, on take-off in the B787, a lot of gold light is pushed into the cabin, to push the Etihad brand."

Sadly the system that creates the 'Lights of Abu Dhabi' effect found on the A380 couldn't be fitted to the B787.

shorter passengers don't have pressure on the backs of their knees and that their feet touch the floor.

Nicholas explains the solution: "There's a neat feature on the seat pan that enables you to extend the front edge 4in further forward to make it more comfortable. This is done through a series of bladders in the Lantal pneumatic seat cushion system, plus a mechanical extension."

With Poltrona Frau leather upholstery in three different color schemes echoing those on the A380, an in-seat massage function, an Icebridge in-seat drinks chiller and a 24in IFE display, Etihad's first suites are a truly luxurious experience. Even better, guests traveling together in the center suites can slide the divider forward to share the experience.

BUSINESS BOTH WAYS

The 28-seat business class cabin is a very similar proposition to that on the A380, with bespoke seats in a forward/aft 1-2-1 configuration. This product boasts 20% more space than the airline's outgoing Solstys-based business class product, and offers a 22in-wide seat and separate ottoman with space for a carry-on underneath, which together create a fully-flat bed of up to 80.5in long (forward facing) and 75.7in (aft facing).

Comfort is assured with Poltrona Frau leather, Lantal's pneumatic cushion system for adjustable seat firmness, an in-seat massage function and an 18in IFE display. Again, a stowable screen between the center seats in this 1-2-1 configuration makes them ideal for passengers traveling together.

A different result in the tender process meant that the B787 seats were developed with Zodiac Aerospace rather

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than Stelia Aerospace (the new name for EADS Sogerma), which manufactures the A380 equivalents. They may be manufactured by different companies, but passengers won't be able to tell the difference between the seats – the dimensions of everything from seat width to the tray table are identical – but given the differences beneath the surface, this took a little work.

As Nicholas explains, "Under the surface, things are different as the manufacturers use different processes and mechanisms. We worked hard to make them look the same, even though what's going on underneath is different."

GALLEYS

An element where Etihad had to stick to the catalog was the galley areas. However, the company did work with Jamco on some customization to create some visual similarity with the A380 units.

As James Tanner, an associate at Factorydesign, explains, "At the Door 2 entrance for business and economy passengers, the galley equipment is concealed by screens and blinds with Arabic fretwork detail like on the A380. We tried to keep in line with A380 as much as possible while being limited to the catalog." The trolleys are clad in wood-finish veneers to complement the galley finishes.



ABOVE: BUSINESS CLASS IS SO GOOD, IT'S AMAZING THAT THERE IS ANOTHER LEVEL OF LUXURY ON BOARD A DREAMLINER BELOW RIGHT: FIRST CLASS GUESTS ARE GREETED WITH A TRAY BEARING A WELCOME LETTER, DRINK, DATES AND A HOT TOWEL

SOFT FOCUS

Etihad has also introduced new inflight products and enhancements to its long-haul cabins, across all classes. Inspired by luxury hotels, the first class service includes a personalized welcome letter from the cabin service manager. Once seated, guests are served with an elegant silver tray bearing a welcome drink, fragrant hot towel and Arabic dates. The tray fits on the armrest so the tray table does not need to be deployed. First class diners also enjoy a new gourmet menu served on Japanese fine bone china, accompanied by wines served in stemmed crystal glasses.

At bedtime, the turndown service includes all-natural bed linen, pillow mist, pulse point oil, and a 'Sweet Dreams' card.

In business, the contemporary dining ware includes a stylized steel bread basket and a hammered metal side dish, inspired by the airline's Facets of Abu Dhabi branding.

A new business class turndown service is offered on ultra-longhaul flights, featuring a mattress, comforter, full-size pillow, loungewear and slippers. As with the A380 galleys, prayer areas by the exit doors are available for Muslim guests, which can be curtained off for privacy and are equipped with an electronic Qibla-finder showing the direction of Mecca. A clever feature that doesn't cost the airline anything in terms of space, and little in terms of money.

CUSTOM CONVENIENCES

While Etihad acquiesced with the galleys, it was unimpressed with the catalog lavatory options, so the EDC again worked closely with Jamco, this time to achieve a high level of customization in the lavatories to ensure passengers enjoy the luxury brand experience throughout the aircraft. In the first class facilities everything above the bench is customized, including a mirrored cabinet in which lighting features and fretwork details have been incorporated, as well as customized faucets.

As Adam White, director of Factorydesign, says, "Along with the ceiling, I think this is the most significant change Boeing allowed us to make. Significant changes were made to the catalog offering and Boeing had to work extremely hard with its suppliers to push the envelope significantly further than had been intended when we sat down on day one. Etihad was a very strong partner in achieving those changes."

Etihad's Dreamliner is a remarkable project, which reflects the increasing needs and demands of airlines seeking to differentiate their product in a competitive market. We agree with Peter Baumgartner, who says that Boeing's flexibility and support should be "appreciated and applauded". Indeed Etihad has not just achieved a landmark Dreamliner design, it has also set a precedent for flexibility in the catalog approach that will benefit future customers.



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SERVING AS ENTRANCEWAYS, KITCHENS AND SOCIAL AREAS, GALLEYS ARE AT THE HEART OF THE AIRCRAFT EXPERIENCE. HOWEVER, A RETHINK OF GALLEY DESIGN COULD SEE THE SPACES BECOME MORE APPEALING TO PASSENGERS – AND WORK MORE INTENSIVELY THROUGHOUT A FLIGHT

Words by Adam Gavine

t has been said so often that it has almost become an industry cliché, but it is true: entering an aircraft through the galley is often akin to entering a hotel via the kitchens. Ray Liotta made this look cool in *Goodfellas* as he walked his date through the kitchens of the Copacabana, but for passengers it can be rather less glamorous. In most wide-body aircraft, locating a galley at the Door 2 entrance is a necessity, but that doesn't mean it has to feel like walking through a kitchen. Some rethinking of the next generation of aircraft galleys could see them become less industriallooking, more inviting, more homely, and more in keeping with the fantastic cabins that surround them and the airline brands that fly them.

NICE PRESENTATION

Let's start conservatively with trim and finish ideas. While modern galleys function brilliantly, enabling ever-fancier dining options, some do have a rather cold, hard, industrial look. Progress has been made in making galley inserts look more like domestic appliances – B/E's Essence range and Zodiac's Symphony range are good examples – but further refinements could be made to the trim and finish of galley units.

That's not to say that galley design hasn't been a focus – several airlines have incorporated self-service food areas or informal bars into galleys to make the areas more welcoming. Indeed Etihad has shown the world what can be done with current galley equipment in its A380s, with rich wood panels and ornate screens concealing functional elements. Even entering the economy deck on that A380 comes close to that often sought-after 'boutique hotel' feel.

Adrian Berry, a director at London-based Factorydesign, who worked on the Etihad A380 galley areas project, gives his view on galley trim and finish. "Galley construction methods, material selection and aircraft integration completely drive the way galleys look.

RIGHT: HONOUR BRANDING'S VISION OF THE GALLEY AS A CULINARY PERFORMANCE SPACE



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Manufacturers are stuck in a bit of a time warp, with the galleys of a Lockheed Constellation looking distinctly similar to the 'modern' galleys on the latest commercial jets – yet with more style.

"Some things, such as edging extrusions, come from standard catalogs that have been used for years and years. While the rest of the aircraft has really moved forward in terms of seating, lighting and décor, the poor old galley, a vital part of the aircraft, remains stuck in a world of square corners and metal finishes – it's the Cinderella of the aircraft world," he adds.

Berry's solution? "My experience has shown me that introducing curves and soft corners can set the cat among the pigeons, but that with a bit of push and clever thinking these shapes can be achieved. Attention to different construction techniques and a move away from panel-topanel build would free-up design opportunities. Of course we need to get all the equipment in, but it can be housed in RIGHT: FACTORYDESIGN'S VISION OF THE GALLEY AS PART OF THE AIRCRAFT WELCOME SPACE BELOW: THE GALLEY'S INTEGRATION WITH THE AIRCRAFT RECONSIDERED BY FACTORYDESIGN AS AN ADAPTABLE SPACE



something that is not a glorified box."

Daniel Baron, managing director of Tokyo-based Lift Strategic Design, is another critic of current galleys. "In terms of aesthetics, for the most part galley design is still driven by traditional notions of 'available real estate' and function, and is too often done independent of seating. As a result, cabin crew still find themselves working in cold, gray, uninspiring environments."

SUPPLIER PERSPECTIVE: BUCHER

Beat Burlet, CEO of Bucher Leichtbau AG says of the future of galleys: "We believe that modularity, space and weight will become even more important in the near-term."

With regard to modularity, he explains, "Aircraft leasing companies in particular have a need for galley designs which can serve various airlines and their needs. Providing modularity within the galley - for example, to accommodate different types of inserts and carts - will allow for quicker and cheaper conversion of the aircraft cabin."

And space? "To increase the number of pax on existing aircraft types, the space taken up by galleys will have to decrease. Smart combinations with galleys and other monuments will be necessary."

Naturally, fuel costs will continue to be a major expense for airlines. Burlet suggests, "Lightweight solutions are and will remain key to reduce operating costs. Using a smart combinations of light metals and composites can further reduce weight."



Baron's solution? "Because bean counters are likely to axe design elements deemed unnecessary to do the job, airframers and vendors must drive innovation. Examples include new locations for accent lighting as a standard item, space for blinds during boarding, and standard pelmet extensions for displays along aisle-facing walls."

From an airline perspective, we asked Cristian Sutter, a cabin design specialist with experience at Thomson Airways, British Airways and Jet Aviation Basel, who views galleys as "primarily Spartan and functional spaces meeting endless lists of requirements".

He says, "When it comes to cabin design, the ubiquitous galley seems to play the role of the poor forgotten relative. Control panels, latches, stowage compartments, work surfaces, etc are engineered for functionality without further ergonomic or aesthetic considerations. Their design feels stuck in time a few generations behind the rest of the cabin and, despite new technology developments in galley inserts, a latest generation galley installed in a modern jetliner does not feel worlds apart from one fitted in a 1975 Lockheed Tristar. The introduction of new materials, inserts standards, food preparation technology and connectivity will lead the way for the next generation of galleys."

As well as being closet classic Lockheed fans, the cabin designers we spoke to all seem to agree that galley styling should be softer and less stark. Something else they have in common is a view that galleys, as well as having a more elegant appearance, can offer a lot more to the passenger experience.

FLEXIBLE SPACES

In Sutter's view, a trend toward integrating galleys as part of the cabin design effort is gaining traction, giving them a role as "architectural features" at the reception and boarding areas. He suggests turning them into multipleuse spaces such as bars, social areas and duty-free displays. "After all, the humble galley is, most of the time, the first point of contact when passengers step into the cabin, and their role in supporting the cabin 'wow factor' is paramount."

Philip Bailey at Honour Branding, which also worked on the Etihad project, believes that galleys will increasingly become a point of differentiation for airlines, especially as focus groups have shown that customers desire onboard destinations where they can stretch and socialize.

"With space at a premium, airlines continue to find it commercially difficult to justify additional spaces for economy customers, unlike the premium cabin lounge and bar areas. Thus economy galleys need to be designed to fulfill operational needs for the food service, and also act as a space that customers can feel comfortable to migrate to at certain times of the flight," he says.

In the wider world, Bailey has noticed that in many modern restaurants, the kitchen is an integral part of the dining experience rather than being hidden away, with the chef and kitchen staff adding to a sense of flair and occasion – surely two attributes that any airline would love to increase.

"With a more innovative approach to the food delivery, perhaps the galleys could be designed to be more open in design, either through windows or folding panels that are removed at certain times during the flight," he suggests. "With customers demanding more personalization and choice, perhaps customers will be able to visit the kitchen for a snack and perch on a foldout seat, or watch their food being cooked and assembled by the chef in front of them?"

The notion of the galley adding a little theater to a flight is also a dream of Juliane Trummer, strategy director at the Mormedi design consultancy in Madrid. Noting that she views galleys as providing a rather cold welcome for boarding passengers, akin to entering a laboratory, she says that this raises the question

SUPPLIER PERSPECTIVE: ZODIAC

Sonja Naumann, marketing manager at Zodiac Premium Galleys explains the company's view of the future: "Airline customer expectations and stringent industry requirements continually set new challenges for suppliers. Emerging trends include eco efficiency and meal preparation, social and lounge areas with full or self-service bar units, and especially for standardized and precertified galleys and galley inserts. Airlines are searching for more space in the galley while simultaneously requesting additional seats, calling for new ideas and innovations to make these goals a reality. Zodiac Aerospace is meeting these challenges by developing integrated solutions between seating products and galleys, adding innovative cart lift systems and other solutions to add more galley capacity while freeing up space for additional revenue-generating seats."

of whether something more could be done with the 'hearth' of the plane.

"Along with gourmet chefs and menus, the kitchen could be positioned as a space that evokes mouthwatering anticipation and that strengthens brand engagement. In the low-cost realm, galleys could advertise and showcase per-purchase products such as a 'fresh choice of the day' and special tax-free offers."

Berry adds that manufacturers of galleys and aircraft need to look at ways of creating more flexible integration and construction to enable galleys to achieve their potential. "Galleys should be considered as part

SUPPLIER PERSPECTIVE: DIEHL

A clean idea for the future is the Magic and Dacapo concept by Diehl Aerospace, which would see galleys operate using an autonomous power supply. At the core of the system is Power Cell, a standalone energy supply that is built into standard trolleys and brings alternative energy into the cabin during aircraft turnaround times at the gate. Propylene glycol water mixture (PGW) is already approved as a coolant for aviation purposes, and in close cooperation with the Mainz Fraunhofer Institute ICT-IMM, Diehl Aerospace created the first functioning PGW reformer, which increases the ecological compatibility of aircraft and brings green energy to the cabin.

The Dacapo concept was developed on the basis of this energy supply, and it is intended to allow users to completely decouple the energy required in the cabin from that needed for the aircraft. Dacapo also opens up the possibility of also supplying older machines with current technology. In the longer term, it will be possible to cover all the electrical energy consumers (cabin light, IFE, galley, etc) in the cabin by interconnecting several trolleys.



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SUPPLIER PERSPECTIVE: AIM ALTITUDE

We asked Richard Bower, group commercial director at AIM Altitude, for his view on aspects of future galleys.

With regard to look and feel, he comments: "Increasingly, galleys will become used as a platform for airlines to differentiate themselves at the point of boarding. This will lead to greater integration of the galley and bar complexes at Door 2. Galleys in customer-facing areas are likely to become more aesthetic statement pieces. While the fore and aft galleys will potentially retain the 'working galley' feel, aft galley complexes have begun to be integrated with lavatories to save space, and this trend is expected to continue."

In terms of positioning within the aircraft, Bower predicts: "It is possible that galley systems could be developed with variable positions to accommodate changes in cabin configuration, giving more route flexibility to an airline's fleet."

of the overall atmosphere and make up of the cabin. Areas designed to adapt to different periods within the flight, to create great welcome spaces – not kitchen entrances – and to enhance the flying experience for passengers as well as crew. Something they rarely do currently."

This idea of galleys being flexible spaces could be key. Galleys – particularly on long-haul flights – are used intensively during meal service, but in quieter periods they do little other than offer a walk-up drink and snack bar. When the main meal service is complete, Bailey would love to see the galley units moved aside in a similar way to moveable library storage/shelving units, and the space opened up to give passengers a destination. Even better, this new space could be monetized.

"In our radical concept, the internal galley inserts traverse inwards to use the space in the galley, allowing fold-out beds to be deployed at the rear that could be sold to economy passengers to catch five or six hours of sleep, depending on the flight route," says Bailey. "Ultimately galleys could work harder to enhance the customer experience on board, creating more experiential spaces for customers or opening up new revenue opportunities for airlines."



BELOW DECKS

We've had the open kitchen concept, but taking the idea of a more traditional restaurant could provide inspiration – and indeed remove the problem of entering through the kitchen altogether.

Tim Manson, design director at JPA Design in London, suggests, "It may be that flying in the future would be improved if the galleys were not on the main flight deck at all. Put them in the hold perhaps, but not in the passenger cabins. No building, house, office or hotel would accept a kitchen as main entrance or reception area, and there would much to gain if the galley location and design could be improved."

THE FUTURE

In terms of technology, our experts have some bold ideas. Manson has embraced the notion of the connected aircraft and applied it to the galley space. "A better marriage of styling and functional requirements would improve passenger experiences, but we believe that future galleys must get connected if they are to create smarter service and operational solutions. We can imagine that galleys, carts, crew, passengers and ground services alike will all be digitally linked, all talking to one another, collating data, streaming information, providing airlines with rich information to analyze and discover new creative ways to be efficient and add value.

"It is not inconceivable that galleys will become fully autonomous"

JPA DESIGN'S TIM MANSON (ABOVE) BELIEVES THAT FUTURE GALLEYS MUST BECOME CONNECTED, AS HIS ILLUSTRATION BELOW SHOWS



"Taking it a step further, it's not inconceivable that galleys will become fully autonomous, pre-empting operational needs, pre-ordering a passenger's favorite foods, optimizing electrical loads and managing their own repairs, even automatically ordering parts for their own servicing."

Jean-Pierre Alfano of Airjet Designs in Toulouse has also considered the future of galleys, and he has an idea that would delight many short-haul low-cost carriers: replacing galleys with vending machines. The machines would use NFC technology for payment and would be located over the wing area in narrow-body aircraft for reasons related to minimizing passenger traffic and weight balance.

How would this work in practice? "Passengers would stay in their seats and order from their seat through the cabin wi-fi network and dedicated airline app. The

"Investments in comfort could be negated by banging and clanging in the galley"

vending machine could also possibly be coupled with an automated trolley robot or a flying drone that would take and deliver the food and beverages," explains Alfano. BELOW: AIM ALTITUDE VIEWS GALLEYS AS A PLATFORM FOR AIRLINES TO DIFFERENTIATE THEMSELVES AT BOARDING

KEEP IT DOWN

All this technology sounds exciting, but in the near-term, something rather simpler could enhance the galley experience – and indeed that of the entire aircraft. For Daniel Baron, the future of galleys is hush-hush. He means this quite literally, due to modern aircraft such as the Boeing 787 and Airbus A350 providing a quieter cabin experience – apart from in the galley areas, where the sounds of crew working and talking is now more pronounced.

"We already we have a situation on next-generation aircraft in which customers seated near galleys can hear everything going on inside them. Imagine paying for an executive suite at a five-star hotel, with only a curtain between your bed and the hotel's kitchen. If an airline's premium customer has paid US\$8,000 for the promise of sleep on a full-flat bed (a seat which costs the airline



US\$50-70,000 per pax), the notion that sleep might be interrupted by galley noise is ludicrous."

His solutions are simple: quiet latches that do not smack metal against metal when closing, better ways to dampen noise when carts and containers are handled, and more use of noise-absorbing materials.

"Some solutions are already on the market, but they are not used because manufacturers are unwilling or unable to go outside their usual supply chain for new products," Baron states. "In general, galleys have been built the same way for a very long time, and are rarely on the radar of an airline's top management. But

they should be – otherwise, investments in comfort will forever be negated by banging and clanging. Sleep needs to be offered in the larger context of total well-being on board, and the sound of silence is priceless."

Our experts have some amazing ideas, but for Sutter, perhaps the solution to galleys lies at a more fundamental level of change. "Perhaps the major impulse for galley design revolution would be to reinvent the air dining experience, turning it into a more suitable format aligned with the constraints of air travel and without trying to shoehorn it into a concept of service that was never meant to be airborne in the first place." @

THE THREE PS

For Paul Wylde, CEO and creative director at the Paulwylde design consultancy in the USA, modern galley design should better reflect the way people want to eat in flight.

"Understanding how to design a galley system means understanding how people want to eat, what they want to eat, and how the operation can best deliver within very challenging circumstances – budget, space restriction, limited resources and ever higher customer expectations. So far galley systems have evolved and developed from an operational perspective, rather than a customer expectation."

From experience as a design consultant to airlines and hotel operators including Hilton

and IHG, Wylde has noted key trends in the food and beverage industry, such as healthier options, smaller portions, fresh and local produce, seasonal foods, exotic creations, and a dash of celebrity and glamour.

A key insight the team has learned is the notion of 'managed flexibility' – the need for airlines to standardize to manage, yet customize to serve. Wylde says that airlines need to create viable systems to deliver costeffective catering to huge numbers of people with limited resources, yet deliver on the promise of fresh, seasonal, local and branded food and beverage experiences.

Delivering on this challenge involves three strategic objectives that, Wylde, says, should

be seamlessly integrated and coordinated – people, product and presentation.

People means the cabin crew, their knowledge, their engagement and their ability to customize. Product relates to quality of product, which should be fresh, seasonal, have variation and of course be delicious. Presentation involves macro and micro elements, from galley to tray, bringing in packaging and product design.

"Due to the evolution of most airline operations over the past 30 years, very rarely are these three resources aligned in the creation of galley environments, as they have been in hospitality food and beverage experiences," says Wylde.



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he September 2014 roll-out of iPhone 6 and the introduction of its shiny new 'Apple Pay' feature set the payments world abuzz with talk of NFC ambiguity, cell phone payments for all, and the advantages of biometric security in a purchasing environment. Tech-evangelists everywhere prophesied that this application was the just the thing to push the cell phone payments wagon forward. Perhaps they were right...

Just a few months after launch, Apple had already signed enough deals to support cards representing 90% of purchases made by volume in the USA. At press time, more than 200,000 retail locations were accepting contactless payments via iPhone 6, and many reported strong customer uptake. Soon, an Apple wristwatch will also have this capability and with boots on the ground in the UK, Canada and elsewhere, the expansion of Apple Pay beyond US borders (and let's face it, globally) is nothing short of imminent.

While naysayers do exist, many folks are delighted by the notion of paying with their cell phones and believe in the safety of the technologies behind it all. A mid-January report by Visa showed that 76% of 18- to 24-year-olds polled in the UK would be comfortable using biometric security (fingerprints, facial recognition, retinal scan, etc) when making a purchase. Even Google Wallet, a rival technology launched and largely forgotten back in 2011, has experienced a publicity revival thanks to all the hype.

Although zealous for progress, airlines are historically slow in bringing new technologies to market. While carriers monitor this shifting landscape, hardware and systems suppliers are jostling for first-to-market status when the scales finally tip. Enabling NFC (near-field communication) in the aircraft cabin is the first step toward cell phone (device to device) payment realization, as NFC payments must be enabled at a retail point before a system like Apple Pay and Google Wallet can be accepted there. Some carriers are already moving to implement NFC across their global networks.

"There is no technical reason why Apple Pay can't be supported offline"





APPLE PAY USES THE IPHONE 6'S FINGERPRINT SECURITY TO MAKE TRANSACTIONS SAFER

JETBLUE EMBRACES APPLE PAY

JetBlue Airways plans to be the first major US domestic carrier to accept Apple Pay for making mobile payments in the sky, whether for food, onboard amenities or seating upgrades. An Apple Pay system is currently rolling out and will be available fleet-wide by June 2015. To enable Apple Pay in the air, JetBlue is deploying iPad Minis with NFC-enabled cases to more than 3,500 cabin crew. In addition to the cases with Apple Pay compatibility, each iPad Mini will be loaded with a custom-designed iOS app – the Inflight Service Assistant – which will give crew access to the customer manifest and flight data. In addition to onboard purchases, JetBlue customers will be able use Apple Pay to complete purchases in JetBlue's mobile iOS app later this year. GuestLogix, a provider of payment services and processing engines for airlines, is ready to support Apple Pay on board. "We have more 90 payment certifications in nearly 150 countries," says

Dan Thompson, SVP of global strategy. "We started obtaining the certifications for NFC when US Airways developed its new set of POS (point of sale) devices over a year ago. They can now accept contactless cards, whether at the kiosk, check-in desk, or flight crew POS device."

Although it's going to take some time, Thompson says that the ground roll-out of Apple Pay (and the hype that it generates) is going to help drive the adoption of NFC everywhere. Already, GuestLogix says that the vast majority of its activated handheld crew POS devices are capable of processing NFC transactions, so it's just a matter of the airlines saying "go". Once NFC is available on board, cell phone payments are really just an executive decision away, even in an unconnected cabin.

"There is no technical reason why Apple Pay can't be supported offline. We have completed successful tests on multiple devices and expect full certification within Q1 2015," says Thompson. "Once we get certification, any customer with an NFC-enabled device will be able to accept Apple Pay. Then, the question of accepting cell phone payments from Google versus Apple becomes a similar question to whether you accept Visa or Amex."

Simon de Montfort-Walker is the president of eGate Solutions. His company is examining how to manage Apple Pay transactions in an offline setting and he expects to see some airline customers flying with the capability, at the crew POS device level, in Q2 or Q3 this year.

While he's excited about the possibilities of NFC and cell phone payments in airline retail and service models, he's also realistic about the challenges yet ahead. "For some of our customers this is about speeding payments,



"The mag stripe liability will shift from card issuers to the merchant"

but then we are having more conversations with people about how this all fits together," he explains. "What is this going to do? Is it really going to do anything, or is it just going to be an NFC adoption thing?"

The answer to that question is yet to be known. It is safe to guess though, that as airlines rely increasingly on ancillary revenues to bolster bottom lines, and passengers rely increasingly on their mobile devices to do just about everything – we're going to see more a lot consumer technology integrated into the onboard environment. The cell phone payment wagon looks set to move forward.

SELF-SERVICE SEATBACKS

A huge hurdle to better sales figures and service on board is that the window of opportunity for transactions and interactions is just too small. Further enhancing ancillary revenue and passenger experience through NFC and mobile transactions is going to involve letting the passenger take control, freeing up cabin crew to create positive experiences through other types of interaction.

Companies such as IFPL have been working the bugs out of onboard NFC for some time. IFPL has developed an inexpensive retrofit seat-mounted solution that can integrate with onboard payments severs or stand alone.

"In the USA the 'mag stripe' payment liability will shift from the card issuers to the merchant by October 2015," explains IFPL marketing executive Jason Davies. "In our industry, it means that the airline will have the mag stripe liability as the card issuers have decreed that data is

LIVE CREDIT CARD AUTHORIZATION

Hong Kong Airlines (HKA) is the launch airline for a new service from Rockwell Collins that enables the airline to conduct live credit card authorizations using wi-fi over its existing ARINC ACARS infrastructure. The service is offered through an agreement with the DFASS Group. With this service, HKA will be able to process credit card authorizations in real time, eliminating loss due to credit card fraud. Live credit card authorization also benefits passengers by allowing airlines to remove the current inflight credit card buying limits, facilitating seat upgrades and high-value purchases. In addition, the service opens up future possibilities of accepting other payment modes such as debit card, e-Wallet as well as live frequent flyer miles accrual and redemption programs.



THE CREDIT CARD READER OPTION ON THALES' AVANT SMART VIDEO DISPLAY UNITS MAY BE ABOUT TO BECOME LESS POPULAR



insecure and the cards are relatively easy to copy. Issuers are moving to chip and PIN and NFC-enabled cards. [Our solutions] will greatly increase the momentum to update or install onboard payment systems to comply with this. Chip and PIN and NFC is a more cost-effective option, as well as being cheaper to install," he says.

For airlines with NFC on the shopping list and a bit more cash to spend, fully integrated seatback solutions are also just around the bend. Panasonic Avionics announced in September that it would offer embedded IFE with integrated NFC capability by 2015, startling many industry observers who thought this development was much further down the line. "This new technology will enable passengers around the world to personalize their travel experience and intensify their relationship with their airline in incredibly valuable ways," said Panasonic Avionics' CEO in the release. Apply Pay was mentioned in the announcement and it was also stated that high-value transactions (something that NFC does not currently support) would somehow be possible.

In January, Panasonic and B/E Aerospace's jointly developed Jazz seat concept debuted at CES Las Vegas, with NFC payment capability as a standard (see p15).

Thales Avionics says it too is implementing NFC technology for its Avant system and will roll this out with a launch customer in 2016. "But NFC limits passenger use to low-value transactions (i.e. US\$25 to US\$50), depending on the card user," says Priti Arora, who is responsible for the Thales Payment Card System and future roadmap. "We are working on NFC capability as an extension to our current payment solution and evolving the solution further with other payment methods to enable low-value and high-value transactions. Airlines will need to assess what type of digital payment methods are ideal for their passengers and invest accordingly in the registration process."



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AS VIRTUAL REALITY SOFTWARE MOVES FROM GIMMICK TO MUST-HAVE, EXPERTS IN THE FIELD DISCUSS WHAT'S NOW AND NEXT FOR THIS DESIGN TOOL

Words by Guy Bird







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irtual reality (VR) cabin software renderings have never been anywhere near as good as experiencing a physical full-size mock-up. But, if VR proponents are to be believed, recent technology leaps - and their associated cost savings - look set to tip the balance in favor of the former for increasing amounts of aircraft design work.

According to Autodesk's industry manager, Detlev Reicheneder, every part of the aerospace industry is adopting virtual reality in some form, but with different levels of adoption.

Stephan Ritz, global head of design and development solutions for 3DEXCITE at Dassault Systèmes, agrees and adds, "From a technical perspective, VR design software has played an important role in the aerospace industry for a very long time. But since it helps address business needs more and more, its importance is growing. That shift from purely technical to broader business application elevates its status. Aerospace is leading in integrating VR across the entire product lifetime - from design, through development, to sales and marketing."

For example, the vice president of sales at Pace, Frank Ehlermann, sees three main customers for its Pacelab Cabin aircraft and cabin configurator: "Firstly, we have the OEMs who use this product in their sales and agreement phase with the airlines. Together they use and define the options and packages available. The second customer is the airline. They use it more as a scenario and conceptual configurator, to bounce around ideas internally. They can play around with the settings before returning back to the OEM and saying, 'this is what we want'. The third user group for the software is the suppliers of seats and so on. They use the tool in a more

conceptual sales sense, as it allows them to promote their product to their clients - be they OEMs or airlines. They can show them examples of a seat in various pitches and how that will look in a given aircraft."

In simple terms, VR software cuts cost and time out of the design process. "We can speed up the decisionmaking process massively by reducing the number of physical prototypes, which reduces cost and thus the development cycle," says Autodesk's Reicheneder. "I know certain customers who were able to cut three months out of their process by avoiding just one physical mock-up which can easily cost between half a million and one

"I know customers who were able to cut three months out of their process by avoiding just one physical mock-up"

3DEXCITE PREDICTS THAT VIRTUAL REALITY TECHNOLOGY WILL GAIN IN STATUS ACROSS THE INDUSTRY

million euros - depending on the scale. And even that model will only be a section of the cabin. With VR, you can walk through an entire cabin. The other area is communicating with the customer. Imagine you are Airbus and want to sell your interior to Emirates. You can build a mock-up or sketch pictures, or you can sit your customer in a room and guide them through the virtual cabin, letting him or her sit in the seat and realistically see what they will get. This is a totally different interaction, an immersive world that should increase sales."

Simon Jones, sales director at ZeroLight, agrees and is excited by VR's ability to fuel rapid advances in aircraft interiors by allowing designers to interact with their ideas in the same way their eventual customers will: "By empowering the designer to move through, interact with and experience new designs, they'll reduce errors and eradicate problems often not seen by physical modeling."

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MARKETING TO MOCK-UPS

The benefits of VR come not only in its ability to help design and build new aircraft cabins, but also in its ability to promote them to the market. As Lumiscaphe's Kopecky makes clear. "Before, it was just designers and engineers who used it, those who deal with the aspect of an object. But little by little, each big company seems to be going through a process where many other departments see VR's potential for presenting information. It almost goes from an internal to an external need, to marketing and more. Before, VR was for technology fanatics, but now it's just for people who use it as a tool. They don't care whether it works with three or five cameras, they just appreciate the spectacular results."

Such is the resolution, quality and adaptability of the information that it can easily be transferred, as Autodesk's Reicheneder enthuses: "This is one of the advantages of scaleable solutions. The same data set used for a design review can have images generated from it to be re-used for marketing. In the automotive industry, pretty much all the images in the brochures are virtual. Nothing is real. Because they cannot afford to wait until the car is built."

It can also assist in areas like staff training, as Ritz at Dassault Systèmes explains: "Whenever we see a chance to significantly improve client processes, we do just that. For instance, VR can complement physical crew training and help scale it." to a digital model. It's not that they don't trust it. We have examples where not even an expert can tell the difference between a virtual and a real model – but the biggest challenge is acceptance. It's not so much the cost, because the return on investment is very easy to calculate."

Michael Kopecky, marketing manager at Lumiscaphe, agrees, saying: "If you have a seat manufacturer in a bidding process for a new airline cabin, and the amount of the contract at stake is several million dollars, the cost of the VR is not a big problem. User understanding might be – but that's up to providers like us to solve."

BETTER THAN THE REAL THING

For ZeroLight's marketing director, Jason Collins, the point of VR is not just to match real life, but to better it: "We believe VR should improve on what the real world can offer, otherwise you're missing an opportunity to add



For Christian Medrow, senior consultant of ESI's VR Center of Excellence, VR's benefit is about the ability to make real-time changes based upon those decisions too. "ESI's IC.IDO software is the only solution that enables ad hoc changes for real-time decision making during immersive reviews. No other vendor allows users to engage with the very same size and complexity of product, while allowing dynamic interaction with the model."

OBSTACLES TO ADOPTION

But is everyone in aerospace as keen to adopt as the software developers are to provide? It depends. "It's a disruptive workflow," Autodesk's Reicheneder concedes, "and every disruptive workflow lacks acceptance in the beginning. Some people have made decisions on physical models for 40 years so it's hard for some of them to move *"We have great examples where not even an expert can tell the difference between a virtual and a real model"*

VIRTUAL REALITY TOOLS CAN EVEN PROVIDE VIRTUAL FELLOW PASSENGERS IN THE CABIN value. We don't believe VR is just about recreating an environment, it's about adding capability that would be impossible in the real world. That might be by instantly changing the lighting conditions or seat configurations, or even filling the cabin with virtual travelers."

Lumiscaphe's Kopecky sees this extra benefit as a great way to convince the skeptics too. "If I look at the paint finish in an aircraft exterior when on the runway in bright sunlight, it will appear differently to when it is in inflight mode at sunset or in a hangar under neon lighting. With VR you can simulate each of these scenarios. I can't do that with an aircraft that hasn't been built. That opens new benefits to even conservative customers."

