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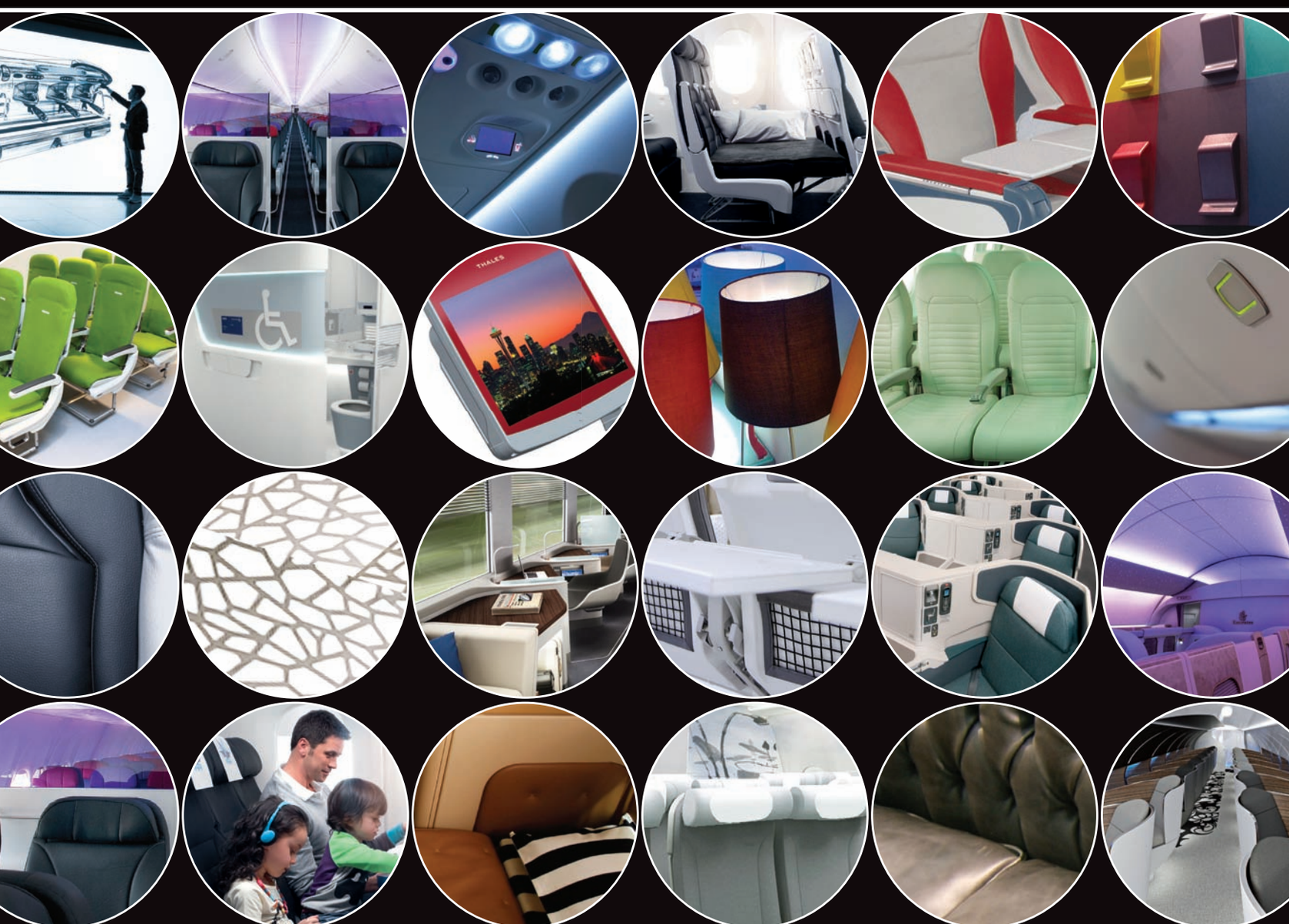

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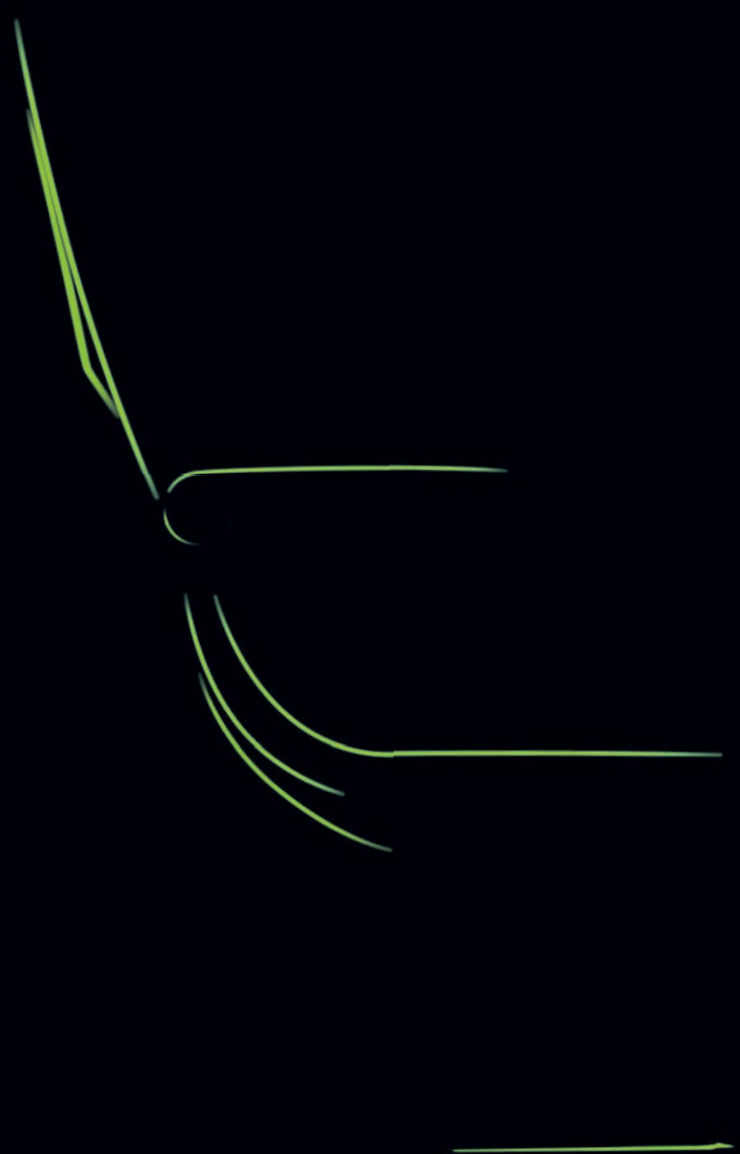

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supplyanddemand

2012 is poised to be another monumental year for aviation – demand for air travel continues to grow, despite the ongoing economic turbulence. In response, airframers continue to pump up production and refine their product catalogue, offering ever more efficient and flexible aircraft to airlines keen to increase their profitability and the span of their networks.

As our feature on page 10 notes, both Boeing and Airbus currently predict demand for over 30,000 new aircraft by 2030. The majority of these will be single-aisle short-range aircraft – a sector ripe for competition, with regional jet manufacturers in particular keen to exploit the desire for growth that is a trademark of the low-cost carriers that have revolutionised the industry in recent years.

For a glimpse of what to expect in terms of future cabin interiors for the short-haul segment, turn to page 74 to read about Zeo's (C&D Zodiac's design studio) plans for Bombardier's new CSeries, which despite its smaller fuselage, boasts overhead bins that can carry more baggage than today's single-aisle competition. This was accomplished by an optimisation exercise that sought to integrate previously separate cabin systems such as electrical, lighting, environmental control and oxygen. The result? More bin space for passengers, increased head and aisle room, and a 50-70% reduction in components for Bombardier to install.

Clearly the frenzied demand for aircraft implies intense pressure on those charged with designing and delivering their interiors. Hence new technologies, materials and approaches will be required to ensure supply keeps up with demand. The question on everyone's mind is how to continue providing interiors with passenger-pleasing features and brand-defining USPs that can help an airline really stand out from the crowd, while also ensuring fast and efficient production? The airframers favour a 'catalogue' approach where carriers pick and choose between supplier furnished equipment – however many airlines remain unconvinced.

Ultimately it all comes down to good design and sound manufacturing. Hence we hope you will find this year's Annual Showcase of immense value – profiling as it does the very latest in design thinking and supplier innovation. We also take a look at certification – a huge consideration for any interior project – on page 24; and the latest trends in IFE hardware architecture on page 30.

So the stage is set – 2012 promises more growth, challenges and opportunities than ever before – buckle up and enjoy the ride!

Anthony James, editor

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features

There is a need to be more intelligent about understanding our customers' needs at different times and different stages of their journey

PETER COOKE, DESIGN LEAD, BRITISH AIRWAYS, PAGE 22

design showcase

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numbersgame

Continuing growth in passenger numbers means more than 30,000 new airliners will be needed in the next 20 years, according to airframer predictions – can the interiors supply base keep up?

BERNARD FITZSIMONS, AIRCRAFT INTERIORS INTERNATIONAL

Despite the occasional setback, world passenger traffic continues to grow. By 2030, according to the latest estimates from Boeing and Airbus, the number of revenue passenger kilometres (RPK) flown by the world's airlines is likely to increase by more than 150%.

The Airbus Global Market Forecast looks at aircraft with 100 or more seats. It predicts that the number of revenue passenger kilometres, having doubled twice since 1980, will double again in the next 15 years to reach 10 trillion in 2025 and carry on growing to more than 12 trillion by 2030. That dizzying RPK growth translates into a lot of new passenger aircraft – 31,920 of them according to Airbus, 32,530 by Boeing's reckoning. And if those numbers sound improbable, Boeing points out that 23% of its predicted future deliveries are already in the manufacturers' order books.

However, the rivals differ on the details. Supporting that growth, Airbus reckons, will require 26,920 new aircraft with 100 or more seats, or an average of more than 1,400 each year. That total breaks down into 19,170 single-aisle, 4,790 small twin-aisle, 2,120 intermediate twin-aisle and

1,780 very large aircraft. On top of that Airbus says there will be a need for around 5,000 regional jets and turboprops.

Boeing's Commercial Market Outlook suggests that 23,370 of the new deliveries will be single-aisle aircraft, 18,980 of them with 90-175 seats and 4,390 with more than 175. Another 7,180 will be twin-aisle models, made up of 3,020 small (180-260 seats in three-class configuration, such as the 787 and A350-800), 3,590 medium (260-370 seats, exemplified by the 777 and A350-900) and 590 large (the 400-plus category currently represented by the 747-8 and A380). The balance of 1,980 will be regional jets with fewer than 90 seats.

UNPRECEDENTED DEMAND Despite the disagreement over details, the two totals are fairly close, and whatever the precise numbers they spell unprecedented demand for seats, galleys, lavatories, baggage bins and cabin liners, not to mention lights, carpets and all the other elements that make up the modern aircraft interior. And both manufacturers agree that the highest growth will occur in the Asia Pacific region, where the total fleet is predicted to treble from 4,410 in 2010 to 13,480 in 2030 in Boeing's analysis.

That sounds like good news for cabin suppliers: "Of course, we are very pleased to see that happening," agrees Diehl Aerosystems' CEO, Rainer von Borstel. Much of Diehl's business is in the Supplier Furnished Equipment (SFE) market, and most of that for Airbus, so Diehl benefits directly from any ramp-up, something that is not necessarily the case in the Buyer Furnished Equipment (BFE) market.

"Only with our latest acquisition, Mühlenberg, have we stepped into the BFE market," von Borstel says. "We have acquired Mühlenberg because we think there is not enough galley capacity out there to serve that ramp-up, but it is only a small part of our business. But with SFE interiors of course we benefit directly from the steep ramp-up, which is needed to cope with the aircraft sales."

The first step in coping with the ramp-up is accurate capacity planning in production and engineering, he says. "But all the associated investments have been authorised and put in place already, so we feel quite well prepared. We are not short of any material, we are not short of people." Beyond

01

ramping up

Airframers are already ramping up production rates in response to unprecedented demand. Airbus delivered 509 aircraft in 2010, but that figure is set to grow substantially. Production of A320s increased from a monthly rate of 36 to 38 in August 2011 and is planned to reach 40 in the first quarter of 2012 and 42 by the fourth quarter.

The A330 rate is due to grow from 8.5 in 2011 to nine early in 2012 and 10 in the second quarter of the year. And deliveries of the nearly 600 A350s on order are due to start in late 2013.

Boeing, whose 2010 deliveries of 462 commercial aircraft consisted of 373 737s, 12 767s and 74 777s, is implementing an overall 40% increase in production. The 737 monthly build rate increased from 31.5 to 35 in October 2011 and is due to rise further to 38 in the first quarter of 2013 and 42 in the first half of 2014. The 777 monthly rate has increased from five in 2010 to 7 this year and should reach 8.3 in the first quarter of 2013.

Only 36 747-8Is had been ordered by October 2011, nine of them for private operators. But with the 787 backlog standing at nearly 800, Boeing is aiming for a monthly build rate of 10 by the end of 2013. So by 2014 the annual delivery rate should be well over 700 aircraft.

Deliveries of ATR's turboprops, their sales bolstered by the success of the new 600 series with its Giugiaro-designed Armonia interior, are also due to increase, from around 53 this year to 72 next year, 80 in 2013 and 85 in 2014.

the numbers already approved for the various programmes, however, "there may be even more and therefore we are still preparing ourselves for an even steeper ramp-up".

Caution, too is required, von Borstel says: "As everybody knows – and this has happened in the past already – there could be cause to slow down the ramp-up or flatten it, so we need a certain flexibility as well in our ramp-up planning in order to be able to slow down the acceleration of production."

As a consequence of increasing production rates, he says, "I see a much bigger focus on efficiency of production, which is coming from the design. We have to put more focus on how we can better design cabins in order to make production more efficient. We have to be so fast, we have to be so flexible, and therefore we have to facilitate our production." For the time being, consequently, "I am not so focused on future features that may be requested by airlines, I am more focused on efficient production, which is based on good engineering."

The keys to that efficiency are standardisation and modularisation. "And of course by introducing standardisation and modularisation, we would like to come up with weight improvements as well, which are of great benefit to all customers." Another goal is to reduce

02

03

04

installation times at the OEMs by techniques such as plug-in solutions and pre-assembly of packages.

Aside from the SFE market, where the OEMs are the customers, Diehl also serves the retrofit market where it has direct access to airline customers: "There we have a slightly different picture, we can offer new solutions, new technical features directly to the airlines," explains von Borstel. "This is a big market potential for us, we have quite an exhaustive portfolio and of course we like to market it directly."

For new aircraft, though, Boeing and Airbus have moved already to limit what the airlines can specify for their 787s and A350s. Increasing the proportion of SFE is the right way to go, he considers, though the airlines prefer BFE. "But how far it goes I cannot predict."

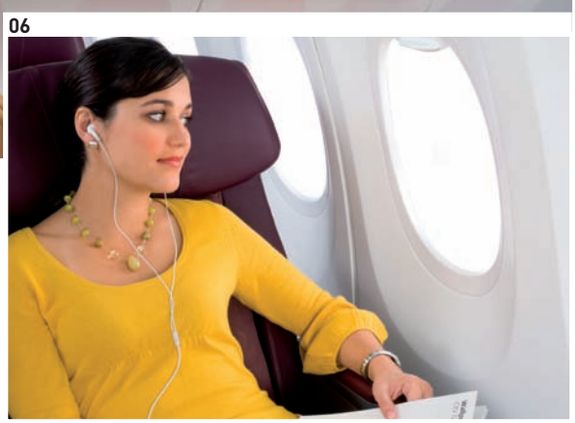
Whatever happens, he expects the fundamental relationship among OEMs, airlines and suppliers to endure: "For me it's a given thing, the architect of the cabin is always the OEM because they have the direct interface to the customer, particularly when they are designing or developing new aircraft. Of course we make proposals for new cabin designs but the relationship is built in a way that they are the architects of the aircraft and particularly of the cabin. This is true today and I don't see big changes."

However, one change is happening: "We have taken over a sort of end-to-end responsibility," he says. "We are involved in the research and technology phase now, which we did only partly in the past, we are to a certain extent architect and integrator as well because we are working with risk-sharing partners. We are also in the retrofit market, so we have a certain end-to-end responsibility. But the real architect of the cabin is the OEM and this will not change."

Diehl also has to be prepared for the sort of downturn that has occurred in the past, von Borstel adds. "First we have to do accurate planning and production and engineering. We are

01. 787 Dreamliner interior – Boeing predicts a need for over 3,000 'small' twin-aisle aircraft (such as the 787 and A350-800) by 2030
02. Ceiling detail from the 787
03. A350XWB seat detail
04. Airbus foresees demand for nearly 5,000 small twin-aisle aircraft such as the A350-800 by 2030

05



06

05. The 737 Boeing Sky Interior's enhanced baggage storage – Boeing sees a need for over 20,000 single-aisle aircraft by 2030

06. The larger windows of the Boeing Sky Interior were inspired by the 787

involved in head of version of engineering as well, which means customisation of the aircraft, so we have to do capacity planning and engineering and production. We have done that based on the figures we have received from the OEMs. We have recruited people, we have launched investment and production. Not everything is there, because it's not due to be there yet, but it's under way, so for the time being I don't have to worry about the production ramp-up."

FLEXIBILITY AND SIMPLICITY C&D Zodiac uses the Boeing and Airbus projections in most of its forecasting. Customer and product EVP Scott Savian says keeping up with the predicted demand will mean continuing to expand capacity and capability. But more important aspects to address include simple cabin flexibility and improved materials with simplified processes.

"Design is a critical aspect in our growth plans," he says. "We can either continue building parts as we do now and effectively double our operations in order to double our output, or we can continue to introduce simpler, cleaner designs that improve efficiency in production and customisation." So which is it? "We have a substantial, dedicated team pursuing design simplification at this time."

Whether the strong growth of the Asia Pacific market dictates any change in cabin design philosophy remains to be seen: "We've worked with a number of airlines on premium cabin offerings and are starting to get a feel for some differences, but we'll reserve judgement right now."

As for the airframers' evolving relationship with customer airlines and cabin suppliers, Savian maintains that the airlines will always want an aircraft suited to their particular mission: "They will always be striving for a competitive advantage, whatever they perceive that to be. Our job in the industry is to provide the necessary customisation in the simplest manner possible."

The best way to accomplish that, he believes, is through integrated packages such as those C&D supplies on the regional aircraft and two new entries into the narrowbody market: "The ability to eliminate BFE and provide an integrated cabin all from one source is very powerful. In this way an optimised cabin, not components, is developed, with customisation as a key factor, maybe the key factor in how the cabin architecture is developed. As we move up in aircraft size, the range of products offered from a sole source certainly has to be expanded – this is a key driver of Zodiac Cabin Interiors strategy of having several galley and seat manufacturers within the group, for instance."

FUTURE IMPERFECT The one certain thing about the future is that it is unpredictable. Past air transport crises have been caused by anything from war to bird flu. But there are equally unpredictable threats to the supply chain.

Production of A320 components at the Tunisian factory of EADS subsidiary Aerolia was disrupted by the December 2010 revolution in the country, while production by IHI of turbine blades for the A380's Trent 900 engine was interrupted by the March 2011 earthquakes and tsunami in Japan. More recently, Airbus CEO Tom Enders has warned that the banks' reluctance to lend in the current economic climate is hampering the ability of smaller suppliers to invest in increased production. Airbus would like to increase production of the A320 beyond even the 42 per month currently planned. But if it is to do that, the entire supply chain – including those companies responsible for interiors – has to be able to match the higher rate. ☒

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truebrit

Peter Cooke, design lead at British Airways, explains why design should matter to leading airlines – and advises on how to get the best from agencies and suppliers

Q&A

> DELIVERING GOOD DESIGN GIVES OUR CUSTOMERS A SENSE THAT WE CARE ABOUT THEM

WHY DOES DESIGN MATTER TO BRITISH AIRWAYS?

We feel that design is about getting things right for our customers. It's about understanding their needs and acting on them. Delivering good design gives our customers a sense that we care about them. It's not about decoration or styling, instead design is about solving a problem or answering a customer need. So whether that's for the business or for the customer or whether that's for both, if we use design effectively to solve complex commercial problems we'll be a successful airline going forward. This ties in with the wider business world where corporations that really understand design are usually very successful companies.

HOW IS THAT REFLECTED AT BOARD LEVEL?

We have a number of stakeholders within each new product programme that we work with and each of those stakeholders will go to a certain level, and everything is signed off at board level. Frank van der Post, our MD of brands and customer experience (under whom design sits) is a director here at BA reporting straight into the CEO.

HOW MUCH SHOULD AIRLINES BE LOOKING TO INVEST IN DESIGN?

I can't talk about other airlines, but clearly British Airways believes in investing in design. We've just introduced a new first class, which is now on 42 out of 76 of our long-haul aircraft. We were also the first airline to deliver full-flat beds in business class – investing in design is something we've always believed in as we see a clear need for it, so we continue to innovate while focusing on what we're doing rather than what everyone else is. Take the new First cabin, which cost over £100 million to develop and introduce during one of the toughest periods the airline industry has every faced. However, we realised we needed to do it now because our customers won't wait – they know what they want and what they need. And as you come out of recession you have to have your product there for people to choose – and you've got to offer the very best when it comes to the front of your aircraft.

WHAT ARE THE SECRETS OF TRULY EFFECTIVE DESIGN MANAGEMENT?

The most important thing is right at the beginning isn't it? It's about understanding the problem. It is really making sure that you get things right in the beginning, which involves collating all the information, ensuring that you know you've got all the right stakeholders involved that they can input into a really clearly effective brief. That's the most important thing – to understand

the problem and be able to articulate that in a clear brief. Then it's about making sure that you've got the right team of people involved. That includes the internal team and the external team. We're a design management team here at British Airways – we don't actually design in house. So we're only as good as the team of external people that you're able to employ and that's where our skills lie – in making sure that we're working with the right people and being committed to delivering the best solution that you can.

It's also ensuring all the creative ideas have been explored, and taking care not to narrow down or dismiss any possibilities too early in the process. You need to really stretch the boundaries. You also need the unique ability to instinctively know when an idea is right and when an idea is worth pursuing. Having a background in design can be helpful here. It's all about understanding when it's better to revolutionise or basically is it just an evolutionary thing? If something is working and if something is right, then don't try to change it, only innovate if it's necessary.

Finally it's about understanding how to deliver the concept that everyone has bought into in the best way – implementation, in other words. You need to see the whole project through so you don't just show a nice model or visual of what you want, you actually see that project through right to delivery, making sure that all the details and the qualities are correct right until the very day it gets put on board the aircraft or in a lounge or on the ground.

HOW DO YOU GO ABOUT SELECTING A DESIGN AGENCY?

There's no hard and fast rule – we'll pick any agency that we think is right for the job. It doesn't matter where they come from – they could be yacht designers or from anywhere within the world of design. We'll sometimes stick with agencies that we've worked with for a long period of time, because we know they are good in specific areas. Some jobs require different skills and if those skill sets cannot be found within one agency, we'll pair up two different agencies. Ultimately we don't like to restrict ourselves – so long as the agencies we work with are committed to delivering the best that they can and passionate about the British Airways brand.

WHAT ARE YOUR THOUGHTS ON THE EXISTING SUPPLY BASE?

The amount of choice certainly narrows down quite a bit after coming up with the concept as to who can then actually manufacture it! But that's down to the constraints of what you can put on an aircraft. It's not like designing furniture for your home – we understand those constraints and we know products that go on an aircraft have to go through stringent tests. We accept that and hopefully we've worked successfully with the suppliers that are out there.

HOW DO YOU GET THE BEST FROM SUPPLIERS?

You have to understand the constraints and you have to be patient, but you also have to be tenacious when you think something is right and really push the boundaries. The thing with the supply chain in the airline industry is they tend not to innovate themselves because the investment pot they would need to go out and innovate would be huge. They'll wait for the airline industry to come to them and say 'we want to do one of these'. So it's about the airlines moving the parameters forward.

01. Seat detail from British Airways' new First cabin – note the attention to detail in the stitching
02. A lamp and individual 'blinds' provide a personalised, domestic feel
03. The latest ergonomic research helped inform the design

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HOW DO YOU ENSURE BRAND AND DESIGN CONSISTENCY ACROSS SUCH A LARGE FLEET?

That is a difficult one – we have so many aircraft types and we have so many initiatives going on it can be quite difficult to ensure brand consistency. We've done a lot of work recently in this respect with the new aircraft that we've ordered, where there are more constraints regarding the materials and finishes that you can use because these aircraft are more commoditised in terms of their interiors. So for the first time we've started to look at our interiors from nose to tail. We've done a lot of work consolidating the numbers of materials that we use and the qualities of those materials and how durable and how maintainable they are. This has helped us build a much more holistic brand vision, which is important because it's about the customer having a premium experience no matter what cabin or sub-brand they're travelling in.

HOW IMPORTANT IS PASSENGER RESEARCH?

It's essential – understanding what the customer wants is the key to any successful design. It's so easy to go off track and lose direction in a design process where you end up with something that's quite nice but actually doesn't solve a particular problem or a customer need. We don't benchmark competitors either – we don't go out there and say 'they've got a big TV screen, we need a bigger one' – we design what we feel is right for our customers. Understanding our passengers' needs is what keeps us ahead of the competition, rather than chasing after the competition. That's why research is important to us, but sometimes, you've got to be a bit more proactive and design something for the customer before they know they even want it and that's about being innovative.

However, we'll always look to do functionality research – making sure that things are working properly and are in the right place. We've done sleep trials, with people sleeping on mock-ups of our beds and we do physical mock-up checks all the way through the design process. So wherever we can we'll bring the customer in and do some qualitative research on every aspect of the product under development.

We also do consumer research on comfort – British Airways has spent a lot of time and effort understanding ergonomics, so when we design a seat, we put a huge amount of effort in designing that seat to be comfortable. I think we do more than most other airlines in that area and we've got a huge amount of work that we can look back on.

WHAT ARE SOME OF THE KEY TRENDS YOU SEE FOR THE FUTURE?

Technology – the latest consumer electronic devices are going to affect our entertainment products on board as more and more of our customers become increasingly tech-savvy. We're also going to have to start thinking much more seriously about the environment, and the impact that our products have on the planet. Not just from a fuel burn standpoint, but by also designing products that are more durable and cleanable, so that they don't have to be rotated quite so often. Personalisation will also be important – the ability to have a two-way conversation with our customers is going to be key. With the advent of smart phones, we have a great opportunity to keep passengers informed and up to date, as well as the ability to understand our customers more clearly. Flexibility is another important trend.

There is a need to be more intelligent about understanding our customers' needs at different times and different stages of their journey and being flexible enough to meet those needs.

WHAT SKILLS DO YOU NEED TO BE A GOOD DESIGNER IN THE AIRLINE BUSINESS?

Patience. Design in the airline business moves a lot slower. It takes a lot longer to get things on board an aircraft from start to finish. You also need to be pretty tenacious. If you think you've got a good idea then you need to really try to see that through. There are a lot of barriers on the way but you have to just work through them. You also have to understand the limitations. It can be very frustrating but we're not the car industry and we're not the consumer goods industry, where design is more central. There are a lot of other factors that come in to play, so you need to understand that it's about playing a part in a team. You can't be a prima donna and stamp your feet and say 'I want this!' because there are other factors to consider.

WHAT DO YOU LOOK FOR IN NEW RECRUITS?

Design management is a different animal to design in a way – it's almost a skill in itself. It's understanding when to step back – you don't go in there with a pencil and start sketching, instead you manage the process of design. You bring the right people to the table and you articulate it. So candidates need communication skills, organisation skills – because a lot of it is about administration – making sure things are being done at the right time in the right place. Creativity and being able to instinctively understand what's right are also important.

WHAT ARE THE CHALLENGES AHEAD FOR AIRLINE DESIGN TEAMS?

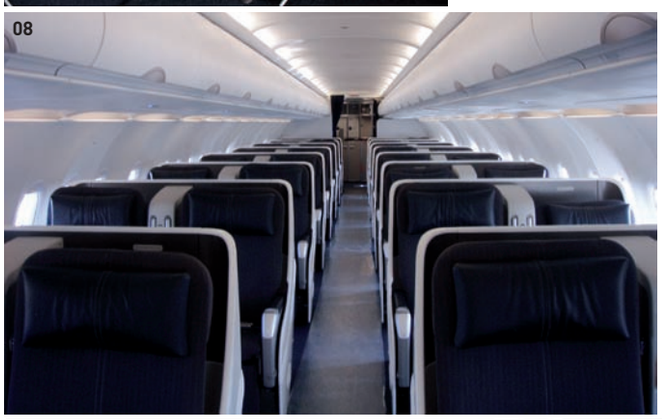
The increasing 'commoditisation' of the aircraft interior on next-generation aircraft – where the aircraft manufacturers want to create factory lines of aircraft where they don't want you to be too different because they want to keep everything rolling. I think that's going to be difficult – we almost have a catalogue of products that we get to choose from – how do we get a real brand presence in there and how do we differentiate?

Safety standards are also getting more stringent, which is further restricting the number of materials that you can use on board. But I think without doubt the biggest challenge is going to be the rising cost of fuel – every item on board an aircraft will be considered from a weight standpoint. Personally I think this will be positive and will lead to some great developments. I think you'll start to see some really interesting partnerships happening within design and with R&D, similar to how Formula 1 technology leads the way for car technology. Anything that happens in Formula 1 usually ends up on a road car in about five years time and I think R&D and development for aircraft will go the same way. We'll spend a lot of time developing new materials and products to save weight on an aircraft. One of the big challenges will be how to design the right products with the least impact on the environment.

WHAT NEXT?

We've got our new A380s and 787s coming – first deliveries start in 2013. I can't say anything yet about what's on board – you'll just have to wait, I'm afraid! ☒


07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07. British Airways's unique all-business-class cabin offering on its London City to New York (JFK) route, operated by two A318s
08. Each A318 cabin features just 32 seats
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closecall

Certification is a crucial stage in any aircraft interior project – as Air New Zealand recently discovered when developing its new Skycouch and Spaceseat products

SELWYN PARKER, AIRCRAFT INTERIORS INTERNATIONAL

It was the sort of phone call that experts in aviation certification have come to expect: "We need approval urgently," an Air New Zealand executive from Auckland told Nigel Smith, managing director of Bristol, UK-based SWS Certification. "It's about Skycouch – can you come down at once?"

