Aircraft *interiors* INTERNATIONAL

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SEATING SPECIAL

Our guide to every new seat launched over the past 12 months

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IN THE HEAT OF THE MOMENT

ust 12 months ago I was witnessing the launch of a refreshed United, with CEO Oscar Munoz on stage, his chest swelling with pride as he unveiled the Polaris experience, declaring it "the new spirit of United". The airline had a genuinely improved, innovative and impressive passenger offer on its hands and things were looking good... until April, when something unpredictable, unacceptable and fairly unimaginable happened. An overbooking situation escalated to a violent altercation on board, culminating in a bleeding and semi-conscious passenger being literally dragged off the aircraft. It seems bizarre even to write that sentence, and the footage of the incident is even more outlandish.

United has reached a settlement with the injured Dr Dao, but that is far from the end of the matter as Munoz – together with executives from American, Southwest and Alaska – were summoned to Capitol Hill to face the US House Transportation and Infrastructure Committee.

The incident seems to be the last straw for the committee, which slammed the attitudes of US carriers toward the flying public. Indeed, congressman Michael Capuano said that the US airline industry has "a problem" and that flying "should not be as bad or unpleasant as it is".

"Something is broken," added committee chairman Bill Shuster.

Perhaps profits and policies have been put ahead of passenger experience in some cases, and a positive to come out of the United incident is that common issues such as hidden charges, impenetrable terms and conditions, lost baggage and of course overbooking are being addressed – with the threat of congressional intervention to improve customer service as a motivator.

United wasn't the first airline to have a PR disaster and it certainly won't be the last – how many airline CEOs breathed a sigh of relief that they didn't have to take *that* phone call. When crew get it right, it adds more to the passenger experience than millions of dollars of fancy onboard product, but when human error strikes, the damage can be substantial.

Thus in this issue we explore ways to prevent and handle unfortunate events. Marisa Garcia spoke to neuroscientist Lisa Feldman Barrett (p40) to find out how staff can be trained to anticipate problems with passengers and deal with them appropriately. Barrett challenges every preconception about emotions, and explains why in the multicultural cabin environment a onesize-fits-all approach is not always effective.

And when it does go wrong – as it will occasionally – experts in crisis management explain how to respond appropriately and effectively in Stephanie Taylor's feature on p32. Not wishing to put the boot in, Mr Munoz, but if that first response had featured the word 'sorry' rather than 'belligerent', a lot of brand damage would have been prevented.

Personally I think the quality of US airline services has improved greatly in recent years, and with the extra attention being paid to frontline activity and passenger care following '#bumpgate', one man's worst possible passenger experience could strangely provide the catalyst for all US flyers to have a great experience.

Adam Gavine, editor



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24-HOUR PREMIUM PEOPLE

Airbus is showcasing its new interiors division with Day & Night, a luxury space with two distinct zones

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2. THE DAY ZONE COMPRISES A PREMIUM SEAT, A DINING AND WORKING TABLE, AND A LARGE PERSONAL IFE DISPLAY

3. THE NIGHT ZONE FEATURES A FULL-HEIGHT ENCLOSED SUITE WITH COMFORTABLE BED, INDIVIDUAL STORAGE AND PERSONAL SCREEN People don't tend to sit, eat and work in the same space that they sleep, but aside from elite flyers in Etihad's Residence, premium passengers have to do just that in the air. To create a more authentic residential-style premium experience on board, Airbus has created Day & Night, a customizable concept devised for the A380 and A350, which offers two distinct zones within each 3.4-3.9m² suite.

For TTL, working and relaxing, a 1.3-1.4m² open plan 'day' living zone features a luxurious swiveling lounge seat, a large dining and working table, and an IFE screen. The two windows in this zone, complete with a luxury surround, add light and really add to the daytime flying experience. During TTL, and if traveling with a partner or colleague, or simply talking with a neighbor, an adjustable partition allows these outboard zones to be open and shared.

When it's time to go to sleep, one simply leaves the lounge seat and retires to the bedroom, and this is where the quiet 'night' environment comes in: a noise-insulated, full-height, enclosed, inboard zone measuring 2.1-2.5m² and complete with a 0.8 x 2m bed, nightstand, carry-on stowage and an IFE screen. Essentially it is a small bedroom.

The concept is the work of Airbus Interiors Services (AIS), a rebranded version of Airbus's former ACJC corporate jet completions unit, which was set up in April with a focus on commercial aircraft cabin upgrades.

If the idea seems simple, that's because it is. And even the certification process for Day & Night would be simple, as the majority of the certification constraints would apply only to the seat and not the bed space.

The company is currently soliciting feedback on the design, and is also looking into expanding the Day & Night offering to include other wide-body aircraft such as the A330/ A340 family. 🚳





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HAPPY DAYS

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INTERNAL AFFAIRS

British Airways has patented an exciting idea for the ultimate in inflight personalization and wellness, but some passengers might find the concept difficult to swallow

Many airlines are pursuing the personalized passenger experience, but British Airways has gone a step further, filing a patent for system that would gather intimate details of passengers to improve inflight wellness and help combat jetlag. The concept sees sensors fitted throughout the passenger environment, gathering information on temperature, body temperature, lighting, humidity, body movement, sleep phase, eye movement and heart rate. However, to really get to know passengers' physical states, they are offered an 'ingestible sensor', a digital pill that when swallowed can detect internal temperature, stomach acidity and other internal properties, and wirelessly relay this information to the onboard computer.

The computer analyzes this wealth of data, and if any passengers are

showing discomfort, whether muscular, hunger, nerves, or being too hot or cold, their environment can be automatically adjusted to aid comfort, for example by adjusting the seat position, lighting or air-conditioning.

Passengers could also opt to let the system help eliminate jetlag. Download an app from the airline's website and enter personal health information as well as travel plans, and algorithms will plan a wellness program for the journey, optimizing sleep, nutrition, hydration and exercise patterns. With a wellness This concept could help with analyzing passenger behavior. See p40

schedule calculated, the various sensors can detect if a passenger is awake or asleep at the appropriate times, and if they are not in sync with the program, the system can automatically make adjustments to the seat, climate or lighting accordingly, and send signals to crew devices to deliver food or drink when a passenger is deemed hungry or thirsty, or a blanket if cold - or to leave the passenger undisturbed in their sleep phase. The system can also send signals to the passenger's device or IFE screen to prompt them to take actions such as sleep, exercise or stretch.

VIRGIN FIGHTS JETLAG

A solution that is less high-tech, but is available today, is Virgin Atlantic's Jet Lag Fighter app. Passengers can pay £1.19 (US\$1.54) for the app and then input data such as age, gender, health and flight details. The app will then calculate a personalized program for their flight.

Developed with creative agency, Mental Workout, and sleep expert, Dr Chris Idzikowski, the app

suggests when the passenger should be sleeping or exercising, and the best and worst times for being exposed to light. Combined, these elements should help the body best adjust to a new time zone.



MIT MAKES IT REAL

MIT has invented technology that could make BA's plans real, namely an ingestible electronic device that enables vital signs to be monitored from within the gastrointestinal tract. The sensor is about the size of a multivitamin pill and consists of a tiny microphone packaged in a silicone capsule, along with electronics that process the distinctive sound waves produced by the beating of the heart and the inhalation and exhalation of the lungs, and then wirelessly send this acoustic data by radio signals to an external receiver, with a range of about 3m. In simple terms, it is a tiny stethoscope. In tests with pigs, the researchers found that the device could accurately pick up heart rate and

respiratory rate, even when conditions such as the amount of food being digested were varied.



Got something to say? Why not submit a blog for aircraftinteriorsinternational.com?

MAGIC MOLECULES

A team of chemists and biologists at Nagoya University's Institute of Transformative Bio-Molecules (ITbM) are developing a cure for jetlag following their discovery of molecules that change the circadian rhythm. Most living organisms have a biological clock with an approximately 24-hour circadian rhythm, which regulates body functions such as sleep/wake cycles, hormone secretion and metabolism. Disruption of this rhythm by environmental factors such as jetlag can lead to sleep disorders. The team is developing synthetic chemistry methods that can shorten the circadian cycle to help the body clock adjust to the disruptive effects of jetlag, with the next step being tests on animals. 📀



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STRONG, SLENDER, SUPER LIGHT AND SHAPELY: THE CHAIR-LIKE MAGNESIUM ALLOY SEAT LEGS ARE POSITIONED RELATIVE TO THE PASSENGER RATHER THAN THE SEAT TRACK

<image>

JOINT ADVENTURE

Meet Poise, a seat concept developed to demonstrate the benefits of an effective supply-chain collaboration

Visit our website for a full gallery of the Poise seat

With the aircraft seating sector estimated to be worth US\$21.7bn by 2025 (according to a study by Counterpoint Market Research), it is unsurprising that suppliers and designers are keen to increase their participation in this sector. Taking a slightly different strategy to the norm, a team has collaborated to create a seat concept intended to demonstrate not just their individual capabilities, but also the benefits of close collaboration and a ready-made supply chain.

For the concept – named Poise – the Tangerine design consultancy has taken an unconventional approach to the economy class seat structure. By moving the spreaders from their usual position beneath the cushion down to the floor, the seat legs can be positioned relative to the passenger, rather than relative to the seat track. This structure

FLASH IDEAS

Dan Flashman, design lead at Tangerine, explained the concept: "Poise rethinks the structure of the economy seat to enhance the passenger experience, creating extra legroom for everyone, irrespective of where their seat is positioned relative to the seat track. Creating the seat design around this small innovation will have a considerable impact on the level of comfort enjoyed by the passenger."

has allowed the designers to integrate the seat frame and spreader into a single part, which creates additional passenger space, enhanced by a slightly elevated foot position that helps prevent the edge of the seat cutting into the legs of shorter passengers.

> The structure makes use of Elektron 43 magnesium alloy developed by partner Magnesium Elektron, which now has a clear certification route following revision C to SAE standard AS8049, which removes

the magnesium ban in seating. The structure has been formed into a chairlike aesthetic, further enhanced by measures such as positioning the table legs – again high-grade magnesium – inside the seat hoop to give the seatback a more integrated look.

Innovative fabrics from the world of residential design – created by seat cover manufacturer Bradfor – have been applied to create a sumptuous feel. As another example of partner collaboration, Bradfor worked closely with Tangerine to develop a 'sock effect' that enables the seat cover to be pulled down over the extended 'ears' of the headrest wings and over the seatback for a seamless appearance.

Perhaps the most impressive aspect of the concept is that the partners progressed the design through the conception, design and development stages into a showcase prototype in just eight weeks.

Visit the Videos section of aircraftinteriorsinternational.com to see Poise in action



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STAR CAST

A study has found that combining high-tech design and cutting-edge 3D printing with good old-fashioned metal casting could dramatically reduce seat weight

THE SEAT STRUCTURE MAY LOOK FRAGILE, BUT ANDREAS BASTIAN HAS CALCULATED THAT THE LATTICE STRUCTURE OFFERS THE SAME STRENGTH AS CONVENTIONAL ALUMINUM CASTINGS

By combining metal casting with additive manufacturing (AM), a software company believes it has come up with the next big thing in the quest for reducing seat weight. Researchers at Pier 9, Autodesk's technology center in San Francisco, California, took an existing seat frame design and ran it through algorithms in its design software with the aim of reducing weight while maintaining strength.

The optimum solution was deemed to be the creation of a sophisticated lattice structure and the application of a surface optimization process. AM in metal would be excellent for fabricating a structure with such complex geometries, but for the relatively high volumes required in aircraft seat manufacturing, the team decided the size of the parts and the costs involved would not stack up.

Autodesk research scientist Andreas Bastian decided that the solution would be to combine the best aspects

of AM with the well-proven casting process. AM is better than metal-forming for creating the complex lattice geometry, while casting opens up many more options of available metals and composites, as well as allowing much larger pieces to be manufactured in one piece and offering better economies of scale.

Pier 9 collaborated with Aristo Cast, a foundry in Michigan, and they identified an opportunity to further reduce weight by casting the frame in magnesium instead of aluminum. According to Aristo Cast, casting is more complicated with magnesium than aluminum, but it does bring a 35% weight benefit. Thus magnesium was chosen, and the simulations for the part were re-run to check the design would still work with the structural properties of the new metal.

Aristo Cast then 3D printed positive molds of the seat frame patterns in plastic resin, chosen because it offers a cheaper, faster and more flexible process than metal. The molds were then coated with ceramic to create a negative mold, and once the ceramic shell hardened, the plastic was heated so it vaporized away. There was just one thing left to do: use the molds to cast the parts. Only small quantities have been produced as that is all that is needed for the project, but the parties believe they have developed a viable and cost-effective way of producing seat frames, which could be scaled up to manufacture 160 seats every two days. 🔊

SLIM FIGURES

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WHETHER DIRECTLY OR INDIRECTLY, ELON MUSK'S AMBITIOUS VENTURES HAVE THE POTENTIAL TO TOUCH EVERYONE'S LIVES. PHOTO BY DAN TAYLOR

THINK BIG

Could Elon Musk's Neuralink venture merge biological intelligence with digital intelligence in the future passenger experience?

Imagine if passengers could send their thoughts, requests and anxieties directly to the aircraft or the crew, and even control their seat, IFE system and lighting – all by the power of the mind. Noisy flare-ups could be prevented, sensitive requests made silently, less able-bodied passengers could be more independent – there would be myriad benefits.

It sounds like a sci-fi story, but it could become a reality thanks to everyone's favorite billionaire genius, Elon Musk, and his latest venture, Neuralink. This San Francisco-based company is developing ultra-highbandwidth brain-machine interfaces, which loosely translates as a network of electrodes linked to the brain that could allow us to connect with the internet at a biological level via an implanted or external device – and for the device to control or monitor the brain's activity.

The initial intention for the technology is to improve the quality of life for stroke victims and to help with disorders such as ADHD. However, a longer-term vision for the technology is to enable the mind to control smart systems in the home, enabling truly connected living as well as exciting entertainment and gaming applications. For the aircraft cabin, as well as the control applications mentioned above, this biotech could enable crew to

MARKET INTELLIGENCE

The TechVision division of Frost & Sullivan monitors emerging technologies in its research work for major companies. What is its market perspective of Neuralink?

Anand Subramanian, vice president of TechVision, says, "Brain-computer interface is gaining prominence as researchers across various departments from Brown University, Case Western Reserve University, Stanford University and the US Department of Veterans Affairs are engaged in a collaborative R&D effort on remedies for brain and neurologic diseases, and initiated the BrainGate consortium.

"Neuromarketing is a new tool in market research – it extracts emotional and cognitive information of persons using technologies such as brain imaging, biosensors and eye-tracking. This could facilitate new business opportunities using electric signals from the brain."



respond to medical issues, help and reassure stressed flyers, or even just serve thirsty or hungry guests.

It sounds amazing, if potentially intrusive. But could it become a reality? Christopher Markou from the Faculty of Law at Cambridge University offered his thoughts: "There are a number of technological hurdles between Neuralink and its goal. There is reason to think they can surmount these; and reason to think they won't.

"While Neuralink may ostensibly be lumped in with other AI/big data companies in its branding and general desire to bring humanity kicking and screaming into a brave new world of their making, what it's really doing isn't altogether new. Instead, it's how it's going about it that makes Neuralink special – and a potentially major player in the next chapter of the human story."

As extraordinary as the idea sounds, so are its issues, according to Markou: "Neuralink is not like putting an implant in your head to manage epilepsy. This would be elective surgery on (presumably) healthy people. Right there, we're in a different ballpark, legally and ethically.

"What it really comes down to is this: across a number of fields at the intersection of law, philosophy, technology and society we are going to need answers to questions no one has yet thought of asking. We are facing incredibly complex and overwhelming problems that we may well not like the answers to.

"And so Neuralink is probably a bad idea, but to the first person who fell into a firepit, so was fire. On a long enough timeline, even the worst ideas need to be reckoned with early on," Markou concludes.

Neuralink's work is certainly interesting. But will it fly? What do you think? \circledast

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THE BRIEF

As lifespans increase, so too does the number of senior travelers taking to the skies as they enjoy their retirement in good health. However, age does bring a few functional limitations to the body, so it would be nice to see an economy cabin that goes beyond today's 'one size fits all' approach to better support senior passengers.

THE SOLUTION

To address the discomfort and risk of injury of senior travelers in economy class, Sii Deutschland has designed a concept for an accessible seating area for twin-aisle aircraft. This modular design is based on three main observations of senior flyers' needs.