However, ZeroLight's Jones is cautious about who will be able to deliver such gains. "There are, in fact, two main obstacles to building a good, commercial VR experience or design tool," he begins. "The first is understanding the unique complexities and requirements of head-mounted display (HMD) technology – and this comes down to software engineering and optimization. Overcoming motion sickness for example, more than often comes down to software optimization to achieve high enough frame rates and low enough latency. A good experience requires the software solution to be bespoke to VR, and this requires specialist expertise and resources."

The second obstacle is one of design – specifically VR experience design. "We're discovering that this is its own discipline with its own set of requirements. There's the user interface but also user instruction, structuring learning curves and providing cues to the user when objects or areas are out of view or, at the opposite scale, intersecting with where their virtual self is situated in the virtual world," adds Jones. "The barriers to entry for making a VR experience are low, but the barriers to making a good one are high."

LET'S NOT GET PHYSICAL

So are real-world physical prototypes facing extinction? ZeroLight's Collins predicts "the days of the physical prototype are coming to an end", although Lumiscaphe's Kopecky is not so sure – for now at least. "VR will reduce the number definitely, but completely replace them? If I want to check out leg room, I could replace a real model with VR. But if my target is to get the feel of a leather material or even its smell, then I need something else."

However, Kopecky and other experts point to haptic gloves and other, for now experimental, technologies to

solve these final VR frontiers, as well as predicting added potential benefits such as augmented reality and flexible screens in the future to allow more gestural immersion.

For ESI's Medrow, the key advantage will be "that there is only one holistic virtual prototype in the next decade, instead of multiple virtual data sets for different subdivisions of the aircraft and for each virtual investigation aspect".

In the opinion of Reicheneder, VR's future will depend on hardware progress, but will definitely become mainstream. "It will go from possible, to expected, to required. In a few years, VR technology with gesture or voice control and HMD to give a full immersive

"The barriers to entry for making a VR experience are low, but the barriers to making a good one are high"

BELOW: THE MICROSOFT HOLOLENS HEAD-MOUNTED DISPLAY BOTTOM: USERS CAN EXPLORE THE VIRTUAL CABIN, BUT PHYSICAL IS STILL BEST FOR SOME ELEMENTS experience will be required. And it doesn't even need to be a HMD, it could be a hologram like Microsoft's HoloLens system, so you can still walk around it."

That 'virtual walk-around' could happen well beyond a specified VR cave or powerwall too, as Reicheneder continues, describing the analogy of a CEO in a hotel room, working from an iPad: "You could be anywhere in the world, but could log onto the cloud, go into the virtual space and make the best possible decision. Or as Lumiscaphe's Kopecky envisions on a broader level: "Imagine you want to change your living room and you have some VR glasses linked to your smartphone. All you'd need to do is log-in to IKEA's site, swipe through its catalog, virtually click on the chairs and sofas you like in various colors and seat configurations, and view them virtually in your own home, rather than driving for an hour and having to walk through a huge store."

And therein lies one of the most convincing and relatable arguments for VR I've heard so far. The future looks virtually perfect.



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PLAYGROUND RULES

AS REPORTS OF BAD PASSENGER BEHAVIOR BECOME MORE FREQUENT THANKS TO SOCIAL MEDIA AND CELEBRITY MISHAPS, LET'S TAKE A LOOK AT THE LAW ON BOARD AND HOW TO HANDLE BAD SITUATIONS

Words by John Walton. Illustration by Phil Hackett

eports of unruly or disruptive passengers nearly doubled in the latest set of statistics from IATA. Its numbers for 2014 suggest a meteoric rise in disruptive incidents (up 43% over the 2013 numbers), and 40% of airlines had experienced at least one incident where diversion was required.

These statistics, covering 8,217 incidents, were captured in IATA's STEADES (Safety Trend Evaluation, Analysis and Data Exchange System), and cover eight types of disruption ranging from using cigarettes or drugs, verbal or physical confrontations, interfering with crew or refusing to comply with instructions, sexual misconduct and other "riotous behavior".

But is passenger behavior getting worse, or is it just being reported more frequently by crews and in the media? The answer likely lies somewhere in the middle. It's no secret that passengers view air travel as being less pleasant than in the past, with more queues, more frustrating security, smaller seats, less legroom, fewer amenities, worse service and unfriendlier crews – and all for more money.

The realities – that ticket prices have fallen in real terms over the past 20 years (US domestic ticket prices adjusted for inflation have come down nearly 15% since 1995), that extra-legroom economy seats on US airlines and proper international premium economy on non-US carriers are equal or superior to the 'good old days' – are less relevant to passenger behavior than the perceptions.

And if pitch and service were the panacea, then the 34in-pitch economy standard on JetBlue and Korean Air would suggest those airlines should have fewer incidents. Yet widely publicized incidents involving JetBlue cabin crew member Steven Slater and Korean Air former senior VP of inflight service Heather Cho Hyun-ah spring to mind. However, a lack of standardized reporting means data-driven comparisons across airlines are not possible.

Clearly the increase in the number of devices capable of recording video means that we see more disruptive incidents in the news. It's a lot easier for a tabloid newspaper, Gawker site or Buzzfeed contributor to hang a story on pictures of an Icelandair passenger taped to his seat or a YouTube video of a passenger going bonkers than it is on just a description.

Flight attendants may also be more willing to report incidents than in the past. Factors contributing to this could be the post-9/11 focus on cabin security, optimization of cabins to maximize the passenger to flight attendant ratio, wider societal changes making harassment less acceptable, and even much maligned occupational health and safety regulations.

"Regardless," says threat management specialist Totti Karpela, who has worked with multiple airline crews,



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WHAT TO DO WHEN: A SERVICE DISPUTE TURNS SERIOUS

In the 'knee defender' type of incident over seat recline, for example, crew should consider whether de-escalation could take place without an audience, potentially in a galley or other area, says threat management specialist, Totti Karpela. Ensure crew members are aware of the situation and at least one other crew member is assisting. If able-bodied passengers are permitted to assist under airline policy, ensure they are ready to act. Approach the situation in a professional and objective way, without bias. Remember that calm people create calm results, and that you are on a stage: most passengers will follow your response and some will likely record it. Ensure both parties feel they have been listened to. Repeating what has been said will demonstrate that you are listening. It rarely hurts to apologize for the inconvenience to both parties – or to thank them for cooperation at the end.

"incidents will also be extremely unpleasant and sometimes even traumatizing for other passengers. Naturally, all incidents have the potential to cause damage to the airline – besides diversion and delays – once media and especially social media get hold of the incident and all of a sudden 20,000 people are retweeting or sharing information on Facebook."

So what's to be done? The first step – to ensure that enforcement of the rules is possible regardless of

where they are broken – is currently underway.

THE MONTREAL PROTOCOL Montreal Protocol 2014 provides jurisdictional

provides jurisdictional updates to the 1963 Tokyo Convention. Over 50 years after the Tokyo Convention was promulgated, it's clear that the w

was promulgated, it's clear that the world has changed. ICAO, the UN body concerned with civil aviation, began a review of the Convention in 2009, resulting in the Montreal Protocol of 2014.

The very first section of the preamble to the Montreal Protocol, currently out for ratification to member states, is clear about the problem: "States have expressed their concern about the escalation of the severity and frequency of unruly behavior on board aircraft that may jeopardize the safety of the aircraft or of persons or property therein or jeopardize good order and discipline on board."

Most of the 2014 Protocol deals with international and multinational jurisdictional issues to ensure that all states are able to prosecute disruptive passengers on inbound aircraft. It also grants some additional specific legal powers of restraint to aircraft commanders, and makes some clarification around the types of

"All incidents have the potential to cause damage to the airline" disruption that should be considered unlawful.

Yet the jurisdictional issues within states may be just as problematic as between them, and many states have enacted additional national regulations to fill the gaps of the Tokyo Convention to provide a relatively wide scope for action to be taken about disruptive passengers following an incident.

A US FAA spokesperson told *Aircraft Interiors International:* "It is up to the

airline to decide if they want to report a case to the FAA. The pilot in command can make that call. They can also choose to divert, if necessary. If a case is egregious, they may request law enforcement support once they land. In that case, the passenger would be handled by local or federal law enforcement. Those cases are not in the FAA's database. Those cases would be criminal and a local US District Attorney would decide if there was a case to prosecute. The US Department of Justice does not have national stats for those cases. In addition, security violations are handled by the TSA."

That's a possible eight sets of lumbering bureaucracy, covering a complex Venn diagram of jurisdiction, even within a single country. Yet the laws themselves seem fairly clear, even if enforcement is complex. With few important changes in the laws in recent years, and certainly nothing new that would seem to trigger a huge spike in reports of disruptive passengers, it can't just be a legal gap.

As an example of the legislation around disruptive passengers, the UK's Air Navigation order makes it a criminal offense to endanger the safety of an aircraft in any way (Article 137), and specifically proscribes being drunk on board an aircraft (Article 139), smoking on board an aircraft (Article 140) and disobeying the













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In the USA, Federal Aviation Regulations 91.11, 121.580 and 135.120 cite that, "No person may assault, threaten, intimidate or interfere with a crew member in the performance of the crew member's duties aboard an aircraft being operated."

International regulations are harmonized by ICAO, with further regulation regionally. As the UK CAA put it to us: "All EU carriers operate to an equivalent level as they are required to comply with EASA Air Operations regulations. As for non-EU carriers, there are no particular agreements in place, although ultimately all international aviation authorities follow guidance and policy set by ICAO."

With ICAO's work currently focusing on ratifying the Montreal Protocol, airlines themselves – perhaps with leadership from IATA – need to develop and iterate best practices to deal with disruptive passengers.

PREVENTION IS KEY

IATA's *Guidance on Unruly Passenger Prevention and Management* recommends that airlines, "develop a preventive strategy based on: increased awareness of passengers and among all employees of how the air carrier will respond to disruptive acts, the implementation of a Zero Tolerance policy, and the type of response and consequences of unruly behavior".

"Prevention," IATA says, "is the most effective mitigation measure to unruly passenger incidents and

WHAT TO DO WHEN: A PASSENGER APPEARS DRUNK

If the aircraft is in flight, says threat expert Totti Karpela, check the passenger's consumption of alcohol and consult with the airline's alcohol consumption checklist. If the behavior fulfills the criteria to stop serving alcohol, do so. Ensure the entire crew is aware of the passenger and that he or she will not be served further alcohol, including by friends, the crew in the galley or from their own supplies. Offer nonalcoholic drinks or other options, such as food or sleep, for the remainder of the flight. Remind the passenger of what's in it for them: feeling better once the drinking stops, a better chance of clearing immigration and airport security at the destination, and a lower chance of meeting with law enforcement on arrival. Consider a spoken warning and, if necessary, a written warning by the aircraft commander. Once compliant, thanking the passenger for their cooperation can be very effective.



"The focus of company policy should be on acting on early signs of unruly behavior"

could be promoted as the responsibility of employees throughout the entire organization. Often unruly behavior is not the result of a single event but rather the effect of a series of events that build up. Early signs of potential unruly behavior can often be observed. The focus of the company policy should be on acting on these early signs, rather than dealing exclusively with escalated events."

Problematically, the airline industry is focusing on reducing the number of passenger touchpoints. Even today, a passenger boarding a Lufthansa flight in

> Frankfurt using a mobile boarding pass or kiosk and the airline's self-boarding gates may not even encounter an airline employee until door 1L.

Increased regulation of airport service of alcohol to dissuade overconsumption could also make sense. An FAA spokesperson told us, "The FAA has no regulatory authority over airport businesses." The situation in the UK is the same: "We have no involvement in regulating the sale of alcohol in airport terminals," said a CAA spokesperson. "It is down to local authorities."

Airlines also have a responsibility: several have quietly ceased or modified their duty-free sales on problem routes (Bali-Australia, for example). Virgin

"Airlines need to take disruption seriously, and set expectations as part of their brand"

Atlantic recently changed its alcohol announcement, with a spokesperson confirming: "We have been making this announcement for many years. This was about Virgin Atlantic being proactive with our passengers." The new announcement states: "We'd like you to enjoy your flight, so bear in mind that we only serve alcohol in moderation. Please don't be offended if we stop serving you – and of course this means you can't drink your own supply."

Airlines' responsibility also extends to the way they brand themselves and present their crew. From the "Bring on the women!" comment from Nok Air's CEO when asked to pose for photographs, to the plethora of advertising using (exclusively female) sexualized models posing as flight attendants giving flirty glances in comehither poses, if airlines don't set a respectful tone before passengers board then how can they expect passengers to maintain one on the aircraft?

Frequent flyers can be some of the worst offenders. "Some of the Marco Polo Club members think they can do things to us because they are privileged and we somehow allow it. They think it is part of their



THE FAA "UNRULY PASSENGERS" LOG	
YEAR	TOTAL
1995	146
1996	184
1997	237
1998	204
1999	226
2000	255
2001	305
2002	279
2003	286
2004	310
2005	205
2006	137
2007	153
2008	124
2009	139
2010	128
2011	155
2012	183
2013	147
2014 (as of januar	121 Y 5, 2015)

These figures are for violations of 14 CFR 91.11, 121.580, 135.120, 125.328, 49 USC 46318 & 46504 privilege. Afterward, they believe they can apologize and everything is settled," Cathay Pacific flight attendant union official Michelle Choi told the *South China Morning Post*. Could the three global alliances take a stand here with existing systems? Sharing information about disruptive passengers is likely to reap benefits – not least because if there is a single list then passengers might modify their behavior to avoid future consequences, not least to their points balances.

A wider information-sharing system about passengers who have been disruptive on aircraft has been mooted – and dropped – previously. "We are not aware of any specific proposals. A shared database of 'problem passengers' has been discussed in the past. However, there are possible data protection issues that may need to be resolved before such a system could be set up," a UK CAA spokesperson commented. A spokesperson for the FAA was also unaware of any activity to share information about passengers. IATA's STEADES incident database is anonymized, so carrier-by-carrier comparisons are not possible.

Regardless, it's clear that airlines need to take disruption seriously, and set expectations as part of their brand. With the amount carriers spend on advertising annually, it would certainly help show that their money is where their mouths are. \otimes

WHAT TO DO WHEN: A PASSENGER BECOMES VIOLENT

Crew should first ensure that the fasten seatbelt signs are on, to stop other passengers interfering or bystanders getting into harm's way, says threat management specialist Totti Karpela. Spoken or written warnings might not be suitable, depending on how quickly the particular event has developed. Crew can command a passenger to sit down or lie down on the floor. If airline policy permits, crew can enlist the aid of willing able-bodied passengers to assist them. Restraining devices including – but not limited to – handcuffs can also be used. "I have rolled one handcuffed kicking, hitting, biting and spitting passenger into two blankets and taped him to resemble a 'cigar' or 'worm'," Karpela told *Aircraft Interiors International.*




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SOUND JUDGENAENT NEW REGULATIONS AND NEW TECHNOLOGY ARE

NEW REGULATIONS AND NEW TECHNOLOGY ARE ADDRESSING ACCESSIBILITY ISSUES FOR PASSENGERS WITH DISABILITIES – PARTICULARLY IFE SYSTEMS FOR THE HEARING AND SIGHT IMPAIRED

Words by Michael Childers. Illustration by Anna Davie

S airlines, and any that fly into and out of the USA, are awaiting a rulemaking due this year from the US Department of Transportation (DOT) that is expected to set requirements for closed captioning of IFE. A mandate to replace the approximately 50% of existing IFE systems that are not closed-caption capable could cost as much as US\$1m to US\$5m per aircraft, depending on the specific equipment and aircraft size, and a broad mandate to convert all the audio to closed captions could generate costs in the millions of dollars for the creation and delivery of the captions themselves.

To represent the IFE industry's point of view, the Airline Passenger Experience Association (APEX), through its Technology Committee and Washington DC counsel, has engaged the DOT in an effort to reach closed-caption objectives without onerous costs. A few airlines – including Air Canada, Delta and Emirates – have moved voluntarily to make some IFE content more accessible to passengers who are deaf, hard of hearing (HoH), blind, or who have limited vision. But despite the capability of the IFE systems they use, most airlines are awaiting the DOT ruling, technical specifications from the APEX Technology Committee and Closed Caption Working Group (CCWG), and perhaps a clearer determination of the business terms that will apply to the cost of delivering closed captions to the aircraft before they implement closed captioning.

APEX – then known as the World Airline Entertainment Association (WAEA) – began to consider closed captions in IFE for the deaf and HoH in the early 2000s. It established a working relationship with the National Center for Accessible Media (NCAM), part of the Media Access Group at Boston's public television

CLOSED CAPTIONING

MUFFLED MUSIC PLAYING IN THE BACKGROUND

He shoots and scores another GOOOOAAAAAALLLL!

> Vivid orange and yellow sunset over London, with lights glistening

Table tennis match in school gymnasium

ping...pong...ping...pong

Turn captions ON or OFF A vast desert with nothing visible but orange sand and blue sky

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He shoots and scores another GOOOOAAAAAALLLL!

station, WGBH, to explore closed-caption implementation on board aircraft.

In 2006 the DOT issued a Notice of Proposed Rulemaking (NPRM) that would have required all inflight video to be closed captioned. APEX (WAEA) responded to the NPRM by saving that closed caption technology was not compatible with the IFE platforms in use at that time, but that the emerging MPEG-4 technology would be friendlier to closed caption objectives.

Citing the APEX response, the DOT announced in 2009 that it was not able to establish requirements at that time because of the limitations of the technology underpinning IFE, but said it would follow the emergence of the MPEG-4 technologies described by APEX and consider subsequent action.

Later that same year, APEX - through its Technology Committee - made the first major step toward making closed captions a reality in IFE by codifying a solution compatible with MPEG-1/2 IFE platforms that could provide closed captions using bitmap graphic overlays on the video. The bitmap solution is still used today, and can also be used on MPEG-4 IFEC platforms.

Vivid orange and vellow sunset over London, with lights glistening

FROM 7FRO TO 50%

Since 2006 - when solutions to enable the provision of closed captions first seemed to be within reach for future IFE

platforms - until today, IFE systems with closedcaption capabilities where the video display is controlled by the viewer have gone from virtually zero to about half of such systems. By sometime in the first half of this year, all new IFE systems sold to airlines by APEX members will support closed captions of the kind codified by APEX in 2009, and systems that are not closed-caption capable will begin to be phased out.

APEX - with assistance from market research specialist IMDC - determined that as of June 2014, 38.7% of IFE systems (excluding satellite broadcast systems) on the worldwide commercial air transport fleet already support closed captions. If the number of overhead/communal screens that are not under viewer control and support only open captions are excluded from the count, then 50.6% of worldwide IFE systems support closed captions.

Some existing IFE systems might be upgraded with software changes in anticipation of the upcoming

TECHNICAL REQUIREMENTS

One of the objectives of APEX's Closed Captions Working Group (CCWG) is to establish the same specification for closed captions as for dynamic subtitles, as they will both occupy the same screen in many instances. Therefore the specification must include the Uniform Transformation Format using 8-bit blocks to represent a character, i.e. UTF-8. There is a requirement for supporting both ASCII (if the file is just plain English) and Unicode characters, and both right-to-left and left-to-right text simultaneously.

Not all post-production encoders are equipped to support this requirement, and thus some may be faced with upgrading their capability.

According to Andy Rosen of Bitlogic, also a member of the CCWG, closed-caption standards SMPTE TT, UV CFF-TT, W3C SDP, W3C ISMC and WebVTT all support UTF-8. UV CFF-TT supports

bitmap, but SMPTE TT will require a conversion. It is planned that the CCWG will specify an IFE Timed Text profile as well as any conversion required to support bitmap during 2015. Content providers will be able to deliver in Timed Text, the industry will support any needed conversion into bitmap, and over time the industry will leave bitmap behind and migrate fully to Timed Text. However, given the life of IFE systems, simultaneous support of multiple IFE systems may be unavoidable for some time to come.

Rosen is a long-time SMPTE member and has been active in the development of IFE standards since the first IFE digital content delivery standard, known as APEX (WAEA) 0395, which celebrates is 20th anniversary in March 2015.

Geoff Freed, director of technology projects and web media standards at NCAM, and a member of APEX's CCWG, is also a member of the W3C Timed Text Working Group (TTWG) and a co-author of the W3C's Timed Text Markup Language (TTML), a non-proprietary method for providing captions and subtitles in digital media. Rosen and Freed are expected to aid in the coordination of the SMPTE and W3C standards.

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"I have been trying for some time to get airlines to provide closed captions on the movies on their airplanes. I can't understand why they don't do it" – Senator Tom Harkin

rulemaking, while in other cases even the cost of an upgrade might be considered cost-prohibitive by the airline.

Given that it was less than nine years ago that possible closed-caption solutions began to emerge, and less than six years ago that APEX was able to codify those solutions in a specification that the IFE industry could follow in developing IFE systems, many in the industry consider that real progress has been made.

Using statistics regarding the closed-caption capability of the fleet, APEX is making the industry's case to the DOT. But the agency faces pressure from members of the US Congress, and particularly from advocacy groups





In the USA there are two principal regulations governing accessibility for air travelers: The Air Carrier Access Act (ACAA), under which the Department of Transportation (DOT) has jurisdiction for anything taking place inside the aircraft; and the Americans for Disabilities Act (ADA), under which the Department of Justice (DOJ) has jurisdiction over public facilities such as airports. Some states also have regulations, such as the California Civil Code 54.9.

Regulations with primacy in other countries include the Canadian Government Travel Policies, the UK Disability Discrimination Act, the Australian Standards for Accessible Public Transport, and certain European Union regulations such as Regulation [EC] No. 1107/2006.

In December 2014, the UK's CAA, and other national enforcement agencies in Europe, gained legal authority to enforce EU regulations that provide for the rights of air travelers with disabilities and reduced mobility. The EU regulations provide that disabled travelers are legally entitled to special assistance in the air as well as help traveling through an airport, or while boarding, disembarking and during the flight. Appropriately the CAA made its announcement on December 3, 2014, the United Nations International Dav of Persons with Disabilities.

Among the EU regulations that these national enforcement agencies now have the legal podwer to enforce is European Regulation (EC) 1107/2006, originally adopted in July 2006 and updated in June 2012, which requires airlines and airports to provide special assistance at no charge for air passengers with disabilities, and for people with reduced mobility (PRM) when traveling. for the deaf, blind and passengers with reduced mobility (PRM) that often see the glass as – at best – still half empty, particularly when considering that it could be 10 years until all aircraft IFE systems support closed captions.

In 2013 Senator Tom Harkin (D-IA), who retired in January 2015, introduced a bill to the US Senate requiring that video on board aircraft flying in and out of the USA be closed captioned. Senator Harkin's landmark legislative work was on the Americans with Disabilities Act (ADA), which he authored and sponsored. As it did in 2006 (as the WAEA), APEX then engaged the DOT on behalf of the industry in an effort to balance the goal of deaf/HoH passengers having an inflight experience like other passengers against the technical limitations and costs associated with IFE systems and content delivery.

In June 2014, with only a few months left in his final term, Senator Harkin saw an opportunity to attach his bill to a transportation appropriations bill as an amendment. After the Senate Appropriations Committee sent the bill to the floor, Harkin said, "I have been trying for some time to get the airlines to provide closed captions on the movies on their airplanes. I can't understand why they don't do it. It doesn't cost anything."

In order to ensure that Congress understood that the proposed rules, rather than costing nothing, could cost millions of dollars per aircraft, APEX, through its Washington DC counsel and Technology Committee, undertook to inform Congress – as well as the DOT – of the actual facts of the matter. Congressional staffers were surprised to learn of the cost potential of the measure. As a result, the amendment was substantially revised and eventually tabled, leaving the matter to the DOT – at least for now.

One of the key recommendations made to the DOT by APEX is that potential regulations should apply only to newer digital systems that have the capacity to handle closed captioning, to new aircraft for which an IFE system is purchased, and to newly purchased IFE systems for any aircraft that currently has an system that is not closedcaption capable. APEX has asked the DOT to make no rule that would include a requirement to retrofit existing aircraft with a newer system solely to achieve closedcaption capability. A vast desert with nothing visible but orange sand and blue sky

"Timed text has become the most likely form of closed caption delivery between content providers and post-production"

In support of these recommendations, APEX has advised the DOT that a typical new MPEG-4 digital IFE system costs approximately US\$1m to US\$5m per aircraft, depending on the aircraft's size. Explaining the costs, APEX cited the fact that the US FAA is required by law to certify all onboard equipment for aircraft installation and airworthiness, necessitating designs unique to IFE use and substantial additional costs and time requirements.

APEX has also advised the DOT that the life of an IFE system is 12 to 15 years, and that some systems last even longer than that, as when the aircraft is sold to another airline the system may be in use for several more years.

Beyond the capability of IFE systems to display closed captions are the costs of creating and delivering closed captions in the content files created for IFE, and also the conversion of the various content versions to conform to each airline's content format. As those who work with IFE are aware, there are frequently multiple versions of content (edited versions for example) and there are multiple IFE system platforms in service at any time that potentially require conversion of files to match their requirements.

While APEX broke new ground in 2009 when it codified the bitmap solution for the delivery of closed captions to IFE systems supporting MPEG-1/2 and compatible with MPEG-4 systems, the 21st Century Communications and Video Accessibility Act, signed into law in the USA in 2010, and which began to be implemented in 2012, adopted a caption format created by the Society of Motion Picture and Television Engineers (SMPTE) referred to as SMPTE Timed Text 2052 as a 'safe harbor' for Video Programming Owners under rules for IP-delivered full-length video programming.



As a result, Timed Text has become the most likely form of closed-caption delivery between content providers and post-production. But the majority of IFE systems currently in service cannot display Timed Text. Therefore the APEX CCWG is seeking to establish a delivery profile for IFE that is rooted in Timed Text and may derive from SMPTE TT 2052 in the Ultra-Violet Common File Format (UV CFF-TT), the W3C Timed Text Simple Delivery Profile (W3C SDP), and perhaps WebVTT, but can be converted into bitmap.

NON-ENGLISH CLOSED CAPTIONS

Another area of considerable concern to airlines – particularly non-US airlines with routes in and out of the US – concerns language requirements. APEX has formally asked the DOT to limit any rules for the provision of closed captions to English language content of US origin.

Outside the USA, closed captions are not consistently available and are influenced largely by the laws of each country with respect to television broadcast and internet distribution standards. APEX has explained to the DOT that in situations where closed captions are not created for other markets – such as theatrical, television, packaged

ABOUT THE AUTHOR

Michael Childers is a long-time IFE industry consultant. He is a member of the APEX Board of Directors and chairs its Technology Committee. He co-authored APEX's 2006 response to the DOT's NPRM on closed captions, and was the principal editor/author of APEX Specification 0403 when it was updated in 2009 to provide for MPEG-4 and bitmap. In June 2014, when closed caption requirements were being added to a Senate appropriations bill, he traveled to Washington DC to work with APEX counsel in drafting documents for distribution on Capitol Hill to show the potential costs of such legislation, and met with Airlines for America and IATA to coordinate the effort. He has been the editor and co-author of APEX's documentation for use in engaging the DOT. He was an invited speaker at the DOT's Forum on Passengers with Disabilities in 2014. In 2013 he co-represented APEX on the FAA PED Aviation Rulemaking Committee along with Rich Salter, CTO at Lumexis.



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media or the internet – a requirement imposed on the airline industry to bear the costs of non-English captions would likely entail a cost that exceeds the economic structure of the service, and therefore result in the unavailability of certain content.

It is known that making the case to the DOT for English-only is a bigger challenge than getting the agency to avoid requiring costly IFE systems replacement. The potential cost of replacing an IFE system, at US\$1m to US\$5m per aircraft, is a meaningful figure on its own, while a cost of several hundred to a few thousand dollars to create and deliver closed caption files on a movie does not – at least on the surface – seem so onerous.

English language content produced outside the USA may or may not have captions available. Mandates by the European Commission, Australia and New Zealand, APEX advised the DOT, as well as broadcaster policies at the UK's Office of Communications (Ofcom) and other networks, have required the availability of captions on television. But conversion of these sources into





IFE-compatible captions has not been done and will be complicated by the multiplicity of television standards involved.

For much of the non-English-speaking world, closed captions are not used and are not available in those languages. In countries other than within the European Union, which has mandated that public-service television programs be captioned, and Canada, which enacted mandatory captioning on television for both English and French in 2007, further mandates may be rare. Even in the UK, where a high percentage of

television content is closed captioned as a result of government mandates, such mandates do not currently apply to movieon-demand services, where closed captioning is limited.

APEX hopes to convince the DOT that it is reasonable and prudent to limit any rulemaking to English-language content of US origin, at least until its CCWG can further investigate the extent of closed captioning outside the USA. S

USA POPULATION BY DISABILITY STATUS, 2010 SURVEY OF INCOME AND AMERICAN COMMUNITY SURVEY **PROGRAM PARTICIPATION** PERCENT AGE GROUP AND NUMBER NUMBER PERCENT DISABILITY STATUS OF GROUP OF GROUP (1,000)(1,000)Age 18 to 64* 203.083 191,138 With a disability 32 220 13 4% Severe disability** 21,545 8.6% 19,048 10.0% Difficulty seeing 4,295 1.8% 3,209 1.7% Severe difficulty seeing*** 0.4% 960 Difficulty hearing 1.7% 3,924 2.1% 3,420 Severe difficulty hearing*** 1,030 0.2% Ambulatory difficulty 5.2% 11,996 61% 9,857 Uses a wheelchair** 1,623 0.6% Age 65 and older 38,599 39,132 With a disability 19,234 49.8% Severe disability** 14,352 36.7% 14,138 36.6% Difficulty seeing 3,782 10.1% 2,688 18.7% Severe difficulty seeing*** 1,050 2.8% Difficulty hearing 4,152 11.2% 5,904 15.1% Severe difficulty hearing*** 66 1.5% Ambulatory difficulty 11,883 30.8% 9,315 23.8% Uses a wheelchair*** 2.014 5.2%

*SIPP estimates are age 15 and older

**Asked as 'serious disability' on ACS data collection instrument

***Not included on ACS data collection instrument

Sources: Census Bureau, 'Americans with Disabilities: 2010,' Current Population Reports, P70-131, July 2012; and 2010 American Community Survey, Table S-1810

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The more luxurious a project gets, the less it makes use of my talents

WHILE IT MAY STILL BE IN THE CATERPILLAR STAGE, JAMES LEE HOPES HIS PAPERCLIP DESIGN STUDIO WILL METAMORPHOSE - THANKS TO A BUTTERFLY

Interviewed by Adam Gavine

A

had



"I really need to be a step ahead, instead of being a part of the business class arms race"



PAPERCLIP ARMREST

Where it all began: the armrest design that James Lee dreamed up in 2006 while at MIT and which lent its name to his company. The design – in the approximate shape of a paperclip – is intended to solve the problem of 'elbow wars' in high-density seating. A double-deck geometry creates double the armrest space so neighbors can share the feature amicably. The armrest can be incorporated into existing seats, or even in other applications such as cinema seats.

If you don't like the styling, it can be specified in different shapes, forms or materials, as long as its basic criteria remain: the two levels must be approximately 3in (7.5cm) apart, with a roughly 8in (20cm) gap between the backrest and the upper level.

Explaining the commercial status of the design, Lee states, "I'm still having talks with some companies, but nothing is finalized yet. I did find the armrest was quite useful in getting media exposure. I get more press inquiries about it than airline inquiries!" ou may well have heard of Paperclip Design, with its many concepts that regularly receive accolades from organizations such as Crystal Cabin, Red Dot, Goldman Sachs and Good Design. However, less is known about the creative mind behind the concepts, and the purpose and progress of those concepts.

Back in 2005, as a young man who had just gained a mechanical engineering degree from the University of Hong Kong, James Lee was not short of options, but there was never any question which direction he would take. "Aviation had been my passion for many, many years. The reason I studied mechanical engineering was because I thought it would lead to aeronautical engineering," he explains.

Thus his next step was to attain a Masters of Science in aeronautics and astronautics at the esteemed Massachusetts Institute of Technology, where he was also a research assistant at MIT's International Center for Air Transportation.

Various commercial roles at Cathay Pacific followed, but Lee's burning desire to combine his skills with design saw the inevitable move toward creating his own design studio. "I'm passionate about design, so aviation and design is a natural combination for me," he says.

Paperclip Design began in 2006 as a part-time project while Lee was working at Cathay Pacific, during which time he developed the Paperclip armrest (more on that later), but it became a full-time project three years ago when he left his job at the airline. He has since opened a studio in his native Hong Kong, where he shares workspace with a creative collective of engineers, architects, artists and designers, who all share ideas and collaborate on projects.

The philosophy of the studio is 'innovation, simplicity and elegance', and those who have seen Lee's concepts, such as the Meerkat, Checkerboard and Butterfly, will have noticed a focus on the economy and premium economy cabins.



Butterfly is Lee's second foray into convertible seating. You may recognize the design as the winner of the 'Premium Class & VIP' category of the 2014 Crystal Cabin Awards, but following some correspondence from a certain offhighway equipment supplier, it is now called Butterfly. This long-haul concept is intended to allow a swift transformation between premium economy class and

Innovating within the constraints of the main cabin is where Lee feels his talents are best used, as he explains: "In terms of aircraft interior design, the most challenging space is in economy, where every half an inch makes a difference.

"When you work on premium economy and business, while you still have a lot of constraints because you always want to maximize the space, you can play a lot more with the space.

"Once you get to first class, space optimization becomes less of a problem. It becomes more like an interior design project because you have so much space that it's not about squeezing an extra inch here and there; it's more like designing an apartment. In those spaces I would lose my edge because I'm not a designer by training. I never studied design, I am more of an engineer and I'm good at optimizing space, which is more about being analytical than styling," states Lee.

"I would say the more luxurious a project gets, the less it makes use of my talents, but having said that, I am currently involved in a private jet project. That's a bit ironic, but I love aviation so that's why I still find the project worthwhile and fun."

So as a keen observer of the economy space, which elements does Lee think need to be improved or changed? "I think there might be some basics in terms of ergonomics that have been taken as assumptions that nearly every seat manufacturer follows, but which might not be ideal."

