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#### WHERE NEXT?

t's definitely true - the old adage that time flies. It's impossible to put into perspective the speed with which the 20 years have vanished since we launched Aircraft Interiors International, first as an annual review and soon followed by the quarterly frequency that we have run since 2000.

I recently had the pleasure of chairing our new conference we ran in Cologne this July, namely The Future of Transportation World Conference, at which Airbus and Italdesign participated as keynote speakers talking about their 'Pop.Up' concept, a modular multimodal vehicle that can function as an autonomous car as well as autonomous urban VTOL air transportation. They were presenting in the session labeled 'Getting Transport Off The Ground', where another key player in this area, Volocopter, was also presenting an autonomous urban/inter-urban VTOL prototype - essentially an autonomous air taxi - that is expected to be part of Dubai's Expo 2020. Another advanced player in the realization of what will be a revolution in transport is Chinabased E-Hang, which has successfully demonstrated a single-seater self-flying prototype, the E-Hang 184. In September 2017 Airbus also announced an initiative with HAX, an active early-stage investor in hardware startups, whereby they are joining forces to explore the future of urban air mobility through a four-month accelerator program based in China.

What excites me is that all this is achievable in less than seven years. Yes we really are talking urban air mobility, with relatively low-speed fully autonomous aircraft operated in an Uber-style 'sharing' system flying around our cities. This will be the new face of public transport. If it sounds unlikely, take note: Daimler has just confirmed a €25m (US\$30m) investment in Volocopter, and Airbus's A3 division in Silicon Valley intends to fly a fullsize prototype of its Vahana autonomous VTOL passenger aircraft before the end of 2017.

In these single-, two- or perhaps four-seat aircraft, don't expect to see much in the way of deluxe interior comforts. Most of what you'll see will be touchscreens for destination selection, if you didn't specify it when you booked the flight via an app. Think 'Spartan comfort', as weight will be a prime consideration for these electrically powered UAVs.

At the other end of the scale, a more ambitious possibility may turn up in the form of flying hotels. One particularly novel take on this has come from the Seymourpowell design studio, which has envisioned a rather fabulous hydrogen-powered airship concept, with the comforts of a hotel and incredible views, which can be enjoyed at a leisurely pace instead of having a rushed experience.

What we know for sure is that there will be plenty coming along to keep aeronautical and cabin interiors designers fully engaged. The future of transportation and aircraft will be full of variety, with Richard Branson and Elon Musk bringing intergalactic aircraft to life, plus fully autonomous personal airborne urban transport vehicles and sooner or later - and yes, I do believe this - flying hotels. Adam Gavine and his team will keep you up to speed!

Curry Brinky

Tony Robinson, CEO of UKi Media & Events and founder of Aircraft Interiors International

ABOVE: IMAGE CREATED FOR THE FUTURE OF TRANSPORTATION WORLD CONFERENCE, COLOGNE, JULY 2017

## two of a kind





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#### Up front

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# Design showcase

FACTORYDESIGN: A treat

for Concorde fans as the

studio recalls how it

with the cabin

068

created the interior for

this legendary aircraft –

JPA DESIGN: There are

exciting possibilities in

body cabins, as IPA's

and flydubai show

PEARSONLLOYD:

users for 20 years,

092

This studio has been

transforming the experience of its clients'

including bringing in a

new culture of design

080

projects with Hawaiian

applying a premium wide

body approach to narrow-

and how it is still involved

PRIESTMANGOODE:

This studio is securing

globe by thinking beyond

tube in its designs and by

overcoming regulations

TANGERINE: In 1998,

Tangerine solved the

seemingly impossible for

British Airways with Club

World, which changed the

face of business class

travel forever

064

contracts around the

the constraints of the

TEAGUE: By taking inspiration from Oman's ancient heritage and modern hospitality. Teague elevated Oman Air's business class experience to a new level



ACUMEN: Since 1994. Acumen has been creating innovations that have benefitted airlines' profits and passengers experiences. The studio shares its proud history



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access concept that has

advantages in terms of

efficiency and flexibility

JACOB INNOVATIONS:

aircraft cabin in order

()4.

to create more comfort,

options... and revenues

Clever seating ideas that maximize the use of vertical space in the

living space, spatial

096

ormation has conceived

084

076 DESIGN Q: From AIM ALTITUDE: Harmony of design is important prestigious cars, to aircraft and aircraft interiors, Design Q has had an exciting 20 years.

when integrating frontrow monuments with cabin design, as designer and manufacturer AIM Altitude highlights

088

ALMADESIGN: How the studio blended national heritage, locally sourced materials and global technologies to make TAP Portugal a flag carrier to be proud of



"Look out for gold circles throughout this special 20th anniversary Showcase issue of Aircraft Interiors International. As part of our vicennial celebrations, we asked all our contributors to share their predictions of what changes and trends the next two decades might bring into the aircraft interiors sector."

> Adam Gavine, editor, **Aircraft Interiors International**

# 

# Supplier showcase



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# *"Airlines need to understand that people want flexibility and different options"*

# WHAT COMPETITION?

"It's not about addressing competition, but the passenger," stated Klaus Brauer, Boeing's director of passenger satisfaction and revenue (now retired) on fuselage design in 2008. "Most of the evolution in seating over the last 10 years has been with premium seats." Brauer also had views on the other classes. On private first class suites: "These are exquisite products that we would never have imagined."

And on economy class: "It has the potential to generate lots of revenue, but it has not got the attention that it deserves. Why? Because it's not romantic."

2008

## Take risks

"Take risks and differentiate. Understand your consumers and understand what your consumers want. Provide a menu of product options as opposed to a tiered hierarchy. Airlines need to understand that people want flexibility and different options." This advice was from Paul Wylde, who was part of British Airways' design management team in 2001. "An airline that can provide a menu of options to a consumer, whether they wish to work, play, socialize or sleep, would be a very interesting and exciting proposition. By doing this, you would be effectively removing the classes – first, business and economy – which are antiquated terms anyway."

2001

#### KEEP ON MOVING

"To stand still in this industry is to be overtaken," said Bob Ayling, chief executive of British Airways (1996-2000) in our 1998 launch issue.

*1998* 

## **Embrace design**

Discussing innovation in aviation, Joe Ferry, in his role as industrial design manager at Virgin Atlantic, in 2002 said, "I still think there is an enormous opportunity. If you look at the automotive industry, there isn't one car company that doesn't appreciate that design sells. I still think this approach has some way to go in filtering down through the aviation industry, but whoever does it the quickest and best is going to capitalize on that."

#### 2002

# BE HONEST

Some will think this has changed today, while others won't, but this is what Dr Hans Krakauer, senior vice president of the IAPA (International Airline Passengers Association) had to say in 2000: "The continuation of present, crowded conditions based on permissible safety rules must come to an end. It is only by informing the public of the complications, actual costs and difficulties involved that airlines can hope to gain understanding for the required levels of travel costs. "It is essential that we return to a civil aviation industry trusted by the public. This trust is sadly missing today."



#### "An airline's interiors are of paramount importance"

#### 'FRIENDLY' RIVAI R`

"Any airline that attempts to steal a march on us in the all-important areas of product and service does so in the knowledge that their advantage can only be temporary, warned Michael Tan, EVP at Singapore Airlines (until 2004). Tan was discussing the airline's US\$300m investment in its B747-400 cabins, but it is consistently among the very best in terms of inflight experience. Tan added, "A singleminded approach in putting the customer first is crucial to our long-term investment strategy. We must forge ahead and reassert our leadership in high-quality service and product innovation." Tan left the airline to join Millennium & Copthorne Hotels in 2004.

#### (),(),()FI FXIBI

"If you lock both suppliers and customers in a closed catalog offering, I'm not sure you are meeting market requirements," said Francois Caudron, Airbus's VP of business and customer development for the A350 program, in 2008.

KEEP IT

#### 2008

#### It's all about reputation

"As the part of the aircraft that passengers actually touch and experience on both a physical and perceptual level, an airline's interior is of paramount importance to the ability of the company to earn and maintain a good reputation," said Jennifer Coutts Clay in 2006. She was, and still is, principal of J Clay Consulting and author of Jetliner Cabins: Evolution & innovation. See p184 for more thoughts from Jennifer.

#### 2006

#### Captive audience

"If you want a guiet zone – away from the cockpit - forget it. We want Ryanair to be noisy and full because we will be trying to sell you something," said Michael O'Leary, Ryanair's CEO yesterday – sorry, in 2006. O'Leary has since decided to soften his unconventional approach to customer service with the Always Getting Better program - mainly because he has found that being nice to customers can benefit profits.



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#### symbol of the health of the brand. The psychological reassurance of a quality, detailed napkin ring is a subliminal confirmation that we care for and maintain the aircraft's engines to the best of our ability."

Key focus:

napkin rings

"A total brand experience requires total design management in order to define the macro statements and the micro detail. Qualitative research confirms continuously what we have always

instinctively believed: brands are more often remembered for their smallest, softest details rather than bigger, harder innovations," stated Michael Crump, British Airways' former senior manager

of design management, in 2002. And Crump really did have an eye for even the smallest of details: "In any service industry, the micro detail can be a powerful





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#### BACK TO BASICS

"Customer satisfaction depends on passengers feeling in control and at ease," said Ingo Wuggetzer, VP of cabin innovation and design at Airbus in 2015. Ingo has been a regular voice in Aircraft Interiors International over the years, and in the time since that quote, he has taken on a new role at Airbus. Find out his latest thoughts and new role on p18.

2015

# Space quest

"Dedicating space for uses other than passenger seating is very difficult to justify economically, but we have started to see more flexible, multipurpose spaces, and they will continue," said Alan Anderson, chief engineer at Boeing's Payload Concept Center in 2002. CFOs still fret over the potential lost revenues of social spaces, but clever and flexible design and brand kudos have convinced them to allow some fantastic spaces today, such as the onboard lounges of Korean Air, Emirates, Qatar Airways and Etihad.

2002

#### CRYSTAL BALLS?

"I believe the biggest stride in product development will take place in the valuefor-money premium economy product, which within five years' time will look like the business class of today," said Shane O'Hare, head of marketing at Gulf Air in 2005.

2005

#### Ferocious competition

"In the harder cabin product elements, the competition has become ferocious, the amount of spend the airlines are putting into the cabin has increased, and the frequency with which they renew their cabin product has quickened," said Bob Lange, Airbus's head of cabin payload strategy in 2008 when discussing business class – but we're sure he would say the same today.

2008

#### Please innovate

"Really we are only limited by our imagination. You need to be tenacious," stated Victoria Bamford, Air New Zealand's aircraft interior manager in 2014. "And you need to innovate, not just for the sake of innovation, but because there's a true need you'll be meeting by realizing these innovations."



AND OUR FAVORITE...

Let's finish with perhaps the wisest words in all 20 years of Aircraft Interiors International, when Alex McGowan, head of product at Cathay Pacific, said in 2011: "Anyone who tries to predict how anything will look in a decade's time will inevitably be wrong."

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IT'S DIFFICULT TO BELIEVE, BUT THE HIGH-CALIBRE NAMES IN AIRCRAFT INTERIORS INTERNATIONAL DO SOMETIMES GET IT WRONG. NATURALLY THIS IS A VERY RARE OCCURRENCE, AND THESE SEVEN GAFFES REPRESENT THE TOTAL OF LESS SUCCESSFUL PREDICTIONS OVER TWO DECADES... HONEST

014 aircraftinteriorsinternational.com ANNUAL SHOWCASE 2018

#### too nice a price

In 1998 Airbus predicted that the development costs of the A3XX would be in the region of US\$8-9bn. In 2016, analysts estimated the costs at US\$25bn.

#### the VVIP A380

"If we don't see [an A380 VVIP completion] by 2008, I am in big trouble. However, I strongly believe that there will be an A380 completion before 2010," said Bernhard Conrad, Lufthansa Technik's senior vice president of its completion center in 2005.

Conrad was sadly wrong, and is still waiting for that completion, although in his defense a Saudi prince looked set to be a customer in 2007. However, considering he became CTO of Lufthansa Technik shortly after, we suspect he wasn't in too much trouble. And with A380s now leaving airline fleets, there is renewed interest in using these lower-priced aircraft as the ultimate VVIP jets.

#### reclining is believing

"The first class market is tiny and is not showing any signs of growth... in fact we believe it is declining," said Stephan Egli, VP for Europe at Delta Air Lines in 1999. "Do people really want to spend an extra US\$2,000-3,000 for a fully reclining sleeper seat?" Egli was arguably correct about first class, as 18 years later some airlines have lost faith in it, while others are still investing heavily in it. However, on his second point, Egli could not have foreseen that in just the following year British Airways would cause major disruption in business class when it launched Club World, a fully flat business class seat developed with Tangerine (see p76). People would indeed pay more or even switch carrier for a flat bed, and today Delta has a great sleeper seat with its Delta One suites.

ABOVE: THIS VISION FOR A VVIP A380 WAS CREATED BY DESIGN Q (SEE P84)

#### a world changer

In 2001, Boeing announced it was focusing product development efforts on the Sonic Cruiser, a fast, long-range aircraft expected to fly at Mach 0.95 or faster. This 100-250 seat aircraft was planned to have a B777-inspired interior and it was an exciting plan. "This is the aircraft our customers have asked us to concentrate on – they share our view that this new aircraft could change the way the world flies as dramatically as did the introduction of the jet age," said Alan Mulally, CEO of Boeing. "We have had detailed conversations with our customers, and it is very clear that they would strongly value an aircraft that can fly

faster, higher and more quietly over very long ranges." It turned out that airlines generally preferred low operating costs to high speed, and Boeing promptly ended the Cruiser project in 2002. The replacement project was impressive though: the Mach 0.85, fuel-efficient B7E7 – today's B787 Dreamliner.

015

#### overstating economy

"While in mass travel [economy class] the cost/space ratio will prevent sleeping flat out at altitude, it is likely that seat configurations will move away from the close grid of seats and aisles into groupings of work, leisure and rest stations," said Landor's Cliff Nichols in 1998. We have seen many such concepts for the economy cabin over the last 20 years, but an economy class cabin LOPA from 2017 would not have intrigued Nichols in 1998. In the same year, he made another statement which some

will disagree with and some will agree with. See what you think: "The aircraft's interior is one of the most important manifestations of an airline's identity, and airlines are suffering from terminal sameness."

#### space race

"Bar and stretch areas and oversize bathrooms with windows will become the standard, particularly on ultra long-haul flights," said Shane O'Hare, head of marketing at Gulf Air in 2005. We like O'Hare's optimism, but sadly his predictions are still far from standard.

all bets are off

NEROBIRD FOR HIRE Virgin ameri

In 2011, Virgin America's Ken Bieler, director of engineering, had this to say about future cabins: "I hope they look nothing like what they do today – and as a new airline known for innovation, we fully intend to push that envelope. And by then we'll have Virgin Galactic flying – so all bets are off, right?"

With the Virgin America brand being retired following its 2016 merger with Alaska Airlines, any pushing of envelopes will be down to Alaska. However, despite some unfortunate setbacks, Richard Branson has indicated that Virgin Galactic may commence its first suborbital test flights in 2018, so Bieler may yet have the last laugh.



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# TRANSPARENCY

AIRBUS'S INGO WUGGETZER HAS BEEN A REGULAR FACE IN AIRCRAFT INTERIORS INTERNATIONAL OVER THE YEARS. FROM THE INTRODUCTION OF THE A380, TO TRANSPARENT CABINS, HE SHARES HIS VIEWS ON AIRCRAFT INTERIOR DESIGN Words by Marisa Garcia

ver the past 20 years, Airbus's vice president of cabin marketing, Ingo Wuggetzer, has had the unique experience of working on both ends of the cabin design equation: from the airline and the OEM perspective. We asked him to share his views of the key design milestones over the past 20 years, and what we might expect from the future.

"Half of that time, I was with Lufthansa, and half of the time I was with Airbus. I saw both sides, in terms of operation and design. I would say that industrial design in the cabin has changed a lot over the past 20 years," he says.

"For me, what is clearly marked over that period is a very positive upward trend. We always sought continuous improvement, with the aim of delivering a lot of value to the cabin in several ways."

Perhaps the most notable change, Wuggetzer suggests, is a shift from utilitarian design in the cabin, to more customer-centric design.

"Earlier we saw a more industrial era design, which was mostly driven by safety and engineering solutions," he says. "Ten years ago, design agencies really started to come into the picture. We had a clear change, in terms of product design that looked a lot different from before. We also had a change in terms of long-term history, coming from a passenger revenue focus to a passenger experience focus. I think that was the big change overall."



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#### "The passenger experience focus was definitely supported by great industrial design"

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Alto a

Ingo Wuggetzer is a member of the Crystal Cabin Awards judging panel



While there have been periods of creative freedom during previous generations of travel – what many refer to as the 'Golden Age' of flight – Wuggetzer differentiates the most recent design revolution as delivering on domesticity and comfort, making the aircraft cabin feel like an experience of equal comfort to being at home on the ground. That has been achieved, he says, thanks to the contributions of design specialists who bring outside perspectives. Advances in technology have also played an important role.

"This passenger experience focus was definitely supported by great industrial design; new agencies that really put design learnings on the ground into the aircraft," Wuggetzer says. "We had big changes in comfort services, especially when you consider IFE and connectivity. If you remember, we had these big pneumatic IFE headsets, and now you have noise-canceling headsets and perfect quality surround sound. We now have big IFE screens with full HD quality, and with connectivity passengers can enjoy all the online services that they are used to on the ground."

#### MILESTONES

Airbus has achieved some considerable milestones over the past 20 years, but Wuggetzer believes that the A380 has delivered the most important change to aircraft architecture.

"Clearly, one big unique update to cabin architecture history was the double-decker A380, which is still unique and hard to top because it offers unique comfort levels in terms of width of space and in terms of the quietness of the cabin. It's a product architecture that is really enjoyed by passengers," he says.

Airbus statistics consistently show a passenger preference for the aircraft, even if airlines are shying away from super-sized airplanes.

"I think in the beginning people were thinking, 'What is this big aircraft?' However, if they board on both levels, people don't even feel that size. They only reflect on the positive onboard experience, and I think it's the best value you can get when flying in economy class," he says. AIRBUS

3. AN EARLY A380 UPPER DECK LOUNGE AREA CONCEPT FOR THE A380. SOME LOUNGES FLYING TODAY WITH ETIHAD AND QATAR AIRWAYS ARE EVEN MORE LUXURIOUS

> Passengers enjoy the increased personal space created by the vertical cabin walls on the A380 main deck

#### "The A380 cabin offers more opportunities and possibilities than any other"

Of course, that is not what happened in the end," he says. "But the aircraft offers more opportunities and possibilities than any other, in terms of segmentation. We have seen aircraft design ideas with up to six different classes. This reflects a trend for more individual travel, and the A380 offers more choices for passengers. You can have everything from a very efficient low-cost product up to a super-first-class, like The Residence by Etihad."

#### FAVORITE PROJECTS?

Having worked on so many cabins over the years, we ask Wuggetzer whether he has a favorite. He answers us candidly.

"I'm very biased, you know. I designed one myself for Lufthansa, which I liked very much. It was the A340-600, a very long and very elegant cabin. We created a very contemporary feel," he says. "If I look at more recent programs, for me, the outstanding one is the Airspace cabin. Its DNA, its ambience, the service design and comfort... all of those are elements that we can

now apply across other programs. To me, that is achieving the next level. It truly has the best features and the best potential advantages for the passenger experience, and it will be available across all aircraft programs."

#### CHALLENGES?

Satisfying the needs of a diverse mix of customers can be challenging. We ask Wuggetzer whether he can think of any particularly challenging customers he'd like to mention. He sets us straight.

"Airline programs are not difficult. They are always fun, especially if you sell aircraft at the end," he quips. "Of

"I think it is an excellent cabin. The environment in the cabins is what we want: lots of space. We love space. It's a perfect cabin situation."

All that space in the A380 opened up a host of creative design opportunities, and many airlines pushed the boundaries of the passenger experience. Those ambitious projects also came with demands to deliver new products and new service options.

"There were high expectations, which was to be expected for this size of aircraft and the routes they operate," Wuggetzer says. "It's a flagship aircraft operating between the biggest city pairs where you have the most demand for the ultimate passenger experiences. We therefore have quite elaborate customization options."

While the options are elaborate, Wuggetzer acknowledges that some of the initial cabin concepts were a bit off the mark.

"The problem, in the beginning, was that people expected to have swimming pools and tennis courts on the aircraft.

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#### *"For me, 3D printing will be revolutionary, and that might involve different materials such as plastic casting"*

course, there are always a lot of challenges with the very customized solutions that you want to create for airlines. There are all kinds of challenges. I remember when we were asked to create the atmosphere of the Middle East sky using star lights overhead, which we did for Emirates."

To Wuggetzer, these challenges are the fiber of success. But the past 20 years have also delivered some considerable shocks to the airline industry. We wondered whether any of these events restricted creativity and design innovation. Wuggetzer doesn't believe they have limited design, although they may have shifted the focus of innovation.

"What impacted everyone was 9/11. I think the whole world was shocked about the attacks and that really affected people, but in the long run it didn't stop people from traveling. Travel is something we need for globalization, and it is generally a positive thing for everybody. So 9/11 did not stop our cabin design work. It had no effect other than we increased our safety focus in terms of cockpit doors and systems protection: security features that help passengers travel in safety.

"However, the business class market did suffer after the financial crisis, and that had an impact. It may have contributed to the market growth of premium economy. Some people who previously flew business were challenged about their travel costs, and that may have created a difference in demand."

#### FUTURE DESIGN TOOLS

Asked what materials advances hold the most promise for design over the next 20 years, Wuggetzer does not hesitate to answer.

"We have always dealt with composites, so we have great experience with them. I think we've applied that experience in a perfect way on the A350, 4. AN INITIAL CONCEPT STUDY FOR A SOCIAL ZONE ABOARD THE A380 ramping it up to deliver the aircraft to market

on time, without any problems. Clearly

and that might involve different materials such as plastic casting, or metal 3D printing. That is something that I believe strongly will take off – especially for interiors parts – because it makes customization easy. You can create really weight-efficient solutions, which will bring the cabin elements to the next level."

#### THE LONG VIEW

And what of some of Airbus's more ambitious concepts, such as the Concept Cabin with its organic lines and transparent ceilings? Will we really get that feeling of our seats flying through the skies?

"Absolutely. The translucent outer-structure may not be with us 20 years from now, but the vision was 2050, so we have an extra 10 years to achieve that one," Wuggetzer says.

However, he adds a more achievable target as an interim milestone. "In order to get there, the next step is to use new technology, like projection or OLED, or whatever new technology comes up, to create that perception of the view outside. It's what we would call an 'artificial outside view'. In terms of passenger experience, it might be quite realistic and you may forget that it's not real. This is technically something that we can do within the next 10 years."

Our website features several in-depth case studies of airline A380 cabin of airline A380 cabin projects, including Etihad and British Airways

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AFTER MORE THAN 20 YEARS IN THE AVIATION SECTOR, BOEING'S PAYLOADS CHIEF ARCHITECT, P J WILCYNSKI, IS STILL IN LOVE WITH THE MAGIC OF FLIGHT – AND THE PROMISE OF THE NEXT 20 YEARS Words by Marisa Garcia

BOOTES

offlight





1. FUTURE AIRCRAFT CAN WORK BETTER WITH CREW. FOR EXAMPLE, INDICATORS IN THE DOOR LININGS CAN INDICATE WHEN THE DOOR IS ARMED

2. FUTURE AIRCRAFT CAN ALSO WORK BETTER WITH PASSENGERS, FOR EXAMPLE THROUGH MORE INTERACTIVE IFE – SELFIE ANYONE?

#### "As technology evolves, it will help make the aircraft more 'aware' and responsive"

ooking back at the past 20 years of cabin design, there have been impressive advancements, including seeds planted for improvements that will re-shape air travel for the next two decades. As P J Wilcynski, payloads chief architect for Boeing, states, the principles of cabin design endure, adapting to and benefitting from new technologies.

"We believe there are some unchanging drivers for cabin design, and a few of these things that have guided us for the last 60 years," Wilcynski says.

Boeing has distilled these drivers into three basic needs: a place for things, a view outside, and feeling connected to the sky. Improvements to the cabin, including technology upgrades, are created with these principles in mind.

Boeing has worked to deliver those design principles, including innovations like the electrochromic windows of the B787, a concept of comfort that can be traced to an original mock-up for the B707 cabin in the late 1950s, which included tinted visors.



Visit the Articles section of our website to see Boeing's 2004 vision of today's passenger experience Likewise, the notion of the Starry Skies lighting effects on the B777 cabin was first conceived for a B707 mock-up, which included Sky Domes. Looking forward to the next 20 years, many of the experiential improvements Boeing expects to see will help passengers feel free of the confines of the cabin, giving them a closer connection with the sky.

"When we look at the journey map, it hasn't changed over the years. There's boarding, personal time, meal time, rest, landing and deplaning. What has changed, and what will change in the next 20 years, is what we call 'ubiquitous continuous connectivity'. That's airplane to crew, crew to airplane, passenger to airplane, airplane to passenger, and airplane to the world," Wilcynski says.

As technology evolves, Wilcynski expects that it will help make the aircraft more 'aware' and responsive to the needs of passengers and crew, while also helping make

## STRONG VIEWS

Wilcynski believes that ensuring that connection to the flight experience, by preserving windows, will still be important in future cabin designs.

"I would struggle with modules,

personally, and from a design point, due to the importance of windows. Of course, there's nothing to say that you couldn't have windows on modules that would connect with the windows of the aircraft. Many don't know that the Boeing has had this capability for close to 40 years. We've built Combi aeroplanes, which have a freighter door and allow for overnight conversions. "In those cases, everything is built

> into a platform. The windows are constructed and they would allow conversions between various seating configurations on a palette, or all-cargo configurations, or whatever an airline wanted. It's all done by the palette, not necessarily by a complete module."

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# *"Over 20 years we've seen extreme differentiation by airlines"*

passengers and crew more aware of each other and of their environment.

#### MAJOR MILESTONES

Looking back 20 years to major milestones along the path of the passenger experience improvements we already enjoy, Wilcynski highlights the introduction of the B777.

"That was the first aircraft interior to win an industrial design award. That was the start of really significant recognition by Boeing that passenger cabins can be beyond the purely functional, that you can take it to the next level from an aesthetic standpoint," he says.

Of course, the B787 Dreamliner has also been a major milestone, its design extending to other Boeing aircraft.

"Shortly after 2000, we started on a journey to develop the B787 interior. What we now call the Boeing Sky interior was then propagated into the B737, the B747-8 Intercontinental, and now we're looking onward from there," Wilcynski says.

"In those 20 years we've really recognized the value of great cabin design and of embedding appropriate technology to enhance the cabin experience."

Wilcynski also notes that the industry has been evolving during this period, with changing airline brand strategies.

"Over 20 years we've seen extreme differentiation by airlines, an exploration that has provided opportunities to explore cabin design," he says. He believes that the industry has progressively advanced in its passenger offerings, even though the past



(3)

## CONNECTIVITY

Inflight connectivity with access to the ground will facilitate a number of experiential and operational features, Wilcynski predicts.

"The developments that I see are large touchscreen surfaces in the cabin. The challenges are going to be structural substantiation and flammability of those large surfaces," he says. "I see that going well beyond, with what we refer to as cabin health monitoring, where each of the furnishings is able to report where it is and whether it needs repair."

"Passengers could share information to better allow the crew to personalize services. You can imagine 200 people boarding and offered an option for meal selection, and the crew knows who wants their meal first – that kind of thing. That would all rely on connectivity of airplane to passenger to crew."

Connectivity could also facilitate novel experiential enhancements, such as sending aerograms: inflight digital postcards featuring the passenger's image by the window, the image being a live picture taken by wing-tip cameras.

Beyond these fun explorations, Wilcynski believes there will ultimately be a next-level way to deliver connectivity to the aircraft.

"Whatever happens, there has to be more availability, more seamlessness. Like certain consumer products, it has to be just a download of software. It can't be that you have to swap out boxes to increase functionality," he says.

> 3. AIRCRAFT WINDOWS COULD BE MORE INTERACTIVE, HIGHLIGHTING LANDMARKS

4. THE BOARDING AREA COULD BECOME A CENTRAL INFORMATION POINT

20 years have included 9/11 and the financial crisis.

"The low times, from an economic standpoint, drove them to consider how to get a get a larger share of premium passengers. Airlines grew in their understanding that, to attract premium passengers, they really had to differentiate. Some of our customers were differentiating in economy class, but differentiating to gain premium passengers was crucial," Wilcynski says. "They did that primarily in things that we really don't control: seats and other cabin furnishings, quality of materials, onboard services, and services removed from the aircraft, like picking you up at home."

In that push to attract high-revenue flyers, Wilcynski credits airlines for helping spur innovation by raising the stakes. "All of our customers are very demanding, and rightly so. That can be in many different ways, but airlines always find a way. They see opportunities and they push us, which is a good thing."

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2017 Crystal Cabin Award Shortlistee







Wilcynski states that introduction of the Dreamliner has helped airlines achieve differentiation, improving global networks, and opening up new routes for city pairs that weren't previously viable. The Dreamliner program also presented fresh opportunities to engage passengers in research and development. In many ways, the Dreamliner was the world's first crowdsourced aircraft.

"It has also been very interesting and heartwarming that we get as much feedback as we do," he says. "The testing that we did with thousands of people on the ground as we developed the Dreamliner led to our design and served for subsequent airplanes. The Dreamliner name itself came from both customer research and online feedback, in the

# Blended wing

Asked about blended wing aircraft, Wilcynski modestly answers that the viability of the aircraft itself is beyond his purview, although he has some notion of what might be required for the cabin design of such an aircraft.

"I know we've talked about it for many years, and I hesitate," he says. "If I look

at what I think is important in the passenger cabin, I think it would be a very different perception. It would have to be an extreme focus on architecture."

However, he tells us that the introduction of virtual reality, or augmented reality, could open up possibilities.

### FOND MEMORIES

Over the 36 years that Wilcynski has worked at Boeing, dealing with cabin design, he has seen many trends come and go, and new technologies emerge to become new service standards. We asked him whether he has a cabin of which he's particularly fond.

"I do have a personal favorite, from pure aesthetics," he confides. "When we redesigned the B777 interior to go into the B767, it was spectacular. It just had fluorescent lights – nothing fancy – but it was a spectacular interior in its form alone."

So form that fits function, even simply, can be enduringly elegant. But

the function and experience of flight is far more than transporting people from points A to B, and Wilcynski hopes the industry will never lose sight of that.

"I would hope that we can still preserve a joint travel experience in the cabin, so that we don't lose the feeling that we are on a journey together. I worry that everybody is too focused on their electronic devices and that we lose that excitement of 'Hey, I'm up in an airplane at 40,000ft,"" Wilcynski says. "The wonder of flight, the magic of flight, is just incredible. I hope someone looks out the windows once in a while."



5. THE FUTURE AIRCRAFT COULD ENABLE MORE ENHANCED PERSONALIZED SERVICE BY GIVING CREW MORE INFORMATION

#### "The B787 was the first crowdsourced aircraft"

early days of AOL. We had tens of thousands of people around the world looking over our shoulders and participating both on the ground and online to help us design that airplane. What's really gratifying is that people are now flying in it. They never dreamed of that before."

#### DARE TO DREAM

Delivering on the promise of the Dreamliner presented a number of new challenges to the cabin designers.

"Like the rest of the B787, the interior has a lot of advanced technology. This took time to develop. Specifically, I could point to the windows, and other lighting technologies, which required enhancement and refinements as time went on. We had advanced materials for the electronically dimmable windows, and the control systems for those were very novel, especially to be introduced as broadly as they were on the B787," Wilcynski says. "The combination of new technologies and new materials on the B787 was probably the biggest challenge."

But Wilcynski sees those challenges as being rewarding. "When we developed the lighting, that was the fun part. We knew what we wanted to do. We had the technology, with a few bumps, of course. Creating the lighting scenes was some of the most fun I had on the program."

#### THE NEXT 20 YEARS?

Looking forward to the next 20 years, Wilcynski expects that connectivity will play a continued role in cabin design, not only the connectivity we commonly think of today, DESIGNER OF AIR FRANCE'S NEW BOEING 787-9 PREMIUM CLASSES

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facilitated by data networks, but the connection between passengers and aircraft, and the experience of flight, addressing the three basic needs around which Boeing design is focused.

"I don't think there's anything unique that changes those key drivers of design," he says. "They get enhanced with more information, or waiting for appropriate and proven technology to enhance them. With Starry Skies, which we now do with fiber optics, perhaps it will be done with a projection system, or at some point with an OLED system."

Wilcynski can imagine aircraft that create more interactive experiences for passengers, with images from below projected onto class-divider panels. For example, a program might project sightings of whales in the water.

FIRST CLASS LAVATORY This Lavatory is Available

> 6+7. FUTURE PASSENGERS CAN CLEARLY SEE THE STATUS OF THE LAVATORIES, WHICH WILL ALSO BE SELF-CLEANING

#### MODULAR CABINS

Wilcynski struggles with the notion of modular cabins, although he believes airlines will want cabins to be more quickly adaptable to new market opportunities.

"At the top of every airline's list of priorities is efficiency. Cabin modules would require a freighter door built into the fuselage, and some sort of transferring system built into the floor, both of which add weight to the aircraft. So, for that flexibility, they would pay a significant weight penalty of several thousand pounds, for every flight. That's why, when I think about modularity, it has to be the sort of modularity that can be broken down and then passed through a passenger door, which could then easily adapt to what an airline wants to do with the cabin."

There is also a possibility of kitting certain cabin elements, so that they are easier to install and change out.

"I remember many years ago that there was a galley that wheeled onto the airplane and latched onto the floor," he says. "I think there's possibility there, but it's really going to be the airlines that lead it. Every time that you do kitting of that nature, you are incurring weight penalties, and there are always the certification aspects of how that is handled."

Wilcynski also cautions that a "quick change" of modules may not be that quick due to regulatory and Service Bulletin requirements.

### Soft elements

Improvements to cabin hygiene have already advanced, including new water purification systems on the B787 and the introduction of antimicrobial surfaces. Boeing has proposed a self-cleaning lavatory, using UV light to sanitize the surfaces. Wilcynski can see this going a step further, with lavatories self-

reporting – via digital screens on doors – when they are undergoing a self-cleaning phase, so that it is evident to passengers that the lavatories are free to use when the process is complete. There's room for improvement in meal preparations too, especially for premium passengers, although, as Wilcynski points out, what we might sometimes perceive as a "game changer" doesn't always turn out to be so: "A few years ago, induction ovens were all the rage for premium meal preparation, but I don't think that they've developed quite as well as everybody was expecting back then. You've got steam ovens now."

#### "The focus of design should be to make flight less isolating"

Lighting programs could create experiences, such as a projection of floating lanterns on the ceiling, to accompany meal times, and nightscapes of the stars, including the position of the constellations relative to the phase of flight. These experiential features might also be projected to seatback displays, but Wilcynski believes the focus of design should be to make a flight a less isolating experience.

While there are many benefits to individual comfort and entertainment choices, passengers should also feel that they are enjoying an enhanced flying experience together, he believes. That said, some individual experiences can be improved through a greater awareness of the ground and enjoyment of flight. Informational projections on windows could point out sights and special features.