Within a few days Smith was in Auckland to see the situation at first-hand. The date was November 2010 and the airline was about to take delivery of the first of an order of Boeing 777-300ERs with highly innovative seating – the Spaceseat and Skycouch – intended to help boost sales for the long-haul carrier in a highly competitive market.

Indeed the airline did have a problem. The FAA had decided they were not able to issue certification approval for Skycouch – the row of three economy-class seats specifically engineered to provide a lie-flat, flexible space – within the current regulations. That meant the seats, which had been conceived by Air New Zealand and manufactured by Recaro, could now only be used in the normal sit-down configuration instead of as planned. The FAA had ruled that the leg rests, crucial in creating the 'couch', could not be extended above 60°.

Eager to bring the concept to market, the airline had to find an alternative way to allow operation of the Skycouch in commercial service. The first aircraft was due for delivery soon and the certification had to be complete before Air New Zealand began operating the first three 777s in four months' time.

NO GUARANTEES

Smith is a veteran of certification battles. SWS, whose clients include Virgin Atlantic, Reynard, BE Aerospace, STG Aerospace and AgustaWestland among others, advises on the approvals process for cabin interiors including seating, galleys and inserts, avionics and their installation, electrical systems and structures. And as he explains, companies all too often view the certification of new products, whether seats or anything else, as a semi-automatic process.

"The certification process generally gets involved in the design programme far too late," he says. "Typically, it works like this. The senior management gives their approval to a nice-looking design concept often involving physical mock-ups. Next, the company gets into the engineering and goes

> CERTIFICATION MUST BE CONCURRENT WITH ENGINEERING... IF IT ISN'T, YOU'LL GET INTO TROUBLE

02. With its leg rests fully extended, the Skycouch provides plenty of room for couples to stretch out
03. Skycouch arm rests stow fully flat to aid comfort and access

looking for manufacturers. And that's when things tend to run into trouble. Certification and approvals should be embedded in the entire process from the very start."

The product itself is often only part of the process. "The process has to take into account the proposed installation, type and location of operation, and the regulators involved among other matters," he adds.

POWERS OF PERSUASION Some aviation manufacturers already know this. When STG Aerospace was designing its award-winning wireless emergency primary power system (WEPPS) – a "fit for life" product that manages the system in the event of a breakdown – it involved SWS from the outset and the relationship helped gain certification for many types of aircraft. For Ben Brown, STG Aerospace's director of operations and quality, this is only common sense.

"Certification must be concurrent with engineering," he says. "If it isn't, you'll get into trouble. When you embark on the development of a product, the certification requirements will be the key drivers in determining the design assurance level that must be met. It will fundamentally affect the architecture of your product – and that's not something you simply tweak once the product is designed. You then need to add your own requirements for robustness. Authorities are concerned only with a product's safety, not with how good it is."

SCREEN TEST Generally, it's the most interesting and innovative products that attract the most attention from regulators. When a major carrier came up with a first-class cabin featuring electrically operated sliding doors, it ran into a last-minute, highly technical debate about whether these were to be classified as 'doors' or 'screens'. Among other issues, the certification process had to resolve whether the doors would open in the event of a technical failure or risk injuring the occupant during normal operation.

There's a better and ultimately more efficient way and that's to view certification as an integral element of the creative process and not as an innovation-destroying burden. "We can't allow innovation to be stifled by certification issues," argues Smith.

And because it's one of the key points of differentiation, seating often attracts the most attention. "The more innovative the seat, the greater the certification challenge,"


02

risk rewarded

The Skycouch is a row of three economy seats with a leg rest extension that folds up to create a lie-flat space all the way to the seatback in front. The product is available on Air New Zealand's new 777-300ERs, flying between Auckland, Los Angeles and London. It's specifically aimed at couples in search of some extra room, and parents travelling with children. Meanwhile, the premium-economy Spaceseat features a hardback shell so a passenger in front cannot recline into the personal space of the person behind, with recline created by a base that slides forward and angles up. The centre seats angle outwards from each other for privacy, or can be combined so couples can snuggle up or dine at a common table, while window seats are angled to offer privacy for individual passengers.

"The majority of our long-haul flights are overnight and we fly on average 90 minutes longer than any other airline," explains Kerry Reeves, manager for aircraft programmes at Air New Zealand. "That's why we set out to overcome the seemingly impossible challenge of finding a way for people to lie down in economy without compromising affordability. Few airlines have invested time and money beyond first class, whereas we have focused on the areas where most of our passengers sit, by reinventing every aspect of our economy and premium-economy customer experience."

The airline's efforts haven't gone unnoticed – the Skycouch won the Crystal Cabin Award for Passenger Comfort, and 'best furniture design' from *Design Week* magazine. Meanwhile, the Spaceseat has also won its fair share of gongs, including a Wallpaper design award and a Red Dot 2011 product design award. But it's not just about prizes – more than 30 airlines have been in contact with Air New Zealand regarding the new seats and formal negotiations are under way with carriers from Asia, North America and Europe to license the seats following an 18-month period of exclusivity for Air New Zealand.

declares Smith. He had worked with Air New Zealand for two years on the concept phase of the award-winning Spaceseat in premium economy, drawing up the critical path for evaluation, certification and approval, and providing a running stream of expert advice on issues as they predictably arose with such a radically different and exciting product design. In all, SWS provided some 2,000 opinions, informal or otherwise, during the conversion of Spaceseat from concept to reality.

At first sight Skycouch did not appear to present anything like the challenges of Spaceseat. The difference however was that Skycouch was being marketed as a purpose-designed, multi-occupancy three-seat berth and recreational area. It was the first time an airline had done so, certainly in economy, and that was the nub of the problem. How to approach and evaluate it?

In the case of Skycouch, the main issue was occupant safety and the potential for injury during turbulence. If individuals – adults or children – are lying prone side by side, that required the attachment of the seatbelt to the seat in front. Seating regulations are mainly concerned with the risks involved during taxi, take-off, landing and inflight


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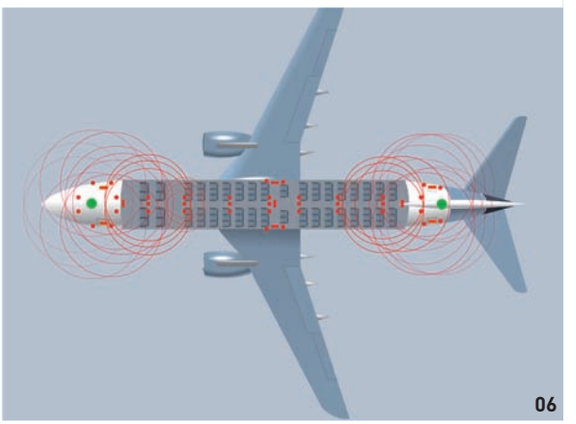

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04. Air New Zealand's award-winning Spaceseat
05. STG Aerospace's WEPPS diagnostic panel
06. WEPPS is a new-generation power system for emergency lighting, featuring a built-in wireless monitoring system

turbulence – it's all about passengers not suffering serious injury during an emergency landing.

With flammability, structural and other issues signed off, it all came down to the issue of occupancy injury because of turbulence. At that point, Air New Zealand decided it would probably not be able to win approval on its own in the required timescale. "It was felt that the assistance of SWS to provide a level of independent assessment and approval would give the regulator [New Zealand's CAA] further comfort that all aspects had been reviewed," explains Kerry Reeves, the airline's manager for aircraft programmes.

With Smith working alternately from New Zealand and Britain, Air New Zealand and SWS evaluated the entire turbulence-related flight data records for its existing 777 fleet, plus FAA and EASA research among a mountain of other material.

Wichita State University, a world authority on aviation, also stepped into the breach with analytical, finite element modelling on a wide variety of issues – the interrelationship between Skycouch and the seat in front, the effectiveness of forward-attached seatbelts, the risk of head and chest injuries for adults, children and infants of various sizes. One by one, tough pass or fail criteria were drawn up – and met. "Wichita was brilliant and extremely supportive," enthuses Smith.

Meanwhile in Europe, Recaro carried out extra static testing while Amsafe ran its specially designed seatbelts through more rigorous tests and qualification.

Finally, Smith returned to New Zealand in March 2011 armed with two boxes of files, DVDs of tests and supporting certification data, and a couple of briefcases. In March, the authority gave its approval after demanding considerable degrees of proof and testing.

Was it worth it? Reeves certainly thinks so, pointing to a welcome boost to the airline's profits: "Skycouch provides us with a significant improvement in yield because this space/seat is often unsold or under-utilised," he explains.

As challenging as the process was, the certification for Skycouch may have produced long-term benefits for the industry as a whole. There is now a vast reservoir of data that should pave the way for new kinds of passenger-friendly seating that will make the flying experience more congenial. And Wichita's dynamic model tests, backed up by a body of hard data, were able to meet the developed criteria at a much reduced cost and time. Physical testing would have required a significant amount of expensive hardware.

Smith's experience has convinced him that the entire certification process runs more smoothly when related issues and experts are involved early in the concept and design phase. The more innovative the product or application, the greater the need for early consideration of certification challenges. "The Skycouch project showed how important it was for all the parties to work together," he concludes. "This way final certification and airworthiness approval becomes a known rather than high-risk process. It also gives customers a more realistic version of their initial concept." ☒

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  Part 19 (supply)

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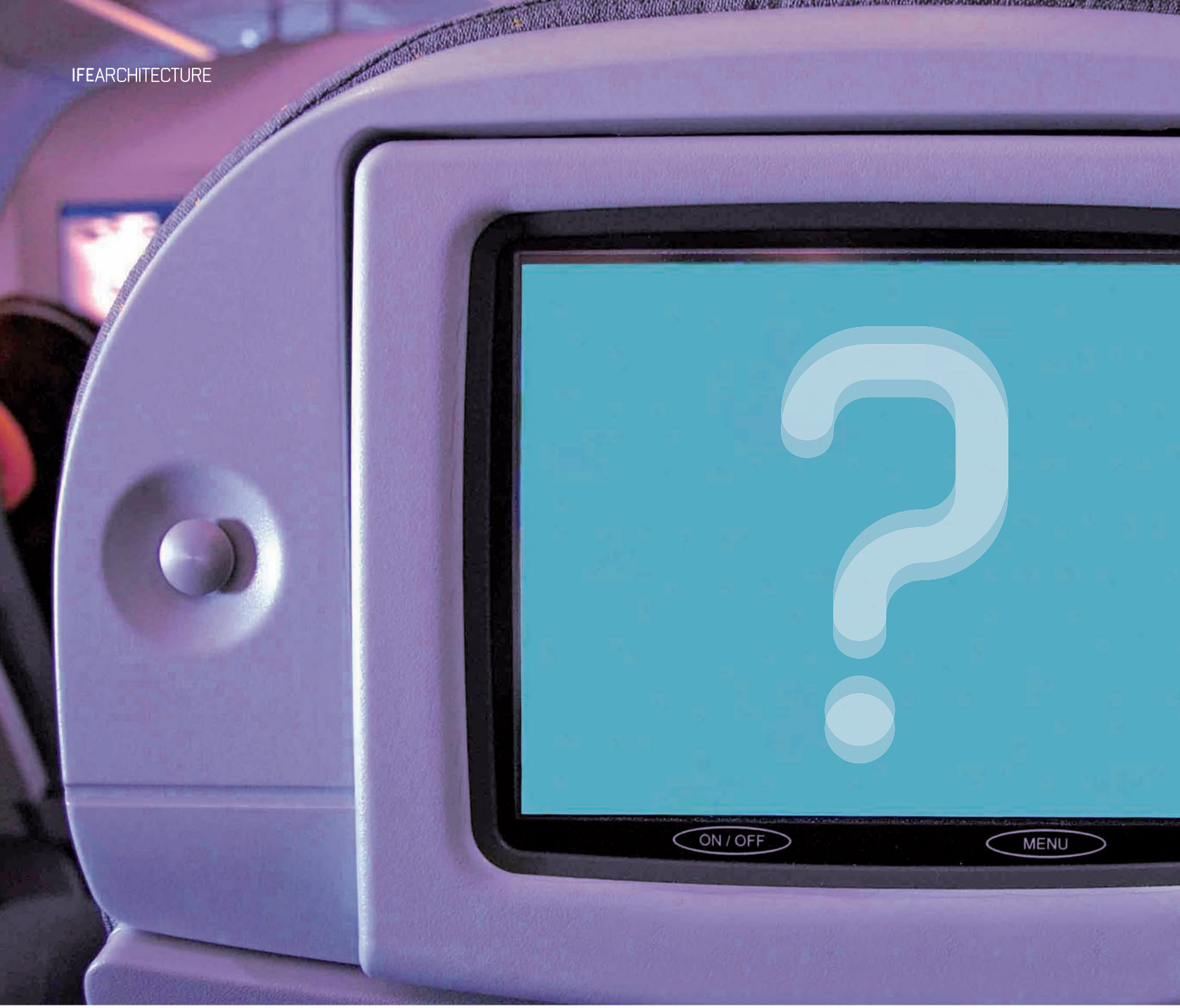


lessismore?

Robert Smith of IMDC provides some much needed clarity on the future for IFE hardware design and architecture

New technologies and economic pressure are changing the architecture of IFE hardware, even to the point of changing the delivery interface with the passenger from an embedded screen to their own device. IMDC's Inflight Technologies Market Outlook Report 2012 looks at AVOD IFE hardware in terms of three main types of architecture: server-centric, seat-centric and wireless IFE to passenger devices. All deliver an individual experience, but do so in a significantly different way that impacts on the passenger experience in terms of functionality and recovery scenarios.

SERVER-CENTRIC Server-centric architecture can be thought of as the 'traditional' way of delivering AVOD IFE to every seat, through a personal screen. There is a danger, though, in assuming that the alternatives represent the next step in IFE evolution, that this will leave server-centric systems outdated and outperformed in every way. We will discuss the relative advantages and disadvantages later.

Original photo:Vacclar/Shutterstock Images

> ONE OF THE MOST RECENT ADVANCES IN SEAT-CENTRIC IFE SYSTEMS IS THE LEVEL OF INTEGRATION IN TO THE SEAT

In a server-centric IFE system, each screen plays a relatively passive role. In the most extreme cases the screen can be used purely to broadcast the signal received from the server while a handset or Passenger Control Unit (PCU) provides the interface between passenger and the system.

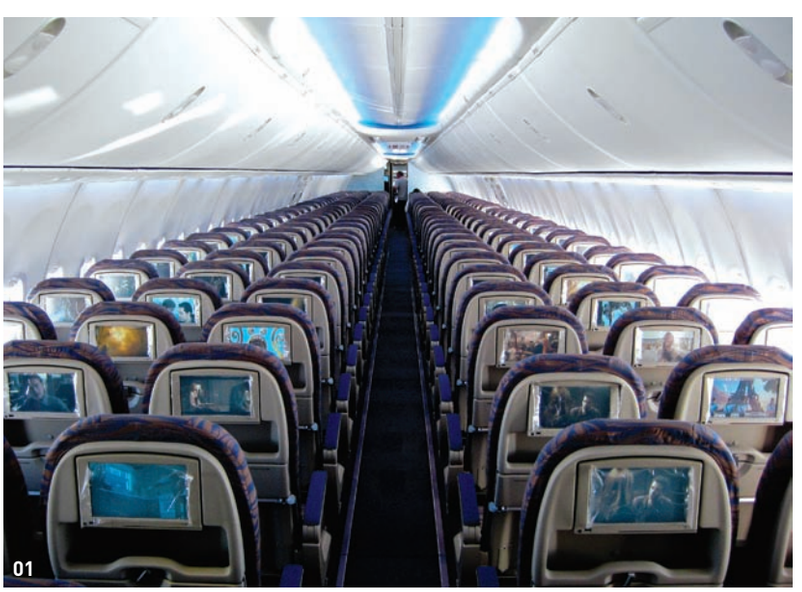
Over time, IFE hardware providers have offered the choice of integrating more functionality in to the display unit – there has been an observable trend for more functionality to be migrated in to the seat in front of the passenger, rather than in their own seat. Brightness, volume, the entire PCU, power, input jacks, card readers and even headphone sockets are now more likely to be found in the seat in front of the passenger.

The system connections and wiring are simplified and reduced as a result of moving functionality in to the same seat as the screen unit. It follows that weight, wiring costs and hardware failures can be expected to similarly decrease, all things being equal. To further integration in to the seat back, the passenger can control the system via a touchscreen system rather than PCU. Eliminating the need for a handset removes one of the largest and most exposed components of an AVOD IFE system.

One of the most recent advances in seat-centric IFE systems is the level of integration in to the seat. By working in partnership with seat suppliers, IFE providers can extend the trend of moving functionality in to the seat in front and fully integrate the screen in to the seat, making for a lighter and significantly more attractive design. At this point, it is appropriate to point out that an IFE system integrated in to the seat does not have to be seat centric, and it is in fact server-centric IFE systems that have so far made the most progress in seat integration.

A key element in improving the reliability of server-centric IFE systems is the inclusion of redundancy in to the architecture design. In simple terms, such systems are designed with the objective that the failure of any one component has a minimal, or zero impact. Duplicate servers and bi-directional wiring loops are typical techniques for introducing redundancy and along with improved reliability of components have increased system reliability to the point where 100% availability is a reasonable target for airlines operating modern systems.

SEAT-CENTRIC As the description suggests, in a seat-centric IFE architecture the functions of an IFE server are migrated in to the seat, with content storage and processing added to the functionality of the seat-back unit. With such architecture, no communication beyond the seat is required



01

01. Lumexis's FTTS IFE system, installed here on a Flydubai Boeing 737, is server centric but can also provide local storage at the monitor

02

02. The IMS Company's RAVE seat-centric IFE system – each seatback display unit (SDU) contains all of the content, applications and playback functionality to provide the passenger with audio and video on demand

when a passenger interacts with the IFE system. By its nature there is a duplication of both storage and processing in comparison to server-centric IFE systems.

Despite this duplication, seat-centric systems often cite a lower pricing as one advantage over server-centric systems. In some ways this is a valid claim. These newer systems do compare well on a hardware cost per seat basis against some of the older server-centric systems flying today. Such an advantage is founded on falling component prices due to advances in consumer technology. In assessing the true costs differential though, it is important to ensure that comparisons are being made with the latest server-centric systems, where a new generation of low-cost systems from established and new suppliers have been developed. It is also important to consider any possible differences in functionality, and the total cost of ownership as apposed to hardware cost only.

A key element of a seat-centric system is the simplicity of the architecture design. In operation, the only possible failure point is at each seat, which operates independently of the rest of the system. In such a scenario, the possibility of a 'dark flight' with no functioning IFE, or of entire seat rows or seat blocks failing seems less likely with a seat-centric system. It is important, though, to recognise that each seat unit still requires power to be delivered to each seat, if not content, so the system remains theoretically vulnerable to some failures beyond the seat, if not as many potential failure points as a server-centric system.

Some seat-centric system suppliers describe their system as not requiring or including a server at all. Ultimately, all seat-centric systems do include a component or combination of components that perform the role of a server in that it receives content when it is loaded on to the aircraft and then distributes it to the seat units. The key difference is that the content is loaded and stored at each seat, not broadcast on demand.

The content loading process for seat-centric systems is an important consideration for airlines and an area where seat-centric systems differ between suppliers, especially with some of the newest providers in the sector. As with server-centric IFE, content is loaded on to the aircraft while it is on the ground and there is a variety of methods to perform this upload. The difference is that for seat-centric systems, this content must then be loaded in to each seat before it is available to passengers.

A key difference between seat-centric systems in terms of their architecture is whether content is transferred to the seat units over wired or wireless networks. As this content is not being streamed to each seat, but loaded in the background, the network bandwidth requirements are not as demanding as in a server-centric system and wireless networks are more feasible. Using wireless networks to distribute IFE to each seat is a new concept, which could be considered to be better suited to a seat-centric network where content is only loaded in the background.

WIRELESS IFE A very recent development in the IFE hardware sector has been the emergence of wireless IFE solutions. The definition is important here. As described above, wireless technologies are at least theoretically capable

of providing the network architecture for a seat-centric and possibly even a server-centric IFE system, where screens are installed at each seat in both cases. In this section we examine wireless IFE architecture that utilises passengers' own devices to display content, and where no screens are installed on the aircraft.

In such a system, content is stored on an onboard server and streamed to passengers' devices over a wireless network. By leveraging passenger devices and employing a wireless distribution system, there is naturally a great reduction in installed hardware requirements for these wireless IFE systems. The minimal hardware requirements are a key driver of the early interest shown in these systems. Clearly the cost and weight of such a system can be expected to be drastically below both seat-centric and server-centric systems that include a screen at each seat.

By introducing such a significant reduction in hardware costs, these systems make introducing IFE in to smaller aircraft in particular a more viable proposition. It is perhaps this broadening of the potential fleet for IFE that will be the greatest contribution of these wireless IFE systems. Despite the cost advantages of such systems, the potential audience is limited to passengers carrying, willing and able to use their own device with an onboard system. As a result, it will be easier for airlines to introduce wireless IFE to aircraft where otherwise there will be none, rather than as a cost-saving measure for aircraft competing with in-seat AVOD systems.

As alluded to above, there are implications to providing IFE through passenger own devices. Most obvious is the issue of passengers without any compatible device, which restricts the potential market. Penetration of such devices is increasing all the time but it would be unreasonable to expect all passengers to be carrying anything larger than a smartphone, so the experience will never replicate an in-seat system for all passengers. Of course, replication of a traditional AVOD IFE system should not necessarily be the motivation for introducing wireless IFE to passenger devices.

> IT MAY NOT ONLY BE THE AVAILABILITY OF PASSENGER DEVICES THAT LIMIT THE POTENTIAL AUDIENCE FOR WIRELESS IFE

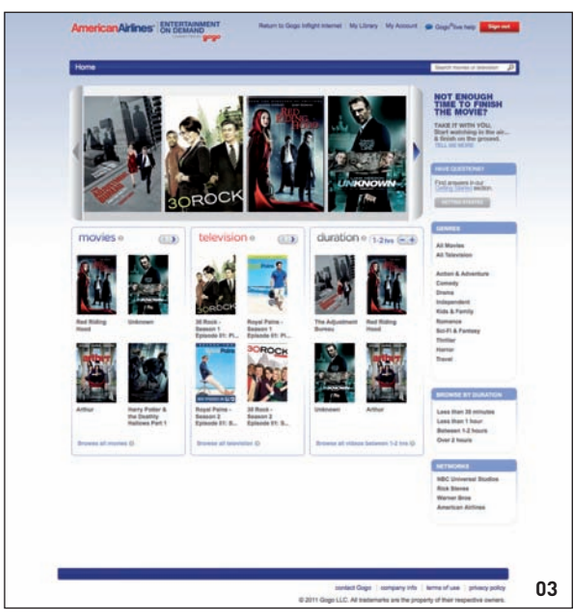
It may not only be the availability of passenger devices that limit the potential audience for wireless IFE. The technology employed for such systems is currently not capable of delivering streaming video to a full aircraft, according to most suppliers. This limitation is more sensibly just one more consideration for airlines rather than reason to extinguish all interest. The technology is likely scalable and will improve, demand may well not reach system limits, and not all usage has to be live video streaming.

Compatible devices with wireless IFE will require an adequately sized screen, wireless connection (most likely WiFi), and the functionality to interact with the onboard server (a browser is logical but a downloadable application, or streaming media player could also be employed). Smartphones, tablets and laptops can all be expected to meet these requirements, but there are some more intricate issues relating to device compatibility such as whether to use a standard browser interface or to provide applications specific for each platform.

Considering that wireless IFE consists essentially of just a streaming server and wireless network, it is perhaps no surprise that it is being offered by a large number of new entrants, and also by existing providers of both passenger connectivity services and in-seat IFE. Aircell has included a 1TB server on its passenger connectivity systems from the first installation and are now using it to provide movie rentals on passenger devices.

03. American Airlines is the first carrier to opt for Gogo's wireless movie streaming service

04. Lufthansa Systems' new wireless IFE system, BoardConnect, will enter service later this year on Condor's 767 fleet



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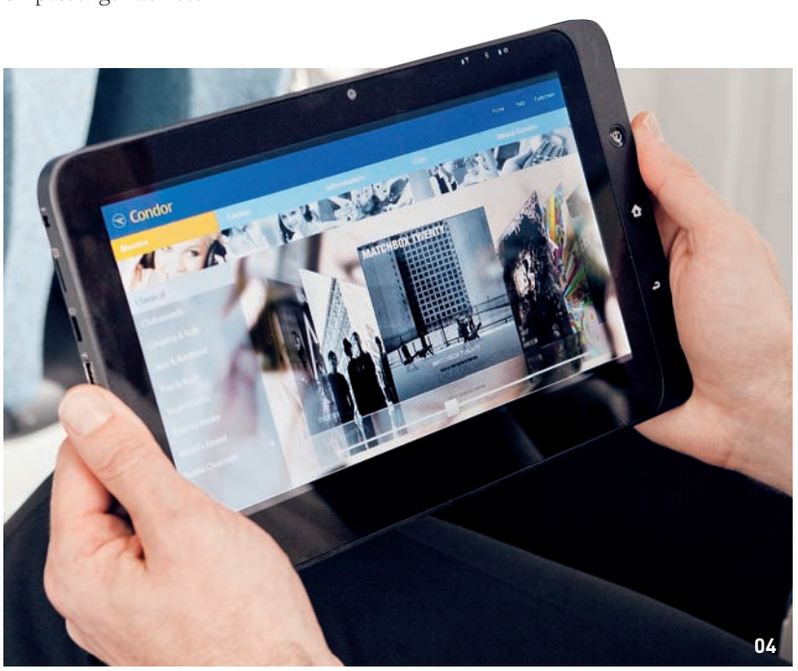

04

about the author

Robert has five years experience at IMDC, which has been assisting airlines and their partners in optimising their investment in cabin and communications technologies since 1999. IMDC's consultants are experts in media, content, technology, connectivity and airline operations. The company is widely recognised as the leading organisation in this sector for market research, executive training, product evaluation, independent strategy development and project management.

Robert manages the Market Intelligence Unit at IMDC and is the primary author of the IMDC Inflight Technologies Market Outlook Report for which he produces a five-year market forecast and conducts analysis of trends in IFE hardware, content and connectivity.

Robert has also worked on major consulting projects for IMDC, including those for Royal Brunei, Southwest and LAN Airlines. He holds an honours degree in Business Economics from Exeter University and has lectured on airline marketing at Cranfield University.

The simplicity of the hardware makes wireless IFE relatively easy for any existing inflight technology supplier to add to their product should they wish to. Providers of embedded IFE systems have been demonstrating their own wireless IFE systems, even Electronic Flight Bag (EFB) technology can be leveraged to provide wireless IFE as AirAsia X plans to do in partnership with Tune Box.

CONCLUSIONS Close analysis of the current suppliers and would-be suppliers in the IFE hardware space suggests that too much emphasis is being put on the technologies employed to deliver IFE. Ultimately, IFE has a choice of: architecture, which can be seat or server centric; network, which can be wired or wireless (each with different technologies); and the display and interface, which can include passengers' own devices. It makes sense to evaluate the suitability of each of these three aspects relative to an individual airline when evaluating any particular supplier.

Seat-centric architecture can bring cost advantages to an airline, and deliver impressive reliability with a simple design. However, it is interesting that a seat-centric architecture is often talked of as being more advanced than a server-centric one. Away from aviation, the concept of 'cloud' services, interactivity and being constantly connected are current themes. A server-centric architecture, especially when connected beyond the aircraft, more closely matched the idea of a connected 'cloud' experience. In actuality, airlines must consider what is most important and suitable to their own circumstances when selecting IFE. Perhaps the ideal solution for airlines is a hybrid model, with some storage and processing at the seat for a minimum level of service during system failures but within a connected 'live' network to allow for maximum potential performance and functionality.

Introducing wireless IFE through passenger devices is a more straightforward decision for airlines if they can leverage other onboard technology and services such as passenger connectivity systems, AVOD IFE or even operational hardware. Where airlines have a competitive need to offer a high level of inflight technology, then wireless IFE can be considered as an enhancement to other services for a relatively marginal increase in required investment.

Although minimal in architecture, wireless IFE to passenger device systems have key characteristics that can be further leveraged to offer an enhanced service. Through storing content and providing a wireless delivery mechanism, these systems are very well positioned to benefit from even a small bandwidth connection to the ground while in flight. By combining cached content and a live connection, the passenger experience can benefit from an application-like experience where minimal bandwidth offers an enhanced interface and content.

Ultimately, providing IFE to passenger devices is beneficial when no IFE is present and complementary to all forms of IFE. It does not have to represent a mutually exclusive decision and there are benefits of integrating an embedded IFE solution in to a passenger device solution, as a way of forging a deeper, longer lasting and mutually more beneficial relationship between airline and passenger. ☒

> EVEN ELECTRONIC FLIGHT BAG (EFB) TECHNOLOGY CAN BE LEVERAGED TO PROVIDE WIRELESS IFE

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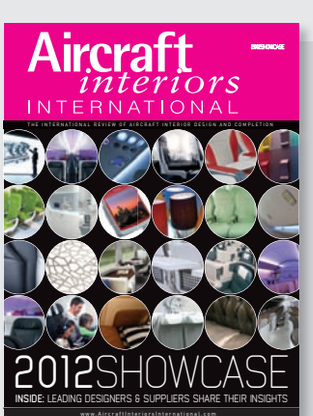

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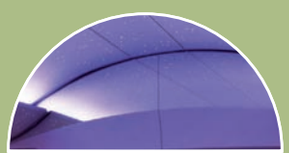


DESIGNSHOWCASE

storyteller

Teague explains the importance of storytelling in creating a successful airline brand

Over the course of the past decade, storytelling has taken on new relevance in driving curated brand experiences. "The trend has grown quickly for two reasons: first, because of the emotional connection stories bring to experiences, and second, because of their ability to coexist with a brand while having personal and cultural impact," says Jenny Ruegamer, associate creative director at Teague. "As designers we use storytelling to create compelling products and experiences that connect back to larger brand narratives."

While storytelling in design has a relatively short history related to brand, Teague has a long history of researching social cultural trends and the shifting values of consumers. "For more than eight decades we've looked at industries outside of aviation and aerospace to gain unique insights that inspire the flight experience," says Ruegamer. "In the aviation industry, where cost and performance are dominant drivers, the intangible elements are often overlooked by airline brands. But economy and performance do not inspire brand loyalty – it's the story behind the brand that speaks to consumers and ultimately leads to a lasting emotional connection."

