

# Aircraft *interiors* INTERNATIONAL

2015SHOWCASE

THE INTERNATIONAL REVIEW OF AIRCRAFT INTERIOR DESIGN AND COMPLETION



## 2015 DESIGN SHOWCASE

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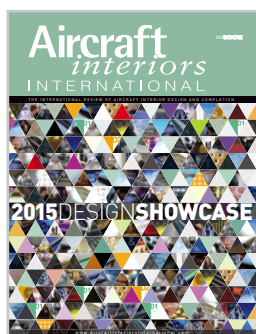
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**Cover graphic: Anna Davie**



# insideview

Congratulations on working in the world of commercial aviation – you chose wisely. We may be biased, and you could be having a bad day, but that doesn't detract from the cold numbers. You are working in a market that will serve orders for more than 36,770 new aircraft over the next 20 years – worth an amazing US\$5.2tn, according to Boeing's latest forecast.

The numbers are staggering, exciting and enticing. With industry experts Counterpoint Market Intelligence estimating the aircraft interiors market to be worth US\$10.5bn, it is clear to see why so many new companies are seeking to enter the industry, whether as designers or suppliers.

Indeed, some researchers estimate that the passenger seating sector alone will reach US\$4.86bn by 2017, with IFEC estimated at US\$3bn in the same year, and lighting US\$1.25bn. Small wonder that there are new names emerging in seating, especially when they are quickly finding orders in a fast-paced market. IFEC is even faster paced, with new names announced or rumored to be joining the market every few months, particularly in the rapidly expanding wireless IFE sector.

While money makes the world go round, many suppliers and designers are creating innovations that can help to make it more comfortable to travel around. There is of course Etihad's ultra-luxurious Residence, which has enjoyed an enormous amount of public interest ahead of its December launch. If you want further details, an in-depth feature can be found on our website, and you can hear more from two members of the Etihad Design Consortium in this issue – Factorydesign on p44 and Acumen on p48.

A different proposition for first class is the elegant suites designed for Air France's La Première class by Yellow Window (p72). The agency has also worked on the Halo concept, Zodiac Aerospace's vision of how a first class space could work in the future.

Lest it sounds like the industry is elitist, there is also fantastic work going on in the economy cabin. One example is Teague's design for GOL, which blends a feel of home with a feel of Brazil. Achieving a sense of a flag carrier's country without resorting to cliché can be a difficult task, but Teague's Devin Liddell has managed to strike a balance, as he explains on p36.

In other economy news, given the increasingly frequent headlines about 'reclining wars', with passengers resorting to 'knee defenders' to prevent a seat in front from reclining, we could be about to see increased airline interest in fixed-back seating. Amid these reports of mid-air unpleasantness, UK-based leisure carrier Monarch Airlines has introduced a smart fixed-back seat, designed by Design Q. For more details, and to find out how this clever seat also improves comfort for the occupant and saves the airline money, turn to p60.

Of course, business class, usually the profit engine of any major airline, has also seen some amazing developments of late, including Recaro's entry into the long-haul fully flat segment, the CL6710, full details of which are on p98.

For the inside story from the designers of the latest business class innovations, see Design Investment's discussion of the business seat it created for Air France's Boeing 777s on p68, and the slick design that Tangerine created for Virgin Australia on p56. Speaking of Tangerine, the agency is enjoying a double celebration at the moment, with the 15<sup>th</sup> anniversary of its hugely successful design for British Airways' Club World approaching, as well as the studio's own 25<sup>th</sup> anniversary.

We congratulate Tangerine, but also everyone else involved in the aircraft interiors industry. There may be 10.5 billion good financial reasons to be in the industry, but the pure desire to innovate is just as compelling.

Adam Gavine, editor



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"The interiors market will grow at a CAGR of 5.5% over the next 10 years. This is well in excess of the anticipated growth in other aerospace sectors, which are more closely related to the OE cycle"

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# flyinghigh

The commercial aerospace industry is booming. Build rates for aircraft OEMs have reached record levels and the supply chain is benefiting, with many sectors achieving impressive growth. However, there is one market segment that is forecasted to expand much more than all others – aircraft interiors

**JON LUNDBERG & BEN BETTELL, COUNTERPOINT MARKET INTELLIGENCE**



If there is one thing that aircraft manufacturers, engine OEMs and investment analysts can all agree on, it is that the commercial aerospace industry is in the midst of a period of strong growth.

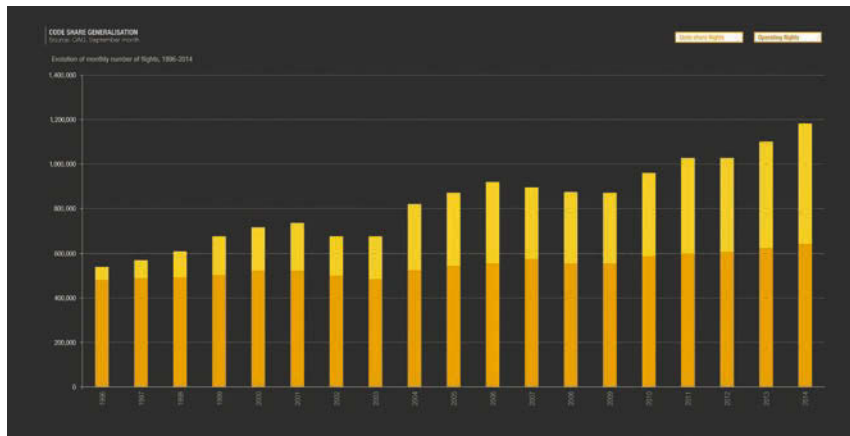
The major aircraft OEMs' growth forecasts for civil aircraft all portray a positive outlook. For example, Airbus launched its new Global Market Forecast in September 2014, and said that air traffic will double over the next 15 years and that revenue passenger kilometers (RPKs) will grow by an average 4.7% per year over the next 20 years. Similarly, Boeing's latest market outlook released in September 2014 has forecasted that RPKs will grow by an average of 5% per year over the next 20 years, leading to a doubling of the world's jet fleet to 42,000 aircraft by 2033.

By most accounts then, the aerospace industry has a bright future over the next 10 years. But what of growth beyond 2024? The core of the argument that air traffic will remain a growth market is that the number of trips by air per person in major emerging economies (around 0.5) is well below that in the West (around 2.0). It seems rational to conclude that trips per person in emerging economies will gradually catch up, leading to major growth in demand. This development is likely to be caused by a

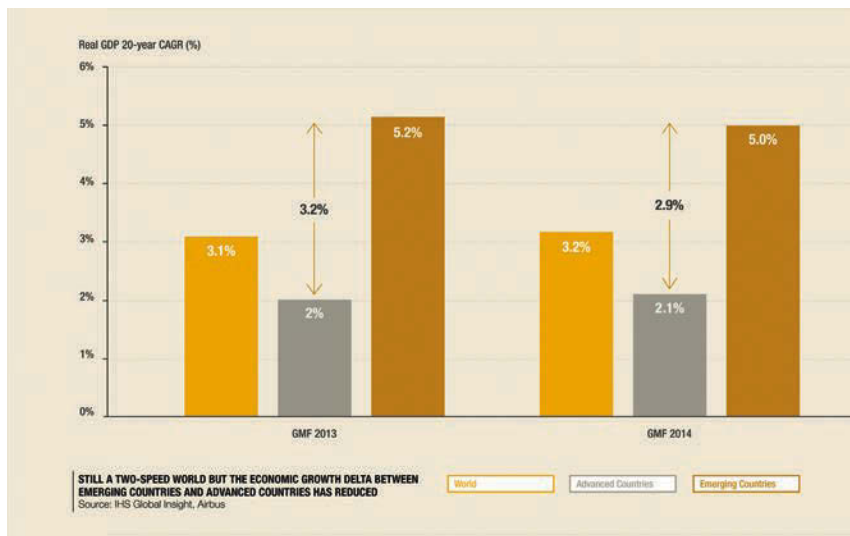
forecasted huge expansion in the 'middle class' across the globe. Most of this growth is driven by two economies – China and India.

So how does this affect the aircraft interiors market? One major driver of market growth in commercial aircraft interiors is the demand for new aircraft, and this is partly driven by air traffic growth. However, the interiors market is also driven by competition between airlines. The passenger experience is crucial; therefore continual cabin investment is a key enabler for success. This affects not just newly delivered aircraft, but entire fleets. In other aircraft equipment sectors, there is downward pressure on aftermarket demand due to equipment becoming more reliable and the trend toward slightly shorter aircraft lives. However, this is not the case in aircraft interiors. Counterpoint views the aircraft interiors market as largely immune to these trends, as the market is driven by competition for passengers between airlines.

As a result, the aircraft interiors market is booming. This US\$10.5bn market has been analyzed by Counterpoint Market Intelligence in its new report, *Commercial Aircraft Interiors 2014*. Leading aircraft interiors practitioner Ben Bettell joined Counterpoint with the



01



02

01. The evolution of monthly number of flights, 1996-2014. The paler yellow represents codeshare flights
02. It is still a two-speed world, but the economic growth delta between emerging and advanced countries has reduced
03. According to Airbus, there will be demand for over 31,350 new aircraft of more than 100 seats and 100 tonnes between 2014 and 2033

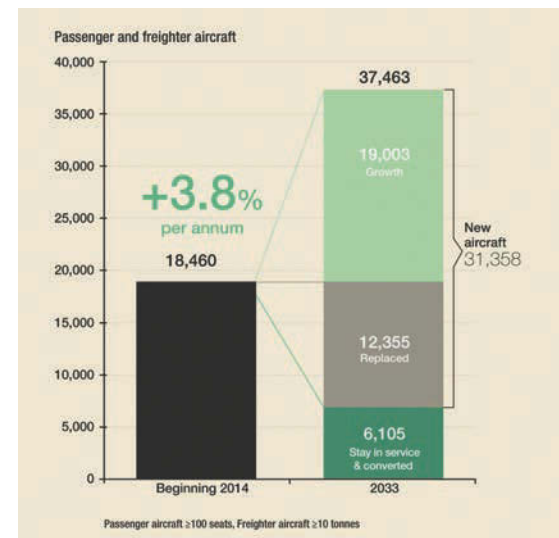
vision of creating a market report that would break down this sector in detail. His first-hand knowledge of the sector (35 years of experience in aircraft interiors) complemented Counterpoint's aerospace market analysis and modeling capability.

One of the conclusions that can be drawn from the report is that it's a good time to be a manufacturer of aircraft interiors. Counterpoint forecasts that the interiors market will grow at a CAGR (compound annual growth rate) of 5.5% over the next 10 years. This is well in excess of the anticipated growth in other aerospace sectors, which are more closely related to the OE cycle. For instance, during the same period Counterpoint forecasts that the gas turbine engine components market will have a CAGR of 3.7%, while aerostructures will have a CAGR of 2.7%. There is no aerospace market as hot right now as aircraft interiors.

One of the top-three interiors sectors in terms of the forecasted 10-year growth rate is the seating market, where the top end of the market is achieving the highest growth, driven largely by carriers in Asia and the Middle East. For instance, the super-first-class market is forecasted to achieve a CAGR of 10.6% from 2013-2023,



THE PASSENGER EXPERIENCE IS CRUCIAL: THEREFORE CONTINUAL CABIN INVESTMENT IS A KEY ENABLER FOR SUCCESS



03

albeit from quite a low installed base. During the same period, first class seating is forecasted to have a CAGR of 7.1%, and super business full lie-flat is expected to achieve a CAGR of 8.0%.

There is an ongoing industry-wide trend in the premium sector to retrofit full lie-flat business seats onto existing aircraft, which is an important driver of growth as this is the largest sector of the seating market. The fierce competition between premium airlines, such as Emirates and Etihad, to win the business of the high-end traveler is having a huge effect on the market.

**THE MARKET MODEL** The confidence of such strong growth in the aircraft interiors market is grounded in a detailed market model. Counterpoint constructed its market model of the aircraft interiors market based on an analysis of all commercial aircraft in service by type and year of construction, and the OEMs' forecasts for new aircraft deliveries over the next 10 years. Certain assumptions were made. For aircraft fleets, it was assumed that the proportion of aircraft in storage remains roughly constant, and that commercial passenger aircraft have a service life of 25 years on average.





The High Flyers...

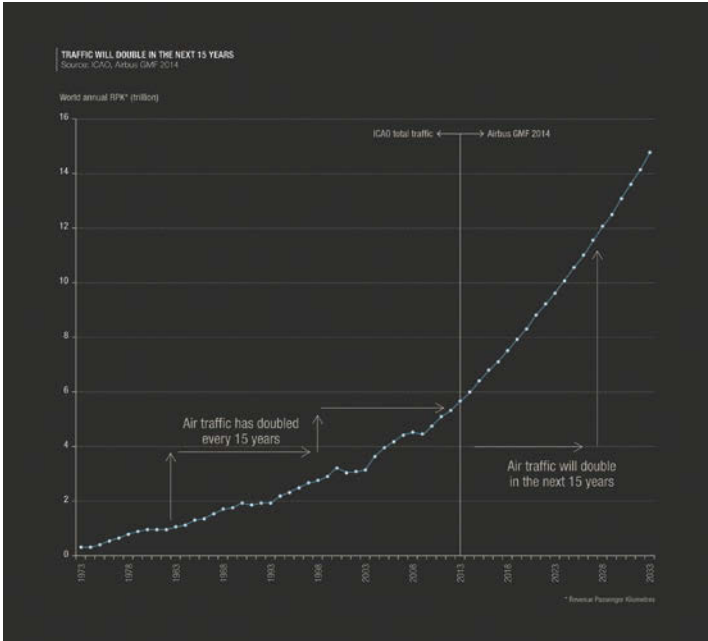
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“THERE HAS BEEN AN ENORMOUS AMOUNT OF CONSOLIDATION INTERIORS OVER THE LAST FEW DECADES”



04

- 04. Air traffic will double in the next 15 years
- 05. Counterpoint's CAGR estimates for different interiors categories over the next decade

For the new aircraft delivery forecast, Counterpoint's own forecast was constructed by modeling demand. This was based on numbers of seats, starting with data on current fleet size, load factors and aircraft productivity; assumptions for the growth in demand for air travel (RPKs), load factors, aircraft productivity and any changes in average aircraft size. This culminated into the fleet required, and combined with Counterpoint's assumptions on aircraft retirements (varying in this model by aircraft type), gives the demand for new aircraft. Counterpoint reconciled a demand model with the short- to medium-term production plans of the aircraft OEMs and aircraft order books.

To obtain estimates for the size of the aircraft interiors market and its segments, Counterpoint obtained estimates for the prices of the various parts of the interior and then estimated the aftermarket both in terms of the frequency of interior retrofits and the rate of demand for spares, which was then applied to Counterpoint's aircraft fleet data and aircraft delivery forecast to give the aftermarket demand by year.

Counterpoint then analyzed the players in the market, identifying their annual sales, contracts, number of employees and floor space, enabling validation of the

CAGR 2013 -2023	
Seats	5.9%
Galleys	4.5%
Galley inserts	4.6%
Lavatories	4.7%
Crew rest compartments	5.5%
Monuments	6.9%
Lighting	3.8%
Interior panels	3.6%
Luggage bins	4.1%
IFE and in-flight comms (IFEC)	6.9%
Floor coverings	6.0%
Certification services	5.5%
Total	5.5%

05

market sizes and estimation of market shares. Counterpoint tested its assumptions, dependencies and forecasts through discussions with people across the global interiors industry.

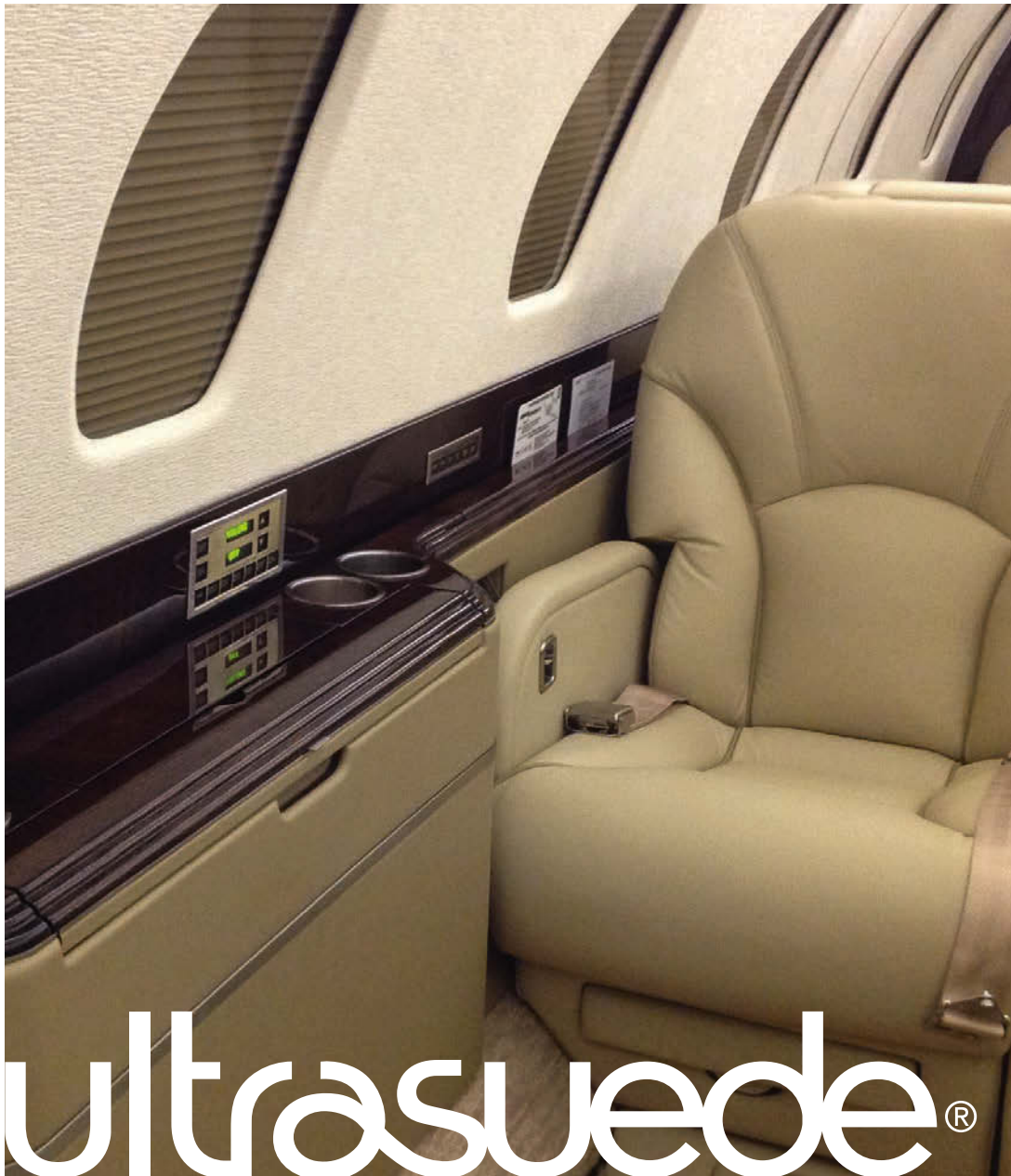
**THE OVERALL INTERIORS MARKET** The interiors market can be broken down into seats, galleys, galley inserts, lavatories, crew rest compartments, monuments, lighting, interior panels, luggage bins, IFEC and floor coverings.

In Figure 6, forecasts for these segments are shown over a 10-year period.

The three most rapid CAGRs are for IFEC, floor coverings and seats. The differing CAGRs for the various sectors are driven by: different aftermarket drivers; different growth rates by class of aircraft – e.g. single-aisle versus twin-aisle; and increasing market penetration for certain types of new technology systems explains why IFEC is the fastest-growing sector.

**WHERE THERE IS GROWTH, THERE IS CONSOLIDATION** There has been an enormous amount of consolidation in interiors over the last few decades. Most of the consolidation has been centered on two players: B/E Aerospace and Zodiac Aerospace. These firms have





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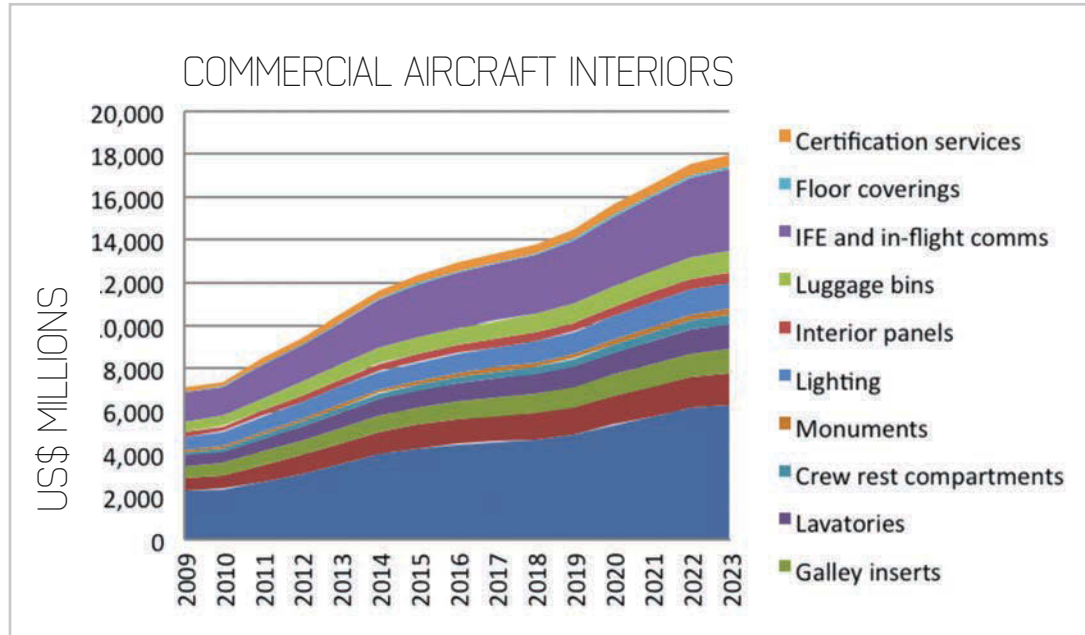


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06. Forecasts for key interiors segments, shown over a 10-year period



THE HIGHLY ATTRACTIVE GROWTH RATES OF THE INTERIORS INDUSTRY IMPLY THAT CONSOLIDATION IS LIKELY TO CONTINUE

## about counterpoint

Counterpoint Market Intelligence is an aerospace and defense market analysis consultancy, specializing in aircraft interiors, aerostructures, engine components, tooling and aerospace actuation. With over 50 years of industry experience, Counterpoint supplies research reports based on industry discussions and projects, data analysis and modeling, and its own extensive experience in the aerospace and defense industry. The company analyzes markets at a global level, with a special emphasis on: Tier 1 and Tier 2 suppliers; segmentation by product and process; and assessment of current and emerging trends.

Counterpoint also carries out consultancy projects specializing in deep dives into markets and products, strategy and competitive assessment, and market due diligence for M&A. The team leverages its extensive contacts and experience in industry to provide an industry-leading level of accurate, specialized and independent analysis on the niche markets it covers. If you would like more information on the reports and how Counterpoint can help your business, please email [enquires@cpmil.com](mailto:enquires@cpmil.com).

morphed into mega-size, full-service organizations delivering products across all interiors market sectors. Since 1987, B/E has acquired 23 interiors companies, including three this year – Emteq, Wasp and Fischer. Similarly, Zodiac Aerospace has made 17 interiors-related acquisitions since 1992, with Greenpoint Technologies being just the latest acquisition, in June 2014.

The highly attractive growth rates of the interiors industry imply that consolidation is likely to continue. In Counterpoint's opinion, B/E and Zodiac will likely continue to grow as they look to expand their market share through acquisitions. However, consolidation is unlikely to be confined to the mega players in the interiors market. The demand in aircraft interiors is forecasted to be so great that Counterpoint believes several new medium-to large-sized organizations will emerge.

Smaller independent companies will also enjoy considerable growth as demand increases. The challenge for smaller players is to convince airlines of their financial stability and long-term longevity in ownership or management. Smaller companies (such as Thompson Aero Seating and Geven) still have a strong role to play in the market, and this will continue to be a characteristic of the interiors market into the future.

By all accounts, there are exciting times ahead in the aircraft interiors market. Boeing, Airbus and the other aircraft OEMs disagree on many things. However, there is one thing they can all agree on, and that is the solidity of growth forecasts for air traffic. Equally, there is unlikely to be any let-up in airline competition to seek differentiation through interiors. Aircraft interior suppliers will have plenty of reason to rejoice over the next 10 years. ☒



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01. Moments of refreshment can be generated by simple things such as seatback entertainment and literature, as on this Singapore Airlines flight



# flightrefreshment

From subconscious cues to encouraging walking, studies are finding new ways to help passengers feel refreshed and ready for the day upon landing after a long flight

P VINK & S A T VAN VEEN, FACULTY OF INDUSTRIAL DESIGN ENGINEERING,  
DELFT UNIVERSITY OF TECHNOLOGY, NETHERLANDS



02 03

02. A small group of survey respondents considered watching movies to be refreshing. Virgin Atlantic prides itself on its IFE offer
03. If walking is important, so is having a destination. The shop on Korean Air's A380s is a great place to stroll to



It is possible to feel refreshed after a long flight on an aircraft. Several factors play a role, but being able to sleep well is, of course, a major influence. There have been many studies on the effect of sleep. For instance, a good continuity of sleep and being gently awoken makes people feel better<sup>1</sup>. This is an opportunity for airlines, and human movement can help one to feel refreshed upon arrival.

#### REFRESHING ACTIVITIES DURING CURRENT FLIGHTS

This year, Delft University of Technology conducted a study<sup>2</sup> looking at when passengers feel refreshed during a flight. A total of 114 air travelers (aged 16-63; 70% German;  $n=114$ ) were asked directly after their flights (both short haul and long haul), what they had found to be the most refreshing activity during their flights. For both short-haul (less than two hours) and long-haul (more than six hours) flights, about one-third of the travelers said they felt most refreshed after having food and drink. Sleeping is also seen as a refreshing activity by a large group, and reading and watching a movie is also considered refreshing as well, as mentioned by a small group. However, it is often not possible to have a good rest due to time differences, body posture, light, noise and other disturbances. The most important activity to improve well-being on a long-haul flight was seen as having a walk around the aircraft. The fact that human exercise creates a refreshed feeling is interesting, as it offers opportunities for airlines.

**ENABLING WALKING INSIDE THE AIRCRAFT** You cannot have all the passengers walking around inside an aircraft as there is simply not enough space. Furthermore, it would create congestion in the cabins and disturb passengers who are in their seats. However, creating opportunities to walk somewhere in an aircraft is worth considering, especially as research shows that those moments of relaxation are enough to create a more positive feeling about the flight, as well as physiological and mental benefits. Walking during flights can also help prevent travel-related thrombosis<sup>3</sup> and leg exercise promotes blood flow, making flying healthier.<sup>4</sup> As well as this physiological effect, there is also a relationship between movement and cognitive fatigue. Movements of, for instance, the hands and postural adjustments seem to be natural countermeasures against fatigue.<sup>5,6</sup>

**UNAWAWARENESS OF PROBLEMS** To explain the theory on feelings of well-being, some background is needed on how the human senses work. In general, humans are often unaware of the environmental characteristics that help create experiences. Dijksterhuis<sup>7</sup> and Park et al.<sup>8</sup> showed the difference in effects between a forest and a city in an experiment that had 280 test subjects walk in both environments. Salivary cortisol (a hormone related to feeling stressed) was significantly lower (a 15.8% decrease), average systolic blood pressure was significantly lower (a 1.9% decrease) and heart rate was lower for subjects after walking in the forest compared with





04 05

walking in the city. Of course humans are not aware of all these facts.

Mellert et al.<sup>9</sup> studied the impact of noise and vibration on the well-being of people during long-haul flights and in flight simulators. As well as indices to characterize the human response, they found that noise has an important effect on health indicators, comfort and well-being. For example, flight crew experiencing swollen feet are more aware of their foot situation in noisy conditions – indeed awareness increased 43% in noisy conditions, compared with the quiet at the beginning of the flight. Similar results were found for neck pain, with a pronounced pain increase of 57% as noise levels increased.

These results show that questioning crew and passengers about noise is difficult, because noise may not be recognized as a problem. The same influence could be true for lighting, cabin pressure and air quality. It makes sense that we are not continuously aware of what all our sensors record because there is too much information coming into our body from all sensors. The human brain selects the important elements. According to Dijksterhuis,<sup>7</sup> we unconsciously perceive much more than we realize and have the ability to convert unconscious into conscious information when it is needed or when we have to explain our behavior.

**SENSORS RECORD FAST DIFFERENCES** So, human sensors do not always make us aware of what they record. Apart from the awareness aspect, sensors are not capable

of recording absolute values. The ideal comfortable indoor temperature, for instance, is not one absolute value and is dependent on the outside temperature.<sup>10</sup> In the northern hemisphere, higher indoor temperatures are preferred in the summer than in the winter. The tolerances of thermal perceptions are not fixed within one season. People who live or work in naturally ventilated buildings, where they are able to open windows, become used to this thermal diversity. Their thermal perceptions extend over a wider range of temperatures and the preferred comfort range is broader.<sup>10</sup> To put it simply, people get used to a wider range of temperatures and thereby broaden their comfort zone. A similar effect can be found for the sense of hearing. For instance, when one is exposed to loud music at a concert, the hearing threshold (the level below which a human is no longer able to detect sound) is shifted.<sup>11</sup>

Human sensors record fast changes more readily than slow ones. In a study by Kolarik et al.,<sup>12</sup> 52 subjects were asked to report differences in temperature while in a climatic chamber. Subjects did not distinguish a slow temperature increase of +0.6°C/hour for the first three to four hours of exposure. However, when changing from a room with a temperature of 24° into a room with a temperature of 20°, it is experienced as cool<sup>13</sup> and heart rate increases.

Goossens et al.<sup>14</sup> showed that small differences in pressure under the buttocks are not noticed. The authors made a hole in a seat and inserted a round contact surface

**04.** Another onboard destination can be a bar area. The bar area in Qatar Airways' new A380 is a striking piece of design

**05.** The majority of survey respondents said that sleep is the ultimate means of refreshment. Premium passengers with Singapore Airlines will have no trouble sleeping in their fully flat beds

06. To help passengers sleep, Air France has created a hotel room ambience for its La Première product
07. Passengers on Qantas' refreshed B767 fleet might enjoy the many options that the iPad-based IFE provides

with a diameter of 10cm. The pressure was 26.5kPa and a difference of less than 2.7kPa was not noticed by occupants of the seat.

The fact that the previous value does influence the comfort experience should be considered in seat design as well. Van Veen et al.<sup>15</sup> showed that after sitting on a hard wooden stool, a test seat feels much softer than after sitting in the same test seat after a soft comfortable chair, as reported by the test subjects. So, sensors do not record slow changes easily and do not record absolute values, but refer to the latest recorded value.

**SELECTIVE MEMORY** Kahneman<sup>16</sup> asked test subjects to put their hands in ice-cold water. In one trial, the water was at 14°C for 60 seconds, which is very uncomfortable. In the other trial the water was 14°C for 60 seconds, but then rose slightly and gradually to about 15°C by the end of an additional 30-second period. So the first 60 seconds were equally painful and in one case 30 seconds were added, but the increase in temperature smoothed the experience in the end. Nearly 70% of participants chose to repeat the 90-second trial, even though it involved 30 extra seconds of pain. Participants also said that the longer trial was less painful overall, less cold, and easier to cope with. Some even reported that it took less time. So the end of an event influences the total experience considerably. Additionally, it is accepted that people have selective memories.<sup>7</sup> Impressive moments seem to be better remembered than

'average' moments, and our memory often does not have a linear scale for all events in a journey.<sup>16</sup>

**TRANSLATING THEORY TO AIRCRAFT INTERIORS** The aircraft interior should be designed in a way that results in a positive experience. This can be achieved by bearing in mind that the human memory is selective, that most environmental influences are subconscious, and that our sensors tend to record fast changes.

First of all, any passenger discomfort should remain below the level of conscious awareness. Thus, a relatively good basic level of interior elements (seats, seat pitch, lighting, temperature, pressure, humidity), as well as pleasing aesthetics are required, and they should all be selected or designed in such a way that passengers are not aware of them. On top of this, moments of refreshment are generated by good food, movies and literature. This is probably old news for interior designers, but the important consequence of the research is that refreshing activities can also include exercise. Opportunities for walking should be arranged, such as opening a buffet for separate sections consecutively to prevent everyone from walking around at the same time, and adding other forms of exercise. Furthermore, considering that people are more aware of changes and that sensory variability is also preferred by humans,<sup>17</sup> variation in the experience of an interior over time is necessary.

**A PROMISING FORM OF EXERCISE** Kamp<sup>18</sup> presented in her PhD thesis a new concept named 'active seating', which consists of two sensors in the upper part of the seat backrest to measure each shoulder pressing backwards. This active seating was used to control a game and showed that a large part of the passenger's body was activated. The concept was tested with passengers in the back seat of a BMW 7-Series car while being driven. Electromyography signals showed that even the leg muscles are activated



THE IMPORTANT CONSEQUENCE OF THE RESEARCH IS THAT REFRESHING ACTIVITIES CAN ALSO INCLUDE EXERCISE



06 07





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08 09



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THIS IS AN ARGUMENT FOR THE NEED FOR  
MOVEMENT STIMULATION DURING LARGELY  
SEDENTARY PERIODS ”

08. A walk to the bathroom for a wash is a refreshing activity...
09. ... And having a shower is even better still, for first class flyers on Emirates' A380s

when pressing backwards with one shoulder. Twenty-six subjects played the game in the rear seat using this active seating while being driven for 30 minutes on a route consisting of mainly highways. The game was played three times for five minutes, with each game followed by five minutes of rest. The same subjects then had another drive of 30 minutes, during which they sat still. Thirteen started with the game, and 13 played during the second part of the journey. Subjects felt more refreshed after driving 30 minutes in the gaming condition with the active seat compared with the other conditions (reading a book, working on a laptop or playing a game on a tablet). The discomfort between the two conditions did not differ significantly. Seventy-nine percent of subjects liked the system and 85% said it was possible to play the game in a car, although the movement of the vehicle had a disturbing effect. Also, persons older than 50 years reported that they liked the game. This is very promising. If we apply this to an aircraft seat, the interesting question is how long and at what time during the flight the gaming seat should be activated for the users to feel refreshed after the flight.

**A REFRESHING END TO THE JOURNEY** Another important factor to feeling refreshed is a smooth and positive ending to the flight. It is still a challenge to create a more positive ending, since the last experience for passengers is usually waiting for their trash to be picked up, waiting while the aircraft taxis to the gate, waiting for the doors to open, waiting to get out of the aircraft while other

passengers grab their hand luggage. Of course, the time spent waiting to disembark or waiting for luggage could also be used to offer refreshment. There are still many opportunities for airlines to offer refreshing options, such as the smell of fresh air, information about the destination, a farewell chocolate, larger overhead bins, a nice area to disembark into, easier disembarking and a super-friendly crew to create a positive end to the experience.