Other technologies that may shape the future of the cabin include additive manufacturing, but while Wilcynski sees great potential in this technique, he believes there will be technical challenges. "There's going to have to be a lot of development to get to that point where you say, 'Okay, we can now do 3D printing for structural elements that meet both flammability and structural substantiation," he says.

Overall, Wilcynski sees the flight experience changing gradually and organically for the better over the next 20 years, with few radical changes.

"It's going to be an evolution," he says. "The only revolution might be in the services airlines provide, how they interact with passengers, and how they deliver meals. That's what I see as a possibility of revolutionary change."


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#### MILESTONES

# *1998*

• The cabin industry is finally recognized with a dedicated publication addressing trends, issues and news. *Aircraft Interiors International* is born.

• Among the content of the launch issue was an interview with Pierre Huggins, accident investigator with the US Air Line Pilots Association, who gave some cabin safety advice that is relevant two decades later.

"We would like to see designers consider fitting overhead bins with remotely operated secondary latches driven by electric solenoids. These would allow access only when crew deem it safe," he said.

This suggestion was again raised in 2016 when many passengers delayed their exit from a blazing Emirates B777 in Dubai because they retrieved their bags from the overhead stowages.

# Aircraft

For turbulence events, Huggins suggested electronically monitored seatbelt status systems so that FAs have the ability and time to confirm seat occupancy and seatbelt use while they themselves remain safely at their stations, reducing their own exposure to potential injuries.

This idea is still being explored today by various companies, as are his other ideas, including the installation of cabin watermisting systems, and larger, power-assisted overwing exits to further reduce evacuation times.

### 2000

• Delta takes the first jet delivery of the 21<sup>st</sup> century: a B767-ER

• Emirates becomes the first airline to commit to the A3XX, with Sheikh Ahmed bin Saeed Al Maktoum, chairman of the airline, signing an MoU for five firm orders at Farnborough International Airshow and an option for a further five. Air France was next in the line at the Airbus chalet, placing an order for 10 A3XXs.

• American Airlines introduces its Flagship Suite, an innovative first class seat developed with Acumen (see p72) with a unique swivel function to aid dining or socializing, as well as the industry's first twin dropping armrests to facilitate access and expand bed space (the 21in-wide seat transformed into a 30.5in-wide bed).

 British Airways announces a £14m (US\$19m) investment on new seats and cabin interiors for Concorde, bringing in Factorydesign and Terence Conran for the design work (see p68).

### 1999

• Delta ends its first class service, instead focusing on its US\$314m BusinessElite program. Nearly a decade later, Delta's business class suites – Delta One – are approaching first class levels of quality.

• The UK government introduces air rage legislation, intended to deal with passengers who threaten, insult or abuse crew, or interfere with their duties. The maximum penalty is an unlimited fine and/or two years' imprisonment.

• Virgin Atlantic launches plans for US\$60m of passenger experience improvements in Upper Class, including "double beds in business class", new seat designs and a new onboard bar design.



#### A DARK YEAR

The terrorist attacks on September 11, 2001, shook the world, and changed aviation forever. The direct effects included airlines reporting a short-term reduction in demand of 30%, corporations cutting business class travel, escalated security measures (driving many to seek alternative modes of transport), and several airlines filing for bankruptcy. The tragic event will never be forgotten, and the effects on flying are still being felt in terms of stressful security procedures, but technology is helping to smooth the process.

2001



BA'S KELLY HOPPEN-DESIGNED FIRST CLASS IN A B747. IMAGE: GARY BEMBRIDGE

• British Airways is on a roll, now unveiling a new £20m (US\$27m) first class, designed by Kelly Hoppen to evoke the feel of a Rolls-Royce, with Connolly leather, burr walnut wood effect, velvet and cashmere-style fabrics and artworks. High tea and afternoon tea are reintroduced, completing the airline's overhaul of every class.

• United becomes the first US airline to introduce an enhanced economy option (Economy Plus), with an extra 5in of legroom (36 vs 31) and 35% more personal space.

• Airbus unveils the first A340-600, with an allnew interior and the quietest cabin in the sky. The aircraft could carry 380 passengers in a three-class configuration up to 13,900km (7,500 nautical miles).

• Business class is hotting up in Asia, with Cathay Pacific rolling out the "longest and widest stretchflat seats in the sky" (with 75in beds) for its long-haul fleet, complete with bar and reception areas, designed with Acumen and Futurebrand. Meanwhile, Singapore Airlines unveils its US\$100m SpaceBed, claimed to be "widest and longest business class bed in the sky" (78in long and 27in wide) for its B747s and B777s, created with Ludeke Design and Aviointeriors (p150).



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### **SCHNELLER**

• Virgin Atlantic unveils its new £50m (US\$68m) Upper Class Suite, due to launch in 2004 on its B747-400 and A340-600 fleet. The 1-2-1 herringbone suites featured a flip-over design, with an optimized seat surface on one side and bed surface on the other. Every seat – designed with input from PearsonLloyd (see p92) – had direct aisle access, and half were both a window and aisle seat.

• Mike Bair, SVP of Boeing's 7E7 program, tells Aircraft Interiors International that the company is making "excellent progress" with the next-generation aircraft, being dubbed the Dreamliner.

• The FAA proposes a mandate that would require airlines to install 16g seats fleet-wide (up from 9g) over the next 14 years – at an estimated cost of US\$519m. The agency said that the new seats could avoid 114 deaths and 133 serious injuries in the next 20 years.

## 2004

• Singapore Airlines sets the record for the world's longest non-stop commercial flight, with its A340-500 traveling between LA and Singapore in just over 18 hours.



AIR NEW ZEALAND'S NEW BUSINESS CLASS WAS

• First Choice Airways is the first European carrier to install the Boeing Enhanced Interior. Fitted in its new B767-300, the cabin is based on the B777 interior, with a greater sense of spaciousness created through curved ceiling panels and soft accent lighting.

• Air New Zealand announces it will "redefine long-haul travel" with a US\$106m cabin overhaul of its B747-400 and 777-200ER fleet. First class is removed in favor of a 'premium' enhanced business class (pictured above), with a lie-flat seat design licensed from Virgin Atlantic.

• Virgin Atlantic fits four pairs of 'double suites' on two of its B747-400s. The suites remain separate until a double is confirmed at check-in, and crew then unclip the middle partition to create a 21.5ft<sup>2</sup> (2m<sup>2</sup>) double suite. "Now passengers can enjoy even 'suiter' dreams next to their loved ones," said Richard Branson.

### 2003

• A sad moment for aviation as Concorde makes its final flight. Low passenger numbers following the Air France tragedy in 2000, the slump in air travel following the 9/11 attacks, and rising maintenance costs, spelled the end for this iconic machine.



• Emirates celebrates being the first to operate the A340-500 by introducing fully enclosed first class suites (1-2-1) with 'room service' that enabled guests to phone the galley for meals.

• EADS considers developing a successor to Concorde. The company suggests that an engine collaboration between Europe and Japan could result in a hypersonic jet twice as fast as Concorde that would be able to fly 7,000 miles non-stop and carry 300 passengers – triple Concorde's passenger capacity.

 In the same year, Boeing drops the Sonic Cruiser hypersonic project as it didn't believe it could sell the aircraft in market conditions geared toward efficiency.



2005

 At Aircraft Interiors Expo, Airbus shows a full-scale A380 cabin mock-up – the first public showing of the cabin. Visitors could explore sections of both decks – accessed by the forward stairs – complete with fully functional lighting and deliverystandard wall and ceiling shapes.

• Bucking the downward trend for first class services among many carriers, Continental doubles the number of first class seats on its B757-300 fleet. "We are seeing a significant increase in demand for our first class product, a result of our competitive fares, as well as our complimentary upgrades for OnePass Elite members," explained Larry Kellner, Continental's CEO.

• Airbus begins evaluation flights of its A380 test aircraft fitted with a complete cabin.

• British Airways is back in the news with a £100m (US\$136m) investment in a major overhaul of its long-haul business class, including a major upgrade of IFE in all cabins with the Rockwell AVOD TES system. "This is the first major product investment BA has made in five years, in part because of the success of our strategy to reduce costs during recent years," said BA CEO Willie Walsh.

• 2006 marks the 10<sup>th</sup> birthday of the first lie-flat bed. In 1996, BA launched its first class bed project, designed with Acumen and Contour (now part of Zodiac). The program took just 18 months from the initial project briefing, through development and manufacturing to launch.

• Qatar reveals its new A340 first class cabin and onboard lounge, designed with PriestmanGoode (see p64). CEO Akbar Al Baker took a minimal approach to market research for the bar, as he told us: "If we start speaking to passengers, we will give away our secrets. Of course, they would love to have their own lounge on the aircraft – there is no need to ask them. I know what they like, and we are more than happy to provide it."

• The Crystal Cabin Awards are launched, with top airline executives, engineers, journalists and scientists on the jury.



• Virgin America gets US DOT approval to launch its domestic services. A two-class interior is announced for its A319s and A320s, with eight seats in first class and 141 in economy. A highlight of the experience is the customized Panasonic X-series AVOD platform, with the interface branded as Red.

• The first A380 is completed, for Singapore Airlines. "The interior looks fantastic and brings a brand-new dimension to the onboard experience," says Peter Hahn, head of A380 final assembly line. The 12 first class suites are the star of the show: designed by French yacht designer Coste Design, these private spaces raise the game in first class, and the center suites can be converted into double beds.



LEFT: QATAR AIRWAYS' FIRST

ONBOARD LOUNGE DESIGN BELOW: BA'S UPGRADED AVOD IFE SYSTEM IN 2006

BELOW LEFT: AIRBUS'S

ENHANCED A320 CABIN DESIGN

BELOW: SINGAPORE AIRLINES'

# 2008

• *Aircraft Interiors International* celebrates its 10<sup>th</sup> anniversary!

• Emirates announces its plans for its A380 interiors, including private suites and social areas. It is the showers that fascinate the public, though. They require 25% more water to be held on board (a 500kg penalty), but that weight is offset by removing the footrests in economy (saving 1kg per seat) and by removing most of the printed media. The showers ultimately prove popular, with 75% of first class passengers making use of them.

2009

• Etihad unveils new first class suites for its A340s. The airline also creates something called the Etihad Design Consortium, comprising Acumen, Factorydesign and Honour Branding – whatever could they be up to?

• Boeing reveals its new B737 Sky Interior, due to be launched in 2010. The cabin design draws on the B787's sculpted sidewalls and window reveals, and also has a 'blue sky' effect ceiling. "Humans love to fly. So the overreaching goal of this new interior philosophy reconnects people to the magic of flying. We wanted to create a welcoming environment. It is difficult for airline staff to greet every single passenger. So we have the architecture of the airplane creating this welcome," said Kent Craver, Boeing's director of passenger satisfaction and revenue.

• Airbus fits an Air France A380 with 538 seats, making it the first operator to offer more than 500 seats.

• The extraordinary landing of US Airways Flight 1549 on a New York river is dubbed the 'Miracle on Hudson'. Years later, Tom Hanks plays the role of the legendary pilot in *Sully*.



THE SCULPTED CABIN OF THE B737 SKY INTERIOR



• Airbus begins delivering its Enhanced cabin for the A320, with more space at shoulder level, 15% more overhead stowage volume, a 1dB cabin noise reduction, and a 50kg weight saving. The cabin is set to become standard fit on the A320 by 2009.

• Emirates announces it is investing more than US\$600m in its interiors following a busy day at Dubai Air Show, where it signed contracts for the world's largest aircraft order: 120 Airbus A350s, 11 A380s, and 12 Boeing 777-300ERs, worth around US\$35bn.

• Airlines made a combined profit of US\$5.6bn according to IATA – the first year of industry-wide profit since 2000.

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• Scandal – as seat manufacturer K

• Scandal – as seat manufacturer Koito admits it falsified fire resistance test data for seats and made design modifications that weren't approved by regulators. According to Japan's transport ministry, Koito omitted part of the test processes and used figures from past tests instead. It was also alleged that the company manipulated its computers so that normal figures would appear on monitors when ministry officials observed tests. Apparently the data falsification began in the mid-1990s and only came to light when a whistle blower from a supplier informed the ministry in 2009. Among Koito's many problems now was having to fix 150,000 seats in around 1,000 aircraft, for 32 operators.

• For its B777-300ERs, Air New Zealand reveals some really innovative products for everyman: the lie-flat economy Skycouch and the Spaceseat premium economy seat (pictured above). Three years went into developing "a new experience that will influence cabin design for the next decade", said Ed Sims, the airline's general manager.

 Delta announces it is investing US\$1bn (US\$300m per year to mid-2013) on customer experience improvements.

### 2011

 Boeing unveils the B747-8i, with interiors inspired by the B787, including the LED lighting schemes and curved architecture. Highlights include a dramatic staircase at the main entrance. "The B747-8i will give operators an aircraft perfectly suited for long, heavily traveled routes around the world," said Pat Shanahan, Boeing's VP for airline programs.

• Korean Air receives its first A380 and wows the public with a duty-free shop at the rear of the main deck, two Absolut vodka sponsored premium lounges on the upper deck, and a spacious first class.

• Lufthansa shows its new first class seats for the B747-400 upper deck – notable because they are actually a separate bed and seat.

# 2012

Southwest introduces the Evolve cabin design for its B737 fleet at an estimated cost of US\$60m. It features many items from the Green Plane launched in 2009, with sustainable products including seat covers, carpets, foam fills, 1 lb lighter life-vest pouches and aluminum instead of rubber seat rub strips. The existing B/E Innovator II seat frames were kept, but with the new materials it is nearly 6 lb per seat lighter (635 lb per aircraft).

• This year marks the first flight of the Bombardier C Series, with smart, modern interiors designed with the ZEO design studio (see p118).

 2012 also marks the delivery of the 300th B737 Boeing Sky Interior (for Garuda Indonesia). Since the first B737 Sky Interior was delivered in October 2010, 65 airlines and leasing companies have placed orders for the interior.

• Air France reports that three years after its launch, its premium economy class (pictured above) has recouped its investment and is returning profit, having carried more than 1.5m passengers.

 Lufthansa reveals a bespoke business class seat, designed with PearsonLloyd (see p92) which formed part of a €3bn (US\$3.6bn) investment in inflight product over the next two years.

• Virgin launches a new Upper Class Suite for its A330s, with a clever LOPA that enabled an extra three seats to be fitted, as well as a larger bar area. It looked so good it was our cover story!



• American redesigns and refreshes its entire widebody fleet with an investment of "several hundred million" dollars a year, with major cabin treatments and customization, developed with JPA. The airline also unveils its three-class A321s, notable because these transcontinental aircraft have lie-flat seats in first class and business.

• BA takes delivery of two new aircraft types in a week: an A380 and a B787-8, forming part of a £5bn (US\$6.8bn) investment in the passenger experience. Brand chief at the time Frank van der Post took a different position to Qatar's Al Baker with regard to bars – and their research – as he told us: "For 50% of the time, an aircraft is flying people who want to sleep, and a bar is very disruptive. I don't believe in bars. We did some research, and not many passengers want a bar."

• Qatar reveals its Dreamliner interiors, with CEO Akbar Al Baker telling *Aircraft Interiors International*, "Qatar Airways refused the Boeing catalog interior. Qatar's airplanes will never be a compromise." The result is a spacious boarding area due to the galleys and lavs being relocated, and custom monuments.



044 aircraftinteriorsinternational.com ANNUAL SHOWCASE 2018 ABOVE: THE GORGEOUS B747-8I ENTRYWAY



ABOVE: LUFTHANSA'S UNUSUAL B747-400 FIRST CLASS

RIGHT: QATAR AIRWAYS' DISTINCTIVE B787 INTERIOR

# **SOMETIMES IT'S THE SIMPLE THINGS** DONE SUPERBLY





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• Etihad reveals the interiors of its A380 and B787 – the most customized commercial aircraft cabins the world has ever seen. Star attractions include the Residence – a suite with living room, shower room and bedroom (pictured above) – and unique galley configurations that involved much structural work and reinforcement.

• JetBlue introduces its A321 Mint product to shake up the domestic US market – including some enclosed business class seats – but as an airline that aims to "bring humanity back to air travel", it makes sure all passengers can access the self-service snack bar.

• Embraer reveals the initial designs for the E2 interiors – which are also a blueprint for the entire next-generation Embraer passenger experience. The designs were created with PriestmanGoode, and swift reconfiguration of the modular cabin is possible through clever design touches such as moveable PSUs.

• Virgin Atlantic develops the interiors for its B787s, with new bars and an Upper Class Suite that reverts back to the B747 and A340 models, but its trim retains some design cues from the A330 version.

# 2015

 Qatar Airways reveals its A350 cabin designs, which CEO Al Baker says are "jointly architected with Airbus". A new seat design is shown, but he tells Aircraft Interiors International that the seats will be obsolete by mid-2016 as he will offer "a double bed at a business class fare" which will be "unrivaled in our industry".

• Etihad reveals its B787 and, as expected, it is highly customized.

• It's the A380's 10<sup>th</sup> birthday!

• Delta signs up to fit the entire ISIS cabin scheme from ZEO (see p118) on its A320s and A319s 2016

• Airbus reveals the Bionic Partition, a concept 3D-printed cabin partition that it believes can reduce weight by 45% (30kg) while maintaining structural performance through its novel structure.

• United unveils Polaris, an innovative business class that is the answer to all its dreams. Acumen gives further details on p72. • Airbus celebrates its 10,000<sup>th</sup> aircraft delivery!

 Airbus reveals its Airspace brand, an 'any color as long as it's white' cabin scheme upon which airlines can project their brand through lighting and trim (more details from Airbus on p18).

Boeing celebrates its centenary!





as part of a US\$770m interiors upgrade program. The scheme includes 60% more overhead stowage, new galleys and lavs, a new aft complex, relocation of ducting and wiring to maximize space, and cool PSU 'pods' that also incorporate the LED cabin lighting. These aircraft represent "the first non-OEM-led interior of this scale, complexity and depth," said Zodiac.

• Security researcher Chris Roberts, CTO of One World Labs, claims he used the IFE system on a United flight to hack into the flight control systems from his laptop and even activated thrust management mode to go "sideways". • Airbus develops an aft galley stair module, reconfigurable cabins and crew rest options to make the A380 more flexible and appealing to operators.

• United becomes the unfortunate focus of attention around the world when a passenger is forcibly removed from his seat and dragged down the aisle as a result of overbooking.

• Delta launches its Delta One suites, a long-haul product with sliding doors. The suites were designed with Factorydesign (see p68).

• Airbus extends the Airspace scheme to the A320, with the cabin to be introduced in 2020. The design will draw on the A330neo and A350 schemes.

 The Seat Egress in Air Travel (SEAT) Act in the USA pushes for the FAA to go beyond current regulations and mandate a minimum seat width and pitch.



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20 YEARS IS A LONG TIME IN THE IFE AND CONNECTIVITY WORLD, AS THESE HIGHLIGHTS FROM TWO DECADES OF *AIRCRAFT INTERIORS INTERNATIONAL* REPORTING ON THE SECTOR SHOW...

#### IFE ADVANCE

#### 1998

• Aircraft Interiors International is established, creating a fantastic new resource for the IFE world.

 Emirates signs a US\$56m contract for Matsushita Avionics Systems (MAS) to supply its 2000E IFE/telecommunications systems for two B777s and 16 A330-200s. These are the first systems to feature infrared technology, enabling ultra-sensitive touchscreen control for the displays (10.4in in first and business class, and 6.5in in economy).

# ircraft

1999

 Virgin Atlantic is the first airline to try out handheld DVD players for IFE, with a six-week trial in Upper Class.

 American becomes the first airline to actually roll out personal DVD players for IFE. First class passengers could choose from a library of 20 discs.

 Singapore Airlines and Virgin Atlantic announce plans to offer email and internet in all classes via ATG, to be delivered through MAS's MAS3000 IFE system.

• "With the changing web we are likely to see a divergence of methods of access. It is primarily accessed from fixed locations today, but there will be access everywhere in the future," predicted an eerily accurate Dave Frankenbach from In-Flight, in this magazine. "The internet will be increasingly intertwined in our lives. Web use will become unnoticed. The way people use the internet will determine the services they want during flight - passengers will become increasingly dissatisfied to be unconnected from the internet during 10-12 hours of flight."

• Airbus and Rockwell Collins start developing technical specifications for the Aircraft Information Network System (AINS), creating the infrastructure needed to establish high-speed data communication links on and off the aircraft, based on Ethernet and wireless network technology.

• Commercial aircraft data connectivity is made available through some inflight telephone systems, with a data rate of 2,400-9,600 baud, at US\$1.99 per minute.





 The FCC grants Boeing a license for its Connexion inflight connectivity service. This landmark two-way license is the first of its kind in the broadband services industry, enabling real-time high-speed internet and intranet access, TV and email above US territories and waters. Trials begin with Lufthansa and British Airways, and analysts project a US\$70bn market for the service over the next 10 years.

• Inmarsat brings in the Swift64 L-band service with a bandwidth of 64kbps, allowing ISDN and mobile packet data service.

#### 2003

 Emirates introduces its ICE (Information, Communication, Entertainment) system from MAS, with IFE content levels never seen before, including 100 movies, 50 TV channels, 350+ audio channels and 40 games – three times more than any other airline, plus email and SMS services. First class gets 19in displays, business class, 15in, and economy, 9in.

 MAS reveals its EX2 IFE system at the WAEA show in Seattle.





• With the list of airlines interested in Connexion by Boeing growing, the pricing for passengers is revealed as US\$29.95 for flights of more than six hours, US\$19.95 for three to six hours, and US\$14.95 for under three hours.

• OnAir is formed by Airbus, SITA and Tenzing.

• Airbus completes the first trial of GSM mobile phones onboard an A320 test aircraft, paving the way for inflight mobile telephony.

#### 2005



• Panasonic and Thales send enough eX2 and TopSeries i-5000 IFE systems to Airbus to equip two 550-seat A380 test aircraft in preparation for route proving. This is one of the most extensive pre-service entry test programs undergone for IFE systems to ensure they are bug-free.

• Singapore Airlines claims to be the first airline in the world to introduce live TV on international flights – accessed via passengers' own wireless-enabled laptops via the Connexion by Boeing service.



### 2006

• Boeing pulls the plug on the Connexion program. "Over the last six years we have invested substantial time, resources and technology in Connexion," said Boeing CEO Jim McNerney. "Regrettably the market for this service has not materialized as had been expected."

• IMDC predicts a 2011 IFE equipment market worth US\$5.4bn.

• Singapore announces that it will be fitting eX2 IFE systems to its eagerly awaited B777-300ERs and A380s.



• Emirates shows its love of IFE again, launching its US\$1bn next-generation ICE Digital Widescreen system (based on eX2) with the world's largest displays – 23in in first class, 17in in business, and 10.6in in economy.

• Panasonic and Intelsat sign an inflight broadband access agreement. Panasonic's eXConnect satellite transmission platform will use Intelsat's GlobalConnexSM Broadband Service, with data rates comparable to public wi-fi hotspots.

• United is the first US airline to offer iPod and iPhone connectivity, with 30-pin connectors in first class and business class (pictured above).

#### 2007

• Emirates becomes the first airline to introduce mobile calls in flight, through a US\$27m deal with Aeromobile.

• Boeing axes its plans for wireless IFE on the Dreamliner, citing frequency regulation issues and size and weight penalties. "Given the issues with a wireless system – which would not have been reliable in some regions of the world, a situation that would be totally unacceptable for passengers – airline customers absolutely understand that this is the best decision for the aircraft," said Boeing.



• Virgin America is the first airline to offer Gogo internet on every flight.

• "We are going to see the start of viable broadband in 2009, but the killer applications are going to be email and SMS rather than live web browsing," said Bob Lange, head of cabin payload strategy for Airbus, in a 2009 issue of the magazine.



#### 2010

• Flydubai is the launch customer for the Lumexis FTSS IFE system (as well as the first to fly the B737 Sky Interior).

• Lufthansa relaunches FlyNet, its satellite-based onboard internet service that ran between 2004-2006 until Connexion by Boeing was dropped. The service is brought back to life using Panasonic's Global Communications Suite.

Inmarsat signs a US\$1.2bn deal with Boeing for three
702HP Ka-band satellites to make up the I-5 constellation.

#### 2012

 Boeing develops an advanced method to test wireless signals in aircraft cabins, using proprietary measurement technology to help ensure safe yet powerful signal penetration throughout the cabin. The technology? Potatoes, as they were found to have similar physical interactions with electronic signals as people.

• Thales establishes a Joint Innovation and Technology Project in collaboration with one of its major IFE clients, Qatar Airways. The project is intended to develop innovations year-on-year.



#### 2011

• Boeing conducts the first inflight test of a Ka-based sitcom antenna system, demonstrating the system's ability to support applications including file transfer and VoIP video conference.

• Aircell unveils an expanded technology roadmap for the delivery of its Gogo Inflight Internet service. In addition to Aircell's existing air-to-ground (ATG) technology, the company will enable connectivity via a next-generation version of ATG (ATG-4) as well as Ka-band satellite technology.

#### 2013

• Together with Thales, ViaSat launched the Exede In The Air Ka-band service with JetBlue, boasting 12Mbps per passenger.

• EASA announces that it will publish guidance to extend the use of PEDs to all phases of flight, including TTL. • The first fully assembled Inmarsat-5 satellite passes a mechanical testing program at Boeing's manufacturing facility in California. This satellite is the first of three that will eventually comprise the Global Xpress Ka-band inflight broadband network.

• Thales acquires LiveTV from JetBlue, meaning it can offer an IPTV service for a near-real-time feed of live TV programs.

• Virgin America completes the fleet-wide rollout of Gogo's ATG-4 wi-fi service. ATG-4 is said to offer peak speeds of 9.8Mbps to each aircraft – more than triple the peak speed of the 3.1Mbps available with the first generation of inflight wi-fi.

• In a first for the commercial aviation industry in China, China Eastern Airlines (CEA) begins offering broadband connected flights over China (although Chinese government agencies are observing the operation of the service before granting full regulatory approval).

### 2015

• Honeywell Aerospace, Inmarsat and Kymeta announce they are working together to design, create and test a higher-speed Ka-band wireless antenna for business and commercial aircraft.

 Indian carrier Vistara becomes launch customer for BAE Systems' IntelliCabin IFE system – the first IFE solution in the commercial airline industry to secure approval from a major Hollywood studio for the streaming of early window content to both passenger- and airline-owned devices.





### 2017

• Embraer selects Panasonic Avionics to provide the IFEC systems for the forthcoming E-Jets E2 range.

• Viasat unveils the second-generation inflight internet equipment for its ViaSat-2 and ViaSat-3 class satellites, optimized to take advantage of the "massive capacity increases" expected from the satellites.

### 2016

• Prof. Harald Haas of Edinburgh University proposes light fidelity (li-fi) as a bidirectional alternative to wi-fi. The design uses visible light communication or the UV and near-UV spectrum instead of radio frequencies. "I believe that li-fi will herald the arrival of nextgeneration aircraft cabin designs," Haas said in an interview with Aircraft Interiors International.

• Wireless IFE company Immfly proves that it is possible to

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complete the installation of a fixed wireless hardware system in an aircraft cabin in just one night, without requiring operational downtime and consequent loss of aircraft revenue.

• The FAA issues a safety alert to all commercial passenger and cargo airlines, urging them to conduct a safety risk assessment to manage the risks associated with transporting lithium batteries as cargo.

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Industrial Neotex is a company founded in 1987 that offers equipment for aircraft, trains and ships.



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AIRCRAFT INTERIORS INTERNATIONAL REGULARLY FEATURES THE WORK OF THE WORLD'S TOP CABIN DESIGNERS: INDEED THEY CAN BE FOUND SHOWCASED IN THIS ISSUE. HOWEVER, OCCASIONALLY OVER THE PAST 20 YEARS, HOUSEHOLD NAMES IN GLOBAL DESIGN HAVE ALSO GRACED OUR PAGES...

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#### MARC NEWSON

Australian design megastar Marc Newson graced our cover in November 2008, to talk about his work on the Qantas A380 project, and to share a little of his wisdom: "Our job is to look at everything in the cabin, all of the thousands of little details, most of which the passenger will never notice, and to make sure that they're intelligently designed," he said.

Newson didn't adopt the common approach of emulating residential design in the air, instead he embraced his love of aviation. "The most important thing for me was to design new and modern materials, because they look fantastic. The logic in the past has been to recreate a terrestrial environment in an aircraft – but I think philosophically that's the wrong approach – I love aircraft, I love flying and I think the processes, technology and materials that have been developed for this industry are wonderful things to play with as a designer – they're wonderful tools to have.

#### ROSS LOVEGROVE

This genius of Lovegrove's design talent has found its way into everything from the 1980s' Sony Walkman, Apple computers, Knoll, Moroso, Vitra and Kartell furniture, concepts for Airbus, and projects for Issey Miyake, Louis Vuitton, Hermes and Tag Heuer. In 2002 we spoke to Lovegrove about a project for JAL, which had come to him with a problem: 99% of its passengers were Japanese, and it wanted to widen its global appeal.

Lovegrove said that he brought "cultural insight that they couldn't get in their own country" with a new first class seat design: the Skysleeper Solo. JAL was so delighted with his work that it placed a card in every firstclass seat pocket to let them know they were sitting in the work of a genius, with a description from Lovegrove of his design process.

As Akira Kimura, JAL's director of product development added, "We really admire Lovegrove's organic design philosophy. We wanted something unique, something very special indeed, and exclusive to JAL."



#### KELLY HOPPEN

In 2000, British Airways unveiled the result of its £600m (US\$813m) overhaul of its entire onboard product. Sir Terence Conran was brought in to work on the Concorde cabins with Factorydesign (see p68, while famous interior designer Kelly Hoppen worked on the main fleet, including working on first class with Acumen (see p72).

We interviewed Hoppen in 2000, and caught up with her again in 2013 to ask her philosophy for cabin design. "I see residential design influencing aircraft design massively. The interior of an aircraft should feel comfortable, cosy and inviting, just like a home," she said.

"You need to remember you are creating a single seat that needs to be somewhere you can eat breakfast, watch TV and sleep. You are incorporating three or four aspects into one tiny space, so everything has to be about making the customer feel relaxed. Being a nervous flyer, I am very aware of my surroundings, and that is why designers need to appeal to each sense and make sure everything you touch, feel and smell has a calming effect."



KLM is proud of its unique Dutch style and brought in one of its best home-grown talents for its new cabins. Hella Jongerius is famed for her collections of textiles, crockery and furniture, with clients including Camper shoes and IKEA, and one of her best-known works being the famous Polder sofa for Vitra.

She customized KLM's B747 business class cabins in 2011, with the aim of making the cabin atmosphere more homely rather than "reminiscent of an open-plan office". She simplified what she viewed as the 'noisy' look of the standard B/E Diamond seat and created a cabin scheme that included jacquard fabrics, carpeting woven from recycled crew uniforms, and a particularly clever abstract bulkhead decoration, created as a tribute to the diversity of economy-class travelers.

The project was so well received that in 2015, KLM decided to continue their partnership for the design of its Dreamliner business class and economy cabins. "It is truly remarkable that KLM is open to this kind of approach. Aircraft interiors have to meet an unbelievable range of technical requirements," said Jongerius.

#### PHILIPPE STARCK

A truly iconic designer, Philippe Starck has created everything from the world's most famous lemon squeezer to mega-yachts. In 2015 he made his first foray into the commercial aircraft cabin – albeit on a small scale, with an amenity kit project.

In a partnership with Wessco International for a collection of first and business class amenity kits, he considered form, function and context, scrutinizing every aspect, from the outer shell to the contents.

"From the beginning of the creative process, two words appeared to me: the elegance and the gift," he said. "We create such an elegant and intelligent object that it would truly become a gift. And it might be the first time that passengers will open the bag and say, 'Oh! This is exactly what I wanted!"

We would love to see Starck involved in larger-scale aircraft interior projects in the future.

#### NORMAN FOSTER

A major name from the world of architecture entered the commercial aircraft interior design arena in 2013. Foster + Partners, the London-based architectural practice famous for structures such as London's Stansted Airport, Hong Kong International Airport and the Gherkin in London, arrived in style, creating a revised first class for Cathay Pacific's B777-300ER fleet.

Cathay had worked with Foster before, on its flagship firstclass lounge in The Wing at Hong Kong International Airport, and that work influenced the cabin design, with many of the lounge's colors and finishes carried forward into the cabin. In addition to updated and upgraded CMF, and specially commissioned cabin artworks, a new side console was introduced for the suites, the overall interior of which was reworked to have fewer panels, for a cleaner look.

Foster + Partners said of the project, "While this was our first project for a commercial aircraft, it was a unique opportunity to bring together architecture and industrial design. Our challenge has been to take the design principles of the new lounges into the aircraft, while working within stringent safety requirements and retaining Cathay Pacific's award-winning seat."









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# Design showcase





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Design Showcase section to find out what they have to say." Adam Gavine, editor,

**Aircraft Interiors International** 







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JACOB INNOVATIONS

# THE SEAT OF CULTURE

By taking inspiration from Oman's ancient heritage and modern hospitality, Teague elevated the business class experience on Oman Air by paying attention to the details and bringing a residential feel

f you search online for 'Omani architecture', you find clean lines in nature and structure, stone and masonry, and a desert palette. One highlight: the Chedi Muscat, a luxury hotel in Oman's capital, which brings together traditional elements with contemporary chic. For Brian Conner, a creative director at Teague, the Chedi served as an inspiration that guided the design of a new business-class experience for Oman Air.

"The Chedi hotel is luxurious, but also has the purity and clarity of traditional Omani architecture, and is welcoming to guests from all over the world," says Conner.

Oman Air positions itself as a boutique airline. For economic reasons, the airline decided to change its business class configuration from four passengers across, to six. To enhance the customer experience, the airline also decided to invest in a new seat. Conner and his team set to the task of providing a luxurious experience in business class, while making the most of the tight space.

The creative team immersed itself in Omani customs and taste. After many iterations, the team proceeded with a plan that maximized space, conformed to Omani culture, and used sumptuous materials. Material specialists on the Teague team played a key role from the get-go, helping the team take advantage



of new technologies such as laser etching to produce graphic patterns in the seat's fabric.

#### CUSTOMER INSIGHT

The Teague team scrutinized every aspect of a long-haul flight, with a specific focus on the details of a temporary life in the sky. The designers enacted passengers' patterns of movement, from a quick nap to typing on a laptop or reading

Much work went into the IFE integration to give it a natural look within the suite

a book, to taking a trip to the lav. Envisioning passengers' every move, the team designed new spaces where belongings and devices would fit, amplifying customer empathy to the 'n<sup>th</sup>' degree. Teague's design embodied the axiom, "a place for everything and everything in its place". The team anticipated passengers' pain points and inevitable questions; questions such as 'Where can

#### "WE PUSHED THE LIMITS WITH OUR MANUFACTURER AND SUPPLIER PARTNERS"

1. THE CENTRAL DIVIDE IS INSPIRED BY OMANI DESIGN

2. THE STITCHING IN THE LEATHER ADDS FURTHER LUXURY

3. TECHNOLOGY AND LUXURY MERGE SEAMLESSLY IN THE SUITE "Two decades from now, the smartest airlines won't just be airlines anymore. To compete, they will have evolved into fully integrated lines of transport. This means they'll be operating fleets of autonomous cars and even Hyperloop capsules alongside next-generation aircraft."

