Aircraft interiors INTERNATIONAL

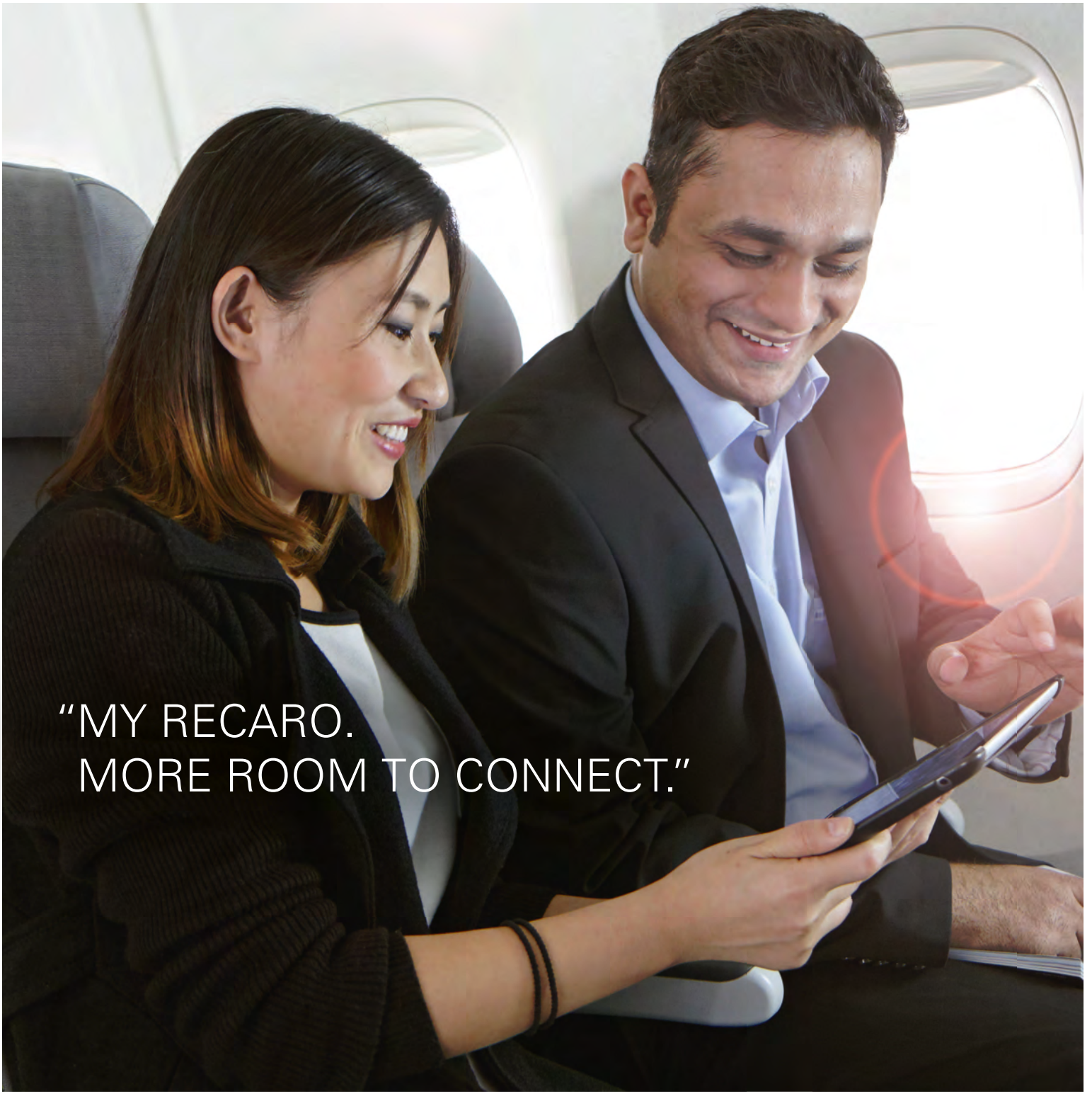
NOVEMBER 2015

In this issue

PURE JOY

CLEAN AND HEALTHY CABIN AIR: THE LUXURY EVERY PASSENGER EXPECTS AND DESERVES

RECARO



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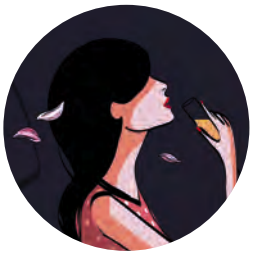

BREATHE EASY

What do passengers really need in their flight experience? Double beds, cocktail bars, massages, 32in TVs? Such features are undoubtedly amazing in the context of an aircraft cabin, but they really fall into the 'want' category, and increasingly that of 'expect'. For what they really need, perhaps we should go back to basics and look at Maslow's hierarchy of needs, which has at its very base physiological well-being, namely food, water, clothing, shelter, sleep, and breathing. In the shelter of the aircraft on a short-haul flight, not even these needs have to be met, except for one: breathing.

Needs don't get much more fundamental than breathing, which is why we explore this most basic human requirement in this issue. A flying tube filled with people and flanked by giant engines is not the ideal recipe for fresh and healthy air, but thanks to the wit of mankind, this hostile environment is getting ever-closer to alpine fresh.

With the latest-generation aircraft, passengers are enjoying unprecedented levels of clean air, with oxygen and humidity levels optimized, germs and contaminants filtered out, and cabin pressure set at just the right level, leaving airlines free to focus on meeting the higher levels of Maslow's pyramid, such as respect, love and belonging. There is of course more work to be done – as Marisa Garcia explores on page 20 – and the depth of research taking place is simply amazing, with studies being conducted at a nanoparticle level. And when you hear that in the pursuit of perfection researchers are going so far as to measure the viscosity of tears in the cabin environment, you know you can breathe easy.

Speaking of hierarchies, another topic we consider in this issue is that of adding a mezzanine seating level in the cabin. This idea has been big news recently, following the widespread reporting of an Airbus patent application for a tiered seating design. Airbus has not indicated any intent to develop the idea, but the design referenced in the application has already been widely condemned by flyers – well, news site comments sections at least – around the world. Are the naysayers justified or just scared of change? We have garnered some expert and informed opinion on this seemingly sensitive topic, and consider whether adding a seating level is viable in terms of passenger comfort, access and certification – and whether the potential seat count benefits justify the added cabin complexity.

Whether by accident or design, the Airbus patent application has generated some interesting – if not always valuable – international feedback on an oft-considered idea. Watch this vertical space…

Adam Gavine, editor

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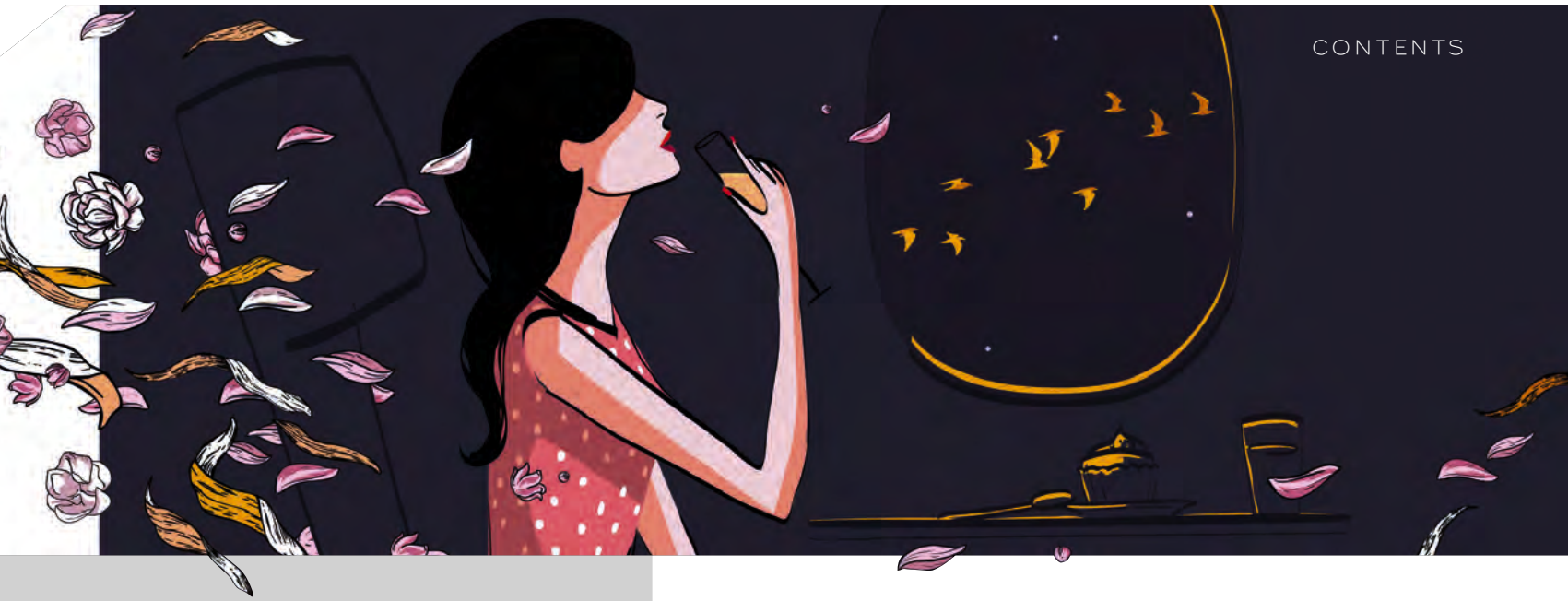

Up front

A bite-sized selection of the latest trends, developments and oddities entering the passenger experience airspace

Features

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THE TEAM

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AD-0245

Can't make it to Hawaii? Take an armchair tour of the cabin in the videos section of our website

ISLANDS IN THE SKY

Long-haul business class flyers with Hawaiian Airlines will soon be as laid-back as the area's island lifestyle

1. THE SEATS FOLD INTO 76IN-LONG, 180° BEDS. FOR SOLO TRAVELERS, THE BAMBOO-EFFECT PRIVACY SCREENS PROVIDE OPTIONS FOR A MORE PERSONAL FLIGHT EXPERIENCE

2. THE OUTER SEAT SHELL IS FINISHED IN A 'POI' STONE GRAY TO CREATE A FEELING OF CALM AND BALANCE, WHILE THE INSIDE OF THE SEAT IS FINISHED IN DEEP ESPRESSO POLTRONA FRAU LEATHER WITH ICE BLUE CONTRASTING STITCHING

Be it to satisfy tourists treating themselves or to attract and retain business travelers who expect comparable standards to rival carriers, Hawaiian Airlines needed to upgrade its long-haul business seating from recliners to fully flat luxury. This need will be met in early 2016, when the airline will fit some upscale new product to its fleet of 23 A330s.

The seats are being supplied by Italian seat manufacturer Optimares, with brand and design consultancy PaulWylde, based in West Coast USA, appointed to translate the airline's design language into the cabin refresh.

Paul Wylde, CEO of the eponymous design consultancy, explained the program: "The first part was very technical and analytical. Working with the company's strategy and transformation team, we developed agreed commercial, ergonomic, operations and brand experience-led criteria, and analyzed hundreds of different configuration designs, using different products, before we collectively agreed on a solution."

The solution is the Maxima seat model, and Hawaiian is its first outing. The 2-2-2 configuration does not offer direct aisle access for window passengers, but with a lot of leisure traffic and many passengers flying as couples, the LOPA is both space efficient and appropriate to the airline.

The seating order was placed in March, with customization work undertaken in the interim, including extensive styling work. The IFE system is tablet-based, with the devices held in place on telescopic arms, and not having embedded IFE screens has really opened up some exciting design possibilities for the seatbacks. The team created a unique wave-like back shell detail finished in a white reminiscent of Hawaii's beaches, with the island theme continuing in the aqua blue and bamboo-effect trim, which is also carried over to the 'thatched' translucent privacy screens. This is truly a seat that Hawaiian Airlines has made its own.

"We believe that these innovations are a breakthrough for commercial aviation," added Wylde.

The business cabin capacity will remain at 18 seats, but overall seating will be reduced from 294 seats to 278, with main cabin accommodation dropping from 236 to 192 at a 31in pitch, while the Extra Comfort section (36in seat pitch) increases from 40 seats to 68. This reconfiguration should see revenues rise, as the business class product attracts more custom, and as more premium seats are available to sell.

The first newly outfitted A330-200 is expected to enter Hawaiian's long-haul network in the second quarter of 2016. The airline will begin installing the lie-flat seats in its remaining 22 A330s in a program running from September 2016 through to 2017.

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ALL SYSTEMS GO

There are some interesting developments taking place in the IFEC market, some involving big names, others brand-new ones

Another big IFE story of 2015 is the first installation of BAE's IntelliCabin. See p60

1

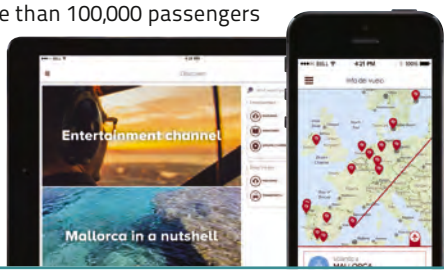
WI-FI WHEELED ON BOARD

In September, TUI Airlines Netherlands (known until very recently as Arkefly) concluded its successful trial of the TUI Cloud streaming IFE system, which was deployed across its fleet of B767-300s, B737-800s and B787s. TUI Cloud is enabled by the battery-powered wi-fi boxes, which are stored, charged (a four-hour charge gives up to 15 hours of operation) and uploaded in Amsterdam by Newrest, the airline's catering supplier before they are brought onboard in galley carts (three of the AirFi boxes can fit into one standard trolley drawer). Because the boxes are removable the system does not need an STC.

2

IBERIA'S EXPRESS APPROVAL

Following a successful test period this summer using eight aircraft, Iberia Express plans to introduce Immfly wireless IFE in all its aircraft. Open wi-fi points in the cabin allow all passengers to connect with the system simultaneously on their PEDs. Once connected, users can access sponsored entertainment including TV shows and newspapers, destination-specific deals, and travel guides. According to Immfly, which makes its money from companies paying to put their content and advertising on the system, more than 100,000 passengers have already used the app during flights, with the average connection lasting 40 minutes. Immfly has its eyes set on 2018, when the company's vision is to have 1,000 aircraft operating the system and 200 million passengers accessing its content.



3

SPRING HAS SPRUNG

September saw China's Spring Airlines launch the first Kontron inflight wi-fi distribution system on one of its A320s. The hardware deployed includes the ACE Flight 4600 airborne server, a Cab-n-Connect A100 cabin wireless access point, and a system control panel. Kontron has also been responsible for obtaining airworthiness approvals for the system from the FAA and CAAC, which it has achieved. Spring Airlines has incorporated the cabin wi-fi distribution feature into the regular flight service of that first A320, and has reported positive feedback from the pilot trial flights, which led to a second installation in October 2015.

4

WI-FI BECOMES FACTORY FIT

In September, Boeing entered into an agreement with ViaSat to initiate the evaluation process for the line-fit installation of wi-fi terminals. If the outcome is positive, ViaSat's Ka-band airborne satellite terminal will be available as a factory-fit option. ViaSat and Boeing are also working together to offer the ViaSat Flexible Broadband System, which couples ViaSat's high-capacity ViaSat-2 satellite payload design with Boeing's 702SP (Small Platform) satellite bus to lower the barriers of entry for regional satellite service providers to offer affordable satellite broadband anywhere in the world. With this system, service providers can focus capacity to match bandwidth demand and scale their infrastructure as expansion is needed.

5

ALL IN THE PASSENGERS' HANDS

Dutch LCC Transavia is the first to adopt Voyage, an IFE system that leverages Piksel's video-on-demand platform and Spafax's content expertise. Passengers select and download video content to their PEDs prior to boarding their flight, which opens up possibilities for airlines to engage with passengers, both pre- and post-flight, as they use the app to choose their inflight viewing from a range of premium TV shows and films, access and update their booking, and make other travel arrangements – and all without the airline having to buy any onboard IFE or wi-fi equipment. The entertainment content is locked until the passenger boards the flight, when it then becomes available to view. Once the flight has ended, the content is automatically deleted from the device.

Visit aircraftinteriorsinternational.com for regular IFE news

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15

NUMBERS UP 3

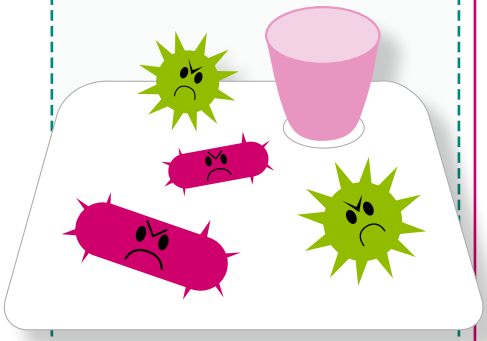
8

As 2015 draws to a close, the latest figures and intelligence show another strong year in the interiors industry, marked by bright prospects and changes in passenger expectations

GERM COUNT

Tray tables carry more than **eight times** as much bacteria as toilet flush buttons

Travelmath study



Airline ancillary revenues reached US$38.1bn in 2014, a 20.9% increase over 2013

IdeaWorksCompany

The average airline passenger values IFE over other inflight services

64%

of the time

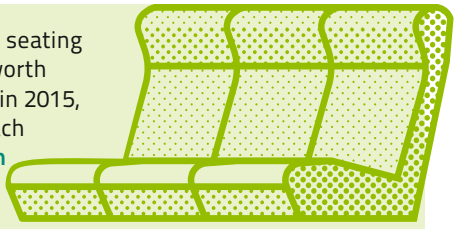
SITA OnAir survey

China's commercial aircraft fleet will nearly triple by 2034, from 2,570 in 2014, to 7,210 in 2034

Boeing China Current Market Outlook

The aircraft seating market is worth US$7.48bn in 2015, and will reach US$14.82bn by 2020

Research and Markets report



Boeing estimates a demand for 6,330 new aircraft in China by 2034, worth nearly

US$950bn

4,630 will be single-aisle

Boeing China Current Market Outlook

SPECIAL SERVICE

50% of travelers are willing to pay for premium amenities and services. Those prepared to pay are most interested in splashing out on:

- High-performance wi-fi (with streaming capability): 64%
- In-seat power: 50%
- Texting capabilities: 31%
- Early deplaning privileges: 22%

FlightView research

The IFEC market is expected to grow to

US$5.8bn

by 2020, from US$2.85bn in 2015

Research and Markets report

70%

70% of UK pax have checked in via cell phone, computer or kiosk, compared with 57% of global pax

SITA survey

The global commercial interiors market will grow at a CAGR of more than 12.48% in the next five years, to reach US$25.6bn by 2020

12.48%

MarketsandMarkets research

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CASE CLOSED

Hate carrying baggage? Fed up of paying for its travel? Worried it will go missing? These ideas could help lighten the load

You can read more about Bag2Go in the Articles section of our website

1

POPPI POPS IT IN THE HOLD

Baggage fees may be good for ancillary revenue, but in Teague's view, passengers regard them as a 'fine' for doing business with an airline. This is bad for brand perception, and it also incentivizes passengers to carry inappropriately sized bags into the cabin, cluttering gates and slowing boarding. Teague has come up with a simple solution in its Poppi airline concept: to do away with cabin baggage. Poppi's B777s feature 'fedora bins', which only hold personal items, such as computer bags and jackets. All luggage is checked in – as part of the ticket price – with RFID-enabled technology ensuring it does not go missing, spoiling the Poppi passenger experience. What Poppi doesn't make in checked-bag fees, it makes up for with premium pricing that includes point-to-point delivery. And there are other benefits of not having traditional overhead stowage: fedora bins could remove 1,800kg from a B777 cabin, and boarding speeds could increase by up to 71%.

2

YOUR BAG DOESN'T NEED YOU

In a cross-industry innovation project, Airbus, Rimowa and T-Systems have collaborated to create the Bag2Go concept, a digitally enabled case that can weigh its own contents, communicate with airport check-in and security, and be monitored by its user throughout its journey via a smartphone app. Before a flight, the traveler simply inputs their flight data via the app. This information is then transmitted to the airline, which generates a barcode and sends this to the display unit on the case. This barcode assigns the baggage a unique identifier linked to the passenger, meaning the case can travel independently of its owner, right to the destination. This smart bag can also register if it is opened during its journey and inform the owner when and where this occurred. Airbus hopes the project gains traction as there are further benefits for aircraft cabins and baggage holds in having standardized bag sizes.

3

THE END OF LOST BAGGAGE?

If you don't fancy splashing out on a new 'smart' travel case, SITA's BagJourney enables you to keep using your trusty companion, but crucially promises that it won't be lost. This claim is not pie in the sky, as SITA continually gathers information on the location of airline baggage, from check-in to final delivery, using the 2.5 billion data messages it manages through its BagMessage service. By integrating that data with WorldTracer, a tracing and matching service for delayed bags, BagJourney means a bag's progress can be tracked, even if it is mishandled, and the information made available to airlines and airports, with mobile updates to passengers also possible. This system is SITA's response to IATA's Resolution 753, which comes into effect in 2018, requiring IATA member airlines to monitor and log the status of passengers' bags through the major stages of the journey. One of the biggest consequences of the resolution is that inbound bags will need to be more actively tracked.

4

BE A BRAND AMBASSADOR

Fed up of baggage fees? They could be a thing of the past, if you're willing to wheel around a mobile billboard. Order your free luggage from Orion Travel Tech and the company will also cover your round-trip baggage fees – the catch is the front and rear of the cases will be wrapped in advertising. It's a good deal if you're not a luggage snob (though the advertiser could be a luxury brand), and a good deal for advertisers, whose marketing message could end up being wheeled through major cities, circling baggage carousels, and being seen by thousands on the world's public transport systems. The system is due to begin in February 2016.

5

WHO NEEDS ALL THIS STUFF ANYWAY?

Just imagine the pleasure of not taking any baggage apart from a small carry-on containing the personal essentials. Toronto-based startup company Zerobaggage thinks it can make this dream come true, based on a clothing rental system. Members register online, select their destination and the items they would like to hire, where they need them, and for how long. Brand new items can be hired at less than cost price, and when they are returned they create a supply of preloved items offered at a lower cost. Items are returned to the system once they are determined to be in perfect condition and clean.

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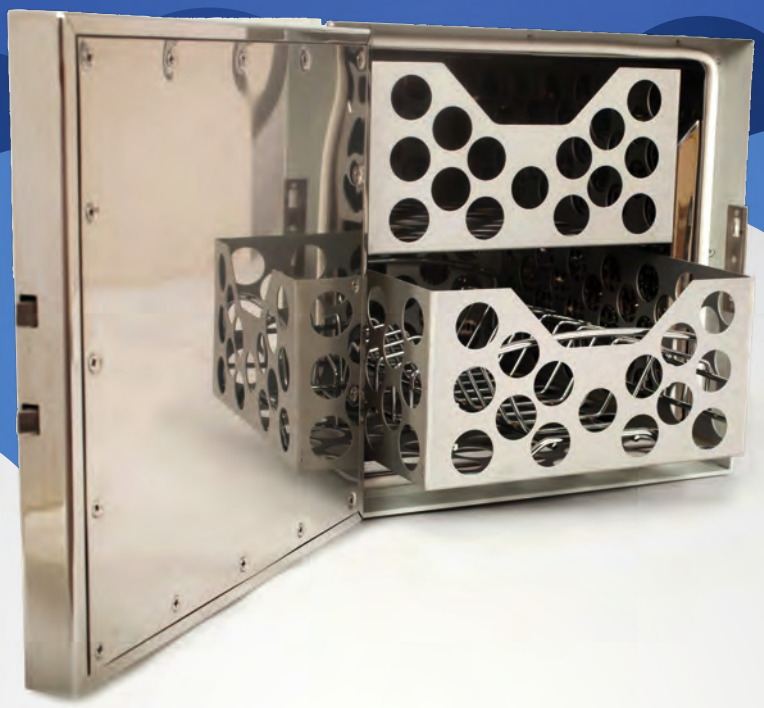
BUN WARMER



This compact self-contained unit has been designed specifically for warming buns, bread rolls, croissants etc.

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The oven incorporates baskets and crumb tray and the baskets can have plate racks inserted for storage.

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POPPI LOVE

BRIEF

Some of today's most flourishing startups owe their success to being brave enough to challenge the status quo: just look at Uber and Airbnb. Give people quality products and services that truly answer their needs at a fair price, and the profits roll in. We would love to see how a startup airline unencumbered by legacy thinking could challenge the status quo and take the skies by storm.

DESCRIPTION

Meet Poppi, Teague's vision for a future airline. At first glance you might think "Sure, it's a cute name and cute logo, but we've seen this sort of thing before". However, to win hearts and wallets, Poppi goes far deeper than cuteness, with three core values inspiring its every decision. The first value is 'Love over Loyalty', which means the experience must create the sort of love passengers show to brands like Nike or Apple, which in turn brings high margins and brand loyalty. Second, Poppi 'Knows the Journey', and understands and supports passengers' needs across the journey. Thirdly, 'Membership matters', and Poppi's members must feel valued and rewarded, not nickel-and-dimed by a frequent flyer program.

To show it is not just practising hollow branding evangelism, Teague has conceived some ideas that could be implemented now. The first is – brace yourself – there is no cabin baggage allowed. No one loves baggage fees, so they won't love the airline charging them. All baggage is checked, and passengers can stow small items in 'fedora bins'. Ancillary revenue can be generated through real value-adding services, such as point-to-point bag delivery.