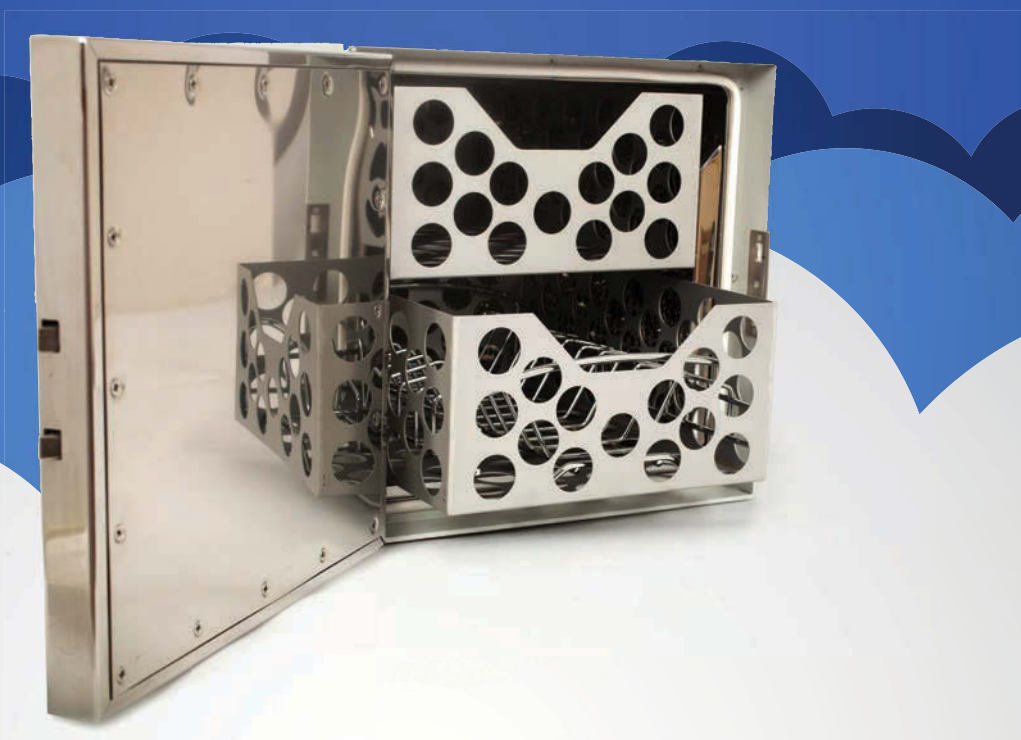
#### MORE SUPPORT FOR VARIATION IN HUMAN MOVEMENT

The number of experts in the field of musculoskeletal loading who promote a seat or an office environment that stimulates movement is growing. Nordin<sup>19</sup> states that, based on a review of epidemiological studies, prolonged sitting in a restricted posture is a risk factor for musculoskeletal injuries. This is an argument for the need for movement stimulation during largely sedentary periods. Lueder<sup>20</sup> also states that based on a review of studies into ergonomics, more dynamic sitting and more variation in posture reduces discomfort and is better for maintaining a healthy body. Large posture changes, such as the aforementioned walking and gaming onboard an aircraft, have positive effects. However, the benefits of movements with a lower intensity have been shown as well. Franz et al.<sup>21</sup> showed an increase in comfort by adding a lightweight massage system in the backrest of a seat. An experiment with 20 people driving for approximately 2.5 hours showed that active movement of the shoulder muscles was significantly increased when using the massage system compared with driving without the system. This was measured by placing electrodes on the trapezius muscles to record tension. The comfort was highly appreciated and there was no distraction. The system is now commercially available in the BMW 7-Series.

**FUTURE RESEARCH** Some important questions to ask are: What movements of what parts of the human body are needed to prevent discomfort and musculoskeletal complaints over time? What movements of what parts of the human body are needed to feel refreshed and



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10

10. Having adequate and easy to use stowage can remove stress from the inflight experience

comfortable after sitting for a long time? Is it possible to build games, exercises, playful movements or other activities into a journey? There is also a maximum on what is possible and what passengers want to do. A few hours of exercising might be healthy, but may not be pleasant for everyone and may not be feasible. The right combination of commonality and variation<sup>22</sup> that applies to the evaluation and aesthetic appreciation of a product could be useful for designing the right combination of movement and static posture during a journey as well as for office work.

**CONCLUSION** There are many opportunities to improve the flight experience so that passengers feel refreshed, such as good food and good entertainment. However, to further enhance the refreshed feeling there is a sound theoretical base for stimulating passengers to walk more in the aircraft, for instance by providing a buffet or exercise games in the seat. It is even possible – based on theory – to create a flight where passengers feel refreshed upon landing by keeping the discomfort in the unconscious domain, generating enough conscious moments of refreshment and ending the flight in a positive way. Research is needed to define the exact interior and service demands to create such a refreshing flight. ☒

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SKILLETS

# CSeries

As Bombardier's CSeries narrow-body approaches its 2015 launch, we can reveal details of the production-ready cabin configuration

ADAM GAVINE, AIRCRAFT INTERIORS INTERNATIONAL;  
MICHAEL BLOCK, LOUIS SAMSON & ROBERT GRANT, BOMBARDIER

01. The cabin is being designed to have features and flexibility to match its strong aesthetic appeal



The CSeries single-aisle aircraft is Bombardier's answer to what it sees as an under-served 100-150 seat market, designed to offer an optimized airframe-cabin combination. 'Optimized' is one of two words that Bombardier believes sum up the development of the CSeries cabin, the other being 'integrated'. Let's take a moment to define those terms. The dictionary definition of 'integrate' is "to form, coordinate, or blend into a functioning or unified whole", while 'optimize' is "to make as perfect, effective, or functional as possible". These are bold aims, so how is Bombardier working to achieve them?

**STOWAGES** Bombardier is not developing the cabin interiors alone – the CSeries Interiors team also includes experts from integrated interiors supplier Zodiac OEM Cabin Interiors. As passengers increasingly opt to take carry-on luggage, inadequate overhead stowage is a frequent cause of frustration. Thus the CSeries will feature pivoting overhead bins, in which passengers can stow their carry-ons wheels-first to maximize capacity. Bombardier claims to be the first to incorporate such bins in a narrow-body, although Boeing's 737 Sky Interior was first to bring them to market. However, the CSeries is unique in offering pivoting overhead bins for a five-abreast cabin, as compared to the fixed overhead bins found on the five-abreast SuperJet SSJ100 and AVIC ARJ21.





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03

During the design and testing phases, the C-Series Interiors team further optimized the bin design to achieve the latest design and security requirements while permitting additional carry-on capacity in the larger right-hand bins by allowing some carry-ons to be stowed on their narrow side, freeing up space for more items.

The bins include wiring harnesses for upwash and downwash lighting and passenger service units (PSUs), air ducting for cabin distribution and passenger gaspers, as well as support features for ceilings and sidewall panels, minimizing the need for additional airframe provisions. This design means that fewer items need to be installed during initial build and removed during heavy maintenance. The bin installation techniques avoid the need for rigging and adjustment, while also ensuring optimal visual alignment throughout the cabin.

**PSU DESIGN** The PSUs are fully integrated to keep all passenger services together on a single panel, which minimizes the number of parts that engineers need to install and manage, while maximizing seat pitch flexibility, from as short as 28in. The PSU panels are designed to accommodate an optional fixed overhead video display from Panasonic Avionics, the supplier of the cabin management system (CMS). The 4.3in LED display can be used to show safety briefings, connecting gate information and passenger flight information, among other applications that are under development by Panasonic. As a further example of integration, the wiring within the overhead bins includes part of the CMS Ethernet network, so if installing displays, fitters need only swap out the panels.

**LIGHTING** Of course, the C-Series cabin features LED lighting. The main cabin ceiling is broken up with aisle lights that may be controlled independent of the upwash lights to provide soft cabin lighting during night-time



THE C-SERIES INTERIORS TEAM FULLY EMBRACED THE LATEST INDUSTRY GUIDANCE WITH REGARD TO COLLABORATION



operations. These aisle lights incorporate emergency floodlights to provide a secondary function in case of electrical power loss.

Other dual-purpose light fixtures are the spotlights in the forward and aft ceiling panels, which are controlled by the CMS, and may be operated as ceiling lights in their respective entry or galley area, or alternatively as reading lights, to support the nearby cabin crew seat.

**SIDEWALLS** In line with the integration aim, the sidewall panels are designed for ease of installation and removal, even with passenger seats installed in the cabin. The lower sidewall panels (dado panels) incorporate integrated air passages for cabin air extraction and decompression. These longitudinal passages replace the traditional grilles that can collect dust and dirt and require frequent cleaning, and are a seamless part of the cabin architecture. The sidewalls also incorporate large, integrated window reveals that complement the already generous cabin windows that measure 11 x 16in, with a reduced parts count.

**SEATING** The C-Series Interiors team has fully embraced the latest industry guidance with regard to collaboration between IFE supplier, seat supplier and itself, as the seat installer, and has designed the cabin to feature the widest single-aisle passenger seats to accommodate a growing population (not only in numbers but also in size).

The initial offering was exclusively supplier-furnished equipment (SFE), with a selection of seats from Zodiac

- 02. The lighting system can create soothing effects for night flights
- 03. From the outset, Bombardier is looking to work with SFE and BFE seating options



04

04. The PSU panels can feature a 4.3in LED display to show passenger information

05. Bombardier has also worked with Thales on seatback IFE integration in business

Seats, namely the Dragonfly ultra-light seat, the Slimplus economy seat (evolved from the Weber 5751 model) and the Close Comfort 2 business seat (evolved from the Weber 6810). Business class is configured 2-2, while economy is 2-3.

While the SFE offering made for a good business case and aided C-Series customers in managing their selections and workload to introduce a new aircraft seat combination, it was quickly recognized that some airlines wanted to manage their key passenger touchpoint on their own, so a more traditional buyer-furnished equipment (BFE) offering is evaluated on an as-requested basis.

According to Bombardier, while some airlines are happy to introduce the wider C-Series SFE economy seats into their fleets with no customization, some others have considered their place in a fleet-wide passenger experience. As Michael Block, a senior engineering specialist on the C-Series Interiors team states, “What to do with those Airbus or Boeing types that cannot offer the same seat width? Will frequent passengers with an airline expect some level of consistency when changing between fleet types on different flight legs? This is not an unwelcome challenge for an OEM, but it certainly gives the airlines something to think about.”

Another challenge for Bombardier as an OEM is that of integrating and certifying multiple backrest configurations and combinations of comfort features for passenger seats (whether SFE or BFE), including in-seat audio/video on demand displays and in-seat power supply systems (ISPSS).

As with all recent aircraft programs, IFEC integration has become a significant element in the planning and provisioning of the C-Series. The Interiors team evaluated multiple IFEC systems and developed a provisioning strategy that it feels will facilitate integration of a number of line-fit systems. The team found that some systems were initially designed for the retrofit market and need to be further evaluated because their component technology may require adaptation to function with the more integrated systems of the C-Series.

Space has been reserved in the avionics bays and a new equipment rack has been designed to ensure that compatible IFEC systems and ISPSS can be installed without any negative effect on passenger stowage or cargo volume, depending on an airline's cabin configuration.

Bombardier has been working with Panasonic Avionics on early IFEC integration activities, having completed early flight testing with the Aura LE Ku-band antenna on Flight Test Vehicle 1 (FTV1) in the second quarter of 2014. The implementation of Panasonic IFEC systems is expected to offer seamless integration with the existing Panasonic CMS, offering airlines a single means of controlling both CMS and IFEC functions without the need for additional control panels in the cabin – reducing parts count and training requirements.

Connectivity systems such as Panasonic's eXConnect Ku-band internet service, eXW cabin wireless system and eXPhone onboard mobile telephony system are currently being evaluated by some C-Series customers and will be featured in upcoming flight test activities to ensure early availability. Given the ever-changing landscape of the inflight connectivity industry, other systems such as Gogo's ATG (Air To Ground) and Inmarsat's Global Xpress Ka-band internet service will be evaluated case by case, based on customer interest and priority.

**GALLEYS** The C-Series galleys are designed to the latest ARINC 810 specifications, permitting customers to select from a variety of galley inserts (GAIN) from available suppliers. Size 2 convection or steam ovens may be specified for compatible compartments, and any style of Size 1 beverage maker may be installed to meet the needs of even the most demanding coffee lovers. Moreover, C-Series customers will have an opportunity to exchange their GAIN between different suppliers after delivery without requiring significant changes to the galley structure and wiring. The non-electrical galley compartments are designed to accommodate the most common Atlas standard inserts.

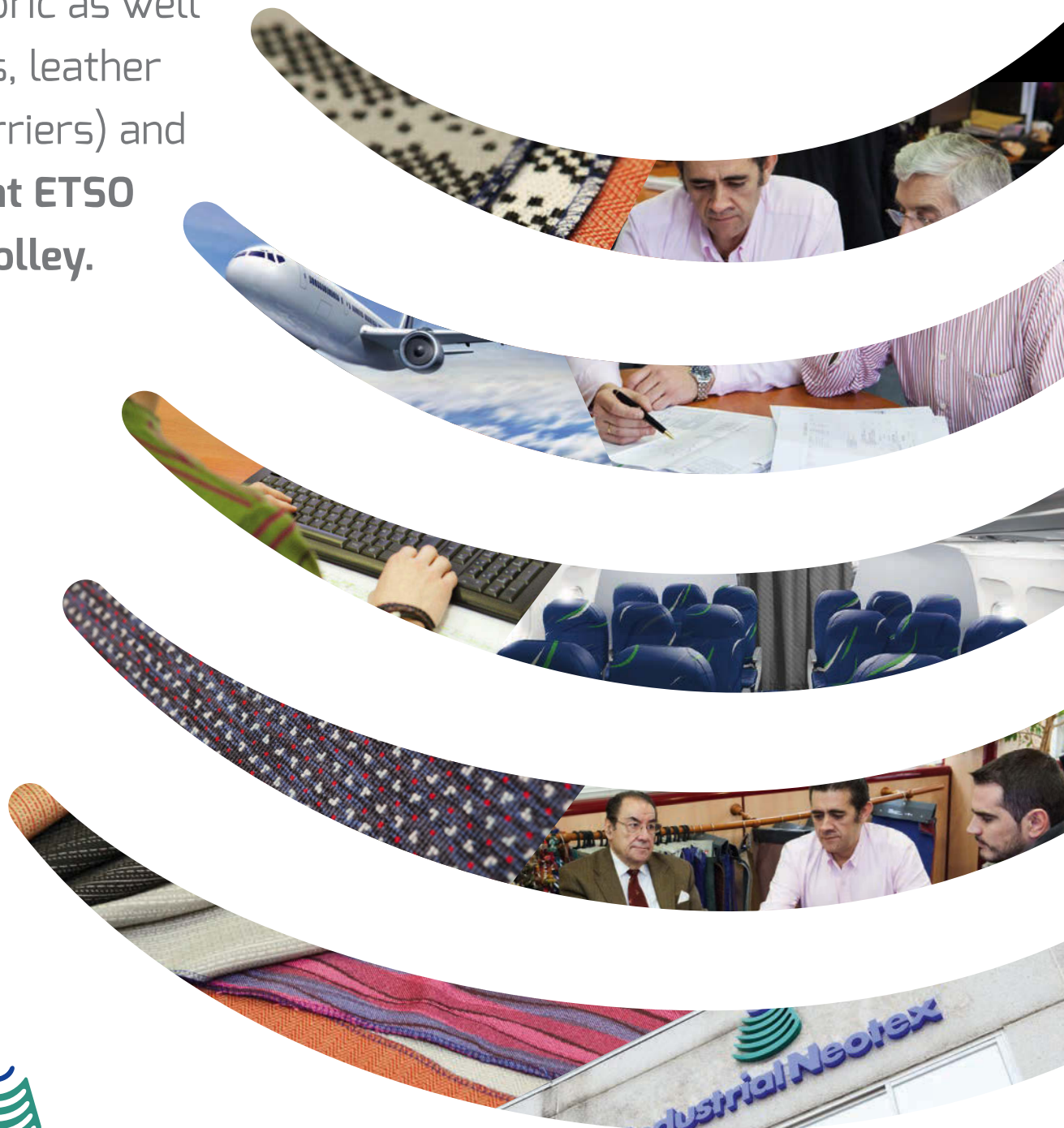
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05



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use (POU) air-over chiller, which is a compact unit that fits inside the trolley compartment and will maintain up to three full-size trolleys at required temperatures throughout the operational envelope. The lightweight POU chiller is claimed to deliver optimized cooling performance without the need for heavy ducting, and maintenance crews will be happy with the ease of access for servicing and replacement. Bombardier is integrating activities between B/E Aerospace and Zodiac OEM Cabin Interiors, which will provide the provisioned galley.

The key aim of cabin optimization also drove the integration of a pull-out cabin crew seat into the aft right-side galley complex (G4). This seat sits between the G4 and either a persons with reduced mobility (PRM) lavatory or a complementary left-side galley complex (G4A), to provide the level of service required by individual airlines, all while ensuring compliance with cabin crew direct view requirements and keeping mandatory emergency equipment away from passenger areas. The integration of the pull-out seat still permits airlines to carry up to seven full-size trolleys in either chilled or unchilled compartments, as well as a selection of standard units, ovens and beverage makers to meet catering requirements. In line with its integration aims, the team planned for integrated stowage to keep as many unsightly emergency equipment items as possible out of view and away from passenger stowage areas, but within easy reach of cabin crew stations. Thus passengers with a strong sense of aesthetic or fear of flying will not have items such as flashlights, fire extinguishers, smoke hoods and portable oxygen cylinders in their field-of-view.

**LAVATORIES** The CSeries lavatories have been designed with the passenger in mind, with minimal cabinetry and maximum illumination, even at floor level. Even with these minimal cabinets, additional stowage space remains available for airlines to stow extra stocks of amenities such as paper towels and lavatory paper out of the sight of passengers.

With recent trends leaning towards maximizing seating capacity, the CSeries team also worked with Zodiac's ZEO creative team to evaluate designs for a dual lav complex in the aft bulkhead area. This complex is designed to allow two to five additional seats to be fitted, depending on an airline's service levels, and it can be configured with an internal folding partition and sliding doors to support PRM capability.

Indeed, Bombardier says the CSeries is the first single-aisle aircraft to offer a truly PRM-accessible lavatory that does not require secondary partitions in order to afford disabled passengers privacy and dignity.

Two PRM lavatory positions are offered on the CSeries, to support airlines with different catering requirements and cabin service levels, each of which can accommodate a folding onboard wheelchair with the door closed. Live tests and consultations were performed with actual PRMs (paraplegic and quadriplegic), as well as senior citizens and bariatric patients to support design choices. Space was allocated, and assist features were incorporated, to ensure that safe and efficient independent transfers are possible for capable passengers.

**FLEXIBLE CONFIGURATION** A key point with regard to the monuments is that, during early development phases, the CSeries Interiors team planned for layout flexibility and optimized the structural and systems provisions for the 'flex zones' to balance weight and installation complexity. Wherever feasible, these provisions are usable for different types of monuments in a given zone. For example, common electrical connectors carry power and/or signals to support a galley or lavatory at the same cabin position, while underfloor water and waste systems are routed to ensure easy access via exchangeable floor panels that include penetrations for structural fittings and plumbing, where applicable.

**GENERAL DESIGN** All elements of the cabin design have been considered by the CSeries Interiors team. For example, the over-wing emergency exit door is designed as an automatic opening exit to meet the latest regulatory requirements. The door's liner is an articulated design with an easy passenger interface to ensure ease of operation while conforming to overall cabin styling. The floor-level exit door liners were also engineered to ensure that noise paths are minimized and door operation is intuitive.

All monuments in the passenger area between the floor-level exits have been treated with a contemporary corner

06. Monuments between the exits have been treated with a contemporary corner radius, meaning no more hard metal strips

06



07. The lavatory designs feature minimum cabinetry with maximum illumination, even at the floor level

The CSeries by numbers

	CS100	CS300
Max. fuselage diameter	12ft (3.7m)	12ft (3.7m)
Cabin width	129in (3.28m)	129in (3.28m)
Cabin height	83in (2.11m)	83in (2.11m)
Cabin length	78ft (23.7m)	78ft (23.7m)
Cabin crew	2-5 FAs	3-5 FAs
Passengers	125 (1 class, dense)	60 (1 class, extra capacity)
	110 (1 class, standard)	150 (1 class, dense)
	108 (2 class, mixed)	135 (1 class, standard)
		130 (2 class, mixed)
Seat pitch	28in (1 class, extra capacity)	28in (1 class, extra capacity)
	30in (1 class, dense)	30in (1 class, dense)
	32in (1 class, standard)	32in (1 class, standard)
	36in & 32in (2 class, mixed)	36in & 32in (2 class, mixed)
Seat width	18.5in standard seat	18.5in standard seat
	19in middle seat	19in middle seat
	20in business class seat	20in business class seat



radius that removes a lot of the metallic trim commonly associated with monument design in airliners. A further departure from the norm is that all grilles, speakers and handles have been designed with a common “elliptangle” theme – a rectangle terminated with ellipses. The Interiors team likes to think that it coined this term.

Even the smallest elements received attention. For example, pictograms are favored whenever a message can be communicated to a multicultural audience, and consistent color-coding is used to indicate passenger interfaces, as well as crew instructions and warnings.

**VIRTUAL OR REAL?** Current aircraft interior design practices rely on 3D virtual design tools such as CATIA v5. However, to address real-life installation and maintenance/ accessibility aspects as well as test the air distribution in the cabin for temperature and noise analyses, a full-scale interiors/ECS rig was commissioned, which the CSeries Interiors team dubbed Cabin 0.

Cabin 0 was also used for full-scale ergonomics testing for cabin crew familiarization and certification evaluations, and the team reports that the tool has proved successful in supporting many design improvements that could not have been caught using only 3D virtual design tools. Many of these improvements are already being incorporated into Flight Test Vehicle 5, the first CS100 with a complete interior. Cabin 0 is also being used as a life-sized configuration tool with early CSeries customers to help them appreciate the actual cabin environment, aiding them in confirming their configuration selections.

Despite some recent testing setbacks, Bombardier is confident that the CSeries will enter service in the second half of 2015. The current order book includes 180 firm orders for the 135-seat CS300, 63 for the 110-seat CS100, and 162 options. ☒



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# DESIGNSHOWCASE

# selfworth

Devin Liddell, principal brand strategist at Teague, discusses  
'My culture, your brand: avoiding the flag carrier identity crisis'



The brands of international airlines, and flag carriers especially, are those most at risk of an identity crisis. Designated as official or pseudo-official national airlines, these brands are often compelled to represent their country in two very different ways, serving as a vital infrastructure for home audiences and as cultural ambassadors abroad. Along with the standard dichotomy between business and leisure travelers, international carriers must also reconcile additional tensions between the familiar and the exotic: "I'm from this place and I recognize this brand as part of my home" versus "I'm a visitor and I find this exciting and welcoming". There's even one more to add: the tension between heritage and modernity – "My brand has a history" versus "My brand has a vision for the future".

Put simply: international carriers are asked to somehow embody their nation's defining characteristics in a way that is entirely authentic and yet immediately recognizable to a foreigner. This is a tricky business, and how these tensions are reconciled plays a defining role in the brand strategies and brand design that international carriers employ.

Unfortunately, the irony here is that so many entirely unique nations produce so many airlines mostly distinguished by brand identities built around just birds and flags. So how can flag carriers and other international carriers create highly differentiated brands that also reflect their unique cultural identities? Here are three guiding principles we at Teague have used in our work for airlines around the world.

**REPRESENT A MODERN VISION** I live in Seattle, and even though the Seattle World's Fair was way back in 1962, the Space Needle – Seattle's most well-known landmark – is probably what



kangaroos are to Australia: an iconic visual distillation of a place that actually plays a very, very small role in that place's everyday essence. This is an easy trap for international carriers to fall into as well, representing the postcard version of a place. And, on the surface, there's nothing objectionable about this approach. However, the most innocuous representations of a place – the clichés – are shackled from the start in their ability to connect emotionally with audiences.

And there's an even bigger problem: what's lost to the brand in the postcard approach is a sense of forward motion and innovation. That is, focusing on the historical perceptions of a place – the most commonly associated ideas, artifacts and symbols – robs the brand's ability to communicate its modernity. The future of Mongolia is far removed from Genghis Khan. India's image as an emerging technology titan is similarly disconnected from a cartoon of a Maharaja. Ireland is more than

01. Air Canada worked with Teague to create every touchpoint in the cabin of its new B787. From seats and monuments to lavatories and lighting, each element was part of a cohesive brand experience inspired by a singular vision to connect more emotionally with passengers



“

THE AIRLINES AT THE VERY TOP OF THE SKYTRAX RANKINGS HAVE FIGURED OUT THE CONUNDRUM, AND IT'S DELIGHTFULLY SIMPLE: SERVICE EXCELLENCE ”



shamrocks. The USA is a lot more than the Stars and Stripes, but our largest international carriers share a red, white and blue color palette. These visual presences are stuck in time; they're a country's lowest common denominator iconography. Instead, a brand tailor-made for the challenges and opportunities of the 21<sup>st</sup> century requires a more modern vision. That's why the best international airline brands feel like they were born in a place, but belong to the future.

**DESIGN FOR THE BRAND'S HUMANITY** While ANA All Nippon Airways originally served mostly domestic passengers traveling within Japan, over the course of the next few years the airline expects to achieve equilibrium between domestic and international passenger numbers. This creates a brand challenge common to international carriers: how can you be distinctly familiar to domestic passengers and yet entirely welcoming to passengers from abroad? Solving this



challenge can lead to some serious overthinking, with some airlines even trying to sort out the cross-cultural suitability of one color versus another.

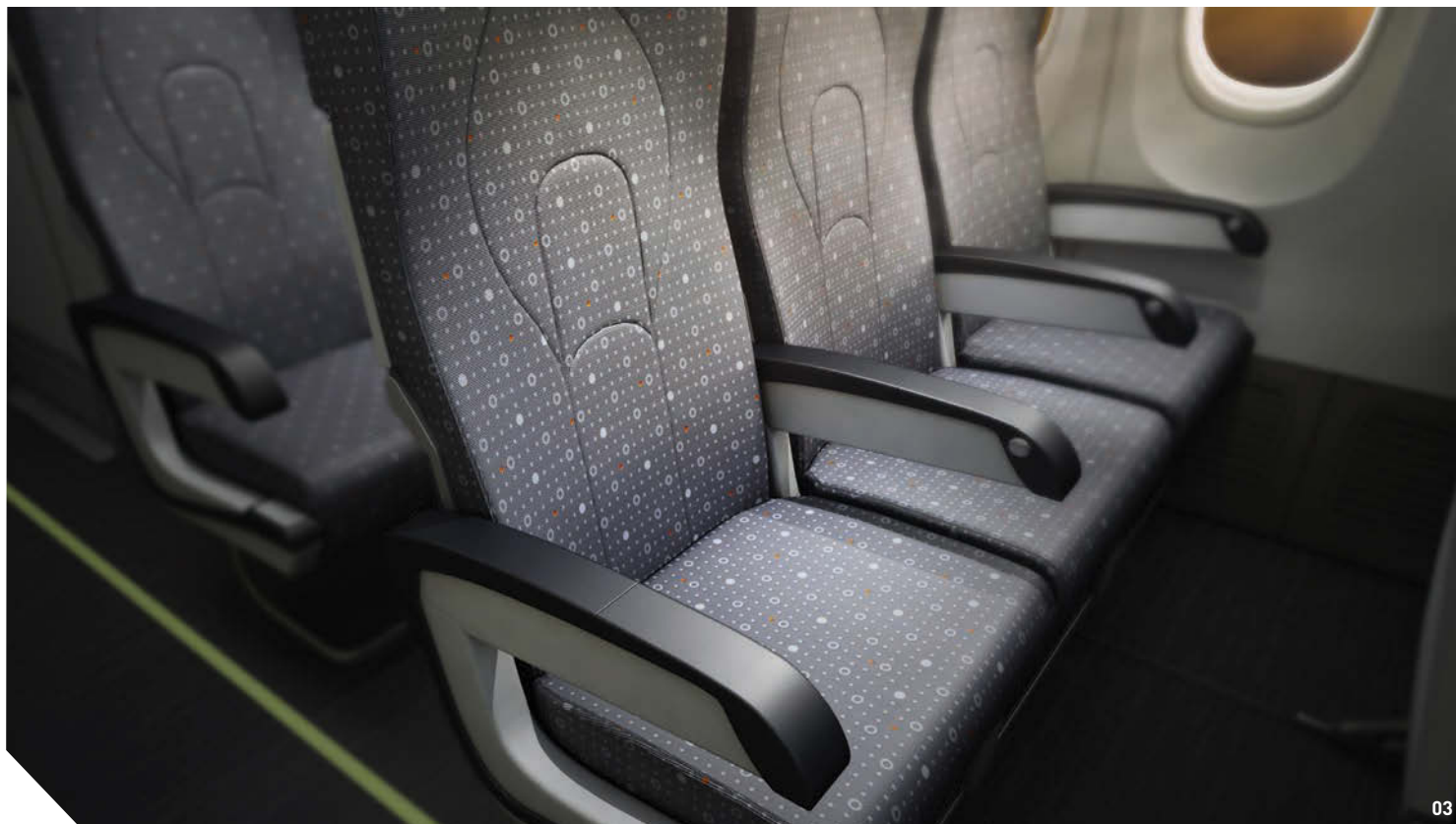
But the airlines at the very top of the annual Skytrax rankings have all figured out this conundrum, and it's delightfully simple: service excellence. Emirates, Cathay Pacific, and Lufthansa are all from different cultures, but share a culture of service excellence. Bluntly, this is what plagues many airlines at the other end of the rankings. In particular, intense merger and acquisition activity has disrupted the internal cultures of airlines in unhealthy ways, and unhappy employees have a much harder time making passengers happy.

This is not to say that every international carrier must focus on premium service. Rather, the way forward is always thinking about how design serves the human elements within the brand. After all, what matters across all kinds of demographics and psychographics is how the brand makes people feel. Whatever the intended feeling, the best carriers use design to empower staff and bring the brand to life in human terms.

**02.** Designed in collaboration with Teague, Aeroméxico's B787 cabin was inspired by the contemporary architecture and technological advances of Mexico City, placing it in an unexpected context to create a new and unique passenger experience



THE REPRESENTATION OF CULTURAL IDENTITY  
IS SIMPLY NOT ENOUGH ON ITS OWN



03

**MORE CREDO, LESS FLAG** It's a straightforward truth that the best brands in the world, from Apple and Google to Nike and Zappos, aren't built around what they sell or where they're from – they're built around the defining beliefs that guide how they do what they do. Nike is not in the athletic shoe and apparel business – it's in the business of empowering the athlete in all of us, a business that happens to involve selling a lot of sneakers and shirts. This is not a nuance; it separates the brand from its competitors and guides all of its design efforts. And this belief-driven approach also provides a blueprint for international airline brands. Brands are fundamentally an inside-out proposition, so the role of cultural identity to these brands is in informing those beliefs.

So the question is: informed by who we are and where we're from, what do

03. Service-led GOL partnered with Teague to design the B737 BSI interior cabin to reflect Brazil's youthful culture, while providing passengers with a sense of home

we most fervently believe in? Volkswagen knows the answer to this question, focusing on bringing “the power of German engineering” to everything it does around the world. Similarly, Virgin Atlantic possesses both absolute clarity about its identity as a UK airline and its particularly British take on subverting the ordinary and challenging the status quo. One of Virgin Atlantic's key competitors – British Airways – is also a UK airline, of course, but sees its reason for being very differently, instead focusing on tradition and premium service. Together, these two brands offer a perfect portrait of how essential a unique credo, through the lens of

cultural identity, is to creating a vibrant, highly differentiated brand in a crowded marketplace. The representation of cultural identity – most commonly represented through a flag – is simply not enough on its own.

A defined, forward-looking reason for being is the real differentiator. And, actually, the ideals that extend from our various cultural identities around the world – those of freedom, optimism, innovation, adventure, hospitality, equality, and so on – are far more powerful brand expressions than a flag can ever be. That's why the best international carriers are very clearly from a place, and even more clearly for the world. ☒

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# gamechanging

The PriestmanGoode team explains why designing an aircraft interior is just one part of the design process for airlines



There have been great developments in the design of aircraft interiors over the last 10 years, changes that have vastly improved the passenger experience. What design means, however, and what it encompasses, can often be misunderstood. As Nigel Goode, a director of PriestmanGoode, explains, "Earlier this year, our studio won the Queen's Award for Enterprise in International Trade. The awards recognize companies that have developed a significant global client base. What interested me is that I found myself at the winners' reception explaining to other business owners what design is and what we do. Speaking to a non-design audience was interesting as there is often the preconceived notion that design is just about styling and aesthetics. For us, it is much more than that; it's about making something better and more efficient to manufacture, run and maintain."

01. The design for South African Airways' A320 fleet will influence the airline's wide-body fleet

02. Thai Airways' new wide-body designs have been designed with consistent brand image in mind

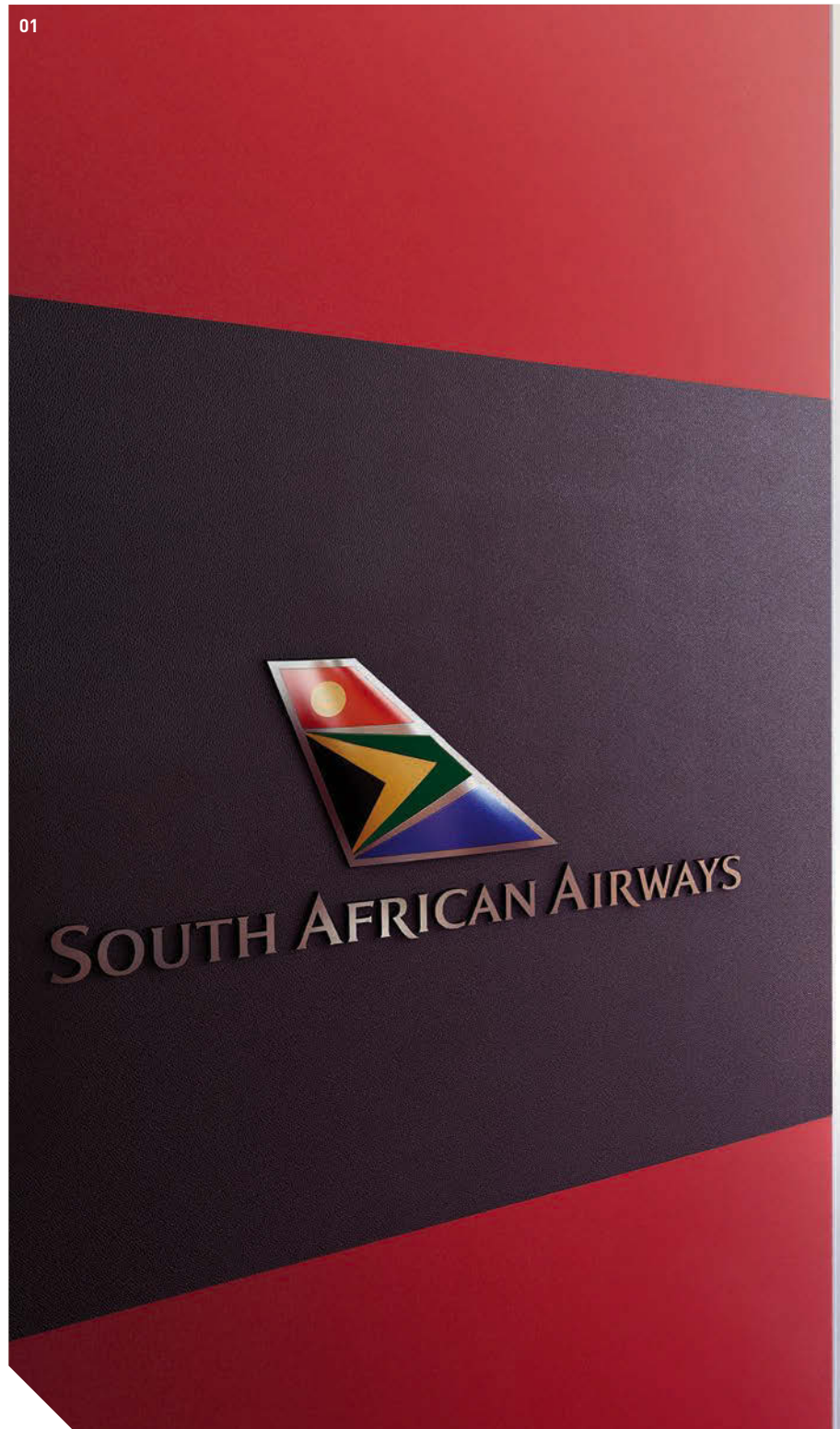
"In the end, the simplest way to phrase it was that we deliver game-changing ideas to improve our clients' profitability. That language seemed to resonate with everyone in the room."

A closer look at some of the many projects the London and China-based company has launched in 2014 reveals



02

01





“

OUR WORK ENCOMPASSES THE  
ENTIRE PASSENGER EXPERIENCE”



an intricate design process where every aspect of a brand, every passenger touchpoint, from the overall brand presence on board the aircraft to the stitching detail on a headrest, is given equal weight. Luke Hawes, director, says, “Our work encompasses the entire passenger experience. We have product designers, graphic designers, materials specialists, visualizers and branding specialists all under one roof. This means we look at every project holistically. And it has proved to be a great way to work, as this cross-pollination of departments leads to more creative solutions.”