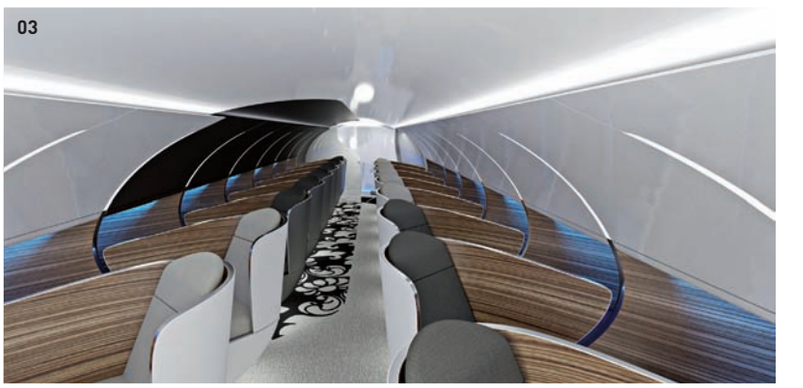
01. Panasonic's Integrated Smart Monitor lets passengers interact through the IFE
02. Lighting on Emirates' new Boeing 777 emulates the night sky as seen from Dubai

Ruegamer says individual stories are as varied as airlines themselves, though there are a few story types (authentic, participative and holistic) that airlines can no longer afford to ignore if they want to win the hearts and minds of today's discerning consumers.

THE AUTHENTIC STORY "An authentic story makes it easier to know and trust a brand, bringing transparency and simplicity to an experience," says Ruegamer. It can include ideas as simple as understanding the origin of a meal, or a hotel that reflects local culture. "Even when catering to a global audience, an airline's culture and country of origin should drive its story, acting as the central element that makes its brand unique and authentic," says Ruegamer. "Similar to how hotels have become part of the travel experience rather than simply places to sleep – creating a mood and service that reflects an airline's culture allows the flight to become a memorable extension to the final destination."

Creating an authentic story also means designing experiences that speak to a brand's distinct message. "A business-class meal is intended to be special. If the food is special, the plates,

> ECONOMY AND PERFORMANCE DO NOT INSPIRE BRAND LOYALTY – IT'S THE STORY BEHIND THE BRAND THAT SPEAKS TO CONSUMERS AND ULTIMATELY LEADS TO A LASTING EMOTIONAL CONNECTION



03. Teague's customisable Boeing SkyLoft concept

cutlery, service and lighting should all support that experience," says Ruegamer. "Airlines must decide how they'd like to be perceived by their passengers and then design a branded experience to match. Being intentional with the small details produces large returns. Mindlessness might as well be superficiality – without a backstory, there's nothing for passengers to connect with."

THE PARTICIPATIVE STORY Beyond authenticity, Ruegamer says consumers crave participation – they want to be actively engaged and influence the brand experience. Mobile technology and social media are mixed into three growing consumer trends that are driving influences in the participative story. These are lifestyle, community and personalisation.

'Lifestyle' gives the consumer a vehicle to make a statement about who they are. "Consumers' choices around fashion, cars and hotels all make a statement about their tastes and values, tying them to brands," says Ruegamer.

She says hospitality is leading the pack on this trend – as hotels move from generic boxes for sleeping to carefully curated experiences that reflect lifestyle statements on sustainability, value, design and wellbeing. "When it comes to airlines, they need to first understand their own brand DNA and then invite the passenger to become a part of it," says Ruegamer. "In details such as designer amenity kits, cutlery or blankets, flying can become a lifestyle choice for the passenger. An experience that is grounded in something more than a simple brand colour gives passengers something to be a part of and inspires them to participate in the story."

'Community' is a growing trend that allows consumers to take pride in being part of something larger. "Brands such as Facebook, Twitter and Tumblr are built around individual expression within a larger community," says Ruegamer. "Other industries are also using 'community', as a way to get to know their customers – connecting their individual narratives with a larger brand story.

For airlines, this means giving passengers the options to create their own inflight story, as well as the opportunity to share their story with a wider audience. Apps or IFE systems could help passengers connect with others on their flight to share a taxi or restaurant recommendation, or to swap travel stories."

'Personalisation' is a travel trend where consumers look for their

04. The Boeing SkyLoft can include anything from sleeping quarters to a multimedia room, business centre and bar

personal preferences to be a simple, seamless part of their trip. "Some airlines do a great job at greeting premium passengers by name, but need to take it a step further," comments Ruegamer. "Ideas such as personalised IFE screens with recognition of each person's inflight preferences, or allowing passengers the ability to build their own welcome bag before the flight using an app or online tool, would add a meaningful personal touch."

HOLISTIC STORY Ruegamer argues that the passenger experience is no longer defined by one special feature such as a business-class seat, or a generalised impression left by brand guidelines.

"Today, consumers experience and react to brands in a multitude of micro-experiences with the ability to provide instant feedback on the internet," she says. "A holistic story takes the individual elements of an experience and connects them to something much stronger and more memorable."

Ruegamer contends that an airline's brand identity, website, livery, check-in, lounge, boarding, cabin, IFE, seat, service and food should be connected as one carefully designed story.

"Each moment of the journey needs to be intentional and designed around a defined emotional response," she says. "Stories have a beginning, middle and end – miss any one of these and the story lacks clarity and meaning."

Ruegamer believes airlines have the opportunity to use the concept of 'story' to evolve air travel, to make it an anticipated journey.

"For the experience to be successful it needs to be authentic to the brand and culture, allow the passenger to participate throughout, and be holistic from preflight right through to post-flight," she says. ☒

> "STORIES HAVE A BEGINNING, MIDDLE AND END – MISS ANY ONE OF THESE AND THE STORY LACKS CLARITY AND MEANING"

Q&A with Jenny Ruegamer

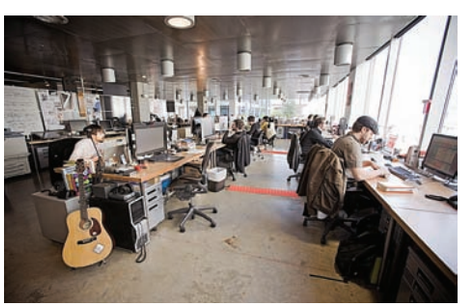
Jenny Ruegamer
associate creative director
Teague

HOW DID YOU GET INTO AVIATION DESIGN? I have a degree in architecture, but I've always designed interior spaces. I see the aircraft cabin as another kind of interior space; what's especially exciting is that a cabin is part of a much larger experience.

WHAT BROUGHT YOU TO TEAGUE? A friend of mine worked for Teague and often talked about the opportunities there to design for airlines all over the world. Before I joined Teague, I worked for a Japanese architecture firm that exposed me to travel. I wanted to travel, but I also wanted the opportunity to work closely with, and understand, different cultures. At Teague I get to do just that!

WHY DO YOU THINK BRAND HAS TAKEN ON MORE MEANING IN THE CONTEXT OF DESIGN? Selling a brand is more powerful than selling a singular product or experience. Without a strong brand DNA, an experience is very challenging to create.

HOW IMPORTANT IS RESEARCH AND DESIGN STRATEGY TO BRAND? Extremely important. The insights gained through research and strategy help brands find a relevant and unique voice. Especially in the aviation industry, where airline brands are very similar – they're traditionally built around safety and reliability. There's an opportunity through design research to create a conscious differentiation strategy.



WHAT IS THE MOST IMPORTANT TREND ON YOUR RADAR THAT'S RELEVANT TO AVIATION? Definitely the ability for individuals to customise an experience so that products and services meet their individual needs. We've seen this happening for quite some time in other industries, it's a natural next step for aviation.

WHERE DO YOU SEE AIRCRAFT CABIN INTERIORS GOING? In the immediate future I see cabin interiors becoming much more interesting as the average passenger becomes more design savvy. In the longer term I see technology playing a large role in helping airlines change the experience more often. Right now an airline will fly the same interior for 10-20 years before they change it. In retail, shoppers are expecting to have a new experience every time they visit a store. Passengers don't want to have the same experience each time they fly an airline. In the future, technology will enable wall patterns, lighting, food, etc to be changed much more quickly.

WHAT PROJECTS ARE YOU WORKING ON NOW? Right now we're working on several new Boeing 787 interiors. Airlines see their Boeing 787s as an opportunity to create an entirely new cabin experience, and rightly so!

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holisticapproach

Many of Priestmangoode's recent projects have focused on transforming not just the aircraft interior, but the passengers' entire journey

"Passengers today are no longer looking just for a comfortable airline seat, they are looking for an enhanced passenger experience from home to destination," says Nigel Goode, founding director of London-based design consultancy Priestmangoode. "That includes transit services, ground services, onboard environments and hotels. In the same way that the internet revolutionised the way we communicate, the future of the travel industry is one where each part of the journey connects seamlessly to the next."

Priestmangoode's experience in aircraft interiors, as well as other transport, hotel, branding and product design over the past 25 years, has enabled it to develop a holistic view of the travel industry. "We understand what passengers want and know how to deliver designs that satisfy both customer requirements and commercial imperatives," says Goode.

Key to its approach is a recognition that travelling doesn't start at the airport, it starts as soon as the passenger books their ticket. "While much thought has been given over the last couple of decades to improving cabin interiors, there has been little focus on improving transit journeys to and from airports," says Goode. "These services provide a unique opportunity for passengers to download emails and files before boarding a long flight or preparing ahead of a meeting, but current train interiors are little suited to these activities."

01. Priestmangoode is working on GUIs to improve space customisation
02. The LoungeLink train concept

LOUNGELINK Priestmangoode designed a solution to this problem with the LoungeLink concept transit train. Informed by the studio's work in airline, train and hospitality design, LoungeLink is designed to make the journey between airport and city centre more comfortable, practical and useful. A staggered layout maximises seat count, partitioned workstations provide business passengers with an ergonomic working environment and lounge-like armchairs and sofas make the journey more comfortable. LoungeLink also features a flight information display and a monitor for check-in to enable a speedier journey through the airport. "It's about simplifying the journey so that the passengers can enjoy the experience of travelling," says Goode.

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> TO DESIGN ENVIRONMENTS THAT WILL LEAD TO REPEAT BUSINESS, IT'S CRUCIAL TO TREAT THE TRAVEL EXPERIENCE AS A WHOLE

Priestmangoode is also doing a lot of work with airlines such as Turkish Airlines to extend their branding and design language to ground services. "Extending the brand experience beyond the cabin interior provides tremendous opportunities for companies to position themselves within the broader travel market," comments Luke Hawes, director at Priestmangoode. "Not only does it enable brands to strengthen their presence across a much broader section of the journey, but from the user point of view, facilitating the travel experience through a clear and consistent design language is key to creating a comfortable, stress-free experience."

The company says its experience in designing ground services, wayfinding and airport lounges means it knows how to use design to ensure clear brand visibility and enable an intuitive journey through the airport.

03. Lufthansa's new first class was designed as a totally integrated cabin

"The transition from ground services to the aircraft should be seamless, with lounge-like cabin interiors that carry on the design language of the airport lounge to everything from galley design, logos and uniforms, seat trim and finish, seat controls and GUI displays," says Hawes.

CULTURAL CONCERNS At the heart of the company's work lies its ability to reflect an airline's national identity through the design of its cabin. "We don't have a house style, each project is designed to suit that particular brand," says Hawes. "This enables us to work for many airlines simultaneously. We have just signed an agreement with Thai Airways to redesign its whole fleet in a contemporary Thai style and are currently absorbing the culture, its heritage and visual language. This will enable us to design something authentic and unique to Thai Airways, while ensuring it remains suitable for discerning global audiences."

Past the look and feel of the cabin, much of the onboard experience is the seat itself and the passenger's immediate environment on board the aircraft. While seat pitch is of course important, the integration of the seat into the rest of the onboard environment is at the heart of Priestmangoode's airline interiors work. "Seats have traditionally been designed as separate entities, but

03

> GOOD DESIGN NOT ONLY OFFERS PASSENGERS A BETTER EXPERIENCE, IT CAN ALSO HELP AN AIRLINE TO REDUCE ITS RUNNING COSTS

rebranding Turkish Airlines

In 2009, Priestmangoode won a contract to completely rebrand Turkish Airlines, from cabin interiors to ground services. The project was a unique opportunity to create a consistent brand image from start to destination, the aim being to enable a more intuitive passage through ground services, a seamless transition with the onboard environment and a better travel experience.

Priestmangoode worked on applying the design language of the new cabins in to all aspects of ground services. This included assisted check-in areas (including a signage totem for disabled users and unaccompanied minors), mobile security stations, tickets sales offices at the airport and in towns, management building desks, frequent flyer and newspaper counters/desks, leaflet stands, baggage size and weight check units as well as speech counters.

Priestmangoode's new cabins for Turkish Airlines were launched at the end of 2010, while the ground services are currently being rolled out.

if cabins are going to feel more unified, it is crucial that their design is done in relation to, not separate from, the architecture of the cabin," says Hawes.

Priestmangoode's first-class cabin for Lufthansa, for instance, was developed as a totally integrated cabin. Seats were designed in relation to structural elements such as credenzas and columns to ensure a better flow of space and consistency of design and sightlines throughout the cabin.

CUSTOMISATION Flexibility and the ability to customise one's space are also becoming increasingly important. Priestmangoode is working on GUI systems to improve this and enable passengers to customise their own space at the touch of a button. "Today's digital age has meant that everything can instantly be adapted to suit one's requirements and passengers have come to expect that level of flexibility from their onboard environment," says Goode. "GUI systems are a great way to enable passengers to make the space their own through lighting, seat controls and IFE, resulting in a more comfortable journey, and crucially, a better personal experience."

03. Turkish Airlines' new branding extends to its assisted check-in

Using its design skills from other transport and hospitality industries has been at the heart of Priestmangoode's ability to design effective onboard solutions. "Because we work in other areas such as high-speed trains and hotels, we understand that aircraft interiors are only part of the journey, and that in order to design environments that will lead to repeat business, it's crucial to treat the travel experience as a whole," says Hawes.

In addition, the company contends that working with a single design company is more cost-effective. "Priestmangoode's ability to work on all aspects of the travel experience and bring together different suppliers, means airlines can save both time and money," says Hawes. "It also means better integration of the brand into each aspect of the journey."

"Offering a seamless passenger experience from start to destination is the key to a successful airline," says Goode. "Good design not only offers passengers a better experience, it can also help an airline to reduce its running costs. We use design as a strategic tool to transform businesses and help position brands as leaders in their field. Our experience across various industries means we understand what design should look and feel like for the end user, while our holistic view of the industry means we are uniquely placed to design a better passenger journey from home to destination." ☒

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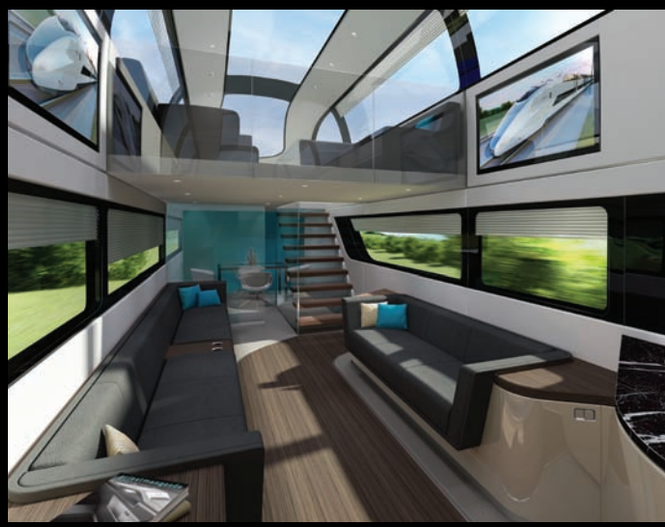
Designing the complete travel experience



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texasstyle

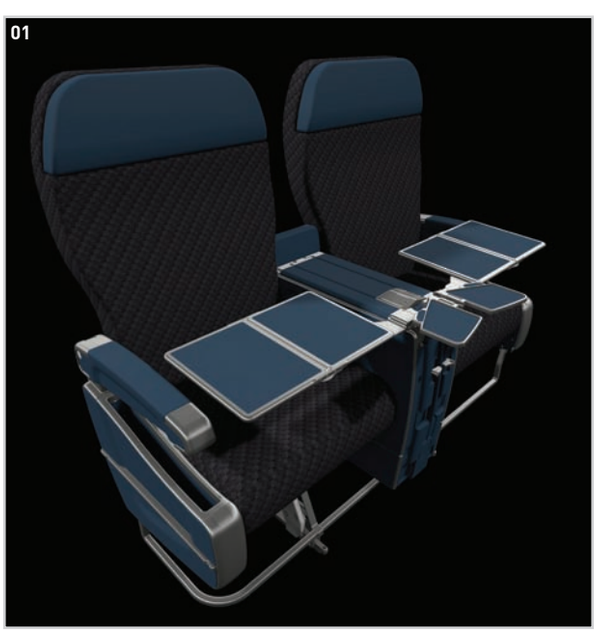
For TXS, successful design is about balancing the airline's push for innovation with the manufacturer's realities

On a sweltering summer night in Texas, USA, a solitary office glows with eco-friendly bulbs and flatscreen monitors. Tucked away in a technology park, staff designers are pulling together a pressing revised presentation. On the other side of the globe, Weber Aircraft marketing and engineering professionals are just having their morning coffee while downloading the latest concept revision to a 575X seat, a new idea based on discussions with the airline customer the day before. This is not a second revision, more like revision 22.

Real-time technology and seamless integration between TXS Industrial Design and Weber Aircraft results in a super-fast response to airline customers' requests. Discussions about an armrest idea on Monday result in conceptual renderings on Tuesday morning; a tweak to cushions, conceptually developed and rendered in hours.

Behind the scenes, TXS has impacted the airline industry in a quiet way. Rather than marketing its services directly to airlines, TXS has worked with Weber Zodiac Seats providing airline support, market positioning, new product development and marketing support. Although an independent design agency, TXS has worked closely with the manufacturer for more than 15 years.


02


01

01. A domestic first-class seat for a US carrier
02. Weber's 5751 seat with integrated Thales IFE

BALANCING ACT TXS says tight integration with the manufacturer's R&D, production engineering and programme managers coupled with hands-on interaction with airline customers has given it a unique experiential knowledge of product and capabilities. These collaborations result in a high level of airline customer support with TXS designers involved in many phases of the product's developmental life, ranging from early product concept through airline deployment. As an outside consultant, TXS champions the design and branding requirements of the airline customer, while balancing the realities of the manufacturer's production.

This low-profile agency has contributed to programmes across all classes, for airline clients including major flag carriers on five continents. Nearly 300 programmes for more than 60 airlines have crossed the designers' desks, ranging from making a small adjustment to comprehensive new product R&D. TXS also has a

03

> ALTHOUGH AN INDEPENDENT DESIGN AGENCY, TXS HAS WORKED CLOSELY WITH WEBER ZODIAC SEATS FOR MORE THAN 15 YEARS

next-generation seating

State-of-the-art seating products can enhance the passenger's experience with sleeper, privacy, service and entertainment amenities. "Unfortunately what often comes with these enhancements are elaborate cabinet systems, partitions, mechanisms and massive weight gain," comments Tim Terleski of TXS. "Quite often, high-profile niche market seating products translate to more weight, more fuel consumption and less profit."

Terleski thinks that in the future, designers will be challenged with providing comfort and experience for passengers in lighter, more efficient products. "Although lighter, stronger materials play a role, these challenges cannot happen with materials science alone," he says. "I believe a holistic approach to user perception, eco awareness and airline emphasis through brand and action will be required. Newer, more efficient aircraft demand newer and efficient seating. The current generation of seating is based on previous norms, the next generation promises to be radically different."

model shop, aptly named Buzzwerk, producing dozens of prototypes, mock-ups and first-article components to support PDR/CDR presentations for airline programmes.

"We interact with the manufacturer every day," says Tim Terleski, president at TXS. "Our often passionate input sometimes makes their job more difficult. However, we always keep the customer (airline) and end user (experience) in mind. We strive to be guardians of each airline's brand and design intent and we are willing to push hard within the organisation for the best possible product. Challenging the manufacturer is always a priority."

As Weber's design agency of choice, TXS has quietly impacted the manufacturer's success. "Weber really get things right," says Terleski. "Competitive, market-focused, global customer support make them great. I think our close relationship and design efforts contribute to their success."

SMALL AGENCY, WIDE SCOPE TXS has nurtured its experience and portfolio working in a wide variety of industries. It has past experience with numerous Gulfstream and Boeing Business Jet corporate interiors, has launched successful telecom startups, developed medical equipment and has a close relationship with the developers of Texas Instruments' OMAP chip (used in Motorola's Droid mobile phones). It has even won two Primetime Emmy Awards as a result of its work on stage lighting products for television.

Over 25 years, a staggering number of projects have flowed through the small, 16-person agency. "Our designers and mechanical engineers are globally aware and enlightened," says Staci Mininger, vice president at TXS. "The constant interplay and crossover between disciplines and industries makes us thrive. Frankly, we just bring a lot to the table and our clients appreciate it."

03. A study into passenger space

04

04. Seats and IFE have to cater for a wide range of people
05-06. A domestic business-class concept

05

06

> COMPLIANCE AND BUSINESS METRICS DEMAND AN EVOLUTIONARY APPROACH TO PRODUCT

the future of IFE

In the past, all you had was a book, a friend, or just the thoughts in your head to pass the hours until you landed. Today we are submerged in a feast of technological options that are not only provided by airlines, but also by the passengers. "Unbound by the constraints of FAA approval, your average interactive tablet or smartphone can provide more personalised entertainment to the consumer than what any airline could hope to offer," says Per Magnus Skold of TXS.

For the IFE integration designer this poses many questions. Does this mean the eventual removal of IFE from airlines through lack of use? And, if so, what happens to the passengers who do not have their personal entertainment with them? From a design standpoint, how do you integrate airline-approved IFE into seats and provide a suitable docking situation for those who bring their own? What privacy situations might need to be considered with personal media that might be too personal for fellow passengers? For overnight flights, how does the light pollution from all the screens affect those trying to sleep?

"As designers, we have to tackle these questions while trying to avoid head impact issues, 'feature-sprawl' and other mouldability considerations," says Per Magnus Skold. "It's a fun puzzle to piece together as we head towards a more and more personalised inflight experience."

Recent years have seen increased interaction with airline amenity suppliers and airline designers. TXS has provided direct collaboration with Thales and Panasonic on IFE integration over a broad range of seating products. TXS designers assisted the manufacturers' engineering groups in implementing ambitious and integrated solutions just now entering service. Recent programmes with cushion fabric, plastics and leather providers have resulted in designer-based catalogue ranges for Airbus and Boeing programmes.

Behind the scenes, TXS has also provided support in integrating other design agencies' work to fit the manufacturer's product. "Exciting designs from other agencies are often designed on baseline platform or even other seat manufacturers' structures," says Terleski. "These designs are often ambitious from a design standpoint but sometimes neglect to pay full attention to manufacturing, compliance or production constraints. These constraints prohibit the redesign of seat structures for every airline's programme. TXS assists in adapting these concepts to the manufacturer's products."

Terleski says the big challenge is to balance the manufacturer's production reality and the push for innovative new design concepts. "Compliance and business metrics demand an evolutionary approach to product over years; revolution is fuelled by the innovative energy designers bring to the industry," he says. "As an independent agency with in-house experience, TXS continues to be uniquely positioned to adapt and support airline's needs." ☒

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Seatback integration of Thales display products

brainwave

How James Park Associates customised its 1-2-1 reverse herringbone business-class seat for Cathay Pacific

James Park Associates (JPA) is a multidisciplinary agency with expertise in aircraft, trains and hotels. It is happy to offer complete hands-on programme management from first conceptual sketches to design engineering and beyond into brand extensions.

"We're very thorough in what we do," says agency founder and managing director James Park. "We deliver very strong and original concept work. All the things we've done stand out as something special and are long lasting in terms of design and functionality. I think that's one of JPA's USPs."

There is substance to Park's claim. JPA's big break in transport design came when the architect-trained Park got the chance to design the Venice Simplon Orient Express luxury train back in 1982. The train is still running across Europe today and was recently dubbed by *Vanity Fair* magazine as, 'the train against which all other luxury trains are measured'. That breakthrough project led to a raft of other transport design projects for the London and Singapore-based consultancy, from more luxury train and then hotel interiors to finally – and logically – aircraft interiors too.


01


02

01-02. Cathay Pacific's version of JPA's 1-2-1 reverse herringbone product

JPA's first aviation job was the Boeing 747 first-class cabin programme for Singapore Airlines, launched back in 1998. The project won industry awards and is still in use 13 years later. The thinking that went into its development has also helped to inform one of JPA's latest projects, Cathay Pacific's new A330-300 and Boeing 777-300ER business-class suite.

REVERSING THE HERRINGBONE Far from being the result of a 'Eureka!' moment, Park says the 'reverse herringbone' seat configuration at the heart of the new Cathay suite was merely a case of solid design evolution.

"When we were doing the Singapore Airlines Boeing 747 first-class cabin, the logical thing was to herringbone the seats around the perimeter and down the centre as the front of the aircraft tapers in towards the nose, but for various product-related reasons we couldn't do that at the time," Park recalls. "We then moved on to Singapore Airlines' A380 Diamond business-class seat in 2002, in which you sleep on the diagonal in the same way as we wanted to do with the Boeing 747, only facing forward for take-off and landing. Really, the reverse herringbone configuration was an evolution of that idea."

> THE 1-2-1 REVERSE HERRINGBONE GIVES EVERY PASSENGER DIRECT AISLE ACCESS, YET AFFORDS A VERY HIGH LEVEL OF PRIVACY AND SPACE

looks aren't everything

JPA prides itself on offering considerable design engineering skills in addition to straight aesthetics advice. One prime example is the way it helped design a weight-saving solution on Cathay Pacific's new business-class seat through the removal of the pallet interface between the seat and the aircraft.

"If you have an unconventional configuration it won't automatically align with the seat track of the aircraft so the tendency is to use a pallet in between," explains James Park. "In conjunction with the vendor, we got around this by using a very clever structural arrangement that enables adjustment of the fixing points with the seat track." The new mounting solution resulted in "significant weight savings", according to Park.

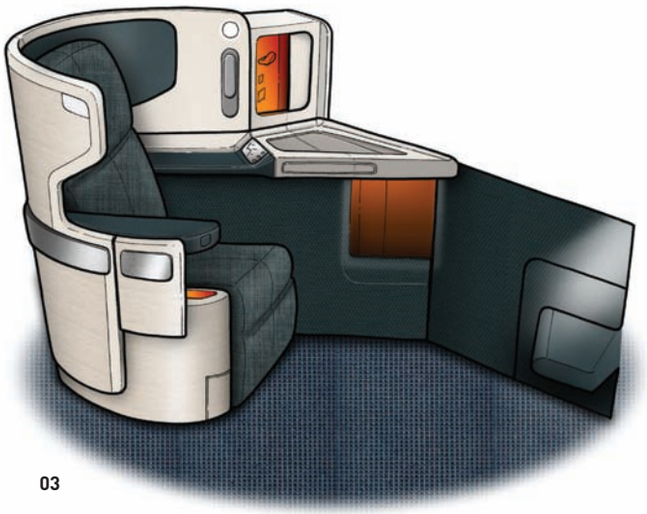
The benefits of this approach, which was pioneered on US Airways' A330-200 premium-class cabin and launched in December 2009, are now well documented. The 1-2-1 reverse herringbone configuration gives every passenger direct aisle access, yet affords a very high level of privacy and space while maintaining a reasonable passenger density. It's a modular design too, so with slight adjustments to seat angle and by offering different features and new finishes, the idea can be applied to other carriers, says Park. Cathay Pacific proved this by adding considerable new functionality and style on its new business-class seat as a result of the collaborative effort of its in-house design team and JPA.

CATHAY PACIFIC Look closely at Cathay Pacific's new seat – which started rolling out in March 2011 – and you'll see great attention to detail and thoughtful functionality. There are some obvious visual differences to the US Airways' version; Cathay Pacific's seat has a high-end residential lounge look and feel and a distinctive wingback seat design that gives a greater feeling of privacy to each passenger around the head area.

But perhaps a more crucial addition – given that sleeping comfort is regularly cited as the No 1 requirement for long-haul business-class customers – is the innovative way the armrest retracts when the seat is converted to lie-flat mode, which boosts hip width for sleeping. There's also a bed extension function that deploys automatically as the seat transforms into a bed, increasing bed width.

Then there's the way the new tray table has been designed to deploy horizontally rather than vertically from the centre console, thus creating additional space for a customer's knees around the area where the literature pocket is located. The extra room should also be noticed by customers when lying down.

Beyond these more function-led improvements there are plenty of features designed to surprise and delight passengers as well. For example, a ground-level locker securely stores shoes, which are commonly removed for long-haul flights, while the door on the head-height personal cupboard can increase privacy between centrally situated passengers when opened to 90°. The door also features an internal vanity mirror to enable passengers to



03

flying colours

JPA has long used outside colour and trim experts to supplement its two in-house specialists when demand requires it, and with great results. "They were always able to identify and bring in the right people for colour and trim," confirms Cathay Pacific's Alex McGowan. "When we wanted a residential feel, JPA did some great stuff helping us with the crockery, cutlery, serviceware, carpets and curtains, as well as all the materials on and around the seat."

However, in March 2011, extra work led JPA to add three more permanent colour and trim designers with expertise from other high-tech industries, including the automotive sector, to boost its capability to the point that JPA's Rachel Barnett boldly states: "Now we've got the best colour and trim team in aviation design."

03. An early conceptual sketch of Cathay Pacific's new business-class seat
04. Colour and trim samples from the project

check their hair or make-up without having to go to the bathroom.

Considerable effort has been made to give these business-class seats a social dimension if required. To that end, the new seat can move horizontally fore and aft by almost 1ft so that centre passengers who want to talk can make easy eye contact and share a wide table space without resorting to leaning around the centre console to do so.

This may sound like a simple idea, but it involved big decisions and complex changes, including an additional seat actuator.