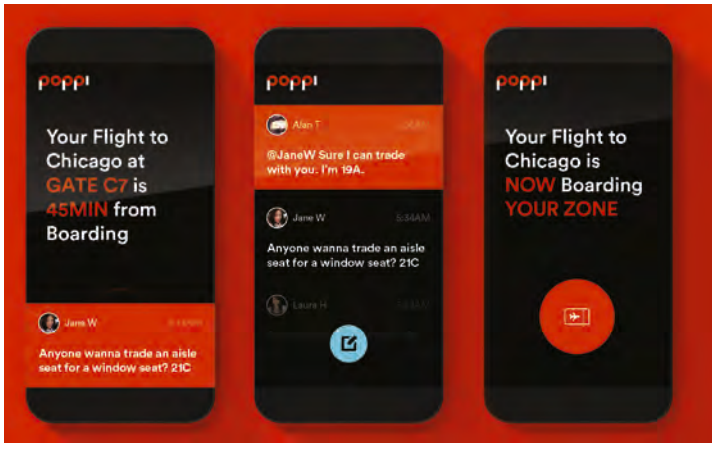
Next, the airline membership program can create a true sense of belonging, through the operation of secondary marketplaces for everything from ticket re-sale to seat swapping.

Thirdly, no one loves the middle seat, but when it is a 'promotional class', trimmed in a sponsor's colors and featuring exclusive inflight experiences and gifts, they will be more excited:

"Where did you get that cool cap?"

"I was given it when I flew an Adidas seat on Poppi."

Where there is excitement there can be love, and where there is sponsorship, there is revenue.



VERDICT

Poppi's charms are difficult to resist, especially when they are so fundamentally decent. Time will tell if genuine care for passengers could create genuine profits higher than the more 'take take take' ancillary money-hungry approach of some carriers, but several new brands in other sectors are reaping the rewards of delivering real quality at a fair price. Ask a passenger why they chose a particular airline for their flight and they might say they liked the fare, the route, the hard product, the service, or the points structure. Go that step further and they might say they chose the airline because they love being a part of it.

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fresh approach

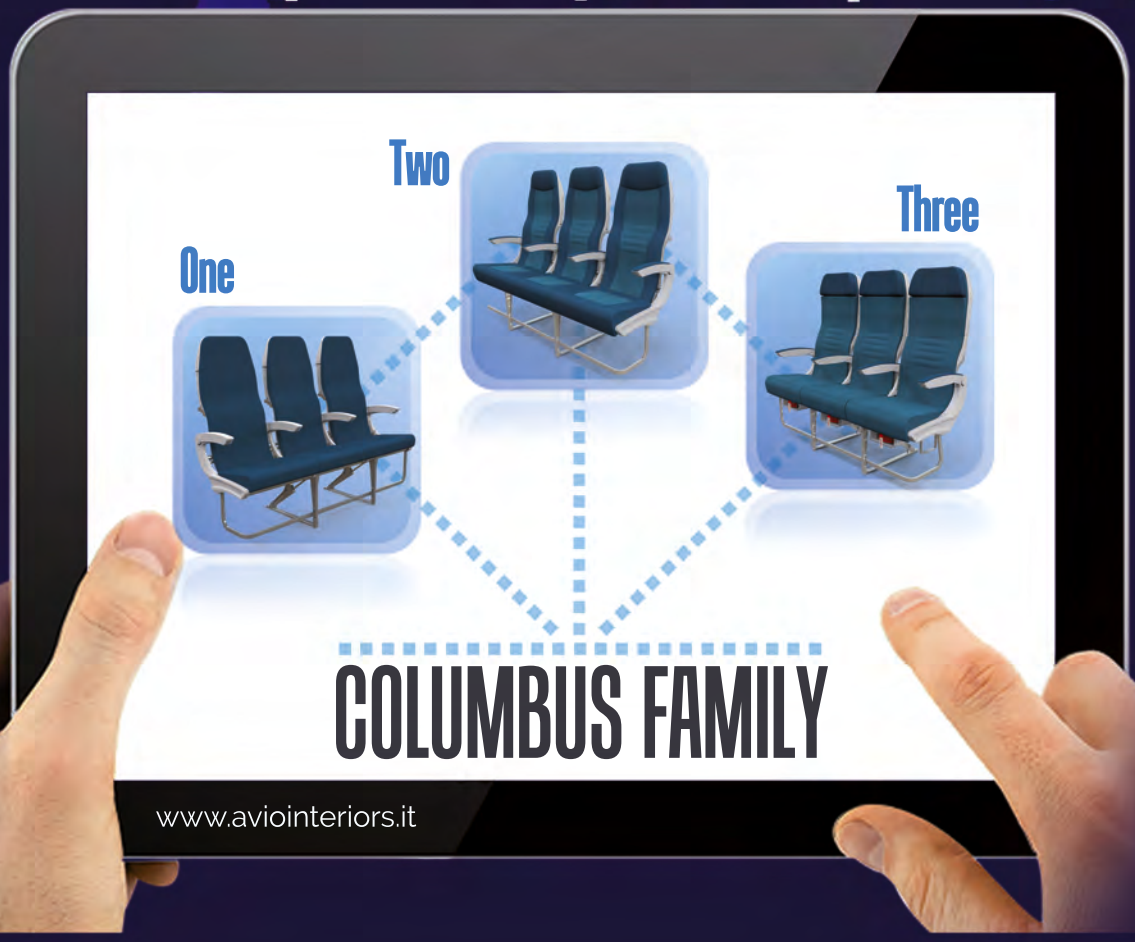
FORGET BEDS: ONE OF THE PRIME PASSENGER EXPECTATIONS IS A HEALTHY CABIN ENVIRONMENT. EXPERTS EXPLAIN HOW FUTURE TECHNOLOGIES CAN FURTHER PROMOTE CLEAN AIR AND SUITABLE PRESSURIZATION TO MAKE FLYING EVEN HEALTHIER

Words by Marisa Garcia. Illustration by Karine Faou

ConverTable

Sky-Nap

Y-bed



AVIO INTERIORS

Aviation has made progress in addressing common cabin environment complaints and improving passengers' well-being in flight, but there is still room for improvement, especially when it comes to cabin air quality.

According to Dr Craig Lawson, a lecturer in airframe systems design at Cranfield University's Centre for Aeronautics in the UK, the greatest negative effect placed on passengers' bodies stems from cabin pressurization and corresponding oxygen levels.

"Passenger health and well-being is affected by the condition of the atmosphere in the cabin, and this is determined by the design of the cabin and air-conditioning systems, also known as the Environmental Control System (ECS). There are two main factors here," he explains. "The level of oxygen present in the cabin is about three-quarters of that found in the atmosphere at sea level, since a typical cabin altitude is about 7,500ft. The reduction in oxygen density causes fatigue on long-haul flights."

The ideal environment would perhaps be to have cabin pressure equal to that on the ground, but, as Lawson points out, basic physics makes this very difficult and prohibitively costly, if not impossible.

He explains that having cabin pressure equivalent to that at sea level would increase the pressure difference between the inside and the outside of the fuselage, since at cruising altitude the atmospheric pressure is only one-quarter that of sea level pressure. "This means the fuselage needs to be stronger and heavier, detracting from aircraft performance," he says. "The increased use of composite material, such as carbon fiber in place of traditional aluminum alloys, makes it possible to make a stronger and lighter aircraft structure."

Lawson credits airframe manufacturers with making great progress in lowering the cabin altitude on the latest airliners – the B787 and the A350 – where cabin altitude is about 5,500ft, reducing passenger fatigue on long-haul flights.

Blake Emery, director of differentiation strategy at Boeing, adds that the manufacturer tested the effects of pressure on the body at specially designed pressurized chambers at Oklahoma State University in the USA, with Boeing physicians present to evaluate the physical effects of the environment on test participants at different altitudes.

DRY AIR

Replacing aluminum alloy parts with composites, Lawson tells us, also helps address the second key contributing factor to passenger health and well-being in flight: reduced humidity.

"The air at cruising altitude is almost completely dry [0% relative humidity]. We would ideally have a humidity of around 35% for comfort," Lawson says. "The ECS typically provides a humidity of about 10% on an airliner,

"The greatest negative effect on passengers' bodies stems from cabin pressurization"

and this is naturally raised by passenger exhalation. However, the ECS dries the air to prevent condensation-causing corrosion and interference with electrics. Composite materials are not susceptible to corrosion, and so the A350 and B787, with their greater use of composites, promise higher humidity of 15-20%."

Emery adds that when Boeing carried out studies on humidity levels and air filtration for the B787, at the specialized facilities of DTU Technical University in Denmark, a Boeing physician was present to measure how changes in these cabin conditions affected the body.

"You have to put people in the condition and then you take measures at time intervals," he says. "These measures are a combination of self-reporting, meaning the participant fills out a questionnaire about how he or she is feeling. We also take pretty sophisticated physiological measures at regular intervals, including heart rate, blood pressure and even the viscosity of tears, which helps understand eye dryness, membrane dryness, etc."

Beyond discomfort, Lawson says, low humidity can also make passengers more susceptible to disease. "On long-haul flights, passengers' respiratory systems dry out," he says. "The mucous membrane in your respiratory system guards you against viruses such as the common cold, and hence you are more susceptible to catching a cold on a long-haul flight because of the dry air. Antibacterial surfaces in the cabin could also be introduced to reduce the spread of viruses."

CABIN DEBUGGING

Because dry air makes passengers more susceptible to disease, ensuring cabin hygiene is important, and advances in nanotechnology, including easy-clean coatings and anti-viral/anti-microbial treatments, could be added to anything from textiles to hard surfaces.

PEACE AND QUIET

Another invisible factor that can negatively affect passenger well-being is the noise level in the cabin. Boeing's Blake Emery explains why reducing noise entirely would not be desirable.

"We know that noise, in and of itself, is one of the components that adds to fatigue. We also know from questionnaire results that measuring decibels alone is not necessarily the best measure to find out what's going on," he says.

"In inflight research, when we ask a question to rate the degree of satisfaction with noise in the cabin, we've had passengers more satisfied at times when the noise decibel level is higher. Decibels are not a perfect measure of how someone will react to noise. I know, in general, noise is something that we're trying to get down, but we probably don't want to get noise to zero, because then the inside of the cabin would be just like in a crowded room, when you hear people talking, and that can be fatiguing as well. To have some white noise or ambient noise inside the cabin is probably a good thing. Basically, the way to counteract noise is with insulation, and that comes with the drawback of added weight, but there's a tremendous amount of work that goes on related to noise through the design of things such as the return air grills, and the ducting of air that circulates within the cabin, which create noise."

"You are more susceptible to catching a cold on a long-haul flight because of the dry air"

LEFT: THE TESTS CARRIED OUT IN THE CABIN OF MSN2, AIRBUS'S A350 TEST AIRCRAFT, INCLUDED INTENSIVE AIR QUALITY EVALUATIONS

In a report – *Antimicrobial applications of nanotechnology: methods and literature* – prepared by the Laboratory for Nano-medicine Research at Brown University, in Rhode Island, USA, authors Justin T Seil and Thomas J Webster state, "Nanotechnology, the use of materials with dimensions on the atomic or molecular scale, has become increasingly utilized for medical applications and is of great interest as an approach to killing or reducing the activity of numerous micro-organisms. While some natural antibacterial materials, such as zinc and silver, possess greater antibacterial properties as particle size is reduced into the nanometer regime (due to the increased surface to volume ratio of a given mass of particles), the physical structure of a nanoparticle itself, and the way in which it interacts with and penetrates into bacteria, appears to also provide unique bactericidal mechanisms.

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"A variety of techniques to evaluate bacteria viability, each with unique advantages and disadvantages, has been established and must be understood in order to determine the effectiveness of nanoparticles (diameter ≤100nm) as antimicrobial agents."

Emery reveals that Boeing has already studied the benefits of nanotechnology treatments, and continues to monitor progress.

"We have had people looking at nanotechnology, on and off again, over the years. We've been looking at anti-microbial surfaces for many, many years," Emery says. "There are reasons why it hasn't been ready for airplanes yet. In some cases, in the early days, the appearance wasn't good enough, or the durability wasn't there yet. However, all that stuff is getting better and it's something that we are monitoring. We're certainly aware of the technologies out there and are always watching for any technology that can make it easier to clean the airplane – or indeed anything that can make the passenger experience better."

FEELING BETTER

Although the topic of healthy cabins might be interpreted as being mainly preventative, helping to reduce the negative physiological effects of flying, Emery suggests that the industry could set a higher standard and help improve travelers' well-being after flying.

"The reason we go after this research is not only to try to get rid of the 'symptoms' of flying. We are more strongly motivated by wanting to help people feel better in general," Emery says. "One of the biggest motivators for the B787, for example, was that in some of our research and focus groups around the world, someone said that when they flew across the Atlantic on a B777 they felt better when they landed than they had when they took off. That was an interesting statement. There's a great goal. Why not build aircraft where people get off feeling better than before. Why not help them feel better? That became a motivator for us."

BELOW: THE BOEING 787'S CABIN ARCHITECTURE GIVES A FEELING OF SPACE AND CLEANLINESS, WHILE ITS FUSELAGE DESIGN AND CABIN SYSTEMS DELIVER REAL HEALTH BENEFITS

"Boeing is strongly motivated by wanting to help people feel better in general"

Emery explains how that motivation, and that design strategy, ultimately contributed to the success of the B787 program.

"One of the things we've found, looking at anecdotal evidence and comments from airlines and passengers, is that most people right away know that the B787 is better," he says. "But a few people wrote to us after their first B787 experience, saying it was just so much marketing hype. Frequently, those same people write back to say they have changed their mind. If all they're thinking about is the ride on the B787 then they may not feel much difference. But when they quickly get on a different aircraft for a connecting flight, they notice. Even on the second and third day after the flight they notice, because their body takes a long time to recover after flying, but

"The more benefits are felt, the more they become real. That's the way the body works"

when they fly on a B787 they find they feel recovered by the next day."

Even so, Emery cautions that many changes made cannot be directly correlated to specific improvements in passenger well-being, which is one of the principal challenges of designing healthier cabins.

"It's difficult, because you can't just say you fix this symptom by increasing the humidity, another symptom by lowering cabin altitude or decreasing the pressure, and another symptom by improving the filtration system. There isn't a one-to-one correlation between the systems and the symptoms. It's just not the way the human body works, because everything is so tied together. However, in the B787, for example, for those who experience these kinds of symptoms, we're seeing less reporting of muscle stiffness, muscle aches/cramps, headaches, dry eyes. All of these things have improved significantly in the B787, but you can't say exactly whether that was because of bigger windows or higher cabin pressure. You can't just say that, because everything changed at once," he says. "If you make a change on an airplane and then fly for an hour and a half, the impact of that change may not manifest itself. But with some changes, like the filtration and pressurization developments, the more the benefits are felt, the more they become real. That's the way the body works."

Emery agrees with Lawson that cabin pressure is the most measurable factor that promotes healthy cabin environments.

"Because we had the controlled experiments in the chambers, we can infer that probably the biggest factor on passenger well-being of the changes that we made is the cabin pressure," he says. "That's probably the most powerful, and the other changes help things along."

THE AEROTOXICITY DEBATE

Reports of ill health among cabin crew stemming from cumulative exposure to unidentified toxins in the cabin is as contentious as it is troubling. As Dr Craig Lawson tells us, there is not yet definitive evidence of what these toxins could be, and therefore no way of determining how to prevent the exposure.

"We can distinguish between two [reported] types of contamination," Lawson states. "'Fume events', which are extremely rare and happen when a fault causes smells and/or smoke in the cabin. Most passengers, even frequent long-haulers, will never have experienced this. Less well understood is the effect on aircraft crew in particular of long-term exposure to low-level toxic air. Some crew have had careers cut short and they have attributed this to the so-called aerotoxic syndrome. Research so far has not got to the bottom of this issue.

"Anecdotal evidence needs to be backed up by robust scientific research to gain a full understanding of what these toxins are, quantities and frequencies of exposure, and their effect on health. Then we can engineer solutions to prevent aerotoxic events. Since cabin air is taken from the engine, engine fluids are likely to be the root cause, which could be filtered out with better understanding. Another solution is to use atmospheric air to pressurize the cabin."

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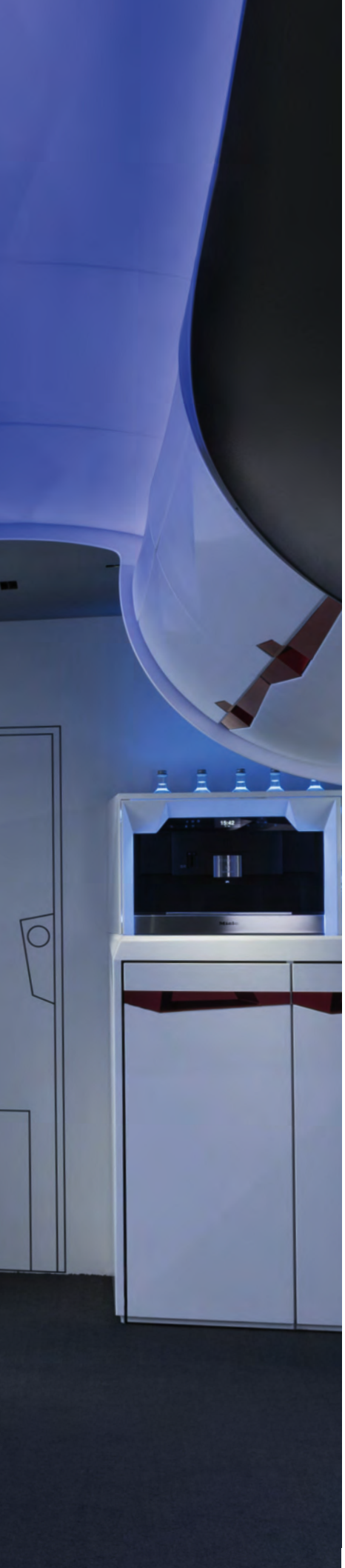

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AN AIRBUS PATENT APPLICATION HAS GOT THE WORLD TALKING ABOUT THE NOTION OF ADDING A SECOND LEVEL OF SEATING. AMID THE UPROAR, IT'S TIME TO CONSIDER THE TRUE VIABILITY OF TIERED SEATING

Words by Adam Gavine. Illustration by Phil Hackett

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Airbus files around 600 patents each year, but one in particular made international news in 2015, sending news site comments sections into meltdown as the public swore it was the last straw in cramped travel conditions. Outraged comments ranged from oaths never to fly again if the design became reality, to comparisons with sardine cans, and even 19th century slave ships. The cause of the uproar? A patent application for a double-deck business class cabin.

The idea of monetizing the vertical space in the cabin is something every major airframer, airline, design house and seating manufacturer has explored at some point, but clearly no such ideas have been implemented in recent years. Is it that the market isn't ready for a second tier of seating, or is the idea simply not viable in the real world?

"Innovating with LOPAs in the traditional way is becoming more difficult with every new patent that is published. The landscape of IP is growing ever denser, and this makes the third [vertical] dimension very appealing and indeed interesting," says Anthony Harcup, an associate at the Acumen transport design consultancy.

Harcup adds that if vertical cabin space is to be used, careful consideration must be given to whether people will be prepared to embrace a travel experience that offers different benefits and drawbacks to today's norm.

"When you deviate from an offer that passengers have come to accept as standard, you have to tread very carefully," he warns. "As history has shown, it takes a brave airline to put its best foot forward and make a leap of faith. With the right idea and a strong team, it is these kind of ventures that make history. Get it wrong and you are in trouble."

Let's explore some expert opinions to assess the risk and reward of creating an additional level of seating.

In the 1940s the Boeing 377 Stratocruiser and Douglas DC-3 offered bunk beds

ABOVE: JPA DESIGN IMAGINED THIS CONCEPT FOR TWO-LEVEL, TWO-CLASS SEATING IN A WIDE-BODY AIRCRAFT

CABIN DENSITY

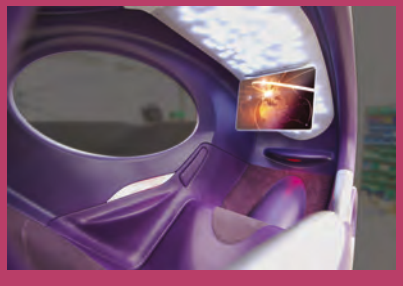
If the aim of adding a second seating level is to increase cabin density, would it really work? After all, while the upper tier gives an opportunity to add more seats, you may lose some of that benefit as lower-level seats are removed in order to provide a means to access that space.

Martin Darbyshire, CEO of the Tangerine studio, has considered the practicalities of accessing the upper tier: "The interesting twist is that because you have to create things like an additional aisle and some other access aspects, you don't get a massive increase in the number of seats, which I think quite quickly calls into question the validity of this sort of direction – particularly as you

AIR LAIR

Factorydesign was challenged to create a fantasy concept for Contour (now Zodiac Seats UK), and devised the striking Air Lair design, which was a double-deck system of individual pods, claiming to offer 30% additional passenger accommodation in the same footprint as a single-deck layout. The concept lay somewhere between premium economy and business class.

"We did have a weather eye on creating something that had a basic intelligence about what it was suggesting a cabin could do in terms of new innovation," explains Adam White, director of the studio. "What we were trying to say was that thinking about the cabin in layers was important."



The concept had a very mixed reaction at its reveal at Aircraft Interiors Expo 2012, but White has noticed a recent increase in people approaching him to talk about the validity of Air Lair as an idea, as more people are seeking new ways to optimize cabin spacxe.

Perhaps the concept was just a little ahead of its time. "That would be our ultimate wish. That people are able to look back at Air Lair in a few years and say, 'That was the first moment I thought that what we have launched today was possible'."

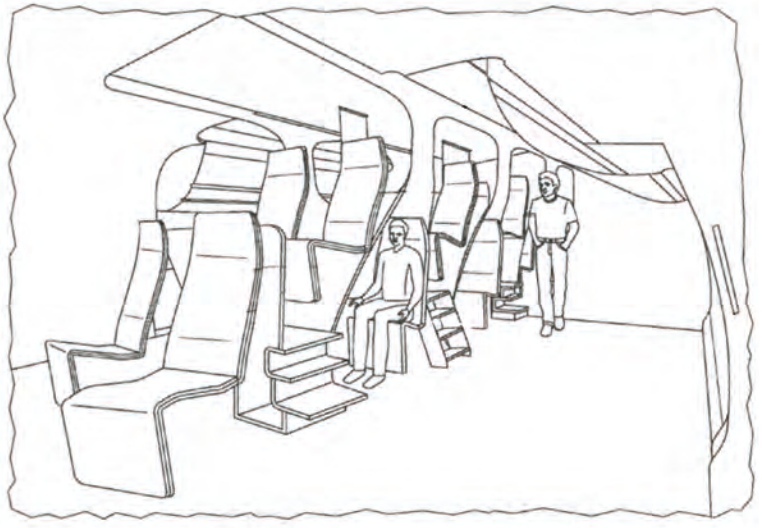
BELOW: THE PATENT APPLICATION THAT HAS BEEN MAKING HEADLINES. IF AIRBUS DECIDES TO GO AHEAD WITH THE IDEA, THE TECHNICAL CHALLENGES MAY NOT BE TOO DAUNTING

probably can't do this kind of thing adjacent to the windows in a relevant and appropriate way."

However, if using the vertical space isn't considered as a mere 'pack 'em in' exercise, it begins to make a little more sense. "Is this really just about adding seats? No, I think it is about whether you can actually change the degree to which somebody can recline and offer greater comfort in a reclined position, but still maintain a reasonable level of cabin density," adds Darbyshire.

However, Adam White, a director at Factorydesign, has a little more confidence in the passenger density potential of mezzanine seating. "The only reason anyone in the industry would pursue the idea is to get higher cabin density. That's my, perhaps cynical, observation, and I think that [a second tier] would add seats if that were your only ambition," he says. "But I think from that higher density, increased privacy and a reduced cattle herd feeling could be achieved with the second level."

"The biggest challenge is not design nor engineering: it is certification"



Ben Orson, managing director of JPA Design, adds, "Railcar solutions that do this efficiently have existed for a long time. The overall density benefit could far outweigh the small reduction in seating from adding a set of steps. A cleverly designed pod could be a great place to spend time. We need to think about the overall experience. If the freed-up space allows for another benefit, then the overall situation could be much improved."

CERTIFICATION CONCERNS

Mezzanine seating seems to have potential in terms of cabin capacity and human comfort, but how does it stack up in terms of meeting aviation requirements? Would the added weight and stress created by a second level make it through the certification process?

"The biggest challenge is neither the design nor the engineering. It is the certification," warns White. He states

TIERS IN HIS EYES

Looking at the Airbus patent itself, we asked Martin Darbyshire, CEO of Tangerine, for his view of the concept

"I think there is a whole central set of disadvantages to it that really call into question whether it is a sensible thing to do. Do the benefits outweigh the disadvantages? I'm not sure they do. It is certainly inventive, interesting and different, but is it good enough? I think the answer is no.

"I think some of the thinking in it is actually quite interesting and quite powerful. I think there are aspects of it that are very questionable, but then again it depends on what Airbus's strategy is, and we don't know what its strategy is.

"We have got a good idea of what Airbus is trying to protect within the patent. Viewing it from the perspective of what IP lawyers call a 'person who is skilled in the art', I might say, 'Yes there are novelties in there. There are original bits'. But I also might look at it and say, 'Are they deliverable? Can you overcome the issues that it may present?'

"My gut feeling is I don't see a lot of point in it to be perfectly honest. Because I don't see how it is going to radically develop much higher levels of density. For every one little step-up space, you are going to lose a seat. Are you getting two seats back? The answer is no, so what are you really getting?"

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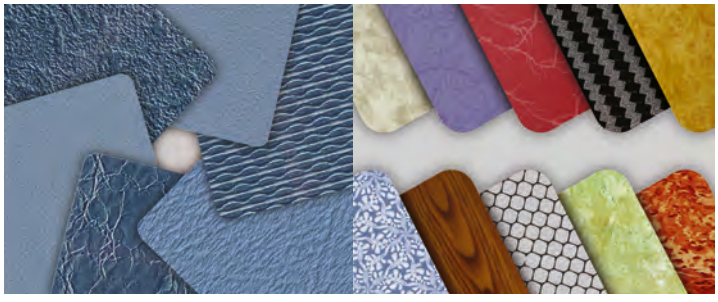

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PREMIUM ECONOMY

Perhaps a second level would work well in premium economy, or even as a hybrid cabin with economy on the lower level and premium passengers having a slightly more luxurious and personal experience above.