His solution? "I have some ideas, such as alternative ways for the backrest and the headrest to be shaped, which I will soon begin working on in order to test out my theories. I'll be doing work on the fundamental forms of economy seats as I think there are some very basic points of ergonomics that are worth looking into to find improvements."

a business class flat bed suite to match real-time demand on each flight. The seat is designed for a 44in pitch on a B777 or 47in on an A330/A340.

In an eight-abreast configuration on a B777, the staggered premium economy configuration gives a 21in seat width between the armrests and features include cocktail trays, seat pockets on the side, as well as an adjustable ottoman. To convert the seat to business class,

the inboard seat is flipped over to form

Convertible seating is where Lee now

concept is intended to give short-haul

operators the flexibility to adjust the

cabin configuration for each flight.

y-axes, can be folded to give more

focuses his attention. The Checkerboard

Every other seat, in both the x- and

legroom to the seat behind. Thus every

remaining seat, after the transformation

a flat surface, creating a private suite, complete with seat, a side couch which can also be used for companion dining, and direct aisle access. The addition of soft furnishings on the couch gives a living room-like ambience to the suite.

For sleeping, simply flip the aisle seat over as well so, together with the side couch, a large diagonal sleeping surface is formed. At a 44in pitch, the bed is 77inlong tip-to-tip, and up to 44in-wide at the hip area.

FLEXIBILITY

BUTTERFI

Lee's Checkerboard and Butterfly concepts indicate a fascination with the concept of 'convertible' seating, where a seat can be quickly altered to suit a class above or below. This is where Lee views the future of seating – and his company.

"Over the past 10 years, especially in business class, designers have come up with all sorts of different ways to make seats more efficient, using less space and giving more comfort. That's the natural way of progressing. People will come up with even better ways to configure seats, but as a new entrant in this industry, I think I need

to be a step ahead, instead of being part of this business class arms race.

to business class, will be next to and behind empty spaces. As a business seat, density is good, with 30in pitch installations equivalent to 40in pitch at four-abreast on a narrow-body.

In economy mode, Checkerboard is a typical short-haul seat, with seatback table, high literature pocket, and a high pivot recline. When converted, the seat offers extras such as padded armrests, extra-large cocktail tables, additional stowage spaces, and the economy armrests can be raised to become lightweight privacy screens.

The folded seats create up to an additional 8in of legroom, while the raised armrest increases seat width from 17in to 19in for aisle and window seats, and 21in for center seats.

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"As a new entrant I have to give airlines a reason to use someone who's not famous. And I think that reason would be revenue"



"I have placed my bets, and have chosen flexibility as my direction because I think the optimization of business class beds is reaching a plateau. It's really hard to achieve big improvements from what we have today," Lee states.

"Most importantly, as a new entrant to the market, if I want an airline to use my designs, I really have to give them a reason to use someone who's not famous. And I think that reason would be revenue."

THINGS ARE LOOKING UP

People often think of seating design in lateral terms, but what of the vertical opportunities? "Nearly all seat manufacturers use vertical space – it has been used quite extensively with current business class seats like Thompson's Vantage – but usually not entirely vertically. It is more like the cocktail tray might overlap the footwell space.

"To use vertical space further than that, it seems to me the major constraint would be regulations and safety, mainly the escape path," he says. "I do hope that the regulations can become more flexible so that more freedom can be given to cabin designs."

MEERKAT

Created in 2011, the Meerkat economy concept is intended to enhance the passenger experience, while minimizing weight and maintenance costs. One of the main features is an alternative to the traditional recliner mode, whereby the lower portion of the backrest cushion detaches to allow items to be stored securely behind, pushing the backrest forward to provide a deep recline. The effectively shortened seat pan enables passengers to stretch their legs out underneath the seat in front

Other features include a shared literature rack between every two seats – does every passenger really need their own copy of the shopping catalog? – which can reduce inflight magazine weight by up to 50%, or 33% for triple seats; a tablet stand; an IFE box that doubles as a footrest; and of course the Paperclip armrest.

TRICKY CONDITIONS

FLIP BUTTERFLY'S INBOARD SEAT

AND A FLAT SURFACE IS EXPOSED,

CREATING A PERSONAL SUITE

As a small player without the vast R&D funds of some industry names, does Lee find aviation to be a difficult sector in which to be innovative?

"Yes and no. On the one hand there are a lot of regulations in aviation which prevent radical design, but on the other hand, because there's a huge amount of cost and revenue involved, there seems to be a lot of R&D involved in aviation, which results in a lot more new products than in other industries. For example, if you look at seating, have you seen any new types of cinema seats or theater seats in the past two decades? In general, in trains or other key industries, you don't see them selecting new seats every three years. In that sense, there's a lot more incentive to innovate in the aviation industry."

THE OUTSIDE WORLD

Speaking of other industries, does Lee draw influence from outside the aviation world? "I'm aware of things happening in the aviation industry, because from my other designs I have gotten to know the limitations and regulations, cabin dimensions – all these constraints.

"Any inspiration from other industries is mostly on styling. For example, if I want to style my seat to look very residential, then I might look at that type of furniture."

However, Lee's work is aviation-centric, because his USP is in the usage of space. "No other industry takes space so seriously as aviation. In that sense, I get a lot more inspiration from other products in aviation than any other industry."

So we know Paperclip's designs are innovative, but the big question is, when will we see them enter the commercial world? Lee is hoping to license his designs to seat manufacturers, with a focus on the Butterfly Convertible Seat.

The design is complete, and a full-size mock-up of the seat is currently being constructed at Paperclip's studio, which will be ready in mid-2015. In the meantime, Lee is talking to airlines and manufacturers and promoting his work through his many awards wins. As he says, "it's a long road ahead", but we have a feeling we'll be hearing more from the plucky Paperclip soon.



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看雲起時 王維

CHINA AIRLINES AND A TOP TAIWANESE ARCHITECT DREW INSPIRATION FROM THE SONG DYNASTY TO DESIGN ONE OF THE MOST **BEAUTIFUL BOEING 777 INTERIORS EVER** CREATED, WHERE ART MEETS TECHNOLOGY

Words by Adam Gavine

DHP





CHEN'S CHALLENGE

The China Airlines NexGen project is an impressive entry into the world of aviation design. We asked Ray Chen how he found his first aircraft interiors project. "For an architect, aviation is quite a challenge. When I started the project I had very little knowledge about aviation, but when you are designing you are learning. I found [in aviation] that people always say 'no' to you as they are quite conservative and engineering-based. Even when I ask to see a blue color, they only show me

a single blue and say 'take it or leave it'. For my design projects on the ground, if I asked people to show me a blue they would show me maybe 10 or 20 shades and ask me to choose. There are a lot of limits in the air, and for me it was quite a challenge.

"I am not a designer of cars or aircraft, but I wanted to create a lifestyle in a single journey. I imagined a boutique hotel and thought about when you welcome people and when people stay, how do you want them to feel? Likewise, when people leave the aircraft, what memory will they take away? That is what I wanted for this project."





OFFER TRAVEL AND CULTURAL WORKS, CHOSEN FOR THEIR ABILITY TO BE READ IN THE DURATION OF A FLIGHT

"Showing the culture behind the business of China Airlines is important"





hen Boeing CEO Ray Conner tells a designer that his is the most beautiful B777 interior he has ever seen, you know the aircraft is something special. The aircraft is the Flying Oasis, the first of 10 B777-300ERs being delivered to China Airlines, the interiors of which are designed to be a theater to show the world the beauty of Taiwanese history and culture.

The designer who received Conner's praise is a new name in aircraft interiors, but not in design. Indeed architect and designer Ray Chen, a native of Taiwan (also home to China Airlines), is well known for his hotel, retail and auditoria designs, and has been acclaimed as one of the most influential designers in Asia.

There is a world of difference between designing for the ground and for the air, but Chen's philosophy and love of Taiwan attracted the airline to him. In fact, it was after China Airlines executives saw Chen being interviewed on a television program, talking about how he would like to take on some new design challenges that would still allow him to incorporate Chinese culture, that he received a phone call. A two-hour conversation later, Chen was the design lead for NexGen, the airline's initiative to create a new brand personality based on 'elegance, sincerity, competence and innovation'.

Passengers in the 358-seat B777 – a 24-month interiors project – can take a journey through Chinese and Taiwanese culture, specifically the Song dynasty of 960-1279CE, which was a time of technological, cultural and artistic innovation for China.

"I am very fond of Song dynasty artwork. The civilization of the Song dynasty is a peak in Chinese culture and history," explains Chen. "Showing the culture behind the business of China Airlines is important."

Song artworks particularly appeal to Chen as an architect, as their simple style can be mixed with more





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CHINA AIRLINES



THE USE OF PERSIMMON WOOD GIVES THE BUSINESS CLASS A DISTINCTIVE LOOK AND FEEL

contemporary design. "The concept of minimalism originally came from the Song dynasty," says Chen. "People accept and understand the designs immediately, so they don't need any translation. Sometimes Westerners don't really understand Oriental and Asian culture, and that's why Song is a good base. Song is also very easy for passengers from Korea and Japan to understand."

SKY LOUNGE

China Airlines has the first B777 with the new Premium Arch option, which gives a Dreamliner-like effect at the Door 2 entrance. The soaring architecture with integrated mood lighting is a great backdrop for the Sky Lounge, a galley area that also serves as an inflight social area for business class passengers, where East meets West.

On the port side of the monument, guests can get a taste of Taiwanese culture in the Eastern 'Literary Teatasting Area', which offers six teas from Taiwan, while BELOW: THE AIRLINE WORKED WITH PANASONIC TO CREATE A CUSTOMIZED GUI FOR THE IFE BELOW RIGHT: PREMIUM ECONOMY FEATURES POWER OUTLETS TO SATISFY GADGET-HUNGRY PASSENCERS

"The concept of minimalism originally came from the Song dynasty"

the Western 'Fashionable Coffee Area' on the starboard side provides coffees and pastries. The bar in the middle offers cocktails, tapas and cup noodles, and symbolizes a meeting of cultures. The aisle sides of the walk-up bar feature bookshelves with a selection of Chinese and English books of the month.

The idea is that passengers will feel as if they are relaxing in a refined Taiwanese teahouse or at home, in a setting of literature and taste. The feeling is accentuated by the persimmon wood veneers on the monuments, which are carried through to bulkhead walls, lavatory walls, and the table finishes on the business class seats.





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"The airline needs to see how every space can earn money"

Chen explains his design for the area: "We tried to create a platform to tell people about Taiwanese culture through tea, food and literature. An aircraft is a stage, a platform, and people can learn about the culture of Taiwan on this platform. So we have some English books on Taiwanese culture that can be read in about two hours."

Chen takes some credit for the idea of the Sky Lounge, which he created with AIM Altitude, explaining that as a frequent flyer he noticed that on long flights people would either sleep or watch the IFE, which he found rather boring options. He was keen to have a social area, but one that has a second function, for space efficiency.



BELOW: THIS REMARKABLE AIRCRAFT IS A GREAT PLATFORM FOR CHINA AIRLINES TO LAUNCH ITS PREMIUM ECONOMY PRODUCT



"I couldn't just ask to have seats taken out for a new idea. The airline needs to see how every space can earn money, so I had to fight for every space, every detail," says Chen.

RESTING PLACE

Passengers in the 40-seat business cabin enjoy a lightly customized B/E Aerospace Super Diamond seat. It's a popular choice of seat, but the airline has made it its own through Song-inspired patterns and textures on the textiles, persimmon wood table surfaces and a lamp that wouldn't look out of place in a tearoom. The style was influenced by a poem by Song dynasty poet Lu You, about the resting places of travelers.

As Chen explains, "The seat is a special design for China Airlines. It is not a revolution of the seat design,



SOCIAL LIFE

The B777s are fitted with Panasonic eX3 IFE, with 18in HD touchscreens in business, 12.1in in premium economy and 11.1in in economy, on which the Song dynasty artwork theme is carried through on the custom GUI.

There is a huge amount of content available and options to create a playlist, so your entire flight's entertainment can be planned before takeoff. China Airlines conducted research into what passengers want from IFE, and found that in addition to movies, TV and music, passengers want destination travel guides (10-25%), electronic books and magazines (10-19%), online shopping (10%) and online games (11-19%).

The airline offers all the above, plus a 3D moving map, but having also seen some interest in inflight social media, and following further research from IMS, the airline also decided to try something new: a Seat Chat social networking feature. It works in Mandarin, English and Japanese using the keyboard or the Chinese handwriting function on the touchscreen (which took 18 months to develop), and allows passengers to message one another and share their favorite content from the system.





but we took a lot of time to modify many small details. seem wider than with other airlines, including removing shoulder-level stowage, altering the angle of the shell and creating more storage space. People travel with a lot of electronic devices, so we modified the space so that they can stow and charge them. We couldn't make big changes, but for some small functions we made modifications."



but we took a lot of time to modify many small details. For example, we made slight adjustments to make the seat **The airline is the first to** license Air New Zealand's Skycouch design"

FCONOMY

The B777-300ER also debuts China Airlines' premium economy class. The 62-seat cabin features fixed-backshell seats with adjustable leg rests and 39in of legroom. There ABOVE LEFT: ANOTHER FIRST FOR THIS AMAZING B777: THE SKYCOUCH ECONOMY BED ABOVE: RANDOM SEATS IN ECONOMY ARE TRIMMED IN A DIFFERENT COLOR

ABOUT THE TEAM

Ray Chen is one of a team of internationally renowned Chinese designers brought in to create different elements of China Airlines' new brand image

Chen, who is leading cabin design, is the only Taiwanese architect to have won the Design for Asia Award three times. In the past, Chen has worked under famed architect Tadao Ando, and weaves Eastern aesthetics into his modern and minimalist designs, which include the Sanxitang Teahouse at the National Palace Museum, the main

hall of the National Theater and Concert Hall, and the Eslite Bookstores.

Chen is joined by William Cheung, Oscar-nominated costume designer and winner of 11 of Taiwan's Golden Horse Awards, who is designing China Airlines' new uniform. Chen Chun-Liang, shortlisted as one of the top 10 designers in the Tang Prize, also known as the Asian Nobel Prize, will give the inflight utensils a new look. Meanwhile Viola Chen, a winner in Italy's 11th Grandesign Etico International Awards, will design exquisite inflight amenities.

are several dedicated storage spaces, including a compartment for tablets to the side of the armrest, and a stowage space between the seatbacks in front suitable for phones and spectacles, which is illuminated by a reading light. The tray tables have adjustable tablet holders, and when folded, a smaller snack tray can be extended to hold cell phones or cups. Of course, to complement all this PED stowage, each seat comes with a USB port and power outlet.

In the 256-seat economy cabin, Zodiac slimline seats have been specified at a 32in pitch, with dark seatbacks and Song dynasty prints. To add visual interest, the occasional seat is trimmed in red.

More interesting still, the first 10 rows on the starboard side are Family Couch seats. The airline is the first to license Air New Zealand's Skycouch design, in which the leg rests on a triple seat can be raised to create one flat 180° flexible space. When this option is booked, the crew add a special seatbelt, pillows and blankets to create a bed-like feel.

One cabin, many options, and many types of traveler: does Chen's design bring them all together? "Going back to the Song philosophy, I cannot control the whole spirit but I do not want to lose my direction. Therefore there is one single conscious theme linking the whole design."



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IN THE BAGG WHETHER A FEW ESSENTIALS IN ECONOMY, OR DESIGNER LUXURY IN FIRST CLASS, PASSENGERS HAVE

DESIGNER LUXURY IN FIRST CLASS, PASSENGERS HAVE GROWING EXPECTATIONS OF AMENITY KITS. WE ASKED A PANEL OF AMENITY EXPERTS WHAT'S HOT, WHAT'S NOT, WHAT'S ESSENTIAL, AND WHAT SHOULD BE LEFT IN THE STOCKROOM

Refreshing Towel

Earplugs

Dental Floss





What items are considered a real luxury?

JAMES MARLOW

"Three items stand out in every international passenger survey: brandname bags, recognized brand cosmetics and quality pens. They all share a 'second life', being used in the passengers' daily routine, though the cosmetics are mostly used on board. Bags find their way into women's purses or carry-ons to hold make-up, and men's gym bags for shaving or bathing kits, or to hold electronic items and cables. Pens have been mostly replaced by technology, but are still needed to complete immigration forms at arrival."

SHAI LEVY

"None of the items are luxurious per se, it is the attention to detail and thought that makes the difference. A good quality, well-designed and thoughtfully curated kit will provide a special experience."

PAULINA CHALITA WHITE

"Some items are considered a real luxury, but more than specific items, luxury is more often perceived by the quality of the items. You can include the same item in economy or first class – socks, for example. However, in this example, the perception of quality depends on the material, thickness, length and even color. Nevertheless the most upscale first class kits offer some extra items to pamper passengers, such as cologne, shaving cream, aftershave, shoe bag, deodorant, make-up remover, vanity kit, mirror, nail file, lint brush, etc."

MARK RUSSELL

"From our experience it is as much about the bag as the contents. Leaving the passenger with a well-made bag or satchel is a way for an airline experience to remain with the customer long after the individual products have been used. In addition to the bag, the products that receive the most praise are luxury lotions and cosmetics that are designed to take the passenger's mind off the fact they are on a long-haul flight."

THOMAS G MOCKLER

"High-quality cosmetic items and products add to a luxurious image and presentation. These designer brands present themselves to passengers that may or may not have been exposed to them in the past."



PINAR MEITZER

"Luxury items are defined by the brand chosen for the products. High-value brands for all items, from basics to cosmetics, improve the well-being of passengers. Passengers also feel indulged with high-quality materials. Slippers, pajamas or perfume would be items to be found in a luxury amenity kit range."

ROLAND GROHMANN

"Amenity kits are concepts in constant evolution. Obviously cosmetic brands are a kit's contents key differentiator, and hence the most scrutinized by passengers. So the challenge remains to be accessible to the budget of a complimentary kit whilst enhancing its perceived value. Nowadays, the trend shows preference for less cosmetic items but in larger sizes, which helps relate to the retail product. Whilst some items have come to stay (lotion, lip balm, mist/facial spray) others such as EDTs are generally disappearing due to the tendency of passengers to prefer using their own fragrance."

> AMERICAN AIRLINES HAS INTRODUCED A LIMITED EDITION RETRO RANGE WHICH HONORS AIRLINES FROM ITS PAST. THIS KIT RECALLS TWA



YILMA KASSAYE Zodiac Aviation Support



SHAI LEVY
Seventy Eight Percent



NELE WALLAYS Harmony



ROLAND GROHMANN *Formia*



PAULINA CHALITA WHITE Global Inflight Products

Do passengers expect an amenity kit, even in economy?

JAMES MARLOW

"Absolutely! Economy class passengers are the ones that need them most! Even LCCs have accepted that passengers have an expectation for such small comforts as eye shades, earplugs and – at least – a mouth wash set. This is especially true of Middle Eastern and Asian airlines, where their passengers' expectations of service are demanding."

SHAI LEVY

They certainly expect them in first and business class; not receiving one would be considered a let-down. In economy, while not expected, being given a kit would be a pleasant surprise."

PAULINA CHALITA WHITE

"Depending on the airline, the flight length and destination, passengers still anticipate the excitement of an amenity kit. It's always important to keep it new and fresh, particularly for frequent travelers. Business and first class passengers definitely expect kits, especially on long hauls, whether for pleasure or business. Economy passengers may not always expect them, but amenity kits are certainly a fantastic way to make them feel special, especially during longer flights."



SPIRIANT CREATES A NEW VERSION OF THE RIMOWA AMENITY KIT EACH YEAR

MARK RUSSELL

"The use of amenity kits varies drastically across airlines, but I would say most passengers on long-haul flights expect some type of amenity, regardless of cabin class."

THOMAS G MOCKLER

"Depending on the duration of the flight, passengers that sit in the front of the aircraft do expect some form of a useful kit. Many of these passengers prefer to have a product that can be used after the flight. The proliferation of electronic devices has made the amenity bag an interesting opportunity to also be used as a useful holder for such devices (an iPad cover, for example).

PINAR MEITZER

"It depends on the market. Passengers on flights within Europe mostly do not expect a kit, whereas those on long-haul flights might. However, it is always advisable to give passengers travel choices and give them the option to purchase amenity kits and other comfort items, whether through in-flight shopping or when purchasing the ticket."

NELE WALLAYS

"First and business class passengers will expect an amenity kit, even on daytime flights. In economy class, an amenity kit will be very well received but is not expected, with the exception of long-haul flights of eight hours or longer."

How important is investment in amenity kits?

YILMA KASSAYE

"Airlines are spending billions of dollars in replacing their fleets with state-of-theart aircraft. However, airline customer experiences are affected by simpler investments, such as legroom, updated and varied IFE content and – especially - comfort items such as amenity kits. This is especially true for long-haul services, where customers appreciate the opportunity to refresh, refresh their breath and apply lip balm at the end of a long, dry flight. Most customers will also carry their kits off the plane with them – one of the very few opportunities that airlines have to create a lasting impact. This is why we advocate considering these expenses part of an airline's marketing budget rather than as simple operating costs."

SHAI LEVY

"It is very important for an airline to invest in making its customers feel special, and to enhance their travel experience. Amenity kits provide a great platform for that."

PAULINA CHALITA WHITE

"An airline's investment in amenity kits is vital, particularly on flights where key amenities are expected. They are part of the onboard experience during longer flights, when passengers can relax, dream and enjoy the airline's service.



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AMENITY KITS

THAI AIRWAYS' FIRST CLASS PASSENGERS ARE PRESENTED WITH A MINIATURE RIMOWA TRAVEL CASE, WITH SEVERAL COLORS TO COLLECT

3

It is critical to present a 'gift', something remarkable that exceeds passengers' expectations, eases their trip and differentiates the airline from the competition.

MARK RUSSELL

"When airlines make decisions about the level of investment in amenity kits, it typically boils down to the overall onboard experience the passenger garners, both during and after the flight. Often this opportunity is paired with furthering the airline's brand and rewarding premium-class passengers with more luxurious amenities."

THOMAS G MOCKLER

"We believe it is an investment for an airline to present quality kits and contents that show they genuinely appreciate their passengers' business and care for their comfort during their flight. It should be presented as a gift to show appreciation."

PINAR MEITZER

"An investment in amenity kits benefits the airline by being a unique branding opportunity. The inflight experience is not only made more comfortable, but the passenger also carries the brand home in the form of the amenity kit. It is therefore crucial that an airline's brand identity is reflected in the kit, while it also helps create a memorable flight experience."

NELE WALLAYS

"For a passenger, cabin interiors often look very alike, so how can they define value? The amenity kit is one of the key elements on board for building brand value and for connecting with the passenger in a very personal and direct way. The amenity kit is a bit of luxury and fashion onboard that excites and wows the passenger.

3

ROLAND GROHMANN

"The amenity kit has become a key indicator of an airline's commitment to enhance comfort on board. The brand of the kit, the quality and the items included influence the perceived value of the kit. This is directly related to the passengers' perception of the airline's level of customer care, pampering and indulgence. Airlines are realizing the communication power that lies in amenity kits. Amongst all the complimentary items that make up the service on board (food, blankets, pillows, etc), amenity kits are the only one that passengers are meant to take with them after the flight. So the opportunity rises of servicing passengers' comfort not only on board, but also after the flight.

Is a designer name important?

YILMA KASSAYE

"Designers and airlines understand that brand recognition is a powerful tool, so both airlines and designers actively seek marketing alliances for this purpose. We actively seek to foster marketing alliances."

SHAI LEVY

"Good design, product and story are more important than a brand or a logo. Putting a designer name on a generic pouch or item is a mistake. Amenity kits give airlines an opportunity to introduce their passengers to an array of great brands and products. Designer-named pouches will create an impact only if their designs are original and actually reflect the designers' DNA – even more so when there is an alignment between the airline and the designer brand's values. In such cases, the brands an airline chooses to partner with add an interesting angle to its own branding."

PAULINA CHALITA WHITE

"The most important goal is to deliver a quality product that enhances the perception and inflight experience of the airline brand. You want the passenger to feel the difference, to feel pampered, as if someone really selected these products for you. A designer name can improve perception, but it's not a necessity. It's more important to focus on quality and to introduce something new and unique to this captive audience, especially to the frequent flyer who has seen it all. Today there are many high-end brand-name amenities using low-end cosmetics. In these cases the airline is only paying for the name."

3

MARK RUSSELL

"Airlines have the option of supplying a well-known brand name or using their own branding when it comes to amenity kit contents. Each approach has its own advantages; however, leveraging the reputation of a designer's products is a way for airlines to align their brand with a perception of luxury. That said, an airline should never discount the value and strengths of its own brand."

THOMAS G MOCKLER

"A designer name on any product increases perceived quality. So with quality products and a designer brand it can increase overall value. However, it's not always necessary if the kit and container are well made using quality materials."

PINAR MEITZER

"Airlines with a strong brand and brand identity prefer to have their own branded products, while other airlines choose to cooperate with famous brands to highlight their products and add value to them and their brand."



THIS KIT FROM INFLIGHTDIRECT USES ALL NATURAL MATERIALS FOR THE BAG AND ITS CONTENTS

NELE WALLAYS

"All cosmetic items (including luxury shaving sets) with an international brand name are perceived as a real gift. Wellknown brands with high-end market positioning are key. If an airline's budget allows, the brand name will help to differentiate them from the competition and to strengthen the airline's brand personality. Airlines are stepping away from offering separate brands, each with its owns terms, image and market positioning. The choice of brand for amenity kits and relevant comfort products and services in all classes is becoming more of a design statement."

What are the most important items to include in a kit?

NARIEMA HAZRATALIE

"The essentials should offer a balance between comfort and hygiene. We suggest our customers include earplugs, eye shades and a scented refreshing towelette for short-haul flights. For long-haul flights we suggest earplugs, eye shades, a dental hygiene kit, tube socks and lip balm.

SHAI LEVY

"An eye mask and earplugs are crucial for people like me who try to get some rest on board. A toothbrush and paste make the journey pleasanter for myself and the people I travel with. These are my must-haves."

PAULINA CHALITA WHITE

"The must-have items are earplugs, eye mask and socks; the addition of a toothbrush, toothpaste and cotton buds [Q-tips] is a plus. A refreshing towelette, pen, tissues, mints... these are some of the extra items that passengers also appreciate."

MARK RUSSELL

"In my opinion, an eye mask, earplugs, a pen, mints, a toothbrush and toothpaste are the most important items. Airport security restrictions for carry-ons and accessibility to those items during flight are important to keep in mind when deciding what to include in any amenity kit."

THOMAS G MOCKLER

"The more important items in these kits is a balance of a functional container combined with useful, quality items that can be used inflight to increase comfort. InflightDirect believes, and has always believed, that amenity kits need to have a use onboard as well as after the flight. This can prove to be a useful tool for both airline marketing and passenger appreciation."

PINAR MEITZER

"The basics items to include are an eye mask, socks, earplugs, toothbrush and paste. On top of these, sleeping items and personal care products are appreciated, such as lip balm or hand cream. Cosmetic products that can also be used after the flight are valued. Amenity kits should, however, be designed personally, addressing the individual needs of each airline and its passengers."

NELE WALLAYS

"Dental set, earplugs, eye mask. It is also absolutely essential to have specific kits for males and females."

KIDS' KITS

Entertainment kits are becoming increasingly popular – after all, a happy child can mean a happy cabin! Jane Goring is director of Silver Squiggle, a supplier of children's 'edutainment' kits, which include exciting inflight packs, fun at mealtimes, turn-down surprises, out and about activities and, most importantly, happy memories.

Goring explains, "A child's kit is a relatively low-cost way for an airline to demonstrate to all passengers that it recognizes it has a duty of care to provide some form of entertainment – especially for two- to seven-year-olds, as older children can often entertain themselves with books, gadgets and IFE. Of course some parents fly prepared, but if a child is given something it enables airlines to engage with customers by improving the brand experience."

So what items should an airline include in a children's kit? "It is vital to give a child something to do. Airlines often make the mistake of spending all their budget on a bag or rucksack – great for brand visibility, but pity the poor parent who ends up with even more bags to carry off the aircraft, and pity the poor child that gets a bag with nothing to 'do' inside.

"What a child wants is something to play with (quietly of course), such as coloring books, puzzles, games and a small keepsake toy or collectable – ideally something unique and special, and definitely educational. No parent wants cheap plastic rubbish, so if they feel their child has been given something well thought out, everyone is happy."

While mummy and daddy might like Armanibranded amenity kits, is it worth investing in a branded kids' kit – SpongeBob perhaps? "The problem with known names is twofold. First, a licensing fee can bite a big chunk out of a small budget, leaving little for the kit itself. Second, they do go out of fashion and the last thing an airline wants is a warehouse full of kits that feature yesterday's hot character," explains Goring.



Supplier of the Year 2013


CORDING TO CHINESE TRADITION, WHEREVER THE PHOENIX FLIES, THE RESIDENTS ARE BLESSED WITH PHOENIX FLIES, THE RESIDENTS ARE BLESSED AS THEY TY IN CABINS THAT BLEND CHINESE ART, TRADITION AND FOLKLORE WITH AN INTERNATIONAL FEEL

Words by Adam Gavine. Artworks by Han Meilin



ir China's latest interiors project is a special moment in aviation. It is a Boeing 747-8i scheme, sadly a rare sight as Lufthansa is the only other airline flying the intercontinental Queen of the Skies. Even more special, the seven aircraft in the fleet will have interiors that incorporate traditional Chinese art to tell a story in which the passenger is flying through the clouds, carried on the wings of the phoenix flying high in the sky.

The airline commissioned Chinese artist Han Meilin to create the artwork for the interiors. Han was a particularly good choice, as in addition to being an artist of no little renown in China and around the world, in 1988 he designed the airline's logo, which cleverly combines a phoenix with the letters 'VIP'.

Air China also brought in JPA Design to collaborate with Han,

BACK ON EARTH

Air China has also completed airport lounge projects in Shanghai and Beijing. The Shanghai lounge is set over two floors, with a 20,000ft² space for business passengers and 7,000ft² for first class.

The lounge designs reference Air China's brand colors and specially commissioned patterns by Han Meilin, again blending Chinese heritage with an international feel. The first class lounge in Shanghai and the Air China Lounge in Beijing feature articulated curving timber screens to separate the dining and bar areas from the quieter, more relaxed lounge areas while also creating a sense of privacy and exclusivity.

The lounge projects were designed by JPA Design. Sim Kim Chui, product innovation director at JPA in Singapore explains, "Air China wanted a very coordinated look, so it wanted the lounge to be a very similar experience as in the new aircraft cabins. Some of the cabin elements are used on the ground, such as the divine cloud and terra cotta design."

"The passenger is carried on the wings of the phoenix flying high in the sky"

THE VENUS SEAT MAY BE STANDARD, BUT CLAD IN HAN'S BEAUTIFUL ARTWORK IT LOOKS ESPECIALLY STRIKING to translate his work into the aircraft interior. This isn't the first time that JPA has worked with Air China, as the firm has designed lounges, and a partial interior scheme for the airline's B777s launched in 2012. There wasn't time for a complete scheme on the B777s, but as the B747 design work began in late 2012, there was time to perfect the complete scheme for the B747, which ties in with the lounges for a seamless transition through the Air China experience.

The project is purely CMF: the architecture, seats and configuration were all pre-selected by Air China (including some Dreamliner-style architecture options), so the project shows what can be achieved through pure CMF work, with no hard product customization.

We spoke to Sim Kim Chui, product innovation director at JPA's Singapore office, and the studio's lead on the Air China project. Prior to joining JPA, Sim was VP of product development at Singapore Airlines, where he worked for nearly 20 years, so his cabin design credentials are impeccable. He explains how the studio collaborated with Han: "Air China brought Han in and he was responsible for coming up with the Chinese culture elements, while we put together the cabin scheme,



BUSINESS BUBBLE

Air China's B747-8i has a slightly unusual configuration, with its 12 first class seats located not in the nose, but behind business class. This allows the luxurious Venus seats from Zodiac Seats UK to be fitted in, while also giving the 24 business travelers in the nose and the 30 in the upstairs bubble a real sense of occasion as they recline in B/E Aerospace Diamond seats. Behind first class is a premium economy cabin featuring 66 Star Plus seats from B/E Aerospace, and behind that the economy cabin, accommodating 233 passengers – again with the Star Plus seat.

incorporating those elements. Air China wanted something that reflected Chinese culture, but with an international feel."

This international feel is important for routes such as Beijing to New York, but as Sim says, "In some ways this was the most difficult part because you have to strike a very good balance."

Han created artwork specifically for the Air China interiors, including a phoenix in flight and a divine cloud, creating soft, dream-like images in a calligraphy style. The patterns depict three traditional Chinese cultural elements – beautiful clouds, pottery pieces and the auspicious phoenix – which represent heaven, earth and

ABOVE: BUSINESS CLASS IS LOCATED IN THE NOSE AND THE BUBBLE OF THE B747 BELOW: DIFFERENT SCALES OF THE PHOENIX PATTERN CAN BE SEEN IN THE ECONOMY SEAT COVERS AND CUSHIONS



flight respectively, conveying the message that heaven, the land and man are in perfect harmony in a peaceful and happy world.

However, it was not a simple case of printing and stitching that art on to various textiles and laminates. This is where JPA's aviation design expertise was crucial. "Han painted a few hundred artworks, but only a few were shortlisted for us to experiment with. We selected those that we thought had a good balance for that international feel, and those that worked well with the colors we had in mind," explains Sim. "Some of the calligraphy-style phoenix designs cannot be replicated well on a fabric, because on a fabric the pattern has

> to be repeated. Some of the designs have a lot of empty space, which also didn't work out well. The weaving process, by its nature, may not be able to capture the dynamism of the phoenix."