Firstly, Sii found that seat pitches between 28in and 34in lead to an unbalanced posture as people try to move between seat rows. With reduced muscle strength and flexibility in the joints, senior passengers have to hold the backrest of the seat in front in order to maintain balance. The proposed solution is foldable seats. If provided with slim backrests, foldable armrests and a new leg design, such seats can meet the needs of older passengers at a 33in pitch.

Secondly, analysis of the movement involved in sitting down and standing up shows that the natural flow is hindered if the seat row in front is pitched between 28in and 32in, as older passengers have to lean forward, with their legs bent, in order to maintain balance. The solution is a synchronized movement of the armrests and seat pan upward and downward, allowing the occupant to fully control the movement with a light push of the armrest or seat pan.

Thirdly, Sii determined that seat width must be at least 20in in order to be able to vary the sitting position to prevent stiffness on long flights. Thus the seat width is 20in – which, with individual armrests for each seat, means that the concept works best as a double or triple seat, rather than quadruple.





227mm



VERDICT

Initial thoughts are that any measure that improves the passenger experience is worthwhile, especially if it is one that benefits a potentially vulnerable passenger demographic. And Sii Deutschland's concept certainly does benefit older travelers, in terms of accessibility, stability and comfort.

Even better, the use of folding seats means that the potential trip hazard of protruding legs is reduced, while the easier movement of passengers in these seat rows can help keep the aisle clear in this zone during boarding.

Now for the inevitable 'however'. While the concept is space-efficient, the zone does require a greater seat pitch, and that space needs to be paid for. But Sii Deutschland is confident that if airlines offered such a concept with the key features sought by senior passengers, these often affluent flyers would be willing to pay a premium to enjoy the comfort and safety of this zone.

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WHILE CERTIFICATION IS IMPORTANT FOR AVIATION SAFETY, ARE THE HIGH COSTS INVOLVED STIFLING INNOVATION AND EXCLUDING INDUSTRY NEWCOMERS? SOME BIG PLAYERS AND BOLD NEW NAMES IN INTERIORS SHARE THEIR THOUGHTS ON CERTIFICATION COSTS AND HOW TO MANAGE THEM

Words by Marisa Garcia. Illustration by Danny Capozzi

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lanning for testing starts during the early phases of the design process, according to Thierry Rouge-Carrassat, chief technical officer at Zodiac Aerospace. "We have to think of certification from the beginning of the program, not just the testing phase. It's the best way to avoid bad surprises at the end of the development stage," he says.

Under pressure from airlines to find new and revolutionary passenger experiences, especially for premium seating, manufacturers such as Zodiac Aerospace have to find ways to ensure that design features never previously tested will be certified.

"We are introducing a lot of complexity as business class seats become more innovative. We have to challenge our designs more and more," he says. "The discussion from the beginning of the program is always a matter of level of risk. Airlines rely on us to look at innovation that they can be confident will go through certification. There is a dialog throughout the process."

Raki Islam, vice president of compliance and certification at Zodiac Aerospace, technical fellow for seat and monument certification, and chairman of the SAE Aircraft Seat Committee since 2010, explains that innovation relies, in part, on the work done by the SAE working group to reconcile regulations to industry needs.

"From an SAE perspective, if we see a new trend or novel feature becoming a growing customer demand, we have a discussion among the seat suppliers and discuss within the industry how best to test and evaluate that feature. We take the topic up with SAE and then take the discussion to the FAA for advice on how we should work it through. They will ultimately recommend a standard that is adopted.

"If you are talking about something unique and novel, like mini-suites or high-density business class seats, that's an issue directly associated with aircraft evacuation. The

PANASONIC AIMS FOR EASY UPGRADES

"It's not a matter of costs, but timeline," says Jon Norris, director of corporate sales and marketing at Panasonic, regarding certification. "If I just look at the IFE connectivity industry, what is driving the pace of change and making the certification timeline too long, is that consumer technology is changing at an amazing rate on an annual basis," he continues.

"Every few months a new update comes out. From a passenger experience point of view, passengers compare the seatback screen with their personal devices and the challenge for the industry is keeping up with that. We have a significant amount of activity going on in R&D. We are looking at longevity and relevance to maximize the value of our systems, so that they can be easily upgraded."

"Airlines rely on us to look at innovation that they can be confident will go through certification"

HALF OF LHT'S WORK IS CERTIFICATION

"On a normal program, you have a 50/50 split between design work and certification work," says Lukas Bucher, head of connectivity and aircraft modification at airline MRO & VIP cabin completion specialist Lufthansa Technik. "On new radio certification projects, it's more than 50% certification and less than 50% design work. The same would apply for new materials and for new seat and cabin arrangements." CORRECTOR CORCUTOR CO

a first class seat. Of course, this does not include the costs of the equipment destroyed during the testing process. Dr Mark Hiller, CEO of Recaro, says there is a healthy

"When the design is completely new and unique, it takes a considerable amount of time"



FAA established one set of requirements and then EASA drafted a different set of requirements that were more stringent. Now, they are trying to harmonize these different standards. It becomes challenging, in terms of research and development and getting the job done, while taking the risk out of it. When the design is something completely new and unique, it takes a considerable amount of time."

Rouge-Carrassat acknowledges that established manufacturers have an advantage in the market due to their decades of practice working through various certification challenges, in-house testing facilities, and established reputations with regulators. "Big players, like B/E Aerospace and ourselves, all have our own testing facilities and we don't see any limitations from the certification testing requirements. For newcomers, it might be a limitation," he says.

THE HIGH COST OF ENTRY

Anyone entering the aircraft seating market must cover the costs of performing tests at independent labs. Something simple, like vertical burn tests of fabric to prove flammability compliance, which have to be done with each new material lot, may cost between US\$50 and US\$100. But new product testing is pricier.

Raki Islam says that one set of more complex heat-release tests, required to certify composites, can cost US\$500-US\$700. Spread out over multiple tests to approve a seating program, it can add up to US\$5,000-US\$8,000. Impact testing of seats can start at US\$4,000 and run to US\$8,000, depending on the complexity of the design elements. The upper limit for

testing costs would be around US\$10,000, to impact test

lab infrastructure building up in the industry, which might support other suppliers entering the market. For all manufacturers, established and new, the destructive nature of tests is the highest contributor to costs.

Destroying a business class seat, for example, may cost Recaro in the region of €70,000 (US\$76,000). He says Recaro invests more than 10% of its revenues in the R&D process, which covers innovation and

certification. Certification may take 30% of the R&D budget. But it's not just about the cost of the seat itself; there is also a risk of programs going off-schedule if testing proves unsuccessful.

BOEING STREAMLINES CERTIFICATION

"Boeing continues to work closely with stakeholders to streamline and effectively manage certification requirements for aircraft interiors," says Boeing spokesperson Nathan Huling. "A streamlined process and stable certification requirements will allow regulators ensure passenger and crew safety."



SIMULATION SPEND SAVES MONEY

To manage these risks, Recaro has set up an internal process of validating new designs through simulation. "Destructive testing is not the only reason, but it is one reason why we are investing in simulation," explains Hiller. "It can also give you input to the engineering work at the beginning of the program, and show the feasibility of a design. We are also doing simulations to check the quality of our assumptions."

While regulators do not accept simulations as part of the final approvals process, conducting simulated testing up-front gives Recaro greater confidence that they will succeed when destructive testing is conducted. Repeated simulations as part of the standard R&D process has helped Recaro's engineering team refine the design process and develop confidence in their design assumptions. Hiller says the company finds that its simulations have a high degree of accuracy in predicting

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....EASA

"The industry wants innovation, but it also wants something that can be delivered on time and used today"

THE FAA VIEW

We spoke to FAA spokesperson Alison Duquette about the costs of certification. Her response was as follows: "The FAA does the vast majority of the research on occupant safety issues. Research on new products for passenger comfort and convenience is conducted by the industry.

"A decade ago, the FAA worked with industry to streamline seat certification to reduce costs and expedite the certification of airplane seats. We learned that industry should communicate potential issues early in the certification program to the FAA. Early coordination supports timely certification of new configurations and features and helps to avoid last-minute delivery problems.

"We encourage applicants to contact the FAA before beginning a project, or very early in the project if they plan to install a novel or unusual cabin feature, so that we can assess the issue, provide guidance, and develop our certification criteria if necessary." what will happen in the final model. The company maintains a simulation versus physical testing history, which helps inform future design choices.

LABS BRING RESULTS As a new seat supplier, albeit with established history working in the aircraft cabin, LIFT by EnCore has had to meet these same expectations, while being swift and competitive enough to satisfy Boeing as a line-fit supplier. Aram Krikorian, vice president and general manager at LIFT by EnCore, says there have been some increases in the costs of certification over the past 10 years that might make the barrier to entry for newcomers a bit higher. The company has addressed these rising costs by bringing testing in-house.

"Costs have gone up, but this is because there is a natural evolution of certification and of seat design," he says. "At the end of the day, certification is about providing passenger safety on the aircraft. With that comes additional criteria that have to be met to create a certified product. That's why we prioritize certification at LIFT. We have invested in a world-class lab with the latest equipment and capabilities, which we are using to the fullest extent, especially with dynamic testing. Establishing our own testing facility was a large investment up-front, but it is a critical part of ensuring that we meet our commitments and obligations to our customers. LIFT designs with certification in mind. With an understanding of the path through certification, we minimize the impact and mitigate risk."

The company considered the costs of certification as part of its original business plan, including hiring personnel qualified to oversee early testing and run the new 16g dynamic test lab.

The company's collaboration with Boeing on the development of new seats for its B737 and B787 aircraft has made the R&D process and certification capabilities critical. "The industry wants innovation, but it also wants something that can be delivered on time and used today," says Krikorian.

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UNITED'S #BUMPGATE AFFAIR HAS HAD EXTRAORDINARY COVERAGE AND CONSEQUENCES. NO AIRLINE IS SAFE FROM HUMAN ERROR, SO HOW SHOULD THEY PREPARE FOR THE UNPREDICTABLE?

Words by Stephanie Taylor. Illustration by Studio Murugiah

enjamin Franklin said, "Glass, china and reputation are easily cracked, and never mended well." This is no more evident than with airlines, which are plagued by unique circumstances. Yet the question remains, if knocks to a carrier's reputation are unavoidable, how are they best dealt with?

Even before anything has gone wrong, airlines are at a disadvantage, because they're part of an industry that people love to hate. "Imagine walking into a crowded place and asking people if they've had any sort of unpleasant experience with a flight," says Nick Kalm, founder and CEO of public relations specialist Reputation Partners. "All hands would go up and stay up."

Jez Frampton, global CEO of Interbrand, thinks this is even more pertinent today because of the way people's expectations of brands have changed over the past 15 years. "We expect to be treated like an individual – to have our experiences tailored to us," he says.



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The airline industry is one of the most competitive around, so it's no wonder they're always trying to one-up each other. Shashank Nigam, CEO of SimpliFlying, sees no problem with airlines 'newsjacking', as long as it's on-brand. "If you're known for being reactive and cheeky, it's okay," he says. "But you wouldn't expect someone like Singapore Airlines to do it."

A recent example includes Norwegian, which put out newspaper ads when Brad Pitt and Angelina Jolie split up, stating 'Brad is single' and then advertising low one-way fares to Los Angeles.

What frustrates many observers is how little airlines seem to learn from the mistakes of others. As a positive exception to that rule, Delta has empowered its employees to grant passengers up to US\$10,000 to give up their seat on an overbooked flight. It seems expensive, but how much did this recent issue cost United? Furthermore, the negative media attention was huge.

This is difficult to achieve during air travel, which is experienced communally, and Frampton says unpleasant incidents caused by overbooking, for example (sorry, United), fracture these expectations – everyone feels like they're just a number.

But is the impact of these negative experiences, whether individual or collective, meaningful to airlines? At the inaugural Financial Times Business of Aerospace and Aviation Summit in London on April 25, Ryanair's CMO Kenny Jacobs called an article from a reputation management company about the recent United debacle "nonsense", saying people should "get over it". He claimed that neither the airline's bookings nor share prices had taken a hit.

Rupert Younger, founding director of the Oxford University Centre for Corporate Reputation, sympathizes with the sentiment Jacobs expresses: "I think it's important to point out there are two major reputations that matter. The first is capability reputation, which is what you are perceived as being able to do. The second is character reputation, which is what is perceived about how you go about what you do."

Younger explains that United's recent crisis was a character reputation hit. No one questioned whether they could fly from A to B – what was at stake was the perception of how they treat customers. The impact of these two reputations being called into question are

"Capability hits tend to be taken very seriously by customers"

BELOW: OXFORD UNIVERSITY'S RUPERT YOUNGER DISTINGUISHES BETWEEN 'CAPABILITY' AND 'CHARACTER' REPUTATION different too, Younger says. "Capability reputations are sticky - once earned they are very hard to destroy - whereas character reputations by contrast are very volatile. Capability hits tend to be taken very seriously by customers," he continues. "An example is Toyota's stuck accelerator pedal issue in 2009. That hit customer perceptions about safety, and annual sales of Toyota cars fell from 2.1 million to 1.8 million per annum for three years as a result. Character hits manifest their cost in diverse ways. Take the banks - they have now clocked up over US\$200bn of fines for bad behavior since 2008. That's not a customer hit, it's a financial hit imposed by the regulator."

Interbrand has the advantage of publishing a global ranking of brands each year based on analyst opinions. The branding giant uses data from companies such as Bloomberg and Thomson Reuters, so Frampton concurs with Jacobs that "the media can be just a storm in a teacup and won't necessarily affect the long-term risk to profitability".

STUDY YOUR PERCEPTION

Perception seems to be the most important concept during a PR disaster. Shashank Nigam, CEO of SimpliFlying

CRISIS MANAGEMENT



and author of *SOAR: How the Best Airline Brands Delight Customers and Inspire Employees*, thinks it is vital for airlines to address what's being seen by the world and not necessarily its own version of things: "People are reacting to what they see, so if the airline tries to address something else, they're not addressing it at all."

Kalm identifies a recent issue where two girls were denied access to a United flight for wearing leggings. What fellow passengers witnessing the scenario didn't know was that the girls were traveling on employee passes, so they should have known that leggings were against the company dress code. People just saw the airline discriminating against people because of what they wear. "We're consuming so much news so quickly, the subtleties are lost on people," notes Kalm.

Frampton acknowledges that dealing with perception can be complex, considering that business is now a collaborative exercise. "You can't sell a lettuce without partnering with multiple companies. Airlines also have to consider the perceptions of their suppliers, their travel agencies and their shareholders."

When it comes to customers though, keeping it simple is useful, and it's hard not to talk about United's #bumpgate as an example. "They mentioned their overbooking process to try to clarify the situation, but the world caught fire because many did not know about overbooking until they said it," highlights Nigam. "Companies can clarify things later with the results of

"We're consuming so much news so quickly, the subtleties are lost on people"

BELOW: INTERBRAND'S JEZ FRAMPTON SAYS TODAY'S PASSENGERS ARE USED TO BEING TREATED LIKE INDIVIDUALS – NOT ALWAYS EASY IN AIR TRANSPORT



a formal investigation, and reveal at the same time the steps they're going to take."

One of the airlines featured in SOAR is Southwest, which made film director Kevin Smith leave a flight, telling him he was a 'safety concern' because of his size. Southwest responded by putting Smith in touch with the senior vice president of the company. "Very soon there were people on social media defending Southwest, and the carrier didn't have to do much work to get to that point," Nigam recalls. This backs up another important point of Nigam's: "It's important to attach a face to the brand."

GET IN FRONT

A bugbear with both Nigam and Kalm is that many airlines wait for something to go wrong before they do something about their image. Nigam maintains that: "An airline needs to build a reservoir of goodwill before things go wrong, by ensuring they're over-delivering in general. By taking care of people when trivial things go wrong, you ensure brand loyalty."

He cites Singapore Airlines, which, after a flight with severe turbulence, had to deal with pictures surfacing on Twitter of food splattered all over the cabin. However, Nigam says the image that remained with people showed passengers being handed a box of Lindt chocolates when they landed, as an apology for the inconvenience. "That's 500 boxes of chocolates, but it's also 500 people who are potentially now lifelong fans of Singapore Airlines because of the way they've been treated."

"The sad fact is that many companies only call when they're in crises, even though we could be so much more effective in helping them outside of one," adds Kalm. "In the aftermath of a crisis, we do a post-mortem.

A set of recommendations about what they can do in the future comes out

of that, but with more time to be thoughtful we could do scenario planning, help them build relationships, and so forth. With budgets tight, airlines perhaps see that as a 'nice to do' rather than a 'must do' investment."