"I think premium economy is an interesting one to watch because it has evolved in a lot of different ways in terms of what you might get, but ultimately they all tend to be a bigger seat with more room and more recline," says Adam White of Factorydesign. "This is a different environmental experience. I think that is one of the things I particularly like about it."

Tangerine's Martin Darbyshire adds, "I guess if it opens up a much more reclined posture in economy, then that could be a route. If you are not trying to add more seats, but just trying to redistribute the available space and offer a more comfortable solution, then I guess it is a possibility."

ABOVE: JPA'S CONCEPT CREATES A SPECIAL EXPERIENCE FOR COUPLES TRAVELING IN THE CENTER DOUBLES

that there would be "an awful lot of leverage" going through the floor, but that by fixing the seating to both seat tracks and ceiling attachment points, it could work.

"I can't imagine that current certification allows for such a design," he adds. "However, over the past five years we have seen more and more innovation in cabin design, and my experience of the certification bodies is that if an intelligent plan is put in front of them, then they are very prepared to listen."

Acumen's Harcup is less confident, though. "On a practical level, stacking and tessellating real people in seats that must pass dynamic certification testing is no mean feat. With only seat tracks available to secure assemblies, which could potentially be quite high up in order to be effective, a number of engineering conundrums create a seemingly impossible set of challenges. It is likely that this is why there is yet to be an effective solution on the market."

Harcup has a similar view to White, saying that the effective use of vertical space for passenger seating depends on closer collaboration with the airframers to provide 'flex-zones' where upper attachments are possible – enabling the construction of floor-to-ceiling structures that are certifiable.

"This could unlock a whole new generation of design thinking," he states.

The basic idea of stacking composite pods on top of another, attached to conventional seat tracks, has been explored extensively by Tangerine. In the case of Tangerine's Club Limo concept (see p112), it was envisioned that the two levels of seating would be attached to the existing seat tracks, with no other hard fixings required. However, Darbyshire is also of the opinion that it may be possible to attach an upper deck to other points in the airframe.

"But you are definitely going into unknown territory to some degree and it's potentially going to call into question the way the dynamic tests are currently carried out," he cautions. "Therefore you are going to have to

SERVICE ASPECTS

It seems an upper level of seating is possible in terms of engineering, but one of the biggest problems could lie in the service aspect. No top-tier airline will want its service standards to decline as a result of a redesigned cabin.

"Perhaps when you have innovated to this level with seating you have to re-examine how to innovate with catering," states Adam White of Factorydesign. "As the seating products and indeed the service style has become much more sophisticated in the premium cabins, aircraft trolleys have disappeared from those classes with a lot of carriers. While the sheer volume of meals required in economy means a delivery system is required. I think at this moment it is a blank sheet of paper, although the standard equipment on an aircraft would need to relate to the design in some respect."

Ben Orson of JPA Design has an idea: "It is conceivable that a new model of service would need to be developed alongside the seat that would address this. For the majority of an aircraft's passengers in economy, the reduced expectation might make this challenge easy to overcome. The new design might enable ideas such as onboard central restaurants to be implemented."

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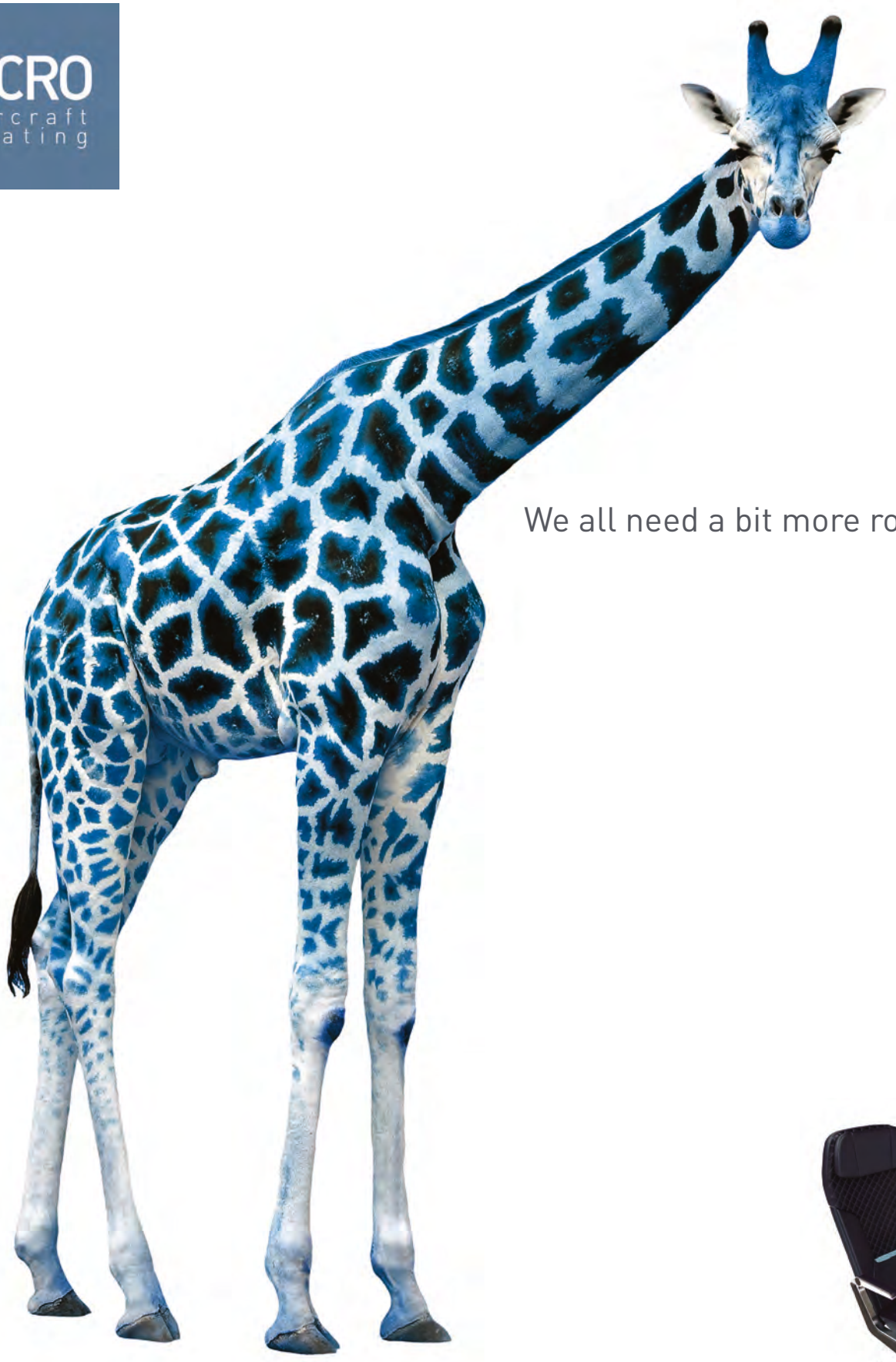

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STEPPING UP

Another major practical issue of adding an upper level is that of access and egress. Steps will clearly be a bar to access for some passengers with limited mobility, and they may create potential issues for the 90-second evacuation requirement.

"There are very real challenges along these lines, which have prevented many 'stacked' passenger seating solutions from being commercially viable," states Harcup.

Acumen has a yardstick for assessing cabin concepts, which in an industry that loves technical terms and acronyms, is the charmingly low-tech 'granny test'. If Harcup feels that his grandmother wouldn't be able to get into or out of a passenger enclosure without discomfort, then he feels its design is likely to discount a large volume of the market. "Solutions involving the vertical space must carefully navigate and compensate this issue", he says.

ABOVE: THIS CONCEPT BY FORMATION USES VERTICAL SPACE TO MAKE A SPACE-EFFICIENT PREMIUM SUITE

Clearly any upper aisle would have to be wide enough to meet the general aviation requirements, but Darbyshire adds that if steps are used, they would have to be wide enough for two people to pass at the same time. "But I think it is doable," he says. "There is nothing in the idea that absolutely scares the pants off me."

BREATHING SPACE

Another practical consideration is that as the center overhead stowages are removed, the center PSUs go with them. Lighting and crew call buttons are not difficult to relocate, but oxygen masks present a bigger problem, for both lower- and upper-level guests sitting along the centerline of the cabin.

Chemical oxygen generators could be fitted into the center seats, but they are not a lightweight solution. Darbyshire instead proposes reconfiguring the current gaseous manifold systems into a different location that can be accessed by both levels of passengers.

A confident White adds, "As a designer, my position with innovation is always one of optimism. I like to imagine that between the engineering force of the airframer and us developing it, there would be the wit to overcome such obstacles."

ECONOMY APPLICATION

From the views given by these cabin design experts, it seems that business class cabins could benefit from a second level of seating – and that it is not an entirely

CLEVER FORMATION

In the mid 2000s, Robert Henshaw, a partner at Formation, noticed that wide-body aircraft cabins were generally becoming taller, and began thinking about the possibility of using some of this space to layer the bed and seat arrangements, creating higher passenger density without compromising passenger living space.

Henshaw has created a few layered seating concepts, the latest featuring an arrangement of two forward-facing and two aft-facing lie-flat seats, which are separated by a raised premium class suite with living space comparable to a first class suite at a pitch of 80in or more. The standard business class seats that bookend the suite underlap the armrest areas of the suite, and when the suite converts to a bedroom, the bed overlaps the armrest and thus the lower leg area of the four bookending seats.

The lower positioning of the bed provides two advantages. The first is more vertical space in the footwell to better accommodate crossed legs, while the second advantage is improved step-over egress for the window or center seats.

The concept is well suited to several aircraft types. The high-density 1-2-1 suite and 2-4-2 standard lie-flat arrangement is suitable for the A350, A380 main deck and B777. A more spacious but less dense arrangement of 1-1-1 and 2-2-2 would work well for the A330, A380 upper deck, and B787. For single aisle, a 1-1 suite and 2-2 standard lie-flat arrangement would be a very compelling transcon product offering.

In a 2-4-2 B777, Formation claims that an overall seat gain of 17 lie-flats is achieved, compared with a typical staggered or herringbone LOPA. The cabin is comprised of 46 standard lie-flats and 11 premium suites. According to the studio, the ability to offer 11 premium suites and still have a higher count of standard lie-flat seats could be a game changer.

implausible idea. But what of economy class, where the potential cabin density benefits of tiered seating would be of great interest? Many of the outraged comments about the Airbus patent seemed to mistake the concept for an economy cabin idea, but are their concerns unfounded?

"Well I like it," White says of the idea of stacked seats in economy cabins. "I like the fact that it doesn't say 'one seat fits all', which is the bane of economy class. It allows for the fact that there are some people fit enough to climb up a couple of steps and who, I have no doubt, are prepared to do so to enjoy the solitude. I love the idea of being able to climb into essentially my own space. From that point of view, I think it is brilliant."

The notion of economy cabins having more choice and being more, well, interesting than the usual rows of identical seats is compelling. "The economy cabin has a lot of different people traveling for different reasons, and it is only for convenience that everything is pretty much the same unless you are in an emergency aisle or the front row," says White. "I think what is most exciting about the Airbus patent is that a proposal from one of the world's big players could shake up the rank and file of economy class seat design."

However, Orson warns that in some cultures the idea of having someone sitting above is not appealing, and that customer demand for upper and lower seats would have to be carefully considered before committing. He adds that perhaps the upper seats could attract a premium.

But in the high-density environment of an economy class cabin, wouldn't adding an overhead mezzanine level make the space feel rather claustrophobic for lower-level passengers? "I think as long as it is done with care and designed sensitively, there could be a much more intimate feeling," says White. "I hesitate to say a private jet feel because it is not, but the feeling of having a much more exclusive experience than being in the sort of auditorium seating that we have today."

For those wanting space, with the double deck running along the centerline of the cabin, the outer rows would still offer a more spacious feeling – and perhaps the window seats could also attract a premium.

Our panel of designers seem confident in the potential of the concept of tiered seating. Whether we will see it fly or not, it is interesting to see an exploration of new ways of integrating seating with the airframe for potential airline and passenger benefit. The space may be finite, but why should the way it is used be finite?

"I like the fact that it doesn't say 'one seat fits all', which is the bane of economy class"

FLEX APPEAL?

As part of a recent airline pitch, Tangerine developed the Flex concept, which gives window seat passengers a separate bunk located above the inner seats. The two spaces are entirely separate, giving window seat customers a comfortable reclining seat for TTOL, working, dining or watching films, and a separate, dedicated and private sleeping area across the aisle and up five steps.

"From a customer proposition point of view it's really powerful," states Martin Darbyshire, CEO of Tangerine.

While the inner passengers do not have access to the mezzanine-level bunks, their seats do convert into lie-flat beds. The concept sketches show the inner seats facing sideways in the cabin, but that is not a necessity for the arrangement to work, so long as there is sufficient space for the center seats to be converted into flat beds.

There is clearly a big disparity in the passenger offer for window and center occupants, which would have to be addressed in the ticket pricing. However, the concept does have a big drawback...

"The scary thing is that the number of seats that you get is not bigger than using a current lie-flat solution in a fairly dense form," states Darbyshire. "I think that is really going to call into question the validity of the concept for a lot of airlines."

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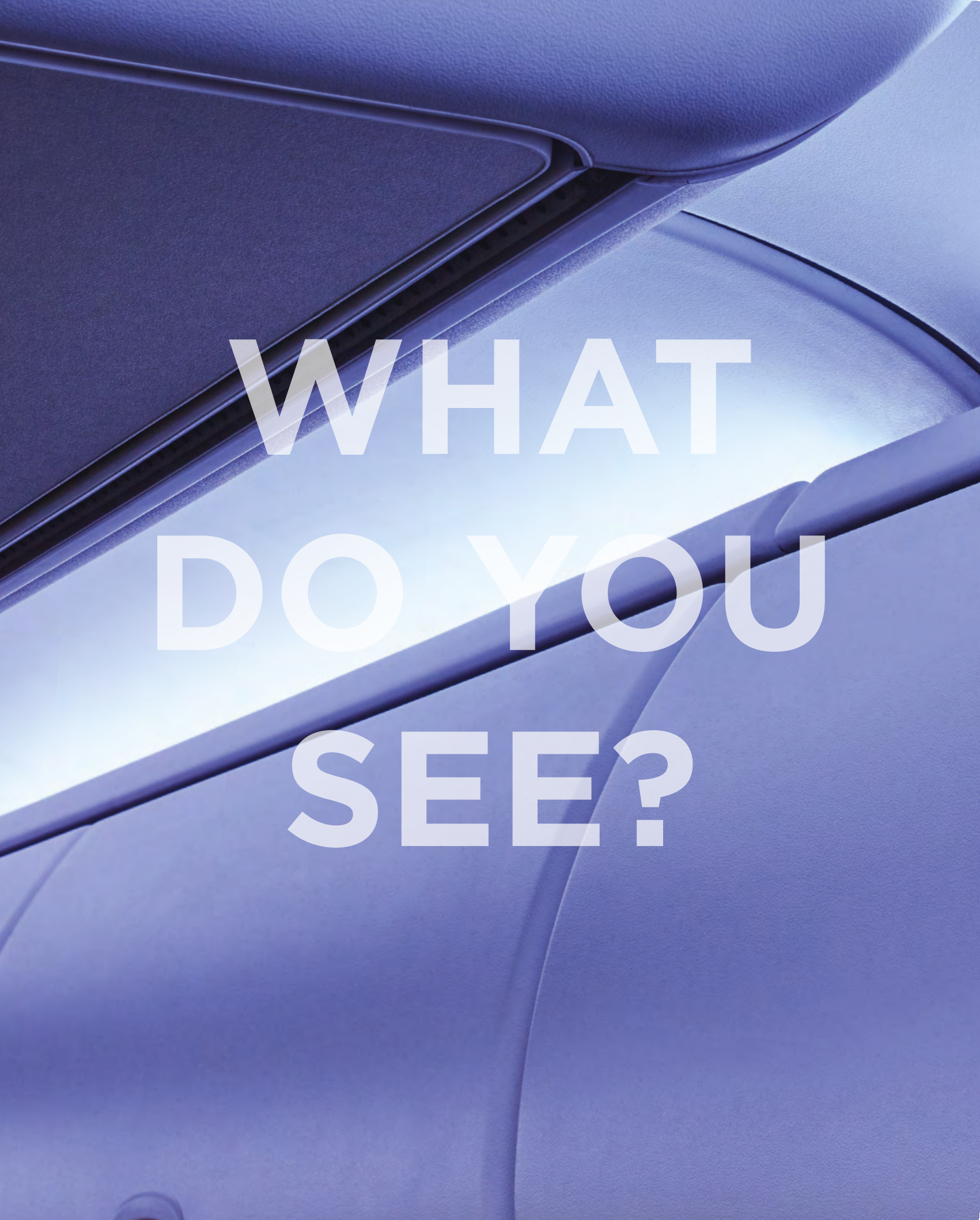
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EUROPE'S FIRST A350, AN UPGRADED PASSENGER EXPERIENCE, FLEET-WIDE WI-FI, AND A POTENTIAL VIRTUAL FUTURE: JUST ONE YEAR INTO HIS ROLE AS FINNAIR'S CCO, JUHA JÄRVINEN IS IMPLEMENTING EXCITING CHANGES AT THE AIRLINE

Words by Adam Gavine

Just two years after his appointment as managing director of Finnair Cargo, November 2014 saw Juha Järvinen secure one of the most coveted positions in Finnair: chief commercial officer and board member. He has taken the role at a particularly exciting time at the airline, as it becomes the first European carrier to take delivery of an Airbus A350 – and indeed only the third in the world, after Qatar Airways and Vietnam Airlines.

"Our vision is to offer the best unique Nordic experience, and this is the first aircraft type that reflects that vision," he says of this new era at Finnair. The aircraft is also a key part of Finnair's strategy to double its Asian traffic by 2020, from its 2010 level of around 1.2 million.

Asian traffic is one of Finnair's key selling points, as Helsinki represents the fastest, most direct route between Europe and Asia; indeed many Europe to Asia flights pass through Finnish airspace due to the efficiency of the route. Working in harmony with Finland's airport operator, Finavia, the target time for a transfer through Helsinki is just 35 minutes – considerably faster and less stressful than at some other European hubs, and Finavia claims that 99% of passengers make their connections.

The majority of Finnair's Asian operations are planned so that aircraft can rotate to Asia and back within 24 hours (Tokyo and Bangkok are 10 hours away, Beijing is 8 and a half hours, Delhi seven and a half). Finnair is the only European carrier that can achieve this quick rotation, with others requiring two aircraft per route for daily services. "That is a unique asset benefit we have and it creates a huge unit cost saving," explains Järvinen.

GOING EXTRA WIDE

Further savings will come as the 19 fuel-efficient A350-900s replace Finnair's fleet of A340-300s. So why did the airline select the A350 rather than the B787? The first reason was for commonality with the rest of the fleet, which includes the A330-300 and several variants from the A320 family.

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The second reason appeals to Järvinen's cargo experience, and his continuing role as head of Finnair Cargo's operations.

"The A350 is more optimized for cargo and passenger capacity. The B787 has a more limited cargo capacity, and as our focus is between Europe and northeastern Asia (particularly Japan, China and South Korea), it is important to have that balance between cargo and passenger revenue potential," he states. "For us, the A350 offers that balance better than the B787."

ABOVE: DSIGN VERTTI KIVI APPLIED THE SPACE ALIVE CONCEPT ACROSS THE FINNAIR EXPERIENCE, FROM LOUNGES TO THE A350 CABINS

British planespotters will be pleased to hear that Finnair's A350s will be a regular sight at London Heathrow from early 2016. According to Järvinen, when an A350 is available during the day, it can replace an A320 on the route, carrying more passengers, and of course more cargo. "We have a cooperation whereby we feed into British Airways' network with IAG Cargo, and IAG then feeds into our northeast Asia platform. Having wide-body capacity to London a few times a week enables us to feed one another's platforms. However, flying to Europe isn't the primary reason for the A350s – that is supplementary."

FLYING FINNISH

Those passengers on the London route who are lucky enough to be on an A350 flight are in for a treat, particularly in business class, where they will swap narrow-body Eurobiz for wide-body comfort, complete with fully flat seating.

Going back to that "unique Nordic experience" – how is this delivered in the A350? The Nordic DNA has been ensured by the appointment of Helsinki-based design house dSign Vertti Kivi as the cabin designer. The A350 is the studio's first aircraft project, but as it has worked with the airline since 2011, and designed the Finnair lounges at Helsinki-Vantaa Airport, its involvement helps ensure a unified passenger experience, all designed in line with the studio's Space Alive concept for dynamically changing spaces (see sidebar).

A lot of publicity has surrounded the LED cabin lighting, which features no fewer than 24 lighting scenarios, including, of course, a simulation of the Northern Lights. "No other airline has used LED lighting to this extent," says Järvinen, though Icelandair's special Hekla Aurora B757 also has an aurora borealis lighting scenario – and livery. When in Nordic skies, the schemes are a cool blue, changing to a warm amber in Asian aerospace. A clever Finnair touch is that the lighting

SPACE ALIVE

dSign Vertti Kivi may be a new name in aircraft interior design, but its design credentials have been proved in cruise ship and hotel design, with clients including SAS Royal Caribbean Cruises and Hilton hotels, as well as numerous retail, office and cinema projects.

The studio has developed a design concept named Space Alive, which is applied across many of its projects to create multifunctional spaces. One of the core aspects of the concept is that the lighting and the physical elements of a space can be altered using remote control so that the atmosphere and functions meet the changing needs of the day.

Space Alive has also been implemented in Finnair's lounge areas at Helsinki-Vantaa Airport, to create dynamic yet peaceful spaces that complement the experience on board. The mood, colors, lighting and wall patterns change according to time of day and seasons.

"Lighting design is always an integral part of our design process. Bad lighting can kill even the nicest interior, and no interior is nice in bad lighting," states Vertti Kivi, founder of the studio.

Onboard Finnair's Airbus A350 the dynamic LED lighting system is programmed to gradually recall some 24 different skyscapes as the flight progresses, such as sunrise or sunset, cloud formations, and even the aurora borealis, easing customers on long-haul flights into new time zones, destinations and seasons.

"Many of Finnair's long-haul passengers coming from Asia, Europe or North America may not be familiar with Finland, but their time spent traveling with us is a great opportunity to showcase the best of our design culture and show how good design can make life better," says Juha Järvinen, Finnair's CCO.

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FOR THE LOVE OF FLYING

Järvinen has always felt drawn to the aviation industry and so, when choosing a career, he opted to study travel. He gained a BA with Honors in business studies and tourism and in transport services management at London Metropolitan University, then took up an industrial placement at SAS (Scandinavian Airlines), working in Heathrow. He stayed at SAS for 14 years, moving his way up the ranks and around various locations before joining Finnair three years ago. "I have worked in this crazy but fascinating industry for 17 years now," says Järvinen. "I have always had a fascination with aircraft and travel. As a child I didn't get to travel that much, so I always dreamed about it. Then when I had a chance to work in the industry, I got hooked, and that's why I'm still here."

system is connected to the IFE system, so when the background colors on the seatback displays are not showing content, they are automatically dimmed in harmony with the cabin lighting to give a more unified and calming ambience, which is of particular benefit in the economy cabins, which have 208 IFE screens. This feature is unique, and again uniquely Finnish, with the system and the customized GUI developed with Reaktor Aero and Fjord, both Helsinki-based digital design agencies.

Don't think all this lighting turns the A350 into a flying disco though; the aim of the cabin design has been to convey Nordic simplicity, reliability, and nature. "Our design philosophy is all about the detail. We don't express luxury through golden taps – that isn't Nordic," says Järvinen. "Nordic design is about simplicity, functionality and feeling at home. In Nordic culture we invite people to our homes more than we go out; the aircraft is our home and our crew will make you feel at home."

CATALOG SHOPPING

While Finnair is keen to make its A350 a unique flying experience, it didn't opt for bespoke seating for the 46-seat business class, instead selecting the catalog Cirrus III seat from Zodiac Aerospace. Järvinen explains the choice: "We believe the seats we have chosen are state-of-the-art, so we didn't feel we needed a dedicated seat design. Our Oneworld partner British Airways has its own seat design, but we stayed with the mainstream. We are the first airline to have this seat on this aircraft and we believe it offers the total package. The seat isn't everything – it is the total offer, including the unique lighting schemes, which creates the bigger picture."

A key point of the Cirrus is that its 1-2-1 configuration offers direct aisle access for all, though its 78in pitch is a little tight for the long of limb.

PREMIUM CONSIDERATIONS

Another conservative choice was the Economy Comfort zone, which features the same seats as in economy – the Zodiac Z300 in a 3-3-3 configuration – but with an additional 4in of seat pitch, at 35in. Economy Comfort offers a few ancillary extras, such as comfier headrests and better headphones, but why didn't the airline opt for a dedicated premium economy product?

"We considered it as late as this summer, but we kept coming back to the same conclusion, that we have a superb seat in economy and don't need a third class of service," Järvinen explains. "This is because part of our business is transfer traffic between Europe and Asia, and the price points are limited on those routes."

With an upgrade costing a very reasonable €60-70 one way, the 43-seat Economy Comfort cabin should prove popular, especially as it is also available to buy on board if there is capacity. Indeed if it proves very popular – or even if it does not – the commonality of product gives flexibility to adjust the economy and Economy Comfort seat count quickly and easily compared with a dedicated cabin with separate seating product.