However, after many modifications the artwork was finalized, with styles and scales appropriate for cabin materials. The textiles feature the artworks in different scales between the seat fabrics and soft goods, and in different colors throughout the aircraft, from first, to business, premium economy and economy. "The idea is that you don't see the same design everywhere, but you can see that they are all from the same family. There's a theme that runs through the whole aircraft and



JPA DESIGN

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THE HAN DYNASTY

Mr Han Meilin's first work with Air China was back in 1998, when he was commissioned to create a corporate logo for this new airline. Given that the phoenix symbolizes beauty and auspiciousness, happiness and harmony, as well as flight, the phoenix was always a strong contender for the logo. However, Han was particularly inspired by the head of a Han dynasty (206BC-220AD) bronze stick unearthed in Jinning's Shizhai Mountain in Yunnan, on which a number of parallel lines had been turned into a phoenix pattern. Han made the parallel lines into not only a phoenix pattern, but the letters 'VIP'. Chinese red was selected as the logo color, as in Chinese culture it implies auspiciousness, completion, peace and happiness. The logo is applied to the tailfin of the Air China fleet, with the fuselage including a Chinese flag and the airline's name in English and in Chinese calligraphy, written by former national leader Deng Xiaoping.

BELOW LEFT: FIRST CLASS PASSENGERS MAY ENJOY THE NOVELTY OF TURNING RIGHT BOTTOM: THE ANTIMACASSARS IN ECONOMY SHOW THE VARYING SCALES OF THE ARTWORK

we emphasize different aspects of the design for different finishes," explains Sim.

These scales meant that sometimes only part of the phoenix was used, so while the creature features hundreds of times throughout the cabin, passengers will keep discovering the bird as they walk through the cabin during the flight.

For example, the pillows and antimacassars are printed with just a part of a phoenix, reproduced at a larger scale than on the seat covers. The decisions were made after considering the size of the cabin and its seating products. "There was no hard and fast rule. We just made sure that when you look at everything in combination it looks good," says Sim.

Meanwhile the carpets and lavatory floorings were specified with a terra cotta tile design, referencing stability and solidity, showing "the earth at your feet".

JPA briefed the fabric suppliers (Lantal and Botany Weaving) and gave them the artworks to reproduce in the seat fabrics, carpets and curtains, together with specifications of colors and weave. Similar specifications were given to the laminates suppliers (Schneller and Isovolta), and to Teague.

"Passengers will keep discovering the bird as they walk through the cabin"



Getting the patterns just right was a painstaking process that took several months. "Due to some limitations in the weaving process, Han himself wasn't satisfied. However, he understood the limitations and he adapted his designs so we can get that perfect result," recalls Sim.

From April 2011 to launch in October 2014 seems like a long time for a CMF project. Indeed it was longer than Sim expected, but as he explains, Air China was very thorough. "We built a full-size mock-up cabin complete with seats and lighting for them to test out two different schemes. They brought in management, staff, passengers and the media, and the final choice was a democratic selection."

Whether by democratic selection or divine intervention, the Air China jumbo will certainly give passengers a happy and harmonious flight, under the watchful gaze of the phoenix.





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LEFT: THE FACILITY IS DESIGNED IN AN OPEN 'U' SHAPE BELOW: IT MAY STILL BE A BUILDING SITE, BUT ZAL IS EXPECTED TO BE OPERATIONAL IN 2016

he world wants more comfortable aircraft, quieter aircraft, more fuel-efficient aircraft – but most of all, it wants many, many, many new aircraft. In 2014 Airbus and Boeing each recorded orders totalling more than 1,400 new aircraft, yet they made only 629 and 723 customer deliveries, respectively. Supporting production ramp-ups is imperative for both major airframers, and big gains in efficiency are needed allaround if they hope to keep pace with demand. Lean management, fresh thinking and even unorthodox means could well be critical to the success of these endeavors, for as the saying goes, 'If you do what you've always done, you'll only get where you've always gotten.'

In Hamburg, the world's third-largest aviation cluster site and the seat of Airbus's operations and production in Germany, a radical and exciting project is in motion that could change how we approach the process of aeronautical innovation. Many believe this venture will dramatically increase supplier cooperation to reduce development costs and lead times on the back of streamlined component integration, particularly in the area of cabins, cabin systems and hydrogen fuel cells.

The ZAL Center for Applied Aeronautical Research (ZAL being an acronym for Zentrum für Angewandte Luftfahrtfoschung) is currently under construction in Hamburg's Finkenwerder district and is to be the nerve center of this project. The impressive \notin 82 million building is scheduled for completion at the end of 2015 and should be operational by early 2016. The ZAL "TechCenter', as it is most commonly called, will bring dozens of previously segregated supply chain enterprises and academic and research institutions together with Airbus under one roof. It is hoped that by providing a safe and cooperative environment for the free exchange of ideas, along with advanced testing frameworks available for rent, innovation will come hard and fast.

"When you're a company developing a new product, in the beginning it's all ideas and paperwork, but there comes a stage when you need to integrate that product or idea into the complete aircraft structure and systems," explains Roland Gerhards, CEO at ZAL. "Because we will be sharing this test infrastructure, and because people will be able to rent it rather

than buy it, costs will be reduced for smaller companies – and even bigger ones."

There are nine main shareholders in the ZAL TechCenter, a number that increases to 200 if you consider companies *"Many believe this venture will increase supplier cooperation"*





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that belong to bigger shareholder organizations. Airbus, Lufthansa Technik and the city of Hamburg each have a 20% stake, while two representative industry groups the National Aeronautics and Space Research Center of Germany, and the Association for the Promotion of Applied Aviation Research - hold 18% and 10%, respectively. Four regional universities that are heavily invested in aviation and fuel cell research hold 3% each, creating a good balance of industrial, political and educational involvement. It is by design that no single entity has been allowed to possess more than a 20% interest in the TechCenter, as this keeps it an SME (small to medium-sized enterprise) and not a subsidiary of another entity.

AIRBUS GETS IN EARLY

"The ZAL TechCenter comprises modern offices, meeting areas, laboratories and hangar space. A modern architecture integrates these services into the building concept," says Fabian von Gleich, Airbus's head of the Hamburg site's strategy and development. "Airbus has committed to supporting ZAL since its foundation. This way of working will greatly accelerate and improve the results of our research activities. We do not expect any commercial benefit to come out of ZAL GmbH. What we expect instead is that it will increase speed and agility to bring innovation into the product."

Airbus has agreed to rent just over 50% of the 26,000m² workspace available at the facility and will move its entire 300-person research and technology team into the building. The airframer and Lufthansa Technik have both committed to donating advanced equipment including generic test rigs, full-sized mock-ups and utilities that all renters and researchers will have access

THE MAN TO KNOW: ROLAND GERHARDS, CEO OF ZAL



"The whole layout of the building is centralized around communication"

BELOW: THE OPEN CONSTRUCTION OF THE BUILDING IS INTENDED TO ENCOURAGE COMMUNICATION BETWEEN THE VARIOUS TENANTS AND VISITORS



to, starting in 2016. Up to 25 companies will be working simultaneously at the location.

In many ways, the TechCenter's office and meeting spaces are inspired by successful Silicon Valley tech companies such as Google and Facebook, which are famous for designing work environments conducive to brainstorming and creativity.

"The TechCenter think-tank culture will promote our joint and combined approach," says von Gleich of Airbus's own modularly planned office space within the structure. "An innovative workplace environment will support a new way of working by offering flexibility and dedicated areas for very specific tasks. Based on an in-depth analysis of our needs, we have created the right mix of formal and spontaneous meeting zones, communication and concentration areas, as well as short- and long-term project 'war rooms."

Shaped in a large 'U', the facility sits about 1.1 miles (1.8km) from the Airbus final production line, but not on Airbus property. This means that people working or participating in research at the TechCenter can take advantage of Airbus's extensive employee transport networks (buses, ferries, etc), yet avoid the quite rigorous security screening necessary to enter an Airbus site. As collaboration between organizations is the name of the game for ZAL, other details of the building are planned accordingly.

"We will not have doors everywhere. The whole layout of the building is centralized around communication,

communication, communication. The hangar space is open, with a large gallery that looks down inside it. We will have many windows and glass fronts, plus a glass façade on the outside of the building," explains Gerhards. He understands that this culture of sharing will initially make some people nervous. "Of course we need to protect intellectual property, that is clear, but we can't do that to the very end. That's what we think the 21st century should be all about – not only creating ideas but also exchanging them and bringing them forward in this way."

DIEHL IS ON BOARD

A number of influential parties, especially those involved in cabins and cabin systems, are keen to get on board. First-tier Airbus supplier Diehl Aerosystems has been part of the conversation since the early days of the project and has pledged to rent space in the TechCenter alongside key players such as Lufthansa Technik, Zodiac Aerospace, Siemens, Parker Fuel Cell and the Technical University of Hamburg. Tenants are now in place for 80% of the space.

"One of the deliverabilities of ZAL is a cooperation agreement accepted by all participants. Based on this, intellectual property should not be the major concern. IP ownership is no basis for success in itself – rather, it is a means to secure industrial success," says David Voskuhl, vice president of communication for Diehl. "Diehl Aerosystems will focus on the integration aspects of the overall aircraft system. A fuselage section in the form of a full barrel will be available to facilitate this approach. Working with other suppliers, academia and institutes under the supervision of an OEM will reduce developmental risks, such as late or non-availability of test beds and late design changes. This is a good opportunity to extend the front-loading aspects of concurrent engineering into research and technology."

The fuselage Voskuhl speaks of will be totally modular, with the flexibility to serve as a single-aisle or wide-body text rig, complete with cargo hold. The TechCenter will



"The 21st century should be about creating ideas and exchanging them"

also boast about 5,000m² of hangar space, an acoustics chamber, a hydrogen and fuel cell lab, various other labs, an environmental control and power systems zone, meeting rooms, places to conduct market research, video

conferencing suites, a virtual reality room, and a modular auditorium with seating for 200 people. The auditorium will have a double-floor construction, so it can be adapted for the installation of computer workstations that can relay visualizations through a server and onto the very large screen at the front of the hall.

Another of the more interesting spaces is a smaller one to the immediate right of the main entrance. The Innovation Marketplace will be an attraction of sorts, a 500m² space where TechCenter tenants can exhibit new developments and garner feedback, anonymously or otherwise, from other workers and guests.

As of mid-January, rental agreements were still being drafted between ZAL and the 10 or so renters that have already committed to taking space in the TechCenter. Although it was still too early for Voskuhl to reveal precise details about the number of people that Diehl would station at the TechCenter and for how long, or in how much office space, he did say this: "ZAL is the only institution of its kind in Germany and it will provide a great opportunity for research in Hamburg. Since two Diehl Aerosystems units are based in Hamburg, and with a lot of research and technology organizations and potential in close proximity, synergies are expected to materialize more quickly here than in any other place." \otimes

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INGO WUGGETZER, VICE PRESIDENT OF CABIN INNOVATION AND DESIGN AT AIRBUS, EXPLAINS WHY PASSENGER WELL-BEING SHOULD BE AT THE HEART OF ANY CABIN DECISIONS

Words by Marisa Garcia

or Ingo Wuggetzer, vice president of cabin innovation and design at Airbus, a focus on passenger well-being is critical when designing any elements that affect the passenger experience. This well-being is ensured by catering to the physical and emotional needs of individual passengers.

As he says, "Customer satisfaction depends on passengers feeling in control and at ease in a familiar environment that accommodates their preferences, all the way from the booking process and throughout the duration of the journey."

When designing the travel experience over the coming years, airlines will need to consider that the make-up of passengers will include increasing numbers of larger passengers, older passengers, technologydependent passengers, and female business travelers. Those changing profiles necessitate a new product design paradigm.

Rather than continuing the traditional travel class-based product model, airlines would be best served by unbundling their products, Wuggetzer suggests, creating spaces that accommodate these various passenger profiles, and increasing their focus on services that make travel easier, more familiar and less disruptive to passengers' everyday lifestyles.

EMBRACE TECHNOLOGY

"Customers will become more dependent on electronic devices to measure and control every aspect of their lives," Wuggetzer states.

Providing passengers with mobile companion apps that allow them to use their mobile devices to navigate the airport, board the aircraft and find their seat is one way to ensure a trouble-free travel experience, he says. The mobile companion app can be expanded to provide value-added services.

Airlines can also capitalize on the capabilities of PEDs, making it easier for passengers to enjoy their own content on board and remain productive while traveling. "As OLED screens become

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more widely available, airlines will be able to install these displays on seatbacks, as receivers for content transmitted by passengers' PEDs. Advanced OLEDs, as well as providing exceptional graphic resolution, will also be extremely light and reduced in thickness to little more than a sheet of paper. They will provide weight and installation requirements advantages," states Wuggetzer.

FRESH IDEAS

Consumers are increasingly demonstrating a predilection for fresh foods made with locally sourced and organic ingredients. While strides are made through the hiring of expert chefs to coordinate special menus for first and business class passengers, selection is still limited by mass-production and deliverability.

Wuggetzer suggests that airlines allow passengers to use their mobile apps to order customized meals before boarding – perhaps delivered by restaurant chains present in terminals. They could be given to passengers as they board the aircraft, packed in trays that fit directly into the seatback. This would eliminate the need for tray tables,



TOP: AIRBUS'S VISION OF 2050 INCLUDES INTELLIGENT SEATS THAT SENSE PASSENGERS' NEEDS AND ADAPT FOR THE PERFECT FIT, OFFERING MASSAGE, DRINKS OR VITAMINS ABOVE: WHEN IT COMES TO INFLIGHT RETAIL, KOREAN AIR'S A380 IS STILL WORLD-LEADING

COMPONENTS ON DEMAND

On February 10, JetBlue Airways announced plans to be the first major domestic carrier in the US to accept Apple Pay for making mobile payments in the sky, whether for food and beverages, onboard amenities or seating upgrades. The system is currently rolling out and will be available fleet-wide by June 2015. To enable Apple Pay in the air, JetBlue is deploying iPad Minis with NFC-enabled cases to more than 3,500 crew members. In addition to the cases with Apple Pay compatibility, each iPad Mini will be loaded with a custom iOS app – the Inflight Service Assistant – which will give crew members access to the customer manifest and flight data. In addition to onboard purchases, JetBlue customers will be able use Apple Pay to complete purchases in JetBlue's mobile iOS app later this year. lightening seat structures. This foodservice option would also enable smaller galleys, or even eliminate the need for them, resulting in substantial weight reduction and better use of cabin space.

RETAIL THERAPY

Wuggetzer expects the desire to shop as a method of passing the time to endure. He also believes that the consumer preference for using technology to make

purchases will increase to the point where it becomes the norm. It follows that passengers will find an innovative onboard shopping option attractive.

"The current onboard shopping experience is outdated and unappealing to consumers," states Wuggetzer. "Ads printed in inflight magazines, and products delivered on trolleys do not encourage passengers to buy."

Technology can again be put to good use here, enticing passengers to spend by making shopping on board a delight. As an example, by providing an augmented reality interface that gives the passenger a better way to visualize products, airlines could more effectively tap-in to the retail pleasure principle.

Furthermore, he suggests, if technology is used to reduce the galley requirements for meals, the available space could be used to provide an attractive onboard shop, more in keeping with a boutique experience.

Wuggetzer also points to a passenger preference for home deliveries of purchases. Ensuring that passengers can have items delivered, instead of having to carry them around as they travel, may encourage more shopping. It could also result in reduced demand for stowage space. "Allowing passengers to 'screen-shop' items to be delivered to their door also provides a novel buying experience and makes it easier to complete purchases, which in turn encourages more buying," adds Wuggetzer.

"There is room for improvement by analyzing the ergonomic properties of seats"

COMFORT FACTORS

Passengers suffer a number of complaints, including aching bones and joints, dry skin, nerves and jetlag. Aircraft interiors innovations should be focused on reducing or eliminating these conditions.

Inevitably, when discussing aircraft interiors, seats are a focal point. Lie-flat beds are great in first and business class, but as Wuggetzer says, "There is still room for improvement by carefully analyzing the ergonomic properties of seat

structures. Manufacturers, designers and airlines should work with OEMs to identify and install seating that molds to the body, providing improved support," he adds.

Passenger sizes vary, so seat sizes should as well. While Airbus proposes that the standard economy seat should be 18in (46cm) wide to provide enhanced comfort for the increasing number of larger passengers, airlines may find it attractive to provide variable seating. In the past Airbus has suggested that an extra-wide seat located at the aisle side of an economy triple (17in-17in-20in) might be an attractive option for airlines, allowing them to sell preferred larger seats in economy at a premium. Wuggetzer feels this proposal continues to have merit, though there are other ways to accommodate customers of various sizes in the economy cabin.

One solution, which would allow airlines to configure the aircraft for varying passenger sizes on a particular flight, would be a bench seat used as a 'flex seat' space. This seat would have armrests that could be adjusted according to passenger needs for seat width.

RAY OF SUNSHINE

Wuggetzer identifies cabin lighting as a great opportunity to ensure passenger health and well-being. Recent improvements have the potential to greatly reduce stress and influence the perception of space in the cabin. He tells us that when the intensity and wavelengths of that lighting are properly coordinated, there is an improvement in relaxation, and that providing lighting solutions that generate beneficial 'natural' light would reduce the negative health impacts of air travel.

OLED foil innovations will also contribute greatly to this aspect of the cabin environment. They are already in use as a design element in high-end bars and hotels, and manufacturers such as Philips continue to enhance and



VIRGIN AMERICA HAS EMBRACED THE IDEA OF MULTISCREEN IFE

improve on them. "While the current cost is prohibitive for aviation, and the certification process to bring such innovations on board might take time, the technology could enhance the cabin environment," says Wuggetzer.

As product improvement continues, this feature is likely to become much more economical. There will also be sufficient information on the performance of OLEDs to facilitate certification. When this development becomes more practical, it will enable airlines to install OLED sheets on galley walls and overhead ceilings, which could project moving, high-resolution images of open skies and clouds, for example, to generate a greater sense of space and a cabin that feels alive and less confining.

Climate control is also a factor of well-being, Wuggetzer states. "The industry should focus on innovations that deliver better control of temperature and humidity in the cabin. In the ideal aircraft of the future, each passenger will be able to control the amount and type of light they receive, as well as their preferred temperature. In the interim, there are opportunities to improve on existing systems."

THAT'S ENTERTAINMENT

Wuggetzer feels that multiscreening will become more important in IFE. He believes that ensuring effective interfaces between the screen or screens installed on the aircraft, and the passengers' own PEDs, is essential. Further developments in wi-fi connectivity will allow these connections to be automatic, eliminating the need for special adaptors or connectors.

Wuggetzer suggests that the industry look to current innovations such as Google Glass for inspiration. He refers more to enhanced-reality and the responsive nature of the interface than to the device itself.

"Passengers will want more than films and TV as entertainment. They may at the same time want to play a game related to the film franchise, or search for more information on the actors or for other entertainment related to a particular genre," he says. "They may also want to access an online store to download the ebook of the film to their PED. They may even want to do all of this while updating the spreadsheet they need to complete, or the trip report they have to turn in." @

BAMBOO AND BONES Aircraft interior materials manufacturers could be inspired by bamboo and bird bones, suggests Wuggetzer. Both of these natural products share similar structural advantages, with forms that are strong and sturdy while also being very lightweight. Innovative product developments for aircraft cabin interiors should look closely at these natural materials to influence design.



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BELOW: THE CL6710 WILL BE SHOWN WITH NEW AND ENHANCED

COMEORT FEATURES

updates



O NEWS 2015

STAND: 7B20

Recaro to reveal second business model

Recaro drew a lot of attention at last year's Expo with the premiere of its CL6710 long-haul business seat. For 2015, the company will again be placing an emphasis on innovation in business class with the reveal of its new CL5710 seat for shortand medium-haul flights, which is designed to combine comfort and efficiency.

Based on the CL4420 model, the new seat has a modern design and offers, among other features, a new leg rest, increased stowage space, and integration of the latest IFE systems.

Recaro will also be showing new comfort features for its CL6710 long-haul seat, and the latest product developments in its economy range - from short-haul to long-haul.



STAND: 5D48

ZIM reports growth in premium economy

The year 2014 saw German seating supplier ZIM Flugsitz focus on its new premium economy class range of seats. The company delivered its first 35 shipsets to Lufthansa, and in parallel, ZIM's engineering division started the design



work for Singapore Airlines' premium economy seat, which will go into service in August 2015.

ZIM focuses on environmental aspects across its entire product portfolio, from the short-range EC-00 economy seat, to its fully IFE-equipped economy, premium economy and business seats. Highlights in Hamburg will be the high-end premium economy seat and a new economy seat, which was developed to meet the requirements of single-aisle aircraft. The company is also focusing on meeting an increasing customer demand for customized seats.

ZIM Flugsitz is able to issue STCs for retrofit programs at short notice, saving airlines time and money.

LEFT: THE EC-00 SHORT-HAUL ECONOMY SEAT, LAUNCHED AT HAMBURG LAST YEAR

STAND: 5B21

NEW NAME, NEW SEAT

Following its merger with Aerolia, Sogerma will be present in Hamburg under the new name Stelia Aerospace. The merger reinforces an already strong team of 150 design office staff, enabling the company to raise the bar of design and innovation.

Stelia says that customization lies at its heart, and its cabin interiors business line will be presenting updated incarnations of the Celeste and Solstys product lines.

The major news at Stelia's stand is that it will be formally introducing its new Comet business class seat, following the unveiling of the concept in 2014.

Stelia also invites customers to explore its vision of the future, with new materials, ideas and concepts that it says will change the way that you look at the cabin.





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STAND: 5A40

POSITIVE TIMES AT ACRO

With seats entering service in 2015 on Condor, Thomas Cook, Frontier and Spirit aircraft, and with its first Airbus line-fit program completing later in the year, Acro Aircraft Seating is enjoying continued success.

At Hamburg this year the company will be showing its full seating range, including a new

STAND: 7D50

premium economy product as well as a completely redesigned fixed-back seat, both due for delivery in 2016.

In other news, the company beat off competition from other shortlisted finalists and was announced as winner of the Export Award in the UK's Made In The South East awards 2014. When accepting the prize at the awards ceremony and gala dinner, Cameron Allan, Acro's commercial director stated, "It's great that everyone's hard work has been recognized in winning this award. Eighty-five percent of Acro's seats are exported and we source from an entirely UK-based supply chain."

Acro was also a finalist in the SME Manufacturing Company of the Year award

Have a Qantas experience

Fancy a taste of Australia? Among the rest of its range, Thompson Aero Seating will be exhibiting the Vantage XL Suite, as customized for Qantas, at the Expo. Designed in collaboration with Marc Newson and customized exclusively for Qantas, the seat introduces a number of new innovations, including a 'relaxed lounge position' that has been certified for taxi, take-off and landing, enabling Qantas business class customers to maximize their rest time from the moment they board the aircraft. Other features include a generous 23-24in seat width, a fully horizontal bed length of 79-82in, easy access to the aisle, extensive work surfaces, and a wide range of personal stowage solutions. The first A330 aircraft installed with the Vantage XL seats entered service in late December 2014 and it's no surprise that the new suites are already proving popular with Qantas customers.

VISIT THE EXPO WEBSITE TO DOWNLOAD AN EVENT APP

ABOVE: VANTAGE XL HAS ALSO BEEN SELECTED BY SAS. SEE P14 FOR DETAILS

STAND: 6E110

4KG PER PAX!

If you haven't tried it out yet, it's worth visiting Expliseat to see the Titanium Seat, the lightest seat in the world, at 4kg per pax – especially since the company will be showing brand-new features and accessories developed for this innovative product.

In operation since 2014 on A321s, on flights up to six hours, the EASA- and FAA-certified seat has also been selected by airlines in Africa, the Middle East and Asia-Pacific.

As well as being suitable for Airbus A320 and Boeing B737 aircraft, Expliseat is developing a double-seat version for ATR aircraft. The launch customer, Air Tahiti, has signed up for a complete retrofit program of 10 aircraft. Specifically adapted for domestic and regional airlines, the double-seat saves operators around 650kg per ATR platform, which can be leveraged by increasing the load factor, enhancing cargo activity, and maximizing take-off and landing weight to access difficult areas.



b seating

STAND: 5D10

HAECO TO DEBUT VECTOR-Y

The Hamburg show will feature the launch of the Vector-Y economy seat, designed from a clean sheet based on airline customer requirements and input. Created by HAECO Cabin Solutions – a subsidiary of the HAECO Group formerly known as TIMCO Aerosystems – the seat platform has been designed for easy maintenance and passenger comfort. Affordability is another factor – not just the initial investment, but also throughout the seat's lifetime.

HAECO has drawn from its deep understanding of seat architecture, and its experience in maintaining and repairing aircraft, to create a design that includes a low part count, innovative materials, and useful amenities such as an eyelevel tablet holder in the seatback.

The new seat is expected to be fully certified and ready for delivery as soon as late 2015.

STAND: 6D60

Big developments at TSI

TSI Aviation Seats will be debuting its new lightweight seat design. Weighing in at 10kg per pax place, the seat's ergonomic design and lightweight components make it a good option for low-cost carriers looking for fuel savings without



compromising passenger comfort. TSI has also completed the concept design of its business class seat, which the company says will be in mass production in a couple of years.

In addition, having started with short-range economy class and convertible seats for B737-800s, TSI Aviation Seats is widening its product range with a long-range economy class seat with an articulated seat bottom and IFE provision (including an 11.1in smart monitor), suitable for installation on B777-300 and A330-300 aircraft.

Another innovative product is the short-range economy class seat with an articulated seat bottom and IFE provision (including 10.6in smart monitor) to be installed in B737-800s. Thanks to the special design features, TSI's products will reduce the maintenance costs and introduce advanced living space due to the slim design of the lower literature pocket.

STAND: 7C20

PREMIUM SEAT ACTUATION SYSTEM

Staff at Crane Aerospace & Electronics' booth will be demonstrating the mcX premium seat actuation system, designed for business and first class seats. mcX uses a patented 'smart module' system architecture, including linear and rotary actuation, lumbar, passenger control, and auxiliary functions.

The mcX systems can be customized so airlines can regularly update seat components for a fresh feel and increased competitive

ABOVE: HAECO'S VECTOR-Y WILL

BE ONE OF THE BIGGEST DRAWS AT THE HAMBURG SHOW advantage. Each smart module is capable of enhanced diagnostics and prognostics to identify potential problems before they start. Passengers enjoy smooth seat motion, reduced system noise, and seamless integration with auxiliary systems. Airlines benefit from a reliable system, global customer support, and a user-friendly maintenance tool. mcX is installed on carriers around the world, with adoption rates rising globally.

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b seating

STAND: 5C20

BIG BUSINESS AT GEVEN

Following the success of its range of economy seats, Geven has been investing in the development of cutting edge products, incorporating advanced materials, modern technology and innovative tools.

The result? This year, Geven will be presenting its new full-flat business seat, an enhanced version of the concept demonstrator showcased last year, following further input from customers and suppliers.

As Pasquale Rapullini, Geven's R&D director, explains, "Based on analysis of the design of experiment, the seat boasts the use of innovative and sophisticated materials, focusing on comfort, weight, customization, distinctive elegance, Italian style, and the best quality/price ratio." The design was influenced by two key requirements: to meet the need for passenger appeal and comfort, and to adhere to the space and weight restrictions of the various long-range cabins. Passengers can adjust the seat into any position to ensure a high level of comfort, not only for sleeping but also for dining, reading, making phone calls or enjoying the IFE.

STAND: 6C50

STAND: 7AO2

Try out the PF2000



Design Q, an aircraft interior design consultancy for commercial and VIP interiors, will be showcasing a lightweight seat for UK-based seating supplier Pitch Aircraft Seating Systems.

The PF2000 fixed recline seat is currently flying with Monarch Airlines and has been designed to maximize passengers' living space. Using modern design principles and intelligent packaging, it offers passengers an increase of 2.5in in leg room over a standard economy seat.

The seat incorporates an 'easy clean' bungee system, which replaces the traditional seat pocket style with simple straps, thereby minimizing cleaning requirements. For Monarch, a tablet holder has been incorporated into the design.

Design Q works closely with airlines to create unique cabin interiors which represent their brand. Customers are provided with complete cabin solutions, from seat design through to interior specification. Using the latest visualization technology, Design Q provides photo-realistic images and cabin walkthroughs during the design phase and for marketing prior to launch. The studio also offers full-scale marketing prototypes to help airlines visualize new interior proposals.

> RIGHT: INDUSMECA'S TABLE DESIGN HAS BEEN ENTERED FOR EVALUATION BY THE CRYSTAL CABIN AWARDS JUDGING COMMITTEE

SLIDING TABLE

Eclipse is INDUSMECA's innovative new meal table, designed for VIP cabin interiors. Unlike other meal tables, the Eclipse's secondary table slides from inside the main tray via a push-to-open latch. Once uncovered, its upper part automatically raises to the same level to become a full-flat meal table offering a large surface area and high stability.

Besides its innovative sliding mechanism, Eclipse provides users with all the general characteristics of a meal table including a swiveling mechanism, easy handling, full base stability and a glass holder. The design complies with FAA and EASA safety standards, and is also an entrant in the 2015 Crystal Cabin Awards.





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STAND: 4A10, 4A40

INTEGRATED ENTERTAINMENT

One of the key themes for Panasonic at the Expo will be demonstrating how to bring the comforts of the premium classes to economy. A great example of that is the Jazz seat concept, which will be on display at the company's booth during the show.

Developed in conjunction with B/E Aerospace and Teague, Jazz has been designed from a blank sheet of paper, with IFE considered from the outset.

The overall thinness of the seat, which is created from a mandrel-free composite seatback construction, frees-up more space for the passenger by improving knee clearance, while the innovative armrest geometry increases hip clearance.

Jazz considers every aspect of passenger entertainment by featuring the latest IFEC technology, including a 13.3in 1080p LCD touchscreen integrated into a seamless edge-to-edge glass structure. Passengers are able to control the ambience of their seat environment through mood lighting, built-in reading lights and communication with the cabin crew through integrated attendant call lights. AC power, inductive charging, USB ports, Bluetooth 4.0 and NFC payment seamlessly integrate PEDs for a fully personalized passenger experience.

Find out more on page 15, or at Panasonic's stand in Hamburg.





Jazz was created when IFE and seat manufacturer got together from the start

ABOVE: IA77'S DISPLAY IS SO SLICKLY INTEGRATED WITH ITS SEATBACK THAT THE FEEL IS CLOSER TO HOME ENTERTAINMENT

STAND: 5E51

ESP earns its stripes

Interiors supplier Chameleon Products and aircraft seat manufacturer Flving Service, have collaborated to produce a new economy seat called ESP, which will be shown in Hamburg, bringing a little designer touch to proceedings.

The ESP (Extendable Seat Product) converts from a standard economy seat into a lounger seat, which enables passengers to lie flat in a sleeping position or to relax with other traveling companions. The seat can also be used to differentiate new areas in the cabin and provide new revenue streams for airlines by allowing them to utilize unsold seat places on flights offering the ESP option, or by offering the ESP product as a part of a reward or upgrade package.

"In 2014 we looked at the concept of enhancing the customer experience and had noted a potential need in this area. Whilst airlines had been busy enhancing the business and first class experience, we felt there were other areas that could be developed around economy and premium economy offerings. We used our engineering experience to produce something simple that was user friendly

for passengers and crew," says Robert Burne, owner of UK-based Flying Service.

Chameleon created the name. branding, marketing and overall aesthetic look of the seat. The first seat, which will be on show in Hamburg, has been covered in a material that was designed by celebrated British designer Sir Paul Smith to combine great British engineering with superb British design.

"We hope airlines will adopt the 'ESP Designer Class', which will enable us to work with established and new designers to enhance the ESP section in the aircraft to create something new and generate additional revenue for the airline," said Trevor Whetter, owner of Chameleon Products.

The ESP seat can be produced for any aircraft type and the certification time is around 12 weeks. The product can guickly enter service with A330 operators in particular as Flying Service already has a 16G A330-approved standard economy seat at a 34in pitch. However, the ESP seat has been designed to go into a 29in pitch, allowing

> more seats to be put into the aircraft. The seat, when not in its ESP mode, can be used as a normal economy seat.

> > BELOW: PAUL SMITH FABRIC LENDS A DESIGNER TOUCH TO THE ESP SEAT

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seating

STAND: 5C20



Who says you can't sleep in economy? Geven will be revealing a brand-new economy seat that can help ensure a good night's rest at a low fare. In normal configuration this seat looks like a fairly conventional economy quad. However, in less than 30 seconds the seats of the Piuma Sofà can be converted into a 'sleeper sofa' asset. This feature comes with no loss of legroom, footspace or under-seat stowage when in the normal seating position, and no major penalties in weight.

Benefits for the operator include easy cleaning and operation, and being able to monetize empty seats, even when all passengers have boarded. Expo visitors will be among the first to try out this seat; try it for yourself!

STAND: 6B101

FLIPPING GREAT

mechanism and a three-point harness, which is truly comfortable at a 28in pitch? seat is very real and will be ready to order

As managing director Gareth Burks says, "We looked at everything out there, looked at the regulations and sat down with a blank sheet of paper. We considered what passenger really want?"

the seat pan, and because the contours of the seatback and seatpan cushion match, clear benefits for ingress and egress, and a passenger can even sit on the folded part position around 4.5in higher, which enables

them to straighten their legs and stretch the lower back.

Be upstanding for the Rebel

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According to Burks, the sculpted a 30-31in pitch, and Rebel is working with lightest and best comfort for a shorthaul flight. They are currently looking at contoured, multiple-layer and multiple-

The three-point harness helps the seat fixed back, pre-reclined at 17°). The harness does increase load, and it means that more structure is required around the shoulder area, but even with that added weight, I.Aero is expecting the seat to weigh sub-10kg per pax, aided by a low parts

There will be some customization options, and the company is looking at incorporating



launch seat – designed for short-haul A320s tooling change it could be incorporated. for future medium- and long-haul versions.

has conducted a full feasibility study with a certification company, to plot the quickest bill of materials and a full supply chain in place, ready for order, with certification for a particular airline's configuration billed as


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SABETI WAIN MOVES INTO FOAM MARKET

Sabeti Wain Aerospace, a designer and manufacturer of seat covers, has expanded its operation to include all foam seat components.

A new production plant in the UK will produce precision-shaped seat bases, backrests, headrests and leg rests. The new facility, at Leighton Buzzard, uses a range of safetyapproved foam materials, combined with sophisticated cutting and assembly techniques. The plant also produces the foam components used in Sabeti Wain's seatcovers – the company is preferred supplier to over 20 major international airlines.

The new operation is led by Jonathan Sanders, who was technical manager at Recticel for 10 years before working at Franklin Products for 15 years, latterly as director of European operations.

