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2016 SHOWCASE



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THE TEAM

EDITOR Adam Gavine
adam.gavine@ukipme.com

ASSISTANT EDITOR John O'Brien

ART EDITOR Anna Davie

DEPUTY ART EDITOR Louise Adams

DESIGN TEAM
Andy Bass, Andrew Locke,
Craig Marshall, Nicola Turner,
Julie Welby, Ben White

PRODUCTION EDITOR Alex Bradley

CHIEF SUB EDITOR Andrew Pickering

DEPUTY PRODUCTION EDITOR Nick Shepherd

SENIOR SUB EDITOR Christine Velarde

SUB EDITOR Alasdair Morton

CONTRIBUTORS
Guy Bird, Michael Childers, Aubrey Cohen,
Jennifer Coutts Clay, Natasha Edwards, Bernard Fitzsimons,
Marisa Garcia, Christine Negroni, Selwyn Parker, Tomás Romero,
Maryann Simson, John Walton

HEAD OF PRODUCTION AND LOGISTICS Ian Donovan

DEPUTY PRODUCTION MANAGER Lewis Hopkins

PRODUCTION TEAM
Carole Doran, Cassie Inns,
Frank Millard, Robyn Skalsky

CEO Tony Robinson

MANAGING DIRECTOR Graham Johnson

EDITORIAL DIRECTOR Anthony James

ART DIRECTOR James Sutcliffe

PUBLICATION MANAGER Simon Hughes

INTERNATIONAL ADVERTISING SALES Sally James

CIRCULATION AND SUBSCRIPTIONS
MANAGER Suzie Matthews

published by UKIP Media & Events Ltd
Aircraft Interiors International
Abinger House, Church Street,
Dorking, Surrey RH4 1DF, UK
Tel: +44 1306 743744
Email: aircraftinteriors@ukipme.com

Annual subscriptions (5 copies)
Worldwide rate: £47/US\$75

Airfreight and mailing in the USA by agent Air Business Ltd,
c/o Worldnet Shipping USA Inc, 155-11 146th Street, Jamaica,
New York 11434. Periodicals postage paid at Jamaica, New
York 11431. US Postmaster: Send address changes to *Aircraft
Interiors International*, c/o Air Business Ltd, c/o Worldnet
Shipping USA Inc, 155-11 146th Street, Jamaica, New York 11434.
Subscription records are maintained at UKIP Media & Events
Ltd, Abinger House, Church Street, Dorking, Surrey, RH4 1DF, UK.
Air Business is acting as our mailing agent.

USPS 019-144. ISSN 1463-8932
Aircraft Interiors International Annual Showcase 2016
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Printed by: William Gibbons & Sons Ltd, Willenhall,
West Midlands, WV13 3XT, UK



SUNNY FORECAST

What a year it has been! Regular readers of the *Aircraft Interiors International* magazine and website will have noticed many new companies entering the aircraft interiors arena, keen to secure a slice of this burgeoning industry with its incredible growth projections, and to fill potential gaps in the supply chain.

Let's consider the types of figures that people are finding so enticing. This year Boeing's *Current Market Outlook* forecast demand for 38,050 new commercial airplanes over the next 20 years, while Airbus's *Global Market Forecast* projects a slightly lower demand for 32,600 in the same period. Even Airbus's more conservative estimate (it considers only aircraft with 100 seats or more) is worth a staggering US\$4.9tn.

How about some more figures? The US\$4.4bn aircraft seating market is projected to grow at a CAGR of 5% between 2014 and 2024, while in the same period IFEC will achieve a CAGR of 5.6%. Even the previously modest cabin lighting market is now worth US\$781m. You can find out the facts behind the figures in Counterpoint Market Intelligence's report on page 8.

Other reports we have highlighted in our news pages this year indicate an increase in global aircraft seating revenues from 2014's US\$5.99bn to US\$7.19bn in 2019, the IFEC market growing from 2012's US\$2bn to US\$3bn by 2017, and the overall cabin interior market growing from 2014's US\$12.85bn estimate to US\$17.19bn in 2019.

The numbers are undeniably exciting and alluring, but new entrants must be aware that being a cabin supplier is not simply a case of creating a great product and then thrusting it into the eager hands of the cabin community. With airlines seeking market differentiation through their cabins, they generally want something a little more personal. Customization seems to be becoming the norm in today's wide-body market, which is where the design houses play an invaluable role, through application of their knowledge, expertise and experience. Thanks to some impressive work, in many cases passengers could fly with two airlines without realizing they had been sitting in the same model of seat on both flights. The days of the only question asked of airlines being 'what color would you like?' are long gone.

And that's where this Showcase edition also plays an invaluable role – it gives cabin designers and suppliers an opportunity to demonstrate their skills and abilities to the world's airlines, airframers and cabin experts. In these pages you'll find a concept for a boutique hotel in the sky (p62), an idea for an airline with a real focus on core brand beliefs (p34), a space-efficient way for first and business class to share the same cabin (p66), details of some of this year's most important customization projects, the latest innovative ideas from suppliers to enhance the passenger experience... and much more.

Some of the ideas in this issue are flying today; others we hope to see flying soon. They all have one thing in common, though, which is more important than even the big numbers in the interiors industry: they are aiming to make the flying experience as special as the phenomenon of flight itself.

Adam Gavine, editor

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Design showcase

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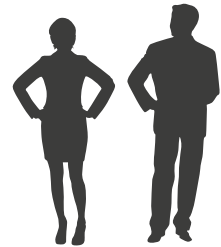


5.6%
The IFEC market is forecasted to achieve a CAGR of **5.6%** between 2014-2024



\$4.4 billion

US\$4.4bn seating market with a 2014-2024 CAGR of **4.9%**



THE FIRST CLASS SEATING MARKET IS FORECASTED TO ACHIEVE A CAGR OF **-12.7%** FROM 2014-2024

CAGR 2014-2024

- 4.9%: Seats
- 3.8%: Galleys
- 4.5%: Electrical galley inserts
- 5.8%: Galley stowage boxes and carts
- 4.3%: Lavatories
- 4.8%: Crew rest compartments
- 2.6%: Monuments
- 4.3%: Lighting
- 3.1%: Interiors panels
- 3.7%: Luggage bins
- 4.3%: Lavatories
- 5.6%: IFE and in-flight comms (IFEC)
- 4.6%: Certification services

4.6%: total



7.1%
Business class seating is forecasted to achieve a CAGR of **7.1%** from 2014-2024

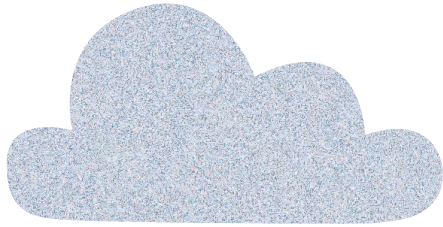


The interiors market will grow at a CAGR of 4.6% over the next 10 years

4.6%

\$781 MILLION LIGHTING MARKET

\$13.5 billion aircraft interiors industry



CLOUD NINE

RECORD GROWTH IS LEADING TO EXCITING
CHANGES IN THE AIRCRAFT INTERIORS INDUSTRY

Words by Jon Lundberg, Counterpoint Market Intelligence

The commercial aerospace industry continues to fly high, with both Boeing's and Airbus's build rates having increased to record levels. Buoyed by this increase in build rates and a rising battle between airlines to retrofit aircraft, the commercial aircraft interiors market is continuing to grow at an impressive rate.

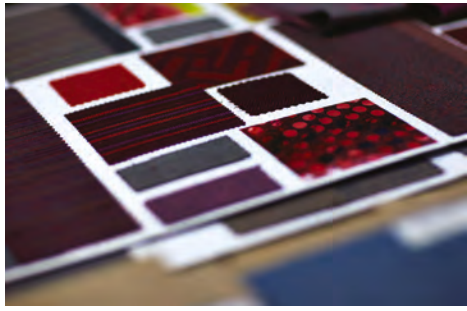
The aircraft interiors market is perhaps the most dynamic sector in aerospace, with exciting developments occurring throughout the industry. New product sectors, innovations and entrants are all emerging. Over the past year the interiors market has evolved considerably as a response to strong demand. In particular there have been great changes to the landscape in the areas of seating, lighting and IFEC.

SEATING

It has been a transformational year for the US\$3.7bn seating market. With a forecast 2014-2024 CAGR of 4.9%, the seating market still has one of the highest growth rates among the sectors in aircraft interiors. However, the market has been disrupted with the emergence of several new classes in seats.

The premium seating market continues to evolve, with high-density business class (HDBC) lie-flat seats and super business class (SBC) seats eroding the dedicated first class seating market. Several airlines around the world have implemented a reduction in their first class cabins. This trend will continue as the bar is raised by carriers flying super first class (SFC), and SFC and HDBC lie-flat seats take hold in the market. As a result, the first class (FC) market is





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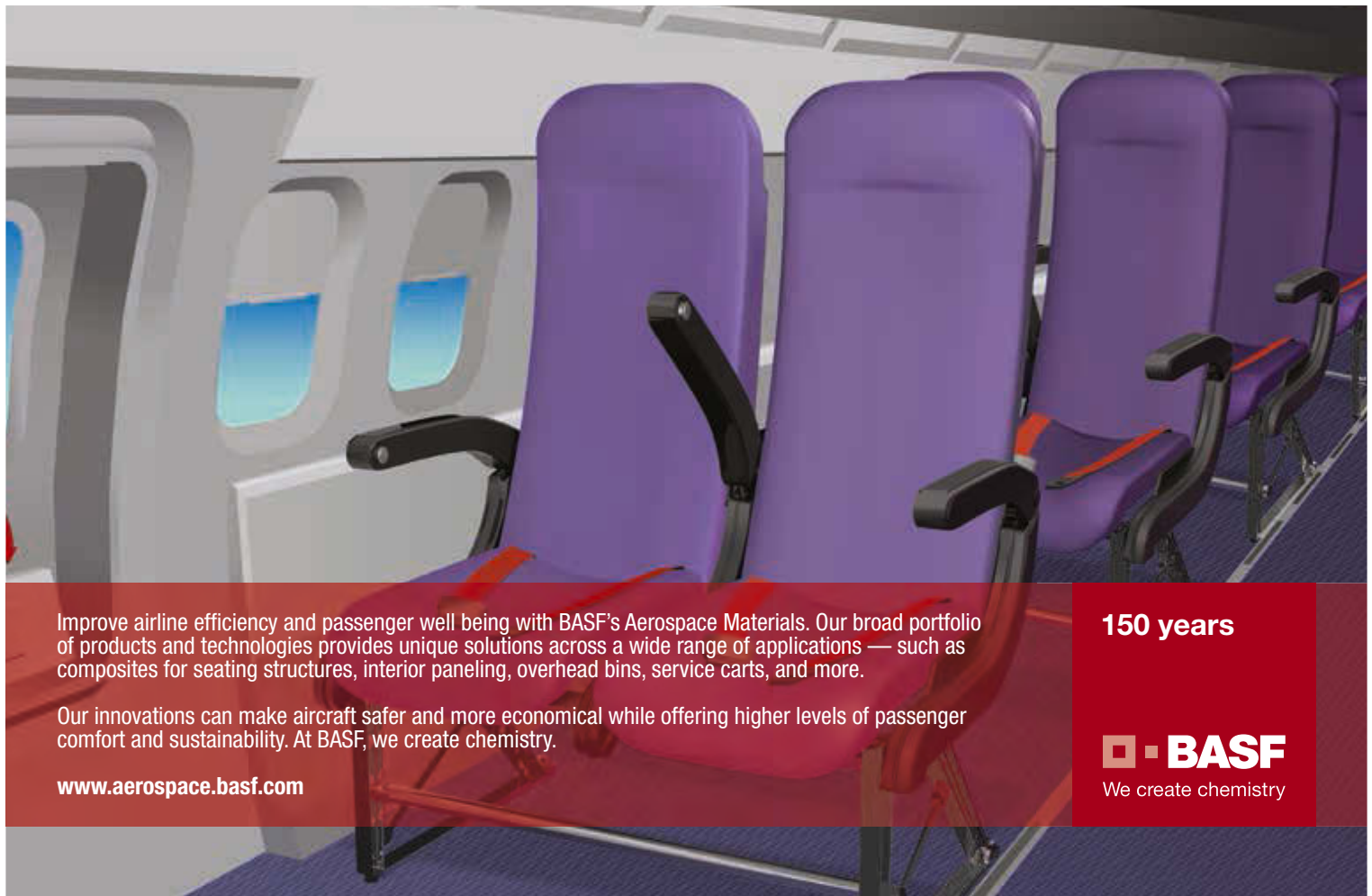
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“Premium economy seating has disrupted the aircraft seating market”

forecast to achieve a CAGR of -12.7% from 2014-2024. Most airlines use FC to attract high-yield business class (BC) corporate passengers, but most FC sectors are loss-making. For airlines, the real revenue is earned in the BC sector.

The economics of HDHC fully lie-flat seats for the airline, and passengers’ preference for them over angled lie-flat business seats, have combined to the demise of the latter.

The reduction in the FC market has been balanced with a rise in SBC fully lie-flat/HDHC, which is now forecast to achieve a CAGR of 8.7% from 2014-2024. This growth is driven largely by carriers in Asia and the Middle East. For instance in China airlines are reducing FC as government travel policies are being implemented.

Another disruption in the seating market over the past year has been the rise of single-aisle lie-flat (SALF) seating. Airlines are using this seat configuration to target flights ranging from five to seven hours. Once found only on Jet Blue, SALF seating can now be found on American Airlines and Delta. The team at Counterpoint envisions that this trend will not be limited to the USA, but will spread to other regions of the world in the coming years.

Premium economy seating has also disrupted the seating market. This sector has grown considerably for two reasons. First, it has been adopted by airlines and generates



revenue. Second, premium economy seats offer airlines an opportunity to attract corporate business class passengers who are no longer able to fly business class, and passengers who are looking to elevate their experience from economy. Premium economy offers airlines a lucrative middle ground between business class and economy seating.

LIGHTING

The US\$781 million lighting market is also undergoing a major transformation. LEDs have gone from being a trend to becoming standard throughout the industry. By the end of 2015 nearly all OE aircraft will be fitted with LED interior lighting. Airlines now have the ability to retrofit single-aisle aircraft with LED lighting overnight. The penetration of the aftermarket by LEDs is growing rapidly as retrofit kits are now being certified for all major aircraft types. The growth of LED lighting in both the OEM market and the aftermarket has been driven by improved technology, with 140-150 lm/W now possible, compared with 85-95 lm/W just 10 years ago.

Airlines also discovering the potential of LED mood lighting in cabin interiors. There is a growing body of evidence linking the quality of light to passenger mood. The higher the color index (CI) of an LED light, the closer it is to natural sunlight. The quality of lighting also affects the perception of the aircraft interior, with the ability to

Another major market disrupter is the rise of single-aisle lie-flat seating

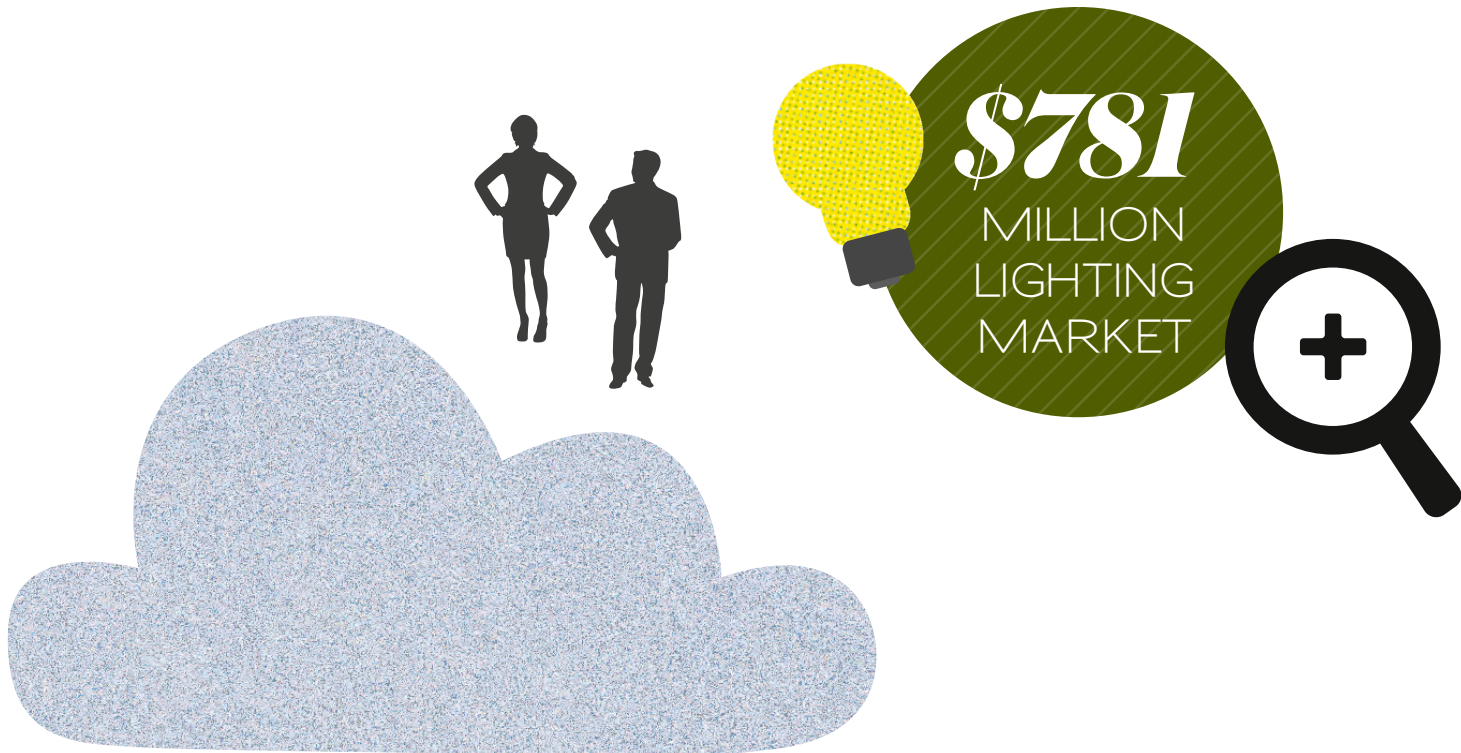
THE OVERALL MARKET

Following the success of its Commercial Aircraft Interiors 2014 report, Counterpoint Market Intelligence has released a new report on the US\$13.5bn cabin industry: Aircraft Interiors 2015. The disruptive changes outlined here (analyzed in detail in the new report) reflect the health of the aircraft interiors market.

The report segments the aircraft interiors market into seats, galleys, galley inserts, lavatories, crew rest compartments, monuments, cabin lighting, interior panels, luggage bins, IFE, inflight connectivity and floor coverings. The seating section is further segmented into 11 seat classes.

Counterpoint forecasts that the interiors market will grow at a CAGR of 4.6% over the next 10 years. This is greatly 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 aerostructures will have a CAGR of 2.8%





enhance or dilute it. LED mood and wash lighting gives airlines a powerful branding tool to separate themselves from competitors. Once solely the domain of wide-body aircraft, mood lighting is now increasingly being retrofitted on single-aisle aircraft.

IFEC

There are also disruptive changes arising in the IFEC market. While the past several years have witnessed a revolution in consumer electronics (iPads, smartphones, 4G internet), the aircraft interior IFEC market has been slow to evolve. As new technology is introduced and the costs of systems come down, this is now changing. The IFEC market is forecast to achieve a CAGR of 5.6% from 2014-2024.

In general, IFEC penetration on wide-bodies has historically been much higher. This is due to aircraft weight limits and passenger demand. IFEC hasn't traditionally been installed on single aisle aircraft, but this is changing. As the cost and weight of IFEC systems fall, they have greater appeal to the single-aisle market. Passengers increasingly expect to be able to connect to the internet onboard aircraft – even on short-haul flights. Connectivity will eventually become ubiquitous on both wide-body and single-aisle aircraft. The transition will be facilitated by the rise of wireless IFEC systems. The industry is at the dawn of the wireless cabin. New systems will be introduced over the coming years, such as Lumexis iPax, which offers an attractive combination of reduced cost and weight.

NEW ENTRANTS

Surging demand, strong growth rates and a desire by aircraft OEMs to diversify their supply chain have attracted

“Of all interiors subsegments, the seating market attracts the most new entrants”



several new entrants to the aircraft interiors market over the past few years.

Of all interiors subsegments, the seating market attracts the most new entrants, because there is more scope for introducing innovation. Counterpoint has identified that there are now 21 companies offering commercial airline seats, compared with just eight companies 10 years ago.

Some of the new entrants are established interiors suppliers that have entered from an adjacent market. For instance, Jamco came from nowhere in seats to becoming a catalog supplier for the A350. EnCore Aerospace, already an established galley and monument supplier, entered the seating market in April 2015 with its new economy seat and division called LIFT by EnCore. Other new entrants are completely new players in aircraft interiors, such as Acro Aircraft Seating in the UK, which is working with Saab and Fokker and has recently won major orders with Spirit and Frontier. Since entering the market in 2010, ZIM Flugsitz of Germany has won two major contracts to supply a total of more than 7,000 premium economy seats to Lufthansa and Singapore Airlines.

The influx of new entrants is not just limited to the seating market. Most are coming from two other sectors – cabin lighting and IFEC. Panasonic, one of the largest IFEC players and the largest LED manufacturer in the world,



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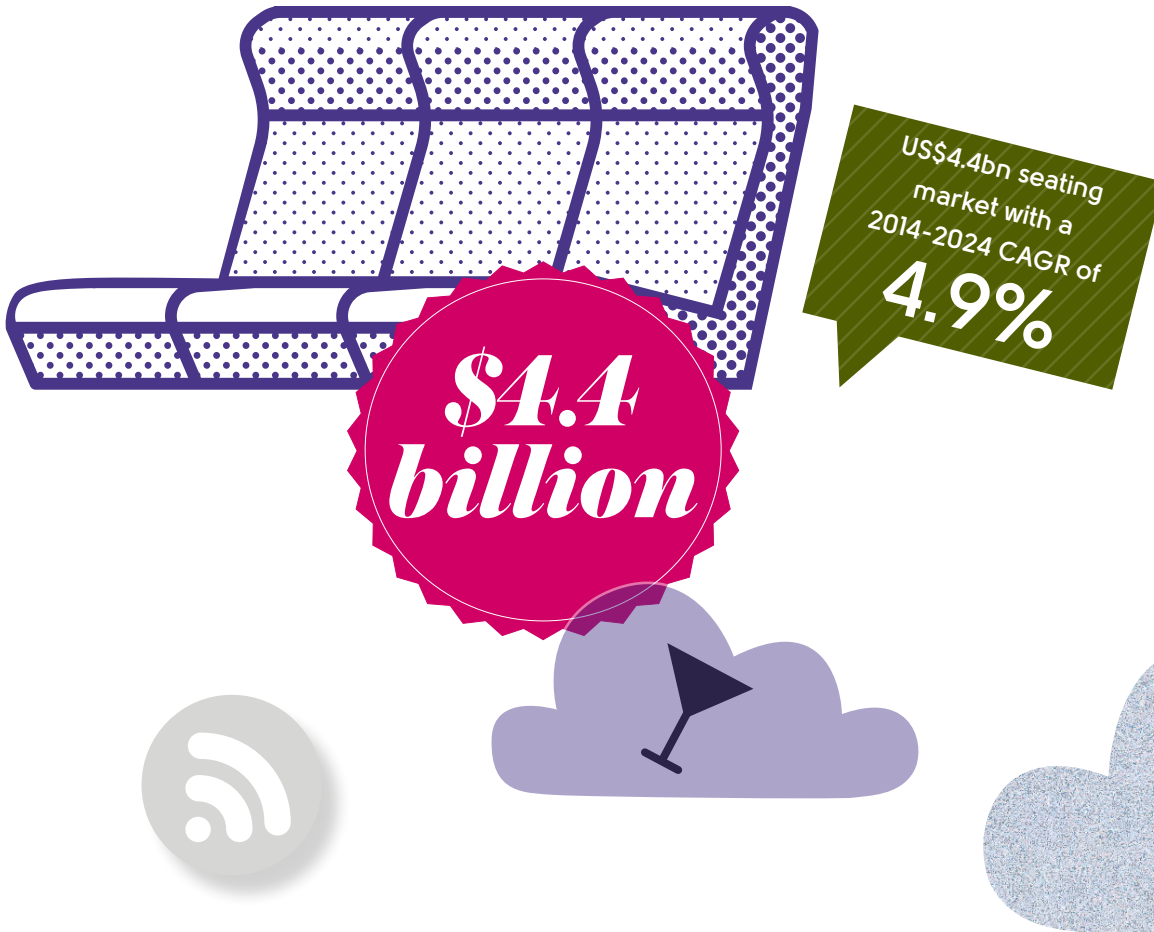
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“The aircraft interiors market will continue to evolve, attracting new entrants”

announced its intention to enter the aircraft cabin lighting market in October 2014. Similarly, digEcor entered the LED market from its position in IFEC in April 2015. Meanwhile Lumexis entered the IFE segment in 2010, with the decision by flydubai to install the company’s new fiber-optic-based product as a retrofit on 44 Boeing 737s.

HOW ARE THESE FIGURES GATHERED?

Counterpoint constructed its 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. For aircraft fleets, it was assumed that the proportion of aircraft in storage will remain roughly constant, and that commercial passenger aircraft have a service life of 25 years on average.

For new aircraft deliveries, Counterpoint’s 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, with assumptions for the growth in demand for air travel (RPKs), load factors, aircraft productivity and any changes in average aircraft

size. This culminated in 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 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 market sizes and estimation of market shares. Counterpoint tested its assumptions, dependencies and forecasts through discussions with people who work across the global interiors industry.

STILL FLYING HIGH

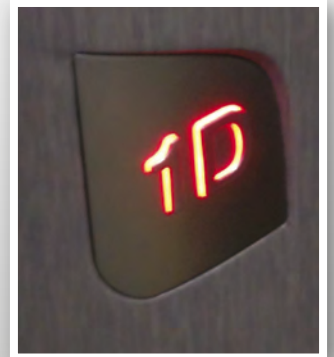
Why does the aircraft interiors market attract so much interest? In comparison with many other segments, the change is faster in aircraft interiors, and CAGRs can be much higher. As a result, the aircraft interiors market will continue to evolve, attracting new entrants and more striking innovations in the years to come. ☒



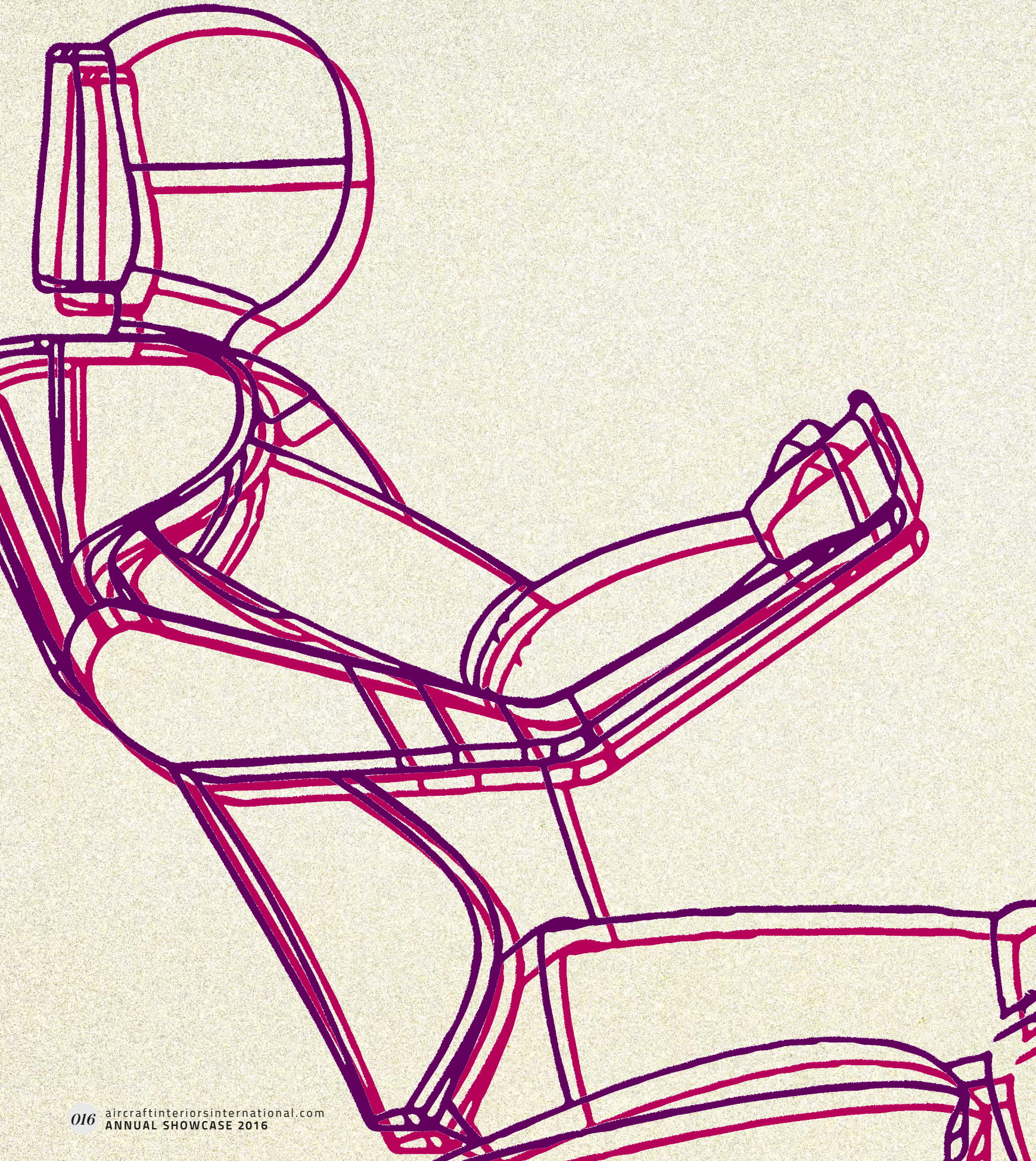
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comfort zone

THE LATEST RESEARCH INDICATES THAT THERE ARE MANY – SOMETIMES UNEXPECTED – FACTORS THAT INFLUENCE SEAT COMFORT, AND INDEED DISCOMFORT

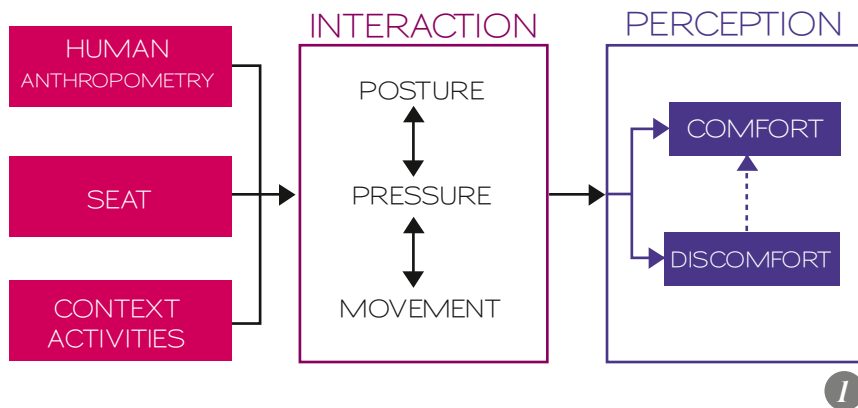
Words by Suzanne Hiemstra-van Mastrigt, Delft University of Technology, Netherlands

The first studies of passenger seat comfort appeared around 40 years ago, but dramatic changes in transportation have necessitated contemporary studies. More knowledge is needed about the influence of changing passenger body sizes, the activities of passengers, the properties of seating, and the comfort and discomfort perception of passengers. Thus the aim of this research has been to provide new knowledge on how to design comfortable passenger seats, as well as to provide recommendations for design and research. Not only are the numbers of passengers increasing, but also the cultural diversity of those passengers is increasing. Furthermore, a revolution in

information and communications technology (ICT) devices, applications and networks introduces a larger variation in the activities that passengers are able to perform while traveling.