However, Finnair hasn't dismissed the idea of a full premium economy offer replacing the current product in the future. "Both options are valid and we will regularly re-evaluate having a third service class, but at the moment we believe that Economy Comfort is right for our business model, especially as you can buy the product on

BELOW LEFT: WHEN BOARDING A FINNAIR A350 IN HELSINKI, THE CABIN LIGHTING WILL GIVE THE FEEL OF A CLEAR BLUE NORDIC SKY

BELOW RIGHT: WHILE THE A350 BUSINESS CLASS CABIN IS PALE UNDER WHITE OR BLUE LIGHT, IT BECOMES MUCH WARMER UNDER THE SUNSET AND FAR EAST PHASES OF THE LIGHTING PROGRAM

Keep an eye on our website for an upcoming review of Finnair's A350 business class

AT YOUR CONVENIENCE

An unusual feature of Finnair's A350 is that one of the four lavatories in business class is designated a female lavatory. "This is a reflection of Nordic society being very equal; we decided to offer women a more female-friendly lavatory in business class," says Järvinen.

This lav is not fundamentally different to the others in business class, though the shelves are stocked with a few extra toiletries and cosmetics. As with all the lavs, the Nordic love of nature has been brought in, with plants providing fresh scents.

That's not to say that male guests cannot use the ladies lavatory if the others are occupied. Similarly, if there is a queue for the ladies, the other three lavs are unisex.

board if seats are available. We can maximize the load factor of those seats."

ECONOMY BEDS?

And what of economy triples or quads that can be converted into a flat surface, a growing trend which began with Air New Zealand's Skycouch? "During my time we have not considered it, but then we do not need it because we have such short flights to Asia. Our average flight time to Asia is seven to eight hours, and considering you get a meal and breakfast, the actual time left to sleep is limited. We are too quick for that product!"

NO TIME FOR LOUNGING

There may not be much time for sleep, but there is always time to socialize. However, you won't find any social areas onboard Finnair's A350s. "We believe that having a configuration that maximizes the number of seats is best for our business model. Being so dependent on a business model designed for transfer traffic, in order to secure profitability we need to have as many seats as possible, but of course with passenger comfort. Inflight bars are nice but we didn't feel they fit in our business model. We would rather invest in our lounges on the ground."

EVERYTHING'S CONNECTED

A trend Finnair has fully embraced is connectivity, with the airline investing in onboard wi-fi across its entire fleet, including narrow-bodies. Of course the A350s have wi-fi, and retrofitting of the Panasonic system will begin on the remainder of the long-haul fleet – the eight A330s – in autumn 2016. Järvinen states that Finnair is still deciding which system is best for its narrow-body fleet, but is confident that in 2018, Finnair passengers will have internet access on any flight.

This program is a sizeable investment, but Järvinen sees wi-fi as essential. "It will become a commodity. Even though today relatively few airlines have wi-fi, looking at what happened in US where now all carriers have it, it is now becoming a commodity in Europe. But the big challenge for European carriers is that the systems are satellite-based whereas in the US they are land based, and the difference in cost is considerable. But there are now a number of projects in Europe working on land-based solutions. Once land-based systems are available, I'm sure the speed of wi-fi introductions in Europe will increase."

ABOVE: AS SUNLIGHT STREAMS IN TO THE A350 CABIN, THE LIGHTING SYSTEM CAN COMPLEMENT IT TO ADD TO THE FEELING OF WARMTH

SO WHAT'S NEXT?

Finnair is undoubtedly on the up, but there is no time to rest. So what does Järvinen have planned for the future? "The next thing after launching the A350 is that we are going into expansion mode, adding new destinations. We will also further develop the onboard product, introducing new technology for ancillary products and entertainment. For example, we are looking at virtual reality to see if that is something we should have on board. We are looking at what the customer experience should be in 2020 – that's the next phase."

"We are looking at what the experience should be in 2020"

THE COMPETITION

So who does Järvinen view as Finnair's main rivals, and how does the airline compete with them?

"The main competition is from the Gulf and Turkish carriers, and European competitors including Lufthansa. And also increasingly the Chinese carriers, who are improving their product in Europe – they are catching up. However, the game changers of the business are the Gulf carriers.

"But the reason we believe we have a solid business model is the fact we focus on northeast Asia, where we have very clear geographical distance advantage over the Gulf carriers because we have the fastest and most direct route from Europe. This is why our route network design is based on the northern hemisphere, and not further south, where the Gulf carriers have the biggest advantage."

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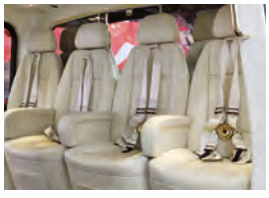

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BEST DEFENSE

INNOVATIVE THINKING CAN GENERATE MILLIONS IN EXTRA TICKET REVENUES. HOW DO YOU MAKE SURE YOUR DESIGNS ARE ADEQUATELY PROTECTED?

Words by Nicola Davies. Illustration by Andrew Gibbs

Seating design, monuments and even minor interior details can make a huge difference in terms of competitive advantage in aviation. A clever design that creates space for an extra four seats in business class can mean hundreds of thousands of additional dollars in annual revenue for an airline. It is small wonder that aircraft interior designers, suppliers and manufacturers invest so much in the design and innovation of cabin products – and in the protection of this work.

"The stark truth is that unless a business has some form of right over the design, it cannot prevent another business from using the same design," says Claire Bennett, a partner and intellectual property (IP) expert at global law firm DLA Piper.

Having rights over a design can include rights in confidence or in unfair competition, but it primarily refers to IP rights. "What can be protected, and the limits to that protection, vary depending on the particular type of IP right being considered," explains Bennett. "In broad terms, IP rights can be used to protect aspects of designs that are new and innovative. Patents protect designs that have a 'technical' aspect." Examples of technical aspects to design are seat technology systems, seat mechanisms and cunning cabin layouts.

THE BUSINESS IN PATENTS

"Patent protection can be incredibly valuable for a business," says Bennett. "It enables an airline to maintain exclusivity over an aspect of its interior design that is distinctive of its service and attracts customers or has other commercial advantages, such as being cheaper or more robust in service than alternatives."

In the case of the manufacturer, whether it chooses to sell products incorporating its design generally, or to a small number of airlines, the patent protects its revenue

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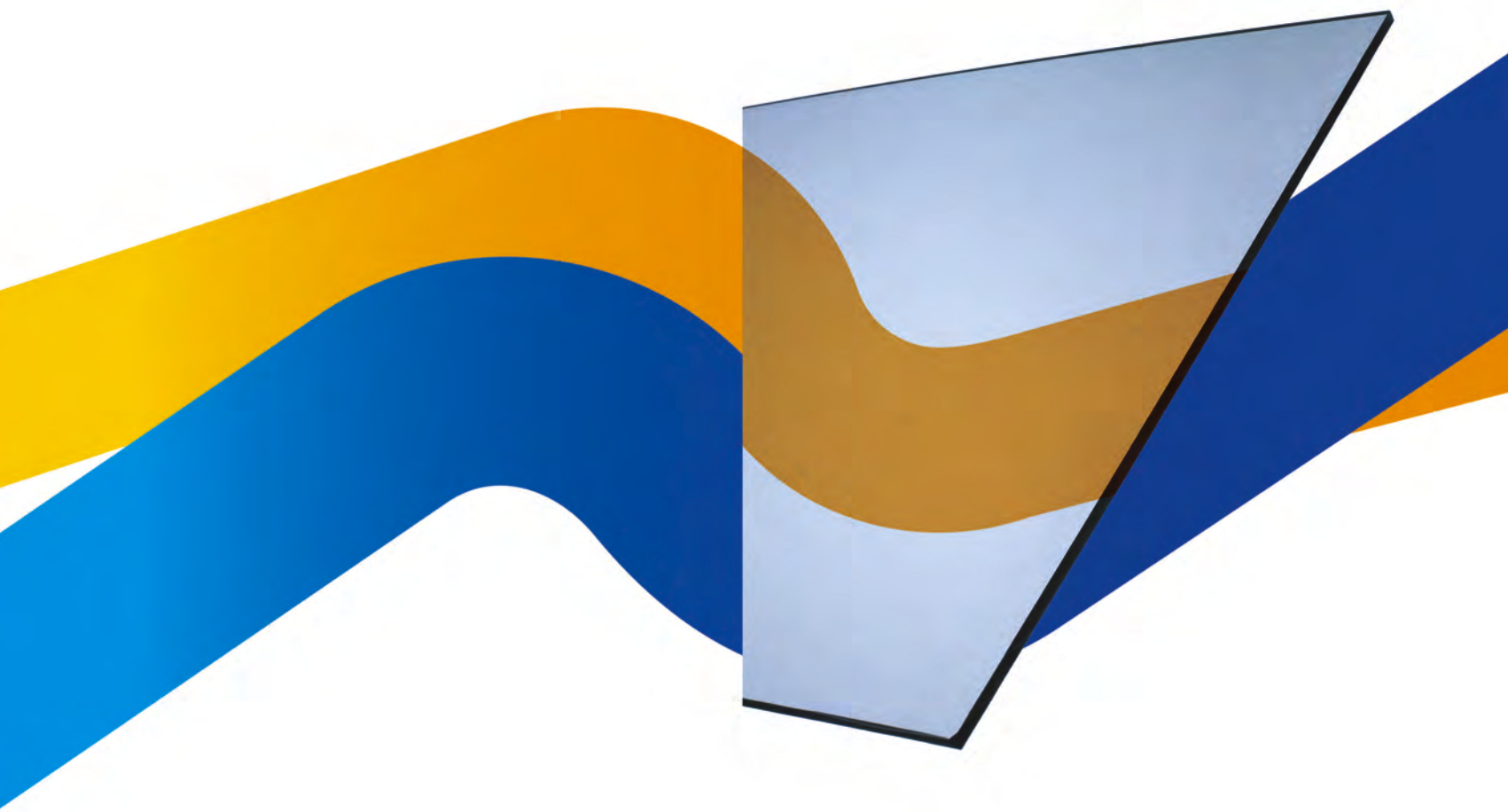
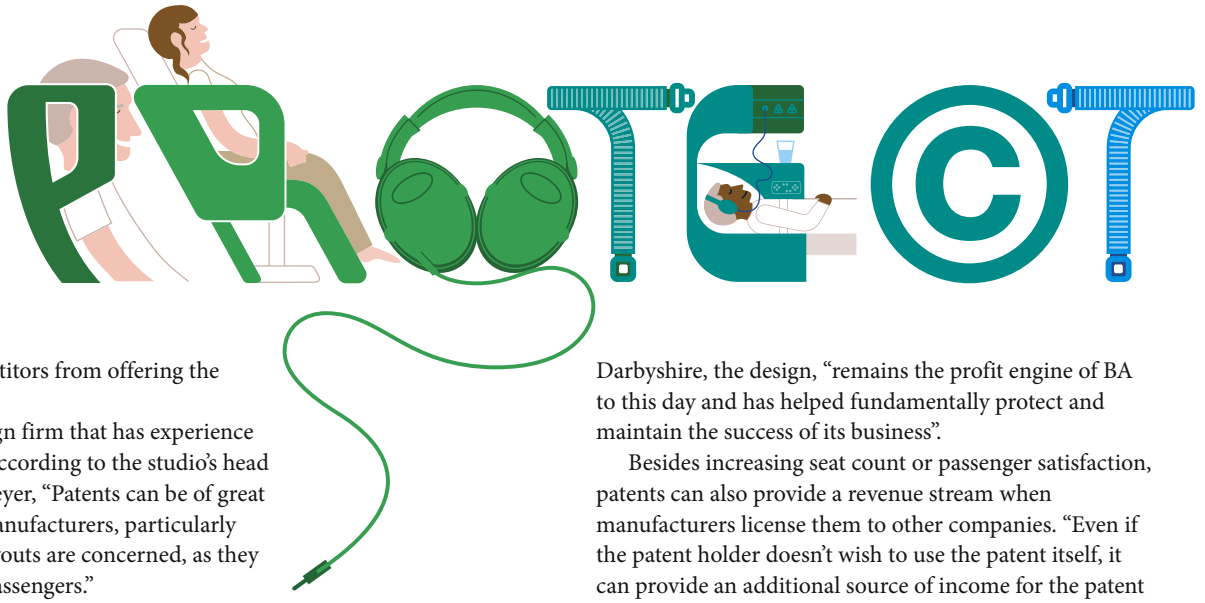




stream, by preventing competitors from offering the same product.

PriestmanGoode is a design firm that has experience in aviation seat innovation. According to the studio's head of communications, Anna Meyer, "Patents can be of great importance to airlines and manufacturers, particularly where seat mechanisms or layouts are concerned, as they can be key selling points to passengers."

She points out that this kind of competition for innovation places great pressure on designers, suppliers and manufacturers. Nevertheless, patents help drive innovation forward. "The reason passengers today – particularly in business class or first class – are enjoying more private space is the result of this constant drive to improve aircraft interiors, their look, functionality, manufacturing process and maintenance," Meyer explains.

A strong example of aircraft seat innovation is the 'yin yang' business class seat design for British Airways, developed by the design firm Tangerine in 1998. At the time BA was seeing its market decline and was searching for a transformational product for its business class offer. Tangerine's 'Lounge in the Sky' concept met the brief, with its forward/backward configuration offering a lie-flat bed for the first time in a very space-efficient format.

Naturally BA patented the configuration, and according to Tangerine founder and CEO, Martin Darbyshire, the design, "remains the profit engine of BA to this day and has helped fundamentally protect and maintain the success of its business".

Besides increasing seat count or passenger satisfaction, patents can also provide a revenue stream when manufacturers license them to other companies. "Even if the patent holder doesn't wish to use the patent itself, it can provide an additional source of income for the patent holder if it is licensed to third parties. Considering the typical lifespan of aircraft interior products, the 20-year exclusivity provided by a patent is usually sufficient," says DLA Piper's Bennett.

"With extremely technical designs, holding off the filing of a patent may be necessary"

TIMING IS EVERYTHING

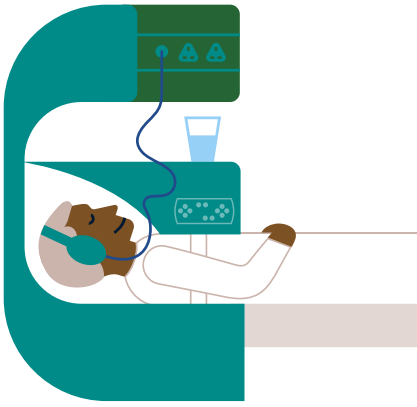
According to Bennett, patent protection should be applied fairly early in the product development process. "Most of the major markets around the globe have a 'first to file' system, where a patent is granted to the first person to apply for a patent for that invention, not the person who first comes up with the invention. Hence a business needs to file a patent before its competitors file conflicting patents," she says. "In any event, a business must file a patent before the aspect of the design to be patented is revealed publicly, as once an invention is disclosed without any confidentiality restrictions, it can no longer be patented."

However, this doesn't mean that patent protection should be filed for almost immediately. A suitable time at which to consider patent protection can be toward the end of the initial design process, when the business is in a position to assess the value to the business of the designs, and they are sufficiently developed to have enough information to file a patent. Furthermore, with extremely technical designs, holding off the filing of a patent may be necessary, to ensure that all engineering aspects have been fully evaluated.

PATENT PRICES

Protection of intellectual property doesn't come free, but it may be more reasonable than you think.

- If applying for a patent in the UK, the cost is relatively minimal for a large company, and can be as low as £230
- There are renewal fees from the fifth year of a patent to its expiry at 20 years (from £70 in year five to £600 in year 20)
- The major cost is the professional advice of a patent attorney who will draft the patent to make sure it is as watertight as possible
- The cost of professional advice in the UK varies, but can be anything from £3,000 upward for services throughout the process. This can increase substantially if wide international patent protection is required



"Patented designs should not be seen as hindrances to innovation and business"

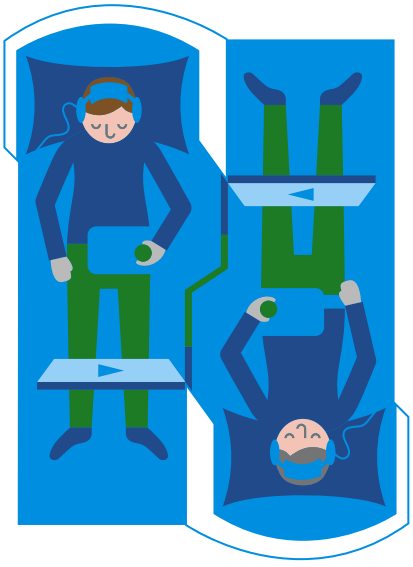
STRATEGIZING GLOBAL PROTECTION

The possible complications with patents are not contained only within the scope of the design features being protected, but also in terms of location. The Chicago Convention and other unique national laws prevent the enforcement of a patent against an aircraft that is temporarily entering a country's airspace. Patents are national rights and can only be upheld within the country where they are filed.

According to Richard Binns, an IP and aviation lawyer at UK-based law firm Burges Salmon, "There is no such thing as a global patent. You have to apply in individual territories or countries where you want protection."

However, Bennett adds, "With clever planning it is possible to obtain effective global protection with patents in a selected number of countries, by considering the places of manufacture, assembly and residence of key competitors and obtaining patents in those locations."

However, the proposed European Unitary Patent system should bring businesses a step closer to effective global protection. According to Binns, "This will allow an applicant to apply for protection across 25 Member States who have signed up to the Unitary Patent (notable non-signatories being Italy and Spain)." The Unitary Patent is likely to come into effect in 2016.



POSSIBLE COMPLICATIONS

For a seat design to be eligible for a patent, it must be both new and shown to contain an inventive step over any prior design. Since it can be more difficult in the aviation interior industry to be 'new' because of the similarity and wide competition in the industry, manufacturers must remain vigilant of the patents held by their competitors.

"It is prudent for a business to build IP considerations into its design process for a number of reasons," advises Bennett, "including ensuring that the business avoids infringing the rights of others."

However, patented designs should not be taken as hindrances to innovation and business. According to Bennett, "The existence of IP rights also requires those who wish to do something similar to find a suitable alternative, spurring innovation in design."

IP therefore offers an opportunity to build on the ideas of others. "While not perfect, IP laws try to strike the right balance between granting a period of exclusivity to the rights holder to incentivize innovation, and promoting innovation through enabling others to build on the right holder's work," she adds.

Patent protection for aviation interior design can provide business value, global protection and grounds for further innovation. However, it is also important not to focus solely on this innovation. From a designer's perspective, Meyer provides a reminder: "It is important that airlines don't get too caught up spending all their time chasing the latest seating configuration and forget to refine their cabin interior products to maximize comfort, express their unique brand, and create the best possible customer experience."

BEEN INFRINGED?

Have you seen a design that looks a little too similar to your own? These points are worth considering:

- A patent is only as good as its enforcement strategy. Legal action can be taken against anyone or any company who is operating within the scope of the patent's claims
- Remedies include an injunction stopping the infringer from continuing its actions, or damages such as an account of profits the infringer has made from the design
- Preventing an airline from using a design once it is on an aircraft can be tricky, but matters can often be resolved commercially without resorting to litigation
- It is important to take swift action if anyone suspects their IP rights are being infringed, and to have obtained IP protection in the countries that provide effective enforcement options against an infringer

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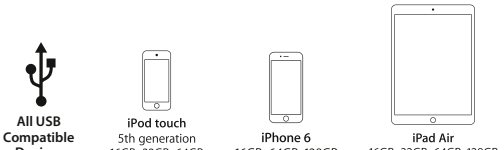

EARLY LEARNINGS

A NEW ENTRANT TO THE IFE BUSINESS LAUNCHING A NEW SYSTEM ON A NEWLY OPERATIONAL AIRLINE… IT SOUNDS CHALLENGING, BUT BAE SYSTEMS SAYS INTELLICABIN IS ON TRACK TO LAUNCH AS PLANNED WITH VISTARA

Words by Maryann Simson

In 2014, BAE Systems entered the passenger experience space in a big way with the introduction of Intellicabin. Promoted in the company's marketing materials as an "integrated approach to cabin management", the Intellicabin suite of products promised to enhance the feeling of comfort on board aircraft by providing a modular and scalable architecture for capabilities such as in-seat power, LED lighting, wireless in-flight entertainment (IFE), dimmable windows, and crew interfacing.

Then at Aircraft Interiors Expo 2015, the company announced that start-up Indian carrier Vistara, a joint venture between India's Tata Sons and Singapore Airlines (Vistara is the pair's second attempt at starting a full-service regional carrier), would be the launch customer for Intellicabin's IFE streaming solution, rather than the full cabin management system (CMS), which is aimed at original equipment manufacturers.

Under the agreement, BAE Systems would equip Vistara's entire leased fleet of 13 new Airbus A320-200s, eight of which are now in service and seven still on order. Not unlike some other streaming solutions in the marketplace, Intellicabin consists of a head-end digital server and powerful wireless access points (WAPs) sourced from system hardware supplier Kontron. In addition to the basic system hardware, the agreement stated that a BAE Systems/Samsung partnership would enable Vistara to provide ruggedized, 10.5in Galaxy Tab S tablets to business class passengers.

Since that April announcement, BAE Systems has been working with the airline to customize the user experience; to compile a suitable content pool (BAE


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SELECT CATEGORY
NEW RELEASE
LIFE VEST UNDER YOUR SEAT
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"The biggest learning experience we've had is with regard to shipping"

LEFT: A RANGE OF CONTENT CAN BE VIEWED IN SUPER AMOLED QUALITY ON THE GALAXY TAB S

BELOW: BAE CLAIMS IT HAS RECEIVED APPROVAL FROM A HOLLYWOOD MAJOR TO SHOW EARLY WINDOW CONTENT ON INTELLICABIN. WATCH THIS SPACE

BELOW LEFT: VISTARA'S CABINS INCLUDE SEATBACK DEVICE HOLDERS

Systems is working with Global Eagle Entertainment (GEE), using the company's studio connections and WISE IFE software backbone); to select a capable MRO facility in Delhi; and of course to obtain the certifications needed for a fleet-wide program start before the end of Q2 2016.

THE FIRST INSTALLATION

With the first Vistara system installation scheduled for this November in Delhi, *Aircraft Interiors International* was keen to learn how the launch program is progressing, and to discuss the challenges involved in bringing an all-new product to market, with an all-new airline, in a region that could present some unfamiliar bureaucratic procedures for BAE.

"It's all gone perfectly, with no problems whatsoever," jokes Jared Shoemaker, director of Intellicabin at BAE. "In honesty, though, I would say that the biggest learning

experience we've had is with regard to product shipping. We're a US$30bn global company and we ship products everywhere, but still, shipping product and working within Indian regulations is difficult. It's very complicated and bureaucratic – from taxation to import and export, there are a number of regulations that you have to be crystal clear on."

That being said, Shoemaker asserts that preparations for the first installation are going nicely, thanks in equal parts to Vistara's cooperativeness and the combined experience of the airline's senior executives, many of whom have come over from parent Singapore Airlines.

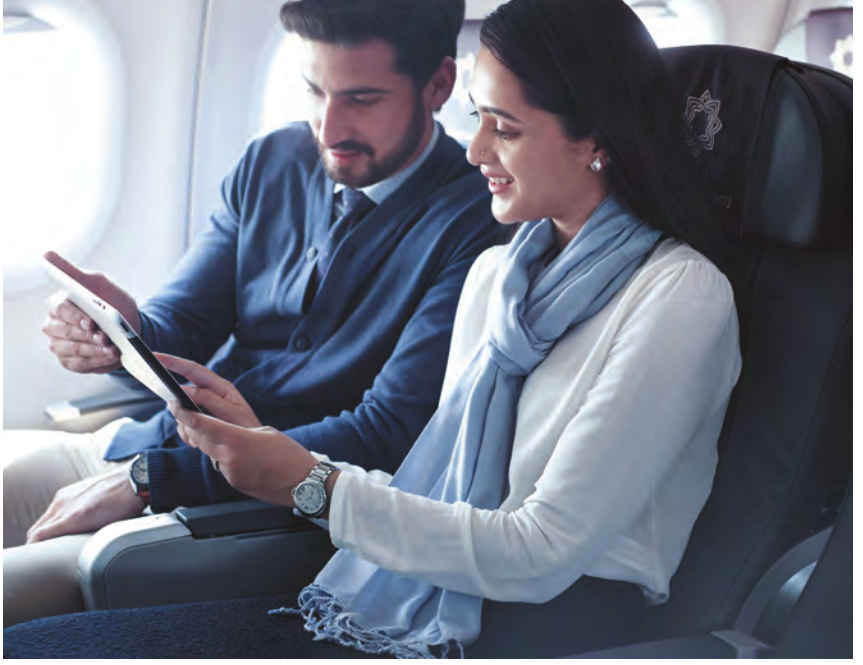
"They have been an amazing group of people to work with. They are extraordinarily capable, with a lot of background. This helps us a lot because they know what

they want and they know how to get there. As our launch customer, Vistara has a unique level of influence on what we do and where we're going," explains Shoemaker.

At the time of writing, in late October, BAE Systems and Vistara are closing in on awarding the installation contract to an MRO facility in Delhi, with Shoemaker telling us that there are a handful of very capable facilities in the running.

To ensure correct installation of the first system, one aircraft will be removed from service for an undisclosed length of time. However, due to the non-invasive architecture of the Intellicabin streaming system, subsequent installations are anticipated to happen without the airline missing a beat.

"We expect to do our installation on a set of consecutive overnight shifts," states Shoemaker. "So the aircraft, when it has completed service for the day, will be worked on. Then we put it back, ready for service the next day."



ABOVE: TABLET-BASED IFE CAN BE GOOD FOR CREATING A SHARED ENTERTAINMENT EXPERIENCE

REGULATORY APPROVALS

Once the first installation is complete, BAE and Vistara will begin the task of obtaining the regulatory approvals needed to flip the switch. The multistep process will involve approvals from both India's DGCA (Directorate General of Civil Aviation) and the European Union's authority for aviation safety, EASA. Although the DGCA spent the first quarter of this year struggling to prove itself fit after last year's downgrade to a category 2 security rating by the FAA, Shoemaker believes that same FAA intervention will facilitate a smoother process for BAE Systems, now that a category 1 rank has been restored.

"The FAA came in recently and helped [the DGCA] get a little bit more straightened out," he states. "They're now much more streamlined and similar to the FAA in the way they do business. They have been very good to us and we expect approval in January. At that point we will fly it for a period of time to wring out any remaining issues there may be, then roll out across the rest of the fleet, for 13 aircraft by the end of Q2."