> Devin Liddell, principal brand strategist, Teague

sits behind an elegant piece of glass, positioned alongside a side light. "Rather than bolting the IFE elements into place as an afterthought, we pushed the limits with our manufacturer and

supplier partners to integrate the IFE into the suite design, so it looks natural," says Christopher Pirie, Teague's senior director of business development.

Similarly, Teague integrated the

in-flight entertainment (IFE) into the suite

design from the beginning. The monitor

#### CREATING THE RIGHT MOOD

In refining the suite, lighting played an important role. The design team illuminated the suite in a way that would avoid dark corners, and promote ambiance. The designers assessed intuitive and correct use and placement of task, indirect, and accent lights throughout the cabin.

Sleep is a main reason why travelers buy business class tickets, so the design

team worked closely with the manufacturer to steer clear of backlit switches, dimmable suite lights, and other common visual irritants. And every seat has ample legroom and access to an aisle, to avoid the 'excuse me' awkwardness of interrupting a fellow passenger's meal, work, or rest.

Most important, the designers cultivated a sense of privacy. Oman Air wanted to alleviate any passengers feeling exposed. Pirie says, "A lot of people fly in the business cabin to allow themselves some privacy from the outside world, whether they are eating, working or sleeping. We provided that cocooned feeling."

From an aesthetic point of view, a mantra that drove the design approach was 'calm but bold'. In both color and materials, the designers played with stone and masonry materials, to align with Oman's architecture. For visual interest,

I charge my phone?' and 'Where can I place my headset, so it doesn't rattle or fall on the floor?' The designers lived out every possible passenger scenario, all the time with an eagle eye on ergonomics.

For instance, because Oman Air takes pride in its food service, Teague asked the airline to send the design company all of those components. As a result, the Oman Air passenger has a place for both a glass of water and a glass of champagne.



#### "WE KNOW HOW TO MAKE AN INTERIOR LOOK FRESH AND TIMELESS"

4+5. THE LARGE ONE-PIECE TABLE

Oman Air won the Best Airline Staff Service in the

awards

the designers juxtaposed those lightcolored materials with leather and deep, rich wood. Teague wanted to create a residential sensibility, avoiding the plastics and other materials people associate with airplanes. The result showcases touchfriendly finishes like you would find in hotels and at home. The designers envisioned an unfolding of surprise and delight, as repeat passengers might continue to notice, discover and appreciate Oman Air's refinement and deeply considered details.

#### IN IT FOR THE LONG HAUL

On a practical note, the design had to last. Oman Air was making a significant investment in the new seat, and the update would need to appear current yet classic – for a decade. Whereas other carriers often opt for busy patterns, this airline expressed a preference for understatement. Teague kept a keen eye toward the client's return on investment.

As Pirie says, "Because of our aviation heritage, and our experience in designing hotels and interiors generally, we know how to make an interior look fresh and timeless."

To bring the design to life, precise implementation was critical. "We pushed very hard to ensure the trim and finish, as well as the final the execution, was as high quality and seamless as possible," Pirie says, crediting manufacturer Rockwell Collins for its willingness to work together to get all the details right.

Conner echoes the sentiment, saying, "As we went through each design review, we make exact mock-ups so we can review the physical design and finishes. You can have great design, but if that design isn't tuned to product engineering and manufacturing, the seat could lose features along the way."

But together with Rockwell Collins, in prototype after prototype, he says, "We paid attention to those details and never let go of important features."

Given the aviation industry's regulatory requirements, professionals inevitably feel pressure to check every box. Design is the linchpin that holds together all the elements of the passenger experience.

"In the industry, for a long time in its history, the customer experience wasn't the main driver, but there has been a lot of progress," says Conner. "What design

Middle East at the Skytrax brings to the table is that we consider the end-to-end passenger experience, and we're an advocate for them from start to finish."

Of the design team at Teague, Pirie says, "We challenge ourselves with solving difficult problems, with the many conflicting tensions, so the airline can be profitable but also offer a sense of luxury and well-being."

The design of Oman Air's business class seats epitomizes the juggle between satisfying requirements and delivering the best possible human experience in flight.

Pirie acknowledges that, "It's easy to get lost in requirements, they become the reason you're designing - to pass a test."

For Teague, in partnership with its clients, top performance requires perseverance. As Pirie adds, "It's our job as designers to say you can have your cake and eat it too. It takes more work, but it's always worth it." 🔊

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# **CO-FOUNDING THE FUTURE.**

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The only thing we owe the status quo is a thoughtful challenge. Together with our clients, we're bringing together emerging technologies and interdisciplinary thinking to design brave new possibilities.

#### TEAGUE

# OUTSIDE THE TUBE

By thinking beyond the constraints of the tube in its designs and overcoming regulations with creativity, PriestmanGoode is securing exciting airline contracts around the globe

rom North and South America to South Africa, Russia, China and the Middle East, this year has seen PriestmanGoode undertake a series of global, varied projects. Their breadth is emblematic of the studio's work, which can range from short term, quickturnaround cabin contracts; to designing groundbreaking seats and configurations that create unique offers for clients; or complete overhauls of an airline's entire products and services, including ground services, cabin interiors, digital services and onboard items in projects that can span many years.

An experienced, varied, talented and international team lies behind PriestmanGoode's work, with dedicated departments able to oversee every element of each project. The studio is renowned for its innovative thinking and for solving problems quickly and efficiently. PriestmanGoode's philosophy has always been to make things better. The team designs for people, and its primary concern is to ensure a good user experience, whether that's creating a comfortable seat environment for passengers, or a cabin that facilitates the work of the crew and maintenance teams.

PriestmanGoode has long-standing relationships with aircraft and seat manufacturers. For over a decade now it has worked with the industry to define the future of the aviation industry, and to develop concepts that drive the direction of travel. Each year, at Aircraft Interiors Expo, the team develops unique concepts





for clients, many of which have been developed into products now flying.

Examples include the award-winning first class cabin designed for TAM Airlines. Launched in 2010, this was the first instance of a commercial aircraft featuring a residential look, with seats designed to look more akin to home furniture.

#### QATAR'S QSUITE

Another example is the premium cabin and lounge developed with Qatar Airways

for the airline's A380s. PriestmanGoode broke new ground with Qatar Airways again this year, when the airline launched the innovative Qsuite, which is the first seat designed to offer a social layout and a full-size double bed for passengers traveling together in business class.

The industry is seeing an important shift in commercial air travel, with more and more airlines investing in and enhancing their business class products to levels previously only seen in first class

#### "PRIESTMANGOODE'S PHILOSOPHY HAS ALWAYS BEEN TO MAKE THINGS BETTER

1-3. THE QSUITE ENABLES A UNIQUE ONBOARD SOCIAL ENVIRONMENT, WITH PRIVACY FROM THE REST OF THE CABIN



cabins. Such work requires considerable knowledge, not just of design, but of materials, regulations, maintenance requirements and, crucially, an understanding of how an airline seat fits in within the life of the business class passenger. PriestmanGoode's experience of designing across all parts of the travel industry, including hospitality, means it has an intimate understanding of passengers' expectations, and is able to meet and exceed them.

The Osuite is a revolutionary product. It's the first business class seat to address the requirements of passengers traveling together. A four-seat 'quad' layout enables passengers to socialize while seated, while privacy doors ensure that if only three passengers are traveling together, the remaining traveler in the 'quad' layout remains undisturbed. This is made possible by the integration of complete privacy doors, a new element for the business class cabin. The studio's experience of designing first class seat environments allowed it to design the doors in such a way that part of the door can be removed by the passenger in case of emergencies, which meant the design successfully got through all certification and regulation issues.

Huge amounts of development go into working with authorities and manufacturers to make a seat like this possible. Consider the myriad products that business class passengers are surrounded by in everyday life: luxury cars, the latest mobile technology, high-end interior design...

Commercial airlines need to match the level of detail and finishing seen in luxury consumer goods that are made in their millions through automated processes. Such quality is considerably harder to achieve when you are making small quantities for an aircraft, and even more so for a product that is in the air more than on the ground. Business class cabins today need to be the epitome of immaculate design and engineering.

The Qsuite isn't just an outstanding example of innovative thinking and problem solving, it's also testament to the amazing results you can achieve when you create partnerships between companies that seek to challenge the status quo.

#### SOUTH AFRICAN AIRWAYS

Another airline which has enjoyed a long-standing relationship with PriestmanGoode is South African Airways; 2017 saw the launch of the studio's designs for the airline's wide-body fleet. The new aircraft interiors for the airline's A330-300 fleet build on the design language that the studio previously developed for the airline's short-haul fleet in 2014, which was launched to great acclaim. The designs provide the airline with a consistent, elegant design language across the fleet, with subtle detailing and highlights of vibrant color and pattern that "Twenty years ago, premium seats were just overstuffed economy seats. Today, airline are creating private spaces with lie-flat beds, bars and lounges. At the other end of the spectrum, economy seats can be said to have gone the other way. It's time to improve the experience for all passengers. It's time for economy seating to take the limelight."

> Nigel Goode, director, PriestmanGoode

reflects South African's distinct cultural heritage and interprets it into a palette for contemporary global passengers.

#### ENHANCING EL AL

Working with flag-carrying airlines has become one of PriestmanGoode's specialities. Over the years, the studio has worked with carriers from all corners of the globe, including Swiss International Airlines, Air France, Lufthansa, Turkish Airlines, Thai Airways and Korean Air.

Earlier this year, PriestmanGoode's designs for Israeli airline El Al were launched in what was one of the studio's quickest projects. Over 18 months, the studio worked closely with El Al on a complete program that included a livery update, a new brand identity for each class, and new cabin interiors including business class, premium economy – which is new to the airline – and economy, as well as entrance areas and galleys. Vice president of commercial affairs at El Al, Gonen Usishkin, described the designs as a "sophisticated representation of Israel that will appeal both to domestic and international passengers", and lauded the studio for creating "a cabin our crew can be proud of, and which allows them to better serve our passengers".

The PriestmanGoode team is also developing designs for Hainan Airlines, the only airline in mainland China to receive a 5-star Skytrax rating. The scope of work includes complete aircraft interiors, as well as an overhaul of onboard service items.

#### THE WIDER PICTURE

PriestmanGoode also works with various organizations at the secondary and higher

education levels, to nurture design and creative thinking in the future leaders of the design industry.

One such example saw the studio's CMF (color, materials and finishes) department work with students at London's prestigious Royal College of Art to develop innovative materials for the future. Textiles and surface design are an important part of the landscape of the aviation industry, and have a huge impact on the passenger experience, as well as on the efficient running and maintenance of aircraft.

The thriving CMF department, for instance, specializes in developing and delivering new and innovative materials within the highly regulated environment of the aviation industry. In the project with the Royal College of Art, students were asked to look beyond those constraints and develop material palettes for aviation in 2050, specifically considering the challenges of weight and of delivering materials with additional benefits to areas such as well-being, health, hygiene, privacy, cleaning or maintenance.



4. THR STUDIO CREATED AN INTERNATIONAL FEEL FOR EL AL'S NEW B787 BUSINESS CLASS CABINS

5. PRIESTMNGOODE ALSO MADE SUBTLE CHANGES TO THE EL AL LIVERY

PriestmanGoode provided direction and guidance throughout the project, working with students to develop their ideas to consider the passenger experience as a highly visual and tactile journey. The results covered a vast spectrum of observations, ideas and methods, from morphing fabrics to translucent knits and low-impact materials, and showing the intrinsic value in developing concepts for the aerospace industry.

Using strategy, insights, observations and analysis to drive innovation, the studio makes sure its teams are exposed to different projects, industries, trends and environments, and constantly seeks out the new. At the core of PriestmanGoode is a belief that its solutions must be both visionary and have longevity, and positively affect every touchpoint of the user experience. The team gets to the heart of problems quickly, delivering high-caliber thinking and design with category-leading solutions that have consistently raised the bar for passenger environments.

The advancement of aircraft interiors is a direct result of those that seek to think beyond the constraints of the metal tube, who don't just see regulations as constraints, but rather as drivers of innovation and creative thinking.

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# A SUPER(SONIC) STORY

As the Aerospace Bristol museum opens – complete with the last Concorde to be built and the last to fly – Factorydesign recalls how it created such a game-changing cabin interior for the aircraft

hen it was built in Bristol, UK, in 1978, Concorde 216 (also known as Alpha Foxtrot or G-BOAF) was sadly the last Concorde ever built, and the last to fly. Following 25 years of supersonic service with British Airways (BA), the aircraft was returned to Bristol, but it needed a suitable home: a home worthy of such a special aircraft. This year, Alpha Foxtrot will get the home it deserves at the new Aerospace Bristol museum, where it will take pride of place.

Visitors will be able to view the cabin interior of this aircraft, which was created by Factorydesign. The London-based industrial design consultancy was less than a year old when it was commissioned by BA in 1998 to create what would be Concorde's last manifestation.

The studio's response to the airline's exciting challenge was to adopt a holistic approach to Concorde travel, expanding the scope of the passenger experience beyond the cabin and into the terminal, and developing the idea of branding as an integral part of the cabin design.

Factorydesign's job was to produce new designs for Concorde's interior, and where possible to go beyond a simple replacement of the seat, fixtures and fittings – it was a brief that allowed the studio to examine the potential to change everything. Through its designs, the





1 + 2. FACTORYDESIGN HAS A STOCK OF CONCORDE PARTS (BIGGER THAN THE AEROSPACE BRISTOL MUSEUM'S!) AND IS DONATING THEM TO THE MUSEUM, SOME OF WHICH WILL BE AUCTIONED OFF AS PART OF THE FUNDRAISING EFFORTS



concept of customer experience in the aviation sector was born.

The Factorydesign team immersed itself in possibilities for the upgrade of Project Rocket (BA's affectionate nickname for the aircraft). Team members examined Concorde's unique position in the BA fleet, and the opportunities that the 'cottage industry' that surrounded this position presented. They quickly realized that as the world's only commercial supersonic jet, Project Rocket would allow them to redefine premium travel.

Meanwhile, another BA design consultant, Sir Terence Conran, was responsible for the soft side of the design work – colors, fabric design, cutlery and such. The two agencies presented their visions for the design strategy separately, and worked with BA's in-house design team of Neal Stone and Paul Wylde, to align 'soft' and 'hard' elements.

Underlying all the opportunities was a clear message from BA design manager, Mike Crump: Concorde is about selling time. For many of the more regular

You can see

Factorydesign's

Concorde cabin

project at the new

Aerospace Bristol

museum, UK

- and therefore valuable customers, the principal justification for Concorde's high fare was the speed. This message needed

to be communicated, while at the same time the issue of weight needed to be addressed: the seat had a target weight reduction of 20%.

In their analysis of other businesses going through similar juggling acts of weight versus strength versus cost, Factorydesign proposed that the composite materials, such as carbon fiber and Kevlar used by Formula 1 car makers could fit the bill. The studio designed the seat bucket as a single piece – a cradle

seat as a monocoque structure – saving parts count and therefore the cost and weight of fixings needed to join them. Each part performed from an engineering perspective first, rather than as simply a 'styling' exercise. The seat philosophy meant every part had to perform both its engineering requirement and an aesthetic one, leaving no room for cladding.

In terms of aesthetics, Factorydesign created a seat that had the feel of extreme comfort, more akin to a luxury car than an aircraft, with built-in adjustable features such as a headrest and footrest. The result was a seat that would not look out of place in a boardroom or an Aston Martin.

One of the early ambitions for the interior was to define Concorde as a British Airways Concorde, something that could be achieved with elements such as colors. Factorydesign also made the airline's new 'Speedmarque' logo work as a 3D form that functioned as the cast aluminum armrest support - a visual device that subtly reinforces the brand all along the aisle. The central armrests in the 2-2 seat layout turned through 90° as they were raised, so they would slip between seatbacks without wasting space: another subtle innovation from Factorydesign.

#### COMPACT AND BIJOU

The consultancy also transformed the utilitarian toilets into bathrooms, bringing on board some of the refinement expected of a bathroom in a good hotel or restaurant. Their innovations included doing away with the standard paper towel dispenser and introducing a stack of neatly folded, white flannel hand-towels; specifying fittings such as the faucet from the best the domestic retail market had to offer; and the use of high-grade finishes and materials, which gave a premium feel

Factorydesign is a member of the Etihad Design Consortium, which created the A380 and B787 interiors



3. FACTORYDESIGN WAS HEAVILY INVOLVED IN ETIHAD'S AMAZING A380 GALLEY ZONES

4. THE FOUR SEASONS JET BRINGS A LUXURY HOTEL FEEL TO THE CABIN

in a tight space. The bathrooms featured an innovative blend of three different light types to provide both illumination and ambience.

Although Concorde's two galleys were some of the smallest in the air, they could be used to create meals for some of the most demanding diners. Factorydesign upgraded the galleys from mere functional kitchen areas to 'welcome zones'. This was part of the holistic thinking about creating a special customer experience from home to destination.

#### THE WIDER EXPERIENCE

Factorydesign's role went beyond the interiors to extending the Concorde experience for both regular and once-ina-lifetime passengers. From Heathrow Terminal 4's first class/Concorde lounge, as passengers passed through the gate on the way to boarding, they got a tantalizing glimpse of the waiting aircraft. But shortly afterward they were in the comparative darkness of a jet bridge, before stepping on board. It was not the fanfare celebration it deserved to be.

Factorydesign's solution was to create a clear pier, which they described as a 'catwalk with glass walls'. This allowed passengers to see the preparation of the airplane as they approached for boarding, adding glamor and romance to the moments of anticipation.

The consultancy also introduced a sense of theater to the breaking of the

sound barrier. In previous Concordes, the event was only marked on the machometer – a digital display on the front bulkhead. Factorydesign introduced a discreet wave of blue light into the ceiling lighting, which washed from the front of the cabin to the rear in a five-second pulse, before seeming to disappear from the rear of the aircraft. This understated but dramatic display rewarded passengers wanting the exciting supersonic experience, without disturbing guests who wanted to work or rest.

#### BEYOND CONCORDE

Factorydesign's work for Concorde helped turn the consultancy into an aviationfocused business. As a result, the studio was tasked with reinventing the commercial flying experience for Etihad Airways, as the airline remembered the inspirational design of Concorde and wanted to borrow some of that creative DNA. In 2014, Etihad launched the world's most highly customized cabin interiors for its B787 Dreamliner and A380 fleets. Factorydesign's input included creating the customized galleys that double as welcome areas. The relaunch of Concorde was very much a collaborative effort involving BA and Conran, and this understanding of how to work as a team was crucial when Factorydesign joined two other studios to form the Etihad Design Consortium, which created the airline's amazing new designs.

"One of the most precious commodities in future will be time. Reversing the backward step in air travel speed that came with Concorde's 2003 retirement, we believe there will again one day be supersonic commercial travel. With the likes of Boom, Lockheed Martin and Virgin Galactic embracing new technologies and materials, this may be sooner than we dare hope."

> Adam White, director, Factorydesign

Many years on from the Concorde redesign, Factorydesign has also applied some of its learnings to the hotel industry's first fully branded jet experience, the Four Seasons Private Jet with luxury cabin interiors for just 52 guests.

The challenges that Concorde presented to Factorydesign meant that creativity and innovation became embedded in the DNA of the agency. The guiding philosophy of 'bringing the outside in' – taking the design of the Concorde exterior and applying that to the cabin – encouraged the creation of an interior that required 'thinking outside the box'. 🚿

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## INNOVATION DIVERSITY

Since 1994, Acumen has created many innovations that have benefited airlines' profits and passengers. The design studio looks back over the past two decades...

ongratulations to all at Aircraft Interiors International on your 20<sup>th</sup> birthday! Who could have predicted in 1997 that the industry would look the way it does today? The continued prosperity of Aircraft Interiors International is a positive reflection on the dynamic nature of the industry across a 20-year period, during which Acumen has led and completed around 40 full airline design programs.

It is worth reflecting for a moment on the market dynamics in 1997. British Airways had just launched the Acumendesigned first class Bed in the Sky one year earlier, the first blue-sky seating program in aviation to be led by an industrial design consultancy. This product was groundbreaking at the time. It completely redefined the first-class experience, won every design award, and proved an outstanding commercial success for the airline, propelling its brand to previously unimagined levels.

Twenty years on, this product has been the inspiration for almost every first and business class experience since. It is now almost unimaginable that someone would fly long-haul business without a flat bed, demonstrating how quickly something completely new can become a *de facto* standard. Designers, seat makers and airlines have had to work hard to deliver differentiation in an environment where the unique quickly becomes the expected.

There have been three primary drivers for change in the aircraft interiors industry during the past 20 years: advances in



engineering technology, greater diversity of passenger expectation, and a realignment of the class differential and user experience. Each has played its part in creating a market with more choice than 20 years ago.

#### ENGINEERING DIVERSITY

The commercial deployment of the Airbus A380 some 10 years ago is the obvious standout moment in the history of engineering developments over the past 20 years. The additional volume of passengers that can be carried over further distances and with a smaller environmental footprint has provided designers with a blank canvas on which to create new customer experiences.

For Acumen, this offered a unique opportunity: the chance to work with Airbus in 2000 to define the 'baseline' cabin interior for the A380 – or A3XX



### "AN ENVIRONMENT WHERE THE UNIQUE QUICKLY BECOMES THE EXPECTED"

1. OPTIMA DELIVERS LUXURY, AISLE ACCESS AND CABIN DENSITY: A PACKAGE UNITED COULDN'T REFUSE

2. ACUMEN'S REVOLUTIONARY BED IN THE SKY FOR BRITISH AIRWAYS

3. AURA IS THE MOST POPULAR BUSINESS SEAT IN THE B787 CATALOG



as it was known then – from scratch. The vision was for a cabin interior that reflected the aircraft – modern and spacious, but not cavernous – defined by open spaces and clean lines. Many of the original cabin definitions became the bedrock of the flying experience today.

The A380 also provided another of the most challenging and rewarding experiences of the past 20 years. As part of the Etihad Design Consortium (EDC),



Acumen was responsible for the seating design on Etihad's new fleet of wide-body airplanes. The headline-grabbing story was The Residence: a three-room apartment in the sky, including the first double bedroom ever on a commercial aircraft.

For Acumen, the story was about the smart use of space, especially in converting a previously uncommercial part of the aircraft into an unprecedented VIP experience of The Residence. It was also about offering complete privacy and luxury to those traveling in the First Apartments and giving them an experience more akin to a boutique hotel than an airplane.

Business and economy class passengers were not forgotten. The Business Studios offer improved privacy and space, while the economy experience offers a unique headrest and back support to provide an improved experience.

#### MORE CHOICE THAN EVER

The super VIP experience of Etihad's Residence demonstrates the degree to which flying has diversified over the past 20 years, not only in terms of first and business class experiences, but across all classes of travel.

It would have been inconceivable 20 years ago that a flight could cost anything from US\$1 to US\$20,000, demonstrating the impact of not only the new luxury airlines, but also the low-cost carriers. This will continue with the global fleet of commercial airlines, which is set to double by 2030. Passenger choice has extended considerably from 20 years ago. As competitive pressures grow, cabin design is increasingly about using space more effectively and efficiently to create improved passenger experiences, while reducing the overall footprint of seating.

A good example is Optima, a business class experience that delivers what had previously been seen as an almost impossible challenge: to deliver a flat bed and aisle access to every passenger without any reduction in seat numbers compared with angled lie-flat seats. By combining an in-line and angled seating layout, Acumen achieved this. The design is the inspiration behind United's new Polaris business class experience.

#### REVOLUTION VS EVOLUTION

While aviation interior design is increasingly challenging, Optima has demonstrated there is still scope for a step-change product – such as the Bed in the Sky – that comes to define the shape and direction of the industry for a significant period.

Airlines and manufacturers have to be brave to green-light ideas that go against the norm, but those that do often gain commercial advantage.

Over the past 20 years, it has been a privilege to be involved with many projects that have helped to define and then redefine the industry. For example, in 1998 Acumen collaborated with American Airlines to create the first swivel lay-flat seat on a commercial aircraft.



Inspiration can come from anywhere: for Air France in 2002 it came from classic furniture to create the Espace Premier first class seat; the BA Bed in the Sky configuration was inspired by the echelon style of angled car parking. Created in 2005, the Aura seat has become Boeing's most popular catalog offering for the B787.

These and other projects over the period have led Acumen to create more than 15 patented seating layouts that are still flying today.

#### 20 YEARS FROM NOW

Only a fool would try to predict what aviation will look like 20 years from now. What is certain is that composites, 3D printing and wireless technologies will offer opportunities for designers to reduce weight in the cabin and further improve the passenger experience. This will require new levels of collaboration between regulators, manufacturers and designers 4. ETIHAD'S FIRST SUITES, CREATED WITH ACUMEN

5. ACUMEN HAS WORKED WITH AIRBUS ON CABIN PROJECTS...

5. ...INCLUDING ETIHAD'S AMAZING RESIDENCE ON ITS A380s

to ensure that each is aware of the potential and practical application of new technologies and more sustainable materials. Designers will need to become even more acutely aware of technological developments and seek inspiration from a transfer of technologies from other industries.

Business class cabins have evolved in the past couple of years, diversifying to offer anything from high-density products to what would have been traditionally perceived as first class offerings.

Acumen believes that economy and premium economy is ripe for a similar



"Unprecedented airline interest in wide-body lay-flat business class seating has driven market saturation. We are very interested in prevailing new aircraft types that are unlocking new design potential and presenting fresh canvas space. Long-range narrow-bodies are giving rise to a whole new generation of singleaisle lay-flat seats, which is very exciting! What next? We believe that there is much fun to be had in the gray area between lay-flat business class and economy." *Anthony Harcup, associate director*;

Acumen Design Associates

revolution. Some 70% of those that fly do so in economy. This is the most challenging environment in which to create a step change, but it is where design revolution can be most impactful.

According to air travel intelligence company OAG, the LCCs have grown in 10 years from 15% of worldwide seat capacity to 25%, making it more challenging for traditional airlines to compete on price alone. Airlines are challenged to deliver differentiation so they can compete through unique customer experiences.

Design has a critical role to play in creating customer experiences that drive loyalty, by delivering added value with new and alternative revenue models. Acumen is looking forward to its role in creating the next generation of revolutionary aircraft interior design from nose to tail.

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## FLAT OUT FOR 20 YEARS

In 1998, Tangerine answered British Airways' quest for the holy grail of commercial aviation. The solution was Club World, which changed the face of business class travel forever

he launch of Aircraft Interiors International magazine coincided with a turbulent time for the aviation industry: the global economy was lurching disconcertingly, fuel prices had begun to rise sharply, and competition in the skies was increasingly fierce. Every major airline was scanning the horizon to locate the point of difference that would give them a business advantage.

In 1998, British Airways (BA) presented a daunting challenge to Tangerine: "Find us the holy grail of airline travel sprinkled with a bit of pixie-dust – and astound us along the way."

BA's director of marketing at the time, Martin George, says the airline wanted "something that was genuinely different and distinctive".

The response from Tangerine to the BA brief was Project Dusk, an audacious design that would stun the aviation industry, redefine the business market, and become the profit engine for BA.

"It was something many regarded as simply impossible," says Tangerine CEO, Martin Darbyshire – nicknamed 'the Professor' by executives at BA because of his technical know-how. "We came up with a totally lie-flat bed in business class that kept the same number of seats while enhancing the very special BA brand."

INTENSIVE DEVELOPMENT

It was a hard-won pitch. For weeks, Tangerine's chief creative officer Matt Round had made the company offices





resemble a dormitory after an earthquake: there were modeled beds everywhere and at every conceivable angle – slanted, end to end, side by side, on top of one another.

"It's essential to have something physical to feel and make one aware of how spacious or cramped something feels," Round explains. "It is amazing how different things appear when they are physical and how dramatically they can shift your perceptions."

Project Dusk was about understanding the psychology of the business passenger

as much as the practical constraints of an airliner. A sleep expert, recruited to advise Tangerine, explained that the average person turns over in bed 30 times a night. If you can't turn in your airline seat, you never reach deep sleep, they were told. And the key to turning over was lying flat.

#### YIN YANG

There wasn't a sudden 'eureka' moment of the project, although the answer, when it came, was groundbreaking: the yin-yang approach. From the apparent chaos of

#### 1-3. TANGERINE'S GROUNDBREAKING CLUB WORLD DESIGN HAS HAD A PROFOUND EFFECT ON THE BUSINESS CLASS MARKET

Round's model beds emerged a formation that would redefine the design of aircraft interiors. Instead of all passengers facing the front of the cabin, seats were paired in a forward/rearward formation.

"No one had ever arranged cabin space in this way," says Round.

The yin-yang approach allowed the design team to consider new ways of using cabin space: armrests could be positioned over each other; the footstool could be separated from the seat to give more freedom of movement; and a lower,

### "FIND US THE HOLY GRAIL OF AIRLINE TRAVEL SPRINKLED WITH A BIT OF PIXIE-DUST"



reclined seat geometry offered a more welcoming environment when boarding.

"Passengers told us they yearned for the freedom to move as they wished," Darbyshire explains. "This design allowed people to move around and feel special. We were offering a lounge in the sky."

The team had indeed uncovered something unique – a fully flat, 6ft bed that still kept eight seats abreast in a B747.

Martin George remembers the moment when Tangerine unveiled it to the airline's in-house team. "The reaction was 'Wow!'" he recalls. "People thought 'this is amazing', that it could deliver the crown jewels – but I was actually very nervous. We had yet to convince the BA board."

#### CONVINCING THE BOARD

It was a huge decision for the airline. Should they spend millions on an untried concept for their business class cabins at such an uncertain time for the industry? "It had never been done before, and it was a calculated risk with enormous implications," says George.

Experts from across BA's operation worked closely with Tangerine to help get the project to fly. It was a testing time in more senses than one. The project team had to be confident the new seats were robust enough – any technical failure could have been disastrous.

"On the New York route, for example, there would be 96 Club World seats," Darbyshire notes. "At 32,000ft, you don't want them going wrong."

Tangerine worked with the seat manufacturers for five months as the first prototypes were produced, putting the seat through a wide range of dynamic tests. It wasn't simply the engineering that had to be considered. Early research suggested some passengers might feel uncomfortable flying backward – a psychological barrier to the yin-yang



design. "My gut feeling was that it would work," Darbyshire recalls, "so BA proposed research conducted in their lounges."

While they waited for the results of the survey, the Tangerine team were taking to the skies themselves. Trial flights with the UK's Royal Air Force were arranged to reassure the doubters that people wouldn't suffer motion sickness when flying backward. The exercise demonstrated that, unlike a car or a train, where a passenger relates to the landscape outside, a large passenger aircraft is not close enough to anything for travel sickness to be a significant problem.

When the in-depth survey from BA's lounges had been collated, the results showed only one passenger in 100 was opposed to the idea of facing backward, and they would have plenty of forwardfacing seats to choose from. Yin-yang was still on the table. Everything now depended on convincing the BA board.

Martin George still remembers the trepidation mixed with excitement as he prepared to present Project Dusk to the airline's executives in the form of a foam mock-up model. "We'd done the research and then we just had to push it. Half a dozen of us walked the board through every detail."

There was nervousness, too, at Tangerine, where everyone was waiting to hear the decision.

At a launch ceremony in a London TV studio, BA's then CEO Bob Ayling explained how the airline was basing its



4-5. TANGERINE CREATED A SIX-WAY HEADREST FOR CATHAY PACIFIC'S A350

6. THE ADAGIO SEAT, DEVELOPED FOR AVIOINTERIORS

future on the results of extensive research into what frequent flyers said they wanted. "They wanted us to be the best in the world," he said. "So do we."

#### THE DREAM BECOMES REALITY

Fifteen months from the beginning of the project, the first fitted airplane was in the sky. "Pretty pacy by any standards," as Round puts it. But Project Dusk was never rushed. "Looking for any quick result under pressure is not going to work. You have to have the space to play around." Passengers fell in love with the lounge in the sky. The cabin crew championed it. The board saw a return on their investment within 12 months and shareholders "Meaningful product innovation only were delighted. happened in this sector in the late "It is among the 1990s. A pendulum of change will most innovative

swing back toward real disruption. The source will be technological innovation, as an enabler to service and product transformation. The future is personalization of a door-todoor customer journey." Martin Darbyshire, CEO, Tangerine London

"It is among the most innovative things the aviation industry has ever done and it changed the way the business world thinks about flying," says Round. "Prior to that, everyone was flying all night sitting upright. Now you wouldn't think of it."

Two decades on, and success for airlines hinges on delivering a seamless end-to-end passenger journey. Tangerine meanwhile, draws insight from its work in rail, retail and automotive, to continue to create exceptional customer experiences in the air.

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## NARROW FOCUS

JPA is excited by the possibilities created by applying the premium wide-body design approach to narrow-body aircraft, as adopted in its recent projects with Hawaiian Airlines and flydubai

ondon, Singapore and Dubaibased JPA Design might be better-known for its acclaimed work on wide-body aircraft, but recent projects for Hawaiian Airlines and flydubai suggest there is great potential in the premium narrow-body aircraft market too.

"Ambitions for narrow-body aircraft are on the up," enthuses Ben Orson, managing director of JPA's London office. "We recently worked with a leading American airline on full-flat beds in the front of narrow-body aircraft, and while this is not unprecedented, it is still very rare."

With narrow-body aircraft outselling wide-body aircraft by more than five to one in 2016, according to Boeing and Airbus figures quoted in a recent *Financial Times* report, and modern narrow-body aircraft like the Airbus A321 and Boeing 737 Max able to fly further, JPA sees a significant niche emerging.

Orson continues, "If carriers haven't already considered the possibility that they could afford to do anything interesting with their narrow-body fleet, they should look at companies like JPA, because for a small proportion of their budget we really can make a difference to what can be seen as utilitarian aircraft. Sometimes carriers have limited ambitions for their smaller fleets and don't want to lavish as much attention on them, but we're saying it's worthwhile."

#### HAWAIIAN AESTHETICS

JPA's work for Hawaiian Airlines' singleaisle A321neo aircraft – due to make their public flying debut in late 2017 – is a great example. As you might expect given the destination, the airline's mostly six-hour routes are mainly leisure flights by holidaymakers wanting something more special than their usual commute.

"In America especially, Hawaiian's guests spend the rest of the year using legacy carriers," says JPA's transport design director, Tim Manson, "but for their vacation they choose Hawaiian due to its premium position and generous hospitality. In this case the journey



### "FOR A SMALL PROPORTION OF BUDGET WE CAN MAKE A DIFFERENCE TO NARROW-BODY AIRCRAFT"

"By slicing away every refinement that humanizes the passenger experience, low-cost carriers have led a race to the bottom in the single-aisle market that other carriers have been unable to distance themselves from. But at JPA we think airlines should leverage the scalability and operating cost benefits that smart design can bring to big fleets of small aircraft. Perhaps then, the small airplanes that most of us fly on can match their bigger siblings and deliver a great expression of the airline's values and heritage." Ben Orson, managing director, JPA Design, London





1 HAWAIIAN AIRLINES' ECONOMY COMFORT CLASS REFLECTS THE COLOR AND LIGHT OF THE ISLANDS

2. JPA WAS INSPIRED BY TRADITIONAL HAWAIIAN KAPA FABRIC TECHNIQUES

3. THE KAPA-STYLE FABRIC JPA DESIGNED FOR HAWAIIAN AIRLINES

is viewed as an integral part of the holiday experience."