"We have a very diverse customer base, from Malaysian females who might be 4ft 10in, to Caucasian males who could be 6ft 4in or more," explains Alex McGowan, Cathay Pacific's general manager of product. "So the idea of having one button that goes through one kinematic – upright to flat, like a lot of business-class seats do today – isn't very business class. We accepted we had to do more. Having two actuators means you can recline and adjust the leg rest, but we also added a third actuator, which is independent of the recline function, so the seats can travel 11in forward while angled gently towards each other."

04

SWIFT SERVICE The ability of JPA to quickly come up with new design solutions to drive the intense development phase of the seat was also a major boon to McGowan. "JPA's turning around of design options was phenomenal," he enthuses. "We'd give them feedback via a conference call on a Monday and by Tuesday or Wednesday they had the iteration of CAD for us to manipulate and test to then get built into the prototype."

McGowan's also full of praise for JPA's focus and standing as part of his design team and its ability to manage multiple projects seamlessly. "Once the project was moving forward, we never felt the process suffered as a result of JPA's focus being diverted elsewhere by pitching or winning other work," he says. "We had the undivided attention of everyone that mattered, from James Park down."

The beauty of JPA's 'attention' is that it can be applied to much more than 'just' seats. "A good example of this is the Cathay Pacific business-class programme. We designed not only the cabin, but brand extensions too, including new tableware, blankets, cushions and duvets and also inflight menus," explains Rachel Barnett, marketing and business development director at JPA.

Indeed, the company's design skills go well beyond the aircraft into the pre-flight lounge experience. Notable airside spaces developed by JPA include Singapore Airlines' first-class check-in lounge at Changi, Singapore and Gulf Air's premium lounge at London Heathrow, UK, which opened earlier in 2011. The company says many more are under development, including a new lounge design due for a global roll-out for a huge – but currently confidential – carrier.

Although Park is keen to stress that JPA's long-established hotel interior expertise involves a different design approach to aircraft lounges, he does believe that applying processes learned from other design disciplines to the aviation industry can lead to fresh ideas that can give forward-thinking airline clients an advantage.

"When we first started looking at aviation seats, we questioned long and hard why they were built the way they were," comments Park. "Slowly the industry is adopting some of those thoughts but having said that, there is no substitute for good design, whether it is an interior of a building or an aircraft seat. The approach works very well for us." ☒

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redcarpet

Pierrejean Design Studio presents a virtual airline brand, highlighting the company's integrated approach to design

Pierrejean Design Studio is often contacted by airlines to conceive both specific areas (for example first-class Minisuites, a bar and shower spa for Emirates' A380) and all-encompassing brand concepts (clients for which include Air Mauritius and Etihad). The following is an example of the later, a theoretical concept encompassing the passenger experience both on the aircraft and on the ground.

The concept begins with a red carpet. "Our idea for this project is to roll out the red carpet throughout the aircraft," says Jacques Pierrejean, director of the studio.

A deep red and warm grey form the base of the cabin colour scheme, and by extension, are the company's identifier everywhere. In association with these two basic shades, a Chinese ink pattern is used on the partitions to create a strong visual identity. Pierrejean has avoided a 'trendy' image that would go out of fashion in favour of a more timeless design.

01. The economy-class cabin
02. A business-class airport lounge

The company's logo should be applied across all its aircraft as well as on all airport equipment. "Bearing in mind the financial impact such an investment (changing its brand identity) represents for an airline, this concept should be applied to all cabins operating on domestic and international routes," says Pierrejean. "This principle also eases the maintenance of the aircraft by eliminating the need to keep a varied stock of spare parts."

CABIN CLASSES The economy-class cabin is designed to create a feeling of space and freedom. This is partly achieved by a tone-on-tone cloud pattern on the window panels, which

> OUR IDEA FOR THIS PROJECT IS TO ROLL OUT THE RED CARPET THROUGHOUT THE AIRCRAFT

03. Business class

reflects the light. Apart from the red carpet, the dominant tone is the grey of the seats, designed to impart calm and serenity. The dark grey of the seat pan evolves to a lighter grey on the backrest and to very light grey on the headrest. "The subtle gradation in the intensity of the grey makes the seat look wider and higher," says Pierrejean. Brand details are repeated on the seat covers, with touches of vibrancy from both the red cushions and the cabin partitions, which are decorated in an Asian ink painting style.

In business class, the aim was to create a semi-private space for pleasure or work. "The red of the carpet supports a harmony of grey which befits a group of passengers who tend to move about frequently and detest over-intense colours," says Pierrejean. "The passenger will feel himself transported through the clouds, which are depicted on the cabin's sidewalls. This cloud print decor will be enhanced by coloured lighting which will render the cabin sky blue, midnight blue and orange, simulating the harmonies of sunset and sunrise."

The seats are upholstered in flannel-style fabric, and finished with a pillow and blanket set distributed personally to each passenger. A reading light, storage and a series of personalised functions complete the passenger's seating environment.

In first class, everything is designed for the ultimate in comfort and elegance. "The global style is simple but refined, and the sense of luxury is supported by the use of Chinese lacquer and grey sanded wood," says Pierrejean. A demarcation on the floor between the red carpet of the aisles and the warm grey/beige carpet of the seating area evokes a private space. The design includes a touch of wood to provide natural warmth, while the seat is upholstered in a thick, silky fabric inspired by haute couture. "The environment is taken care of down to the last detail, so much so that the passenger forgets he is on board an aircraft," says Pierrejean. "The partition behind the seat has an upholstered appearance, enhancing the plushness of the cabin."

OTHER ONBOARD AREAS The aircraft cabin concept also includes a convivial area, where passengers can enjoy a drink and socialise together. "The restricted space allocated to this area

> EACH PASSENGER MUST BE ABLE TO GET HIS BEARINGS, TO FEEL THAT HE IS TAKEN CARE OF BY THE COMPANY

04

will be widely enlarged by covering the lining (dado, windows and ceiling panels) with illuminated lexan panels," says Pierrejean.

Meanwhile the rest room is dedicated to relaxation and wellbeing with light therapy and soft sounds inspired by nature (such as a light breeze or birds singing). Special care has been paid to the details, which include illuminated textured walls, a waterfall and tall vases of flowers.

Finally, in the galley, a lot of effort has been devoted to avoiding the 'workspace' effect. "As an integral part of the cabin, the galley needs to blend in with the general scheme," says Pierrejean. "Attention has been paid to the decorative panels so that the passenger perceives them as part of the decor rather than technical spaces."

04. The first-class seat
05. The onboard rest room


05

GROUND SUPPORT Pierrejean's concept also extends to all of the passenger's interactions with the airline on the ground, starting with the travel agency. "The travel agency may be the airline's first contact with future passengers," explains Pierrejean. "The visual impact is immediate and has to be trendy, welcoming and provide a feeling of confidence."

Increasing numbers of airline companies now also pay a lot of attention to welcoming passengers at the airport, and preparing them for their flight. In Pierrejean's airport lounge concept, partitions covered in stretch fabrics are designed to sway imperceptibly, as if in a breeze. On the architectural level, walls and partitions have been eschewed to evoke a feeling of openness. "The architecture will provide for varying sources of ambient lighting to illuminate indirectly the reception, rest, relaxation, work, bar and restaurant areas," says Pierrejean. "For this reason the symbolism of the white colour, evoking purity and freedom, has been chosen to lend full value to the light."

Business- and first-class passengers have a dedicated lounge, a vast open space in which each passenger can find their own corner to relax, work, have a snack or socialise. The lounge includes a play area for children, a business centre and a space dedicated to wellbeing. In the later, the feeling of the design is intimate, with Feng Shui-inspired, muted architecture. The space includes a large spa area, a place dedicated to meditation and Tai Chi.

Pierrejean believes lounge catering is also very important and must be carefully planned. "Many passengers now benefit from the pleasure of delicious cuisine before resting, sleeping or quite simply enjoying an unforgettable flight," he says.

The concept is rounded off with crew uniforms that take their cue from Courreges and Cardin styles.

"Around this global concept, each passenger must be able to get his bearings, to feel that he is taken care of by the company, and have an enjoyable experience," says Pierrejean. "The passenger will thus remain loyal to the company and our work as designers will have been accomplished!" ☒

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breakingbarriers

Addressing the needs of passengers with disabilities and reduced mobility is vital and can create benefits for everyone

01. The lavatory in Basic configuration
02. The lavatory can be installed on any twin-aisle aircraft; here it is on the main deck of an A380

Although standards such as the EC 1107/2006 and US DOT 14 CFR Part 382 have been introduced, AIDA Development (a member of SII Group) believes little has changed for passengers with impairments, disabilities and reduced mobility. "To this day, the lack of accessible aircraft lavatories represents one of the most prominent physical and psychological barriers in any cabin interior," says Enrique Geck, managing director of AIDA Development. "What is the point of a regulation, if existing specifications for the accessibility of lavatories such as those issued by DPTAC and NCAT are not statutory?"

Creating space and accessibility in an aircraft requires a thorough analysis of all types of disabilities and, in particular, the specific needs of those passengers typically labelled as 'minorities'. For the past three years, AIDA Development has focused on this very subject, to develop a concise list of requirements for barrier-free cabin layouts, applicable equipment and related cabin interior components. Meanwhile, a great deal of data and expertise has been gathered, in close collaboration with leading aircraft manufacturers. On this basis and with the support of the BMWi (German Ministry of Economy), the company's comprehensive know-how in seat and cabin design was bundled to develop a universal concept for a barrier-free aircraft lavatory, a product designed to meet and exceed the expectations of passengers and airlines with regard to ergonomics, space, maintainability, interchangeability and costs.

FUNCTION DICTATES In addition to the needs of a regular passenger, the barrier-free aircraft lavatory concept focuses on the specific requirements of elderly people, visually handicapped and blind people, as well as travellers in wheelchairs. Size, equipment and location are dictated by the characteristic movement sequences, behavioural patterns and space requirements of this type of air traveller. Both autonomous as well as assisted use of the facility has to be taken into account, without compromising payload. To this end, variability in size has to be ensured. Particular attention was therefore put into allowing for a transformation into a much larger compartment, i.e. temporary conversion from 'Base' into 'Maxi' configuration of the lavatory – in next to no time.

The barrier-free lavatory is conceived for any twin-aisle aircraft, its interface points being fully compatible with the system architecture of an existing aircraft. It is ideally installed in any of the cross-aisle sections in the centre of the aircraft cabin. This allows for a conversion of the module into the much enlarged Maxi configuration during flight, taking advantage of unused cabin space in this area.

Size and equipment in Base configuration are tailored to the needs of elderly travellers, as well as visually impaired or blind passengers.

> IF PASSENGERS REQUIRING A WHEELCHAIR ARE ON BOARD, THE LAVATORY IS DEPLOYED INTO 'MAXI' CONFIGURATION BY THE FLIGHT ATTENDANT

"Just a slight but clever adjustment in size, shape and arrangement of the main components bears huge benefits to a person using a walking aid or a blind person's stick," says Regine Fischer, senior interiors designer at AIDA Development.

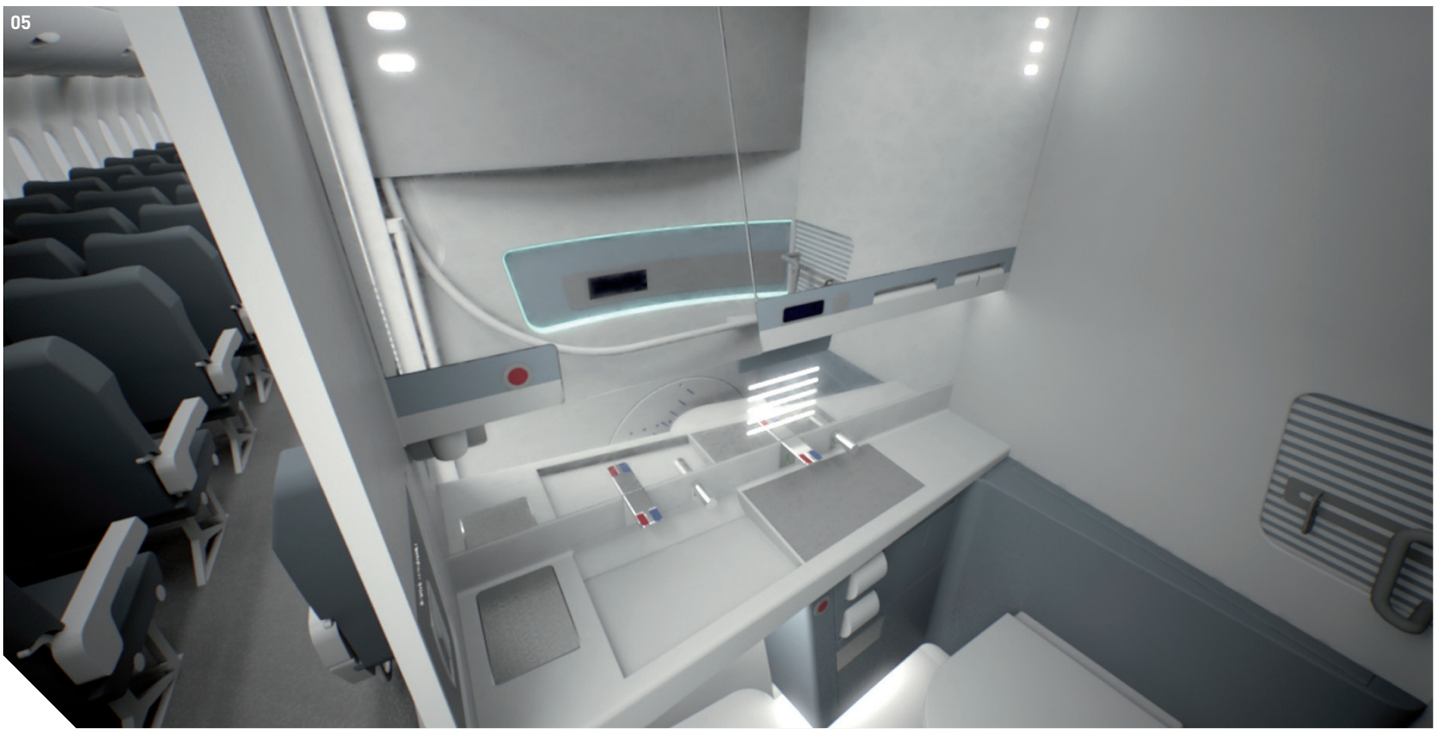
Discreet vertical and horizontal handrails adjacent to the toilet seat, sink and in the entrance area assist and guide the passenger in their movements. Service and functional elements are distinctly labelled in plain text and Braille. The use of dedicated colours for improved contrast, surface materials and illumination of the sanitary devices also improves the visual perception and orientation. A palpable outline of the lavatory layout, including annotations in Braille and options for acoustic instructions, are strategically placed at the entrance to the lavatory. In addition, a motion detector indicates, through an acoustic signal, the availability of the lavatory as well as the lock/unlock position of the main and side door.

FULL DEPLOYMENT If passengers requiring a wheelchair are on board the aircraft, the lavatory is deployed into Maxi configuration by the flight attendant, once the 'fasten seatbelts' signs are switched off. For this purpose, the curved sidewall element, guided by rails, is unlocked and pulled forward. Additional floor and ceiling elements automatically unfold from the inside of the lavatory and lock into their designated end position. Sliding wall and door elements complete the enlarged compartment. This simple yet effective mechanism allows the enlarged lavatory to remain soundproof and watertight in both configurations.

03-04. Maxi mode gives room for the wheelchair user and an assisting person

Additional functional elements necessary for passengers using a wheelchair (which remain deactivated/stowed in Base configuration, for protection purposes) are then deployed. Handrails are produced from the pocket in the back compartment. These are adjusted next to the toilet seat and include a device for triggering the flushing mechanism.

A backrest incorporated in the compartment can be mounted onto the open toilet lid, for added user stability. An additional sink is integrated in the washstand, protected by an electrically driven cover, which can be accessed from a sitting position. The same applies for all dispenser devices,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> IT'S NOT ONLY A SOCIAL RESPONSIBILITY; WE BELIEVE IT'S ALSO A WAY OF ATTRACTING MORE AND NEW BUSINESS


06


07

functional and service elements as well as the optoelectronic tap system installed in each of the two sinks.

The sliding side door in the enlarged lavatory compartment gives the passenger in the wheelchair, as well as an assisting person, comfortable access, without the need for complicated manoeuvres in the gangway. The door is ergonomically positioned for full access to the toilet seat and sink, avoiding the need to turn inside the lavatory. This door depicts a distinct colour scheme, position and shape of the door handle, to differentiate this from the main door.

The lavatory is designed to comfortably house a 95-percentile male in a wheelchair, along with a 95-percentile male assisting person and allows for transfer angles between 0° and 90°. An optional, electrically driven turntable at the base can ease the adjustment of the transfer angle, relative to the toilet seat.

05. Lighting, materials and colours are all optimised for visual perception and orientation
06. There is a turntable to assist transfer to the toilet
07. Additional sink and dispenser devices can be activated for Maxi mode

The space necessary for moving inside an enclosed space at minimum risk for injuries was assessed based on the ergonomic and biomechanical research studies of the National Center for Accessible Transportation, Nutrition & Exercise Sciences from the State University of Oregon in the USA. Minimum space allocation was reached by choosing, from many configuration options, the optimal position between toilet seat, washstand and doors.

"We would like to think that our work will inspire politicians, OEMs and airlines to jointly and actively propel cabin standards for disabled air travellers from the 20th into the 21st century," says Geck. "Breaking barriers is not only a social responsibility; we believe it's also a way of attracting more and new business." ☒

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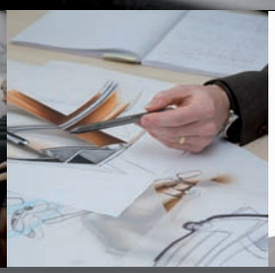
Speaking of CABINS...



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goingretro

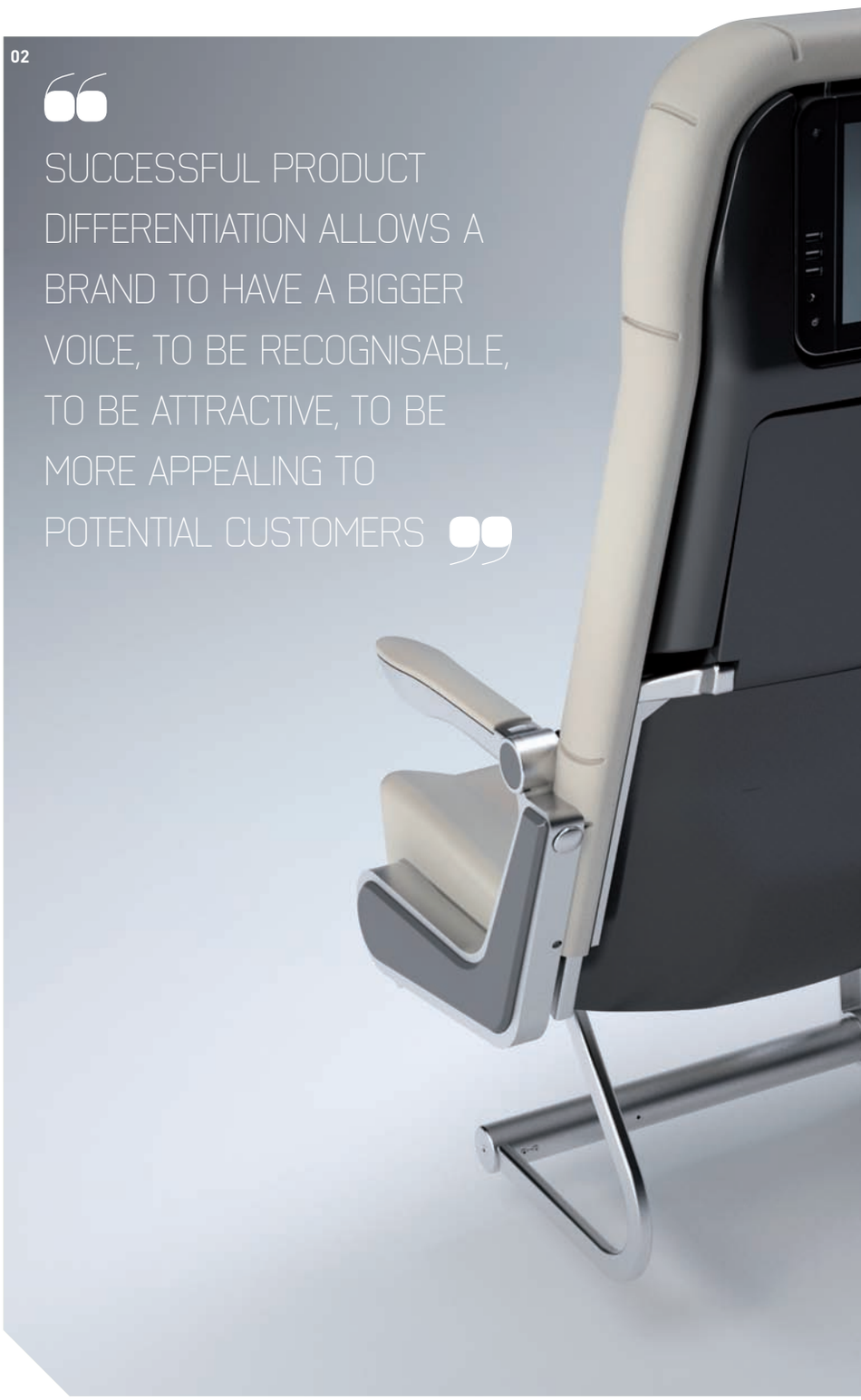
Factorydesign proposes another way of outfitting aircraft that might give airlines more room for manoeuvre

01. Intelligent Avionics' Aura IFE system, designed with Factorydesign
02. Aura integrated in a pair of Acro Superlight seats

From large airline to small, there are armies of marketing and product teams who spend their lives striving to make their product special and different. Distinguishing product from the competition lies at the heart of every marketing endeavour.

"The task sounds simple really – listen to passengers, keep up with trends, make the passengers feel special and innovate," says Peter Tennent, director of Factorydesign. "You have to innovate to identify new products, new configurations, new services and then apply that innovation thoughtfully and effectively. The clever airlines employ design companies to explore these points of difference, to create a cohesive, clear and consistent brand message and connect with passengers visually, emotionally and physically. Successful product differentiation allows a brand to have a bigger voice, to be recognisable, to be attractive, to be more appealing to potential customers than the competition."

When passengers decide to travel from Airport A to Airport B, they are unlikely to be presented with only one



Superlight Ultra seat

The award-winning Superlight Ultra seat from Acro Aircraft Seating is a design by Factorydesign that is intended to be different. Evolving from the success of Superlight within the no-frills sector, Ultra is designed to be lighter, with more legroom, fewer parts and easier maintenance than traditional economy-class seats. "Ultra is a response to market demands that combines the simplicity and robustness associated with Acro seats, with added features to give passengers a greater sense of comfort and elegance to match the actual enhanced comfort that results from key innovations," says Peter Tennent, director of Factorydesign. "Superlight represents a change in approach to seating for short-haul carriers, not evolving the convention in seating, but starting from scratch, approaching the problem from a different perspective, and configured to benefit the passenger and airline."

airline to chose from. The point of difference may be anything from the food to the lounge, the staff, the loyalty programme, or it may be the whole package. But Tennent argues that on an ongoing basis it will certainly not be the price. "Being the cheapest is not a sustainable business model," he says. "So it's simple really, make your airline and your product different so customers can find it and buy only from you, and make your product better, add value and don't take it away so they keep coming back."

DIFFERENTIATION Tennent believes this quest for differentiation is at odds with the stated determination of aircraft manufacturers to optimise their supply chains and minimise manufacturing complexity. "Of course, as a business strategy, limiting customisation makes perfect sense," he says. "Focusing on the supply chain's efficiencies and maximising the productivity of the production line is an entirely logical

> THE PREFERRED BUSINESS STRATEGIES OF MANUFACTURER AND AIRLINE ARE CONTRADICTORY

03

Aura IFE

Designed by Factorydesign, Aura, the new IFE system manufactured by Intelligent Avionics, is different. Aura is designed to be flexible, light and powerful, providing big processor power and storage in each seat without the need for the heavy servers that come with conventional IFE systems. Its manufacturer promises screen availability at 99.99% – that means only one hour of screen downtime in every 10,000, a five-year exchange warranty and lower ownership costs, meaning even the business model is being set up to challenge convention.

strategy and it is not my place to criticise this approach. Yet this is an inward-facing strategy, born to suit the manufacturer and not airline customers, at least not those customers who strive to add value to the product offering. So the preferred business strategies of manufacturer and airline are contradictory."

Tennent predicts this will only be compounded by the growth in the number of people using aircraft. "If we believe the forecasters, then air travel is set to double every 15 years. The aviation industry will only continue expanding, so the relevance of these two opposing business strategies will increase," he says. "Our friends who manufacture will only want to become more efficient and more standard in an effort to be more productive, and the airlines will have to continue to seek out the point of difference in pursuit of competitive advantage."

03. The Aura IFE system

Happily, Tennent sees an alternative approach – for airlines to retrofit aircraft delivered green (unfurnished) from the manufacturer. "Rather than take a fully furnished, increasingly standard aircraft full of compromises – lovely I am sure, but not quite what is wanted in every case – why not take green aircraft and fit them out with whatever carefully designed and innovative products are determined to be best for the brand and the particular target customer?" he asks. "There is an effective and growing network of buyer-furnished equipment suppliers to support this retro- rather than line-fit approach, a choice that is currently constrained by 'catalogues', that will be available to fit out aircraft with not yet imagined innovation. The constraints then are only those that relate to a specific airline. Manufacturers can concentrate on making their airframes more efficiently, faster, more profitably and with super-streamlined supply chains, and avoid the complication of managing the various and differing demands of their customers."

Tennent believes this could be a win-win solution: "The airline's opportunity to innovate becomes unconstrained – imagine a colour palette choice of more than white and grey, lavatories that could grace a premier hotel, galleys that are no longer just inside the entrance, cabin interiors that reflect and communicate the brand. I envisage happy passengers, happy manufacturers and happy airlines." ☒

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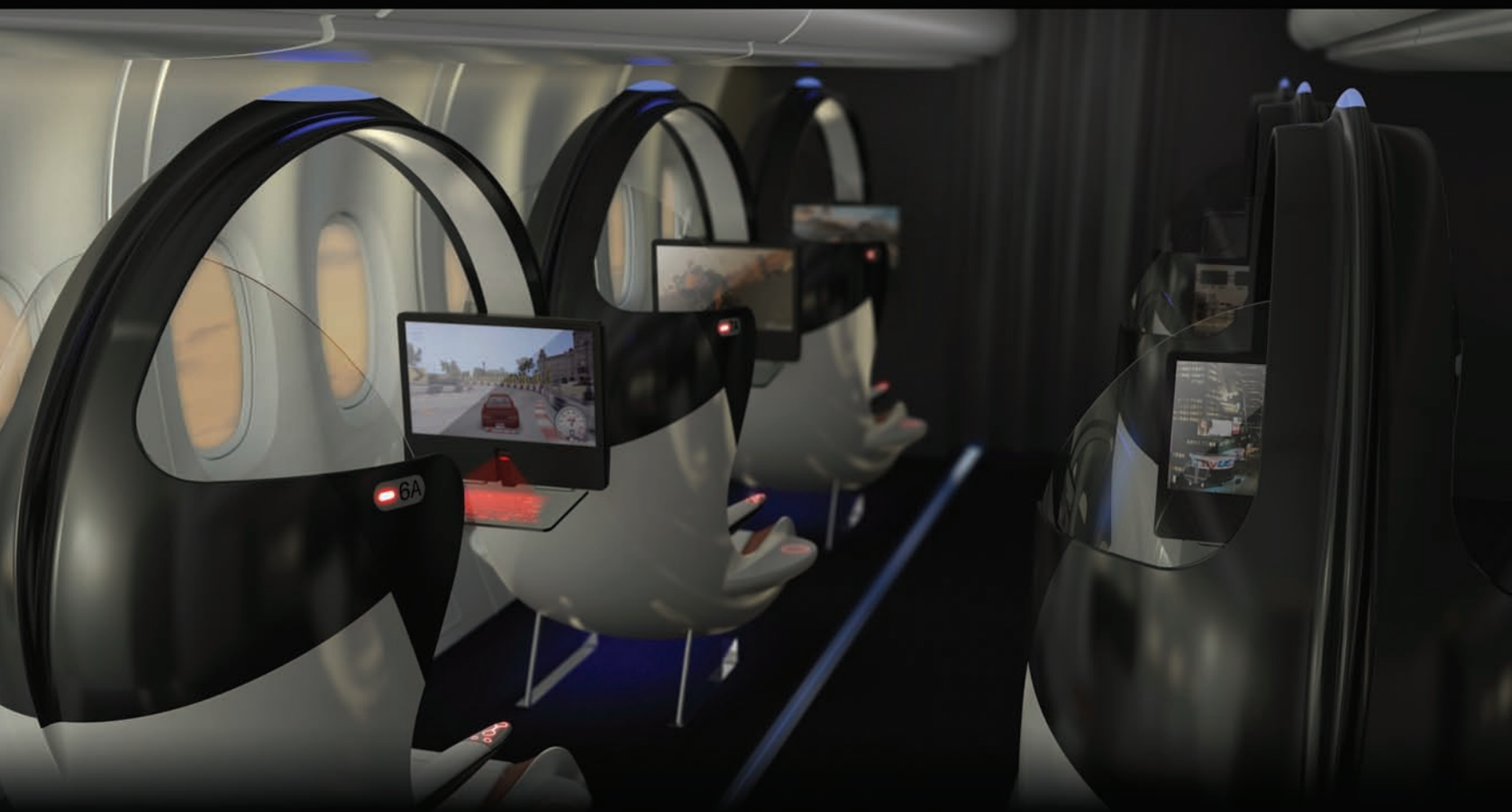

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The Armonia cabin for ATR's regional ATR-600 aircraft benefits from Giugiaro Design's multidisciplinary approach

Giugiaro Design was established in 1981 by Giorgetto Giugiaro, who was named Car Designer of the Century by the Global Automotive Elections Foundation in 1999. He was also awarded a place of honour at the Detroit Automotive Hall of Fame as well as at the European Automotive Hall of Fame in Geneva Palexpo, where he was named among 13 'immortals' of the European car industry.

Giugiaro Design is the industrial division of Italdesign Giugiaro, and is based in Moncalieri, Italy. Since 2010, Italdesign Giugiaro has been part of the VW Group, after having accrued 40 years of experience in the automotive field, working for major international car makers.