BAE Systems made use of a Faraday cage (an enclosure made of conductive material to block electrical fields in the same way a fuselage does) belonging to hardware supplier Kontron to verify Intellicabin's performance should all passengers engage with the system at once.

"We ran 160 devices streaming 720p on our system in the lab to ensure we could cover all the corner points… We've gone up to 60 devices streaming off a single WAP and each Vistara aircraft will have three," said Shoemaker. "So we are very satisfied that we can do what we need to do from that perspective."

THE TRICKY BUSINESS OF BUSINESS

When Intellicabin goes live with Vistara next year, passengers in the economy and premium economy classes will be able to connect and stream, using the web browser, on wi-fi enabled devices. In this setup, the entire IFE solution (application, content, and metadata) will be pushed in real time from the central server to the device through one of three WAPs on board.

Guests flying in business class are to be given a Samsung tablet, on which the experience should be slightly enhanced. This is due to the tablet's high-resolution display and the fact that the application framework 'lives' on the device, reducing the load of the data being streamed.

Since spring, Vistara has been offering its passengers the use of Samsung tablets pre-loaded with a more modest selection of content and a user interface very similar to the final product.

"We've been flying what we call our 'interim solution' for six months now," states Jared Shoemaker, director of Intellicabin at BAE. "We've had a lot of positive feedback from Vistara flying the product, though they are extremely excited to move to the full streaming installation."

However, convincing people to pay more for business class seats in the Indian market is proving difficult, and it is unclear just how much IFE or a tablet can help that decision. In mid-September, leading Indian business daily, the *Business Standard*, reported that poor load factors were forcing Vistara executives to reconsider their 16-seat business class configuration, possibly looking to halve the number of business seats on forthcoming deliveries, to give more space to economy.

In the article, the *Business Standard* quoted Devesh Agarwal, editor of *Bangalore Aviation*, who wrote on his own blog, "The lack of a broad network of business destinations with services at convenient timings adds to the challenge. This is reflected by the extremely low passenger load factors. The airline appears to be relying on value-added services such as wi-fi on aircraft. This would provide a sustainable competitive advantage to Vistara, but it is not likely to generate adequate monetary returns."

BAE Systems and Vistara both declined to speak about the validity of the *Business Standard* report, or comment on how a cabin re-configuration might affect plans to launch Intellicabin.

COMING SOON

FROM WARMER, MORE CONFIDENT COLORS, TO NATURAL FINISHES THAT MEET CUTTING-EDGE TECHNOLOGY, 2015'S MAJOR FASHION, FURNITURE AND AUTOMOTIVE SHOWS HAVE INDICATED THE TRENDS THAT WILL INFLUENCE AIRCRAFT TRIM AND FINISH

THERE IS A TREND TOWARD HONEST MATERIALS, QUALITY AND CRAFTSMANSHIP, SAYS MARIA KAFEL-BENTKOWSKA, SENIOR CMF DESIGNER AT PRIESTMANGOODE

One of the strongest trends to emerge this year in both interiors and fashion is texture, and it has come in many forms – velvet fabrics, raw stone, and fabrics that use stitching or weaving to create a three-dimensional effect. Developments in the technology of CNC stitching have broadened the scope for using stitching, embroidery and weaving to create patterns such as broguing and quilting, and these are currently being favored over printed materials. Touch is absolutely intrinsic to the passenger experience. The development of more tactile materials acts as a counterpoint to the consumer products that passengers use every day, such as cell phones and laptops. The tactile nature of these materials is important to creating something that passengers can connect with on a physical level. Using materials more readily associated with residential interiors, for instance, such as the seat fabrics we have used on the new LATAM Airlines Group interiors, will make passengers feel more relaxed and at home.

Regarding colors, the predominant trend this year is for strong color, whether jewel tones of emerald or amber, Yves Klein blue as seen at the Milan Furniture Fair, or bold primary colors reminiscent of Ettore Sottsass and the Memphis Group at the London Design Festival. In aircraft interiors we find that neutral, calm colors work best for larger items such as seat fabrics, with vibrant accents of color used on smaller items ranging from cushions to stitch detailing or seat pockets. These offer an opportunity to infuse interiors with a sense of personality and brand, such as we have done on the cabin interiors for South African Airways.

Metal has remained a strong trend, with the focus on warm finishes that create a subtle yet luxurious look.

1: TACTILE MATERIALS ARE ACTING AS A COUNTERPOINT TO THE RELATIVELY COLD, HARD ELECTRONIC DEVICES WE TOUCH EVERY DAY

2: WARMER FINISHES ARE ENTERING CONSUMER ELECTRONICS, SUCH AS THE GOLD APPLE MACBOOK

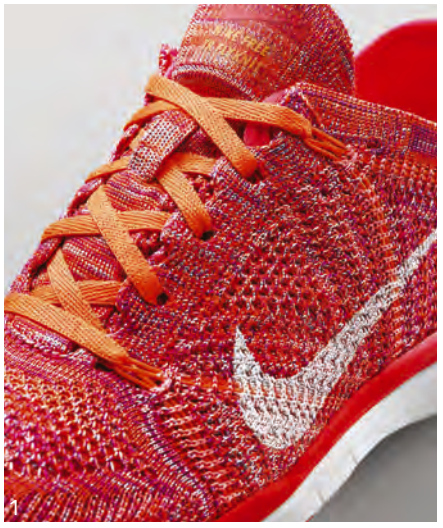
3: THE UNDERLIT CORIAN COCKTAIL TABLE ON THE NEW SWISS B777 FIRST CLASS LOOKS SOPHISTICATED AND FEELS HIGH QUALITY

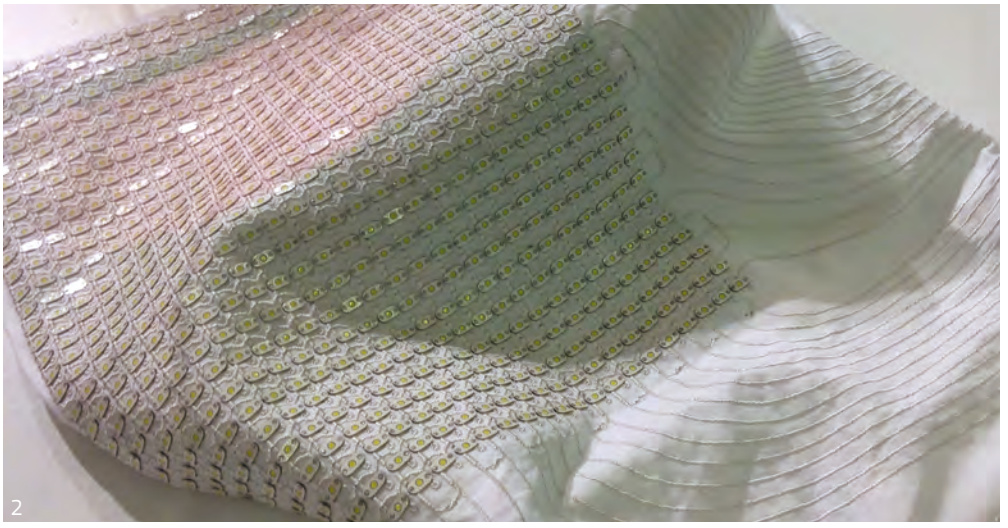
We've also seen a lot of experimentation in material processes to create more rough-luxe finishes such as oxidization. In fact, across the board there is a trend toward honest materials, quality and craftsmanship. At 100% Design in London, for instance, there were a lot of wood veneer companies with natural and man-made products that recreate an organic aesthetic. These developments are broadening the spectrum of materials we can adapt to aircraft interiors.

Marble is still very much in favor, but we're seeing more variation in colors rather than the traditional Carrara marble. The same goes for other natural stones and composite materials. We're increasingly using stone and similar man-made finishes such as Corian on smaller items to add a sense of quality to cabin interiors, like the edge-lit Corian cocktail table on our new first class cabin for Swiss International Air Lines.

Geometric patterns were also dominant across the various shows, whether inlaid in wood, stitched on fabric or laser cut in metal. These patterns were often used as details juxtaposed with cocooning shapes on larger items such as sofas and chairs. This juxtaposition is something that was prevalent through all the shows. The wide variety of materials, colors and patterns can be used to great effect across the cabin – from seat fabrics to cushions, brand panels, meal items, amenities and foils – to create a multilayered passenger experience.

Inevitably, in the age of Instagram, the shows include more and more 'photogenic' installations. Whether larger than life or made of repetitions of small items composed to great effect, it is worth noting the wide reach that these installations have. Creating 'photographable' cabin interiors can be an excellent exercise in brand building.





FABRICS HAVE A LOT OF TECHNOLOGICAL POTENTIAL, SAYS CMF EXPERT CATHERINE BARBER, FOUNDER OF STUDIO CATHERINE BARBER AND BRAND MANAGER AT ACUMEN

This year I wanted to go beyond color and style trends. I have sat in too many concept meetings where we imagine this totally interactive environment, but end up with predictable finishes and nothing more interactive than a GUI screen, so I visited the Techtextil technical textile show in Frankfurt, Germany, in May.

The trend there was for integrating electronics into fabrics using conductive fibers, which deliver heat and light and also allow for the integration of sensors for medical and sports performance monitoring. Some solutions were very simple and well established, like woven meshes that can be sewn into car seat covers and which use electrical resistance to heat individual seats. Some ideas are at an earlier stage of development, like conductive yarns embroidered onto garments and curtains and attached to tiny LEDs to achieve decorative light effects. Some effects are static, like a star lit curtain, while some simple digital animations use grids of LEDs and programmable sequences to create simple figurative elements, like a horse running across the front of a T-shirt. But these animations could equally be programmed to greet a guest as they arrived at their seat on an aircraft and then become an ambient light source during the flight.

There were also circuits printed onto fabrics to form switches and light effects. What if we could combine Andrew Muirhead's new printed leather technology with circuitry to create a leather arm cap for a business class seat that integrates the controls for the IFE, lighting and heat? Or a surface where you can rest your tablet to let it recharge in flight via inductive power transfer.

I was also interested to research more into warp and weft knitted textiles. I have long thought they are underused in the aviation sector. Nike Flyknit sports shoes and Ludeke Design's Aeras seat project illustrate how technical 3D knitted construction offers some interesting possibilities and solutions that are beyond the decorative.

I first came across these capabilities many years ago when I was working on fabric development for the sports and underwear industries. A bra is traditionally constructed out of multiple panels of different materials, all with different stretch characteristics, but the Shima Seiki and Santoni machines we worked with could knit a 3D seamless garment combining all these performance characteristics in one process. So a dress cover can be fully fashioned in one manufacturing process, with different comfort attributes integrated into the cover by using stretch and fiber combinations, all in a single piece of fabric, with no seams and minimal construction time.

Not that I would want to miss Milan and bathing in all that color and style, but I enjoyed catering to my inner geek too.

1: TECHNICAL 3D KNITTING HAS REALLY HIT THE MAINSTREAM WITH NIKE'S FLYKNIT SHOES

2: FORSTER ROHNER TEXTILE INNOVATIONS DEVELOPED THIS TEXTILE, WASHABLE DISPLAY. AS MANY AS 1,000 LEDS CAN BE INTEGRATED INTO A GARMENT, SUCH AS THIS 'E-BROIDERED' T-SHIRT WHICH CAN BE PROGRAMMED TO SHOW MOVING IMAGES OR WORDS

HELLO WARMTH, GOODBYE GREIGE: WARMER COLORS, NATURAL FINISHES AND BEAUTIFUL IMPERFECTIONS ARE THE WAY FORWARD, SAYS LINDSAY BOSONOTTO, FACTORYDESIGN'S RESIDENT CMF EXPERT

As well as the Milan Furniture Fair held earlier this year, The London Design Festival was held in September and I visited as many design events and exhibitions as I could to pick up on some of the world's leading lifestyle and design trends.

In furniture and interiors, craftsmanship and raw materials were celebrated with live demonstrations. Woods, stones and metals subsequently took more organic and less engineered forms and offered more interesting and natural textures.

Aircraft cabin designers could take note from this trend by moving away from materials and processes that look man-made. Natural wood is always going to be a challenge because of burn restrictions, but metals and stones both have low flammability properties and could be applied in a less artificial way, with less brushed and regular finishes on metals, and more imperfections, patinas, luster and color variation. Warm metals such as coppers and golds are popular and could help balance out the lack of wood by adding warmth.

Sekisui has created a product which enables bespoke patterns to be printed onto plastic sheet and then formed. We have been working with this product to disguise the vast amounts of plastic necessary to build a seat, by creating some realistic organic designs.

Textures of raw materials are unexpected and irregular, ranging from soft, indulgent wool, to uneven yet smooth slate. In the confined space of an aircraft these touchpoints can help create a sensory environment for the passenger.

ABOVE: LARA BOHINC'S LUNAR COLLECTION OF FURNITURE WAS CREATED WITH LUXURY STONE SPECIALISTS, LAPICIDA. THE FULL MOON TABLE WAS A STANDOUT DESIGN AT THIS YEAR'S MILAN FURNITURE FAIR

Another way to introduce craft, which we have encouraged some airlines to do already, is to take clues from the country's heritage and traditional handcraft techniques. This not only helps to identify a brand, but also creates a design unique for the customer.

A key raw material seen in Milan and London this year was marble: not just white but gold, pink and blue. I've since seen the techniques of marbling being used in many applications and on many materials such as wood and ceramics; it follows the trend of having no boundaries, which creates an environment for the passenger that offsets the stress and hassle of daily routines. Soft translucent layered fabrics also fall into this idea, so perhaps seat privacy screens will move away from plastics and toward fabrics.

As if to completely counter this re-emergence of craft there is a technological uprising. Advances in CNC, embroidery and 3D printing technologies have opened up new horizons for surface construction and manipulation. I have noticed that some designers are combining traditional craft with new technologies and coming up with exciting, juxtaposed results. Airline suppliers need to update their technologies to keep up with the times and perhaps we will see 3D printing techniques used to create bespoke textures and design features in the aircraft cabin.

Lastly, color: color is coming back and designers are being braver with color and moving away from the safety of taupe/gray/greige. It would be nice to see some airlines break the mold and use different colors without fear of association with other brands.

ALESSIA GIARDINO, TRENDS, COLORS & MATERIALS DESIGNER AT JPA DESIGN, IS BRINGING MORE NATURAL AND HYBRID MATERIALS INTO THE CABIN TO INCREASE EMOTIONAL INTUITION AND CONNECTION

The whole design landscape is dominated by a sensory overload, where 'experiences' are targeted to be real, deep, intuitive and thoughtful. The look and feel for this emerging and progressive trend sees a preference for more natural and organic materials that feel warm, offering a more human-centric design and evoking that sought-after sense of comfort. Tones are deeper and more intense, often combined with delicate undertones and neutrals. Cooler color palettes attempt to make a shift away from previous years of traditionally warmer tones, adding a level of freshness and interest to the cabin interior.

Highly overlooked, copper is moving toward more earthy tones, where colors are ultimately defined by their finishing. Colors blend with the environment in a more cohesive and organic way. Gradient hues embrace this sense of sincerity, adding an element of rhythm and surprise, creating an immersive atmosphere.

Uniqueness helps to make things special, and in order for a fabric to be special, we should look to avoid repeat patterns and instead feature one considered and fluidic design. Unique design finishes could equally create an intriguing passenger experience, for example through the use of real-scale images or dramatic prints. Whether intended for flooring or a sidewall feature, a natural stone look and large-scale wallpaper images can be interpreted through digital technology. Working as backdrop, they set the scene and help to magnify the space, creating a more intuitive, welcoming and 'surprising' atmosphere. This trend was widely seen at Milan earlier this year through Moooi's collection of digital printed carpets and expressed through installations and sets created by the design studios of Snarkitecture, Studiopepe and Fabrica, to name a few.

BELOW: THE 3D WOVEN CERAMIC COLLECTION BY OLIVIER VAN HERPT IS STRIKING IN ITS APPEARANCE AND MANUFACTURE. VAN HERPT SPENT TWO YEARS WORKING ON A CERAMIC 3D PRINTING PROCESS THAT COULD MAKE LARGE AND MEDIUM SCALE FUNCTIONAL 3D PRINTED CERAMICS

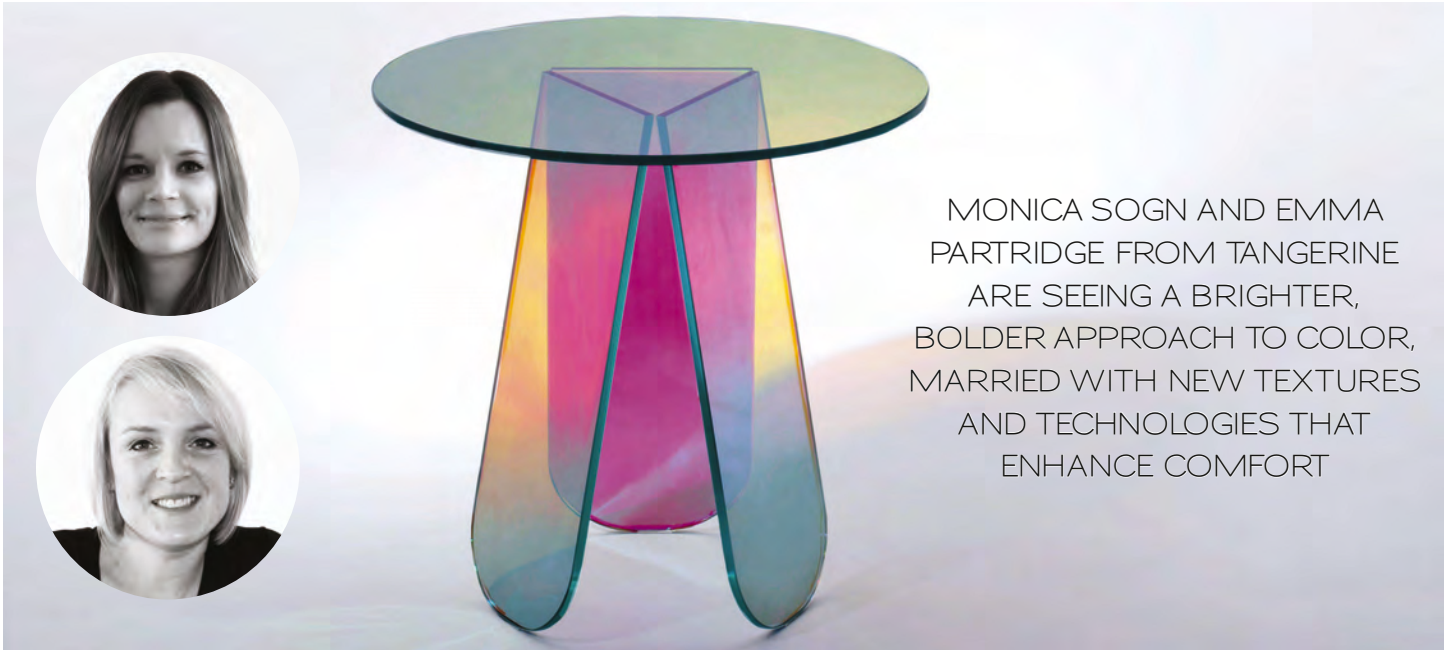
While those trends are already taking place within the aircraft industry, the real challenge is to add a level of tactility and authenticity to materials, which is what triggers the emotional connection for customers.

Influences can be found within the interior, lifestyle and automotive sectors, where colors are often translated through their own finishing or processes. New earthy tones are defined by their natural texture. Sand and other natural elements are shaped through 3D technology; this perfectly blends with traditional glass-blowing techniques, as seen in 'Venice Future' presented at the latest London Design Festival, or the beautiful 3D ceramic collection by Olivier Van Herpt. Translucency and transparency qualities are new sensorial features that make their appearance in objects and furniture, and into interiors. Frosted, colored and gradient textures, applied to mirrors and glass, give a contemporary interpretation of traditional techniques. Some of these effects could be brought into the aircraft in the form of polycarbonates, or through 'infused' techniques. This process could be further explored to be applied to translucent plastics, too.

Designers are also bringing into life local materials, suggesting a more sustainable approach. Graphite, cork, real wood, minerals, edible and recycled composites make their narrative in the material world. Plastics made out of yogurt pots, or composites of resin and flowers, offer a valid and poetic alternative to marble and stone textures. They could also be adopted as a way to measure carbon footprint, and ultimately track materials waste.

The future lies in the hands of emotional intuition and connection. A good start to helping achieve this could be by bringing more natural or hybrid materials into the aircraft, answering the need of a post virtual reality, where we instead crave for a more physical one.



MONICA SOGN AND EMMA PARTRIDGE FROM TANGERINE ARE SEEING A BRIGHTER, BOLDER APPROACH TO COLOR, MARRIED WITH NEW TEXTURES AND TECHNOLOGIES THAT ENHANCE COMFORT

When designing interiors for aircraft, the brand always forms the starting point from which CMF is chosen. There are so many technical restrictions and specifications that need to be met, that designers are always constrained in certain ways. However, yearly trends formed by tastemakers in fashion, interior, furniture and other adjacent industries, do influence the airline industry and permeate cabin interior choices over time.

This year we have seen bright, bold colors replace pastel tones on the fashion runways. From hot pinks and vibrant oranges, to color-clashing statement pieces, next summer the fashion world is determined to bring energetic flourishes to what we wear.

The airline industry is not so daring, but people are becoming more comfortable with a bolder use of color. In the cabin this could be used to introduce accents into the soft furnishings and other changeable items.

Dramatic digital prints have also been in fashion shows this year. The technology used to produce these designs has been getting better and better, so suppliers can now offer a wide selection for flooring, wall covering and textiles. This gives us more freedom to be experimental with color, shapes and pattern.

In interiors, we have gradually seen more color coming through, but palettes remain firmly based in a more natural, neutral color selections. We are seeing more untreated natural materials, such as cork, woods, bamboo and ceramics, with softened glazes. As technology gets more sophisticated, suppliers are able to offer more realistic and natural surfaces. Using more of these materials will help to create a warmer cabin space that is more evocative of a home environment.

ABOVE LEFT: MONICA SOGN (TOP) AND EMMA PARTRIDGE (BOTTOM)

ABOVE: THE 'SHIMMER' COLLECTION OF GLASS FURNITURE, DESIGNED BY PATRICIA URQUIOLA FOR GLAS ITALIA, WOWED VISITORS TO MILAN FURNITURE FAIR 2015. THE IRIDESCENT MULTI-CHROMATIC FINISH GIVES DIFFERENT EFFECTS AS LIGHT ANGLES AND VANTAGE POINTS CHANGE

From Milan, the prevalent color trends saw an overall muted palette; rich greens, royal blues, soft gray tones. In line with fashion, red accents were introduced for warmth and contrast. The show emphasized sharp, clean lines and embraced materials with reflective qualities. Color is being introduced to great effect with holographic film and through the graduation and layering of colored glass. It would be fun to see this introduced on board into bar and lounge areas. Oversized knits and weaves were being used with a more industrial application for carpets and upholstery. These soft, open textures could offer a dramatically different look and feel for aircraft seating.

New technology presents a number of exciting opportunities for improvements to passenger experience. Wearable technology is helping us connect with our environment in more engaging ways. Sensory fabrics can now monitor the body and react accordingly. Fabrics woven with fiber-optic threads have recently been showcased in the automotive sector. We have been particularly excited by recent breakthroughs in memory foam technology. For passenger aircraft, this could mean seating that changes shape and position according to the gravitational pull on the aircraft, providing better comfort and safety.

On the whole, this year at Aircraft Interiors Expo, we found that suppliers are generally being much more adventurous in their collections, exhibiting a far closer offering to that of the fashion and residential interior worlds. This can only be a positive direction for our industry. The availability of more exciting colors and textures is allowing us to express our clients' brands in more varied ways.

AVANT GARDE CRAFT, TRANSPARENCY, REFRACTION AND TRANSFORMATION ARE THE KEY MATERIAL TRENDS OF THE MOMENT, ACCORDING TO HOWARD SULLIVAN AND TOM PHILIPSON OF YOURSTUDIO

Luxury is changing and as the worlds of work, rest and play overlap, the material palette we associate with comfort and hospitality is being revitalized. For example, the Ace Hotel in London mixes co-working lobby spaces with florists and DJs, while the Fondation Louis Vuitton in Paris brings art and performance together in luscious parkland. In these inspiring social spaces, art, food and performance brush shoulders with music and nature, creating a vibrant and artistic mix that feels fresh and new.

We recently took a client on an 'urban safari' (a walkabout of inspiring spaces), and from the East End of London to Mayfair it became clear that we are on the cusp of an exciting evolution in design. A new wave of confidence in materials and spaces is clear, from Christopher Kane's minimal flagship in Mayfair's Mount Street, to Céline's breathtaking marble enclave a few doors down. Further afield in Tokyo, Miu Miu's textured copper flagship by Herzog & de Meuron is incredible, as YourStudio director, Howard Sullivan, says: "Engineered with computer-tight precision, they have created a razor-sharp mix of craftsmanship and the avant garde."

The studio's insights team – YS GroundWork – has defined three themes to distill some of the inspiration it believes will influence onboard cabin design for 2016: craftsmanship, transparency and transformation.

Craftsmanship is essential for the airline cabin, from the details of junctions to the stitching on headrests. New technologies are offering new crafting techniques, as shown in Pininfarina's bicycle created in collaboration with 43 Milano. Interwoven leather strips on the handlebars are a counterbalance to the steel and briar walnut finishes. You can also charge your smartphone on this bike, making the integration of technology an enabler, not a feature. The Apple Watch Hermès again blends the warm (hand-tooled leather) with the high-tech.