"For Hawaiian, the challenge was to create the atmosphere of a wide-body aircraft on a narrow-body," continues Manson. "You need to optimize the space as rigorously as you would a wide-body aircraft, whether that's about the end of rows, storage for crew, or smarter partitions and dividers."

A good example of one such functional layout change for Hawaiian is the introduction of a mid-cabin lavatory. For longer flights, as well as breaking up the space visually, this lavatory will avoid queues building up at the front and rear of the aircraft and also allow the crew to continue serving easily with their trolleys."

From an aesthetic point of view, JPA drew on the beautiful location and culture of Hawaii, calling upon the agency's great strength in premium color, material and finish schemes.

"We left no stone unturned," says Orson. "Every surface you could address, was addressed."

Thus bulkheads - too often seen as innocuous dividers – gain a natural ripple

effect, custom wall and floor laminates in the lavatories are inspired by the

granularity of sand and flora and fauna patterns, and even the lavatory sign itself pays homage to traditional Hawaiian dress, with the male figure wearing an Aloha shirt and the woman a flower in her hair.

JPA's business class design for Singapore Airlines has won four Skytrax Best Business Class

Seat' awards

"With Hawaiian, we aimed to create stories that enrich the travel experience and spark conversations," explains Manson. "It's a charismatic interior that really crystallizes the unique character of the carrier."

#### FULFILLING FLYDUBAI

Another insightful example of premium narrow-body cabins from JPA can be found in its recent collaboration with an ambitious new carrier, flydubai.

John Tighe, also a JPA transport design director, picks up the story: "Flydubai is all about connecting people within the Middle East region, often flying to destinations that aren't serviced by larger regional

competition. Customer expectations are still high, whether they fly four hours or 10, and often people are in transit, so why should it be acceptable to get off a highspec wide-body and onto a basic narrowbody for the latter part of your journey?"

Flydubai, which operates a fleet of 58 next-generation Boeing 737-800 aircraft, placed an order for up to 100 Boeing 737 MAX 8s at the 2013 Dubai International Airshow. The carrier partnered with JPA to entirely reimagine the look of the business and economy class cabins, which will feature on the new B737 MAXs, the first of which was delivered to flydubai in August, making the Middle East carrier the first in the region to operate Boeing's newest single-aisle aircraft.

Commenting on the partnership with JPA, flydubai's CEO, Ghaith Al Ghaith, said, "We teamed up with JPA, as one of the world's leading design specialists, to deliver a new cabin interior reflective of the airline's maturity, offering our more than 10 million annual passengers a more comfortable onboard experience across our growing network."

JPA Design is designing all elements of the two-class cabin for the fuel-efficient, single-aisle aircraft. In business class, a bespoke seat that promises to be unique to flydubai is being developed, giving added comfort and value to passengers.

John Tighe, who is leading the flydubai design project said, "To seek inspiration that helps to inform the final cabin design, the JPA team spent time immersing itself in the culture, color and sights of Dubai. We've compared flight experiences on other airlines in the region and have been getting to know the flydubai family of crew, engineers and management. They are a warm, friendly, smart and ambitious airline, they have a clear vision of where they wish to go, and they value their customers highly. And we both share in the commitment to constantly innovate and strive for best-in-class solutions."

Tighe continues, "The Middle East region and the dynamism of Dubai in particular has interested us for some time and has led us to forming a local presence. There exists in Dubai a truly positive attitude and a desire to achieve great things in the 21<sup>st</sup> century. This approach reflects our own values and we were keen to establish and build on relationships in this fascinating region. Partnering with flydubai is an honor."

JPA Design's full scope of work takes in all cabin elements, including seat design and customization for economy and business class, lavatories, full CMF (color materials and finishes), soft furnishings – including curtains, serviceware and carpets – bulkheads, lighting and the graphic user interface for the IFE system.



With offices in London, Dubai and Singapore, JPA's design teams can design teams can tackle projects anywhere in the world

4. HAWAIIAN AIRLINES' NARROW-BODY FIRST CLASS CABIN IS A RESTFUL, HIGH-QUALITY SPACE

5. JPA DESIGN IDENTIFIES WITH THE AMBITION AND CLEAR VISION OF ITS NARROW-BODY CLIENT, FLYDUBAI

Two creative design successes out of many then, but ones that were only achievable through careful planning and a thorough understanding of how the various stages need to be managed.

"Timing is very important and we can help guide airlines through that process," says Manson, "Hawaiian allowed plenty of time (24 to 30 months), which was a healthy timeframe for ideas to be floated, circulated and approved conceptually and financially and, from a manufacturing perspective, to allow time to produce the elements the airline wanted."

JPA has experience in trains, lounges and hotels as well as aircraft, and its global team can offer complete hands-on program management, from first conceptual sketches to design engineering. With 35 years in the business, and USPs such as an industry-first RGB lighting facility to test prototype potential CMF in-house, its rare insight and skill-set could be just the ticket, whether that flight is narrowbodied or wide.

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# JPA DESIGN

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## 20 YEARS IN THE MAKING

From prestigious cars, to aircraft and aircraft interiors, Design Q has had an exciting 20 years. An innovative seat design is set to play a large part in the company's future – and in aviation...

esign Q began life in 1997, just as aircraft interior design was really taking off. Back then, the Design Q team could not have imagined that their dreams would be realized in the portfolio and pedigree the studio now possesses. A trail of interesting challenges and fantastic projects have shaped and enhanced the company and its people into a highly respected visionary automotive and aviation design consultancy.

Howard Guy, CEO of Design Q, has always been a highly creative individual. Throughout his childhood he was labeled a 'dreamer', but this was used as a critique rather than a trait to encourage. However, from the moment he walked through the doors at art school and then five years later into The Royal College of Art for a coveted place on the Automotive Design MA, everything changed. Guy had always felt the desire to enjoy the everyday, to make and to create. He imagined the day when his design dreams would become a reality. That day has now come, as he can proudly say that his dreams have come true, and that he has driven them and flown in them.

Guy and the team are lovers of great cars, and have had enthralling careers at Design Q working with some of the world's best car manufacturers.

As well as automotive design, they have worked on notable aircraft programs, including rebranding and inventing the interiors and cabin product for Virgin Atlantic, Cathay Pacific and a multitude of other airlines. Then there's the even bigger





### "THE ADAGE 'WE CAN'T DO THAT BECAUSE OF CERTIFICATION' IS NOT ONE DESIGN Q SUCCUMBS TO"

1. THE AERION CABIN PROJECT INCLUDED A SKYSCREEN CEILING

2. THE PITCH PF3000

3. PRESTIGIOUS AUTOMOTIVE CLIENTS HAVE INCLUDED RANGE ROVER (PICTURED), FERRARI, McLAREN, JAGUAR AND MASERATI





players: Boeing (Design Q's first aviation customer), Airbus

and Bombardier, which over the past 10 years have challenged the team with large and significant programs for flight decks, cabins, galleries and seating, with Design Q producing numerous fullsize interior prototypes.

herringbone Jayout

> Another interesting project came when Aerion approached Design Q to design the first supersonic business jet, an adventurous and ambitious project and one that Design Q sees as a great opportunity to break new ground and set new standards in business travel.

> Design Q always aims to work with vision and enthusiasm, leaving customers amazed and inspired, whether they're designing cars, flying cars (yes, that's true), the worlds best business jets, or the interior mock-up for Embraer for the hit film *Now You See Me 2*.

The variation of design and engineering challenges and the diversity of projects keeps Design Q thinking outside of the box, providing its customers with creative solutions, continually inventing new products and working in innovative ways. This acts as an enabler to enable the proposals to reach production. The old adage of 'We can't do that because of certification' is not one that Design Q succumbs to; the team's job is to find an answer and then invent and deliver a product that can be made and certified. Proof of this is shown through the high number of the studio's designs that are out on the road or in the air.

#### ENTERING SEATING

One of the most challenging projects Design Q has undertaken was a seat concept back in 2005, which was showcased to the world at Aircraft Interiors Expo in Hamburg and then taken through certification and on to production.

The difficulties were not down to the design or the engineering requirements, but more due to the funding and the seemingly bottomless pit of cash needed to develop this type of product in the aerospace industry. The key ingredients for delivering on the concept were present at the beginning of the process, allowing them to produce a solution that was realistic and deliverable, and which



possessed intelligent design. In 2005, Design Q felt it had found a gap in the market by designing and producing a short-haul economy seat that would satisfy both the initial customer and the end customer, as well as being efficient, comfortable, attractive and lightweight.

Unfortunately the studio received resistance from the industry, but also didn't truly appreciate how much airline customers would later yearn for what the studio had achieved. Design Q naively thought that a strong idea and progressive design would interest the aviation seating industry, with market leaders queuing to

develop the concept to production, and in the process make a lot of money for Design Q and even more for themselves.

The opposite actually occurred:



two market leaders informed Design Q that a fixed-back economy seat was just not viable or needed in the market. Ironically, both of those companies now supply fixed-back economy seats. Design Q was ahead of its time.

Following this period the studio decided that the concept it had created would only get to market if a small and dedicated team, alongside a factory workforce, controlled the production and assembled the seat themselves. A new company was formed, separate from Design Q.

Pitch Aircraft Seating was founded by Guy and Gary Doy, with Doy becoming CEO of Pitch, dedicated to the work of seeing the product through certification and on to the market. Named the PF2000,

several thousand of these seats are now in their fourth year of service and have proved popular due to their comfort. Pitch has now gone a step further and created the innovative Pitch PF3000, which is now certified for both Airbus and

Boeing single-aisle aircraft, and by the time you read this, will be in production for waiting customers. As well as being the most space-efficient seat in the market, the Pitch PF3000 has evolved considerably to be stronger and lighter, containing 30% fewer components than previous models.

Following the past few years of development, the design of the seat now shares nothing with the original MK 1 PF2000. From the ground up, everything has been challenged and either redesigned or completely removed. The fundamentals of space and comfort remain, but the "From a design perspective, the aircraft interiors industry is in need of an overhaul. There's no need to offer more than a multitude of LEDs adorning a white surface or a 20-minute light show. The customer should have the feeling of being inside something unique, an aircraft interior that is special, something less clinical, not only in terms of the walls, ceilings and peripheries, but also inclusive of the design of the seating and monuments. Traveling is a fantastic adventure, something to be cherished."

Howard Guy, founder, Design Q

4. DESIGN Q PRODUCED THIS BOMBARDIER PROTOTYPE

5. THE PF3000 CONTAINS SEVERAL ENFORCEABLE PATENTS

6. CO-FOUNDER HOWARD GUY

manufacturing opportunities to make it cheaper, lighter and easier to assemble were foremost in the minds of the team.

The space efficiency allows an extra two rows of seats to be fitted in an A320 compared with rival seat models – but remarkably, with improved legroom. One of the key elements that will not be appreciated until it has been in service for some years – having few components and few moving parts means that its durability will make it a leader in the industry in terms of low running costs.

The last thing to mention is of course the design. This has been driven by form and function, with the result being an elegant and well-proportioned seat that can be used by industry for the next two decades, presenting carriers with a compelling business case.

The Pitch PF3000 will enable Design Q to continue to support its customers with rebranding and industrial design, but with the added bonus of being able to offer a serious alternative, driven entirely by visionary design.

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## DESIGN Q SHAPING AVIATION FOR 20 YEARS



BRANDING

VISUALISATION

## INTERIOR INTEGRATION

Harmony of design is important when integrating front-row monuments with cabin design, explains AIM Altitude

uch of the skill involved in cabin interior design is in making spaces feel bigger, lighter and airier. Opening up sightlines and smoothing contours helps to achieve this aim, along with the skilful specification of materials and innovative use of lighting.

AIM Altitude has been able to amplify the feeling of space through the flow of seating with the front-row monuments. While a row of monuments facing the first row of seating in first or business class could create a barrier, intelligent design and engineering can enable this area to be both practical and aesthetically pleasing, enhancing not just the functionality of this area, but also the character and ambience.

#### TRANSFORMATION

The design challenge of seat and frontrow-monument integration is in finding and transforming underutilized space – great design can improve space-efficiency. The furniture that supports the front-rowseat video monitor, meal table and passenger footwell has been redesigned and re-engineered by AIM Altitude for many airlines, with various aims including concealing safety equipment, trolleys or catering stowage boxes, or even to create stowage space for passenger wheelchairs. Such is the benefit of customized monuments over catalog furniture.

For this transformation to work both aesthetically and practically, the concealment of the additional space and functions must be carefully designed to integrate with the bigger picture of the cabin. Hinged doors and decorative panels can make this area a positive aspect of the passenger experience.

Clever engineering is vital in the success of such projects, as the front-row furniture comprising the video monitor, etc, must look identical to those for the rows of seats behind, and manufactured from materials and processes appropriate to the airframe structures.

In some cases, the differentiation of the front-row seating area may be the



### "CLEVER ENGINEERING IS VITAL IN THE SUCCESS OF SUCH PROJECTS"

111

1. HARMONIZING THE DESIGN BETWEEN CABIN FURNITURE AND SEATING FROM DIFFERENT VENDORS IS A CHALLENGING TASK

2. THE CUSTOM FURNITURE INCLUDES GEOMETRIC PATTERNING THAT CREATES A TACTILE BRANDING ELEMENT FOR AIRLINES

desired outcome, and AIM Altitude has been able to generate more bed space and passenger-stowage space for the front-row passengers, allowing airlines to allocate these seats to VIP passengers.

Among the projects undertaken by AIM Altitude, front-row-integrated furniture has included decorative branding panels to differentiate the airline or cabin class. Baby bassinette mounting and stowage provisions are popular additions, which can be integrated into custom furniture that complements the Type Certificate Holder's catalog furniture and equipment.

Perhaps surprisingly, once installed in one piece, the bigger furniture is lower in mass than having separate furniture units, and the loads at attachment point to the aircraft are lower. This helps to eliminate wasted cabin space, and the internal capacity and opportunity for custom brand identity are greater than any combination of standard catalog furniture.

#### ENGINEERING EXPERTISE

A great deal of the work in harmonizing the design and creating a feeling of flow in an aircraft interior is spent in integrating various features, from the back of the lieflat business-class seats, to the galleys, stowages and closets.

Where AIM Altitude has been particularly successful is in generating space and weight-efficient, multifunctional, non-catalog customized furniture. The process required to create "More personalized service demands, ever-developing IFE, and the requirements for both private spaces and social areas will keep industrial designers and engineers busy over the next 10 years. While many innovations will be made, the need for highly skilled craftsmen will continue, with handmade items defining quality."

Mark Edwards, CEO, AIM Altitude

3. AIM ALTITUDE'S DESIGNS MERGE SEAMLESSLY WITH THE AIRSPACE CABIN

aesthetic integration is a challenge, as the Type Certificate Holder certification often necessitates changes of material and manufacturing methods, compared with the technology that is used by seat manufacturers.

With the regulatory requirements for monuments being very different to those for seats, especially in terms of fire properties, many seat companies will opt to certify the seats as standalone products under the FAA TSO and European ETSO authorization processes. To be able to integrate galleys and stowages, which are certified as part of the airframe, as AIM Altitude has done, seat companies would require a different category of Type Certificate Holder approval.

#### TOULOUSE COLLABORATION

When AIM Altitude and Thompson Aero Seating were asked to join forces to create part of the interior for the Airbus A330neo Airspace in the full-scale mock-up center in Toulouse, France, this was the first opportunity for the companies to work together as AVIC colleagues. The two companies had, however, already collaborated on many projects, starting with Swiss Airlines in 2014, before moving on to airlines such as South African Airways, China Southern and LATAM Airlines. AIM Altitude became part of the AVIC group of companies in May 2016, and Thompson Aero Seating joined AVIC in December 2016.

For the A330neo project, it was important to showcase the potential and versatility of the front-row monument design, incorporating both functional interfaces, for IFE and stowage, and to provide the opportunity for airlines to introduce customized and tactile finishes.

AIM Altitude opted to show different designs on the left-hand and right-hand lateral to show how the units would look both with and without recessed bassinette areas, a design feature requested for a number of previous programs.

Of course, AIM Altitude had to acknowledge the design language of the seat in the front-row monument, so the pair are seen to clearly integrate and flow. At the same time, AIM Altitude's industrial designers did not want to be confined to simply duplicating the IFE interface of the adjacent seatbacks, and wanted to explore the potential of the front-row monument space. From the floorplan of the demonstrator, it was known that the front-row monument's forward-face would be on display, which presented the opportunity to introduce some subtle features and designs in this area.

The design complemented Thompson's Vantage XL seats. It needed to be clean and functional in appearance, and ultimately something airlines could envisage as both functional and as an enhancement to seating configurations and cabin ambience.

AIM Altitude and Thompson Aero Seating worked collaboratively to ensure the front-row monument design integrated with the demonstrator seats. Interfaces and clearances between seat and front-row-monument passenger amenities were represented exactly as they would be in the aircraft. It was important for both companies to understand the constraints of the demonstrator fuselage in order to enable a quick installation on delivery, which was only possible with cooperation from Airbus and the team responsible for this facility.

Sleek front-row monuments were designed by AIM Altitude to demonstrate how airlines can differentiate their offering. The white and gray color scheme came from Airbus, to fit the Airspace interior specifications. Thompson's seats were integrated with the monument design to create a unified appearance, and brand identity projected through decorative elements. The geometric patterning was inspired by the ceiling panel in the Door 2 entrance and developed into a more three-dimensional, tactile branding element.

Overall, the look is fresh and minimalist, showcasing an elegant design and universal style that should appeal to all audiences.

The finished monuments and seats installed in the aircraft fuselage at the Airbus full-scale mock-up center

demonstrate perfectly how the harmonizing of seating with frontrow monuments can create continuity and movement in the style and feel of the area. This, in turn, supports a relaxed and comfortable atmosphere, while still offering function and performance. S

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## TRANSFORMING EXPERIENCES PearsonLloyd has been transforming the experience of its clients' users for 20 years,

earsonLloyd is in the business of brand transformation. For 20 years, the London-based design agency has transformed the experience of its clients' users across the spheres of hospitality, the workplace, the city, public transport and healthcare. The breadth of PearsonLloyd's output is unified by a series of common goals.

#### A CULTURE OF FURNITURE DESIGN FOR INDUSTRIES DOMINATED BY INDUSTRIAL AND PRODUCT DESIGN

Unlike other design agencies developing aircraft interiors, PearsonLloyd comes from a furniture design background. The studio understands the language of industrial design – but it also understands that a good product is not just about how an object functions, or the use of a new technology: it is about how an object is crafted. A well-crafted object is an elegant object. And for PearsonLloyd, elegance is more than aesthetics: the concept, a product's appropriateness for a given situation, the way it solves a problem these factors have to be elegant, too. Such thinking is at the heart of the studio.

#### ENVIRONMENTS AND PRODUCTS THAT TRANSFORM THE CUSTOMER EXPERIENCE PearsonLloyd knows how to translate the

core values of a brand - the characteristics that make a brand unique - and express them in three dimensions. This approach



including bringing a new culture of design into the aircraft interiors sector



manifests a brand's identity as a space to be experienced. And by transforming the customer experience, the performance of the brand is transformed too.

Take Lufthansa as an example: the airline wanted its new economy cabins to be judged by more than just performance and safety - it wanted to create a more human experience for its passengers. PearsonLloyd modified the airline's signature blue to create a gradient of blues that draw on the shades of sky and sea that naturally tint the cabin environment.

This palette was implemented across the aircraft seats. The gentle 'color breeze', as Lufthansa describes it, creates a great sense of space in the cabin and between one seat and the next, and means that each seat is unique – just like the passengers in them. But if they take a step back, those on board can see that their journey is part of a collective experience.

#### INFORMED BY THE WORLD

Changes in technology, demographics, the economy – the big issues facing the world

### "THOSE ON BOARD CAN SEE THAT THEIR JOURNEY IS PART OF A COLLECTIVE EXPERIENCE"



are the food of PearsonLloyd's work;
 everything the studio makes is informed
 by the realities of contemporary life.

Research and analysis is vital to the studio's output. Working in an anthropological manner, it analyzes the way people act and is able to develop solutions to problems that most of us aren't even aware of. This requires breaking down existing archetypes, be they old or new, in order to develop intelligent products that are relevant to contemporary life. To achieve this,



however, you need to have an eye on the micro too: the agency is fascinated by how things are made, and more importantly, how they feel. Its skill is in linking these extremes: the biggest ideas materialize in the smallest details of its products.

#### OUR RESPONSE IS STIMULATED AND GENERATED BY THE USER

Industry operates with the view that users belong to a sector. PearsonLloyd doesn't see things this way. The agency knows it is the same person that sits on one of its aircraft seats, works at one of its desks, lounges on one of its chairs and stays in one of its hotel rooms. The job, then, is to understand what users need and expect in different environments – and the kind of activities they are likely to engage in within each environment. Thanks to experience designing for these environments sectors, the studio knows how to find out.

#### DESIGN SHOULD CATER FOR THE SHARED EXPERIENCE AS MUCH AS THE INDIVIDUAL Whether the studio is designing a workplace system, a public square, or an

The Tourist Class seat for Lift by EnCore is now available for the B737 and the B787

> 1. THE ECONOMY CABIN IN LUFTHANSA'S A350 USES COLOR TO VISUALLY WIDEN THE SPACE

2. THE ZONES RANGE FOR TEKNION FACILITATES COLLABORATION IN THE WORKPLACE

3. THE TOURIST CLASS SEAT FOR LIFT BY ENCORE MINIMIZES PARTS COUNT BUT MAXIMIZES STYLE

aircraft interior, the form of a product owes much to the tension between the needs of the public and those of the individual. The resolution might be a new landscape of office furniture, which caters for the public and private needs of contemporary office life. Or it might materialize in a detail as small as a curve on the surround of an aircraft seat, enabling passengers to feel a sense of privacy when they lie down, and – with a slight tilt of the head – join their co-traveler when they sit up.

#### PRODUCTS THAT ARE BEAUTIFUL, USEFUL AND EFFICIENT. THIS IS THE CRAFT OF INDUSTRY

The studio is expert in manipulating the tools at its disposal, and working with the restrictions imposed by the factory, the market, the client, the engineer, the materials and the price – the things that aren't usually discussed when people talk about design.

This is the lifeblood of PearsonLloyd's design process. And it is a process that is driven by passion: when the studio succeeds with this equation, the result is



### something that is efficient, beautiful and memorable.

#### COLLABORATION TO FIND THE BEST SOLUTION FOR YOUR NEEDS AND GOALS

PearsonLloyd cares, and the team brings this care to all its relationships. Skilled strategists, the agency is adept at stepping into the client's world, understanding what is relevant for the brand, and seeing clearly how it needs to develop. The agency's ability to get this right is the reason it has been designing critically

acclaimed products

for over 20 years.

PearsonLloyd also developed the bespoke business class seat for class is ansa's



### THE DESIGN OF THE TOURIST CLASS SEAT FOR LIFT BY ENCORE IS A RETHINK OF THE ECONOMY SEAT"

#### HEALEY SOFT CHAIR FOR WALTER KNOLL, 2017

Healey Soft is a lounge chair for luxury brand Walter Knoll, distinctive due to its understated, soft, quilted upholstery (see image 5) – the result of precision and craftsmanship. Sitting as easily in the home as in the office, this chair is a perfect space for work, relaxation and reflection.

#### ART DIRECTION AND BRAND STRATEGY FOR CROWNE PLAZA, 2012-2017

Over the past five years, PearsonLloyd has led the development of a new brand philosophy for Crowne Plaza Hotels and Resorts, with the goal of transforming the experience of the hotel's guests. The work includes both a new guest room design and a new visual identity for the brand (see image 4).

#### ZONES COLLECTION FOR TEKNION, 2015-2017

Zones is a new furniture collection that responds to the growing need for informal

collaborative spaces in the workplace. The collection comprises a series of enclosures that enable people to meet and work in a spontaneous and relaxed environment (see image 2). It is materialized using craft techniques and industrial production.

#### A350 ECONOMY CABIN FOR LUFTHANSA, 2017

PearsonLloyd's art direction for Lufthansa's economy cabin focuses on the potential of color to create a more human travel environment, and to transform the passenger experience. The color of the seat covers shift from dark blue by the windows, where natural light is strongest, to lighter tones in the center of the cabin, visually stretching the space to make it feel wider and more inviting (see image 1).

#### TOURIST CLASS SEAT FOR LIFT BY ENCORE, 2016

PearsonLloyd's design of the Tourist Class seat for Lift by EnCore is a complete rethink of the economy seat (see image 3). First and foremost, it is designed to be comfortable and ergonomic, for use across various aircraft, by passengers of all sizes – and it achieves this through a lower part count and product cost, a competitive weight, and an attractive design.  $\otimes$ 

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## PearsonLloyd

#designagency #designthinking
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#behaviours #brandstrategy #lufthansa
#virginatlantic #encoreseating







## THE PASSAGE WAY

Passage is an all-aisle-access concept by Formation Design that has three primary advantages over other all-aisle-access LOPAs: improved living space, spatial efficiency and flexibility

ormation Design Group is an award-winning design and innovation consulting firm based in Atlanta, Georgia, USA. It works across many industry segments, from consumer audiophile products to large-scale medical systems. The studio has been part of the commercial aircraft interiors space since the early 2000s, when it began working with Airbus on the SPICE galley program – which won a Crystal Cabin Award in 2007 – as well as numerous other cabin innovation programs with Airbus since.

Formation has also worked for Collins Aerospace Systems (formerly B/E Aerospace) since 2011 on numerous programs, including the Waterfront Seat and the Jazz economy seat, which were both nominated for Crystal Cabin Awards. Formation's team of designers and engineers have been inventors or co-inventors on just under 20 utility patents for Collins Aerospace Systems.

In the later 2000s, Formation began working on aircraft seating concepts, when Formation partner Robert Henshaw independently developed several concepts exploring more efficient arrangements of lie-flat seating, and pursued patents on these over the next few years. Since then, Formation has independently developed six patents in the area of cabin seating, including the Formation Premium Cabin concept, which was nominated for a Crystal Cabin Award last year.

#### RITES OF PASSAGE

While most of these patents have to do with three-dimensional arrangements of lie-flat beds, one patent focuses exclusively on a shared pass-through for two inboard facing seats formed between two back-to-back facing aisle seats. The two facing window or center seats are separated by a divider, which also works with the ottoman for each seat and provides a home for the IFE screens. This patent, which was issued last summer with a 2011 priority date, can be applied in

Formation has independently developed six patents in the area of cabin seating

> the three-dimensional arrangement as it was originally shown, or can be applied to a more conventional two-dimensional arrangement. Formation refers to this concept as Passage.

Formation has been exploring the Passage concept using the same process the team has used on past development programs, with the addition of virtualreality simulations to evaluate the perceived space of a complete cabin. The process involves working fluidly between 2D sketches, 3D CAD and study mock-ups created in Formation's internal prototype lab, utilizing its large-format CNC machining center. The full-size usable study mock-ups built from plywood, foam board and off-the-shelf hardware provide a very tangible means to quickly evaluate various designs. These mock-ups serve

### "THE PASSAGE CONCEPT LEVERAGES A FORE AND AFT FACING ARRANGEMENT"



1. THE ALL-AISLE-ACCESS CONCEPT OFFERS GENEROUS LIVING SPACE, SPATIAL EFFICIENCY AND FLEXIBILITY "Fundamentally, passengers want privacy and comfortable beds. The airline that figures out how to provide more privacy and comfort will be the one that breaks away from the traditions the industry has grown too accustomed to, and which has made them blind to opportunities for true competitive advantage."

> Robert Henshaw, founder, Formation Design

as indispensable evaluation tools to determine how well the design concepts held up to the various use-case scenarios, as well as a means for the designers to conceptualize alternative designs and configurations.

Formations' team of industrial designers and engineers have collected detailed notes and observations on a large percentage of lie-flat seating products currently flying, which supports their evaluation and design optimization process. During this process, the Formation team has outlined numerous use-case scenarios to be evaluated: single business traveler, traveling couple, group of business travelers, families, etc. These use-case scenarios all have a set of subcriteria that are also considered, such as stowage, service access and privacy, dining, and having a discussion or dining with a traveling companion.

Passage is an all-aisle-access concept that has three primary advantages compared with other all-aisle-access LOPAs: improved living space, spatial efficiency and flexibility.

#### IMPROVED LIVING SPACE

The Passage concept leverages a fore and aft facing arrangement, which alternates the passenger direction in each column of seats, which in turn facilitates a single pass-through point for two window or center seats. In this arrangement, the side-by-side, fore and aft facing seats are aligned without the typical stagger normally required to facilitate ingress/egress.

This stagger, either in the case of all forward-facing staggered seating or in other fore and aft facing arrangements, compromises the living space for the sideby-side passengers due to the shoulders having to be closer together.

With Passage, the side-by-side passengers are aligned so that the shoulders are as far apart as possible, which improves the actual and perceived living space. With Passage configured in a 2-2-2 arrangement on a B787 with 20in



2. FITTED IN A B737 CABIN, PASSAGE WOULD REQUIRE 23IN LESS CABIN LENGTH THAN A 40°, 40IN PITCH REVERSE HERRINGBONE CONFIGURATION

3. SHOULDER SPACE IS MAXIMIZED TO CREATE A REAL SENSE OF COMFORT

aisles, the passengers would have over 30in of shoulder space with the armrests lowered for nearly half the bed length, and a 25in width for the legs over the remaining length of the bed, even with privacy doors incorporated in the shell.

Similarly, for a 2-2 arrangement in a 16-seat B737 business class cabin, the Passage concept has nearly an 8% increase in usable bed area over a reverse herringbone product installed in the same cabin, while at the same time reducing the overall cabin length required by 23in.

#### SPATIAL EFFICIENCY

Typically, staggered seating LOPAs require a dedicated single pass-through for every inboard seat – usually 9-12in – which adds this amount to every additional seat row. Since Passage enables two inboard or window seats to share a single passthrough, the savings in cabin space add up quickly.

For instance, looking at a 2-4-2 arrangement of 32 seats on a B777, approximately 52in of cabin space can be gained over a typical staggered arrangement of the same seat count. As more rows of seats are added, the savings continue to increase. This saving is achieved through a combination of a reduction in the number of pass-throughs and the way that the arrangements of seats does not require the initial stagger offset, since the seats are nested in the Formation Design Was chosen by Airbus to help develop the innovative SPICE galley concept

### "THE CONCEPT HAS BEEN PURSUED BY A MAJOR SEAT MANUFACTURER AND AN AIRLINE"

ergonomically and spatially optimal fore/ aft configuration.

Another positive attribute is the efficiency of the design when a small additional business class cabin in required, perhaps due to the cabin being interrupted by an aircraft door complex. For example, on an A321 configured 2-2, a secondary cabin of four seats can be added in only 90in, whereas a reverse herringbone product would require an additional 20in and an all-aisle-access staggered product would require around an additional 31in to add the same number of seats.

#### FLEXIBILITY

The Passage concept achieves flexibility, both in terms of its applicability to various aircraft configurations and in how passengers can configure the seats to suit varied needs. Passage is applicable to a large number of LOPAs for both wide-body and single-aisle aircraft. The density can also be varied from high efficiency 2-4-2 to a more spacious 2-3-2 and 2-2-2 arrangements on wide-body aircraft, and a 2-2 arrangement on a single-aisle aircraft, all while having a more spacious bed and living space.

Passage's open layout means the ottoman can be used as a buddy seat in a manner similar to first class seats, giving the passenger flexibility to dine or have a discussion with a traveling companion. In addition to this flexibility, the side-by-side seats can lower a privacy divider, which again accommodates dining or discussions with the adjacent seat. By utilizing the ottomans, this arrangement supports a meeting of up to four people in the double. Conceivably, this could be even be extended to six people in the middle seat group in a 2-3-2 arrangement, and eight in a 2-4-2 arrangement. The easily accessible ottomans also provide stowage space suitable for a roll-on case.

The Passage concept has recently been pursued by both a major seat supplier and a major airline, which helps to independently validate the value of the concept. Formation is looking to license or sell the IP for the design and is actively seeking a seat supplier or airline with which to further develop the concept. So

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## FLYING THE FLAG

Almadesign blends national heritage, locally sourced materials and the latest global technologies to make TAP Portugal a flag carrier a nation can be proud of – and enjoy flying with

reativity and progress are key to the work of Almadesign, a Lisbon-based design consultancy that has been driving innovation through design for the last 20 years. Using design as a tool to bring people, skills and capabilities together, Almadesign has built a wide network of partners and collaborative innovation projects for its aviation work, as shown in its projects for Portuguese flagship carrier TAP.

Portugal has emerged from the debt crisis of 2010-2014 as a stronger, healthier, growing economy. After this crisis, and following the success of its LIFE project (which won a Crystal Cabin Award in 2012), Almadesign was approached by Portuguese flag carrier TAP to rebrand the cabins of its medium- and long-haul fleet.

TAP Portugal – Europe's leading airline to South America and Africa – saw the updating of its fleet with the A330neo as an opportunity to provide a brand new cabin interior image, as well as to improve the experience on its existing A319, A320 and A330 family. In addition to the new aircraft, the narrow-body and wide-body fleet retrofit projects were part of TAP's global drive to become a modern, efficient and competitive flagship airline: a metaphor for the new Portugal.

The cabin interiors were developed by Almadesign, together with TAP, Airbus and seat manufacturers Recaro and Thompson Aero Seating. The five worked together to define a new cabin interior brand identity that would communicate both the vibrancy of today's Portugal and its centuries-old





"THE DESIGNERS WORKED WITH THE AIRLINE TO DEFINE THE BRAND VALUES OF THE COMPANY" nadesis nstudio rtugal is hebrating its anniversary in 2017 contempo

traditions and culture, aligning TAP's heritage with the contemporary experience. To give the project a global

character, and in recognition of the airline's responsibilities to its clients, all relevant stakeholders were involved in the design process, right from the beginning. Together, they came up with directives for the future positioning of TAP and for the way they would be translated into design information, across all new cabin design and retrofit projects.

The work began with the sharing of information with all parties, from the OEM, to the seat manufacturers, monuments manufacturers, textile and cabin linings producers, including the definitions of lighting, colors, materials and finishes. The design work was based on the options made available by Airbus, but it also introduced new elements, such as the incorporation of local suppliers for the seat covers, and the use of natural leather.

Lisbon's airport hub is a key gateway from Europe to the world. To compete with the low-cost carriers in the short- and medium-haul market, the team developed a flexible A320 cabin layout with three clearly distinguished classes – business, economy plus and economy. The designers worked with the airline to define the brand values of the company, to create a suitable new interiors identity and an improved passenger experience. With these key drivers in mind, the design team proposed a sophisticated global look while maintaining the values of Portugal's local heritage, to create a fashionable yet timeless cabin interior that highlights the differentiation between the classes.

A more efficient LOPA includes 12 additional seats on the A320/A319, and 16 more on the A321, allowing the aircraft to carry more passengers while offering increased personal space and comfort, thanks to the optimized layout and the lightweight seats, simultaneously reducing fuel consumption and thus making the fleet more efficient.