However, every cloud has a silver lining, and even if more





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SOCIAL MEDIA NEEDS A POKE

In a PR crisis, reaction time matters. Within minutes, you should be responding, and social media provides immediate access to a large audience. Frampton says that during the Deepwater Horizon disaster in 2009, BP decided to spend on advertising rather than join the conversation on social media, where many people were distressed and angry.

Nonetheless, correct training is paramount for success with social media. Nigam says untrained staff sharing unverified facts damage a brand considerably. Frampton agrees, stating, "I'm not sure I agree with the phrase 'any publicity is good publicity'." Kalm feels that from a customer care standpoint, airlines have embraced social media wholeheartedly, but the leap he doesn't think many have made is in the broader arena of issues management.

"Flight operations disruptions lend themselves to processes – people's responses can be by the book. But in the more nebulous world of issues management – people behaving badly – airlines may have not yet devoted the attention and the resources to ensure social media success."

could be done to mitigate them, Frampton says unfortunate events are a fantastic opportunity for airlines to look in the mirror: "It's a chance to reset their values."

There's no doubt airlines are unique when it comes to the potential PR disasters they'll face, especially as there's an inherent level of stress associated with air travel, which Frampton says affects people's moods and the way they might react to things. Nigam expands, "With airlines, brand experience lasts up to 24 hours, as opposed to, say, two hours for Starbucks." BELOW: AIRLINES ARE HAVING TO RETHINK THEIR POLICIES REGARDING PASSENGER OVERBOOKING ON FLIGHTS – AND HOW THEY HANDLE CUSTOMER RELATIONS

TAKE THE BLAME

Then there's the issue of blame, which is also unique with airlines. Nigam says, "If the weather is bad, the airline has



to own it – they can't just say 'not my job'. That's the differentiator for airlines doing well. United laying blame on Chicago police didn't turn out well. If a pilot's drunk, or there's an airport closure, that's not the airline's fault necessarily, but they need to take responsibility for their customers during all these different actualities."

Kalm identifies another complicating factor unique to airlines. "Many international airlines are struggling to create harmonious relationships with their workforces, whose needs and wants are often at odds with those of their passengers. It's Hobson's choice when it comes to responding to an incident – do they side with the employees and risk alienating passengers, or vice versa?"

The irony of all of this, Kalm continues, is that: "Among any industry, except for a defense contractor or the pharmaceutical industry, airlines have the most sophisticated crisis response processes because of all the things that can go wrong in the air." But do their crisis plans include non-fatal human errors?

DESIGN FOR CONFLICT

A thought to end on is something identified by Kalm: "Airlines don't just need to figure out how to use materials as inexpensively as possible with the smallest and lightest components, but factor in the possibility of conflict into aircraft cabin design."

With seat pitches shrinking and more passengers being squeezed on board, there's potentially more cause for argument. Let's just hope airlines are finally learning from their mistakes, so that they'll be able to better mitigate any tense situations. WHAT DO MANY OF THE WORLD'S LARGEST AIRLINES HAVE IN COMMON?

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PASSENGER MANAGEMENT

HUMAN FAILINGS OF PERCEPTION CAN LEAD TO UNNECESSARY AND BRAND-DAMAGING PASSENGER INCIDENTS. HERE'S WHY LOOKING SAD OR MAD IS NEITHER GOOD NOR BAD Words by Marisa Garcia. Images from shutterstock.com

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t turns out that our facial expressions, body language and tone may be poor indicators of our true feelings. The conclusions others make about our emotional state using these signals might be wrong; indeed sometimes we may mislabel our own emotions.

For aviation, this is a serious problem. Much of the industry's training and security standards hinge on screening and serving people in various emotional states, in often stressful environments. If we can't be confident of judging those states accurately, how can we be expected to manage people?

Neuroscientist Lisa Feldman Barrett, PhD, is professor of psychology at Northeastern University in Boston, where she is director of the Interdisciplinary Affective Science Laboratory. She is the author of over 200 papers and six books on neuroscience and psychology and challenges every preconception about where emotions come from and how we perceive and react to them.

We spoke with Dr Barrett to find out why we can read emotions so very wrongly, how emotions may be reflected and misinterpreted by passengers and staff along the journey, and what can be done to avoid dangerous escalation of conflict in the high-stress environments of airports and aircraft cabins.

"In my personal experience there is a lot of emotion misperception happening at airports," she says. "We don't detect emotions in other people. We're guessing, based on signals like the acoustics of their voice or body posture.

"The brain's failure to make sense of our environment generates a physical crisis"

There's no real footprint that highlights when someone is angry or afraid.

"At airports, people misperceive anxiety as anger. It's not that sometimes passengers aren't rude and gate staff aren't trying to be helpful. It's that there's a heightened uncertainty in air travel. For example, when a plane is delayed there is uncertainty. Uncertainty enhances arousal and makes people feel agitated, and people derive meaning from that."

That we make meaning out of cues – the expressions, stances or tones – of persons who are in a heightened state of anxiety is a natural process of the brain. But the brain is only making assumptions, because not making them is also a stressor. It is a function of the brain to process information and give that information meaning. The brain's failure to make sense of our environment generates a physical crisis. "It's really tough for the nervous system," she says.

MISREADING SIGNALS

Whatever conclusions the brain draws from these human signals can often be wrong.

"In high arousal states, anxiety and anger don't have facial diagnostics or acoustics," Barrett explains. "Sometimes it's just that a person is on edge. A lot of times what people take for rudeness is just anxiety. There's a fear of flying and a fear of crashing, but there is also just the ordinary uncertainty of the process. A lot of people don't know how to handle it."

Barrett shares that she has experienced this anxiety, just as millions of fellow travelers have. She is aware that her elevated state might be misconstrued as anger by staff. She manages this risk by voicing what she is feeling, explaining that she is nervous and asking for help.

Dr Lisa Feldman Barrett explains more in the Videos section of our site

SENSORS MAKE SENSE

A remote condition-monitoring technology has been developed that can help crew provide enhanced customer service – as well as remotely monitor passengers of concern.

Named ViatorAero, the system uses wireless sensors below rows of seats. Data is beamed from the sensors to crew devices and applied in an app that shows the status of the individual seats in terms of temperature, movement and seatbelt closure, and even to lock overhead bins during TTL. That movement monitoring capability is claimed to enable crew to monitor passengers who are unwell, in need of assistance, agitated or disruptive.

FliteTrak, the developer of the system, is reporting interest in the system from "major airlines".

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"If crew have an increase in arousal, they will communicate that to passengers"

Hearing a clear message and a request for assistance, she says, helps defuse staff tension and avoids confusion. By saying she's nervous, she avoids the leaps of logic the member of staff's brain might make, when no other information is available, leading to a conclusion that she is angry or belligerent.

Of course, most travelers don't have the benefit of her decades of research or training. The majority of the flying public relies on established assumptions about a fixed link between emotion and behavior.

AROUSAL IS CATCHING

Beyond providing reliable information, there is the niggling problem of empathy. While recent incidents in aviation highlight a need for what we intellectually describe as empathy, in practice empathy is complex.

"Crew and gate agents are in a very difficult situation," Barrett says. "They have to deal with the consequences of things going wrong when they have no control over it. That's really tricky. One of the things that could be useful ABOVE RIGHT: HONEST AND EFFECTIVE COMMUNICATION IS JUST AS IMPORTANT AS A WARM SMILE WHEN CREW ARE DEALING WITH STRESSED PASSENGERS



But if staff are humans and humans regulate each others' states of excitement, what are excited human staff to do? "I think, to the extent that they can, they should not be reactive, but directive," Barrett suggests. "If they see someone who is really agitated, rather than say, 'Don't be rude,' or 'Don't be angry,' they should not presume to know how the passenger feels. Instead, they should say



is having crew and gate agents understand that arousal is catching. We are social creatures. We regulate each other's nervous systems. We do it with sound, with our voices, with our sight and with touch, even with the words we use. The words we use, our language concepts, are connected. They are implemented in the brain, a system that is directly connected to the body and is responsible for regulating the body.

"So the first thing to understand is that staff will also get worked up when there is a lot of uncertainty, particularly if they are predicting that they are going to be facing angry passengers. I think the first thing they can be taught is awareness that if they are worked up then passengers will become worked up too. If they have an increase in arousal, they're just going to communicate that to the passengers."

TECHNOLOGY WILL FAIL

Barrett's findings on the variable and unreliable nature of emotional displays call into question how effectively technology might do what humans cannot. Barrett believes that if technology is designed to make judgments based on facial expressions, aligning each with a stereotypical emotion, then that technology must fail because there are no stereotypical emotions.

"The best use of technology in this area would be as an aid to tracking and measuring passengers' movements for a more complete context of the mind/body reaction to stimuli. What that looks like, exactly, we're not sure," she says.

CULTURAL CLASHES

There are huge individual differences in how people express emotions, but there are also substantial cultural differences. "Not everybody scowls in anger and sometimes people scowl when they are concentrating," says Barrett. Not everybody smiles in happiness and sometimes people smile in anger. There's a lot of variability across cultures as well. "I think the most profound difference is that for some cultures emotion is about a situated action. This is true of cultures of honor, and cultures where there are strict guidelines on how you should behave in different situations. You can make no inference based on their behavior about what someone is feeling internally. In fact it is sometimes seen as extremely impolite or disrespectful to do so because everyone knows what the rules of contact are in different situations. "For people in the USA and some western cultural contexts, we think of emotions as internal states, feelings that drive behavior. But for much of the world, emotions are just a sequence of actions. One action in a particular context allows you to predict what the next action is going to be, without any inference about what's going on inside the person. This is particularly true in cultures where behaviors are highly scripted."

something like, 'I can see you are concerned and I really want to help you.' The extra 10 seconds that it takes to reassure a person that you're trying to be helpful can calm the passenger down. If someone is intent on being difficult, they're going to be difficult, and there's not really a lot you can do. But there's a big margin for managing arousal and managing expectations, by having airline staff become more aware of their own effect, to prevent them from constructing emotions that are going to be detrimental to their getting their work done. Like anger, for example; sometimes it is very productive and very useful, but a lot of times it isn't."

OWN YOUR EMOTIONS

If it sounds as though Barrett is suggesting that emotions are something you own and not something that happens to you, that is because, to a degree, that is precisely what she is suggesting.

While we cannot control the feelings themselves, the elevated state, arousal or excitement our environment causes, we can affect behavior indicative of what is popularly construed as an emotional state. In other



SINGAPORE AIRLINES BOASTS PERHAPS THE BEST TRAINED, MOST ATTENTIVE CABIN CREW IN THE SKIES



words, someone who is in an excited state can work to put on a calm demeanor, if it is more appropriate.

That is why emotions are so confusing to us, and why jumping to conclusions about what strangers feel is like entering a minefield, especially in a field like aviation, where interactions are most often multicultural (see *Cultural Clashes*, above).

THE EYES CAN LIE

"The second point to make – which I think so often escapes people – is that if you care about security, if that is your main goal, the best way to achieve that is by adopting an attitude of service. If you try to be helpful to someone, you are more likely to get them to do what you want them to do, with less cost to you, than if you try to use authority. In my lab, we call it 'buy it versus wear it'.

"You want people to follow you of their own volition, basically. You want to make them do what you want them to do because they want to do it. Just getting them to comply behaviorally is a very risky strategy that often backfires. I think that's

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what you see in a lot of cases. When someone approaches you, not to be helpful but to get you to comply, what often happens is that people's backs go up immediately. So even if your primary goal isn't service, sometimes taking the attitude of service, taking the attitude of empathy, taking the attitude of 'how can I be helpful to you,' can be a better way to influence people's behavior and get compliance."

In effect, interpreted emotion is largely an affect. Even smiles can't be trusted. Barrett tells us that the belief that smiles are genuine because of "a crinkly eye movement too and not just a baring of the teeth" is largely false. The eyes can lie.

"Those types of cultural differences, are not so much about emotion as the affective tone of interaction," she explains.

TRAINING IS EVERYTHING

Which brings us to the last kicker. There have been many words written about the negative stereotypes some airlines reinforce when they encourage flight attendants to behave in what may be perceived as a servile manner.

Crew are well trained to manage crises, and possess resilient personalities. But the training is everything. When emotion is about perception, and people jump to conclusions based on socially ingrained emotional stereotypes, it is imperative for crew to affect those emotions that are most likely to create and maintain a calm environment.

GENDER AGENDA

A combination of global and cultural norms, and the gender composition of the aviation industry, suggests that some of the affect relics of the past might be revived and refreshed, in the interest of effective crowd management.

INFORMED OPINION

Barrett shares an anecdote from a recent flight during which something unusual happened. "The captain

came to the gate desk and gave us really

specific information on why our flight was delayed, and let people know when he would update them again. He explained, 'We'll sit on the tarmac for 30 minutes so that we can be first in line when things open up again.' Nobody complained. Everybody did what they were told. There was no anxiety, even though the flight was delayed, because people had information.

"That is one end of the spectrum. The other end is that flight crew or gate attendants change the delays, saying, 'We'll be 30 minutes late' and then 30 minutes later it's 30 minutes more. That persistent ambiguity is very difficult for the human system to take.

"What passengers need is not a mix of information sources, with varying degrees of accuracy, but relevant and reliable information throughout.

"If you adhere to emotions as triggers of behavior, then you have the assumption that passengers are going HOW EMOTIONS ARE MADE

The Secret Life of the Brain LISA FELDMAN BARRETT

to react in a predictable fashion. But there are no emotion switches. The brain is constantly trying to make sense of what those sensations mean. If you make it hard for a passenger to know what is happening, then passengers will experience a range of emotions, which you could improve just by providing accurate information."

"This strategy runs counter to what one might wish in the interest of gender equality"

"There are substantial differences in how people perceive emotion in women versus men, even with the same behaviors," Barrett says. "When a man appears angry, the assumption is, for the average person, that something must be wrong in the situation. Whereas when a woman becomes angry, the modal perception is that she is a difficult person or overly emotional. That's particularly true with negative emotions.

"Having a strategy where women are taught to smile and be supportive in the service of gaining behavioral compliance is a very sensible strategy in an industry like aviation, because the expectation is that women are supposed to be service-oriented and very pleasant. If they are not, there is an attribution made about what they are like as people, instead of considering that they may be in a tricky situation."

Though she says this without a hint of irony or the slightest altering of her pleasant tone, which might indicate judgment has been applied, she acknowledges that this view runs counter to what one might wish in the interest of gender equality.

"I find it really fascinating as a scientist that this is true, but as a woman I find it horrifying," she reveals. "But what are you going to do?" Yes, what are you going to do? The sky's a stage and each of us has

a part to play. 🔊



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THERE ARE EXCITING DEVELOPMENTS UNDERWAY IN SEATING STRATEGIES AND COLLABORATIONS, ACCORDING TO ALAN WITTMAN, DIRECTOR OF BOEING'S SEAT INTEGRATION TEAM Words by Adam Gavine Portrait by Mitch Gee n recent years, a major talking point in the cabin interiors sector has been supply chain issues. Indeed until 'Bumpgate', United's biggest issue was the no-show of many of its Polaris business class seats, and several other airlines have suffered with seat delivery issues. However, despite such problems, Boeing reports that 2016 was a record year for the company in terms of seat delivery, with a full 10 months of on-time deliveries reported: the first time this has been achieved since 1999.

A key figure in Boeing's seating activities is Alan Wittman, director of the seat integration team, who says that while this milestone is positive, deliveries are "still an issue", as any one program can create knock-on problems. Wittman's team is on the case though, resolving identified issues – including the delivery of United's delayed Polarisequipped B777-300ERs, which "won't take much longer", as he said during our talk in April.

A MAN OF PRINCIPLES

In Wittman's eyes, there are many factors involved in a successful seat supply chain, and his team has established a set of principles that they focus on. One key principle is design and build quality, ensuring that the product on a Boeing aircraft "performs better than the competition, and is reliable and maintainable", as Wittman says.

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In addition to its dimensions, the LIFT seat is also optimized for the Dreamliner through features such as the backlit 'cove' behind the IFE display, which ties in the seatback lighting with the cabin lighting as it goes through scenes of boarding, waking, etc, to give a complete and integrated feel in the cabin. Boeing discussed the possibility of linking the lighting behind the screen to the IFE content being shown – akin to Philips' LED backlit TVs – but decided it would be too much in the cabin.