1: HOWARD SULLIVAN (LEFT) AND TOM PHILIPSON (RIGHT)

2: ARTISAN LEATHER AND A DIGITAL INTERPRETATION OF CLASSIC TIMEPIECES MAKE THE APPLE WATCH HERMÈS VERY DESIRABLE

3: MIU MIU IS EMBRACING THE WARMTH OF COPPER FINISHES

4: YUE WEI'S GRADUATE SHOW AT LONDON'S ROYAL ACADEMY OF ART USED EXPERIMENTAL PROCESSES TO WEAVE TOGETHER LEATHER AND PERSPEX

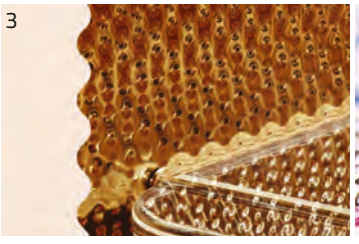
5: TECHNOLOGY MEETS TRUE CRAFTSMANSHIP WITH PININFARINA'S BEAUTIFUL FUORISERIE BICYCLE

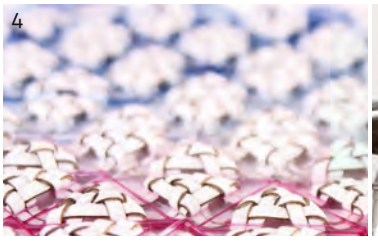
Transparency stole the catwalk in Paris Fashion Week. Master of the avant-garde, JW Anderson's collection for Loewe SS16 used see-through fabrics to reveal different details of the body. This year's Milan Furniture Fair was dominated by a range of show-stoppers in glass. Patricia Urquiola's rainbow-hued furniture for Glas Italia mixed dichroic (gasoline-effect) transparent filters over simple glass forms. "Patricia Urquiola's work took glass to another level; she had us all in a trance," says Tom Philipson, YourStudio's managing director.

Nendo's Deep Sea shelves stacked subtly tinted panes of glass in gradating greeny-blues, representing the depths of color in the ocean. All of these precedents have shown a whole new way to approach this notion of transparency and refraction, and should definitely be employed creatively for accents in future airline spaces.

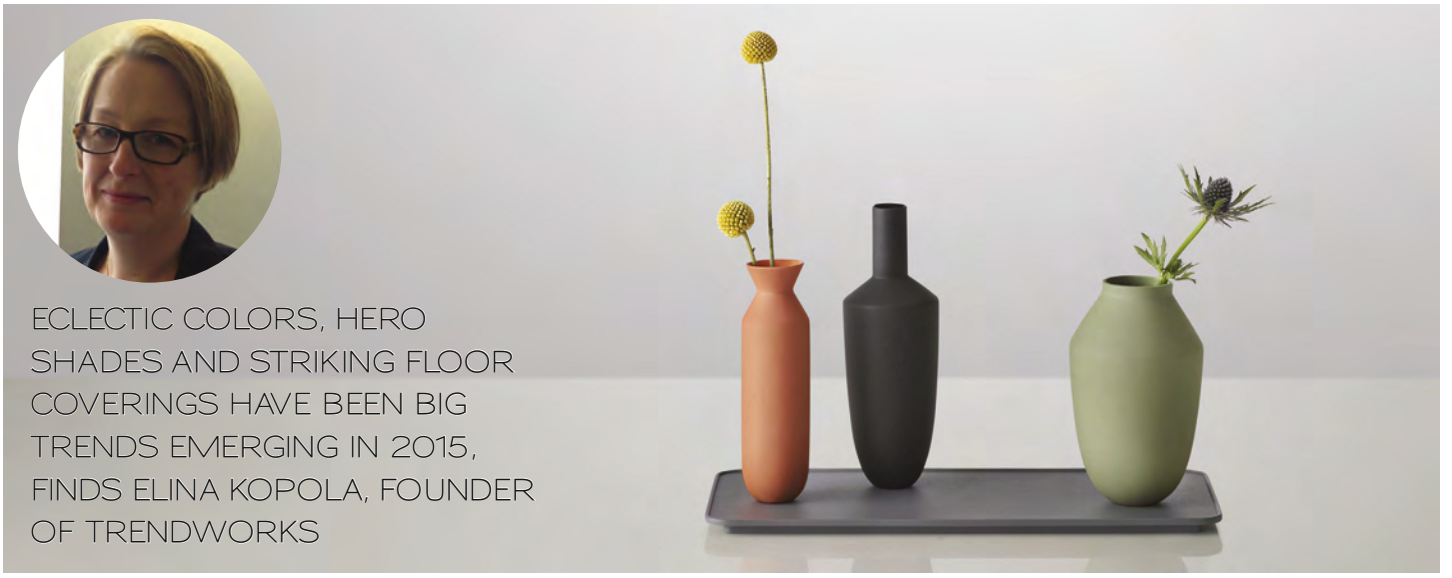
Transformation is key to any journey by air. With potentially long periods of time on board, especially for long-haul flights, we will be able to enhance our experience by having things that change and adapt in response to us. Hussein Chalayan's Paris Fashion Week show had a catwalk shower that dissolved a top layer of clothing to reveal intricate tailoring beneath. From the high concept to the high tech, there are a number of opportunities, from seating fabrics to hard surfaces, that could employ a touch of responsive alchemy.

BMW collaborated with the University of Offenbach to create interactive surfaces where driver and car can communicate. Exploring magnetic fields, air, static electricity, light and humidity as a means of expressive energy, the smart surfaces allow intuitive interaction through material innovation. Incertitudes by Ying Gao is a fabric that responds to sound through wave-like ripples in garments. As the environments around us become ever more inter-sensory, interactive and entertaining, this is set to be a vital trick for engaging passengers on board.





ECLECTIC COLORS, HERO SHADES AND STRIKING FLOOR COVERINGS HAVE BEEN BIG TRENDS EMERGING IN 2015, FINDS ELINA KOPOLA, FOUNDER OF TRENDWORKS



ABOVE: MUUTO'S BALANCE VASES JUXTAPOSE BRIGHT COLORS WITH MUTED SOFT COLORS

There are many amazing new CMF trends and style ideas to tempt us, and often it can feel that we have only just completed an interior development when a new trend comes along. Yet the key to longevity is to trust one's instinct and to make a brand tangible for the passenger by applying CMF that is consistent with the brand's values and instantly projects the airline's personality.

I see the new CMF and design trends as the 'menu' or 'toolbox' to be harnessed to make the brand really 'zing'. There are three important points we focus on to deliver interiors that delight consumers and airlines alike: color, application and styling.

At the moment, some of the biggest trend development can be seen in color direction. We all respond intuitively to color – it affects our mood. And strikingly, color has the power to renew and to make a product or interior feel 'of the moment'.

There are currently several color trend developments. Firstly, dark tones can be used in interiors to give a scene of depth to reveal the 'play of light' contrasted onto dark shades. These new 'hero shades' are saturated, with deep brown, midnight blue and dark teal, as seen in AkzoNobel's CF16 forecast (www.colorfutures.com).

Another color trend is a greater diversity in color strength and hue, as seen on the fashion runways and in new home accessories. There is also more juxtaposition of bright colors, particularly yellow and orange, with muted soft colors such as nude, mint and frosty gray. A good example is Scandinavian brand Muuto. This color direction gives an instant contemporary look to an environment and it can easily be achieved for tableware and soft goods. In addition, unexpected color combinations are the new norm: color has become eclectic! A great example is the Prada AW15 collection.

Then comes the matter of application; how the color direction is applied to an interior that will give the brand focus. Proportion, luster level and material type can be used to emphasize the perception of brand values.

The choices that we make here in terms of quality and in substrates help to make the interior durable for maintenance and to stand the test of time.

Moving onto styling, one of the most striking new developments here is that large-scale patterned floor coverings are back.

These floors are expressive, add drama, and above all, they work to hide wear and tear in a public space. Great examples are Moooi digital printed carpet, as seen in the Milan Furniture Fair, which can be printed with bespoke images in a large scale. Another is Bolon, where the collection is available in rolls or tiles that can be artfully assembled to create large-scale pattern in either soft tonals or unexpected color combinations.

There are many varied approaches at the moment and picking your way through can be challenging. It is how the ingredients of color, material and pattern are strategically put together that reflect a unique personality of a brand.

Interior designer Sara Bonfield, owner of Studio bonbon, reinforces this view, saying, "The seemingly haphazard way in which patterns are mixed or even clash will conjure a particular, brave characteristic, whereas a more subtle ensemble with perhaps just a small pop of bright color or pattern will portray control, self-assurance and calm."

Finally, the right balance of new trends applied skillfully to a cabin interior, can project the brand and keep the environment looking fresh and interesting, journey after journey, to dramatically enhance the passenger experience.

CMF AND TEXTILE SPECIALIST EMMA RICKARDS FROM WEST 6 HAS GATHERED SEVERAL KEYNOTE TRENDS FROM THE MAJOR EUROPEAN SHOWS IN AUTUMN 2015, INCLUDING CHANEL S/S 2016, LONDON FASHION WEEK, 100% DESIGN, PREMIER VISION, FOCUS/15, AND THE LONDON DESIGN FESTIVAL

Leading brands today are chasing experiences. High-end fashion creates a magical world where everything's way more exciting than everyday life. Good cabin interiors need to deliver real comfort for passengers, while capturing some of that excitement and freshness through the application of color and materials.

Focus/15 is the London hub for interior textiles, setting the pace and revealing what's shaping interior design choices today. Here we're seeing an explosion of woven texture in all fibers, from dense felted qualities to intricate webs with drape and flow. The key to this trend lies in the scale of the texture. From extreme volume and dramatic 3D surfaces to micro-grainy peach-skin effects, success is all in the touch.

For a fresh take on the felted trend, there's a development that combines high-specification felted woollen base cloth with the application of dynamic printed pattern. It's daring and decorative without compromising on performance.

Similar to the airline industry, interior design in hotels has tended toward safe options and used color sparingly, applying layers of neutral shades sometimes known in the trade as 'non-colors'. Now a more upbeat economic outlook is resulting in a swing toward a brighter and clearer color palette. People are feeling more optimistic and color is back with a bang! Implementing updated color combinations in CMF will reposition a brand.

Geometric patterns are trending across fashion and interiors in print and weave, ranging from intricate digitally printed interference structures with a pulse of optimistic energy, to more flowing rhythmic contemplative patterns.

In reaction to mass-manufacturing there's a surge of hand-drawn patterns, delivering a personal touch and creating the impression that textiles and finishes could have been produced manually.

Generating a dialog between decoration and texture is central to this season's trends, with an emphasis on discordant and unexpected combinations. Vital to this look is mixing light-absorbent and matt textures with an injection of super-gloss in the form of wet-look leather trim or desirable metals.

Metal is ubiquitous, in large areas and also as a dramatic accent in oversize detail. Gilded finishes, more modern than 'bling-bling', are present across all sectors, and silver leather scored highly at Chanel. The Dulux Color of the Year 2016 is Cherished Gold, bright enough to attract attention, while subtly referring to the past and the ochre color of earth.

Trendsetting leathers complete the decorative and textural theme, ranging from unexpected mattness with a rubbery surface through every degree of sheen and shine, to glossy leathers with an almost oily finish. Laser-cut perforations and laser-printed leather are on the rise across all industries, transforming the ordinary into a unique product.

All these techniques have the potential to create excitement and originality, while delivering comfort through sensorial softness and wearability. If you want to wear it, it's the right choice for your cabin interior!

BELOW: CHERISHED GOLD IS THE 2016 DULUX COLOR OF THE YEAR, ADDING A TOUCH OF GLAMOR WITHOUT THE BLING

BELOW RIGHT: CHANEL TURNED THE GRAND PALAIS IN PARIS INTO THE CHANEL AIRLINES TERMINAL FOR ITS SS16 FASHION SHOW

CUSTOMIZATION COULD BE TAKEN A STEP FURTHER THROUGH TOUCH, TASTE AND SMELL, PREDICTS GEORGINA CHAMBERLAIN, CMF DESIGNER AT HONOUR BRANDING

With airlines looking to differentiate themselves through a standout customer journey from ground to air, we need to look at other sectors to see any emerging trends in the sky.

One such trend that has been around for a while is the journey feeling much more like a boutique hotel experience, with lounges offering spa services, fine dining and sleep suites. Materials and fabrics have a much more high-end domestic feel, with the use of wool, felt, linens and velvets, matt leathers, timbers and natural timbers being examples of this.

Weight restrictions, fire certification and durability are some of the factors stopping the use of these materials in the air, but composites, plastics and vinyls are starting to resemble the real thing with great effect. Stripped back design and materials were prominent at this year's Milan Furniture Fair, and Japanese product designer Nendo had a retrospective exhibition of his work at one of the satellite venues across the city. The beauty was in the simplicity of the production, with glass, wood and leather painted, carved and manipulated to create surprising and beautiful effects using simple methods.

BELOW: KARTELL'S BEAUTIFULLY DESIGNED COLLECTION OF DIFFUSERS AND CANDLES CREATE EQUALLY BEAUTIFUL SCENTS

Customization is still prevalent within the luxury, interiors and fashion industries, enabling the consumer to choose their materials, finishes or colors, making the product individual to them. Brands are pushing the boundaries further in the sensory arena, engaging and connecting with their customers through touch, taste and smell, etc. Kartell has produced its own scents through beautifully designed diffusers and candles, and even fabrics are now starting to be infused with aromatherapy oils to promote a feeling of well-being.

The environment and sustainability, while not a new trend, is certainly making far bigger waves than ever before in the interiors industry. Considered and responsible designs with the focus being on quality of the design and materials to improve functionality, and ultimately the lifetime of the product, are prevalent across multiple industries.

So the question now is how long before we see real collaborations between airlines and the interiors industry? Perhaps Moooi, which launched its range of carpets at Milan this year, could be furnishing the floors of the next A350. Now that would be cool!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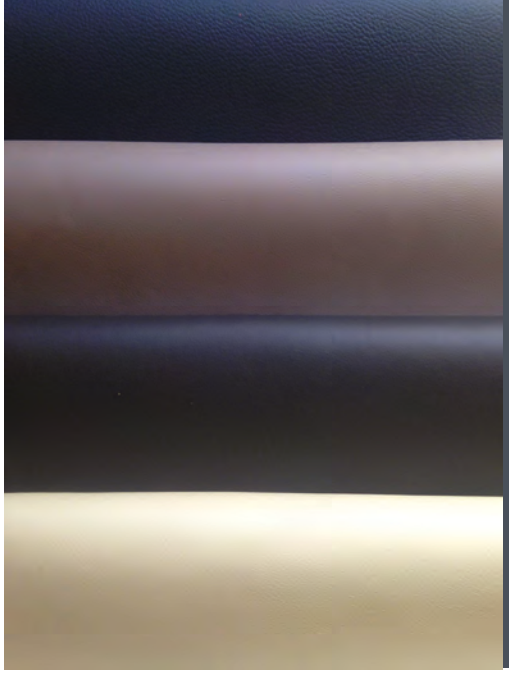
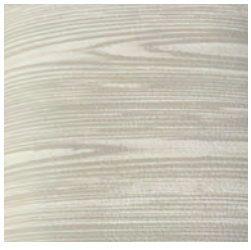


VENTO BREEZES IN

Cortina Leathers has introduced the 'Collezione Vento' (the wind collection) branded range of aerospace leathers in tribute to the company's Mediterranean roots. Zephyr, Notus, Boreas and Eurus, the respective deities of the west, south, north and east winds, have been developed for optimal performance across all classes of aircraft seating. The hides – all from European bovines – are first aniline-dyed in the drum, then finished with a resistant topcoat, to combine suppleness with durability.

Leather in the digital age



The introduction of a fully integrated digital print capability at Muirhead means that the Scottish leather producer can take seat customization a step further.

Customers can submit digital images to Muirhead, which can then offer a rapid turnaround on digitally printed leather samples. These prints can then be seamlessly incorporated into the finished product, as required.

The LED UV print technology is suitable for photographic images as well as corporate branding and abstract design, and Muirhead says the digitally printed image will be as robust as the leather on which it is printed.

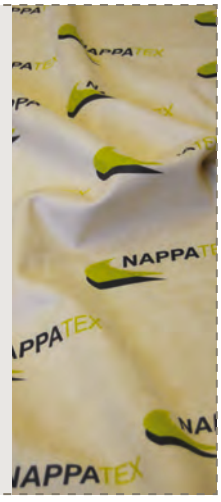
"Our new capability for digital printing will create opportunities for customers who are looking for cutting-edge design while maintaining the durability and cleanliness that our leather has always offered. With the definition and performance capabilities of our process, the potential applications are vast," commented Muirhead managing director, Colin Wade.

SMART COMBINATION

NappaTex, the latest offering from Yarwood Leather, has a distinctive make-up, with soft Nappa leather topped with a high-performance textile. That textile gives clients a new opportunity for creativity, as the textile surface enables designs or logos to be added using laser droplet technology.

Stain resistance is built into the top coat, so common spills such as coffee can be easily removed without staining.

Flameproof to FAA/EASA standards, NappaTex provides the comfort of fabric without the need for dry cleaning, bringing together the maintainability of leather with the design and comfort of fabric.



ENGINEERED FOR PERFORMANCE

Constructing seat covers using engineered products allows for consistency and ease of use during the cut-and-sew process, and provides consistent color, weight and quality. According to Tapis, the Takumi construction process used in its Ultraleathers provides a balance of comfort, quality, durability and weight.

Tapis has developed two new high-performance Ultraleathers for the aircraft seating market, each with distinct advantages: Brisa HP and Promessa. Tapis claims that Brisa HP is the lightest engineered leather product on the market today, weighing in at 340g/m². Additionally, its ventilation system provides customers with long-haul comfort.

The second product, Promessa, is the most durable construction in the company's Ultraleather line and is inherently anti-microbial. Promessa combines extreme durability with comfort and will stand up to the most demanding cabin environments.

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The OSU-rated Eclipse decorative surface fabric range from Replin Fabrics is continuing to evolve, creating new branding opportunities for bulkheads, and enabling a warmer and more coordinated feel in first and business class through complementary seat and shroud fabrics. The Eclipse range can be specified with the Replin Fabric Protection System for stain prevention and easy cleaning.

In other Eclipse news, the product – as with all Replin Fabrics – will now be produced in Leeds, UK, following the firm's acquisition by textiles company, A W Hainsworth and Sons, and subsequent integration into its facilities.

JACQUARD FANS REJOICE

Industrial Neotex has developed a fabric that uses a new fiber and a new way of twisting the yarn that will enable designers to create any jacquard design to be used in partition walls or any vertical surface. This fabric, which complies with OSU/heat release tests, will be introduced at Aircraft Interiors Expo 2016 in Hamburg, Germany, with a wide collection of different colors and designs.

Pretty in pink

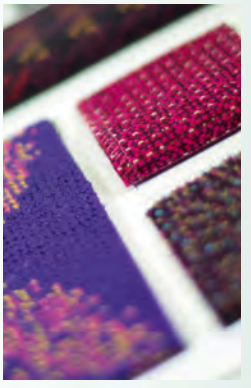
Think of an aircraft interior and then think of the color of the seat fabrics, curtains and carpet. Chances are, you see the color blue or maybe a shade of gray. However, it's time to think pink.

In a joint project by rohi and Anker, the two premium aircraft textile manufacturers challenged themselves to design a range of aircraft fabrics and carpets with a dash of pink that would not only look at home in an aircraft cabin, but would actually enhance and invigorate its overall appearance.

The result – the 'Create Pink' concept – is an eclectic range of fabrics and carpet divided into five themes: Elegant, Powdery, Clear, Sunny and Tropical. More than just an idea, the concept is fully certified and ready to order.

The companies say the range is "exciting and mature, intelligent yet playful, bright but not dazzling".

The concept's five themes have been designed to underline the different ways pink can be understood, whether loud, quiet, elegant or cool.



MODULAR CARPET SCHEME

SkyPaxxx and Interface have agreed to work together on a scheme they claim will change the way airlines and aircraft manufacturers view, purchase, and maintain carpet, through a long-term, exclusive agreement intended to reduce costs, maintenance, logistics hassles, and the burden on purchasing.

The design and manufacturing process of the Sky-Tiles modular aviation carpet creates a floor that will not shrink or stretch; has no need to be serged; is delivered to the aircraft ready to install; allows for selective replacement; reduces waste; prevents microbial growth and related odors; is 100% recyclable; will not fade; lasts longer; is easier to remove and install; and is easy to maintain. The partners say that Sky-Tiles can be provided for any aircraft type and any fleet size.

MIXING MATERIALS

The standards in the aviation carpet industry have long been either 100% wool or 100% nylon. However, Desso is now witnessing a huge migration of traditional 100% wool users to new blends of wool and nylon. The reason Desso gives is that the durability of the carpet is increased through the nylon, while the luxury look and feel is retained through the wool content.

Desso can make many different types of yarn constructions, but the company has most experience with its in-house developed and manufactured 80/20 blend. In this blend, the complete yarn in all plies has a homogenous spread of fibers, to ensure consistent dye and wear characteristics during the lifetime of the product.

Leather flooring

Boxmark's latest innovation is a leather floor for VIP and business aircraft, co-developed with F/LIST. The companies say the product can be used to create a unique environment within an aircraft cabin by adding elegance, sophistication and a luxurious appearance.

F/LIST Leather Flooring is available with a customized tiling concept in a wide range of colors and structures and meets all applicable certification requirements, such as flammability and slip resistance.

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IT COULD BE SAID THAT LED CABIN LIGHTING IS STILL IN THE NOVELTY PHASE. THE TECHNOLOGY IS MATURE, SO WHY ISN'T THE AIRLINES' APPROACH TO ITS USE?

Words by Billy Valentine, Teague

Over the years, LED technology has improved in leaps and bounds. Today's LEDs are more than twice as efficient and far more reliable than those of just a couple of years ago, and they are much more consistent due to tighter bins and hot binning, as well as improved manufacturing methods. At the same time their cost has plummeted, and their presence is ubiquitous, with LEDs being found in phones, car interiors and exteriors, and countless other applications. While LED technology and its control systems have matured a lot, the way we use them in commercial aviation interiors has not. We are seemingly still very much stuck in the novelty era in spite of incredible advances in color rendering index and white LED performance. Perhaps now is the time to mature LED content and usage to match the technology?

When we think of lighting on aircraft, there are a few high-profile carriers that dominate that thought space. These carriers – Emirates, Virgin Group, JAL, and others – have made lighting a major part of their branding and passenger experience efforts. They also go to great lengths to demonstrate the lighting effects and capabilities in print, video and at tradeshows. Whenever airlines demonstrate lighting for their fleet, they do it in one of

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ABOVE AND BELOW: THE LIGHTING SYSTEMS IN DELTA'S NEW A319 AND A320 INTERIORS REALLY STEAL THE SHOW. THE INTERIOR IS ZEO'S ISIS (INNOVATIVE SPACE INTERIOR SYSTEM)

two ways: either with passengers as the focus; or without passengers and instead highlighting the interior. In most cases the images without people in them demonstrate colorful lighting scenes that show off the dynamic power of the system. Often, this is shown in spite of the sometimes negative impact on the cabin design.

We seem to accept this sort of imagery and consider it to be beautiful, bold, garish, or even headache-inducing. However, the majority of business jet advertisements display neutral and refined lighting scenes, whether with or without occupants. So why the difference in lighting approaches? Are saturated and/or bold lighting scenes more effective for commercial lower-cost carriers? Or are BBJ and private jet customers less likely to enjoy or respect the vibrant dynamism of today's LED-based commercial aircraft lighting systems? This question is more complex when considering some of the aforementioned high-profile carriers, with which first and business class tickets can cost tens of thousands of dollars. To shed some light on these questions, it may be useful to look back at the fluorescent era of cabin lighting.

IN THE DIM PAST

During the days of fluorescent lighting on airplanes, the primary focus, other than getting enough light into the space, was to get the lighting as consistent as possible. Technical constraints and limitations made this a very difficult task, and it came down to binning (sorting similar lights on a large scale). Since lights can vary in their appearance and other properties, the same part number can produce a good lighting effect, or make your first class meal look like a forensic study. Having to sort all lights in the cabin is both inefficient and costly, and as a result, many airplanes that still use fluorescent lighting are plagued with various hues of the same bulb type. We've all seen the greenish, pinkish lighting that alternates down the length of the cabin, signifying an aged design and old school technology. Because of all of this, consistency and uniformity of lighting hue and intensity became the top aesthetic priority of main cabin lighting.

When LED main cabin lighting was introduced, the same binning problems persisted. In some ways they were even worse, leaving some people confused about the advancement claims of LEDs on aircraft. LED technology had not matured enough to even demonstrate an improvement in efficacy, or in making an interior and its occupants look beautiful. This meant that not only was it still very inconsistent, as demonstrated by the dreaded 'Christmas tree effect', but it was more power hungry than fluorescents as well. The saving grace was its novelty. LEDs have the capability of creating nearly any color we could want, and they can change colors according to our pre-programmed will. This novelty drew a clear stratification between the forward-thinking carriers a nd the more 'old world' sort, in spite of its practical limitations and cost and aesthetic impacts. Over the y ears LED technology, as well as electronics in general, improved a great deal. Light quality improved enormously, enabling LED lighting to become useful for people and food as well as art and architecture. However, even as the technical improvements of LEDs continued to increase at an accelerating rate, our use of the technology remained stuck in the novelty scene development space. This is the crux of this whole argument. Optical innovations have provided the platform for incredible innovation and maturation of how we approach and use LED-based lighting. The technology has essentially outpaced our use of that technology – at least in the commercial airframe arena.

THINKING OUTSIDE THE TUBE

Now let's look at other forms of commercial travel, to get some perspective on other large vehicles that use similar lighting layouts. Train and bus interiors have a similar basic shape to aircraft. While the scale is quite different, especially for the large wide-body aircraft, the lighting systems perform similarly. They both generally use indirect lighting that runs the length of the interior, and for the most part is used for functional purposes rather than aesthetic. It is interesting how business jet lighting is more consistent with trains and buses in this regard than with commercial airframes. Clearly cost is a driver for mass transit, and there is a large gap between the two systems with respect to refinement, but they both seem to focus on the functionality of lighting rather than

the novelty. In the case of rail interiors, the lighting system is more advanced, but still refrains from using novelty and gimmickry to please travelers.