Sabeti Wain managing director Paymen Sabeti comments, "Bringing seat cover and other foam components under one roof ensures a perfect match between seats and seat covers, as well as opening up exciting potential for seating design in the future.

"It also means a better deal for our customers as they work with a single supplier for all soft seating requirements. With everything shipped together, they just unpack and install, making the whole operation quicker and easier."

This latest phase of expansion follows continued growth at the company's factory in Dubai, and the establishment of a USA-based subsidiary in 2013. BELOW: SABETI WAIN BELIEVES THAT DESIGN CAN BENEFIT WHEN SEAT COVERS AND FOAMS ARE BROUGHT TOGETHER



STAND: 7A30

9G comfort seat foam

In 2014, Skandia made a quantum leap in simplifying and reducing the cost of seat foam replacement/refurbishment for owners and operators of aircraft manufactured under the previous 9G dynamic certification requirements.

The company's new 9G-EC (engineered comfort) is a preengineered, certified and produced seat foam cushion block already approved under FAA flammability requirements. Buyers will save costs by not having to go through the timeconsuming and expensive flammability requirements for replacement foam, as well as not having to dynamically certify their entire seat again.

According to Skandia, the most noticeable benefit to passengers riding on its 9G-EC seats is the comfort. Using DAX foam as the base material, 'negative space' has been engineered and designed into the seating, allowing for softer compression but greater support, thus providing a higher level of comfort. Meet the Aircraft Interiors International team at stand 6A130

AIRCRAFT INTERIORS INTERNATIONAL WILL BE REPORTING ONLINE FROM THE SHOW

seating materials

STAND: 7A08

ProBax takes off with aviation deal

UK-based NuBax has announced a partnership giving Aerofoam Industries of California exclusive rights to ProBax Advanced Seating Technology for use in aviation interiors. The deal means that ProBax will be part of the Aerofoam product offering.

ProBax uses a patented foam technology to encourage correct seated posture without mechanical devices and may be incorporated into any foam-based seat. The technology has its origins in the medical field. It requires no change to the seat design or structure, and only a simple alteration to the cushion manufacturing process. NuBax, owner of the IP for ProBax, licenses ProBax designs to established manufacturers in the target market. The partnership with Aerofoam gives ProBax access to the company's proprietary lightweight firehard memory foams.

"We know that correct seated posture is the key to better comfort, improved physiological benefits, and increased seat durability as seat users fidget less. With this tie-up we can add the potential to save weight and space through materials only available through Aerofoam and gain rapid access to customers in the commercial market," explains Ian Moore, NuBax CEO. "With the increasing importance of increased fuel efficiency, we anticipate that improved passenger comfort via a lighter, slimmer seat will be of interest to commercial fleets throughout the world."

"We have always been the go-to company for comfort in aircraft seat cushions and now we are able to empirically define that comfort biomechanically," adds Aerofoam sales director Matthew Nicholls. "The end result is a lighter, more comfortable seat cushion that offers more legroom and mitigates the risk of DVT. An added side effect is that by keeping passengers comfortable, they're less prone to adjusting their seat incline, potentially reducing passenger irritability and the use of devices such as the infamous knee defenders."



STAND: 7A27

THE WEIGHT IS OVER!

Visitors to Magnesium Elektron's stand at this year's show will notice the gathering pace of magnesium take-up in aircraft interiors particularly in seating. There is now a certification route for seats containing Elektron 43 magnesium alloy, and the latest revision to SAE standard AS8049 is being reworded. When published (expected later this year), it will effectively remove the magnesium ban. This is great news for the interiors market as it enables the benefits of lighter-weight materials with no detrimental impact on performance and without the need for new production techniques.

The main exhibit will be a Piuma EVO economy seat from Geven, the Italian aircraft seat manufacturer, which is collaborating with Magnesium Elektron on a lightweight version of this already successful seat. This work is part-funded by an 18-month NATEP program (UK government aerospace technology funding) with Magnesium Elektron as the lead partner and Geven as the non-funded end user.

The objective is to develop a low-cost manufacturing route for major 16G-compatible structural parts in Elektron 43 magnesium alloy, as well as establishing a UK supply chain. Other partners include Mettis, which is responsible for developing forging parameters for the alloy, as well as Kenard Engineering, which is developing high speed/low waste machining. As well as the seat, there will be a hands-on display illustrating the chosen process route.

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seating interview

Rapid ascent

THE SPEEDY RISE OF THOMPSON AERO SEATING HAS BEEN A FANTASTIC SUCCESS STORY. CEO GARY MONTGOMERY DISCUSSES THE COMPANY'S CURRENT WORK, AND WHAT'S NEXT ON THE AGENDA

WHAT HAVE BEEN THE BIGGEST CHALLENGES IN SETTING UP AN AIRCRAFT SEATING COMPANY?

There are many significant challenges. We felt from the outset that we should only enter the market as a manufacturer if we could make a real difference. We want our customers to say great things about Thompson; indeed to say great things about every aspect of our product, our service and how we conduct business. Therefore our aspiration was to create a great aircraft seating company – great in all areas of our business. That means having best-in-class products, program management, aftermarket support, and so on. So I guess we have made the task more challenging in many ways, but that's what makes the difference and that's what yields sustainable rewards for both Thompson and our customers.

IT HAS BEEN SAID THAT THERE IS A SEATING SUPPLY BOTTLENECK. HOW CAN THOMPSON HELP?

We have recently acquired additional factory space on our current site in Northern Ireland, and have plans approved to extend our current factory footprint. This provides us with not only the capacity to meet the increased demand for our Vantage family of products, but also with additional headroom capacity. Aside from factory space, we are continually assessing the various areas of our business to ensure they also mature to meet our increased output and to enable us to effectively execute on additional market opportunities that might come over the horizon.

WILL THE STAGGERED COZY SUITE ECONOMY PRODUCT BE FLYING SOON?

We firmly believe that Cozy Suite has a role to play in providing additional benefit to the economy class seating sector. We are actively developing the product for a specific enquiry, but we'd rather say no more at this stage.

WILL ANY NEW VANTAGE CUSTOMERS BE ANNOUNCED SOON?

Yes – indeed the strength of the product benefits offered by Thompson Vantage is ensuring that it remains a very popular product with the flying public and with airlines. We see Thompson Vantage having a strong future with an extended lifetime as it works extremely well on new aircraft platforms such as A350 and B787. We are very excited to have recently been awarded a major program for a variation of our Thompson Vantage XL product. We hope to announce something in the near future.

WHAT'S NEXT FOR THOMPSON? A FIRST CLASS SEAT? PREMIUM ECONOMY? SOMETHING DIFFERENT?

Our seats have been flying for some considerable time now and we are receiving increasing levels of feedback from both the flying public and our airline operators. We listen to this feedback intensely – our product users are inherently better informed of the benefits of our seats than we are as seat creators! Our challenge is to innovate to improve products that demonstrate that we 'got the message'.

As we continue to innovate and add additional features on our Vantage platform, we also have two additional premium class products under development that will be displayed at the Hamburg Expo, and which will launch later this year.

WE'VE NOTICED THAT FACTORYDESIGN IS INVOLVED IN MANY VANTAGE PROJECTS. WHAT IS YOUR RELATIONSHIP WITH THE STUDIO?

Factorydesign's involvement goes way back to the very earliest stages of the Vantage concept. It has shown great faith in the concept from the outset. In a practical sense, Factory has a very deep understanding of the intricate aspects of the Thompson Vantage seat geometry, and this affords it a very practical knowledge base on which to build styling flair and branding opportunity. Our airline customers have been extremely satisfied with the results of our collaboration with Factory on their respective projects.

> LAUNCH CUSTOMER QANTAS'S PRODUCT IS A GREAT ADVERT FOR THE VANTAGE XL



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Fully integrated solutions ensure that you receive a perfect match between foam and cover every time, and with one supplier managing all aspects of your foam and cover design and manufacture, all you have to do is unpack and install!

Working with Sabeti Wain Aerospace eliminates the complexity and confusion of communicating with multiple suppliers, saving you time and money and giving you a unique opportunity to take your seat design, corporate image and passenger cabin appeal into the future.

Plus, with one manufacturer supplying all your soft furnishings components, you can simplify logistics and be sure of consistency in three critical parameters in which Sabeti Wain Aerospace excels: quality, safety and durability.

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monuments and more

STAND: 5B60

AIM ALTITUDE REACHES NEW HEIGHTS

Aircraft Interiors Expo is AIM Altitude's first major opportunity to showcase its expanding capabilities since AIM Aviation's recent acquisition of Altitude Aerospace Interiors. Bringing together the skills and vision of its teams in the UK and New Zealand, AIM Altitude will reveal a series of new concepts: an interior comprising a striking new bar, augmented by a full set of frontrow furniture, both showcasing innovative materials and features.

Richard Bower, group commercial director at AIM Altitude, explains, "We hope to engage imaginations by exhibiting the galley/bar complex, with the addition of complementary front-row monuments. We want to present new ideas and options, giving customers the opportunity to see what is possible in design and engineering terms. We will focus on ideas that are achievable in the cabin and feasible for the requirements of airlines and OEMs. We will also be illustrating how such designs can work to reinforce an airline's brand, delivering recognition and differentiation."

China Airlines' Sky Bar is a great example of AIM Altitude's work, see p120

STAND: 5B11

FAA demonstrates faith in Jamco

Jamco America, one of the first aircraft interior companies to receive FAA Organization Designation Authorization (ODA), has been granted additional authorization to perform review and acceptance of Instructions for Continued Airworthiness (ICA) on behalf of the FAA.

"Our [Jamco America's] ability to act on behalf of the FAA to perform review and acceptance of ICA, and approve data along with issuance of Type Inspection Authorizations (TIA) and ensuing Supplemental Type Certificates (STC) streamlines aircraft certification for the customer," states Don Wren, director of certification at Jamco America. "Jamco's growing company delegation offers its customers greater control over schedules with less reliance on the FAA's limited resources."



STAND: 6D78

ENCORE GOING STRONG

EnCore is teasing that it will be unveiling an exciting development at Hamburg. Details are top secret at present, and the reveal is invitation-only. All the company will say is, "prepare to be lifted".

Having only been in business for four years, EnCore's growth has been dynamic. In 2014, its 500th employee joined and the company opened a new manufacturing space – 80,000ft² dedicated to galleys, monuments and other interior components, in California. Boeing chose EnCore to build the 737 and 747 floor panels and in less than one year of operation, the company has produced over 10,000 panels. Following the successful floor panel ramp-up, Boeing also awarded EnCore the 737-MAX lavatory and galley ballistic wall contract.

To handle its growth, EnCore will be constructing a substantial facility in Mexico, with operation beginning this year. In a partnership with Boeing, EnCore is producing the next-generation interior refresh for the 737, a prototype of which will be on display in the Boeing booth at Hamburg.



THE CRYSTAL CABIN AWARDS WILL BE ANNOUNCED ON APRIL 15

RIGHT: A SNEAK PEEK OF ENCORE'S HAMBURG SURPRISE

monuments and more

STAND: 5D60

MULTIFUNCTIONAL MONUMENTS

Bucher Group, the lightweight-construction specialist (also known as Leichtbau), is poised for another positive year in 2015 with the planned introduction of many new products. Many of these products will be launched at the Expo, including a new and innovative monument which combines two different purposes, thereby saving valuable space in the cabin.

Also on display will be a variety of sleek IFE and tray table deployment systems with improved reliability, simplicity and feel. Bucher's Air Transport Stretcher, which is certified for most



Boeing and Airbus aircraft, and soon will be for the A350, will also be on show, as well as its lightweight Bucher Galley with focus on high-grade appearance and flexible branding possibilities.

> Aerolux also manufactures ovens, fridges, toasters, skillets and rice cookers

BELOW: A TYPICAL TTF DESIGNED AND MANUFACTURED LDMCR, WHICH PROVIDES REST AREA FOR UP TO SIX CREW MEMBERS AND CAN BE REMOVED OR INSTALLED IN 30 MINUTES

STAND: 6D120



STAND: 1D31

Inflight retail security

Logistics security specialist Maple is planning to launch Aviation Seal, an electronic, tamper-evident security seal that can replace the padlocks and disposable seals often used on





duty-free trolleys and catering carts. Aviation Seal is reusable and provides control and traceability. Access to carts and containers is monitored, digitally capturing user data such as when and where each trolley has been accessed, and by whom.

The solution has already been well received, having been rolled out across the trolley fleet of one of the UK's leading international airlines. The seals can help combat shrinkage rates and stock losses, and also enables operators to streamline trolley administration and increase inflight duty-free inventory.

STAND: 6A120



Aerolux is a manufacturer of high-end galley inserts for airlines. With 25 years of experience supplying the airline industry as an independent supplier, Aerolux has the capability to offer experience and quality, with the flexibility to work closely with airlines on development. The company provides design services and sees all work through to production and delivery from its site in the UK, giving customers a single point of contact. Aerolux's most popular item is an espresso maker made under license with Nespresso, the latest version of which will be on display at the show.

THE IMPORTANCE OF CREW REST

On January 4, 2014, FAR Part 117 went into effect. This is the first major revision of the flight and duty time regulations in 60 years. This new rule is sciencebased, taking into account physiology and circadian rhythms. The rule introduces several new concepts such as Flight Duty Period (FDP), Fatigue Risk Management System (FRMS), augmentation limits based on the quality of the onboard crew rest facility, and increased rest requirements. TTF Aerospace crew rest modules provide solutions to address the most stringent Class I requirements of FAR Part 117. Airlines are maximizing flight duration in order to make every seat count. TTF Aerospace offers both main deck and lower lobe crew rest solutions to maximize revenue per available seat mile using lightweight materials, safety systems and LED lighting systems to achieve lighter, more comfortable, more energy- and space-efficient modules.



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STAND: 7D20

DIEHL SHOWS FOUR INNOVATIONS

Diehl Aerosystems will showcase its latest projects at a considerably enlarged stand, now also incorporating AOA for the first time. AOA became part of Diehl Aerosystems in the summer of 2014, adding water and waste management components, as well as smoke detection and fire-suppression products for aircraft, to the company's product line.

Also on display will be four projects designed to increase maintainability and passenger comfort – and all of which have been entered in the 2015 Crystal Cabin Awards. The Lavatory Easy Door, for example, is a new and easy to operate folding door that improves the accessibility of the lavatory and reduces maintenance issues. Furthermore, the company will present Solatune, an improved cabin window shading solution that darkens the windows 10 times more effectively than current electrochromatic solutions.

Another innovation on display will be the Smart Battery Concept for Emergency Power Supplies. Whereas today emergency power supply units (including battery packs) are specifically designed for each aircraft program, this modular concept focuses on a smart power supply unit and an adaptable electrical aircraft interface that allows fleet commonality of smart battery packs. The fourth Crystal Cabin contender on display will be AOA's Aerosol-GWDU, a galley waste disposal unit that not only saves rinse water (and thus weight) due to increased flushing efficiency, but also features a brand-new industrial design that makes it a real eye-catcher.



Solatune is claimed to go 10 times darker than comparable windows

STAND: 6A59

STAND: 6A85

The temperature is rising

International Water-Guard (IWG) is heating things up at Aircraft Interiors Expo with its new product: the T-Series Tankless Water Heater.

For over 25 years, IWG has been known for aircraft potable water treatment. However, IWG has now extended its existing line of IWG-ES7 on-demand water heaters by offering the new T-Series tankless water heaters for installations in lavatories, galleys and VIP showers – providing the aircraft owner with an endless supply of hot water.

IWG guarantees that the water heaters will be a hot item not only for completion centers, but also for OEMs and VIP airliners. The T-Series heaters

> THE T-SERIES WATER HEATER CAN BRING REAL VALUE TO THE PASSENGER EXPERIENCE

have smart controls, making them robust, while still allowing for water temperature to be accurately controlled.

The heaters have full DO160 certification and are engineered to meet the requirements for the new generation of VIP aircraft such as the Boeing 787 and A350.



HIGH-PERFORMANCE LUBRICANTS



DuPont's Krytox range of lubricants includes grades with additives for aerospace interior applications. Originally designed as an assembly aid

for screws and couplings of oxygen system, 240 AC is now also used in many applications, including seat adjuster mechanisms. Krytox GPL 105 oil and GPL 205 grease eliminate squeaking and creaking when materials come into contact with one another. And Krytox GPL 205 H-1 is NSF approved for incidental food contact.

All grades are chemically inert and compatible with typical aircraft interior materials. Their tribological properties mean that just small amounts are necessary at the interface to help prevent equipment failure, as well as reducing downtime, maintenance cost and environmental effects. Krytox oils and greases do not release volatile organic compounds, are non-migrating and non-flammable. Even in the harshest environments, they show no oxidation or degradation, and they are thermally stable. monuments and more

STAND: 6A01

Vartan expands support range

Cabin interior support company Vartan Aviation Group currently provides its services to all Airbus (Hamburg, Toulouse, Tianjin) and Boeing (Everett, Renton, Charleston) final assembly lines, performing all kinds of cabin interior repair, installation assistance and modification.

Starting in May 2015, Vartan will establish itself at the new Airbus FAL

USA in Mobile, Alabama, to assist delivery of A320 aircraft to the American market. Furthermore, January saw the Vartan Aviation Group open its new maintenance shop in Abu Dhabi to serve the region's airliners, MROs and cabin interior manufacturers who need technical representation of their units, as well as maintenance, warranty or smart repair solutions.





VARTAN IS EXPANDING ITS SUPPORT SERVICES AROUND THE WORLD

STAND: 2E26

LIGHTWEIGHT TROLLEYS

Norduyn will be showing new lightweight trolleys at the show. One of them it is billing as "probably the safest duty-free lightweight trolley in the market". A completely new innovation – the ATLAS lightweight drawer – will also be shown.

STAND: 2E10

NRC ADDS CABIN COMFORT RESEARCH FACILITY

Adding to its state-of-the-art infrastructure, the National Research Council of Canada (NRC) is developing a Cabin Comfort and Environment Research (CCER) facility to help operators and airframers develop and advance new technologies to improve the air travel experience.

This facility will be the only cabin demonstrator in North America with a platform to investigate the effects of cabin design and technologies on passenger comfort. Its focus is to help industry develop and evaluate new cabin interiors concepts, allowing them to explore trade-offs between cabin attributes to identify the most cost-effective and beneficial designs.

The newly designed CCER facility will include four primary laboratory spaces: a flexible cabin simulator; an airport terminal laboratory; a man-rated vibration platform; and a two-story space suitable for constructing large-scale mock-ups, or to house a client's unmodified fuselage.

This project supports the objectives of NRC's Working and Travelling on Aircraft research program, which identifies costeffective approaches to improve the passenger experience, improve cabin air quality, and reduce the energy consumption of environmental control systems.

You can take a virtual tour of the facility at Booth 2E10.

DISCOVER MORE

...about magnesium alloys

New discovery - 'The Weight is Over'

Ladies and Gentlemen, we are pleased to announce that Elektron[®]43 magnesium alloy can now board the aircraft. Please take your seat designs and prepare for take off!

OVER MORE Although the journey has been long, we have arrived lighter, stronger, and safer - thanks to Magnesium Elektron's commitment to pioneering alloy development and testing, and the determined support of our industry partners. In the pursuit of 'discovering more', seat manufacturers have now finally 'seen the light'!

DISCOVER MORE... by visiting stand 7A27 in hall B7 at this year's Aircraft Interiors Show 14th to 16th April, Hamburg.



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06

With a dynamic start in the Galley Industry, TCI understands your needs very well, keeping up a **customer-focused** approach with **smart design, lightness** and **durability**. With its **competitive** prices, TCI develops day by day and extends its range of products.



www.tci.aero





Wider view

IRFAN DEMIR, CEO OF TURKISH CABIN INTERIOR (TCI), DISCUSSES THE RAPID GROWTH AND FUTURE PLANS OF THIS DYNAMIC YOUNG COMPANY

WHAT ARE THE LATEST DEVELOPMENTS AT TCI?

In the past four years TCI has successfully delivered its first range of products – galleys for Boeing 737s. We have also been continually developing our engineering capabilities to serve our customers' needs.

TCI is aware that customization is very important in the galley business. To provide a fully customized product, TCI is developing smart design philosophies with the help of its engineering team and customer feedback. In order to guarantee flawless products and customer satisfaction we do all design, test and production activities in-house.

In 2013 we moved to a new facility in Habom near Istanbul airport. It's the new hub for aviation services in this region, which connects Europe, Asia and Africa. The 500,000m² facility has modern MRO facilities, giving TCI a competitive advantage in the industry, through comprehensive resources and vast opportunities.

WHO ARE THE LATEST CUSTOMERS?

In 2010 TCI was certifying its B737 galleys. Now our galleys are flying all over the world. We are aiming to attract many new customers with our philosophy of having fully customizable designs. Starting with Turkish Airlines in 2010, TCI succeeded in manufacturing a total of 60 galley shipsets in a very short time.

In 2014 we started design work on our first twin-aisle program, for 15 A330 galley monuments. In the second half of 2015 we will begin deliveries of the first five shipsets.

At the end of 2014 negotiations were finalized with Sunexpress, a joint venture of Turkish Airlines and Lufthansa, for 25 shipsets of B737 galleys. For this new customer we are designing lightweight, functional galleys matching their low-cost carrier needs.

We have also secured some contracts for retrofit programs. In addition to line-fit programs, aircraft modifications are a major part of our market.

OVER THE PAST YEAR, HAVE YOU GOT CLOSER TO YOUR AIM OF TAKING 20% OF THE INTERIORS MARKET?

Discussions are ongoing with other major customers; hopefully we will receive new programs day by day, in line with our capacity investments. Although TCI is expanding its market share rapidly, it is clear that the galley market is quite competitive, with experienced rivals. This means we have to be patient and ensure that we offer consistently high-quality service. We believe that a 20% market share is an achievable target for TCI in the long term, and we are striving to reach this target and hopefully beyond.

ARE YOU LOOKING TO GROW IN OTHER SECTORS, BEYOND GALLEYS?

We are currently fully concentrating on galleys, but we have plans to extend our product range to other cabin interior products in the near future, keeping the same quality standards.

HOW ARE YOUR PLANS TO EXPAND YOUR AIRCRAFT FITMENT RANGE DEVELOPING?

In terms of engineering and production capability we feel ready to work on new product lines. However, the certification process is a matter of allocating time and resources strategically. Considering our current customers and upcoming programs, we will further develop our line of products with new projects.

TELL US ABOUT FUTURE PLANS.

We are following the market carefully, analyzing demand, customers and industry trends. Keeping in mind that there is often a trade-off between growth rate and quality, we want to maintain our business consistently for both current products and any new lines.

Vertical and horizontal expansion is inevitable. In the short term we are planning to increase our customer and product portfolio by concentrating on the narrow-body market. We are currently offerable for B737s in the MENA and Asia region. Eastern Europe, Russia and CIS countries are our other points of focus.

In the mid-term the wide-body market has a lot of opportunities for us and we are optimizing our company structure to fulfill the needs of this sector. With our current A330 project, we have the chance to develop the methodology and tools required for the wide-body market.

In the long term we want to support our customers with new ranges of cabin interior products, according to market demand and our capabilities. ®





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STAND: 2D14

THE CHALLENGE OF HIGH HEELS

The operations of high-traffic airline operations bring new and exciting challenges into composite manufacturing. One of the factors is the frequent embarking and disembarking of passengers – an important operational activity on an aircraft, which becomes especially crucial in terms of the maintenance costs of composite floor panels.

"From a technical point of view we see this challenge as a question of reliability, fatigue and load transfer to floor panels in dedicated cabin areas," says Dr Egbert Gartner from the spare components department at EFW Elbe Flugzeugwerke in Dresden. "The floor panels fulfilling these specific customer requirements are exposed to the forces of the aircraft, and the impact of passenger loads."

To meet these needs, EFW started a special investigation in February 2014. "First of all we had to understand the specific customer needs," explains Gartner. "That literally meant we had to listen to passengers' feet. Within the gait analysis we analyzed the movements of passengers when boarding the aircraft and the force that put on the floor panels."

The team looked at different loads, including flat shoes with a low load per area, through to real spike loads from high heels, and the load of food cart roller wheels. Then a preliminary floor structure with an adjusted number of layers and a honeycomb structure was tested.

As a result of the investigation a new, robust composite lay-up has been developed. The EASA CS-25 and OEM requirements shaped the customer specification and EFW is confident the new customized panels will optimize operators' maintenance costs.



STAND: 5C60

Complete thermoplastics product line

HIGH HEELS CAN PUT EXTRA

Sekisui SPI will introduce the newest additions to its aviation interiors portfolio of Kydex thermoplastics, making it the first manufacturer in the industry to offer a complete aviation interiors product line.

Front and center at the stand will be the unveiling of a revolutionary new technology for pattern-in-product. "A worldclass material supplier to the aircraft interior industry has the responsibility to continuously build on what it's accomplished, to respond quickly to the needs of customers, and to exceed requirements for material performance and aesthetics. These additions to our product line realize our commitment to that responsibility while providing our customers one material source," says Ronn Cort, COO and president of Sekisui SPI. "Sourcing materials from one supplier eliminates the headaches of inconsistent color, texture and gloss."

Sales, design and technical team members will demonstrate the benefits of sourcing progressive materials from one supplier, the extensive design possibilities of the company's new technology, and pragmatic methods for leveraging them. By invitation only, project teams and their clients can visit Upstairs, a space to meet privately while surrounded by SPI's future vision of unified design where different materials from leading suppliers transform and elevate brand and passenger experience. Head upstairs and you might just find inspiration for your next interiors project.



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STAND: 1D29

THE LATEST CABIN MATERIAL: CORK!

The latest R&D by Scocchetti into innovative production processes and environmentally responsible products has resulted in a new cork collection. Cork is the outer bark of the cork oak tree, which grows mainly in the Mediterranean region, and Scocchetti has found it is suitable for seat covers, panels, floors and more, with a fabulous assortment of designs, textures and colors.

Cork harvesting is environmentally sustainable and does not harm the tree. With the increasing concern for the environment, cork oak remains the only tree whose bark can regenerate itself after harvesting. It is a truly renewable, environmentally friendly resource. With its capacity to retain carbon, the total annual production of cork saves the CO_2 equivalent of about 185,000 automobiles from the atmosphere.

Furthermore, as a natural product, cork warms and enriches any interior. With over 40 million natural 'cushion cells' per cubic centimeter, cork is a natural sound and thermal insulator. Due to the special factory finish, cork interiors are durable and require only minimal maintenance.



reduce CO₂

STAND: 6C50

Adverts that stick



A new process has been developed by Adhetec that could help boost ancillary revenue for airlines. A system of thin polymer films and a specific adhesive allow advertising decals to be applied on many different surfaces inside the cabin (glossy or rough), as well as with different shapes. The material is printed with high-quality graphics and cut to the required dimensions. The resulting decal can be easily applied by cabin maintenance staff in less than one hour (even for the largest panels) and does not require the use of heating devices or waterbased solutions. Maintenance of the decal is simple and can be performed using the same cleaning agents as used for the other interior surfaces of the cabin.

STAND: 6B135 *Certified gets certified*

Certified Thermoplastics, a manufacturer of custom-profile thermoplastic extrusions for the aviation and aerospace, defense, medical device and industrial markets, has achieved AS9100C certification for its Quality Management System. The AS9100C certification is in addition to its long-standing ISO9001-2008 Quality Management System certification.

"Being AS9100C certified confirms our long-term commitment to our aviation and aerospace customers, which are a fast-growing component of our sales base," explains Robert Duncan, president of Certified. "The increased commitment to quality, on-time delivery and customer satisfaction will help us continue that focus in the years to come."

STAND: 6B90 *Reach for the skies*

One year after launch and in keeping with the timetable announced at the start of 2013, DräxImaier Aviation GmbH (DAG), the new subsidiary of the premium automotive supplier DräxImaier Group, has already achieved Part 21G approval. In accordance with EU regulation No. 748/2012, DAG has been approved by the German Federal Office of Civil Aviation in compliance with the Part 21G regulation.

The Dräxlmaier Group, which develops and produces high-quality interior components and complete interiors – primarily for premium manufacturers in the automotive industry, has now been given the green light to enter the aviation market as well.

DAG CEO Klaus Schlarb comments on the news: "The 21G approval allows us to utilize the benefits of almost

70 years of experience supplying the automotive industry with premium products, from development, through to prototyping and product design, to industrialization and series production."

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cabin materials

STAND: 6A70

Austrian innovation

The AMES Group, as part of the ACstvria Autocluster GmbH group of companies, will introduce new services and products at the Expo, with a new illuminated class divider and the new EASA Part 145 approval being the focus. With this new approval, AMES can offer a full lifetime management for all its products.

Other ACstyria members that will also present their respective products and services on the same stand are CAM-CNC specialists, Antemo and Fuchshofer GmbH.

STAND: 6B129

RIDING THE CREST

Etihad Airlines' Boeing 787 Dreamliner, which operated its first flight on February 1, has received a lot of attention for its innovative cabin design. Aviation Business Consultants International (ABC International) played a role in the interior, having installed a decorative crest on board.

To support its plan to have more airlines outfitted with its decorative crests this year, ABC provides qualified engineering and managerial services to the aviation industry.

Of course decorative crests are not the only contributor to cabin elegance, and it is often necessary to give new life to tired interiors. For this reason, ABC International's services include: cabin refurbishment and revamping, carpets, seat covers, curtains, cushions, class dividers, stowages and doghouses, and fixed class dividers.

Thanks to successful collaborations with major airlines, ABC International is now an OEM-gualified vendor, and in the near future the company will carry out a new program with Air Canada that consists of manufacturing 150 decorative crests for its B777 fleet.

AIRCRAFT INTERIORS INTERNATIONAL WILL BE AT STAND 6A130

See p64 for

more details

of the

Etihad B787

interiors

STAND: 6D110

Hybrid molding process

Victrex has developed an innovative hybrid molding technology that enables engineers to overmold a PAEK-based composite with fiber-reinforced PEEK injection molding materials. By working together, Victrex and Tri-Mack Plastics Manufacturing Corporation have engineered an aerospace bracket using this new solution, with the demanding performance requirements of loaded applications in mind.

The hybrid-molded Victrex PAEK-based composite bracket is claimed to deliver up to 60%



weight savings compared with stainless steel and titanium, while offering equivalent or better mechanical properties such as strength, stiffness and fatigue.

"These technologies are enabling engineers to design lighter, stronger and more cost-effective solutions like this new bracket," states Tim Herr, aerospace strategic business unit director for Victrex. "This game-changing advantage over metals and thermoset composites is a result of our dedication to the future of flight."

The design flexibility of the process enabled the manufacture of a PAEK bracket that can be produced in minutes compared with the hours it would take for a metal or thermoset equivalent. This translates into less processing time, lower energy requirements and reduced waste.

STAND: 7D60

ON-TREND COATINGS

Aircraft interior coatings technology company Mankiewicz is returning to Aircraft Interiors Expo with its latest high-end product and color trends in tow. The company will be presenting new insight into interior color design, where, in addition to the current choice of warm metallic shades, it will be exhibiting a new range of stronger, clearer, brighter colors, setting the trend for the future. All coatings will be displayed on a design wall offering visitors an authentic impression of the various hues, effects and textures, as well as their functionality.

Approved by leading aviation manufacturers, Alexit-FST-Interior Coating Systems reach the uppermost standards regarding heat release, smoke, flammability and toxicity, while meeting any aesthetic requirements.

Mankiewicz offers a choice of water-dilutable and solvent-based products. Coated with these products, surfaces become highly resistant against mechanical and chemical influences, while remaining easy to clean. An antimicrobial finish for hygiene-sensitive areas completes the range.



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STAND: 5BO2

CERTIFIED BELT OVERHAUL

Airlines and jet owners all have a common problem: at some point their cabins will need to be maintained, including the complete soft furnishings.

While there are many maintenance organizations, each new item of soft furnishing, even if only its color has changed, needs to be re-certified by another organization that has the necessary approval. Another common problem is the minor change documentation being missed, which can result in immense costs due to grounding, rework and certification.

A combination of approvals as a design, maintenance and production organization allows ACM to design and produce soft furnishings and certify both new products and refurbished materials as a single source, making the process more efficient and costeffective due to less time on ground.

This blend of competencies has led to the official approval of the company to overhaul safety belts



and restraint systems for both 9G and 16G seats. EASA's new AD states that a maintenance organization needs to possess the original documentation in order to overhaul belts.

STAND: 6890

ENDLESS CARPET DESIGN OPPORTUNITIES

Ege will be introducing lightweight aviation carpets that have several unique characteristics. The company says that its modern and innovative production processes mean it can offer customers total freedom of design – any color and any design they want. Besides design opportunities, the company focuses on light weight, durability and short production lead times. Ege is EMAS certified and was first carpet company in the world to obtain CSR certificate DS 49001. All its products pass the requirements of FAR 25.853.

STAND: 1C38

No strings attached

A new saying is making its way around the newly formed window department at JBRND in San Antonio, Texas: "No strings attached." The technology behind window shade systems has remained largely untouched for decades. With the old technology comes predictable annoyances, such as string systems that need adjustment after time, not to mention issues with fraying, and outright failure.

The company has developed a new Pleated Window Shade, which uses a proprietary belt system, which needs no adjustment after presetting at the JBRND manufacturing facility, with lead screws and linear mechanisms all made from top-quality materials. The system is fully customizable and comes in single or double, multiple colors, and electric and manual options.

"There are literally no strings attached in there," says Ed Harris, VP of sales at JBRND, of a prototype that has been opening and closing electronically for the last several months. "That shade has been opening and closing, non-stop, night and day, nearly a million and a half times. At this rate, it's outliving the aircraft itself."

STAND: 7B11

Lightweight seat structures are a new focus for Romtex

LIGHTWEIGHT BELTS AND TAILORED TEXTILES

Reflecting the aviation world's need for lighterweight cabin materials for the aircraft interior, Romtex Anjou Aeronautiqu has noticed a change in its orderbook. Back in 2007, 90% of its orders were for simple textile covers, but in 2014 the company saw increasing demand to supply padded seat covers which can give maximum passenger comfort on lightweight seat structures. Romtex also noticed a high interest in leather and leather covers, as well as light safety belts.