Wittman is also keen on delivery discipline, with world-class customer support. "In the seating world delivery discipline has been a challenge, and a root cause of some of those challenges has been design and build quality," he adds. Indeed, earlier this year Boeing hosted an event in Seattle, Washington, that saw the team spend a full two days talking with suppliers about design and build quality, and what Boeing expects of them (see p56).

In line with Boeing's increasing production rates of certain aircraft lines, Wittman's team is also being proactive in ensuring they create enough support and capacity for customers by teaming up with a variety of seating suppliers. "We also share with suppliers that

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ABOVE AND BELOW: THE NEW B787 TOURIST CLASS SEAT FROM ENCORE FEATURES A 'FLOATING' IFE DISPLAY BACKLIT BY AN LED SYSTEM THAT CAN TIE IN WITH THE DREAMLINER CABIN LIGHTING

RIGHT: ENCORE'S SEATS ARE DESIGNED FROM THE OUTSET TO COMPLEMENT BOEING'S CABIN ARCHITECTURES



aviation is a great growth industry for all of us and we're all in it together," says Wittman.

"In recent years it has taken a lot of work to step up our suppliers and our internal capabilities to meet the demands of these growing production rates, and we have been largely successful," Wittman adds. "We work proactively and think ahead, not just in months, but over five, 10, 15, 20 years, because our 20-year outlook predicts long-term growth and we have to make sure we have the capabilities and suppliers to support that. We develop strategies for what we will need in terms of seat products and technology, and supplier capacity and performance."

BLOSSOMING RELATIONSHIPS

As part of its supply chain strategy, Boeing has been developing relationships with several companies over the past four years, including ZIM Flugsitz, Thompson Aero Seating and Recaro, which Wittman says have been a success in terms of line-fit product, and he is "really happy" with the performance of these partnerships.

To broaden customer choice and raise capacity potential, Boeing has also been investing energy in developing relationships with new seating suppliers, notably LIFT by EnCore, Jamco and Adient.





Dream seats

Another important figure at Boeing who is really excited about seating collaborations is Blake Emery, director of differentiation strategy, who was heavily involved in the design of the Dreamliner interior.

"We designed a great interior and then realized that none of the seats coming out for it looked like they went with that interior. When we first started talking with seat manufacturers about architectural compatibility with the rest of the airplane they worked with what they already had and tried to make it look rounder, and it didn't really work. One of the promises I made to myself was that I wouldn't work on designing an interior again unless I also designed on the seats. But with the LIFT seat, they started from scratch to design a seat for the Dreamliner, and in every element it really works." So is this the best way for design agencies and manufacturers to work with Boeing interiors for better integrated product? "I really want seat designers and suppliers to work like this, and some seat manufacturers have started inviting us to their facilities."

J'ADORE ENCORE

Following a successful start to EnCore's new LIFT seating division with its Tourist Class economy seat designed specifically for the B737 Boeing Sky Interior, the collaboration is now being expanded to include a seat designed specifically for the Dreamliner cabin.

"The collaboration has been fantastic, and it's going faster and faster as we build our relationship," says Wittman. "They've invested in all the right ways, with test sleds, you name it. They're going to vertically integrate, build more seats and perform, which is something customers are looking for. The wide-body seat needs more comfort features than the B737 seat [hence the addition of a cradle effect], but it's the same concept, just spatially, structurally and aesthetically optimized for the

"The EnCore collaboration has been fantastic, and it's going faster and faster" TOP: JAMCO'S JOURNEY B SEAT, OPTIMIZED FOR THE B787. SEE P76 FOR MORE DETAILS

ABOVE: BOEING'S BLAKE EMERY IS A BIG FAN OF CLOSE COLLABORATIONS WITH SEATING COMPANIES. READ MORE ABOUT EMERY IN THE ARTICLES SECTION OF OUR WEBSITE

> B737 BEDS

An exciting development in Boeing's seating world is that the company is now offering lie-flat seating on the B737. "We have a couple of seats available that would fit," says Wittman, adding that while it is too soon to define layout choices, forward-facing would work best. "We know how to certify the option, but we haven't yet – we will work with customers and suppliers to get it done. Multiple airlines have shown interest in lie-flat seating on the B737."

B787 instead. When you design a product for a particular airplane, you can take advantage of specific dimensions that help create a sense of space that isn't available to other seating companies."

J'ADORE JAMCO TOO

Another of Boeing's close collaborations is with Jamco, for business class projects including the forward-facing Journey B business class seat and the herringbone Venture seat, both also optimized for the B787 interior spatially, structurally and aesthetically.

"Jamco is a great partner of Boeing and we have a long relationship [Jamco enjoys an almost 50% share of the lavs market]. The company has grown its seat business over the past five years to something significant, and they have great capability," states Wittman.

"With any company, people can make promises and then not keep them or make mistakes. But Jamco has long relationships with proven performance and proven trust, plus they're pretty conservative about what they sell and we trust they won't overcommit themselves."

To help prevent supply problems, Boeing carries out production readiness assessments, with a lot of math going into assessing production capabilities, and then they collaborate with the suppliers to make sure their figures agree. "But we're not there every day when they're selling seats, so we trust they will stick to that line," adds Wittman. "Jamco's seats will be in the B787 catalog soon; we are working on putting them in this year."





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- Perform market, customer and competitor analyses.
- Product development and improvement throughout the product life cycle based on a defined strategy.
- With your expertise in passenger safety systems you will be the focal point for our customers, partners, suppliers and internal stakeholders.
- Train the international sales teams on restraint systems.
- Collaborate closely with the RECARO Engineering departments to ensure a certifiable design of complete seating systems.
- Participate in conferences of the SAE Seat Committee with the goal to define and standardize relevant requirements.

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- Extensive experience with development of safety belts and torso restraint systems.
- Extensive experience with development of aircraft passenger-seat-mounted, seatbelt-mounted, and aircraft-structure-mounted airbag systems.
- Experience with pretensioning systems for both safety belts and torso restraint systems desirable.
- Experience with the application of TSO/ETSO-C22 and TSO/ETSO-C114 required.
- Some experience with testing and certification required.
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RETAIL THERAPY

Speaking of the Dreamliner catalog, how is it shaping up? "The B787 catalog has changed over the last couple of years; it's not the catalog we started with," says Wittman.

"The SFE model initially set for the B787 really didn't serve the market as intended. We do still have the Dreamliner Gallery [a showroom in Everett where customers can view and try out catalog products] and Jamco will be in the Gallery soon with the Journey and Venture seats. Ultimately we work together to choose which customers we offer [seating product] to on a campaign basis. We do project-based offerability."

ADIENT DRIVES IN

The latest big news for Wittman's team is that Boeing has entered into a collaboration agreement with Adient – a world-leading automotive seating company – to build aircraft seats. One in three car seats in the world are manufactured by this company, and it is now widening its focus, with a goal of achieving US\$1bn in annual revenues from non-automotive markets over the next five years.

"We're excited about getting that kind of expertise and capability in the aircraft sector. Adient has really strong capabilities in design, quality, craftsmanship, supply chain and industrialization: a lot of the things that frankly the aircraft seats and interiors market has been lacking. We're really excited about working with them to see what we can create for aircraft seating," says Wittman.

"Again it's about creating new ways to offer more choice and more value for customers. They are a strong company with a lot of capability and we are excited about getting a company like that with a background of proven performance into this industry."

Adient has developed prototype seats and is working quickly through the industrialization process, but both Adient and Boeing say it is too soon to say when they will be ready to go public with the designs.

"Adient is a large, capable company so they are looking at the whole seating market. Where the collaboration



REGULATORS COLLABORATE TOO

Three years ago, Boeing started hosting an annual supplier symposium as a way to get everyone together on the same page, explain its expectations of the cabin supplier industry and to collaborate on solving pinch points. The theme at this year's event, held in March, was design and build quality, and how a value stream can be put together.

There are further benefits to participation, as Beth Anderson, vicepresident of supplier management for payloads and systems at Boeing, explains: "Regulators come to the symposium as well, as we try to improve processes to take some burden out of the lengthy and really resource-intense process of certifying a new seat, for example by using technology such as simulation in lieu of using sleds to test every minor design change."

"By working together with seat suppliers we can share and bring them up to speed on the advances we are making with the FAA, EASA, etc," Anderson adds.

"The SFE model initially set for the B787 really didn't serve the market as intended

BELOW: FOLLOWING SOME REVISIONS TO THE B787 CATALOG, EXPECT CHANGES IN THE DREAMLINER GALLERY

DIREAN

comes in is they are relying on us to teach them how the industry works from a certification and technical perspective."

Meanwhile Adient will contribute new perspectives in terms of design, comfort, craftsmanship, operation and supply chain.

COLLABORATE TO ACCELERATE

Boeing stresses that by collaborating with its engineers, suppliers can develop product with fewer design iterations than when they do such work on their own, as they can be provided with all the environmental, structure and stress specifications of a particular aircraft at the start of a project.

"Our collaboration strategy is that we're always looking for new opportunities, whether to solve particular pinch points or to introduce a new capability on the market that can add value to customers," says Wittman. "It's about creating choice for customers." @



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SLIDING AND STAGGERING

The innovative Side-Slip seat has generated much interest since the prototype was revealed in 2012, with its unusual design that allows the aisle seat to be slipped over the middle seat, which doubles the width of the aircraft aisle to speed up boarding. Now the developer of the design, Molon Labe Seating, has revealed that it expects the seat to be market-ready in late 2017 following successful 16g dynamic tests.

In addition to the boarding efficiencies of the side-slip action, Molon Labe claims that the staggered design affords each passenger in a triple seat more living space. The window and aisle seats are 18in wide, while the center seat provides 20.8in of width at the shoulders. According to company founder Hank Scott, the increase in lateral space as well as the staggered design enhances passenger comfort and consigns shoulder-to-shoulder contact and fights over the armrest to problems of the past.

STILL STAGGERING

While the unusual operation of the Side-Slip seat has made buyers hesitant, despite its advantages, Molon Labe has altered the design to create something a little more conventional, which is generating much interest: the Stagger Seat. By replacing the telescopic frame mechanism with a fixed chassis, the width and personal space benefits of the Side-Slip are offered in a more familiar form.

Two variants are currently undergoing final stages of engineering: the S1 Ultralight for short-haul operations, weighing less than 10kg per pax, and the more luxuriously appointed S2 long-haul version. Both feature a large 'ear' on the headrest that helps support the head and enhance privacy, as well as remarkable IFE possibilities, with the aisle and window seats able to accommodate 15.6in displays, with 18.5in in the middle seat.

According to Molon Labe, the S1 and S2 models will be market-ready in 2018.

SCULPTED COMFORT

ST Aerospace has developed a new family of economy class seats, with the first launch being short/medium haul variants for narrow-body application, with A330/ B777 seats to follow shortly.

Depending on the variant selected, there are options for sculpted seat back cushion and headrest cushion designs, where the cushion wraps around the passenger, providing good longhaul support. The seat structure has also been sculpted to maximize living space, enhanced by a design language intended to increase the perception of comfort and space. An optional articulating seat pan can further increase passenger comfort.

ST's engineers have made extensive use of lightweight aerospace-grade metals, including some composite materials, to bring the seat under 11kg fully dressed for the medium-haul variant and approximately 9kg for the short-haul variant. The seats were awarded a CAAS STSO in 2016 and will obtain EASA ETSO by Q3 2017

 Seat pitch: 28in minimum to 36in maximum, depending on variant

Economy class

LIFT PURSUES THE DREAM

LIFT by EnCore made a splash in 2015 when it entered the seating sector with its Tourist Class Seat, the result of a collaboration with Boeing, optimized spatially, structurally and aesthetically for the B737 Boeing Sky Interior.

At least two airline customers have already been secured for the seat, and the relationship between Boeing and LIFT is deepening, with a model optimized for the B787 economy cabin now developed - a design that "feels like it belongs in the Dreamliner", according to the company.

LIFT again partnered with design consultancy PearsonLloyd, and for the new seat it has retained a family resemblance with the B737 model, but with a few new touches added, notably a 'cove' in the IFE shroud that is illuminated by a mood lighting system behind the monitor (up to 12in), complementing the cabin mood lighting and intended to resemble a sleek home theater experience. The setup ties the seat and cabin together and highlights the main attraction in the economy seat envelope, complemented by a PED holder below the monitor for second-screen content.

The use of composites, aluminum and titanium in the structure has helped achieve a baseline weight of 12kg per pax, fully dressed

The B787 model

has been developed using the specific dimensions and curvature of the Dreamliner cabin to achieve 17.7in between the armrests and features a pivoting recline optimized for maximum comfort.

The headrest is also a unique cradling design, providing an effective neck and headrest that is comfortable from the smallest (fifth percentile) passengers up to the tallest (95th percentile) passengers, rather than just targeting the average-EnCore Group sized passenger. received a 2016

LIFT is currently gauging feedback and interest from airlines in the seat and will begin the detailed design and certification process later during 2017 and 2018, with first deliveries targeted for early 2019.

LIFT'S HOUSE IS IN ORDER

Part of LIFT's swift success in the market – and a persuasive factor in its Boeing tie-in – is its in-house test facility that enables it to develop new product guickly. A star attraction is the 16g dynamic test sled, which gives the engineering team the ability to meet deadlines without having to wait for availability at third-party facilities. Other resources include a flammability lab, a cycle and abuse center, and a prototyping center that can achieve a one-day turnaround.





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This smart cabin reconfiguration concept is the result of a collaborative research project by Airbus, Recaro Aircraft Seating and linear motion specialist THK. While the idea is innovative, it is also simple: crew flip up the seat pans of the unused seats at the rear of the cabin, which creates an extra 15in of available pitch. The remaining occupied seats are then slid backward using a simple mechanism to increase seat pitch – or to go from single class to dual class within a very short turnaround time if airline booking systems can adapt to the newfound flexibility.

The mock-up version is based on the SL3510 economy class seat, for application in the A320, but the concept can be adapted to other aircraft types.



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ACRO SECURES BFE AND A NEW BFF

Acro Aircraft Seating has supplied line-fit seats to Airbus since 2015, but 2017 has seen their relationship become a little deeper, with its Series 3 Superlight ST and Series 6 models now added to Airbus's BFE catalog.

The first model to enter the catalog is the 'Series 3 Superlight ST,' a slimline economy class seat featuring an aluminum table that has been optimized for beverage service and the use of tablet devices.

The Series 6 model will follow, with multiple customer orders already in place, according to Acro. The orders are still confidential, apart from launch customer Air New Zealand, which will take delivery of the first shipsets during September 2017 for line-fit on its 13 new aircraft – a combination of A320neo and A321neo aircraft – replacing its A320 fleet.

According to the airline, a key benefit of the new Series 6-equipped aircraft will be that the window and aisle seats will be 1cm wider than those on its current Airbus fleet, with the middle seat 3cm wider.

Chris Brady, CEO of Acro Aircraft Seating, stated, "Air New Zealand came on board just less than a year ago and immeasurably improved the seat with its determination to put the passenger at the center of the design."

The Air New Zealand model also features a seat cover developed with New Zealand company Flight Interiors, which the partners claim has demonstrated superior comfort levels for longer periods during customer testing.

COMFORT PHILOSOPHIES

Since the positive reaction to the prototype Series 6 seat it unveiled in 2015, Acro Aircraft Seating has been working to further refine the design, and it is now officially on the market. Of course all seat manufacturers strive for seat comfort, but together with its design consultancy, Factorydesign, Acro has taken a slightly different approach with Series 6, with philosophies such as 'seats can't be comfortable, only passengers can', 'comfort is found in the space between the seats' and 'comfort is the absence of discomfort, the most comfortable position is the next one' driving the design.

This has resulted in some novel approaches, such as replacing the conventional aluminum tube-framed seatback with a space- and weight-saving one-piece fully composite model that is contoured for comfort. A minimized parts count also helps reduce weight and maintenance, with the latter also aided by a focus on easy accessibility to replaceable parts – even maintenance crews are afforded a little extra comfort.

Comfort of operation has also been considered, with a clever idea being the recline mechanism. Rather than bending the arm back to reach a button on the armrest, which can project an elbow into a neighboring seat space, a slider mechanism has been positioned to the front of the frame, by the knees. Just push the slider forward as you lean back, and you can access the 4.5in of recline and stretch out your legs due to the centrally located lower mount.

Perhaps the best feature is that the middle seat in a triple is wider than the window and aisle seats, helping to even out the passenger offer throughout the cabin.

Economy class

LAST LONG AND PROSPER

Many seat models have numerical codes as their model name, but the 897 is a little more interesting than most as it means "long-lasting prosperity" in Chinese numerology. Arcaro believes this sentiment will be displayed in two ways: prosperity for customers in its operation, and benefits for the environment through reduced fuel burn.