In the automotive world, interior lighting is showing more and more innovation through some interesting approaches. Many of these innovations are centered on accent and display effects such as instrument panel backlighting, lit logos and/or designs, and lit trims and features in the doors or footwells. The main interior lighting appears to stick close to the high color rendition and neutral tones that favor vision and human skin.

ABOVE: AUTOMOTIVE LIGHTING IS GENERATING EXCITING NEW IDEAS, AS THIS BMW CONCEPT SHOWS

RIGHT: VIP AND BUSINESS JETS ARE ALWAYS PORTRAYED AS NEUTRAL AND REFINED SPACES

BELOW: CREW AND CABIN LOOK GREAT IN THIS OFFICIAL VIRGIN AMERICA PHOTOGRAPH, BUT THAT COULD BE DUE TO A SUPPLEMENTAL LIGHTING SOURCE

In aircraft lighting, again, we are faced with the duality of lighting for the architecture, and lighting for the occupant. In the former case, we see strong colors and the promise of dynamic transitions and stunning play of lighting on the interior design. Almost without fail, airlines show cabins lit in this way as empty. If there are humans involved, almost invariably they are lit with a supplemental light source that is not part of the cabin lighting. Why? Because the deep colors that make a cabin picturesque and surreal make people look terrible.

In the cases where people are the primary focus of the image, the lighting is much more neutral and flattering. This is similar to the business jet approach. All of this leads to the big question: when we design lighting for commercial aircraft, are we designing for people, or for the architecture? Can we design for both? Can we demonstrate beautiful lighting without resorting to gimmicks and novelty? The answers may lie in the commercial lighting space.

BACK TO BUSINESS

Commercial lighting is a very wide topic. There are so many applications, circumstances and variables that it could be impossible to relate it directly to commercial aircraft interior lighting and to make it stick. Additionally, the subject matter is inherently a subjective one. This, of course, makes it especially precarious to discuss in absolutes. That being said, even if we go to Las Vegas, one of the best-known places in the world for lighting effects, we can find some interesting relationships between aircraft interiors and casino interiors.

The first link is that while there is prodigious use of LED colored lighting in casinos, the vast majority of the spaces occupied by people are lit with warm or neutral high-quality lighting. The saturated colors and dynamic transitions are reserved for accent lighting only. This ensures that people look as good as they can and their attention is on the game, food, or each other, for longer periods of time. It also reduces the fatigue and/or annoyance that can be experienced by being subjected to highly saturated dynamic lighting for long periods of time. That is not to say that all casinos follow this rule. In the nightclubs, the lighting is energetic and intense. In the theaters, the lighting is designed to focus occupants' attention on the stage, which could be flooded with highly colorful and dynamic lighting.

So, perhaps one possible way to mature the use of powerful and dynamic lighting systems on commercial aircraft is to maintain the balance of accent lighting and occupant-friendly lighting. We have passenger service unit lights that help keep food and other objects on our tray tables looking natural. We have lighting systems in the galleys and lavatories that provide great visibility and color rendition. Is it possible to do the same for all passengers, while simultaneously providing a rich and meaningful lighting experience? I think so. Some strides have been made in this area, but there is much more innovation and creative usage of lighting to be had. I look forward to lighting maturity catching up with technological maturity.

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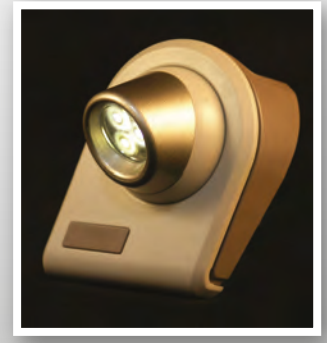

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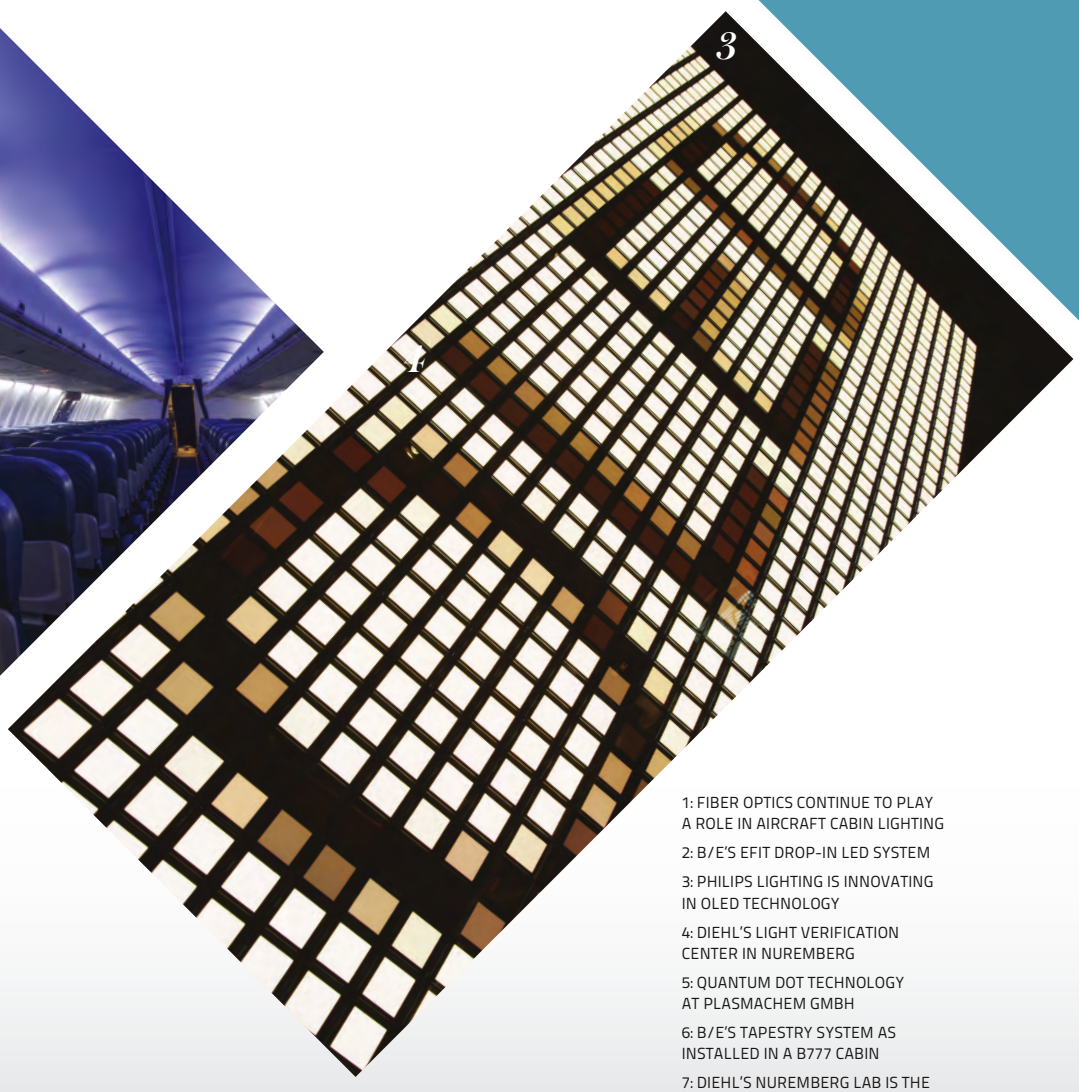
LED LIGHTING IS MULTITALENTED, BEING COMPACT, LIGHTWEIGHT AND ENERGY-EFFICIENT. HOWEVER, AS THE FIRST-GENERATION SYSTEMS APPROACH A DECADE OF SERVICE, WHAT DOES THE NEXT GENERATION OF CABIN LIGHTING HAVE IN STORE?



1: FIBER OPTICS CONTINUE TO PLAY A ROLE IN AIRCRAFT CABIN LIGHTING

2: B/E'S EFIT DROP-IN LED SYSTEM

3: PHILIPS LIGHTING IS INNOVATING IN OLED TECHNOLOGY

4: DIEHL'S LIGHT VERIFICATION CENTER IN NUREMBERG

5: QUANTUM DOT TECHNOLOGY AT PLASMACHEM GMBH

6: B/E'S TAPESTRY SYSTEM AS INSTALLED IN A B777 CABIN

7: DIEHL'S NUREMBERG LAB IS THE LARGEST IN EUROPE FOR TESTING AND DEVELOPING CABIN LIGHTING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OLAF SCHULTZ
Senior product and sales manager, Schott Aviation

ERIC JOHANNESSEN
Director of R&D, B/E Aerospace

DR FRANK SCHMID
Head of system engineering, Diehl Aerospace

DIRK DE VOS
Sales and marketing director, Europe, Astronics – Luminescent Systems

KEVIN MCDERMOTT
VP of business development, Patriot Taxiway Industries

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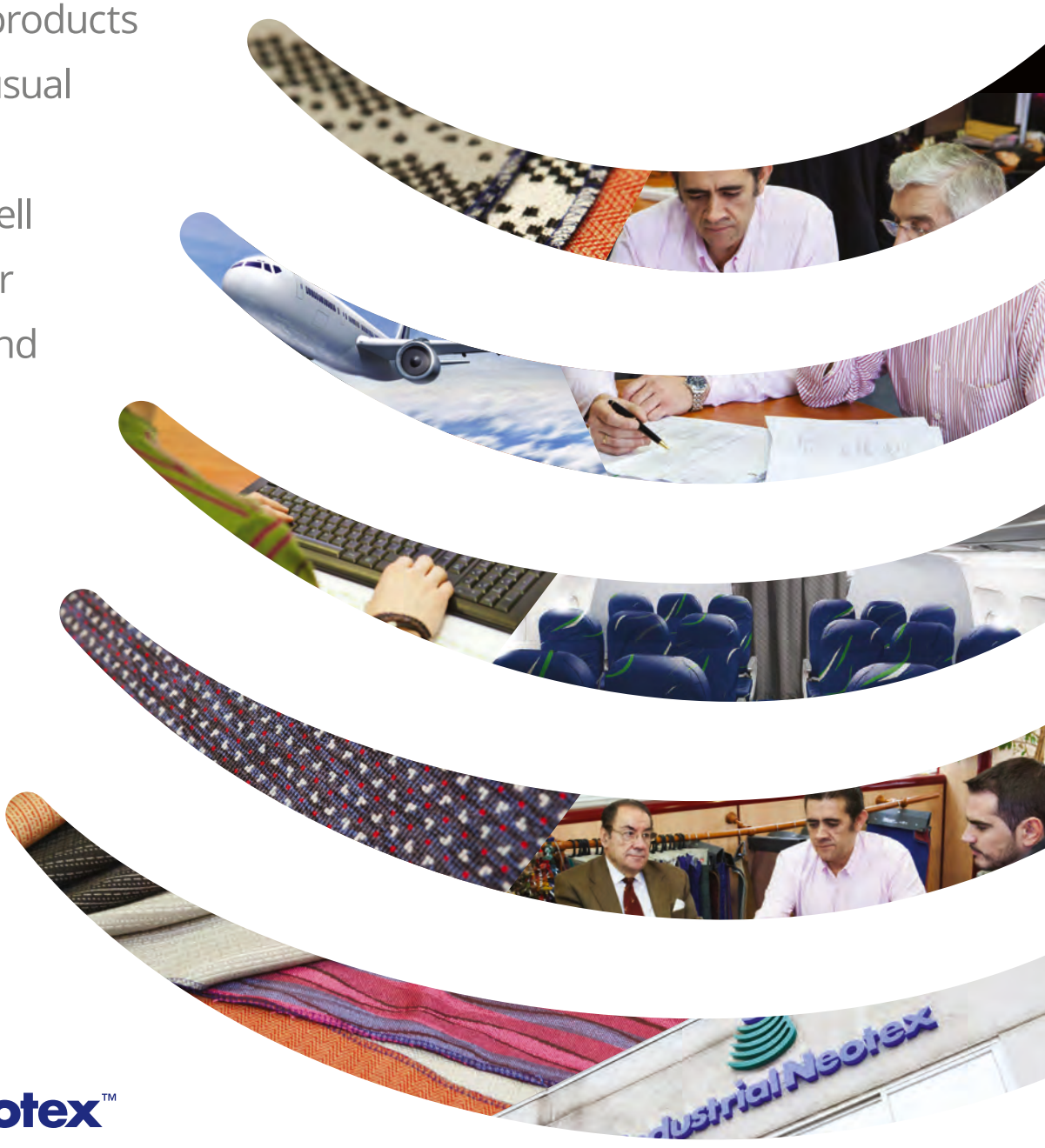

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Fiber optics

An optical technology that transports light without using electricity: in theory fiber optics sound ideal for aircraft cabin lighting – and indeed they are already in use as supplementary systems – but what do cabin lighting experts think of their potential?

VERDICT: Limited potential

ERIC JOHANNESSEN, B/E AEROSPACE

"B/E is investigating a continuously diffused glass fiber, which is ideally suited for accent lighting, as it provides an even glow. Furthermore, fiber optics can be cut to length, and their minimal size allows their application throughout the aircraft by replacing conventional lighting sources. Fiber optics will allow lighting to be integrated into fabrics and flooring, and on seatbacks, PSUs, panels and monuments. Maintaining interoperability with existing lighting products and protocols is a strong focus during development. Consequently, B/E is utilizing RGBW LEDs as a lighting source, to ensure that future fiber optic lighting applications will function in harmony with other B/E systems."

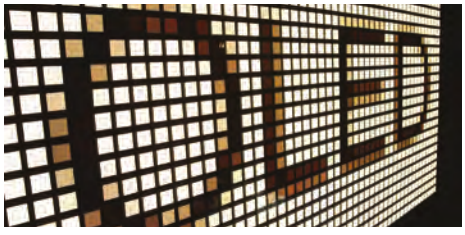
DR FRANK SCHMID, DIEHL AEROSPACE

"Optical fibers are already in use in combination with LEDs as a light source. They are highly suitable for unspecific 'linear' lighting, for example in window frames and in other special applications, such as starry skies, due to their brilliant coloring.

"The strength of optical fibers is also their weakness. The linear form of the light source roughly corresponds to the dispersion pattern of a pipe. This in turn means that its light output – in contrast to an LED with a lens, for example – cannot be bundled in a specific point or space. Because of this, its use in central cabin lighting is limited, especially as far as the homogeneous illumination of complex surfaces (curved ceiling panels, etc) is concerned. Customization options are therefore very limited."

OLED

Could the organic light-emitting diode (OLED) be LED's successor? The 'organic' part relates to an emissive electroluminescent layer, which is a film of organic compound that emits light in response to an electric current. OLED technology is in use in consumer technologies such as TVs, but could we see it in aircraft cabins soon?



VERDICT: Big potential if the technology progresses

ERIC JOHANNESSEN, B/E

"OLED offers flexibility and diffusion, which enables use as backlighting. The initial excitement regarding the potential of OLED for general lighting has become subdued due to efficacy and lifespan deficiencies."

KEVIN MCDERMOTT, PATRIOT TAXIWAY

"OLED is still very early in the technology readiness level. The products are sensitive to heat, cold, and cleaning compounds. There is a lot of 'wow factor' with OLED displays, but in the lighting arena there is a lot of development and design work left to bring the technology on line."

DR FRANK SCHMID, DIEHL

"It is generally expected that OLEDs will succeed the LEDs commonly used today. The main reason is they can be realized on an extensive scale (as flood lights), while hardly taking up any space. This technology is at an intermediate stage between prototypes and industrial availability: there still is some way to go to realize any specific application scenarios. OLEDs are still far too expensive and their useful life is too short. This disqualifies them at this stage for use in cabin lighting.

"However, because of further technical development, the lifespan of the light sources is increasing by leaps and bounds. OLEDs can now last for up to 40,000 hours, albeit only under specified standard conditions. For example, at the high temperatures inside an aircraft, they age disproportionately quickly. The threshold for use as cabin lighting (under real environmental conditions) is somewhere beyond 80,000 operating hours."

LIGHTENING THE LAG

Can cabin lighting prevent the flyers' worst enemy: jet lag? Blake Emery, Boeing's director of differentiation strategy, is of the opinion that the correlation between light and jet lag is rather complex.

"The science of lighting and jet lag is split into two parts. There's a psychological part and a physiological part that you can affect with lighting," he says. "As far as actually changing the human body clock goes, that doesn't happen. That's a function of millions of years of evolution.

"There are things you can do to help ease jet lag, but you're not really changing the body. There are some physiological changes that can be accomplished with the use of some bright light that goes to the back of your retina. One recent finding about that is that the light doesn't have to be too far away. There are glasses that you can put on now that can give your body a shot of bright light to create a sense of wakefulness."

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QUANTUM LEAP

Quantum dot technology is already evolving, with experts at Hiroshima University in Japan having developed a new hybrid variant. Professor Ken-ichi Saitow and graduate student Yunzi Xin have devised an Si quantum dot (QD)-based hybrid inorganic/organic LED that exhibits white-blue electroluminescence due to conductive polymer solutions and a colloidal Si QD solution deposited on the glass substrate. The team predicts this hybrid LED becoming a next-generation illumination device for producing flexible lighting and displays.

According to the team, the current and optical power densities of the LED are, respectively, 280 and 350 times greater than those reported previously for such a device at the same voltage (6V). In addition, the active area of the LED is 4mm², which is 40 times larger than that of a typical commercial LED; the thickness of the LED is 0.5 mm.

Saitow stated that, "QD LED has attracted significant attention as a next-generation LED," though he added that breakthroughs will be required before implementation.

Quantum dot

Quantum what? Quantum dot is an emerging lighting science that takes LED technology even beyond OLED. There is no question that quantum dot is a long way from being realized, but cabin lighting engineers are keenly monitoring its progress. In basic terms, nanocrystals made from semi-conductor materials – quantum dots – with a size ranging from 2 to 10nm are mounted on a film, backlit by blue LEDs. Passing light through the film of dots creates a light with excellent color saturation, tenability and precision.

DR FRANK SCHMID, DIEHL

"The advantage of quantum dots is that they provide extremely rich and brilliant colors; however, they have yet to generate the brightness levels required in the context of main cabin lighting. The color rendering index is also lacking, and still causes considerable distortions. But this is the very nature of things. While brilliant colors are desirable for a flat screen or display, they are only suitable for cabin lighting to a limited extent. The broad light spectrum is simply missing, with the consequence that, for example, a banana will not be seen as yellow, but instead will be perceived by the human eye in a shade of orange-grey. We do not consider quantum dot as a future technology for main cabin lighting."

VERDICT: A mixed opinion, but there is definite potential

ERIC JOHANNESSEN, B/E

"Quantum dot is the closest technology to natural light sources and, therefore, the most sophisticated. An exciting feature of quantum dot is the ability to tune different dot sizes to a specific color, which allows ideal color binning and a mix of colors from red to cyan, resulting in near perfect, real-world color rendering (CRI). Consequently, quantum dot boasts a true spectrum of color, allowing for a complete visible gamut. B/E is integrating this real color rendering within its next-generation lighting systems as it will eliminate the color matching issues that are found with even the tightest of binning practices."

Electroluminescence

The idea of a material – usually a semiconductor – emitting light in response to electricity is not new. Indeed, Chrysler was using electroluminescent technology in its automotive instrument panels as early as 1960. Could the technology have application in the aircraft cabin?

DR FRANK SCHMID, DIEHL

"The use of electroluminescent lighting is already known from the automotive industry. However, it is definitely still too short-lived for applications in the aviation industry. Moreover, its brightness potential is limited, speaking against its use as cabin lighting.

"In addition – and this will not be solved with further technological development – electrically conductive films that are applied on a large scale inside an aircraft will act like antennas.

"There is probably little chance that this application will meet the acceptance criteria for electromagnetic compatibility inside an aircraft cabin. With the possible exception of application in the context of accent lighting, we do not expect any breakthrough in the use of electroluminescent films for main cabin lighting."

DIRK DE VOS, ASTRONICS

"Electroluminescence continues to serve a couple of niche markets in the aviation industry where its unique features such as its uniformity over the entire lit area and its extremely thin profile add value. The extremely thin profile and its availability in any size, shape or form including double-twisted curves still render it an ideal light source for dormant emergency lighting systems on rotorcraft. However, its limited luminance and half-life prevents it from being considered for other lighting applications in the cabin."

VERDICT: Low potential

ERIC JOHANNESSEN, B/E

"Although allowing for perfectly homogeneous as well as panelized lighting, the limited unsaturated color offering, along with deficiencies in efficacy, CRI and audible noise, may confine the application of this technology to accent-type lighting only. FIPEL (field-induced polymer electroluminescence), a new technology superior to electroluminescence, provides the best efficacy and white usability, which may open the doors to panelized lighting applications when the technology is mature, hence allowing for a stable product."

Remote phosphor

Could this technology excite our experts? Remote phosphor separates a white LED into its blue base, with a phosphor coating on a separate glass or polycarbonate lens.

ERIC JOHANNESSEN, B/E

"Remote phosphor's promise of efficacy and color control created excitement. A typical wash light may require 20-50 LEDs diffused by a lens, with a possible loss of 30%, whereas remote phosphor is inherently diffused, eliminating the deficit. Therefore, its applicability is limited to white-only or tunable color temperature white-only systems. Also, the cost of the remote phosphor sheets, along with the orange/yellow appearance when unpowered, has slowed its adoption."

DR FRANK SCHMID, DIEHL

"In theory, this technology allows for more brightness than with LEDs. However, this method does not have any perceivable benefits for use in cabin lighting. On the contrary, system complexity is increased and the technology is limited to pure white light."

VERDICT: Low potential

LEC

One further lighting technology is being considered by a member of the expert panel: LEC. Diehl's Schmid explains...

DR FRANK SCHMID, DIEHL

"The industry is currently testing a new technology of light-emitting, electro-chemical cells – LECs in short – which are organic metal complexes. This technology is still in its infancy. The opportunities provided by LECs are every designer's dream, since their extremely flat structure – like the OLED – is able to act like a kind of screen in "wallpaper form". It allows for nearly any kind of display, from advertising to branding – in the smallest of spaces. However, as the challenges relating to securing material stability remain great, any realization of their application in cabin lighting seems remote for the time being.

"But the present challenges remain. Airlines and aircraft manufacturers have one goal in mind: they want and need to save costs and weight. The relevant approaches are seen less as a revolution of light technology, and more as the evolution of technical integration."

LIGHTS AND ACTION

Blake Emery, Boeing's director of differentiation strategy, suggests the term 'mood lighting' is a misnomer. "There is a difference. Mood lighting is lighting that tends to saturate the space with light. Our dynamic lighting in the Boeing Sky Interior intentionally does not do that. We don't want people's faces and clothing to be influenced by lighting;. The dynamic lighting creates scenes, designed to create a sense of spaciousness, and to enable the airline to have brand differentiation. If an airline selects a scene at meal time that makes the food look more appetizing, or puts the passenger in the 'mood to eat', then it is mood lighting to a degree, but that's not the point of the dynamic Sky Interior lighting."

LED

Let's not forget LED technology; its potential is by no means exhausted, and it still represents the foreseeable future of cabin lighting.

DR FRANK SCHMID, DIEHL

"Nearly all passenger aircraft with more than 100 seats are fitted with LED. The reasons are obvious: they provide a high degree of lighting quality – and now at very affordable prices.

"Even if LED technology were soon to be overtaken by other light generators (not conceivable at this stage), generation cycles in the area of cabin lighting last for about 10 years. As far as the development of new aircraft types is concerned, their cycles are considerably longer, ranging from 25 to 30 years. This fact alone shows the time it takes for a new technology, once it has been 'fully developed' for the user markets, to be accepted by the aviation market and adopted in consistent production processes."

OLAF SCHULZ, SCHOTT

"LEDs are a great light source, however, they have one big disadvantage: aging LEDs are afflicted by color changes. As LEDs age individually, they emit slightly different colors after just a short period of usage – as a whole, this can make a passenger cabin equipped with a large number of LEDs looked striped or mismatched at least. This is why Schott has developed a cabin lighting system which combines special optics with a new sensor-based LED technology."

DIRK DE VOS, ASTRONICS

"The technology is here to stay. A key factor is simplicity, fitness for purpose and the cost it takes to validate, test and certify new technology. Whereas new technologies such as OLED are appealing across a range of new applications such as smart signs and lightweight displays, the additional functionality they might offer may add unintended complications that will not justify their economic shortcomings for certain applications such as emergency lighting."

KEVIN MCDERMOTT, PATRIOT TAXIWAY

"There are three areas driving the development of LEDs: reduced glare effects; better diffusion techniques and materials to make better lighting; and warmer colors."

ERIC JOHANNESSEN, B/E

"Future advancements in LED lighting will be driven by the improvements of the LED itself, but moreover by its application. While the achievements in LED technology have enabled us to develop flexible lighting matching the lumen output and color consistency of our high-end rigid washlight strips, we are continuing to refine and develop systems with an emphasis on integration and performance for retrofit LED lighting upgrades.