The seat configuration in economy class – developed with Recaro – increases leg space and provides comfort in a highdensity seating cabin, improving the overall airline operation.

The slimline lightweight economy seats have a 28in pitch, offering good comfort levels and optimized ergonomics.

In business class and economy plus, the seats combine passenger comfort and



1. THE BUSINESS CLASS WAS DEVELOPED WITH THOMPSON AERO SEATING

2+3. A NEUTRAL MAIN PALETTE ALLOWS TAP TO CHANGE THE SOFT PRODUCT FOR REGULAR CHANGES IN CABIN APPEARANCE





"Cabin interiors in the future will be influenced by the search for greater efficiencies – environmental, energetic and operational – and the need to design products and technologies increasingly focused on the passenger experience."

José Rui Marcelino, CEO and design manager, Almadesign

4. VIVID GREENS AND REDS IN THE COLOR PALETTE ENLIVEN THE ECONOMY CLASS CABIN

5. THE MOOD BOARD FOR THE PROJECT INCLUDED MANY ELEMENTS OF PORTUGUESE CULTURE

experience. The use of materials such as locally sourced natural leather seat covers contributes to the airline's ecological and economic sustainability strategy, which also helped TAP grow at a rate of 24% during the first eight months of 2017.

Design acted as a 'conceptual integrator' in between the different project partners' needs and expectations. Collaboration with multidisciplinary partners throughout the product development process offered a unique approach for creating the new interiors.

From identifying and structuring requirements, to conceptualizing and developing solutions for production, the design team was able to bring together knowledge from different areas and, through collaborative brainstorming, visualization and model-making processes, was able to create a tangible vision which will help the airline evolve.

Almadesign's broad experience across other industries – with more than 400 projects in transport, product and retail – has led the team to develop innovative solutions for aviation projects, and also for railway and nautical products, based on collaborations between companies with different expertise, maintaining a focus on the passenger experience, and integrating state-of-the-art technologies, manufacturing processes and materials.

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lightweight design with connectivity solutions. Economy plus has a 33in pitch, a 4in recline, and additional features such as an in-seat power supply, tablet holder, moveable headrest and a cocktail table.

For short-haul routes, a warm color palette of gray shades highlighted with a modern and fresh lime green and distinctive red details was combined in the cabin materials and finishes. These colors reflect both the TAP Portugal brand colors and its national colors, inspired by Portugal's unique landscapes and traditional products such as port wine, olive oil and ceramic tiles. The colored sparkling stitching details, the brand tag and the divider panels strengthen the company's identity, bringing a smart freshness to the cabin interior. The use of natural local materials such as chromefree leather underscores TAP Portugal's commitment to the local economy.

During the fleet retrofit, TAP also implemented changes in the cabin interior of its existing long-haul A330 fleet. The fleet renewal process was integrated into the strategic positioning of the TAP Portugal brand through the values of comfort and Portugal's identity and cultural links around the world.

For these aircraft, a new business class seat was designed with Thompson Aero Seating and the existing economy class seats were updated with new seat covers, colors, materials and finishes. In addition to the work on the seats, all cabin linings were updated – including sidewall panels, ceiling panels, stowage compartments, and galleys – and new designs were chosen for the carpets, floorings, class dividers and branding panels. The soft cabin products, such as cushions, blankets, menus and cleaning wipes were also redesigned by the team, to help build a coherent passenger experience.

The business experience translates into fully lie-flat seats, with a look based on the concept of Mediterranean luxury, through the use of natural-looking materials and references to Portugal's nautical traditions, reinforcing the feeling of 'at home' comfort through the choice of textured, detailed and rich natural fabrics.

The TAP 'label' on all the fabrics and seat covers, highlights the exclusivity of the aesthetic choices made and the use of locally sourced materials. The design of passenger lighting, the addition of stowage spaces, and additional functionalities of the seats and monuments all contribute to an improvement in the overall travel





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## UPWARDLY MOBILE

Jacob Innovations has devised some clever seating ideas that maximize the vertical space in the cabin

hile air travel has progressed in many ways, as far as seating comfort is concerned, there has been a significant regression. For example, seat pitch has shrunk from an average of 35in in the 1970s to about 31in today. News about flights being diverted due to passenger conflicts over seat reclining has become more frequent in recent years.

The situation has become so bad that in February 2016 a US congressman proposed a law to limit the shrinking of airline seat pitch.

One of the most frequent complaints about air travel is seating discomfort, and in its quest to create better comfort without reducing cabin density, Jacob Innovations LLC in Boston, Massachusetts, has created new seating models that capture unused vertical space. The design is dubbed the StepSeat model as it uses steps to provide safe and comfortable access to the vertical space.

#### ECONOMY STEPSEAT

Starting with economy class, the One-StepSeat model provides cost-effective reclining accommodations that maximize valuable and previously unused vertical space. Every alternate seat is elevated (by no more than the height of a conventional step), providing a significant improvement over typical economy class and increasing the angle of recline available to passengers without affecting passenger density.

One way to look at the concept is to imagine the added legroom you would



"IMAGINE THE ADDED LEGROOM IF THE SEAT IN FRONT WERE RAISED BY 7IN"

have if the seat in front were raised by 7in. The fixed seat shell also allows passengers to recline without encroaching into the space behind.

A recline function of about 45°, together with a footrest, makes sleep much more possible in this model than in a conventional economy class seat. The design brings increased revenues as airlines can charge a premium for the added comfort of these seats, without losing any cabin density compared with standard economy class seats. A further benefit is that the seat pan folds up vertically when unoccupied, allowing for easy passenger access.

#### **BUSINESS STEPSEAT**

For the business class cabin, Jacob Innovations has developed a design that uses two steps to access the vertical space. The Two-StepSeat model improves cabin density and reclining space by elevating every other seat by two steps. New space is created, providing additional legroom for the passenger in the lower seat and reclining space for the passenger in the higher seat. "As most companies do not pay for business class travel, there is a great deal of strain on health and productivity on staff traveling frequently on long flights. Given the affordability of the Economy StepSeat model, this accommodation could provide many employers with an incentive to pay for improved sleeping comfort for their employees traveling on long flights." *Emil Jacob, founder; Jacob Innovations* 

> 1. THIS SKETCH SHOWS ALTERNATE ELEVATED SEATS (BUSINESS FLEX-1) FOR WINDOW SEATS, COMBINED WITH FLEX-SEAT FOR THE MIDDLE SECTION

2. BUSINESS TRAVELERS CAN SAVE PRECIOUS TIME BY NOT HAVING TO CHECK IN AND PICK UP THEIR LUGGAGE. IN ADDITION THIS MODEL PROVIDES NEW COMFORT FOR TRAVEL WITH A BABY

3. BUSINESS FLEX-1: ALTERNATE ELEVATED SEATS. EVERY OTHER SEAT IS RAISED BY A HEIGHT OF TWO STEPS

This model can improve density by as much as 50% relative to existing full-flat business class seats. An additional 1m (3.3ft) of new space is generated every two rows – so 0.5m (1.6ft) is saved in the legroom space of the lower passenger and 0.5m from the reclining space available for the upper level passenger.

#### SLEEPER CLASS: FIVE STEPS

For the Five-StepSeat model, a set of lateral steps is used for passengers to access a second tier of seating. While this design requires a greater investment in structural developments, it provides access to more vertical cabin space.

In addition to the potential for doubling the seat count compared with conventional business class seats, the Sleeper Class model brings a number of valuable benefits currently not available in business class, such as greater privacy and stowage space for baggage under the steps. An additional advantage over conventional business class seats is that passengers can access their seats/pods without disturbing their neighboring passenger. One of the concerns raised by some subjects interviewed by Jacob Innovations during its research was claustrophobia. However, the majority responded that they would choose this accommodation for long flights if the price was no more than 50% higher than an economy ticket. In order to reduce concerns over claustrophobia in this model, the studio is exploring the use of transparent materials where possible.

#### SLEEPER CLASS: BUSINESS

In the model shown in Figure 2 the length of the beds is shorter than a conventional



flat-bed business class seat , due to the limitations of the width of the aircraft. In order to accommodate the longer beds required by some airlines, Jacob Innovations has designed a configuration that combines two alternate elevated seats and lateral steps.

While this design requires more cabin space, it provides for longer beds as well as a better view of the windows and generally a greater feeling of space.

## BUSINESS STEPSEAT: THE UPPER DECK

Another adaptation combining the two concepts was developed to for cabin spaces with limited height, such as the upper deck of a Boeing 747.

In this case, due to the height limitations, the second-tier passenger

is seated laterally to the main level passenger. On the other side, near the windows, this configuration uses the alternate elevated Two-StepSeat model. This configuration brings superior comfort and privacy, as well as improved density relative to fully reclining accommodations in the same space.

#### AVAILABLE HEIGHT

A frequent question is whether there is sufficient vertical space in the cabin to accommodate the five steps plus the seat/ bed, and measurements have shown that there is sufficient height available, even in the upper deck.

Designing vertically is the future of airline seating and Jacob Innovations can provide the most innovative models in this area.

4+5. SOME BENEFITS OF THE FLEX-SEAT MODEL ARE SUPERIOR TO CONVENTIONAL BUSINESS CLASS SUCH AS: PRIVACY, TRAVEL WITH INFANTS, AND ROOM FOR LARGE CARRY-ON LUGGAGE

6. FOR BUSINESS CLASS IN THE UPPER DECK OF A BOEING 747, A SECOND-TIER FLEX-SEAT IS FIXED LATERALLY AT THE SHOULDER HEIGHT OF THE FIRST-TIER PASSENGER, PROVIDING A SOLUTION FOR HEIGHT LIMITATIONS A video of how the StepSeat works the StepSeat works can be viewed on the Aircraft Interiors International website

DESIGNING VERTICALLY IS THE FUTURE OF AIRLINE SEATING"



6

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## Supplier showcase



## PERFECT COMFORT

An innovative approach to seating comfort for passengers is leading to strong expansion for Acro, and exciting new developments such as entering the Airbus BFE catalog

passion for human-centric design is at the heart of Acro's work: everything the company does starts with the passenger. Acro manufactures furniture, not equipment, which supports its philosophy that seats can't be comfortable, only passengers can, and that comfort is found in the space between the seats. Acro challenges the status quo, looking at the 'space within the space'; seeing freedom, opportunity and possibility; optimizing hidden dimensions in a way that creates extraordinary differences in the passenger experience; and giving space and room to move, even when pitch is limited.

This year Acro celebrated its 10<sup>th</sup> anniversary, and what an exciting decade it has been. Since 2007 the company has designed, certified and manufactured over 90,000 seats on multiple platforms at its base near London Gatwick Airport. It has also established offices with regional sales and product support teams in Miami, Kuala Lumpur and China to address demand, as customer airlines operating in the North America and Asia-Pacific regions grow.

Having successfully supplied seats for line-fit since 2015, Acro signed a contract in January for its products to be included in Airbus's BFE (buyer furnished equipment) catalog. This agreement with Airbus is the latest milestone achievement

that reflects how hard Acro has been working to grow by investing in staff, product innovation and supporting infrastructure. With new products arriving in the Airbus catalog, Acro can extend its reach and accessibility to scheduled flag carriers, enabling growth.

Acro won an award for innovation at the 2017 Sunday Times Fast Track 100 awards

An entrepreneurial spirit drives Acro to pursue its vision of perfect comfort, supported by a dedicated team that shares this vision, from designers and engineers, to sales, support and the backoffice crew. To 'perfect comfort', the airlines'



1. THE SERIES 6 SEAT DEMONSTRATORS ARE FINISHED IN AN ATTRACTIVE QUILTED LEATHER

2. RENDERINGS OF ACRO'S MAJOR NEW PRODUCT: THE SERIES 7

### "ACRO BELIEVE THAT SEATS CAN'T BE COMFORTABLE; ONLY PEOPLE CAN"

"With cabin density increasing on all fleets, and airlines competing on service, finding the space within the space through innovative seat design will become even more important in delivering perfect passenger comfort."

> Alan McInnes, SVP of sales, Acro Aircraft Seating

> > need for lightweight and robust seats has to be satisfied, but this is merely a necessary precursor to the goal of making passengers more comfortable. Optimizing operational costs is a vital part of an airline's success, but is not sufficient in itself. To succeed in the long term from repeat business, they must deliver excellent service day after day, year after year.

#### THE PERSON NOT THE SEAT

When you ask someone to sit in a seat for two or three hours, and then ask them whether the seat is comfortable, they're forced to think about how they feel at the end of that time. They start asking questions of themselves. This idea is central to the philosophy that it's not the seat that's comfortable – it's the user. Comfort is experiential for the user.

#### DESIGNED FOR PREMIUM ECONOMY

Series 7 is the first premium economy/ single-aisle first class seat from Acro and it embodies all of the company's characteristics of comfort, robustness, maintainability and light weight, all in a supremely elegant and refined design.

While exemplifying the fundamental design principle of simplicity, the Series 7 uses all the room available in the cabin to deliver class-leading living space for passengers. It is a highly configurable seat built around an articulated seat pan, and features a seat width of up to 552mm between the armrests. The result is a seat that can be configured to fit a wide range of aircraft and cabins to optimize passenger comfort, while retaining the maximum number of shared components with minimum modifications.



The typical deployment will be 36in in a single-aisle and 38in in twin aisle. The seat offers 11in recline, a one-piece table, a legrest, footrest options, IFE display options of up to 17in and in-seat power, plus a wide selection of customizable trim, finish and stowage options.

#### INNOVATIVE EVOLUTION

With Acro's investment in people, facilities and products, 2018 will be marked by continued growth of its business as it expands its product range and builds on its line-fit offerability. A strong product pipeline will underpin the company's growth over the next five years. In an ideal world Acro would like to have all these new products available now; however, the reality is that it takes two years to bring a seat from the drawing board to delivery.

Acro's new-generation economy class seat, the Series 6, successfully launched at Aircraft Interiors Expo in Hamburg, Germany, is suitable for single- and twinaisle aircraft. For its design, the spaces to the left and right of the passenger were examined, and precious extra room between the armrests found.

The innovation was achieved by simplifying the structure to maximize living space and to replace the standard aluminum tube-framed seatback with a fully composite design.

The seatback curves gently around the passenger (left to right and up and down), creating a bucket shape that creates an ergonomically correct shape and returns the otherwise wasted space to the left and right of the passenger's hips to the person seated

behind. This design generates around 2in more room at knee height and allows someone 6ft 3in (190cm) to stretch their legs out at a 28in pitch without touching the seat in front. The seat delivers increased

passenger comfort, a more sophisticated appearance, unequaled legroom, a 13% reduction in weight and a 50% reduction in parts, greater durability and lower costs of operation – ultimately making its selection commercially advantageous for airline customers. The Series 6 seats can be

3. A FULLY COMPOSITE SEATBACK REPLACES THE CONVENTIONAL TUBE FRAME OF ECONOMY CLASS SEATS

4. ACRO'S UNIQUE RECLINE LEVER SAVES WEIGHT AND MAINTENANCE, AND IMPROVES USER COMFORT

### "ACRO'S GROWTH WILL BE DRIVEN BY THE **EXPANSION OF** THE NARROW-BODY FLEET"

pitched from 28-34in, while maintaining good passenger comfort.

#### **RECLINE ERGONOMICS**

With many seat designs, the recline mechanisms are positioned almost alongside the passenger's body, either on the armrest or underneath the base cushion, making them difficult to find and activate. With this in mind, the Series 6 recline has been located in a more natural position at the front edge of the seat, allowing effortless access and operation.

The lever allows intuitive actuation, requiring very little force to simply slide it either forward or back (depending on the airline's preference) at the same time as the passenger leans back. The lightweight design is made from glass-filled nylon for durability and strength, with an aluminum mounting plate.

Acro's growth will be driven by the continued expansion of the global narrow-body fleet. While the company offers airlines and leasing companies innovative products and swift lead times on retrofit projects, its business mix will start to evolve as it enters long-term line-fit contracts. 🔊

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In April 2017, Air New Zealand was announced as the launch customer for the Series 6

seat

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## INGENIOUS DESIGN

Ergonomic and efficient: Recaro Aircraft Seating has devised ingenious designs for its business class models

he key challenge faced in the aviation industry is to increase passengers' comfort and wellbeing, while also enhancing the economic efficiency of airlines. Recaro Aircraft Seating's business class portfolio for short, medium and long-haul flights combines comfort with intelligent design, quality and light weight.

Having focused on passenger requirements for more than 40 years, Recaro Aircraft Seating responds to these needs with aircraft seats that set the benchmark. Passengers will disembark from their flights relaxed and rested thanks to outstanding ergonomic comfort and generous living space. The company's packed order books serve as evidence that the high quality of its aircraft seats attract manufacturers and passengers alike.

Exceptional expertise with ergonomics and extensive computer simulations and testing provide quite an accurate understanding of how aircraft seats must be developed so that they offer comfort to people of different body sizes and statures. Intelligent and functional design, paired with an attractive appearance and premium materials, ensure that Recaro's ergonomic aircraft seat design is the total package.

Over 40% of all products sold in 2017 will be younger than three years old. "This is the result of our workforce's extraordinary commitment and our high double-digit investment rate in research and development over recent years," highlights Dr Mark Hiller, chief executive officer and shareholder of Recaro Aircraft Seating. The 5-star 'Add Value' concept, which Recaro presented at Aircraft Interiors Expo (AIX) 2017 in Hamburg, Germany, refers to the company's strength in innovation. Such innovations include the I-Seat, which can be used with an app on the passenger's personal cell phone, as well as the Recaro Well-Being Package.

"Our objective is for passengers to feel better and more relaxed after the flight than before the flight," says Hiller. "If the passenger is also comfortable when using The CL6710 business class seat earned a special mention in the German Design Awards



"The number of travelers is increasing. Boeing alone has projected more than 15,000 new aircraft will be delivered to the Asia-Pacific region by 2035. This equals the total demand from America and Europe and means that the demand for ingeniously designed new aircraft seats that combine passenger comfort and efficiency for airlines will also increase. Market growth in China was the primary factor in establishing Recaro operations in Qingdao."

> Dr Mark Hiller, CEO, Recaro Aircraft Seating

the seat – be it while working, eating, or simply resting – we have reached our goal: maximum comfort in a very limited space."

The lightweight seats provide a wide variety of economic and ecological advantages for airlines, with maximum flexibility in the cabin layout and with minimum maintenance.

Recaro calls this package of benefits 'Ingenious Design' – the perfect trio of functionality, ergonomics and aesthetics.

#### CL6710: A WIN-WIN PRODUCT

WITH VALUE FOR LONG-HAUL The CL6710 is Recaro Aircraft Seating's flagship product for long-haul aircraft, and one of the lightest business class seats on the market. Its attractive design, premium workmanship, usage of select fabrics and materials, intuitive operation and numerous stowage options are impressive. In addition, the CL6710 offers every passenger direct aisle access. The length and width of the seat, as well as the different seating positions, invite passengers to stretch out and relax.

The seating area converts to a completely flat bed at the push of a button. Changes in position are made at an ideal, predefined angle that supports the passenger's body optimally and securely in the seat at all times.

Furthermore, an app for Recaro's Well-Being features offers real benefits for passengers: settings for the seat, lighting, and temperature can be individually controlled and saved from a smartphone or tablet. A massage function in the advanced CL6710 seat model completes the package for maximum comfort on board. As an option, the CL6710 seat can transmit its operational status digitally to the airline staff. One advantage this feature provides is the ability to improve the efficiency of airline maintenance intervals.

The efficiency of the seat can be measured objectively: Recaro Aircraft Seating's formula for success is a pitchto-bed length ratio of 1 to 1.8. Recaro can provide a bed length of more than 2m with a pitch of 1.18m – thus making optimal use of the available passenger space. In this way Recaro creates a win-win situation for passengers who enjoy maximum living space, and for airlines, which can use their cabins with the greatest possible efficiency.

Efficiency can also be measured in kilograms. The CL6710 seat weighs just 80kg, depending on aircraft type, layout, and individual configuration – a light weight for long-haul flights, enabled by the use of innovative lightweight materials. The reduced complexity of the overall seat design also saves weight.

The CL6710 has already reached its maturity phase and, with a particularly efficient use of space, adapts perfectly to the new generation of wide-body aircraft. The aircraft seat was developed at company headquarters in Schwaebisch Hall, Germany, where it is also manufactured.

The CL6710 business class seat took off for the first time in EL AL's B787 Dreamliners. Recaro also won TAP, the Portuguese airline, as a customer for the CL6710, and its Airbus A330neo long-haul aircraft will take off with the seats.

"We have more orders for the CL6710, which we will announce at the appropriate time," says Hiller.

1. THE CL6710 IS RECARO AIRCRAFT SEATING'S FLAGSHIP PRODUCT FOR LONG-HAUL AIRCRAFT – AND ONE OF THE LIGHTEST BUSINESS CLASS SEATS ON THE MARKET

#### 2. THE CL6710 FEATURES A GENEROUSLY SIZED TABLE FOR DINING OR WORKING

3. THE FEATURES OF THE CL5710 BUSINESS CLASS SEAT FOR SHORT-AND MEDIUM-HAUL FLIGHTS OFFER PASSENGERS A RELAXED FLYING EXPERIENCE AND THE ABILITY TO WORK COMFORTABLY IN THE AIR

4. RECARO'S CL4710 BUSINESS CLASS SEAT FOR SHORT- AND MEDIUM-HAUL FLIGHTS BOASTS IMPRESSIVE SEAT COMFORT, FUNCTIONALITY AND SELECTION OF FLEXIBLE OPTIONAL FEATURES





#### MORE COMFORT AND FUNCTIONALITY ON SHORT-

AND MEDIUM-HAUL FLIGHTS Comfort on board also plays an important role for passengers on short- and medium-haul flights. With this in mind, Recaro has two suitable and innovative seat models in its business class portfolio, each of which offers passengers a relaxed flying experience and the ability to work comfortably in the air – especially thanks to state-of-the-art ergonomics and a wide selection of advanced features.

Recaro's CL5710 business class seat is designed for single-aisle aircraft. With its special leg-rest and generous recline, the electrically actuated seat offers unmatched passenger comfort with a minimum pitch of 45in, and includes various predefined seating positions. A lumbar support and an integrated massage feature also help ensure exceptional seating comfort.

The seat can be equipped with the latest inflight entertainment systems and a monitor of up to 13in. Additional stowage options include space for electronic devices and personal belongings. All power plugs and ports are located in the center console.

Large numbers of the CL5710 model have already been delivered. All Nippon Airways already uses the seat in its A320neo fleet. The business class seat will also fly in Shenzhen Airlines aircraft, starting in 2018.

Recaro's new CL4710 business class seat for short- and medium-haul flights



is the result of more than 40 years of experience in the design of aircraft seats. The seat's comfort, functionality, and selection of flexible optional features are impressive.

The relaxing position with the generous recline ensures optimum comfort. A legrest that is adjustable in both length and angle, so that it automatically adapts to each passenger's leg position, results in relaxed sitting and reclining. Thanks to the multi-layer cushions and individually adjustable headrests, occupants can enjoy an exceptionally comfortable resting position. In addition, each seat offers its own armrests. This business class seat also includes numerous stowage compartments, so that it can be set up as the ideal workstation, with all devices and controls at the passenger's fingertips. A generously dimensioned tray table, with tablet holder, opens out of the outer console. Power, audio and USB ports for personal electronic devices are integrated into the center console, making them easily accessible without restricting the living space. The high-quality video screen (up to 13in) can be operated conveniently and intuitively with the passenger control unit (PCU).

Alaska Airlines will soon be taking its passengers to the next level of seating comfort, as it is the launch customer for the CL4710 seat. The US airline is installing the seat in its first class cabins. More than 80% of Alaska Airlines's fleet is currently equipped with seats from Recaro.

Recaro established a production site in the USA in 1998, and it was the first European aircraft seat manufacturer to do so. As Hiller remarks, "With its proximity to the largest aircraft manufacturers and airlines in the world, the US site has a strategic role in Recaro's international production."

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## VALUE CREATORS

By applying four key philosophies to its cabin designs, ZEO can make the aircraft cabin a more enjoyable environment for passengers, and a more profitable environment for operators

he passion of the team at ZEO, Zodiac Aerospace's design studio in California, is not to simply create beautiful-looking products, it is to create fundamentally better solutions. Everything about the purpose-built Design and Innovation Center and the team that works there has been put in place with this single overriding objective.

This focus enables ZEO to pursue solutions founded on a deep understanding of the importance of brand and value creation throughout the entire product lifespan, not just for the press photo opportunity... as the man says, "A puppy is for life, not just for Christmas."

Nothing is sacred, and everything is challenged: How is a product built and maintained? How many parts does it have? Is it intuitive and simple to use? Does it help further the customer's brand through form, function, experience and execution? Can it be upgraded simply? And does it help to maximize customers' revenue opportunities?

In short, does the design help customers to thrive?

#### ZEO'S FOUR PILLARS OF VALUE CREATION

ZEO has four key pillars for value creation: simplify ownership, embrace people, enable branding and differentiation, and maximize revenue generation.



Developing products that truly address these four pillars requires a team with the bandwidth and experience to interrogate the problem, but also the creative mindset and agility to tease out and articulate the critical success factors and drive the best solutions. The backbone comprises industrial design, advanced concept engineering, and mock-up and prototype builders, but is bolstered with design-tomanufacture and design-to-maintain specialists and the full spectrum of expertise available within the greater Zodiac Aerospace ecosystem, allowing ZEO to dive deep into the core of value creation throughout the product lifetime.

It is not by coincidence that the studio is located within a manufacturing facility: the impact of design – good or bad – is brutally evident on the production line for the entire team to witness first hand.

#### SIMPLIFY OWNERSHIP

At the foundation of ZEO's way of working is a relentless drive for simplicity, clearly manifested in the emphasis on simplifying the ownership experience. Solutions must be efficient to procure, robust in operation,

### "A NEW PUPPY IS FOR LIFE, NOT JUST FOR CHRISTMAS" – THE MAN

The ECOS baggage system was a finalist in the Crystal Cabin Awards 2017

1. THE ECOS EFFICIENT CABIN OPEN SPACE SOLUTIONS EMPHASIZE OPTIMIZING REVENUES WHILE IMPROVING THE CUSTOMER EXPERIENCE

2. EXPLODED VIEWOF A LAV, WITH VARIOUS OPTIONS FOR SINKS, MIRRORS, ETC

3. DMS LAVATORIES ENABLE KEY BRANDING ELEMENTS TO BE CUSTOMIZED EFFICIENTLY

and simple to maintain. To prolong their relevant lifespan, these solutions need to enable smart upgrading and reconfiguring in a modular manner.

It is this commitment to simplifying that leads the ZEO team to perpetually ask the same questions at each design choice: Are we making our solution simpler or more difficult? Are we minimizing the number of parts and the part numbers? (We keep track.) Are we reducing the time to build and the effort to maintain? (We prototype.) Can it be made easier to operate and more durable? (We test and retest.) With good design, the answer is yes.

#### EMBRACE PEOPLE

Product design is not just about satisfying an end user, but is about people and how they engage with the things they use. ZEO recognizes that user experience and engagement change, depending on who is interacting with the product, and why. And that a great solution understands and addresses the needs of everyone who experiences it: the builder and installer, flight crews, cleaning and maintenance teams, and ultimately the passenger... from the frequent flyers to novices, and to those who need assistance.

#### BRANDING AND DIFFERENTIATION

The commercial airline cabin is a contradiction. On the one hand, as an industrial product, it strives for lean processes, safety, and efficiency in cost, weight and complexity. On the other hand, as a consumer product, the emphasis is on expression of personality, remarkable experiences, and recognizable and "Not a single flight is currently optimized for profit or experience... it could have sold a seat for more or carried too many sandwiches and too few vegetarian meals. That vast gap between today's reality and an optimized flight presents a huge profit and satisfaction opportunity. Harnessing emergent technologies will shrink that gap."

> Scott Savian, EVP, ZEO

4. THE POD PSU COMBINES FUNCTIONALITY WITH AESTHETIC APPEAL

desirable differentiation from the other sharks in the pool.

Every customer has their own vision. ZEO embraces this by developing products that enable brand and individual expression in a simpler manner. The team recognizes that while customers value image, they also value efficient, cost-effective solutions with robust operational performance.

Both are achieved by developing products that understand and enable high-value branding points, empowering customers to achieve their vision while not impacting the robust operational backbone of their product. This approach is fully realized in ZEO's Dynamic Modular System (DMS) products, which are modular where robustness and efficiency are valued, and dynamic where customers value differentiation.

#### **REVENUE GENERATION**

The interior of a commercial aircraft is probably the most expensive real estate on the planet. Understanding this, the biggest impact a studio can have for customers is to optimize the use of that asset to improve their bottom line. ZEO

#### The Pod PSU puts the lighting at the same pitch as the seat and the passenger

achieves this not only through solutions that inspire loyalty and help reduce costs, but also by helping to create revenuegenerating opportunities.

The ECOS (Efficient Cabin, Open Space) integrated cabin solution does just this. Helping customers to add seats (increasing revenue), the passenger experience can still be improved in a measurable manner by optimizing living space with efficient yet comfortable lavatories; by improving headroom and sightlines for seated passengers; with elegant lighting fixtures that connect more directly with individual passengers; and with larger, more ergonomic bins that facilitate fast boarding and turnaround while reducing crew workload, and ultimately easing baggage anxiety.

ECOS is more than a family of products though; it represents a design methodology to evolve and grow with the people who spend hours in cabin spaces.

### "SPACE TO STAND OUT FROM THE CROWD AND BE MORE COST-EFFECTIVE"

ECOS is an efficient cabin, not just in terms of cost, weight and durability: it also means reduced complexity and elimination of the unnecessary. It means not breaking fingernails, not straining muscles, not panicking about luggage on the way to the airport... and airline crew not having to tell passengers "No! You can't bring that." It has open space, and not just more of it, but a better utilized space, a quieter space, a healthier space. Space to stand out from the crowd and be more cost-effective.

ECOS is the embodiment of why the ZEO team comes to work every day. A different breed of design and innovation studio, built to create value throughout the product lifetime and within every inch of the cabin.

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### ECOS<sup>™</sup>. Efficient Cabin. Open Space.

ecos<sup>™</sup> matured through 6 years of robust testing and in-service experience, integrates the best in class products from the pioneers of integration. The smooth tight transition lines flow along the customizable branded latches down through each passenger touch point, highlighting every detail of this clean common sense cabin interior. eCOS<sup>™</sup> brings to the market the highest capacity luggage system, with the largest cabin living space. "efficient cabin. open space." where functionality meets beauty.





## HOME GROW

By bringing its production operations in-house, Geven is enjoying capacity, cost and flexibility benefits, which it can pass on to customers

he Geven story begins in 1984, when the Veneruso family started manufacturing customized upholstery for the automotive sector. The Italian company soon expanded the scope of its operations into train and marine seating, and then as a logical progression of its transportation seating work, moved into the aeronautical sector.

Entering the aerospace seating sector required the company to prove it could meeting strict safety requirements - which it could – and when Geven secured the first orders for its aircraft seats in the late 1990s, this confirmed the market's confidence in the company's products and services. Geven's aircraft passenger seating operations began with retrofit programs and then moved on to include OEM catalog approvals with Airbus.

A key year in Geven's pursuit of capacity growth was 2006, when the company decided to build larger, more modern production and administrative facilities in the industrial area of Nola, 12 miles (20km) from Naples.

In 2012, the company implemented a rationalization and improvement program, intended to create a more efficient operational (and corporate) structure, by dividing the overall activities into three core business units of seating, thermo-acoustic blankets and mechanical parts production. The program involved the creation of the Skytecno company (65% owned by Geven). In order to house Skytecno and its mechanical parts production lines, in 2013 the company



secured the use of a new 107,640ft<sup>2</sup> (10,000m<sup>2</sup>) industrial building, as well as another 129,170ft<sup>2</sup> (12,000m<sup>2</sup>) plant, located very close to its existing facility in Nola. The combined covered and

uncovered area of the three plants currently stands at 624,310ft<sup>2</sup> (58,000m<sup>2</sup>). This growth in facility coincided with some key investments in new machinery

(including two flexible manufacturing systems), which have played an important role in the company's development.

The greater facility size and machinery inventory has of course led to an increase in Geven's seat production capacity. Indeed these investments have driven an increase in delivery rates, with 2014's average capacity of 2,500-3,000 passenger seat places per month expected to rise to 5,000 per month by the end of 2017.

#### QUALITY AND PRODUCTION

Geven has found that one of the biggest advantages of keeping its seat production

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### "WITH ITS MANUFACTURING CAPABILITY , GEVEN CAN TEST PES IN-HOUSF"



in-house is the continuous learning loop that it offers. This loop makes it possible for the manufacturing team to send feedback to the R&D team during each step of the development cycle, which allows for the possibility of seeing what works and what doesn't in a time-efficient manner. Having such feedback available enables quicker improvements in product design, raw materials and process optimization, meaning more control over the quality of the final product.



In-house production also brings benefits in terms of material handling, equipment maintenance and waste management. The full effect of any problems in these areas cannot be completely understood until actual production commences. Issues can affect production times, product yield and costs, which can all potentially lead to problems further down the line. By keeping production in-house, any issues can be swiftly resolved.

#### FASTER MORE FLEXIBLE DEVELOPMENT

With its in-house manufacturing capability, Geven can test prototype products in-house, discuss any issues with its engineering and design departments in-house, and then quickly make any necessary changes. Prototypes do not have to be shipped across the world for evaluation; all this work can all be done quickly and easily within a small geographical footprint.

If, for example, someone comes up with a new idea, to adopt it all one has to do is inform the other departments and get the ball rolling. This rapid and flexible

1-3. GEVEN'S FACILITIES IN NOLA HOUSE THE COMPANY'S ADMINISTRATIVE, PRODUCTION AND ENGINEERING CAPABILITIES

operation enables Geven to move through the design, engineering, product development and production phases quickly. This compares very favorably with outsourced production setups where, should a change be required to meet changing market demands, there can be major time and budget implications.

#### CUSTOMIZATION

Product customization can also be achieved swiftly through in-house production – this is one of Geven's major strengths in the seating market. If a customer wants a customized item or product, Geven does not need to go through a range of channels and processes, which also brings a higher likelihood of errors being made, with instructions getting lost in translation.

Given the high levels of customization that Geven offers, the notion of outsourcing is not compelling. The control that Geven has over its production processses significantly outweighs any



potential cost savings in manufacturing that outsourcing would offer.

#### LOWER PRICE PER PRODUCT

Manufacturing seats in-house not only eliminates one step in the supply chain, but it also dispenses with shipping costs, delivery costs, and any difficulties with customs agencies. With in-house manufacturing, the product goes straight to market once it has been completed. It takes less administrative work to complete a manufacturing cycle in-house compared with outsourced arrangements. This setup also enables Geven to keep prices low without having to compromise on quality.

#### COST TRACKING

Outsourcing may allow a company to keep startup costs low, but it becomes very

# GEVEN HAS THE

difficult to keep tabs on what it actually costs to complete the manufacturing cycle, and also becomes difficult to reduce these costs effectively over time.