For instance, the company launched a new concept cabin for Embraer’s narrow-body fleet of E2 jets, due to fly in 2018. The cabins were very well received at the Farnborough Airshow in July, where PriestmanGoode had developed a full-size mock-up for Embraer. Every aspect of the interior had been rethought, not just in terms of improving the passenger experience, but also in terms of facilitating maintenance and reducing weight. Paul Priestman, director and head of the project, explains, “As responsible designers, it is our role to implement designs that will reduce the weight of the aircraft, thereby also reducing fuel consumption. This is one of the most

**03.** Every aspect of an interior was rethought in creating the Embraer E2 cabin concept

important aspects of aviation design. Not only does it offer environmental benefits, but for airlines, it can provide considerable savings in running costs.”

One of the ways PriestmanGoode was able to do this on the E2 was by creating a staggered layout in first class, which enabled the same seat tracks to be used throughout the length of the aircraft. This solution not only offers financial benefits, but also reduces complexity and improves flexibility for airlines and leasing companies alike, which was one of Embraer's main requirements for the new-generation aircraft.

Not every project, however, sees a complete overhaul of the aircraft interior. Hawes says, “I think there's often a misunderstanding that designers need to be employed only when an airline or manufacturer wants to develop new cabin interiors. Our work is much more complex than that and covers the branded experience, and there are always elements of the passenger journey where design thinking can add value. This can be ground services, lounges or even simple trim and finish inside the cabin. We have many projects that develop over different stages. This is the case, for instance, with South African Airways, United Airlines and LaTam, which have all seen narrow-body designs launched this year, with plans for development across other platforms – including wide-bodies – over the next few months.

We've also launched wide-body designs for Thai Airways and Air France. It's about working with our clients, seeing what their current fleet is like, their future orders and expansion plans, and delivering tailored design programs to ensure that there will be a consistent brand image across the whole fleet, from narrow-body regional aircraft to wide-body, ground services, uniforms, online platforms, marketing materials, etc.”

Aviation projects aside, the firm is also busy working across other transport modes, including commercial space travel, and at the end of last year revealed a design to take passengers on flights to the edge of space. Designed for World View Experience, the project has attracted a lot of attention as an alternative to the more ‘traditional’

“

THERE ARE ALWAYS ELEMENTS OF THE PASSENGER JOURNEY WHERE DESIGN THINKING CAN ADD VALUE

”



04. The World View Experience is a new approach to commercial space travel

spaceships we know. Beyond the mere aesthetics, however, there is an important message behind projects like these. Goode explains, “Sometimes, you don't really know whether there is a market for something until you develop it. Over the years, we've aligned ourselves with forward-thinking companies, trailblazers that invest in research and development despite the fact that current demand for a product may be lacking. We really value these relationships; it's inspiring to work with people for the pursuit of development. Paragon is one of these clients, and the World View Experience project we are working on with them is a great example of how concepts can attract investment and create demand for a product.”

Projects like these also show the value of design on a wider scale. Indeed, the UK Government has selected World View as its lead visual to promote British innovation around the world. Goode continues, “This, for me, really goes to show that design is about more than aesthetics; it's about

business and competitive advantage. I think sometimes it's easier to comprehend design in the latter terms. While everything we do is about improving passenger experience and delivering coherent brand experiences from home to destination, the bottom line is that we help position our clients as market leaders.”

Following the studio's busiest year yet, the next 12 months show no signs of slowing down. The studio's team is steadily growing and has just moved into its new headquarters – a six-story building in central London, complete with showroom, four floors of studio space and a roof terrace overlooking London's architectural landmarks. The studio is also currently undergoing a rebrand in order to showcase its increasing range of capabilities. Priestman concludes, “Our aim is to become a center for excellence in aviation design in the heart of London's West End, encompassing all skills – from design to research, future thinking and branding – under one roof.” ☒

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# makinginnovationfly

Creating innovation across the entire passenger experience elevates a brand's loyalty, and its standing and perception in the market



When the term 'innovation' is bandied about by businesses, they are most likely referring to product innovation. The belief is that for people who already have everything, a new item – or at least a new version of an existing item – is the answer.

And this approach has often worked. In the automotive sector, the new Mini and the new Volkswagen Beetle, with their sleeker styling and much-improved functionality, were revelations. Meanwhile, standard toothpaste has evolved from just cleaning teeth to freshening breath, fighting gum disease and now whitening teeth.

The upshot is that 21<sup>st</sup> century customers have been brought up to believe that something different lies around the corner of the production line, and that there's a good chance it's better than what went before.

As a sector, the airline industry has led the way in product innovation, in the recognition that passengers' choice of carrier is not just driven by cost or even route.

Off the aircraft, these innovations have extended way beyond mere products, and have included desirable services such as Virgin Atlantic's complimentary chauffeur-driven car service, which the company describes as 'the most luxurious upper class airport transfer going', and the increasingly popular fast boarding. This is where customer experience really means something to travelers.

On board the aircraft, however, some airlines have been guilty of focusing heavily on the product – i.e. the seating – particularly in first and business class. There has been a long-running battle to improve passengers' comfort levels, a battle that began in the mid-1990s between two competing UK airlines. That was when British Airways and Virgin Atlantic launched the first business seats that converted



01. Factorydesign's luxurious Lobby design proposal for Etihad's A380

02. Lighting is used to great effect in the first class aisle of Etihad's A380 interior

into fully flat beds. These innovative seats introduced a new standard for long-haul comfort.

Since then, the word 'seat' has become jargon for the piece of real estate passengers can use in flight, and airlines have been competing to introduce more and more commodious and innovative seating, particularly in first and business class. These passengers are highly prized, and the seat is still seen as a surefire way to secure their loyalty. Take, for example, the recent efforts of Aer Lingus and SAS Scandinavian Airlines, both with

brand-new (and different) business seats designed by Factorydesign.

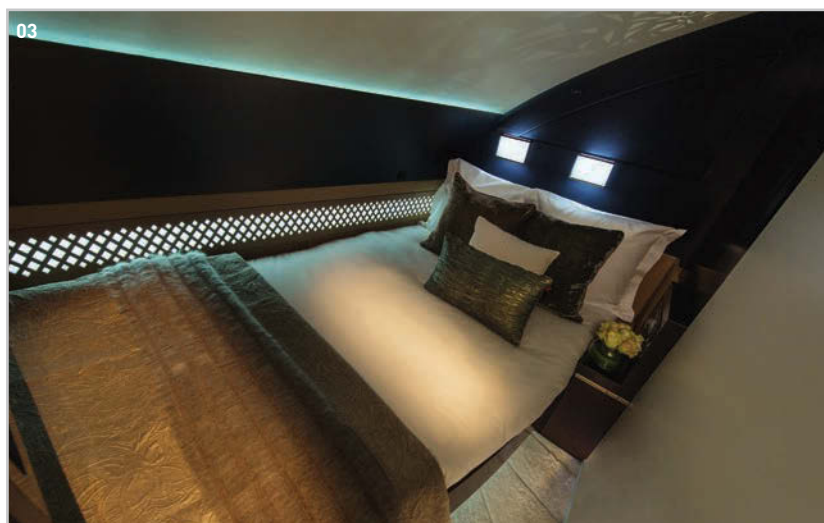
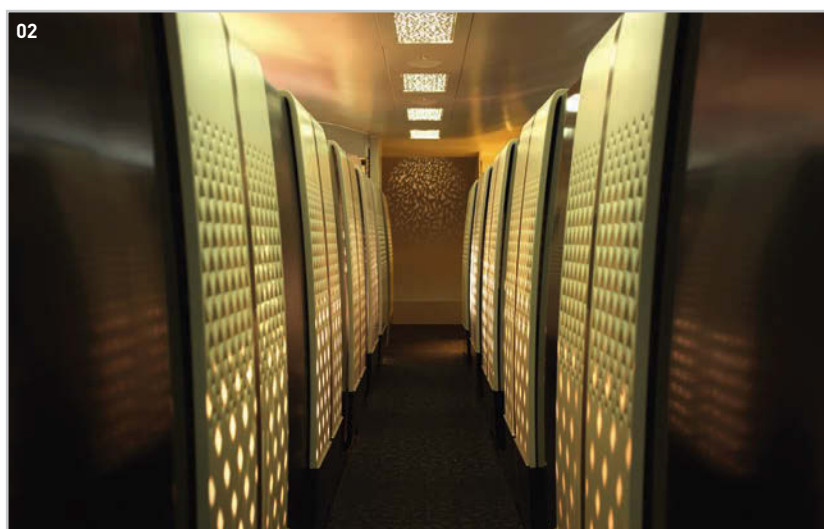
However, onboard product innovation can take you only so far when customer expectations for a better experience have been raised to a fever pitch. Couple this with the stringent restrictions put on aviation designers, and an improved physical environment proves even harder to pull off.

The savviest operators are starting to recognize that there is a third way: a truly innovative experience that both delights and satisfies their customers.





ONBOARD PRODUCT INNOVATION CAN TAKE YOU ONLY SO FAR WHEN PASSENGER EXPECTATIONS HAVE BEEN RAISED TO FEVER PITCH



This approach blurs the boundaries between the physical product and the environment, and in the right design hands it can be a rewarding return on investment for airlines.

The founders of Factorydesign have built up a reputation for bringing the best experiences of flying to life. They do this by combining an untiring attention to detail with a flair for the bigger picture.

The team, which is based in west London, cut their aviation teeth on Concorde in 2001. British Airways asked them to work up a complete refit

of the supersonic aircraft, including the seats, galleys and lavatories. Their ability to inject some theater into the passenger experience and fulfill or even exceed passengers' expectations informed their recent work for the United Arab Emirates' national carrier, Etihad Airways.

Etihad's brand-new Airbus A380 and Boeing 787 will take their maiden voyages in December 2014 with completely bespoke interiors – a significant first for the industry.

The much talked about centerpiece is The Residence by Etihad on the

airline's A380, the original concept of which was created by Factorydesign. With its living room, separate double bedroom and en-suite shower room, it is the airline industry's most luxurious onboard living space. This fundamentally changes the airline experience – The Residence provides a hotel-like experience in the air.

Factorydesign's remit for this project extended from welcome spaces, galleys and lavatories, to lighting and passenger destinations, as well as whole areas such as the Lobby – a premium onboard lounge.

**03.** The Residence space on board Etihad's A380 includes a double bedroom



AN AIRCRAFT INTERIOR WITH THE INDIVIDUALITY AND EXCLUSIVITY OF A LUXURY BOUTIQUE HOTEL



So on the upper deck the team decided to turn the center galley around 90° – again a major first – to create a ‘back’ kitchen area, to be used by crew out of sight of boarding passengers. This rotation enabled a dedicated boarding entrance space to be created, like the reception area in a hotel, with access through to the Lobby lounge. And every corner, lip and edge of every surface was manufactured with a smooth, rounded finish, to enhance the impression of quality. From the passengers’ viewpoints, the innovations change the experience, creating a much more welcoming, softer environment in which they can relax and enjoy themselves.

Even the lighting was given careful consideration. Factorydesign created a diffused, dappled light effect rather like sunlight shining between the leaves on a tree. The welcoming, enchanting ambience that this creates is a far cry from the industrial-style lighting of many aircraft.

The effect of Factorydesign’s work is an aircraft interior with the individuality and exclusivity of a luxury boutique hotel, boasting more patentable design innovations than any other airline cabin. However, the improvement in the customer experience is more than just a sum of



- 04. An early design proposal for Etihad’s A380 center galley
- 05. A business class solution for Aer Lingus
- 06. Factorydesign also worked on the bespoke Four Seasons private jet

technical innovations. In overall terms, it provides long-term benefits to Etihad’s brand and will encourage passengers who have flown in the A380 to become brand ambassadors.

The same approach – combining an obsession with detail with a fascination for the experience – informed Factorydesign’s luxury cabin interiors for the Four Seasons Private Jet Experience, the hotel industry’s first fully branded jet offer.

The team worked in partnership with Four Seasons Hotels, TCS Expeditions and Iacobucci HF Aerospace as their preferred design partner, and helped define the Four Seasons Private Jet Experience.

The Boeing 757 is outfitted with just 52 guest seats, rather than the

standard 233. That reduction in seat numbers freed up room for state-of-the-art flat-bed leather seats, each built individually by craftsmen at Iacobucci (rather than on an assembly line), using the best-quality and highest-comfort materials available in the aviation market today. The interiors also feature plush carpets, in-seat power and USB outlets, premium wall coverings and lighting, plus contemporary lavatories.

There is little doubt that a total and totally positive experience is what customers in all sectors expect, and what businesses are having to commit time, energy and funds toward. Well-considered, meaningful innovation can enhance those experiences and help raise one brand above the rest. ☒



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A photograph of the AerLingus Business Class cabin interior. The image shows two rows of seats with dark teal upholstery and light grey headrests. Each seat has a white rectangular pillow and a brown leather seatbelt. The seats are separated by a dark console with a silver armrest and a small screen. The cabin walls are white with oval windows. The overall design is modern and comfortable.

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# disruptivedesign

Anthony Harcup from Acumen Design Associates discusses the latest Etihad premium seats and the role of disruptive products in the aviation sector



Genuinely disruptive design is a rare thing. Terms such as 'blue sky', 'iconic' and 'groundbreaking' are all too frequently used to describe products and services that represent little more than incremental improvement. The acid test of any new design is whether it disrupts a market or simply maintains the status quo. A truly disruptive product creates brand differentiation and secures market leadership and often changes the way a consumer interacts with his or her environment on a fundamental level.

This is true in the premium commercial aviation seat-to-bed market, where a handful of top-tier airline products have shaped the landscape of the industry. The sector has experienced unprecedented growth in the last 10 years and is forecast to see compound annual growth over the next 10 of over 8%, according to a study by Counterpoint Market Intelligence Limited.

Customer demand for increased comfort and individual aisle access, and differing privacy requirements have driven the development of a variety of seating products for both first and business class cabins.

Meanwhile, in the manufacture of these products, engineering developments have reduced complexity and improved reliability. Common seat platforms have been created, which provide the basis for a range of customizable seating options, paralleling the automotive industry's common-platform approach, and snowballing economies of scale have increased profitability for the manufacturers.

Given the formidable financial penalties associated with mismanaged creative ventures, blue sky design initiatives are perceived as presenting significant risk to airlines, seat vendors and airframe manufacturers, and so often give way to the lure of a low-risk



01. A view of The Residence, showing the chocolate interior with bespoke carpet and table designs

catalog approach. A change of clothes is now a more commonplace mechanism for refreshing cabin interiors and communicating brand values than transformative design.

For a large sector of the market, this represents progress. The benefits of modularity and standardization to all parties are clear, but this is not the automotive industry and with a very limited choice of manufacturers able to fulfill large airline orders, there is little competition or financial incentive to stimulate fundamental change and innovation. Alongside all the positives, this mindset may have brought about a level of stagnation to a once exciting and unpredictable industry. Perhaps in the super-first-class sector, where brand differentiation is key, the trend toward platform products is at odds with the customers it seeks to serve.

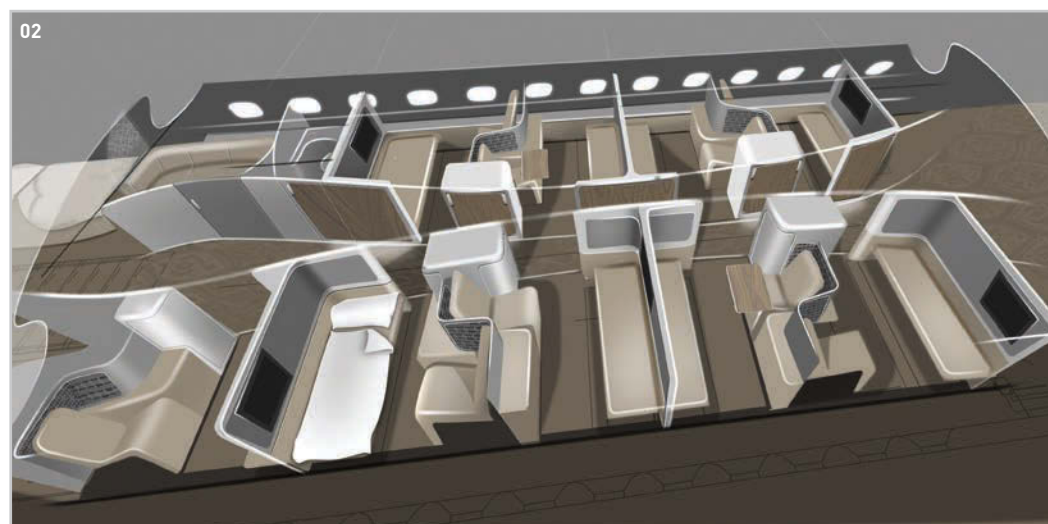
**SHOCK TO THE SYSTEM** In this light it's easy to see why Etihad Airways' recent product launches have had such a profound impact – unleashing five groundbreaking new seating products throughout all classes on its flagship Airbus A380s and B787s, each poised to set a new benchmark in their respective categories. The press are heralding The Residence and the First Apartments as 'game-changers', establishing Etihad as an icon of luxury travel. But why are these products so important and what do they mean for the industry?

The Residence by Etihad is not only an incisive and innovative commercial proposition, it is also a daring breakthrough in cabin layout design made possible by a revolutionary central aisle and a pioneering use of space on the upper deck. None of this



“

ETIHAD AIRWAYS HAS UNLEASHED GROUNDBREAKING NEW SEATING PRODUCTS THROUGHOUT ALL CLASSES ”



Etihad, it was integrated into The Residence to create a double bedroom.

Until this point, mini-suites had only been certified for one person. In order to safely accommodate two passengers in The Residence, EASA was required to write a new certification chapter to cover potential safety issues. To overcome these challenges while also maintaining the expected level of privacy, luxury and consistency with the rest of the cabin, Acumen worked with the Airbus certification team for more than two years. Full-size mock-ups were built, and design ideas tested and reviewed. The final configurations for single and dual occupancy were the result of a disciplined and pragmatic design approach.

**FIRST APARTMENTS** The First Apartments by no means play second fiddle to The Residence. In fact, the configuration of the First Apartments drove the positioning and design language for The Residence. Given that both products share a very deliberate continuity in their material treatment and detailing, one feels compelled to more clearly delineate the First Apartments' unique and new-to-market qualities, which differentiate them from their closest first class contemporaries.

To appreciate the paradigm shift that has taken place, some historical context is needed.

**TRAILBLAZING** Cast your mind back to the mid-1990s. Premium aircraft seating was little more than standard forward-facing seats; width and pitch were the only differentiators. Acumen's highly original herringbone seating layout revolutionized the industry with the first ever lie-flat seat-to-bed product. This not only transformed the way the world viewed first class seating, but it changed passenger expectations of the premium travel experience. No longer referred to as seats, these products eventually became suites – with brand-new cabin layouts and substantial passenger furniture.

Now we are again on the verge of another tectonic shift as Etihad's new First Apartments and The Residence products redefine the frames of reference in the super-first-class sector – creating not just suites, but rooms with significant floor space and dedicated passenger zones, all within a world-leading footprint.

Each First Apartment benefits from a footprint extending to 89in wide by 72in long, creating near-residential proportions and expansive lines of

**02.** An early elevational sketch of the premium cabin, showing a sweeping central aisle

would be possible without the commitment of an airline determined to surprise and delight its guests.

**LAYOUT CREATION** Crafting this cabin concept into a commercial reality called on all of Acumen's creative and technical aviation experience as part of the Etihad Design Consortium. The central aisle was initially conceived to generate the suite width necessary to accommodate a dedicated transverse bed. This presented the additional advantage of positioning the suite walls more in-line with the stairwell, enabling us to privatize the port side lavatory and capitalize on the space between the forward-most bulkhead and the shower. Most airlines struggle to monetize this area effectively and it is more commonly used as a social space or enlarged bathroom. For

sight within the suite. The vast amount of stowage space has enabled the removal of the overhead bins, making way for 64in-high privacy doors – the highest in the sky. For many years, the premium seating industry has aspired to the hotel aesthetic. Often automotive design finesse is required to help camouflage the Swiss Army knife functionality packaged into the suite. The First Apartments on the other hand present a living space that credibly sustains real domestic architectural treatment, with walls instead of privacy screens, sliding drawers instead of expandable nets, integrated cabinet doors instead of stowage lids, and a 30in-wide sofa seat with large padded armrests.

Venturing into such uncharted territory in pursuit of true innovation is not without risk. A truly big idea, which breaks from the norm, will often throw up a host of original conditions that require sophisticated and intuitive solutions. The scale of resource required to resolve each condition grows exponentially as the idea progresses from concept to production. In the case of the First Apartments, as the cabin matured through iterative models, mock-ups and prototypes, projects emerged within projects.

**A CASE IN POINT** In the advancing age of platform products, with catalog solutions on offer for almost every conceivable mechanical requirement, designers rarely find themselves in the shaky territory of engineering how things actually work. But when there is no pre-existing kinematic to satisfy a unique requirement and there is little basis upon which to produce credible industrial design, integrity and true innovation must prevail.

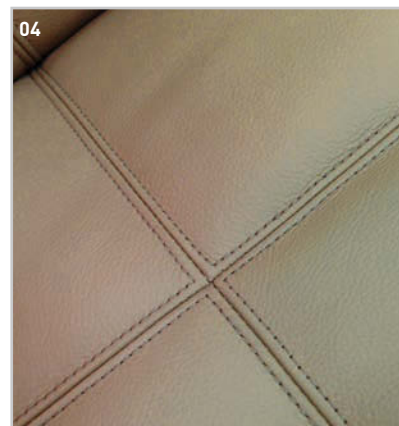
The divan-style transforming bed with rotating lap-belts is a great example of a true industry first – driven by layout and customer demand. Initially, the bed was conceived to be manually operated; however this was changed during a mock-up review when the benefits of an incrementally adjustable, automated bed became apparent. And so the powered footrest was born.

To safeguard the guest offering and to give the supplier the best possible starting point, Acumen developed a



03. An aerial view of the First Apartment, showing linking upholstery elements

04. A close-up of one of the Poltrona Frau premium leathers



## THE DEVELOPMENT PROGRAM IS A COMPELLING EXAMPLE OF A LANDMARK BLUE SKY PROJECT



conceptual kinematic, proved-out through working rigs and ultimately a fully powered, full-size working mechanism. On passing the kinematic to B/E Aerospace, its engineers refined it and went on to create a highly original drive system to help not only control the movement of the bed panels, but also the switch between seat-to-bed belt configurations.

Now faced with 15ft<sup>2</sup> of leather bed surface and a domestic scale sofa-seat, a coherent upholstery strategy was defined to introduce an element of passenger zoning to the bed and also to allow room for Poltrona Frau to express its quality craftsmanship. Working with its prototyping team in Tolentino, Italy, was a memorable experience. Often a sketch would be agreed in the morning and the team would create a dress-cover for review by lunchtime. This work rate permitted sufficient experimentation with the details for Acumen to achieve both individual character for each upholstery element and also to create subtle, linking visual elements between them.

The seat and bed received Poltrona Frau's characteristic paneling, a detail that translated beautifully onto the bed as a designated footrest area, echoing a

classic recliner and footstool arrangement. Many of the details in the seat covers were inspired by its best-selling residential products.

**NO PAIN, NO GAIN** Nothing worthwhile comes easy. Suffice to say, this process has consumed the time, energy and commitment of a large global team of specialists to produce a significant number of world firsts and bring about fundamental change.

This development program is a compelling example of a landmark blue sky project followed through with passion and commitment. Etihad has unearthed valuable market insight and converted this into game-changing products.

Creating brand new seating layouts and original but functional design features offers airlines tangible, lasting brand differentiation over and above more superficial graphics and styling-based design solutions. This approach is one of the most effective and enduring ways in which to challenge the industry paradigms and shake things up.

Etihad is a great example of how disruptive genuinely disruptive design can be. Be prepared to witness permanent change. ☒

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# newluxury

2020 vision. How a new report is helping JPA Design reimagine luxury travel and design for the future



How do you reimagine luxury for a new generation of global travelers with very different ideas and desires from those of their parents and grandparents? First you have to understand which way the world is moving, then find ingenious ways to turn insight into reality. Research conducted by JPA throws up some fascinating observations about how trends are likely to play out over the next decade-plus. The *Premium Travel Strategic Report* clearly shows how the world is changing. Traditional ideas of 'luxury' are not what many people in the travel industry have been used to. In fact, its findings imply that the airline industry may have to consider new approaches to keep customers satisfied.

02. JPA Design worked with American Airlines to create the unique new business class design that will feature on its B777-200 fleet

JPA's report makes a convincing case for a change in premium airline travel's mood music. Tastes among high achievers in the developed West are shifting toward signs of quiet achievement over showy wealth. The report states that choices are trending in the direction of niche labels

over megabrands; local artisanship over generic 'international' design cues; personal rather than mass entertainment. On board and in business lounges, a new generation wants its premium travel experience realized in the form of such things as intelligent ergonomics that help them relax or work, not just mere opulence; and technology that's truly useful over simple gadgetry. They want a form of 'luxury' that, first and foremost, makes their lives and experiences better.

The managing director of JPA's London office, Ben Orson, believes that this is a subject the travel business needs to respond to. "Our instincts already told us that a new generation, globally, has its own ideas about what 'premium' means. The report we conducted supports JPA's design decisions on recent projects – such as our recent work for American Airlines' cabins and seats, and the new business and first class cabins and multiple-hub lounges for Air China," he states. "Internally, we're talking about

01

## ASPIRATIONS

## LUXURY NARRATIVES

## CULTURAL INSPIRATION

## WELLNESS

## SERVICE



premium experiences in a new way – we think of it as 'new luxury'."

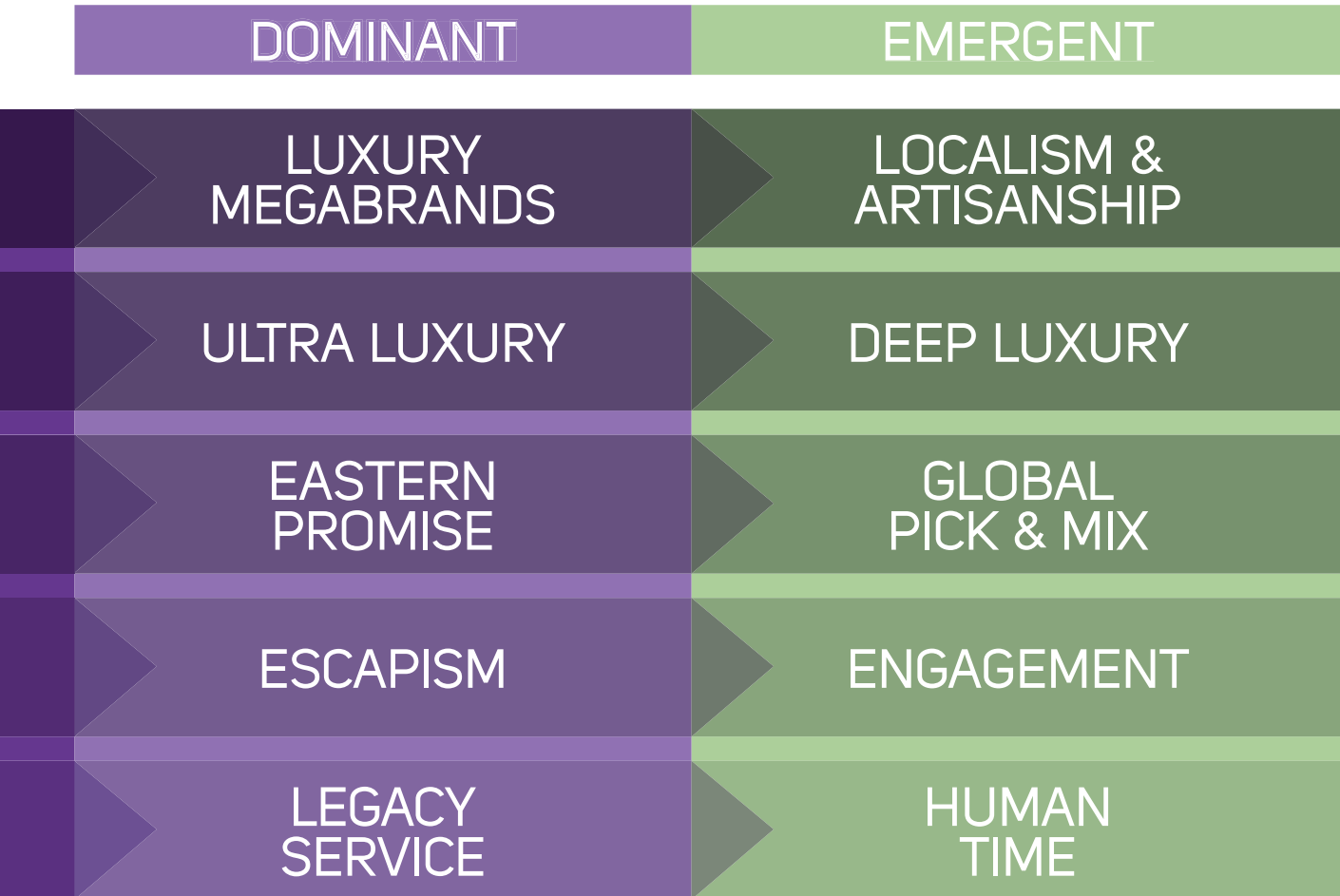
Tim Manson, JPA's design director for transport, continues: "We see the report as an exciting opportunity that JPA is more than capable of responding brilliantly to. We've always been ready to think outside the box and make new ideas come to life, for example, our Cirrus seat design for Zodiac, which made the reverse herringbone cabin configuration possible. The idea seemed shockingly different in 2009, but now it's an industry standard."

John Tighe, also a design director for transport at JPA, adds: "Innovating has always been an area where JPA has excelled, so we're excited about the report's findings. We will be using insight from the report as a springboard for projects that will take us into the 2020s and beyond. It's





WE'RE TALKING ABOUT PREMIUM EXPERIENCES IN  
A NEW WAY – WE THINK OF IT AS 'NEW LUXURY'



01. JPA's report details how emergent themes in premium travel are breaking away from the established patterns

exciting to think how emerging technologies will enable us to provide new, smarter, innovations to the premium travelers of the future.”

JPA's research showed that there's more than a generational difference at play here – it's cultural too. The prevailing wind has created a new generation of travelers in the Far East with similar expectations of premium travel to their counterparts in the West.

Cultural influences are moving from East to West as well. The art and design of emerging economies is becoming more aspirational to those who live there than are Western influences, and Far Eastern designers and design studios are increasingly being employed by organizations in the West.

The report is specific about how new technology could affect premium travel, particularly in the next

generation of airline interiors and design. The trend for personal health monitoring suggests that on-board wellness is a big area of possible focus for future cabin design. It suggests that advanced lighting, materials and furnishings can create an on-board experience that's more ergonomic and comfortable, improving premium flyers' ability to relax, sleep, work and combat jetlag. And it discusses the concept of wearable technology, allowing airlines to recognize regular travelers and remember their preferences or curate their favorite entertainment content.

In the meantime, JPA is already pushing innovation using existing technology. The DoveTail premium class seat, designed in partnership with Jamco, is uniquely configured and can be optimized for a number of aircraft

types, offering aisle access, improved passenger space and a range of enhanced passenger-centric features.

JPA moved into transport design with its work on the interiors for the Venice-Simplon Orient Express launched in 1982, followed in 1993 by a complete fit-out of the interior of the Eastern Orient Express. London-based JPA set up its Singapore office at that time and has had a strong presence in the Far East ever since.

“JPA began over 30 years ago as an architectural practice, so we always look at restricted spaces to some extent with architects' eyes,” JPA founder James Park comments. “For all its exotic glamour, the Orient Express is, after all, a train. Space is limited, but we were able to make it feel roomy, comfortable and luxurious. One way of describing what we do is working with



## EMERGENT LUXURY HAS AN INCREASING TASTE FOR LOCALISM IN DEFINING TRAVEL EXPERIENCES



the innovative, intuitive use of space – making small spaces bigger, more enjoyable, places to spend time. The skills needed to meld a high-quality experience with practicality in small spaces are rooted in the mix of architectural and interior design expertise, and technical know-how, that JPA has in-house, both in London and Singapore.”

Sim Kim Chui, head of product innovation at JPA Singapore, takes the baton: “Great examples of James’s point are the business-class cabins and seats that JPA designed for Singapore Airlines’ B777s, which added an extra 2in of legroom to an already spacious seat, and won the 2014 Skytrax Award for best business seat. We’re adopting that very same approach for Air China’s aircraft interiors, part of a major commission that includes creating nine state-of-the-art lounges in five airports across China.”

Picking up the Air China theme, Orson returns to JPA’s premium travel report: “JPA’s recent work with Air China illustrates a number of themes in our research. First, emergent luxury has an increasing taste for localism in defining travel experiences. It’s no longer sufficient to work to a generic definition of luxury and expect it to be valued by a global audience; brands need to find ways to connect to



03. JPA’s work on Singapore Airlines’ B777-300 business cabin has been awarded Skytrax’s best business class seat for 2014

04. To create Air China’s new textiles, JPA’s CMF team had to develop new production techniques with suppliers



their customers that recognize the brand’s geographic origins. Second, it focuses on the growing trend for artisanship.

“JPA’s collaboration with a renowned Chinese artist combines both of these trends. From a series of sketches that illustrated the story of a Phoenix flying through the clouds above the roofs of the houses below, JPA’s team created designs that carried the narrative through the cabin. Capturing the spirit of the original illustrations was a key challenge for JPA’s CMF team and it

became apparent that it would be necessary to develop new production techniques with suppliers in order for the dynamism and lightness of the original work to speak to passengers.”

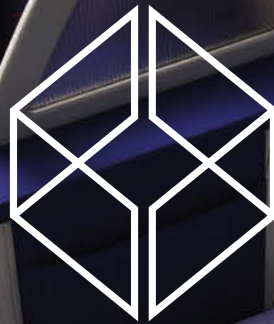
From aircraft, to trains and hotels, JPA is intent on creating a new type of luxury and smarter spaces for a new generation of travelers. Judging by its recent successes, JPA is certainly persuading many airlines, from American and Singapore to Air China, that it is not only making small spaces bigger, but thinking bigger too. ☒

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# flyingcolor

As the Tangerine design house turns 25, it's time to reflect on its successes in the world of aircraft interiors

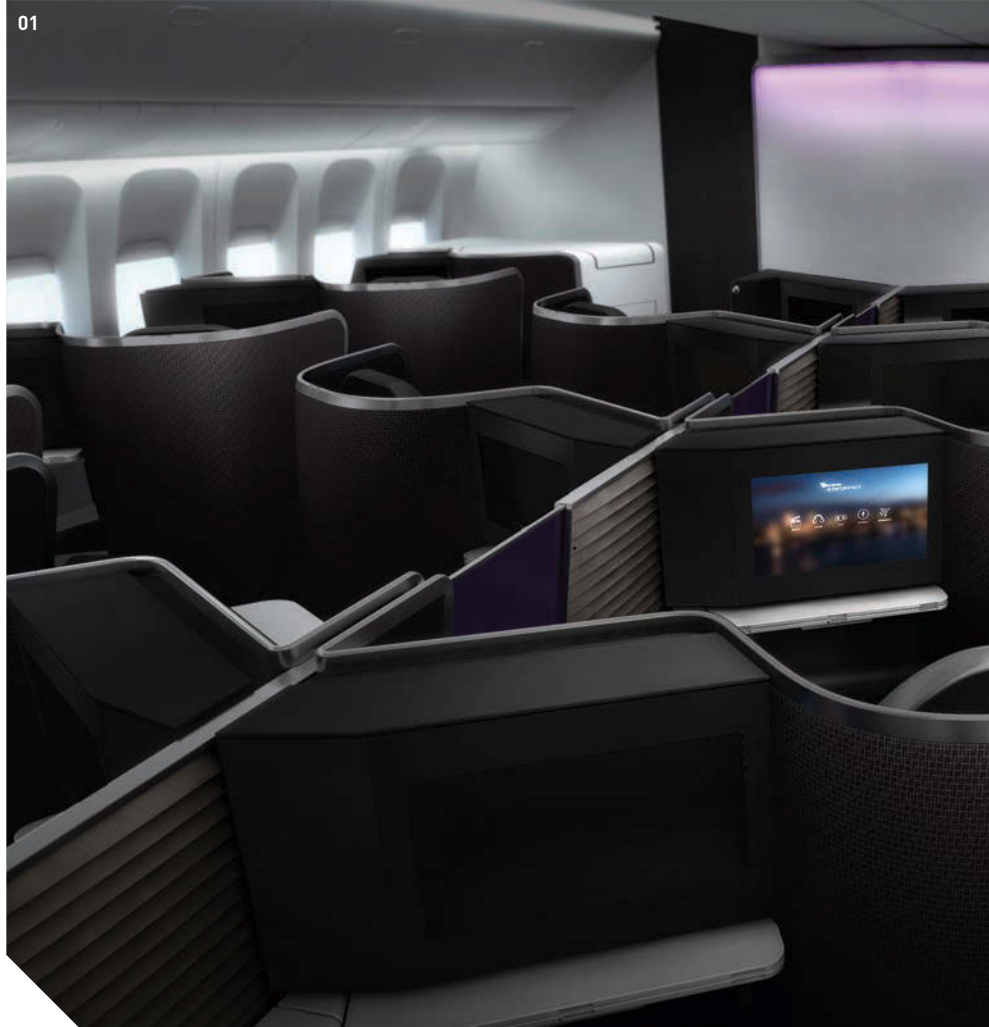


From its first steps in the front room of a north London row house 25 years ago, Tangerine has grown to become one of the world's most respected design firms. Nowhere has its creativity and influence been more obvious than in the skies. As Tangerine celebrates a quarter of a century, it is an opportunity to assess the impact the company has had in the world of aircraft interiors.