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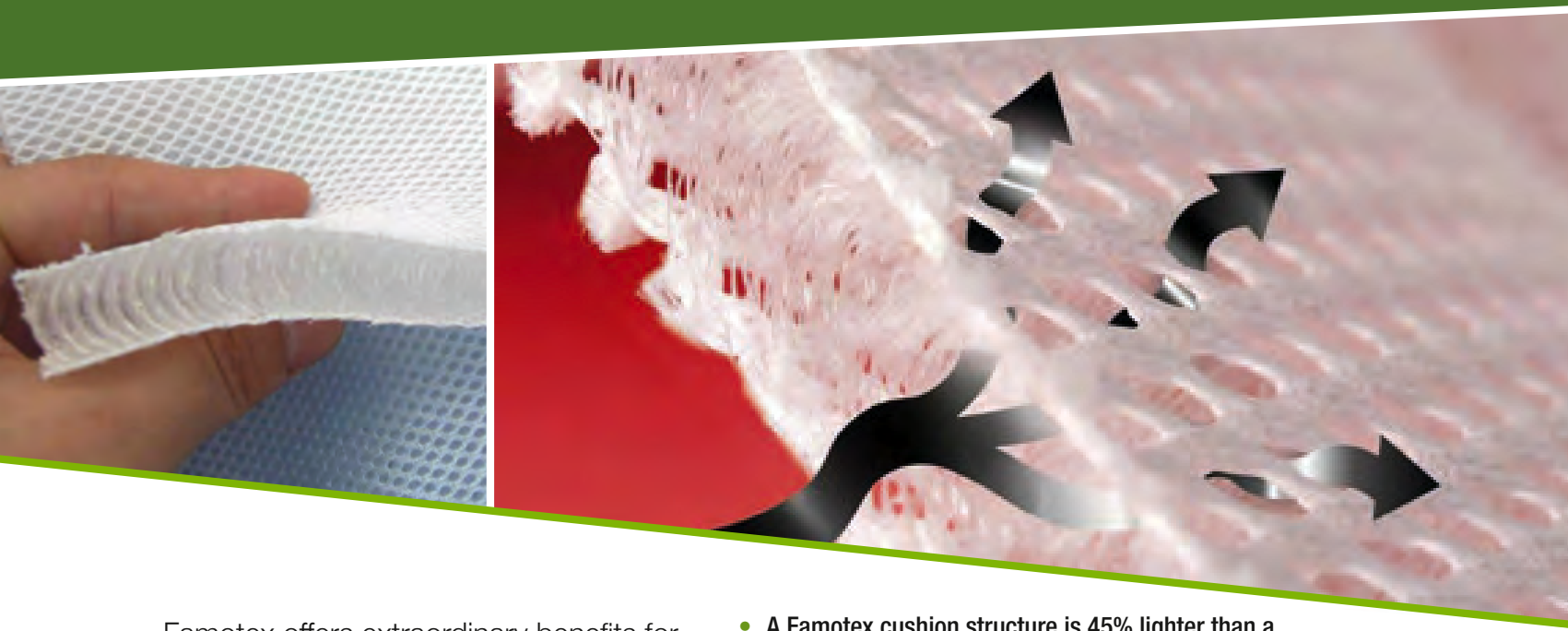

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HOLISTIC VIEW

Where does the future of aircraft cabin lighting lie? STG Aerospace believes in a more holistic view

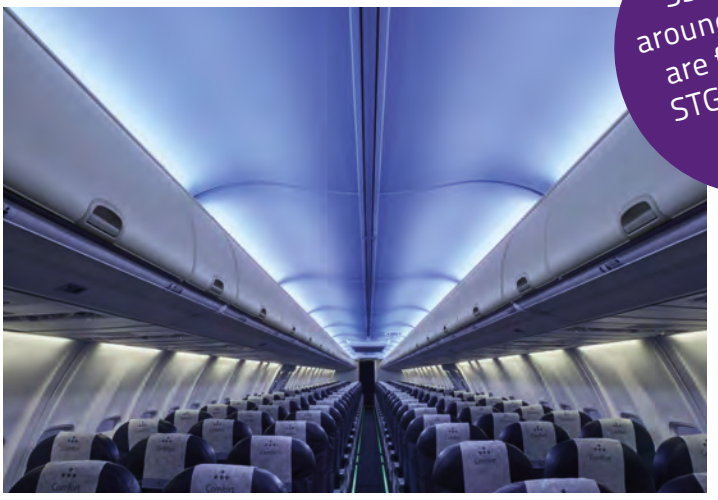
Aircraft cabin lighting has developed dramatically over the years, from fluorescent strip lighting to more colors and controls than airlines know what to do with. The reality is that systems are often overcomplicated, unnecessary and expensive. It was a good exploratory phase, but the future of aircraft cabin lighting is far more holistic.

One company that is looking at the whole cabin environment and thinking of the overall passenger experience is STG Aerospace. STG Aerospace invests substantially in R&D to ensure continuous improvement, pursuing new lighting technologies and applications.

STG Aerospace's CEO, Nigel Duncan says, "We take a holistic view of the cabin lighting environment. The key is to ensure that each aspect of cabin lighting is not only task-optimized, but also integrated within a holistic cabin view that is aesthetically pleasing in itself, as well as being supportive of the airline's brand identity. There are 350 airlines now flying with our products, on more than one-third of the global fleet. Our systems are designed to enhance passenger comfort and brand identity, and reduce the cost of aircraft operation, while still complying with the very latest safety standards and regulations."

The flexibility and programmability of some of the newer aircraft cabin LED lighting systems, such as STG Aerospace's liTeMood, enable the implementation of a lighting philosophy that addresses the physical and emotional well-being of passengers, while at the same time improving airline metrics. The resulting weight and energy savings, as well as an enhanced passenger experience, can make a meaningful improvement to an airline's competitiveness.

350 airlines around the world are flying with STG Aerospace products



TUI AIRLINES NETHERLANDS (FORMERLY ARKEFLY) CHOSE LITEMOOD LED LIGHTING FOR ITS B737-800 UPGRADES

Most recently, Miami Air selected liTeMood following evaluation of available LED systems, while for Thomson Airways, STG Aerospace was involved in the simultaneous upgrade of two aircraft platforms when the carrier sought to upgrade nine B737NGs as well as 14 B757s – a project that involved the replacement of four legacy fluorescent lighting systems to provide an improved and unified experience across the fleet.

liTeMood has been developed by focusing on customer needs in transforming the interiors of legacy aircraft – providing a quick and easy to install, cost-effective upgrade.

STG Aerospace's holistic approach is rooted in its long-standing record as a pioneer of innovative cabin lighting technologies. The company was the first to develop and certify a photoluminescent floorpath marking system for aviation. Since then, it has continued to develop its unique saf-Tglo product range.

Designed to survive the harsh operating environment of the cabin floor, the latest photoluminescent saf-Tglo systems are narrow, light and discreet, and easy to install.

This combination of form and function is also evident in STG Aerospace's saf-Tsign range of products, a leading brand of photoluminescent emergency and informational signage. With no power source required, saf-Tsign products are easy to install, failsafe, and have zero running costs. Highly visible in the dark, and offering long-duration illumination, their automatic activation means that no 'switch on' is necessary.

This summer, STG Aerospace has provided both its latest saf-Tglo SuperSeal UltraLite system and a liTeMood system on the all-business class B757 operated by DreamJet, trading as La Compagnie, on flights to New York from Paris and London. Installing this practical demonstration of the company's holistic approach to cabin lighting took place during an extremely short ground time; indeed, it was just two months from receiving the order to completed installation.

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SIMPLE PLEASURES

A new entrant to the interiors industry has developed some smart innovations in cabin lighting and wireless PED charging

Many seat manufacturers are predicting increased demand for wireless charging

With a focus on using groundbreaking technologies to deliver 'best in class' features, Cobalt Aerospace's growing product range looks set to transform the world of cabin equipment.

Established in 2013, Cobalt Aerospace is a dynamic new entrant into the aircraft cabin space. Drawing from deep engineering knowledge and expertise in regulatory compliance, Cobalt is well placed to provide the innovative products the airline industry craves.

Among Cobalt's latest products are Spectrum, the world's first 'drop-in' full RGBW cabin lighting system, and Unplugged, the first Qi-compliant wireless charging solution for use in cabin interiors.

The paradigm in cabin lighting today falls into two camps: full mood lighting or basic 'drop-in' systems. Spectrum creates a new niche, offering unique features and ROIs that are truly compelling.

Cobalt believes that drop-in lighting offers huge benefits to airlines. But in addition to providing class-leading reduced weight and power consumption, Cobalt also offers its Longevity age correction system and a choice from a full palette of millions of colors.

Dan Rust, Cobalt's director of innovation, states, "We believe that lighting needs to be focused on the minimum feature set that is really required. So when you say airline customers only need two colors, we agree... but they should have the choice of any two colors they want."

Spectrum addresses this need, allowing operators to choose colors to complement their branding. With the colors selected, lighting units are delivered that simply plug in, ready for service.

Once in service, Cobalt's Longevity age correction system solves an issue that some other LED systems suffer from: degradation in color and light output over time. Cobalt's built-in algorithms make constant adjustments to the LED drive levels to keep the light units looking good throughout their service life.

Aside from lighting, Cobalt technologies address many other aspects of the cabin. For example, one troublesome area that affects both the customer experience and airline maintenance is the provision of charging sockets for smartphones and tablet computers in the cabin. Conventional sockets suffer considerable wear, tear and abuse. Airlines suffer the expense of replacing sockets and passengers experience inconvenience when charging is not available as expected.

Cobalt has solved these issues by developing Unplugged, a range of Qi-compliant wireless charging modules that can be incorporated into seatbacks, armrests, bar tops and other surfaces.

Passengers charge their electronic devices by simply resting the device against the charging 'hot spot' on the surface. The charging modules are blended into surfaces so they are inherently robust and are not exposed to fluids or abuse.

The Unplugged modules have very small form factors, and because there is no need for socket apertures, exciting new possibilities are open to designers for them to create smooth, flowing surfaces that integrate wireless charging in the cabins of the future. And while we all transition to a socket-free world, Unplugged is offered standalone or integrated with conventional sockets where required.

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Aircraft interiors INTERNATIONAL

SIT TIGHT

The high-density cabin configurations available for the Airbus narrow-body family are attracting low-cost carriers. In response, Geven has created seat designs optimized for this market

In perfect step with the ongoing trend for increasing cabin density, Geven, the Italian seat supplier, is now supplying customers with seating for the new, increased passenger count cabins on the Airbus single-aisle family.

For example, for A320s, Geven is providing low-cost carriers such as VivaAerobus, Volaris, Vietjet and Spring Airlines with seats for the new 186-pax cabin configuration.

Geven's longest-standing partner, Wizz Air, has also ordered seats for its A321s, which have a maximized passenger count of 230. Wizz Air is the largest low-cost airline in Central and Eastern Europe, and Geven expects their relationship to last well into the future.

Over the past six years, more than 50 A320 shipsets of Geven seats were delivered to Wizz Air, for a total of about 4,000 pax places. As a sign of the trust given to Geven, the partnership was consolidated recently when Wizz Air placed a further 18 firm orders for its new A321s, plus options for another 75 Airbus narrow-body aircraft.

Wizz Air's new A321 aircraft, expected to be delivered by June 2017, will have the now very popular high-density configuration of up to 230 pax, and will be operated on the airline's most popular routes. The highly efficient cabin configuration will reduce the airline's unit costs significantly, allowing for a very attractive low fare offer and creating more opportunities for passengers to find seats on the flights they want.

Wizz Air's highly efficient A321 configuration dramatically reduces unit costs

GEVEN IS SUPPLYING THE SEATS FOR WIZZ AIR'S HIGH-DENSITY A321 FLEET

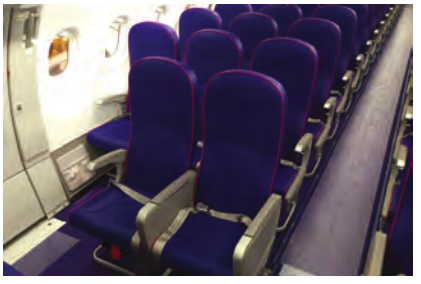
The partnership between Geven and Wizz Air began six years ago with the delivery of the first shipset of Geven Slim HD seats installed on aircraft MSN 3807, delivered to Airbus in January 2009. In the years that have followed, the two companies have developed a strong relationship.

After the Slim HD order, Wizz Air went on to order the new Piuma seat, trimmed in the airline's unmistakable pink and burgundy leather upholstery.

For the recent refresh of the Wizz Air brand, including a complete restyling of the livery, and with the low- cost carrier celebrating its 11th anniversary, Wizz Air has chosen a new version of this seat, which will debut on the A321 family.

The Piuma with the new pink and electric blue trim and finish, dedicated to the first A321 – MSN 6848 – was delivered to Airbus on September 18, 2015. The aircraft is expected to start its routes in Europe in November 2015.

All in all, many of Geven's customers will now be creating more seating slots for their passengers, which will also offer comfort and living space. Everyone will be sitting tight and sitting pretty, from Eastern Europe and Asia to Mexico!



ABOVE: GEVEN AND WIZZ AIR'S RELATIONSHIP BEGAN WITH THE SLIM HD, FOLLOWED BY THE PIUMA (ABOVE RIGHT)

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Mankind has always been fascinated with the idea of flying, and now that it can do so, people also expect an aircraft cabin interior to be both durable and comfortable. Boxmark's high-quality products, which meet all aviation safety standards, offer both these characteristics, while also giving aircraft interiors a little charm. The use of high-quality and special materials is a key factor in ensuring the well-being of today's sophisticated flyers.

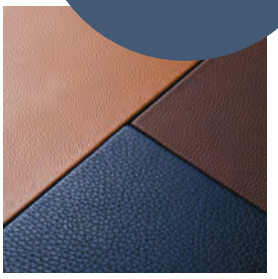
Boxmark's innovative leathers – XTREME and XLIGHT – offer a natural look and excellent technical properties.

The XTREME product offers perfect protection against soiling and wear and is also extremely easy to clean. The outstanding high-flex fastness properties, maintained even at freezing temperatures, offer many years of service before degrading. These properties, together with a variable area weight of 800-900g/m^2, give Boxmark an edge in the commercial aircraft, VIP and business jet sectors.

The cabin interiors of commercial aircraft have to be particularly hard-wearing while also being comfortable. Boxmark's XLIGHT product offers both characteristics, while also conforming to aviation standards and offering excellent hygienic properties. This leather is a compelling offer due to its low weight of 600g/m^2 (laminated). This low weight results in fuel savings and consequently lower pollutant emissions – meaning cost savings and a contribution to environmental sustainability.

Both XTREME and XLIGHT are suitable for seating furniture and wall panels, and for wrapping parts.

Boxmark is one of the few suppliers of flame-retardant leather to not only meet the aviation industry's high requirements concerning flame protection, smoke gas concentration and toxicity, but to also use eco-friendly flame inhibitors for this purpose.



FROM SEATING TO FLOORING, BOXMARK STRIVES TO ACHIEVE LOW WEIGHT, DURABILITY AND LUXURY

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

The company's newest innovation is leather flooring for VIP aircraft and business jets, co-developed with F/List. The expertise of both partners was combined to develop an innovation that can be used to create a unique environment within an aircraft cabin by adding elegance, sophistication and a luxurious appearance.

F/List leather flooring is available with a customized tiling concept in a wide range of colors and structures, and meets all applicable certification requirements, such as flammability and slip-resistance regulations. Additionally, a very stringent qualification program ensures that the flooring meets and exceeds the most demanding customer expectations.

The material will improve with age, and is resistent to wear and tear. F/List leather flooring develops a rich texture that looks beautifully lived in, and which greatly enriches the style and charisma of an aircraft cabin.

Boxmark is one of the world's leading manufacturers of high-quality upholstery leather, and the company specializes in the manufacture and processing of high-end upholstery leathers for the high-end indoor and outdoor sectors. Boxmark supplies customers including Audi, BMW, Bentley, Bugatti, Lamborghini, Poltrona Frau, Porsche and Mercedes-Benz.

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To request more details from Boxmark, visit **www.ukipme.com/info/aim**

REST INTENTIONS

Two economy class seating innovations have been introduced by Aviointeriors, both developed to help passengers get some sleep on board

The Y-bed surface can be offered as a way to increase ancillary revenue

Most of us have had a similar experience on a flight in economy: as you begin to feel sleepy your head feels heavy, and when you finally drift off, your neck muscles relax and your head falls down, snapping you awake again.

Sky-Nap could be a simple solution: a padded cushion that plugs into the top of the fixed seatback of the Aviointeriors Columbus One short-haul economy seat. A passenger need only fold down the tray table, then lean forward, and rest their forehead against the cushion. Sleeping is now possible.

Sky-Nap is also available as an inflatable pillow, either offered by the airline or purchased by passengers for use during a flight.

For the long-haul Columbus Two seat, the Y-bed features an extension area at the bottom cushion level that can be deployed. By simply extending the bottom surface of each seat on a triple or quadruple seat configuration, a seat row can be transformed into a couch that can accommodate one or two sleeping passengers.

Alternatively, the row can be partially converted by extending only one or two of the seats, which is ideal for accommodating a parent sitting with one or two sleeping children. The seat conversion is achieved through a pivoting mechanism that lifts the bottom cushion and pushes it forward to bridge the gap between the front of the seat cushion and the back of the seat in front; moreover, the seat bottom cushion opens backward like a butterfly to fill the gaps on the other side.

Of course, airlines will wish to generate some extra revenue from the Y-beds, so the seat conversion can only be carried out by cabin crew once they have unlocked the seat conversion mechanism. Once this has been unlocked, the conversion is simple and an entire seat row can be completed within a few seconds.

ABOVE: THE Y-BED TURNS A SEAT QUAD OR TRIPLE INTO A COMPANION TRAVEL SPACE
LEFT: SKY-NAP KEEPS THE HEAD IN PLACE TO HELP PASSENGERS SLEEP

The Y-bed has no visual or functional difference to a standard economy class seat. Also, no passenger will find their living space is affected by any additional element or device related to the Y-beds.

The Sky-Nap and the Y-bed innovations are an interesting addition to the many features already available for the Columbus family of economy class seating, each of which has its own personality, while they all benefit from the same lightweight design and standardized operation.

There are three members of the Columbus family. Columbus One is designed for short-haul operation and is now available with the Sky-Nap option.

Columbus Two is comfortable for medium-long flights, even at a 28in pitch, and can now also be integrated with the Y-bed option. Columbus Two can be further integrated with the ConverTable feature for premium economy use.

The Columbus Three cradle seat has been designed for long-haul flights and features an adjustable headrest and footrest, and can also be integrated with any type of IFE system.

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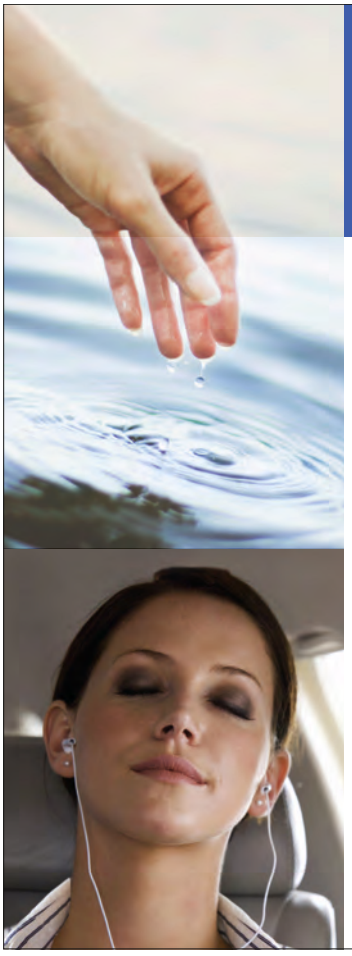


Imagine VVIP Humidification on your next flight

Feel at ease after long-haul flights - Cair™ empowers passenger wellbeing

Cair™ humidification is an evolutionary step in meeting passengers' continuous demand for improved health and wellbeing. Dry cabin air is an unwanted nuisance when flying.

For years, our Cair™ humidification has been considered as the de-facto standard in prestigious VVIP aircraft; bringing an essential wellbeing to important passengers that is recognized by the leading completion houses as they race to constantly improve these prestigious cabins.

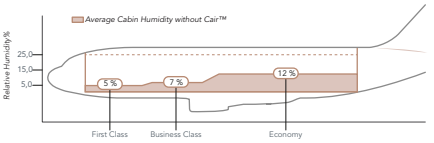
Lately, several airlines have upgraded their premium cabins with adapted VVIP aircraft innovations to significantly improve passenger comfort, flexibility and privacy.

Cair™ humidifies the extremely dry air in (Super) First / (Super) Business Class without causing any moisture problems in the aircraft.

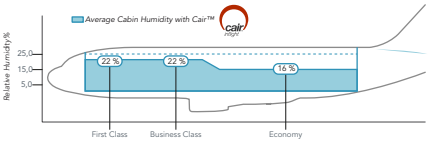
Cair™ humidification generates a pleasant relative humidity of around 20%, compared to 3-5%, thereby reducing dry air related problems (e.g. fatigue, jet-lag, red eyes, dry skin, dried out membranes lowering the protecting hurdles of the immune system).

Cair™ humidification catalyzes passengers to relax, sleep and feel more at ease!

Cair™ humidification is a Wellbeing Differentiator.



Humidity in an aircraft is determined by passenger density. The more spacious and private cabin layout – the more dry air.



Cair™ humidification keeps humidity at a comfortable level. Cair™ humidification empowers passenger wellbeing!

In partnership with B/E Aerospace

CTT Systems is the leading provider of products for humidity control in aircraft; including anti-condensation systems and humidifiers. Customers include both aircraft manufacturers and airlines. ***Also visit: www.ctt.se***

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FIRST-CLASS COOKING

Aerolux offers a range of galley inserts that can help airlines differentiate their cabin service from the competition

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 to be easy to clean, especially in an aircraft environment.

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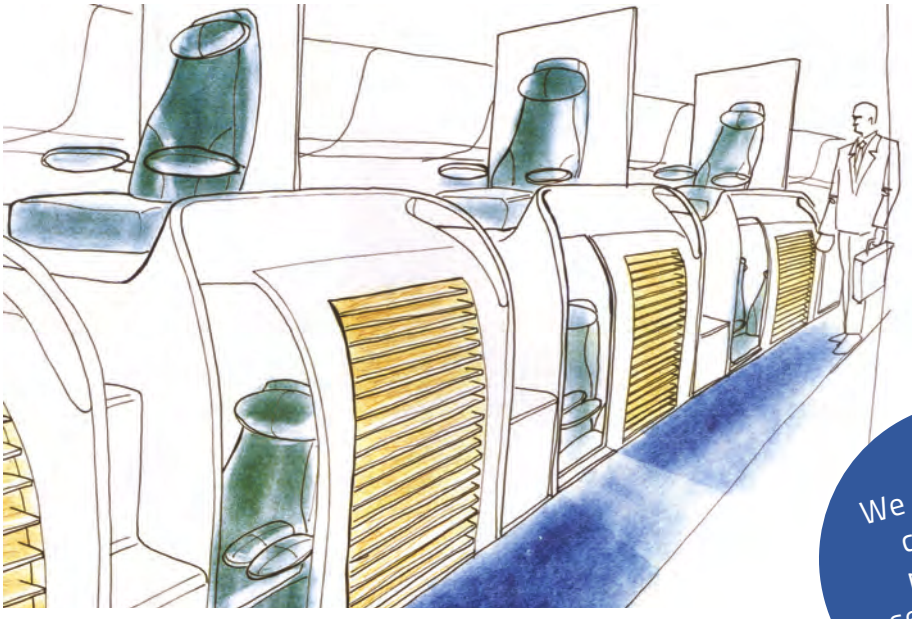

We explore the concept of mezzanine seating further on p32

Club Limo

The concept of adding a second level of seats to a cabin may be receiving a lot of attention today, but as with so many ideas, it is hardly new. In 1998, when a studio in London was working on ideas to impress British Airways with a groundbreaking business class concept that would combine high cabin density with high comfort, one of the concepts devised was the double-deck Club Limo.

The wide-body cabin concept saw the center overhead stowages removed and two rows of single compartments installed, either side of a raised level walkway on the centerline of the cabin, with steps between each compartment leading up to a central overhead seat. The arrangement was perhaps more like a stagecoach than a limo, but its passenger offer was as luxurious as a limousine – and remember this was 1998 when a recliner was as fancy as it got in the air. The concept developed by the Tangerine studio was not a mere work of fantasy, though; if BA decided to run with Club Limo, the structural pods could potentially be fixed to existing seat tracks with no additional fixings – although it would certainly have caused a stir with the certification bodies.

A nice aspect of the design is that it creates two distinct seating options, each of which would be favored by different types of travelers, whether in terms of age, culture or just personal privacy preferences. Some would prefer the greater privacy and easier aisle access of the lower pods, while some would like the greater feeling of space afforded by the upper-level seats.

"The concept was called Limo for good reason: you only had 100in to play with [the floor to ceiling height on a Boeing 747 or 777]. If you are stacking seats one on top of another, then it is quite a low ceiling height. Upper-level passengers would have to bend down quite acutely to get in," recalls Martin Darbyshire, founder of Tangerine. "But when they are in that space, while they might have a low-ish ceiling, they would have lots of room in front of them."

Looking at the passenger in the concept sketch as gauge of scale, there would certainly be an element of folding required to access the Club Limo seats – whether on the lower or upper tier – but its design also makes service a breeze.

Club Limo looks ambitious even today, but it wasn't devised as a fanciful design; Tangerine wanted to demonstrate to British Airways its commitment to exploring every possibility for an efficient and alluring business class cabin, and to establish whether using all the vertical space in the cabin really is viable. History tells us that BA didn't opt for Club Limo, the main reason being that the access requirements for the upper level meant that for its relative complexity, the LOPA didn't create a huge benefit in terms of cabin seat count.

That low ratio of reward to risk saw BA opt for another of Tangerine's concepts instead, which was equally radical but significantly easier to implement: the hugely space-efficient, yin-yang LOPA that would give Club World passengers 6ft-long fully flat beds, while giving the airline eight-abreast seating on the main deck of a B747. BA made the correct choice, particularly when you consider that essentially the same design is still flying and generating healthy revenues 16 years later. The boldness of the Club Limo concept should be applauded though, especially given the conservative nature of the designs flying at the time of its conception. We will never see Club Limo fly, but we have a feeling we could see a little of its double-deck DNA fly in the future.

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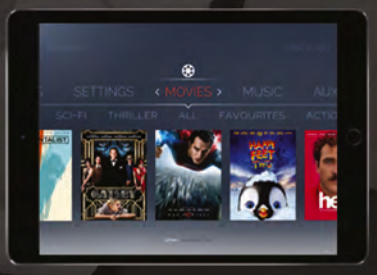

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