"The decision to develop projects other than cars came two years after setting up Italdesign Giugiaro," says Giorgetto Giugiaro. "Our new clients were keen to see how a designer so wrapped up in industrial problems would operate with products that were different but, nonetheless, bound to a philosophy of series production aimed at a well-defined market. We therefore started investigating other fields. Our transport business unit has gained an outstanding reputation over the years for translating quality design,

01-02. The Armonia cabin for the ATR-600 regional turboprop


01


02

> THE TWO MAIN GOALS WERE REDUCING WEIGHT AND CREATING MORE SPACE FOR PASSENGERS

03. A seat detail from the Armonia cabin

engineering and research into any transport solution: trains, buses, bikes, motorbikes, scooters and yachts."

ARMONIA When Giugiaro Design developed the new Armonia cabin, it considered it as an important step towards increasing its presence in the aircraft industry.

The company says designing for the aircraft industry was a real challenge, because it is a restrictive market with a lot of regulations and certifications. The Giugiaro Design team's goal was to design new elements for the Armonia cabin, incorporating weight reductions but keeping in mind the severe limitations and so avoid additional rounds of certification, which would have delayed the project and added costs. "Limitations are the real challenge for a designer," says Giugiaro.

The two main goals for the project were reducing weight and creating

> THE DESIGNERS TRIED TO CONCEAL THE TECHNICAL PARTS TO CREATE A WARMER AMBIENCE

more space for passengers, meaning more comfort.

The main idea was to create an emotional and stylish atmosphere in the cabin, trying to reinterpret the technologically advanced aeronautical components traditionally featured in a rational and unemotional way. The designers tried to conceal the technical parts to create a warmer ambience and allow passengers to feel more relaxed.

MATERIALS SELECTION A new design often implies wide research into new materials and technology. New composite materials have been used in several parts of the newly designed elements, but Giugiaro Design says it was also possible to achieve great results by making small modifications. For example the thickness of the foam was reduced as much as possible in all versions of the seats, making the ATR-600 a more fuel-efficient aircraft.

The Armonia cabin also features more space for its passengers. This goal was achieved by redesigning the overhead bins, making them deeper. Giugiaro Design believes the ATR is the only regional aircraft to enable passengers to take standard-sized trolley bags in the cabin.

New lighting technology has been used as an architectural element in the cabin to create a comfortable environment. Using a combination of light colours on window panels and coloured lights makes it possible for the whole cabin to have a uniform light ambience, supported by strategically situated indirect lights.

The objective for the illumination was to immerse the passenger in a warm and relaxing atmosphere. Colour-changing LEDs change the colour of the cabin smoothly for a stress-free travel experience.

"We could go on talking about how wonderful this cabin is," points out Giugiaro, "but the true innovation can only be understood through experience". ☒


04

04-05. Armonia has warm, uniform lighting


05

lessons from other sectors

Over the past 30 years, Giugiaro Design has gained solid knowledge from working in various fields and cooperating with companies at every level, worldwide, from small- and medium-sized enterprises to large multinationals. For example, in the electronics, food and beverage industries, Giugiaro Design boasts collaborations with leading corporations worldwide.

"My father founded Giugiaro Design to take advantage of the enormous opportunity the industrial design world was about to offer, applying our automotive design methodology to other mass-production sectors," says company co-chairman and styling director Fabrizio Giugiaro.

Long is the list of high-profile brands with which Giugiaro Design has collaborated, delivering projects for both interiors and exteriors in the transport sector. Giugiaro Design's interior work ranges from office furniture to home interiors, from utensils to medical equipment, from home appliances to consumer electronics. Moreover, the teamwork that has been cultivated between Giugiaro Design and academic institutions, contemporary artists, museums and exhibition centres, as well as other foundations, has led to several unique and innovative projects.

At the heart of Giugiaro Design's versatility is the adoption of a working method that is divided into steps, which can be used for any product. The company says this method enables a project to be developed for various areas of application, sticking to the same exacting approach.

"Having the possibility to operate in various different cultural contexts and domains has been extremely positive and useful for us – a solution envisaged in the automotive sector might be a happy intuition in the transportation design field, and vice versa," says Fabrizio Giugiaro. "But some aspects have to be considered – a luxury and high-performance car is a dream for all but a few people, whereas an aircraft has a larger number of end users."

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specialeffects

Altitude's focus on customised monuments has lead to some interesting projects with clients including Boeing and Air New Zealand

In 2008 Altitude Aerospace Interiors was launched. Since then it has been anything short of a rollercoaster ride for this New Zealand based company.

In just over three years it has delivered multiple customised monument programmes for airlines, a number of reconfiguration programmes (including two for VIP projects) and designed and built a Boeing 737 BBJ mock-up. The first of two VIP green completions is landing at its dedicated hanger in a couple of months, the other following closely behind. While this may make most stand back for a breath of air, Altitude is now using its experience to tackle a new area in the aircraft interior market.

CUSTOMISED PRODUCTS Designing and supplying customised interior components is at the forefront of Altitude's product offering. It specialises in designing one-off monuments for airlines that want to maximise their customers' travel experience and stand out from their competitors. Whether it's a unique bar monument, or something a little less complex, such as class partitions, Altitude aims to deliver the wow factor.


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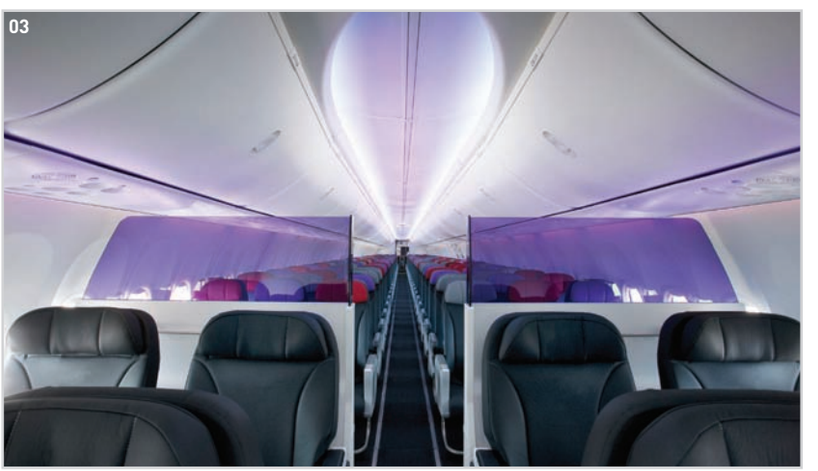
01. Injecting glamour into the galley
02. Altitude created 13 monuments for Air New Zealand's Boeing 777-300ER

One of the company's most recent products was the ultra-modern class dividing partition that was delivered to an Australasian based airline for its Boeing 737-800 fleet. The partitions provide a physical separation between business and economy class, but most importantly create a highlight feature to enhance the modernised interior that the airline desired. Distinctive to the design is the purple-tinted, frameless window made from polycarbonate thermoplastic resin.

While the aesthetic features were vital, the partitions also had to be functional. On the front is a coat-rack for business-class passengers, while the

> ALTITUDE SPECIALISES IN DESIGNING ONE-OFF MONUMENTS FOR AIRLINES THAT WANT TO MAXIMISE THEIR CUSTOMERS' TRAVEL EXPERIENCE



back of each partition allows for a 'hidden' carpeted footrest area, which offers additional legroom for economy-class passengers.

Altitude worked closely with the airline and met with them numerous times to ensure that the end result achieved their design expectations. The development process included building and reviewing mock-ups with the customer to ensure that the end product was just right.

WORKING WITH BOEING Altitude will deliver over 60 partitions to the airline for its Boeing 737-800 aircraft in the next two years. This programme follows on from two major customised product programmes for Altitude, including business- and premium-economy-class monuments for Air New Zealand's Boeing 777-300ERs and more recently, first-class monuments for a fleet of Boeing 747-8I aircraft supplied directly to Boeing.

While the specific details of the Boeing 747-8I first-class monuments are still under wraps until the launch of the aircraft in early 2012, Altitude says the process has been an interesting and challenging experience. Altitude engineers have become well versed in the documentation, testing, reporting and design requirements of a Boeing supplier furnished equipment (SFE) supplier. It has also meant that the Altitude team members have been based at Boeing during the engineering and design phase of the programme and during product installation.

AIR NEW ZEALAND The Air New Zealand Boeing 777-300 programme has been one of the largest airline customised monument programmes to date for Altitude. A total of 13 highly customised and technically complex monuments were designed and supplied as part of this programme, many constructed to fit unique spaces created by the non-standard seats and seating arrangements.

The 13 monuments designed as part of the Air New Zealand programme

03. Class dividers for an Australasian airline's Boeing 737-800 fleet

future galleys

The team at Altitude are now hard at work on a galley innovation project. Altitude and its manufacturing partners are investing heavily in galley technologies to put themselves in a position to be able to sell an entire suite of monuments, throughout the cabin. Altitude has noticed that customers want to be able to simplify their supply chain and at the same time be able to have an interior that is different from their competitor's. The company believes that its previous experience in designing and manufacturing other complex monuments puts it in an excellent position to offer this full suite of monuments – from customised bars to a suite of galleys. "This is a natural progression for us, and I think we can bring something new to the galley market," says Baden Smith, Altitude's head of airlines.

Galleys may not sell seats, but when viewed as a whole, Altitude believes a galley is an integral part of the aircraft and should be an essential part of the airline's brand. "Airlines can create a point of difference in two ways, either with the service to their passengers, or with their cabin interior," says Smith. "Galleys are special in that they can help with both. An excellent meal service is best delivered from a well designed galley that has the crew workload in mind and this shouldn't be at the expense of the way this monument looks."

Altitude is taking a considered approach when tackling galley areas. The weight of the overall galley system, the aesthetics, functionality (to increase cabin crew efficiency) and cabin traffic flow are all vital to the design of its concepts.

Major galleys are often placed at Door 2 on a wide-body aircraft, an area where most passengers are required to board. This is often the initial point of contact an airline's customer has with the aircraft. "The first thing passengers do is walk through a commercial kitchen space," Smith points out. He believes there is a real opportunity for airlines to use this area to introduce customers to their brand.

"We believe that Altitude's forte is in collaborating with an airline's marketing and interior design teams to develop solutions that differentiate an airline's cabin interior in a way that is consistent with the brand values of that airline," says Smith. "We don't just build anonymous grey boxes."

04. The M2 Bar business-class bar/galley on Air New Zealand's Boeing 777-300

included five business-class closets, a business-class bar/galley and ceiling at Door 2, a premium-economy closet, centre partition and ceiling assembly and three partitions/monuments at the transition zone from business- to premium-economy-class.

The business-class bar/galley at Door 2, or the M2 Bar as it is affectionately known by the Altitude team, is designed to provide a striking entrance to differentiate it from a traditional working galley zone. The full-height bar and galley unit contains refrigerated stowage for three full cars and two half cars. The ceiling feature has coloured LED lighting as well as task lighting for cabin crew.

Once the scheduled meal service has concluded, the unit transforms into a passenger entertainment area equipped with a self-service bar, servery and accompanying LCD monitor. A number of carefully selected materials were used in the manufacture of the unit. The customer's brief was a welcoming and elegant bar unit, with the functionality and storage space of a traditional galley.

Altitude's commitment to supplying products where the integrity of the design is completely intact is obvious. While the designs are often ambitious, Altitude uses the latest technology and computer modelling to ensure each product's feasibility, quality and compliance with the weight target before any panel is cut or moulded.

LEARNING THE LESSONS The lessons learnt during its inaugural three years have come hard and fast. In fact, Altitude has adopted a rigorous 'lessons learnt' session, which it holds with all stakeholders after each programme. Key to the outcomes of these sessions is creating policy or a team culture that ensures good lessons are duplicated, and those lessons which do not need to be duplicated are eliminated. General manager Michael Pervan looks at each lesson as an opportunity: "We are young and fresh, and I hope for the sake of our customers, we continue to improve. We are all about pushing the envelope, creating a desirable, interesting and highly technical piece of aircraft furniture." ☒

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Combining industrial design, mock-up capabilities and concepts engineering, Zeo aims to change the way interiors are brought to market

With the formal introduction of Zeo – the next incarnation of C&D Zodiac's prodigious, if under-the-radar, design group – Zodiac Cabin Interiors is stepping out from the shadows and entering the industrial design market.

"The idea behind Zeo is simple – great design is as much about the process as the product, and if we can impact both, we can truly become a catalyst for major change," says Scott Savian, EVP of customer and product at C&D Zodiac.

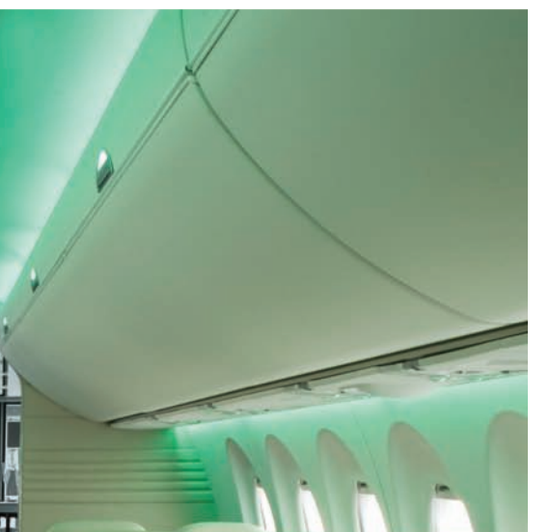
To realise this vision, Zeo has co-located three interdependent groups – Industrial Design (led, starting from January 2012, by industry visionary Ian Scoley), Advanced Concepts (fronted by industry and C&D veteran Steve Kearsey), and the Mock-up & Prototype team (run by C&D's Dick McClure).

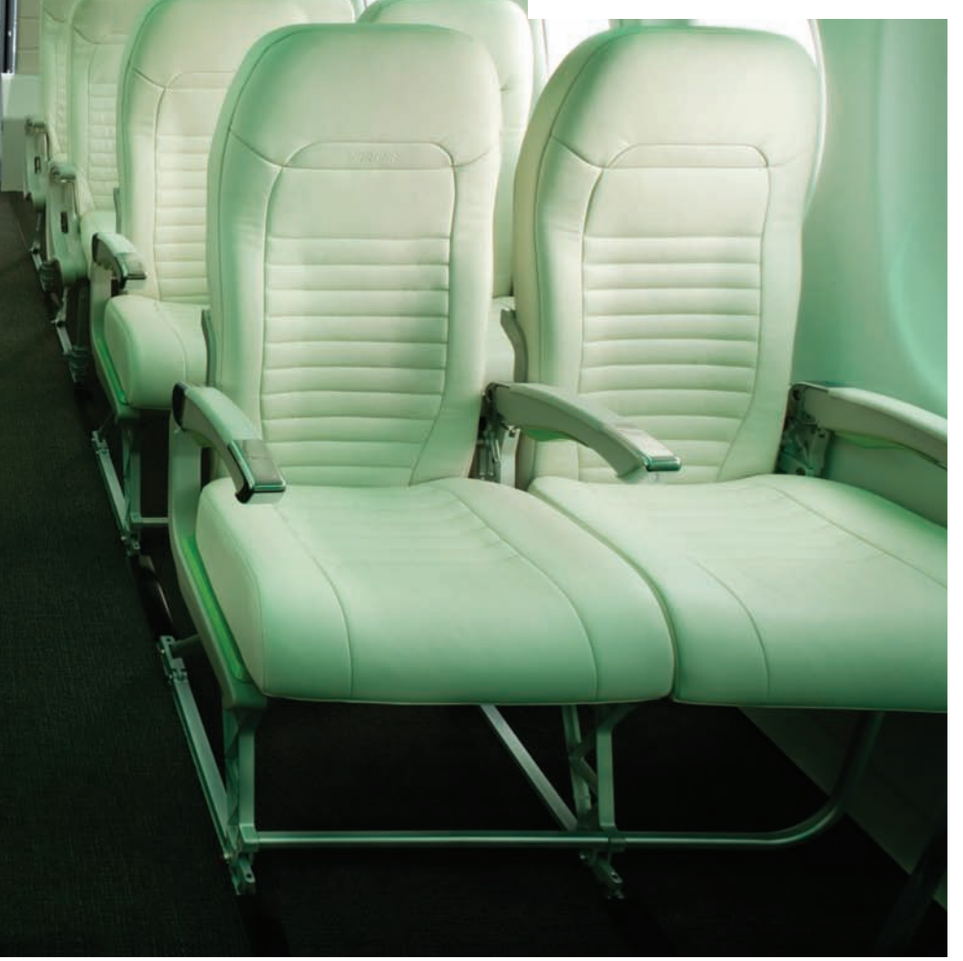
"The Zeo initiative with integrated engineering and mock-up capability really put the hook in me," says Scoley. "The ability to derive, develop and deliver mature cabin solutions from within one team is unique in the industry. This combined with the capabilities available within the Zodiac group makes the whole constellation even more compelling."

Zeo is based in the new 35,000ft^2 Zodiac Cabin Interiors Customer &

01. On the CSeries, the surface shapes and lighting are optimised as one
02. The CSeries cabin demonstrator

> GREAT DESIGN IS AS MUCH ABOUT THE PROCESS AS THE PRODUCT, AND IF WE CAN IMPACT BOTH, WE CAN TRULY BECOME A CATALYST FOR MAJOR CHANGE





03. The CSeries' pivoting overhead storage bins

Product Center, due to open formally in early 2012. The groups sit together in interdisciplinary project teams – designed to speed up the development process, elevate the level of innovation and ensure robust execution.

THIS APPROACH AT WORK C&D believes that this way of working has already captured benefits on numerous high-profile projects, such as the Bombardier CSeries integrated interior and the C3 Premium Cabin; the latter of which was displayed at Aircraft Interiors Expo 2011 in Hamburg, Germany, and featured on the front cover of the June 2011 issue of *Aircraft Interiors International*.

For the CSeries cabin, Bombardier partnered with C&D with the goal of optimising the whole interior, not just the individual interior components. The C&D design, mock-up and engineering teams (now Zeo) worked with Bombardier to develop an interior that marries the industrial design with the functional aircraft systems.

The results of this approach are tangible. For instance, despite a smaller fuselage, C&D says the overhead bins actually carry more baggage than today's single-aisle competition. This

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> USING 100% CATIA MODELLING ENABLES A SEAMLESS TRANSITION FROM INDUSTRIAL DESIGN TO ENGINEERING, TOOLING AND PRODUCTION

was accomplished by an optimisation exercise that included, as part of the interior design, the integration of previously separate cabin systems such as electrical, lighting, environmental control and oxygen. This not only optimises bin space for the passengers, it improves head and aisle room as well. Further, this effort resulted in a 50-70% reduction in components for Bombardier to install.

INTEGRATION OF PROCESSES ZEO believes it is alone in the industry in using 100% CATIA modelling, which it says enables a seamless transition from industrial design to engineering, tooling and production. As such, there is no data loss or redundant effort – engineers and designers share models, helping to ensure the harmony of ID shapes. "Subtle changes in shape can have a profound impact on the feasibility and certification of a product. Our challenge is to help establish a compelling industrial design that does not adversely impact other key aspects of the programme," says Kearsey. "This helps us see that the true design intent and innovations are fully realised in the final product – our customers' initial concepts actually reach production."

Zeo aims to redefine the possibilities in premium cabins as well. Ben Orson, Zeo's director of Industrial Design for premium cabins, notes that the studio is aiming to lead the industry into complete premium cabin solutions such as the C3 project. "To maximise the value and impact, the premium cabin should truly be about the entire cabin," he says. "The development of the premium cabin has become a little narrow of scope in recent years. Designers have poured huge effort into arranging seats within the cabin looking for the last few unexploited efficiencies then customising these layouts to suit the aspirations of their clients. While these types of exercise will remain essential components of any successful approach, our belief is that Zeo's unique capabilities will allow our designers a little more latitude to express themselves." ☒

time flies

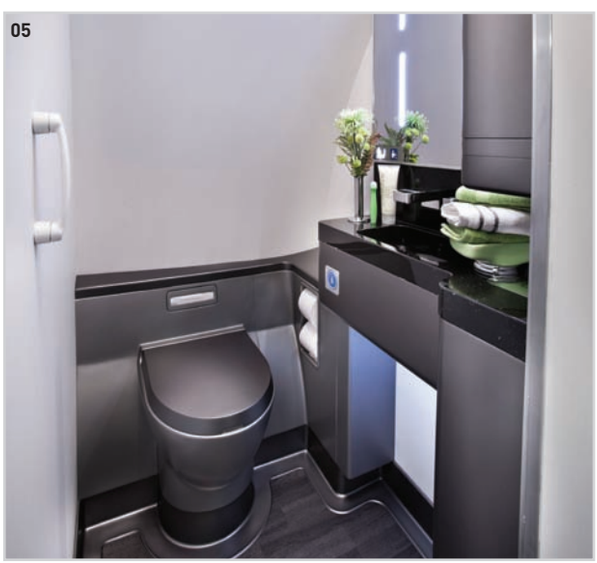
Zeo, as C&D's design studio and mock-up shop, has led or collaborated on a number of high-profile jobs over the last few years, including complete interiors for Bombardier CSeries, Learjet 85, Irkut MC-21 (see feature in the September 2010 issue of *Aircraft Interiors International*), and Hondajet aircraft, as well as major product programmes such as the A350 lavatory.

The studio has also played a key role in several premium cabins, and believes that this arena is ripe for innovation. Zeo set out to demonstrate this with the C3 premium cabin displayed at Aircraft Interiors Expo 2011.

A complete premium cabin for a wide-body aircraft, the solution was developed from the initial concept in only five and a half months. Highlights include a single, larger aisle; passenger-dedicated (and transverse) overhead storage bins; a new seating system; and complete liner and lighting integration.

"A rapid and complete effort of this quality and detail is only possible when the designer has the capabilities we have in-house," says Dick McClure, head of Mock-up and Prototype at Zeo. "In fact, the product design was only part of the capability that Zeo wanted to show with the exercise. The ability to drastically reduce lead times to develop new innovative solutions that can meet tough certification, production and functional demands is just as critical to Zeo's plans."

04. The galley and entryway on the CSeries
05. A CSeries lavatory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ZEŌ – THE NEW INCARNATION OF C&D'S DESIGN STUDIO

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arabianflights

Honour Branding was chosen to redefine Saudi Arabian Airlines – a fascinating journey in creating the ultimate Arabic experience

"Simple and elegant with an Arab touch" were the words His Excellency Khalid Al Molhem, director general of Saudi Arabian Airlines, used to describe his vision for the future of the airline. Honour Branding was the fortunate company appointed to bring this alive throughout the customer experience.

The airline has a clear ambition to realign its customer experience with the "elegance and mystical wonder" of the Arab world. Rather than go for a homogenised experience, Saudi Arabian Airlines wants to celebrate its cultural heritage and bring the best of the Arab world to the 20 million passengers who fly with the airline each year.

With a privatisation programme under way and a major investment in new aircraft – beginning in January 2012 with the delivery of the first of 20 Boeing 777-300ERs, Saudi Arabian Airlines is now reviewing its entire product, both on the ground and in the air. The first step was made in early 2010, when Honour Branding was appointed to identify a new strategic direction for the brand, along with developing a 'binding theme' to refresh the passenger experience from start to finish. Creating consistency was high on the to-do list for the airline, with the last major refresh being almost 15 years ago. As with any business, inconsistencies had crept in.


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01. The new Arabic-inspired colour palette
02. Signature 'amethyst wash' lighting

POINTS OF DIFFERENCE So committed was Saudi Arabian Airlines to doing this right, that it undertook an extensive immersion and research stage, incorporating interviews at an executive board level through to focus groups with frontline staff. Honour Branding's managing director, Gerrie Smith, together with her team, worked closely with the airline's management to discover what truly sat at the heart of the business and differentiated the airline from its competitors.

> WE WANT OUR VALUED CUSTOMERS TO GET A REAL SENSE OF SAUDI HOSPITALITY AND ELEGANCE

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03. The new theme extends to all brand collateral – including ticket wallets and bag tags

One such aspect is the airline's policy of customer segmentation. As with any carrier, the business traveller market is of vital importance, but for Saudi Arabian Airlines the religious market is also hugely important to the business; so both had to be addressed.

Following an intense strategic period, new positioning was agreed that reflected the airline's confidence in the region and pride in its culture. Supporting the positioning, Honour Branding then developed a new and refreshing design language, which brought alive the strategic direction for all future projects.

Central to the new design language was the creation of a secondary device and an Arabic-inspired colour palette. Personally selected by the director general, the 'Arabic curve' device was drawn from the corporate identity insignia mark. The new palette captures the characteristic colours of Saudi Arabia and the wider Arab world.

Using these two new elements a binding theme was created, designed to lead the customer through their travelling experience, and signal change and investment in the business. It was decided that the perfect launch for this fresh new look was in the colour and trim of the airline's soon-to-be-delivered Boeing 777-300ER.

"Consistency in product and experience is of vital importance to us," says Hazem Sunbol, general manager of products at Saudi Arabian Airlines. "We want our valued customers to get a real sense of Saudi hospitality and elegance, reflecting the best of the Arab world, the moment they step on board."

PERSONALITY The old interior language was dominated by a corporate blue palette characteristic of national flag carriers in the late 1990s. Honour has replaced this with a more individual palette of tonal shades inspired by the subtlety of the Arabic landscape.

Always thinking holistically, Honour developed an overarching cabin strategy that would communicate the Saudi Arabian Airlines story as a whole. Considering every touchpoint – from a unique tedlar design through to the smallest detail in the combination of the warm tonal shades of the seat trim, no aspect was left untouched.

Working with Boeing and B/E Aerospace, Honour began to translate this new cabin strategy into airworthy trim and finish products. With close involvement at the most senior level within Saudi Arabian Airlines, Smith's visits to Jeddah were numerous, with doors always open and the consultant's dream of speedy approvals.

04

brand power

Since its launch in 2004, Honour Branding has stayed true to its passion and focused on building an airline branding practise. One of the very few dedicated airline branding consultancies, Honour has accumulated an impressive amount of aviation experience.

"We provide our clients with a unique depth of knowledge in airline change programmes that goes beyond delivering a simple brand strategy or cabin interior design," comments Gerrie Smith, managing director of the London-based consultancy.

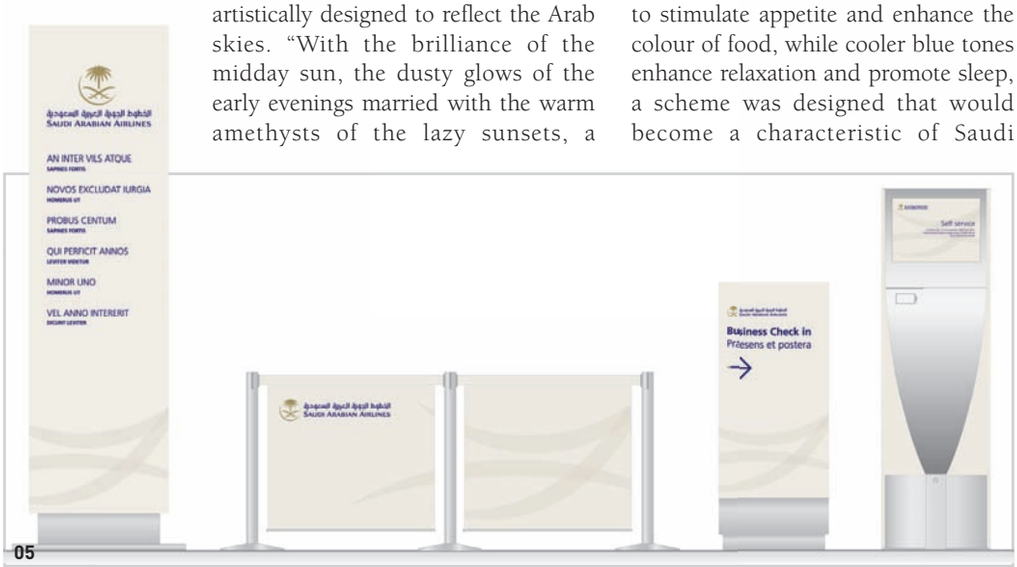
04. At lunch time the cabin is lit by an amber glow
05. The Arabic curve used on airport signage

Making the most of every opportunity we had, we've transformed our cabin to mirror the elegance of the Arab world," comments Yousef Attiah, executive vice president, commercial, at Saudi Arabian Airlines – directly on brief from the ambitions of His Excellency the director general. Indeed, even the cabin's ambient lighting was artistically designed to reflect the Arab skies. "With the brilliance of the midday sun, the dusty glows of the early evenings married with the warm amethysts of the lazy sunsets, a stunning theatrical lighting scheme was created," says Smith.

Care was spent here to both the short- and long-haul experience, ensuring that everyone using these aircraft – even if only on a 90-minute hop to Dubai – gets to enjoy a taste of the Arabic skies. "Working with the knowledge that warm tones are proven to stimulate appetite and enhance the colour of food, while cooler blue tones enhance relaxation and promote sleep, a scheme was designed that would become a characteristic of Saudi Arabian Airlines," says Smith. "We created an 'amethyst wash' signature lighting effect that our client can own and its customers will grow to associate that with the airline, whether travelling short- or long-haul."

With major works taking place on the ground at airports in both Jeddah and Riyadh, and a new Jeddah airport scheduled to open in 2014, there will be many opportunities to integrate this colour and branding on the ground at check-in and in the new lounges, so as to create a holistic and seamless experience for all customers.

From January 2012, customers choosing to fly with Saudi Arabian Airlines in and out of the kingdom will get to experience a taste of the Arab world. But this is only the beginning, as Saudi Arabian Airlines is now working conscientiously through the entire passenger experience, taking every opportunity to enhance it while celebrating the various routes. Honour Branding continues to work with the airline to enhance customer experience, acting as a 'brand guardian'. ☒



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SUPPLIERSHOWCASE

progressreport

Recaro explains how it kept up with demand during a very busy year for its newest weight- and space-saving economy-class seats

For many, the ideal economy-class aircraft seat must be slim, to enable a lower seat pitch; lightweight, to reduce fuel spend and therefore the airline's carbon footprint; attractive and comfortable, to please passengers; and economical. Clearly producing such a seat is no easy feat, but both Recaro's latest economy-class seats (the BL3520 and SL3510) are designed to tick all these boxes.