COMFORT AND DISCOMFORT – A NEW MODEL

Comfort and discomfort are considered to be two separate entities, each with other underlying factors. Discomfort is related to physical factors such as pain, stiffness and numbness, whereas comfort is more related to factors such as well-being, space and relaxation. Discomfort is dominant, which means that comfort can only be perceived if discomfort is low or absent.



“The majority of passengers preferred adjustability options”

A literature review, conducted to map the current state of knowledge, resulted in a new conceptual model that illustrates the relationships between activities (context level), anthropometric variables (human level), and seat characteristics (seat level) on the one hand, and passenger comfort and discomfort on the other hand (see Figure 1). The characteristics at context, human and seat level together determine a passenger’s body posture, pressure distribution and movement, which in turn determine the level of comfort and discomfort the passenger perceives. Subsequently, experiments have been performed on aircraft seats, train seats and car seats, to provide a better and more practical foundation for the relationships in this comfort model.

CONTEXT FACTORS THAT INFLUENCE (DIS)COMFORT

Two examples of context factors that influence comfort and discomfort are the activities performed by the passenger and the duration of the journey. These influences are illustrated by two case studies. The first case study investigated the possibilities for working in the back seat of a car (see Figure 2). It appeared that the variation in body posture was restricted by the car interior, and that passengers missed having support for their arms or their devices (laptop, e-reader or tablet).

In the second case study, an experiment with three aircraft seats, discomfort was found to reduce significantly

Anthropometrics has the largest influence on posture and pressure

1. NEW MODEL FOR PASSENGER SEAT (DIS)COMFORT ON THE BASIS OF LITERATURE RESEARCH

2. PASSENGERS ADOPT DIFFERENT POSTURES WHILE PERFORMING DIFFERENT ACTIVITIES IN THE BACK SEAT OF A CAR

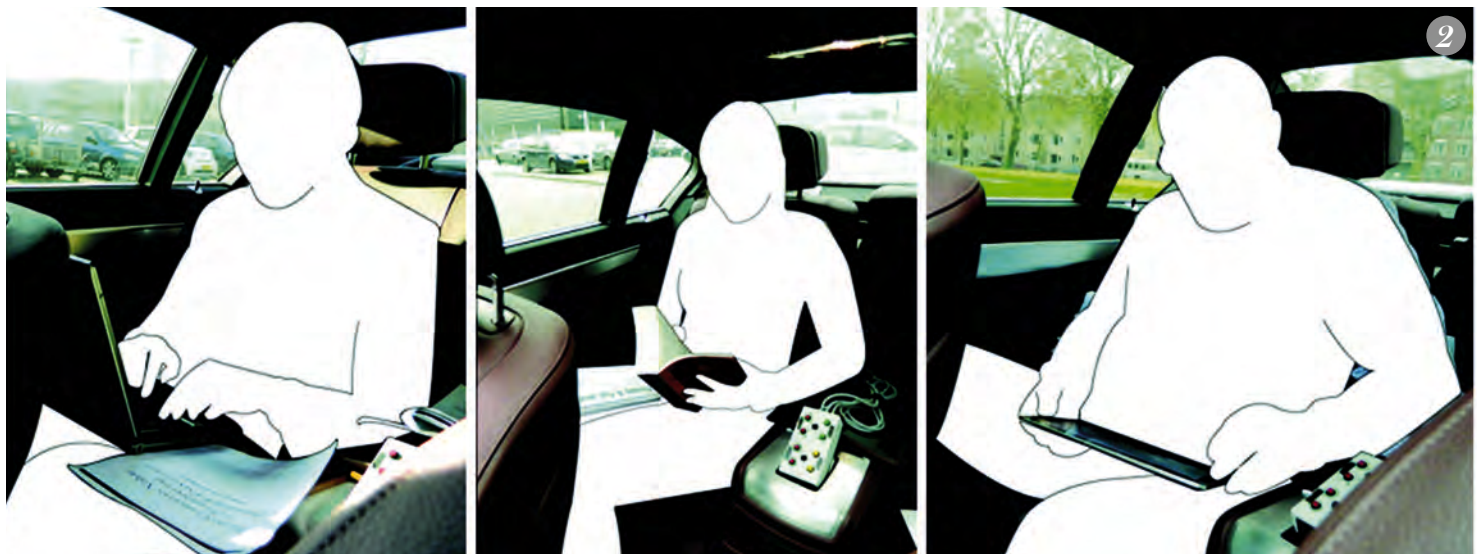
after participants were able to stand up after 1.5 hours of being seated. Furthermore, respondents from an online survey indicated that they felt most refreshed after walking through the aircraft, especially passengers on long-haul flights (six hours or longer).

In another study, in which 800 train passengers were observed, four main activities and eight corresponding postures were defined. Comfort scores were not significantly different between activities, except for headrest comfort, which was higher for viewing or sleeping activities compared with a reading activity. For nearly all activities, the majority of passengers preferred adjustability options to optimally fit the seat to the performed activity.

HUMAN FACTORS THAT INFLUENCE (DIS)COMFORT

Passengers’ body sizes, or anthropometrics, is the factor at a human level that has the largest influence on posture, pressure and movement, and thus on the perception of comfort or discomfort. This influence has also been illustrated by two case studies. The first case study compared the body measurements of passengers with the dimensions of three economy class aircraft seats, and found that 8-21% of passengers do not fit, based on seated hip width. This is due not to the width of the seat, but to the distance between the armrests.

In the second case study, also conducted on aircraft seats, the comfort and discomfort ratings were different



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“Active seating can be considered as a possibility for stimulating body movement”

discomfort; the most comfortable posture/activity was not necessarily the posture/activity with the least discomfort.

SEAT FACTORS THAT INFLUENCE (DIS)COMFORT

The influence of seat characteristics such as shape, material and dimensions on comfort and discomfort perception is also illustrated by two case studies. The first case study described how the design of innovative armrests could support the use of handheld devices in the back seat of a car (design by Sigrid van Veen; see Figure 3). When using the armrests, the neck flexion of passengers significantly decreased, thereby reducing discomfort in the neck.

In the second case study it was demonstrated how an ideal seat contour for aircraft seats could be designed using 3D scanning techniques (Figure 4). This could be an opportunity for a better fit to the human body and a more lightweight seat.

In another experiment, the use of ‘active seating’ has been evaluated. By using active seating, test passengers could control a game by activating sensors in the backrest of a car that respond to body movements. The results of this study showed that the comfort of car passengers can be improved by using active seating, as participants felt significantly more fit and more refreshed after playing the active seating game compared with other activities such as reading a book, working on a laptop, or gaming on a tablet. Additionally, higher muscle activity was measured during active seating, not only for the upper body (which was used to control the game sensors), but also for the upper legs.

Active seating can therefore be considered as a possibility for stimulating body movements. This year, BMW will launch the active seating option on its new 7-Series, as part of the BMW Vitality Programme.

A second experiment, regarding the comfort of train seat cushions, has shown that the comfort of the seat is also determined by the age of the cushions. Deterioration is not an aspect that is currently taken into account when considering comfort, but due to the frequent use of passenger seats in public transport, the quality (e.g. hardness) of the seat cushions reduces over time. Participants in this study preferred the softer, deteriorated train seat cushions, so the initial hardness of a cushion should be carefully selected, taking into account lifespan and aging properties.

RECOMMENDATIONS FOR DESIGN AND RESEARCH

The results of the previously described case studies and experiments have been translated into recommendations

between short and tall passengers. For example, shorter passengers mainly reported discomfort in the feet due to the seat height, which was too high for them (meaning their feet could not reach the floor), whereas tall passengers mainly reported discomfort in the neck, because they had to look too far down at the IFE screen.

Subsequently, in a series of two experiments, the comfort and discomfort of a train seat was evaluated for different activities and body postures. The goal of this study was to determine the ideal seat parameters for different combinations of activities and body postures (obtained from the previously mentioned observation study). The preferred seat pan length was found to be correlated to stature, while several other seat adjustments were found to be related to the performed activity, such as the table (lower and closer to the body for working on a laptop compared to reading) and the lumbar support (less pronounced for relaxing compared with other activities).

Another outcome of this study is that the headrest could be redesigned to support more variation in body posture and to provide more neck support, thereby increasing passenger comfort. Furthermore, this study has shown that the activities performed seem to influence the perception of

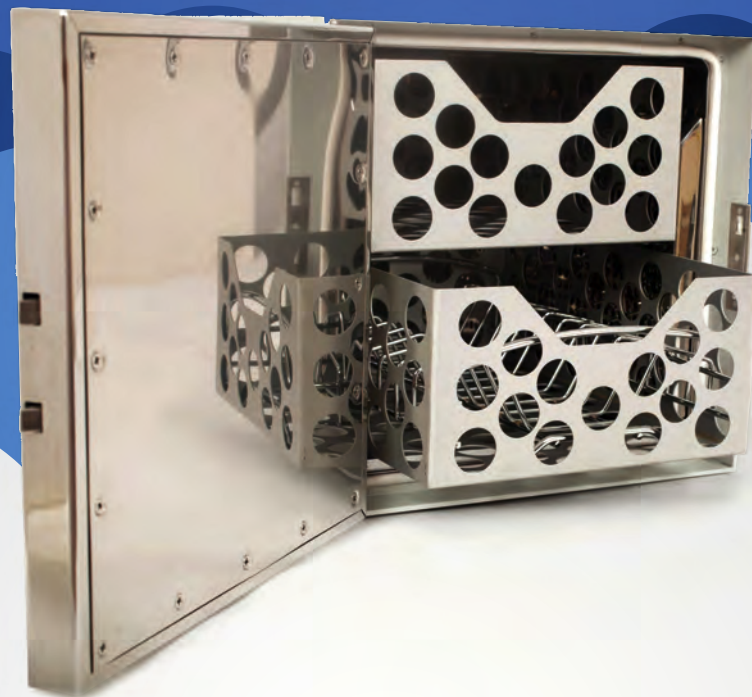
Initial hardness of a cushion should be selected taking into account its lifespan and aging

3. INNOVATIVE ARMRESTS TO SUPPORT HANDHELD DEVICE USE (DESIGN BY SIGRID VAN VEEN)

4. 3D SCANNING OF HUMAN BODY CONTOURS TO DETERMINE AN IDEAL SEAT CONTOUR



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for designers and researchers in the field of comfortable passenger seats, and have been summarized into a flowchart that can be applied for the design of passenger seats.

The flowchart is composed of nine successive steps, categorized into the three levels: context, human and seat. It is advisable to start the process by determining relevant context factors, which consist of the area of use, the duration of the journey, and the activities the seat should facilitate.

On the basis of these context characteristics, the corresponding characteristics at a human level can then be defined: the body dimensions of the intended target group, the desired movement of the body (possible variation in posture) and the preferred body support (for performing different activities). This leads to a specification of the starting points for seat design: seat dimensions, seat adjustability and necessary seat elements.

5. A PROTOTYPE BMW 7-SERIES WITH ACTIVE SEATING INSTALLED ON THE BACK SEAT

6. FLOWCHART FOR THE PROPOSED DESIGN APPROACH FOR PASSENGER SEATS

“The concept of comfort and discomfort remains controversial”

The concept of comfort and discomfort remains controversial, but the model proposed here tries to give seat designers more practical recommendations on designing for comfort. The flowchart is almost exclusively based on experiment results and should be validated. Recommendations for future research include the development of a predictive model, which can support seat designers during the design process, and takes into account the context, activities and target group. Finally, the relevance for industry is illustrated by considerations for research and development, as well as considerations for the purchase of passenger seats.

CONCLUSION

The results from this research can be used by designers and researchers to help anticipate the changing demographics of the passenger population, changing technologies, and changing activities that passengers perform, thereby contributing to a more pleasant traveling experience for passengers, which promotes their well-being. ☒

ABOUT THE AUTHOR

Dr Suzanne Hiemstra-van Mastrigt is currently a post-doctoral researcher at Delft University of Technology (TU Delft), in the Faculty of Industrial Design Engineering. Her research focuses on the reduction of travel time at the airport in order to enhance the passenger experience. She is also developing innovative designs for future airports and aircraft, as part of the European H2020 PASSME (Personalized Airport Systems for Seamless Mobility and Experience) project. Her PhD thesis ‘Comfortable passenger seats: Recommendations for design and research’ can be downloaded from the TU Delft repository (repository.tudelft.nl)

6

1. DETERMINE	2. DEFINE	3. DESIGN
CONTEXT	HUMAN	SEAT
A) AREA OF USE	A) BODY DIMENSIONS	A) SEAT DIMENSIONS
B) DURATION	B) BODY MOVEMENT	B) SEAT ADJUSTABILITY
C) ACTIVITIES	C) BODY SUPPORT	C) SEAT ELEMENTS

SUPPORT GROUP

The technology that passengers bring on board an aircraft is an important factor in their comfort. For example, to be comfortable, laptop users require an upright backrest, armrests that support the lower arms and wrists parallel with the tray table, and the table itself should be low and close to the body. Smartphone or tablet users meanwhile do not need a table, but

they do need the armrests to be high in order to support their hands and reduce neck flexion.

As new technologies enter the market, such as smart glasses and smartwatches, passengers will adopt different postures requiring different types of body support, which can be translated into new seat elements.

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DESIGN DIRECTORY

THE DESIGN EXPERTS IN THIS ISSUE ARE AMONG THE FINEST IN THE WORLD. THIS BRIEF GUIDE SHOWS WHO THEY ARE, WHAT THEY HAVE BEEN DOING, AND WHAT THEY HAVE PLANNED



ACUMEN



AIM ALTITUDE



ALMADESIGN

1. AIM ALTITUDE
MANUFACTURES THE BAR
FOR VIRGIN ATLANTIC'S
DREAMLINERS

ACUMEN

Location: London, UK

Founded: 1981

Employees: 17

Experience: Premium aircraft interiors in both the commercial and private sectors, including galleys, seating, lavatories, cabin linings, rest areas, CMF development, and passenger experiences.

Work over the past year: With over 35 airline programs completed to date, few companies have helped to shape the industry in a more fundamental capacity. The past year has seen the launch of multiple Acumen-designed aircraft products including premium seating products for China Eastern, American Airlines, Recaro and the world-renowned Etihad A380 and B787 interiors.

What's coming in the next year: Acumen continues to combine blue-sky thinking with practical implementation to deliver real innovation in the aircraft interiors market. Acumen is currently working on a number of commissioned but undisclosed projects for airlines around the world.

AIM ALTITUDE

Location: Bournemouth, Byfleet, Dafen and Waterbeach, UK; Auckland and Christchurch, NZ

Founded: 1920s (Jecco)

Employees: 1,000

Experience: Premium bars and lounge areas; special monuments; front-row monuments for premium cabins; galleys

and stowages; partitions and dividers; design, engineering and manufacturing; certification and testing; composites.

Work over the past year: AIM Altitude has continued to supply the iconic A380 horseshoe bars for Emirates Airline and the stunning new bar and lounge area for Qatar's A380, in addition to manufacturing bars for Virgin Atlantic's growing fleet of Boeing 787s. The team has also been working with a number of other airline customers on the design and manufacture of new Door 2 bar complexes for a range of wide-body platforms, including the Boeing 777 and the Airbus A330, which will be revealed as they enter service. AIM Altitude has also been developing galley products for existing and new wide-body platforms.

What's coming in the next year: AIM Altitude will continue galley development work on existing and new wide-body platforms for both major OEMs and will also be undertaking a significant new factory build at its Bournemouth Airport location. The new factory will be 160,000ft² and will consolidate existing facilities, as well as providing expansion space to support future growth plans. The company will also be working on a number of design, engineering and supply chain initiatives, looking to simplify design and structures, and develop products with reduced weight.



ALMADESIGN

Location: Lisbon, Portugal

Founded: 1997

Employees: 10

Experience: Cabin interior design (including lavatories, galleys); CMF design; product customization; conceptual projects.

Work over the past year: Over the past 12 months, Almadesign has been working on the newFACE project, an R&D project for future aircraft configurations for eco-efficiency, which has resulted in three different concepts for commercial aircraft (the BoxWing), business jets (the V-Tail), and the Utility aircraft. The studio has also been working on the desAIR project, a business jet galley that developed high-performance composite solutions with natural materials (cork), which was awarded a National Design Prize. Almadesign has also been working with an airline for the definition of CMF and for component customization, including monuments and seats.

What's coming in the next year: Almadesign will be working on the PASSME project – Personalized Airport Systems for Seamless Mobility and Experience – a European project to deliver real-time savings for aircraft passengers. Almadesign will also be working on some newFACE aeronautic spin-off projects.

B/E AEROSPACE ADVANCED DESIGN GROUP

Location: Winston-Salem, North Carolina, USA

Founded: 1987

Experience: B/E Aerospace is a world-leading manufacturer of aircraft cabin interior products. The B/E Aerospace Advanced Design Group is an award-winning leader in the design and development of cabin interior products.

DESIGN Q

Location: Redditch, UK

Founded: 1997

Employees: 17 permanent staff plus contractors

Experience: Invention, industrial design and prototyping; graphic design and marketing; high-resolution 3D renderings and walkthrough animation; seating; branding color and material specification; full-scale mock-ups; full aircraft interior design; flight decks; cabins, galleys, bars, lavatories, seating.

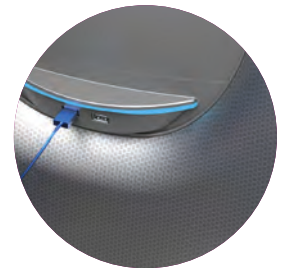
Work over the past year: Design Q continues to support the world's largest-ever luxury marketing prototype: the Global 7000 for Bombardier, which represents a new standard in business jet interior design. Design Q has worked on a good selection of projects



2. DESIGN Q HAS BEEN BUSY TACKLING MANY PROJECTS THIS YEAR, INCLUDING SEVERAL BUSINESS JET CABIN DESIGNS

this past year, including the rebranding and design of an airline interior, following a successful interior rebranding project for Thomas Cook the previous year. A new unique Global 6000 was successfully handed over to a happy customer, and by contrast a one-off Maserati with new coachwork and interior was also delivered. Lavatory and galley redesigns, along with new seating developments, have been progressing to date, and new lighting products certified and flying since June 2015.

What's coming in the next year: 2016 promises to be more exciting and challenging than ever for the studio.



B/E AEROSPACE



DESIGN Q



dSIGN VERTTI KIVI



FACTORYDESIGN

dSIGN VERTTI KIVI

Location: Helsinki, Finland

Founded: 1993

Experience: dSign Vertti Kivi & Co is an award-winning interior design agency based in Helsinki, Finland. Since 1993, the studio has completed more than 1,000 projects and served hundreds of clients around the globe. Projects have varied from Michelin-starred restaurants and boutique hotels, office and retail spaces to cruise ships and of course aircraft interiors.

FACTORYDESIGN

Location: London, UK

Founded: 1997

Experience: Embracing the entire passenger experience, there is nothing in an aircraft cabin that Factorydesign cannot design. From exclusive VIP and premium travel experiences, to catering equipment and products for the demanding low-cost market, the team's expertise is in the interpretation of brand characteristics and values, and converting them into category-leading products and passenger experiences.



FORMATION DESIGN



JPA DESIGN



Work over the past year: The Factorydesign team has continued to expand its aviation portfolio, working for airlines such as Etihad Airways, Aer Lingus, Scandinavian Airlines; and manufacturers including Thompson Aero Seating, Acro Aircraft Seating and Ipeco. Projects such as the Four Seasons Jet and The Residence on the Etihad Airways A380 remain unique VIP experiences. As the studio's activity in aviation increases, so its team grows ever stronger. Factorydesign took a significant step to share ownership of the company with key staff members, implemented in the knowledge that the team is as talented and experienced as it has ever been.

What's coming in the next year: The Factorydesign team will continue to do work they love for people they like, through repeat business for existing clients, as well as innovative projects for new customers. They have exciting partnerships, and are building new ones, which will continue to expand the studio's network around the world and add complementary skills to their offer. Beyond that, there is little Factorydesign can reveal, but they are not alone in that...

FORMATION DESIGN GROUP

Location: Atlanta, Georgia, USA
Founded: 1999
Employees: 13
Experience: Seating, galleys and cabin design.



- 3. FACTORYDESIGN WORKED ON ETIHAD'S RESIDENCE, A MILESTONE IN COMMERCIAL AVIATION
- 4. THE BUSINESS SUITES IN FORMATION'S INTRIGUING LAYERED CONCEPT. SEE P66 FOR DETAILS
- 5. JPA DESIGN CREATED THIS SEATBACK FOR SINGAPORE AIRLINES' PREMIUM ECONOMY

Work over the past year: Formation has been working on numerous seating projects that will be shown at the 2016 Aircraft Interiors Expo. Formation was a 2015 Crystal Cabin Award finalist with the Jazz economy seat, which the studio designed and prototyped for B/E Aerospace in collaboration with Panasonic and Teague.

What's coming in the next year: Besides seating and cabin design work with clients, Formation is also continuing to develop high-density lie-flat seating concepts, including a premium suite that is situated between higher density groupings of lie-flat seats (more details on page 66).

JPA DESIGN

Location: London and Singapore
Founded: 1982
Employees: 45-50
Experience: Air: aircraft cabin design (all classes), galleys, lavatories, welcome zones, seating customization, blue-sky seat design, inflight branded goods, co-development (airframe and cabin product manufacturers), IFE interfaces, crew uniforms, aircraft livery, brand development, lighting design, CMF.
 Ground: premium airport check-in (first and business class), premium airline lounges, automated passenger management systems.

Work over the past year: As well as designing the interiors for the 40 luxury villas at Cape Weligama for the Dilmah Group, and the latest luxury train from Belmond – The Grand Hibernian – JPA has launched two seating solutions into the market: the long-haul premium economy seat for Singapore Airlines, and the DoveTail business class seat from Jamco. JPA was also recently appointed by Garuda – Indonesia's five-star airline – to develop the interiors and seating solutions for its new fleet.

What's coming in the next year: JPA London will be relocating into a larger space, allowing for an increased capacity of its London team. JPA will also be establishing



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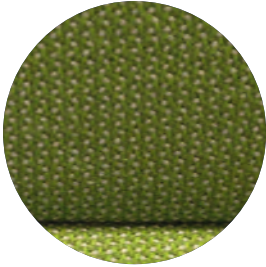


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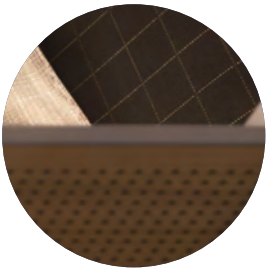
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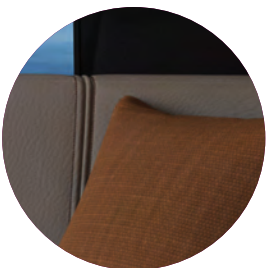
LIFT



MÜLLER | ROMCA



PRIESTMANGOODE



SEYMOURPOWELL

a presence in the Middle East to enable local support for clients across the transportation and hospitality sectors. There will also be a number of new announcements throughout the year as key projects reach their respective launch phases.

LIFT STRATEGIC DESIGN

Location: Tokyo, Japan

Founded: 2009

Employees: Varies

Experience: Cabin and seat design/styling, brand design, passenger experience development.

Work over the past year: Cabin design and uniform design for HK Express, cabin design for Philippine Airlines, a project with Icelandair, and follow-up work for the Orbis next-generation Flying Eye Hospital.

What's coming in the next year: Three new cabin and passenger experience programs.

MÜLLER | ROMCA

Location: Kiel/Hamburg, Germany

Founded: 1993

Employees: 7

Experience: Galleys, lavatories, IFE, cabin design, product customization, seat design.

Work over the past year: Lufthansa premium economy seat adaption to the A350, Diehl Comfort Modules lavatory design, Diehl Service Modules galley design, a Siemens high-speed train interior and exterior design, and design of various capital goods.

What's coming in the next year: Diehl Comfort Modules lavatory designs, Diehl Service Modules galley designs, high-speed train interior and exterior design. Design of vessel interiors, and design of a ship's technical equipment.

PRIESTMANGOODE

Location: London, UK and Qingdao, China

Founded: 1989

Employees: 50+

Experience: Creating seamless brand

experiences across all touchpoints of the passenger journey, from the airport to on board the aircraft.

Work over the past year: PriestmanGoode has been growing its studio to become a leading center for aviation design. Over the past 12 months, new cabins for Swiss International Airlines, Korean Air, United Airlines and Qatar Airways have been launched. PriestmanGoode also won a Crystal Cabin Award in Industrial Design and Visionary Concepts for the Embraer E2 Jet, designed in partnership with Embraer.

What's coming in the next year: PriestmanGoode's work covers the journey from home to destination, and it regularly develops stepped programs that help clients achieve a holistic passenger experience across its entire fleet and services. Over the next 12 months, PriestmanGoode will continue to work on exciting new projects for existing and new clients, doing all it can to take the airline experience to the next level.

SEYMOURPOWELL

Location: London, UK

Founded: 1984

Experience: Seymourpowell provides a range of research, design strategy and design and innovation services, including rail exterior and interior design for Bombardier, Siemens, Midland Mainline and Alstom; aerospace interiors including cockpit seating and linings for Virgin Galactic, Bell Helicopter, Bombardier Business Aircraft, Lufthansa Technik and Cathay Pacific; automotive interior and exterior design and innovation for Ford UK and USA, Toyota, Honda and GM; automotive two-wheeler development for BMW, MuZ, Yamaha, Hong Leong, TVS Suzuki (India) and Intelligent Energy.



6. TANGERINE CREATED A REALLY SPECIAL PRODUCT FOR VIRGIN AUSTRALIA'S A330 AND B777 RETROFITS

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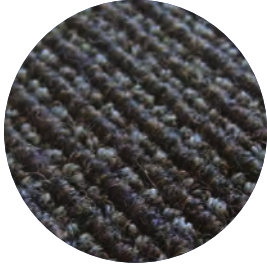
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TANGERINE



TEAGUE



ZEO

7. TEAGUE'S POPPI CONCEPT OFFERS SOMETHING A LITTLE DIFFERENT TO MIDDLE SEAT PASSENGERS. SEE P34 FOR MORE DETAILS

TANGERINE

Location: London, UK; Seoul, South Korea; Porto Alegre, Brazil

Founded: 1989

Employees: 25

Experience: Brand and corporate identity; brand experience through cabin and seating design and CMF design; product innovation spanning from creating innovative spatial seating concepts to the full engineering of working prototypes; customer experience design spanning all hard to soft experience elements; customization of catalog seating, from minimal to moderate change; design of customized monuments, including bars and lounges, galleys and lavatories; user experience and user interface design (IFE systems), including in-the-air and on-the-ground services.

Work over the past year: For Azul, the tangerine team had 11 months to improve the catalog business class seat, and to design and develop the trim and finish for the seating and cabin in two classes. They created new cabin elements and delivered all of these to work for both A330 and A350 aircraft types, while meeting certification requirements. For Virgin Australia they designed the cabin for its A330 and B777 retrofits, heavily customizing catalog seating and creating unique bars for business and premium economy. tangerine designed all of the seat and cabin trim and finish, the mood lighting and the seat control GUI.

What's coming in the next year: Over the next 12 months, Tangerine will build on its design strategy consultancy, working closely with seating and monument manufacturers. The studio intends to use its knowledge of the airline industry's certification requirements, garnered from over 20 years of working within the sector, to push forward with paradigm-shifting product innovation.

TEAGUE

Location: Seattle, Washington, USA and Munich, Germany

Founded: 1926

Employees: 300

Experience: Cabin design, product design,



custom architecture, monuments and features, lighting design, lavatories, galleys, seat design, IFE, brand expression, digital design, passenger experience.

Work over the past year: Most recently, Teague has worked with OEMs, suppliers and airlines to solve problems in ways that break new ground – the type of work that requires vision and deep technical expertise, as well as a strong point-of-view about how to create cohesive experiences for passengers and enhance revenue for operators. The studio has touched every part of the passenger experience, working on hundreds of projects in the past year, from developing apps and new devices, to seating solutions, new lighting technologies and custom architectures.

What's coming in the next year: Teague will seek out new partners and new opportunities to innovate at the intersection of travel and technology, designing products, services, and experiences that positively impact clients' businesses and the lives of its customers.

TTF AEROSPACE

Location: Auburn, Washington, USA

Founded: 1999

Experience: TTF has extensive experience in galleys, lavatories, crew rests, overhead stow bins and aircraft interiors.

ZEO

Location: Huntington Beach, California, USA

Founded: 2011

Experience: As the design and innovation studio of Zodiac Aerospace, ZEO offers design, integration and prototyping of the full range of aircraft interior products. ☒



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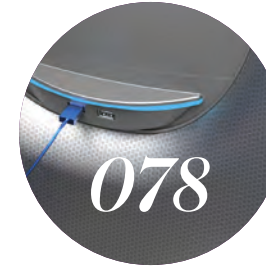
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LIFT STRATEGIC DESIGN

FUTURE VISION

Devin Liddell, principal brand strategist at Teague, envisions the airline of the future

The biggest enemy of today's airlines isn't cut-throat competition or complex regulatory processes – it's the status quo. Conventional thinking about the way we structure and operate our businesses leaves us vulnerable to the innovations of others. This is how Uber upended the taxicab industry, and how Airbnb is challenging hoteliers. Yes, barriers to entry in the airline industry are high, but the industry's current trajectory of taking more and giving less to increasingly dissatisfied passengers is a perfect setup for disruptive innovations.