The company is constantly working on renewing the designs and reducing the weight of its textile products (seat covers, seat foams) and seatbelts. For example, its new 353 model lightweight seatbelt 353 features aluminum custom-colored buckles.

Another important trend for the company is customization, reflecting the fact that cabin interiors are such an important part of an airline's brand image, as well as being a key element of passenger comfort and safety. This is why the company is focusing its activity on tailor-made products and solutions for completely customized aircraft cabin interiors.

💮 cabin materials

STAND: 5C66

Ultraleather could save US\$20k on a B737

Due to increasing pressure to cut weight for fuel savings, airlines must find a seating material that balances weight savings with passenger comfort and durability. According to Tapis, Ultraleather creates the ultimate seating experience that balances weight, comfort, quality and durability.

Based on a standard Boeing 737 seating configuration, Brisa HP, Tapis' lightest weight version of Ultraleather (340g/m²) could save airlines approximately US\$20,000 in annual fuel costs per aircraft.

Ultraleather is engineered using a premium-grade polycarbonate, a highly durable polyurethane resin. Tapis has conducted extensive independent testing at the University of Cincinnati that it says proves Ultraleather is a premier product for seating applications. The company claims that Ultraleather cools down 50% faster than genuine leather, maintaining a neutral seating temperature and creating the most comfortable seating experience.

<u>Ultraleather</u> can be engineered to achieve customer specific requirements, including custom grains, colors, finishes and technical specifications. The gloss level, weight, breathability and thickness can be adjusted, and enhanced inherent properties incorporated, such as ink, UV and antimicrobial protection. The product can also be engineered to meet specific flammability requirements including the most stringent heat release and smoke density, as well as 12- and 60-second vertical flammability.

STAND: 5BO2

CELEBRATING 75 YEARS

As well as celebrating its 75th birthday, Swiss family-owned and run company Tisca Tiara will be presenting its award-winning carpet collection at the Expo. Tisca Scalino is a floor covering that integrates various weave structures in the carpet to accentuate elements of the design. Scalino represents a challenge in weaving technology, but it offers designers and airlines novel design possibilities for cabin interior design. The use of 3D effects results in variable light refractions, opening up unexpected possibilities for an accentuated floor covering.

The company will also unveil a new collection of harmonized fabrics and carpets. This collection reflects the latest global trends in terms of design, textures, materials and color combinations.

Also on display will be a variety of steam-pleated, ready-toinstall curtains, which the company also produces in-house. Tisca Tiara keeps a huge stock, with over 1,500 curtain fabrics to choose from, in all types of colors, patterns and qualities.

Tisca Tiara designs, develops and manufactures seat cover fabrics, curtains and carpets all under one roof in Switzerland. It does not subcontract, which makes everything easier, faster, safer and cheaper for customers.



Installing Brisa HP could save US\$20,000 in fuel per aircraft per year

STAND: 6F51



TRAVELING IN A CLASS OF ITS OWN

Boxmark will be explaining why leather, as well as creating an exclusive ambience in cabin interiors, also offers excellent hygiene properties, plus easy care and good durability. The company will be demonstrating two products that it believes set a trend for the future and contribute to environmental sustainability.

XLIGHT is a leather with a laminated weight of +/- 600g/ m², yielding cost savings and a contribution to sustainability. XTREME is a hard-wearing leather. This material has certificates that prove excellent resistance to mold, bacteria, disinfectants, insulation, dirt, chlorine, sea water, oil, alcohol and water. It is highly stretch- and tear-resistant, break-resistant even at sub-zero temperatures, highly abrasion-resistant and flame retardant. XLIGHT and XTREME fulfill all international standards and are also available combined in a leather product.

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- Partitions, divider panels, protective panels and barriers
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electronics and software

STAND: 1C58

POWER STRUGGLE

There's an power struggle on most aircraft today – not enough power for all the PEDs passengers bring on board, such as tablets and smartphones. The True Blue Power TA102 dual-USB charging port offers a solution. This compact inseat, cabin or cockpit power source converts the aircraft's power into all the power needed for a passenger's portable technology. The TA102 is engineered to simultaneously provide 2.1A of power per charging port to any consumer product requiring a USB interface. This allows passengers and pilots to charge two high-powered devices at the same time. Some other dualcharging devices are built with one low-power and one highpower port.

FAA TSO and EASA ETSO certified, the intelligent power source protects itself and the charging devices from short-circuit, power surges and over-current potential. And while the rugged aluminum case withstands vibrations, shock and humidity, its compact, 1.5in square by 1in-deep size fits within an armrest, interior cabin wall, or instrument panel.

STAND: 4C40

Windows go ultra dark

Vision Systems' Electronically Dimmable Windows (EDW) gained a lot of interest last year, and for the 2015 show they have gained a new feature: Nuance Ultra-dark. This feature provides improved visual and thermal comfort and a special composite glass offering excellent optical quality. Based on SPD (suspended particle device) technology, the EDWs dim from clear to dark in three seconds to reduce light, glare and heat entering the aircraft. They can be controlled from a touch panel on the window or a wireless tablet.

These solutions contribute to a reduction in air-conditioning power consumption as they are at their

> THE NUANCE ULTRA-DARK DIMMABLE WINDOW CAN EVEN BE CONTROLLED FROM A WIRELESS TABLET

darkest possible state when the aircraft is on the ground. They also block more than 99.9% of UV light and their fabrication allows noise reduction. Furthermore the systems have no moving parts as the electronics are fully integrated, reducing maintenance costs and downtime.



STAND: 6B90

LOCK DOWN

In real-life applications, a standalone solenoid often proves to be insufficient to really live up to the high requirements of a specific function. For this reason, a combination of mechanics and electronic control is usually required to develop a solution with optimized performance and to realize a functional module offering added value.

Kendrion Kuhnke Automation will be presenting its complete technology portfolio for fields such as fluid control, solenoid technology and control technology for applications inside the cabin. For system manufacturers in application areas such as galleys, lavatories, overhead storage, seating and life support, the company develops solutions ranging from custom-designed components all the way to complete functional modules.

Typical examples are magnetic locking systems for doors, lids, etc, based on the stored energy principle. These systems are characterized by pulse control for opening with minimum power requirements, requiring no power consumption in open and closed condition, while offering high locking forces in a small and compact design.



electronics and software

STAND: 6A58

ONLINE MOTION ANALYSIS

GOM will present its new Pontos Live software module at the show. In testing applications it enables online point measurement and positioning, as well as point-motion analysis. The module can be used with all stereo camera systems from GOM. An infinite number of 3D measuring points can be captured, evaluated and displayed online.

In the aerospace industry, the module is used for online component testing, for example during long-term, fatigue and load testing, as well as in vibration analysis. The measurements taken during testing are displayed online, enabling users to see directly in the software what happens during testing. Via a digital interface, the measuring data can also be communicated to other programs, such as software from test stands, and further processed live. Analog signals from external measuring devices can also be recorded and processed.

In addition the software is used for positioning tasks to accelerate test setups. As part movements are measured online, components such as aircraft seats can be positioned correctly in the test stand. The software also offers a back projection function, for example to mark the positions of strain gauges. With this feature it is possible to project elements created in the software back to the real component. Try the Pontos Live system for yourself at the Expo

BELOW: THE SYSTEM BEING USED TO PROJECT STRAIN GAUGE POSITIONS



STAND: 6D131

CANBUS FLIGHT DATALOGGER

Vector has developed the GL1020FTE datalogger for analyzing CANbus communications in aircraft. On February 26, 2014, the CANbus datalogger passed its first test trial aboard an A350 XWB MSN2 test aircraft. The device fulfills requirements for use as aircraft equipment and was designed according to the RTCA DO-160E standard.

The logger time-synchronously records up to 32GB of data from two CAN channels and four analog measurement channels. It operates on layer 2 of the CAN protocol and is also able to acquire error frames, bus load and bus timing. Both long-term and event-triggered loggings are



possible. To reduce data volume, the test engineer can define extensive filters and trigger conditions with a Windows-based logger configurator. The configurator software can be used to upload the logged data via USB 2.0 and to convert the data to various formats for evaluation. Vector also offers software tools for offline data analysis, such as CANoe, CANalyzer, CANape and vSignalyzer.

STAND: 1D30

Cabin safety and security

As OEMs concentrate on upgrading cabin interiors, engineers are beginning to investigate new technologies, such as electronically driven locks and latches that can be networked into an aircraft control system to secure various interior applications. Incorporating these electronic access solutions can improve functionality and overall weight consumption, while enhancing safety and security.

Southco, a provider of mechanical as well as intelligent electronic access hardware products, offers a range of electronic access solutions that comply with the requirements of RTCA (Radio Technical Commission for Aeronautics), such as DO-160, which specifies test conditions for the design of electronic equipment in airborne systems.

Southco's electronic access solutions lend themselves to a range of cabin applications: they can keep access points secure during TTOL, and turbulence. They allow flight crew members to remotely control passengers' access to overhead luggage bins and lavatories. They can also protect access to lifesaving devices such as oxygen masks, keeping them securely locked in place and releasing them in emergency situations.

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TA102 Dual USB Charging Port



STAND: 4B50

TE CONNECTORS BOEING CERTIFIED

The new Deutsch 369 series connectors from TE Connectivity (TE) have received qualification from Boeing under the new meaning they can be used for cabin lighting on Boeing aircraft

The compact connectors are engineered for high reliability, light weight and cost efficiency, and are particularly suited to civil aerospace cabin systems applications, having

been designed to meet today's tightening industry regulations and Electrical Wiring Interconnect Systems (EWIS) best practices.

Improved installation features of the Deutsch 369 series include color coding for guick ID and install, positive button latching/ audible click, and simple cable-tie mounting with a latch-defeat mechanism.

The connectors are sealed for use in areas with high levels of moisture and

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latest cabin

lighting news

are manufactured from composite materials that are designed to help meet smoke, toxicity and flammability requirements.

The 369 series connectors are suitable for various aerospace applications in the cabin, including cabin lighting, oxygen-mask systems, galley systems and seat-actuation systems. The connectors also provide a solution for UAV lighting systems and helicopter control panels.

STAND: 7B09

Your ideas in a new light

Ambient lighting plays a major role in creating a comfortable atmosphere for passengers. UTC Aerospace Systems' new decor area light panels offer the option of combining pleasant and discreet illumination with individual styling.

The openwork pattern may consist of any decorative design - from graphical elements such as circles, squares, stars, flowers or leaves, to the use of airlines' logos to support corporate identity.



Thanks to an optimized lighttransmitting pane mounted behind the decor area light panel, a very uniform illumination accentuates the distinctive look of the openwork pattern. Customers may choose from a wide range of light colors, depending on the mixture of LEDs - from unicolor neutral or warm white to adjustable multicolor LED light strips. For example, an arrangement of red, green and blue LEDs gives a palette of 16 million colors including white.

The combination of a unique pattern and individually adjustable light colors offers endless styling options for different parts of the aircraft. Individual decor area light panels may turn the whole ceiling of the passenger cabin into an eve-catcher, or they may set accents in bars and seating areas of business jets.

STAND: 6A75

PROTECTIVE COATINGS

Over the past 40 years Parylene coatings have been improved and perfected continuously to create the most reliable protection layers. The biggest advantage for the aviation industry is the low weight load. Due to the micrometer-thin layers of Parylene, it adds very little weight compared with other seals such as grouting or varnish. The layer is generally applied structure-preserving and free of pore with a thickness of 1-50µm (real conformal coating). During the coating process the assemblies do not suffer raised temperature stress, as it is conducted in a vacuum chamber at ambient temperature. Because synthetic gas is used, all surfaces below the components are sealed hermetically by the Parylene layer. Therefore areas and structures that are not accessible using other procedures can be coated.

Parylene is currently the most suitable vacuumcoating technology. With steady quality, a good electric carbon copy firmness is produced, as well as protection against humidity and corrosion for construction elements and electronic assemblies. Find out more from Heicks at Stand 6A75.



electronics and software

STAND: 6A48

MAKING LIGHTING PERSONAL

The next-generation SELA mood lighting system will be launched on the STAG Group stand (STAG Group represents SELA in the UK). Supporting growth in demand and increased adoption of cabin mood lighting, SELA is further enhancing its Clematis range. A complete set of LED RGBW cabin lighting fixtures, which can be operated via a passenger's smartphone or tablet, is offered. The latest lighting addition to the STAG range enhances aircraft interior aesthetics, reduces power consumption and helps aid body clock adjustment to new time zones.

Commenting on the new Clematis range, Thibaut de Bouillane, STAG Group's commercial director, said, "The introduction of the Clematis system in Airbus Corporate Jet cabins has opened up infinite possibilities in mood lighting. Light color, intensity, transitions and zoning can all be set up within the cabin environment. This not only enhances the traveler's environment, but the ability to adjust lighting to match the ambient level at the traveler's destination is a major benefit.

"The days of quick switching of harsh fluorescent lighting

are well and truly over. With an infinite number of lighting options, to avoid supplying systems with too much choice and complex controls, the color, intensity and transition algorithms of the new mood lighting are software driven. This means that sophisticated programs, based on research into passenger behavior and tailored to the operator's needs, can be developed and easily uploaded to onboard lighting software using a simple tablet or PC."



THE SELA SYSTEM ALLOWS LIGHT COLOR, INTENSITY, TRANSITIONS AND ZONING TO BE CUSTOMIZED

STAND: 6B41

Lighting the mood

As a leading innovator in the field of illumination, STG Aerospace has been investing substantially in aircraft cabin lighting R&D to pioneer new technologies and applications – liTeMood being an excellent example.

A programmable, plug-and-play LED lighting system, liTeMood is easy to install and offers a cost-effective upgrade for airlines seeking to improve the passenger experience, increase yields and boost reliability. According to STG, liTeMood is up to 40kg lighter than original-fit fluorescent lighting and consumes 70% less power, increasing the aircraft's fuel and electrical efficiency.

Despite the simplicity of the system, its design incorporates the latest research into the effects of ambient lighting – resulting in a

transformative effect on individual passenger comfort and wellbeing. And as a result of the system's versatility it can be applied to achieve brand differentiation.

It was benefits such as these that most recently led the UK's largest leisure airline, Thomson Airways, to award STG Aerospace a contract to retrofit nine of its Boeing 737NGs and 14 of its 757s with liTeMood.


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QUATRO Imagik's USB In-Seat Power



ZERO POWER AC (ZPAC)

Imagik developed this innovative technique to have the power supply OFF while not in use.

When no device is attached the System turns OFF the AC Power, until a USB device is plugged in.

Port Power Management (PPM)

PPM is the intelligent and dynamic allocation of power. For multiple USB Power ports systems which cannot power all simultaneously at Full 2A. Purposes of this feature are:

1. To enhance user's experience since all passengers have USB Power Capability.

2. Power supply designed for an efficient use of Power Input per Row.

Initially all 4 ports are allowed to broadcast high current Power.

System monitors STATUS to check when high current capable devices are present at the same time, If more than two high current Devices are attached, the system will broadcast Low current Power capabilities to each.







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- Ultra Low inrush current for daisy chain connection
- Ultra Low harmonic distortion @ 400 Hz
- Ultra High efficiency
- Extremely compact size fits under the seat, with no fans
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- Only 3.5 Watts per Row
- Low cost

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STAND: 3C30

THE BEST WI-FI IN THE SKY?

The best wi-fi in the sky, based on Routehappy's recent State of In-Flight wi-fi report, is on JetBlue Airways and United, early adopters of ViaSat Exede In The Air inflight internet service. While traditional inflight services share bandwidth among passengers, Exede In The Air delivers 12Mbps per passenger regardless of how many connect, for a home-like experience at a comparatively low cost, or free in JetBlue's case.

According to ViaSat, on average each flight offering Exede In The Air has more than four times the

number of passengers using the service compared with the next best inflight service.

With internet video traffic set to grow fourfold through 2018 according to a Cisco forecast. inflight network capacity will have to scale up to keep pace with demand for media streaming. Unlike traditional services that often block media streaming, more than 20% of all data consumed on Exede In The Air equipped flights goes to streaming applications. The Exede In The Air service

is soon coming to Europe on

board Israeli carrier El Al. And to keep pace with data demand, the ViaSat-2 satellite, expected to launch in mid-2016, will further expand capacity and extend service to transatlantic. Central American, Caribbean and European routes.

3 - 5 Mbps TO THE ENTIRE PLANE VS **12 Mbps TO EACH PASSENGER** Creates Sharing Problems After 3-8% Usage Keeps Everyone Happy and Engaged

STAND: 3B12

Cobham to present next-gen Aviator S

Progressing toward the anticipated approval of the SwiftBroadband (SB) Safety service in 2016, Cobham Satcom is presenting its nextgeneration product family, the Aviator S series, at this year's Aircraft Interiors Expo.

Cobham is currently working with the FAA during the safety evaluation period as it continues the development of Aviator S through a recent agreement with Hawaiian Airlines, as well as by collaborating with other airline customers. Representing an important milestone for the SB Safety service, the installation of Cobham's Aviator SB satellite communications systems on Hawaiian's fleet of B767-300 aircraft will be used for safety services data as well as for the provision of an IP pipe to the cockpit.

Providing safer and more efficient flights due to better overall situational awareness and transfer of operational data to and from the

aircraft, Cobham said operation of the Aviator S series will enable the fast, efficient transfer of ACARS data messages over the SB link. It will also offer flight deck safety voice services and IP connectivity to the flight deck, enabling other flight operations and cockpit services.

The Aviator 200S airborne Satcom, the first system to be made available, features the compact HELGA (combined HLD and Enhanced LGA) antenna, which reduces the number of LRUs from three to two. Designed as the first Inmarsat Class 4 terminal by Cobham, the system allows simultaneous transmission of safety and non-safety services over the same SB channel. The system will also deliver the space and weight savings demanded by air transport operators.

THE AVIATOR 2005 AIRBORNE SATCOM FEATURES A COMBINED HID AND ENHANCED I GA ANTENNA

THENE ZONE/IS/25% LARGER THAN IN 2014

b connectivity

STAND: 2B70

Halls B2, B3 and B4 make up the dedicated JFE Zone

Breakthrough Ku antenna due in 2016

Brace yourselves for some big connectivity news in Hamburg: Global Eagle Entertainment (GEE) has announced that it is jointly designing an inflight connectivity antenna with QEST Quantenelektronische Systeme, a developer of antenna systems. The partners claim that the new global antenna will provide airlines with high-speed inflight connectivity that will operate reliably at all latitudes, including equatorial regions, where Ku and/or Ku high-throughput satellite (Ku HTS) coverage is available.

The global GEE-QEST antenna, with availability scheduled for mid-2016, will be optimized for use with upcoming Ku-band HTS systems, designed to offer airlines a breakthrough mix of reliability, high connection speeds and global coverage. The antenna will also be fully compatible with existing Ku-band satellite systems and will use a steerable pointing system to optimize coverage anywhere a commercial aircraft flies. The antenna will be compatible with GEE's current installation architecture and Supplemental Type Certificates (STCs), and is also intended to meet the requirements for future line-fit installations.

Aditya Chatterjee, SVP of connectivity systems and CTO at GEE, stated, "Through our joint development with QEST we will provide airlines with the most advanced, high-speed connectivity technology and service in all latitudes where Ku and Ku HTS are available."

Dr Jörg Oppenländer, CTO at QEST, added, "With our design expertise in highperformance antenna systems, we will provide GEE with a technology solution that provides global coverage, takes full advantage of the high-speed performance capabilities of upcoming Ku HTS satellite systems, and is fully compatible with the current generation of satellites."

STAND: 4B30

CONNECTED AIRCRAFT TO TOUCH DOWN IN HAMBURG

The newly formed SITA OnAir is announcing its full service offering at the Expo. Much has been said about the theoretical applications of the connected aircraft, but SITA OnAir is making sure it can talk about the connected aircraft in the present tense. Today SITA OnAir is offering a full range of services alongside, crucially, the capability to integrate connected aircraft into an airline's IT infrastructure, improving air travel for passengers, improving operational efficiency for cockpit and cabin crew, and ultimately streamlining airline operations.

Goals for nextgeneration antennas

TE Connectivity has identified the following three key trends in antenna technology:

- Multiband, wideband antennas yield fewer antennas per platform, but with each antenna performing more functions.
- Conformal/embedded with higher levels of integration into the platform for improved fuel efficiency and aerodynamics.
- Smaller, lighter and more powerefficient antennas that integrate seamlessly into the platform.

STAND: 4B50

ADVANCED ANTENNA TECHNOLOGY

TE Connectivity (TE) will be showing how it is using its experience in consumer antennas, RF design and the military/aerospace markets to create antennas that are small, light and efficient. Materials science

is yielding new possibilities in antenna design, and Kathleen Fasenfest, senior electrical engineer of antenna products at TE Connectivity, will be at the Expo to explain how she is working to improve antenna technology through advances in materials science to lower cost, weight and size. She pinpointed conductive inks and coatings as key tools to lowering SWaP, because they enable developers to replace metal components with coated plastic or composite parts. Fiber-filled composites will likely also be instrumental in creating lower-profile antennas, since they are stronger than the unfilled plastics often used in today's technology and even allow thinner radomes. She cited 3D selective metallization (a process by which conductive paths are created on polymer structures) as one example of how new materials will



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STAND: 4A08

HIGH FLYERS TEST INTELLICABIN IFE

BAE IS MAKING HANDHELD IFE A PREMIUM ENTERTAINMENT EXPERIENCE

In fall 2014, two international flights operated by MLW Air, one flown by government officials from the USA and the other carrying models to London for a fashion show, gave passengers an IFE experience available nowhere else. The reason? These flights were used to test BAE Systems' IntelliCabin IFE system.

"Outfitting flights for MLW Air gave us the opportunity to test the IntelliCabin IFE solution with passengers who fly frequently aboard some of the most luxurious flights in the world," said Jared Shoemaker, director of cabin systems for BAE Systems. "IntelliCabin's tablet-based system delivered entertainment via its innovative user interface for the VIPs on the flights." Together, BAE Systems and Samsung delivered a fully integrated, wireless IFE system that integrated the best of today's tablet technology from Samsung with BAE Systems' IntelliCabin suite of products. The system, viewed via Samsung Galaxy tablets, delivered movies, television, magazines, games and moving maps hosted natively on each device. The configuration also included picture-in-picture features, and offers an entertainment experience that's more like a multimedia setup at home.

"Our VIP clients expect a premium experience when they charter a flight with us, and in-flight entertainment can be a big part of that," said Martin Woodall, CEO of MLW Air. "IntelliCabin is a truly innovative solution, allowing for a unique, visually appealing user interface and the ability to update to new tablets regularly."

STAND: 2E84

Digiredoo digital home delivery

Why wait until your flight for the entertainment to begin? DMD has extended its digital press service for airlines beyond the bounds of airport and aircraft, to give travelers exclusive access to digital newsstand content before they even leave home.

As an extension of Digiredoo Online (introduced to deliver content to passenger devices in lounges), DMD now gives passengers free access to new editions downloaded direct in advance, typically when checking in online. "The innovation is especially suitable for airlines with no exclusive lounges, or when passengers have a short terminal dwell time," noted DMD's digital business director, Kevin Birchmore. "It brings real brand benefits too, since every Digiredoo portal has a bespoke UX and custom content sets compiled for an airline's unique passenger profile."

Service delivery can be controlled and segmented by cabin class, with options for handling IP authentication. There are also choices for integrating the service into online check-in, and authentication options include virtual voucher and PNR protocols.

The service complements Digiredoo iterations for lounges, seatback systems and wireless delivery on board, and the core DMD business of providing physical newspapers and magazines to airlines and airports worldwide.

STAND: 3C34 JACKS, USBS & PAYMENTS

IFPL will be showing three product lines at the Expo. The Classic range includes the Long Life audio jack, a range of Breakaway jacks, and a Self-Testing jack that enables easy system checking at a glance.



Among IFPL's latest interface products are a USB outlet designed for charging PEDs through its 2A output. In the payment range, the Contactless Retail System (CRS) uses NFC technology to enable contactless purchases.



IFE

STAND: 3C10

PORTABLE IFE WITH EWC

Lovers of Early Window Content (EWC) will enjoy the latest news from Bluebox Avionics, as the company is now offering airlines the option to quickly deploy a portables-only solution that delivers brand-new Hollywood movies and far more besides. Wireless IFE is an attractive proposition for many reasons, although no wi-fi system is Hollywood-approved to stream that allimportant EWC to passenger devices.

"We recognize that choice can bring complexity too, and the challenge of ensuring a future-proof investment,"

said Bluebox's joint MD, John Howe. "Our portfolio of IFE solutions is designed to make the choice far easier."

That portfolio brings together an optional suite of digital platform solutions that work standalone or together in one integrated IFE product.

The Bluebox Ai application, approved by all six major US studios to host pre-loaded EWC, has been delivering IFE content on iPads since 2010 and now boasts more than 14,000 units flying. The more recent Bluebox wiFE streaming system supports a

range of consumer portables, with a configurable user interface to ensure a quality passenger experience.

EWC on wireless IFE?

Bluebox Ai is an interesting

proposition

The provider's latest market initiative marries both compatible concepts in Bluebox Hybrid – designed to deliver EWC as well as content streamed to Bluebox devices, from the wiFE platform or any approved onboard system.

Essentially an enhanced Ai solution, Bluebox Hybrid delivers the latest Hollywood content as a complement to any onboard wi-fi system.



STAND: 4CO3

Pay per flight IFE

PED IFE is a growing trend at the Expo, and Portuguese company In Flight Solutions Group will be talking about its new service. This fully integrated tablet-based IFE service includes ground handling so that airlines do not need to invest time or personnel in running the system. Airlines do not need to invest money into the

system either, as it is offered on a 'single fee per flight' business model, enabling small and medium-sized carriers to compete with the major players in the market in terms of customer experience, while preserving their cashflow.

The launch customer for the system is Ukraine International Airlines.

A LACK OF EARLY WINDOW CONTENT HAS BEEN A EREQUENT COMPLAINT ABOUT PORTABLE IFE

STAND: 4C40

ONE BOX, MANY TRICKS

Vision Systems will present its VisiStream IFE system, a single compact box that offers many functions, such as broadcast, AVOD on PEDs, cabin management and moving map. Easy to install, update and maintain, software upgrades and content are rapidly downloadable by USB connection or on ground 3G/4G connectivity.

Various configurations are possible with wireless personal or company tablets for DRM-approved

streaming, and priority data flows for passenger announcements put the tablets on hold. The connectivity option provides internet access, email, video conferencing and VoIP. Other options include the recording and broadcasting of images from external digital IP cameras.



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IFE

STAND: 2C40

Go on, UGO

Display Interactive will be presenting its disruptive UGO solution, which demonstrates how to bring the simplicity. efficiency and cost levels of the digital world into IFEC.

Imagine a smooth, continuous customer digital experience, from website to mobile apps. What kind of services would an airline deliver to differentiate itself from the competition, simplify processes and increase profitability?

What if IFE content were seamlessly updated? What if passengers were actually happy to spend more, using one-click payment? What if they fueled the innovation process by sharing their digital behavior with airline marketing teams? What if those marketing teams could know, a few hours after landing, how passengers interacted with the airline brand and its business partners during the flight?

Imagine the power of having not just a single IFE system in a cabin but several, adapted to passengers' levels of contribution. Imagine that each airline's IFE offer is really unique, easily customized to its business and marketing processes, and exactly as they want it to be...

Visit stand 2C40 for a live demo of UGO on Kontron hardware.

CURIOUS? TRY UGO FOR

Ideas such as UGO allow airlines to extend the

passenger experience



STAND: 4C10

NE-STOP IFEC

Following Rockwell Collins' acquisition of ARINC just over a year ago, the company has strengthened its IFEC cabin offering for airlines. Rockwell Collins' PAVES family of IFE will be on show, including its on-demand, in-seat displays, overhead broadcast system and wireless solutions. Airlines can choose varying combinations of IFE to meet customer needs.

The ARINC Cabin Connect onboard content solution, which streams live TV, voice and text services to personal devices and provides real-time

operational data to airlines, will also be showcased. Cabin Connect also integrates with PAVES Wireless for streaming of airline-offered movies and music.

Global Ka broadband will enter the market later this year and Rockwell Collins is now a value-added reseller of Inmarsat's GX Aviation. This new service enhances the PAVES family of IFE and Cabin Connect solutions, and gives passengers fast and reliable connectivity anywhere they travel.



GOT SOMETHING TO SAY ABOUT IFEC? WHY NOT SUBMIT A BLOG ON OUR WEBSITE?

STAND: 4B60

PAVES SEAT ELECTRONICS TESTER

Sinters America will showcase its newest easy to use Rockwell Collins PAVES On-demand Seat Electronics Tester. PAVES On-demand provides overhead broadcast video and in-seat audio/video with a compact footprint and light weight.

The purpose of the electronics tester is to check and test the functionality of the seat electrical installation, consisting of cables, disconnects and the installed LRUs, to ensure swift maintenance and fully functional seat groups.

The Sinters America booth is just a few steps from Rockwell Collins' booth, and Rockwell Collins clients will have the opportunity to try out the seat tester for themselves.



STAND: 6C50

HD CAMERA STREAMING TO PEDS

Bordeaux-based Otonomy Aviation will be announcing its new wireless features for remote tablets. The company's CAMHD HD camera range is compatible with all IFE systems and cockpit displays, so its output – whether the view from the tailfin or the cockpit door – can now be displayed on any tablet connected via wi-fi using a new app. The app, available on any operating system, will be able to display various features such as mosaic or full screen view, and even has a recording capability including time-lapse features.



STAND: 3C51

Flying travel guides

Fueled by new partnerships, PXCom will be demonstrating its IFE multimedia solutions, and Expo visitors can see how the company's technology can be coupled with world-class travel guide content and seamlessly integrated into an IFE system.

"Thanks to its important destination content catalog and local partnerships, airlines can now be supplied with 100% coverage of their operated destinations," said Cyril Jean, PXCom's CEO. "We are also thrilled to unveil a fully customizable destination guide, featuring upscale addresses and built-in partnership with world-class luxury editors, targeting premium classes and private jets." According to Jean, these multimedia destination guides are also a perfect medium on which local tourism stakeholders, sourced by PXCom, are eager to promote their activity.

"Our end-to-end solution is also an ancillary generator for airlines, which comes in addition to their legacy advertisers.

"Ninety percent of our tourism partners never used to advertise on board, due to a lack of targeting," added Jean. "Thanks to the latest technological improvements, IFE has become a real tactical medium. PXCom is glad to participate in transforming it into a strategic medium."

Don't discount printed travel guides: China Airlines has them in its onboard library (see p120)

LOOKING FOR A NEW JOB IN IFEC? TRY THE RECRUITMENT SECTION OF OUR WEBSITE

STAND: 6F131

COOL FOR CUSTOMERS

Ametek Rotron has introduced a tubeaxial cooling and ventilation fan with the highest performance in the industry for its package size, according to the company. The MIL-XTM Extreme Performance Series fans deliver 300cfm at 1.5iwg (inches of water gauge). This is a 24% increase in airflow over previous models with the same package configuration.

With advances in aerodynamics, motor and DC drive, the new fan maintains ruggedness and reliability and it can be used, for example, to cool commercial aircraft electronics, telecommunications, heat exchangers and crew ventilation.

Operating at 7,500rpm, the MIL-XTM delivers up to 42% efficiency, compared with a typical tubeaxial fan efficiency of 27%.

Standard features include shock-proof construction (meeting MIL-S-901), immersion and wash-down capability, over voltage and reverse polarity protection and locked rotor shutdown with automatic restart. ALSO ON SHOW WILL BE AMETEK'S RANGE OF DIGITAL HUMIDITY SENSORS







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Besides offering tasty meals, exciting equipment, smart logistics and innovative retail concepts, LSG Sky Chefs also provides valuable consumer insight based on thorough studies about global food trends and lifestyles. Discover our advanced approach to creating in-flight concepts that truly meet your passengers' individual needs and explore smart ideas about how to satisfy them.

Visit us at the WTCE April 14-16, 2015 Hall A4 / Stand 4D30

wtce 🎁

CATERING FOR ALL TASTES

From headphones to hot chocolate, duvets to dollies, galley carts to gin and tonic, there is a lot to see at World Travel Catering & Onboard Services Expo. Here are a few products and companies to look out for at the show...

See our website for catering and onboard services news

STAND: 4D30

WHY UNDERSTANDING TRENDS MATTERS

Do you ever wonder why some gastronomic concepts become more popular than others? At LSG Sky Chefs, this question has been a crucial one for years, and a worldwide research study was conducted to find out more about the magic triggers behind food trends.

The result of the survey was that the correlations are actually quite complex. Trends in general can be viewed as answers to current or future social and individual needs. They are reflected in distinctive styles of life and individual trends are strongly interlinked with each other. Of course they vary by country, region or continent, and depend very much on a society's cultural background. But yet, they are all based on worldwide megatrends.

Topics such as mobility, individualization and ecology, for example, play an important role whenever you travel, so they have to be considered when it comes to developing new products, packaging or food and beverage concepts for the airline industry and its passengers. With that in mind, the LSG Sky Chefs team further extracted three food styles that are most prevalent among food-lovers: classic, 'natural 'n' local' and inspirational. At WTCE 2015, LSG Sky Chefs will present a range of products and services in these styles, showing why they are relevant and how passengers' experiences can be enhanced by better understanding what individuals really want.

STAND: 4C40

Children's activity packs



Any parent knows that taking a flight with children can be challenging. The need to keep them fed, calm and busy is not just for parents' own sanity, but also to avoid those disapproving glares from fellow passengers.

Marketing agency Milk is already working with some of the world's top airlines to help keep kids entertained on short- and long-haul flights across the globe, and with its activity pack launch in Hamburg it is aiming to make parents' lives easier with a new range of onboard children's activity packs in a range of languages, with enough distractions for children across a wide range of ages.

MILK IS WORKING WITH AIRLINES TO CREATE CHILD-FRIENDLY IN-FLIGHT ENTERTAINMENT



STAND: 3D10

TOP DRAWER

Airlines are constantly looking for ways to cut costs and create ways to generate new revenue streams. However as these programs progress, the easy options have almost gone. Onboardlogistics has been listening to the industry's issues and has found that a lack of galley space is always an issue when trying to generate extra inflight revenue.