"Our focus in 2011 has been on the efficiency and cost-effectiveness of our seats, throughout the entire product lifecycle," explains Eckhard Behnert, director of product management at Recaro. "We have developed new products featuring lower weight, advanced materials and intelligent construction to support airlines in their efforts to operate more economical, environmentally friendly flights. This is why we presented our seats at shows in 2011 in a striking shade of green – Recaro has gone green!"

BIG ORDERS The BL3520 has already proved itself in terms or orders. "The Lufthansa Group was our launch customer for this seat and we have supplied more than 40,000 units for 200 aircraft," says Behnert. Of these, 32,000 units were supplied to Lufthansa, with the remaining 10,000 split between Austrian, Brussels, Germanwings and Swiss. Another success was Airbus's inclusion of the seat in its BFE catalogue.

"One of the biggest challenges was to design, test and certify the BL3520 and to ramp up production within a limited timeframe," says Behnert. "Another challenge was ensuring a steady supply of seat components in the right quantity and quality to our two manufacturing sites."

Close coordination with the customer was a key factor in the project. The total number of miles driven (nearly 7,500) between Recaro's facilities in Schwaebisch Hall to

01. Recaro's BL3520 seat, which replaces foam cushions with netting

> ONE OF THE BIGGEST CHALLENGES WAS TO DESIGN, TEST AND CERTIFY THE BL3520 AND TO RAMP UP PRODUCTION WITHIN A LIMITED TIMEFRAME

customers based in Frankfurt and Hamburg attests to the fact that, along with digital communications, face-to-face collaboration plays an important role at Recaro.

During the design phase, Recaro paid close attention to enabling airlines to stamp their brand on the seat – whether through their signature colour, logo or specific design elements. Signature elements include the literature pocket, coat hooks, seatbelt and table latch. "Our goal was to achieve maximum customisation with minimum impact on testing, licensing and tooling costs for our customers," explains Behnert.

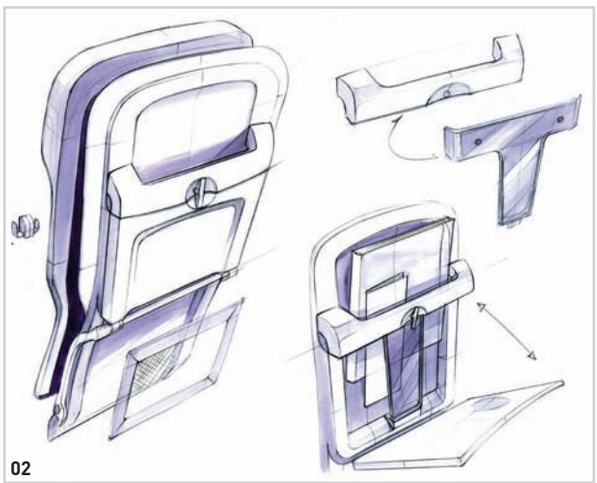
TRIMMING WEIGHT Visually, the design was reduced to the essentials to trim weight and maximise space utilisation, for the benefit of both passengers and airlines. The slim-line silhouette was enhanced with details including re-proportioned armrest and a new end-bay design.

Improving comfort, in terms of both living space and ergonomics, was of vital importance. Recaro used the latest findings from research conducted with various universities to determine the ideal contour for the seat, and in particular for the seat pan cover.

The frame structure and stretched netting function without foam. "This took time to get just right," says Behnert. "One of the biggest challenges was to find the most suitable material in terms of elasticity and flammability. We also had to develop a wrinkle-free solution for attaching the material to the frame."

To test the comfort of its creation in practice, Recaro turned to 300 of Lufthansa's frequent flyers and staff, who gave the seat top marks for criteria including the ability to stretch out and the overall legroom.

Consistent weight tracking also played a key role in the product development process. "If an assembly



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or component exceeded our target weight by more than 2g, an alarm went off," says Behnert.

Weight was reduced by 30% compared with the previous model. "We lowered the weight of each assembly by reducing the number of parts and using new processes like extrusion for the backrest and injection moulding for the armrest," says Behnert. "We also implemented new joining technologies, removed the foam and integrated innovative solutions."

Shortly before the start of series production, the final report revealed that the seat was actually below the target weight, much to the delight of Recaro's project managers and the airline customer. Lufthansa says the new seats reduced the weight of its A319 fleet by 131,200kg – resulting in a 4.3% reduction in fuel consumption for this fleet.

02-05. The BL3520 maximises living space with a slim backrest and the high position of its literature pocket

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> AFTER THE GREAT SUCCESS IN EUROPE, WE WILL CONCENTRATE ON THE MARKETS IN THE USA AND ASIA IN THE NEXT PHASE

"Our seat is not only lighter, it takes up less space in the cabin," says Behnert. "As a result, six more seats can be installed in an A319. And this adds up to more than 2,000 additional seats for the whole Lufthansa fleet."

TIME TRIALS Recaro's prototype shop set a new record with the BL3520. Within six weeks the five-man department built 13 fully functional prototype seats for the first customer presentation. "During this time the lights in the shop were burning late into the night," recalls Behnert. "Series-production parts for a new seat like the BL3520 simply don't exist. Our team was also faced with a number of unprecedented technological solutions. This means that they had to try things out, simulate new ideas and continue to improvise until the form and function were just right."

Examples include the milled aluminium 'bridge' on the backrest, and the literature compartment made from lacquered plastic instead of the transparent material used in series production. The prototype team had a tough nut to crack with the seat pan cover, but its efforts clearly paid off. "They managed to meet the deadline and convince the customer to give us the contract," says Behnert. Afterwards, the team got to work on building 40 more prototype seats for the engineering test phase.

The virtual assembly line ran at full speed long before the first shipset left the production facility. Managing such an extreme production ramp-up required Recaro to organise planning down to the finest details. For the global order management, purchasing, supplier management, industrial engineering, assembly and quality assurance departments, this boiled down to hard figures – two shipsets per day. One shipset was manufactured at the main plant in Schwaebisch Hall, the second came from Recaro's factory in Swiebodzin, Poland. "The fact that we supply top-quality products from two plants in Europe is a key advantage in projects like this," says Behnert.

To make production as smooth and reliable as possible, the Recaro BL3520 team set another record – in final assembly, only around 200 parts and modules are required for each shipset.

The next steps were clearly defined. A key focus for the BL3520 was on European licensing requirements. "After the great success in Europe, we will concentrate on the markets in the USA and Asia in the next phase," reports Behnert. "We also need to integrate live TV, AVOD, a headphone plug and a PCU control panel. As well as the leather model, the BL3520 will be available in a fabric-covered version."

AWARD SUCCESS Along with its sales success, the BL3520 also triumphed in the 2011 Crystal Cabin Awards, winning the Industrial Design/Interior Concept category. It is not the first time Recaro has won this category – its SL3510 short-range economy seat took the title in 2009. The BL3520 also took top honours in the Transport/Traffic category at 2011's Focus Open – International Design Award; while the SL3510 was chosen as one of 365 'landmarks' in Germany's Land of Ideas 2011 competition.

"National and international awards like these are important incentives – they show us that we are on the right track with our lightweight products," says Behnert. "More 'green' ideas are already in the pipeline." ☒

green dreams

The BL3520 it not the only product to demonstrate Recaro's 'green' side – the SL3510 short-range economy seat (pictured below) is also designed to save weight and fuel. "When we introduced the SL3510 into the market in 2010, we showed how much we can lower weight in the economy-class cabin," says Behnert. "This seat represents a quantum leap."

In fact the seat weighs about 9kg per passenger place – including the structure, standard foams, seatbelts, fabric dress covers, fixed tray table, net literature pocket, spreader cover, baggage bar, injection-moulded armrest with armcap and life vest pouch. Recaro believes the SL3510 comes in 5kg lighter than conventional seats. Launch customer Air France says the SL3510 weighs 40% less than previous models and saves it 1,700 tonnes of jet fuel each year, reducing CO_2 emissions by 5,200 tonnes.

The seat features a slim and ergonomically shaped backrest preset at a 15° angle, and a headrest that provides support in resting or sleeping positions. The aluminium frame is covered with netting that adapts to the curve of the passenger's spinal column.

"The SL3510 uses far fewer parts and is much easier to access for maintenance. Tried and tested in the automotive industry, the seat's innovative materials are not only extremely durable, they are also very light," comments Behnert. "The SL3510 is a product innovation that has performed extremely well in constant operation since its introduction."

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leatherforever

A commitment to sustainability and longevity is driving the development of Andrew Muirhead & Son's 'Low Carbon Leather'

Scottish leather manufacturer Andrew Muirhead & Son is continuing to hone the quality and lightness of its 'Low Carbon Leather', addressing rising concerns over fuel costs, sustainability and carbon emissions.

The made-to-order leather, which was launched in 2010, comes at no extra cost to the customer and is 30% lighter (approximately 600g/m^2), while still 1mm thick. "Still 100% genuine leather; less weight does not mean less leather," says Archie Browning, sales director at Andrew Muirhead & Son. "It is not reconstituted, recycled or rehashed and has greater elasticity than standard leather, which allows for more flexible use. The raw material has not changed and it has all the properties you expect from genuine leather."

NO WASTE In compliance with accredited quality management systems, Andrew Muirhead & Son's leather also demonstrates the company's commitment to its parent company's (Scottish Leather Group's) zero waste strategy. Hides are taken after tanning from sister companies NCT Leather and W. J. & W. Lang and manufactured at Muirhead's site in Glasgow, Scotland. The waste is then taken to Scottish Leather Group's recently opened £6 million thermal energy plant, which converts process waste to energy on the group's site at nearby Bridge of Weir.

Operating a vertically integrated structure, Andrew Muirhead & Son retains full control of the manufacturing process, which it says is crucial for maintaining quality, and most importantly, meeting all its various customers' requirements.

Environmental sustainability is seen as a requirement, not a choice, throughout the company's operations. Hides are locally sourced, which limits 'hide miles' and again contributes to a lower carbon footprint.

"Andrew Muirhead & Son knows that sustainability is key to the company's long-term prosperity and, indeed, staying ahead of the competition," says Browning. "The

01-04. Muirhead's latest trends forecast a collection of inspirational designs from various companies and industries

01

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> THE INVESTMENT IN THIS ENVIRONMENTAL TECHNOLOGY WILL ALLOW LEATHER MANUFACTURING TO REMAIN ON THE SITES FOR MANY YEARS AHEAD


04


03

investment in this environmental technology will allow leather manufacturing to remain on the sites for many years ahead."

The company also believes its Low Carbon Leather, in conjunction with the introduction of biofuels to the market, is helping airlines to stay ahead of their competitors.

"With jet fuel prices still at an all-time high, despite marginal price softening in line with international market rates, Andrew Muirhead & Son leather promotes energy efficiency and renewable energy," says Browning. "Savings on operational costs resulting from the lighter leather ensures less fuel is needed and has the knock-on effect of reducing carbon emissions."

Andrew Muirhead & Son is currently supplying to two aircraft within the Boeing 787 programme, working with an existing customer from the Americas.

"In its strategy to define aviation, Boeing earlier this year put forward a view that the market landscape was being rehashed by both globalisation and new competitors in the aerospace industry. Always selecting the most capable products in the market, its commitment to innovation ensures that Boeing is also looking to increase production rates by 40% in the next three years," says Browning. "Boeing is also continuing to progress its aviation and environmental sustainability campaign within the UK. A high priority within the sector, its specification of Andrew Muirhead & Son leather assists in meeting the increased standards."

A feature in their cabins for many years, Andrew Muirhead & Son also continues to supply to the Emirates Boeing 777 and A380 programmes.

TREND SPOTTING Working with luxury airlines means that Andrew Muirhead & Son feels it must stay at the forefront of trends forecasting within the aviation market. The company believes this forecasting helps its customers to anticipate trends in colour, style and mood, which can


05

> THE MAIN DRIVER IN TEXTILE SELECTION IS TO WORK WITH A LIGHT MATERIAL FROM A MANUFACTURER THAT HAS SUSTAINABLE SOURCES

subsequently be reflected in aircraft interiors. "The main trends for this year incorporate natural colours, pastels, skin tone shades and Post-it note colours," says Susan Ross, design consultant at the company. "Andrew Muirhead & Son is able to offer a bespoke service, creating leather colours to each specific requirement. The trends information is presented as a guide for customer inspiration when selecting leather. Compiled from research undertaken throughout the previous year, it focuses on colours, grains and finishes in four trend groups: Showtime, Skin Zone, Rationale and Urban Jungle."

05. Muirhead leather installed in Emirates' first class
06. The company's leather flies on Singapore Airlines' A380

QUALITY MATTERS While trends change from year to year, Andrew Muirhead & Son never compromises the quality and durability of its leather.

"Unlike some cheaper leather products, our leather wears well and can be left for 8-12 years without worrying about tearing or bad yield," contends Browning. "When specifying leather, quality is imperative. Higher quality results in increased longevity – think long term over short. Increased fuel prices and tax mean our customers are looking to address the carbon issue in more ways than one and Andrew Muirhead & Son is helping them to achieve this."


06

In the current economic climate, aircraft refurbishment may perhaps be more common than before, especially with the continual development and emergence of brands who charter used aircraft to service more routes.

"Initial perceptions and the overall impression that is gleaned from the use of a quality product in instances such as these are tantamount to the reputation of an airline," says Browning. "In all contracts, Andrew Muirhead & Son leather will deliver a quality and longevity that will not go unnoticed."

British Airways is a long-term customer and specifies Low Carbon Leather on its entire short-haul fleet. Francesca Zaccaria, design management executive at British Airways, says the airline's decision to work with the supplier was based on the leather's sustainability, durability and longevity.

"It is always important to use light materials that are sustainable, especially within aviation, which is not seen as a sustainable industry; we have to compensate in any way possible. One gramme may not seem like much, but has an enormous impact on fuel consumption and reducing our carbon emissions," explains Zaccaria. "The main driver in textile selection is to work with a light material from a manufacturer that has sustainable sources. We wanted to use a greener product and were introduced to Andrew Muirhead's sustainability programme, which was rated very highly. Its leather has a high level of resistance to wear and tear and we require highly durable leather that does exactly this." ☒

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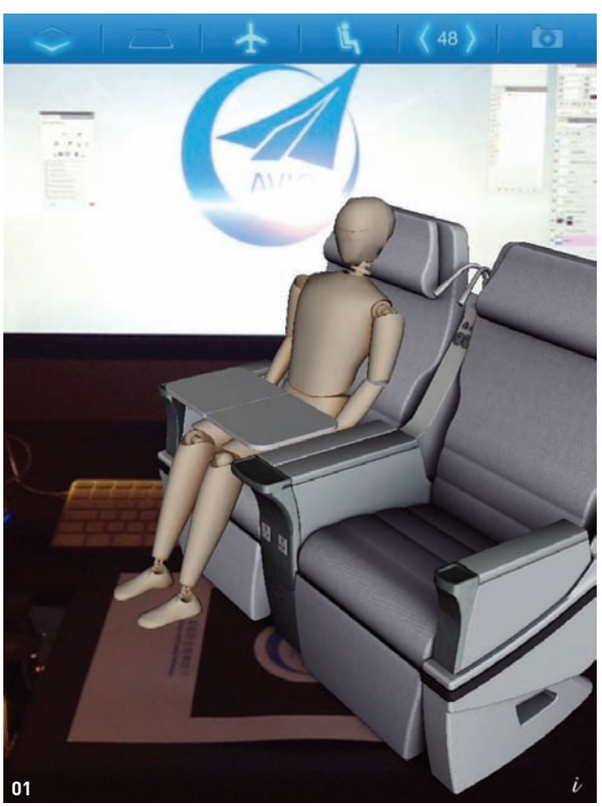
realitycheck

JUST is tapping into the augmented reality revolution to showcase its seats

Picture the scenario: an airline executive has returned from an interiors tradeshow, where she was looking for a new seat model for the company's fleet. She met various seat manufacturers' design and engineering teams, sat in the seats and envisioned them in her aircraft. After lengthy discussions she narrowed the decision to three seats and had the marketing information on her desk; now it was time to decide. There were photos of the three choices but, without the products in front of her, it was difficult to envision any of the seats in the aircraft cabin. Then she noticed a tablet in one of the presentation kits. When she turned it on an image of the seat appeared. She could look at the front, the sides, the back; with a few motions of the hand, she put the seat into the cabin section. She changed the pitch, moved the seat forward, moved it back, reclined it into all its positions and opened the table. Science fiction? No, it is called augmented reality (AR), it is available today, and businesses are racing to incorporate it in as many product applications as they can.



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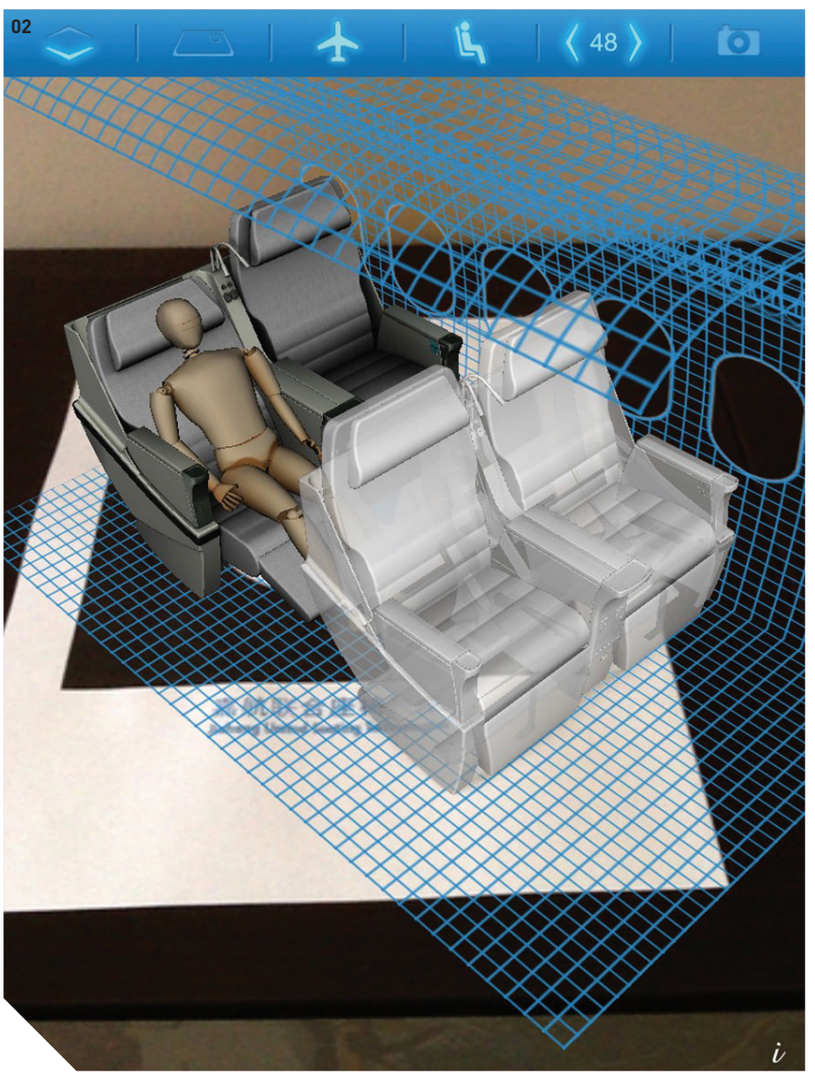


AR is a term for a live, direct or indirect view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics or GPS data. It is related to a more general concept called mediated reality, in which a computer modifies the view of reality. As a result, the technology functions by enhancing one's current perception of reality. By contrast, virtual reality replaces the real world with a simulated one.

AN EMERGING TECHNOLOGY In 1990, Boeing researcher Tom Caudell first coined the term 'augmented reality' to describe a digital display used by aircraft electricians that blended virtual graphics on to a physical reality. As for the computer science world's definition of AR though, it's more detailed, but

> SEATS AND INTERIORS CAN BE VISUALISED IN A COMBINATION OF REAL AND VIRTUAL ENVIRONMENTS

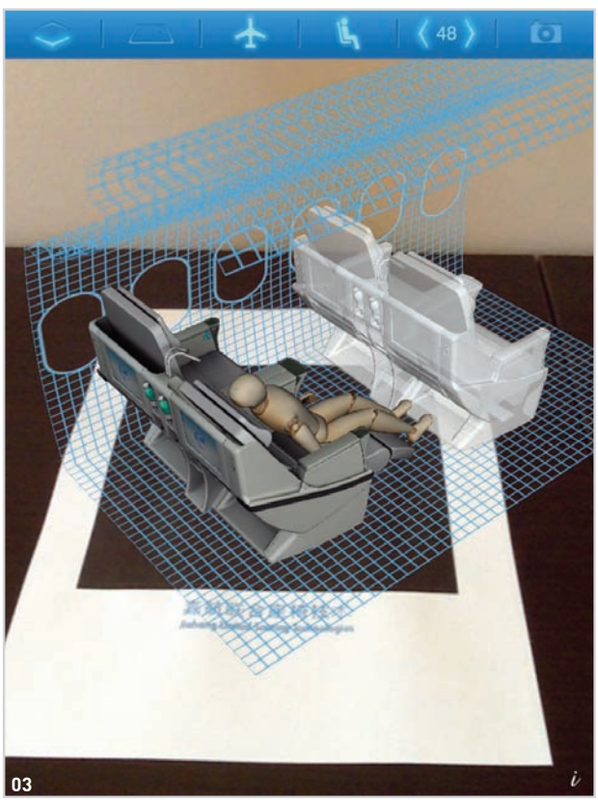
essentially the same: AR is the interaction of superimposed graphics, audio and other sense enhancements over a real-world environment that is displayed in real-time.

About six million AR apps were downloaded in 2010, according to ABI Research, still a small fraction of the overall app market. But the number is projected to increase to 19 million downloads by the end of 2011 and balloon to nearly one billion by 2016.

In aircraft seating and interiors, Optimares and Jiahang United Seating Technologies (JUST) have teamed up to apply the technology to the presentation of their products and have entered into an agreement with Ascanio Malgarini, a media communications agency based in Latina, Italy, to create the JUST AR app, which is expected to hit the App Store any time now. Using AR, the seats and interiors can be visualised in a combination of real and virtual environments, enabling the presentation of the product without all the logistics, packing and unpacking, costly transportation and effort required to show it in person. With the application marker it is possible to visualise, in high-definition, the seat(s) as a static display or in motion. Complementary aircraft data such as percentile humanoids, seat pitch adjustments, motions of tables, seatback recline, footrest/legrest, aircraft interior contours, etc, can be added.

Will the AR app eliminate or replace the aircraft seating and interiors tradeshows? Probably not, but JUST believes it could help companies to make the most of the investment made in these events; and reach clients who would prefer to have the initial presentation in their own office. ☒

01-03. JUST's new AR app is designed to help airlines get a better feel for its products in a range of scenarios



the evolution of AR

Until 1999, augmented reality (AR) remained very much a scientist's toy. Expensive, bulky equipment and complicated software all meant that the consumer never even knew of this growing field – as far as they were concerned, explorations into virtual worlds had died along with *The Lawnmower Man*. All that was to change when Hirokazu Kato of the Nara Institute of Science and Technology released the ARToolKit to the open source community. For the first time, it allowed video capture tracking of the real world to combine with the interaction of virtual objects, and provided 3D graphics that could be overlaid on any OS platform. Although the smartphone was yet to be invented, it was the product that enabled a simple, handheld device with a camera and an internet connection to bring AR to the masses.

In 2000, it was the turn of another consumer favourite to get involved with the AR revolution. Bruce Thomas and his team in the Wearable Computer Lab at the University of South Australia demonstrated the first outdoor mobile AR video game. Years later, in 2008, the first AR apps came to smartphones, enabling the world to actually begin to enjoy the experience somewhere close to what it's supposed to be. Mobilizy was among the pioneers, bringing its Wikitude app to the T-Mobile G1, which enabled Android users to take in the world through their mobile phone cameras and see augmentations of nearby points of interest.

With the term only coined in 1990 by Tom Caudell, and the practice just reaching consumers two or three years ago, AR is barely out of its embryonic stage. Relatively speaking, the devices so far have been crude and the applications are only just starting to be written. But dawn has arrived in the AR world – as databases grow and the speed and ease of connections to them rise, this field is now really about to spring into life.

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sweetharmony

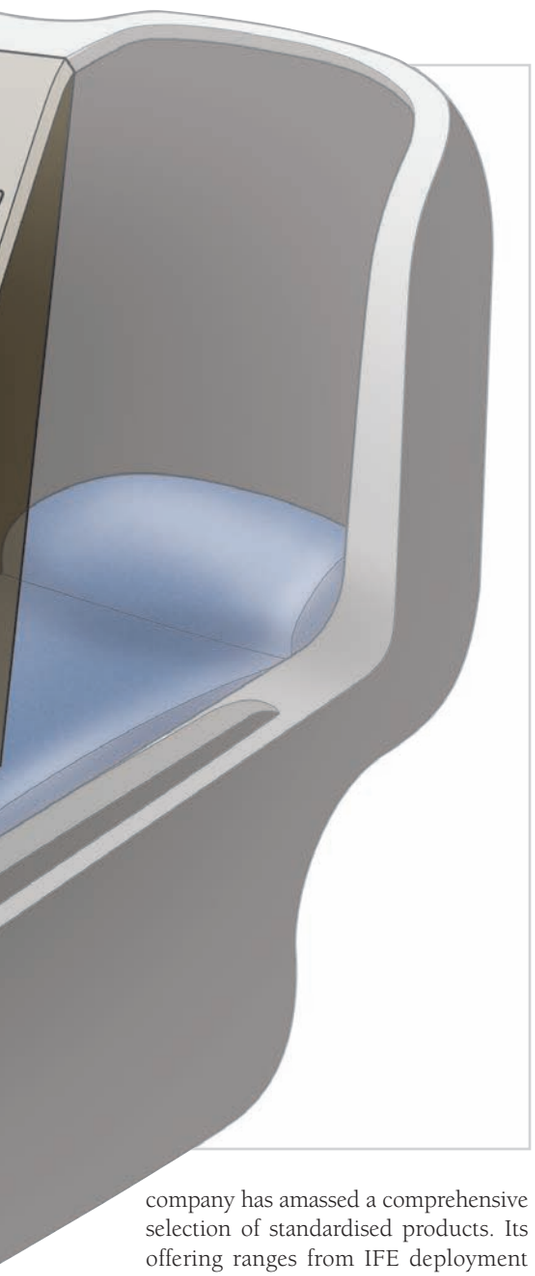
Bucher Aerospace says a collaborative approach is the best way to deal with the conflicting demands of differentiation and harmonisation

As the air travel industry becomes increasingly competitive, airlines and completion centres are continually striving for unique cabin interior designs to differentiate their products and services. At the same time there is substantial momentum behind harmonising product offerings and providing solutions that are seamlessly integrated. The former approach is perfectly illustrated by Air New Zealand's launch of its newest Boeing 777-300, which brought to fruition numerous new concepts to differentiate its brand. Examples of the latter can be easily seen in the drive towards catalogue solutions being offered on the newly certified Boeing 787 and also on the upcoming A350.

"This somewhat contradictory trend presents unique challenges to many players in the aerospace industry," says Stephen Somogy, director of sales and programmes at Bucher Aerospace. "On the one hand, it is very difficult to dispute the financial and weight benefits which result from integrated, common or shared designs. On the other hand, this can be seen as constrictive to the differentiation and market share sought by aircraft owners and airlines respectively."

Bucher Aerospace believes its ability to address this contradiction helps to make it an essential partner in the cabin interiors market. Over the years, the

01-03. Integrated furniture developed with Recaro



company has amassed a comprehensive selection of standardised products. Its offering ranges from IFE deployment systems, deployable food tray tables and inflight service carts to business-class seating furniture including centre consoles, shells and surrounds. Applications span the entire spectrum from tourist class to first class, VIP and head of state. Bucher is also able to collaborate with other organisations to achieve unique solutions to satisfy customers' need to differentiate.

02

> MODULAR SOLUTIONS DELIVER WHAT IS NEEDED QUICKLY, WHILE MAINTAINING HIGH STANDARDS OF QUALITY, FUNCTIONALITY AND RELIABILITY

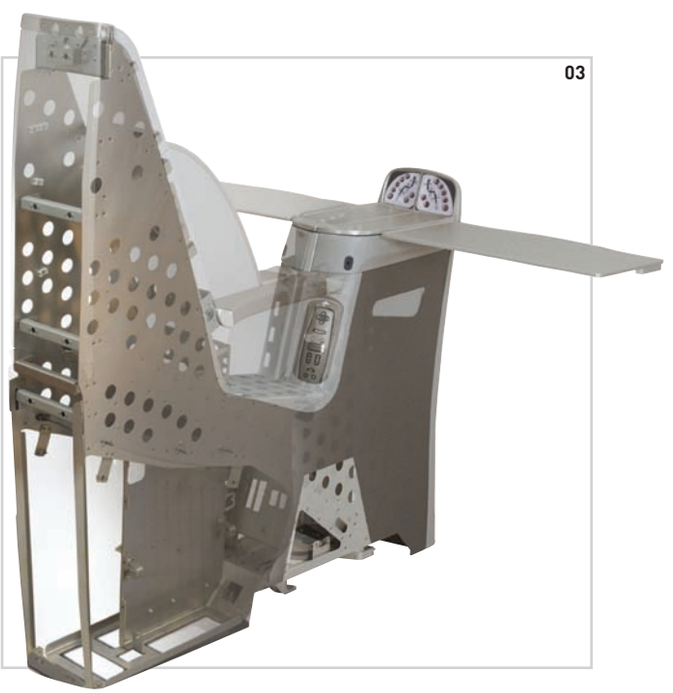
"All this is possible because as part of its mission Bucher Aerospace holds central the idea of partnership and open communication. This approach allows the fulfilment of mutual, albeit sometimes contradictory, objectives," says Somogy.

COLLABORATIVE APPROACH An example of this approach is the company's recent collaboration with Thales to introduce a new IFE deployment arm concept. B/E Aerospace also provided design input via its Pinnacle seat geometry to add 'real world' constraints to the application. Developed over six months, the new arm features a unique articulation mechanism allowing the accommodation of large-format IFE displays – such as Thales' 12.1in SVDU Gen IV – under a standard or premium-economy seat with a reduced swing radius. The reduced swing radius also works with smaller format displays and allows seats utilising the arm to be positioned as close as allowable to class dividers, monuments and seatbacks. "This permits airlines to maximise seating capacity," says Somogy. "This feature alone has drawn attention from multiple carriers seeking solutions to the age-old issue of seat pitch."