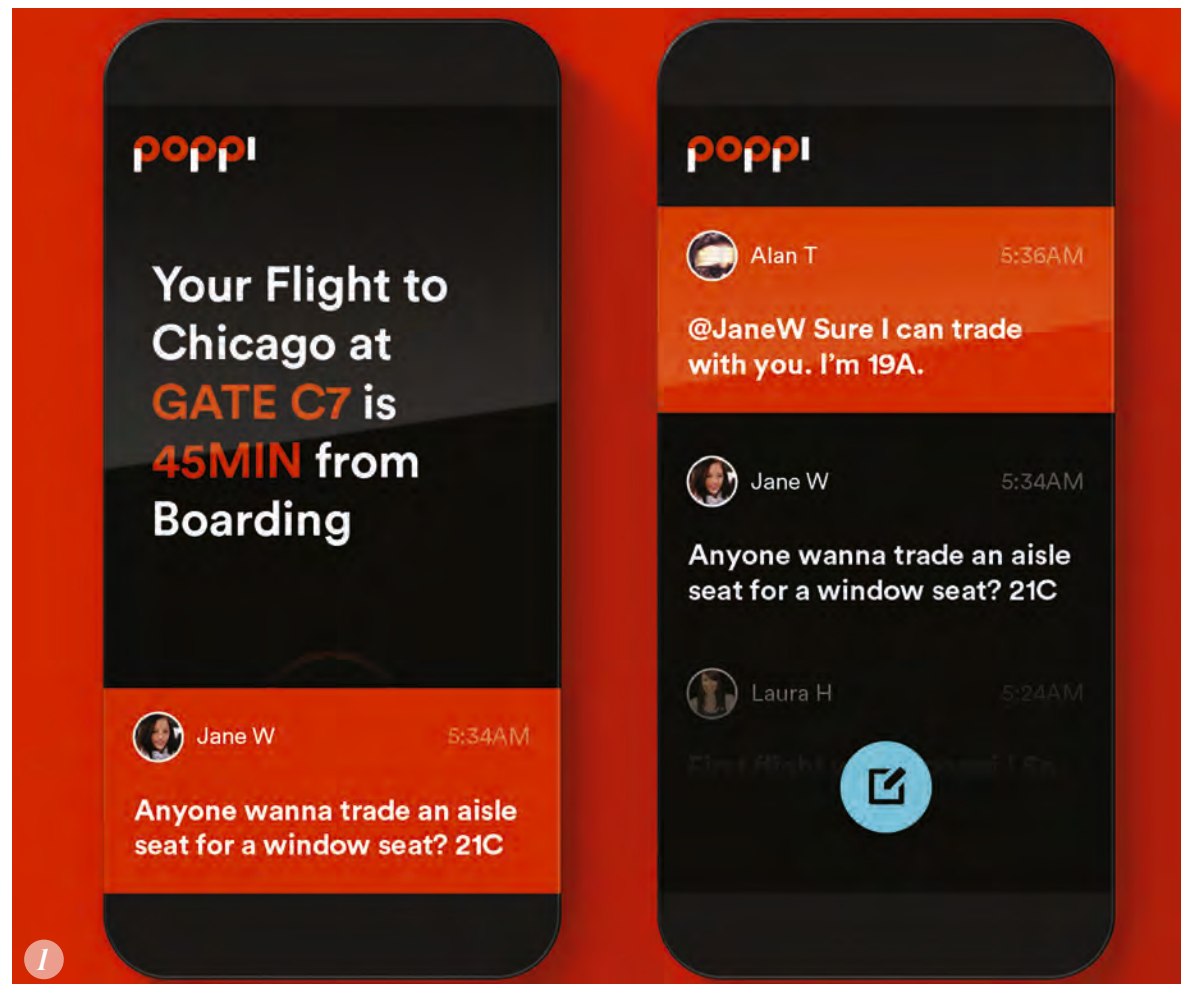
But what if we could anticipate those disruptive innovations? This question inspired Teague to design an airline of the future – a start-up airline unencumbered by the status quo. Through this exercise of prototyping a future airline, Teague sought to illuminate new ways forward for airlines operating today.

FOUNDATIONAL BELIEFS

Like any startup, Teague's airline of the future – nicknamed Poppi – began with founding beliefs about its reason for being. These core beliefs are often missing from modern airline brands due to merger and acquisition activity that tends to dilute the original ideas of company cultures. People will pay more for a brand that believes in something, but today's airlines don't trade in those emotional currencies: they trade in commoditized fares and route structures.

The Poppi team developed a small set of company principles to inspire everything the airline would do. First, Poppi values 'love over loyalty', which is about creating an airline that passengers love in the same way they love Nike, Netflix, or Levi's – and earning the higher margins and resistance to competitive pressures that love delivers. Conversely, loyalty is a myth in the airline industry, with passengers participating in the loyalty programs of so many airlines that the concept has become oxymoronic.

Second, Poppi is organized around the ability of the airline to 'know the journey',



a promise to understand passengers' context across the travel experience and proactively deliver in-the-moment support based on that context. Today's airlines generally do a poor job of transparently communicating what's happening now and what will happen next – for proof, see passengers at a gate asking each other what rows are now boarding.

Lastly, Poppi is structured as a business around the concept that 'membership matters'. Membership models are no longer the exclusive domain of bulk goods warehouses and health clubs, with the emergence of member-driven models at Amazon (nearly half of all Amazon customers are Amazon Prime members) and Starbucks (the company

makes 8% of its profit from interest, largely from the billions of dollars loaded onto its payment platforms), among others.

THE PROVOCATIONS

The Teague team designed extensive products, services and experiences for Poppi, treating the brand like a soon-to-launch airline as much as possible. The team also set two core objectives: enhance the passenger experience and enhance airline profitability, always connecting these objectives back to the three principles as well as the need to prototype future innovations that today's airlines could replicate now. Among these innovations, three deserve particular attention.

"POPPI'S PROMOTIONAL CLASS IS A PIONEER IN CO-MAKING SPONSORSHIP REVENUE"

poppi

Your Flight to
Chicago is
NOW Boarding
YOUR ZONE



Teague explored everything from Amazon to Starbucks to sports teams

1. POPPI HAS SECONDARY MARKETPLACES FOR EVERYTHING FROM TICKET RE-SALE TO SEAT SWAPPING

2. ALL MIDDLE SEATS ARE 'PROMOTIONAL CLASS', A TOUCHPOINT WHERE OTHER BRANDS CAN BE PART OF THE CABIN EXPERIENCE

NO CABIN BAGGAGE

The airline industry is drunk on bag fees. These fees bolster bottom lines, but for passengers they are often considered as a fine for doing business with an airline. And that's not how you get to be loved.

Moreover, these bag fees incentivize passengers to carry on bags they shouldn't, cluttering gates and slowing boarding processes to a crawl. The answer to this problem is simple: no cabin luggage at all. That's why Poppi's B777 aircraft feature 'fedora bins' that hold only personal items, such as computer bags and jackets. All luggage is checked with RFID-enabled tags to assure passengers that their bags are where they're supposed to be.

Poppi makes up for lost checked-bag fees through premium pricing that includes point-to-point delivery to hotels, transit lockers, parking facilities, and even car trunks. And there are other benefits: fedora bins remove approximately 1,800kg from a B777 cabin architecture, which would save today's largest operator of B777s more than US\$25m in fuel per year. Finally, fedora bins would increase boarding process speeds by up to 71%.

MEMBER-DRIVEN MARKETPLACES

Teague's exploration of emerging business models from Amazon and Starbucks also included the unique practices of professional sports teams and leagues.

These global businesses earn significant, turnover-resistant revenue from season-ticket holders, who typically prepay for their tickets as much as a year in advance. On top of this interest-generating revenue, six out of the 10 biggest sports leagues in the world, including the NFL and NBA (USA), Barclay's Premier League (UK) and Bundesliga (Germany), operate fan-to-fan ticket exchanges. From a revenue standpoint, this means the teams and leagues earn prepaid revenue from season-ticket holders, and then generate additional commission revenue when those fans sell their tickets to others.

For consumers, this 'buy-in' arrangement of prepayment pivots them from customers to members, complete with an important sense of belonging, cementing their relationship with the brands on an emotional level. Poppi borrows extensively from these lessons in a number of ways, most notably through the operation of secondary marketplaces for everything from ticket re-sale to seat swapping, and the development of branded artifacts that communicate

There is no cabin luggage on board Poppi: only fedora bins for small personal items



membership in ways more akin to a lifestyle brand.

PROMOTIONAL CLASS

The economy middle seat needs some love. Currently, the middle seat is often viewed as a punishment for booking late on full flights. But it doesn't need to be this way; the middle seat should be reconceived as valuable space for unique experiences. With this in mind, all of Poppi's middle seats are featured as 'promotional class', a brand touchpoint within a brand touchpoint wherein other brands participate in the cabin experience by bringing something special to middle-seat passengers.

The seats themselves are visually designated to represent the sponsors, and feature both exclusive inflight experiences and after-flight takeaways. On some routes, Poppi's promotional class could be sponsored by Beats or Microsoft, for example. On another route, Uniqlo or Adidas. And the word 'sponsor' is important here: Poppi's promotional class is a pioneer in co-making sponsorship revenue – commanding fees from the sponsor brands. This marketplace is there if we create it.

“LOVE OVER LOYALTY WILL REQUIRE AIRLINES TO ADD VALUE TO PASSENGERS' LIVES BOTH INSIDE AND OUTSIDE THE CABIN”

WHAT DO WE NEED TO DO?

Each of these provocations – and many others within the Poppi concept – point to the unique requirements of airlines in the future. First, offering products, services and environments that are contextually aware of the traveler's needs – knowing their journey – will require airlines to become technology companies. To put this requirement in perspective from another transportation category, Uber's full legal name is, tellingly, Uber Technologies.

Second, airlines will need to look and act like – and become – lifestyle brands. Love over loyalty will require airlines to add value to passengers' lives both inside and outside the cabin. The existence of Pan Am retail stores, where consumers purchase branded artifacts

from a defunct airline, show this latent interest that today's airlines have not fully grasped.

Finally, airlines of the future will need to transform their bottom lines and their relationships with passengers through membership-driven business models. These models inspire a level of brand buy-in that will help airlines climb out of the fare-as-commodity trap. And climbing out of that trap is necessary to creating a future of belief-driven brands that earn high margins for what they give passengers, rather than for what they take. ✕

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TEAGUE

SUPERBRAND SUPERSTAR

By thinking of themselves not just as air carriers, but as superbrands, airlines can elevate their passenger offer and reap many rewards

Over the past couple of years, we have been talking increasingly about the importance of branding to create consistent, remarkable passenger journeys. European airlines were the first to use design as a differentiation tool, but today these airlines face competition from all corners of the world, especially Asia and the Middle East, where airlines are investing heavily in their cabin experiences. In order to stand out in today's highly competitive market, airlines need to become superbrands.

The concept of a superbrand is something that we see across other industries – automotive in particular – but that has yet to have a noticeable effect on the way the aviation sector operates. Our extensive experience in aviation and diverse portfolio across other industries, including hospitality and transport, has proved a unique tool to enable us to elevate airlines into superbrand territory.

According to Superbrand, a leading organization involved in branding, a superbrand is one that has “established a top reputation in its respective market segment and in the market as a whole. It offers its public substantial tangible or perceived advantages over its competition, which the public (consciously or subconsciously) recognizes and requires.”

That reputation will come from a number of things, including an outstanding



1



2

product and unparalleled service. While design today is more readily recognized as a driving force in creating better products, it is also intrinsic to the latter. Design is a tool that, when used from the outset, can enable airlines to deliver a better service.

In recent years PriestmanGoode has established its studio as a center for excellence in aviation design. Based in London, the team includes designers, brand specialists, CMF (color, material and finish) experts and visualizers. To help clients elevate their brands, the studio works in close partnership with their various teams including marketing, engineering, crew and maintenance. Each team has different

needs, but being able to create a product that answers all of them will help the airline deliver a better service and thus establish a top reputation in its market.

On the interiors product front, our dedication to research and development and to creating bespoke products will serve airline clients well. Adopting such products demonstrates to flyers that an airline is willing to continuously invest in order to provide its passengers with the very best experience. Our most recently launched cabin interiors, for instance for Swiss International Airlines (SWISS), Korean Air, Qatar Airways and the new first class seat for United Airlines'

"IN ORDER TO STAND OUT IN TODAY'S MARKET, AIRLINES NEED TO BECOME SUPERBRANDS"

Gaining superbrand status reaps rewards in terms of perception and profit



1. A CLEAN, PRECISE AESTHETIC IN SWISS'S FIRST CLASS SUITES REFLECTS THE AIRLINE'S VALUES
2. EUROPEAN OAK IS USED IN THE PERFORATED PANELS AND SIDE SURFACES OF FIRST CLASS
3. UNITED'S NEW DOMESTIC NARROW-BODY FIRST CLASS SEAT
4. THE UNITED DOMESTIC FIRST CLASS SEAT FEATURES GRANITE COCKTAIL TABLES TO ADD A REAL SENSE OF SOLIDITY AND QUALITY

domestic fleet, all include completely bespoke products. Each of these products has been designed to exceed passengers' expectations of their onboard environment, but also to help reflect the airline's own brand and values.

SWISS SUITES

The new first class suites we have designed for SWISS, for instance, include an illuminated Corian cocktail tray. This feature serves a number of purposes. Aesthetically, it adds to the precious feel of the cabin and highlights the attention to detail that embodies the SWISS brand. From a practical point of view, it offers

a place for crew to place drinks for passengers, and that place will be exactly the same each time a drink is served. In business class, water bottle holders and headphone hangers also facilitate a more efficient and consistent service, meaning the crew can always be relied on to deliver outstanding service.

The seat architecture has been designed following a grid-like pattern. The design is inspired by Zurich airport and the flagship SWISS lounge, as well as by Swiss graphic design. Stylistically, the design reinforces the SWISS brand and the country's reputation for order, precision and attention to detail. Importantly, from

a maintenance point of view, the grid-like system enables us to design the seat environment with localized panels, which can be individually removed and replaced if necessary, minimizing time and cost.

UNITED DESIGN

We are also working with United Airlines to overhaul its passenger experience. Interestingly, a recent article on our work in the *Huffington Post* commented on the fact that North American airlines have been slower on the uptake in making design an integral part of their business.

United Airlines stands out as an exception. Over the past couple of years,

Superbrands create a human connection with their customers



5. KOREAN AIR'S B777-300ER FEATURES THE BRAND NEW KOSMO SUITES 2.0

6. THE KOREAN AIR B777-300ER'S STAGGERED BUSINESS SUITES FEATURE 18IN IFE

7. THE PREMIUM LOUNGE ON BOARD QATAR AIRWAYS' A380 IS A REMARKABLE SPACE

we have been working closely with the airline's engineers and marketing experts, looking at their corporate values and then working to integrate them through design solutions to enable them to be seen across every product and service. This means that as well as crew and customer service, which are the most obvious element of brand perception, every single part of traveling with United Airlines – from the seat to the material choices – should reflect the brand's core values.

ASIAN CARRIERS

Among Asian airlines, Korean Air is at the forefront of a passenger-centric approach. Over the past year a number of our first and business class cabins have been launched, each of which has been specifically designed for a particular aircraft type. Rather than adapt one design to several aircraft, we have instead designed a family of products, each specifically suited to claiming maximum passenger space for that aircraft type.

This means we are able to create consistency across the fleet while optimizing the passenger experience.

NATIONAL CULTURES

As design enables airlines to become superbrands, it is also interesting to note that many reflect not just a corporate culture, but a national one as well. We design for many flag carriers around the world and these airlines offer an opportunity to elevate a country's reputation on the world stage.

Qatar Airways is an outstanding example. Our cabin interiors for the airline's flagship A380 were launched at the end of 2014 and included many industry firsts, both in the materials and the products themselves. This work serves two purposes. On one hand it offers passengers an exceptional onboard experience. Just as importantly, however, it is testament to Qatar Airways' continuous drive to lead the field in innovative cabin interiors. This investment enables the

airline to position itself as forward-thinking and individualistic, both of which are human characteristics that passengers can connect with.

HUMAN TOUCH

Superbrands successfully embody a lifestyle and are effective because they create a human connection with their customers. They understand that they live to serve the consumer. Their role is to demonstrate to passengers that they are a people-centric company, that passengers' needs are continuously being evaluated and products refined to better suit current and future demands. Those that succeed in this area are handsomely rewarded, in no small part thanks to what are often referred to as 'superconsumers'. A recent article in the *Harvard Business Review* talked about the importance of focusing on this group. Airlines must find ways to get customers not just to buy, but to buy into their offer. By appealing to superconsumers, airlines can grow a network of spokespeople for their brand, helping them along the way to becoming a superbrand.

As more airlines invest in their cabin experiences, passengers are looking for something personal. It is no longer just about price, as many consumers will pay a premium if they buy into a company's values. In today's market, design offers the means by which airlines can position themselves ahead of the competition. ⊗



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HIGH CLASS

Airborne luxury is going back to the future to create amazing experiences. What could this mean for economy passengers?

The definition of luxury is evolving in first class travel, to the benefit of deep-pocketed passengers.

But while imaginative innovation is making flying in the front of the airplane increasingly delightful, passengers at the back are being woefully neglected.

When British Airways unveiled its seat that converted into a flat bed, the first class category was transformed. From that moment in the mid-1990s, airlines, manufacturers and designers focused on making beds longer and seats wider.

But in recent years, a handful of airlines have started to reassess what the first class cabin can be, and are thinking beyond the furniture. Air France now has curtains that allow passengers to close-off their own 'real estate' – an idea, coincidentally, that Factorydesign suggested to an airline client many years ago, but which at the time was considered laughably impractical, which demonstrates how much more flexible makers and certification processes are becoming. Singapore Airlines has individual cabins, and Etihad has introduced The Residence: a three-room suite with its own butler. These are features that give passengers a real sense of privacy and intimacy, and are a far cry from 'steerage', where packed-in



passengers are lucky if they're only rubbing shoulders.

LUXURY FINISHES

Hand in hand with these architectural changes comes a celebration in top-of-the-range materials and finishes. Etihad's Residence boasts Poltrona Frau leather, while other discerning carriers use wood veneers and high-quality metals. This sort of extravagant attention to detail improves a passenger's experience with the entire cabin and its most intimate touchpoints: the seat controls (the 'hero point' of passenger interaction) and the IFE remote control. In these cabins, the surfaces that passengers sit on or lean against are as sumptuous as those found in an Aston Martin or a Ferrari.

"THIS IS A RENAISSANCE PERIOD
IN TERMS OF AIRLINES CREATING
INTERIOR ARCHITECTURE"

Passenger
touchpoints can
tell them a lot
about an airline's
quality



1. THE RESIDENCE BY ETIHAD HAS BECOME THE MOST TALKED ABOUT EXPERIENCE IN COMMERCIAL AVIATION

2. THE THOMPSON AERO SEATING VANTAGE XL WAS CUSTOMIZED FOR SAS, WITH HIGH-END FINISHES SPECIFIED

This mirroring of luxury automobiles is no accident. Aircraft designers have long kept a weather eye on that sector, because first class passengers step out of their very expensive car to step into the aircraft cabin interior.

It is this combining of a radical rethinking of passenger space with the most deluxe materials possible, that has seen some airlines really differentiate themselves. And increasingly, some top-tier national carriers are choosing to express their national identity through these tools – Air France and Etihad being two good examples.

CABIN RENAISSANCE

This is a renaissance period in terms of airlines creating interior architecture that

goes way beyond just the seat. It's an inspired evolution of first class from a big fat seat (or folding mattress). For anyone with a long enough memory, these current offers evoke those halcyon days of first class flying in the 1970s, when lounge bars abounded and even crooning piano players were not unheard of.

Product designers who work in the luxury category across a range of industries are well-positioned to translate that sense of extravagant indulgence so loved by first class clientele to the physical environment. Factorydesign's experience of designing beautiful pens for Mont Blanc epitomizes this approach. Fountain pens are very personal objects that users get close to, just like the interior of an aircraft. Designers think of such objects as a

'handshake' with the manufacturer. So in the design of luxury goods, a switch is not just a mechanism that goes on and off, but a point of contact between the passenger and the airline's brand. A thoughtful designer can build into that switch specific and relevant characteristics in the way it feels, works and moves. Designers can dial in a lot of interesting subconscious, emotional cues in that way. This approach can tell the passenger a lot about the quality, attitudes and culture of an airline.

The epitome of this approach to luxury is the Four Seasons Private Jet Experience – the hotel industry's first fully branded jet experience – which Factorydesign helped define. With just 52 state-of-the-art flat bed leather seats in a space that normally carries seating for 239, the cabin interiors

The Private Jet Experience is a new direction for the Four Seasons brand



3. FOR A WELL-HEELED FEW, THE FOUR SEASONS PRIVATE JET EXPERIENCE CAN OFFER THE ULTIMATE VACATION

"IF FIRST CLASS IS ABOUT EXPANDING REAL ESTATE, WHERE DOES THAT TAKE ECONOMY?"

are outrageously exclusive. Through these interiors, Four Seasons Hotels hopes to redefine luxury hospitality.

THE FUTURE OF FIRST CLASS

This is an apt time for airlines and manufacturers to be thinking hard about onboard luxury. First class reservations are up by 2% this year compared with 2014, according to the International Air Transport Association. Meanwhile, the British Official Airline Guide has reported an increase of one-third since 2009.

At the same time, prices for first class tickets have been going up, which has allowed or encouraged British Airways, Lufthansa and Air France to cut seat numbers.

Where can onboard luxury go from here? We hope that the level of flexibility within the real estate that passengers buy will become increasingly sophisticated. There will be new opportunities for transforming a space beyond folding a table and relaxing a chair. The capacious A380 certainly lends itself to such innovation, and luxury could increasingly be synonymous with generosity of space.

The second area with potential is technology. The need for airline

certification means that technological advancements move more slowly in the air than they do on land, and there is the perennial problem of obsolescence. The trick is to identify hardware that can sustain the most software changes. At the same time, in an ideal world, there would be a process that allows a faster turnover of hardware.

REMEMBER THE REAR

While there is much excitement in the advances in first class and business class and, to a lesser extent, premium economy, this has led to a bigger and bigger black hole between the front and the back of the aircraft. Economy class is just not good enough, especially for passengers traveling with children.

There is a large group of professionals who travel business class for work, then drop back down into economy for their holidays. They then find themselves in a 1970s school bus environment, the only change being the removal of ashtrays.

Air New Zealand's Skycouch, with its footrest that extends at the same level as the seat, goes some way to addressing this discrepancy, as do the stand-up grazing areas in the Qantas A380s and

Etihad's welcoming and celebratory entrance spaces in its A380s.

But no airline has really bitten the economy bullet, despite the fact that every year at Aircraft Interiors Expo in Hamburg, concepts are trumpeted that would improve things in economy. But despite the buzz generated by such ideas, neither the airlines nor the manufacturers have committed to such an investment.

Such is the state of the industry that manufacturers' order books are full for the foreseeable future and there is no incentive for them to move away from the tried and tested. Innovation inevitably carries risk, and certainly at the economy class level, that risk is something that very few seem willing to embrace.

But if first class is increasingly about expanding passengers' real estate, where does that take economy, where most carriers would be loath to reduce capacity? Perhaps the materials and styling that convey the brand should remain consistent throughout the airplane, with only the amount of personal space changing between cabins.

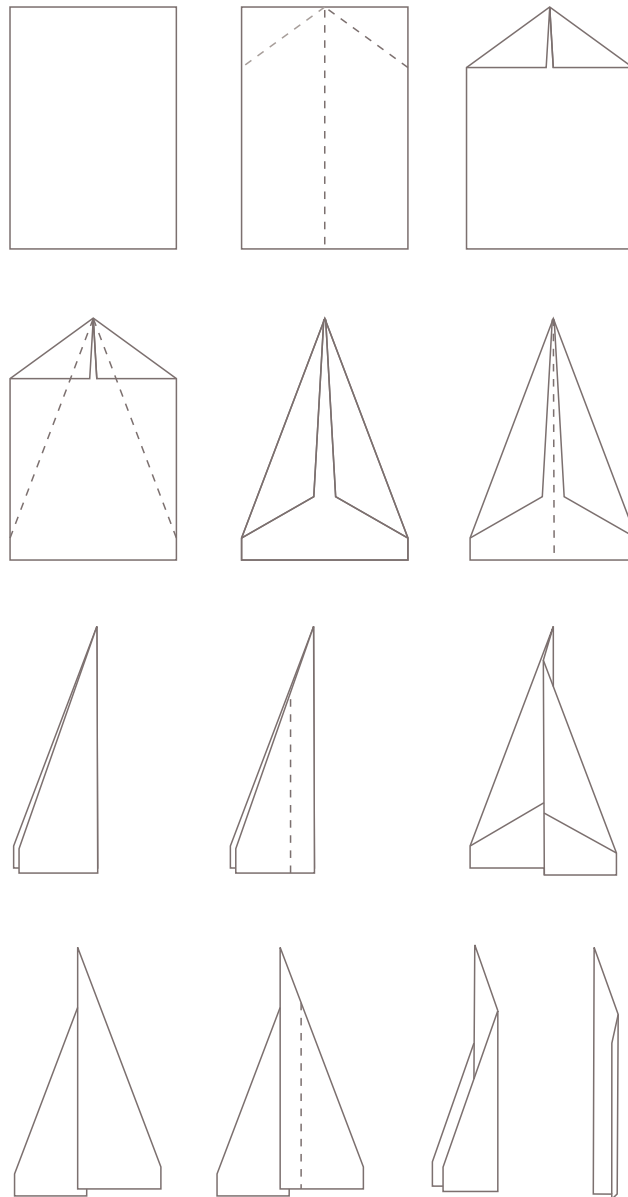
Now that first class innovation is really taking off, it should be time for economy to get its own renaissance. ✕

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Confucius

BUSINESS AS USUAL?

Acumen director John McKeever discusses the increased demand for business class seating and how airlines can differentiate themselves in a crowded marketplace

The airline industry is complex: for the airline, the overriding priority is that the aircraft arrives safely, without incident and on time. The passenger takes this as assumed and is most directly affected by other factors. What was the check-in experience like? How comfortable was the seat? What was the food like? Did the bags arrive quickly? All these factors, which strongly shape a customer's experience and perception of an airline brand, are peripheral to the job of getting a large metal tube from A to B, yet the passenger will remember the bad cup of coffee or the misplaced bag – not the on-time arrival.

Choice has never been greater for the traveler. They can choose anything from a no-frills short-haul flight to a luxurious intercontinental experience with a chauffeur to the airport, private lounge access and a butler on board. With such a marked level of differentiation in the industry, some traditional airlines, particularly those that offer both short and long haul, are struggling to differentiate their brand sufficiently and thus risk customer perception that they are simply a 'me too' airline, competing neither on price nor inflight experience.

Nowhere is this truer than in the battle for business class. The past decade has seen the rise of both super business class (SBC) and high-density business class (HDBC) offerings from airlines. The reason is simple: as flat-bed seats have become



the standard offering in business, the advantage of first class (and the additional cost associated with it) has become less marked. Both first class and business class passengers are being offered a good night's sleep on a flat bed, so the advantage of traveling first class becomes less noticeable.

THE MARKET IS CHANGING
As a result, two trends have emerged. Firstly, more than 11 airlines have decommissioned their first class offer in the past two years in favor of SBC

solutions – driving a surge in the SBC and HDBC marketplace.

Secondly, there has been the emergence of a super first class (SFC) offering among a small number of very high-end airlines that wish to offer the ultimate level of privacy and space for a limited number of passengers. This class is perhaps best demonstrated by the recent launch of the First Apartments by Etihad Airways, on the upper deck of its A380s. This multi-award-winning, unique single-aisle layout is leading the march on this category. With a flat bed and aisle access

"SOME AIRLINES ARE STRUGGLING TO DIFFERENTIATE THEIR BRAND SUFFICIENTLY"

Whichever class of travel, the seat is a definitive element of the experience



1. THE BUSINESS STUDIO FOR ETIHAD IS A CLASS-LEADING OFFER MORE AKIN TO TRADITIONAL FIRST CLASS

2. WORKING CLOSELY WITH RECARO AND HONOUR BRANDING, ACUMEN CREATED A HIGH-DENSITY BUSINESS CLASS SEAT DESIGN WITH A UNIQUE LAYOUT OF GENTLY CANTED AND STAGGERED SEATS

now coming as standard in business class, a new kind of product was needed to establish Etihad's desired brand position, and this product has redefined what it means to be a first class passenger. Of course this also had implications for Etihad's business class passengers.

Acumen met this challenge by designing a new product known as the Business Studio for Etihad. This new-to-market layout delivered a class-leading offer more akin to a traditional first class product, achieving best-in-class in the SBC sector and setting another benchmark by

combining increased levels of privacy and aisle access from every seat, with a functional layout that maximized revenue from the space available. This suite contributes to Etihad's brand objective: to be the best airline in the world.

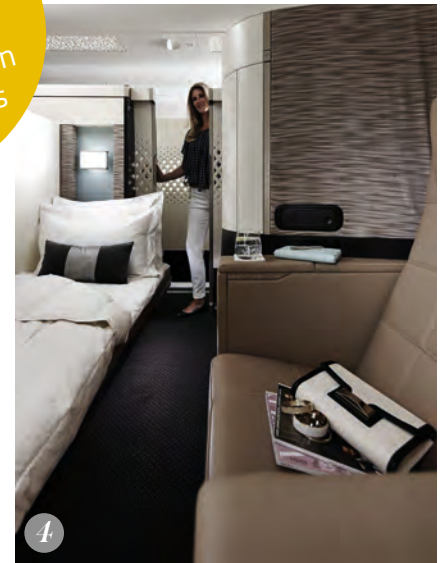
CREATE AN EXPERIENCE

Whether airlines are considering upgrading first class to SFC or removing it altogether, it is critical to create a business class experience that is unique, differentiated and on brand. Finding the sweet spot demands expertise and experience in

transport interior design combined with the inspiration to create something unique that goes beyond extra inches of legroom or width and delivers a holistic experience.

Customer experience encompasses every touchpoint of the journey from check-in to disembarking the aircraft and, particularly in business class, this offering needs to be unique to the airline. It is an inescapable fact that during long-haul travel, the lion's share of a passenger's time is spent in the seat, and it is therefore one of the key definitive elements of the brand experience. Get the seat right, and

Seat design and customization is a business in itself and can reap rewards



3. THE AURA HAS BECOME ONE OF THE BEST-SELLING B787 SEATS

4. ETIHAD'S FIRST APARTMENTS ARE A TRULY LUXURIOUS EXPERIENCE

the passenger will arrive refreshed and happy – and will be an enthusiastic and loyal advocate of the airline. Get it wrong and a bad experience can be an equally defining attribute in the negative.