Outsourcing can appear less expensive, but in reality it can lead to considerable long-term costs, especially if things don't go as planned with the third-party manufacturer. Geven has the ability to track every aspect of production, from



needs to become more accessible to everyone. This will mean higher passenger capacity on aircraft, more densely packed cabins and leaner operations. The future of flag carriers with giant overheads looks grim, while that of the more efficient, low-cost operators is much brighter!"

> 4. AUTOMATION HELPS ENSURE PRECISION IN MANUFACTURING

5. GEVEN NOW BOASTS 58,000M<sup>2</sup> OF MANUFACTURING FACILITIES

the total cost of raw materials to processing equipment, maintenance and warehousing, giving a far more complete picture of business costs.

#### INDUSTRIAL PROPERTY PROTECTION

Despite the numerous ways of protecting a company's intellectual and physical property, including confidentiality and manufacturing agreements with thirdparty manufacturers, in practice it isn't easy to stop a third-party manufacturer from exploiting a client's technology after it has been produced, especially if the manufacturer is based on the other side of the world.

Even if third-party manufacturers honor agreements, much knowledge and power over the product is given away, which can weaken advantages over competitors. With Geven's latest range in particular, considerable R&D resources have been invested in a bid to provide the market with class-leading innovative products. This ongoing differentiation is vital to the company's continuing success. 🔊

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## **ESSENZA** Essentially: class!

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## SKY-HIGH DEMAND

With aircraft deliveries set to soar and customer expectations also rising, the time to innovate is now

t's no secret that commercial airline fleets are expected to double in size in the next two decades. In line with this development, the next three years will see steady growth, making this a pivotal time for aviation interiors, as suppliers scramble to meet demand for imaginative designs based on the latest technologies.

#### STAYING A STEP AHEAD

"A hot topic among airlines and manufacturers right now is delayed aircraft deliveries," says Ben Smalley, a plastics expert and former Sekisui Polymer Innovations (Sekisui SPI) customer, who now serves as the aviation market business manager for the company.

"The delays are due to components provided by third-party suppliers, and the problem will only get worse as demand increases," states Smalley.

Working with Sekisui SPI customers all over the globe, Smalley has first-hand experience with the aviation industry's growing pains. As he explains, "Emerging markets in Asia, the Middle East and Africa account for half the industry's growth, partly driven by the new middle-class market in China. The other half of the growth is coming from mature markets such as North America and Europe, where most fleets are nearly 20 or 25 years old. As much as 80% of fleets will have to be replaced, and there is industry-wide





1. INFUSED IMAGING FIRST TOOK FLIGHT IN AIR CHINA'S B747-8I, LAUNCHED IN 2014 (PHOTO: AIR CHINA)

2. THE CLOUD PATTERN DELIVERED THROUGH SEKISUI SPI'S INFUSED IMAGING

### "WE WANT RESOURCES IN PLACE, UP AND RUNNING, FOR WHEN DEMAND HITS"

This year is the 30<sup>th</sup> anniversary of Sekisui SPI's ownership of Kydex Thermoplastics



concern that the current supply chain is not prepared."

Sekisui SPI has anticipated the need for aircraft components and taken steps to stay ahead of industry demand, while maintaining its high standards of product quality and customer service. In 2016, the company opened a new South Campus facility at its Bloomsburg, Pennsylvania headquarters, with a custom-built aviation extrusion line.

According to Smalley, "Sekisui SPI used its 30 years of knowledge gained from manufacturing top quality aviation materials to optimize the design of the new facility."

More expansion is coming over the next year. "Now we're implementing phase two," says Smalley. "We're investing before we actually have the need. We want the resources in place, up and running, when the demand hits."

To ensure an uninterrupted supply chain, a new aviation-specific extrusion line will be added in December 2017, with startup planned for the first quarter of 2018.

"We are focused on putting the longterm needs of customers first," Smalley explains. "And not only will customers

Sekisui SPI has a 50-year heritage in the design, production and delivery of thermoplastics

> 3. A CUSTOMIZED PATTERN CREATED USING INFUSED IMAGING TECHNOLOGY

4. AVIATION MARKET BUSINESS MANAGER BEN SMALLEY

benefit from the expansion, so will the community, as new jobs and opportunities are created."

Another much-anticipated development is the expansion of the Sekisui SPI designLab, with a move to new facilities and recruitment of more staff. This unique, creative space enables the Sekisui SPI design team to collaborate with customers to develop innovative materials that can replace traditional polymers, metals and fiberglass. Also gearing up for growth is the FSTLab where engineers, working in partnership with customers, can perform regulatory tests on products throughout the development cycle with the goal of making aviation products safer, lighter and more compliant.

#### INFUSED WITH POSSIBILITIES

Another exciting development is Infused Imaging, a proprietary Sekisui SPI technology that can give a new appearance to aircraft cabins, allowing for greater customization and branding opportunities. This revolutionary technology won the Material and Components category of the prestigious 2016 Crystal Cabin Awards, which was presented at Aircraft Interiors Expo in Hamburg. For the first

time in the industry, bespoke, pattern-inproduct is now possible in thermoplastic sheet extrusion. Infused Imaging technology allows a design or pattern to be embedded into the sheet with none of the drawbacks of capped or printed materials – no delamination or peeling.

"It's designed for durability," Smalley explains. "Surface scratches are disguised because the image is infused into the material, so parts look like new for longer."

What's more, components created with Infused Imaging technology maintain the chemical and flammability properties of the Kydex thermoplastics sheet.

"Not only are the aesthetics exceptional, the material still meets compliance standards," says Smalley. "It's an exciting technology that lets designers customize aircraft cabins as never before, and no one else in the industry is doing it."

#### COLLABORATIVE SPIRIT

Sekisui SPI's commitment to innovation is strengthened by collaboration. Smalley describes a partnership spirit that's integral to the company's operating philosophy.

"We collaborate on all levels with designers, OEMS, airlines and thermoformers. We try to make the process less fragmented and more streamlined by bringing ideas together from all partners. For instance, we're proactively collaborating with other materials suppliers to take on the challenges that come with bonded buildup. We're combining

"We want to be a better partner to the supply chain. That's why we've made a commitment to growth that's unique in the industry, an investment that Sekisui SPI believes supports its customer service goals. We have a responsibility to our customers to continually improve our levels of quality, service and delivery. By expanding our capabilities now, we can ensure a seamless transition as demand increases."

Ben Smalley, Sekisui SPI

thermoplastics with materials like leather, fabrics, foams and adhesives." The United Polaris

program is a recent example of effective collaboration. United launched Polaris this year and used Infused Imaging components in the newly designed business class seats. The personal, suitelike pods offer passengers direct aisle access from every seat, along with exceptional, sleep-inducing privacy. A stylish new look has been created for United and carried throughout the cabin.

Infused Imaging elements are used in the seats, monuments, and on the door panels. The Infused Imaging Hemisphere Weave pattern is an integral part of the design, and the Kydex 6513 product with a frosted matte finish and a transitional pigment is used to create an iridescent effect, which interacts with light to generate a distinctive glow.

Four partners collaborated to create this striking aircraft interior. As the Kydex supplier, Sekisui SPI worked closely with the design agency PriestmanGoode, seat manufacturer Zodiac Aerospace, and United Airlines.

Sekisui SPI has had the strategic foresight to develop new technology and ramp up capacity to prepare for tomorrow's challenges.

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## www.aircraftinteriorsinternational.com

## CONNECTED COMFORT

Seating cushions from Aerofoam Industries can form a key role in passenger comfort – and the basis for a truly comfortable end-to-end passenger experience

an you connect comfort? Well, that depends on how you define it. So many airlines think about comfort as a magical seat cushion with a wonderful new material that makes even the most uncomfortable seat frames a pleasure to sit on. But how much of comfort is physical and how much is psychological? Why can't we make passengers' minds more comfortable?

What would happen if we thought outside the usual 'comfort zone' and thought about the passenger journey, from origin to destination? Couldn't airlines do more with the data they have about their passengers? For example, they could build artificial intelligence that learns about passengers and their tastes, and tailors the experience accordingly.

#### PREFLIGHT PLEASURE

The airline experience should start the minute you go online to book a flight. Imagine you are Alex Buchanan, a regular business class customer with an airline, and when you booked your flight a personal assistant message popped up that said, "Mr Buchanan, I noticed you didn't book your usual rental car option. Would you like me to add it to your reservation to match your flight?"

If your response is "Yes," then the magical AI host (who we'll call Chandra) automatically books the car, adds it into your app and adds any associated status points to your frequent flyer account.

You're all set for the flight, so when you leave home and arrive at the parking structure at the airport, why not have a dedicated entry lane and parking for frequent flyers? After you park, it could automatically add the location of your car to your app so that you can find it easily on your return, and even let you access the parking lot CCTV system to check up on your beloved chariot while you're away.

Walk into the airport and the facial recognition system at the counter will recognize you, and give the desk agent a moment to prepare to give a warm and personal greeting. "Good morning Mr



Buchanan, how are you today? We printed your boarding pass when the app told us you were entering the airport. Are you looking forward to your trip to Fiji? Go ahead and pass through the gold status door and enjoy your flight."

After this door you're directed via the app to a private security screening area, and after you scan your boarding pass it records the time it takes you to get through the security checkpoint. Passengers' speeds are monitored so that speedy boarders can be kept together in a separate lane from families and less organized travelers.

If you're traveling as a family, a separate line that is a little less rushed could be available – and of course it would know you were a family because of the details on your booking. Foams provide the comfort baseline on which to build a great passenger exnerience

### "HOW MUCH OF COMFORT IS PHYSICAL AND HOW MUCH IS PSYCHOLOGICAL?"



 1. HIGHLY RESILIENT FOAM IS LIGHTWEIGHT AND HAS EXCELLENT BOUNCE BACK AND RECOVERY
2. GRAPHITE MEMORY FOAM HAS AN OPEN-CELL SOLID STRUCTURE THAT MATCHES PRESSURE AND SLOWLY RELEASES BACK TO ITS ORIGINAL SHAPF

two minutes for any last-minute restroom or retail stops. No PA or departure screen announcements have been made yet, so the lines at the gate are clear.

#### A WARM WELCOME ON BOARD

Stepping on board the aircraft is a very calm experience because the particular time you were sent the alert was calculated to minimize the number of people boarding at once, reducing the stress and time of boarding. Once you arrive at your seat – with overhead locker space reserved for you – the IFE screen displays a welcome message from a familiar name: "Welcome to Flight 105, Alex Buchanan. My name is Chandra, your inflight intelligent service agent. Feel free to ask me questions at any time, and have a great flight."

The information center offers useful rolling information about your flight, including a countdown to take-off, flight duration, and the weather and temperature at your destination. Tap the screen to pair your phone, and its content is available to play and view, including streaming services such as Hulu, Netflix, iTunes and/or Google Play accounts. There is a small charge for streaming, but by simply tapping a button to say you accept, your card is automatically charged and all your content is available.

A multitask side menu pops up with food and beverage choices. As passengers make selections, the menus are updated so that they only offer what is available (with priority given to the most frequent flyers), and the cabin crew's smart devices are updated so that they can load their carts with just the right goodies. Of course the crew already knew almost exactly what stock they would need before they took off because the passengers' archived food and beverage history allowed them to plan accordingly.

One last movie before landing? A pop-up notice warns you that you might

After security, head to the lounge and the facial recognition system will recognize your status and let you in, whereafter the bartender will pour your favorite tipple (not that uncanny since your preferences have been noted during previous journeys).

After a little rest and relaxation in the lounge your phone buzzes with a silent pre-boarding alert, because it knows how long it takes to walk to the gate and adds not finish it in time, but if you were watching a streaming service, then the next time you log in you can carry on where you left off.

#### SMART CONNECTIONS

Now let's say you need to take a connecting flight. After deplaning, the mapping beacons in the airport terminal can send your device clear directions to your gate and advise how long it will take to get there or if there's enough time for a lounge stop.

The app also tells you what time it is at home, at your stopover and at your destination, and reminds you not to sleep in order to minimize jetlag.

If you do visit the lounge, your device will automatically but securely connect to the wi-fi. After another quick snack,

the app buzzes your device again that it's time to head to the gate. Actually, it's a double buzz this time: you've been upgraded! Chandra is back: "Alex, your favorite

Without a subconscious feeling of comfort, the benefit of these innovations would be lessened 3-5. AEROFOAM COMFORT CAN BE EXPERIENCED IN EVERYTHING FROM LOTUS SPORTS CARS TO PRIVATE AVIATION

wine store is two gates further down. I've checked their inventory and they have your favorite vintage. Shall I give you directions, since you have time to stop en route?" Stop by and the purchase can be made through the airline app – and of course the airline has a mileage agreement with the wine store, including double miles if you buy two bottles, and guaranteed overhead stowage space for your purchases.

#### FINALLY THERE

Finally you land at your destination and ask, "Chandra, how do I get to the rental car location?

She replies, "The rental car is being delivered to the meet and greet area. Head to the arrivals level, door B4," and gives directions."

"But Chandra the line is long at immigration and customs. Will the car still be there?" She replies, "Don't worry Alex, I'm keeping track of you, and wait times are averaging 15 minutes."

Get into the car and you can sync your phone with one tap.



"Diamonds will play a role in Aerofoam Industries' activities for the next 20 years, adding some hidden bling to seat cushions. We have just launched a new foam which, instead of being graphite-impregnated, is a very high-tech memory foam that is impregnated with diamond dust. Diamond is incredibly conductive, so it conducts heat energy away from the body."

> Matthew Nicholls, sales director, Aerofoam Industries

"Chandra, get me to bed. I'm exhausted." The satellite

navigation powers up and gives directions to the hotel you booked. The fastest way is through the express lane and Chandra arranges to pay the toll via the app and links the fastpass to your account for future use.

When you arrive at the hotel, Chandra is already out of the car and waiting for you at reception, as she automatically checked you in and activated your digital key. You're exhausted, but there may be time for one last nightcap from the minibar. How did they know about your favorite blueberry wine and how did they know to stock it in the fridge?

The following day, refreshed and following a great meeting, you have to get home again.

The rental car was one way, so you want to head back to the airport with Uber. Chandra books the car in advance and sets an alarm warning you it is time to check out of the hotel. You are automatically checked out, with the bill sent straight to your expenses account just as you step out to the waiting car.

You're so relaxed on the flight home that you notice how comfortable the seats are... 🗞

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## Luxury must be comfortable, otherwise it is not luxury

Coco Chanel

Aerofoam Seat Cushions, probably the most comfortable cushions in the world.



Aerofoam Industries 31855 Corydon Street Lake Elsinore, CA 92530 USA Tel: +1-951-514-9301 www.aerofoams.com

## FEEL THE DIFFERENCE

The sternest test of an airline's brand promise is in its consistent delivery of comfort. The humble seat cover is arguably the most important component of the inflight experience, so it's time to show this critical part number the love it has always deserved

aving raised passenger expectations through smart, compelling and consistent marketing techniques, the world's leading airlines now find themselves under more pressure to differentiate and deliver their brand promise in the most important aspect of the entire customer journey – a comfortable inflight cabin experience.

A new generation of savvier passengers, who are increasingly bringing expectations into the cabin that are formed outside it, are value-seeking, design-conscious, innovation-hungry and quality-expectant global travelers. For many, the journey itself is as important, if not more so, than their destination as the world becomes a smaller and smaller place.

This trend will grow as mobile, omniconnected, fiercely individual and highly expressive millennial travelers continue to drive airlines to develop new ways in which to engage, connect, entertain and serve them.

The one constant that is sure to remain while the profile, needs and expectations of flying customers change over the coming 10 years, is the role of tactility and physical experience – quality, attention to detail and insightful, meaningful innovation. Tapis is at the forefront of new material technologies that combine the comfort and experience of passengers with the practicalities of airline operations.

#### INNOVATION

The term 'innovation' has almost become a cliché, yet customers want more of it. The aviation industry has enjoyed two decades of applaudable innovation and product development, from highly efficient new aircraft platforms to fully flat business class seats in a variety of styles, elaborate and intimate suites for first class, ergonomically designed premium economy seats, and steadily improving economy class cabins.

yed well-designed and stable mobile apps have revolutionized how we interact with airlines, and airport lounges often resemble 4- and 5-star hotels for those lucky enough to be flying in a premium cabin or who have achieved a high status.

> The future focus, we predict, will be on improving the consistency of customer service levels delivered by crew and ground staff all along the travel ribbon. Watch this space for a new generation of digital and mobile innovations as airlines

realize that it's still their best people who are their key asset, brand differential and killer app.

All the admirable efforts of airline marketing, engineering and operational teams can be ruined, however, if any aspect of the inflight experience is neglected, broken or unloved. This is especially the case with perceived and actual comfort. The airline seat is the product. It is the customer proposition. It's the reason airlines are in business. The airline seat is an enabler. It allows business and trade to be facilitated.



"In the next 20 years we will see more advanced engineered textiles enter the market that will be even lighter, more durable and with more flame-resistant properties, as well as high-tech features such as self-cleaning and on demand customizable comfort control."

> Jason Estes, VP of global sales and marketing, Tapis

### "SEAT COVERS ARE VERY EFFECTIVE IN UNIFYING THE OVERALL BRANDED CABIN EXPERIENCE"



1. THE PROMESSA RANGE COMBINES EXTREME DURABILITY WITH A LUXURIOUS, INNOVATIVE,

TWO-TONED TEXTURE

2. THE ECO TECH RANGE

OTHER POLYURETHANE

MATTE FINISH UNLIKE ANY

FEATURES A UNIQUE

Vacations to be enjoyed. Passengers to arrive ready for work. Communities to be connected. Chance encounters to happen. Dreams to be realized.

#### THE ROLE OF SEAT COVERS

Let's stop for a moment and think about the role of seat covers within this reality. Seat covers are the heroes of the cabin interior in terms of passenger perception, comfort and ergonomics.

We believe that the seat cover is one of the most, if not *the* most, important onboard product. It is literally the component that touches most passengers: it is touching most of the passengers at any given moment, and it touches each passenger most of the time. So, just in terms of its primary function, it has an elevated importance and can make or break the perception and delivery of comfort and brand promise.

The potential benefits of quality seat covers can be summarized in three main categories: perception, comfort and ergonomics.

#### PERCEPTION

In terms of perception, the seat cover is effectively the lead focal point of every airline cabin. The sheer number of seat covers in an economy cabin commands t he attention, establishing the first 'macro' brand perception the moment customers enter the cabin. Here, the color of the main seat body and also the headrest unit play a crucial role in expressing the brand iconography of the airline.

The choice of color, material, trim and finish will convey the first impressions for the flight ahead in seconds – welcome, warmth, comfort, anticipation – which the cabin crew will then reinforce as they welcome their guests.

Seat covers are also very effective in unifying the overall inflight branded cabin

experience while giving subtle (or overt) product differentiation between airline sub-brands, be they first class, business class, premium economy or economybased products.

#### COMFORT

Once the passenger is seated, the seat cover's second 'micro' job commences: comfort. In a matter of seconds, the material declares its quality and integrity through design, texture and finish. How the seat cover feels is just as important, if not more so, than its visual appearance. Whether the airline's brand position is biased toward accessibility, performance, heritage, being global, luxury or fun, the seat cover and its design is the single most important onboard interior element that an airline can use to deliver its unique brand promise (with the exception of cabin crew and IFE).

#### ERGONOMICS

The third characteristic of a great seat cover is its ergonomic properties. Ultraleather by Ultrafabrics, which is supplied by Tapis, is breathable, comfortable, lightweight, easy to clean and maintain, and has proven durability. Ultrafabrics and Tapis have forged a successful relationship over more than 30

Tapis' Dallas facility is dedicated to flame-treatment, quality control, and an extensive inventory

> 3. PROMESSA IS A VERSATILE OPTION FOR A WIDE VARIETY OF HIGH-WEAR USES, INCLUDING THE APPLICATIONS THAT A REGIONAL JET PROGRAM, JUMP SEAT OR ECONOMY CLASS SEAT MAY DEMAND

years, bringing this highly durable, luxurious product to the aircraft interiors market and making it airworthy.

Ultraleather is manufactured using proprietary technology to create four-layer, high-performance fabric. It is an extremely durable product manufactured using a process that does not use adhesives or bonding agents, eliminating the risk of delamination.

The first layer is a protective surface that provides resistance to liquids, stains and the harmful effects of harsh cleaners and disinfectants. It is responsible for the product's easy-to-clean surface qualities and can even be enhanced to resist ink and denim staining.

The next layer is the top skin, made with unique polycarbonate resins engineered for maximum hydrolysis resistance. This layer adds enduring strength to provide long-lasting vibrancy and consistent grain retention. It has a wide range of leather and non-leather textures, and limitless color selections.

The third layer is a polycarbonate foam layer for added comfort and cushioning. Additionally, this layer has been designed to transfer body heat and moisture away from the passenger, creating a comfortable seating experience, even during long-haul flights.

The last layer is a premium reinforced woven backcloth for dimensional stability. This layer forms the foundation of the

### "THE WEIGHT DIFFERENCE CAN CREATE FUEL SAVINGS OF US\$56K ANNUALLY ON A SINGLE-AISLE AIRCRAFT"

material and is responsible for the fabric's mechanical properties. The backcloth can be customized based on the specific application and upholstering technique, for a seat that looks great throughout its life.

The combination of these four unique layers produces great performance without compromise. Ultraleather can be engineered to achieve customer-specific requirements, including custom grains, colors, finishes and technical specifications. Tapis can adjust the gloss level, weight, breathability and thickness, and incorporate enhanced properties such as a greater ink and stain protection for seating applications. This custom process has the unique ability to resist the toughest stains, including denim dye transfer and ink.

Ultraleather weighs less than leather – in some cases more than 75% less – substantially reducing cabin weight and fuel consumption. At 330g/m<sup>2</sup> this product is even lighter than most seating materials made from cloth. This weight difference can create fuel savings upward of US\$56k annually on a single-aisle aircraft.

So in conclusion, we thought it was high time that the hardest working component

of the inflight experience had some kudos. It works relentlessly for airlines, 24 hours a day, 365 days a year.

Next time the subject of seat covers comes up during an internal discussion, remember the ease with which this allimportant component accommodates a wide variety of uses. The cabin seat often becomes a work station for entrepreneurs. It facilitates impromptu meetings between flying companions and coworkers. It becomes a restaurant chair for midnight snacks over the Atlantic. It becomes a bed for honeymooners returning home. It proves to be an irresistible play space for inquisitive toddlers. Or it's simply the trusty chair that gets weary travelers home on time, after a long two days of client meetings.

We passionately believe that how the seat cover feels is the most important element of the inflight experience. For Tapis, form follows feeling. And you can feel the difference.

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#### TOUCHING INNOVATION





tapiscorp.com Featured: Ultratech™ Dwell by Ultrafabrics®

## BRIGHT DAYS

Aircraft Lighting International (ALI) is also celebrating 20 years of success and innovation. The latest technologies from the company can benefit maintenance crews and passengers alike

abin illumination expert, Aircraft Lighting International (ALI), has something exciting in common with Aircraft Interiors International: both are celebrating their 20<sup>th</sup> anniversaries this year! ALI has been providing state-of-theart, safety-certified aircraft interior lighting systems to satisfied clients for many years and is recognized as an industry leader for LED systems. ALI's journey has been a long one, from its first days when founder and president, Nicholas Michelinakis, operated out of a one-car garage, to now operating out of a 19,000ft<sup>2</sup> facility and holding multiple PMA certificates for over 79 makes and models of aircraft.

In his early days, Michelinakis spent years working for a large corporation, but he left once he realized that lighting systems would soon change from fluorescent to LED technology. As we all now know, LEDs consume less power, are solid state, durable, and last much longer than their fluorescent brethren. More than understanding technology, Michelinakis learned that to make it in the aerospace industry, one had to be an expert in the field and understand the needs of owners and operators.

Michelinakis recognized that large corporations were always supposedly offering the latest and greatest lighting systems, but rarely did such systems ever translate to anything feasible or effective. Accordingly, he made it ALI's mission to offer solutions that improved upon



existing systems rather than reinvent them entirely.

He started by selling fluorescents and then began developing a truly directreplacement LED lamp. All maintenance crews had to do was take out the existing fluorescent bulb and plug in ALI's 100% interchangeable R-Series LED lamp instead. The process required no rewiring, and no new lamp holders, connectors, dimmers or controllers. The LEDs would work just as the fluorescent bulbs did and were even dimmable. It was like changing a household light bulb.

Michelinakis, and if you have ever met him that should come as no the aircraft's power buses.

With L-Series being a self-ballasted LED lamp, this meant that those pesky ballasts could be removed for weight savings and would no longer be another part to maintain. Fewer parts meant less maintenance, less hassle and, most

But that was not enough for surprise. He went further in the mid-2000s, developing the L-Series, an LED system that would bypass the fluorescent systems' ballast and operate directly off

1 13

"It is ALI's belief that the future of our industry is what its mission has been since day one: seamless integration. New systems are inevitable, but collaboration between companies will be critical, as consumers will demand more individualized customization. Conglomerates will have a more difficult time offering 'take it or leave it systems', which do not align with every other aspect of their daily life." Nick Michelinakis, founder, ALI

### ALI'S ENGINEERING TEAM HAS A COLLECTIVE 50-PLUS YEARS OF AVIATION EXPERIENCE"



1. THE WARM AND INVITING ATMOSPHERE OF THIS GULFSTREAM GIV-SP BUSINESS JET CABIN OWES A LOT TO ALI'S LIGHTING SYSTEMS

2. ALI'S SIMPLE PLUG-N-PLAY LED READING BULBS

3. THE R-SERIES, DIRECT REPLACEMENT LED WASH-LIGHTING UNIT

4+5. A WELL-LIT CARGO AREA, AND HOW IT LOOKED BEFORE ALI'S INPUT





importantly, money saved for owners and operators.

By 2013, all of ALI's first LED lighting systems were PMA certified. With this certification, owner/operators would no longer need to certify the LEDs onto the aircraft; they would just have to make a logbook entry. Accordingly, ALI's market reach grew and before Michelinakis knew it, he had his very own facility.

#### THE CURRENT SITUATION

Today ALI specializes in supplying stateof-the-art, safety-certified aircraft interior lighting systems. The company strives to meet the needs of its customers and to continue to be an innovation leader in aviation lighting.

ALI's engineering team has a collective 50-plus years of aviation experience, with expertise including RF engineering, wireless technology, software generation and emulations, EMC/EMI engineering and quality assurance. This expertise allows ALI to offer customized products for commercial and military aviation, as well as for numerous one-off projects for specific clients' needs and tastes.



ALI's primary market is business aviation, having supplied fluorescent and LED interior lighting solutions for over 70 aircraft makes and models. Nearly every major manufacturer of aircraft can be found on the company's PMA certificates, including Textron, Boeing, Gulfstream, Dassault, Bombardier and Pilatus.

Over the past 10 years, ALI's exposure has grown exponentially. As an independent company, this growth is achieved by adhering to a four-point business strategy: highest quality product; competitive pricing, shortest lead-times; and premier customer service and technical assistance.

As it did in its early days, ALI still stocks a full array of 12mm replacement fluorescent lamps. In addition to its original LED lamp systems, ALI now offers direct-replacement, plug-and-play LED reading lights. Requiring absolutely no change or modification to the reading light fixtures, these LED reading light bulbs can replace 28V DC/AC halogen/incandescent miniature lamps. These bulbs consume roughly one-tenth the power of halogen/ incandescent bulbs and do not emit any heat, making for a more comfortable passenger journey.

In addition to LED reading lights, this year saw ALI receive PMA certification for its self-ballasted 8mm LED lamp system designed specifically for Falcon 900s and 2000s.

#### THE FUTURE

ALI's Mood system offers over 40,000 colors, which can be dimmed and programed as presets, much like a car radio. The Mood system also includes true white lighting. ALI's in-house programing team allows for individualized branding, as well as specific dimming and mood presets such as sunrise and sunset.

Over the past 20 years, Michelinakis has dedicated his life to being an expert in

6. LIGHTING SYSTEMS CAN BE USED TO ALTER THE MOOD OF THE CABIN DURING THE VARIOUS STAGES OF A JOURNEY

7. A CUSTOM NGV LED FOR MILITARY APPLICATIONS

all things related to interior aircraft lighting. Through this dedication and commitment, a passion was born to provide customers with the best lighting product for their needs.

To that end, Michelinakis has also created a team providing exceptional technical support and customer service.

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# AIRCRAFT LIGHTING INT'L PRESENTS THE L1309X READER YO OUNT

## PMA APPROVED LED LAMPS FOR THESE AIRCRAFT



## PANEL DISCUSSION

Airlines can increase passenger loyalty through cabin elements such as branding panels

n recent years, air travel has been growing incredibly quickly, with passenger numbers booming all over the world. As a natural consequence, aircraft manufacturing rates and deliveries have been ramping up, and ultimately the level of competition between airlines is becoming more and more sophisticated.

This trend has led to great improvements in the inflight experience, an element that is essential to airline strategies today. The focus is no longer just on the pure transport service: indeed the availability of a large network with multiple destinations as well as appropriate flight schedules is almost a commodity nowadays, especially with worldwide alliances, codeshares and partnerships. The fierce competition between airlines is leading to a further enrichment of the travel concept, making air travel more pleasant, which definitely adds value to airlines' relationships with their passengers. Hence most airlines' marketing campaigns prioritize items such as food, comfort and IFE systems.

Increased competition leads to a greater need for airlines to differentiate themselves from all the others, and brand image and identity are key factors for success. Branding means visibility, and visuals are essential in our society and culture. When we board an aircraft, the cabin should become our 'room' or our 'office', rather just ABC International's client list includes Etihad, LATAM, Ethiopian Airlines and Alitalia

Alitalia a place for the duration of a flight. As a consequence, colors and lighting contribute to creating a loving feeling, while branding elements establish the relationship between passengers and the airlines' brand image.

#### BRANDING ELEMENTS

In this arena, ABC International has been developing cabin branding elements since 2008, and by following a growth path and investing in this field, the company is now

specialized in cabin branding design, certification, manufacturing and installation approval.

ABC International was set up in Naples, Italy, to support airlines and operators by providing tailor-made, cost-effective solutions in a timely manner and with a special focus on cabin interiors. The company's first challenge to create cabin branding elements came in the very first year of its operations, in 2009. Following the completion of a simple commission coming from a customer, the company
#### "BRANDING ELEMENTS ESTABLISH THE RELATIONSHIP BETWEEN PASSENGERS AND BRAND IMAGE"

"The cabin interiors design sector is constantly growing, both in terms of new companies and its importance for airline differentiation strategies. We are seeing a big increase in specific cabin customization requests on line-fit and retrofit programs. This means that airlines are engaging specialized design houses in order to create a unique environment where passengers can enjoy their travel experience. We expect this process to continue, with a growing focus on new technologies, exotic materials and socially oriented platforms."

> Alberto D'Ambrosio, CEO, ABC International

1. A SIMPLE, HIGH-QUALITY CABIN BRANDING ELEMENT INSTALLED ON BOARD ALITALIA'S FLEET

2. A MULTILINGUAL WELCOME PANEL GREETS PASSENGER ON LATAM'S A350 FLEET

3. A HIGHLY PRESTIGIOUS BRANDING PROJECT CARRIED OUT FOR ETIHAD AIRWAYS' B787 DREAMLINERS

realized it had an ability with cabin design and perceived its increasing importance in the aviation transport sector.

Since then, ABC International has been following a growth and investment path, and has become a specialist in cabin branding concept design, engineering, certification, manufacturing and installation approval. The company's track record of success with many customers all over the world, and the wide range of cabin branding elements it has developed, manufactured and successfully delivered, have kept the company's teams highly motivated. Indeed, they now realize that this business segment is of great importance to airlines wishing to maintain a high level of competitiveness in terms of strategic branding and marketing.

"Our CEO's 40 years of experience in the aeronautical field, his background and his desire to pass his know-how to us, have been the key elements of ABC International's success," explains Virginie lorio, the company's media relations and communications manager. Many prestigious cabin branding programs have been awarded to ABC International over the years, including Turkish Airlines (2011), Air Canada (2013), Etihad Airways (2014) and Alitalia (2015). Other high-profile cabin branding projects have included Royal Jordanian, Ethiopian Airways, Rwanda Air, Latam, CityJet and Air Iceland, with many others joining the list.

In addition to technical proficiency, the company's design team has a strong aesthetic sense that comes from previous experience accrued working with leading



cabin interior OEMs. The prestigious 'Made in Italy' label, which is synonymous with elegance and style in the fashion world, has also become a 'must have' in the cabin interiors world.

#### APPEAL TO THE SENSES

Cabin branding is the link between a positive flight experience and the sense of loyalty in the minds of passengers. Nowadays, airlines are well aware of the need to be easily recognizable during every single moment of the flight experience.

Effective branding elements are essential for airlines seeking a deep emotional connection with passengers, and ABC International's philosophy is to strengthen brand presence in the cabin. In other words, brand equity is the incremental value added by a visible brand image, and it strongly influences brand and purchasing preferences.

Confirmation of this thinking comes from Gudmundur Oskarsson, head of sales and marketing at Air Iceland Connect, who states, "The Air Iceland Connect logo, in the shape of a winged horse, has played a large role in the region in and around Iceland, throughout the country's aviation history. Over time, the airline has evolved and modernized, and has been an important part of Iceland's aviation industry. We installed cabin branding elements manufactured by ABC International on our Bombardier DHC-8 202Qs and DHC-8 402Qs, supported by an anodized lightweight aluminum panel."

#### BRAND EQUITY

At the heart of airline branding is the promise to passengers of a safe, smooth,

easy and comfortable travel experience. Brand identity must be aligned with a strong brand image. When these factors are combined, brand equity becomes the surplus value that helps to establish loyalty. This pathway goes through the decision-making steps of awareness, interest, desire and satisfaction.

In addition to recognizing the importance of brand equity for airline profitability, it is becoming very important for airlines to adopt specific brand-building strategies in order to build up sustained competitive advantages. In other words, airlines have to focus on maintaining relationships with their customers beyond the flight experience.

Alberto D'Ambrosio, CEO of ABC International, remarks, "Airlines need to highlight their company's logo in the finest and most effective way. The aircraft cabin is an environment where the customer is a guest being cared for by the airline."

Therefore cabins represent the 'home' of an airline and have to be aligned with branding strategies in order to transmit and transfer that airline's tangible and intangible value to passengers.

"An example is Alitalia's new logo, livery and interiors, revealed in June 2015. The new cabin interiors are comfortable and



4. INSTALLATION OF A CABIN BRANDING ELEMENT ON BOARD AN ETHIOPIAN AIRLINES B737

5. A CABIN BRANDING ELEMENT ON BOARD A BRUSSELS AIRLINES SSJ-100, OPERATED BY CITYJET

#### "IT IS IMPORTANT FOR AIRLINES TO ADOPT SPECIFIC BRAND-BUILDING STRATEGIES"

refined, and the attention to detail is clear as soon you step on board. We were eager to play a part in the renewal process of Alitalia," confirms D'Ambrosio.

The project was successful, as Veronica La Marca, Alitalia's cabin interiors and entertainment systems manager, confirms: "ABC International proactively supported Alitalia's new A330 cabins. Their decorative elements are now installed on all our fleet and passengers are enjoying our new cabin interiors."

ABC International can implement and combine branding expertise with DOA cabin interiors skills and knowledge, as demonstrated when the team worked on a retrofit project with FL Technics, a major MRO company. ABC International took on the task of designing, manufacturing and certifying a customized cabin monument and new cabin branding elements with backlit LED illumination, for Small Planet Airlines. The outcome was really fantastic.