Similar examples of fulfilling the requirement to differentiate while providing a harmonious, integrated solution can be found in Bucher Aerospace's development of premium-class deployable food tray tables. The company frequently receives requests for custom deployable table solutions to address seat manufacturers' challenges. Although this would seem to, and often does, drive ground-up design efforts, there is another approach that is often taken. Bucher Aerospace can identify the commonalities between its customers' requests and address these overlapping, constantly changing sets of requirements by offering modular, scalable solutions. "These modular solutions deliver what is needed quickly, while maintaining the high standards of quality, functionality and reliability that Bucher's customers have come to expect," says Somogy.

The successes of its IFE deployment systems and deployable food tray tables have led to the expansion of Bucher

03



04

> WITH MULTIPLE DEVELOPMENT PARTNERS INVOLVED, COMMUNICATION IS A VITAL PROCESS THAT NEEDS TO BE VIGOROUSLY MAINTAINED FROM THE OUTSET

Aerospace's offering into the engineering and manufacture of aircraft seat furniture with integrated IFE systems and food tray tables.

INTEGRATED FURNITURE Bucher's first integrated seat furniture design was accomplished with Recaro Aircraft Seating for American Airlines. The resulting centre console was eventually adapted for three aircraft types. Bucher Aerospace says features include a tasteful styling and colour scheme, articulating leather-clad armrests, a pair of lightweight yet strong deployable food tray tables, ample stowage provisions (including life vest stowage), integrated IFE and electronics, venting paths for cooling, and ease of maintenance and installation. From the outset, Bucher Aerospace partnered with the seat manufacturer, airline, aircraft manufacturer, industrial design consultant and IFE supplier to develop the most attractive offering possible for the airline passenger.

Once again engaged in a new seat furniture development project, Bucher Aerospace says the process is unchanged today. The customer requirements are extensive, and include styling, functionality, IFE incorporation, field of view, stowage provisions and other amenities. Reliability, resistance to abuse, weight, cost, maintainability and ease of installation are other key factors. Obviously, FAA and aircraft manufacturer requirements must also be strictly adhered to, particularly the ability to withstand the 9*g* dynamic testing requirements (driven by the STC); plus flight, gust and emergency landing loads; and for the materials used, flammability, heat release, smoke and toxic gas release requirements.

04-05. The new IFE arm integrating Thales' display

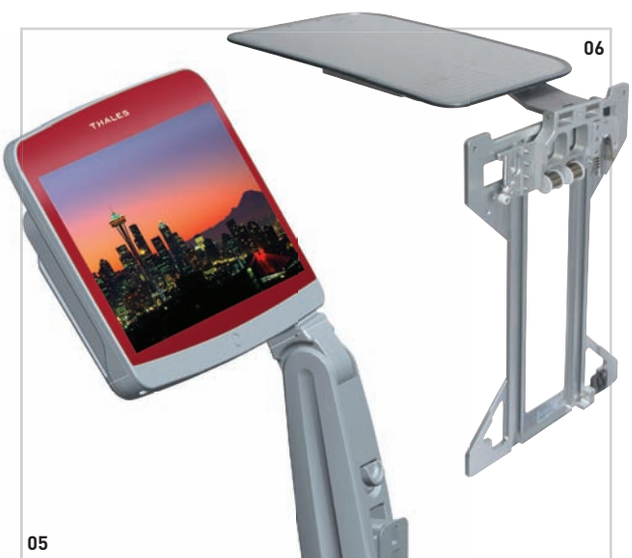
06. A food tray table developed with Weber

PROGRAMME MANAGEMENT "With multiple development partners involved, communication is a vital process that needs to be vigorously maintained from the outset," says Martin Burgisser, Bucher Aerospace's CEO. "Our rigorous documentation of requirements, design decisions, information exchange, programme planning, test planning, test reporting and the documentation of the final product itself, ensures that the entire process is effective and efficient. Strong, professional programme management is a key driver of success."

The ideas of partnership and open communication are embedded in the mission of the company. "Every day Bucher Aerospace personnel live these concepts through relentless dedication to customer service," says Burgisser. The company networks throughout the development chain continually, from industrial design consultants through to seat manufacturers, completion centres and airlines, to identify collaboration opportunities with mutual gain for all parties. "Bucher Aerospace endeavours to engage in the development process as early as possible to ensure that the final hardware is highly faithful to the day-one vision," says Burgisser.

Looking forwards, Bucher Aerospace believes it is well situated to expand its role in this growing market segment. "The successes of the past will continue to drive the projects of the future," says Burgisser. "Change is always a factor, and new products must adhere to ever more stringent regulatory and product standards and be of lighter weight and even higher quality,"

However, Bucher Aerospace believes its focus on partnership and communication combined with its depth of product offering, expertise and strong design principles will ensure its future success. "In an industry involving so many parties and technical challenges, the collaborative approach should not be underestimated," says Burgisser. "It allows Bucher Aerospace to thrive in an environment filled with contradiction." ☒



06

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meetingofminds

Thermoplastic sheet manufacturer Kydex works closely with designers to turn their visions into reality

If you've boarded an aircraft or two, you have probably come into contact with Kydex's products – the company manufactures the thermoplastic sheet used for components such as tray tables, seatbacks and dividers, for numerous airlines' cabin interiors.

But for the company, each of these components is not simply a standalone functional item; it is a design statement, a seamlessly integrated element and a fresh opportunity to take form and function to new heights.

Although Kydex takes compliance very seriously, and employs technical experts who know what will fly, what to avoid and how to navigate the most complex regulations, the company constantly questions preconceptions about what an aircraft interior must be. Kydex places great emphasis on collaboration in every phase of planning, design and execution.

To that end, Kydex has engaged the services of renowned designer David Scott to help guide its aesthetic vision. Scott came to Kydex seeking solutions for a project with lofty goals, and found them through close collaboration, experimentation and shared determination. He has stayed on with the company as a consultant, bringing the dual benefits of his design talent and the practical knowledge of a veteran industry insider.


01

FORM AND FUNCTION

Kydex's flagship product for aviation is Kydex FST, a material designed to offer the best of both worlds – full compliance with the most stringent regulations in the business, and a dizzying array of design options in terms of colour, texture and versatility.

"Kydex FST is an important new material in the Kydex sheet portfolio," says Ronn Cort, international business manager at Kydex. "This product has

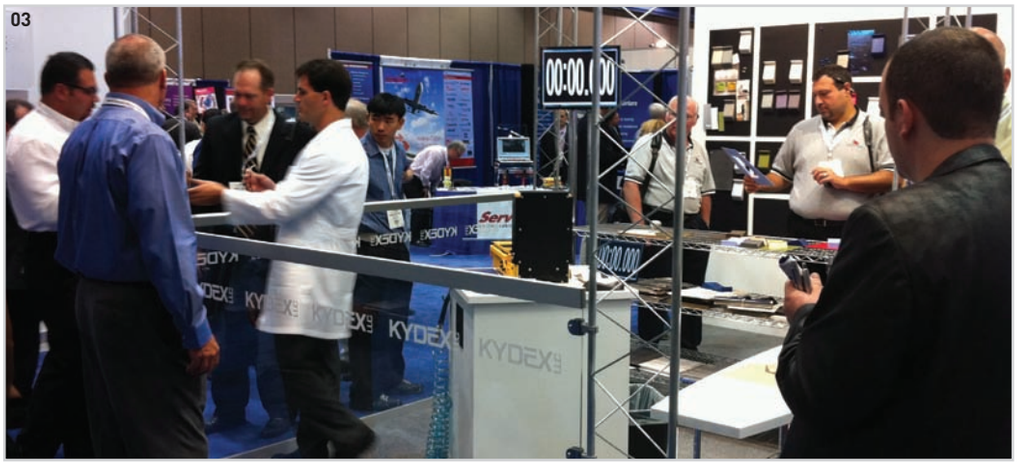
> TRANSLUCENCE HAS LONG BEEN THE HOLY GRAIL OF AIRCRAFT INTERIOR DESIGN, THE SEEMINGLY IMPOSSIBLE DREAM LADEN WITH LIMITLESS POSSIBILITIES

been developed in response to our clients' expressed needs and the benefits to them are substantial. In addition to Kydex FST meeting toxicity requirements, customers will continue to benefit from our ability to manufacture this product in short runs of custom colours with quick lead times and high quality."

MAGIC TOUCH Available in virtually limitless colours, Kydex FST is now being developed to also include the option of Kydex Soft-Touch technology. Soft-Touch is an integral element that can be incorporated to give surfaces a feel akin to glove leather. "Passengers get a more pleasing tactile experience, designers get a new dimension of texture and airlines get durability in high-use areas," says Cort.

Kydex FST can also now be fashioned in translucent form. "Translucence has long been the holy grail of aircraft interior design, the seemingly impossible dream laden with limitless possibilities, yet long unattainable in compliant form with standard thermoplastic sheet," says Cort. "Our development means that physical separators that provide privacy

01. Kydex FST is now offered in translucent form
02. Kydex offers a colour-matching service



03. Kydex's busy booth at Aircraft Interiors Expo Americas 2011
04. Kydex 6503, the first fruit of the company's collaboration with David Scott

need not limit the integrated flow of light, colour and design patterns in the cabin. Privacy screens, cabin separators, galleys and more can now be a part of the design, instead of a breed apart. And the colour matching possibilities, varied textures and integral durability of Kydex FST mean it can be used throughout the cabin to comprise a seamlessly integrated design."

Scott believes the translucent sheet will be a game-changer. "Kydex FST transforms a designer's thinking – sheet is no longer just a solid surface, because of its translucent possibilities," he says.

> KYDEX FST TRANSFORMS A DESIGNER'S THINKING – SHEET IS NO LONGER JUST A SOLID SURFACE

GETTING TO GRIPS While Kydex FST looks great on paper, the ultimate test is putting it before the eyes, and literally in the hands, of aircraft interior designers. Kydex did just that at Aircraft Interiors Expo Americas 2011, held in September 2011 in Seattle, Washington, USA. Elite designers from all over the world saw the translucency, felt the Soft-Touch and delved into the colour palette. More often than not, Kydex says the traditional five-minute tradeshow stops became hour-long conversations with Scott on the applications, benefits and possibilities of the FST material.

"More than a mere introduction of product, it was the meeting of design minds and lively dialogue of exciting ideas," says Cort. "It's precisely the kind of dynamic partnership Kydex promises aircraft interior designers to help them realise their unique vision."

Kydex FST is only the beginning of a raft of new aviation-compliant materials on the way. They will roll out in 2012 and be featured prominently at tradeshows. Kydex is also introducing an expanded colour palette that's "design-forward, rich in variety and full of fresh and surprising hues", according to Cort.

All these developments are brewing in the Kydex Design Lab, which is also expanding in size, operations and possibilities. "Designers come in with a vision, a plan or just a sketch, and the technicians in the Design Lab use their experience and expertise to make it happen," says Cort. ☒

David Scott's first work with Kydex

Designer David Scott's first collaboration with Kydex came about when he was working as part of a team on the interior branding for a major airline's new fleet of Boeing 777-300s.

Frustrated that he couldn't get the colours he liked in aviation-compliant material, Scott visited Kydex's facility in Bloomsburg, Pennsylvania, USA, to see if they could work together to develop the product he wanted. Impressed by what he saw, Scott embarked on a three-month collaboration with Kydex's lab technicians. He was personally involved in the development of the new material on a daily basis.

The aim was to develop the pearlescent qualities required by incorporating them into the raw material, rather than with a film cap – partly to make scratches less noticeable.

The final aviation-compliant product, called Kydex 6503, reflects and refracts light and has an ethereal pearlescent colour that is not white, not silver, but has violet undertones. Scott and Kydex have since developed a range of 28 colours in this material.

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singleminded

The latest enhancements to Rockwell Collins' IFE include new offerings for single-aisle aircraft and regional jets

Rejuvenating its IFE offering for single-aisle aircraft in 2011, Rockwell Collins' new PAVES 3 system, announced at the Airline Passenger Experience Expo (APEX) in Seattle in September, is designed to offer unprecedented versatility for airlines and maximum reliability for passengers.

"Single-aisle aircraft operations present a unique set of requirements for IFE," comments Dave Austin, vice president and general manager of cabin systems for Rockwell Collins. "The PAVES 3 system provides the features passengers want while meeting the needs of airlines to make quick gate turns without extensive content loading or maintenance."

PAVES 3 offers customisable cabin configurations. Airlines can select from a variety of overhead and in-seat monitor combinations throughout the aircraft. "We live in a world of choice and airlines are no exception," says Austin. "Our new system gives airlines flexibility they've never had previously when configuring IFE in their cabins."

PASSENGER-DRIVEN FUNCTIONS

The HD on-demand, in-seat solution with intuitive touchscreen user interface includes a vast range of features powered by a robust operating system. For example, passengers can connect their mobile devices to the PAVES 3 system to access their personal content, such as movies and games, and view it on the HD in-seat monitors.

"We're going to continue to see more and more passengers bringing their own devices onto aircraft," comments Austin. "If passengers know their mobile experience will be enhanced with this new system, they'll be even happier."

PAVES 3 also enables passengers to recharge their personal devices. "Passengers expect this now, not only for long trips, but on short trips too," says Austin. "We knew that this capability was necessary to viably compete for business."

Austin says those who do not bring a personal device on board will not feel left out with PAVES 3. Everyone using the in-seat system will be able to experience HD video, games and applications. And for connected

01. The PAVES 3 IFE system
02. Rockwell Collins' new overhead 9in LCD monitor for regional jets

> UNTIL NOW THERE HAVE BEEN LIMITED PASSENGER ENTERTAINMENT OPTIONS FOR REGIONAL JETS

02

aircraft, passengers will also enjoy live updates from digital news sources and magazines, and access to social media such as Facebook and Twitter. "Social media is becoming an essential part of society," says Austin. "People want access to it no matter where they are."

Other capabilities of the PAVES 3 in-seat monitors include an operating system that supports applications from numerous sources, flexible content storage to suit individual airlines' needs, a quick-release mechanism designed to enable easy maintenance, and real-time monitoring through remote diagnostics.

"We've talked about the many benefits that PAVES 3 brings to passengers, but the benefit to airlines may be greater," reveals Austin. "The ease of maintaining PAVES 3, along with its reduction in size, weight and power compared to previous systems, will enable airlines to focus more on the passenger experience."

The PAVES 3 system builds upon Rockwell Collins' PAVES systems, which are installed on 1,600 aircraft. The system is available as both forward-fit and retrofit, and can also be installed as an upgrade to existing PAVES systems to bring in-seat capabilities to those aircraft.

OTHER DEVELOPMENTS Beyond PAVES 3, Rockwell Collins has also been busy working on improvements to its existing overhead IFE product, including introducing surround sound at APEX. The virtual surround sound enhancement is a collaboration with SRS labs designed to enhance audio quality greatly with no modifications to hardware, creating a spatially expansive, theatre-like experience.

The PAVES product portfolio has also been extended to regional jets, with the introduction of an ultra-thin, lightweight, 9in retractable overhead LCD display that attaches directly to the overhead bag bins.

"Until now there have been limited passenger entertainment options for regional jet operators," says Austin. "Now regional jet operators have the opportunity to entertain and inform passengers by using our lightweight, cost-effective solution."

Aircraft equipped with tape-based IFE systems can now also be easily

03. Airshow now integrates with the PAVES portfolio

upgraded. Rockwell Collins' new Digital Media Reproducer is an upgrade solution designed to provide airlines with reliable, higher quality digital content through a plug-and-play unit that does not require an extensive retrofit installation.

The PAVES portfolio is also being enhanced with the integration of Airshow Network – a real-time flight information and moving map product that is well established in the business jet market. Airlines will be able to present a variety of real-time news, weather and sports information, or customise by sourcing content from local providers.

CROSS-SECTOR BENEFITS Porting products, services and skills across divisions is a key part of Rockwell Collins' approach. Airshow Network integration, as well as other innovations originally developed for the business jet market that are now part of the PAVES product family, such as point-to-point HD video distribution, show how the company has leveraged its technology to benefit its range of customers.

"You'll see more collective innovations coming from us going forward," reveals Austin. "In fact, we're working on a low-risk solution with our Flight Information Solutions business that fuses the air transport cabin, flight deck and the back office to improve airline operational efficiency."

In-cabin, wireless streaming of both broadcast and on-demand content and applications is another area that Rockwell Collins is developing. Although there are clearly challenges to overcome, Rockwell Collins believes that many applications and services are well suited to personal electronic devices, and can provide an excellent complement to embedded IFEC. The company continues to explore means of resolving outstanding concerns, such as the lack of early windows content, bandwidth constraints that may impede reliable delivery of HD content, and overlapping signals from numerous wireless access points.

"As wireless AVOD technology continues to mature, airlines will seek to differentiate their IFE solutions with unique user interfaces that captivate passengers and reinforce their brands and services," asserts Austin. "They will continue to value long-term, low-risk solutions that include OEM-approved, line-fit cabin entertainment and moving map systems."

Ultimately, Rockwell Collins believes that it can provide a feature-rich experience for passengers by offering the opportunity to reliably interact with content and applications, such as Airshow data, airline applications or web pages, via personal devices in parallel with using a robust client-centric IFE system.

KA BAND PARTNERSHIP In August 2011, the company announced that it had reached an agreement in principle to be the sole lead in the development, production and distribution of user terminals and to provide service for Inmarsat's Global Xpress (GX) Ka broadband global satellite communications. The company believes that in the future, airline passengers connecting with the outside world will see dramatic improvements in reliability and bandwidth capability, wherever they are in the world.

"This partnership is a game-changer for airborne connectivity," says Steve Timm, vice president and general manager of Flight Information Solutions at Rockwell Collins. "Our long and proven track record in providing industry-leading connectivity solutions for business, commercial and government aviation, combined with the differentiated services of Inmarsat GX, will result in a compelling global broadband solution that will give passengers and operators the same level of connectivity in the air as they have on the ground." ☒

> "PORTING PRODUCTS, SERVICES AND SKILLS ACROSS DIVISIONS IS A KEY PART OF ROCKWELL COLLINS' APPROACH"

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testingtimes

Magnus Power has the equipment to support manufacturers as they meet the demands of ever-more technologically demanding passengers

With so many different items of electrical equipment now on board aircraft, all of which require extensive testing at all phases of design, engineering and installation, Magnus Power believes most equipment designers and manufacturers will need to convert power for equipment used in environments where dissimilar voltages and frequencies are found.

This is where the company's specialised expertise comes in. Magnus Power is a wholly owned subsidiary of Aker Subsea. It has been manufacturing power supplies and static frequency converters in the UK since 1986, for the oil, gas, sub sea, aviation, aerospace and military sectors.

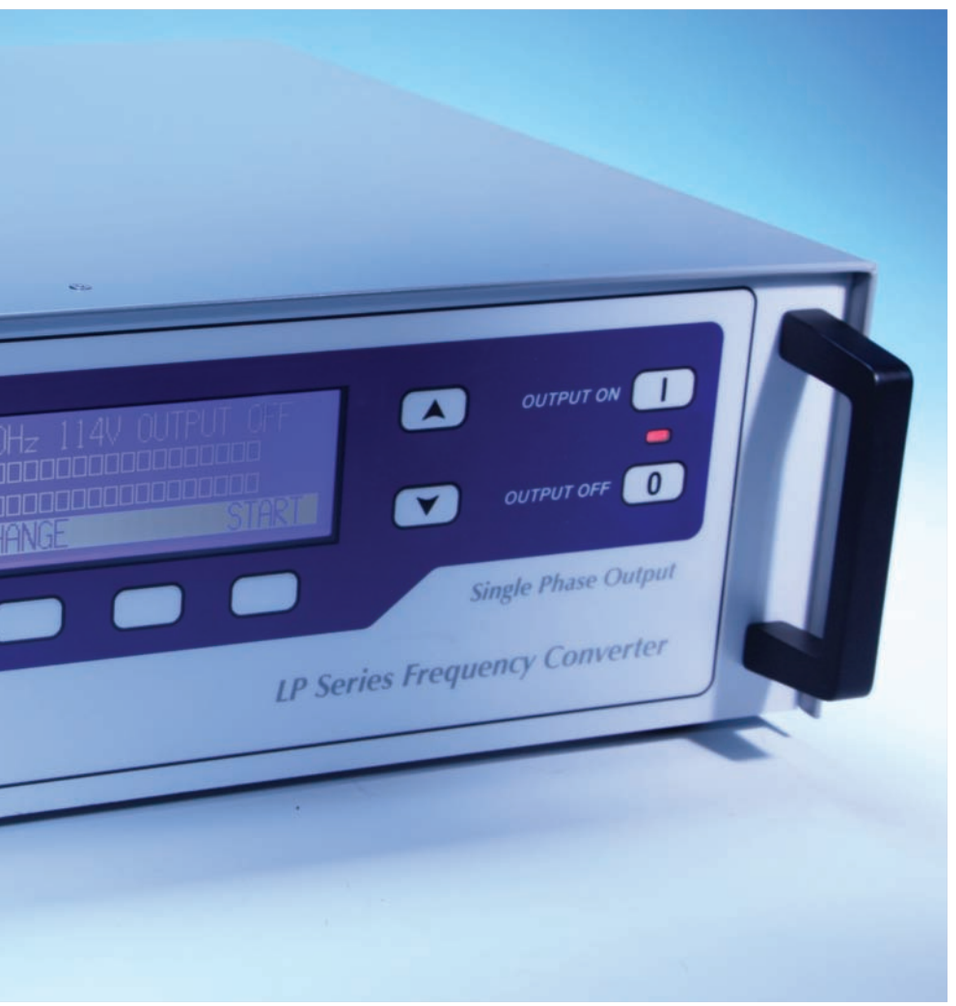
"With over 25 years of experience, we have always resolved all of our clients' power requirements, even with unusual issues that have been presented to us," says Keith Hammond, sales manager at the company. "With an extensive design team on-site, we not only provide off-the-shelf products we have designed and engineered ourselves, but we also provide many bespoke solutions."

Magnus Power's latest product, the LF3-400 frequency converter, was created specifically for the aircraft interiors industry. The company works closely with its customers to understand some of the major issues that confront engineers when testing pieces of electronic equipment for use on board aircraft. "We pride ourselves in listening to our customers' demands and offering them cost-effective and reliable products for the aircraft and aerospace industries," says Hammond.

The range of static frequency converters offered by Magnus Power starts at the LF1-400, a small benchtop converter with an output of 1kW at 400Hz, which is used for testing small electrical items; through to the LF3-400, one of its most popular models, which offers three-phase output at 3kW

01. The compact LF1-400 converter
02. An LP-series converter

> WE HAVE ALWAYS RESOLVED ALL OF OUR CLIENTS' POWER REQUIREMENTS, EVEN WITH UNUSUAL ISSUES THAT HAVE BEEN PRESENTED TO US

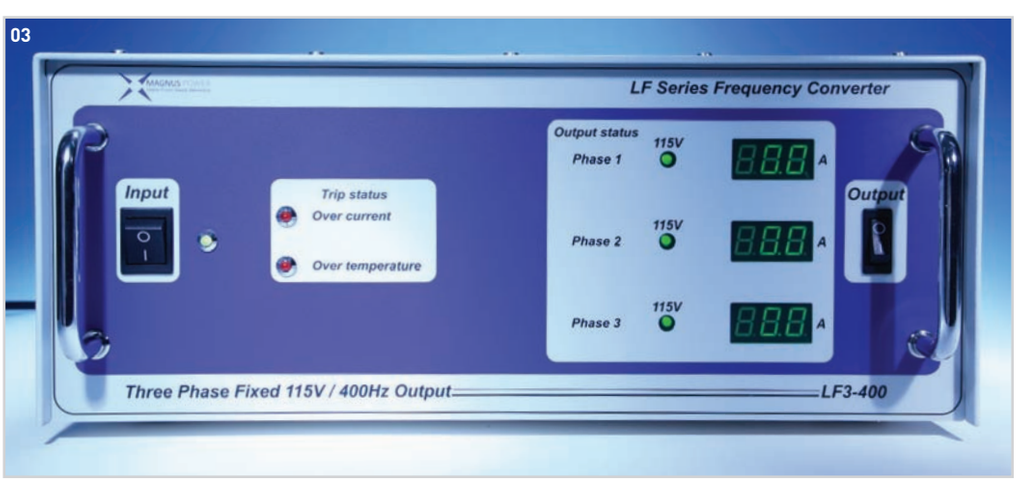


400Hz. "The latter we often supply to aircraft seating manufacturers, for use in their testing and service areas and recently to power equipment on exhibition stands," says Hammond. "If you are looking for a static frequency converter to power the whole manufacturing facility with 400Hz, we can supply a converter up to 300kW."

MIX IT UP The company has found that often the best solution for a manufacturer's facility is a mix of products. "Ideally a mix of static and mobile units which are small and portable and can be carried by hand, such as our LF and LP range, and larger fixed units to support the in-house test or production areas," says Hammond. "Our range of ME3 products is an excellent choice here as they have a larger output from 10-300kW."

In testing labs, where a manufacturer may have to test the upper and lower tolerances of products for aircraft use, they might instead of testing just at 400Hz need to test from 350-850Hz. This is where a variable frequency converter such as Magnus Power's LP1 or LP3 may be required. With both of these products the voltage and frequency can be varied within a broad range from 1-270V per phase, and from 44Hz to 1kHz.

Magnus Power believes its products can help companies cut their costs, in particular their energy bills. "Ensuring that your existing products, frequency converters and UPS systems are both energy-efficient and functioning to their best ability can greatly assist in reducing these costs," says Hammond. "Replacing old or malfunctioning units with the latest in solid-state static frequency converter technology can ensure that your testing departments and team are more energy-efficient. Magnus Power can advise you in the latest in our proprietary technology, as to what would best suit your needs."



03. The popular three-phase LF3-400 model

STATIC FREQUENCY CONVERTERS GENERALLY HAVE A MUCH REDUCED FOOTPRINT

03. A frequency converter from Magnus Power's LP series

STATIC VERSUS ROTARY One question frequently asked of Magnus Power is concerned with the relevant advantages of static frequency converters over rotary converters. There are a number of parameters to consider in answering this query, the first of which being where the items will be situated. "Static frequency converters generally have a much reduced footprint, requiring less space, and also operate at a much lower noise level than rotary ones as their solid-state technology means they have no moving parts," explains Hammond. "Static frequency converters can be housed internally within your main building, even within rooms that personnel are working in, without staff having to wear protective equipment."

Hammond says an argument for rotary converters is that they produce a perfect sine wave output; but he adds that static frequency converters are improving all the time. "Unlike rotary converters, static converters require less maintenance because of the lack of moving parts," he continues. "This can seriously reduce your company's maintenance and repair bills, and ensure little or no downtime to your testing or manufacturing."

Another advantage of static frequency converters is that they can be extremely portable; most of Magnus Powers' product range can either be carried easily or comes with wheels. Larger units can be supplied with optional extras including carts.

SERVICE HISTORY "A major consideration in purchasing a static or variable frequency converter is ensuring that the company you are purchasing from has a solid and reliable service team," advises Hammond. "There are many power supply companies that are purchasing imported products, and have no extended service or warranties available. A frequency converter is a significant expenditure for any size company, and when investing in a piece of expensive equipment you want to ensure that you have complete peace of mind if anything does go wrong."

Magnus Power has its own dedicated service team, and offers many levels of service agreements. "Fortunately our technology is very precise and robust, undergoing extensive testing before each item departs our premises, so we rarely see pieces of equipment back for repair, and if it does happen we offer unparalleled support from our service team," says Hammond.

Using the latest technology in the power electronics field and digital control, Magnus Power believes its systems are essential kit for aircraft equipment workshops. "Regardless of how demanding your applications for testing are, Magnus Power can deliver exactly the right frequency converter," says Peter Jenner, operations manager at the company. "Magnus Power static and variable frequency converters are available in a wide power range suitable for all loads. Our flexible design allows them to be configured for a wide variety of voltages and frequencies. In addition, the majority of our products come with a very clear easy-to-read LCD display." ☒

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materialmatters

E-Leather believes its composition leather can save money for airlines at every stage of its life

Maximising revenue per passenger is a key objective for many operators. As a direct result, suppliers of seats and seat covers are looking to deliver solutions offering reduced weight and increased seat density, while preserving comfort and reducing maintenance costs. "This is certainly a long list of challenges," says Nico Den Ouden, sales and marketing director at E-Leather. "In addition, seat producers are facing high demand and need to complete each programme to demanding schedules."

AIRLINE CONSOLIDATION Den Ouden believes consolidation within the industry is adding to the mix. "Some airlines that had traditionally used leather are now owned by airlines that use fabrics," he says. "This integration process means that companies take a step back from their established view and look to their future needs to define the best solution."

Within this environment, E-Leather's eponymous product has flourished, with adoption by many operators following extensive evaluation. "As is appropriate in this industry, this evaluation has included extensive flight trials and independent laboratory testing in comparison to the best competing materials, including leather and fabric," says Den Ouden.

The composition leather is designed to offer financial and performance benefits, as well as helping airlines to improve their environmental credentials. "Now that the performance has been proven time after time, the rate of adoption is accelerating," says Den Ouden. "This has enabled operators to validate the results from their initial evaluations – replicating the adoption process that has delivered successful innovation in the past."

In major organisations and complex supply chains there is often a division of responsibilities and budget accountability. "To succeed in this environment, new technology has to provide benefits all the way through its life – during testing, qualification and installation, as well as in terms of maintenance," says Den Ouden.


02


01

01-02. E-Leather, a composition leather for aircraft cabins

> A PRODUCT THAT CAN BE MAINTAINED ON THE AIRCRAFT TO PROVIDE A CONSISTENTLY HIGH LEVEL OF CABIN PRESENTATION IS BEAUTIFULLY SIMPLE

RELIABILITY So how can designers meet these diverse requirements? "The reliability of engineering standards and performance in such criteria as fire testing creates a reliable foundation that removes project risk," says Den Ouden. "In addition, flexibility to meet exacting finish and colour standards to work with the full range of mood lighting enables designers' and marketing departments' objectives to be achieved in harmony."

Of course margin protection objectives mean that these benefits have to be delivered at competitive prices. "From then on the operating costs become the key focus of attention," says Den Ouden. "In an environment in which kerosene costs have escalated, it is simple to calculate the cost benefits for airlines of using a material that weighs up to 2 lb (900g) less than the same seat upholstered with traditional leather. In a typical Boeing 737 this can equate to savings of around US$25,000 per year."