Tangerine's first aviation project was for British Airways in the late 1990s. The result didn't just transform the experience of the airline's business passengers – it transformed the business. Arguably, it transformed the entire market. The project was, of course, the multi-award winning Club World seat, the first ever lie-flat business class bed, launched to international acclaim in 2000. It was an audacious design that stunned the commercial aviation industry and became the airline's profit engine.

Following this success, Tangerine's relationship with BA strengthened. The firm's vision for the second-generation Club World managed to increase the seat/bed width by a full 25% and the team also collaborated on the redesign of BA's First cabins.

A host of other top airlines have selected Tangerine as a design partner,



01. Tangerine's striking new cabin design for Virgin Australia

02. Three key members of the Tangerine team. From left to right: Dontae Lee (president of the Seoul office), Matt Round, Martin Darbyshire



including Iberia, Cathay Pacific and Azul. This year has seen the launch of its redesigned premium cabins for Virgin Australia and Korean airline giant Asiana.

Tangerine's expertise has been applied to the smallest aircraft spaces, such as designing the interior of a light aircraft for Korea Aerospace Industries (KAI), and there are other exciting aviation projects in the pipeline.

"Aircraft interiors are a vital part of what we do at Tangerine," says CEO Martin Darbyshire. "Tangerine's mission is to deliver unimagined change in products, services and experiences –

doing what it takes to guide a client to where they want to get."

Darbyshire is certain there is still room for big innovations to advance the aircraft interiors industry, but as he says, "Airlines must recognize they need it and know how to get it." Tangerine, he believes, can help businesses see beyond the obvious, offering fresh thinking on what really matters, joining the dots so everyone recognizes what change might bring. "The genesis of the success with BA, for example, was a deeper understanding of what had meaning for business travelers," he explains.



“

IT'S ABOUT BRINGING A MIX OF CREATIVE VISION  
AND PRAGMATIC LOGIC TO A PROJECT ”



about bringing a mix of creative vision and pragmatic logic to the project.”

Round led the Tangerine team responsible for the redesign of Virgin Australia's newly launched A330 and B777 premium cabins. “The challenge was to infuse the spaces with sophistication and elegance that would help define the airline as a quality carrier offering outstanding service.

“One of the problems that current aircraft cabins have, because of the way components are made, is a lack of variation in the surfaces,” Round believes. Particular consideration was given to how light and shadow play on surfaces such as the louvered privacy screens, the sparkle within the metallic paint on the adjacent surface and the combination of leather and fabric on the seat.

New lie-flat seats in business class, engineered by B/E Aerospace, replaced the previous recliners and were heavily customized to give them a sense of international style and exclusivity.

“We considered as many aspects as we could,” says Tangerine designer Martin Mo. “Everything was rethought – the side profile, the return wall, the divider, the seat covers and even the ventilation gaps on the monitor. Nothing was considered too small

to help achieve the right passenger experience.”

The color palette, under the guidance of Tangerine's CMF expert Emma Partridge, introduced bold contrasts, with warm metallics and black leathers chosen to counteract the flat monotonal character of many aircraft cabins. This complements the smooth painted areas, incorporating a range of attractive finishes.

Every aspect of the interior was addressed by Tangerine: the bulkhead and storage spaces were given the same detailed attention as the seat and curtain fabrics and the carpet. Even the baby bassinets were remodeled and incorporated into the overall design, and now when cabin crew open a wardrobe they are greeted by an iridescent repeat pattern of the airline's ‘flying maiden’ monogram. “It's something special for the crew,” Matt Round says, “and adds to the sense that the whole space is cherished.”

The business cabin also incorporates a distinctive bar area, developed by senior designer Dan Flashman. The design involves interconnecting angles that break up the conventional cabin shape, bringing flair and modernity to the cabin environment.

**03.** The sumptuous first class suites in the Asiana A380 lower deck

While Tangerine recognizes that there are few airlines prepared to commit to that sort of total transformation today, it believes passionately that there is the possibility to deliver real change. Wooing the modern global traveler begins with first impressions on walking through the aircraft door, but extends through to the fine detailing on a cushion or a personal touchscreen.

“Everything must flow,” says Tangerine's creative director, Matt Round, “from the broad experience to the detailed design at the end of a customer's fingertips. For Tangerine, it's



To celebrate 25 years of design, the studio has created a book. *Tangerine*, 25 insights into extraordinary innovation and design. As an Aircraft Interiors International reader, you can receive the book at a reduced price of £23 including P&P. To order, telephone +44 844 576 8122 and quote promotion code AD214.



THERE IS SPACE FOR MORE INNOVATION  
IF AIRLINES AND SUPPLIERS COMMIT



Premium economy passengers have access to a self-service snack area, introducing choice and freedom more often associated with business class cabins. New seating fabrics and leathers add to a quality experience, consistent with but differentiated from the business class offer.

Meanwhile, another Tangerine team has been working on interiors for the six Airbus A380s ordered by Asiana. The first of these entered service in the summer of 2014.

Asiana was looking for a calm, quality feel to its cabins, in keeping with the airline's premium travel branding. Once again, Tangerine worked with pre-designed seats – first class engineered by B/E Aerospace and business class by Sogerm. The interior layout of the A380 was fixed and the project also presented major geographical challenges.

"We were working on a first class seat manufactured in Arizona, a business class seat made in France, a first class galley and walls produced in Tokyo, and a bar and lounge area created in Germany," says Darbyshire. "The client was based in Seoul and the aircraft were being assembled in Toulouse. All these products had to be given a sense of coherence and made to belong to the brand."

For Tangerine, the key to this project was finding the space within the confines of the cabin (and the contract) to remain creative. "It is about strategic thinking, exhaustive inquiry and attention to detail," Darbyshire believes. "Although we had to accommodate existing seat mechanisms, we were able to make subtle adjustments that freed us to create notable improvements to the design, ending up with the serene and



04. Tangerine designed the IFE GUI for Asiana's new Airbus A380s

comfortable environment that reflects Asiana's style."

There was even less room for maneuver with Tangerine's recently completed first light aircraft project. KAI's four-seater Naraon offered a cockpit space one inch narrower than the inside of a Smart car. "Much of the instrumentation and mechanics were fixed and had to be worked round," says Darbyshire. "You need to pull together all of the disparate stuff and work out what flexibility you have."

As with Asiana, Tangerine was able to call on the expertise of its London and Seoul studios to come up with the best possible solution for the Korean clients. Seoul-based designer Junghyun Cho flew to London and set about giving the cockpit some style.

"The shapes we could influence needed to be simple and clear," says Cho. "We are particularly proud of the

flowing curve we created, the continuum from the armrest through the glare shield to the armrest on the other side. We felt it gave a sense of harmony and sophistication."

After 25 years in business and with over 15 years' experience in designing aviation interiors, Tangerine feels entitled to reflect on what success in the skies looks like. "There is space for more innovation if airlines and suppliers commit," says Darbyshire, "but in the end it will always be about working with a client to make the brand differentiated in the right way and the traveler experience better."

"All the innovation, the strategic thinking we apply, the attention to detail, everything we do, only means something if it can be translated into customer satisfaction," the Tangerine CEO believes. "That is the core of any sustainable and successful business." ☑

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# Celebrating 25 years

# cabin**evolution**

Broad experience across the aerospace and automotive industries has led to Design Q creating exciting new ideas for airlines and airframe makers



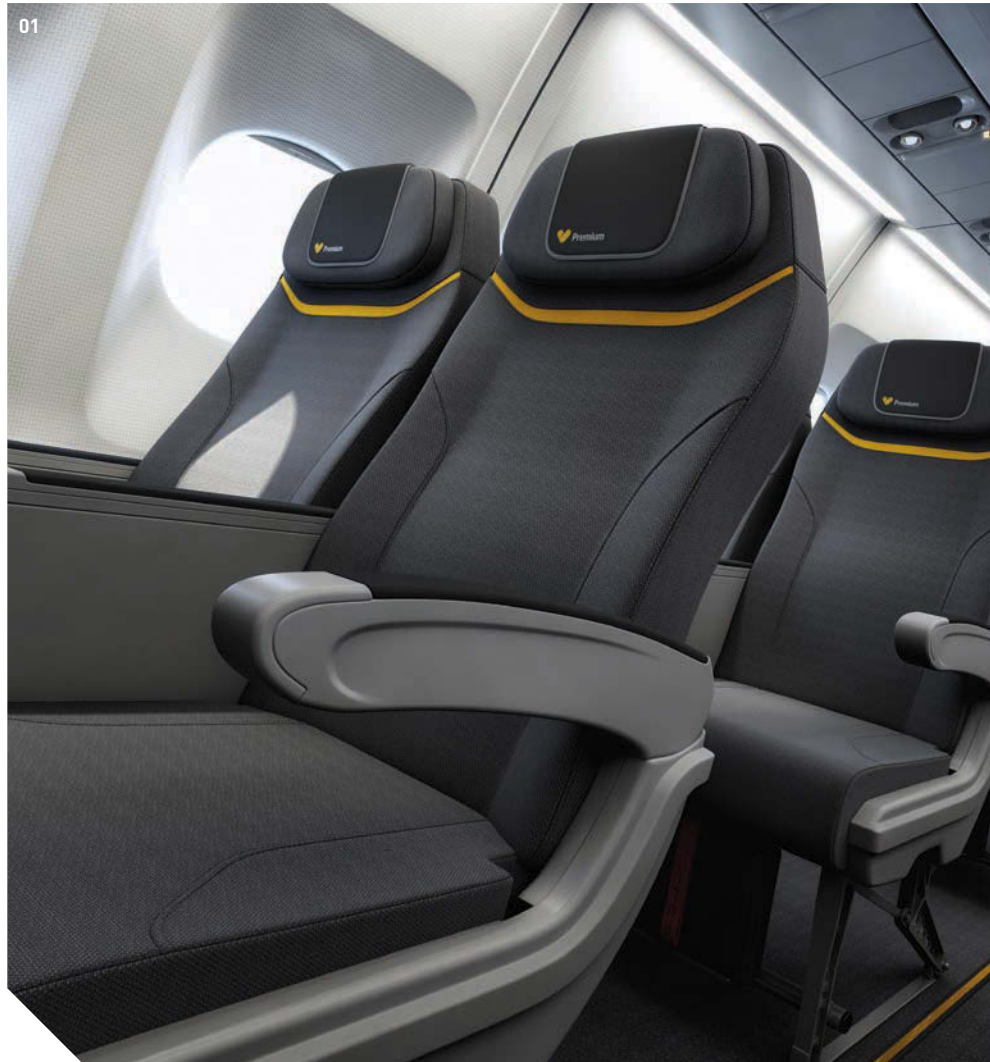
In the 15 years Design Q has been working in the aircraft industry, the agency has seen and been involved in a number of new products aimed at improving the passenger experience and providing airlines with a more competitive offering in the marketplace. Some projects have challenged convention, while others have been a logical evolution and part of a process of continuous improvement.

Running a commercial airline is a very competitive business, with intelligent use of design playing a key role in adjusting the balance in the airline's favor. Cabin design is evolving under a diverse range of influences: new technology, changing customer requirements, branding and commercial drivers, to name just a few. The results from some of Design Q's more recent projects in the commercial airline sector show how design thinking has been guided by these emerging requirements, and how these solutions form part of the constantly evolving cabin interior.

01. Application of the Thomas Cook brand colors throughout the cabin shows strong design links to the travel company

02. The Airbus Bag2Go concept is a holistic approach to travel

**INCREASING PASSENGER SPACE AND SAVING WEIGHT** Driven by a goal to improve passenger space, UK-based leisure carrier Monarch Airlines' new lightweight economy class seat, supplied by Pitch Aircraft Seating



Systems, was conceived and designed by Design Q. The fixed-back seat uses modern design principles and lightweight materials, which have enabled the airline to increase legroom within a seat pitch and save fuel.

Adrian Tighe, Monarch's chief commercial officer, comments, "We listened to the extensive feedback we received from our customers at the very start of this project, and the new ergonomic seats designed by Design Q were developed around this input. The non-reclining design gives far more space than traditional aircraft seats,

with the added bonus of the person in front not being able to impinge on the traveler's personal space."

The weight reduction in the new design achieves major savings on fuel and emissions. For instance, when compared with a set of Monarch's existing seats, a set of new seats on a flight to Egypt saves 562 lb of fuel, which is equivalent to 1,799 lb of CO<sub>2</sub> on a single flight.

**NEW TECHNOLOGY AND CUSTOMER INFLUENCE** Personal tablets now play a major role in commercial and

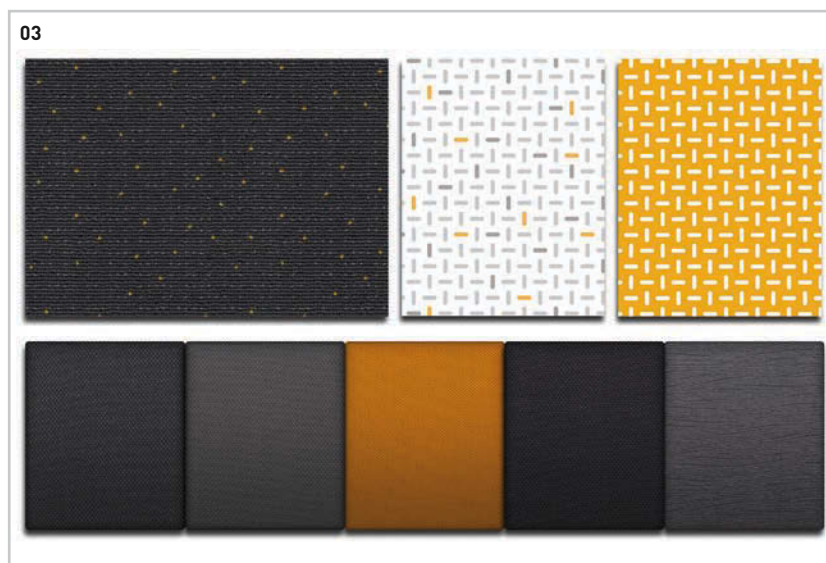


“

PERSONAL TABLETS NOW PLAY A MAJOR ROLE IN  
COMMERCIAL AND BUSINESS JET INTERIORS ”



business jet interiors. With a large number of passengers using these devices in the cabin, the industry has looked at ways of making the best use of the technology. This summer, Monarch Airlines launched its new personal IFE service called MPlayer, which lets customers connect to the onboard wireless network via their own iOS or Android smartphone or tablet and get a wide range of free and pay-to-access IFE content. Design Q worked with Monarch to adapt the seat design to meet the airline's requirements, incorporating an in-seat



tablet holder that would take a wide range of models without using any moving parts.

Tighe comments, “We were aware of the changing trends regarding IFE, and Design Q worked closely with us to consider ideas that reflected the changes in customer behavior. The customer feedback also told us that seat storage is particularly important to customers. Our new seats offer more flexibility than traditional pockets and use the concept of a bungee cord. The storage area can comfortably fit water bottles, books and even children's toys.”

Design Q's bungee cord concept is a good example of how customer requests can generate a different way of looking at the problem and result in new design solutions. Taking influence from sports equipment, the natural elasticity of the cord makes it a very versatile storage system, helping airlines to keep the area clean and well presented for the next passenger. During the development phase, Design Q used the feedback from customer trials to understand how the system was being used, enabling the team to further refine

the design, emphasizing the importance of these trials.

**SEAMLESS TRAVEL** The airline industry recognizes the importance of providing a seamless travel experience to the customer, and has for some time looked outside the cabin for ideas to improve the quality of travel, and to reduce travelers' stress levels at either end of the journey. Over the past few years, Design Q has been working with the Emerging Technologies and Concepts team at Airbus on the 'Airbus Bag2Go' concept.

The concept is a holistic travel system using 'intelligent' baggage so that the passenger does not need to carry big suitcases or the larger 'carry-on' bags, allowing them to make different travel choices to and from the airport and freeing them to enjoy their travel experience. It looks back to an era when the lucky few had their baggage transported to their destination and they were confident that it was being looked after. Through track-and-trace technology directly linked to smartphones, Bag2Go will allow passengers to carry their luggage in their pockets.

03. Material and color swatches for the Thomas Cook proposal

“

WITH AN ALTERNATIVE BAGGAGE SYSTEM, THE  
IMPLICATIONS ON THE CABIN MAY BE CONSIDERABLE ”

Jan Reh, innovation manager of emerging technologies and concepts at Airbus, explains, “We will enjoy a new dimension of travel freedom – our hands and minds freed from baggage worries.”

With an alternative baggage system, the implications on the cabin could be considerable. We could see novel seat-centric carry-on storage solutions, with the upper cabin environment opened up to provide a bare canvas for new passenger-focused technologies. Although conceptual, the technology and capability already exist and it is an idea that is sure to generate discussion and possibly change the way we fly in the future.

**BRAND APPLICATION** Airlines are getting more sophisticated in the application of their brands on the passenger experience. As well as being a way to differentiate a company from the competition, a brand reassures passengers that they are being consistently looked after in a considered way. This year, Design Q worked with Thomas Cook to translate its brand into the new economy and premium economy A330 cabins. With the new logo and product positioning, the cabin required a new interior tailored for long-haul passengers.

Christoph Debus, CEO of Thomas Cook Airlines UK, states, “Our brand-new long-haul economy cabins and service will challenge perceptions of



04. The Pitch PF2000 bungee system is a neater solution than a standard seat-back pocket
05. The Design Q design team at work in the studio

our airline, and our new premium economy will ensure those customers experience a great range of services, whether they are celebrating a special event and want to fly in style, or need to relax on a business trip.”

Working with the Thomas Cook team, Design Q defined an aesthetic language and material selection based on new brand guidelines. The Design Q team specified the cabin interior finishes and worked in partnership to execute a design theme influenced by contemporary British artwork. The new cabin makes use of warm neutral fabrics with a yellow accent, and the scheme is designed to stand the test of time, appealing to both vacationers and business users alike.

**DESIGN Q** The agency was founded in 1997 by the owners, Gary Doy and Howard Guy, to provide design solutions in the aviation and

automotive industries. Doy and Guy still take a hands-on approach with project work, placing a strong emphasis on realizing design solutions for their clients.

One of Design Q's founding principles is to put the customer's identity first. The company name is a play on this principle, with a reference to the 'design cues' it uses to give the product an identity relating to the brand. The team strives to understand the manufacturing process to help get the very best out of the smallest design detail, and appreciates the value of teamwork in the development process.

Working in both the aviation and automotive industries, Design Q has a passion for the subtle form development and material break-up that brings a sense of quality to the product. The team members like to pool their experiences working in different industries and use them creatively to look for novel answers to the design challenges they face.

Design Q is based in the heart of England near Birmingham Airport. With around 10,000ft<sup>2</sup> of studio and workshop space, and a highly skilled workforce, the company has the ability to manufacture full-size mock-ups and prototypes to validate design concepts. This year, Design Q engineered and manufactured the Bombardier Global 7000 mock-up interior presented at EBACE in Geneva. It is believed to be one of the largest business jet mock-ups ever built, and received high praise for its quality and attention to detail.

The experiences gained through work on business jets over the past seven years have reinforced Design Q's understanding of the luxury traveler, and the studio looks forward to translating this knowledge into the next generation of high-end commercial aircraft interiors. ☒



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
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# futureflyers

A different breed of consumers is on the horizon: Gen Z. Unencumbered by the past, and empowered by rapidly advancing technology, they will forge a radically altered new world

 In January 2014, Lewis Clarke became the youngest person to reach the South Pole. He was 16 years old. In March 2013, Nicholas D'Aloisio-Montilla sold his Summly app to Yahoo for a reported US\$30m. He was 18 years old. In October 2014, Malala Yousafzai became the youngest person to win a Nobel Peace Prize. She was 17 years old. Generation Z (those born after the mid-1990s) are rewriting the rulebooks.

In the summer of 2014, design and innovation consultancy Seymourpowell launched 'The Gen Z Study' to get under the skin of this extraordinary new generation. Its staff spent time with influential members of Gen Z leading progressive lifestyles to illuminate the cultural shifts that they are creating, as the attitudes and behaviors they are forming today will influence the future consumer landscapes of tomorrow. Below is a snapshot of Seymourpowell's findings.

01. The Gen Z project is illuminating tomorrow's consumer landscapes
02. Marriott Hotels' brilliant 'Travel Brilliantly' campaign

**INTERTWINED WORLDS** The term 'digital natives' has become a much-used nickname for Gen Z due to the deeply intertwined role that technology plays within their day-to-day lives. Incredibly, their worlds have become so blurred that physical adaptations are



even taking place. For example, Seymourpowell's 15-year-old Tech Customizing respondent Elliot is proud of his little finger, which has become bent after years of gaming, morphing to the shape of his PlayStation controller.

And yet, surprisingly, despite this warm embrace of new technologies, the study highlighted that Gen Z are still keen to keep a firm grip on the physical world and are skeptical of entirely digital experiences. While Elliot is optimistic about gestural interfaces, he says that he finds comfort in the tactility and precision offered by physical interactions more appealing.

This suggests that physical product experiences should not be discarded in a digital world, but rather woven together to create compelling experiences. A charming example of how this could work can be seen in Disney's Aereal interface, which uses haptic technology to deliver tactile sensations in mid-air, enabling users to feel virtual objects, creating an invisible yet physical experience.

Currently, many airlines that are incorporating new technologies into their customer journey are keen to hero technology and place it center stage to create the impression of a progressive



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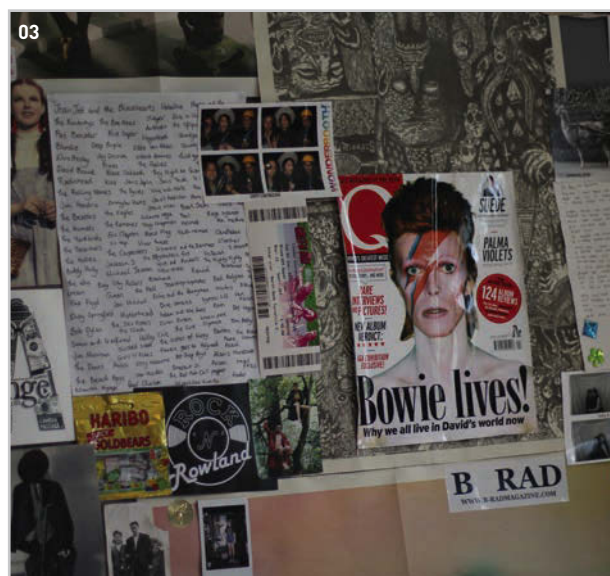
ADAPTABILITY IS STRONGLY DESIRED AND

SEEN AS FUNDAMENTAL TO SUCCESS ”



brand. However, as the Internet of Things expands and more of our devices become smart, future consumers who are highly tech savvy and cynical of technology for technology's sake will want experiences where technology is carefully and seamlessly woven into their physical environments. The truly progressive airline brands of the future, therefore, will be the ones that embed technology into the customer journey in a responsive, tactile and human way.

**ADAPTABILITY APPEAL** One of the key differentiators between Gen Z and



the generations that have come before them is their innate ability to cope with the turbulence of the current era. While older generations have attempted to cling on to the stability they once had, Gen Z (having grown up with in-stability as the norm) have embraced it and found new opportunities amid the flux. As a result, adaptability is not only strongly desired, but is also seen as fundamental for success. When the various survey respondents were asked about who they looked up to and why, transformation came up as a recurring theme. Gamer Eligh and fashion blogger Ellie, both 16 years old, cited David Bowie as one of their key role models. They stated that this is because of the way he has changed multiple times in his long career, while always staying true to himself.

This admiration and reverence for adaptability throws up interesting possibilities and challenges when translated into air travel, particularly within cabin and lounge interiors, where compelling new customer experiences could be offered. It was these shape-shifting principles that Seymourpowell worked into Morph, its

concept economy seat for airline travel, which uses smart architecture to adjust the seat to suit varying sizes of passenger. This level of transformation may seem radical, but in the context of Gen Z, anything but radical innovation will seem old hat and dull. This is a generation that is learning coding from and early age, and is adept at hacking the products around them to suit their needs. If they are to be taken seriously by Gen Z, brands will need to unleash the potential of personalization, as future consumers will buy into experiences that bend to their desires rather than those that offer a one-size-fits-all approach.

**THIRST FOR DISCOVERY** Having been born in a time when the internet was available to create global connections, Gen Z feel that they are living in a small world with increasingly broad horizons. Omnivorously curious, they are hungry for knowledge and novel experiences, perhaps more so than any other generation that has come before them. While connectivity has empowered them, an interesting downside to it is that it has created a feeling that there is less of the world for



03. David Bowie's adaptability has gained him popularity amongst Gen Z
04. This 17-year-old crew runner dreams of hybrid vehicles



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AIRLINES ARE IN A GREAT POSITION TO TAP INTO  
THIS HEIGHTENED THIRST FOR ADVENTURE

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their generation to uncover. Seventeen-year-old fashion and DIY blogger, Rose highlighted this point by saying: “There’s less to explore. There’s less to find out for yourself.”

We all like to unearth a new hidden gem, be it in the form of a product, experience or person, and for many of Gen Z, it is the prospect of discovery that drives them to keep exploring and makes them an extremely daring audience. A great recent example of a brand responding to this can be seen in Marriott Hotel’s ‘travel brilliantly’ campaign, which includes the use of 4D virtual-reality travel experiences, which transport guests to potential destinations using Oculus Rift gaming headsets.

As with the hotel industry, airlines, which already provided access to global travel, are in a great position to tap into this heightened thirst for adventure.

**ENVIRONMENTAL CUSTODIANS** The word ‘sustainability’ can often feel like an insurmountable challenge for the airline industries, where external factors, such as government legislation, can inhibit green innovation. And yet, Seymourpowell’s research indicates that by tackling this elephant in the room head on, brands can build a strong emotional connection with Gen Z, who view sustainable products and lifestyles not only as an urgent necessity, but also as cool and aspirational.

This new perspective on ‘green’ is unsurprising when you consider that this post-tsunami generation have had unparalleled access to the human stories behind environmental tragedies. Thanks to ‘citizen journalism’ being enabled by smart devices, they feel a far



05. 15-year-old Elliot customizing a PlayStation controller
06. Gen Z are forging a radically altered new world

greater personal responsibility for looking after the environment than previous generations have done. This outlook was highlighted during a discussion on aspirational purchases with Simran, a 17-year-old Crew Culture Athlete who told us, “I’m really loving hybrids at the moment. So my dream car would be a hybrid car, because if we could change the way that we drive, it would change a lot around us for the better.”

The shift from dreams of supercars to dreams of hybrids indicates a future

generation of consumers that will demand a fundamentally different type of performance from transport, and that aviation brands that are seen to make active steps forward with problem solving will be in a strong position for the future. Think of Virgin Atlantic, which has been one of the first to align its brand values with sustainable innovation by investing in low-carbon aviation fuel. Vitally, Gen Z will not only hope that brands will follow in their footsteps, but expect them to. ☒

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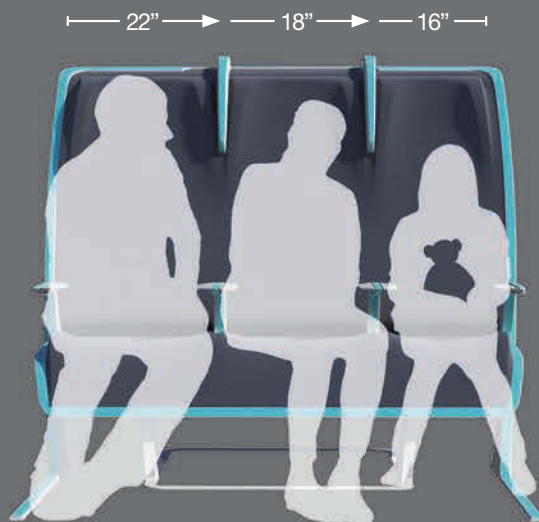
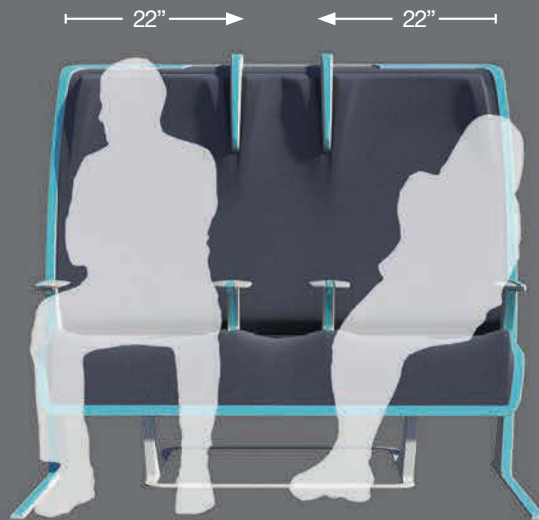
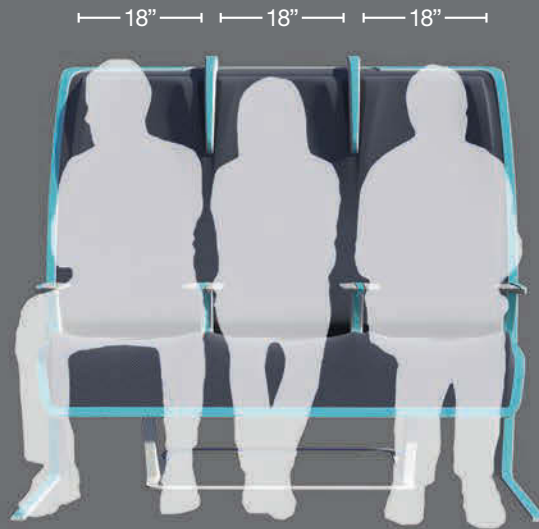
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shape the future

# skycocoon

Design Investment took some innovative steps in the creation of Air France's new business class seat for its Boeing 777s



"Air France, France is in the air." Air France used this motto in September 2014 to invite passengers and travelers to a special event at the Grand Palais in Paris. Following successful events in Shanghai and New York, the French airline also held a grand event in its own country in order to present the latest development in its Best & Beyond program. By implementing this sophisticated service and comfort concept, the airline hopes to place itself ahead of the competition at the highest level and to be able to offer guests the perfect all-round flight experience.

One of the core building blocks of the Best & Beyond program is the new long-haul business class seat for the Boeing 777. In February 2014, Air France presented the design with all of its various functionalities to the professional public, and since June, the business cabins of Air France's entire B777 fleet – a total of 44 aircraft – are gradually being equipped with over 2,100 of these seats.

At the event in Paris, passengers of all flight classes and age groups were able to take a seat in the newly developed seat in order to judge for themselves how well the airline had met their expectations. Mark Collins, who is the designer of the seat and the person in charge of the project, was present in Paris and was thrilled with the extremely good feedback received from over 13,000 visitors.

- 01. Design Investment created a versatile solution for Air France
- 02. The stowage compartment enables comprehensive, yet neat stowage of smaller items



"We are very pleased that our design was able to meet not only Air France's requirements, but apparently also to a large extent passengers' standards," said the English-born Collins from the sidelines at the presentation in Paris. "For us, the passengers, with all of their expectations and needs, are at the center of our strategy and planning." Since starting 10 years ago, Design Investment has dedicated itself to the aviation industry, with a focus on design for commercial aviation and private jets. Air France, KLM, as well as Airbus SAS, Lufthansa Technik and PrivatAir, are among the customers for whom the company has worked.

As part of the redesign of the seat, Mark and his wife and co-founder Alexandra Collins, together with their team, got to grips with one of the most important criteria for business class passengers: the highest-possible level of privacy.

Fittingly, Air France calls the new product 'Cocoon in the Sky'. The feather, as a way of expressing lightness and comfort, was the airline's motif. Incorporating this idea, Mark Collins used the various attributes of a feather as the basis for different concepts, and developed a design that particularly impressed Air France: the development of the seat shell into a curved 3D form,



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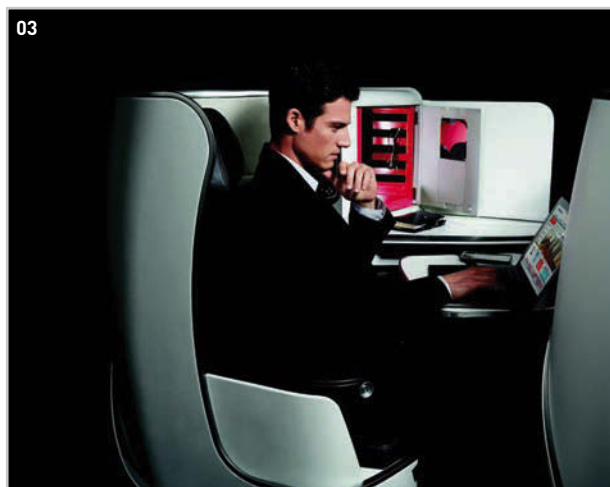
FITTINGLY, AIR FRANCE CALLS THE NEW  
PRODUCT 'COCOON IN THE SKY' ”



in which the passenger feels as if he or she is in a capsule or a cradle, protected and almost as if floating. The visitors in Paris were able to see and also experience how Design Investment had implemented these thoughts.

According to Mark Collins, “What makes this product unique is the especially soft surrounding, as well as the new shape, which the passengers retreat into.”

The seat can be converted into a full-size bed, 78in long and 26in wide. A feature that is particularly noticeable in bed mode is the headrest, which has been specially designed for Air France, with the aim of giving the resting



passenger a feeling as if they are in a warm, comfortable room. The leather armrests on the aisle side can be completely lowered, offering additional space to help passengers find an ideal sleeping position. In addition, the privacy screens between the seats, which are in the middle of the 1-2-1 cabin divisions, can also be taken down if needed and offer greater privacy, for example to couples traveling together. Furthermore, each passenger in business class now has direct access to the central aisle, thanks to the new design.

The need to integrate all of the features of the seat into a harmonized and balanced design, while also hiding the technical elements, was doubtless a particular challenge for the seat manufacturer, Zodiac Aerospace. After evaluating various models of seats, in terms of their design, as well as from financial and strategic viewpoints, Air France chose the Cirrus seat.

Mark Collins says of the choice, “In the process of collaboration with the Zodiac team, we were able to significantly develop the Cirrus seat with its V arrangement through our new cocoon design.” This subtle but innovative touch became clear when compared with Cirrus seats already in use by other airlines.

Work, play, eat or sleep: all aspects that are unique to long-haul flights are also found in the design of the B777 business seat, which Design Investment developed in collaboration with Brand Image. The agency was responsible for the compatibility of the product and branding strategy during the development process.

Creating enough space – not only for the passenger, but also for the things he or she will want to have at hand during the flight – was of particular importance to the Design Investment team, and they were extremely careful to add additional comfort through strategic and innovative touches.