This is why seat design and customization is a business in itself, which airlines understand carries equal parts of risk and reward. This work requires keen insight and experience to achieve a seating product which delivers on all passenger expectations and adequately represents the airline brand. Since designing the first ever flat-bed product for British Airways in the mid-1990s, Acumen's groundbreaking designs have been shaping the premium aircraft interiors industry for 20 years, and with more than 35 airline programs in the studio's portfolio comes a certain sense of reassurance for both airlines and seat vendors when planning to mitigate risks.

Zodiac Seats UK was one of the first seating companies to recognize the opportunity offered by a seat platform that could offer the passenger a premium lie-flat bed in business class. Acumen worked with Zodiac to design a customizable platform that would deliver a flat bed in business class without compromising on the number of seats available in the cabin. The result: 'Aura' has become one of the best-selling seats in the B787 catalog. With its famous trademark 'gooseneck' arm, this product delivers a class-leading seat width and bed size, lightweight construction and flexible privacy – all key

“INNOVATION IS RARELY SIMPLE – IT TAKES BOLDNESS, DARING AND COMMITMENT”

attributes to building an effective brand in the sky. Because the seat is easily customizable for different airlines, more than 13 airline customers have selected this seating platform to date.

This is only one example of the increasing interest in the business class segment as a means to differentiate airline brands. In 2013, Acumen was commissioned by Recaro to help the company extend its product offer into the HDBC market. Working closely with Honour Branding, Acumen created an HDBC seat design. This seat has a unique layout of gently canted and staggered seats that offers the airline not only customizable layout options, but also a full-flat bed, and aisle access for all seats at a very competitive cabin density. This seat also showcases all the hallmarks of Recaro's engineering prowess.

BUSINESS IS BOOMING

The growth in business class is a trend that airlines cannot afford to ignore. Not only is business class a highly profitable

sector, it is also one that is opening up to people outside of the traditional business traveler. As a generation of baby boomers spend their retirement traveling the world, they have the resources to upgrade to business class. Business class travel is increasingly being bundled into the high-end holiday market, ensuring that once-in-a-lifetime vacations do not start and end with an economy experience.

The opportunity offered by new engine option Boeing and Airbus long-range narrow-body aircraft will also have an impact on the premium seating market, requiring a mixture of bespoke and platform single-aisle lie-flat products. Newer aircraft types, a widening of customer requirements, and newly emerging seat suppliers hungry for market share, will all throw up new challenges and opportunities to drive product innovation and further market segmentation. Innovation is rarely simple – it takes a combination of boldness, daring and commitment. But the alternative for airline brands is unthinkable: becoming a 'me too' brand that is identified with little of value. If business class is the new battleground for airline brand differentiation, blue sky thinking around the customer experience is the key to winning the battle. ✕

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TAKING SHAPE

How JPA's visionary seating designs are helping airlines meet the world's demand for more aircraft

We live in a fast-changing world, and the airline industry is no exception. Over the next 20 years, global GDP is predicted to grow by 3.1% a year, and passenger traffic by 4.9%. Over that time the airline industry will have to deliver an estimated 38,050 new aircraft to meet demand.

Thought-provoking statistics, aren't they? To satisfy our increasing hunger for air travel, the airline industry needs to produce not only enough fuselages, wings and engines, but also, of course, interiors. Passenger cabins that are not only better equipped and more beautiful, but are also easier and quicker to install across a wide range of aircraft, and which could cut costs and resources, and help roll out more airplanes to meet the world's growing jet-set.

It's the sort of issue that JPA Design likes to grapple with. "JPA's approach has always been to find creative solutions to real-life problems – and to work with partners who can help us realize them," comments JPA Design director John Tighe. "It's about strategic thinking that creates spaces in which innovation can flourish."

But how do you create a high-end business class cabin that can be painlessly installed in aircraft of all different shapes and sizes? It was a conundrum that JPA Design looked at in depth – and one it found an answer to.

Reducing the number of variants is crucial for manufacturers and airlines, for



managing spare parts inventories, and for rationalizing production lines for each aircraft type. JPA's design director Tim Manson takes up the story: "We realized that our challenge is to create what is fundamentally a single cabin and seating layout. Something that can work easily in a wide range of different aircraft."

IDEAS TAKE SHAPE

Within JPA, a solution began to take shape in the form of a new herringbone-type design. JPA had already created the benchmark take on the herringbone layout

with the highly successful Cirrus business class seat it developed for Zodiac Aerospace. Rather than have passengers facing away from the windows and into the aisles, JPA reconfigured the traditional herringbone so that business class could offer both greater privacy, companion travel and a window view.

But the challenge was now to design a seat that allows cabins to be manufactured more quickly and efficiently. To realize the concept, JPA partnered with Japanese seat manufacturer Jamco. They called the new seat DoveTail.



"IT'S ABOUT STRATEGIC THINKING THAT CREATES SPACES IN WHICH INNOVATION CAN FLOURISH"

DoveTail's modular design allows it to fit any twin-aisle aircraft with ease



1. DOVETAIL IS INTENDED FOR WIDE-BODY APPLICATION IN A 1-2-1 CONFIGURATION AT A 43-46IN PITCH, DEPENDING ON AIRCRAFT TYPE

2. THE SEAT IS 21.5IN WIDE, WITH JUST A 1.5IN TAPER TO THE FOOT OF THE OTTOMAN

DOVETAIL

JPA managing director Ben Orson explains the thinking behind the DoveTail design: "The beauty of the herringbone layout is that essentially the same arrangement of seats can be adjusted to fit any twin-aisle aircraft type, with no losses in efficiency and very little difference apparent to the passenger. The beauty of DoveTail in particular is that it's a modular design, and only a small proportion of the product's components need to be altered, and the maximum number of parts can be shared, across different types of aircraft."

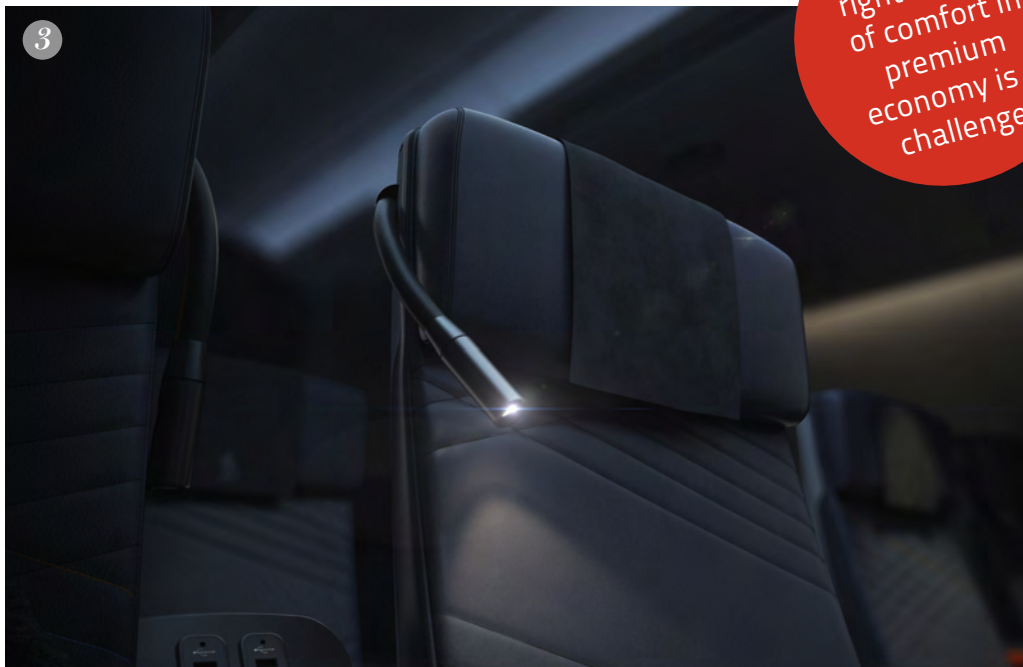
With DoveTail, JPA and Jamco are providing an elegant, practical answer to airlines eager for new aircraft to meet global demand. But DoveTail isn't simply a solution for Jamco and its customers. What will passengers make of DoveTail? With business class travelers growing in numbers worldwide, the bar of expectation is rising all the time.

Manson is passionate about the aesthetic and ergonomic considerations: "DoveTail falls into a new and growing sub-category – premium business class. It's a product with long-haul feel and

features, packaged within a beautiful design inspired by Japan, seen through a modern lens. We concentrated on creating subtle variations in texture and material that immerse passengers in a restful, tactile environment."

DoveTail offers a fully flat bed and direct access to a 20.5in aisle on all aircraft, a maximum 44in pitch, a usable bed length of 79in, an 18.5in monitor and accessible end-of-row stowage. The seat's hidden lighting only reveals itself when activated, and intuitively simple controls allow passengers to have

Getting the right balance of comfort in premium economy is a challenge



3. COLORED STITCHING AND ASYMMETRIC PATTERNING ADD TO THE PREMIUM FEEL OF SIA PREMIUM ECONOMY

4. JPA WORKED CLOSELY WITH ZIM FLUGSITZ TO CREATE THE WELL-APPOINTED SINGAPORE AIRLINES SEAT

5. TRUE LUXURY AND BREATHTAKING VIEWS ABOARD THE BELMOND GRAND HIBERNIAN TRAIN, LAUNCHING IN 2016

quick, uncluttered access to all of the comfort features.

PREMIUM ECONOMY BECOMES MORE PREMIUM
 JPA's forward thinking isn't restricted to the front of the airplane. Where DoveTail is playing a part in building the premium business class category, JPA's new interiors for Singapore Airlines (SIA) are helping develop an increasingly popular sub-category further back in the cabin.

Designing for premium economy is about creating extra passenger comfort at a mid-point between economy and business class, and getting this balance right is challenging for designers. How do you create a desirable yet affordable space with a clearly defined identity of its own?

Manson explains, "We aimed to make SIA premium economy 'the place to be'. Particular care was taken to implement innovative colored stitching details and asymmetric patterning indicative of premium goods, and at the same time adopt a more youthful attitude. For example, 'luxury' features like leather and antimacassars are predominantly graphite gray, yet strategically accented with a vibrant orange and cool blue."

JPA Design worked with ZIM Flugsitz to design SIA's new premium economy seats, which will feature on the A380 and B777-300ER. Each seat has a width of between 18.5in and 19.5in and offers a 38in pitch. Complementing this is a sleek 13.3in full HD monitor, the largest in its class. Each

"THE DESIGN JOURNEY JPA GOES ON IS A QUESTIONING ONE"



seat also features an individual power supply, two USB ports, a personal in-seat reading light, and a cocktail table, alongside additional stowage space for personal items such as a water bottle, mobile phone and laptop.

A GRAND NEW TRAIN

JPA has been re-imagining spaces in hospitality and transport for more than 30 years... and not just in the air. In fact its first headline-grabbing commission, the refitting of the Venice-Simplon Orient Express train, is about to be reborn with an Irish lilt. Belmond Grand Hibernian's Irish train tours from Dublin, launching in 2016, will all enjoy luxurious carriages outfitted by JPA Design.

"We took our influences for the interior design from Irish classical architecture and the brightly painted houses of its towns and villages," comments Alex Duncan, director of interior design at JPA. "Reflecting the iconic style of Belmond's luxury trains, such as the Venice Simplon-Orient Express and Belmond Royal Scotsman, we have created an updated interpretation of the sort of design elements expected by discerning passengers."

JPA Design's long history with Belmond finds an echo with their many airline and hospitality clients across the world.

On the face of it, a luxury train may not appear to have anything in common with an airport lounge in Shanghai, a hotel in Cape Town, or a business class cabin. But JPA believes it's a desire to think deeply about premium environments. Whether it's making small spaces feel bigger, or creating spaces more attuned to changing tastes and a changing world, the journey it goes on is a questioning one. Unearthing trends, analyzing future needs and desires. And thinking out of the box about how to make them real, with a combination of hard thinking, creativity, innovation, and great partnerships.

And of course, after more than 30 years in the field, a lot of experience. ☒

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DYNAMIC THINKING

ZEO has adopted a new way of thinking and working that has resulted in a new approach to interior design: the Dynamic Modular System

DMS is a step-change in aircraft lavatory architecture

Each day, more than 90,000 commercial flights take to the air and 7.6 million passengers prepare to avoid the dreaded lavatory.

Largely unchanged in the past four decades, aircraft lavatories have become synonymous with everything dirty, unhygienic and generally undesirable for passengers. For airlines, lavs remain a roadblock for customer service, branding and cabin optimization. For service crews, the ownership and maintenance experience is far from ideal; ironic, considering they remain the one private space on an aircraft that should be focused on cleanliness, comfort and passenger well-being.

Zodiac Aerospace already builds today's most advanced lavatories for some of the most demanding OEM and airline customers out there. This work has given the company a comprehensive overview of what is important for customers, passengers and service crews. Across the cabin, airlines are continually raising the bar to match their branding and operational needs and it has become painfully apparent that the aircraft lavatory that we are all familiar with today could no longer be iterated or evolved to match these expectations, re-inventing the wheel each time to answer a customer's specification.

ZEO, the design and innovation studio of Zodiac Aerospace, recognized that in order to bring a paradigm shift to the world of lavatories, it would have to totally disregard all the preconceptions and legacy iterations that make today's state-of-the-art unsuitable for sustaining customer expectations for the future. Fundamental to that approach was the need to fully understand customer needs, and this essentially came down to one very simple premise: ZEO wanted the first response to a customer request to be 'Yes, of course you can!'... not 'Yes, but...' or 'You can select from...'. They like to call it 'What you want, without all the fuss'.

This sounds easy, but without clear focus, it inevitably proliferates into



uncontrolled customization, driving point solutions that jeopardize everything from cost and schedule to quality and performance.

DYNAMIC MODULAR SYSTEM

This was the starting point for the Dynamic Modular System (DMS) lavatory, and in order to make it successful, two things had to happen. Firstly, it was recognized that this kind of step change would not be possible to execute within the confines of a normal program delivery schedule, so a critical executive decision was made to take DMS off-line and run it in parallel with the serial programs, using

a dedicated team from ZEO to drive the concept while partnering with engineering to coordinate production cut-ins.

Secondly, ZEO had to clearly communicate and reinforce the importance of its customer needs to the development team, re-programming the work ethic from the program driven, silo mentality of "get it done" to an open, collaborative environment capable of challenging the status quo at all levels.

THE FOUR PILLARS OF DMS

Informed by more than 20 years of manufacturing experience, direct customer feedback and a continuous process of

"ZEO WANTED THE FIRST RESPONSE TO A CUSTOMER REQUEST TO BE 'YES, OF COURSE YOU CAN!'"



2
1. DMS ARCHITECTURE SEPARATES THE SINK CABINET ZONE FROM THE TOILET TO PROMOTE VISIBLE HYGIENE

2. THE CORE OF THE DMS PLATFORM IS A FLEXIBLE SHELL WITH INDEPENDENT SNAP-IN MODULES AND 85% PART COMMONALITY

3. DMS INVESTIGATED GENDER-SPECIFIC LAVATORIES. 'SINKINAL' DIDN'T MAKE IT THROUGH CUSTOMER TESTING!

development and prototyping, the idea of "What you want, without all the fuss" was distilled to describe the core needs facing the industry today and into the future. These are now the four pillars of DMS and the benchmark that sets the targets and KPIs for every new customer definition, large or small, line-fit or retrofit.

The first pillar is 'embrace differentiation': enable high-value airline branding opportunities where it counts, not where it's allowed.

Second, enhance the user experience for all users, passengers, crew and maintenance teams. Make it simple, intuitive and safe.



Thirdly, maximize cabin revenue generation: enable flexible lavatory sizing to match specific cabin space planning needs, transforming static monuments into strategic enablers.

Finally, simplify the ownership experience: make it easy to build, easy to install, easy to live with, and easy to upgrade.

To meet these needs, DMS had to be more than 'modular', a term endemic in the industry with negative connotations implying pre-defined solutions that can only be assembled in pre-configured ways. It needed to be a step-change approach to lavatory architecture, to establish a flexible platform to ensure customer focused, robust and cost-effective industrial delivery and service, to adapt to all aircraft types, wrap around all LOPAs, and to anticipate where airlines would want to add their signature.

ZEO IN ACTION

With the needs clearly captured, the creative engine that is ZEO kicked into



4. A CONTINUOUS CYCLE OF PROTOTYPING AND EVALUATION ARE EMBEDDED IN THE ZEO PROCESS

5. THE DMS LAV CAN HELP ENHANCE A PREMIUM PASSENGER EXPERIENCE

6. DMS PREMIUM LAVATORIES ALLOW BROAD CUSTOMIZATION OPPORTUNITIES BUILT ON A COMMON ENABLING PLATFORM



The design process for the DMS lav is informing future ZEO work



"PROTOTYPING, LEARNING AND RE-APPLYING IS A WAY OF LIFE AT ZEO"

action. ZEO's methodology is built on an open, collaborative environment, bringing team members, specialists and customers together. Designers and engineers are encouraged to get their hands dirty. The mock-up team works in step, allowing ideas to be prototyped quickly and to an appropriate level to be tested and evaluated to failure. Failing, learning and re-applying is a way of life at ZEO, meaning concepts and ideas can be honed down to the minimum; less really is more.

Industrial design framed the project, with the team working with specialists to build a concept that could be readily applied across multiple aircraft platforms, addressing everything from simple plug-and-go baseline solutions up to fully enabled premium lavatories and allowing for full cabin integration with seating and galleys. The advanced concepts engineering team worked in concert, putting the concept under a microscope, with every designer challenged by a series of very severe needs-driven critical to quality (CTQ) objectives, including 75% part reduction, 85% part commonality, and one minute line-replaceable units (LRUs).

Surprisingly, these CTQs, which feature prominently on every project presentation and in every design review, have proven to be most influential in driving the 'what if' mentality of challenging convention to find the best solution rather than the easy, fast solution. The targets seem unattainable, but now design reviews have become competitive: 4,500 parts have become 1,300 parts, over 1,000 of which are common to every lavatory; five days of mind-numbing hand finishing have become four hours of snap and click, high-quality, injection-molded precision. Hundreds of hours of intense engineering effort that previously went into 're-inventing the wheel' and 'applying band-aids' can now be focused on what the customer truly values.

The DMS initiative has been running for nearly two years, with continuous prototyping, testing and evaluation to correctly frame the objectives and drive the best solutions, including stress, certification and durability testing. It has been through multiple cycles of Class A 'looks-like, feels-like' mock-ups, which have been presented to and evaluated by

customers and operators. The same customers have also experienced rough-and-ready working prototypes and test rigs, from the radical to the ridiculous, and all an integral part of the learning process.

The scheme has also been run in parallel with program chief engineering, with selected modules and parts strategically cut into serial production to enhance running programs and to evaluate performance against objectives.

The needs-driven design process, established and formalized during the DMS development, is now a fundamental part of the ZEO way of working, in an environment where customer participation is actively encouraged to ensure that the best solutions make it on board.

And with multiple customers already in the pipeline, the first full DMS lavatory will enter into service in Q1 2016. Welcome to the new age of aircraft lavatory design. ✕

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A photograph of two young children sitting inside an open, dark brown suitcase on a white, shaggy rug. The child on the left is wearing a brown leather aviator helmet with goggles and a blue and white striped shirt. The child on the right is wearing a tan pith helmet with goggles and a blue plaid shirt. A large, dark green backpack is attached to the suitcase. The background shows a white wall with a shelf and a window with white shutters.

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FRUITS OF LABOR

For the challenging Azul interiors project, tangerine peeled the pineapple in Brazil

Brazilians call it 'peeling the pineapple'. The process of solving a complicated problem is likened to the challenge of extracting goodness from one of the country's more intimidating-looking fruit.

When Brazilian low-cost airline Azul decided to launch long-haul routes to the USA, it wanted to give its cabins a stylish and sophisticated new look, including the introduction of business class seats for the first time.

But with budgets tight, a very short timeframe and many of the fundamentals of the aircraft interiors fixed, achieving Azul's ambitions was going to require highly creative and inventive thinking.

Azul tossed this particular pineapple to tangerine, a design company (and a fruit) with an international reputation for making 'peeling' easy. "We knew tangerine had done some outstanding work before and the fact they have an office in Brazil only made this choice more obvious to us," says Azul's Gianfranco Beting, communication and marketing manager at the airline.

In the aviation world, tangerine is perhaps best known for its iconic Club World seat for British Airways, the first ever lie-flat business class bed, which since its launch in 2000 has remained the airline's profit engine. However, the studio has worked with numerous airlines on projects of varying length and complexity. Its recent work for Virgin Australia



1. THE CABIN CMF CHOICES CREATE A STYLISH AND SOPHISTICATED FEEL. BLUES ARE USED IN AN ENGAGING WAY TO EMPHASIZE THE HEART OF THE BRAND

2. THE STORAGE SPACE ABOVE THE COCKTAIL TABLE WAS REDEFINED AS A RECESS FOR STOWING HEADPHONES

3. THE AZUL XTRA BUSINESS CABIN ON THE A330-200, DESIGNED BY TANGERINE

4. TANGERINE WORKED WITH STELIA AEROSPACE TO ADAPT DETAILING ON THE SOLSTYS BUSINESS CLASS SEAT

redefined the business class for the airline's A330 and B777 aircraft and won the agency international acclaim.

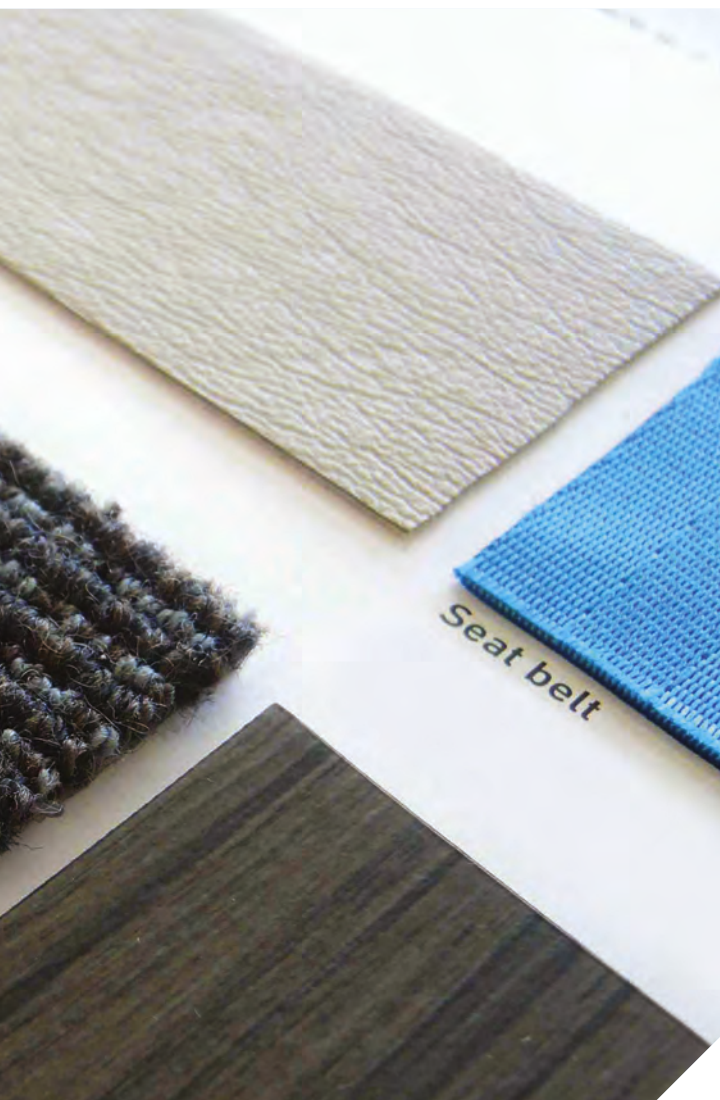
TIGHT TIMELINES

"Azul asked us to complete in around 11 months, but even with such a short timescale, tangerine is confident it can make a real difference," says managing director Martin Darbyshire.

"I recognized that success would require us to be really clever, introducing relatively small changes that would deliver maximum benefit to the customer,"

"THE BATHROOM FLOORS REFLECT THE FAMOUS BLACK AND WHITE TILING ON COPACABANA BEACH"

The design conveys a feeling of good value without being cheap



Darbyshire explains. "We were confident that, working closely with the client and the seat manufacturers, we could still come up with something really effective."

The challenge was to retrofit a fleet of six A330-200s that began operating on the new routes to Orlando and Fort Lauderdale in Florida in October, but also with an eye on the interior design of five new A350-900s due to come into service soon.

BRAZILIAN FEEL

The approach needed to differentiate and enhance the brand, chiming with Azul's

Brazilian character and emphasizing that this low-cost airline was also stylish and confident.

"We wanted to create the best possible experience across both the aircraft, and to make them connected and on brand," Darbyshire says.

Central to the look was customization of the Stelia Solstys seats in the A330 business cabins, and key to that was collaboration with the manufacturer.

"We really enjoyed working with tangerine as they took into account our constraints and gave us the necessary

flexibility by offering several options," says Mathieu Marraud des Grottes, Stelia's sales director in the Americas.

HARD PRODUCT

Changes to the Solstys seat involved a reworking of the injection moldings to introduce new machined parts that created a much more effective storage area, improved functionality, and enhanced the look and feel of the seat. The rear housing of the IFE console was modified to redefine the storage area behind the cocktail table as a recess for headphones.

The Azul Xtra Business cabins also feature a walk-up bar and social area

5. A NEW SELF-SERVICE SNACK BAR WAS DEVELOPED TO SERVE BUSINESS CLASS. A COLORFUL 3D METAL AZUL EMBLEM FURNISHES THE CENTER OF THE DESIGN, BOLDLY EMPHASIZING THE ENERGY AT THE HEART OF THE BRAND



The pocket is easier to access, features a leather-covered panel embossed with the Azul logo, a metal surround and a hook with a fastening leather tongue.

Changes to the detailing of the storage pocket at the side of the seat included the creation of a special compartment for stowing a laptop and water bottle. A second, adjacent, thin compartment holds the inflight magazines and safety card.

For tangerine, these small changes to the quality of the passenger touchpoints not only improve the brand experience, but also make a real statement about the airline's ambitions.

Darbyshire is particularly pleased with the reconfigured IFE box. "The new console is really rather cool," he says. "There are lots of airlines which, although they don't have massive budgets, really want this kind of impactful result."

It was critically important given the short delivery time that tangerine's proposals for the Solstys customization won the approval of the manufacturer. "Together we succeeded in enhancing the comfort and overall experience of the seat by implementing design modifications," says Marraud des Grottes. "With this new cabin, Azul's success is guaranteed!"

The Azul Xtra Business cabins also feature a walk-up bar and social area, an addition the airline hopes will mark it out in business class services to the USA.

BRAND EXPRESSION

"We wanted to reposition the Azul brand as sophisticated, rich and evocative, denying any suggestion this low-cost airline was downmarket," Darbyshire says. "It was about saying the airline offers

"WE WANTED THE INTERIORS TO REFLECT THE IMAGE OF A NEW BRAZIL"

'value' without ever being 'cheap', that it is efficient and professional without being austere or dull."

"We wanted the interiors to reflect the image of a new Brazil," Azul's Beting explains. "The feeling should be bold and colorful, but also professional. Brazil is a place where people live, work, or even just stroll down the beach sipping a caipirinha."

CMF CHALLENGES

Given the airline's name, blue is inevitably the dominant color, but delivered in a warm and engaging way. It may be a low-cost airline, but Azul wanted to announce itself as a global player with a global feel.

"The look is smart and tailored with a palette of inky blues with gray, dark blue leather and dark blue seatbelts," tangerine color, material and finish (CMF) expert Emma Partridge says.

"Smaller features were adapted to echo Brazilian heritage. For example, the bathroom floors reflect the famous black and white tiling on Copacabana beach," she reveals. "We had fun with that. The same wave pattern was on the bulkhead, but in a really subtle way that becomes visible when the lights are up, but not when they are dimmed."

Again, the very tight timeframe on the project was challenging, but tangerine's

long relationship with suppliers meant the team was able to move quickly in developing bespoke materials and maintaining momentum on the project.

PREPARING FOR A350

An important consideration in deciding upon the CMF for the A330s was how easily the design language could be translated for the new A350 aircraft.

"Everything we used was selected with the thought that there must be synergy across the fleet, not least because some manufacturers are stipulating that airlines must take CMF from a pre-approved catalog," Darbyshire says.

Often, the base materials come from the same catalog, helping to give a sense of an integrated design across cabins and aircraft, but tangerine then customized those materials so that they also distinguish and enrich the brand.

"This was a really important commission for us," Darbyshire reveals. "It was the first major project in Brazil following the opening of our Brazilian office in Porto Alegre, and we are delighted with the way it has gone."

"The working relationship with tangerine was perfect," says Beting. "They were always responsive and always kept track of the whole project. I firmly believe that the marriage of tangerine's interiors and Azul's exceptional customer service will make our experience second to none."

It seems the pineapple has been returned – beautifully peeled and inviting. ☒

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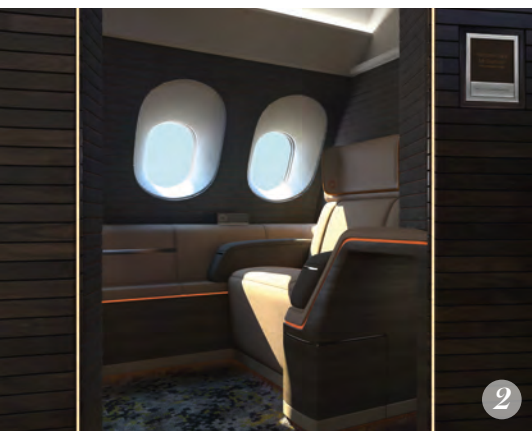
FIRST SPACES

What does the future of air travel look like? How different could it be? And, critically, what might drive change, and why?

Lead times for new aircraft and their expected service life are so long that we have to think well beyond fashion and style trends and instead understand how new technologies might enable change, and how passengers' future needs and expectations will evolve. Airlines compete for passengers, and delivering a better experience gives an airline a major competitive advantage, with new business opportunities to drive change, to optimize load factors, and to increase profits.

Seymourpowell has long been considering a different business model for the future – a business model that is more flexible, to allow airlines to configure their aircraft to better suit the needs of passengers each and every time they fly. The current business model is based upon selling the same thing (a seat) at vastly different prices depending upon when and from whom you buy your ticket. The alternative is a scalable value offer, where passengers who spend more get better value!

This is why the studio developed Morph, an economy class seat solution that allows passengers to buy more or less space, depending on their needs. This concept was followed with Flex, a configurable business seat, which allows airlines to optimize the cabin layout for traveling passengers. And now, this thinking has been extended into first class, shown here on the upper deck of



an A380. The concept is called First Spaces and it was originally created by Seymourpowell in autumn 2013 as a concept for Singapore Airlines.