Two versions are available: an aluminum alloy version weighing 6-7kg per pax fully dressed, and a (more expensive) magnesium alloy version weighing 5-6kg per pax. Polish airline LOT ran calculations on the magnesium version and estimated that switching to this seat could save at least 4,000 tons of jet fuel and 8,000 tons of CO₂ per year.

The 897 is suitable for short-to-medium range missions on the A320neo and B737NG families (Arcaro says the seats could also be adapted to other aircraft types), and according to the company, the slimline design can enable an additional seat row to be fitted in these aircraft – or for pitch to be expanded.

Arcaro has been appointed by LOT to work on new business class seats for its B787-8s

UNIQUE, FLEXIBLE, MAGIC AND LUXURY SEATS The last 12 months have been interesting for ZIM Flugsitz, with perhaps the biggest development

being its signing of a BFE agreement with Airbus for economy, premium economy and mechanical business class seats. The ZIMunique, ZIMflexible, ZIMmagic and ZIMIuxury models will be admitted to the Airbus BFE catalog this year, being progressively approved for the A380, A330 and A320 families of aircraft.

AIRBUS SIGNS UP FOR

"To satisfy our customers for their aircraft fleet we have to deliver into every kind of aircraft, independent of size or age," added Angelika Zimmermann, president of ZIM Flugsitz.

To help support the Airbus assembly line in Germany, ZIM has opened a new seat manufacturing plant in Schwerin, near Hamburg.

In product news, the company has refined its EC01-ZIMflexible NG model with more stowage space and leg room as well as a 13in IFE capability, and ZIM has stated that Asian airlines have reported a specific need for such a seat.





Aspire



Meridian

UNITED'S COMFORT ASPIRATIONS

B/E Aerospace has secured a major customer for its latest economy class seating platforms. United Airlines has selected Aspire as the line-fit model for its B787-10s and A350s and the retrofit model for its B777-200s, while Meridian has been chosen for its B737 MAX 9s.

According to B/E, Aspire is "the industry's lightest full-feature wide-body main cabin seat", but it also has passenger benefits. A kinematic mechanism cradles the passenger during recline, and Aspire also incorporates generous under-seat stowage and greater passenger living space due to the proprietary seat frame and leg structure.

The narrow-body Meridian seating platform is proving a success for B/E, with over 200,000 pax places sold in its launch year, outselling its hugely popular Pinnacle model. Meridian is lighter than the outgoing United product, but rather than simply reap the fuel-burn savings, the airline has opted to add comfort amenities including a seatback tablet holder, PC power, and B/E's Crystal Flex diaphragm technology for seat comfort. These new-generation economy products are being tailored for United by B/E Aerospace's Design Group and PriestmanGoode.

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SIMPLE PLEASURE

The new PF3000 model builds on the attributes of Pitch Aircraft Seating's original fixed-back seat, the PF2000, with further increased passenger space and additional functionality, optimized for a 28in seat pitch on an A320 or B737.

The fixed-recline seat features an open upper literature pocket that allows airlines to present literature in a tidy and attractive way, and also means that this printed material can become part of the cabin branding. It's simple and effective, as is the bungee storage system at the lower part of the highly sculpted seat back. Such simple ideas keep weight low (sub-25kg per triple) and minimize maintenance.

Pitch claims automotive levels of fit and finish, a fitting attribute as the company's design partner is Design Q, which as well as being involved in the aircraft interiors industry, has extensive experience in the automotive sector.

Geven is

supplying seating for South African

Airways' long-haul

and short-haul

fleets

The seat is scheduled for production as we go to press, following success in a number of indicative tests, including "a very comfortable pass" in the 16g HIC dynamic test.

PITCH RAISES ITS GAME

In readiness for the launch of the PF3000. Pitch Aircraft Seating has set up a manufacturing facility in the UK to support high-volume production of the seat. The facility, begun in 2016 and due to be fully operational in the second guarter of 2017, features an optimized production layout with a focus on lean manufacturing techniques. Pitch has mainly contracted UK-based suppliers for the seat components, with the company working closely with these partners to understand their capabilities and manufacturing processes.

As Gary Doy, director of Pitch explains, "Design at all levels plays a key role in the overall quality and success of the product. You have to invest time and work closely with your supply partners to enjoy the benefits of efficient manufacturing."

A USB power option will be available, located behind the tray table in order to discourage use during TTL

ATR TIES UP WITH GEVEN Turboprop aircraft manufacturer ATR has signed a seating contract with Geven for its ATR -600 series aircraft, delivered from Q1 2018. The seats in question – the Neo Classic and Neo Prestige – have been specifically created for ATR by famed Italian

designer Giugiaro to replace the current generation in new ATR -600s. The R&D for the project took two years to complete, including ergonomic studies.

A compelling factor in ATR's choice was its desire to offer the widest intra-armrest space in the turboprop market – 18in – which both the Neo Classic and Neo Prestige achieve. The Neo Prestige is slightly better appointed, as it can be reclined, has a larger tray table, and its backrest is 2in higher.

The seats also offer weight savings of up to 170kg per aircraft compared with those fitted in the current model, and thanks to further space optimization it is now possible to accommodate two additional seats in the cabin without a penalty to the operational weight.

ESSENZA Essentially: class!

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Premium economy

PREMIUM THINKING GETS FLIPPED

When Rebel. Aero revealed its innovative S:two economy seat design in 2015 it caused quite a stir in the aviation industry due to its unique features. Headline acts included a fold-up 'booster' seat function that enables passengers to stretch out within the confines of their own seat and aids ingress and egress, a three-point safety belt, and an integral child seat that can be created when the seat is folded up.

While the company is still busy securing customers for the S:two, it has also been busy developing the S:3, a premium economy version. The seat draws on many of the ideas from the S:two, such as the booster function and three-point belt, and indeed shares 75% of its components. Where the added luxury of this model comes in is its increased width (22in on a narrow-body), a wireless device-charging option, an adjustable SleepEasy headrest and up to 20in IFE.

The biggest comfort benefit, however, is the cradle recline system, which pivots the seat by up to 18° within the composite seat shell by means of a simple and lightweight mechanical/ gravity actuation system. An adjustable leg rest can also be deployed to achieve a 'lazy Z' position.

Rebel.Aero is working on a standalone version of the flip-up 'booster' seat that can work with any current economy class seat



FLAG-CARRYING COMFORT

Epianka, TSI Aviation Seats' latest model, is a premium economy seat for narrow-body aircraft, specifically the A321-200NX, B737-8MAX and B737-9MAX. The seat is not just a rehash of one of TSI's existing economy models: this design features a new backrest frame and back foil, and uses special materials and minimized cushion foams for optimized lightness. To ensure comfort, ergonomics development studies were undertaken with specialists, with six forms and two seat widths tested by various passenger profiles that included 120 postures.

The result of all this research is a 6in recline as standard – with the option to extend, depending on the seat pitch – and a fourway headrest with rotating ears as standard, with a six-way version available as an option. The armrest has a curved form that enhances comfort, especially for middle seat passengers, who often find both armrests occupied by the passengers to their sides. As an option, airlines can order the middle seat wider than standard to increase comfort for those passengers.

The seat is designed for legacy carriers, and will be equipped with a 12in IFE monitor and a choice of three backrest designs to allow airlines to mix and match features to tailor the seat according to their specific requirements. In-seat power is now in major demand, so the seat features both USB and 115V AC outlets.



TSI has ambitions to rank

among the world's

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Aircraft types: A320 and B737 as domestic business class; B787, B777 and A350 as premium economy Pitch: 38-42in

See our website for full details of the customized Optima seat created for United's Polaris class The first delivery of Vector Premium is expected during the second quarter of 2018

Business

CUBIST MOVEMENT

The Vector Premium model is the newest member of HAECO's Vector seating platform, which extends the economy-class range into the single-aisle business class/wide-body premium economy sector of the market.

If you think it looks angular, there is a good reason for that. Mark Peterman, president of HAECO Cabin Solutions, explains that the aesthetic philosophy behind the seat "takes its inspirations from the cubism art movement. The Vector design will create a substantial presence and sense of opulence inside the aircraft cabin".

There is also a sense of comfort, with ergonomic features including 8in recline, and a leg rest that can be deployed to create a 60° resting angle.

Further benefits of the model include a claimed light weight (weight currently undisclosed), achieved through features such as a carbon fiber seatback and pan, along with part-count minimization.

The model is a good fit for airlines that have, or plan to specify Vector economy class models, as their common design philosophy gives a harmonized cabin appearance.

CLOSE COMFORT

Zodiac's Optima is a unique proposition due to its configuration that mixes in-line and angled seats, to bring together the ultimate combination of high cabin density and 100% direct aisle access. This 'herringline' LOPA was originally designed by Acumen, and it can offer airlines 15% more seats in the cabin compared with some standard 3F (full flat, full privacy, full access) business class products - as launch customer United can attest with its Polaris cabins. In the window rows, the in-line seat is fitted next to and parallel with the

sidewall, with two windows, while the angled seat, with one window, is separated from the sidewall by the side furniture and runs along the side of the in-line seat. The center in-line seats nestle into the gap between the angled seats.

Its modular architecture makes Optima highly customizable, with options and customizable areas enabling each customer to inject their brand. For example, airlines can opt to modify the privacy screens, or choose from stowage, lighting and PCU options – they can even opt for a centerline double bed.

- Suitable for: A330, A350, B787, B777
- Pitch: 77-92in
- Width between armrests: up to 21.8in
- Bed length: up to 83.5in
- Bed width: up to 30in
- IFE: up to 18in
- Table size: 19 x 11in





Business

EASY STYLE

Adagio (from the Italian *ad agio*, meaning 'at ease'), a high-density business class seat optimized for an eight-abreast LOPA, is the latest development from Aviointeriors. On a B787 a staggered 2-4-2 configuration is possible, complete with 100% fully flat beds and full aisle access, while in wider cabins, the aisle access can enable additional features

such as sliding doors that can turn Adagio into a mini-suite.

The design teams aimed for flexibility in the design of Adagio so that it can be adapted to different cabin sizes with only minimal work. And as the seat is also suitable for narrow-body application, it can help airlines with multiple aircraft types across their fleets achieve a consistent passenger experience.

Aviointeriors worked with design consultancy Tangerine to maximize the feeling of privacy and space. For the latter, a 16.2-18in-wide footwell affords comfort to taller passengers, while an adjustable IFE screen gives the freedom to move around within the seat space without compromising viewing comfort. To even out the seat offer throughout the cabin, the bed length for the inboard center seats can be extended; extra bed length can also be given to bookers of the outboard window seats.

Minimum pitch: 43in Weight: 80kg Seat width: 20in Bed length: 76.4in Bed width: 26.2in Armrest width: 3in Ottoman foot space: 16.2-18in IFE: up to 21in Layout: B777 – 2-4-2; A330 – 2-3-2; B787 – 2-4-2 Lead time for orders: 12 months from ITCM

IFE PARTNERSHIP

Aviointeriors is collaborating with digEcor to develop a range of TSO-authorized IFE systems that integrates with the company's range of seats across economy, premium economy, business and first class. The partners are working with digEcor's Integrated Flight Experience modular product portfolio, which consists of various sizes of HD screens, noisecanceling technology, customdesigned personal controller and passenger service controls, and USB and 110V PC in-seat passenger power.

The agreement also includes provisioning for retrofit of IFE and passenger power into in-service Aviointeriors seats.





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Business

Venture is offered with a three-point harness and no airbag

LOGICAL VENTURE

Venture is a good option for Dreamliner operators, as Jamco collaborated with Boeing and Teague to make sure this seating product complements the B787 Sky Interior in style and form. The high-density herringbone design works with every available inch of the Dreamliner cabin and every curve of the sidewall to maximize comfort in its 1-2-1 configuration, although it can also be used across an airline's fleet – including narrow-bodies.

A big selling point of Venture is its minimized parts count: some 30-40% fewer components than some competitor seats, according to Jeremy Hunter, senior program manager at Jamco America. A notable example of this minimal approach is the reduction in seams, which reduces seal part count and maintenance and gives a clean appearance, particularly with the one-piece seatback shroud. The single actuator and three-point seatbelt without airbag are other examples of reducing weight and maintenance.

Another interesting facet of the shroud – and indeed all other composite parts in Venture – is that it is made in-house at Jamco. The company buys in the materials from a third party, but they are then manufactured at Jamco facilities using proprietary processes. "We control our supply chain in order to mitigate risk," explains Hunter, adding that the in-house FAA ODA and EASA DOA certification capabilities also help.





AN ENHANCED JOURNEY

The Sky Interior was again a key design influence with Jamco's Journey B model, an update and upgrade to the Journey seat. As with Venture, the model has a lightweight steel seat structure with Jamco-patented composite panels, and no airbag. Another pleasant point in common is that seamlines and parts count is minimized. Where Journey B differs is that it is a more conventional forward-facing model, primarily intended for a 2-2-2 layout.

The upgrades include the meal table switching from a cassette fold-out table to a simpler – and easier to operate – push-button fold-out system. The center console has been narrowed to increase seat width to 24in, and the privacy level is being evaluated, with a potential expansion of the divider screen in the pipeline.

Jamco cannot disclose the launch customer for Journey B at present, but has stated that they are undergoing the certification process together.





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The double seats are offset at 12°, with the tables also offset

KEY CHANGE

lacobucci HF Aerospace has collaborated with Pininfarina, the famous Italian design house, to create Cambiano (Italian for 'change'), a medium-haul in-line seat which is the company's first foray into

the business class sector, having previously only offered first class – although the company classifies Cambiano as super business class seat due to the high-end finish.

At first glance, the automotive background of Pininfarina is clear (the studio has designed many Ferraris), with quilted Alcantara lining the backshell, and the finishes are of automotive quality,

with tight tolerances and no visible screws, rivets or attachments, even in the fully flat position.

The design is contemporary and comfortable, with a 2m bed at a 67in pitch, a 21inwide seat, 18in IFE (12-20in is possible – it is 16in on Cambiano Cambiano also features slick in-seat LED lighting. in-seat LED lighting lacobucci is working with lacobucci is working with lacobucci is working with lacobucci is working with he systems, PGA on the systems, Mich can be tied in which can be tied in with the cabin lighting

• Weight (fully dressed): No more than 165kg (350 lb), with IFE

COBIN

- Pitch: 60-70in
- Bed length: 2m (6.6ft) (guaranteed at 67in pitch)
- Width between armrests: 21in
- Center console width: 7in

Business

the demonstrator) in an elegant curved wraparound bezel, and a 47L stowage area under the ottoman. As a nice detail, the stowage is also lined with Alcantara, while even the life vest compartment – located under the leg rest to maximize living space – is leather-lined.

The demonstrator shows how Cambiano would look in an A320, for which it enables maximum aisle width, and it would make a luxurious singleaisle seat, in line with airlines' long-haul products. Wide-body options (four, five and six abreast) will follow, once the single-seat version is completed. lacobucci expects to complete certification for the double seat during 2017.

NEW BUSINESS CLASS FOR THE FIRST B777X

The executive board of Lufthansa Group has revealed that it is planning a completely new business class seat for its B777Xs, for which it is launch customer, with first deliveries due in 2020. 'Perfect customization' and digitization are themes of this new generation of seats, with a prime example being that passengers can control their seats and IFE wirelessly using their own smartphones or tablets.

"This seat will be more than 'just' a seat. It will meet the specific needs of customers – no matter whether they prefer to work or sleep, or whether they are traveling with their families or on their own for business. You really have something to look forward to. Let us surprise you," said Harry Hohmeister, member of the board of directors at Lufthansa Group.

The seat is also an example of a new strategy within the Lufthansa Group: an increasingly joint responsibility for processes. For instance, the new seat is being developed for the network airlines Lufthansa, Austrian Airlines and Swiss, collectively.

ALOHA MAXIMA

A heavily customized version of the Maxima model from Optimares is flying with launch customer Hawaiian Airlines on its A330s. The IFE is tablet-based, with the devices held on telescopic arms, and not having embedded IFE has opened up exciting design possibilities for the seatbacks. The team created a wave-like backshell 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. 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.



Business

This year Recaro received the coveted Supplier Support Rating: Service and After Sales from Airbus

NARROW-BODY COMFORT

Recaro Aircraft Seating has enhanced its narrow-body business class offering with the CL4710 model. The seat – which weighs approximately 27kg per pax – is the successor to the CL440 model and features a calf rest that is adjustable in both length and angle, which automatically adapts to each passenger's individual leg position. Other comfort improvements include armrests for each seat so there is no need to share with neighbors, and a flexibly adjustable headrest that supports the neck and enables the passenger to make use of the side support to rest their head.