The spacious personal storage compartment has been designed with the needs of passengers in mind. The compartment has a red interior, which is a traditional Air France color accent, as well as a mirror in the door. Passengers will find noise-reducing headphones in this compartment, as well as an amenity kit.

For personal items, such as a passport or cell phone, the design team has also created a simple but very practical solution: elastic straps act as restraints. For larger items, such as laptops and tablets, as well as bags and shoes, Design Investment developed



03. Day and night: 'Cocoon in the sky' project is a versatile design solution



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THE DESIGN PROPOSAL IS SEAMLESSLY EVALUATED IN  
A DIRECT EXCHANGE WITH THE PROJECT PARTNERS

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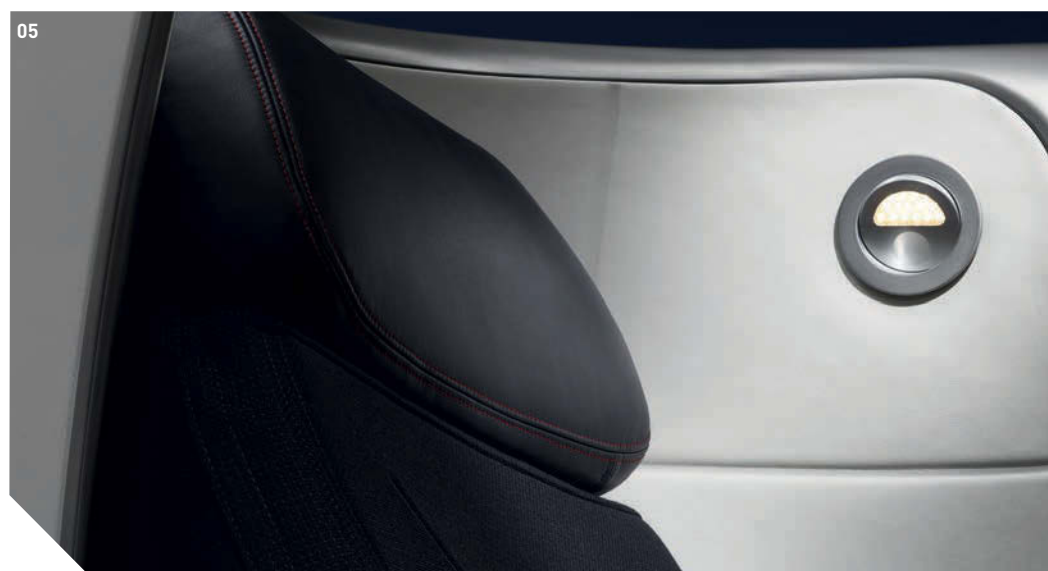
additional storage spaces, which are designed and implemented so they do not encroach on the passenger's space, while also remaining within reach. Electrical outlets and USB ports have also been integrated into the seat, so that computers and smartphones can be used throughout a flight.

“In such a complex project, many different partners and service providers are involved,” explains Mark Collins. “The most important thing during the whole development process is to retain and promote close cooperation between all those involved – from the airline's marketing team, to engineering, to ergonomics specialists and other external experts.”

According to Mark Collins, the secret to a successful product lies in the cooperation with the seat manufacturer. The designer needs to provide expert know-how, in order to persuade the manufacturer to step out of its comfort zone in order to achieve improvements that involve added seat complexity.

To this end, Design Investment has created the Design to Engineering method. The design proposal is seamlessly evaluated in a direct exchange with the project partners and remains the overriding design guideline from the very beginning of the design concept and throughout the whole development process.

Design Investment sees one of its great strengths in project management and communication with customers and partners. As Mark Collins says, “We see ourselves as the important connecting link in this chain and provide, as seamlessly as possible, current information and interaction.”



04. Husband and wife design duo Alexandra and Mark Collins

05. Business class lighting solution

For Air France, working with Design Investment has been a great success. The Geneva design office has been working for the French airline for over five years now. In October 2009, Air France presented the new Premium Voyageur Seat for long-haul flights in economy class. This premium product, developed by Design Investment, was one of the few fixed-shell seats in economy class.

Mark Collins – a trained car designer – and his wife Alexandra – an industrial designer – are the creative brains behind Design Investment, an international design studio, which they founded in 2004. The studio is not situated in a metropolis; rather it is only a few miles from Geneva, with an exceptional view of the French Alps.

For Mark and Alexandra, as Switzerland is known for quality and innovation, they consider it to be the ideal place to develop perfect solutions for customers. Slightly hidden away and with few signs, the road to the design studio winds through a magical landscape and vineyards. The panoramic location, and the associated peace and quiet, mean the designers can enjoy a completely different sort of freedom to aid inspiration and creativity. Customers also value this unusual location, as it is far removed from conventional office life, and they like to use the studio for workshops. While the studio is tucked away, accessibility is no problem, as Geneva International Airport is only a stone's throw away. ☒

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# premiumservice

Yellow Window is targeting the qualitative properties of aircraft interiors to deliver a unique and immersive passenger experience



Design is a process and an expertise that creates value through a holistic approach and by taking on all constraints in the creative process. This is very much the case in aircraft interior design, an industry with many constraints, making design assignments even more challenging for client and designer alike to make dreams come true.

These challenges are enjoyable for designers who have to assist airlines to innovate, to differentiate from the competition and to improve and enhance the customer experience. "As designers, we prefer to work for airlines as this gives us the opportunity to cover a larger part of the customer experience," says Martijn Vogelzang, a partner at Yellow Window. "This has been our experience in other modes of transport as well. Customers that operate high-speed trains or even mass transit solutions in metropolitan areas, have this drive for innovation coming from the need to improve the whole journey experience rather than a specific touchpoint or system between customer and service."

With the airline business in transition and a regained focus on service and travel experience, the design of first class cabins has become the forefront of innovation and a very competitive market. Yellow Window

01. Yellow Window's initial concept for Air France's La Première class

02. The concept aimed to take first class to a new level of luxury



had been working on first class seats, cabins and bars for Air France when Zodiac Aerospace approached the design agency to participate in an 'individual first' design competition, aiming to explore the future of first class travel.

"We did not realize that the journey we were starting in mid-July 2013 would result in the Halo laboratory suite. The entire experience was unique because of the truly multidisciplinary approach. The Zodiac group incorporated various types of expertise and input from several business units.

The team we brought together for the first stages included yacht designer Arman Marine, and Lowie Vermeersch, best known for automotive design, who acted as real sparring partners."

A competition always means there is little time available. Yellow Window is used to running analysis and creative activities in parallel, with the aim of enhancing both: ideas feed the analysis process and the analysis process feeds creation. The dialog between emerging technologies and customer needs triggers creativity and leads to smart solutions.



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THE DESIGN OF FIRST CLASS CABINS HAS  
BECOME THE FOREFRONT OF INNOVATION

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The concept Yellow Window proposed appeared to offer the best set of innovations integrated in a coherent and user-oriented way. The focus on premium service was explored in depth, especially targeting the qualitative dimensions of the experience that are most often considered to be restricted while on board: sense of space, flexibility and freedom. Also addressed were the social and personal needs of demanding travelers. Here, the travel experience was taken way beyond the journey, addressing the challenges of

travel time on the human body, actively supporting regeneration through physical and sensorial support.

This holistic approach led the concept toward adjustable space, beyond the confinement of the adjustable seat. Even if not meant to be implemented as such, the Halo suite shows that it is possible to meet the different design challenges of a first class cabin: to be both a collective space and a space in which to cater for individual needs, or to offer a true metamorphosis between a real office, a real bedroom, lounge or dining space.

By clustering different needs, functions and emotions into 15 'states of mind', a method was found to enhance the quality of the design proposals and detailing of solutions, and ultimately to communicate the Halo concept.

The Halo suite was presented at Aircraft Interiors Expo in April 2014 and featured in the September issue of *Aircraft Interiors International*. It is intended as a laboratory to showcase ideas and test new concepts. Managed by Zodiac Seats UK (formerly Contour), the project involved teams

**03.** The Halo suite is an entirely new proposal for first class travel

**04.** Halo has LED screens over the windows which can be simply transparent, or can show anything the passenger wishes, such as a film or images



from all over the Zodiac organization and integrated results of in-depth research into customer needs and experiences.

The Yellow Window agency has also collaborated on other projects with Air France. After designing self-service bars for Air France's B777s, the company took on the restyling of the La Première seat for the airline's Airbus A380.

This mission set out to define a new first class design, consistent with the brand image and marketing strategy. The concept was driven by French hospitality, and the motivation of Air France was to take passengers beyond first class and into a new level of luxury: La Maison La Première.

Patricia Bastard, partner in charge of the Paris office, explains: "The design challenge was to create a spacious lounge atmosphere, while also enabling the passenger to enjoy full privacy. On the emotional side, it required the right sensibility to translate the airlines' brand identity. This was a great accomplishment of our multicultural team, which included French designers, who understand French design and could achieve the precise translation of elegance, resulting in clean, feminine lines." A new vocabulary of form, with the seat's base shell reminiscent of a blooming flower, was established before further translating it into industrial design.

After La Première was realized, the Air France story continued, with Yellow Window developing further first class concepts, resulting in further design proposals.

Yellow Window has a long history that started nearly 40 years ago with

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MOBILITY NOW ACCOUNTS FOR MORE THAN  
HALF OF THE COMPANY'S TURNOVER ”



05. A first class concept that Yellow Window created for Sogerma

06. The concept uses clever design and lighting to give the seats a 'floating' appearance

designer Axel Enthoven. As a small product design company based in Antwerp, Belgium, Enthoven worked for clients worldwide and developed a specialization in mobility design. Now renamed as Yellow Window and with offices in four locations, the company has evolved into a creator of value, using design as a method and bringing together multiple disciplines. The company's client list is very diverse, including multinationals such as LG, Coca-Cola and Siemens, as well as very small companies.

Today this client base includes airlines and their suppliers, although Yellow Window still designs city buses,

coaches, trams, commuter trains, high-speed trains and seats for all travel modes – which is where it all started. Mobility now accounts for more than half of the company's turnover as the combination of product and service design corresponds to the needs of the whole value chain and all travel modes. In 2000, demand from operators and service providers began to exceed that of manufacturers. Today, projects also include journeys that are integrated from before departure until after arrival, apps to change the travel experience, toolkits, design training programs for front-line staff, and design and brand manuals. ☒

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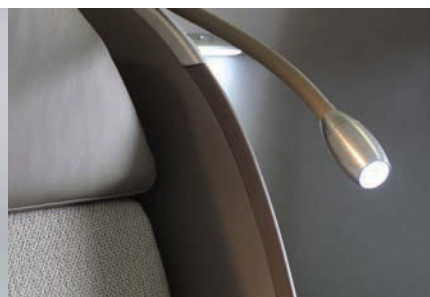
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# 10-minute turnaround

Ugur Ipek explains how three key words from a design brief led to a complete re-imagining of commercial aircraft

01. Cigar's interior is based on a large radius
02. The Cigar concept is a bold reimagining of a commercial aircraft



Successful design is about raising the right questions. Do it and you can open a new universe. "Shall we get bigger IFE screens than our competitors?" is definitely not a question that will put you ahead of the game. Although good benchmarking is part of a thorough analysis, you see only what your competitors want you to see – but what does the client want? That's where it all starts. This is one of the questions that brings us closer to our future. Defining goals and timelines, identifying enablers and then striving for the best is no secret. But how you get there is an interesting journey.

The Ugur Ipek Design studio usually starts a project with a blank sheet of paper and then questions everything: all processes and touch points in the product lifecycle. With a holistic analysis, you can define how much of a change is desirable. And as everything changes constantly over time, a little redefinition is needed every now and then. So go ahead and ask questions – especially of your creative team.

Asking the right questions is critical, as is using the design team to gain solutions that exceed expectations.

A few years ago, the Ugur Ipek team was approached by the Airbus Cabin Innovation Team to create a future aircraft. The studio had just completed seven years of design work on the



A380 interior, and was eager to work on future concepts. The brief was simple: design an aircraft capable of a 10-minute turnaround. The team could take the concept as far as they liked, and were encouraged by this design freedom and the potential for some truly disruptive development.

As the project began, the Ugur Ipek team went to the Harz Mountains, near Blocksberg in Germany, for a weekend. These mountains are known for being the place where witches gather on Walpurgis Night. And over the course of that weekend, a magic vision was indeed born.

How can you make a 10-minute turnaround happen? Fueling takes almost 20 minutes, getting passengers off the aircraft and boarding new ones takes another 20, and there is also catering and cleaning to consider. But remember, the design team could go as far as they wanted... So they decided that as they needed to fill the cabin with passengers quickly, a capsule system would work best. The concept consisted of two elements, with the plug-in passenger cabin separate from the flight-relevant parts, such as the cockpit, wings, engines and landing gear. When the aircraft lands, the crew





simply exchange the cabin pod and take off. Job done. The team then went ahead and created some sketches and renderings. But they were somehow not satisfied with this concept. It was so close but yet so far. It felt like the right solution at the wrong time.

They then asked themselves how to speed up the boarding process in an existing aircraft type. First, they divided the stream of people in half by moving the boarding door into the center and making it double the size in order to double the boarding rate. Color-guided boarding was also introduced, to divide the flow of

passengers by colors. At the gate, blue boarding card holders turn left through the blue framed door, while green go right. In theory we have increased the boarding flow by a factor of four.

How well would this work in the real world? The team pored over scientific flow studies of people and the several boarding options, such as out-to-in, aft-to-front, free choice of seats, and found that there was no real solution. All the flow would come to a stop as passengers blocked the aisles while loading the bins. An 'anti-blocking-aisle' was required – an aisle wide enough for people to pass each



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THE TEAM DESIGNED A NEW AIRCRAFT WITHOUT ANY CONSTANT-WIDTH SECTION ”

other. But would it need to run the full length of the aircraft? Where is the most traffic expected? Aisle width is required at the cross aisle at the center doors, and can taper at the ends, where traffic decreases.

But could you have a completely tapered aircraft with all of the problems that could entail, such as high development costs, special parts, special brackets and tooling, complicated spare part logistics, increasing part numbers and compromises in the cabin aesthetic?

Yes! The team designed an entirely new aircraft without any constant-width section. They approached the problem in the spirit of aikido and used the initial counter energy to create a radical solution.

**03.** An anti-blocking aisle design is central to Cigar's design



## THE WIDE CENTER CROSS AISLE ENABLES BOARDING COMFORT AND IS AN EYE CATCHING DESIGN



Cigar was born – an aircraft based on radial modularity. One lining set was created based on a circle with a radius of approximately 186m, consisting of a dado, window panel, light cover, PSC, bin and a lateral ceiling. This set was then duplicated and rotated around the pivot point of the circle and strung together until the cabin was complete. This design eliminated the conical-constant-conical tube shape and created an iconic interior following an arc. The only non-modular element was in the center ceiling where a gap needed to be filled with a light cover.

This modular manufacturing and installation system, where one element fits all positions in the aircraft – no matter whether on the left or the right – also helps to increase production rates, standardize monument integration, and reduce spare part numbers and logistics.

As one part fits all, it may be economical to consider different lining styles for each alliance or even each airline. Thus customization goes beyond color and material selection.

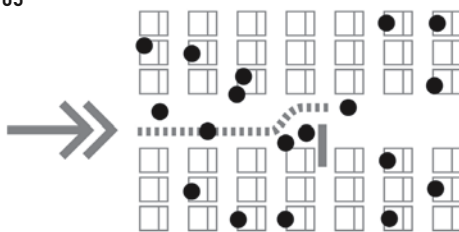
The wide center cross aisle enables boarding comfort and is an eye-catching design, providing a great first impression. Even boarding for disabled passengers can be performed during the regular boarding time slot. The spacious entrance enables further flexible use, and if desired, new revenue streams can be established, such as a shop.

The team continued stretching the boundaries as they wanted an aircraft that was less of a tube. Therefore they put a lot of effort in the cross-section and the lighting. They totally discarded the circular tube. The team's main objective throughout the design and research process was the comfort of the passenger, so they designed the aircraft

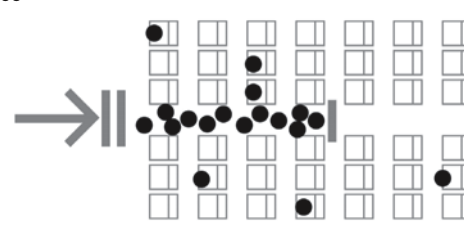
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05



06



- 04. The central boarding position allows all passengers to embark at the same time
- 05. The anti-blocking aisle diagram shows the extra space available
- 06. A traditional central aisle and its constraints

from the inside out, following the principle of 'form follows passenger'. Upright window panels meant a wider view and a cabin that felt more spacious. The panel surfaces were specially designed to enhance the arc-shaped cabin and illustrate the radial modularity.

When it came to cabin lighting, the team designed it to achieve an even wash of light. It took a while to figure out how to create an immaculate wash light, and how to extend or stop it. However, it occurred to the team that natural beauty rarely features mathematically perfect light distribution, so they started to create cabin surfaces that were more lively and communicative. The outcome was delicate and very subtle surface treatments, giving the panels not only

technical strength, but also character. In conjunction with light, they reveal a natural beauty with their play of light, shadow and reflection.

The window panels were substituted by OLED-film screens, which deliver an artificial outside view. Because different viewing angles can lead to distorted images, it was decided to angle the screens. As a result, a big portion of the 'stuck in a tube' feeling is eliminated.

Since Airbus has now patented the oversized center doors and the principle of radial modularity, Ugur Ipek can happily tell you how a question and a sense of freedom created a new perspective in aircraft design and styling.

And it all started with the quest for a 10-minute turnaround. ☒

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# monumentalstyle

Cabin monuments are a key focus for Altitude Aerospace Interiors, with the company's latest project being highly complex and customized monuments for Virgin Atlantic's B787s

01. A Door Two area bar concept designed for wide-body aircraft such as the B777 and B787



In a highly regulated and safety-conscious industry, it's hardly surprising that commercial aircraft interiors have historically been driven by economics and function, rather than style. Over the past few decades the price of air travel has dropped considerably, and flying has become a much easier and affordable option for the average person. Commercial airlines have made changes to their service offering over the years, but actual aircraft designs and interiors have changed very little until recently. Notably, the past decade has seen revolutionary aircraft designs from both of the major wide-body aircraft manufacturers, with the entry to service of new-generation aircraft. As a result, aircraft interiors have also undergone some equally revolutionary changes – which is something that Altitude Aerospace Interiors is particularly excited about.

“We’re seeing a huge demand for unique interior features, with a strong emphasis on being aesthetically pleasing rather than just functional, particularly in the premium classes,” says Baden Smith, head of airlines at Altitude Aerospace Interiors. “The team at Altitude is always keen to push boundaries and enjoys working with airlines who are trying to stand out from the competition by incorporating their brand personality into the aircraft interior.”

Altitude is very proud of the fact that its customers include some of the world's top airlines. These airlines are continually improving their offer and looking for ways to differentiate themselves from the competition – and that is where Altitude steps in. Altitude designs customized solutions, which align with an airline's brand while providing tangible performance benefits to the airline. Customized products such as stowages, closets, crew rests, galleys, partitions, bar units and ceiling features are all part of





“

ALTITUDE DESIGNS CUSTOMIZED SOLUTIONS,  
WHICH ALIGN WITH AN AIRLINE'S BRAND ”



Altitude's growing range of monument offerings. Many of Altitude's recently developed products feature design elements that haven't previously been seen on a commercial aircraft, and represent real feats of clever engineering design.

One of the niche areas of expertise for Altitude is the Door Two area on wide-body aircraft, especially the Boeing 777 and 787. Given that this is the door by which most passengers usually board the aircraft, it's a perfect place for an airline to create a feature that will be memorable and reflect its brand. Altitude has created many variations of designs for bars, partitions, closets and ceiling features in this area, which passengers really notice when they board, and in the case of aircraft bars, also enhance the inflight passenger experience. Altitude believes that this area of an aircraft represents a great branding opportunity that has largely been underused by airlines. Recently, there have been a considerable number of airlines seizing this space by incorporating color and style into what was previously a purely functional area.

There are of course challenges in creating something that works well in such a confined space, and that's where

Altitude's research-led approach really comes into play. With extensive aircraft engineering experience and a strong design intent, Altitude can easily translate the functional requirements of the Door Two area into a sleek, welcoming and aesthetically pleasing entrance while simultaneously offering great improvements to its inflight functionality and service delivery.

The team at Altitude brings a highly aesthetic focus to all its designs, and customers looking to create interiors that are both stylish and functional are lining up for the Altitude touch. With an increasing and broadening scope of work on the horizon, Altitude remains firm in its customized approach to each project to achieve the best results for each individual airline brand.

One of the most exciting projects that Altitude has undertaken recently was for Virgin Atlantic's Boeing 787-9 Dreamliner, the first of which is now in service after a much-anticipated wait. Virgin Atlantic continually invests in its customer experience and is known for challenging the status quo in its quest to achieve a great experience.

Altitude was awarded the contract to create numerous highly complex and customized business class monuments for Virgin Atlantic's order of 16 Boeing

**02.** The Door Two bar monument implemented by Air New Zealand

787-9s. The monuments include a range of products including a unique bar unit, bar stools, a ceiling feature, stowages and closets, all with a high degree of glamour, including bespoke lighting features and textured panels not typically seen on commercial aircraft. It's no surprise that the design-focused team at Altitude relished the challenge and the opportunity to put their energies into such an innovative program. "Virgin Atlantic set an incredible challenge for Altitude on this program," says Ian Bannister, B787 technical project manager at Virgin Atlantic Airways. "We wanted the best bar in the sky, sporting a bespoke LED lighting system – and we wanted it done in under 18 months! It would be an understatement to say that Altitude delivered – they exceeded our expectations in every aspect."

Smith adds, "We see many synergies between our design philosophy and Virgin Atlantic's vision for its aircraft, so it was particularly exciting for our team to work on this program. It takes huge effort and a collaborative approach across the multiple teams encompassing OEMs, customers and multiple suppliers to achieve a successful result when embarking on new territory such as this."

Delivering such a unique set of monuments for a brand-new aircraft type isn't a task for the faint hearted. Having a team of talented and motivated individuals working cooperatively is definitely a key factor in working through such a complex program. Design house Viewport Studio's Gareth Southall worked on the Boeing 787-9 interior concepts for Virgin Atlantic and was instrumental to the program's success.

“

VIRGIN ATLANTIC SET AN INCREDIBLE CHALLENGE FOR ALTITUDE ON THIS PROGRAM ”

03



03. Design proposals for a half-height Door Two bar area  
04. Full-height bar design concept

"As with any major aircraft interior program, this one did meet with challenges," continues Smith, "but as all teams were clearly focused on the end result, these challenges were overcome and the final product is simply stunning. Passengers traveling on Virgin Atlantic's new aircraft will get to experience a totally new level of glamour and comfort."

Bannister adds, "As an airline that strives to wow our customers in everything we do, we have to constantly push boundaries. Our design ambition for the B787 Upper Class bar was no exception. Altitude's airline roots and technical expertise meant that its team understood where we were coming from at every twist and turn of the program, and were able to rapidly resolve issues. I would relish the opportunity to work with Altitude again. The commitment from the team to deliver this program has been phenomenal and the result is stunning:

a world-class bar that forms the centerpiece of Virgin Atlantic's 787 fleet."

The increasing focus on form and aesthetics within aircraft interiors is exciting news for airlines and, of course, ultimately for passengers. With the advent of new aircraft designs, new interior designs, more options and amazing technologies, the future of commercial air travel looks like bringing back the glamour and the charm from the travel of yesteryear, while delivering an overall experience that is infinitely more pleasurable.

"Altitude is currently working on a diverse range of projects," concludes Michael Pervan, the firm's general manager. "As a design-focused organization, Altitude is very encouraged to see an increasing level of innovation and dedication to excellence from our customers. The future of this industry looks bright indeed." ☒

04



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# beyonddesign

For the design team at ZEO, it's not all about style and finish.  
The critical design work is conducted in the build and test phases



Members of the ZEO design team are staring intently at a massive plywood and foam mock-up of a wide-body cabin as a parade of test subjects open, load and close the bins for the first time. It will be just one of many mock-ups, tests and refinements necessary before the product can advance to the next stage.

"A concept that hasn't been built and hasn't been tested is really just an idea. A great idea is a powerful thing to get you started, but the ultimate goal is a great product," says Ian Scoley, vice president of industrial design at ZEO, who judged the bin design to be squarely in the concept phase. Surveying the test objects, it becomes apparent that while the bin shapes are geometrically space optimized, they look too different between the center and outboard positions. It would require only a small compromise in space efficiency to create a more uniform look, a trade-off that could easily be tested using ZEO's rapid prototyping process. Using a combination of foam board, 3D printing and plywood, a revised bin shape would be available less than 48 hours later for a second evaluation.

"Our whole operational model is centered on two things – rapid iterations and open collaboration," explains ZEO's director of operations, Nathan Kwok. "It's way too easy for a

01. This integrated premium cabin concept blurs the lines between galleys, lavs and seats
02. Finding inspiration in a mock-up monument



project to fail because one critical party or another was ignored during the concept phase, or because we went too far in detailing a design without testing it first. Our aim is to get everyone in the room from day one and then design, build, test and repeat. The build and test part isn't a rubber stamp on a design; it's part of the learning experience and is what makes the product better."

The often ambitious goals, both in terms of time and product scope, also make the build and test process a

necessity. In what has become an annual event, every February ZEO hosts the full range of Zodiac Aerospace products at its Huntington Beach facility in California, inviting airlines to take a peek at future products in development.

"We don't think of the Airline Symposium as a product roll-out event," says Scott Savian, executive vice president of ZEO. "It is an invitation to be part of the process. The response we get to product concepts at the symposium will set the course for



66

A GREAT IDEA IS A POWERFUL THING TO GET YOU STARTED,  
BUT THE ULTIMATE GOAL IS A GREAT PRODUCT ”



This philosophy was on full display as ZEO displayed a highly integrated premium cabin concept that blurred the lines between galleys, lavatories and seats. While airlines appreciated the space savings that could be realized, the design also challenged many aspects of the cabin architecture, triggering a series of one-on-one collaborations as various airlines wanted to see how the concept would

"It is a great experience, getting to work with airlines from such an early stage and designing something for them that is a reflection of their individuality as well as a continuance of the concept that inspired them from the symposium," states Savian.

cautions Dick McClure, ZEO's vice president of mock-ups and prototypes. "The finish is what makes it look real, but right now every mock-up serves a purpose, whether it is ergonomics, durability or FAA compliance. We can make it look pretty at the end."

Step into the machine shop, and watch prototypes are being prepped for cycle testing, following which they will be sent to the qualification department within Zodiac Aerospace, where purpose-built robots will subject the moving parts to the equivalent of 10

**03.** The ZEO team working closely on a lavatory design



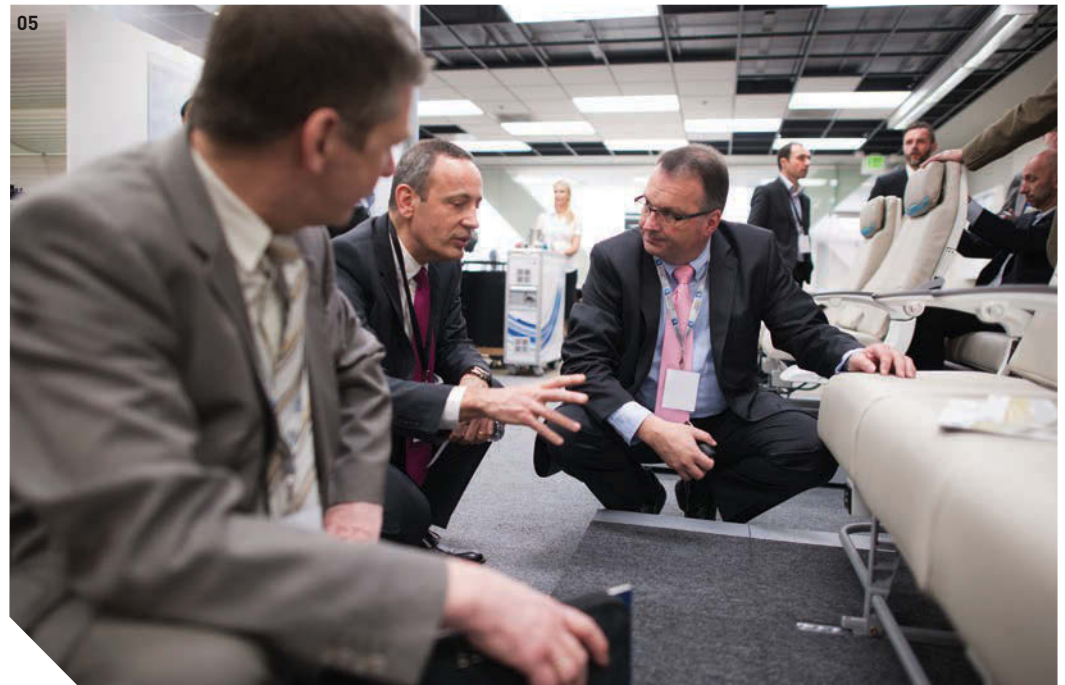
years of flight service in the span of a few months. Something as simple as a broken ashtray can actually ground an aircraft. It's a fact the designers on the ZEO team are keenly aware of, having it and many other pitfalls pounded into them at their weekly and daily meetings with engineers and manufacturing and certification experts.

Spanning the divide between the instinctive designers and the encyclopedic certification department is the Advanced Concepts Team, headed by Nick Lee. As one of the three pillars of ZEO (the others being industrial design and prototyping), the team handles the design of non-aesthetic components while ensuring that the visible parts stay realistic.

"While the industrial design team might look at how a part looks, functions and feels, we'll ask what it weighs and costs, and how we should manufacture it," says Lee. "It takes the right kind of engineer to be part of this team, because we want them to have expertise in their field but with an appreciation for the aesthetics. We all fly a lot. In the end, our products end up being a home

“

OUR PRODUCTS END UP BEING A HOME AWAY FROM HOME FOR US, AND YOU WANT THAT HOME TO FEEL NICE ”



- 04. Ian Scoley, VP of design, demonstrating a new galley idea
- 05. Evaluating economy seats
- 06. Testing a rapid prototyped seat concept

away from home for us, and you want that home to feel nice."

The constant exposure to designers and engineers certainly makes it easier to strike the right balance, but Lee cites the biggest advantage as having access to the large network of experts throughout the organization: "Last year's symposium got a lot of people excited, but it also put pressure on us to realize the potential everyone saw. This year we're focusing on validation."

As one walks back into the design office and approaches the supersized desks housing four to six people, each table is either engaged in intense debate as parts are passed around, or clustered around large monitors

examining a design before it goes to the shop. Teams with customers embedded in the design process remain segregated in the conference room. In every instance, conversations at times veer between inspired high-fives to a multidirectional tug-of-war and back again. With the next symposium looming – among numerous other deadlines – there is a sense of urgency laced with a requirement for endless improvement in every discussion. Eventually the debate concludes: the team has come to a compromise. "We think we have a way forward that considers everything," says a designer quietly. "Now it's time to build, test and see what the customer thinks." ☒



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# realitycheck

AIM Aviation explores the process of creating a concept and then delivering the reality



The continuous evolution of design and engineering is fundamental to delivering the differentiation demanded by today's leading airlines. While the creative thinking required for innovative design is limitless, safety, certification and practicality will often constrain the possibilities. This is the challenge of transforming a concept into a deliverable reality.

**THE ART OF THE POSSIBLE** AIM Aviation has long been at the forefront of what is possible in commercial aircraft interiors. The mission of designers is to be ever more creative and imaginative. The task of AIM's engineers is to find a way of making the shapes, structures and materials work within the tight confines of an aircraft cabin.

For the 2014 Aircraft Interiors Expo, AIM Aviation's designers had a free hand in creating concepts. The idea was to start with a blank canvas and see what might be possible. This would allow observers to consider the possibilities, without the constraints of the specific choices of any one airline, and to visualize how their airline's branding and personality could be applied to the space.

The objective was to showcase what is feasible in terms of design and engineering potential, innovative materials and product realization. The company hoped to inspire visitors with 'the art of the possible' and construct a visionary interior born of congruous design and engineering.

**FUNCTION AND FORM** The principle behind the integrated bar and galley concept is to provide the functionality required of a galley, styled to meet the design ambitions of airlines, closely integrated with a bar unit that can give the airlines differentiation, both in terms of interior design and service offering.



01

01. AIM Aviation's vision for a Door 2 galley and bar complex, as demonstrated at Aircraft Interiors Expo 2014

The unit brings together technical innovations, engineering advances, new manufacturing processes and the latest decorative finishes. Innovative display and storage solutions are presented, along with creative lighting schemes and pioneering materials.

The concept provides an open viewing experience into the cabin and the ability to create an encapsulated social experience for passengers, and ease of operation for the crew. It represents a new way of thinking in terms of blending the bar and galley areas, genuinely uniting form and function. The continuity of design,

materials and lighting creates a greater feeling of space, as sightlines are not restricted. For many airlines, product display can be important for revenue generation, and the structure's design features afford passengers the opportunity to interact with self-service areas and onboard product offerings.

Above all, it is a statement piece that can be branded and customized to suit the ambitions of the airline.

**FULLY ACHIEVABLE** At the expo, AIM Aviation hoped to inspire visitors and construct a visionary aircraft interior, introducing both new ideas and



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IT IS A STATEMENT PIECE THAT CAN BE  
BRANDED AND CUSTOMIZED TO SUIT ”



genuine options. While this was an exercise in the possibilities of design and manufacture, the interior created is entirely achievable. It is based on the Door 2 galley and bar complex of a Boeing wide-body aircraft, but would also work for Airbus long-range platforms.

Door 2 is essentially the lobby of the aircraft and creates the all-important first impression for passengers. The design intent is to create continuity, connection and a greater sense of space, with a galley structure that is closely aligned to the adjacent bar unit in terms of style.



**BAR** The bar area promotes an open and clear view into the cabin, framed by the two outboard pillars. This emphasis of space is AIM Aviation's reaction to a growing trend of visually opening up the cabin and allowing an appreciation of the new cabin linings, found in aircraft such as the B777, A380, B787 and A350.

The bar itself has a raisable bottle-rack housing called 'the bridge', which serves both aesthetic and practical purposes. This monument attracted particular attention at the show and was much admired. The bridge incorporates a presentation monitor, to show anything from the latest airline information, to advertisements or films. The bridge contains the bottles on the bar in a sealed unit for taxi, take-off and landing, which is increasingly becoming a requirement of many airlines. During flight, the bar can then be raised to unveil the bottle rack and allow an attendant to begin the inflight service within the social area. The key aspect is that passengers can still see through to the cabin, maintaining the relaxing feeling of space.

**DISPLAY** The complex is founded on four pillars, each with an attractive way to display or retain items.

Pillar one carries a library of relevant literature or current magazine titles, held in place by retention bars or drop-in recesses.

Pillar two is a touchscreen control panel and tablet dock. The idea is that a stylish customized touchscreen interface can be developed to drive ambient lighting or additional design features.

Pillar three is a water station, consisting of shelves of self-service water bottles. This can be customized to suit an airline's needs, and there is also a central shelf that holds three antibacterial hand gel containers, promoting inflight hygiene.

Pillar four is the duty-free display. The display cabinet elegantly displays various duty-free goods, driving increased revenue for airlines.

**GALLEY** AIM Aviation strongly believes that galleys can be functional, maintain design integrity, and feature the differentiated styling often required by airlines in premium cabin areas.

The concept galley has been designed with a smart, minimalist, retractable blind system to cover the more utilitarian galley equipment. This feature allows the crew to conceal the service areas from the passengers. The

**02.** British Airways has embraced 3D textures in its new brand panels



03



DESIGN FEATURES SUCH AS BRANDING PANELS ENABLE AIRLINES TO INCORPORATE THEIR BRAND VALUES



blinds retract neatly away into the upper section of the compartments when not in use.

Two stylish integrated handrails provide added safety for the crew. These rails also separate the equipment into three zones: the two sets of outboard ovens and meal boxes, and the central sink area, where there is a tap and a facility to discharge excess liquid from the coffee makers and water boilers.