Research with first class passengers revealed that there is a clear and unequivocal market for a very high-end premium service. Without exception, privacy was cited as their primary reason for traveling in first class. They don't want to be bothered by other passengers. They don't even want to be seen by other passengers. They want absolute privacy from any kind of intrusion, with service

only when they want it, not when it suits the staff. For them, discretion, along with a real sense of personal 'unshared' space, is everything.

For travelers in first class, it's all about the provision of a faultless experience. In First Spaces, that experience is achieved through three key strands: the provision of a room that feels like a room in a contemporary boutique hotel, the delivery of what we call 'prescient service' enabled by new technologies, and a new expression of contemporary luxury.

"FIRST SPACES EMULATES THE HOTEL EXPERIENCE WITH A CHOICE OF SINGLE OR DOUBLE"



A smart inflight service system underpins the service aim

1. THE 42IN IFE DISPLAY IS 10IN BIGGER THAN THE LARGEST DISPLAYS FLYING TODAY

2. THE SINGLE ROOM – ALL ROOMS HAVE STORAGE FOR LUGGAGE JUST INSIDE THE DOOR, WITH A WARDROBE AND STORAGE DRAWERS ABOVE

ANTICIPATING NEEDS

Prescient service means anticipating the needs and desires of passengers, so that they can be met before they are even voiced, where subtlety and discretion are hallmarks of great service, and stealth and quiet demonstrate respect.

Underpinning this service aim is a Smart Inflight Service System (SISS), which draws information from a suite of sensors and which references information about each passenger and their preferences to create a dynamic picture of potential passenger needs throughout the flight,

to ensure staff are informed and able to respond before they are needed.

Current IFE controls can seem desperately old fashioned when compared with how people interact with their smartphones and tablets, so there is a multi-touch tablet in each First Space to provide a better, more contemporary experience (passengers can, if they prefer, use their own with the First Spaces App).

Mirroring of tablet and screen offers an escape from the terrible ergonomics of wired controls, and the tablet offers easy and bespoke adjustments of seat

ergonomics and position, lighting and access to IFE, internet, menus and every aspect of service.

A BOUTIQUE HOTEL WITH SINGLES AND DOUBLES

As a single traveler booking a hotel room, you would typically be asked, 'Which room would you like Sir/Madam... the regular or the king size?'. First Spaces emulates this hotel experience with a choice of a single room or a double room, both of which offer genuine private accommodation that is more boutique hotel than cubicle.

First Spaces
gives passengers
a compelling
reason to
upgrade



3. THE LUXURIOUS KING SIZE BED IN THE DOUBLE ROOM, WITH THE 42IN IFE SCREEN IN ITS STOWED POSITION

4. THE BIG SOFA IN THE DOUBLE ROOM. THE SEATS CAN BE GANGED TOGETHER TO OPERATE AS ONE, OR THEY CAN BE DEPLOYED AS TWO SEPARATE SEATS

5. FULL CABIN OVERVIEW SHOWING THE SWEEPING S-CURVED LOBBY AND THE SIX ROOMS

There are four single rooms and two doubles to give passengers a more hotel-like choice. Critically, this arrangement represents a different business model, because the two doubles can be sold with either single or double occupancy.

With single occupancy, airlines can sell the doubles at a premium (a new price point), giving a solo passenger the option of more space, a 42in screen and, most importantly, a bigger king size bed (70 x 75in).

More interestingly, these doubles also enable traveling couples to enjoy the First Spaces experience, but at a lower cost than two single rooms. This introduces a new, mid-price tier for couples, which gives them a unique experience and a compelling incentive to upgrade, as well as giving airlines a more flexible sales strategy (selling space) and countering under-occupancy.

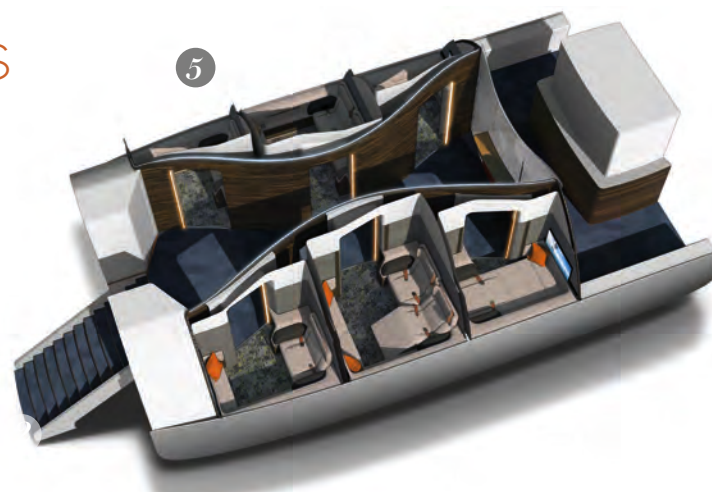
A SEAT CONFIGURED FOR YOU
Passenger size varies enormously from the 5th to 95th percentile – so much so that airline seats are forced to compromise around the average, which is bad for both smaller and bigger people. The First Spaces seat can be accurately pre-configured to suit its passenger, whatever their size, before they board the aircraft (or this can be quickly and easily done via a tablet). Once configured, the seat's kinematic movement automatically maintains critical dimensions, irrespective of seat position. This is achieved by separating the adjustment kinematic from

"THESE DOUBLES ALSO ENABLE TRAVELING COUPLES TO ENJOY FIRST SPACES"

the deployment kinematic (mostly in software), with the former working within the envelope of the latter.

Singles can be deployed seamlessly into a flat bed (44.5 x 75in), with variable positions between seat and bed including a 'High Z' position: the best for comfort and DVT prevention. The headrest slides independently rather than being mechanically linked to the seat. With such a wide seat (36in), having large headrest 'sides' is very important so that passengers can comfortably nestle to one side or the other, or sit on the flat bed.

CONTEMPORARY LUXURY
The S curves of the lobby make for a dramatic space, with horizontally slatted walls, so that light from above plays on their surfaces. At the rear is a glazed galley, which is transparent to reinforce the staff/passenger eye-contact that is so critical to the delivery of great service. Today's consumer wants to see behind the scenes, to meet the makers, to breathe the aroma of craftsmanship, just as they do in



contemporary restaurants, where the food preparation is part of the experience. With staff always 'on', it says "We're proud of the care we take; we have nothing to hide."

While passengers indicated that privacy and space were most important, many also said that they wanted their First experience to feel "more boutique hotel and less Radisson". So, the pared-back color palette of the rooms is calming and allows for soft furnishings such as throws and cushions, which can be more lavish and extravagant. Having various options of soft furnishings enables the airline to curate the rooms based on each passenger's preferences and to help keep the experience fresh every time they fly. ✕

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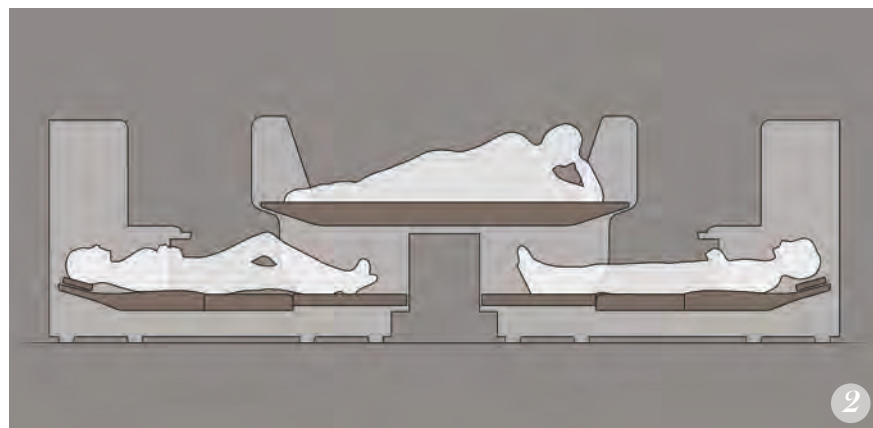
ANOTHER DIMENSION

A lie-flat seating concept has been devised that could increase cabin comfort and density, as well as creating new revenue opportunities

Considerable cabin innovation has occurred since the mid-1990s, especially with the introduction of lie-flat beds in first class and business class. Business class has increasingly lost density to accommodate this trend and has in many cases replaced the first class offering. Two dominant cabin configurations have emerged: herringbone and staggered layouts, whereby the seat and bed are optimally arranged in a two-dimensional plane. Increasingly, these seats are offered in all-direct aisle access arrangements, which is great for passengers, but can reduce cabin density. Naturally, as business class has evolved, the chasm between it and premium economy has widened. However, new configurations that address this problem are possible if the historical paradigm of homogeneous comfort levels, defined by having different cabins for different classes of travel, is challenged.

For the past several years, Formation Design Group has been independently exploring new ways of increasing cabin density while maintaining or improving passengers' living space. Formation is a design innovation company, based in Atlanta, that works with clients ranging from large companies such as Coca-Cola and Siemens, to smaller startups.

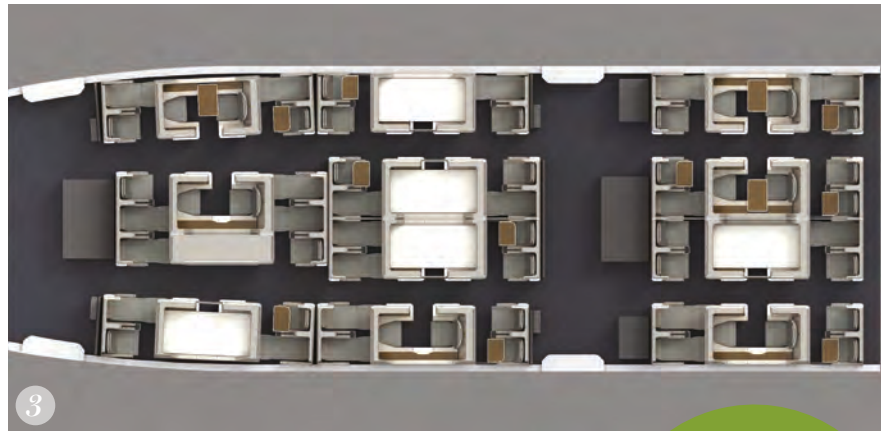
The studio's first aviation program, which began in 2002 with Airbus and several of the A380 launch customers, was a research and concept exploration study



for aircraft catering, focusing on the unique architecture of the A380. After that program, Formation began working directly with Airbus on the SPICE galley system, which won a Crystal Cabin Award in 2007. Formation has also been working with B/E Aerospace's seating group on numerous programs including the Jazz economy seat, which was a Crystal Cabin Awards finalist in 2015.

THINGS ARE LOOKING UP
In the mid-2000s, Formation partner Robert Henshaw noticed that wide-body

"AN ELEVATED BED SITS ABOVE THE LOWER LEG SPACE OF FOUR BUSINESS CLASS PASSENGERS"



The business seats that bookend the suite underlap the armrest areas of the suite

passengers (one forward-facing, one aft-facing). This arrangement effectively mimics the packaging efficiency of an angled lie-flat seat where the occupant's lower legs are covered by the head and shoulders of the seat in front.

A patent was applied for early in 2008 and was issued in 2012. In the initial patent application, the center seat was envisioned to be elevated when in the seated upright mode, but subsequent filings include configurations that put the center seat (a forward-facing seat situated between the forward and aft-facing seats) at the same level as the forward and aft-facing passengers when upright. In these arrangements, the layering effect only occurs when the center seat is put into the bed position.

NEW DEVELOPMENTS

Formation's latest concept, which leverages the original layering principle, features an arrangement of two forward-facing and two aft-facing lie-flat seats, which are separated by a premium class suite with living space comparable to a first class suite with a seat pitch of 80in or more. The standard business class seats that bookend the suite underlap the armrest areas of the suite, and when the suite is converted into a bedroom, the bed overlaps the armrests and thus the lower leg area of the four bookending seats.

The arrangement shown in Figure 3 is a Boeing 777 LOPA, where the standard lie-

1. VIEW OF A CENTER GROUPING OF THE BUSINESS SUITES SHOWN WITH THE DOORS OPEN AND THE CENTER PRIVACY DIVIDER LOWERED

2. DIAGRAMMATIC SECTION VIEW OF THE BUSINESS SEATS AND CENTER SUITE SHOWN IN BED MODE

3. LOPA VIEW OF A B777 SHOWING ZONE A AND PART OF ZONE B FEATURING 46 75IN LIE-FLAT BUSINESS SEATS AND 11 80IN+ BUSINESS SUITES

aircraft cabin ceilings were generally becoming higher in order to create more headroom under the overhead stowage bins, as well as to increase the perception of openness in the cabin. This realization led to Henshaw thinking about the possibility of using some of this increased vertical space in order to layer the bed and seat arrangements, with the aim of increasing premium cabin density without compromising passenger living space. In doing so, he created a layered arrangement whereby an elevated bed sits above the lower leg space of two business class

flat seats are arranged in a 2-4-2 layout, similar to the living space of United's current B777 business class product. The width between the armrests is 19in in the seated position. In bed mode, with the outer armrests dropped down flush with the bed surface, the shoulder clearance is 24in, which is comfortable for sleeping. As the seat transitions into bed mode, the seat cushion and seatback are lowered to the same height as the ottoman; at 10in above the floor, this is slightly lower than most seat kinematics, which are usually 12.5-16in above the floor.



4. MOCK-UP SHOWING THE LIE-FLAT SEATS' LIVING SPACE, WHICH UTILIZES THE VOLUME UNDER THE ARMRESTS OF THE SUITE

The concept is well suited to most wide-body aircraft types



5. MOCK-UP VIEW OF THE LARGE BED FEATURED IN THE SUITE. THE BED DEPLOYS FROM THE COMPARTMENT BEHIND THE SEATBACK, WHICH IN THIS MOCK-UP FOLDS OVER TO ACCOMMODATE THE BED

This lower bed position provides two advantages. The first is that more vertical space is created in the footwell, which can better accommodate crossed legs and raised knees while maintaining an armrest console height of just under the typical 25in. The second advantage is improved step-over egress for the window and center seats, as confirmed through studies conducted using a mock-up of the concept.

To aid egress even further, a step feature was added, which is situated between the two seats, but still under the shell overhang of the premium suite so as to not impede ingress or egress when the seat is in the upright position. The combination of the 8in step and the lower bed height means even a window passenger of small stature can access the aisle while their neighbor is sleeping. With typical high positioned ottomans/beds, step over is all but impossible for passengers of a small stature.

There is already a certified seat kinematic on the market that can fulfill the lower bed position requirements of the concept. This kinematic is produced by Stelia Aerospace (formerly Sogerma) and is used to move the lower seat area of the company's Equinox business class product.

SUITE DREAM

The suites, which overlap the lower leg area of the standard lie-flat seats, are configured in a 1-2-1 layout. Since the area above the standard seat footwells is

approximately 48 x 80in, the perceived space is comparable to that of a typical, full width first class suite at a pitch of 80in or more, as with the initial concept.

In the version of the concept shown in Figure 5, the bed is deployed from its storage area just behind the backrest. The backrest is then flipped forward so that the bed can be deployed. The bed surface itself would essentially rest just above the armrests/standard footwells, making for a bed height of approximately 27-29in, depending on mattress cushion thickness. The bed shown is 34in wide along its entire length, and has 4in of padded overhang along the window/center divider side and 7in on the aisle side, which adds greatly to the spaciousness of the suite. Even with this extra area, there is still room to install a sliding privacy panel if an airline wishes to fully enclose the suite. As is typical in first class suites, the ottoman can serve as a companion seat for dining or meeting with another passenger.

An alternative approach to deploying the bed is to use a seat mechanism to lift the seat as it transitions into bed mode. Again, the Equinox mechanism or something similar would be well suited, since it raises the bed to just above the armrest level. The padded armrest areas would then serve as the outer perimeter of the sleeping surface. Additionally, the space behind the backrest could be used to store a mattress style topper to provide additional comfort.

"A GAIN OF 17 LIE-FLAT SEATS IS ACHIEVED COMPARED WITH A STAGGERED OR HERRINGBONE LOPA"

MULTIPLE APPLICATIONS

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

In the B777 LOPA described here, a gain of 17 lie-flat seats is achieved compared with a typical staggered or herringbone LOPA. The cabin is comprised of 46 standard lie-flat seats and 11 premium suites. The flexibility for an airline to be able to offer 11 premium suites and still have a higher count of standard lie-flat seats could be a game changer. ✕

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CLASS APART

Creating Lufthansa's premium economy experience required collaboration, commitment, and a lot of sitting down by müller | romca's design team

With the launch of its premium economy class in 2014, Lufthansa introduced its first entirely new class of travel for 35 years. The seats have a generous center console, giving passengers more privacy and around 4in of additional usable surface space to the side. At 38in, the seat pitch is considerably more comfortable than in economy, and the backrest can also be reclined further. This means that premium economy passengers have up to 50% more personal space than those in economy. Practical features of the seat include a bottle holder, an electrical socket, and plenty of storage space for personal belongings, which also help to ensure a relaxed journey. It's a great product, but how was it developed?

Designers of airline seats have to meet a wide range of requirements, some of which are opposing. For example, demand to provide as many in-seat features as possible is difficult to reconcile with the desire for more living space for the passenger, and the desire for more passenger space is difficult to reconcile with achieving maximum cabin density. If the armrests are widened, the seat becomes narrower. If the seat is widened, the aisle becomes narrower. Planning more space for personal belongings increases production costs.

"Resolving these paradoxes and developing a balanced product requires suitable tools, intelligent project partners and a good design team," says Jens Romca,



co-owner of müller | romca, the design studio which created Lufthansa's premium economy class product.

While as many components as possible were integrated into the 3D computer model, most of the development work was conducted on full-size physical working models, from the very start of the project. At every stage, seats were built in the company's own mock-up center, allowing the ideal shape and position of all components to be tested in relation to one another. Another advantage of using

"CONSTANT DISCUSSION WAS CRUCIAL TO A SUCCESSFUL COLLABORATION BETWEEN THE PROJECT PARTNERS"

Lufthansa would not compromise on the quality of its offer



1. AS ITS FIRST NEW CLASS OF TRAVEL FOR 35 YEARS, LUFTHANSA WAS KEEN TO GET ITS PREMIUM ECONOMY OFFER RIGHT
2. LUFTHANSA FLYERS UPGRADING TO PREMIUM ECONOMY ENJOY 50% MORE PERSONAL SPACE
3. THE SEAT, MANUFACTURED BY ZIM FLUGSITZ, IS SET AT A 38IN PITCH

team works with accuracy and a high level of efficiency. Almost all the designers completed apprenticeships before their degrees, developing craft skills including carpentry, boat building, model building and ceramics, giving them an eye for what is possible and a feel for how to use materials and surfaces in design. The project team worked with ergonomics and seat comfort experts, allowing them to dimension and position the entire seat and the foot or leg rest perfectly.

There was no compromise when it came to the design quality of the seat, either. "Passengers not only have 10 hours of body contact with the product – they look at it for just as long, too," says Romca. "Every wrong radius or wrong expression in the product would be noticed."

It is often these small details that require the most work – the leather edging on the seat pocket, for example. "The leather strip has to look smooth: the ends of the cords in the magazine netting

physical models is that the ergonomics and comprehensibility of the product can be trialed directly.

"And of course, it enables us to deliver realistic seats for important executive board presentations," explains Jochen Müller, the other co-owner of the studio.

COLLABORATION

Constant discussion was crucial to a successful collaboration between the project partners. This was particularly true of the studio's work with the seat

manufacturer, ZIM Flugsitz. The same collaborative approach was applied to other suppliers, such as rohi for fabrics and Panasonic and IMS/Zodiac for the IFE. In consultation with these project partners, original components, materials and prototypes were developed, which led to the desired result. Last but not least, Lufthansa itself was a key factor as it is such a well-organized customer.

The heart of a design office is of course the design team, and at müller|romca, this team is made up of seven specialists. The

The seat design was successful in the Red Dot design awards



cannot be visible through the material," explains Müller. "The leather edging also has to remain taut, even after a lot of use, so an elastic tape and sprung metal strip have been integrated."

The team is very persistent when it comes to resolving such details, working closely with the respective manufacturers to achieve a quality finish. These discussions were very intense and took a series of detours before a technically sophisticated design was accomplished, to which Lufthansa as the customer, the designers from müller | romca and the suppliers were all fully committed.

QUALITY APPROACH

Added pressure came from Lufthansa's high standards regarding the design and precision of parts and the quality of their workmanship. The entire Lufthansa passenger experience needs to be of the highest quality. The seat must fit perfectly into the flight experience, which also includes aspects such as the cabin ambience, the service, and the quality of the meals.

The design impressed independent experts, as an international jury awarded the airline seat the Red Dot design prize as soon as the product was launched. But Jochen Müller and Jens Romca are almost as excited about the fact that the product ranked top for customer satisfaction in the premium economy class sector.

COST CONCERNS

Alongside function and aesthetics, the issue of cost is also a decisive factor – and

4. THE COLORS LINK TO BUSINESS CLASS, WHILE THE BACKREST SHAPE LINKS TO ECONOMY

5. THE OPEN ARMRESTS HELP MAINTAIN SPACE-EFFICIENCY

6. THE LEATHER EDGING ON THE SEAT POCKET WAS A KEY QUALITY TOUCHPOINT

7. THE GENEROUSLY SIZED IFE DISPLAYS CAN BE OPERATED VIA TOUCHSCREEN OR HANDSET

ALL IMAGES © LUFTHANSA

not just the production costs. After all, cost is an issue throughout the entire lifespan of a seat – that is why longevity is such a crucial cost factor. Both the durability of the components and the ease with which they can be replaced play a role here. For example, the dress covers need to be easy to change in very short cycles and they must have a very thin structure, so that they do not take long to dry after washing.

The aisles need to be wide enough for cabin crew and trolleys, and it is crucial that there are no sharp corners and edges. As Romca explains, "Designing an effective bumper that also looks good is one of the toughest challenges in industrial design."

WIDER CHALLENGES

Designers are frequently confronted with challenges like this in the aerospace industry. When developing the bathrooms for Lufthansa's long-haul first class, for example, müller | romca commissioned an entire team of specialists and suppliers to develop a synthetic stone that looks exactly like the flooring in the first class lounges. During the development of the



floors and decorative films, an attention to detail was shown that is arguably only otherwise seen in the automotive industry.

"We flew halfway around the world simply for the flooring in first class, which has to display the same color under every imaginable light source," says Müller.

The müller | romca studio sees itself as a creative service provider, and in doing so, puts itself in the role of the passenger. That means the designers have to do a lot of sitting down. If a seat is too softly upholstered, it is pleasant when tested during a presentation, but would become uncomfortable and tiring over a long flight. In order to recommend the right upholstery structure to a customer, it is essential to test prototypes for hours.

The road to achieving a good passenger seat curves this way and that, but at the end of the road, there it is: the seat. You sit down, recline, and enjoy the flight. ✕

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* Lufthansa: A380/A330/A340/A350/B747/B747-8l Premium Economy Class Seats, B747 First Class Seats
Airbus: A380 Lavatories · Air Macau: A321 Cabin Refurbishment · Lufthansa: A380/A330/340/B747-8 First Class Lavatories
Diehl Comfort Modules: A330/A340 Standard Lavatories · Condor: B767 Cabin Refurbishment
Bucher Leichtbau: EC145 T2 HEMS Rescue Helicopter Interior

BEYOND COLLABORATION

Design holds a key role in fostering collaborative innovation, for improved passenger comfort and environmental sustainability in the future

It is important to recognize that design can be used as a tool to bring together people, skills and capabilities. Lisbon-based design consultancy AlmaDesign has spent the past 18 years following this philosophy, creating a network of partners and collaborative innovation projects in various sectors, namely aeronautics, railways and road vehicles.

The studio strives to act as a 'conceptual integrator', articulating the needs and expectations of its clients through good design. By collaborating with multidisciplinary partners throughout the whole product development process, a unique approach for creating new products through 'cross-pollination' strategies has been created. AlmaDesign's team of designers are able to bring together knowledge from several areas. Also, through collaborative brainstorming, visualization and model-making processes, the studio is able to create a tangible vision that helps to steer projects to completion.

CROSS-POLLINATION

The studio's broad experience across other industries – with more than 400 projects in the automotive, railway, product and retail sectors – has led the team to develop innovative solutions for aircraft. These solutions are based on collaboration between companies with different areas of expertise, with a focus on passenger experience, and on integrating state-of-the-art technologies, manufacturing processes and novel materials.

This methodology of cross-pollination, and migrating and combining solutions from these areas, has led AlmaDesign to explore new solutions and approaches.

"The cross-pollination strategy requires appropriate management of the available resources, the various disciplines involved, communication between the parties and the culture of the organizations involved," according to José Rui Marcelino, AlmaDesign's CEO.



The ability to bridge competencies, experiences and synergies from companies in different transport sectors was recognized in 2012, when the Life project won a Crystal Cabin Award in the Visionary Concepts category.

CASE STUDY: LIFE

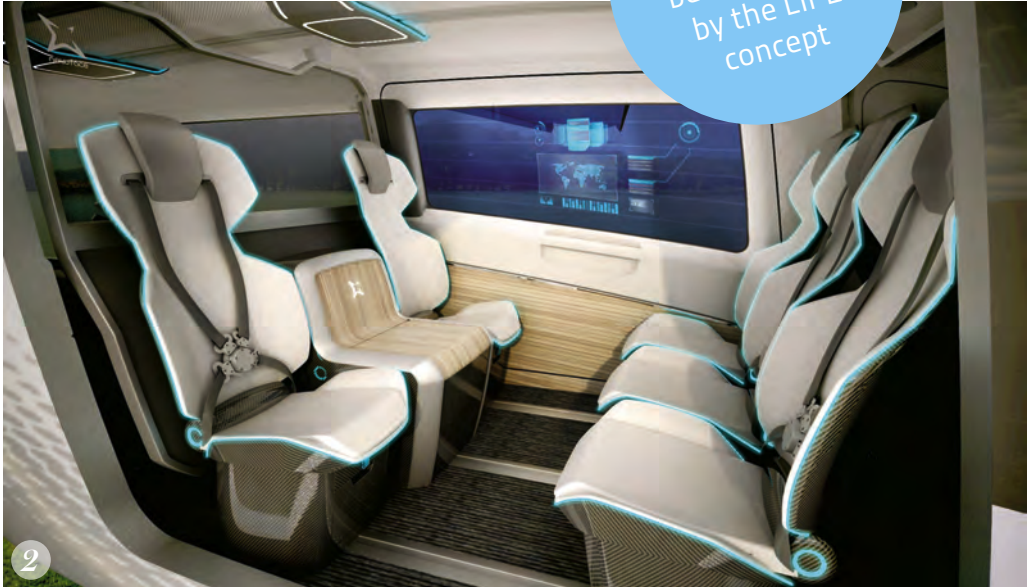
Life was AlmaDesign's conceptual vision for an executive jet cabin interior. A full-scale mock-up was created to showcase the technological capabilities and synergies of a consortium of five companies in collaboration with

AlmaDesign. The companies ranged from an OEM (Embraer) to a cork composite manufacturer (Amorim Cork Composites), a technical leather manufacturer (Couro Azul), an engineering and composites institute (INEGI) and an automotive engineering and tooling manufacturer (SET). The project offered a vision of a future travel experience through the combination of sophisticated design, state-of-the-art technology solutions and natural materials.

"An innovative window design based on composite filament winding technologies,

"A UNIQUE APPROACH OF 'CROSS-POLLINATION' STRATEGIES HAS BEEN CREATED"

Several spin-offs have been inspired by the LIFE concept



- 1. THE NEWFACE CONCEPT FOCUSES ON ECO-EFFICIENCY AND PASSENGER COMFORT
- 2. THE UTILITY VARIANT OF NEWFACE IS BASED ON A MODULAR PHILOSOPHY
- 3. THE LIFE CONCEPT IS A VISION FOR BUSINESS JET TRAVEL IN THE FUTURE

a Skin2Skin system enabling technological interfaces to be integrated on leather, motion-sensing lighting systems, cork composite solutions and an immersive geodesic virtual environment were some highlights of the project," says André Castro, Almadesign's design manager.

CASE STUDY: DESAIR

As a spin-off from the Life project, AlmaDesign's expertise was applied in the DesAir Project with the development of new high-performance composite solutions for interiors. The team created

a sustainable solution based on the use of cork – a natural, renewable and 100% recyclable product – as a core material. The solution was integrated in a business jet galley concept with a refined choice of materials and finishes – textile, leather, stone – resulting in a high-quality look and feel, for an innovative design approach.

DesAir is an all-in-one product providing thermal, acoustic and vibration insulation, water resistance and recyclability for flooring, side panels, galleys and monuments. The project design was led by AlmaDesign in

collaboration with ACC, INEGI, UBI, Embraer, Couro Azul and FrontWave (a stone material technology specialist).

CASE STUDY: NEWFACE

With the future of aviation in mind, AlmaDesign developed another Life spin-off called NewFace, a visionary aircraft concept focused on eco-efficiency and passenger comfort.

According to Rui Marcelino, "NewFace used a holistic approach to aircraft design, with the interior and exterior, operational and technical requirements, market and



"ALMA INVOLVES OEMS, SUPPLIERS AND OPERATORS FROM A RANGE OF TRANSPORT SECTORS"

4. ALMADESIGN HAS WORKED ACROSS MANY TRANSPORT SECTORS, INCLUDING METRO RAILWAY PROJECTS

AlmaDesign acted as a conceptual and project integrator in the NewFace concept

technology aspects all developed simultaneously."

The stakeholders and the entire life of the product were considered from the start. AlmaDesign acted as a conceptual integrator, including building up new ideas from scratch, and making the necessary trade-offs to satisfy passenger needs and technical requirements.

The Boxwing was one of the three concepts that emerged from NewFace. It is a future vision for a commercial aircraft to meet the mobility demands of emerging markets. Passenger traffic will increase, as will a growing 'active senior' population that demands accessibility, comfort and usability in aircraft cabins. Universal design principles were applied to the design, creating improved accessibility for all. The large cross-section allows a twin-aisle configuration for faster ingress and egress and greater passenger comfort. The Boxwing and fuselage configuration leads to aerodynamic efficiencies and weight savings, enabled by the use of advanced composite materials and processes.

For the cabin design, the color palette introduces a fresh approach to cabin interiors, using materials with self-healing properties for lower maintenance and a more comfortable experience.

By blending natural materials with flexible electronics, intuitive interfaces can be created, through which passengers will enjoy a full, permanent connection during flight. The system can learn from frequent flyers' historical preferences, creating a personalized experience by combining

exterior and interior design. A radical proposal for storing luggage was addressed, offering better ergonomics and the feeling of an open, airy space, together with a faster boarding time.

The operational efficiency of Boxwing is a solution for the demanding emergent centers of economic activity worldwide that need point-to-point connections with shorter door-to-door times. The concept reflects airlines' increasing awareness of environmental factors and the will to minimize the ecological footprint per passenger for a more sustainable future.