"When we look back at our past, we can count many important professional and human milestones. Our customers' satisfaction, every great challenge faced, and each difficulty overcome, are the strengths that will drive our next successful project," adds D'Ambrosio. "Our team is expanding and we have moved into a new headquarters."

In conclusion, ABC International's cabin branding elements can be a key element of airline branding strategy, creating a deep emotional connection with passengers.

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Cabin Branding Element for Small Planet Airlines' A32



ABC International S.r.I. Via Napoli, 155 80013 Casalnuovo di Napoli (Na) - Italy Tel.: +39 081 842 4321 e-mail: welcome@abc-int.it www.abc-int.it

The cabin branding specialists.

# LIGHT AND COLOR

With digital printing and smart surface visualization, Diehl Aerosystems has developed two future-oriented technologies that enable the intelligent and effective use of aircraft interior surfaces. This development has sparked the interest of passengers and crew, airlines and OEMs

assengers should feel comfortable during their flight, and remember the airline that carried them in a positive light. This is precisely why it is so important for all airlines to present themselves as positively and sustainably as possible, especially in such a competitive market. Until now, the sidewalls of aircraft interiors had been an unused surface. Not so any more: these surfaces can now be used not only to help create a comfortable ambiance, but also as a tool for extensive branding opportunities. So when it comes to atmosphere, imagery and resonance, the magic words are 'light' and 'color'.

#### DIGITAL PRINTING

Digital printing is a new printing process that brings color into the passenger cabin, enabling creative cabin design through bespoke prints. This means that soon, the industry-standard, pre-finished décor foils will become a thing of the past. The printing procedure is suitable for almost all lining elements.

Until now, cabin elements such as sidewalls and luggage compartments were sparsely and simply decorated – if they were decorated at all. The reason for this lies in the time-consuming and complex requirements of the realization process. Conventional screenprinting uses a multilayer film that can only

be applied by hand to the relevant part of the aircraft interior after the printing process. This is a timeconsuming and relatively inflexible procedure, a task akin to painstakingly laying a wafer-thin carpet.

Digital printing makes everything easier, in every way. First of all, the chosen design can be directly applied onto the lining element, without the need for preparatory procedures. This ensures not only high resolution and precise color reproduction, but also facilitates much more complex designs. A further advantage is the considerable

could be about to become much more interesting!

weight reduction due to the loss of the multilayer films. This might only be a matter of 100g/m<sup>2</sup> (dependent on the decorative film used), but when that's extrapolated for an A320, it equates to a substantial saving of around 6kg.

Two different production processes are used for digital printing. For direct printing, once the selected element has been prepared with a primer for texture and color, it goes to the printer. Then, the selected design can be applied to the piece in around an hour. As soon as this process is finished, the part can then be delivered. Further processing is not necessary.

During the sublimation procedure, the selected design is first printed onto a transfer film, which is then is thermally transferred on to the part. Next, the transfer film is removed while the design remains. The particular advantage of this

#### "NO LONGER IS THE IMAGINATION RESTRICTED TO STANDARDIZED IMAGES"

1+2. MORE CREATIVITY WITH DIGITAL PRINTING: COMPLEX IMAGES AND INTRICATE GRAPHICS CAN BE APPLIED TO ALMOST ALL LINING PARTS WHILE ALSO ENABLING FLEXIBLE AND DIVERSE CABIN DESIGN CONFIGURATIONS



"In 20 years' time, we will be able to offer many more passenger comfort features in the aircraft cabin than we do today. Branding experiences by digital printing on surfaces, as well as lighting and projection, will be part of that."

> David Voskuhl, vice president of communications, Diehl Aerosystems

> > standardized images: each cabin interior can be designed completely at will, with discreet and realistic renderings, stylized panoramas, or fully scalable vector graphics. It's even possible to produce finishes such as wood grain, leafy forests, or clouds. This means that not only can individual elements be printed with designs, but also that one sidewall can make up an entire scene in its own right. This makes the cabin something worth beholding as well as creating a pleasant atmosphere on board.

#### **BRANDING OPPORTUNITIES**

Digital printing also opens up new branding opportunities: logos and other

brand elements can be introduced into the cabin interior simply and easily. The full effect is of these branding elements is particularly intense during a flight, given the increased dwell time and the fact that there are fewer distractions on offer than on the ground. If needed, the designs can be quickly and easily replaced – whether it's a new advertising campaign for the airline or other marketing-related changes. However, the printing process cannot be carried out in the aircraft – the sidewalls need to be removed and replaced.

Diehl Aerosystems is the only global supplier of directly printed cabin elements. This is why, with this innovative digital printing concept, the specialist for floorto-floor linings, cabin lighting, water and waste water disposal, and avionics was one of the finalists in the Crystal Cabin Awards 2017.

#### SMART SURFACE VISUALIZATION

In the future, previously unused cabin surfaces will be able to be used to provide information updates, which will have a positive affect on onboard comfort, as well as potentially being an additional source of income for airlines and third parties. This is all thanks to the lighting specialist Diehl, which has made it possible to project static or moving images, animations and even videos onto cabin ceilings, luggage compartments and partitions. If needed, individual projectors can be used for

technology is that the printed image doesn't sit on the surface of the part, but is instead actually integrated into its surface. This is what makes sublimation printing particularly durable and resistant.

Both production processes ensure that resistant, durable and particularly robust images are applied to the chosen pieces. However, the biggest advantage of digital printing has to be its versatility. No longer is the imagination restricted to



focusing on particular cabin elements, or multiple devices can be employed to turn the entire cabin into a canvas.

The size of the images projected by the various light sources is scalable, depending on the desired effects and element(s) involved. Special software tools take into account the particular distortions created by the shape of cabin interiors, so that the image content displayed is not affected in any way. The technology can even make allowances for cabin vibrations. The result is sharp images that lose none of their quality, even when they are projected across the entire cabin.

The hardware can be completely integrated into the linings and can, for example, be placed in the front row monument – which also happens to be the ideal projection surface. This technology can, in principle, be installed during both initial outfitting and during retrofitting.

It is also possible to link the system to the aircraft's cabin management system. This means that information can be disseminated at the touch of a button. For example, during boarding the sidewall surfaces could display the row and seat numbers. The system also makes it possible to provide passengers with internal notifications, news, or even individualized information, throughout the entire flight.

Smart surface visualization can go a long way toward improving the mood on board, not least because the cabin lighting can be adapted to suit the mood of the images currently on display. Scientific research has shown that pale colors have a decisive influence on the well-being of aircraft passengers. While yellow light encourages sleepiness, blue light – which is scientifically proven to suppress the melatonin sleep hormone – promotes concentration and attentiveness.

In addition to this, the potential for showing various videos could also positively affect the mood on board. The perceived restriction of being confined could be negated, for example through a projection of the starry night sky or a morning sunrise. It is also conceivable that information about the destination, or the cities that are currently being flown over, could be displayed in running text, or in a series of images.

#### THE BIG PICTURE

Alongside the visual design of surfaces, the ambiance of the entire cabin is also a crucial consideration for Diehl, as a Tier 1 supplier. Harmonizing the cabin lighting,



3. DIEHL'S BLUE LAGOON DISPLAY AT AIRCRAFT INTERIORS 2017 IN HAMBURG SAW A MOCK-UP CABIN BECOME AN UNDERWATER WORLD, THANKS TO SKILLFUL PROJECTION AND CABIN LIGHTING

4. WHEN CABIN LIGHTING AND PROJECTION ALIGN, A UNIQUE ATMOSPHERE IS CREATED

#### "THE PERCEIVED RESTRICTION OF BEING CONFINED COULD BE NEGATED"

reading lights, or elements of the emergency lighting can all contribute to the passengers' overall impression of an airline. To that end, Diehl is concentrating on visually enhancing the surfaces in the cabin with this projection technology, but also has an eye on the future as far as display technologies are concerned: technologies such as using organic LED matrices as information carriers.

Airlines and OEMs can sell themselves with in-cabin smart surface visualization in a new way. This is more than just mere logo placement; it also creates the possibility of promoting corporate design through the interaction of static or moving images, branding and lighting effects. On top of that, there is potential for traditional and promotional advertisements in the form of static projections or films, and the option to offer interactive customer contact. Everything is possible.

The easy-to-use technology provides a high degree of flexibility and is of particular interest to the charter market, as corporate designs can be altered in the cabin in a matter of seconds.

The projection system by aircraft outfitter Diehl was one of the finalists of the Crystal Cabin Awards 2016 and is now virtually market-ready.

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### MAKE BRANDING AN EXPERIENCE

DHIRIDE

HHHHH

Digital printing turns lining elements into more than just lining. In digital printing, the conventional décor foils on the lining elements are replaced by direct printing. Direct printing is not only lighter and more durable, but also 100% customizable: Unobtrusive patterns, complete panoramic images, realistic renderings or freely scalable vector graphics – there are no limits to flexibility.

www.diehl-aerosystems.com

# SUCCESS STORY

Engineers at Aviointeriors are busy developing new seat models to ensure the company is competitive in every aerospace seating sector

ngineers at Aviointeriors are working very hard to expand the company's range of aerospace seating. For business class, in addition to a new version of the Adagio seat, they are developing two other all-new models: Galileo and Canova.

Galileo is a staggered, fully flat business class seat for wide-body aircraft that gives all passengers direct access to the aisle, and generous personal stowage space.

Meanwhile, Canova is also a lie-flat seat, but intended for high comfort in narrow-body aircraft.

Launch customers have already been secured for both seat models, and the certification process for both will be completed by the end of 2017.

But Aviointeriors' engineers are not just focusing on developing new seats for business class; they are also working on new economy class models.

The first coach seat is Columbus Three, a lightweight seat that is an evolution of the previous C3 model, for which new materials and new engineering solutions have been implemented to enable a reduction in weight of nearly 25%.

Also in development is Voyager, a completely new economy seat being created for small aircraft, allowing Aviointeriors to enter the turboprop aircraft interiors market.

As with the business class models, launch customers have already been



The Columbus economy seat and

Canova business

seat have been

added to the

MC-21 catalog



"Aviointeriors is helping secure its future through the establishment of an academy, which sees graduates in aerospace engineering from the University Federico II in Naples work in the company's facilities. Focusing on the professional development and growth of these graduates creates a specialized and well-trained workforce, and 71% of trainees are given a permanent contract."

> Ermanno De Vecchi, CEO, Aviointeriors

#### "ALL THIS ACTIVITY IS JUST ONE PART OF OUR EFFORTS TO ENLARGE OUR PRODUCT RANGE"

secured for both of these new seats, and the certification process is underway.

Aviointeriors is sensitive to the needs of everyone on board an aircraft, and has thus also launched a new line of very specific seats dedicated to crew: the Andromeda crew rest and the Columbus crew rest.

Both of these crew seats are already flying on aircraft around the world, giving the well-known Aviointeriors comfort experience not only to customers, but to crews too.

Ermanno De Vecchi, CEO of Aviointeriors, states, "All this activity is just one part of our efforts to enlarge our product range, allowing us to offer a product that can always meet airline and passenger needs. This is of course achieved without forgetting the famous Italian style and personalization of products that are part of the DNA of our company."

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CLOCKWISE FROM ABOVE: ADAGIO, GALILEO, CANOVA, VOYAGER



# COMPOSITE PICTURE

There have been many developments in aviation over the years, especially in cabin materials. E-Leather considers future influences of the industry, and how its innovative composite upholstery will contribute

K-based E-Leather, an environmentally friendly materials technology company, has been offering the aviation industry an alternative, high-performance seating upholstery material for over a decade. Having seen a number of changes in the industry during that time, the company takes a look at where the aviation industry is heading over the next 10 to 20 years and what part suppliers have to play in it.

According to IATA there has been particularly strong growth in aviation over the past three years, and this trend is expected to continue. Despite pressure on airlines to reduce operational costs and a looming rise in the price of oil, IATA anticipates the airline industry delivering strong results of US\$29.8bn EBITDA in 2017. In addition, it predicts passenger numbers will double from 3.8 billion to 7.2 billion over the next 20 years.

This is all positive news. However, there is another pressure facing airline operators: the requirement for them to grow in a more sustainable way.

Alexandre de Juniac, director general and CEO of IATA, talks about the ways the organization is aiming to make this change: "Aviation is at the forefront of industries managing their carbon

1. E-LEATHER WORKS WITH ACRO AIRCRAFT SEATING 2. NICO DEN OUDEN, E-LEATHER'S TRANSPORT EXPERT

### ABOUT E-LEATHER

E-Leather is an environmentally friendly materials technology company offering products specifically engineered for interior and seating applications for a diverse variety of sectors worldwide. E-Leather products are designed and manufactured to provide exceptional characteristics, delivering an eco-friendly material that outperforms traditional leathers, synthetic leathers and fabrics. Using the process of hydroentanglement, E-Leather combines traditional leather fibers and a highperformance core material to produce ecoengineered leather fiber composite upholstery. This clean technology product uses only the power of water in its production process, recycling 95% of that water and converting the waste streams into energy, which is fed back into the process.

E-Leather partners with leading brands in the aviation, rail, bus, coach and automotive sectors to meet and exceed their business goals while ensuring compliance with industry safety regulations and helping to create better experiences for their customers – all through a unique and sustainable process. footprint. Airlines are now working with partners in the industry to advance technology, improve operations and generate more efficiencies."

Over the years airlines have received regular criticism for being unfriendly to the environment, but together with their suppliers, operators are now seeking solutions that contribute positively to a more sustainable industry. One area that has received much attention over the years is seating design – not just in terms of styling, but right through to the upholstery material. "Every year we see seat providers innovating slimmer, lighter seats that take up less room, are more comfortable and offer enhanced services such as contactless pay systems and the ability to use your own PDA instead of built-in IFE systems. There are two main influences I believe are driving this change: higher passenger expectations and the operators' goals to be more efficient and sustainable." Nico den Ouden, business unit director, passenger transport, E-Leather



Operators understand how important the seat is and how new designs can introduce a number of benefits to multiple stakeholders. This was also recognized by E-Leather, which saw a natural fit for its lightweight, high-performance leather fiber composite within airline seating applications.

Nico den Ouden, business unit director, passenger transport at E-Leather, comments, "Seat upholstery specification is often as important as the seat itself due it being the longest contact point between the passenger and the airline. Until 2007



there was no alternative to traditional leather unless operators wanted a fabric, which can present operational and efficiency challenges."

Traditional leather has always offered passengers luxury, style and comfort while providing airlines with a more robust, easier to clean surface than fabric. The downside is that traditional leather is expensive and heavy, and although it is a non-porous and wipeable material it can be prone to scuffing and becoming baggy. Fabrics are lower cost than leather at the outset, but often mean operators incur costs through maintenance schedules and replacement seat covers after a number of washing cycles.

E-Leather saw the opportunity for its product to become a novel, standalone category in the industry, a position now recognized by a number of large airlines worldwide.

Den Ouden continues, "Having secured repeat programs with four of the largest airline fleets worldwide as an alternative to traditional leather, we are now seeing further adoption by other big airline brands, which plan to replace all their fabric seats with E-Leather."

E-Leather is the only material available on the market that contains actual leather fibers and has the look, feel and maintainability of traditional leather at a weight similar to fabric.

Offering the industry an alternative material to traditional leather has allowed operators to do three things: provide a better customer experience, improve operational efficiency, and contribute to a more sustainable planet.

Karl Hartung, technical service manager at E-Leather, explains some of the properties of the material that make it so 3+4. THE E-LEATHER RANGE IS AVAILABLE IN A SELECTION OF COLORS AND FINISHES



attractive to the aviation market: "Leather fiber composite has a much

E-Leather prevents thousands of tons of leather waste from going to landfill every year

lighter weight than traditional leather. However, it is more durable due to its unique structure. Resistance to wear and tear such as bagging, creasing and scuffing is far superior. We do a number of durability tests, one being Taber abrasion, which demonstrates that our engineered leather fiber composite reaches well beyond 2,500 cycles, compared with 1,000 from the next closest supplier. Most reach only 500 cycles or fewer."

In addition to the enhanced performance benefits of leather fiber composite, E-Leather is clean-tech manufactured using only water to bind the fibers during production. Ninety-five percent of that water is recycled and the entire process is designed to be environmentally friendly. E-Leather transforms natural leather waste that would otherwise be sent to landfill into a totally unique, sustainable material.

Den Ouden concludes, "As many brands are being driven to be more environmentally conscious and responsible, we are able to support them with this one small, albeit critical, element of their business.

"E-Leather has frequently been recognized for its environmental credentials, including listings in Global Cleantech Top 100 for the past three years and TT TechTour Growth 50 for the past two years."

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### EXCITE INFLIGHT

Direct Air Flow is celebrating 25 years of innovating and manufacturing galley equipment. The company's founders share their philosophies and the secret of their success

et's take a moment to consider Direct Air Flow's memorable journey in the field of inflight galley equipment, as the company celebrates its 25<sup>th</sup> anniversary.

The owners and founders of Direct Air Flow, Mieke Bougie and John Reidy, explain what underpins their success: "We're two entrepreneurs and when you match this skill with unstoppable passion and unbridled devotion to the fascinating world of aviation, a business is created that stands the test of time," states Reidy.

"It's been a fantastic journey. Back in 1992, our office environment was quite different to what it is today," adds Bougie. "I do believe that our humble beginnings have paved the way for a strong foundation that we still embrace fully. We have always listened carefully to our customers' needs; supplying products that offer effective solutions. Our shared vision to provide excellent products and services to the aviation industry is our core value."

The decision to safeguard product quality and service delivery underpins the company's growth strategies. "We recognized that in order to have greater control over our core values, we had to take an essential step: establishing Korita Aviation, our manufacturing facility in Suzhou, China," adds Reidy. "This decision has really supported our accelerated growth over recent years, guaranteeing our ability to provide standard inflight catering equipment from a stock position through Direct Air Flow, or offering a manufactured option through Korita Aviation that is specified to airline requirements."

A key product developed by Direct Air Flow and Korita Aviation has been the Aluflite range of galley carts, which offers a lightweight durable design as well as maximum maneuverability in operation.

"Our aim has always been to enhance tried-and-tested design to meet the cyclical demands of the aviation sector," states Bougie. "With fuel price fluctuations and the increasing demand for environmental awareness, we wanted to ensure that we could also support our customers with cost-effective galley equipment that still remained a 'work horse'. We have achieved that with our Aluflite range of inflight galley equipment."

The company has always been forward thinking, and throughout the years its owners have invested resources and expertise to ensure that they create a competitive environment, challenging the marketplace with its panel-finishing expertise. The need to enhance the onboard passenger experience and the potential for optimizing inflight sales is of increasing importance.

"Supporting airlines with current and future need is what we do," says Reidy.

Korita Aviation listens to the needs of airlines, and aims to help enhance the customer journey through the process

The Direct An Flow galley range includes trolleys containers and oven racks

of sublimation on the exterior panels of inflight catering trolleys. "Sublimation in itself is a process that many companies are familiar with; so we had to take it to an even higher level. Our expertise in both process application and the development of extremely resistant protective coatings has ensured that we can offer an aspirational look, which is resilient to even the toughest washing cycles," states Reidy. "We believe that sublimation is an increasing trend, offering airlines more than just a branding opportunity - we make an inflight catering trolley part of the customer journey.

"It's wonderful to see how you can improve the inflight experience in different ways through the creative application of high-resolution imagery. When airlines are looking to build upon their existing onboard experience, we work together with them to help take the passenger journey to that next level. What once was simply a tool for the cabin crew to provide service to passengers has been transformed into an exciting part of passenger inflight experience."

The inflight galley is another area that passengers often notice, and in recent years, airlines have recognized the need for galley containers to match the overall cabin style.

Korita Aviation has noticed a greater level of interest in containers with a powder-coated or sublimated finish.

"When an airline invests in a complete cabin restyle, they consider every customer touchpoint. An investment in sublimated inflight trolleys is often matched by sublimated containers. Airlines are dedicating time and money to enhancing the passenger experience at every step of the journey, and because the galley is visible to passengers as they board the aircraft and as they walk around on a longhaul flight, every aesthetic element counts. Passengers like the difference this attention to detail makes," says Bougie. "As the cost of travel becomes more homogeneous, flight routes and the inflight experience will be deciding factors in selecting an airline. The competitive landscape is changing; consumer insight and rapid response will make the difference. Inflight galley equipment innovation is set to happen, and service delivery will be more dynamic, both visually and practically." *Mieke Bougie, co-founder; Direct Air Flow* 

A commitment and dedication to continuing to explore new opportunities, and to develop, enhance and innovate the inflight catering experience, is at the heart of Korita Aviation.

"We want to make the inflight passenger experience memorable. Our success is built on a firm foundation of listening and partnering with our customers, developing certified inflight galley equipment that delivers need-based solutions, and providing service that counts," concludes Bougie. 1. DIRECT AIR FLOW FOUNDERS AND OWNERS, MIEKE BOUGIE AND JOHN REIDY

2. THE SUBLIMATED TROLLEY CAN BE ORDERED WITH CUSTOM FINISHES

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#### Be Different. Choose Sublimation. Your customers will love you for it!





# SAFE AND SECURE

The next-generation Cobham SATCOM Aviator S solution is set to transform the flight deck, bringing benefits in communication, security and safety

obham SATCOM will launch an industry-leading next-generation solution for flight deck satellite communication in 2018. Following years of development and evaluations, the first installations of Cobham SATCOM's Aviator S Series will represent a landmark step in the transformation of the quality and security of cockpit and cabin communication services.

Aviator S enables Inmarsat's new SwiftBroadband-Safety (SB-S) internet protocol (IP) data service through groundbreaking systems that feature the most advanced security architecture and domain segregation measures. The systems address the growing demand from airlines for continuous secure data exchange between their ground operations and their aircraft, while meeting the trend for smaller, lighter, less-expensive but still feature-rich systems with reduced installation requirements.

Already backed by a high level of industry support, Aviator S enters the qualification phase this year and will be certified for flight through an EASA TSO by mid-2018. Major airframers have selected the new systems, with Cobham providing its Aviator 200S and 700S systems for the Airbus A320 and A330. It was also recently announced that the 200S will be certified on the Airbus A350 XWB. In addition, Cobham is in discussions with Boeing about establishing TSAs for Aviator S on new airframes.

Further supporting Cobham's development of technologies to meet the future needs of the aviation community, United Airlines has installed the Aviator 300D system for participation in the evaluation of SB-S, while Hawaiian Airlines has selected Aviator 350D and SB-S for its new Airbus A321neo fleet.

The superiority of IP-based data communications over previous generation solutions has been verified through evaluations of ACARS over IP over SBB on a fleet of Hawaiian Airlines aircraft during the past 18 months. Analysis of the system performance began in 2015 after  $\bigcup$ 

"Cobham believes that in 20 years, no aircraft without cockpit satcom support will be allowed in controlled airspace"

> Willem Kasselman, VP of aerospace, Cobham SATCOM

a Hawaiian Airlines Boeing 767-300 became the first commercial aircraft to fly with SB-S, enabled by Cobham's Aviator 300D system, which was certified for FANS 1/A+ and CPDLC communications as well as ATC voice over SBB during the evaluation period.

The advantages include safe reduced separation in congested airspace, better situational awareness for pilots and air

traffic controllers and, most importantly, safer flying for passengers. By transforming the flight deck into a fully connected work environment, aircraft operators can address operational loads and allow pilots and flight crews to focus on flight management tasks more efficiently. Pilots will have access to more regular updates of rapidly changing weather or flight conditions, and the crew can take advantage of more applications including telemedicine, passenger data, aircraft documentation and more.

Suitable for all air transport and bizjet aircraft, Aviator S is designed to the latest standards to resist future cyber threats, combining ACARS and IP data with compliance with the latest security architectures. The security provisions in the Cobham SATCOM terminal include segregation of all functions, and protection of each functional path with several independent security gates.

Willem Kasselman, vice president of aerospace at Cobham SATCOM, states, "Finally the aircraft is set to benefit from an IP datalink for professional communications. The new generation

1+2. COBHAM SATCOM'S AVIATOR S SERIES WILL REPRESENT A LANDMARK STEP IN THE TRANSFORMATION OF THE QUALITY AND SECURITY OF COCKPIT COMMUNICATION SERVICES of smaller terminals will provide cheaper communication capital expenditure and operating expenditure. To fend off the threat of data or communications corruption by intentional interference, we embraced rigorous security architectures to avoid the exposure of flight safetycritical communications to hackers."

The Aviator S product range will be available in different configurations, from the breakthrough Aviator 200S two-LRU solution, up to the Aviator 700S, which provides maximum SB throughout.

Offering significantly reduced installation requirements, power, weight and cost versus 'classic' safety products, the Aviator 200S is the smallest available SB-S product. Weighing less than 6kg (13 lb), the single-channel Class 4 Inmarsat SwiftBroadband system with HELGA (an antenna, high-power amplifier and diplexer, all in one enclosure) is suitable for all aircraft. The 2005 offers cockpit voice and datalink (ACARS) in the aircraft control domain (ACD) and background IP data communications in the Airline Information Services Domain (AISD), with achievable throughput of 200kbps shared between the two domains.

The Aviator 700S is a dual-channel Class 6 Inmarsat SwiftBroadband system, which will allow secure segregated ACD and AISD communication on the first SBB channel and dynamically configurable (background or streaming) IP data for passenger information and entertainment services domain (PIESD) on the second SBB channel. Suitable for installation on most types of air transport, large business aviation and government/ military aircraft, the Aviator 700S with high-gain antenna (HGA) will support the same as the Aviator 200S on the first channel and up to 650kbps on the second channel, using SBB HDR streaming services.

In addition to the new Aviator S, Cobham SATCOM offers an existing portfolio of systems for voice and data communications on a broad range of aircraft, including the Aviator 200/300/350, plus the 300D and 700D. To benefit from L-band systems on the Inmarsat SwiftBroadband network, Cobham SATCOM's Aviator Special Purpose (SP) systems offer multichannel solutions for expanded bandwidth requirements and special environmental qualifications. ©



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### CARPETING RECONCEIVED

Carpeting specialist Anker has developed a lightweight textile carpet that offers many design opportunities and practical benefits

nker Flooro is a revolutionary new textile carpet developed specifically for the aviation industry by Anker, a traditional woven carpet specialist from Düren, Germany.

So what is new about Flooro? This innovative product looks more like a luxury flooring material than an industrial carpet and weighs considerably less than conventional carpeting (50-70% less), all while also being extremely hard wearing.

This unique innovation has been made possible by the development of a special high-tech weaving system. In addition to this, 50% of this new generation of textile flooring is made using recycled Econyl yarns.

In 2013, Anker put together a team of experts made up of weaving specialists, weaving machine specialists, designers, and sales and marketing people. The aim was to develop an aviation carpet that delivered top performance and weighed just 1,000g/m<sup>2</sup>.

Following many development trials and several prototypes, this aim was not achieved. Ensuring top performance while considerably reducing the weight appeared to be an unsolvable contradiction.

The breakthrough only came with a brilliant idea. What if material was used instead, and what if that material was woven in a way that made it suitable for use as flooring? The idea for Anker Flooro was born.

There are several advantages of this product. On the one hand, there are the economic benefits associated with the carpet's lower weight, optimized functionality, low logistics costs and the fact that it is very easy to work with.

On the other hand, the new textile designs and textures also present completely new possibilities in terms of cabin interior design.

Anker Flooro weighs 800g/m<sup>2</sup>. Traditional wool carpets, on the other hand, can weigh up to 2,500g/m<sup>2</sup>. Innovative products that are designed



to offer the best possible lightweight performance weigh 1,200g/m<sup>2</sup>, which means they weigh half as much, while continuing to offer very good functionality.

Accordingly, 1,200g/m<sup>2</sup> has hitherto been considered the limit value. The figure of 1,200g/m<sup>2</sup> appeared to be difficult to beat without compromising on durability. So how has it been possible to achieve a weight reduction of 50-70% for Flooro?

The compactness of the pile results in impressive functionality, because despite the fact that less material is used, the product's performance improves in

"The positive effects of lightweight carpeting will continue to be appreciated, not just during fitting, but also during transportation, through reduced logistics costs of delivery, return and disposal. Using less materials also represents an important step toward responsible and sustainable use of resources."

> Gerd Hoffe, managing director, Anker

1. VISITORS TO AIRCRAFT INTERIORS EXPO 2017 IMMERSED THEMSELVES IN THE WORLD OF ANKER FLOORING

terms of durability, cleaning properties and longevity.

This is due to the high density and reduced rolling resistance of Flooro compared with conventional carpets. By its nature, the upright pile on these carpets forms a friction surface, which is subject to many kinds of mechanical wear, depending on the material.

Furthermore, that compactness generates a unique, homogeneous and flat floor surface that gives interior designers completely new alternatives for their work. Thanks to the design, patterns, structures and textures can be produced that are not possible with conventional carpets. Floor design can be even more refined and also perfectly matched with other textile elements in the cabin.

Flooro is also much easier to lay and work with than conventional carpets due to its lower weight. And thanks to the product's compactness, it can be cut in any number of ways while still remaining stable at the edges. A 'channel cut' is not necessary.

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### THE 'DUKE' OF AUSTRIA

Austrian tannery Boxmark has developed its new Duke aviation leather as a stock item available in 55 colors

hose that can help quickly can help twice. This principle forms the basis of operations at Boxmark, the leather specialist from Austria, and was a driver in the company's decision to produce its newly developed Duke leather as a stock item.

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

Furthermore, a service-oriented warehousing system has also enabled a low minimum order quantity of only one skin (approximately 5m<sup>2</sup> (54ft<sup>2</sup>)) per color.

Concerning design, Duke has a fine grain. "In close coordination with the trend scouts of our internal design department, we decided to develop a smooth leather. Moreover, the market confirms this trend. Inquiries about this leather have increased significantly recently," says Schober.

Only European bull hides are used in the production of Duke. The leather is only 0.9-1.3mm thick, which results in a weight below 800g per square meter. In addition, the easy-care finish – a common feature of Boxmark leathers – assures easy cleaning and resistance to soiling.

"In this way maintenance and cleaning expenses, and thus also costs, can be reduced," adds Schober.

Of course, Duke leather also fulfills all the necessary physical testing standards for its use in the aircraft sector – including fire safety. Boxmark's in-house laboratories are equipped with state-of-the-art testing equipment (e.g. headspace, gasphase chromatography, nuclear spectroscopes, etc),



Boxmark

and this capability enables specialists to carry out product analyses. Furthermore, these experts also make vital checks of all the physical leather properties, which are necessary for the practical use of the material. These checks comply with internationally recognized guidelines for technologies and excellence. A strict incoming goods inspection process, combined with continuous and final material testing during manufacturing, ensures the production of superior upholstery in line with specifications. However, Boxmark is not only a leather manufacturer. With 8,200 employees at nine sites globally, the company is also capable of offering the entire value chain, from research and development, to design and leather manufacturing, up to the finished product, "Referring to latest studies (e.g. ICAO), all from a single source. there will be a worldwide demand for With its Production about 40,000 new airplanes through **Organisation Approval** to 2035. The market share of leather

(POA) certificate, the company is also authorized as a certified producer for aeronautics.

PRIVATE AVIATION SECTOR ALSO Due to increased demand for its

products, Boxmark has carried out extensive expansion and modernization over the past few years, and also acquired a number of new technical facilities.

"These include, for example, 3D scanners and state-of-the-art computing systems, which allow for the virtual development of prototypes, as well as CNC-controlled machines, band saws, and milling machines," Schober states.

As a technology leader and based on its existing expertise, Boxmark is able to create foam models, perform foam reconstructions, and add upholstery to existing seat systems and add-on components.

"In our experimental tannery in Feldbach, Austria, we work to continuously and meticulously test and optimize established and new products, such as tanning materials, fats and dyes, with regard to production and chemical processes," Schober says.

For Schober this is the only way to maintain and improve state-of-the-art technologies relating to both the qualitative and ecological requirements of leather products. 🔊

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in the aircraft industry today is about

30%. Due to consistent developments

in durability and maintenance, this

share is expected to expand."

**Christian** Schober,

account manager,

**Boxmark** 



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### POWER TO THE PEOPLE

A range of high-power USB charging ports from True Blue Power enables passengers to enjoy their devices throughout flights

ommercial aircraft passengers are hungry for power. With an increase in the use of wireless inflight entertainment (IFE) systems, personal electronic devices and other electronics, airlines are in need of reliable USB power now more than ever. True Blue Power's USB charging ports are a cutting-edge power source that meets these growing demands, providing uninterrupted power to passengers.

The TA202 Series high-power USB charging ports can power both current and next-generation devices by simultaneously delivering 3A per port. These ports are designed for in-seat, cabin and galley installation. With the ability to select from single and dual, USB Type-A and Type-C configurations, this versatile USB charging port delivers more power to a wider range of electronics.

The self-contained TA102 Series dual USB charging ports are a modern addition to any cabin interior. The ultra-compact unit can charge two USB-compatible devices at the same time, such as tablets, iPads, cellphones and other electronics.





2. THE TA202 ENABLES TWO HIGH-POWERED DEVICES TO BE CHARGED AT THE SAME TIME, DELIVERING 3A PER PORT

The sealed USB chargers offer water-resistant protection against spills and surface cleaning solutions, and they are also designed for in-seat, cabin and galley installation.

All True Blue Power USB charging ports come in small, economical, easy-to-install packages, with lighted and non-lighted versions. Manufactured in an AS9100C certified facility, both the TA102 and TA202 Series USB charging ports are FAA and EASA certified, and they protect passengers' devices against short circuit, power surges and temperature overload.

True Blue Power, a division of Mid-Continent Instrument Co, Inc., specializes in the custom design and manufacture of power solutions for the global aerospace industry. This work includes inverters, converters and USB charging ports found on more than 50 airlines worldwide. Select products feature proprietary Nanophosphate lithium-ion battery technology, which offers stable chemistry, fast charging, consistent output, excellent lifespan and superior cost performance, all of which translates into smaller, lighter products that are less than half the size and weight of existing solutions.

FREE READER INQUIRY SERVICE To request more details from True Blue Power visit www.ukimediaevents.com/info/aim Inverters Converters USB Charging Ports Emergency Power Supplies Lithium-ion Batteries



#### Happy pilots. Happy passengers.

There's an ongoing power struggle on most aircraft today — not enough power for all the electronic devices pilots and passengers bring on board. The solution is True Blue Power<sup>®</sup>. The TA102 and TA202 Series USB Charging Ports power consumer products requiring a USB interface. These next-generation in-seat, cabin and cockpit power sources enable nonstop entertainment and business productivity on the fly.

They're all the power you need in a small, economical, easy-to-install package.





TA202 Series High Power USB Charging Port

Type-A and Type-C configurations Simultaneously provides 3.0 amps per port



TA102 Series Dual USB Charging Port

telephone: +1 316 630 0101 toll free: +1 800 821 1212 email: tbp@mcico.com

truebluepowerusa.com

Simultaneously provides 2.1 amps per port

### VALUE ENGINEERING

Armed with strong engineering capabilities, ST Aerospace is expanding beyond MRO to start making a difference in air travel comfort

ince its beginnings as a military aircraft maintenance service provider, ST Aerospace has steadily grown its engineering competencies to provide products and services that add value to its customers' businesses and operations in both military and commercial aviation.