The trolley stowage is designed for five full-size trolley carts and the aperture can cater for all types of cart. Door latches are Boeing-approved, dual slam latches. The laminate on the door is a bespoke textured metallic film. Bump-strips can be fully removable plastic or metallic, to aid maintenance in high-traffic areas.

The work-deck is made of lightweight aluminum, with AIM Aviation's unique robust surface finish and an integrated edge-lip. The bottle rack has a decorative 3D textured pattern incorporated into the presentation face.

**BRANDING PANELS** Many of the world's leading airlines are increasingly turning to branding panels to differentiate their cabins. New aircraft platforms often have interiors that are based on a catalog approach, with limited opportunity for customization. Design features such as branding panels enable airlines to easily incorporate their brand values into a cabin. AIM Aviation has recently created a number of different stylized panels for various airlines, and some of these panels can already be seen in service today.

Three-dimensional textures on the panels can either be molded to produce



04

03. The galley and bar concept creates a clean, minimalist look

04. BA's new B787 Club World has clear branding, which can be seen from right across the cabin

smooth-running patterns, or machined for better definition on more angular designs. Magazine racks, flower display options and logos, to name a few features, can be incorporated into the panel structures to further enhance the visual appeal of a cabin.

**DELIVERING THE REALITY** The automotive industry has a well-established process of introducing concept cars to awaken the mind to new possibilities and to challenge the norm in vehicle design and manufacturing. To AIM Aviation, it was a natural move to use this practice to generate the next stage of evolution in aircraft interiors.

AIM Aviation's design and engineering team was well qualified to turn conceptual ideas into a fully realized concept of a bar and galley for display at Aircraft Interiors Expo. The result was a convincing demonstration of 'the art of the possible'. Strong interest from airline customers has already translated into a leading airline selecting AIM for the supply of a number of similar bar units on its new wide-body fleet.

The new interior will directly reflect design aspects from the concept bar, clearly demonstrating that such concepts can become operational realities in today's commercial aircraft interiors. ☒

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# skindeep

TTF Aerospace is again looking to revolutionize bin extensions and protective surface coatings



As airlines cut their free checked luggage allowances and increase checked bag fees, passengers are carrying ever-larger bags onto aircraft. And the response you hear all the time is, 'I'm sorry, the bins are full. We will have to check your bag.' Not many people enjoy being called upon for that privilege, but nevertheless, all these elevated passenger expectations regarding carry-ons, whether reasonable or not, are becoming the norm these days.

So, in this era of ever-increasing numbers and sizes of bags, all airlines seem to be searching for ways to rid themselves of passenger carry-on complaints and reduce the frequency of departure delays by increasing carry-on capacity. The new-generation TTF bin extension addresses these concerns with an economical, effective solution for narrow-body aircraft.

TTF Aerospace has always felt it could design and build a better, lighter and easier to install bin extension kit. And after entertaining a variety of concepts, the company thinks it has a winner. First off, TTF considered passengers' desire for larger carry-on bags, namely the 25in-long roller bag. Thus, the company's bin extensions are engineered to easily accommodate today's 24in and 25in roller bags. And it is truly usable space, as passengers can just slide their bags in and close the door.

The bin modification itself is quite simple to accomplish. The TTF bin extension kit has utilized newer, lighter weight materials and improved the latch reliability, while minimizing part count and complexity. For the mechanics tasked with installing the kit, TTF's engineers believe they have made this the easiest to install bin extension kit. There are no potted fasteners, and no trim to glue – no painting, no potting compound, no adhesives – it's as simple as it gets. What you end up with is a seamless,

01



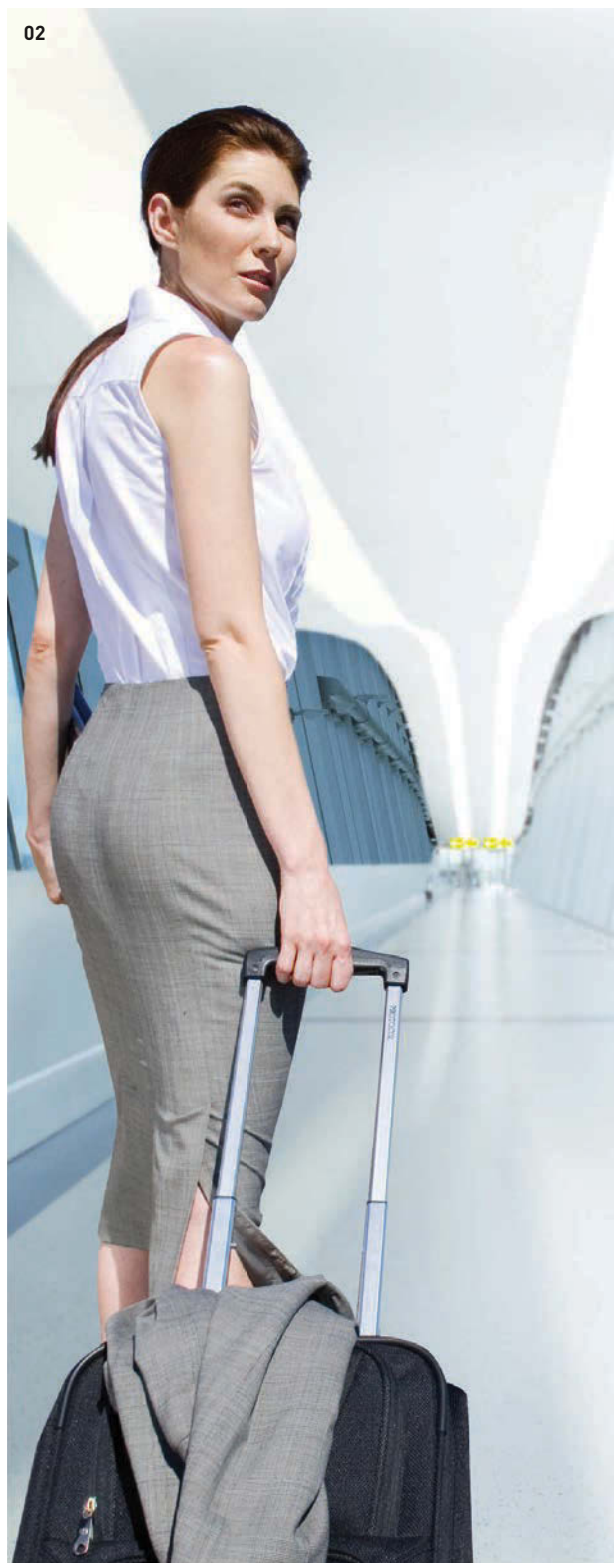
01. Trials of a mockup bin extension kit found that it could realize up to 40% more baggage space than some bin designs

02. Today's travelers are increasingly taking larger carry-on items on flights





02



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TTF AEROSPACE  
HAS ALWAYS FELT IT  
COULD DESIGN AND  
BUILD A BETTER,  
LIGHTER AND EASIER  
TO INSTALL BIN ”

aesthetically pleasing, six-hour installation for a typical Boeing 737-800, that immediately pays dividends, with 40% increased bag capacity, greater customer satisfaction and far fewer push-back delays caused by baggage issues, particularly where disagreements about roller bag sizes are concerned.

One major airline, having just installed the new bin extensions, comments, “We are very pleased with the bin extensions. We have been tracking the aircraft fitted with the TTF Aerospace bin extensions and we have not taken a single delay for late bags yet. This has a huge impact, not only to our operations, but more importantly it gives our customers a flexibility that makes them feel comfortable about their flying experience.”

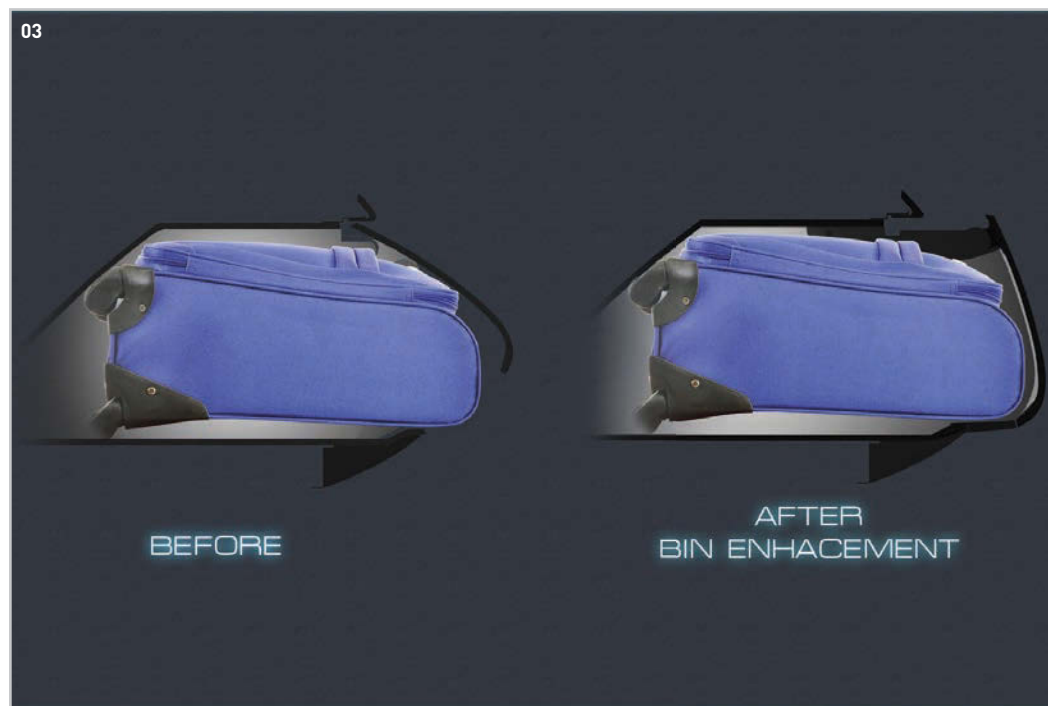
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WITH A SELF-ADHESIVE BACKING DESIGNED TO LEAVE  
NO RESIDUE, THE PRODUCT IS FULLY RECYCLABLE ”

Jerry Lalone, TTF's VP of sales and marketing adds, "We have received very good feedback about the new bin extension product from our customers, and airlines are already seeing faster gate turnarounds."

TTF has even addressed the issue of bin interior durability and appearance with its new, patent-pending T-Skin product. Originally introduced as a cleaner, greener and more durable alternative to painting inside stowage bins, this easy-to-install decorative surface is taking on new challenges. Following customer requests, TTF is introducing the next generation of T-Skin, which is available for use in the open portion of the passenger cabin as well as enclosed areas.

This new generation of T-Skin provides more opportunities for flexible, easily refreshed logo distribution and advertising throughout the passenger cabin at minimal cost. T-Skin's simple peel-and-stick application, its easy replacement, flexible printing capabilities and green recyclability offer a great opportunity for airlines to imaginatively expand their branding, product placement and interior decorating opportunities.



03. Revisions to the overhead bins allow passenger luggage to fit better in the space available
04. TTF's solution accommodates both 24in and 25in roller bags

While T-Skin can replace original paint without the need for repainting, it also dramatically reduces punctures and scuff marks. And, with a self-adhesive backing designed to leave no residue, the product is fully recyclable and easily replaced without requiring any additional surface preparation. Peel it off and you will never know it was there. Throw it in the recycle bin and add no waste to the ecosystem. Then re-color or refresh with new T-Skin or leave the surface alone. What could be easier, more cost effective and more environmentally friendly than that?

As TTF Aerospace follows its vision of 'breathing life into aircraft interiors',

the company continues to keep a tight grip on to its core values of integrity, quality, relationships and commitment to success. TTF believes there is no better way to do business, and its staff are determined to make sure that is always the case.

Whether it's a straightforward solution or a complex one, TTF's goal is to listen to its customers and do its best to make their vision a reality. After all, that is why the company exists.

TTF Aerospace designs and manufactures aircraft interior products, including galleys, lavatories, crew rests, overhead bins, and various closets, stowages, doghouses and more. ☒

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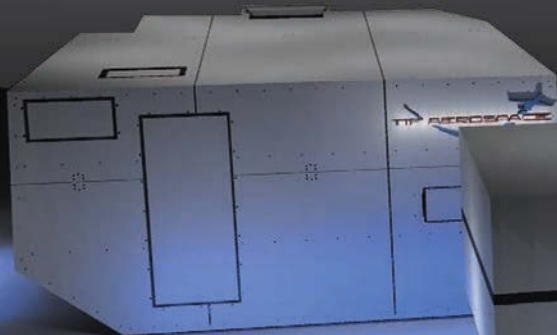
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# hotelcomfort

Recaro has developed a new seat that offers hotel-style comfort to business passengers, and weight and maintenance benefits to airlines



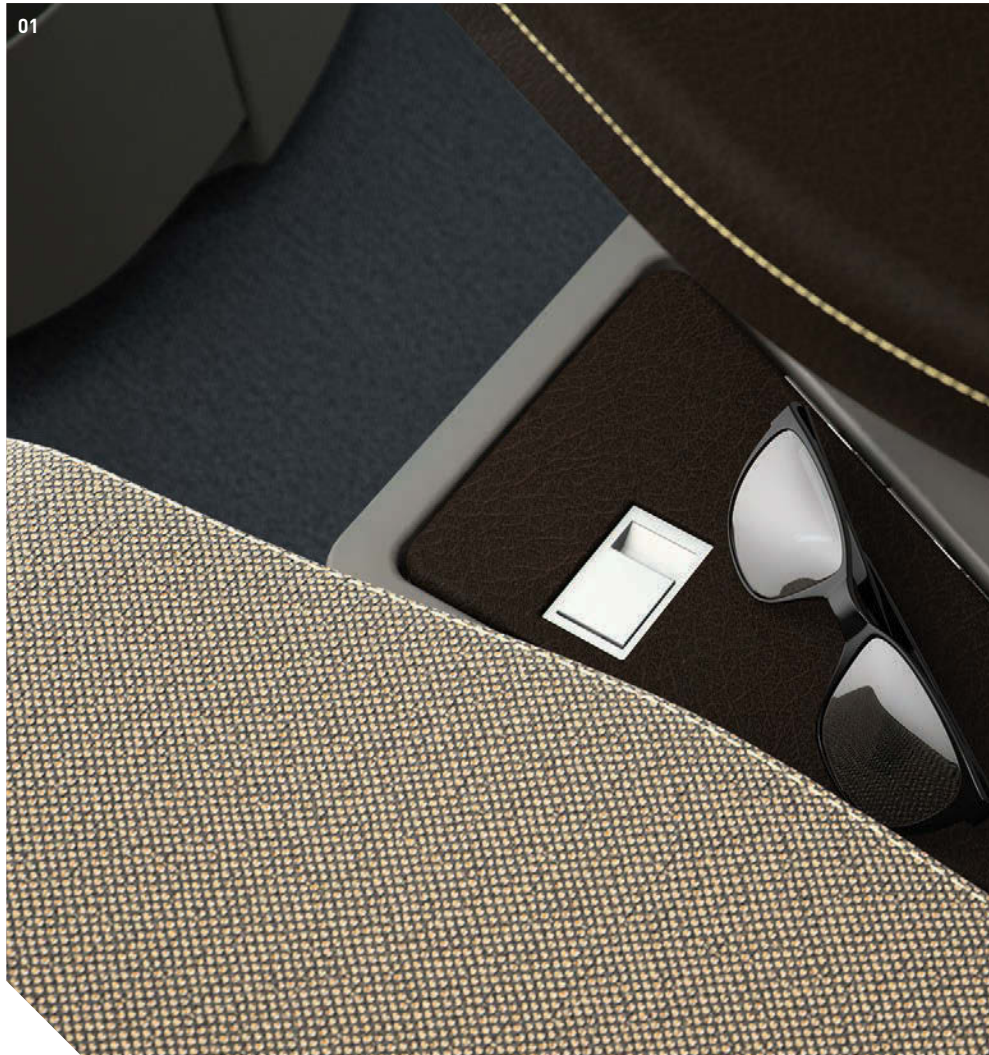
Recaro Aircraft Seating presented its new CL6710 business class seat at Aircraft Interiors Expo 2014 in Hamburg. The seat invites passengers to relax and enjoy a comfortable journey above the clouds.

“The new product generation for the business class segment is 100% Recaro,” says Dr Mark Hiller, CEO of Recaro Aircraft Seating. “The CL6710 embodies our strengths – the combination of comfort, ingenious design, quality and lightweight design – and meets future market requirements. It has the optimal balance of a premium product that pays off for customers.”

In 2013 a mock-up of an unusual business class seating concept shown at the Recaro Aircraft Seating stand in Hamburg evoked a wide range of responses. The concept inspired intense discussions about the possibilities of business class. “It was exactly what we hoped to achieve: engaging with our customers in talks about the future of business class,” says Hiller.

In the meantime, the Recaro team continued to work on new products. They focused on a holistic approach, bringing in intensive market research, analysis of current demands, and

01. The CL6710 offers space to keep personal belongings very close to the passenger. Wallets, cell phones, jewelry, or other precious belongings can be kept safe in this private stowage area
02. The seat has a fully flat bed length of 78-82in, and direct aisle access



feedback from Aircraft Interiors Expo. “With our growth strategy in mind, business class is a very important market segment for us,” says Hiller. “Our team looked at the entire cabin and designed a perfectly coordinated seating environment.”

The new CL6710 from Recaro Aircraft Seating is a fully flat bed seat. It combines high comfort with the possibility of a high-density cabin layout. It has excellent living space, direct aisle access, and a variety of stowage opportunities. It has timeless design, innovative functionalities and

is extremely reliable. And it features low weight without compromising passenger comfort. The Recaro CL6710 is unique in that it sets new standards by combining all these factors in one seat.

**PERFECT RATIO** Efficiency can be measured in figures. For the Recaro team, the ratio 1 to 1.8 (pitch to bed length) is a key number, reflecting the efficiency of what is important in business class: bed length. The centerpiece is the scalable arrangement of the seats in the cabin. With a





THE CL6710 IS A FULLY FLAT BED SEAT THAT COMBINES  
HIGH COMFORT WITH HIGH-DENSITY CABIN LAYOUT



resulting bed length of 78in up to 82in, a fully flat bed, and direct aisle access for every passenger, the CL6710 is an extraordinary combination of outstanding features with an attractive business case for airlines.

Business class means premium comfort. For Recaro Aircraft Seating, it means visual and tangible comfort at the highest level. In the CL6710, passengers travel in their own compartment-like area, which offers excellent living space and a high degree of privacy. In terms of length and width, as well as in its positions, the



seat itself provides premium comfort. The relaxed position is remarkable – the seat pan articulates in an ideal, pre-defined angle with seat motion to support the passenger's body.

A large one-piece table is offered for each passenger for working and dining. In developing the seat, Recaro engineers focused on an easy and intuitive adjustment of the dining table as well as the monitor, which need only be pulled out to deploy and pushed back to stow. The passenger can even exit the seat while the dining table is in use. In addition, a large side table is offered to each passenger to accommodate books or laptops, for example. It is also a secure and easy-to-reach place for snacks and drinks.

The six-way headrest provides optimized neck support, especially in the deployed position – even while wearing headphones. The individually adjustable leg rest also contributes to comfort and a pleasant sitting or relaxing position. The cushions are

designed for optimal body support on long-haul flights. The very long fully flat bed, particularly wide in the shoulder and waist area and with a generous footwell, invites the passenger to stretch out and relax, while the seat shell protects them from disturbances in the aisle.

#### VISUAL COMFORT AND PREMIUM QUALITY

A seamless experience, from check in, to the modern ambience of an airport business class lounge, to a hotel room in the sky – these are the best conditions for a relaxed travel experience. For the design of its new-generation product, Recaro was inspired by contemporary interior design in hotels, clubs and lounges, with a modern mix of materials, colors and light. Exclusive materials such as leather and fabric seat covers, clear lines and contours emphasize the visual comfort and premium quality of the new Recaro business class. It is characterized by timeless design that

03. The seat shell protects occupants from the aisle, in both seat and bed mode



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THE SEAT FEATURES ELEMENTS OF FURNITURE DESIGN TO UNDERLINE THE FEELING OF A HOTEL ROOM ”

”

cleverly incorporates its functionalities to keep the surfaces flush and clean – for example the coat hook and latches are seamlessly integrated.

Although it is a sophisticated piece of technology, the seat features elements of furniture design to underline the feeling of a hotel room in the sky. Unobtrusive mood lights enhance the passenger's flight experience – not only at night – and they also illuminate stowage areas and the ottoman area. The integrated flush reading light provides a light cone ideal for eating, working and reading in all seating positions.

The design provides numerous storage areas and compartments for travelers' personal belongings on a business class flight. The multipurpose top stowage has space for various items including water bottles, laptops, tablets and headphones, as well as magazines and safety cards. In the lower part of the seat each passenger can securely stow shoes, with the open design providing enough space for most types. Passengers can keep personal belongings such as wallets, cell phones and jewelry in a very convenient and private space nearby.

Efficiency means more than just seat pitches and high-density cabin layouts. It can also be measured in kilograms – more specifically, saved kilograms per seat. The business class seat design is based on innovative lightweight materials. The reduced complexity of the overall seat design also saves weight, and this all adds up to give the seat a competitive advantage.

With the new business class, Recaro is placing great emphasis on quality.



04. The one-piece table has been designed for intuitive adjustment, and the seat can be exited with the table deployed
05. In the relaxed position, the seat pan articulates into a pre-defined angle to support the body

The overall seat is less complex and has fewer moving parts than previous designs. To aid maintenance, the seat provides easy access to parts such as bumpers and side panels, which can be replaced without requiring special tools. Also, no tools are needed for components such as the three seat actuators, as they feature a quick-release mechanism.

Last but not least, the Recaro business seat can offer a consistent

experience throughout an airline's entire fleet. The seat can be adapted for all major wide-body aircraft types. An excellent living space, generous stowage options and direct access to the seat are provided for each passenger. And regardless of their location in the cabin, all passengers can share the same experience in their seats. This includes the bed length and width, the monitor size, and the meal table and side tables. ☒

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# hiddendepths

In product development, what you can't see can make all the difference.  
Enter the world of thermoplastic sheets for aircraft interiors

## 01. Kydex FST2 thermoformed



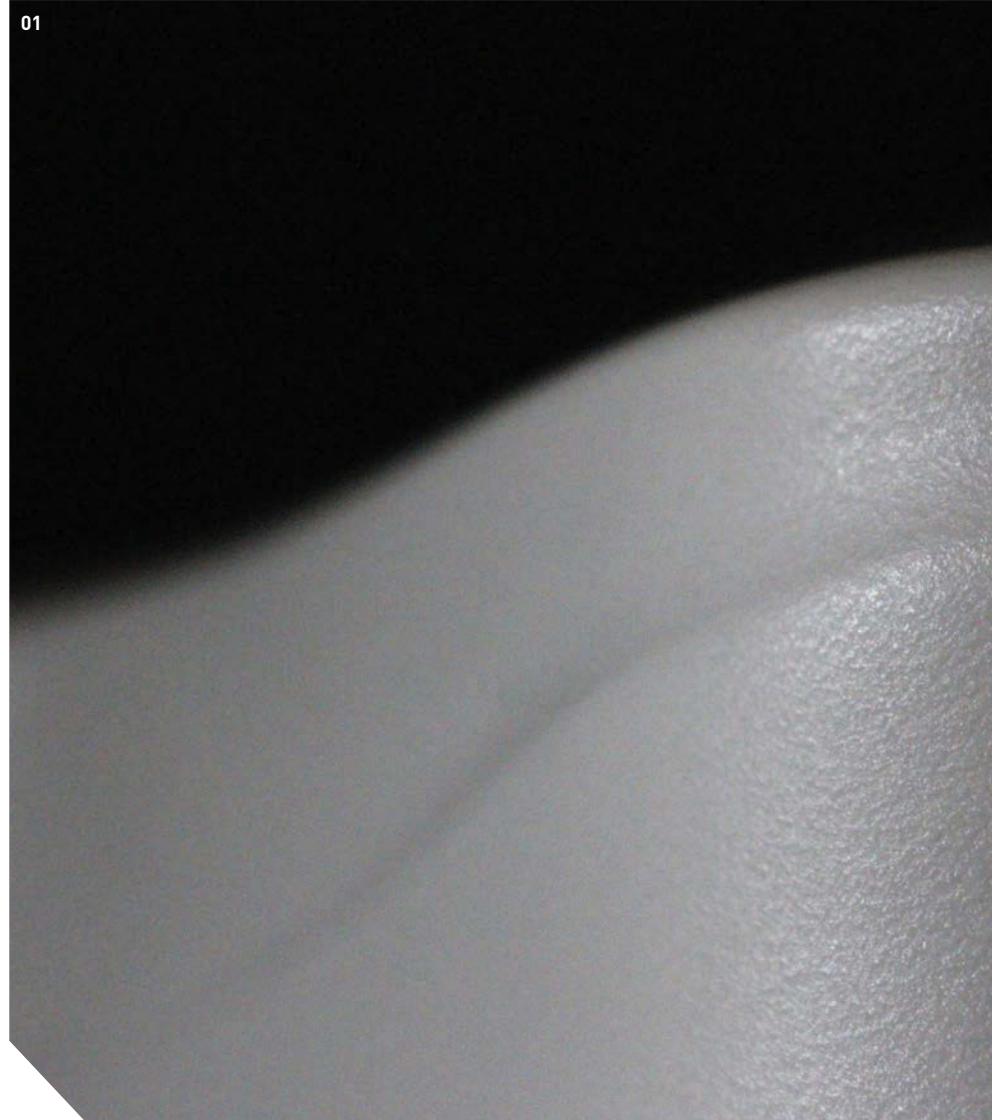
Manufacturers are in the business of collaborating with like-minded customers and fellow manufacturers to invent new products. As a material supplier to the aircraft interior industry, Sekisui SPI (formerly Kydex LLC) chooses to imagine what is possible and what may be required years from now in material performance and aesthetics. At the same time, a solid footing in the past and present is important; the company needs to continuously build on what has been accomplished and established with science and technology while responding quickly to the needs and requests of customers.

In the ongoing sourcing and development of progressive materials for new finishes and effects, the challenge is to create new materials that are compliant with aviation regulations and anticipate increasingly stringent requirements. Great products must meet a complex mix of regulations and have a fine degree of finish and color, while retaining excellent mechanical properties. Whether a product is the next generation of an existing product or a brand-new technology, traversing the gap between final validation and entry to market requires access to special technologies and expansive R&D capabilities that are focused on a growing product portfolio for niche and boutique applications.

This might sound like a constant conflict, but in fact it is the nature of innovative product development, and the company embraces it. It is a recurring and welcome challenge to source the right mix of all components in specialty thermoplastic sheet, including polymers, additives, modifiers and colorants, to find the right balance between physical characteristics, performance, compliance and appearance.

**DELIVERING MORE THAN YOU SEE**  
Admittedly people may take for

01



granted the immense amount of work, time and diligence it takes to manufacture a product we use often, especially one we use every day. That is perfectly fine; arguably, it may be an indicator of good design.

There is a much bigger picture and story behind an aircraft seat or even something as ostensibly simple as a toothbrush. After all, often what you can't see in a product can make all the difference. Customarily, we have a tendency to think of design as what we

can see or feel: characteristics like texture, decoration and pattern, color and finish.

Product developers usually see much broader and deeper than the visual. Their perspective is a window into all factors that influence product and development. Their outlook is rooted in formulations and research to enable a product's performance and ability to meet regulation requirements, while offering a continuously evolving suite of visual possibilities.



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OFTEN WHAT YOU CAN'T SEE IN A PRODUCT  
CAN MAKE ALL THE DIFFERENCE ”



in the industry, which benefits the most important clients – the passengers and crews.

One example of a new product that meets these higher safety standards is Kydex FST2, an advanced polymer, PVC-free material with a formulation that was in development for more than two years by the Sekisui SPI designLab. It is a fully compliant aviation interiors material that meets a complex mix of regulations including FAR 25.853 paragraphs (a) vertical burn and (d) smoke development and heat release, in addition to toxicity requirements outlined by Boeing and Airbus (BSS7239 and ABD0031, respectively). Applications include passenger-facing seat components, bulkhead laminates, galleys and other cabin interior parts.

Lydia Swan, vice president of sales and marketing at Sekisui SPI, explains how this product brings the industry benefits above and beyond regulatory and safety compliance. “With Kydex FST2, our aviation customers have a fully compliant material for their

thermoformed applications that also performs well in fabrication and has a sophisticated finish. Traditionally products that meet this mix of regulations have a gloss level that is quite high. This product features a beautiful flat, matte finish and its gloss level can be increased as desired. Furthermore the complete Kydex thermoplastics product line provides a one-stop shop for designers and project teams.

Having one source eliminates the worry of inconsistent color, texture and gloss that frequently result when parts are supplied from different sources. Designers can layer their designs with low minimums and custom color using the whole line.” Kydex FST2 is exclusive to Sekisui SPI, keeping it independent of existing resin supplier technology.

**LESS CAN BE MORE** Lightweight requirements and materials are also a focus as airlines continue to reduce fuel costs. The second next-generation

02. Kydex T-LW  
thermoformed

#### CONSTANT EVOLUTION INCLUDES RESPONSIBILITY

Raising safety standards for the industry is another responsibility of material suppliers that goes hand-in-hand with the constantly evolving process of product development. The aircraft industry is always striving to improve safety and is increasingly requiring suppliers to meet more demanding smoke, heat release and toxic gas requirements. Fortunately all indicators show that safety standards will continue to be elevated



WE ARE SETTING A NEW STANDARD OF EXCELLENCE FOR  
THE PLASTICS INDUSTRY TO THINK, DESIGN AND CREATE ”

product released by the Sekisui SPI designLab is Kydex T-LW. Although the product looks and maintains flammability compliance like the first-generation Kydex T, it is 10% lighter – a major saving considering all the parts in which it can be used, including tray tables, trim, armrests and accent pieces.

The weight reduction in Kydex T-LW comes from using a proprietary additive, Advancell Em, a Sekisui Chemical Company technology used in multiple industries and applications. While many weight-reducing additives can be negatively affected during production by atmospheric conditions and altitude, Advancell Em uses chemistry that is climate independent, which keeps the product performance consistent between production runs, providing security and consistency of material performance in a finished component.

#### ADVANCES FOR PRODUCT AND COMPANY

What we can't see can make all the difference in products and the companies that make them. Kydex LLC had always been owned and backed by Sekisui Chemical Company. This September, Kydex changed its name to Sekisui SPI. With the formation of Sekisui SPI, which includes Sekisui Allen in Holland, Michigan, the company's legacy of collaborative innovation is even stronger than ever.

Ronn Cort, COO and president of Sekisui SPI, explains, "By bringing Sekisui Kydex and Sekisui Allen together, we are setting a new standard of excellence for the plastics industry to think, design and create. The combined research and development

03



03. Kydex thermoplastic samples wait for testing in the FSTLab at Sekisui SPI

capabilities and products of the many Sekisui companies will continue to result in better solutions for our customers."

Fittingly, the release of Kydex T-LW coincides with the formation of the new company. A large part of the development of the product was possible because of collaboration with the research and development center at Sekisui Chemical in Kyoto, Japan, the team responsible for creating Advancell Em.

**FUTURE ADVANCES** As *Aircraft Interiors International* wrote in its Showcase 2014 issue, air travel is becoming increasingly popular as more of the world's population moves into the middle class. Indeed, air travel is projected to grow by 4.7% for the next 20 years. This increase in passenger numbers will continue to elevate safety regulations and increase demand more for higher aesthetic standards. Most certainly, what we can't see will continue to make all the difference. ☒

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# leanmachine

Business class recliners are still alive and kicking.  
Introducing the next-generation Aviointeriors Canova system



At Aircraft Interiors Expo 2014, held in Hamburg, Germany, Aviointeriors presented Canova, a new business class seat range that is reinventing the classic recliner.

Many alternative business class cabin configuration types have appeared in the last decade, with the rise of new arrangements such as the 'herringbone', the 'staggered' or fancy 'vis-à-vis' solutions. Perceived by business travelers as a blessing, these seats enable the passenger to sleep in a genuinely flat bed, in their own personal space, in full privacy, and usually with direct aisle access. These new cabin configurations are not only limited to the twin-aisle wide-bodies, but recently have also appeared in single-aisle narrow-bodies. This choice often seems driven by the intention to create a 'wow' factor (especially in the media), more than creating a real advantage in the use of cabin space.

Despite this 'layout revolution', which is bringing in new types of seating, the traditional forward-facing business class recliner is still a strong seller, with a growth index linked to the increasing number of airframes that are being introduced in the market.

The strong sales continue because the recliner seat is still the best solution

- 01. Aviointeriors believes that reclining seats are still the best product for medium-haul business class
- 02. The Canova Comfort model has a deployable footrest and a leg rest

01



02





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THE USE OF ALLOYS ALLOWED THE DESIGN OF  
A SLIMMER, LIGHTER AND TOUGHER STRUCTURE

”



for medium-haul business class on both narrow- and wide-body aircraft, where cabin density is needed; as well as for long-haul routes in emerging markets where there is weaker demand for premium products. The VVIP sector is also requesting these kinds of seats for the rear section of BBJ, ACJ or wide-body conversion cabins, where the workers traveling with the VVIP sit.

While still being a classic seat style, the business class recliner is now taking advantage of all the technological improvements that have been applied on recent evolutions of economy class seats and flat-bed business seats. Composite parts, special modern alloys and digital technology are changing the face of what, for 40 years now, seems to have changed little.

This means that, compared with the average business recliner seat, a higher level of seating comfort can be reached with the new generation of recliners,

with more space for passengers, even at the tightest seat pitches, and with a lower structural weight.

With Aviointeriors' new Canova seat, the use of alloys allowed the design of a slimmer, lighter and tougher structure, compared with previous recliner products.

This basic structure is conceived as the support for a modular system, intended to allow many variants ranging from a base seat suitable for premium economy class, to a top-level business class seat with footrest, leg rest, articulated seat pan and a high degree of recline, all electrically actuated by a digitally controlled motion system.

The Canova seat's ergonomics have been designed to accommodate all passenger sizes: not just the 95<sup>th</sup> percentile male western standard, but also a 5<sup>th</sup> percentile Asian woman. Thus the seat has a curved backrest with which almost anybody can be

**03.** A seatback tablet device holder can help enable a cost-effective IFE strategy



MODULARITY HAS ALSO BEEN APPLIED IN THE AESTHETICS, WITH ELEMENTS THAT CAN BE REMOVED



comfortable. Inside the backrest, a special elasticated fabric works in conjunction with the foam and padding, which has made it possible to reduce the backrest thickness while providing superior comfort, freeing up precious living space for the passenger.

The seat has now evolved from the prototypes that appeared in Hamburg at the beginning of April, with a dynamic, clean style chosen for the rigid parts. Modularity has also been applied in the aesthetics, with elements that can be exchanged or removed depending on the performance requirements, to simplify both production and spares management. The upholstery is used not only to cover the soft and padded parts, but also to finish some structural and rigid parts.

The seat provides a single-leaf tray table, stowed below the central armrest, and a recline angle that is customizable to fit the operator's needs. As an option for people with reduced mobility, a special lift-up armrest is available, with a hidden release system. As standard, the literature pocket can be opened wide so it can accommodate large objects.

To meet growing requests from customers, a tablet device holder has been designed and integrated into the seat. This structure is able to swing to adjust the ideal viewing angle, and can accommodate all devices, from the largest devices to smartphones.

The Canova Seat is available in two versions, the elements of which can be mixed to create many variants.

The first version is called 'Canova Smart', and is intended to be a no-frills



- 04. The central armrest can contain a single-leaf tray table, cupholders and power sockets
- 05. As standard, the literature pocket can be opened wide to accommodate large objects

(only comfort) business seat for pitch installation from 36in.

The 'Canova Comfort' model adds a deployable footrest and a leg rest, with continuous upholstery connecting the seat cushion to create a single surface without gaps.

In this version, a special swinging seat pan moves to maintain an ideal body angle between the legs and the trunk of the body; this happens with very limited lift of the front part of the seat cushion in order to avoid shorter people having their feet raised from the

floor when the seatback is reclined. The actuation system can be mechanical or electric, with separate controls for all movements.

According to customer needs, many other features can be integrated into the seats, including PCUs, hooks, vanes and holders. Any detail of the Canova range can also be customized.

The Canova seat system is the ultimate answer for a classic question: how to make the best business class seat for the 36-56in pitch range in a conventional layout. ☑

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# evolution **or** revolution?