Another concept that emerged from NewFace is the V-tail long-range business jet, which has a distinctive aesthetic appeal and an innovative constructive solution based on an isogrid system for greater structural efficiency and reduced manufacturing costs. The engines are integrated into the tapered fuselage, and the large triangular windows improve aerodynamic efficiency and reinforce the distinctive look enabled by the isogrid. The interior, based on the Life project, is bathed in natural light, enhancing comfort and creating a generous space where natural materials, bio-feedback technology and mood sensing are used. These aspects are complemented by an immersive geodesic virtual environment – a vision for a future 'office in the air'.

The third NewFace-derived concept is Utility, a versatile vehicle based on a modular philosophy. A reconfigurable module capable of carrying 10 passengers

or 1 ton of cargo performs missions on short runways, enabled by electrically powered fans in the wings. A turbofan engine creates speed and performance in an aircraft with longer range and higher efficiency than a helicopter, with the same payload. To increase productivity, the wing is independent and autonomous, able to accommodate several fuselage configurations. Structural health monitoring technologies and 3D printing contribute to the concept.

All these projects showcase the integration of technologies and services designed in collaboration to ensure that passenger drivers and sustainability requirements are applied to future aircraft cabins. To drive this collaborative innovation, AlmaDesign takes a design-focused approach, and involves OEMs, suppliers and operators from a range of transport sectors throughout the product development process. This strategy has been effective in creating design solutions ranging from ready-to-market products to demonstrators and visions of the future.

Life, NewFace and DesAir were co-funded by the Portuguese Strategic Framework Program (QREN) under the Operational Program for Competitiveness Factors (COMPETE) and the European Regional Development Fund (ERDF). ☒

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Awards and rewards: how B/E's Advanced Design Group takes innovation from concept to cabin

For B/E Aerospace's Seating Products Group, 2015 has been a year of awards and industry recognition. The innovations generating attention have come from B/E's in-house Advanced Design Group (ADG), a creative think-tank dedicated to improving cabin comfort and space efficiency.

Glenn Johnson, the ADG's director, explains the mission of the group in practical terms: "Every day we ask, 'What could be done in an aircraft cabin to improve the passenger experience?' We look for great ideas of all shapes and sizes, but always with this key consideration: can you put it on an airplane?"

"Within that philosophy, our goal is to find the simplest solution to the problem; to create things that work as you expect them to work. And to make them aesthetically pleasing."

For example, B/E's Solar Eclipse PED-charging window shade concept generated lots of interest at Aircraft Interiors Expo 2015 in Hamburg, and won a 2015 Crystal Cabin Award in the Greener Cabin, Health, Safety & Environment category.

"Here's the story," says Johnson. "In early 2015, two Advanced Design Group designers were flying to a meeting. During the flight, they noticed that the airline was testing a new wireless system that gave passengers internet access.

"Of course, they took full advantage of this new onboard feature. And when they landed, their cell phone batteries were



completely drained. So one said to the other, 'Wouldn't it be great if we could bring one of those solar units to stick on the window, so we could charge our phones during the flight?' And the other responded, 'You know, you could build it right into a window shade'.

"They brought back such a great idea that we immediately said, 'This is awesome, let's do it!'," states Johnson.

So which aspect of Solar Eclipse did Johnson see as having the most immediate advantage for the industry?

"The more we talked about it, the more we

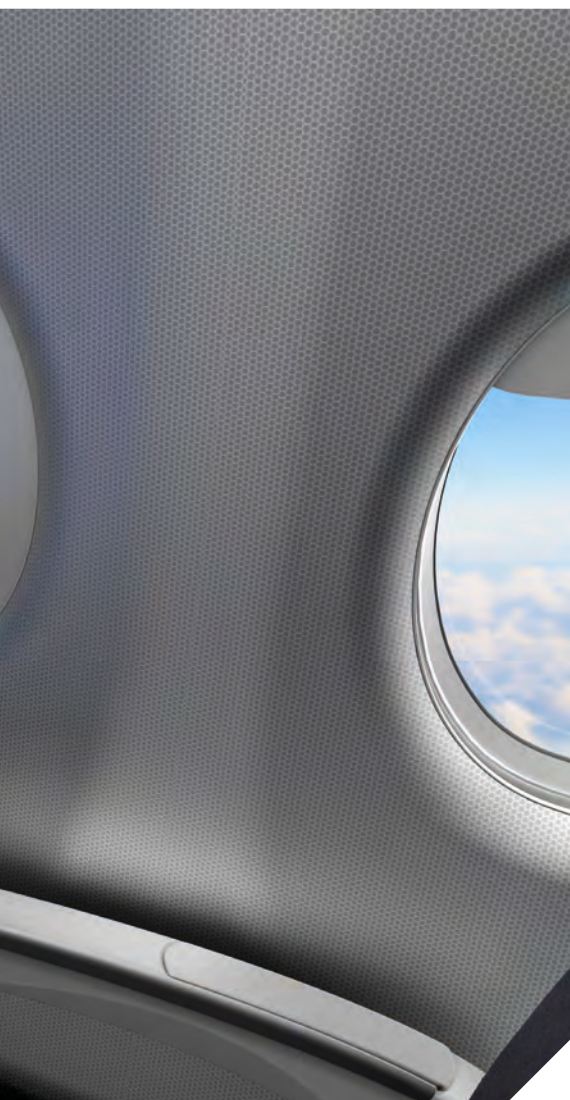
knew it would contribute to a greener aircraft. You're charging the passenger's mobile device efficiently, conveniently and in a sustainable way," he says.

As it stands today, the concept is basically a drop-in replacement for a standard cabin window shade. The only difference is that it has a solar panel and USB ports. Once fitted, the system is ready to charge a phone. If you're on a regional jet, or a small aircraft with no in-seat power, Solar Eclipse provides that power.

The concept also saves weight as the usual wires and cables required to install

"EVERY DAY WE ASK, 'WHAT COULD BE DONE IN AN AIRCRAFT CABIN TO IMPROVE THE PASSENGER EXPERIENCE?'"

A key consideration is if a great idea can actually be implemented in an airplane



- 1. THE SOLAR ECLIPSE CONCEPT CREATES A PASSENGER BENEFIT WITH LITTLE COST OR WEIGHT PENALTY
- 2. A STYLISH SEATING UPGRADE FOR BRITISH AIRWAYS CLUB EUROPE
- 3. THE SUPER DIAMOND SEAT HAS BEEN WELL RECEIVED BY QATAR AIRWAYS BUSINESS FLYERS
- 4. QATAR FLIES THE DIAMOND MODEL IN ITS ALL-BUSINESS A319 FLEET

standard in-seat power are not required. Solar Eclipse is an alternative with both green and bottom-line advantages.

So from concept to prototype, what was the development process? "We did a lot of brainstorming about how it should look. We studied different window shades, and did research on light requirements and charging times," explains Johnson.

"We designed the look of the front interface, and added a blue translucent plastic to let light come through to give it a high-grade look. Then we managed and sorted the engineering and how we could

display it. All in all, the development so far has gone very smoothly."

He goes on to explain what Crystal Cabin recognition means for ADG. "It's the highest accolade you can get, and it's hard to win. In 2012, B/E won a Crystal Cabin Award for our Essence Inserts Collection, and in 2014 one for our Advanced Lavatory. The ADG has received many other awards, but never a Crystal Cabin. So a few years ago, we committed ourselves to having ideas strong enough to make the cut. When the Solar Eclipse idea emerged, we felt we had a winner. The award was

confirmation of our efforts, and we're quite proud of it."

ADAPTIVE SEATING CONCEPT

Speaking of recognition, B/E has been getting both industry and mainstream press coverage regarding the Adaptive Seating concept for flexible seat rows.

Johnson explains how the idea came about: "Seats that move isn't a new idea, but we've solved the challenge of how to actually do it. The B/E concept sorts rows by passenger height, knowing that tall persons need more legroom than shorter



5. THE ADAPTIVE SEAT CONCEPT CAN BE USED TO QUICKLY TAILOR A FLIGHT FOR ITS PASSENGER MIX

persons. We came up with a proprietary track drive solution that lets the cabin crew move rows small increments forward or backward, all via wireless touchscreen during the flight deplaning. With adaptive seating flexibility, passengers are more comfortable, and airlines can maximize their cabin occupancy, with flexible zones, for example."

BREAKOUT CONCEPT

The Breakout concept for a premium cabin experience was another award-winning design, receiving a 2015 Core77 Design Award. So what inspired Johnson to reinvent the premium cabin experience?

"Our Breakout suite is an example of taking a fresh look at something that's become the status quo. We went back and studied each aspect of premium class travel: eating, sleeping, working and relaxing. Rather than forcing a single seat to perform all of those functions, we created separate working and dining positions, plus a proper sleeping area.

"Going back to basic needs analysis helped us develop a space where premium customers can move around, relax and not feel cramped. Breakout uses all available cabin space by integrating non-traditional units that swing into position or unfold," he adds.

AWARD WINNER

Solar Eclipse, Adaptive Seating and Breakout are all in development. What are

some examples of B/E design innovations that have been successful in the marketplace?

"Most recently, our Super Diamond seat received the 2015 Skytrax World Airline Award for Best Business Class Seat. Our team designed it, then built test mock-ups, industrial design mock-ups and high-definition prototypes. Once we got an airline interested, our engineering team focused on getting the seat certified for several different aircraft," says Johnson.

"But perhaps the best example is our Pinnacle economy seat design. It still holds the record for being the most successful aircraft seat introduction. The seat was specifically intended to combine great aesthetics, reduced weight, and greater comfort on both short and long flights. It has become a milestone for our brand because it performs so beautifully."

DEFINING SUCCESS

Since the ADG team deals with innovation on a daily basis, what's is the group's benchmark for a successful idea?

"Achieving a patent generally means we're onto something. If we can patent a new idea – and part of that patent ends up on a seat – then it's a success for ADG. There's also success in knowing you're making passengers more comfortable."

Indeed B/E Aerospace's tagline of 'Passion to Innovate. Power to Deliver' reflects the ADG's mission. "It means we're never content with the status quo: we're

always looking for the next best," states Johnson. "And we have a pipeline full of ideas that address different aspects of travel for the passenger. It's an interesting and dynamic process.

"For us, 'Passion to Innovate. Power to Deliver' is an operative term. It's an accurate way of describing our relentless passion and drive; how we innovate for comfort, and our capability to deliver."

CREATIVE ADVANTAGE

The recognition that B/E has received through the years doesn't happen by accident. Does the ADG have a formula or strategy for success? Where does its creative advantage come from?

"It's all about our people," Johnson says.

"Our team members are wonderfully diverse in their backgrounds and talent. There are quite a few of us, including transportation designers, engineers, graphic designers, prototype specialists and product design experts. We each have a unique background in art, graphics and engineering, with skills ranging from landscape planning and computer design to aircraft and automotive design."

"It's a combination that nurtures maximum creativity and collaboration. Plus we work with an outstanding engineering team. We have a great deal of bandwidth and strength there."

COMING NEXT

So what's ahead for ADG? Does it have plans for the 2016 Crystal Cabin Awards?

"We have a full pipeline of ideas currently in development, and even more on the drawing board," says Johnson.

"As for awards, we love a competition, whether we are solving problems in the real world of business for our airline customers or in designing for the future, and certainly hope we have an innovation or two that are far enough along to enter. Our planning simply goes back to what we do every day: asking what we can do to make the passenger and customer feel they've got the best value proposition." ❁

Expect to hear more from B/E in the 2016 Crystal Cabin Awards

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Always innovating.
Always on.



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Our commitment to innovate and the aspiration to deliver a new best drive us to do great things for our partners.

B/E Aerospace's Solar Eclipse, the 2015 Crystal Cabin Award winner in the category Greener Cabin, Health, Safety and Environment, empowers passengers to stay connected.

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MEETING THE BRIEF

Answering the ambitious design brief for China Airlines' flagship B777-300ER was a great challenge, especially in bringing the stunning monuments to life

To design is to create a convention for the construction of an object; a feel or theme to be followed and translated. The vision of a designer is transmitted to paper, with just sketches to convey the sentiment. Taking these sketches through the process to ensure the finished product not only reflects the initial intent but also works within a commercial aircraft, is a very complex matter. Often, so much can be lost in translation. Features may have to be adapted to fit with the certification requirements; an airy and spacious feel may be lost due to the physical confines of the aircraft; the sentiment itself may be hard to convey.

CASE STUDY – CHINA AIRLINES
For its Boeing 777-300ER, China Airlines wanted to bring a flavor of Taiwan's unique culture to the skies. The airline chose Song Dynasty aesthetics as the design core of the cabin interior, conveying the tranquil, calm, literary feel it desired. The Sky Lounge was to be a breathtaking fixture, situated in the middle of the business class zone, and designed to inspire.

China Airlines planned to immerse passengers in a relaxing setting of literature and taste. A superbly crafted bookshelf would lend a study-like ambience to the already calm business class cabin. The opportunity to enjoy a



variety of teas, coffees and pastries would allow guests to experience flavors from both Eastern and Western cultures. Overall, China Airlines sought to provide an area where passengers could gather, socialize, relax or reflect, making for an enjoyable and distinctive flight experience.

It was a bold move by China Airlines in appointing architect Ray Chen to design the interiors for its B777-300ER. Chen had the vision and creativity the airline's executives sought, and he was highly regarded in the world of structural architecture and design, but he was

little known in the world of commercial aircraft interiors.

China Airlines assigned AIM Altitude the challenge of bringing Chen's concepts into reality. Although the company is known for producing a final solution that is loyal to the brief, the expertise of AIM Altitude's designers, engineers and craftsmen would be put to the test.

SUPPLIER SELECTION

China Airlines liked AIM Altitude's background in the customization of airliners, which the company has been

"CHINA AIRLINES PLANNED TO IMMERSE PASSENGERS IN A RELAXING SETTING OF LITERATURE AND TASTE"

Taiwanese architect Ray Chen designed the interiors for the B777-300ER



1. THE MONUMENTS IN CHINA AIRLINES' FLAGSHIP AIRCRAFT HAVE BECOME KEY PARTS OF THE EXPERIENCE
2. CREW CAN MIX DRINKS FOR PASSENGERS IN THE BAR AREA
3. EVERY ASPECT OF THE EXPERIENCE EXUDES A QUALITY FEEL
4. A RANGE OF TEAS AND LITERATURE CAN BE SELECTED FROM THE MONUMENT

doing since 1950. The company's relationship with Boeing on customizing newly delivered aircraft, which it has been doing since 1983, was also important to the airline. AIM Altitude had the expertise China Airlines sought in developing solutions to meet an airline's unique design and operational requirements to differentiate itself from others (more than 1,200 complete custom interiors designed, built and installed, plus many hundreds of specific cabin products).

AIM Altitude's skills of engineering, craftsmanship, persistence, determination,

and understanding and adoption of unique customer culture, were all vital.

THE JOURNEY

The key to AIM Altitude meeting the brief and producing the physical representation of Chen's inspirations was to create a close working relationship with the architect. AIM Altitude's own industrial designers and engineers traveled to Taiwan to meet Chen in person. His minimalistic, sharp and stylish cubic offices, softened with the careful use of natural materials, gave an instant impression of Chen's design approach.

Rough sketches of the monuments were developed and worked upon by AIM Altitude and Chen together. With Chen's expertise being in architecture and design for buildings and public spaces, his ideas were commercially influenced. It took AIM Altitude's engineering expertise to enable the designs to work in an aircraft. AIM Altitude produced high-end visualizations, recreated the impressions into workable CAD data, then developed low-resolution and high-resolution mock-ups, working closely beside Teague, Boeing's design consultant.

TEAMWORK

To meet the aviation safety requirements of the aircraft within the execution of the operational ambitions of the project, was not an easy task. Bringing Chen's ideas to reality took careful communication with the engineers and safety experts at AIM Altitude to reach the desired quality of design, within the safety parameters.

Adaptability on both sides was another key to success, and the AIM Altitude team was impressed with Chen's approach and flexibility. AIM Altitude worked in concert with Chen's team, to turn his concepts into something that could be manufactured from aircraft-approved materials. AIM Altitude was able to substantiate to Boeing and the FAA that the resulting products satisfied all applicable

airworthiness regulations and still met the maximum permitted weight targets.

REALIZATION

With China Airlines being the flag carrier and the largest airline of the Republic of China, it was important to include cultural references and influences in the design of the interior. This was achieved by mixing nature with crisp minimalist shapes and theatrical lighting.

China Airlines' B777 interior is now instantly recognizable by industry insiders and the public alike. AIM Altitude worked hard to include applications of persimmon wood veneers, a distinctive wood that is native to the forests of Taiwan.

AIM Altitude was responsible for the M2 central monument, the S2L and S2R outboard furniture and the three front-row monuments with integrated stowages at Door 1. Also, the Door 2 area, which forms the entrance to the aircraft; and a four-cart bar with integrated ottoman; the forward-facing ottoman being for the business class seats.

On the aisle side of the monument, a range of boutique teas from Taiwan is showcased. On the port side, traditional-looking bookshelves display Chinese and English novels and literature for passengers to enjoy. The outward-facing wardrobe units have been cleverly integrated with ottoman units, gaining several valuable inches.



5. HINGED DOORS HELP ENSURE THAT THE MONUMENT REMAINS CLUTTER-FREE

6. THE PERSIMMON WOOD LENDS A FEELING OF TRANQUILITY TO THE CABIN

The aft-facing bar has hinged doors. Inside is a display cabinet with drinks and noodle cups. Within that, a further cabinet holds alcoholic drinks and is designed to be manned by a permanent attendant while open. A half-height ledge provides a 'sky life' meeting point, where passengers can socialize, and bespoke accent lights provide a welcoming and intimate atmosphere.

Chen had noticed the tendency of passengers on long-haul flights to isolate themselves by sleeping or watching their own IFE. AIM Altitude's engineering skills made it possible to provide a more open and sociable space, where cultural references allow people to engage and share the inflight experience.

Continuing the cultural theme, AIM Altitude has crafted highly reflective black aluminum panels to display traditional Taiwanese poems, which can only be seen under certain light. Feature lighting is vital to the atmospheric feel. Red light is used to symbolize good fortune and joy. While red is a vibrant, hot color, the use of red lighting within the environment, alongside the flowing persimmon wood, gives a feeling of tranquility.

FROM SENTIMENT TO SUBSTANCE

Perhaps the greatest achievement in the fulfillment of the brief for China Airlines has been in AIM Altitude's ability to keep the initial design vision intact.

The project has gone from nothing – with the use of a revolutionary element, in terms of the project being Ray Chen's first involvement in the aviation industry – to the reality of service.

The cabin design won the 2014 Golden Pin Design Award for 'Best Design of the Year'. It went on to win the Red Dot Design Award 2015 as the 'Best of the Best', along with several other prestigious accolades. Perhaps more importantly, it was described by Ray Conner, CEO of Boeing Commercial Airplanes, as "one of the most beautiful designs for the B777".



The cabin design won the Red Dot Design Award 2015

Demonstrating how AIM Altitude can help airlines to deliver their unique brand ambitions, Conner also commented, "The attention to detail is stunning, and for me, that says a lot about the airplane and the innovation going on in airlines."

BACK TO THE SENTIMENT

AIM Altitude was tasked with translating Chen's love of the land in which he lives and making possible China Airlines' desire for its passengers to fall in love with Taiwan. The product is unique in providing operational furniture to meet a distinct cabin-service requirement, while reinforcing cultural elements, merged with a modern design, as led by Chen.

It is not only the skills of AIM Altitude's designers, engineers and craftspeople that have made this possible, but also AIM Altitude's own passion for its work and its innovation in aircraft cabins. Creating the interior of the China Airlines B777-300ER was, quite literally, a labor of love. ✕

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STAR QUALITY

The same exquisite level of finish found in business jets, and in luxury cars and timepieces, can realistically be achieved in first and business class

When we sit in a space, whether it's in a car, an aircraft or a dedicated zone of some description, we are surrounded by finishes and colors that are either designed to blend in and not be noticed, or in some cases the opposite: to stand out and attract attention. Areas that carry controls, cup holders and light switches, for example, are designed to draw you toward them. How these areas and finishes are treated will determine how the occupant, passenger or customer reacts to and regards the execution of their environment. In a car it is often a blend of quality engineering, manufacturing and style that convinces the onlooker just how good a product is. We have a natural ability to be able to glance at a product for a split second and make a judgment.

Since Design Q was founded 18 years ago, much has changed and improved in the aircraft interiors industry in regard to a desire for high-quality finishes to appear in all cabin classes. However, the restrictions of certification have meant that many ideas are still compromised. Recent projects in the business jet sector have enabled Design Q to reassess and reinvent new opportunities to create cabins with exquisite taste. Traditionally in this industry, acres of veneer – real wood, not plastic lookalike – was the norm due to lesser certification requirements. Globally, designers and customers demanded that the more wood, the more expensive it would look, but this was so far from the truth.



2



1. THE 0.35MM-THICK STAINLESS STEEL USED IN THIS CHALLENGER 350 CABIN DESIGN HAS BEEN FASHIONED TO LOOK MUCH THICKER

2. THE CHALLENGER 350 CABIN DESIGN REMAINED TRUE TO ITS ORIGINAL CONCEPT SKETCH

3. GIVEN HOW THIN THE STAINLESS STEEL IS, THE IMPRESSION OF HEFT AND QUALITY IS REMARKABLE

When you start a design program, the hardest thing is to find an influence, a story, a reason for designing. Everyday products, furniture, fashion, automobiles, photography, art, even nature, are compiled by designers then grouped for evaluation for inspiration to trigger excitement and interest. These images then go toward creating mood boards that detail four or five avenues of influence to impose on a new design. For example, a shoe or a handbag that has a particular

"THERE IS NO REASON WHY A COMMERCIAL AIRCRAFT INTERIOR SHOULD NOT BE OF THE SAME STANDARD AS A VIP JET INTERIOR"

The Jet Business's sales center is now a top 10 retail experience in London



style could be considered by a designer as a possible influence for an aircraft.

MATERIAL INFLUENCES

Four years ago, an unusual project in the form of a concept VIP jet interior enabled Design Q to experiment with new ways of delivering cabin furniture. The interior, commissioned by The Jet Business, used minimal wood content and contrasted it with other finishes to lift and enhance the interior. Design Q boldly turned all the

sideedge facings into brushed and polished faceted stainless steel. The effect and the end result was jaw dropping.

The idea of having high-quality metal around a screen or switch is not new. Design Q wanted to take this to the next level and used the Heuer Monaco wristwatch as one of its influences for The Jet Business. Design Q owner, Howard Guy, set about echoing the machined polished and brushed edges of the timepiece in the exquisite interior of the fuselage.

Design Q's contribution to The Jet Business's sales center in London helped place the retailer as one of the top 10 retail experiences in London by Luxos, with companies including Harrods, Selfridges and Rolex. Quite an achievement for a showroom that most people can only view from the street.

COMMERCIALLY VIABLE

There is no reason why a top first class or business class commercial aircraft interior

4. THIS CABIN MOCK-UP IS USED AS A SALES TOOL BY THE JET BUSINESS

5. THE CASING OF THE HEUER MONACO WAS THE INSPIRATION FOR THE CHALLENGER 350 FINISHES

6. INSIDE ONE OF LONDON'S MOST EXCLUSIVE RETAIL EXPERIENCES: THE JET BUSINESS IN BELGRAVIA



5



4



6

“IT TAKES PASSION AND DEDICATION FROM ALL PARTNERS TO BREAK NEW GROUND”

production runs of 100 upward to be economically viable. The very same high-quality finishes used by Aston Martin, Bentley and Rolls-Royce are now available and achievable for first class airline suites.

CLEAR VISION

Good design is where form and function are as one. Not to be underestimated is the industrial designer's vision at the beginning of this process, to produce something that truly surprises and delights the customer. To be able to turn something from an idea into production, there has to be a close relationship between engineering, manufacturing and design. This is not an easy process and it takes passion and dedication from all partners to break new ground and make something different. Design Q, as an industrial designer and inventor, will always push beyond expectation. As the studio's motto goes, 'Our vision is our customers' success'.

should not be of the same standard as a VIP business jet interior. There are no excuses. Not even certification reasons should be used as justification for being second best. The requirements are the same: comfort, dining, sleeping and socializing, with controls at a fingertip touch enabling you to manage each of these positions and monitor temperature, lighting, vision and sound.

Design Q has made a great contribution to the development of Bombardier's Challenger, Global and LearJet aircraft interiors. It was the Challenger 350 that was launched in 2013, that truly utilized this new metal technique, using 0.35mm-thick stainless steel and

fashioning it to look as if it was centimeters thick.

The immediate assumption is that being stainless steel, the finish is going to be heavy. However, by using thin-gauge stainless steel, a component can be produced that is much lighter and far stronger than its 2mm-thick aluminum counterpart. The additional advantage is that the material is naturally hard, depending upon grade, and can be surfaced in a multitude of finishes, from polished, natural or brushed, to vapor blasted, painted or lacquered. It can even be gold plated if taste dictates.

The manufacturing methods use part tooling and part fabrication to enable

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SPACE ALIVE

The Space Alive concept has been applied across Finnair's passenger experience, including its A350, to create a consistent, quality, customer journey

This autumn, Finnair will take delivery of the first of its 19 Airbus A350 XWBs, becoming the first European airline to receive this aircraft type.

In order to achieve consistency across the Finnair passenger experience, the airline entrusted the interior design of the aircraft to dSign Vertti Kivi & Co, the design agency behind Finnair's lounge areas at Helsinki Airport in Finland.

"Our objective is to create a consistent, modern look for Finnair that sets itself clearly apart from other airlines through quality, freshness and changing moods. We want to offer the customer a cohesive experience throughout the journey," says Jarkko Konttinen, vice president of marketing and product at Finnair.

"The changeable moods and the Space Alive concept [see below] are integral to achieving this aim. Commissioning the aircraft is an enormous investment for Finnair and we decided to choose the award-winning dSign Vertti Kivi & Co for the job as they have a solid background, with success in large projects. I am certain that the new consistent interior design in the aircraft and lounges will reinforce the Finnair brand image."

SPACE ALIVE

The key factors in both the cabins and lounges are fresh Nordic design and use of the Space Alive concept, which was



developed by dSign Vertti Kivi & Co to change the mood of spaces.

The Space Alive concept is a system specially created for multifunctional spaces. Both the lighting and the physical elements of a space can be transformed using remote control so that the atmosphere and functions of the space change completely to meet a range of needs throughout the day. "Lighting design is an integral part of our design process. Bad lighting can spoil even the nicest interior and no interior is nice when badly lit," says Vertti Kivi, founder of the studio.

"I WANTED TO BRING UNIQUE AND FRESH NORDIC EXPERIENCES TO INTERCONTINENTAL TRAVELERS"



The dynamic LED system changes moods and eases flyers into new time zones

1. THE SPACE ALIVE CONCEPT CAN CREATE ANYTHING FROM A WARM MOOD FOR THE FAR EAST...
2. ... TO A CLEAR BLUE NORDIC SKY
3. THE BUSINESS CLASS SEATS HAVE BEEN FULLY CUSTOMIZED FOR FINNAIR
4. LUXURY STITCHING ADDS THE FINAL TOUCH OF FINESSE TO THE BUSINESS CLASS EXPERIENCE

Changing moods on board Finnair's A350 XWBs will be created by the imaginative use of the dynamic LED cabin lighting system. The mood will change as a flight progresses, with ambient lighting programs gradually recalling some 24 different skiescapes such as sunrise or sunset, various cloud formations, or even the hypnotic dance of the aurora borealis (Northern Lights), easing customers on long-haul flights into new time zones, destinations and seasons.

"Interior design is an integral part of the company's image," explains Kivi.

"It plays an important role in streamlining the airline's interface with its customers. We have worked hard to create a special customer experience on board the new A350 XWB and are very proud to be able to bring Finnish design to Finnair's passengers.

"Our Space Alive concept means dynamic lighting, colors and moods to suit the time of day, destination or season.

"For example, when approaching the Far East, the cabin is flooded by warm sunset tones, and when arriving in the Nordic countries the surfaces are lit with

the colors of the Scandinavian sky, from Northern Lights to a clear blue sky."

QUALITY PRODUCT

In addition to the changing moods, the cabin interior of the new aircraft is dominated by the fresh, clean, blue-white tones and high quality look of Finnair.

The bright and spacious interior of the extra-wide body aircraft has numerous carefully considered design details, such as the new aesthetic of the front wall and other surfaces, inspired by Finnair's initial 'F'.



The Finnair A350 XWB interior features a fresh, Nordic design



5. THE ECONOMY CABIN IS CALM AND COMFORTABLE, WITH THE LIGHTING CREATING DIFFERENT MOODS

6. THE MOODS IN FINNAIR'S LOUNGE AREAS CAN ALSO BE ALTERED USING THE SPACE ALIVE CONCEPT

At the front of the economy cabin there are 43 Economy Comfort seats, which offer benefits over the standard economy offer, including comfier headrests, high-quality headphones and an extra 4in of legroom.

The 297-seat configuration also includes 46 seats in business class in a 1-2-1 layout, to ensure direct aisle access. To enhance passenger comfort, the business class seats have been fully customized for Finnair, with flat beds and luxury stitching.

THE WIDER EXPERIENCE

The Space Alive concept has also been applied in Finnair's airport lounge areas, with the concept of changeable spaces used to create dynamic, living and peaceful spaces that complement the customer experience on board the new aircraft. The mood, colors, lighting, wall patterns and the view through the panoramic windows change according to time of day and seasons.

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

"THE SPACE ALIVE CONCEPT IS ALREADY ENLIVENING THE CUSTOMER EXPERIENCE ON MANY PROJECTS"

Juha Järvinen, Finnair's chief commercial officer. "Vertti Kivi and his team have really stepped up to the brief and we are proud of the early recognition of their efforts."

SPACE ELSEWHERE

dSign Vertti Kivi & Co may be a fresh name in aircraft interior design, but its talents have been proved and tested many times in the cruise ship and hotel design industries. The company is known for successfully challenging the norm when looking for new customer experience ideas.

Indeed, the Space Alive concept is already enlivening the customer experience on projects including nautical

and hotel interiors, with the studio's interior design for the MS Viking Grace cruise ferry being awarded the prestigious Shippax Prize in 2012.

The Finnair A350 cabin designs are also a success already, having been awarded a prestigious International Yacht and Aviation Award 2015 in recognition of their excellence in terms of design and passenger comfort in both cabin classes. Key factors in the selection of the A350 cabin interior were its fresh Nordic design, use of high-quality materials, and creative use of the dynamic LED lighting system.

"With this design – as with my others for Finnair – I wanted to bring unique and fresh Nordic experiences to intercontinental travelers in a calming and peaceful environment that promotes wellbeing," concludes Kivi. "I am honored to contribute to what will be Finnair's flagship product for years to come."