Being one of few MRO providers in the world with in-house design and engineering capabilities has allowed the company to steadily move up the value chain to provide a wide range of customized solutions not only in MRO, but also in complex programs such as freighter conversions. Increasingly, ST Aerospace is also offering one-stop solutions in cabin interiors, the goal of which is to provide total cabin interior support, from engineering and modification to certification, by bringing together all its various capabilities, thereby strengthening its foothold in aircraft cabin interior product development.

ST Aerospace's newly developed proprietary economy class aircraft seat is evident of such a push in this direction. The company's portfolio of seats currently consists of a short-haul and mid-to-long haul variant, each tailored to the unique requirements of different market segments. Designed by a team of in-house engineers together with joint-venture partner Japan-based Tenryu Holdings, the seat designs are intended to offer comfort and optimum personal space to passengers, while also providing practical solutions to airlines by being one of the lightest in its class.

Thus ST Aerospace has branded its seating products as SPACELite to evoke a sense of comfort that is created through thoughtful ergonomic features – from teardrop-shaped headrests and tapered armrests, to arched seat cushions. Innovative features also include an articulating seat pan, which creates a large shin clearance to provide maximum comfort to passengers.

Despite being a new entrant in the seating market, ST Aerospace is confident

that the synergy of its design and engineering expertise, aircraft modification capabilities, and rich experience in product certification and support will provide a compelling proposition to airlines.

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The company has so far obtained certification milestones such as the Singapore TSO certification from the Civil Aviation Authority of Singapore, AS9100 Quality Management System certification from DNV GL, and Alternative Procedures to Design Organisation Approval from EASA. European Technical Standard Order authorization and Production Organisation Approval is also expected from EASA by the end of year.

Kham Joon Wui, general manager of ST Aerospace Aircraft Seats, states, "Our value proposition is aptly captured by our product name, SPACELite, which, by "We expect the global air travel and aircraft interior market to grow strongly over the mid to long term. Our seating solutions, based on proven technology, will at the same time help to meet growing demand for new materials that minimize aircraft weight while maximizing passenger space and comfort."

Kham Joon Wui, general manager, ST Aerospace Aircraft Seats

> 1. THE DESIGN BEHIND ST AEROSPACE'S PROPRIETARY AIRCRAFT SEATS DELIVERS MAXIMUM COMFORT TO TRAVELERS AND MINIMIZES FUEL COSTS FOR AIRLINES

conjuring up the sense of weightlessness in outer space, emphasizes the fact that our seats are among the lightest in their class. Through the mental association with space travel, we also hope to highlight the amount of engineering effort behind the seat design, which aims at achieving both maximum operational efficiency and maximum user comfort.

"This was, in essence, how we conceptualized and developed the product: by visualizing and catering for the needs of all stakeholders, from the airlines down to the users, and from aircraft operations to maintenance."

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### At Home in the Air

We know how it is to sit for long hours. Feel the difference in our ergonomically contoured seats designed for that pleasant, well-rested flight.

6

### RAPID PROGRESS

Going from showing a seat concept in 2015, to approaching production in 2018, these are exciting times for Rebel.Aero

1. THE CRYSTAL CABIN AWARD-WINNING S:TWO ECONOMY SEAT

2. THE RECENTLY REVEALED S:THREE PREMIUM ECONOMY VERSION

aunched as a concept idea in 2015, Rebel.Aero has advanced rapidly, winning the Crystal Cabin Award for Passenger Comfort and Hardware in 2016. It has been an extremely enlightening and challenging few years for the business.

As parent company United Aerospace has been manufacturing composite seating components for premium class seats for over 13 years, the Rebel.Aero team believed that they had a good understanding of the aircraft seating industry, its conservative nature, and the challenges they faced in terms of industry acceptance and certification.

The entire concept of Rebel.Aero and its overall ethos is very different from any other seat manufacturer, as the company is trying not only to modernize the design of economy seating, but to revolutionize all aspects of the seating industry, from the unique ways in which it markets itself and its functional yet stylish design approach, to its no-nonsense design, manufacturing and supply offering. The latter enjoys rapid lead times due to the already established manufacturing facility of parent company United Aerospace.

One particular feature on the Crystal Cabin award-winning seat design that gained a lot of industry interest was the unique and patented 'flip up' booster seat. This feature was originally advertised as a unique triple feature that could offer passengers a second seating position during a flight to aid comfort and reduce the potential risk of DVT, act as an integral child seat, and allow passengers to stand up in their own space.



The feature's ability to offer passengers additional comfort and to offer airlines a hassle-free option for child seats that added zero additional weight were both initially seen as being the best features of the design. However, the third feature (passengers being able to stand up in their own space) seemed to pass people by, but following discussions with a number of airlines Rebel.Aero now believes that this is the feature that could offer airlines the biggest competitive advantage.

By further developing this feature in accordance with the space-saving seat structure, the team now believes that overall boarding time for airlines could be drastically reduced by allowing passengers to stand in their own footwell during boarding to remove coats, etc, enabling other passengers to move past them into the cabin, reducing aisle congestion.

Rebel.Aero is now deep in the process of developing a new seat that will maximize this unique feature, while concentrating on other airline requests such as light weight, simple maintenance and, of course, very low cost.

There is still an opportunity for an airline to be a part of this unique design "The revolution is coming; finally the aerospace industry is going to catch up with its perceived technological status. Educated consumer demands and new market competition will ensure that the industry will no longer be able to simply rely on today's designs in aerospace."

Gareth Burks, managing director, Rebel.Aero

process to ensure that the new seat will contain all the features that it desires, as well as to be the first airline to fly it. Interest is running high, so get in quick!

Certification of the S:two seat (which won the Crystal Cabin Award) is now nearing completion, and the seat will soon be available for its launch customer, so 2018 is set to be another busy chapter in the life of Rebel.Aero.

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#### ... still asking questions?







Enquiries now being taken

### SEE SENSE

STG Aerospace is leading the way with its innovative cabin lighting system, as CEO Nigel Duncan explains

head of its activities at Aircraft Interiors Expo 2018 in Hamburg, Nigel Duncan, CEO of STG Aerospace, responds to a few questions about the company's activities...

Can you outline the background to your innovations in main cabin lighting? "Our roots lie in photoluminescent floor path lighting, and we've been innovating continually across all of our cabin lighting product lines with, for example, our exclusive PatternMatch service and the introduction of saf-Tglo blu.

"We also moved into emergency signage with our saf-Tsign range and we've been looking for ways to use photoluminescence for non-emergency applications such as enhancing an airline's brand identity.

"In addition, of course, we've been developing a whole new range of LED lights and lighting products. But we've tended to look at the two areas – powered lighting and non-powered lighting – as independent categories just to create some product clarity and also because the two areas have very different technical requirements and specifications.

"Now, however, we feel the time is right to bring it all together and show the totality of what we offer in the main aircraft cabin. We've talked about it before, but we now have a more targeted approach and a strategy around that. And that's the background to our new offer."

#### What are the advantages of this offer for your airline customers?

"With the breadth and depth of our lighting offer, we can now offer a total aircraft cabin lighting package which we can deliver more cost-effectively at the same time as creating greater synergy between our individual products.

"If we can take control of the floor path lighting, the signage and the LED lighting, we can optimize that system for better performance, which of course leads to improved operational efficiency, saving customers further money in the process.



"It's a holistic approach that enables us to make sure that all the individual lighting elements work together. For example, our liTeMood LED reading light not only defines an individual passenger's space: when we have control over all aspects of cabin lighting, it can be integrated with all other lighting elements to help create an optimal ambience.

"Airlines can experience how the LED reading light works in context with the liTeMood sidewall and overhead lighting, and collectively how it charges the photoluminescent floor path lighting.

#### How do airlines pass this to passengers?

"Passengers have been underserved with traditional lighting, making the flying experience underwhelming. Advances in technology, mixed with our design philosophy of simplicity and quality, afford a range of retrofittable powered and nonpowered products that create ambience, enhance safety, elevate brand personality and promote sense of control and privacy in confined spaces.

Does this total lighting approach give you a distinctive position in the marketplace? "I think it elevates us to the point of being a serious contender as a lighting systems 1. SAF-TGLO BLU IS THE NEWEST PRODUCT TO BE INTRODUCED BY NIGEL DUNCAN (PICTURED BELOW)

"Guests will step onto the airplane seamlessly connected with their environment in terms of communications, entertainment and

personal control of their experience; delivered

proactively by airlines with the same level of service and ambience that differentiates successful businesses on the ground."

company rather than just a product company, albeit a highly innovative one. In that respect, our approach will give us a distinctive position.

"STG Aerospace is not only offering a full range of photoluminescent floor path lighting and signage as well as LED lighting, we are also offering a total, integrated, cabin lighting system. There are few, if any other, companies that can deliver that.

"Critical to our ability to make such an offer is our commitment to investing heavily in research. As a company, we are steeped in lighting and we understand the effects – physical and psychological – that lighting can have on people, particularly

in an enclosed environment like an aircraft cabin. This understanding defines and distinguishes us.

"We continue to see a growing interest in our innovative approach across the globe, especially in Asia and the Americas, where we have recently won a number of new customers. 🔊

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10-12 April 2018, Hamburg, Germany Visit us on booth #6E100

# Innovators in cabin lighting solutions

We offer a full range of powered and non-powered retrofit lighting systems; creating ambience, ensuring safety, elevating your brand and promoting a sense of passenger control and privacy.



saf-tglo° saf-tsign° liteMood°



# STELLAR SUCCESS

From new product development, to production and delivery, to new contracts, STELIA Aerospace is enjoying a successful 2017

t has to be said, 2017 has been an exciting year for premium seating manufacturer STELIA Aerospace, and there's more to come before the 2018 Aircraft Interiors Expo in Hamburg. With three new products being launched this year, as well as welcoming eight new customers to the STELIA Aerospace fold, the company's teams are working hard to ensure continued success and satisfaction for customers.

The Celeste business class recliner seat for single-aisle aircraft entered service this summer with two airlines: Avianca (from Colombia) and Air Côte d'Ivoire (from the Ivory Coast). The Celeste seat offers a unique swinging recline motion, which offers exceptional comfort for shortand medium-haul flights. STELIA Aerospace is delighted to welcome Visit STELIA these two new customers on Aerospace at Aircraft board, both of whom have Interiors Expo 2018, already benefitted from the company's industrial Stand 7A30 excellence, receiving on-time deliveries. Industrial performance and reliability are integral parts of the company's values. STELIA Aerospace has enjoyed a 100% on-time delivery rate to Airbus and Boeing assembly lines, as well as direct to customers, since 2009.

This year also sees the first deliveries of a new seat, designed exclusively for an Asian airline, to the B787-10 assembly line. While the seat won't be flying until 2018, STELIA Aerospace will be ensuring a smooth integration process for both the OEM and the airline in the run-up to the aircraft's delivery and entry into service. A seat for the airline's A350s is not far behind, and the company is extremely proud to have been selected for these two



programs. More information will be revealed soon. The latest versions of STELIA Aerospace's best-selling seat, the Solstys III, and its high-

efficiency business class seat, the Equinox, have also both had a successful entry into service with the A350 this year. While both seat models are available as part of the Airbus and Boeing catalogs, STELIA Aerospace is also working on highly customized versions for customers, fulfilling the company's *raison d'être* of providing '*luxe à la Française*' to airlines around the world, both big and small. The company is also working to customize its innovative and efficient Opal seat to meet the expectations of its first customers.

Thierry Kanengieser, VP of cabin interiors at STELIA Aerospace, is enjoying a busy year. "We are very conscious of the trust our customers, no matter what their size, show us, and we are pleased to again be demonstrating our 100% on-time delivery record across the 16 'heads of versions' and close to 100 shipsets we are delivering this year. A big focus for us has been to bring additional innovation to our "Your seat will be a space where you will recreate your home sofa or your office desk. Virtual and augmented reality spaces help you feel at home but cannot fully replace a need for space, privacy and seat comfort. A more connected world and the Internet of Things will mean that your seat knows your habits and creates a seamless environment from home to hotel and back again."

> Thierry Kanengieser, cabin interiors VP, STELIA Aerospace

1. THE ULTIMATE 17 SUITE

2. THE CELESTE SEAT IS NOW FLYING

portfolio, and we have made big strides. The results will be shown at Aircraft Interiors Expo 2018... watch this space!"

Among the innovations already offerable are the Octaspring cushion, which won a Crystal Cabin Award 2017. "This cushion technology has captured the interest of a number of our customers and we're looking forward to seeing this project come to fruition with a launch customer in the coming months," adds Kanengieser.

All in all, 2017 has been a busy year, with new products entering service and preparation by the research and innovation teams for the next generation of premium class seats. Stelia Aerospace invites you to come and visit its booth at Aircraft Interiors Expo 2018 in Hamburg to discover its vision of the future and how it is planning to realize that vision through the development of its portfolio and with the support of its many loyal customers.

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# ANOTHER SUCCESSFUL YEAR!

Opal<sup>®</sup>welcomes its first customer



Celeste<sup>®</sup> first deliveries: thank you to Air Côte d'Ivoire and Avianca for your confidence



www.stelia-aerospace.com

Contact: marketing@stelia-aerospace.com

### SOLAR SYSTEM

Lantal's Pneumatic Comfort System was a valuable contribution to the successful flight of Solar Impulse 2 around the world

П

n the beginning, it was a vision: building a solar airplane capable of flying around the world. After 12 years of R&D, that vision became a reality. To help the two Swiss pilots Bertrand Piccard and André Borschberg during their flight, Lantal installed its revolutionary Pneumatic Comfort System (PCS) and created specially designed and optimized seat cushions for the Solar Impulse 2 (Si2) aircraft.

Lantal was an official supplier and comfort expert for the project, during which Si2 was airborne for 558 hours and flew an aggregate distance of 43,041km (26,744 miles). The solar airplane succeeded in circumnavigating the globe, breaking 13 world records on the way, and proving that clean technologies can achieve the impossible.

To help make this achievement possible, Si2 demanded that only the lightest, most reliable and – for the cockpit – most comfortable components available be used. In response to these stringent requirements, Lantal developed a pneumatic seat cushion tailored to the needs of the project. The air-filled cushions - which replace the foam in ordinary aircraft seats - not only reduced the aircraft's weight, but also offered the pilots the greatest degree of comfort throughout the strenuous, long-duration flights. Thanks to the adaptable firmness of the cushions, Lantal's innovation assured total comfort in the sitting, relaxation, and resting positions, allowing the pilots to devote their attention to completing their mission.

Comfort was maintained even during the longest leg, across the Pacific Ocean from Japan to Hawaii, which lasted five days and nights. For pilot André Borschberg, who flew this record-breaking eighth leg, it was a real test of endurance, being confined alone in a cramped cockpit with a single seat and no standing room. Lantar-integratero ow been integratero in more than 10,000 in more

Borschberg was full of praise for Lantal's comfort system: "I could never have imagined to stay in such a good shape over such a long time – five days and five nights feeling at ease and comfortable. That was our goal together with Lantal, and we made it."

On arrival at the final destination of Abu Dhabi, marking the completion of a flight around the world without using a single drop of fuel, Piccard said of the

"Si2 served as the ultimate laboratory, giving Lantal the opportunity to test the innovative PCS under extreme conditions and hence improve its product for civil aviation."

Thomas Steiner, vice president, Pneumatic Comfort System, Lantal Textiles AG



PCS: "Lantal developed a lightweight, durable solution that served our specific and challenging needs. As with many of the technologies in Si2, their innovation is now being used commercially to help make lighter, more efficient aircraft."

Even before this prestigious project, Lantal's PCS was becoming increasingly popular in commercial aviation. The PCS helps to boost passenger comfort while reducing fuel costs due to its low overall weight. More than 15 international airlines have opted for the PCS, and it is now integrated in over 10,000 first class and business class seats. For Si2, Lantal used the same materials and parts installed in PCS applications aboard regular commercial aircraft. @

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2. THE CRAMPED CONDITIONS WERE MADE TOLERABLE BY LANTAL'S PCS

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REVILLARD

ALL PHOTOS: SOLAR IMPULSE



Lantal's latest-generation hybrid carpets combine the best properties of wool and polyamide.

# New generation of hybrid carpets

The hybrid carpets have been optimized with regard to wear and weight. Thus, they deliver numerous benefits. The new construction not only prevents linting and unwanted brightening but also assures a longer service life compared to standard wool carpets. The advantages: extended maintenance cycles and lower cost.

Lantal Textiles, Inc. Switzerland, USA, France, Singapore, Abu Dhabi www.lantal.com

### SKIN DEEP

Andrew Muirhead considers environmental sustainability at every stage of production to create high-quality and environmentally friendly aviation leathers

1. MUIRHEAD LEATHERS PROVIDE AN ATTRACTIVE, HARD-WEARING AND ENVIRONMENTALLY RESPONSIBLE OPTION

2. MUIRHEAD'S GB£1.3M (US\$1.75M) ULTRA-FILTRATION PLANT

ith a considerable increase in the number of alternative aviation seating material options available, and with manufacturers and traders variously claiming their product is the lightest, best-performing and most eco-friendly, the question comes to mind among all the noise: which really is the most sustainable? Traditional leather or man-made alternatives?

To establish the facts, one has to look more than skin deep. Indeed, it is the whole supply chain that requires scrutiny.

In order to be called leather, the raw material must come from an animal. Anything else cannot legally be called leather. In the case of seating leather, that typically means from cattle. Cattle are reared for meat or dairy products and not for any other purpose. It is a fact, therefore, that leather is a by-product of the food industry and is only sustainable so long as people consume meat and milk. If that hide was not converted into leather and went to landfill, it would have a bigger negative impact on the environment. It is a generally accepted fact that good meat comes from cattle that have benefitted from a high standard of animal welfare. Quality meat usually means a quality hide whose source is transparent and traceable.

Next, one has to look at raw material sourcing. Where do the hides come from? Shipping raw and partially processed hides all around the word increases the carbon footprint and is therefore not sustainable. The leather manufacturing process itself has to be considered, which includes the environmental integrity of the whole supply chain.



Scotland-based Muirhead Leather, part of the award-winning Scottish Leather Group, the UK's largest manufacturer of leather, whose environmental credentials are of the highest standard available anywhere, has based its future on the truly sustainable manufacturing process.

Muirhead hides are typically sourced from within 300 miles of the factory, working with abattoirs and meat plants who practice some of the highest animal welfare standards in the world. Muirhead subscribes to the 'five freedoms' principles drawn up by the Animal Welfare Council. The manufacturing process starts with the unprocessed hide, right through to finished leather so the entire manufacturing process is under Muirhead's control.

Data analysis following an EU Benchmark shows that Muirhead uses half the amount of water of any other leather manufactured in Europe in its production process. Over 50% of the water used in the Scottish Leather Group is recycled through its ultra-filtration plant. The group has reduced its carbon footprint by 60%.

Waste from the manufacturing process has the natural skin grease removed and is then sold to produce biodiesel, while "Muirhead is constantly looking for ways to further reduce its carbon footprint and thereby increase sustainability. Development is ongoing into reducing weight. Alternative methods of chemical processing are constantly being trialled and adopted. Development of leathers that look and feel more natural, but retain the highest level of durability required by the aviation industry, is ongoing."

> Archie Browning, sales director, Muirhead Leather

the solid waste is processed through a £6m (US\$8.1m), groundbreaking, patentprotected thermal energy plant developed by the company to convert solid waste into energy for use in the manufacturing process. It is the only plant of its type in the leather-producing industry.

The company looks upon its waste products as a resource and is continually developing products from them, all of which assists the true sustainability of its products and processes.

Muirhead is also making a huge investment in developing its people. The Scottish Leather Group Academy is now on its third cohort of leather production apprentices, most of whom stay within the business and develop into other roles. The company sees developing talent as another key element in sustainability.  $\otimes$ 

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### LIGHT FANTASTIC

Cabin lighting is evolving and advancing, bringing new benefits for the passenger experience, and for installation and maintenance

he aircraft interiors lighting market is an innovative sector that is always looking for new developments and technologies, not only to improve the customer experience, but also to facilitate easier installation and maintenance.

Cabin lighting design has evolved dramatically over the past 10 years. Lighting is used to help airlines create their own atmosphere, define different cabin zones, promote branding, and generally create a more comfortable environment for their customers.

An excellent way to see how the LED lighting technology has progressed is to look at the development of the reading light. The reading light used to be purely a light to read by; while this is still the primary function of the light, it is no longer the sole purpose.

The light is now required to produce the correct level of output, color and temperature, to fit seamlessly with the seat design, and to produce an attractive light – and these are just some of the requirements of the end user. For aircraft designers and fitters, the light needs to be low energy, lightweight and compact, and customizable to fit the interior design.

Beadlight specializes in the design and manufacture of high-quality reading lights, and it has been at the forefront of the LED market since 1997 supplying the first LED reading light to be fitted on a commercial aircraft.

Using lighting to create an atmospheric and personal zone within an area helps enable a space to be used more effectively. The development of LEDs has helped with such work: for example, a reading light has a defined 'light cone' that can be used as a task light that can be controlled within an area. Such defined use of LEDs has almost completely removed unwanted light pollution in the cabin.

Beadlight Aerospace works with customers to ensure the correct light intensity and cone is produced for their





"Developments in lighting have enabled a transformation of the passenger experience in ways that would not have even been considered 20 years ago. The level of innovation in the market is exciting and is not ready to slow down. Beadlight is constantly pushing the boundaries and developing new products and technologies to stay at the forefront of cabin lighting."

> Gina Amies, director Beadlight

applications. This is done by applying different mechanical and optical techniques to ensure the optimum result.

The use of ambient lighting is becoming increasing popular in first and business class to create a more comfortable, homely and relaxed feel. Beadlight has designed ambient lights with up to six switching levels to allow the user or the onboard staff to set the required level.

While creating the optimum lighting for the end user is the most important



In 1997, Beadlight designed the first ever LED reading light for a commercial airliner (Virgin Atlantic)



1. THE MONO CS MODEL WITH A MOUNTING DEPTH OF 11.5MM

2. THE TWO-DIMPLE SIROCCO MODEL

3. THE STELLAR LIGHT FOR SEAT SHELLS OR MONUMENTS

4. THE SINGLE-DIMPLE ZEPHYR

factor when designing such lights, it is also important that the lights can be installed efficiently. Beadlight works with interior designers to ensure that its lights can be easily integrated into seat designs, offering innovative front and rear fix options.

A factor that is considered in the design of every cabin light is the use of space, as aircraft cabin space has to be maximized as far as possible. LEDs have enabled lights to be manufactured smaller and smaller. Beadlight has worked to reduce the depth of its reading light units in order to enable customers to fit them into composite panels, which in turn enables them to save space in panel depths which can be utilized in other areas. For example, the Mono CS model launched this year has a mounting depth of just 11.5mm.

When considering lighting design, it is important for clients to assess their lighting requirements early in the design process. This way they can take advance of the latest technologies and developments to create a truly first class environment. @

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#### mono cs



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MADE IN BRITAIN

WE DESIGN, ENGINEER AND MANUFACTURE THE ULTIMATE AEROSPACE READING LIGHTS.



### THERMAL COMFORT

The next level of luxury for premium travelers will be the ability to tailor their personal in-seat microclimate

he first and business class travel experience has improved vastly over the past decade. Advances in cabin design, seat design and connectivity have greatly improved the level of comfort for travelers, but to compete for premium passengers, the premier airlines must also provide the kind of immersive luxury experience to which these travelers have become accustomed in their daily lives. Increasingly this luxury is found in the passengers' ability to customize their environment and, while premium class accommodations offer many choices, missing from this set of luxury amenities is the ability to personalize the thermal environment.

Inspiration can be found by looking at luxury automobiles and how they cater to the well-being and comfort of passengers. The average first and business class passenger travels to and from the airport in an automobile that offers in-vehicle wi-fi, a luxurious interior, high-fidelity entertainment and thermal comfort choices, resulting in a personal microclimate, centered on their climatecontrolled seat.

On board the aircraft most of these same amenities remain – with the exception of thermal comfort. In their automobiles, passengers are able to personalize their thermal environment through adjustment of seat and surface heaters, active seat cooling and multizone climate control systems. The personalization ensures that, regardless of outdoor temperature or other occupants' preferences, luxury automobile passengers can control their individual microclimate to match their current need and optimize their travel experience.

This same luxury, if applied to aircraft seating, can increase relaxation, productivity and sleep continuity, which are all luxury experiences that premium passengers have come to expect. But this innovation, so ubiquitous in luxury automobiles, has not been made available to aircraft interiors – until now.

Gentherm, a leader in automotive thermal comfort systems, and a pioneer

1. THROUGH SEAT AND SURFACE HEATING AND COOLING, PASSENGERS CAN CREATE THEIR OWN MICROCLIMATE



#### THIS INNOVATION HAS NOT BEEN MADE AVAILABLE TO AIRCRAFT INTERIORS – UNTIL NOW"

in microclimate solutions, is shifting the paradigm for premium passenger comfort by making personally controlled thermal comfort on board aircraft a reality. Providing this comfort requires the ability to individually control and deliver energy and airflow on demand to targeted surfaces for each passenger – something current aircraft environmental control systems are unable to deliver. The seat surface, which is the largest single contact area for a given passenger, makes it the ideal anchor for efficient thermal comfort and a personalized microclimate.

With 40 years of thermal comfort experience in the luxury automotive industry, and millions of systems sold worldwide, Gentherm's solutions have proved to be consistently high performing, safe and reliable. The company's solidstate thermoelectric heat pumps, Everything from the seat cushions to the hard seat surfaces can be adjusted

proprietary air distribution systems and other heating technologies, offer an array of solutions that enable the seat OEM and airline to optimize system performance based on specific power, weight and reliability requirements.

Gentherm understands that each passenger has unique thermal comfort requirements and its engineers can solve the most complex thermal management problems. Gentherm systems provide customers with uniquely tailored thermal technology that creates a personalized thermal comfort environment and enhances the prestige and value of the air travel passenger experience.  $\otimes$ 

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### LIVING COLORS

Eternal beauty can be achieved. Schott Aviation has developed an LED cabin lighting management system for lifelong performance stability

1-4. THE INTEGRATED DESIGN OF HELIOJET SPECTRUM ENABLES EASY PLUG-AND-PLAY CAPABILITES. THE CONTROL PROTOCOL GIVES MORE FLEXIBILITY WITH DISCRETE AND R5485 SIGNALS. THE MINIMAL WIRING ALSO SAVES WEIGHT

he human eye is very sensitive to color differences and can distinguish one million color impressions. Brightness, homogeneity and color fidelity define the quality of light, and the quality of light substantially triggers overall human perception and well-being. No wonder airlines are increasingly aiming to tailor lighting in aircraft cabins to create a well-balanced flight experience.

In recent years LED lighting systems have replaced fluorescent tubes in most cabin refurbishment and line-fit projects. LEDs are known for their many advantages, including low costs, high reliability and the ability to integrate mood colors for ambient cabin lighting scenarios.

Operators have had positive experiences with LED technology, but there are some problems. LEDs change their color and light intensity over time. For example, blue LEDs lose 5% of their brightness when heated from 20°C (68°F) to 80°C (176°F), and red LEDs will lose 40% of their intensity at that temperature, resulting in clearly recognizable drifts from the original color tone.

In addition, the age of an LED (the number of operational hours) plays a significant part in the quality of its output. LEDs that have been in use for years will look different from new LEDs, something that airlines are learning as their LED cabin lighting systems get older.

So what should you do when you find that the colors in your thoughtfully designed cabin have been morphing?

According to Klaus Portmanns, director of business development at Schott Aviation, "One cannot avoid the physical reactions of LEDs to operating hours, heat influence and other parameters. But we can manage these processes so that the entire cabin remains lit in the original defined color shades over the entire operational lifetime of the LEDs. It does not matter if the LEDs have been on board for years or days."





HelioJet technology enables such lifelong stability in performance. Sensors integrated into the lighting fixtures constantly measure and control each LED according to defined reference parameters. As a result, all LEDs will always perform in harmony with the reference values.

HelioJet SpectrumCC works with fewer LEDs than conventional systems, as they

nd "Advanced LED technology – including smart enablers such as fiber-optic light guides – will account for the lion's share of the lighting market. OLED and projection features might also play a role. In any case, high-guality

Klaus Portmanns, director of business development, Schott Aviation

lighting solutions will prevail in the long run."





feed light into an optical light converter, in which the light is mixed and then evenly distributed around the cabin.

"If a single LED malfunctions there will be no "dead spot" as with conventional LED strips. And the lower number of LEDs in the Schott system enables sensor management. It is a completely different approach," explains Portmanns.

"From an investment perspective, compared with a conventional RGBW LED strip system, savings are around €150,000 [US\$180,000] over a six-year operational period. Because of the sensor regulation we exchange significantly fewer LED units, which means less downtime and fewer spare parts.

"The calculation is conservative and does not include derived factors such as passenger impressions or brand image. What impression would passengers have of an airline's safety if its aircraft lighting is visibly out of tone?" adds Portmanns.

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### FOAM INNOVATION

A range of foams that can enhance an aircraft cabin's appearance, safety and comfort has been developed by General Plastics

n 1941, General Plastics opened its doors with an acrylic coating for car and floor finishes. Since then it has been developing and producing innovative plastics and foams, and has built particular capabilities in aerospace.

The company produces highly engineered polyurethane foams, tailored to the needs of its customer markets. A range of rigid and flexible polyurethane foam materials is sold under the brand name Last-A-Foam. All Last-A-Foam products are renowned for their strength, stability, durability and uniformity. Beyond that, each product formulation has unique physical properties designed to achieve the specification requirements outlined by customers.

Last-A-Foam FR-3800 FST is the first halogen-free polyurethane-based foam that satisfies fire safety requirements for aircraft interior applications. This includes FST requirements, OSU 65/65 heat-release standards, and the European **REACH standard. Designed** for the aerospace industry in response to lightweighting concerns, cost pressures and stringent fire safety standards, it is used as a core material to replace PVC foam and honeycomb in non-structural panels. The product is lightweight, it can be thermoformed into simple curves, and it bonds well with composite skins. When used with other composite materials, it can help create an aesthetically pleasing cabin, while maintaining fire safety standards. Applications include core material for cabin class dividers, door panels, seatbacks, first class seat pods and tray tables, and edge closeouts.

Other products that are extensively used in the cabin and flight deck belong to the Last-A-Foam WSF flexible foam series. These self-extinguishing foams are flame-retardant, durable and are molded to customer specifications, including color and texture. There are two variants: WSF-

"Building on what we've already achieved, we look forward to providing more high-value solutions in the area of non-metallic materials and composite fabrications. Going beyond urethane foam, we are looking at other engineered materials that will satisfy the evolving needs of our customers."

Mitch Johnson, president & CEO, General Plastics

1010, which is soft and pliable, making it ideal for use in filling gaps, and WSF-1121, which is more durable and stiff.

These seals are essential for accomplishing a high-end look in a cabin, while also meeting the requirements of regulatory agencies. The FAA and the US Food and Drug Administration require all gaps to be eliminated in order to prevent passengers from tucking anything into them that could affect safety or sanitation. The flexible foam gap seal satisfies this requirement, and it also helps give the cabin a 'finished' look. This gap management foam can be installed in between overhead bins, between the In December 2016, the company celebrated its 75<sup>th</sup> anniversary

> 1. WSF-1121 FLEXIBLE FOAM IS IDEAL FOR CLOSING UP ANY GAPS IN FIRST CLASS SEAT PODS, TO CREATE A HIGH-QUALITY FINISH

ceiling and monuments, between the ceiling and sidewalls, as well as in certain galley and lavatory areas.

The tougher WSF-1121 flexible foam is currently used in flight deck padded parts applications, which not only improves the look of the flight deck, but also reduces noise from vibration and enhances pilot safety. It is not uncommon to see this material used in armrest pad applications in the main cabin, and for sealing gaps between and around seats.

As both of these foam systems are self-skinning foams (or integral skin foams), there is no need to wrap or cover the foam part with another material for protection when it comes out of the tool.

These parts are manufactured in the desired texture, color, shape or any other configuration specified by the customer. These flexible foam-based parts give designers and engineers the freedom to design molded parts with complex contours to give the aircraft interior a warmer, more pleasing atmosphere.

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### Super times

LET'S FINISH WITH SOME RECOLLECTIONS OF THE PAST TWO DECADES AND PREDICTIONS FOR THE FUTURE FROM ONE OF THE BEST-KNOWN EXPERTS IN THE INTERIORS INDUSTRY: **JENNIFER COUTTS CLAY** 

During the past 20 years cabin designers have emerged as the new heroes and heroines of the civil aviation sector. Their work has had to comply with the most stringent aviation standards; and every day their cabins are in service, they are analyzed in minute detail and publicly critiqued by millions of passengers.

Just consider the recent challenges. At the end of the 1990s, major airlines invested fortunes in upgrades: entire first class cabins were reconfigured to accommodate fully flat beds. During the 2000s, the trickle-down product upgrade process resulted in dramatic reconfigurations of business class cabins. These levels of luxury were unparalleled in the history of scheduled air travel.

After the economic crisis of 2008, witnessing radical changes in consumer and corporate travel trends, designers focused on premium economy. On a number of airlines the visual treatments for these cabins recall the look of Concorde interiors, regarded as the epitome of elegance in the heyday of supersonic flight.

In economy class, many airlines are now offering larger overhead stowage bins, improved air quality, bigger windows, refreshing mood lighting, contoured seat foams, endless IFE content options, plus wi-fi connectivity. In real terms, ticket prices have declined significantly over the past two decades, but passengers might not realize that governments frequently add punitive airport departure taxes.

When oil prices spiralled to all-time record highs, designers were told to reduce the weight of cabin fixtures. In addition to achieving measurable savings in jet fuel, this move was made to please the growing green environmental lobby by demonstrating significant reductions in carbon emissions and landfill waste. Cabin specialists developed production programs focusing on advanced materials, methods and manufacturing processes.

From the turn of the millennium, the leading 150 airlines have seen enormous worldwide traffic expansion: in 2016, passenger boarding figures were close to 3.5bn, with load factors surging to around 80%, and in some cases, above 90%!

Cabin designers have to repeatedly recalibrate durability and maintainability metrics; and all their design elements – tested both individually and jointly – have to meet international safety requirements relating to flammability, smoke, toxicity and heat release. So what do the next 20 years hold? Customer surveys worldwide indicate that airline passengers are longing for more personalization, humanization, interesting experiences and warmth of welcome.

Cabin specialists have started to explore creative new concepts: virtual reality displays for information and entertainment, automatic reporting of items requiring management or maintenance attention, smart robots to deliver meals, and zoned clusters for personal wellbeing (such as childcare or exercise areas).

During the upcoming cutthroat battles to capture the maturing millennial market, social media platforms will offer opportunities for airlines to run lifestyle and loyalty programs designed to inculcate the allure of air travel.

On the operational front, can we envision the effects of the projected rise of low-cost longhaul airlines (Ryanair already carries over 100 million passengers annually on short-haul European routes and there was talk of 'stand up' seats)? And what about flying cars for airport transfers? And how about affordable secondgeneration supersonic aircraft services?

Cabin designers are ready for all these challenges. So, watch this space....

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