A new LED aircraft cabin lighting system is capable of outsmarting current LED technology

01. The HelioJet LED lighting system is a major part of the new SAS long-haul experience



Light was among the first things mentioned in the Biblical story of creation, but its evolution is not yet complete. Since the beginning of time, humans have been searching for ways to provide light and extend the day. Candles replaced open fire, incandescent light bulbs replaced candles, and light bulbs are now being replaced by other systems. LEDs became a mainstream technology at the beginning of this millennium, and now are becoming a favored technology for aircraft cabin lighting, replacing older fluorescent tubes. While some people claim that OLEDs (organic LEDs) will be the next big breakthrough in lighting, others strongly believe that will depend on the adoption of smart LED technology and that conventional LEDs will continue to be more reliable in harsh airborne environments.

SAS will soon be the first airline to feature the new HelioJet SpectrumCC LED lighting systems, as it is equipping seven Airbus A330s and A340s with the systems as part of a comprehensive cabin modification program. “We are excited to be presenting our new long-haul cabin for SAS customers in the beginning of 2015, and to be the launch customer for the HelioJet LED lighting system. We always have the frequent traveler in mind, and the innovative HelioJet LED lighting system will be an important feature of our new long-haul experience,” said Snorre Andresen, vice president of product management at SAS.

The requirements for state-of-the-art lighting solutions have increased substantially. A study conducted on behalf of Schott Aviation reveals that 89% of the surveyed representatives from airlines, completion centers, lighting manufacturers and design offices stated that lighting is “very important” or “important” for aircraft cabin design. Several airlines stated that they would like to invest in LED



cabin lighting but still think that there is no suitable LED system currently available for aviation. They also believe that cabin lighting increasingly addresses aesthetic and emotional aspects – how passengers perceive the cabin. How well does light set the stage in the cabin? And how well can it be used to adapt to circumstances and individual preferences?

The answers to these questions are heavily dependent on the ability to master the performance phenomena of LEDs. In fact, there are issues that come forth with a closer look at LEDs. First, all LEDs show different

characteristics as soon as they leave the production line – even as they are sorted into bins they show differences in brightness up to  $\pm 10\%$ . Second, colors vary depending on the amount of power used to produce light, and the effects are quite substantial (see Figure 4). Third, and most importantly, LEDs age differently. Some change their intensity and color temperature earlier than others. This unavoidable transformation, known as lumen depreciation, causes visible effects that typically have a dramatic influence on the perceived quality of the environment. After approximately



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THE HUMAN EYE CAN DISTINGUISH  
ONE MILLION COLOR IMPRESSIONS

”



02. The HelioJet SpectrumCC features sensor color control

1,000 operating hours, LEDs start to visibly age. In this transformation process they lose intensity and their color drifts away from the original. This effect is most distinctive in the red spectrum, where the light can be pushed into the invisible infrared zone. The visible outcome is a greenish color as blue starts to dominate.

“Of course that offsets all efforts spent in implementing a nicely balanced cabin interior atmosphere,” says Jan Schmidt, sales executive at Lufthansa Technik. “It is like illuminating a masterpiece with a torch.” Thanks to German engineering,

there is a way now to avoid frustration caused by changing LEDs. The magic product is HelioJet SpectrumCC with sensor color control.

**TRUE COLOR SENSOR** The human eye is very sensitive to color differences and can distinguish one million color impressions. Even though nobody can explicitly calibrate color tones, everyone has a natural sense for what is ‘low-end’ and what is ‘high-quality’ lighting. Brightness, homogeneity and color fidelity define the quality of light. But how can we spot a certain color at all? You may have heard someone say

“Marine blue is so yesterday” or “This papaya whip goes well with the carpet.” Since there are only three basic colors (red, green and blue) but almost endless shades, designers turn into poets when giving colors names.

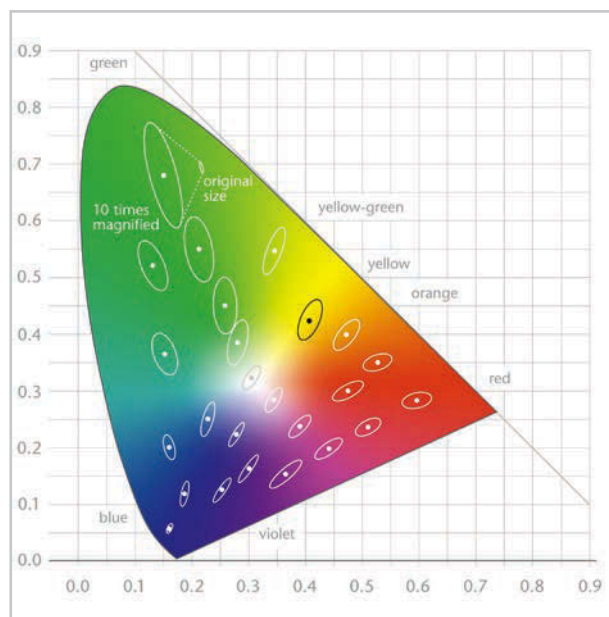
For scientists, however, life is easier. They refer to a standard color system that enables a color to be precisely defined by arithmetical coordinates. The human eye recognizes certain chromaticity coordinates (see Figure 4) as identical. These areas have the form of an ellipse, called a MacAdam ellipse after the researcher who originated the hypothesis. On a scale from 0 to 1, the



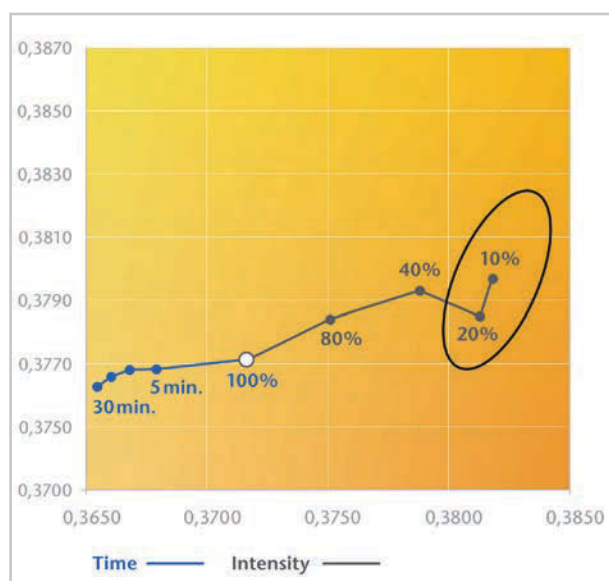
diameter of an ellipse is in the order of 0.001. This demonstrates how precisely one has to manage light in order not to show visible color shifts. The challenge becomes even greater when one realizes that the difference between running a light source at 10% and 100% intensity is a color shift of approximately 0.1 on the CIE (International Commission on Illumination) scale. State-of-the-art light management relies on so-called true color sensors.

“They not only translate a light impression into the basic colors, but they can also detect shifts in wavelength,” explains Dr Bernd Wölfling, head of light source development at Schott Aviation. “This enables management of changes in light intensity and in the physical phenomenon by which different color LEDs lose color intensity differently when they are heated. For example, blue LEDs lose 5% brightness when heated from 20°C to 80°C, whereas red LEDs lose 40%.

“To secure light homogeneity and color stability, it is insufficient to control only a subset of LEDs. HelioJet technology is unique because all LEDs are measured and controlled. We feed in light from both sides into an optical light converter – a rod that consists of grade A glass – using fiber optic characteristics that enable unimpeded light distribution within the length of the element. In this way, we operate with up to 80% fewer LEDs than



04



05

05. The color shades of LEDs change greatly depending on the light source intensity and the period of operation. The black ellipse equals the black ellipse in picture 4 (above)

conventional lighting strips, where LEDs are placed quite close to each other in a row. Sometimes less is more because we generate better light output with fewer LEDs.

“We have eliminated the effect of ‘LED spots’, which cause inhomogeneous light. We also have a higher mean time between failures and our ecologically friendly solution has low maintenance costs. Finally, and above all, we can manage 100% of all

“WE HAVE ELIMINATED THE EFFECT OF ‘LED SPOTS’, WHICH CAUSE INHOMOGENOUS LIGHT”

LEDs involved with our color control sensor technology to secure homogeneous light output over the entire operating period. That is LED lighting 2.0,” adds Wölfling.

Of course this is not the end of the evolution in lighting. But certainly, from today’s perspective, we are looking at a technological benchmark that enables visibility like no other lighting system ever did. Is it evolution or revolution? Time will tell. ☒

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3000 BC | Candle light



1802 | Incandescent light bulb



1938 | Fluorescent tube



1980 | Compact fluorescent lamp



2009 | LED stripe



2012 | HelioJet White



2014 | HelioJet Spectrum<sup>CC</sup>

## Keep up with the Evolution of Lighting

Is there anything more basic than light? People have been working on how to most effectively leverage light for thousands of years. And we have certainly come a long way since the invention of the candle. More recently, aircraft lighting transitioned to simple LED technology. Today, we are offering a more advanced LED lighting system.

HelioJet Spectrum<sup>CC</sup> (Color Control) provides homogeneous LED light and precise color stability that will perform reliably over time. Unlike existing LED stripes, with HelioJet each individual LED is monitored and controlled by a patented sensor system. It prevents color shifts, an inherent weakness of LEDs, that leads to color changes as the LED ages. Don't accept compromises when it comes to ensuring maximum comfort on board. HelioJet Spectrum<sup>CC</sup> – the cutting edge in aircraft cabin lighting!

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# materialworld

From vertical surfaces to seating, Tapis has it covered

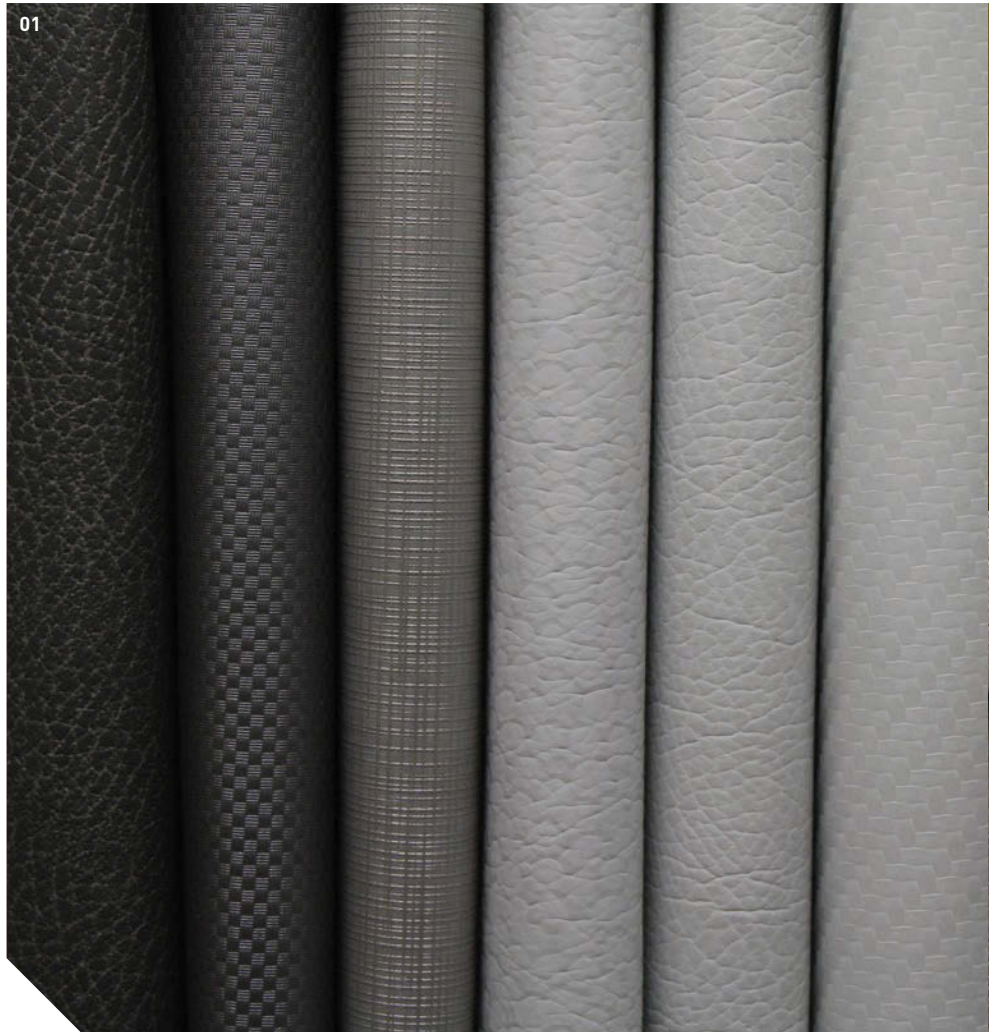


Since its inception in 1977, Tapis Corporation has been a trusted supplier of fabrics to the aviation industry, and it continues to strive for innovative design and implementation. The company's unique custom capabilities offer designers a tremendous opportunity to create an original cabin design, while fulfilling their design vision.

Tapis has a brand-new custom Ultraleather specification that is specifically designed for vertical applications throughout commercial aviation. It is manufactured using technology with low heat releasing and superior FR properties, and can be formulated to pass Heat Release and Smoke Density: FAR25.853, Appendix F, Part IV and Part V, as well as 12 and 60 Second Vertical Flammability: FAR25.853, Appendix F, Part I (ii) and (i). This new Ultraleather product provides a reliable and proven product solution that can be used with various composite build-ups and moved smoothly through the certification process. Tapis has recently launched new programs with this technology with Qatar Airways, Etihad Airways, Air France, Air China, Singapore Airlines, Qantas and British Airways.

This new custom product is available in a number of luxurious

01



01. Ultraleather is available in a variety of shades and grains for all applications

02. The lightweight material is also ink-free

02



custom grains, and ensures compliance in various seat build-ups without compromising durability. Tapis has created custom grains, colors, finishes and technical specifications for many years. Different applications have unique product requirements and Tapis's ability to customize allows the company to develop the best-suited product for each application.

Aircraft seating, for example, requires an extremely long-lasting yet soft and comfortable fabric. The Promessa product, the most durable version of Ultraleather, was specifically developed for the high-wear market of

economy seating. Tapis has customized this product to include features that are important for any seating product: enhanced stain and ink resistance, antimicrobial protection and breathability. For over a decade, Ultraleather has been successfully used in seating applications on Embraer aircraft worldwide, for the Express Jet fleet and many others. Tapis is preferred by seat manufacturers around the world and has most recently partnered with Geven to supply Ultraleather for economy seating.

Another new customized grain is the Brisa HP, Tapis's lightest weight





ULTRALEATHER IS EXTREMELY LIGHTWEIGHT – WEIGHING  
LESS THAN HALF THAT OF TRADITIONAL LEATHERS ”



(as per test methods ISO 1419 Method C and ASTM D 3690-02 se. 6.11), ensuring that every offering on the market meets Tapis's premium standards for durability, as well as heat/moisture and UV resistance. Lesser quality leather alternatives and resin composites, such as polyether and polyester, have a much shorter lifespan than Ultraleather.

Ultraleather is extremely lightweight – weighing less than half the weight of traditional leathers. As a result of its substantially lighter weight, Ultraleather reduces fuel consumption, driving costs down and cutting the overall weight of the seat and cabin. There is also less shrinkage than with traditional leathers, offering 100% yield. This translates into 100% usable fabric. And independent testing from the University of Cincinnati shows that Ultraleather meets or exceeds all industry standard testing criteria used for the most durable leathers available on the market today.

Not only is Ultraleather durable and soft, it's also easy to care for. Removing most stains with soap and water, it can even be disinfected using a simple 5:1, water-to-bleach solution – without affecting the color or the grain. Additionally, no aftercare is needed to keep Ultraleather looking its best, eliminating the need for harmful cleaning solutions, and improving overall air quality in the cabin. Tapis recently introduced Ultraleather Pro with enhanced ink- and stain-resistance technology, which is infused directly into the polyurethane resins during the manufacturing process.

Many fabrics in the Tapis product line complement each other, enabling even more customization and balance in the cabin. Ultrasuede is also a great seat material and has been used in

combination with Ultraleather as seat inserts. Ultrasuede is made of 100% recycled ultra-microfibers, and the innovative technology used in the production of Ultrasuede results in reduced energy consumption and a more ecologically sound manufacturing process. Emirates, Virgin Atlantic, British Airways, LOT Polish Airlines and El Al Airlines are among those currently using Ultrasuede for seating and other applications.

Tapis now offers laser etching on its popular Ultrasuede fabric. The custom laser-etching process adds a pattern to the fabric using a laser, without the need for a screen or roller for printing. This system has been designed to transform Ultrasuede to fulfill your design vision, and the technology can be used to create extraordinary decorating results without compromising the quality and durability of the product. The laser process has the capability to do the full width (54in) of Ultrasuede in a continuous mode, from roll to roll. This unique process can duplicate a pattern from a photo, thus offering exclusive decorating effects. There is no environmental impact – no water or chemical products are necessary for running the system and no waste is produced that requires disposal with special processing.

Ultrasuede and TapiSuede Flannels are also great seat materials, and have been used in combination with Ultraleather as seat inserts. TapiSuede BHC-SS maintains the same characteristics as the standard TapiSuede, but is extremely lightweight and meets the most stringent flame-retardant requirements. TapiSuede BHC-SS can be found on the new JAL First Class B777 program and the new Lufthansa A380 and B747-800. ☒

material for seating at 340gsm, which was selected for the Airbus Ecological Cabin on its A330 mock-up. This version of Brisa combines the Promessa backcloth with the Brisa face for a breathable and lightweight, yet extremely durable, product.

Since 1966, Ultraleather has been produced using only custom-engineered, premium grade polycarbonate resins utilizing proprietary Takumi technology, which promotes thermal comfort and a neutral body temperature, no matter what the climate. Each product undergoes rigorous hydrolysis testing

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# appliedscience

Introducing Geven's innovative new economy seat: the Essenza

01. Geven's Essenza economy seat concept

02. The modular concept of the seats yields three product lines



With the growing demand for air transportation, and with passenger needs becoming increasingly sophisticated, aircraft cabin interiors are now the most important item for airlines. The biggest problem that airlines have to deal with is space optimization, especially in economy, where there's a fine line between comfort and squeezing in as many passengers as possible while remaining profitable and without affecting weight or fuel costs.

The current challenges in meeting market trends are essentially represented by weight reduction, comfort, ergonomics, living space and functionality at restricted pitch ranges, plus a reduced cost of ownership and low expendable part count.

This is why Italian seating manufacturer Geven continually researches new possibilities for design and engineering solutions with a view to creating product improvements in accordance with market trends. The main points of focus are customer satisfaction, reliability, competitiveness in pricing and time to market.

This philosophy has led Geven to evolve its product portfolio. The result is Essenza, a new economy seat, a conceptual mock-up of which was presented at Aircraft Interiors Expo 2014 in Hamburg, Germany. The seat is the result of intensive studies and research into new technologies, processes and materials by Geven's R&D team. As always, the comfort of passengers is front and center of the company's design process, and Geven believes that the Essenza seat represents a notable upgrade to the company's economy product line.

The Essenza seat implements substantial and radical solutions with a high level of industrialization, and is a step forward in terms of style, innovation, technology, robustness, in-service life, comfort, flexibility and modularity.

01



Indeed, Essenza is based on a modular platform, which generates three product lines. One option is a basic lightweight seat with no recline, intended for single-aisle aircraft operators – especially ULCCs, which are always looking for fuel cost reductions. At the other end of the product line is a superior solution that can be integrated with the newest IFE systems, and which is suitable for single- or twin-aisle aircraft. In the middle of the range is a seat with features in between the other two models, which is intended for single-aisle aircraft.

Each derivative line of product maintains the same design and all the

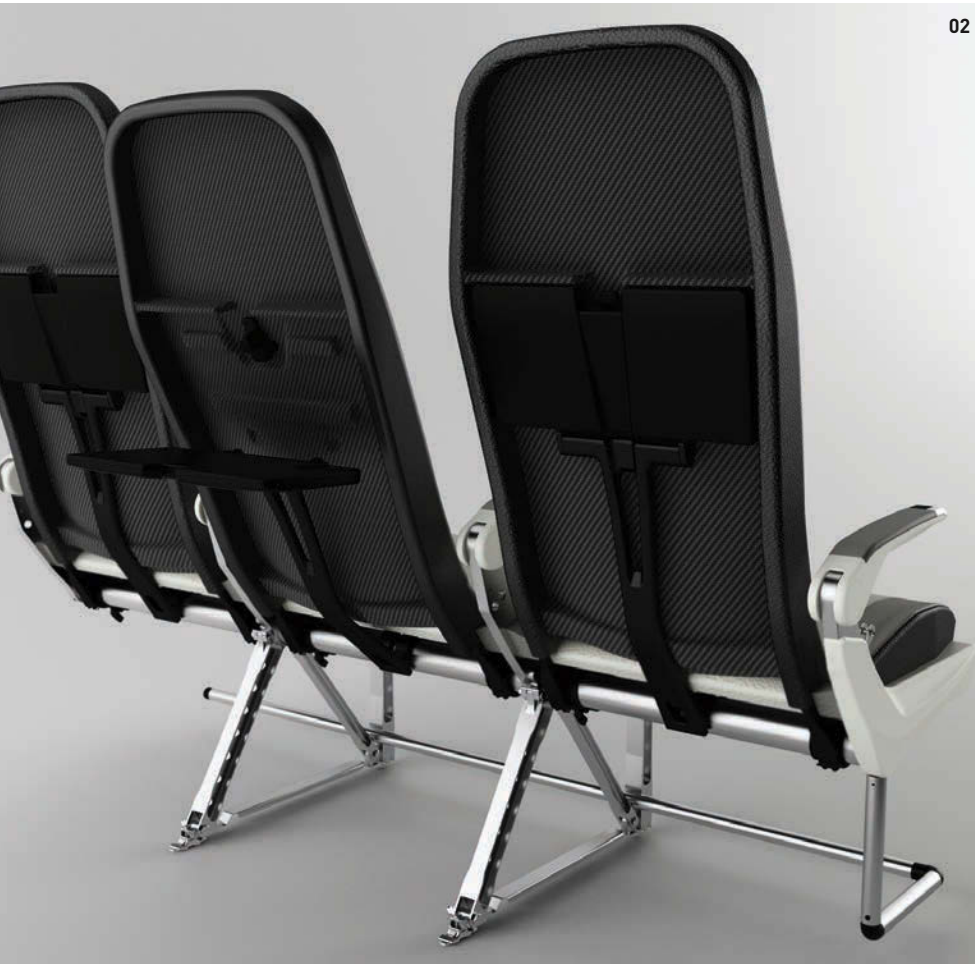
innovations of the original concept, but they have been developed according to the specific requirements of different configurations. This means that airlines can equip their entire fleets with different products, while maintaining the same style, design and performance. A variety of options is available for the seats, as is a high level of customization.

Besides a drastic weight reduction, the Essenza seat model is a technological jewel. Due to an intensive study aimed at creating a fully functional and comfortable yankee class product, even at a short pitches (27in included), Geven's R&D department was able to reduce the





GEVEN'S R&D DEPARTMENT WAS ABLE TO REDUCE THE NUMBER OF EXPENDABLES USED IN THE SEAT BY ABOUT 30-40%



02

number of expendables used in the seat by about 30-40% compared with the company's Piuma Evo super-featherweight seat.

For the design of the Essenza seat, all the core Geven departments, including sales and marketing, engineering, technical assistance, production and supply chain, were involved in order to identify, from the beginning, the main factors that have to be considered in the development of a new economy seat concept, based on the knowledge and experiences distributed within each department.

All feedback highlighted that design, comfort, performance, and efficient production and maintenance

were the key points to work on. Innovation is the continuous aim.

While designing Essenza, Geven's team investigated new technological solutions, and innovative materials and processes, which could be applied on a challenging super-lightweight seat project, in addition to new alternative aesthetic and manufacturing solutions to satisfy comfort parameters.

For Essenza, each structural element has been critically optimized, from the weight of the cushions and covers, to the ergonomics of the backrest, which

has been designed for greater comfort while also being reduced in thickness to save further weight.

The primary structure of the seat has an optimized number of components, realized in new materials and technologies, and assembled using a standard and minimized number of fasteners with few variants, enabling high performance with an optimum compromise between strength and deformation. The seat's primary structure is also designed to enable easy cleaning of the cabin, as well as for the stowage of hand luggage.

There are several patents pending for Essenza, and the first shipset is expected for delivery in 2016.

In accordance with its strong belief in achieving innovation through intensive R&D studies, Geven is continuously involved in several research projects. At present the company is involved in projects focusing on different aspects of the aircraft interiors industry. One focus is on the development of crashworthy seats and lining panels for the cabin and cargo compartments of regional aircraft, and Geven is looking at introducing innovative materials with multifunctional properties in order to achieve high vibro-acoustic, structural and thermic performance, fire penetration resistance and light weight. Other projects are focused on the development and prototyping of a multifunctional foam made using nanocomposite technology for lightweight aircraft seat applications.

All this work is part of Geven's daily efforts to improve quality of products and processes, and it's the reason why Geven has staff dedicated to investigating design concepts and converting them into real and certifiable products. ☒

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# singleminded

The Intellicabin cabin management system from BAE Systems has been designed to make the flying experience more comfortable

- 01. LED lighting can create a different ambience for different stages of a flight
- 02. The dimmable windows can be managed by crew via a centralized control panel or handheld device



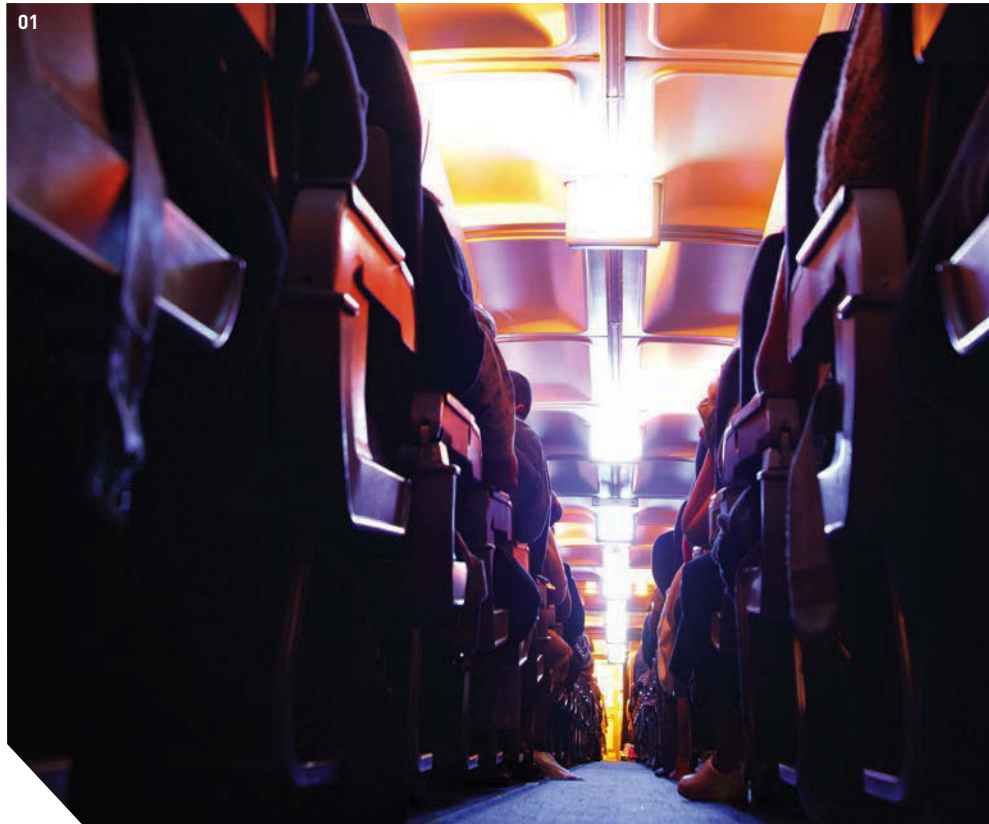
BAE Systems' Commercial Aircraft Solutions division has a history of innovation in manufacturing high-integrity avionics, flight and engines controls, and a broad range of cabin and cockpit electronics. More than 1,000 Boeing 777 aircraft are flying today equipped with BAE cabin systems, with a total installed base of 12,000 aircraft worldwide. In addition, more than 600 in-service B737NGs are outfitted with Boeing Sky Interiors enabled by BAE Systems' attendant control panel.

IntelliCabin, which could be on commercial airlines in 2015, is a next-generation cabin management system designed to provide a vastly improved flying experience for passengers and crew members, while at the same time benefitting the airline itself. IntelliCabin is an integrated approach to cabin management that is flexible, adaptable and scalable, providing capabilities such as in-seat power, LED lighting, wireless tablet-based IFE and dimmable windows, all managed via a centralized attendant control panel or a crew handheld device.

For passengers, IntelliCabin brings comfort and flexibility. By removing bulky power boxes from under the seats and in the overhead bins, passengers receive more legroom and space for luggage. Additionally, it provides power solutions for all seat classes, allowing passengers to have more options and control. But the capabilities don't end there. IntelliCabin also provides tablet-based IFE, enabled by Samsung Galaxy



01



devices, which generate a more personalized user experience that is unparalleled in the industry. Finally, the system offers cutting-edge LED lighting, creating a more relaxed ambience for travelers and an environment for a comfortable boarding and traveling experience.

For the flight crew, IntelliCabin will simplify and reduce their workload, since the system automates many of the crew's tasks. For example, by using either the centralized control panel or handheld devices, which can be utilized from anywhere in the aircraft, crew members are able to easily adjust the temperature and light settings, take refreshment orders, and interact with other crew members to provide an optimized level of service to passengers throughout the flight.

Jared Shoemaker, director of cabin systems at BAE Systems' Commercial

Aircraft Solutions, explains: "We set ourselves the task of designing new technology that could provide the ultimate flying experience for passengers and crew, from keeping you connected, to helping ease the transition from one environment to the next – we believe IntelliCabin does just that. It helps to acclimate and ease you into a more comfortable atmosphere throughout the flight, helping you to feel more refreshed on arrival."

A more comfortable atmosphere and feeling refreshed upon arrival may seem like a foreign concept when traveling now, but when it's time for you to board in the near future, things could be looking up. ☒

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# TIME FLIES WHEN YOU'RE CONNECTED.

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Learn more at: [www.baesystems.com/intellicabin](http://www.baesystems.com/intellicabin)



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INSPIRED WORK

# classapart

Following extensive research, Zodiac Seats is launching the Z500, a premium economy seat designed to offer great comfort as well as great cabin density

- 01. The holistic design of the Z500 includes a one-piece table
- 02. A pocket in the armrest can accommodate tablets or small laptops



Premium economy seats appeared in cabins in the mid-1990s. Since then we have not seen many breakthrough innovations, apart from the introduction of fixed-back shell designs, such as Zodiac Seat's Airgo Fx premium seat (flying with Japan Airlines) and Zodiac's SpaceSeat (flying with Air New Zealand). This limited innovation can be explained by the fact that this segment is more space restrained than business class, which has seen dramatic innovations over the same period.

Today airlines want to offer premium economy passengers stylish seats with differentiating features and more living space than in economy class, while maintaining a much higher cabin density than in business class. Indeed, premium economy seats bridge the gap between economy and business class by offering good comfort at an accessible ticket price.

The growth in premium economy is reflected in aircraft orders. Looking back 10 years, no B777s were delivered with premium economy seats, while nowadays 30% of B777s are equipped with them, according to Kent Craver, director of cabin experience and revenue analysis at Boeing. This is a dynamic segment, which is viewed as highly strategic by Zodiac Seats' customers, which is why the company offers a wide and efficient product line.



In answer to market demand, Zodiac Seats has built a comprehensive offering for this segment over the years. The current portfolio includes a recliner seat – the 5810 – followed by the Z535, which was recently introduced in the Airbus A350 catalog, and the Airgo FX Premium, which is valued in Asia as it allows passengers to manage their own living space thanks to its fixed-back shell concept.

Innovation, differentiation and added value are part of the DNA of Zodiac Seats when it comes to developing new products. In 2013, Zodiac Seats conducted an analysis of over 400 passengers to better understand the premium economy segment, its trends and its specific attributes, with the aim of reaching the sweet spot of cabin efficiency, unique living space and distinctive features to provide the highest comfort in its class.

The results of this analysis confirmed Zodiac Seats' vision that premium economy is a growing market; indeed it showed that in the past year, 71% of the passengers interviewed had experienced an international trip of five hours or longer in a premium economy seat. The research found that 63% thought premium economy represented good value for money in comparison with business class. It also found that 68%

of respondents valued legroom and overall seat comfort as the most important features of premium economy. The survey was followed up with exchanges with airline partners.

In anticipation of market needs and trends, Zodiac Seats is launching another premium economy seat: the Z500. It was introduced at Aircraft Interiors Expo Americas and has been designed to offer a modern, comfortable and spacious living space without compromising cabin density.

The seat frame design delivers much improved leg and foot space without major trade-offs in terms of weight or performance. The space gained means that a passenger in a Z500 seat pitched at 38in can enjoy the legroom of a more traditional seat pitched at 40in.

A holistic approach was taken in the design, with a focus on special attributes, including larger screen capabilities (up to 15in). In addition to the large literature pocket on the seatback, individual cocktail trays and optional water bottle holders will ensure a smooth and enjoyable passenger experience, from boarding to landing. ☒

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“SUPREMELY COMFORTABLE”



“A REVOLUTION FOR PREMIUM ECONOMY SEATING”



**ZODIAC SEATS**



# gotconnectivity

Don't underestimate the role of interconnect technology in the passenger experience. These little bundles of technology can aid connectivity for connected flyers

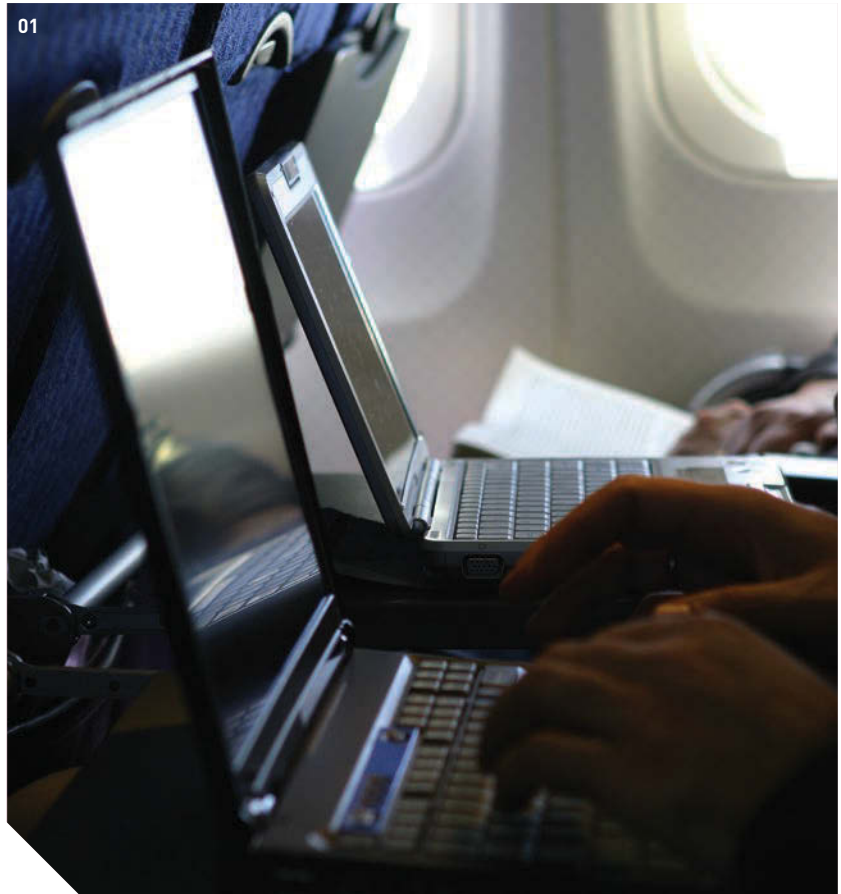


What is the first thing you do after you take your seat on a flight? Text your loved ones, get those last emails through, check your favorite team's game stats, verify the weather conditions in your connecting airport? It's the 'hurry up because we'll be disconnected until 10,000ft' rush. But now you no longer have to switch off your personal entertainment device (PED). The FAA lifted the ban in the USA last December, bringing about the need for better, faster and higher bandwidth.