Finnair will commence service with the A350 on its daily services to Shanghai, beginning on November 21. ✕

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EAST SIDE STORY

Asia-based Lift Strategic Design has undertaken some really interesting projects, all with something in common: they were designed with love

There are many unique aspects to Lift Strategic Design, not least of which is that it is one of the very few – if not the only – airline design and strategy specialists whose home is in Asia.

“Our Tokyo location gives us easy access to a rapidly growing aviation market,” says the consultancy’s CEO, Daniel Baron, who has lived in the city for more than 20 years. “I started out in this business working for a Japanese mentor who had spent three decades at JAL designing all of its cabins. His brains, guts and passion inspired me to create Lift, plant roots in the city I love, and take advantage of business opportunities in Asia.”

The company has worked on a wide variety of cabin, brand and customer experience-related projects, the most ‘notorious’ being the A380 cabin interior for Skymark Airlines that will likely never fly, as the order was canceled prior to cabin installation. “What began as a designer’s dream project ended up rather differently,” says Baron. “Emotionally, it was very difficult on everyone. That deafening noise you heard was three years of work going down a vacuum toilet in two seconds.”

He adds, however, that even an ill-fated program can be highly rewarding. “It is not very often that you get that level of integration with the airline’s team, attending weekly meetings at their offices and working with suppliers on absolutely every topic concerning cabin development.



1

And the people at Skymark, Airbus and the suppliers were the best – an absolute pleasure to work with.”

PREMIUM PLANNING

Skymark’s A380 was to feature an entire deck of fully flat seats, with seat hardware similar to that of business class, intended to be sold at a premium economy fare.

“The program’s cancellation was actually just the last and largest of many dramatic twists and turns,” adds Baron. “The original cabin concept was developed around neutral colors in a warm palette.

One day, the airline’s CEO (who later left the company following its filing for court protection) demanded that all seat covers be green. The very big problem was that the green he wanted was bright enough to be spotted from neighboring planets – hardly appropriate for premium class lie-flat beds, but confronting him at that moment might have resulted in a fate far worse than the 5,000W green.”

The Lift team worked to find a suitable alternative, and in just two days created a new concept based around a more subtle palette, and then spent two months



2

The Skymark A380 was a rewarding project – even if it will never fly

“HAVING ONE STUDIO DO EVERYTHING OFFERS A RARE CHANCE TO ENSURE BRAND CONSISTENCY”



1. SKYMARK'S A380 WOULD HAVE FEATURED THE WORLD'S FIRST FULLY FLAT PREMIUM ECONOMY
2. THE 'GREEN' SKYMARK A380 WITH PART OF THE LIVERY
3. GENTLE CURVES ENHANCED THE PERCEPTION OF SPACE
4. THE SPACIOUS FORWARD LAV ON THE UPPER DECK. IMAGE © AIRBUS
5. THE CURVE OF THE CUSHION WAS SOFTENED FOR MORE COMFORT IN THE TTOL AND LOUNGE POSITIONS
6. THE FABRICS SELECTED WERE FRESH AND COMFORTABLE

developing a shade of green more suitable to the positioning and cabin environment.

“Once the CEO saw the new samples, he understood the concern and signed off. The final textiles were exquisite and later flew on Skymark’s A330s,” adds Baron.

Lift’s work for Skymark’s A380 included seat design, which involved close collaboration with Stelia Aerospace (formerly known as Sogerma).

“Stelia took the original Equinox 3D prototype and made it 2D (both seats at the same level instead of the bi-level crisscross of the 3D version), while we

gave it cleaner lines with a more organic feel and increased personal stowage space,” Baron recalls. “It was an excellent partnership and, given the particular mission, produced equally good results.”

HK EXPRESS

For the past two years, Lift has also been working with HK Express in a multifaceted program for the Hong Kong-based LCC.

“We are immensely grateful,” says Baron, “for the opportunity to design not only the HK Express brand and livery, but also the cabin interior and crew uniforms.

Having one studio doing everything offers a rare chance to ensure consistency throughout the brand experience.”

October 2015 is the airline’s second anniversary as an LCC, and in that short time it has already enjoyed high load factors and profitability. “Our fundamental contribution to HK Express’s success has been spending time and energy to get both the big picture and the tiny details right,” Baron explains. “That means supervising the livery application from beginning to end, designing the cabin for clear differentiation on a very limited budget,



Clear differentiation was achieved for HK Express on a limited budget



7. LIFT'S WORK FOR HK EXPRESS SPANNED THE ENTIRE BRAND EXPERIENCE, FROM LIVERY, TO INTERIORS, TO UNIFORMS

8. FUN MET FUNCTION IN THE HK EXPRESS CABIN DESIGN

and ensuring that the designs and fabrics of the new uniforms truly make the crew feel proud to wear them."

PHILIPPINE AIRLINES

During 2015 Lift has also been working on a new program for Philippine Airlines (PAL), commencing with new B777-300ERs set for delivery in 2016. The studio did cabin styling for PAL's current fleet of B777s, with certain elements also applied to other fleets.

"It is a real treat to be working again with PAL, especially as it heads toward its 75th anniversary in 2016. The new cabin styling will be unmistakably Philippine Airlines, communicating both the sheer beauty of the country and the warmth of its people," says Baron.

VARIED PROJECTS

Outside Asia, Lift has worked on smaller projects for LAN and Icelandair, and with Orbis on the development of the NPO's next-generation Flying Eye Hospital.

Baron says, "The project with Orbis is extraordinarily inspiring. I am grateful to play even a tiny role in creating an interior that will hopefully make patients and their families feel at ease, inspire even more ophthalmologists to volunteer, and communicate to individual and corporate

"EVERY PROJECT IS ABOUT USING DESIGN TO INCREASE LOYALTY AND YIELD"

sponsors a profound appreciation for their financial contributions." Baron also functions as Orbis ambassador to the aircraft interiors community, and welcomes inquiries from suppliers interested in the Flying Eye Hospital.

Being compact and nimble has greatly benefited Lift, says Baron. "Each client's program has quite a unique set of circumstances, including differing corporate goals, products, budgets, timelines, political factors, etc. Yet every project, no matter how large or small, is about using design to increase loyalty and yield, design that is relevant to clients' aspirations, competitive environment and local culture."

He adds, "Our strength lies in our deep understanding of the industry across many levels and our ability to bring to the table new ideas that match clients' strategies."

DOING IT FOR LOVE

For Baron, client-studio relationships also count for a lot. "When you love what you do, every client relationship inevitably becomes personal. I am lucky to enjoy relationships of trust and friendship with clients that last long after a program has ended, when we can laugh about anything and say 'Oh my god, remember that!'"

Baron attributes the success of Lift to passion for the industry. "One of the best moments of my career was watching a mother and child as they walked past an Oasis Hong Kong Airlines B747-400, whose livery I had designed," recalls Baron. "The boy pointed to the aircraft and said 'Mommy, that one is so cool. I want to go on that one!' I melted right there."

"At the end of the day," he says, "it's about cabin interiors inspiring kids to fly and discover the world, to make friends and learn languages, to go on to become the future cabin and seat designers, textile designers, pilots, cabin crew, engineers, marketing specialists, and analysts, to grow as humans and spread a spirit of humanity and peace through air travel." ✕

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SEKISUI SPI



RECARO



THALES



DIEHL AEROSYSTEMS



GEVEN



TTF AEROSPACE



SABIC



AVIOINTERIORS



STG AEROSPACE



THOMPSON AERO SEATING



PHITEK



TAPIS



ROHI/ANKER



STELIA AEROSPACE



GOGO



TRUE BLUE POWER



BOLTARON



CARLISLE IT



INDUSTRIAL NEOTEX

SUPPLIER DIRECTORY

WHAT HAVE THE WORLD'S TOP CABIN SUPPLIERS BEEN WORKING ON DURING 2015, AND WHAT'S IN STORE FOR THE NEXT 12 MONTHS?



AVIOINTERIORS



BAE SYSTEMS



BOLTARON

AVIOINTERIORS

Location: Naples and Latina, Italy

Founded: 1972

Employees: 500

Experience: Design, engineering, certification, production and delivery of seats for all classes and aircraft. EASA approved organization part 21.G.

Work over the past year: A new feature has been integrated into the Columbus range, with the Columbus Two seat now available with a Y-bed option. By extending the seat bottom of each seat on a triple, a couch able to accommodate one or two sleeping passengers is created. Another simple integration is Sky-Nap, a padded cushion that plugs into the top of the seatback of the Columbus One. With the tray table down, passengers can lean forward and rest their foreheads against the cushion.

What's coming in the next year: Aviointeriors' main target for the coming months is to develop a new fully flat business class product to replace the Perseus seat model, with the target of creating a private suite. The new Perseus will be introduced for the first time at Aircraft Interiors Expo 2016 in Hamburg.

BAE SYSTEMS

Location: Worldwide

Founded: 1999

Employees: 84,600

Experience: BAE Systems' IntelliCabin family of products offers integrated cabin

control, wireless in-flight entertainment (IFE), in-seat power, product customization, and certification solutions for commercial airlines.

Work over the past year: BAE Systems has made strides this year in its development of the in-seat power solution for its IntelliCabin line of products as it recently concluded cycle testing in Milwaukee, USA. Cycle testing showed that the system offered continuity of power, even when demand was high, and that the outlets did not loosen their grip on plugs or lose contact, even at end of life.

What's coming in the next year: The IntelliCabin wireless IFE system has been running on pre-loaded tablets in Vistara's premium class on six aircraft, and will move into full installation and certification at the beginning of 2016. BAE is also engaged with several airlines for its in-seat power solution, with a launch customer announcement expected soon.

BOLTARON

Location: Ohio, USA

Founded: 1954

Experience: Boltaron manufactures specialized PVC, PVC-alloy and CPVC performance sheet for thermoforming, fabricating and membrane pressing of aircraft interior components. Over 50 specialized grades offer a combination of fire ratings, durability, colors, textures and gauges unavailable from any other film and sheet producer. Boltaron is unique in the USA in offering calendaring, extrusion and press laminating, all under one roof.

BUCHER

Location: Fällanden, Switzerland; Sinn-Fleisbach, Germany; Everett, USA

Founded: 1953

Employees: 320

Experience: Galleys, closets, front row monuments, seat furniture, tray tables, IFE deployment systems, emergency medical equipment, stretchers, VIP interiors. Capabilities: design, engineering, certification, testing, sourcing, production, on-site support, after sales service.

Work over the past year: Bucher has been developing solutions to optimize space and comfort in the cabin. For example, the company has created an integrated front row/bar monument, which saves space and reduces weight. Also in the works are a variety of sleek IFE and tray table deployment systems with improved reliability, simplicity and feel.

What's coming in the next year: Bucher will be focusing on improving the efficiency of catering equipment. An analysis of the catering process is underway, which has already shown areas where improvements can be made. The first designs are expected to be shown in 2016.

CARLISLE IT

Location: Worldwide

Founded: 1940

Experience: Carlisle Interconnect Technologies is one of the world's leading designers and manufacturers of high-performance wire and cable, including optical fiber. Since 1940 the company has grown its product portfolio to include specialty and filtered connectors, contacts, cable assemblies, complex harnesses, racks, trays and installation kits. Carlisle IT also provides customers with a high level of support by offering engineering and certification services.

DIEHL AEROSYSTEMS

Location: Worldwide

Founded: 2006

Employees: 3,000+

Experience: Diehl Aerosystems is a first-tier supplier for avionics and cabin integration. Its customers include major aircraft manufacturers such as Airbus, Boeing, Eurocopter and Embraer. The integrated product spectrum of Diehl Aerosystem comprises a variety of avionics systems and cabin elements. Diehl Aircabin's product portfolio embraces high-quality synthetic components and cabin fittings for commercial aircraft. The Diehl Aerospace business unit provides avionics solutions as well as cabin lighting and cabin electronics. Diehl Comfort Modules develops and manufactures on-board toilets and washrooms. The Diehl Service Modules business unit rounds off the joint aviation portfolio with galleys for passenger aircraft and VIP jets.

E-LEATHER

Location: Peterborough, UK

Founded: 2005

Employees: 130

Experience: E-Leather claims that its product is 40% lighter than traditional leather. E-Leather has been used in cabin seating, galleys, lavs, crew rests and IFE as it appeals to operators who prioritize sustainability, and also wish to enhance passenger comfort and profit margins.

Work over the past year: E-Leather has made major gains in all transportation sectors, particularly aviation, where adoption with airlines has reportedly been repaid within 12 to 18 months in terms of fuel and lifetime savings.

What's coming in the next year: E-Leather will continue to work on economic savings, brand design, fire performance, wear properties, appearance, colors, textures and feel. The controlled stretch of the product means it retains shape in service, which makes it a popular, durable and economic choice for seating and cladding.

GEVEN

Location: Naples, Italy

Founded: 1984

Employees: 380

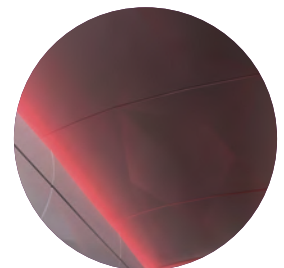
Experience: Geven's reliability and professionalism make it a big player in the seating and interiors manufacturing industry. The company is striving for continued growth, and improved technological and production capacity.

Work over the past year: Geven has been working to increase product innovation through the use of advanced materials, technology and tools, anticipating airline needs. An example is a new fully flat business class seat which boasts innovative and sophisticated materials, with a focus on comfort, weight, customizability and style.

What's coming in the next year: Geven will focus on the implementation of its products, including the Essenza economy seat, which was launched at Aircraft Interiors Expo 2015, and the Piuma Sofà, an economy seat that can be converted into a lie-flat bed. Geven will also be focusing on the development and implementation of the Elemento, a new long-haul economy seat with many accessory options.



CARLISLE IT



DIEHL AEROSYSTEMS



GEVEN



GOGO



INDUSTRIAL NEOTEX



PHITEK



RECARO



GLOBAL EAGLE ENTERTAINMENT (GEE)

Location: Worldwide

Experience: GEE is a leading worldwide provider of media content, technology and connectivity solutions to the travel industry, serving over 150 airlines worldwide. Through a comprehensive product and services platform, GEE provides airlines with a wide range of inflight solutions, including wi-fi, movies, television, music, interactive software, portable IFE solutions, content management services, e-commerce solutions and original content development.

GOGO

Location: Chicago, USA

Founded: 1991

Employees: 900+

Experience: Gogo is a leading global aero-communications service provider that offers inflight internet, entertainment, SMS, voice, connected aircraft services and other communications-related services to commercial and business aviation.

Work over the past year: A huge milestone for Gogo has been the announcement of its next-generation technology, 2Ku. This technology will deliver peak speeds of more than 70Mbps, and Gogo is confident it will be the best-performing technology in the marketplace. To date, Gogo has more than 500 aircraft commitments for this technology, with seven airlines.

What's coming in the next year: Gogo's main goal will be to bring more capacity to global aviation, and to make 2Ku an industry-leading technology for bringing more capacity at lower cost, anywhere in the world. Providing more bandwidth unlocks many opportunities for Gogo in terms of leveraging connectivity for operational and crew applications.

INDUSTRIAL NEOTEX

Location: Madrid, Spain

Founded: 1987

Experience: Industrial Neotex is a family-owned company founded by its current CEO, D Angel Hernanz Serradilla, which offers equipment for aircraft, trains and ships. Neotex specializes in manufacturing carpets and fabric textiles, but is also a manufacturer of cushions, fire barriers and galley equipment such as trolleys.

PHITEK

Location: Auckland, New Zealand, with representation in California, USA, and the UK

Founded: 2003

Employees: 40

Experience: Phitek is a leading supplier of electronic innovations in noise cancellation, audio enhancement and other electronic touchpoints in the aircraft cabin.

Work over the past year: Phitek has been readying two new headphones for production: Longlife Economy, which extends operational lifetime and introduces clever new design features to economy class headphones; and the cost-competitive Business Lite, which offers premium quality audio for the business and premium economy classes. Phitek also launched its Obround magnetic connector, which is compatible with every type of headphone, in every cabin class. The company's R&D team has also been focusing on solving the technical challenges faced by airlines in delivering NFC contactless payments on board – more details on p150.

What's coming in the next year: Phitek expects to continue to accelerate its recent revenue growth on the basis of its current technology development plan, as well as potential technology acquisitions and future company acquisitions. The company is launching the new Business Lite and Phitek Longlife Economy headphone ranges with key airlines this year.

RECARO AIRCRAFT SEATING

Location: Germany, Poland, South Africa, USA and China, with service centers in Europe, the Middle East, the Americas, Asia and Australia

Founded: 1967

Employees: 1,900+

Experience: Economy, premium economy and business class seats, business class monuments, design, product customization, IFE integration, cabin layout, layout advisory and certification.

Work over the past year: Recaro introduced two innovative business class seats, which received very positive feedback: the CL6710 with enhanced passenger comfort and the CL5710. For economy class, Recaro has

developed a new SFE-seat with Airbus: the 3530Swift. Furthermore, the CL3710 economy seat continued its steady climb, winning numerous orders and an 'iF Design Award'. In company news, during 2015 Recaro posted record revenues of €367m (US\$412m), its US site reached an important milestone with the production of its 200,000th seat, and due to its lean processes, the jury of the Industrial Excellence Awards voted Recaro's headquarters Best Factory in Germany.

What's coming in the next year: Further refinements to the Recaro product portfolio and work on the introduction of new seats, as well as innovative new seat features for economy and business class. Recaro will also be expanding its customer service department to better support airlines around the world.

REPLIN

Location: Leeds, UK

Founded: 1945

Employees: 150

Experience: Fabrics for seating, curtains, WNN sidewalls, pilot seats, vertical surfaces, crew rests, etc.

Work over the past year: Replin Fabrics is now part of AW Hainsworth, a specialist textile company that has been a market leader for over 230 years, manufacturing premium quality cloth at the family mill in Leeds since 1783. The integration of Replin Fabrics into AW Hainsworth will enable the company to continue to provide the highest specification of fabrics to the aviation market.

What's coming in the next year: The Eclipse OSU-rated decorative vertical surface fabric will continue to evolve in texture and design, enabling airlines to have real statement artwork in the cabin and on business and first class seats.

ROHI/ANKER

Location: Geretsried, Germany (Rohi); Düren, Germany (Anker)

Experience: Rohi designs and manufactures premium woolen seat cover fabrics for the aviation industry as well as for high-end furniture companies. Anker is a manufacturer of premium carpet flooring for the aviation industry as well for the automotive industry. The close cooperation of Rohi and Anker enables outstanding individualized interior solutions, 100% made in Germany.

Work over the past year: This past year Rohi and Anker decided to develop the Create PINK design study, which exemplifies how the partners deal with tasks and briefs (see p154). Translating individual client briefs into textile design is the core strength of the partners.

What's coming in the next year: Rohi and Anker are currently working on their next study for 2016, which they

say will inspire the industry and show once more that whatever the brief, they can translate it into textiles.

SABIC

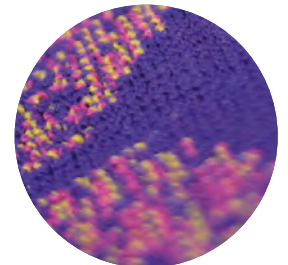
Location: Worldwide

Founded: 1976

Employees: 40,000

Experience: Sabic provides lightweight engineering thermoplastics, compliant with regulatory requirements, along with design and manufacturing support for a wide range of interior applications.

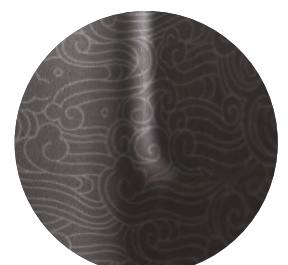
Work over the past year: Sabic has introduced a number of materials to help the aircraft interior value chain reduce weight and expand design freedom. These materials include the Clear Lexan XHR sheet series, which offers the highest level of light transmission available in an OSU-compliant sheet material today. Another market introduction was the Lexan XHR Light sheet, available in two grades (XHRL300 and XHRL200). Claimed to be the lightest sheets with deep thermoforming ability available today, they offer up to 36% and 28% weight savings, respectively, when replacing traditional polyvinyl chloride and acrylic blend (PVC/PMMA)-based solid sheet products.



ROHI



SABIC



SEKISUI SPI

SEKISUI SPI

Location: Pennsylvania and Michigan, USA

Founded: 1964

Employees: 300

Experience: Sekisui Polymer Innovations, (SPI) was one of the first thermoplastic sheet manufacturers to develop materials for the specialized flame, smoke and heat release requirements of commercial aviation interior components. Its Kydex thermoplastics brand is recognized by designers and OEMs as a leader in specialty polymers for aviation interiors. The company's product portfolio features progressive materials for niche and boutique applications. Aviation interior applications include seating (shroud, armrest, seatback); tables; business class surrounds; IFE surrounds; monuments; flight deck, lavatory and galley components; kick panels; dividers.

Work over the past year: The Pennsylvania-based manufacturer



STELIA AEROSPACE



STG AEROSPACE



TAPIS

purchased its third manufacturing facility, two miles from company HQ. SPI's product portfolio additions this year made it the first and only thermoplastic sheet manufacturer with a complete aviation interiors product line. The new products include: Kydex FST2, a fully compliant, advanced-polymer, PVC-free technology; Kydex T-LW, which performs like the first generation of Kydex T but features a 10% weight saving; Kydex 7200, a PC-based material that has better performance than competitive PC materials; Kydex 4545, a solution for bonded build-ups; and Infused Imaging, a proprietary technology that makes pattern-in-product possible without capping.

What's coming in the next year:

Expansion plans include the addition of a new production line for aviation interiors products, further developments and expansion of Infused Imaging, and increased investment in R&D for PPSU and PC-based materials. Due to increasing demand for customer collaboration early in the design process, SPI will also expand its designLab and FSTLab.

SPAFAX

Location: Worldwide

Experience: Working with over 60 clients worldwide, Spafax is a leader in the creation of branded content, specialized IFE management, custom marketing, advertising sales and production services. With offices around the world, Spafax is truly a global creative community with a 'who's who' list of airline, travel and 'terrestrial' clients. But like any success story, Spafax has a history. And it's quite a story. Very few people can predict a company's trajectory and much less predict that a car parts distribution firm based in Bath, UK in the 1930s would one day become one of the world's leading providers of custom communications and media services.

STELIA AEROSPACE

Location: France, Canada, Morocco, Tunisia, USA, Germany, Dubai, Thailand

Employees: 6,100

Experience: With 90 years' experience, Stelia Aerospace is one of the leading suppliers of aerostructure, business/first

class seats, and pilot seats. Cabin interiors activities include seat design, highly customized products and certification.

Work over the past year: Stelia has been working on exciting developments in material technology. New finishes that provide benefits to customers in terms of weight, certification, ease of maintenance and branding have attracted the attention of some of the best-known brands in the aviation industry. Stelia has also launched a customization concept with a flagship carrier and is excited about bringing the future to a new-generation seat. Work is also in progress to bring plenty of surprises to Aircraft Interiors Expo 2016.

What's coming in the next year: The focus for next year will remain the use of innovative materials and technology. Stelia will be preparing for the first commercial flight of the Solstys III seat with its launch customer, as well as working on innovative options and customizations of the basic platform.

STG AEROSPACE

Location: Worldwide

Founded: 1995

Employees: 47

Experience: STG Aerospace is a pioneer in innovative lighting technologies for aircraft. The company's industry-leading systems are designed to enhance passenger comfort and brand identity, and to reduce the cost of aircraft operation. STG Aerospace products include photoluminescent emergency floor path systems and signage, and LED retrofit cabin lighting systems.

Work over the past year: STG established a wholly foreign-owned enterprise in Shanghai, China, and relocated its US operation to a new facility in Miami, USA. In addition the company opened an engineering office and R&D center of excellence in Wales, UK, to help drive the development of its range of photoluminescent and LED cabin lighting systems in the global market. During the year STG won major new airline contracts, including installing liTeMood across Thomson Airlines' fleet of B737NGs and B757s, Icelandair upgrading its fleet to saf-Tglo SuperSeal UltraLite (SSUL), Copa Airlines becoming the first airline in Latin America to install liTeMood, and the first combined saf-Tglo SSUL and liTeMood installation with DreamJet (trading as La Compagnie).

What's coming in the next year: STG will continue to develop its current product range as well as a new range of ancillary lighting products, including recessed lights, over-wing entry lights and galley lighting.

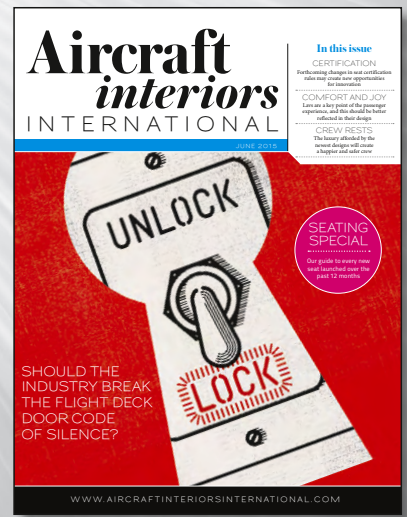
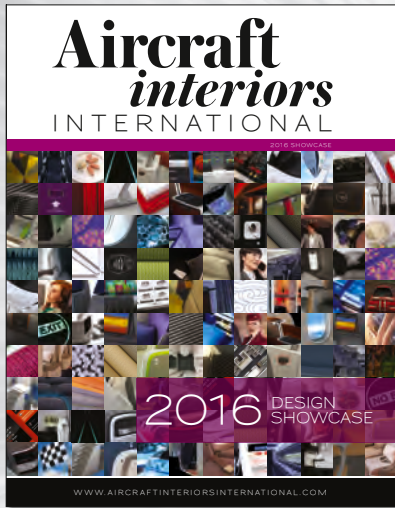
TAPIS

Location: Armonk, New York, with production facility in Dallas, Texas, USA

Aircraft interiors

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THALES



THOMSON AERO SEATING



TRUE BLUE POWER



TTF

Founded: 1977
Employees: 50
Experience: Since its inception in 1977 Tapis Corporation has provided superior fabrics to the aviation industry, and continues to be an industry leader in innovative design and implementation. Tapis's continued commitment to customers has been to explore new ways to provide the highest quality of products and services for aviation interiors that meet FAA requirements.

Work over the past year: Ultraleather is the latest product being used for economy seating. According to Tapis, constructing seat covers using engineered products enables greater consistency and ease of use during the cut-and-sew process.

THALES INFLYT EXPERIENCE

Location: Worldwide
Experience: Thales InFlyt Experience is a global leader in advanced and integrated IFE systems, enriching the commercial travel experience. The company delivers comprehensive solutions that align the passenger experience to the unique needs of each airline's brand, while entertaining, connecting and informing people before, during and after their flights. Through advanced technologies and innovative skills, Thales InFlyt Experience is currently the only company worldwide capable of providing a customizable and transformable entertainment, connectivity and service experience to passengers.

THOMPSON AERO SEATING

Location: County Armagh, UK
Founded: 2009
Employees: 300+
Experience: Premium class seating.

Work over the past year: In another award-winning year, Thompson attracted several new airline customers, extending its global reach to Asia and Africa. A number of line-fit and retrofit projects for the Thompson Vantage and Vantage XL products being successfully delivered to customers including Qantas, Aer Lingus, and the first A330 line-fit delivery with SAS Scandinavian Airlines. Among new

programs awarded during the year were Thompson's first Airbus A350 and Boeing 787 projects.

What's coming in the next year: In late 2015 the first of SWISS's B777 aircraft will be delivered by Boeing, which will include a fully customized Thompson Vantage seat in business class. Several new product lines will be added to the Thompson portfolio in 2016, while further investments in facilities, capabilities and resources will strengthen the company's commitment to maintaining industry-leading delivery times and the ability to offer customers high levels of product customization.

TRUE BLUE POWER

Location: Kansas and California, USA
Founded: 1964
Experience: Innovators in the design and manufacture of next-generation power solutions, True Blue Power is harnessing the power of nanophosphate lithium-ion cell technology. Current production includes aircraft inverters and power supplies.

TTF AEROSPACE

Location: Auburn, Washington, USA
Founded: 1999
Employees: 100
Experience: 15 years of experience in engineering, manufacturing, certification and testing of innovative aircraft interiors. Cabin interior components including crew rests, stow bins, bin extensions, ceiling panels, cockpit doors, floor panels and cabin dividers. Monument products including galleys, lavs, closets and vestibules.

Work over the past year: TTF delivered the first crew rest to be classified as a Class 1 rest facility in 2014 in accordance with 14 CFR Part 117 and the latest delivery continues this trend. With its unique design and lightweight materials, the crew rest is 1,000 lb lighter than the current existing option.

What's coming in the next year: TTF is continuing to deliver an order of 31 crew rests.

WASP

Location: Havant, UK
Founded: 1974
Employees: 100+
Experience: Seat controls; cabin lighting incorporating membrane, keypad and touchscreen technologies; LED-based features; and mood and reading lighting.

Work over the past year: Primarily the design and manufacture of seat and/suite controls and lighting for the Etihad Apartments and Residence. WASP has also been designing and developing its own lighting and touchscreen display systems. ☒



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POWER ARRANGERS

The test and development phase of the IntelliCabin in-seat power system is nearing completion



1. CYCLE TESTING OF THE INTELLICABIN TECHNOLOGY HAS BEEN TAKING PLACE AT BAE'S FACILITIES IN NEW YORK AND WISCONSIN, USA

The power outlet is designed to make sure the plug doesn't vibrate out

BAE Systems has made strides this year in the development of an in-seat power solution for its IntelliCabin line of products. System testing is ongoing at the company's Endicott, New York facility, to simulate aircraft installation and user experience with the company's variable frequency converter, smart junction box and remote power outlets. Cycle testing has recently concluded in its Milwaukee, Wisconsin facility.

Cycle testing analyzed durability, with experiments including the all-important spillage check to make sure power outlets work even if a passenger sloshes a drink on or in them, as well as offset plug insertion and insertion with plugs from various countries.

Abuse testing was conducted for the system's smart junction box and variable frequency converter, to make sure all components of the solution were durable

"CYCLE TESTING SHOWED THE SYSTEM OUTPERFORMED OUTLETS FLYING TODAY"

enough to withstand installation and the rigors of air travel. In all, more than 1.7 million cycles of insertion were performed on 46 outlets during this phase of the test operations.

The system tests assessed the products' ability to provide power when used with plugs from different brands, types and countries. The tests also measured the effectiveness of the system in scenarios requiring different levels of power demand.

Cycle testing showed that the system outperformed existing outlets flying on aircraft today in terms of continuity of power supplied, even when demand was high, and that the BAE Systems' outlets

did not loosen their grip on plugs or lose contact, even at the end of their life.