Den Ouden believes E-Leather can even save operators more money than fabrics that weigh less. "Take into account the more frequent need for replacement and regular cleaning," he says. "Additional covers must be available so that each aircraft can fly after its covers have been removed for maintenance. Someone has to manage the logistics of removing these covers and providing complete traceability for each item until it is installed to start the cycle once more. Once calculated, the costs of fabrics often surprise even those who operate aircraft using them. A product that can be installed and maintained on the aircraft to provide a consistently high level of cabin presentation is beautifully simple."

So what about the future? "New seat designs are driving out weight," says Den Ouden. "More complex negotiations and multiyear agreements are imposing contractual weight targets. Higher operating costs are challenging all stakeholders to consider how they can get the most passenger revenue from each flight. Innovation that meets the future objectives of the industry while reflecting its strong legacy of reliability will provide a truly sustainable contribution." ☒

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centreofattention

SiT's seat-centric IFE solution is gaining ground with important updates set for 2012

It is now two years since Royal Jordanian became the first airline to offer the eponymous IFE system from Zodiac Aerospace's SiT division. Since then the benefits of seat-centric IFE systems have been much talked about, and SiT is convinced its solution will enable it to become one of the major players in the IFE market.

With this aim in mind, 2012 looks to be a milestone year for the company. It will see the system's first entry into service on a line-fit A330 for Corsairfly. SiT will also introduce an updated design, based on latest technologies and including further functionality.

SiT is based on three main line-replaceable units (LRUs) – a smart display unit including the content storage (one at each seat), a system interface box (one per aircraft), and power supply units (one for every four seats). The company believes the solution cuts weight by 50% compared to legacy solutions.

The new SiT architecture enables the use of both HDD and SSD technology for content storage. The background media update principle is designed to make the update process easy and fast, and also fully transparent as it is implemented while the system is in service. The operating system can be updated with the latest applications on board in a few minutes. Testing and validation is performed in labs beforehand to enable this speedy in-service update.

01-02. SiT's smart display unit

The design is also compatible with a mixed IFE configuration; this feature will allow airlines to upgrade one class at a time if they should so desire.

"The 3D game accelerator; the open platform architecture allowing third-party applications to be introduced by other partners or the airline; and the system's compliance with connectivity interfaces all speed up the rate at which new IFE content can be presented to passengers," says Patrick Fretelliere, sales manager at Zodiac Aerospace. Other highlights of the system include plug and play technology, reinforced with a quick-release solution for easy seat integration; and an extended selection of new screens, ranging from 8-23in in size. "An embedded Airshow solution is also proposed in the new design," says Fretelliere.

A key feature of SiT is that it has been designed to be extremely resilient to content storage failure. The company says that even if 75% of the content storage is compromised, all passenger units will remain fully functional.

"Once more, Zodiac Aerospace is demonstrating its ability to innovate and to take suitable risks in the interiors market, more specifically in the IFE segment, where fast-moving technologies and expectations dictate permanent innovations and the availability of new solutions in a fast turnaround time," says Fretelliere. ☒

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teamsheet

Boltaron and Multifab explain their roles in the creation of Timco Aerosystems' latest lightweight seat


02

01-02. Timco's 3050 premium-economy seat

Responding to airlines' requests for ever lighter yet comfortable, feature-loaded and robust seats, Timco Aerosystems, part of Timco Aviation Services, recently introduced its latest premium-economy seat, the 3050 FeatherWeight. The seat is designed to maximise passenger comfort, provide a rocker-type recline mechanism that extends a foot and leg rest as the back reclines, and accommodate IFE systems. Offered in two- and three-seat configurations, Timco Aerosystems believes that the model could reduce the overall weight of a 200-seat aircraft by more than 8,000 lb (3,629kg).

PART NUMBERS "There are numerous parts for these seats," says Dean Cameron, sales manager of Multifab, which thermoforms, pressure forms and vacuum forms armrest caps, end caps, tray tables, centre dividers, electrical shrouds, life vest box assemblies and other parts of the seats.

Multifab specifies Boltaron sheet for all the seats' thermoplastic parts. "It is very friendly to thermoform," says Cameron. "We form complex parts for this application to extremely tight tolerances. The grades of Boltaron sheet we use retain their cosmetic appearance during forming, and maintain a consistent wall thickness in deep recesses and on outside corners."


01

CHOOSING THE MATERIAL Multifab specifies two grades of Boltaron sheet – 4330 and 9815E. Both are proprietary thermoplastic alloys that carry an aircraft interior fire rating of FAR 25.853 A1, ii. Boltaron 9815E sheet is additionally rated to FAR 25.853 D as required for parts larger than 1ft^2.

Because sheet products meeting the more stringent FAR 25.853 D standard can exhibit less impact resistance, the property was studied by Multifab across competitive sheet products. Although the Boltaron 9815E sheet is rated at 5ft lb/in (265 J/m) versus 3ft lb/in (159 J/m) for a competitive 65/65-compliant sheet, Boltaron's drop dart tests revealed that the competitive 60-mil sheet failed drop dart tests at 24in (61cm),

> WE FORM COMPLEX PARTS FOR THIS APPLICATION TO EXTREMELY TIGHT TOLERANCES

compared with 70in (178cm) for 60-mil Boltaron 9815E sheet.

The parts Multifab forms range in thickness from 0.08-0.2in (2.03-5.08mm). Large parts, such as the shrouds between seats, average 2.5ft (762mm) in length, 18-20in (457-508mm) in height, and can have 6in (15mm) draw depths.

COMPLEX TOOLING The parts may not look complicated when they are assembled in a seat, but Cameron says many require sophisticated tools to achieve the shape and functionality required for assembly. Some tools have slides to form undercuts in parts. The shrouds that separate seats, for example, have to be pressure formed in female tools.

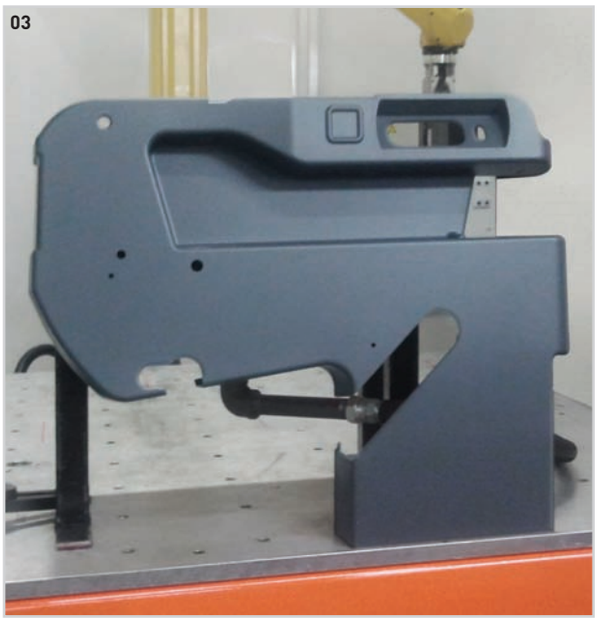
Each tool has a sidewall design feature that requires an undisclosed 'process enhancement' to ensure that the Boltaron sheet forms around the feature properly before vacuum is applied. Otherwise, Cameron says, the material would form a bridge between the feature and the sidewall.

Many of the tools are etched with an MT11020 chemical texture that is usually 0.0015in (0.04mm) deep. The centre divider seat shrouds and parts that interface in assembly are textured in the tools during forming. End bays and back shrouds are formed of textured sheet over male tooling.

Process considerations include whether the seating will be assembled in two- or three-seat sets, or installed in a left, right or centre aisle position. Some parts for left and right aisle seats differ slightly, and so must be formed in different tools, explaining why there are a large number of parts.

COLLABORATIVE APPROACH Multifab orders the sheet in custom colours as specified by each airline. Cameron says the colours are generally special shades of grey, which Multifab and Boltaron develop according to specifications from Timco Aerosystems. Multifab buys the Boltaron sheet in standard or custom sizes, depending on part volume. Standard sizes are typically 4 x 8ft (1,219 x 2,438mm).

Multifab spent a year developing the programme with Timco Aerosystems. By the end of 2012, Cameron expects that Multifab will deliver 30 shipsets of seating components. A shipset is the number of seats needed to equip one airliner for full operation.



03. One of many complex parts formed from Boltaron sheet by Multifab for the new Timco 3050 seat

Multifab has been providing thermoformed components to the aerospace industry since 1991. The company has a 180,000ft² (16,722m²) plant, and employs 160.

Timco Aerosystems is relatively new to the seating market. Parent company Timco Aviation has been involved in aircraft and engine maintenance, repair and overhaul for many years, and in 2002 acquired Brice Seating. Timco Aviation dropped the Brice name in April 2011 and made the business part of Timco Aerosystems.

The new 3050 FeatherWeight premium-economy line is one of the first seating products to be marketed under the Timco Aerosystems brand.

"We are enthusiastic about this opportunity," Cameron says. "Timco Aerosystems' relationship with Multifab has been key to the development of this product line." ☒

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cableready

CarlisleIT presents its latest offerings for fibre optic connectivity

01. CarlisleIT's LITEflight HD cable

Carlisle Interconnect Technologies (CarlisleIT) launched a new standalone Octax high-speed Ethernet connector/cable solution at 2011's APEX show. There are two cable options for this system, a 1Gb/s version and a 10Gb/s version, both of which are offered in 24AWG and 26AWG. CarlisleIT has also patented the technology to house four Ethernet pairs in separate low-profile cells within a small-envelope, lightweight housing. The Octax connector is also capable of operating at both 1Gb/s and 10Gb/s.

The scalable Octax connectivity solution was built to meet the need for greater bandwidth in the aerospace and defence markets.

"IFEC suppliers will always create more product content and will need a faster pipeline," says Dan Dawson, engineering manager for component design and IFE at CarlisleIT. "The 10Gb/s option can transmit data at a faster rate than most IFE systems currently need. The scalability of the Octax system allows IFEC suppliers to install a price-competitive 1Gb/s solution that is instantly ready to meet the demands of new technology and increasingly higher data transmission requirements without the need for added future replacement costs."

OTHER PRODUCTS CarlisleIT also offers a wide array of fibre cabling, assembly and associated interconnect products. Its flagship fibre optic product, LITEflight Fiber Optic Cable, has been adopted by a great number of customers in the aerospace industry.

Meanwhile, with its LITEflight EP (enhanced performance) line of fibre optic cabling and LITEflight HD (high density) fibre optic interconnect products, CarlisleIT believes it has pushed the advancement of fibre interconnect products tailored to excel in harsh environments. "CarlisleIT continues to improve the possibilities for fibre optic installation in harsh environments with advanced products that are targeted to address customers' demands for the lightest weight, highest speed and most rugged fibre optic cabling and assemblies," comments Daniel Bagby, fibre optic product manager at CarlisleIT. "Our release of LITEflight HD is just the most recent step in that progress."

The LITEflight HD cable is designed around compatibility with cutting-edge multifibre connectors, allowing the routeing and simultaneous connection of multiple fibres in a compact package. The company says a 12-fibre bundle, capable of transmitting a dozen 100Gb/s data streams simultaneously, is contained in a rugged, routeable and aerospace-qualified cable only 3.8mm in diameter. "It offers engineers the opportunity to future-proof their interconnects," says Bagby. "This is greater than a 50% reduction in size over standard fibre cabling products and still offers the same flexible routeing, clamping and bundling options, as well as excellent abrasion, cut and impact resistance with non-flammable properties, low smoke, low toxicity and superior resistance to caustic fluids."

Bagby believes that fibre optic technology in general offers numerous benefits. "In addition to the tremendous bandwidth available across fibre optic channels, fibre offers significantly lower weight, immunity to electromagnetic interference (EMI), no signal crosstalk, extremely long service life, security and safety," he says. ☒

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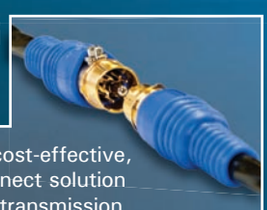

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nearandfar

How Geven developed a new economy-class seat for high-density layouts on long-haul routes

Italian seat maker Geven has enjoyed widespread success with its Piuma range for single-aisle, high-density economy-class seating applications. In fact the basic iteration of Piuma (which means 'feather' in Italian) has been ordered by six prestigious airlines for linefit on more than 230 aircraft.

The company has also recently triumphed with its exclusive line of seating products for the ATR 72 Harmony cabin – Classic for economy, Prestige for premium economy and Privilege for business class.

NEW HORIZONS But the company is not resting on its laurels, and hopes it will widen its horizons and customer base with the launch of a new seating product for high-density configurations on wide-body aircraft.

In fact, with its Piuma Alta Quota, Geven has come on board the Airbus Approved Vendor Catalogue for long-range aircraft and has already secured its first long-range linefit programme, for an A330-300.

01-02. Geven's Steezy seat
03-04. The ATR Prestige seat

01


02


03

The graduation to linefit installation on larger aircraft was foreshadowed by a series of retrofit programmes on wide-body aircraft such as the A330, A340, Boeing 767 and Boeing 777, for customers such as Alitalia, Brussels Airlines, Thomas Cook, Atlas Jet and Air Tahiti Nui.

LONG-HAUL COMFORT Geven set about the challenging task of designing and certifying an economy-class seat comfortable enough for long-haul applications. The seat also had to be very light, offer outstanding living space at tight pitches, and be able to

> VISIBLY ITALIAN IN DESIGN, THE PIUMA SERIES IS MINIMALISTIC AND SLEEK, BUT ERGONOMICALLY CONCEIVED

05. The Piuma Basic seat for single-aisle aircraft

04. The Piuma Basic seat for single-aisle aircraft

accommodate all the most recent and sophisticated IFE systems.

"With the increase in high-density cabins used by low-cost carriers, this demand was also becoming a must in the world of long-haul carriers," says Rodolfo Baldascino, marketing and sales manager at Geven.

ATYPICAL LAYOUTS Geven envisages the seat being used for unusual configurations, such as an 840-seat all-economy layout on the A380; a 440-seat, nine-abreast all-economy layout on the A330-300; a nine-abreast all-economy, 406-seat cabin on the A330-200; and a 10-abreast layout on the Boeing 777.

"Visibly Italian in design, the Piuma series, both Basic for single-aisle application and Alta Quota for high-density long-haul, is minimalistic and sleek, but ergonomically conceived for preservation of comfort and living space at the tighter pitches," says Baldascino. "A jewel for maintenance, thanks to the clever engineering solutions of structurally functional but cosmetic end bays, the Piumas are top of their class in elegance and appeal, especially when attired in smooth but durable Italian leather." ☒

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boxingclever

B&W Engineering's insulated catering boxes enable airlines to implement a new kind of service independent of galleys

With its A-LogEqu series of thermally insulated catering containers, B&W Engineering says it can meet airlines' demands for food safety regulation compliance, high quality and flexibility – and throws in cost reduction and increased revenue opportunities for good measure.

The product range comprises Magic-Boxes and Cold-Boxes, which work independently of the galley and without any power consumption. The Magic-Box offers hot and cold storage in one product; while the Cold-Box has a more limited range for cold storage at a lower price than the Magic-Box. The boxes are compatible with both ATLAS and KSSU standards and are optimised to provide the biggest possible inner volume and smallest possible outer volume. They are also antimicrobial and come with time and temperature tracking as an option.

01-02. The A-LogEqu family of insulated catering containers

For one big low-cost-carrier client, the initial reason for sourcing a new catering concept was a change in food safety laws and the necessity to realise a closed temperature catering chain. But by using the insulated A-LogEqu containers to store chilled sandwiches, B&W Engineering estimates savings of €13 million can be achieved by this airline in less than five years. "The investment in the A-LogEqu system pays out quickly, since the equipment can be implemented directly without any certification issues or modifications in the galley," says Hubert Walter, managing director of B&W Engineering. "Dissolved dry-ice costs, reduced catering cycles, less food wastage, new service possibilities and easier handling all add up to a very short ROI period."

Walter says the benefits of A-LogEqu are not limited to a certain type of airline. Indeed, working with a full-service European airline, B&W Engineering calculated that it could save it €19 million in five years with 74 legs/days by using A-LogEqu containers to store food on overnight stops. "Additionally in economy class, the service quality, for example serving drinks at a good temperature, increased very clearly," says Walter. "While keeping food at a constant quality, the containers maintain the temperature of the goods in a safe range, even when the ambient temperatures increase in the summertime."

B&W Engineering believes that breaking away from traditional galley-focused catering processes enables new service concepts to be implemented. Upon the suggestion of Bombardier, the company worked for an African airline that had a fleet of mainly regional aircraft without any ovens on board. By using the A-LogEqu Magic-Boxes to store hot meals prepared by the caterer, the airline can now offer a hot meal service for business-class passengers, without making modifications to the galley. The A-LogEqu products used are produced according to all relevant norms (FDA, FAA, DO160 etc).

"Partially deep-frozen sandwiches, warm soft drinks, overcooked meals, inhomogeneous temperatures and rock-hard ice cream do not fit in the picture of contemporary onboard service," says Walter. "Especially not for airlines who want to create onboard revenue opportunities. And nowadays that is not limited to low-fare-carriers alone; full-service carriers are also starting to follow that trend in addition to their existing service." ☒

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standout

Tapis's custom grain programme gives airlines more choice and control over vertical surfaces in the cabin

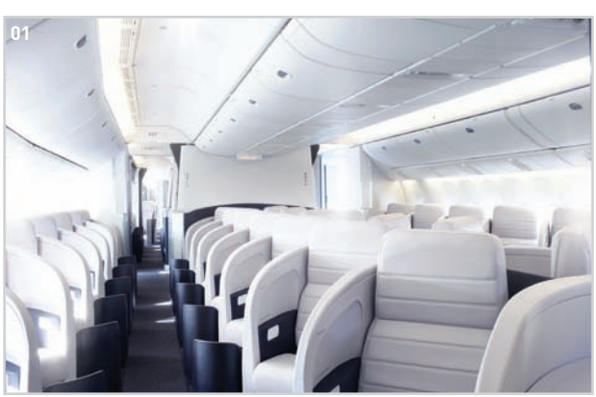
What began as an initial project has become the norm for Tapis, which has seen the popularity of custom grains rise meteorically. Designers working on commercial airline business- or first-class cabins were asking for all the properties of Tapis's faux leather product, but wanted to match it to an existing leather grain, texture, colour or finish. Tapis says it has perfected a way of meeting this demand, in a swift and economical fashion, while also passing FAA commercial testing. As well as matching the look the designer wants, each grain is also a complete one-off, helping to distinguish an airline cabin from the competition.

Projects have included Singapore Airlines in 2005, which wanted to match Ultraleather to a genuine leather grain it was using in its first-class cabin; Cathay Pacific in 2006, which wanted Ultraleather in a custom colour to match its colour scheme; and Kingfisher in 2007, which asked for a custom grain in multiple custom colours.

Other projects have included special Ultraleather grains and finishes for the business- and first-class cabins of Etihad Airways, Swiss Air and JAL. Recent clients include Emirates, Thai Airways, Air New Zealand, Lufthansa, Malaysia Airlines and China Southern. On each occasion, Tapis created a customised programme to meet the airline's required texture and/or colour.


02

01. Air New Zealand is a Tapis customer
02. Lufthansa used Ultraleather for parts of its A380


01

Tapis believes its products give airlines more choices, particularly on vertical surfaces, which have even more stringent flammability requirements than other parts of the cabin.

VERTICAL SURFACES "Airlines used to have limited choices with regards to what materials to use on vertical surfaces," says Jason Estes, sales manager at the company. "Our supple, leather-like product meets heat release and smoke density requirements for vertical surfaces, and can be customised to replicate a variety of real leather grain. This enables airlines to use luxurious soft goods that perform – and match the original hide that appears in other parts of the aircraft – rather than use a laminate or painted surface."

Tapis says all Ultraleather products comply with FAA flammability requirements for many applications on commercial, VIP and corporate aircraft – including outer and inner backshells, footwells, literature pockets, console

> AIRLINES USED TO HAVE LIMITED CHOICES WITH REGARDS TO WHAT MATERIALS TO USE ON VERTICAL SURFACES

shelves, centre dividers, seating, headliners, bulkheads, sidewalls, head rests and trim.

GREEN CREDENTIALS All Ultraleather products, both standard and custom, are made out of polyurethane polycarbonate. Tapis's polyurethane products contain no volatile plasticisers or stabilisers, presistent organic pollutants (POPs), heavy metals, formaldehyde, azo dyes or other toxic chemicals such as nitrogen oxide, pyroxlyn (nitrocellulose), chloride or sulphur. Ultraleather is also designed to be as light as possible – 310g/m – to help improve fuel economy. In addition, it boasts 100% yield, which means very little waste from the cutting process.

Another of Tapis's products is TapiSuede, a faux suede comprised of 88% high-purity recycled polyester and 12% polyurethane. "High-tech manufacturing techniques and the use of special water-dispersed polyurethane eliminate the need for harmful organic solvents in the manufacturing process," says Estes.

Another faux suede, Ultrasuede, is manufactured using ultra-microfibre made with 100% recycled polyester, which is purely reconstituted from such post-industrial material as scrap film.

"Furthermore, the innovative technology utilised in the production of Ultrasuede results in reduced energy consumption and a more ecologically sound manufacturing process," comments Estes. ☒

family saga

Tapis was founded in 1977 by Al Caputo, whose innovations include one of the first AN61 heat-release fabrics (now used by over 50 commercial carriers). Over its 30+ year history, Tapis has pioneered special processes to align its fabrics with stringent aeronautic specifications, and been creative in its choice of embellishments, which have included embroidery, appliqué and screen prints. In fact, Tapis was one of the first companies to provide qualified soft furnishings for OSU vertical application to the commercial aviation market in 1986.

Today, the company is run under the direction of Caputo's daughter, Karen (president), and his son, Bob (vice president). Headquartered in Armonk, New York, USA, Tapis also has a facility in Dallas, Texas, USA, and a distribution network that spans the globe.

The company is a qualified vendor for Boeing, Bombardier, Cessna Aircraft, Dassault Falcon Jet, Embraer, Gulfstream Aerospace, Lear Jet, Hawker Beechcraft, Duncan Aviation and Jet Aviation, as well as completion centres and commercial airlines worldwide. Tapis's operations were certified to the ISO 9001:2000 International Quality System Standard in 2008 and it is now pursuing certification for AS9100.

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fullflight

What the acquisition of Mühlenberg means for Diehl Aerosystems' product line-up

In 2011, Diehl Aerosystems has continued on its path of expansion with the acquisition of Hamburg-based galley manufacturer Mühlenberg. The former member of the EDAG Group is an established player in the industry, founded in 1909 and employing about 200 people. Mühlenberg develops and manufactures galleys and stowage for aircraft manufacturers and airlines worldwide.

The acquisition is an important milestone for Diehl Aerosystems. The company now has four units – Diehl Aerospace, Diehl Aircabin, Dasell Cabin Interiors and Mühlenberg – enabling it to offer an even more comprehensive product portfolio, either as a package or in individually defined offers.

The product portfolio ranges from cockpit to cabin and is divided into two areas: aircraft systems and cabin interiors. Aircraft systems includes cockpit and flight control systems, avionics platforms as well as utility systems, interior lighting and safety and supply systems. Cabin interiors includes air ducting, monuments such as crew rest compartments, galleys and lavatories, complete floor-to-floor linings and VIP furniture.

"This combination of products is currently very rare within the aircraft industry," says CEO Rainer von Borstel. "It enables Diehl Aerosystems to provide customers either with fully integrated and harmonised packages, including avionics, lining elements, monuments and cabin illumination, or with individual packages as customised solutions if customers prefer."


02


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01. The company's retrofit solutions include cabin lining elements
02. A fully integrated lavatory by Dasell Cabin Interiors

Diehl Aerosystems says no further acquisitions are planned, following the purchase of Diehl Aircabin in 2008, Dasell in 2010, and Mühlenberg in 2011. But growth is still high on the agenda, as a result of continuing sales successes with OEMs, leading to production ramp-ups both for single-aisle and long-range aircraft. Added to that are increasing work for A380s, the imminent first deliveries for the Boeing 787 and the forthcoming A350 XWB.

As one measure to cope with the general upturn, Diehl Aerosystems is expanding its industrial footprint outside Germany. It has founded a subsidiary, Diehl Aircabin Hungary, which will start operations in 2012, increasing its capacity for cabin interiors products.

The acquisition of Mühlenberg has added buyer-furnished equipment to

> THIS COMBINATION OF PRODUCTS IS CURRENTLY VERY RARE WITHIN THE AIRCRAFT INDUSTRY

03. A recent Diehl development – electrically operated hand luggage bins

Diehl Aerosystems' portfolio, and beyond the established OEM business, the company is now eyeing the retrofit market. Diehl Aerosystems says increased airframe lifecycles and the importance of cabin interior design in securing a competitive edge for the airlines enables the company to offer its capabilities directly to operators.

Diehl Aerosystems will present itself in its newly enlarged form at various industry events over the next year. On its stands at the Dubai Airshow in November 2011 and the Singapore Airshow in February 2012, the company will feature a newly built exhibition cabin unit, integrating major cabin monuments such as a lavatory and galley, as well as up-to-date lining and lighting. In addition, product features such as electrical window shades and electrically operated hand luggage bins will be on display. The cabin unit on show will focus on high-end market segments in the Middle East and Asian regions, both for airline and business jet applications.

At Aircraft Interiors Expo in March 2012, the company will display an upgraded version of the 'Big Picture' cabin mock-up, which was presented in its initial form in 2011. ☒

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listenup

Long Prosper's new headphones offer active noise reduction, comfort and efficient customisation

Designed to combine comfort, quality and style, Long Prosper Enterprise's latest product, the LPE-P3NC, is a fully equipped active noise cancellation headphone model for first- and business-class cabins. It boasts customised around-ear earpads to enhance passenger comfort, as well as high-fidelity sound quality to suit the premium cabin.

The active noise cancellation yields a 20dB reduction in noise, which Long Prosper Enterprise says blocks out more than 85% of engine noise. The full coverage of the earcups also contributes to noise reduction. The company says other benefits include a battery life of more than 40 hours, and high durability – both crucial for the long-haul market.

The headphones can be customised to reflect the image of each airline, by redesigning the earcups. The company believes its approach – modifying just the earcups, and not the other components – minimises lead times and eliminates additional tooling and design costs.

Everything about the product is designed with the industry's specific requirements in mind. For example, its metallic finishing is achieved using a special painting technique that Long Prosper Enterprise says is environmentally friendly. Meanwhile, in terms of availability, LPE-P3NC is a fully certified CE and FCC consumer-grade product and can be shipped within three weeks.

With over 30 years of experience as a major supplier of headphones to airlines, Long Prosper Enterprise is familiar with IFE systems and has expertise in manufacturing headphones to be compatible with them.

The company also plays close attention to the fast-moving consumer electronic industry. By working closely with several famous chip manufacturers, Long Prosper Enterprise aims to optimise its noise cancellation technology without compromising sound quality. The company is also working with Austriamicro System on its next-generation noise cancellation headphone model. By combining feedback and feed-forward noise cancellation technology, it hopes that the forthcoming model will create another trend in the airline industry.

The company also offers a comprehensive range of services for its airline clients – including warehouse logistics, managing inventory levels based on customers' needs, and the refurbishment of headphones. ☒

> THE ACTIVE NOISE CANCELLATION YIELDS A 20DB REDUCTION IN NOISE

01

01. Long Prosper Enterprise's new LPE-P3NC headphones

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NCH headphone Patent Number
China: 2004200828790
UK: GB2417385

LPE-P3NC

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Noise Cancellation
Headphone

LPE-P2NC

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LASTWORD

goldenticket

How to deliver an exceptional IFE experience for passengers – the three golden rules of interface design

Derek Ellis, Massive Interactive

It's a common adage that IFE should be intuitive, easy to use and adhere to rules such as having a short path to playback. Yet to deliver a truly great experience, there are three golden rules that every IFE designer should follow.

1. Keep it fresh

With consumer expectations moving at such a rapid pace, IFE must evolve beyond the static screen-by-screen-based experience they once were. Today's IFE needs to keep pace with the changing consumer technology market, currently driven largely by smartphones and tablet devices. It needs to be extensible, dynamic and fluid. Critically, it must also be supportive not only of varying passenger needs and wants, but also of the airline's need for a powerful communication channel with which to continually engage and delight passengers. Designers should be creating mechanisms to support the airline to showcase new content, or highlight features or services as they are introduced over time.

IFE designs are also no longer constrained to the seatback, or even one screen. Increasingly, you will be designing for a multiscreen environment including additional devices brought on board by the passenger, and new-generation handsets such as Panasonic's Karma or Thales' TouchPMU.

As designers, we must evolve our view of the user interface being fixed to the seatback, into a more fluid, multiscreen experience. Passengers want to use screens in different ways and at different times during a flight. Establishing clear design principles and screen relationship rules at the start of the project can help turn what could be considered a design overhead into a design opportunity.

2: Be aware of the passenger experience eco-system

Prior to boarding, the passenger may have interacted with an app or airline-branded user interface via their smartphone for check-in, way-finding, boarding or pre-flight entertainment, which they may well also do post-flight. The mobility of services is only going to increase, so look for these links and include these additional services in your core design strategy.

3: Don't let the airline's brand values be skin deep

I believe what takes IFE beyond the obvious intuitive, easy-to-use essentials is when the airline's brand and values are reflected in all aspects of the IFE design. I've seen many IFE systems (and other user interfaces) where once past the welcome or home screen, any hint of the brand beyond a logo has disappeared.

The airline's brand personality is one of the few things that will remain a truly unique point of differentiation, whereas IFE features, functionality and content often cannot. Let the airline's core brand values and personality shine through in all aspects of the IFE design, in the interaction model, and on all screens from the movie detail to the help screen.

The integration of brand values and promise in the core design of the user interface can be that X factor that takes an IFE system from an average experience to an exceptional one. ☒

about the author

Derek Ellis has directed and designed creative projects for some of the world's best-known companies. Co-founder and creative director of Massive Interactive, he leads the user experience and design teams across the company's dual-hemisphere HQs in London, UK, and Sydney, Australia, working with clients such as BBC, Panasonic, Samsung, BT Vision, Cisco, Telstra, Qantas and Virgin Atlantic. Contact Derek at derek.ellis@massiveinteractive.com or see www.massiveinteractive.com for more info.

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