So how does Carlisle Interconnect Technologies (CarlisleIT), as an interconnect company, meet the needs of airframers, airlines, IFE/avionics/satcom OEMs and the super-connected flyer? With little bundles of technology that provide excellent communication with systems, aesthetically pleasing control panels and engineered solutions, CarlisleIT can satisfy the ever-expanding industry's demands. Although the company's foundation is in wire and cable, producing lightweight, high-temperature, tight-radius products, it can now offer such solutions with a multitude of interconnect products.

What are these little bundles of technology? They are: the LITEflight EP loose-structured fiber, which can be easily terminated without breaking, while providing superior data

01. With the FAA lifting the ban on PEDs, in-flight connectivity has never been so important
02. The FlightGear smoke detector can be color-coordinated with cabin interiors for a seamless fit



exchanges; the Octax 10Gb/s Ethernet assemblies that supply the ability to transfer more information than ever before; the unobtrusive FlightGear smoke detector control panels that can be color-coordinated with cabin interiors; and the Blind Mate antenna connector, which gives airlines a quick field-replaceable solution, as opposed to ripping out meters of cable. This just scratches the surface of CarlisleIT's products and services.

The challenges that will ensue with the coming age of ground-to-air and air-to-air communication congestion are issues CarlisleIT is well capable of solving. The company has in-house engineering resources that produce a great range of innovations.

CarlisleIT is also one of the world's leading designers and manufacturers of

high-performance wire and cable. The company's portfolio includes products such as: fiber-optic cable; military and aerospace electrical contacts; RF/microwave connectors; specialty and filtered connectors; cable assemblies; complex harnesses; integrated installation kits; lightweight ARINC trays; aerospace rack and shelf assemblies; certification services with DER, DAR and DMIR personnel on staff; and engineering support for applications in the commercial aerospace, defense electronics, industrial, medical, and test and measurement industries. ☒

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**Carlisle Interconnect Technologies** designs and manufactures easy-to-install, cost effective solutions for the integration of next generation in-flight entertainment and connectivity systems. Our solutions are simple in concept, lightweight and combine full electrical and structural integration. CarlisleIT continues to offer effective, efficient system installation solutions that stand up to the rigors of in-flight and ground operations.




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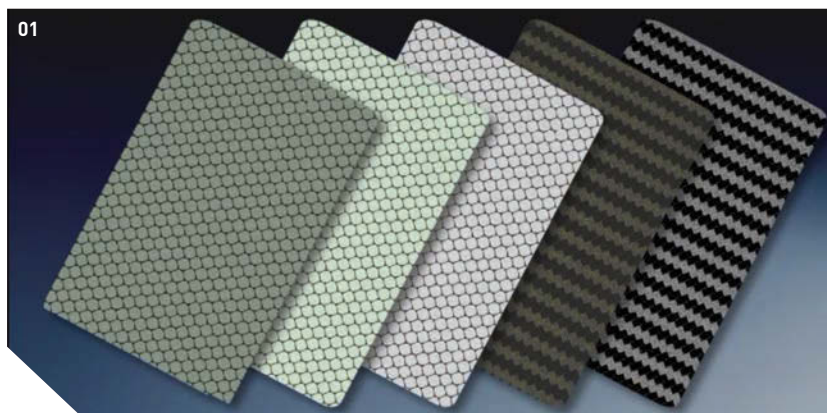
# goodform

Boltaron explains the basic differences that designers should know about three classes of sheets for thermoformed components

 Virtually every thermoplastic sheet product used for the thermoforming and fabricating of cabin components is made using one of three methods. Each method offers distinct advantages and limitations that designers should know, in order to specify sheets with optimum appearance and performance.

Extrusion is a continuous process in which plastic compound is melted, mixed and conveyed through a heated barrel by a screw. The compound's ingredients are converted into a molten plastic mass that is forced through a lip die, which flattens the mass into a sheet of a specified width and thickness. The sheet then passes through heated embossing rolls, which impart a predetermined surface finish prior to trimming to the final sheet dimension or (less commonly) winding it onto rolls. The number of embossing rolls inventoried determines the number of textures available.

Advantages of extruded sheet include the availability of medium- and



heavy-gauge sheets suitable for most thermoforming, fabricating and machining applications; lower minimums than calendering; and custom colors and gauges.

Limitations of extruded sheet include having a monolithic sheet with limited appearance options and properties, a limited number of standard surface textures, higher minimums than press laminating, and a limited range of standard textures.

With calendering, compound ingredients are fed into a two-roll mill that mixes and heats the material. A continuous strip of homogenized, molten compound cut from the mill is then fed into calender rolls that compress it to form a wide, thin film. Embossing rollers then impart a smooth or textured surface, and begin cooling the film, which is wound onto rolls or cut into sheets.

Advantages of calendered film and sheet include the availability of thin-gauge films for capping of heavier-gauge (extruded) sheet in-line or off-line (with low minimums); thin-gauge films for creating composites with exceptional aesthetic and performance qualities; medium gauges can be produced more economically by calendering than by extrusion; greater production efficiency and lower cost than extrusion (depending on volume); and the availability of custom colors and gauges.

Limitations of calendered film and sheet include having only a limited number of standard surface textures; having relatively high minimums; and no availability of heavy gauges.

Finally, press laminating combines layers of calendered or extruded sheet offline, and fuses them using heat and pressure over relatively long cycle times, to form composite sheets in gauges, from medium to heavy.

Advantages of press-laminated sheet include having combinations of aesthetics and economy that are impossible to achieve with extrusion or calendering alone; minimum gauges equivalent to extruded sheet, with maximum gauges of over 3in; unlimited textures with low minimums; unlimited patterns with thin (calendered) clear protective films permanently fused to substrates of any color to achieve unlimited visual effects with low minimums; custom thicknesses and colors with low minimums; and the sheet is generally of higher quality than extruded sheet.

Limitations of press-laminated sheet include the higher cost of production of conventional (monolithic) sheet in longer runs; and that it requires extruded or calendered feedstock. ☒

- 01. Swatches of the various Boltaron products
- 02. Press laminating offers a good combination of aesthetics and economy
- 03. An extruded sheet has lower minimums than calendering
- 04. Calendering can have lower costs than extrusion



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Sheet products that make aircraft components excel

# topfloors

Gerflor has opted for a design-led approach in line with decorative trends for its range of non-textile floor coverings for aircraft interiors



There is a trend among airlines and aircraft interior designers worldwide toward varied and natural designs in non-textile floor coverings in specific areas. This is especially true for wood and mineral patterns, and the market is demanding realistic surfaces. Wooden non-textile floor coverings in the entrance areas help create a warm and refined atmosphere to welcome passengers. Classic or exclusive types of wood are offered in a variety of colors, and natural stone or concrete patterns can help create an on-trend, stylish ambiance.

In recent years, Gerflor has widened its range of products with the introduction of several new Batiflex wood and mineral non-textile floor coverings. Gerflor also developed the Madrid and Sofia designs, which are multicolored with a touch of pearl, and comply with Airbus's most stringent ABD0031 standards. All Batiflex non-textile floor coverings exceed FAR 25.853 low flammability and FAR 25.793 anti-slip properties requirements.

- 01. Wooden floor coverings give a warm, welcoming feel
- 02. The Batiflex range meets flammability and non-slip requirements

**PERFORMANCE** In addition to new decorative trends, the market also demands technical innovation. Among the challenges for aircraft floor coverings are withstanding the effects of pressurization and depressurization on some aircraft interior structures.



A new product, the Batiflex AV 270, has been specifically engineered by Gerflor to offer outstanding resistance to compression. The low weight of Batiflex AV 270 also helps reduce CO emissions and fuel consumption. The product maintains excellent dimensional stability (resistance to shrinkage) and weldability, which results in extremely strong seams and few corrosion issues. The good anti-slip properties of the covering in both dry and wet conditions create a safe environment for crew and passengers, while resistance to abrasion and very high peel strength between layers make for an especially durable product. Its flexibility (it is delivered in rolls) makes storage and handling easier.

**CUSTOMER SERVICE** Besides aesthetic and technical demands, OEMs, airlines and MROs need flexibility and reactivity as well as a completely dependable supplier. To cater for the demands of the very dynamic aviation market, Gerflor implemented a well

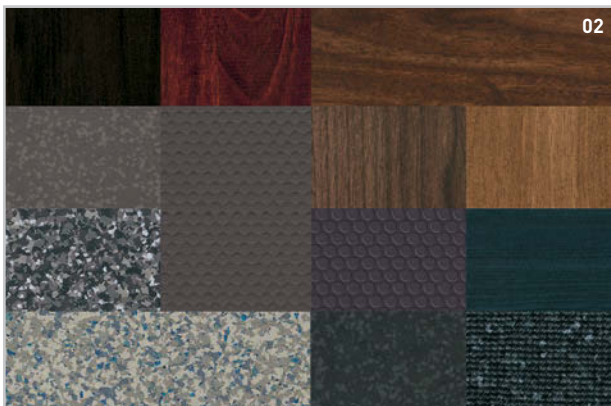
thought-out organizational structure. A wide range of products is kept in stock and readily available. An efficient logistics network makes possible the daily shipment of ordered products to worldwide customers. To ease customers' operations, and to reduce waste and installation time, Gerflor has developed self-adhesive solutions, high-precision cutting and factory-welding services, along with a personalized service.

A sales network – both local and international – guarantees good communication with all customers. A dedicated R&D team works in close collaboration with OEMs in order to anticipate upcoming developments. Together, the sales, customer service, logistics, production, quality and engineering teams are committed to quick, efficient and reliable service. ☒

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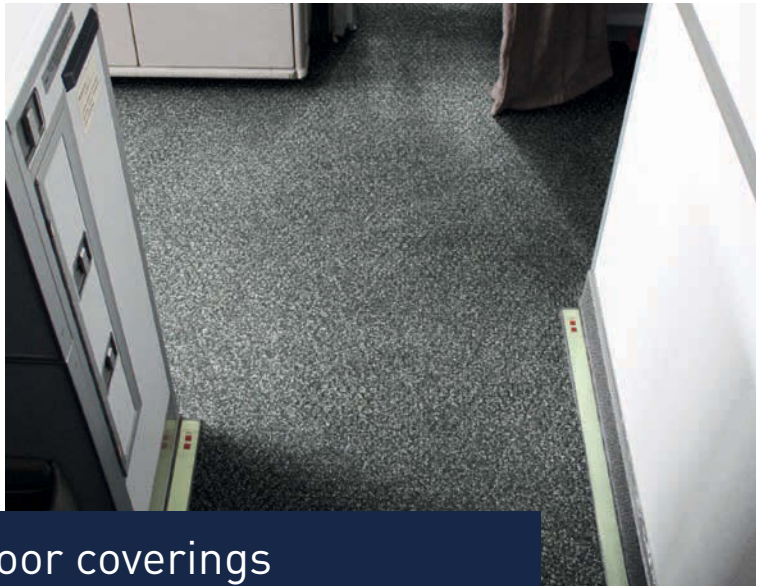
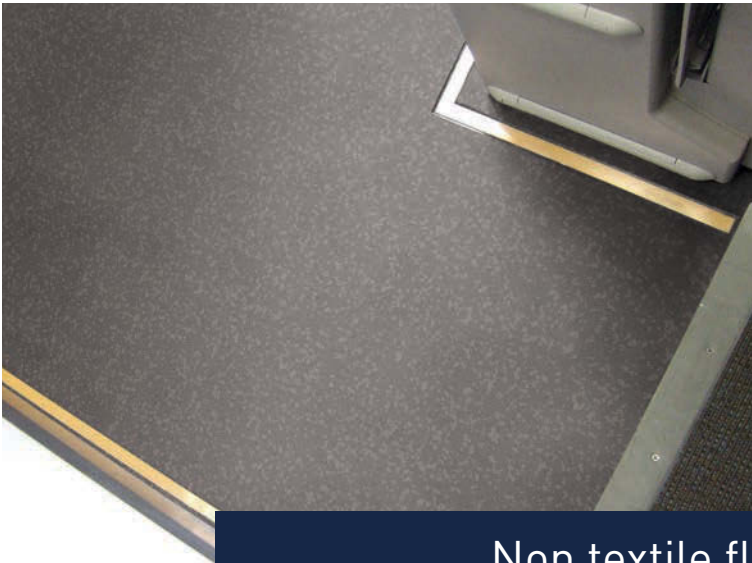
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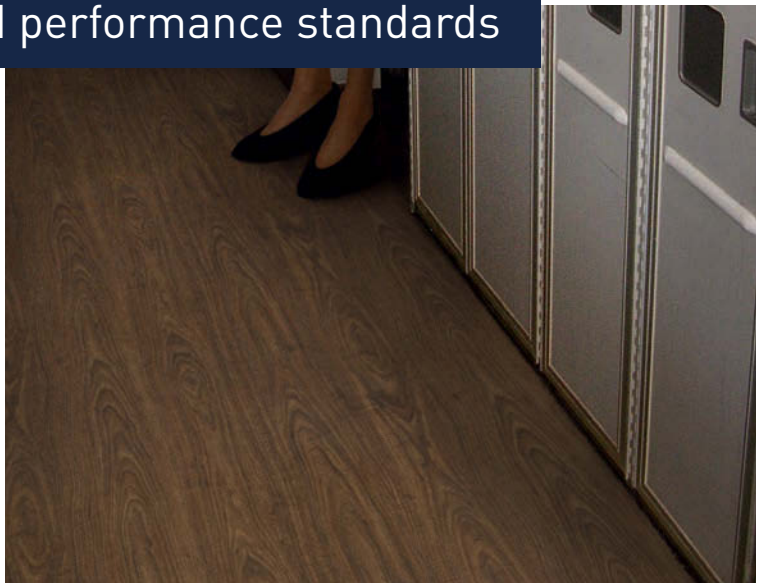


# BATIFLEX

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# paradigmshift

The bar for the finest inflight seating experience has been raised yet again, with a pneumatic seat comfort system specified for Etihad's new interiors



In the course of the past decade, the world's best-known airframers have unveiled the latest-generation aircraft that have redefined civil aviation benchmarks. The Airbus A380 and A350 and the Boeing 787 Dreamliner are shining examples of innovation, with unmatched performance metrics, fuel efficiency and use of weight-saving composites.

The long overdue new era in aircraft seating, much less visible but all the more tangible, started in 2009 when soft-interior specialist Lantal Textiles introduced its weight-saving Pneumatic Comfort System (PCS), which used air-filled cushions instead of conventional foams. Initially adopted by Swiss International Air Lines, it instantly became popular in the frequent flyer community. After Lufthansa, British Airways, Air Canada and other progressive airlines had followed suit, Lantal's PCS became a differentiating factor, especially for premium-cabin passengers who often book long-haul flights.

With approximately 35 million flight hours accumulated on over 120 aircraft in five years of use, Lantal's PCS has exhibited a track record of reliability that exceeds Lantal's guarantee of 60,000 flight hours for all system components. However, superior passenger experience is still the key, and this is precisely why Etihad



Airways commissioned Lantal in 2012. The airline was particularly impressed by the individually adjustable firmness of the cushions in the sitting, relaxing and lie-flat positions. PCS was the perfect match for Etihad's ambitious landmark interior initiative.

*Aircraft Interiors International* featured the Abu Dhabi flag carrier in its June 2014 issue, with vibrant coverage of the airline's unprecedented approach to onboard luxury. In just under 11 years, Etihad Airways has evolved to become one of the world's leading, and, indeed fastest-growing airlines.

Among its many innovations, Etihad Airways has introduced a boutique hotel style, with totally new class categories in its A380s and B787s. The Residence by Etihad on the A380 is the world's first three-room cabin and includes a butler and en-suite shower. The First Apartments on the A380, the First Suites on the B787, and the Business Studios on both types of aircraft are also highly innovative.

On the A380s, Lantal will equip The Residence by Etihad cabin, the First Apartments and the Business Studios with customized PCS. Lantal will also equip the First Suites and Business Studios on the airline's B787-9 aircraft with the same systems.

For the passenger, the individually adjustable firmness of the seat cushions translates into unprecedented comfort. In this particular project, the deliverables also include proprietary developments, such as a seat extension in the First Studios on the B787s. This detail alone demonstrates how much attention Etihad devotes to the well-being of its guests. The collaboration between Etihad and Lantal in this milestone venture was an experience in itself, given the airline's sophisticated expectations and its determination to establish new standards in top-tier luxury interiors.

Since the first quarter of 2014, Lantal's PCS has been fully qualified and certified for Boeing 777s and 787s in addition to all Airbus models. From now on the qualification procedure will be straightforward for virtually any long-haul aircraft model, expediting the distribution of PCS on a global basis. Lantal works with all aircraft seat manufacturers and offers them an attractive and unique turnkey system with full documentation and extensive technical and operational support. ☒

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- 01. Etihad is equipping the First Apartments on its A380s with Lantal's PCS
- 02. The PCS will also feature in the world's most luxurious commercial airline offering: The Residence







The Lantal Pneumatic Comfort System stands for truly heavenly seating. It ingeniously conforms to the passenger's anatomy and features firmness-adjustable cushions with an inbuilt massage function. Lantal customizes it to each airline's signature style.

[www.lantal.com](http://www.lantal.com)

All-in-one soft interior solutions | Consulting and design services | Premium textiles and leathers | Pneumatic Comfort Systems | Ready-to-install seat covers, carpets, curtains, antimacassars, footrests, literature pockets | Laboratory services | Engineering, modification, and customization services | Logistics | Certification

# greenenergy

Diehl Aerospace has created a remarkable concept for greener aircraft energy:  
Distributed Autonomous Cabin Power

01. Power Cell is the heart of the concept  
02. The idea of supplying passenger cabins with electrical energy by using a standard galley trolley attracted a high degree of international attention at AIX 2014



Diehl Aerospace is proud to have won a coveted Crystal Cabin Award for its DACAPO (Distributed Autonomous Cabin Power) concept. The company received the award in the Greener Cabin, Health, Safety & Environment category during the week of Aircraft Interiors Expo 2014 in Hamburg.

The beginnings of the development of this forward-looking technology, however, go back a long way. In 2007, Diehl Aerospace had set itself the goal of developing a concept for integrating clean and quiet fuel cells into the energy-intensive onboard infrastructure. Diehl quickly focused on the facilities in the galley, which up to this time made up 50% of the conventional electrical system during flights. With a view to keeping turnaround times short, Diehl engineers looked for solutions capable of dispensing with a second fuel source.

While dealing with this, they adopted the emerging trend toward the More Electric Aircraft (MEA) architecture. In order to achieve significant weight savings, the MEA concept replaces pneumatic or hydraulic systems with electric drives. However, the increased integration of this architecture also enhances the demand for electrical energy during flight time. The developers came up with a simple, yet brilliant idea. What, they asked themselves, if the 'meal carts', as well as fresh food, also served a lot of 'fresh' energy?

01



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

The DACAPO concept was developed on the basis of this energy supply, and it is intended to allow users to completely decouple the energy required in the cabin from that needed for the aircraft. DACAPO opens up the possibility of also supplying older machines with current technology. In the longer term, it will be possible to cover all the electrical energy

consumers (cabin light, IFE, galley, etc) in the cabin by interconnecting trolleys.

To complement this revolutionary concept, Diehl Aerospace offers three models that help optimize the use of cabin space: Space-Flex, High Density, and SA Seatcount Flex. These models increase seat capacity, and thus the economic viability and profit potential of airlines – or they can be used to expand seat spacing, for more comfort in the cabin. The improved architecture of onboard toilets, overhead storage compartments and high-density galleys offer cabin crews more storage space and enable airlines to enlarge the seat capacity by up to six economy seats.

Smarter use of cabin space, higher passenger comfort, huge potential for increasing profits and a more environment-friendly energy system – these are the solutions Diehl offers. ☒

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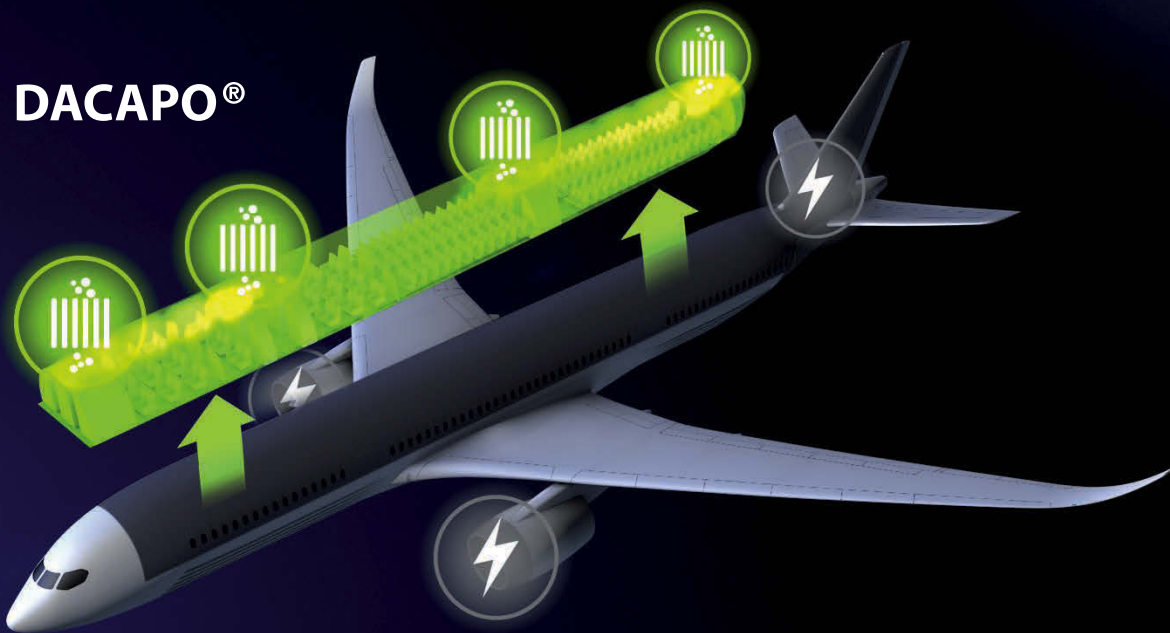
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02





**DACAPO®**



**DIEHL**  
Aerosystems

**MAGIC®**



# GREEN CABIN POWER

## – starting today

DACAPO® is an innovative concept to supply passenger cabins with electrical energy, and to disburden the on-board power supply significantly. Electrical power is generated by a power cell inside a MAGIC® galley, and in consequence the cabin can be supplied by one or more galleys. Installation requires only minor changes on aircraft side and is independent of any infrastructure.

MAGIC® and DACAPO® are registered trademarks of Diehl Aerospace GmbH

[www.diehl-aerosystems.com](http://www.diehl-aerosystems.com)



# smartconnections

Gogo was the first provider to offer inflight wi-fi, and has quickly established itself as a leading provider of inflight connectivity solutions



Providing reliable inflight connectivity takes more than merely offering a connectivity solution. But what exactly does it take? To manage connectivity and to transmit data to and from the aircraft, a sophisticated ecosystem must work in harmony to deliver consistent, reliable service for crew and passengers.

To understand the inflight connectivity ecosystem, it can be helpful to divide the components into three categories: the technology itself; the hardware on board the aircraft; and the accompanying service and support work that takes place on the ground.

How you bring bandwidth to the aircraft is important, but it's just a small piece of the puzzle. Technologies used today are a veritable alphabet soup of spectrums and company products. Take all that away, and the only viable method thus far to connect aircraft has been via satellites in orbit or cellular towers on the ground.

Satellites have the potential to provide global coverage to support any aircraft mission. Ku-band satellites are the most prominent today, and more Ka-band satellites are expected to be deployed in the near future. Cellular towers provide connectivity over land, where an uninterrupted network of towers can be established for aircraft operating within the coverage area. Gogo's ATG network in the USA and



- 01. Work in progress at just one of Gogo's many research labs
- 02. Gogo strives to ensure its equipment is lightweight as well as fast



parts of Canada, which was launched in 2008 and serves more than 55 million connected passengers, is the only such example in current operation. Hybrid solutions are emerging as well. These combine cellular tower technology with satellite technology to create new connectivity solutions that may offer advantages in terms of coverage and/or bandwidth.

The hardware on and within the aircraft creates an in-cabin network, which delivers connectivity for passengers and crew. This technology also enables the integration of voice and/or text capabilities and IFE services, such as streaming movies and TV.

Antennas are installed on the exterior of the aircraft to send and receive signals to and from the source. When cellular towers are the source, small antennas are mounted on the bottom and side of the aircraft. When satellites are the source, antennas are mounted on top of the aircraft and housed beneath a cover known as a radome. Onboard equipment consists of components such as modems, antenna controllers, airborne servers and cabin wireless access points, along with in-cabin wi-fi antennas.

Connecting the aircraft is only the beginning. Whether it's securing

regulatory compliance, providing ongoing technical assistance and maintenance, or coordinating with partners to manage current service offerings and plan for the future, connectivity service providers can play a broader support role in implementing the service to ensure the smoothest performance possible.

In order to operate a network for inflight connectivity, Gogo works with all relevant aviation bureaus to secure the necessary supplemental type certificates, which enable installations of connectivity equipment on the specific aircraft in a given airline's fleet.

Gogo manages the equipment and system installation across all fleet types. To minimize aircraft downtime, installations and certifications can be performed in phases. Because airport staff and flight attendants help drive awareness of connectivity and entertainment on board, Gogo works with its partners to give crews a working knowledge of the service. This can help crews answer any customer questions during flight. ☒

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# Aero-communications service provider to planet Earth

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With more than 20 combined years of experience managing an ever-evolving mobile network in the sky, our advanced technology solutions bring inflight connectivity to your fleet with unmatched experience and insight. And as always, every aspect of our service is backed by ongoing, comprehensive support.

Visit [gogoair.com/airline](http://gogoair.com/airline) to find out how Gogo can empower your fleet for connected skies.



# afterlife

For Bucher, selling a cabin product does not conclude a deal; it is just the beginning of a long after-sales relationship with that customer

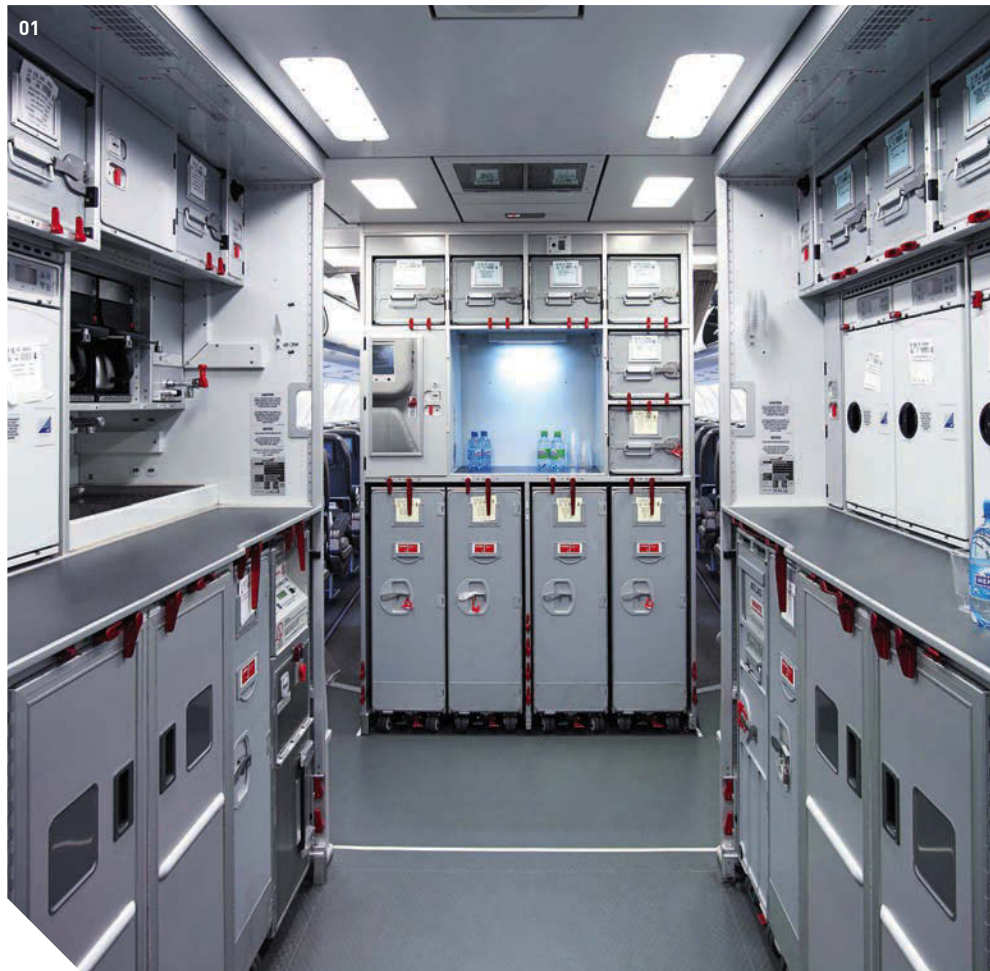
01. Bucher's galley is a lesson in simplicity, allowing for ease of maintenance



When does the after-sales process begin? It can't start soon enough. Galleys, seating components and emergency medical systems are all products that are in service for many years, some for well over a decade. This is why maintenance and overhaul are important factors for these products, constituting major cost drivers for airlines and other aircraft operators. Early on, Bucher recognized the importance of servicing products, and chose to place greater focus on after-sales support.

Excellent in-service performance begins during the early design stages. Not only does Bucher take design for manufacturing and assembly (DFMA) into consideration, but the firm also dedicates its attention to design for service: how can the maintenance cycle of its products be increased? How can product complexity be reduced by simplifying product structures? What are the best materials for customers from a total-cost-of-ownership point of view? Bucher involves its customer service team early on in program milestone meetings, such as design reviews, to assess and implement maintainability into the design. Of course, the engineers at Bucher also receive feedback, during lessons-learned meetings, about the performance of the product in service. By consistently implementing these approaches, Bucher has reduced maintenance time and minimized the need for spare parts. An example of this commitment to service can be seen in the company's standard compartment door, which can be taken off the galley by removing no more than two screws. By removing four more screws for each Bucher-designed latch, customers end up with just the door as a single part in a matter of seconds.

Excellent after-sales service, however, goes even further. At Bucher, a dedicated team takes care of all



aspects of customer service; this not only includes processing of spare parts and repair orders, but also includes a team of experienced professionals on hand to answer all technical questions. Short communications channels and a matrix-type organizational structure make it possible for the customer service team to include members of the engineering, certification, quality management, purchasing, production and logistics functions, enabling the company to satisfy the lead-times specified by customers.

Bucher also considers lead times early in the program, providing accurate recommended spare part lists (RSPL) to help customers decide which

part to keep in stock in different storage locations around the world or in central storage hubs. For non-stock parts, Bucher's lean processes enable the cross-functional customer service team to respond quickly to customer requests. Having the ability to control the production of key components, especially complex ones, has helped the company to further reduce the lead time for service parts.

Customers around the world have recognized the quality of Bucher's after-sales service, which is why the company has been acknowledged numerous times for its exceptional customer support performance. Bucher has been awarded a top-three ranking





## BUCHER INVOLVES ITS CUSTOMER SERVICE TEAM EARLY ON IN PROGRAM MILESTONE MEETINGS



02. Bucher's comprehensive parts catalog ensures customer demands are always met

in Airbus's BFE customer satisfaction ratings for four out of the past five years, and ranked best-in-class galley and monument supplier.

Cost will always be a top priority for airlines and operators. Knowing this, Bucher continues to develop new approaches to improving its after-sales service. Through increased modularized product structures and levels of standardization, Bucher can reduce the number of different overall parts used. This strategy, combined with smart inventory management, creates greater economies of scale, which, by making products even more affordable over their lifespan, provides long-term savings and benefits to Bucher customers. ☒



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Experience our passion for innovative, quality and lightweight solutions that deliver compelling benefits in the aircraft interiors market. Galleys for example, or Front Row Monuments, Seat Furniture, Premium Class Food Tray Tables, IFE Deployment Systems ... and the new Air Transport Stretcher ATS!

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The year 2014 has been yet another exciting and innovative one for the aircraft interiors industry. Here are just a few of the highlights that made this such a great year

#### JANUARY

Thai Airways revealed the first of its six new B777-300ER interiors, which marked the second project carried out with Priestmangoode, the first being the first-class cabins in the airline's new B747s. The B777 interiors have been designed in line with the Thai Contemporary Concept, which aims to bring a more contemporary feel and a more consistent experience across the Thai fleet.

#### FEBRUARY

February marked the 1,000<sup>th</sup> delivery of Boeing's 737 Boeing Sky Interior, with Norwegian Air Shuttle ASA taking this landmark aircraft. A passenger survey conducted by the airline found that more than half of respondents rate the 737 Boeing Sky Interior as more comfortable than the standard interior. Passengers also reported that they feel happier in the new interior.

#### MARCH

Lufthansa premiered an all-new premium economy class – the first introduction of a completely new travel class by the airline for 35 years. The seat was designed in partnership with müller/romca Industrial Design, is manufactured by ZIM Flugsitz, and is claimed to offer up to 50% more room than in economy.

#### APRIL

Gogo revealed details of 2Ku, the next step in its technology roadmap for global connectivity. 2Ku will use the same low-profile antennas as Gogo's Ground to Orbit (GTO) technology, which will be deployed for aircraft flying in North America;

however, instead of using Gogo's Air to Ground solution for the return link to the ground, 2Ku will have two low-profile, high-efficiency Ku-band satellite antennas. The technology is claimed to deliver peak speeds to the aircraft of more than 70Mbps.

#### MAY

Air Canada unveiled its all-new B787 interiors, created in conjunction with Teague and the paulwylde design agency. A highlight is the 20-seat business cabin, which includes customized Executive Pods based on the B/E Aerospace Diamond seat and which feature 18in Panasonic eX3 IFE displays.

#### JUNE

Airbus successfully completed the Early Long Flight campaign of its A350 XWB. The tests involved two flights (7 hours and 12 hours), operated consecutively by Air France and Lufthansa cabin crews, and enabled Airbus to assess the cabin ahead of final certification. During the flights, 500 cabin experts tried and tested all the A350 XWB cabin systems.

#### JULY

Embraer revealed a mock-up of its slick new E-Jet E2 single-aisle cabin, designed in conjunction with Priestmangoode. The flexibility of the cabin really impressed. Depending on customer preference, the cabin can be configured to include economy, premium economy and first class. By putting all seats on the same tracks, the cabin can also be reconfigured quickly, aided by a clever PSU system, which can be slid up and down the cabin.

#### AUGUST

Finnair revealed Europe's first A350 XWB interior, designed by Helsinki design firm dSign Vertti Kivi & Co. The airline decided on a 297-seat configuration, with the Zodiac Cirrus III seat selected for the

business cabin, complete with a 16in touchscreen IFE display. The Zodiac Z300 slimline seat was selected for economy and the new economy comfort class.

#### SEPTEMBER

Virgin Australia unveiled the first major product innovation of Virgin Vision 2017, the airline's new three-year strategy. The carrier will fit redesigned business and premium economy cabins to its A330s and B777s, and the B777s will also feature a newly designed bar in business class. Tangerine London led the industrial design of the new seats and cabins.

**OCTOBER** Air China welcomed its new B747-8i, which is the first aircraft to carry the entire new Air China interior design, created by JPA in collaboration with Chinese artist Han Meilin, whose specially created artworks are referenced through the whole cabin. The new cabin interior design will also feature across Air China's new fleet of 15 B787-900s, which will begin arriving in 2016.

#### NOVEMBER

Virgin Atlantic begins Dreamliner operations with Europe's first B787-9. Named Birthday Girl, the first aircraft is also the airline's 30<sup>th</sup> birthday present to itself, and was designed in conjunction with Viewport Studio, with major monument work carried out with Altitude Aerospace Interiors. You can read the full story in our November issue.

#### DECEMBER

Etihad's indulgent B787 and A380 interiors have generated a huge amount of interest, and in December customers will finally be able to experience the real thing. This is a landmark launch, and is a huge source of pride for the airline and the Etihad Design Consortium, which comprises Acumen Design Associates, Factorydesign and Honour Branding.



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