The CL4710 has also been designed for use as a workplace, with all controls within easy reach. From the outer console, a large table with a tablet holder can be extended over half or the entire seat surface. The power, audio and USB ports are integrated into the center console, making them easily accessible without restricting the living space.

- Seat width: 21in
- between armrests
- Recline: 9in
- Minimum pitch: 37in

Recaro is offering wellbeing options on its CL6710 business class seat, including heating, massage and additional massage and additional fighting options. The lighting options. The features can be controlled features can be control unit or via the seat control unit or a smartphone app

CLEAN LIVING

Recaro Aircraft Seating is working with antibacterial science to apply special bacteriakilling coatings on frequently touched plastic surfaces in the cabin, such as tray tables, armrests and seatbacks.

According to Marc Schmidt, development engineer for composite materials at Recaro Aircraft Seating, the antibacterial coating is effective, regardless of the cleaning cycle, and it has also been found to make surfaces more resistant to scratches.

The antibacterial efficacy has been demonstrated by the Hohenstein Institute, and according to Recaro, during laboratory examinations, 99% of bacteria on test samples disappeared within three hours thanks to the coating's antibacterial properties, and after 24 hours over 99.9% had disappeared.

LAUNCH CUSTOMER

With more than 80% of Alaska Airlines' fleet currently equipped with seats from Recaro Aircraft Seating, the carrier is taking the relationship a step further, becoming launch customer for the CL4710 as its first class seat for domestic and shorter international flights, to be installed on its Boeing and Airbus aircraft.

"We are thrilled to be the first airline to debut Recaro's newest luxury seat to our guests. Our discerning flyers can look forward to a top-of-the-range new first class seat that offers them greater comfort and premium features," stated Brad Tilden, CEO of Alaska Airlines.

The seat will be manufactured at Recaro's production site in Fort Worth, Texas, which in 2013 was more than doubled to cover approximately 250,000ft², and the annual production volume increased to more than 30,000 seat units.





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Business

A GEM OF AN IDEA

Inspired by the many-faceted gemstone, Opal is the new business class seat from Stelia Aerospace, a staggered business class seat for wide-body aircraft. The efficient layout is claimed to afford space for up to four additional passenger places or additional space for monument installation.

With installation possible from 40.5in, direct aisle access for all and a multiposition TTOL function, Opal is a strong four-abreast offer. Opal has also

been designed to reduce the cost of customization, with the backshell shape, console form and function, as well as the aisle-side privacy levels, all able to be tailored to the airline's brand experience with minimum impact on the baseline product.

A plug-and-play 18in screen allows for easier mid-life IFE upgrades, taking advantage of new viewing technology.

- Weight (fully dressed): 75kg per pax
- Bed width: 26.4in
- Bed length: up to 2.2m (86in)
- Seat width: 24.8in
- Minimum pitch: 40.5in

CELESTE JOINS A320 FAMILY

Stelia Aerospace's Celeste business class seat is now fully offerable on the A320 family of aircraft. Airbus has granted full offerability for the mechanical seat, ahead of first aircraft deliveries to two customers in 03 2017.

Celeste is a cocooning seat designed for short- and medium-haul sectors up to six hours. It offers a deep recline position (40°, equivalent to 11.5in), and for privacy a fixed backshell, high console and privacy screen options.

"With four launch customers across three regions, there will soon be more than 200 seats flying in

which passengers can have the Celeste experience. We are also working hard to sign up our launch customer on B737," says Thierry Kanengieser, VP of cabin interiors at Stelia Aerospace.



SOLSTYS ENHANCED

Stelia's Solstys III platform enters service during Q2 2017, with three A350 customers being delivered this year, and more coming in 2018. The next stage in the evolution of the seat is that it can now be converted into a mini-suite with the addition of a door and movable privacy partitions. To further enhance the experience, longer beds can be installed, and even double beds for a honeymoon passenger configuration.





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Crew seats

DOUBLE LAUNCH AT AVIOINTERIORS

Launched in February, the Andromeda crew rest seat from Aviointeriors is intended for the B767 in a 2-2-2 layout. Comfort features include 20in between the armrests, memory foam in the seat cushion and seatback, a 45° recline, a leg rest with footrest, and a meal table that can fold, slide or swivel. The seat is compliant with EASA Class 2 Regulations, and its aluminum construction brings weight down to 40kg.

In September 2016, Aviointeriors also launched the Columbus model for the B767 and B737, and it is already flying with the first customers. Available in double and triple configurations, the seat is fully compliant with EASA Class 3 regulations, with comfort features including a 40° recline, memory foam in the seat cushions, and a leg rest and footrest. Columbus is also constructed from aluminum, with a basic weight of 18kg. The lead time for Andromeda orders is six months

ASI SECURES FIRST CUSTOMER FOR CREW SEAT

Airline Services Interiors (ASI) has developed a Class 2 crew rest seat that offers a 20in seat width as well as a 45° recline, leg and foot support and Supracor's Stimulite Honeycomb seat cushion comfort system.

The first customer is Milan-based charter airline Neos, which in July 2016 ordered 25 of the seats, to be installed on board its B737-800s and B767-300s. The seat entered the test phase after a mere six months in development, through a cooperative project between ASI, SWS Certification Services, and conceptual design consultancy Blue Sky, with a timely Q1 delivery.

"The Neos crew rest development was a very challenging program from a certification and testing point of view, involving new seat design involving new materials in a very aggressive timescale," comments Claire Demarquet, SWS's head of engineering.

B777X ATTENDANT SEAT UNDER DEVELOPMENT

Boeing has been working with new seat manufacturers in recent years, with the B777X attendant seat being another example as it is the first time that Boeing has awarded a cabin attendant seat program to Ipeco. The company has been selected by Boeing to design and manufacture a High Comfort Attendant Seat (HCAS) for the Boeing 777X. This deal follows on from the contract award last year for the pilot and observer seating for this new program. The HCAS will be offered as an option to airlines, with an anticipated selection rate of up to four seats per aircraft.

Embraer named Ipeco Supplier of the Year for its crew seat development work on the E2

FIVE-STAR FACILITIES

Zodiac has been developing 'five-star spaces' for crews in the next generation of long-range aircraft, designed to offer a sense of spaciousness and comfort.

As research and technology manager Tom Schreuder tells *Aircraft Interiors International*, the materials, color and lighting have been developed to meet crew expectations in a number of practical ways. For instance, centrally located light sources have been abandoned and replaced with more effective lighting along the outer walls of the rest, eliminating dark spots and shadows. "This makes each bunk a more inviting and spacious area for the occupant," he says.

Each bunk also has curtains that enable occupants to fully close off their own space.

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AN INTEGRATED FUTURE

Separate fully articulating headrests could soon become a thing of the past, according to James Tanner, associate director at Factorydesign.

Tanner notes the evolution of seat design, with better use of ergonomics, materials and fabrics, and advances in manufacturing techniques. The improving integration of slimmer IFE screens is helping to produce ever-lighter, thinner, more integrated, more comfortable seats that give more space to passengers, even in a restricted pitch.

"This could spell the end for separate fully articulating headrests – especially on shortrange flights – as a fixed headrest that forms part of the seat has significant weight, maintenance and component cost savings. All that makes them very tempting to airlines," says Tanner.

"In long-haul business class and first class, the headrest forms part of your bed, so it continues to move away from the traditional airline headrest and will become simpler and more elegant, with less articulation."

However, the separate headrest may still have a future in some applications. "The headrest's best chance of not becoming merged into the seatback seems to be on short-haul business and long-haul economy flights, where there are tangible benefits to passenger comfort. Material and technological advances will allow headrests to be adjusted to a tailored fit for individuals, with more articulation and more reliability."



Sound shower

Acumen Design Associates is a design agency with some innovative headrest ideas already flying. A prime example is Etihad's A380 and B787 fleet, for which Acumen redesigned the headrest of the Zodiac 5751 economy seat to include a fixed wing. The wing enhances privacy and comfort, giving passengers a large stable surface to rest their heads against, effectively giving everyone window seat comfort.

Jonathan Fenton, senior designer at Acumen, believes that there is yet more untapped potential in the headrest. "In recent years the size and quality of IFE screens has improved. Unfortunately, the same cannot be said for the audio.

"As the quality of wireless headphones improves, and technology such as active noise cancellation becomes more effective, future headrests can provide a wire-free experience. By incorporating 'sound shower' technology into a curved headrest design, airlines will be able to offer cinema-level surround sound while also improving comfort and head support. In doing so, the headrest will help reduce background noise (mainly the drone of the engines) without disturbing neighboring passengers."



"Headrests have been receiving some attention recently, with new ergonomic designs and comfort-enhancing features, especially in economy seats, where the lack of passengers' head support is more apparent than in premium seats," says Cristian Sutter, a cabin design specialist at British Airways. "But despite all these improvements, the headrest is still very much a passive element of the passenger experience.

In the future the headrest will play a more important role as a passenger touchpoint, integrating soundenhancing features such as noise canceling and built-in speakers that create sound zones only audible to the passenger and eliminating the need for headphones.

Taking into account future VR IFE, motors could be integrated into the headrest to support and lead the passenger's head movements according to the VR content, which would make for a more involving experience. An active headrest could also have the benefit of supporting and compensating for undesirable passenger head movements during heavy turbulence."



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MATERIAL IMPROVEMENTS

Disruption-averse airlines may be interested in ideas to improve headrest comfort through the use of new materials, as Maria Kafel-Bentkowska, senior CMF at PriestmanGoode, posits.

"Passengers are expecting increasingly high levels of customization and comfort, regardless of which class they are flying. As new materials and technologies continue to develop, we need to do away with the idea of a 'standard' seat or headrest and work with advances in new materials, looking at both low- and high-tech solutions. Meshes and shape-memory polymers would allow headrests to adapt and suit the needs of each passenger. Using mesh knitted fabrics that nestle the passenger into position would also offer greater articulation and flexibility. Our efforts need to focus on improving passengers' physical comfort, as well as facilitating maintenance through the use of selfcleaning, self-healing materials.

"Shape-memory polymers triggered by temperature would work in a different way, but could help alter seat temperature to suit each passenger's preferences."

Blowing up convention

Back in 2004, when designing the second generation of BA's Club World seat, Tangerine ditched the heavy, lumpy headrest mechanism and replaced it with a lightweight bladder that is inflated using the lumbar pump, giving occupants the flexibility to tailor their comfort.

Tangerine has revisited the idea of the inflatable headrest with a concept that can remove the weight, complexity and manufacturing costs of current headrests. Inspired by the plethora of neck-rest products that are increasingly brought on board by passengers, Tangerine's concept is an inflatable headrest that is held to the seat by straps. The headrest comprises three inflatable chambers that are interspersed with valves that can be tweaked by the passenger to manually add or reduce air pressure in each section of the headrest to tailor the pressure for their comfort. Two sprung straps allow the height of the headrest to be repositioned and held *in situ* once a comfortable

position has been found.



CATHAY PACIFIC GRASPED THE POTENTIAL OF THE HEADREST WHEN CONTEMPLATING THE NEW ECONOMY CLASS FOR ITS A350. ITS DESIGN PARTNER, TANGERINE, MODIFIED THE PRINCIPLES OF AN EXISTING HEADREST TO CREATE AN INNOVATIVE SOLUTION WITH 'EARS' THAT FOLD OUTWARD TO IMPROVE LATERAL HEAD SUPPORT

JUCKY EIGHT

Zodiac Seats is of the view that the number of passengers coming on board with their own neck pillows is indicative that existing headrest solutions are not fully satisfactory, especially in coach. Teams at the company have considered the trend of airlines improving headrest comfort with measures such as pillows that can be affixed to the headrest,

fixed-wing headrests and six-way headrests.

Zodiac Seats analyzed existing headrest solutions and ran several comfort and ergonomics tests with travelers. The conclusion was that more movements are needed to increase comfort while adapting to the various heights, shapes, sizes and sleeping preferences of passengers. The result is an eight-way headrest, which offers many options for manipulation to suit seated comfort, sleeping comfort and privacy levels. Following several iterations of the concept, a prototype was demonstrated on the Z300 economy seat at Aircraft Interiors Expo 2017, and Zodiac has reported that feedback was "very positive".

LOVE U

Turkish Airlines believes that advances in seat weight reduction should allow a little extra scope to include features that could enhance comfort and resolve common passenger complaints.

Thus it has designed the U-Headrest, a U-shaped design comprising a cushion and an inner inflatable part. In the upright position, the headrest sits almost flush with the backrest but still provides support to the neck and the head.

When pulled downward, the headrest then fits around the neck for support, with adjustable sides for a tailored fit.



Systematic approach

The team at JPA Design has found that, apart from supporting the head, the economy class headrest doesn't really offer much to the experience. Thus they have devised a concept that imagines an improved functionality and ergonomic arrangement.

"We see this headrest as more of a 'system'," explains Tim Manson, design director for transport at JPA Design. "It's a design that is highly customizable and can be upgraded and downgraded for different airline and passenger needs. The headrest consists of three parts: a rear housing that provides useful functionality such as security storage; headphone sockets and USB charging; and an 'always on' lightweight fiber-optic reading light that only illuminates when it's revealed."

The unit is mounted to the outer sides of the seat, which allows for greater up-down travel, making it ergonomically effective for smaller and taller passengers. Another benefit of this design is that the IFE monitor can move forward, thereby creating a slimmer upper seatback.

The headrest pad has both an outer and inner 'A surface'. Being deployed from its short edge, it provides a perfect sleeping corner with greater privacy than most headrests today.

"In development for the cover is a 'technical knit' surface, using knitted covers that provide controllable flexibility, much like a modern sneaker shoe or office chair, which with the 'sleeved' antimacassar gives a contemporary look," says Manson.

> FOR MORE VIEWS OF JPA'S HEADREST IDEA, VISIT THE IMAGE GALLERY SECTION OF OUR WEBSITE

DOUBLE HINGED

The industry's first double-hinge system for headrests has been developed by HAECO Cabin Solutions. The Arc headrest can support a passenger's head and neck, following their individual contours, and is enabled by a five-segment, articulating joint cushion system. Even with limited recline, the passenger's head can be cradled from ear to ear in a full 180° curve, with a vertical tilt mechanism that pivots between 0° and 10° to cradle the head from below, and a linear guide system that allows height adjustments of up to 2in.

Arc is available as a selectable feature on HAECO's Vector seating platform and also as a standalone product for retrofit, with multiple points of customization.



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180°

honors Visit

WITH 85 SUBMISSIONS FROM 21 COUNTRIES, COMPETITION WAS TOUGH IN THIS YEAR'S CRYSTAL CABIN AWARDS. THESE ARE THE INNOVATIONS THAT AN INTERNATIONAL PANEL OF AIRCRAFT INTERIOR EXPERTS HAS VOTED THE BEST IDEAS FOR THE PASSENGER EXPERIENCE



THE AWARDS

The best ideas for the future onboard experience – both short term and longer term – have been decided by a 25-strong panel of aircraft interior experts. This, the 11th year of the awards, an initiative of Hamburg Aviation, was more international and more hotly contested than ever before, with 85 submissions from 21 countries.

The awards process

All entries to the competition are examined by the Crystal Cabin Awards Association preselection committee to ensure that entries comply with the rules of the awards, and a shortlist of the best entries is then created.

The shortlisted entries are then evaluated and scored by each judge separately, according to the grade of innovation, operator benefit and passenger benefit. The first-round voting results in a list of the top-three finalists in each category. To eliminate any possible conflicts of interest, members of the panel who have any relationship with an entry under evaluation must abstain from voting.

These top-three entries are then presented in person to the judging panel at an evaluation day in Hamburg, with applicants quizzed and all manner of prototypes tried and tested. There follows intense discussion of the entries, a final voting process, and then the winners are decided.

Cabin concepts

WINNER: DELTA ONE

Delta Air Lines triumphed with its Delta One business class suite, with privacy levels that bring a first class feel to business class travel. The suites will be introduced in the autumn of 2017 on Delta's A350 fleet, and each of the 32 seats will be accessed via a sliding door. The spaces are private, but moveable dividers between the center suites enable a more sociable experience.

The suite is a heavily customized version of Thompson Aero Seating's Vantage XL platform, fettled by the Factorydesign studio in London.