Therefore the company is launching the WTCE Flex-e-Drawer for trolleys. The drawers can nest on top of each other as well as stacking into each other when empty to save space. The empty drawers can be taken from the trolley, stacked and put into the bottom of the trolley or stowed in an Atlas container. A Flex-e-Bag waste bag can then be placed in the trolley, creating a waste cart.

The benefits to airlines are a self-financing revenue stream, creation of extra galley space for better inflight waste management, and lower warehouse space requirements as the drawers are delivered stacked. It is a win-win for airlines as they save costs on purchasing and warehousing, generate a new or extra revenue stream, and the drawer is self-financing. DCA



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STAND: 4K10

CLEAN IMAGE

The new BRA 2500 flatware cleaning system from Walther Trowal cleans flatware perfectly and economically. The machine, which works using the hydro mechanical HDS principle, helps reduce costs for water, energy, detergent and personnel. One machine being used by a European airline caterer cleans up to 70,000 cutlery pieces per day and its purchase cost was amortized within eight months.

The BRA 2500 uses not only water pressure but also mechanical contact between the vibrating polishing media and the flatware, meaning it can easily clean up to 10,000 pieces per hour.

The flatware need only be randomly collected in crates, with no preparation such as unpacking, presorting, soaking or loading into special baskets. The crates are loaded into the machine

and a few minutes later gently discharged into empty crates. Even pieces with days-old meal residue emerge perfectly clean, with no need for post-cleaning control stations. Trowal estimates that, compared with continuous industrial dishwashers, this system reduces personnel costs by 20-80%, as well as reducing water, energy and detergent consumption by 70% (it uses only 250g of detergent per hour). Trowal's BRA

ONE BRA 2500 IN USE BY A EUROPEAN CATERER CLEANS 70,000 CUTLERY PIECES PER DAY

STAND:4L50

Dynamic dishwashing

For more than 88 years, Meiko, a German manufacturer of dishwashers, has been using the most sophisticated technology to create the conditions necessary

for super-clean dishware. With a focus on 'clean' technology as well as clean dishes, machines such as the M-iQ are designed to meet the apparently contradictory

demands of hygiene and safety on one hand, and frugal use of water and energy on the other. The M-iQ series minimizes the use of resources without sacrificing quality to provide the lowest operating costs.



STAND: 4G30B

ROBUST EQUIPMENT

Walther

2500 can clean

10,000 cutlery pieces per

hour

Direct Air Flow and Korita Aviation will exhibit a range of robust inflight galley equipment certified to EASA and FAA safety standards, including carts, standard units and oven racks. Korita Aviation's factory in Suzhou, China, manufactures catering carts in a stable and proven design for both the inflight and rail catering industries. Features of the trolleys include a newly designed push-to-close locking system, a low-maintenance four-wheel braking system, and a choice of finishes on the side panels, including high-definition images. The full range of galley equipment is available for immediate delivery from the Netherlands-based facility of Direct Air Flow.



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STAND: 3G66

HYDRATING SLEEPWEAR

Specialist sleepwear brand Hydra Active is launching the world's first moisturizing aloe vera-infused airline pajama range. The new range of nightwear, designed exclusively for air travel, has been created to combat dehydration and combine comfort and technology to hydrate the skin while sleeping.

During long-haul travel, humidity in the cabin is around 10-20%, rather than a normal 80% outdoors, which has a noticeable impact on the well-being of passengers. Hydra Active has created a unique product that embeds billions of aloe vera microcapsules into the fabric to actively moisturize the skin during wear. Hydra Active holds the exclusive license for this technology.

The range works to gently release aloe vera, one of nature's purest and most efficient moisturizers, through the natural movement of the body, and contains more than 75 nutrients to keep passengers' skin hydrated.



HYDRA ACTIVE'S ALOE VERA-INFUSED AIRLINE PAJAMA RANGE COMBINES COMFORT AND TECH



STAND: 4F10

DELICIOUS DELICIOUS SNACKS

De Kroes, an international manufacturer of savory privatelabel snacks, will be presenting a new range of luxury savory and sweet snacks under the Delicious brand name. De Kroes, which has been in business for more than 150 years, works closely with many major retailers all over the world, shares modern category management techniques and continuously develops products.

STAND: 3B40



Travel textile company Mills Textiles is introducing a range of 'eco' baskets suitable for a range of inflight cabin uses (bread baskets, etc), available in a variety of materials including seagrass and willow. The company can design and manufacture in any size, and minimum order quantities start from as few as 500 baskets.

Mills Textiles offers a full design service from its in-house design team in China, which works with customers all the way from concept to completion and beyond. Specialist team members can help with performance criteria evaluation at all stages of a project.



Key products include hot and cold towels, table linen, headrest covers, pillows and pillowcases, duvets and duvet covers, sleep items, blankets, and disposable items such as pillows, pillowcases and headrest covers. The company has also recently introduced a range of ancillary products including laundry bags, waste bags, duty free and multiuse bags, oven gloves, hazard clean-up kits, air sickness bags, glassware and inflight baskets.

Mills Textiles has partnered with InflightDirect, a supplier of inflight headsets and amenity kits, to offer customers cabin product supply.

STAND: 3C41 *Green packaging*

Amko offers high-quality biodegradable food packaging that is a sustainable alternative to plastic, paper and expanded polystyrene. Its compostable products are composed of natural fibers that are rapidly renewable and do not contain genetically modified organisms (GMO free). Consumers today want healthy packaging that will not pollute the planet. As cities around the world are banning expanded polystyrene, Amko's natural, biodegradable packaging will help airlines stay ahead of the curve and show passengers they care.

STAND: 4K50 Fresh thinking

Fresh food company Just wants to be the most loved convenience fruit and vegetable brand out there. How? By doing better things from the roots up (literally) and doing things differently. Its philosophy can be summed up in six words: 'We cut fresh fruit and vegetables.' Indeed much of the produce – sourced from local farmers – is cut by hand to get the best guality.

Just also presses ultra-fresh juices and smoothies and creates some generous, ultra-fresh meal salads – all fresh, pure and natural with no preservatives or other unnatural additives.





Napkins: Our absorbent airlaid napkins will be delivered in white or colored material in standard sizes. Special sizes or foldings are no problem - please ask us. The napkins can be printed up to 5 colors.



Trolleycover: Trolleycover are available in different materials (absorbent paper, non-woven, airlaid) and in different grammatures. We can produce many sizes - white or colored. A print up to 5 colors is possible.



Hot/cold towels: Our hot/cold towels are made of airlaid or non-woven. They are available in different packages, with or without a tongue, with or without a scenting, with or without a flyer. They are soft and absorbent.



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Headrestcover: Our headrestcovers are made of non-woven. They are flame retardant with glued strings or velcro strings in order to fit them on the seat. Headrestcovers produced in airlaid are an excellent alternative to cloth or leather. A print up to 5 colors is possible.



Pillowcover: Our flame retardant pillowcovers are welded on the sides and are available with or without a flap. We use polypropylene for production. A print up to 5 colors is possible.



Naptainer: a new kind of packaging for the fast food industry. A coated airlaidpaper will be formed to a packaging, which can be used as a napkin, too.

wtce 🌔

STAND: 3H40

LET'S TALK ABOUT SHOES

Ricardo Moreira da Silva, product director at crew shoe manufacturer Skypro, discusses high heel<u>s up high.</u>

Are your shoes safe?

"Users are becoming more informed and aware about the importance of high-quality products, as well as the legal requirements for safety and health protection. However, most of the time we never stop to ask about safety when we buy a pair of shoes. We simply presume everything is right, but sometimes it is not.

There are hazards, for example the presence of toxic substances, that can only be detected by laboratory testing. It is important to keep in mind that you come into contact with chemicals every day, and harmful substances can get

into your body whenever you breathe, eat, drink or touch them. People's reactions to chemicals may also differ. While some people may be exposed to a chemical and never be harmed, others are more sensitive and can become sick easily. Sometimes illness happens only if you are exposed to a harmful substance for a long time. Toxic substances can be irritants, sensitizers, carcinogens, mutagenics or deleterious to reproduction, and if they are in your shoes the skin of your feet could be constantly exposed."

How can you be sure a shoe is safe? "At Skypro only innocuous materials are used in shoe production to ensure maximum protection from exposure to toxic substances." SKYPRO'S PRODUCT DIRECTOR, RICARDO MOREIRA DA SILVA

STAND: 4K70

Linstol expands in China

Linstol, a provider of passenger-related cabin products such as amenity kits, earphones, towels and blankets, has expanded its footprint with two new international offices. In total, Linstol now has four offices, with locations in Naples (Florida) and London in addition to the new offices in Shanghai and Hong Kong. "Linstol is well positioned for expansion as our market share has grown to include over 70 airlines and more than 250 products," explained company vice president Mark Russell. "The industry is growing and our new offices were strategically planned to meet demand and improve current processes."

Linstol has expanded its core team to support growth while providing dedicated facilities close to its supplier network. "Linstol's new offices increase our capabilities in key areas that align with our current and future growth plans. In addition, the prime locations help to better support Asia-Pacific airlines," added Russell.

LINSTOL'S RANGE OF INFLIGHT PRODUCTS COMBINES DESIGN QUALITY WITH AFFORDABILITY



Skypro is the first company to develop shoes for aviation professionals

STAND: 3C10

CALLING SNACK LOVERS

Snacks company Fiore di Puglia is offering snack lovers a true bite of the Italian culinary tradition with some tasty, crunchy and healthy alternatives. Since 1983 Fiore di Puglia has combined tradition and innovation to create high-quality snacks made with the best ingredients, baked according to the traditional recipe: no preservatives and only with extra virgin olive oil.

The quality of Fiore di Puglia snacks has been internationally certified according to outstanding quality standards including BRC and IFS. In order to meet customers' needs, the company has expanded its snacks supply with a wider range of flavors and brands, including Halal and Kosher certified products, premium bakery organic snacks, vegan certified products and gluten-free products.



STAND: 4F20

BRANDED AMENITIES

Skysupply will be presenting its latest partnership with Lufthansa and Samsonite – a new co-branded amenity kit concept. Business class passengers flying long haul receive a co-branded Samsonite bag available in light beige on outbound and dark gray on inbound flights, filled with selected amenity comfort items including a dental kit, eyeshade, earplugs, socks and natural skincare products.

"Co-branding is one of our company's strengths and we are excited to link our airline partner Lufthansa to Samsonite, one of the most acclaimed luggage companies worldwide," said Skysupply's managing director, Wolfgang Bücherl.

For more about amenity kits, see p130.

STAND: 4D17

INTERNATIONAL SALADS

Following R&D work and collaboration with international chefs, Tutti Pasta, a producer of deep-frozen ready meals, will be presenting its new 'around the globe' salad range, developed to cater to increasing demand for light and refreshing meals. The recipes have been created for the inflight catering industry, inspired by different cultures and developed for the summer market.

Among the recipes, the tabbouleh couscous salad, typical of north Africa, or the Arabian chickpea salad, stand out. The range also includes Italian salads with pasta, tomato and tuna, and an oriental recipe with rice, pineapple and soy sauce.



Group SOI's portfolio features more than 150 frozen meals from around the world

STAND: 3D20

Agthia partners with Monty's

Agthia Group, a UAE-based food and beverage group, has joined forces with Monty's Bakehouse, a supplier of bakery items and snack foods to the global airline industry. The partnership will pave the way for Agthia products to be served on a number of global airlines, as well as facilitating the launch of Monty's Bakehouse products in the Middle East manufactured by Agthia.

Under the terms of the partnership, Monty's Bakehouse will represent the full Agthia bakery, water, juices and yogurt ranges within its supply contracts with global airlines, including Etihad Airways and Air Canada. Agthia will also introduce the Monty's Bakehouse brand into hotels, retail and food service providers in the Gulf region.

Iqbal Hamzah, CEO of Agthia Group, commented, "Our partnership with Monty's Bakehouse will not only add a popular name to our portfolio, but will leverage its relationships with airlines to facilitate the promotion of our brands to airline passengers around the world. Our strategy for 2015 focuses on diversifying our product portfolio and widening our distribution reach, and this agreement satisfies both objectives."



• STAND: 3H10 *Local heroes*

If you are looking for ready meals and hot snacks produced using artisan methods, visit Group SOI. The company specializes in single-portioned solutions for the airline and rail industries, with a production unit that uses various quick-freezing methods to preserve quality and freshness.

Group SOI's product portfolio includes more than 150 frozen ready meals, all designed to meet international menu needs, including pasta, ethnic, Asian and western-style dishes. All products are made with the finest ingredients.

STAND: 4C55 Buy the glass

Do you want to save on weight, waste and volume, while also extending your marketing opportunities? All these needs have a strong impact on efficiency, sustainability and costs, but for drinks provision, that doesn't have to be so.

Inflight Drinks has developed a range of intelligent, fully recyclable onboard 'best in glass economy class' beverages.

By specifying these drinks, an airline can save a minimum of 20g per consumption, up to 10% on purchasing costs, and benefit from the various marketing opportunities available.

STAND: 4F60 *Go for a ride*

Watermark Products will be showcasing its exclusive brand relationship with Trunki, the company behind the world's first ride-on suitcase for globe-trotting toddlers and many more innovative, fun travel products for families on the go.

One of Watermark's specialities is designing unique airline kids' kits. Together with Trunki the company has developed a range of inflight kids' packs and goodies for children. On display will be a selection of kids' kits items, including passport holders and luggage tags, a variety of card- and paper-based activities and a range of bags and carry cases.

Skycast Solutions Fuels the Tablet Revolution with the Latest in Portable IFE.

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Alaska needed a portable IFE solution that met the quickly changing demands of their customers and one that would integrate seamlessly with their connected cabin. They looked to Skycast, together with Microsoft and Toshiba, to develop a cutting edge device that packed robust capabilities along with a stunning entertainment experience.





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The challenge for airlines is knowing which end of the spectrum they re aiming to be in

Meet Dnata on Stand 3F30 at World Travel Catering & Onboard Services Expo

aircraftinteriorsinternational.com MARCH 2015

DO YOU SEE A HIGH-QUALITY FOOD AND BEVERAGE OFFER AS AN INVESTMENT FOR AN AIRLINE?

The obvious starting point for answering that is, 'Is there a place for food and beverage on board airlines these days?' Clearly, from where I sit, I'm going to say a massive 'Yes.' The reason is that we think of the F&B side of things as a product differentiator. I like to think of service on board as a jigsaw puzzle. There are many elements that go into that puzzle – the seats, the IFE, the cabin crew, and of course the F&B. If a piece of the jigsaw is missing you can still see the picture clearly, but it annoys you massively.

If you look back 10-15 years, a lot of airlines were stripping product down to the bare minimum, but now I think even the most aggressive of them have realized that service on board, as well as the product on board, can help differentiate them from their competitors and provide a better customer experience. In theory that should help them in terms of the fare levels they can charge.

We've seen a swing back to an interest, from many parts of the industry, in investing in onboard products. I'm pleased to see it, because I think it's right.

WHAT DO YOU THINK ARE THE BIGGEST CHALLENGES IN THE INFLIGHT CATERING MARKET AT THE MOMENT?

The biggest challenge for airlines is making sure they know exactly which end of the product spectrum they're aiming to be in. You've got guys in the Middle East who have a clear understanding of their premium product proposition. Others in Europe, often operating some of the shorter

ROBIN PADGETT HAS RECENTLY TAKEN OPERATIONAL RESPONSIBILITY FOR THE CATERING DIVISION OF DNATA. WITH HIS GREAT EXPERIENCE IN THE AIRLINE CATERING BUSINESS, HE KNOWS THE AIR SERVICES INDUSTRY INSIDE OUT Interviewed by Adam Gavine sectors, are very aggressively doing retail on board, and they're very clear about it. And then you've got a sector of the market that's in between and not quite sure if they should be going after the retail sector or the high-end sector. They can see very strong reasons for going either way, but when you can't make your mind up, it's difficult for the end consumer to understand the product. We, as a business, don't mind which way our customers go; we will support them in either direction and we think we're pretty good at both ends. But it's difficult when airlines can't make up their minds about which niche they are in. That presents logistical challenges. We would always encourage people to think about what their product is, and then go for it aggressively.

ARE YOU FINDING THAT CHANGING PASSENGER DEMOGRAPHICS ARE AFFECTING THE REQUIREMENTS OF ONBOARD SERVICES?

When people are in the premium cabins, no matter what their age, they are expecting a premium experience. They are expecting great wines, great champagnes, and food like they would get in restaurants. It doesn't matter if they're 25 or 65 – they expect to be treated well and to get value that reflects the fare.

EASTERN EXPERIENCE

Padgett was appointed as Dnata's divisional senior vice president of catering in August 2014, a role that gives him full operational responsibility for Dnata's catering division.

While Padgett's career has mostly been in aviation, he originally trained as an economist and worked in insurance and retail before joining the Emirates Group in 1996. Since then he has acquired experience in catering, finance, procurement and logistics, with his previous role being SVP of aircraft catering at Emirates.

Looking forward to the challenges ahead, Padgett intends to work closely with his team, and with stakeholders including staff, customers and joint venture partners, to enhance the company's position as an air services provider.

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PRODUCTS & SERVICES *Contents*



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LIGHTWEIGHT LUXURY

Ultraleather offers great comfort for passengers, as well as several advantages for airlines

oday's aviation market demands products that ensure maximum value and help reduce total cost of ownership. Due to increasing pressure to cut weight for fuel savings, airlines must find a seating material that balances weight savings with passenger comfort and durability. Ultraleather creates the ultimate seating experience that balances weight, comfort, quality and durability.

There are several key advantages of Ultraleather. Firstly, the product weighs less than genuine and lightweight leathers. This weight saving translates to fuel savings for airlines. Based on a standard Boeing 737 seating configuration, Brisa HP, Tapis' lightest weight version of Ultraleather (340g/m²), will save airlines approximately US\$20,000 in annual fuel costs per aircraft.

In terms of comfort, Ultraleather has a soft, supple feel, is exceptionally resistant to the effects of temperature change, stays cooler to the touch in warm environments, and resists stiffening and cracking in the cold. Ultraleather cools down 50% faster than genuine leather, maintaining a neutral seating temperature and creating the most comfortable seating experience.

Ultraleather is engineered using a premium-grade polycarbonate,

an extremely durable polyurethane resin. Tapis has conducted extensive independent testing at the University of Cincinnati that proves Ultraleather is a premier product for seating applications.

For maintenance, Ultraleather is very easy to clean. The protective surface layer keeps surfaces looking their best. Most spills and stains can be cleaned off easily using soap and water and can be disinfected using a 5:1 water/bleach solution – without affecting the color or the grain.

Tapis offers the next evolution of Ultraleather technology, an enhanced ink and stain protection for seating applications. This permanent ink- and stain-resistant technology is infused into the polyurethane resins during the manufacturing process. This custom process has the ability to resist the toughest stains, including denim dye transfer and ink.

Ultraleather is the only polyurethane to be Greenguard certified. It is 100% free of PVCs (polyvinyl chlorides), HFRs (halogenated flame retardants), plasticizers and phthalates, and it meets the most stringent VOC standards for healthier indoor air quality.



Fitting Brisa HP on a standard Boeing 737 could save US\$20,000 in annual fuel costs

ULTRALEATHER CAN BE CUSTOMIZED WITH DIFFERENT GRAINS, COLORS, FINISHES AND TECHNICAL SPECIFICATIONS

Ultraleather is created using efficient manufacturing processes that are based on conservation of raw materials, toxicfree solutions, and minimal dependence on natural resources.

Tapis offers a customization process that enables airlines to create an innovative and distinct cabin design. Ultraleather can be engineered to achieve customer-specific requirements, including grains, colors, finishes and technical specifications. The gloss level, weight, breathability and thickness can be adjusted, and enhanced properties such as ink, UV and antimicrobial protection can be incorporated. The product can also be engineered to meet specific flammability requirements including the most stringent Heat Release and Smoke Density: FAR25.853, Appendix F, Part IV and Part V, as well as 12 and 60 Second Vertical Flammability: FAR25.853, Appendix F, Part I (ii) and (i).

Ultraleather is a solution to evolving market demands that delivers the ultimate passenger experience. Tapis's operations are certified to the AS9100 and ISO 9001:2008 International Quality System Standards. <a>

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MARKET MONITOR

Imagik is focusing on the latest IFE monitor technology to ensure its success in the market

ith almost 20 years of experience in the airline inflight entertainment business, Imagik has become one of the leading suppliers of flat-panel IFE monitors, with products flying with many of the world's most prestigious airlines.

Imagik's technologically advanced monitors, proven track record and excellent customer service, has seen the company win a number of major orders for retrofit or replacement monitors. Some of these projects include Air China's B777 fleet, BA's redesigned B747 and B777 first class cabins with in-seat 15in LED monitors, El Al's B767s, Hawaiian Airlines, Aero Mexico and USAir's B757s.

The design of the electronic components, software and firmware, as well as all the hardware and shroud design, are done in-house, to make the most efficient product in terms of power consumption and weight.

Imagik has an enviable reputation for producing the best monitors at reasonable prices, with no compromise in quality and reliability.

Over 4,000ft² of space has been added recently to expand the company's production area. Imagik has also recently added two full systems to its monitor line. As usual, considerations regarding weight and power were set into the design goals, and achieved using the most current electronics available on the market.

The Quatro is an in-seat USB charger that will satisfy airlines' growing need to provide passengers with power during flight. The Quatro was designed as a very compact, easy-to-install system, with individual boxes for up to four USB chargers each. While not in use, the power draw is zero, and once plugged in it provides power management to ensure all devices have enough power to charge, even while in use.

Meanwhile the Solo is an in-seat monitor, a seat-centric system that uses the most advanced technology in the market to create a simple, reliable, light and very affordable solution, both for retrofit and new installations.

Imagik has been expanding its production capabilities and investing in new technologies

> ABOVE: THE SOLO IN-SEAT MONITOR LEFT: THE QUATRO IN-SEAT FOUR-PORT USB CHARGER

In both systems, great attention was paid to the weight and simplicity of not only the units, but all connections, harnesses and connecting boxes. This method ensured an overall lightweight, high-power solution.

Imagik is also working in collaboration with established seat installers to provide a turnkey installation, whether replacing an existing system or installing from scratch. An FAA-approved D0160 plan test has been completed and units are ready for installation.

At the same time, the company's current monitor line has been upgraded to have both composite and SDI inputs.

These state-of-the-art products will bring the most advanced technology available today into the IFE business. Further lowering weight and power consumption, these monitors will bring the latest available viewing experience into aircraft.

Imagik is currently completing several projects for new and repeat customers. Its reach has also been expanded by the signing of commercial and strategic agreements with top-of-the-line companies, adding visibility and reach to its product line.

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3

ON TREND

To inspire it in creating amenity kits that enhance the journey and brand perception, Formia uses a unique platform to gauge the latest design trends

B

ormia Airline Supplies (FAS), one of the leading suppliers of luxury inflight cosmetics and comfort items, uses its FORUM365 event to predict the latest trends within the design community.

3

The event also enables the company to collaborate with luggage and lifestyle brands that are not traditionally involved in the inflight service business.

The FORUM365's audience is made up of people from very different backgrounds: from the airline industry, fashion houses, cosmetic brands, luxury lifestyle brands, related media, and so on. Each year, Formia invites a futurist or strategy expert to showcase the latest trends from across different industries, all under one theme. For each event, Formia chooses an expert with a different profile, background, area of expertise or nationality, so that trends are discussed from totally different angles.

Formia believes that by linking products, services and communication in one event, it is able to translate these trends to its core business of 'comfort on board'.

The FORUM365 event also helps Formia to understand how travelers are evolving, together with their changing needs and expectations. It enables the company to interact with, and learn about, the next

TURKISH O

For insight into creating the perfect amenity kit, see page 130 generation of customers. Formia has found that these processes enable it to explore the endless potential of amenity kits as the perfect embodiment of functionality, branding and communication for airlines.

3

This knowledge enables the company to indulge travelers with high-quality design and innovation, achieved through an entrepreneurial, business-minded, value-creation approach.

Formia is an independent company, which makes it flexible, fast and efficient in responding to client needs. Based in Asia, the company is not only located in the biggest growth market in the airline industry, but also at the core of the industry's supply chain. Formia is thus well-placed to closely select and monitor the suppliers it works with, ensuring the highest quality end product.

Formia, together with its airline clients, is immensely proud to have won numerous Travel Plus awards to date. Not only are these awards international recognition of the success of its joint efforts, they also represent the consolidation of Formia's position as a premier player in the inflight amenity market. Formia has achieved this position through supplying innovative kits of the highest quality, which reflect travelers' constantly evolving expectations.

Formia's aim is to contribute toward making a journey not only smoother, but also more relaxing. By being enthusiastic about creating value through brands and design, Formia hopes not only to provide the comfort of home while away, but also to create an indulgent experience. Formia is passionate about creating emotional value while enhancing passengers' perception of the amenity kit, and thus the airline too.

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PERSONAL POWER

As passengers increasingly demand to charge devices on board, True Blue Power powers in

here's an ongoing power struggle on most aircraft today: there's not enough power for all the personal electronic devices (PEDs) passengers bring on board. These include tablets, smartphones, noise-canceling headsets, and more. The True Blue Power TA102 dual-USB charging port is the solution. This compact in-seat, cabin or cockpit power source converts the aircraft's power into all the power needed for passenger's portable technology.

The TA102 is engineered to simultaneously provide 2.1 amps of power per charging port to any consumer product requiring a USB interface. This product allows passengers and pilots to charge two high-powered devices at the same time. Some other dual-charging A long list of options provides flexibility during installation, including lit and non-lit (hermetically sealed connector) units. The power connection can be positioned on the back or the bottom of the unit for a tight fit, and four mounting options are available: rear, circular, an instrument hole adapter, or a cosmetic bezel, which can be plated to match any aircraft interior.

As demand for support of onboard personal electronics and portable technology continues to grow, commercial and private aircraft look to reliable products, like True Blue Power's TA102,

Two highpowered devices can be charged at the same time using the TA102





devices are built with one low-power and one high-power port.

The TA102 is designed and manufactured specifically for aviation applications by an aerospace company with more than 50 years of industry experience. FAA TSO and EASA ETSOcertified, the intelligent power source protects itself and the charging devices from short-circuit, power surges, and over-current potential. And while the rugged aluminum case withstands aircraft vibrations, shock and humidity, its compact, 1.5in² by 1in-deep size fits within an armrest, interior cabin wall or instrument panel.



Rear Power Input

to ensure non-stop entertainment and business productivity 'on the fly'. This small, economical, easy-to-install charging port delivers just that.

Tom Genovese, director of sales at True Blue Power states, "Airlines rely on the TA102 as an economical alternative to installing digital media equipment in each seat. It provides passengers with access to uninterrupted IFE via their PEDs."

True Blue Power specializes in the innovative design and manufacturing of next-generation power solutions for the global aviation community.

The True Blue Power product line includes USB charging ports, DC-to-AC

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Bottom Power Input

ABOVE: ALL UNITS ARE HOUSED IN A SIGNATURE 'TRUE BLUE' CASING LEFT: THE TA102 IS SIMPLE AND EASY TO INSTALL

inverters, emergency power supplies and advanced lithium-ion batteries. Select products feature proprietary nanophosphate lithium-ion cell chemistry, which offers stable chemistry, faster charging, consistent output, excellent lifecycle and superior cost performance. All this translates into smaller, lighter products that can be less than half the size and weight of some existing solutions. ©

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VISION TO REALITY

An understanding of customer ideas, attention to detail and creativity helps visions become realized

t Boxmark in Slovenia, visions converge with innovations to form customized product solutions. The company offers custommade services and the full range of leather refining and processing for commercial aircraft, as well as for VIP and business aircraft. From leather hides to leather-covered components, be it a prototype, a serial product or a customized workpiece – each creation is a symbiosis of masterful craftsmanship and industrial manufacturing technology.

"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 Trobis, managing director of Boxmark Slovenia.

Having gained Production Organisation Approval in 2013, Boxmark is authorized as a certified producer for aeronautics, and thus as a supplier to the international aircraft industry. The company is developing and mass-producing interior components for several manufacturers – and owners – of aircraft.

For the airline industry, Boxmark uses XLight lightweight leather, which was developed in-house and weighs a mere 600g/m² (laminated). This material reduces the total weight of each aircraft, resulting in fuel savings and consequently lower pollutant emissions – meaning cost savings and a contribution to environmental sustainability. Xtreme represents a further advantage in the aircraft, VVIP and business jet sector. This leather offers good hygienic properties as well as easy care and great durability. XLight and XTreme meet all international standards.

Boxmark's research and development center has for decades played a crucial role in the automotive industry when it comes to developing and producing



automotive interiors. Concrete results and the considerable investments made illustrate the particular importance that research and development is given at the company.

Due to the increased demand from the airline, shipping, railway and furniture industries, it had become necessary to expand the Slovenian facility. As well as the expansion of the production areas and a modernization of the machinery, numerous new technical installations were acquired. These include, for example, 3D scanners and state-of-the-art computing systems, which enable the virtual development of prototypes, as well as CNC machines, band saws and milling machines. As a technology leader and on the basis of its existing know-how, BELOW: VISITORS TO THE EXPANDED FACILITY CAN SEE THE HIGH-TECH MANUFACTURING AREAS, AND THE SHOWROOMS THAT SHOWCASE THE FINAL PRODUCTS





Boxmark is also able to create foam models, perform foam reconstructions and add upholstery to existing seat systems and add-on components.

"With our manufacturing facilities and machines, which were made exclusively for us, we can fulfill even unusual requirements reliably and on schedule. Together with scientific institutes, we are permanently working on new machines and processing technologies, in order to continue being one of the best," explains Alexander Mesaric, head of Boxmark's engineering center.

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MONUMENT MILESTONES

Cabin retrofits can save weight and space, but the projects must be handled carefully

any airlines run retrofit projects in order to renew and optimize the cabin interior of their fleet. Their objective is to increase cabin flexibility in order to react to changing market demand; the conversion of a three-class cabin to two classes, for example.

For various clients, phi Engineering Services (phi ES) developed interesting cabin interior concepts for aircraft such as the Airbus A320, providing more passenger seats, without reducing service to the airline's passengers.

One option is to replace the current configuration in the aft section consisting of galley and two lavatories (with cabin attendant seats attached), with a single monument solution.

This single monument should comprise a galley, two lavatories as well as a cabin attendant seat. For this concept, phi ES reduced the galley space by half, while still providing more than 50% of the functionality of a typical aft galley.

A specific new feature should be highlighted: in order to optimize stowage space, a new compartment type allowing stowage of three standard units and half-size trolleys in a row has been developed.

The key challenge of this concept was the optimization of the available space. The solution goes beyond standard available space and will be built very close to the structure of the aircraft, while still complying with Airbus regulations and requirements.

A further challenge was the careful interface management required by the previously independent galley and lavatory monuments. Modern cabin retrofit options can really optimize the space used for galleys and lavs

Such a project typically follows a proven product development process: first, the basic layout is agreed in the ITCM (initial technical coordination meeting), followed by a concept design phase where all major structural and system requirements are integrated into one concept to be discussed and approved during the second milestone PDR (preliminary design review). The result is a concept freeze, with all major requirements validated. The subsequent phase covers detail design down to single components and leads to the CDR (critical design review), where the design will be frozen.

Furthermore, phi ES also supports the construction of the unit and its installation into the aircraft.

Based on sound experience and versatile skills in the area of aircraft interiors, the company will support the engineering of such a project, starting with the initial layouts, and moving through all milestones up to the installation of the new monuments into the aircraft. Project management – especially coordination among teams – will be another major part of phi ES's work. The company built its experience not only in retrofits, as it also follows a similar structured development process for line-fit projects.



TOP: THE CURRENT CONFIGURATION OF THE AFT SECTION ABOVE: THE NEW CONFIGURATION OF THE AFT SECTION

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CATALYST FOR CHANGE

John Martino, business manager for aviation at Sekisui SPI, discusses spurring the evolution of material suppliers

assenger tastes are maturing, safety regulations are increasing, and Sekisui Polymer Innovations has been predicting, experiencing and encouraging a renaissance for material suppliers. The way the company is creating materials is evolving.

There are many ways suppliers are challenging themselves and each other to go beyond just taking an order. To be a valued resource, members of the supply chain recognize they need a broad and in-depth understanding of the industries they serve and the materials they use.

It follows that as passenger expectations of air travel become more refined, airlines expect more from materials suppliers. They must be ready to listen to immediate needs and have solutions at their fingertips, while engaging in discourse that engenders deeper relationships with their customers. More conversations begin with, "What would really be interesting..." Suppliers are able to execute those ideas.

When manufacturers, designers, technicians and engineers communicate early and often it enables manufacturers to innovate with new materials and processes. Sharing insights about products that are in development, and those that are already commercialized, enables project teams to discover what is possible, what will soon be possible, and what they collectively wish was possible.

The daunting quantity of components, that are used all the way from flight deck to economy class, makes achieving a multifaceted, layered design a challenge. When materials are from different sources, realizing consistent color, texture and gloss is difficult. Furthermore, sophisticated design may suffer if small but important parts of it are abandoned



when minimums are too costly to merit manufacture. This year, thermoplastics designer and manufacturer Sekisui SPI reached its goal of being the first in the industry to offer a complete aviation interiors product line, with the addition of Kydex 4545 and Kydex FST2.

When suppliers of different materials work together, there is opportunity to transform and elevate the passenger experience. Sekisui SPI predicts more customers will expect material suppliers to make connections for their projects, including those between leading designers and manufacturers of materials. This synergy can result in continuity and harmony in design. Imagine the possibilities of a thermoplastics manufacturer and a textiles manufacturer working together to echo a design throughout the cabin.

When the entire supply chain works together, innovation happens. When we look outside our own industries, good

design happens even faster. Project teams are looking for a global design perspective backed up with dedicated resources who understand objectives and can contribute refined ideas.

While attending Aircraft Interiors Expo every year, the team at Sekisui SPI witnesses how the landscape and role of suppliers are changing. The Expo is an experience eons away from a salesperson standing behind a skirted table with product samples and data sheets. The event now allows one to learn about the ambitions, plans and challenges of customers, colleagues, and the industry. We get real work accomplished and have the privilege of sharing what our R&D and design teams have invented, and plan to invent, and what other suppliers to the industry are predicting as the future. \otimes

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SHOW STOPPERS

From an IFE portal to fiber-optic lighting and seat controls, PGA is set to have a busy time at Aircraft Interiors Expo

GA Electronic, the Astronics Group's French subsidiary, which provides motion systems, lighting systems and IFEC/CMS systems, will be showcasing innovations at Aircraft Interiors Expo (Stand 2B30).