"Everything on the seat was customized," explains Ryan Graham, a senior designer at Factorydesign, adding that the space to include doors was enabled by the A350's generous cabin width.

The doors are a star attraction of the suites, but within the space, passengers will enjoy lie-flat beds, 18in HD IFE, ambient lighting, memory foam cushions, USB and power ports, and dedicated stowage compartments for shoes, headphones and laptops.

"Delta is elevating the international business class experience," states Tim Mapes, senior vice president at Delta. "Added comfort and privacy are important to business travelers, and that drove the design."

Following the A350 debut, the suites will be progressively rolled out on Delta's B777 fleet.

A battle of titans

Delta One triumphed against stiff competition. Runner-up United Airlines' Polaris business class has an innovative cabin configuration that offers allaisle access seats in a density neutral layout, without compromising space or comfort. Polaris was created in cooperation with Acumen, PriestmanGoode, Zodiac Aerospace, EnCore, Boltaron and Kydex. Also in contention for the best cabin category was Bombardier with the cabin for its C Series, the first completely new short- and medium-haul airliner for 30 years.

Cabin systems WINNER: DIEHL Power and data cables are heavy and can lead

Power and data cables are heavy and can lead to 'cable spaghetti'. Imagine if the power cables could also carry data, reducing complexity and weight, and even allowing a little extra cabin space to be carved out through the reduced volume. This is just what Diehl Aerospace has envisioned with its Power Line Communication concept, and it has proved to be a winning idea.

The notion of 'free-loading' data flows (including Ethernet, CAN and ARINC429) using existing power cabling was developed in cooperation with Lucerne University of Applied Sciences and Arts, and in addition to the obvious benefits of saving weight, further potential advantages of the concept include reduced installation time and effort, greater flexibility in cabin layouts, and simpler changes to cabin configurations.



USEFUL COMPETITION

Diehl was up against the Watchdog from Airbus, which addresses the problem of accidental activation of the emergency escape chutes when crew members open the aircraft doors in normal circumstances, by using a sensor that warns whenever a movement is detected near the door handle.

Zodiac Aerospace was also in the running with a sensor: the ECOS cabin baggage management system for overhead compartments, which has lights on the lockers indicating free space for cabin baggage, as well as offering a little extra space for cases.

Electronic Systems WINNER: GLOBAL EAGLE

The proven Airtime wireless IFE and connectivity portal from Global Eagle triumphed in this category. Currently installed and operational on over 800 aircraft, Airtime enables inflight streaming of live TV, on-demand movies and television shows, games, music, digital publications, flight tracking and destination information to passengers' personal mobile devices, and passengers can also use the system to connect to high-speed internet. Global Eagle can offer this content through its own portfolio and can also work with airline clients to create customizable branded campaigns across the user interface, as well as advertising and sponsored content tailored for passenger demographics and routes.



HIGH-TECH COMPETITION

Airbus impressed with its radio-based wireless communications system, whereby smoke detectors, lighting and temperature regulation can be controlled via radio frequency, saving cable weight and complexity. Lufthansa Technik made it to the finals with its Niceview mobile product, a new take on the popular moving map, which offers passengers a way to follow their journey via interactive maps on their personal mobile devices.

Greener Cabin, Health, Safety and Environment

WINNER: RETROLLEY

A simple but effective idea, the ReTrolley enables crew to separate waste into recyclables and non-recyclables as it is collected in the aisle, thus increasing an airline's proportion of recycled waste and improving its ecological credentials. Better still, a simple manual lever compression system enables the volume of the waste to be reduced by up to 30%, saving space in the galley.

ReTrolley is based on a concept first designed by students at the University of São Paulo in Brazil and later advanced by Airbus Innovations experts. As part of the Airbus BizLab Accelerator program, the concept was validated with airlines last year using a demonstrator.

An Airbus quartet

Airbus was involved in four winning projects at the Crystal Cabin Awards that could improve passenger comfort. "Winning several categories at the aviation's 'Oscars' shows that we are constantly pushing the latest in innovative cabin design solutions," states Ingo Wuggetzer, vice president of Airbus cabin marketing. "This means we stay true to our Airspace principles, delivering comfort and benefits to both passengers and airlines."

Passenger Comfort Hardware

WINNER: RECARO

Airlines dream of being able to tailor the cabin for each flight, and the winning Smart Cabin Reconfiguration idea could make it happen. Recaro collaborated with Airbus and seat rail specialist THK on this innovation, which means passengers can benefit from the space taken by unoccupied seats.

By simply flipping up the rear seats and sliding back the remaining seat rows, cabin crew can adjust seat pitch based on flight reservation data – within a turnaround. The idea is initially intended for the A320.



QUICK AND EASY

Bombardier's second finalist in the awards was its concept of barrier-free toilets for PRMs on its CRJ range of aircraft. Bombardier was facing off against Diehl Comfort Modules, with its bar module – developed in collaboration with Lufthansa Technik – that can be integrated into the galley in just a few simple steps, transforming a functional kitchen space into a bar or a duty-free sales counter.

University WINNER: HAMBURG UNIVERSITY OF APPLIED SCIENCES

For passengers with limited mobility, independence on board an aircraft is highly desirable. The Smart Onboard Wheelchair makes this possible. The passenger can roll it over the toilet seat unassisted, aided by a specially shaped seat. This is an easy innovation to implement across a fleet as no structural changes to the aircraft lavatory are required. The wheelchair was designed by students of the Hamburg University of Applied Sciences, supported by Airbus experts. The project was tested by wheelchair users, whose verdict was 'easy to handle, stable and safe'.

Delft double

The Hamburg students triumphed against two finalists from Delft University of Technology. Myseat guides passengers all the way from check-in to their seat using Bluetooth technology, while the Revitalization System turns the seat into a game controller, with body movements controlling the IFE system.



Materials & Components

WINNER: OCTASPRING

A collaboration between Vanema, Boxmark, Stelia Aerospace and Airbus promises to enhance longhaul seating comfort and also reduce weight. They have developed Octaspring, a foam spring that combines the support of foam with the functionality of a spring, while using less material than a solid foam – making it a claimed one-third lighter than an all-foam cushion, with eight-times better ventilation.

The foam springs are placed individually within a seat and move in three dimensions for optimal weight distribution and pressure relief. Springs of varying density can be used in the same layer to create targeted zones, which increases comfort and extends the structure's lifespan. &

A LITTLE SUPPORT

The Crystal Cabin Awards are sponsored by the Free and Hanseatic City of Hamburg and supported by several partners including Aircraft Interiors International, Airbus, Aircraft Interiors Expo, Altran, ATR, B/E Aerospace, Boltaron, Boxmark, Diehl, Flight Chic, HAECO Cabin Solutions, Jetliner Cabins, Lufthansa Technik, Recaro Aircraft Seating and Sekisui SPI.

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MARTIN DARBYSHIRE, CEO OF TANGERINE, DISCUSSES WHAT THE FUTURE HOLDS FOR THE AIRLINE PASSENGER EXPERIENCE

e talk a lot about customer experience rather than just the design of the aircraft interior because our focus has got to be about points of differentiation. They manifest themselves in a physical form, in the look and feel of a brand's positioning, and also in how they change what the customer does and how they do it. People want a joined-up experience, tailored via real-time information, targeted at them as individuals, not as generic groups.

An example is the Digital Sky collaborative concept between Thales and B/E Aerospace, where we designed the interface and an economy class seat featuring a 21.3in IFE screen. The design was created in anticipation of passengers soon being able to pay for things on board aircraft that are currently bought on the ground. It is very digitally oriented and demands ground-to-air connectivity, but allows the customer to do things that aren't going to burn up internet bandwidth, like watching real-time movies or TV do. The transactional end has to be made reliable, then passengers could order duty free online to be sent to their home, arrange onward travel, or make changes to their trip. It could remove the barrier of isolation one currently tends to have.

At the same time, customers are getting on board with their own devices and content. Airlines are responding with attachments for these

devices. We designed a solution for Cathay Pacific's A350 with a seat manufacturer and a leading IFE manufacturer, with a storage area and a rest for a device. IFE systems are incredibly expensive, in some cases costing more than an economy class seat, so it's not easy for airlines to change those systems. Many carriers are now enabling interaction between the two systems in a bid to generate greater revenues.

One of the biggest barriers in the aircraft world is finding the right balance between delivering security and a seamless journey. There could be more 'pre-getting to the airport' security checks. Some of the Middle Eastern countries have invested heavily in first class, giving passengers dedicated security channels. I think those are really big changes.

Emerging 'sense technology' is also important – the integration of switching or the movement-tracking of people. There are systems starting to be presented that will help airlines understand how people behave on aircraft – these could help the crew understand how to deliver a better service. Whether it's tracking people sleeping, or just viewing, i.e. what's their 'mode'? Localized lighting and modifying air-conditioning systems could also be important to people's comfort. They should be more tailorable than they are now. Currently, crews still use aircraft temperature as a means to change passenger behavior.

I think you are going to see business class seats become more like a car seat, where it automatically changes to preset positions. Materials that can wick moisture away will be important too. If you've ever been on a business class lie-flat bed with a blanket on top, you tend to wake up feeling very warm. It's challenging in an airline context because you need fire blocks over the foam, which tend to block out moisture, but I think it will become possible.

Overall, the industry has invested heavily in improving airports and aircraft, but there's still plenty of room for innovation inside the cabin.

DIGITAL SKY'S LARGE SEAT-BACK DISPLAY ALLOWS PASSENGERS TO SHOP, PLAY, LISTEN, EXPLORE AND WATCH SIMULTANEOUSLY, USING A SPLIT-SCREEN FEATURE

PROPS & JETS

JOURNEY INTO THE UNKNOWN...

At The Future of Transportation World Conference on July 5-6 in Cologne, Germany, Martin Darbyshire will be discussing unlocking innovation through a designer's insight into the human behaviors of today, to create future experiences that meet the unmet desires of tomorrow. With almost three decades' experience creating paradigmshifting products, services and experiences for global brands such as British Airways, LG and Toyota, Martin will detail how design can create transportation solutions with exceptional customer experiences that meet the unimagined future needs of passengers and providers.



rains are incredibly complicated objects, fraught with regulations. They involve pretty robust heavy engineering, so you need to be thoughtful when designing them. They get incredibly hard use too. People can treat trains very harshly, almost to the point of trying to break them. Just think of a train full of soccer supporters jumping up and down on the seats. Trains are also in the realm of public transport, so that's where design can play an important role, to make them feel less institutional, so people have bit of respect for them. That's what we've been trying to do with the New Tube for London.

People aren't moving as a crowd as they used to, because they're so absorbed by hand-held devices. Crowds are becoming less efficient. You could call it more selfish or 'less other-people-aware' but if they block others, even unintentionally, it's a problem as the dwell time of trains in stations is critical to get people through a network.

The use of trains is going up in most cities, but we can't build the infrastructure fast enough to cope with demand. We've done a large piece of work looking into overcrowding on trains and come up with two solutions that allow 30% more seating.

One solution is called Horizon, which we're hoping will be trialled very soon. From our learnings with aircraft we've created a seat with a shorter pitch, so you sit in a more upright position. It's not a perch seat – you can take the weight off your feet and fall asleep, but by raising the seat it does a number of things: you can put the seats slightly closer together, but also put bags under the seats, rather than above. And we can fit four of our seats where a normal row of three would go. The idea is that one or two cars in the train set will be designed for commuters



PAUL PRIESTMAN, CHAIRMAN OF PRIESTMANGOODE, ON HOW AIRCRAFT CABINS ARE INFLUENCING RAILWAY CARRIAGES

BELOW RIGHT: THE STAGGERED DESIGN OF THE HORIZON SEAT INCREASES SHOULDER SPACE BETWEEN PASSENGERS AND HELPS IMPROVE THE FEELING OF PERSONAL SPACE only traveling four or five stops and be branded 'Quick-Stop' or similar.

Then we've got another concept called Island Bay. It's about flexible seating that can transform from a [regular depth] off-peak setup to high capacity during peak times, whereby the seats fold up [to become shorter and higher, enabling another seat to be fitted in-between by the window]. Our seats can be retrofitted to existing trains too. They're being crash-tested at the moment. Once they're certified, we can just roll them out.

Mass transit is something we have to make better, because at the moment cities are dying because of the congestion and pollution. We're trying to prove we can get more capacity in a civilized and modern way. Once we can prove that, there's an opportunity for every city in the world."

FUTURE PLANNING AND PRESENT PROBLEM-SOLVING

While R&D into future modes of transport and the long-term direction of rail is undoubtedly important, we must not lose sight of the fact that our current infrastructure is under huge strain and that we need solutions that we can start to implement now. At The Future of Transportation World Conference on July 5-6, Paul Priestman, designer, future thinker and chairman of global transport design consultancy PriestmanGoode will speak about the challenges the rail industry is facing today, and present his two innovative solutions to cope with growing passenger numbers.



FROM THE PUBLISHER OF AIRCRAFT INTERIORS INTERNATIONAL MAGAZINE

NON-POLITICAL GLOBAL THINKING



"Imagining The Unimaginable – How It Will Happen Soon" **5-6 JULY 2017** COLOGNE, GERMANY



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f vou look back to the turn of the last century and the switch from horse-drawn carriages to horseless carriages, the first cars were similar to the old-fashioned carriages. In the same way, most driverless car concepts still look like cars, even if the steering wheel retracts into the dashboard and the seats can revolve around. Car designers are geared up mentally to design these packages like they've done before, where the main focus is the expression of the brand and differentiating visually from other brands. Perhaps BMW or Tesla are being innovative in this space, but I wonder whether the look and function of these vehicles could actually be driven by service providers. There's lots of talk about Google, Uber and maybe Apple working on driverless cars, but I'm more interested in what Fedex, DHL or Amazon might do by rethinking the vehicle as a mobility platform and service, rather than a piece of hardware. The trend is going to move away from owning your vehicle to paying at the point of use. Wouldn't you rather be using a vehicle in the city arranged by Amazon? Imagine the services they could provide.

If these vehicles act in unison, platooning along the highway, think of the efficiencies in terms of windspeed from being behind another vehicle. If you had exclusive highways for fully autonomous and connected vehicles, perhaps you could increase speeds to 200mph.

The other thing that's really interesting for me is that maybe autonomy isn't going to come to cars first. I think there's a lot more potential in what we call utility vehicles, whether that's street sweepers or delivery vehicles, with the kind of robots you get in factories now to move things about. Perhaps these vehicles could be more configurable. Some autonomous vehicles could have a moving architecture. Could you stand up or move around in these vehicles because of improved safety? At busy times they could fit more people in and at quieter times open up to be more spacious. At night they could convert into goods delivery vehicles. There's potential for these platforms to become more like trains, which are designed for 30 years of service, with flexible and upgradable interiors, as opposed to cars, which are designed for considerably less use before being traded in or scrapped.





MATTHEW COCKERILL, CREATIVE DIRECTOR AT SEYMOURPOWELL, SHARES HIS VISION OF A VERY DIFFERENT AUTOMOTIVE WORLD

BELOW LEFT: EARLY AUTONOMOUS VEHICLE INTERIOR CONCEPTS STILL HAVE MUCH IN COMMON WITH TODAY'S CARS – BUT WILL THAT ALWAYS BE THE CASE? IMAGE: BINSDEED Horse riding is now a pastime rather than transport, and I think it will become the same with cars. There will be a fundamental shift. The biggest one up to now has been Uber, with younger people thinking, 'Do I really aspire to having an Audi or a BMW?' The car companies have a challenge here. The smart ones will evolve and perhaps there will be a segment where it's about luxury and the pastime of driving and those top-tier brands will hold onto that. But I think some of the other brands will have to partner with service providers and create the hardware to deliver somebody else's service offering."

THE IN ADI ICATIONIS

THE IMPLICATIONS OF A DRIVERLESS FUTURE

For a century, our cities and our lives in them have been heavily influenced – if not defined – by the car. Although great advances have been made in comfort, features and safety, the basic paradigm of the car is unchanged since carriages became horseless carriages.

At The Future of Transportation World Conference on July 5-6, Matthew Cockerill will explore the implications of a shift to autonomous vehicles and away from private ownership, and the profound effect this will have on the vehicles of the future, the shape of our cities, and the lives we lead in them.

He will be joined by the studio's head of transport, Jeremy White, who will discuss how an interconnected world of multimodal transport will lead to a seamless passenger experience and how rail will play a key part in this execution.