One example is the Smart Cabin Player app, which visitors will be able to try out on a PGA 55in Xtra flatscreen. This remote wi-fi IFE portal provides access to all the content available on the server, such as movies from AVOD, HD media and USB media players, moving map, etc.

Features of the technology include multiplatform application, so the same app can be used for all types of screens (in-seat screens, large screens, PEDs); customizable application through defined themes to fit any cabin interior; an intuitive, ergonomic and modern GUI; a multilanguage platform; special features such as a synopsis, filter by cover/kind of movie or music/alphabetical order; and HD streaming on multiple iPads.

The system also offers access to interactive games, which have been developed in partnership with DTI and are available in the various in-seat and large screens products offered by PGA. The games can be played with either a gamepad connected by USB or wirelessly.

In other news, PGA has developed two new DRM services. With the Full IP System, customers can access HD Early Window Content on demand on the overall Full HD PGA system via in-seat screens or large screens.

Thanks to collaboration with IFP, new content can be made available monthly in aircraft and distributed legally for public use. All the major Hollywood studios have approved the PGA AVOD system.

A further development is that the company has also developed a partnership with Interact, a media provider for IFE systems. This alliance



makes it possible for PGA to offer its customers a legal public-use solution approved by major Hollywood studios for legacy systems.

Customers can now access DRM late content and distribute it in their aircraft. The movies will be a broad-appeal mix of DVD release blockbuster movies and TV series from six major studios.

All movies and television series will be shown in their original language, with additional languages if available. The system is easy to integrate and is adjustable to any cabin configuration without a hardware upgrade. It can also be retrofitted into old IFE systems.

Regarding PGA's lighting activity, at the Expo the team will be presenting an autonomous LED source for its Bebop'tic fiber optic system. The system allows customers to define colors or even match colors, as well as create specific moods such as day/night, take off/lunch, etc.

This all-in-one unique product includes integrated communication and a built-in microcontroller with high software customization capabilities. Moreover, through communication with

external systems, the system can drive

all light sources to create a synchronized ambience throughout an aircraft cabin using RGBW technology.

Bebop'tic can be controlled via PGA's Cabin Management System, which is intuitive to use thanks to features such as chromatic wheel presets and color scenarios, accessible via PGA touchscreens and even an iPad connected to the system via wi-fi.

PGA will also be introducing a new optimized and high-performance seat control box, compliant with Airbus and Boeing's latest standards. Weight and volume have been reduced by 25% so as to facilitate maintenance and integration into the most demanding seat frames, while reducing the maintenance and acquisition cost per flight hour. This product includes improved power supply technologies and allows in-depth diagnostic and health monitoring to reduce maintenance requirements.

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SITTING COMFORTABLY?

A recent deal sees Aerofoam Industries gain exclusive rights to ProBax seating foam technology, bringing comfort and potential medical benefits to passengers

erofoam Industries of California and UK-based NuBax Limited have announced a partnership giving Aerofoam exclusive rights to ProBax Advanced Seating Technology for use in aviation interiors. The partnership takes immediate effect and ProBax will be part of the Aerofoam product offering across all seat ranges.

Probax utilises a patented technology to encourage correct seated posture without the addition of any mechanical devices. The Probax design process utilises the team's extensive experience in biomechanics to define key reference points within a seat cushion. Those reference points are then expertly built into a 3D shape using Aerofoams' foam technology to create the final seat cushion that in trials was over a 1lb per pax lighter.

The anatomically correct shape of the cushion effectively rotates the hips of the passenger backwards to encourage them to sit in a posturaly correct position. With the body now fully supported, less stress is put on the muscular system, leading to less pain and more comfort. By rotating the hips, the passenger moves backwards and creates up to 6in more knee space within the same pitch.

"We know that correct seated posture is the key to better comfort, improved physiological benefits, and increased seat durability as seat users fidget less. With this tie-up we can add the potential to save weight and space through materials only available through Aerofoams, and gain rapid access to customers in the commercial market," says lan Moore, CEO of NuBax. "With the increasing importance of increased fuel efficiency, we anticipate that improved passenger comfort via a lighter, slimmer seat will be of interest to commercial fleets of throughout the world". According to the company, ProBax has been clinically proven to increase blood-flow, aid blood oxygenation, reduce muscle fatigue and discomfort and even improve digestion, all by inducing an anatomically more correct seated posture.

"We have always been the go-to company for comfort in aircraft seat cushions and now we are able to empirically define that comfort bio-mechanically," comments Aerofoams sales director, Matthew Nicholls. "The end result is a lighter, more comfortable seat cushion that offers more legroom

See page 32 to find out more about this comfort technology PROBAX FOAMS CAN NOT ONLY IMPROVE COMFORT: THEY CAN ALSO MITIGATE AGAINST THE RISK OF DVT

and mitigates the risk of DVT. An added side effect is that by keeping passengers comfortable, they're less prone to adjusting their seat incline, potentially reducing passenger irritability and the use of devices such as

knee blockers.

ProBax has its origins in the medical field where its effects have been widely praised as a solution to back pain. Customers

in the theater industry have also been pleased with the results. Sir Andrew Lloyd Webber, chairman of the Really Useful Group, said about seats featuring the foam: "The thing I like best about these seats is that the audience forgets all about them! They sit still and happy and can concentrate on the show... music to my ears."

Beth Morgan, manager at the Fortune Theater in London, adds, "Nine months on and still not a single seat complaint. That's good for a theater manager, but it's the way the atmosphere has changed during the play that I still notice. At the high drama points the audience is still, silent and focused totally on the stage. There's just no fidgeting!" @

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GRAPHIC CONTENT

Interchangeable temporary graphics are a quick and easy way for an airline to alter its image

t first glance, when boarding a commercial aircraft, what fancy and cool detail tells you that you are about to fly with your chosen airline, especially in economy class? Apart from perhaps the crew's uniforms and the corporate colors of the interior design, there is usually no strong differentiation that makes the passenger cabin really distinctive. Yes, airlines work hard with designers to develop their own branding, but while many passengers can immediately identify an airline by its external livery, few can recognize the identity of an airline by its cabins.

Large spaces that can be used for visual communication in the cabin are rare, but partition walls and overhead bins offer a good way to create a unique atmosphere throughout the cabin. Since messages may differ according to the destination of the flight (a tropical island or a winter sports area, for example), the season (Christmas, Chinese New Year), special events and celebrations (anniversaries, sports events), airlines may occasionally want to display a graphic for a limited period, and a temporary or semi-permanent medium is essential.

Demand is increasing for interchangeable temporary graphics that can be applied in the aircraft cabin, and the difficulty for airlines is finding a product with the right level of adhesion (difficult for passengers to remove, easy for maintenance staff), good graphic quality, compliance with FST requirements, and easy to apply and maintain.

Adhetec, a specialist in developing pressure-sensitive adhesive films dedicated to marking, signage and decoration in the aircraft industry, now offers specific decals for airlines interested in decorative solutions for

the cabin. The solution also answers the needs of OEMs to offer a broader range of customized options to airlines wishing to innovate in this aspect of the cabin.

The product features a combination of a thin polymer film and a selective adhesive layer, which means the decal may be applied on a multitude of surfaces inside the cabin, whether different shaped, glossy or rough. The material is printed with high-quality graphics and cut to the required dimensions. The resulting decal can easily be applied by cabin maintenance staff within one hour (even for the largest panels) and does not require the use of heating devices or water-based solutions. The decal can be cleaned with the same materials used for the other interior surfaces in the cabin. CAN YOU IDENTIFY THE AIRLINE FROM THIS PICTURE?

This new product has been developed as a response to the use of massive advertising graphics on tray tables and overhead bins by low-cost carriers who, in their efforts to generate ancillary revenue, have transformed their aircraft cabins into flying billboards. This new type of communication, available to more conventional carriers, can offer different travel experiences to passengers. And as an expert in graphics, both for aircraft exteriors and cabins, Adhetec will keep innovating to help support airlines in developing their image. @

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REGIONAL HERO

The Sophia seat is intended to bring wide-body business class comfort to the narrow-body market

hen talking about economy class, everybody has a clear image of what it is. A triple seat, forward facing, sometimes cramped and accessorized in a bare-bones style, sometimes blessed with a little more pitch and equipped with cupholders, electronics holders and power and USB connections. But however it's dressed up, an economy seat is always recognizable as such.

When talking about business class, however, things gets tougher and the mental image varies from person to person depending on their experience. And the experience can be incredibly different...

Some may have flown in a business class seat that is actually an economy triple seat, with the center seat converted into a small table. But others may have flown in a luxurious personal space with a cozy bed, direct aisle access and a comfort level comparable to first class seats of less than a decade ago.

There are also dozens of other business class seat typologies that fit in between these two limited cases, but few of them are suitable for narrowbody regional airliners.

The new Aviointeriors Sophia is a business class seat tailored to the regional market, with a weight and size that will fit most narrow and extranarrow-body airliners. It is suitable also to be installed as a premium economy seat on any aircraft - even long-range wide-bodies.

The main structure is designed to be light while being able to withstand the most severe certification tests. The ergonomics have also been carefully designed to comfortably accommodate almost every body size percentile.

The backrest is shaped so as not to interfere with the small radius of narrow fuselage sections, and weight is kept low by adopting the latest alloy technology without using exotic materials that might be difficult for smaller operators to service. For the same reason the part count is kept low.

As with every Aviointeriors seat, Sophia is fully customizable, allowing customer needs to be met. This means that a simple change in upholstery stitching can be made, or even a full redesign of the plastic fairings and the shape of the foams.

Various accessories can also be installed. These include any IFE system with a screen size up to 16in, front and rear footrests, a seatback meal table, cup holders, reading lights, amenity pockets, and literature pockets, among others.

The Sophia business class seat for regional aircraft combines small dimensions and operating costs with big comfort and customizability.

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JACK TO THE FUTURE

Why risk a broken headphone pin ruining the IFE experience, when magnetic jacks are available?

eadphone jacks are among the most-used pieces of hardware on a commercial passenger flight, and when they go wrong, they cost the airline and leave passengers with a bad experience they will forever associate with that operator.

Can't watch the latest movie, listen to your favorite band or keep the kids distracted with the games on offer? The pins of a headphone plug breaking off inside the audio jack might be to blame.

This small but essential part of IFE – traditionally a mechanical object based on the insertion of pins into an audio jack – has had an electronic makeover by Phitek, a company that reimagines how connectivity can be delivered.

Phitek's survey of the industry indicates that headphone jack replacement rates can easily top 20% per annum. For the airline it is a considerable cost to replace the audio jack at the next port of call, and the passenger either has to move to another seat or misses out on the IFE for the entire flight.

The airline industry requirements for traceability and the supply chain logistics involved mean that a single jack may cost up to US\$1,000 to replace. With airlines trying to maximize seat densities to increase profits, the likelihood of headphone pins breaking off in the audio jack – and the associated costs to airlines for their replacement – increases.

Phitek's solution, on the face of it a simple idea – to use magnetic connection points, thus eliminating the need for pins – belies complex electronic engineering design. For example, the company's range of jacks can detect what type of headphone is plugged in, whether the headphones can support noise cancellation or not, what type of ARINC plug is used, and switch how audio is delivered accordingly. The design virtually eliminates wearing parts, which greatly improves the service life of the jack. Recognizing that passengers, with a strong interest in audio, often bring their own headphones, Phitek's design handles both old-style (pin-based) and magnetic headphone plugs. Phitek has used military-spec coatings on the conductive surfaces so that if food is spilled on the surface, the electronics don't need to be handled with kid gloves – indeed regular cleaning products will suffice.

To ensure compatibility with all IFE systems, Phitek created a range of magnetic jacks to fit different cut-out sizes. The Obround magnetic connector, for example, can replace the traditional two-pin economy connector as either a retrofit or line-fit solution.

"We're pleased that airlines are recognizing that this is not just a premium cabin product, but will provide savings in economy class as well," states Roy Moody, Phitek's CEO.

Magnetic jacks can offer a surprising amount to passenger comfort

> PHITEK HAS DEVELOPED A RANGE OF MAGNETIC JACKS TO FIT DIFFERENT CUT-OUT SIZES

It's a testament to the value of the product that all the major IFE providers now offer at least one type of magnetic connector in their product ranges. And headphone manufacturers are also on board, with many of the larger companies, alongside Phitek, offering magnetically compatible headphones.

And they are already flying. Etihad Airways recently implemented magnetic jacks following a successful trial with positive feedback from passengers. As Quentin Couturier, the airline's manager of BFE programs and projects, states, "The results of our 60-day trial were encouraging, with no defects logged and no magnetic jack replacements required. Our survey also revealed a positive response from our guests, with a majority expressing their overall satisfaction."

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VIRTUAL CABIN

Whether used for cabin design, crew training, or as a marketing device, the virtual cabin is here

magine if you could enter your aircraft before it is built, or if customers could experience the cabin before booking a flight. The capabilities of virtual cabins open up many new possibilities for airlines.

ACA is a visualization company that has worked in the aviation business for over 28 years, creating stills, animations and applications. Tobias Malangré, CEO of the company, says, "In my opinion airlines are just at the beginning of using the advantages of virtual cabins. We have created hundreds of virtual interiors and exteriors of airliners. Our experience shows that innovation in this area saves money, optimizes workflow, and creates new marketing opportunities."

Two examples of work that ACA created in the past show how powerful these advantages can be.

The first product is an iPad app for crew training. The app contains the complete interior of an A320 or A321, which can be virtually explored by crew members, including animations that show important features and other information.

The app also covers the location and functionalities of the emergency equipment and all other important crew information. Alexa Luppi, from the cabin interior development team at Swiss Airlines, explains the advantage of the app: "The feedback for the application from our crew was very positive. On the one hand, being able to prepare in advance for a flight made it a lot easier for crew members to get to know the aircraft. When they entered the real aircraft, it made it much easier for them to learn the workflow procedures and find all the relevant items. We discovered that there is a great difference between learning from a written manual and learning from a visual walkthrough."

The second product, which ACA developed together with Armstrong Aerospace, is called ACA Virtual Cabin Interactive. It is based on the ACA Virtual Cabin products and is intended to improve the customer experience. The product enables users to interact with the cabin environment before confirming their booking. Unlike videos and still images, users can control and manipulate features, which increases consumer confidence by allowing users to 'test drive' their seat before they buy. This further promotes premium class products and amenities to boost revenue.

ABOVE: VIRTUAL CABIN INTERACTIVE BEING USED TO DEMONSTRATE HOW A SEAT OPERATES LEFT: THE IPAD APP BEING USED FOR CREW REST TRAINING Rob Abinante from Armstrong Aerospace states, "Airlines spend millions upgrading cabins to provide a competitive advantage. Airlines upgrade their aircraft with amazing first and business class cabins and incorporate in-seat video, power outlets and wi-fi, but they do very little to showcase these amenities." ACA Virtual Cabin Interactive solves that issue.

Virtual cabin products give several possibilities to airlines in creating useful products for, on the one hand, internal presentations such as design support, training apps and team presentations, and on the other hand, external purposes such as promotional products and customer experience, available in quite quickly and within a moderate budget.

The development of new terminal devices and improving virtual and visual technologies will increase the importance of virtual products in the future. \otimes

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A PERSONAL JOURNEY

Join Michaela Bolzan, creative director at Interact, on a journey into the ultimate customer experience

ike most of us working in in-flight entertainment, I do a lot of flying. And with a home base in Australia, traveling to visit clients or attend industry conferences means long haul for me. My inflight customer experiences are typically very long and, let's be honest, not many are truly memorable for all the right reasons.

Recently I had a superb customer experience when I visited my local Apple store to update my iPhone and laptop. This got me thinking about the inflight experience and how we IFE professionals could learn a thing or two.

Even before I saw the Apple logo, and despite not having visited this particular store before, I recognized my destination immediately by the big, white, glass façade; no other shop brand on this strip could possibly look this hip. Then, for a moment or two, I became a nervous flyer... I mean shopper. Was I dressed trendily enough? Would I be able to speak the 'tech' lingo? But I had to go in if I wanted to continue living in the 21st century.

Upon entering, a skinny jeans-wearing dude in a red T-shirt glided toward me. In a casual yet professional voice, he introduced himself as Karl.* Despite my now completely dry mouth, I managed to say I was in the market to upgrade my devices. What was I thinking? I never use the word 'market'. With my face now the color of his T-shirt, I listened intently as Karl clearly explained my options.

I was soon ready to place my order, although there was no need to walk over to the sales desk – actually I don't think the store even had one. Karl pulled a device out of his back pocket, tapped my credit card, and asked me to wait right there while he retrieved my goods. The design and technical seamlessness in this store was awesome. I was impressed; it was so easy.

As I looked around, it was like a scene from *Willy Wonka and the Chocolate Factory*: tiny children, sitting on tiny ergonomic balance balls (I need one of those on my next flight to LA), swiping and pinching their screens;

MICHAELA BOLZAN IS THE UNEXPECTED – BUT STILL PROUD – OWNER OF A GOLD IPHONE

happy people of every background clapping and highfiving each other at the end of an in-store workshop; staff engaging in conversation with each other and their customers. I was in Apple-brand heaven. With these kinds of experiences happening in Apple stores around the globe, we've come to expect the same wherever we go – on the ground or in the air.

Once home, I unwrapped my beautifully packaged items, only to realize Karl had not given me the silver phone I had requested, but a gold one. Would I take it back? Would I complain? No, how could I? My entire customer journey with that brand had been so good, of course I could let this small human error pass. I am a new devoted customer.

* Not his real name, but the rest of the story is true

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GOOD FORM

Boltaron explains the basic differences between three classes of sheets for thermoformed components

irtually every thermoplastic sheet product used for the thermoforming and fabricating of cabin components is made using one of three methods. Each method offers distinct advantages and limitations that designers should know, in order to specify sheets with optimum appearance and performance.

Extrusion is a continuous process in which plastic compound is melted, mixed and conveyed through a heated barrel by a screw. The compound's ingredients are converted into a molten plastic mass that is forced through a lip die, which flattens the mass into a sheet of a specified width and thickness. The sheet then passes through heated embossing rolls, which impart a predetermined surface finish prior to trimming to the final sheet dimension or (less commonly) winding it onto embossing rolls.

Advantages of extruded sheet include the availability of medium- and heavygauge sheets suitable for most thermoforming, fabricating and machining applications; lower minimums than calendering; and custom colors and gauges. The drawbacks of extruded sheet include having a monolithic sheet with limited appearance options and properties, limited standard textures, higher minimums than press laminating, and a smaller range of standard textures.

With calendering, compound ingredients are fed into a two-roll mill that mixes and heats the material. A continuous strip of homogenized, molten compound cut from the mill is then fed into calender rolls that compress it to form a wide, thin film. Embossing rollers then impart a smooth or textured surface, and begin cooling the film, which is wound onto rolls or cut into sheets.

Calendered film and sheet's advantages include the availability of

CALENDARING CAN HAVE LOWER PRODUCTION COSTS THAN EXTRUSION

thin-gauge films for capping of heaviergauge (extruded) sheet in-line or off-line (with low minimums); thin-gauge films for creating composites with exceptional aesthetic and performance qualities; the ability to produce medium gauges more economically by calendering than by extrusion; greater production efficiency and lower cost than extrusion (depending on volume); and the availability of custom colors and gauges.

Limitations of calendered film and sheet include having only a limited number of standard surface textures; having relatively high minimums; and no availability of heavy gauges.

Finally, press laminating combines layers of calendered or extruded sheet off-line, and fuses them using heat

and pressure over relatively long cycle times, to form composite sheets in gauges, from medium to heavy.

Advantages of press-laminated sheet include having combinations of aesthetics and economy that are impossible to achieve with extrusion or calendering alone; minimum gauges equivalent to extruded sheet, with maximum gauges of over 3in; unlimited textures with low minimums; unlimited patterns with thin (calendered) clear protective films permanently fused to substrates of any color to achieve unlimited visual effects with low minimums; custom thicknesses and colors with low minimums; and a sheet that is generally of higher quality than extruded sheet.

Limitations of press-laminated sheet include the higher cost of production of conventional (monolithic) sheet in longer runs; and that it requires extruded or calendered feedstock. @

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The Aircraft Interiors International website hosts a digital version of both this November issue and the 2014 Showcase – plus a digital archive of past issues – as well as all the latest news, videos and exclusives you need to stay informed.

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SAFETY FIRST

Schroth Safety Products is a subsidiary of the global Takata corporation. For more than 60 years, the company has been internationally successful and has introduced numerous safety-related products.

The German-American manufacturer of crew restraint systems, commercial passenger lap belts and aviation airbag applications, will be participating in the 2015 Aircraft Interiors Expo in Hamburg.

The company will present its latest restraint designs and technology innovations for improved safety on board. Exhibits will include the all new ultra-lightweight Schroth AirLite passenger lap belt, which has already been chosen by many of the world's leading airlines for their aircraft cabins.

Recent design improvements give further weight savings and increased compatibility with many current and future passenger seat models offered by the industry's commercial seat manufacturers. Both total cost of ownership and weight, combined with thousands of possible design configuration options, make AirLite passenger lap belts one of the most advanced passenger restraint solutions available today. In collaboration with one of the world's largest spare parts distributors, Schroth maximizes worldwide spares availability on a round-the-clock basis, including dedicated supply chain solutions.

At the Expo, Schroth Safety Products will also showcase inflatable restraint technology for improved safety of both aircraft crew and passengers, as well as a great variety of refined and plated high-end restraint systems for individually designed VIP and business jet interior cabins.

In addition, the company offers highly customized engineering solutions for specific cabin interior applications, such as fixation systems for cabin trolleys and other onboard equipment. The company's major development projects include an energy-absorption system for cockpit doors that protects the crew and the aircraft structure in the event of a rapid cockpit decompression.

The Schroth Safety Products team is looking forward to meeting you in Hamburg this April. 🗞

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COMFORT IN ORBIT

In the beginning, it was a vision: building a solar aircraft capable of flying around the world. After years of research and development, the vision is finally becoming reality and the Solar Impulse 2 (Si2) will soon start its adventurous tour.

Given the ultimate goal of flying around the world in about 20 legs of up to five days and five nights over a period of three to four months, it is easy to imagine that comfort and ergonomics will play a paramount role for the two pilots, Bertrand Piccard and André Borschberg.

To help the pilots deliver peak performance, Swiss company Lantal was brought into the project to deliver its revolutionary Pneumatic Comfort System (PCS). Lantal created specially designed and optimized pneumatic seat cushions for the Si2, offering outstanding reliability.

Lantal's PCS air-filled cushions, which replace the foam in the aircraft seat, not only reduce the aircraft's weight by several kilograms but also offer the pilots the greatest conceivable degree of comfort during the long flights.

Thanks to the adaptable firmness of the cushions, Lantal's system ensures total comfort in the sitting, relaxing and resting positions, allowing the pilots to fully devote their attention to the realization of the ambitious flight. In 72-hour simulation flights, the air-filled cushions demonstrated the PCS's superior comfort as neither pilot had pressure points after three consecutive days in the seat.

With the PCS fitted in the cockpit, Lantal is contributing to the goal of Solar Impulse – to circle the earth powered only by solar energy, demonstrating the potential of new technologies to reduce our society's dependence on fossil fuels.

For the same reasons, Lantal's PCS is increasingly becoming popular in civil aviation, where it helps enhance passenger comfort and reduce fuel costs.

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CABIN NOISE

Directives to assess and minimize cabin noise have become a top priority for the aerospace industry. Highamplitude acoustic signals, whether in the human audible range (20Hz to 20kHz) or beyond (infrasound and ultrasound) can range from being noisy and causing mild discomfort, to resonating in the human body and inducing headaches or nausea. Thus commercial or business jets and helicopters require cabin noise reduction, which is critical to the commercial success and competitiveness of the manufacturing industry and is desirable for passenger comfort.

To measure such noise, large arrays of strategically placed microphones and software for beamforming or Helmholtz Equation Least Square (HELS) acoustic holography methods have been implemented for improved sound pressure mapping, acoustic pressure, surface velocity, acoustic power and intensity measurements.

A business jet was used in a test where all interior panels in the passenger cabin were removed. Flight testing was conducted using a conformal circular array consisting of 60 microphones (*see right*) to cover circumferential measurements and a planar microphone array of 50 microphones for cabin door surface measurements in a closed volume between the cockpit and the forward cabin. Circumferential measurements were taken every 2cm in the longitudinal direction, 2cm from the fuselage.

Locations of interest near passengers were analyzed and the reconstructed location of the fuselage and the closed volume surfaces were derived. The acoustic pressure field was reconstructed in seven interior planes, and 'hot spots' in the cabin, to where noise was likely transmitted, were determined.

Array microphones used with beamforming, HELS or other holography methods help determine noise source locations. The result is improved sound inside today's aircraft, enabling manufacturers to reduce noise for passengers.

SERVICE REWARDED

In October 2014, the Surface Engineering Association hosted its biennial Gala Dinner and Award ceremony at the House of Lords in London. FH Lambert Ltd was invited to attend the evening and was honored to receive two awards.

The first award recognized the company's efforts in marketing – for over 50 years, FH Lambert has established an outstanding reputation. Primarily involved in the aviation industry, the company has exhibited at aviation exhibitions across Europe and recently invested in a 3D version of the company logo to act as a main centerpiece for exhibitions.

The second award was the Ray Alford Individual Achievement, a special award for the person who has made the most outstanding contribution to the industry. Jamie Lambert (FH Lambert's newly appointed managing director) became the youngest winner of this award after being in the industry for only 11 years. Described as being the instigator in many of the company's achievements, Jamie set his sights on purchasing new premises, championing new environmental changes and implementing a "faultless computerized booking system". As well as winning two awards, FH Lambert was also a finalist in the Quality and Outstanding Company Achievement category.

Continuing to develop the ever-increasing levels of quality that customers expect, FH Lambert strives to guarantee expectations and provide a consistently high standard of service. The team at FH Lambert is constantly working diligently to gain certifications in excellence.

Image: Constraint of the second se

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LIGHTWEIGHT PVDF

Zotefoams will showcase its ZOTEK F polyvinylidene fluoride (PVDF) range of foam materials at Aircraft Interiors Expo. The company's unique manufacturing process produces lightweight, closed-cell foams that have consistent cell structure and are exceptionally pure and low in odor.

With aviation flammability requirements becoming more stringent, ZOTEK F OSU foams are proving to be a solution for many soft-touch components within the aircraft. The range has outstanding FST (flame, smoke and toxicity) performance characteristics and exhibits exceptionally low heat release, meeting FAR 25.853(d) and offering lighter options for aircraft interior softtouch finishes.

These low heat release values enable greater flexibility in soft-touch trim make-up. It can be readily laminated to a wide variety of both synthetic and natural materials to provide a more tactile surface, but in some applications it has been molded with a sealed, textured surface finish, removing the need for lamination.

ZOTEK F foams are truly lightweight, starting at 33kg/m³, and have been shown to offer impressive weight savings in many aircraft interiors applications; indeed they are fast becoming essential materials for

aircraft systems suppliers. These unique foams deliver up to 50% weight savings in ECS systems, can reduce the weight of a seat by up to 2kg, and when used as carpet underlay can offer savings up to 1.5kg/m².

Zotefoams will have a number of aviation components on display during the show and will have design specialists available to discuss your future applications.

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COST CONSCIOUS

The aerospace world is currently undergoing big changes, with cost reductions and subcontracting abroad seeming to be the future of the industry. Since Air Cost Control (A2C) was set up, its strategy has always been to be loyal and close to its customers.

Founded in 2000 by Laure and Laurent Parelle, A2C's business is to offer purchasing, stocking and the sale of any products needed to build electrical harnesses for the aerospace industry. The company also provides the same services for all other electrical accessories connected to aircraft.

General contracts have been signed with the big names in the international aeronautics industry (Airbus, ATR, Daher-Socata, Dassault and Eurocopter) making A2C a major player in the electrical components sector of the aviation market.

Indeed, aware that one way to succeed is a lasting and collaborative relationship with customers, the company has three logistics facilities – Toulouse (the head office), Hamburg and Miami – along with sales offices in Madrid, Zurich, Dubai, Paris and Beijing.

And when the founders are asked about the future of A2C, they both say, "Our customers are at the heart of the company and our future is synonymous with our close partnerships with each one of them."

Reaching out to achieve a high level of service meant the company set up assembly lines in 2006, and then again in 2009. A2C became the first European VAD for the assembly of serial connectors 8525 (EN3646) and 8533 (EN2997).

Today, this entity has taken on a major role and provides small quantities of custom-built connectors in 24 to 48 hours to meet the needs of its clients. With 30,000 references in stock, the company now boosts 25 mobile stockers. The French branch has just moved into brand new state-of-the-art facilities with a massive 4,500m² of work space, putting it in a perfect position to tackle its promising future.

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AIR FRANCE SELECTS MGRSOFTWALL

As Air France becomes the latest airline to make extensive use of the MGRSoftWall product, Les Simpson, CEO of MGR Foamtex explains more.

What was Air France looking for?

With the launch of its new lie-flat business seat, Air France saw the opportunity to include MGRSoftWall as a key feature to cocoon the passenger and enhance the sleeping experience during flight. There's actually an 'emotional transition' between sitting and lying down – cold, hard surfaces that we tolerate when we're sitting up become really objectionable when lying down – and passenger expectations have risen greatly. With MGRSoftWall we can give soft, comforting surfaces in all those places passengers touch when lying down or reclining. The project was a collaboration between Air France, Zodiac Aerospace, Design Investment and MGR.

You say expectations have risen. Have you had to change the product to keep up?

To keep up with – or better still anticipate – our customers' needs, we have continuously developed MGRSoftWall. First we expanded the choice of décor coverings – like wipe-clean Aramid, Ultrasuede and Ultraleather – and we have other synthetic materials in development. Then we developed ways to give an especially pleasing padded or quilted effect, which Air France has used to recreate a headboard. Right now we're investing in creating other 3D effects that open up even more exciting design possibilities around the cabin for architectural MGRSoftWall designs.

What about practical issues such as manufacture, installation and maintenance?

For airlines, those things are as important as feel and look, so typically, as with Air France, MGR Foamtex works alongside the seat manufacturer to produce all the detail drawings and spec sheets for each component, plus the full flam report, the purchase and stock control of materials, and then supplies items as finished assemblies. We call this Integrated Component Design & Supply. A unique feature of MGRSoftWall is the patented clip-in clip-out facility for each panel, allowing individual, damaged, panels to be changed. That way we not only ensure product quality, but also make sure that installation and maintenance are trouble-free for our clients.

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FIRST-CLASS COOKING

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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 prepare toast and even toasted sandwiches in the galley. Just like at home, the Aerolux toaster will toast two or four slices of bread, light 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 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.

www.aircraftinteriorsinternational.com

IMPORTANT PARTS

Once all the preparations for your trip are complete, you simply look forward to sitting down. But what if your seat does not recline, you can't reposition your armrest, or your IFE doesn't work? And now your hot meal almost slides into your lap due to a defective tray. Discerning passengers are becoming more critical and selective about which airline to fly based on their experiences.

The fact is that from the moment a passenger steps into an aircraft, their perceptions of the airline and its corporate image are influenced. An interior part malfunction in particular can directly affect a passenger's experience. One key role of a parts distributor is to predict which parts might malfunction and to make sure the airline has

immediate access to those parts without investing in a huge inventory.

Ben Nieuwland from Avio-Diepen's marketing intelligence department explains, "To truly stand out from the mainstream distributors, it is important to analyze global parts usage and to use information from airlines, MROs and OEMs to accurately predict the demand for aircraft parts, and proactively stock them in close proximity to airlines or MROs across the world. By also providing supply chain services, we offer airlines, MROs and OEMs the benefit of cost savings.

"Ultimately, an optimal synergy between the part distributor and an airline will ensure that the lack of a part will never affect the airline's performance in its goal to offer the ideal passenger experience," he adds. 📎

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Brave new world

In the late 1990s, British Airways needed a boost – a real point of market differentiation that would help it attract lucrative business class customers and increase revenues. The airline had recently introduced flat beds in first class, but the market was amazed when BA announced that its business flyers would also soon be able to lie down for a great night's sleep.

The lie-flat project was named Project Dusk – a project that changed business class, and one that, 15 years later, some airlines are only just catching up with.

Tangerine won the BA contract with a revolutionary configuration, often referred to as 'yin yang', which saw everyone in the 2-4-2 layout on the main deck of a B747 have the benefit of a 6ft-long, 20in-wide flat bed, due to a forward/aft arrangement that tessellated the wide parts of the body with the narrow parts of the body, and took a little width from the aisles. This design meant that a seat with a bed and 'living space' could be offered in the same footprint as the cradle seat, and that passengers could relax in a preset reclined position as soon as they boarded.

Eyebrows were raised about the prospect of flying backwards, even though facing against the direction of travel is common in anything from a train to a bus, to a London black cab. To establish the true scale of the concern, BA surveyed 2,500 of its business flyers and found that only 1% had an issue with facing the tail. Indeed, the only disadvantages of the layout for the passenger are that not every seat has direct aisle access – not such an issue at the time of launch, but a slightly bigger issue today – and with typical British reserve, some passengers don't like the risk of making eye contact with their neighbor.

The seat wasn't just about a clever, spaceefficient configuration; it was also designed to offer a real improvement in passenger comfort, with a central philosophy being that the ability to move is key to contentment. The bed delivered this key factor by giving people space to turn during sleep, and work with ergonomists Davis Associates saw the seat geometry and kinematic path optimized for comfort. Detailed rigs were constructed, comfort trials conducted, and the engineering perfected over five months of work with Contour (now Zodiac Seats UK). Incredibly,

> the design went from the drawing board to the first inflight trials of preproduction seats in the upper deck of a B747 just 15 months later, in July 2000. Even more incredible, BA saw its £200m investment returned in less than 12 months, which shows the power of forward (and backward) thinking. ×

In 2006, Club World was further refined, adding 25% to the bed width. Find out how on our website

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