Uncoupled autonomous rail vehicles will provide flexibility for passengers and operators, encouraging rail travel and increasing efficiency, while meeting the capacity demands of the future.
AND BEYOND

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HIGH ART DOWN UNDER

Qantas has teamed up with Buzz and top Australian artists to curate a striking series of international business class amenity kits Qantas predicts passengers will find further personal uses for the kits



antas has teamed up with some of Australia's leading artists, photographers and digital influencers, to feature their work on its international business class amenity kits.

With artworks named Fairy Bread, 7000 Ironbarks and Maaate, the 'Qantas Curates' initiative has seen the airline work with inflight experience specialist Buzz and professional Australian contemporary art curators to select artworks from 16 Australians specializing in a variety of styles including pop culture, photography, fine art, abstract landscape, Indigenous art and textile design.

On May 1 the airline began offering the new range of amenity kits (eight types for men and eight for women) to business class customers on international flights, with two updated designs due to be launched every few months.

According to Olivia Wirth, a Qantas Group executive for brand, marketing and corporate affairs, the airline's vision is to grow awareness of contemporary Australian art and give travelers a collectible piece to take off the plane with them.

"As the national carrier, we're pleased to support talented Aussies telling uniquely Australian stories through their artwork and share them with a global audience," she says. "Along with inflight pyjamas, we know amenity kits are an important part of the international business class experience. Customers love the functionality of our kits and many use them after their flight as make-up bags, an evening clutch or to carry their mobile phones. So the exposure is broad."

Billie Justice Thomson, whose artwork Fairy Bread will feature on an amenity kit for women, said she was proud to be part



of a program that showcases artwork in such a unique way.

"It's really exciting to be part of an art exhibition at 38,000ft. This is a powerful way to share contemporary art, particularly alongside some of Australia's most talented artists," she states. The amenity kits include ASPAR products by Aurora Spa (hand cream, lip balm and face moisturizer), an eye mask in the same artwork as the kit, Colgate toothpaste, toothbrush, earplugs and travel socks.

Qantas has a long history of providing opportunities for Australian artists to connect with global audiences. Most recently Qantas joined Sydney's Museum of Contemporary Art and the Tate gallery in the UK in an international joint acquisition program for contemporary Australian art, made possible through a corporate gift from the Qantas Foundation. 🚳

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A WALK IN THE CLOUDS

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

onseal has provided the aviation industry with unparalleled products and service for over 45 years, leading to the company becoming a leader in resilient vinyl flooring. The company has a wide range of commercial flooring products, many of which it has modified to meet all applicable aviation safety and performance requirements.

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

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

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

AXIS COLLECTION

Axis is an embossed product collection featuring differently scaled coin stampings that provide a variety of choice in terms of color and design options, as

well as outstanding traction, which aids in reducing the risk of slipping. The Axis Collection consists of the Loncoin II Featherweight, Lonpolaris, Loncompass and Lonequator products.

CIRRUS COLLECTION

All four of the new

collections will

be available in

June 2017

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

HALO COLLECTION

The Halo Collection is a series of urban. earthy, raw designs that can make aircraft cabins a more relaxing, inspiring and beautiful environment. The natural look of the collection is inspired by Japanese Zen principles, to reflect

1: THE AXIS COIN-STAMPED FLOORING COLLECTION

2: THE MIRAGE COLLECTION OF WOVEN-STYLE DESIGNS

3: REALISTIC WOOD EFFECTS WITH THE CIRRUS COLLECTION

4: THE ZEN-LIKE HALO COLLECTION

balance, harmony and relaxation. The color scheme of the Halo Collection incorporates organic accents and creates an emotionally satisfying inflight experience.

MIRAGE COLLECTION

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

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GUIDING LIGHT

In an environment where every gram of weight counts, Rollon is striving to make its telescoping and linear guide rails as lightweight as they are functional

0.0 0.01

very gram of weight saved on an aircraft saves money on every flight. With interior parts, because many will be used for hundreds or thousands of flights, the right design can make a huge difference in terms of efficiency and costs.

With respect to the appearance, comfort and safety of all components in the cabin interior, there can be no compromises. Specifically, seating components such as telescopic rails and linear guide rails for seats, tray tables or adjustable furnishings must serve the passengers in a trouble-free and unobtrusive manner from the first day of operation to the last. To achieve these aims it is necessary for all interior components to have an optimal design in terms of having the lowest possible weight, uncompromising stability, a long life and durable comfort.

The international company Rollon Group specializes in producing linear and telescopic rails and has broad expertise in the aeronautical sector and with aircraft manufacturers. The company has strived to perfect its range of weight-reduced telescoping rails and linear guide rails, which are custom designed and manufactured for all individual interior design requirements.

The range of applications for telescoping rails and linear guide rails in aircraft interior design are numerous, from seats, armrests and tray tables, to pull-out displays, sliding tables, headrests and footrests. Partitions and mobile walls, and drawers for trash compactors and kitchen modules complete the range of applications.

When it comes to linear technology for the interior design of aircraft, Rollon relies on its research and development department to study and develop customized linear guides and offer

unique development, production, system and application know-how from a single source. The engineers at Rollon create solutions that are custom tailored to the individual requirements of every interior design project, whether a customer prefers standard products, custom system solutions or wants completely new products to be developed. The company also supplies components to manufacturers of special aircraft, in addition to equipment and furnishings for airports.

Rollon's telescopic and linear guide rails are made of lightweight aluminum and steel, with hardened and ground raceways. They combine attractive and ergonomic design with smooth-running properties and excellent self-alignment. Furthermore they offer additional advantages for the airline companies, including being cost-effective and maintenance-free. Overall they are sturdy and long-lasting components. Depending on the

particular task in the aircraft and the required load rating, Rollon can supply suitable telescoping rails and linear guide rails for the particular project, or construct a completely new design if necessary. The optimal weight reduction for the telescoping rails and linear guide rails is precisely calculated, without influencing the other characteristics. Calculations and tests are conducted for each component to determine where and how to modify the design without reducing the load rating and stability of the telescoping rails and linear guide rails.

Rollon can

develop and

supply custom

rails for client

projects

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VARIATIONS ON A THEME

Thermoplastic sheets from Sekisui SPI can help make cabin designers' wildest dreams a reality

n the September 2016 issue of this publication, Sekisui SPI shared a designer's musings while sketching a seat design concept. In the conceptual sketch, the seat featured 21 major touchpoints for color, trim and finish. The designer's question was, "I have all these ideas. How can I make them happen?"

To the right, you can see the progress the designer has made, using a number of different surfaces with seamless transitions between them. The theme's foundation is the designer's material of choice: thermoplastic sheet.

So what is taking shape and how is the design gaining momentum? A cohesive fit and finish is emerging. With 21 touchpoints for color, trim and finish, there is certainly a risk of the design becoming scattered and overwhelming. What unifies the touchpoints is the designer's strategic use of one thermoplastic sheet product, with integral color and effect combined with the right technologies to achieve different textures and color.

The designer uses two technologies: Infused Imaging and pressure forming. Infused Imaging technology is the solution used for the woodgrain pattern on the side table, while pressure forming will create texture and both high gloss and matte finishes (as seen in the triangular sample at the top left of the storyboard).

Pressure forming also delivers subtlety of color. Because one color can change depending on a surface's texture, varying the texture creates understated hues of the same color that bring about a color movement experience for passengers.

Of course, the materials used in a refined design must also withstand the rigors of heavy wear and tear and stay



beautiful – a requirement not lost on this designer. The thermoplastic materials will not delaminate or show surface wear like traditional materials that use a cap layer because the color and patterns are integral to the thermoplastic sheet. Notably, the materials will also not discolor, because they are resistant to the harsh cleaners used during routine overnight cleaning and heavy maintenance checks.

A designer's vision resolved by materials and technology: a sound composition. \otimes

Sekisui SPI won a 2016 Crystal Cabin Award for its Infused Imaging technology

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HYGIENIC COMFORT

Ebco has developed antibacterial armrest coatings for a cleaner and healthier flight eperience

Have you ever considered how many germs accumulate on an armrest between cleanings? The armrest is one of the dirtiest places on an aircraft seat, and can be infected with pathogens and other germs. Ebco, an experienced supplier of traytables and armrests for aircraft seating, has developed and implemented an antimicrobial surface for its armrests, which are manufactured from PUR polyurethane.

By using this antimicrobial foam – named PUR 159/4F – airlines can reduce the costs of disinfection and the number of cleaning cycles required. The antibacterial properties were proved during laboratory testing, when 99% of bacteria (E. coli and M. luteus) as defined by JIS Z 2801 and ISO 22196, disappeared within three hours.

Hanspeter Ebner, CEO of Ebco, highlights another advantage: "We detected that the antibacterial surface is much easier and faster to clean."

With no impact on weight or comfort, PUR 159/4F fulfills the aviation standards ABD0031 and FAR 25.853b, is highly resistant to abrasion and is available in any color.

With this health-oriented innovation, Ebco can provide added safety for passengers through a reduced risk of infectious disease transmission and enhanced comfort on flights. So



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CLEAN COVERINGS

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

At Aircraft Interiors Expo in Hamburg this year, E-Leather celebrated 10 years of recycling traditional leather waste through its unique clean technology process to create high-performance leather fiber composites.

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



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

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

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

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CLEVER CUSHIONING

What do wheelchair users, fighter jet pilots and aircraft passengers have in common, asks Supracor

Finding comfort on a long-haul flight can be just as challenging for able-bodied passengers as it is for wheelchair users who sit for long hours, or pilots confined to the small space of a fighter jet cockpit. Long periods of sitting can progress from discomfort to numbness, and in extreme cases, cause more serious complications such as deep vein thrombosis and pressure sores. Long-term seated comfort requires a well-designed seat and a cushion that distributes the occupant's weight uniformly across its surface.



Stimulite honeycomb, a technology from Supracor, has addressed the challenges of long-term seating comfort with cushions developed for wheelchair users and fighter jet pilots, and recently aircraft passengers, with launch customer Swiss. The airline selected Stimulite cushions for economy class on its new B777s, as it was convinced by the proven track record of the honeycomb technology in demanding medical and military applications.

Stimulite cushions address the primary causes of sitting discomfort by uniformly distributing the passenger's weight and contouring to their body. The honeycomb cells are perforated, which allows air to circulate and moisture to evaporate. Made from resilient thermoplastics produced by partner BASF, Stimulite cushions are lightweight, durable and washable. They can be customized to any shape and profile, with regions of varying stiffness such as a softer section under the legs. Now airline passengers can experience the same long-term sitting comfort that military pilots and wheelchair users have relied upon to carry out their missions and improve their daily lives. @

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INTELLIGENT AIRCRAFT PARTS

The future is bright for connected devices in aircraft interiors, according to Aerofoams

An interesting concept that made its debut at Aircraft Interiors Expo 2017 was the PowerTray, a joint collaboration between Aerofoam Industries and IFPL. The PowerTray delivers power to a replaceable unit within the seatback tray table, without requiring traditional cables.

At the expo, the PowerTray was featured with bidirectional USB-A connectors and a dedicated charge port controller to enable the tray to 'handshake' with PEDs, negating the need for an upstream host. USB C



connectivity is also available in order to future-proof the product.

Future releases of the PowerTray will include a wireless charging unit compatible with all major smartphones, and a PCU (passenger control unit) can also be integrated.

Matthew Nicholls, sales director at Aerofoams, comments, "As a company, it is important that we consider the changing desires of passengers throughout their inflight experience. The way we watch entertainment is changing and the customer preference is moving toward user-specific media as in many instances they prefer to bring their own IFE content with them. To enable them to watch this content on their PEDs, a



fundamental requirement for passengers is power. Our intelligent collaboration with IFPL will extend beyond food trays and will empower passengers to enable them to continuously access their content in flight."

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Introducing the S2 Staggered layout increases lateral space in long-haul economy





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COMPLEX COMFORT

Slip into something more comfortable, as Hank Scott, founder of Molon Labe, discusses the comfort and ergonomics of the Side-Slip seat design

Airlines and passengers often ask about the ergonomics of Molon Labe's seat designs. We originally designed our seats based on industry standards, but knew we had an opportunity to offer a seat that was not 'one size fits all'. In fact we had two widths to play with, and potentially three seat heights per triple.

As we headed down the path of anthropometric data, we realized that two distinct trends have become evident across the world over the past 40 years. First, people are getting taller; second, they are getting wider.

The height issue often results in a discussion of pitch, but there is more to it than that, as seat or airline marketing experts will tell you. There is pressure mapping, pressure contact points and size, pan angle and foam thickness.

All these factors result in a nice and subjective data set. Subjective feedback is important, but from an engineering/ design point of view, the seated height is the starting point and we then apply the subjective feedback. We were lucky in that we could offer two seat heights, and in theory we could do three heights across a triple. In a world where



customers can individualize their seat preferences through apps, and through booking websites such as Expedia and SeatGuru, we see an advantage for airlines with individualized seat offerings.

For width, the exercise was even easier. Our staggered layout offers a 3in-wider middle seat, but also reduces the contact points between adjacent passengers, in particular the armrest and shoulder area where humans are, on average, the widest. Of course, with this comes the inherent problem of making sure you are maintaining individual living space and privacy – both physically and visually. For us this resulted in design changes in the headrest region, partitioning the eyeline at each seat to maximize privacy. We believe the days of 'one size fits all' are truly numbered, as passengers want a choice. 🔊

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1. THE WHITE LEATHER SEATS CAUSED A STIR AT THE 2007 LAUNCH

2. YOU WON'T SEE THIS LIVERY AFTER 2019

3. THE IFE IN THE FRONT ROW OF ECONOMY IS CLEVERLY INTEGRATED WITH THE CLASS DIVIDER



The year was 2004, Apple was bringing cool design to the mainstream, and white was becoming the new black. With the Virgin Group establishing its Virgin America outpost in the trendy San Francisco Bay Area, there was pressure to make the experience contemporary and differentiated from the typical blue and gray cabin palettes of the domestic competition.

And differentiate they did at the 2007 launch, with A320s featuring a first class cabin with white leather seats, purple-tinted class dividers, and innovative IFE to please the hip and high-tech local clientele.

As Adam Wells, Virgin America's design director (he is now head of design for Virgin Galactic), said prior to the launch of the airline, "We're going to have to see if America is ready for it – we won't truly know if it's a viable product until we launch. US domestic airline experiences right now are fairly similar to each other – it's often hard to tell what airline you are flying on. We wanted to do two things: to solve a lot of the problems with current experiences, and to go beyond just providing solutions, to offer something a bit more ambitious."

There are eight white leather Recaro loungers in first class, although with a 55in seat pitch, 21in width and 13in recline, perhaps the title 'first class' is slightly overstating the premium offer, especially in the face of recent domestic competition such as American's A321T lie-flat seats and JetBlue's Mint suites. However, the seat is not short of comfort, with electrically adjustable leg rests, footrests and lumbar, and a massage function.

White seats are certainly different, but they also served to complement an innovative feature at launch: the mood lighting system. This was a big deal as Virgin America was the first domestic US airline to feature such a system, which was developed with Diehl and features preset daylight, dusk, sleep and dawn modes, complemented by color-tinted windowpanes that reduce glare. No more gray interiors with poor fluorescent lighting that make passengers look and feel lifeless; Virgin America's premium passengers look and feel as good as the interiors, with the colors of the mood lighting also reflecting off the white leather.

Another airline first was the purple-tinted transparent class dividers, developed with Zodiac as a way to define classes without shutting off sightlines and the flow of the cabin design with curtains or solid screens. The dividers look great, and also serve to insulate noise and help with direct view requirements.

The 'Red' IFE system is another heavily customized element, developed with Panasonic. Passengers in both classes enjoy 9in touchscreen monitors with stand-out features including 18 channels of live TV, seat-to-

seat messaging, in-seat food and beverage ordering, and, as a nod to its Silicon Valley flyers, an invitation to Linux programmers to develop customized games. At launch, Virgin America was also the only US domestic carrier to offer multilingual programming.

Virgin America's first class is a bold, confident design, and if you want to try it for yourself, you need to be quick, as following Alaska Airlines's acquisition of the airline, plans for the combined carrier include the retirement of the Virgin America brand in 2019. However, Alaska has stated that the combined airline will adopt many of the Virgin America brand elements to create a warm 'West Coast vibe', including its approach to IFE and mood lighting, to offer a distinctive passenger experience.

Continuing the theme of firsts, the new combined airline will be the launch customer for Recaro's CL4710 domestic first class seat, but it looks like black is the new white – and like Virgin America, the cool purple will be relegated to history.

For a sneak peek at the seat that will replace Virgin America's first class, see p80

two of a kind





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