As a passenger, how often have you plugged in your device on a flight, only to realize hours later you weren't getting power because your plug had vibrated out of the outlet? It's a common problem on existing solutions, and one that IntelliCabin's in-seat power system will solve, as the retention force of the outlet, on average, remains consistent over the life of the system. ✕

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INFUSED IMAGING

Infused Imaging technology is enabling the next chapter in airline brand storytelling

Color, special effect and imagery are all used by designers to personalize passenger experience and convey brand stories in aircraft interiors. However, sourcing materials for customized finish and effect that are compliant with aircraft interior regulations can be difficult. Thermoplastic surfaces with bespoke patterns and images are typically achieved by applying a cap layer to a polymer sheet, either during manufacturing or after thermoforming. This decades-old technology has its limitations. Press lamination, decorative film caps and bonded build-ups all create challenges for seating and other interior component manufacturers. The new Infused Imaging technology from Sekisui Polymer Innovations is changing how designers think about and use thermoplastics. With this proprietary technology, the design *is* the polymer.

COMBINING DISCIPLINES

"Infused Imaging is the ultimate in customization," says Sekisui SPI's COO and president, Ronn Cort. "It's difficult to accurately describe something so visual. We like to compare Infused to Washi."

Washi is a traditional, handmade Japanese paper prized for its beauty and quality. Each sheet is unique and is created through an exacting process.

"The analogy is relevant in so many ways," Cort continues. "It nods to our heritage of practicing the disciplines of Japanese manufacturing through processes such as PDCA (Plan. Do. Check. Act) and Kaizen (continuous improvement). It alludes to how we leverage technology to expand what's possible in design with our materials. On another level, it acknowledges the meaningful contradiction of making something custom that's often considered a commodity. Infused allows us to create thermoplastics that evoke the handmade, custom craftsmanship of Washi."

SIGNATURE ELEMENTS

One of the earliest adopters of Infused

Infused Imaging technology is a new approach for thermoplastics in cabins



1. AIR CHINA'S BUSINESS CLASS SEAT WITH INFUSED IMAGING THERMOFORMED COMPONENTS

2. A CLOSE-UP OF THE CLOUD EFFECTS ON AIR CHINA'S B747-8I, MADE FROM KYDEX 6503

"INFUSED IMAGING IS THE ULTIMATE IN CUSTOMIZATION"



technology was JPA Design, which created the interior for Air China's B747-8i, launched in 2014. The design team worked with Air China to create an interior to reposition the brand as a leading international carrier that is distinctly Chinese. The Air China brand story is expressed throughout the cabin and tells a tale of 'earth to sky', with passengers "carried on the wings of the phoenix surrounded by clouds, with the ground at their feet". The predominant design motif is a delicate cloud pattern originally drawn by hand for the project by Chinese artist Han Meilin.

As the cabin's design took shape, so too did JPA's mission to find opportunities for passengers to discover the cloud element. The goal was to remind passengers of the brand story in a poetic, less obvious way than on large-scale bulkheads or walls. In business class, they chose to feature the design on the literature pocket on the seatbacks. Then they began their quest for thermoplastic materials.

JPA designer Annette O'Toole visited the Sekisui SPI stand at the 2012 Aircraft Interiors Expo in Hamburg, Germany, to ask if the company had a material that could capture the light, airy and uplifting motif.

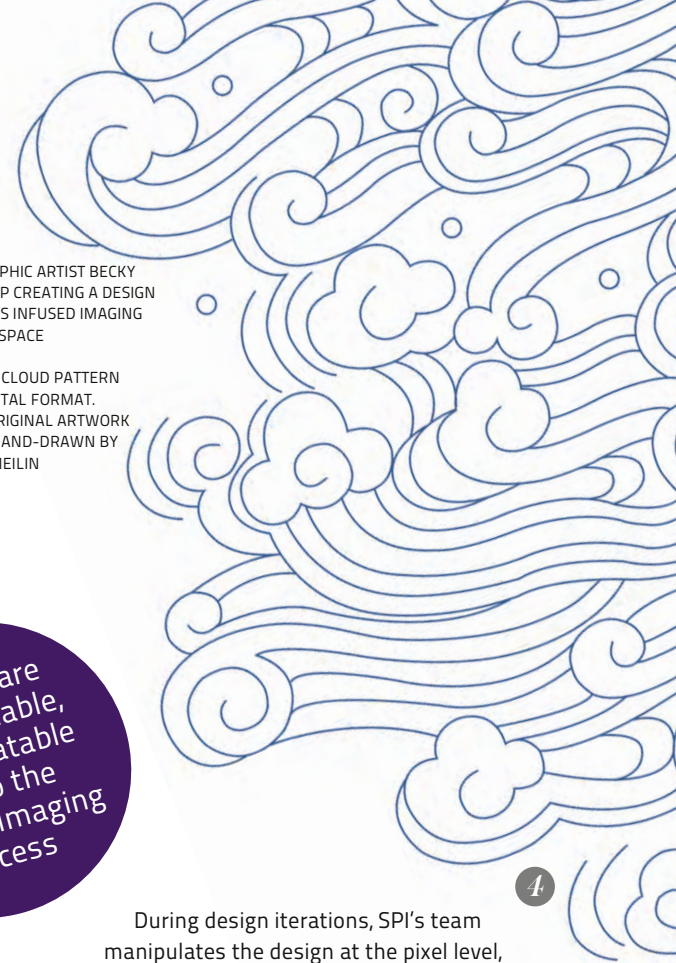
"Annette showed us a piece of vellum on which the clouds motif was drawn," recalls Cort. "The pattern was beautiful, delicate and almost calligraphic. We asked the JPA team to embrace our new Infused technology as the solution and pledged





3. GRAPHIC ARTIST BECKY GALLUP CREATING A DESIGN AT SPI'S INFUSED IMAGING WORKSPACE

4. THE CLOUD PATTERN IN DIGITAL FORMAT. THE ORIGINAL ARTWORK WAS HAND-DRAWN BY HAN MEILIN



Designs are customizable, yet repeatable due to the Infused Imaging process

we would work with them to make the design happen."

The advantages of the technology became clear as the two companies began their collaboration. "The ability to apply the design without using a cap was a welcome surprise," says O'Toole, "We chose to use Kydex 6503 because of its pearlescent effect and we didn't want to lose that by covering it up with a capping material. With Infused, we were able to combine the beautiful luminosity of the sheet with the delicate design to truly evoke the sky. We found the solution to the challenge of transferring hand-drawn calligraphy to a pressure-formed part."

CAPPING VS INFUSED IMAGING

As technical manager of the company's new Infused Imaging business unit, Jym Kauffman collaborates with SPI's customers on every project. "In my past roles in new product development, I've worked with customers who use caps on our material to achieve original design; I thought there had to be a better way to provide customization. With Infused Imaging, we've found it," he says.

Challenges with capping material include image distortion during thermoforming and delamination over time. With Infused, parts stay beautiful longer because the design is integral to the sheet.

Kauffman explains, "When caps become deformed or delaminate, the substrate material shows through and degrades the design, whereas with Infused, the sheet's aesthetics, such as

pearlescent or metallic effects, contribute to the design."

The technology also realizes production efficiencies. Customers typically have to purchase a minimum roll size of 2,500 linear feet of capping material, which can take several months to manufacture and is quite costly. "After those steps, the cap is applied to the sheet", says Kauffman, "With Infused, those steps go away. We can produce the imagery on just one 4 x 8ft sheet for truly boutique customization."

Capping material is also limited to patterns that are repeated every 14-24in. With Infused, a sheet-size image such as a photo, zebra or leopard print can be used with no repeats. Kauffman continues, "The image quality is so realistic, we can replicate other materials like stone, wood and marble or a combination, with no seams or joins."

PLANNING, PIXELS AND POLYMERS

Like the exacting craftsmanship of creating Washi, a successful Infused project requires planning and process. Becky Gallup, a graphic designer in SPI's Infused Imaging business unit, has worked on designs since the company began using the technology.

"It all begins with the customer's idea. Sometimes we start with a description and a color palette, and with others, a drawing. In all cases, our first step is to determine if the art will work with the end shape. We've used whole sheet images, repeated patterns, wording and logos."

During design iterations, SPI's team manipulates the design at the pixel level, adjusting characteristics such as resolution, saturation and pattern direction. Because the design is in the sheet, when a shape is formed during the thermoforming process, the sheet is changed and stretched where the part isn't flat, and therefore the image is also stretched. Gallup adds, "The more complex the formed part, the more consideration the pattern or image requires."

Sheet color, effect and texture are also considered. "With one project, we were working with a dark woodgrain on a white sheet and it appeared flat," Kauffman recalls, "When we changed the sheet to Kydex 6503, which has a pearlescent effect, it added a luxe sheen to the lighter areas of the woodgrain image."

Once the design is approved, the project is scaled up for production and can be replicated for future orders. The same image can be used with different materials, colors and effects to extend the theme of a design.

A POWERFUL TOOL

Infused Imaging is changing how designers use thermoplastics to convey brand in aircraft interiors. "This technology's ability to add to a brand's story is a powerful tool," says O'Toole. "So far we've just touched on the possibilities." ✖

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"Engineered placement of pattern with form: emboss and deboss textures to combine effects."

"Early 3D prototyping for concepts during the approval process for our clients."

"We welcome the opportunity to explore the technology for cabin dividers and linings without additional trim components."

"Concept development and sampling as part of the process engenders a better design, sooner."

"With aircraft seating, we're exploring the freedom to customize catalogue product."

"I'm eager to replace unsightly but required placards, signage, and labels."



JPA DESIGN

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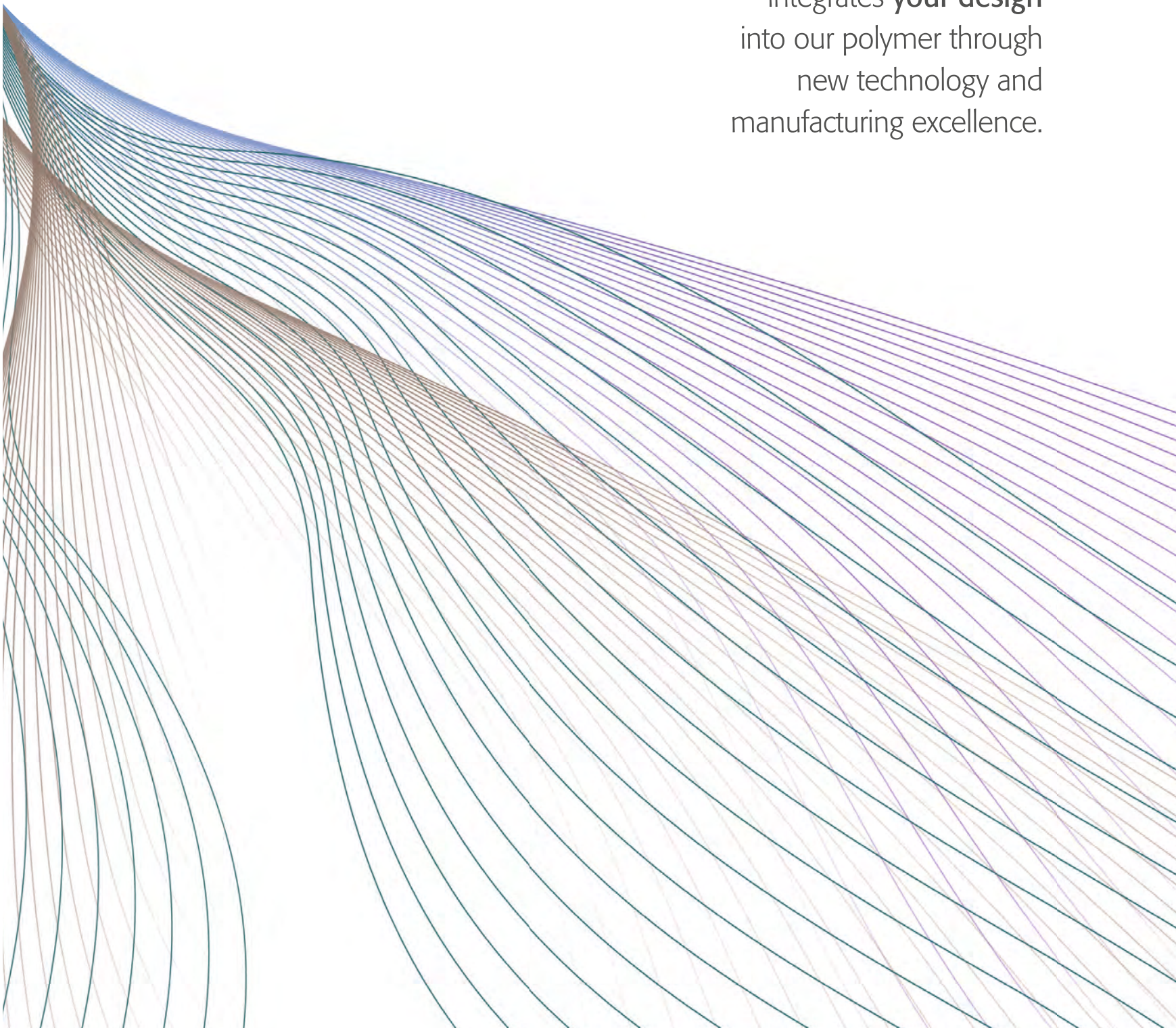
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	KYDEX® 6565 Low heat release	■	■	■		
	KYDEX® 5555 Extreme-low heat release	■	■	■		
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BIG BUSINESS

Recaro Aircraft Seating's move into the business class seating sector has proved successful, with a number of new developments underway

The feedback was unanimous: Recaro Aircraft Seating introduced a new business class product generation in April 2014 and triggered an overwhelming number of positive responses. At Aircraft Interiors Expo in Hamburg and numerous follow-up meetings with customers, Recaro wanted to know: What can we do better? What are the special requirements of airlines and passengers? Detailed feedback was gathered and it soon became clear what everyone wanted in 2015: more business class products from Recaro.

"After fascinating visitors with the premiere of our fully flat CL6710 business class seat for long-haul flights in 2014, our innovative strength was once again on full display at this year's Aircraft Interiors Expo in Hamburg," says Mark Hiller, Recaro Aircraft Seating CEO and shareholder. "We held a number of meetings with customers and listened very carefully. Then we headed into the next round. During 2015 we have expanded our business class portfolio and we presented a new seat at the Expo. The CL5710 is designed for short- and medium-haul flights on single-aisle aircraft, and it offers an outstanding combination of comfort and efficiency."

FURTHER DEVELOPMENT

At Aircraft Interiors Expo 2015, Recaro Aircraft Seating also introduced a series of updates to the CL6710 seat, based on customer feedback.

"We had a lot of ideas that led to major success in 2014. The follow-up work helped the project team improve details, such as movable armrests and gate-to-gate availability of the IFE system," explains Hiller. "We developed the CL6710 as part of our forward-looking product strategy, and it was an important step in the world of cabin interiors."

HARMONIOUS CABIN ENVIRONMENT

For the first time, Recaro Aircraft Seating is also offering a package of front-row monument solutions with the CL6710.



“THE OPTIONS FOR CUSTOMIZING RECARO BUSINESS CLASS SEATS GO BEYOND BASIC DESIGN”



The CL5710 completes Recaro's extensive seating range

“Working together with partner companies that complement our core product by intelligent cabin integration solutions, we can support our customers in optimizing their layout and stowage efficiency, as well as introducing creative additional signature features into the cabin,” reports Bernhardt Seiter, vice president of EMEA sales and cabin strategy at Recaro Aircraft Seating. “In part, an airline’s philosophy is reflected in the design and creativity of its cabin interior monuments. With the CL6710 and our wide range of new monument options, we can offer unique, perfectly coordinated cabin environments that give our customers a competitive edge through differentiation.”

COMING SOON: THE CL5710
The new CL5710 business class seat for short-and medium-haul flights attracted attention at Aircraft Interiors Expo 2015 with its clear design and modern, appealing look.

1. THE DESIGN OF THE CL6710 HAS RECEIVED SEVERAL UPDATES DURING 2015, BASED ON CUSTOMER FEEDBACK

2. THE SHORT- TO MEDIUM-HAUL CL5710 WILL LAUNCH ON AN A320NEO DURING 2016

“The development of the CL5710 was based on our experiences with its predecessor seat. We focused on the implementation of customer requirements and the integration of innovative solutions that optimally combine comfort and efficiency in the new product,” says Klaus Steinmeyer, vice president of business development. “This has already convinced an Asian customer – the CL5710 will be integrated into the A320neo in 2016.”

The new business class seat can be equipped with the latest IFE systems and an integrated monitor up to 13in. Additional stowage options include space for a laptop or other electronic devices and a smaller pocket for personal belongings, like wallets or smartphones. All power

3. THE NEW CL6710 ALSO COMES WITH FRONT-ROW MONUMENT OPTIONS TO AID PASSENGER COMFORT AND CREW SERVICE

The CL6710 creates a simple way to offer a self-service bar in the front monument



plugs and ports are located in the center console.

With a new leg rest and a generous recline, the CL5710 offers unmatched passenger comfort and includes various predefined seating positions. Lumbar support and an integrated massage component ensure exceptional seating comfort. The new business class seat features a reliable, smooth-operating articulation system.

"Its contemporary industrial design, enhanced passenger comfort features and competitive weight make this seat the first choice for single-aisle aircraft on short- and medium-range flights," says Steinmeyer.

ADVANCED PREMIUM SEATING: THE CL6710

Let's turn to long-haul requirements: The 2015 Recaro CL6710 features new passenger comfort and privacy options. In a side-by-side layout, the center seats can be equipped with a retractable privacy divider. Recaro also offers custom-tailored privacy fins for aisle seats. Passengers enjoy a more usable seat control unit (SCU): by refining the visual layout of the SCU, the Recaro design team optimized intuitive handling.

Added space or more seclusion and protection? Movable armrests at both sides of the new CL6710 give passengers additional options for arranging the seating environment according to their individual needs. They can enjoy more shoulder space in the sleeping position when the armrests are down, or feel shielded from the aisle or cold cabin wall when the armrests are raised.

To enhance the flight experience, the CL6710 enables airlines to offer their passengers a practically unlimited choice of entertainment options. From the moment of boarding until leaving the aircraft, IFE can now be made available in all flight

"THE CL6710 ENABLES AIRLINES TO OFFER A PRACTICALLY UNLIMITED CHOICE OF ENTERTAINMENT"

phases, gate-to-gate. With the flexibility of the seat design, airlines can decide where sockets for PC power, headphones or USB should be placed. Sockets can be located close to the passenger, near the side table, or they can be integrated into the lower part of the console.

CL6710 occupants have multipurpose stowage options for various items. For example, the top stowage area can be custom-configured to include closed compartments in different sizes, a different handset orientation, or compartments with roller blinds. Alternative concepts were displayed at Aircraft Interiors Expo, to prompt discussion of airline-specific solutions.

The timeless design of the CL6710 offers a wide variety of options for adapting the seat to suit an airline's needs: from various privacy and stowage solutions, to the look and feel of the SCU, different trim and finish options, and dress covers. Customers appreciate the Recaro design team's expertise when it comes to translating strictly defined requirements into custom-tailored product details.

NEW MONUMENT SOLUTIONS

The options for customizing Recaro business class seats go beyond basic design. Recaro premium quality now extends to monument solutions. The company offers a wide variety of options for cabin interiors equipped with the new CL6710. The front of the monument offers all comfort features for the first row passenger, while the back incorporates many potential configurations, such as stowage space for wheelchairs, wardrobes for coats and jackets, or extra stowage for emergency equipment, pillows and blankets.

Special solutions, such as a self-service bar with beverages and snacks for passengers during night-time flights, can also be integrated into the monument.

PREMIUM QUALITY MEETS MAINTENANCE

With the new business class, Recaro is placing even more emphasis on optimized maintenance. This includes new solutions such as attractive 24/7 maintenance packages and support services, quick and easy data retrieval, an innovative attachment concept to replace foil parts, and, for the easy change of dress covers, a new zipper and hook-and-loop tape attachment. ☒

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BETTER CONNECTED

Thales InFlyt Experience is the smart choice for the connected airline, optimizing the passenger and airline experience

Thales InFlyt Experience is a global leader in providing leading-edge connected in-flight entertainment systems and services that enrich the travel experience. The company prides itself on having highly motivated people, airline insight and capability gained from extensive experience in aerospace, aviation, satellite systems and cybersecurity.

Thales's years of success in the IFE market have enabled it to continuously evolve its products, keeping pace with trends in consumer technologies and cultivating a thorough understanding of passenger behaviors, preferences and expectations. The company's experience in IFE avionics is manifested in expertise in the design, development and qualification of robust hardware and software solutions for the aircraft operational environment. Thales has in place a global infrastructure to provide tailored maintenance and support services that improve aircraft dispatch readiness and system reliability.

IFE and connectivity have become truly integrated systems. Together they form the foundation of an ecosystem of services that create the passenger experience – an experience that can mimic the one you have at home. With the proliferation of personal electronic devices (PEDs), connectivity enables the extension of the home experience into the air travel environment: from connected applications such as news and weather, to streaming video, to targeted advertising, information and messaging – before, during and after the flight. The Thales view is that PEDs complement its embedded seatback systems by integrating a second screen experience, which has become a common paradigm for today's multitasking consumers.

Avant is Thales' fourth generation, state-of-the-art Android-based IFE solution. It features a modern industrial design and highly customizable passenger experience, including the latest applications on the market. This fully scalable and flexible platform enables



airlines to offer a feature-rich experience to all passengers on board. In less than three years, over 15 million people have experienced Avant.

Thales' connectivity solutions enable airlines to reach their full service and revenue potential by offering global inflight coverage that supports the needs of passengers and the needs of airlines to access critical real-time inflight data. The onboard cabin network offers the latest in multiple wireless technologies to support high-capacity streaming capabilities to meet the ever-increasing demand for bandwidth. Thales is focused on bringing the best technology to the airline that

will provide the optimal combination of coverage, capacity and cost for the route network.

Thales' products have been built to be modular and scalable, from the ground segment to the airborne segments, allowing for a uniform standard of services to be provided to customers across a common platform. Innovation is in the company's DNA and it has positioned itself to be the quickest to embrace new technologies as they come to market. The company's solutions offer both onboard streaming solutions from cached content as well as streaming via the connectivity system to the passenger seat.

"THE THALES VIEW IS THAT PEDS COMPLEMENT ITS EMBEDDED SEATBACK IFE SYSTEMS"

Consumer choices are shaping the inflight broadband experience



1. THE ANDROID-BASED AVANT SYSTEM CAN BE NEATLY INTEGRATED INTO SEATBACKS

Wirelessly streaming content gives passengers the ability to enjoy content through their own PEDs. These devices provide a tremendous opportunity to personalize and customize the travel experience, while extending the engagement between the passenger and the airline. Passengers can select their in-flight entertainment choices and learn more about their flight in advance of boarding. Returning customers will be reunited with their favorite programming and can connect automatically to multitask on their PED by reading the news, streaming video, using mobile apps, perusing social media and much more.

FUTURE VIEW

It is this demand for consumer choices that will shape the inflight broadband experience as connectivity becomes more ubiquitous and bandwidth costs decrease. In fact, JetBlue Airlines recently announced its partnership with Amazon to offer passengers complimentary streaming, on-demand video and music content, using capabilities enabled by Thales.

Passengers who are members of Amazon Prime have access to titles at no extra cost while on board a JetBlue aircraft. This evolution in streaming on-demand video to passengers is a major leap for the onboard experience. In the near future,

Thales expects to deliver the capability to not just stream video, but also to enable live video content so passengers can watch their favorite sports team in action anywhere on the globe.

IMMERSIVE ENTERTAINMENT
As Thales continues to focus on the best way to leverage its capabilities to create an engaging experience for the passenger, it is continuously investing in innovation. For the past year, the immersive seat developed with B/E Aerospace has been doing the rounds at industry events. When in the immersive seat environment, passengers have the choice of navigating

New ways of controlling IFE systems are currently in development



2. THE AVANT CONTROLLER CAN BE USED FOR GAMES OR FOR SHOWING SECOND-SCREEN ENTERTAINMENT

3. THE AVANT SYSTEM HAS MULTIPLE PLUG-IN CHOICES FOR PAYMENT DEVICES AND OTHER TECHNOLOGIES



the IFE system through gesture movement, eye tracking, or a specially designed motion pointer.

Occupants are immersed in high-definition 'spatial sound' audio that adjusts to their head position. They are able to view entertainment and information in multiple ways, whether in front of them or to the side, and with the possibility of a third device on the tray table. While intended as a demonstrator platform, the immersive seat has succeeded in providing Thales with valuable user feedback to shape the passenger experience of the future.

REVENUE GENERATION

Inflight connectivity services will continue to be a strong growth market for airlines for years to come, and Thales recognizes the great potential for other in-air connected services applications.

Revenue generation, including traditional pay-for-service and shopping applications, facilitate ancillary revenues, and opportunities for sponsorships/partnerships. The scalability and flexibility of the Thales platforms allows for seamless integration of third-party partners and sponsors, as well as targeted advertising and messaging. Thales is also

“THALES’S PORTFOLIO GIVES AIRLINES THE OPPORTUNITY TO DESIGN THE EXPERIENCE THEY WANT”

providing a wide array of value-added services that create revenue opportunities for the airline beyond traditional internet service fees. These opportunities include wireless IFE, and live television products that allow pay-per-access revenue generation, as well as destination packages and targeted e-commerce. Thales views the onboard experience as similar to other digital marketplaces, and is working to remove barriers to create a similar experience on board.

WIDER BENEFITS

Airlines are also turning to connectivity solutions to help drive a competitive advantage. Using real-time reporting of onboard information, airlines can quickly

address maintenance requirements, better serve passengers, and provide critical information to pilots. Working with partner organizations within the Thales Avionics domain, the following applications will be brought to market: electronic flight bags; crew-to-ground messaging; real-time health monitoring and diagnostics; predictive maintenance; electronic log books; surface tracking (logistics improvements for sequencing of aircraft); performance calculations/weight and balance; and engine and fuel consumption monitoring and analysis. These solutions reduce downtime and improve efficiencies, helping to increase airline profitability.

Thales’s complete portfolio provides airlines with the opportunity to design the experience they want, no matter what their business model, addressing all aircraft types and providing solutions for both line-fit and retrofit. More than 300 million passengers per year across 75 partner airlines use Thales InFlyt Experience solutions – making it the smart choice for the connected airline. ✕

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More than just IFE, Thales InFlyt Experience

The smart choice for the connected airline



Thales InFlyt Experience, the new name for our entertainment and connectivity business is revolutionising passenger engagement throughout their travel experience and creating smart opportunities for airlines. Our solutions ensure the fastest, highest capacity, data links possible for passenger and airlines. No other provider has the people, airline insight and capability gained from such extensive aerospace, aviation, satellite and cyber-secure data communications involvement. We work with you to create inflight and connectivity solutions to achieve substantial financial returns and operational efficiencies. A commitment to open architecture solutions ensures greater choice, easier integration and customization for your fleet. For our airline customers, Thales InFlyt Experience is making a difference. Everywhere.

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FUTURE VISION

The Diana concept brings together many innovative ideas that can make it the high-tech, holistic cabin of tomorrow

A vision for cabin design: a transparent, glowing, crystalline, brand-new interpretation of an aircraft interior. The lighting is integrated into surfaces, with the colors changing according to mood, perfectly adapting to the circadian rhythms of the passengers, while sophisticated acoustics make for an even more pleasant atmosphere. The cabin functionalities, including in the lavatory, are simpler to use, more efficient and lower cost thanks to a standalone energy supply. Imagine all of this, and all of it being centrally controlled and finely tuned to the requirements of crew and passengers. All these ideas have been combined in the unique Diana research project to create one single vision: the aircraft cabin of tomorrow.

The Diana project has been receiving German federal funding since 2012, and is being realized by Diehl Aerosystems business units including Diehl Aircabin, Diehl Aerospace, Diehl Comfort Modules, and AOA, together with partners such as Airbus and Osram, as well as some leading German universities and research establishments. The optimization of technical details has been combined with fascinating innovation: lighting and surface structures and hardware and software elements have been fused together to create a new holistic concept.

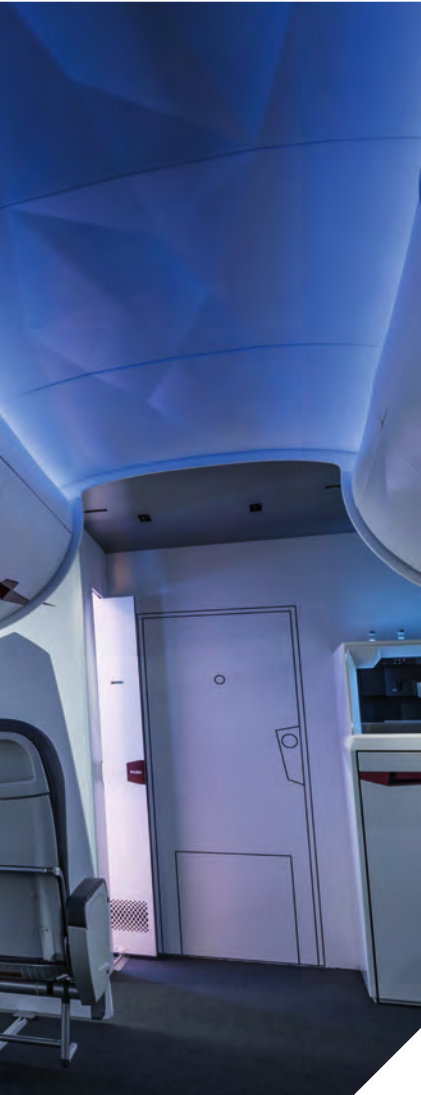
After just three years of joint research and development, Diana has become a reality today in almost all its aspects. Using the Diana demonstrator in Diehl Aircabin's showroom in Laupheim, Germany, project participants have been able to prove that the newly developed technologies fulfill expectations and interact with each other intelligently. Since then, visitors have been able to build a vivid impression of how they will fly tomorrow. As well as a cross-section of the passenger cabin of a short- to mid-range aircraft, also on display are an integrated lavatory and the DACAPO (Distributed Autonomous Cabin Power) concept for a cabin with a standalone energy supply.



Within the framework of Diana, an innovative cabin management and services system has also been developed. This system controls centralized functions such as cabin lighting, illuminated displays, calling flight attendants, and galley and lavatory functionalities, as well as many other systems such as those for fresh water and wastewater. The modular approach and the standardized interfaces of the network infrastructure minimize maintenance, reduce costs throughout the service life of the aircraft, and offer a high degree of reliability.

Upon stepping into the demonstrator, the all-new design elements are immediately apparent. Light, structural and surface elements work in harmony. A great deal of thought went into the integration of the light sources into the individual cabin modules. Surfaces are often transparent or opaque, in coordination with the various light sources and their effects. Not a single angle of vision or ray of light has been left to chance. The concept – for which Diehl coined the name Precision Contour and Area Illumination – turns the cabin into

“IDEAS HAVE BEEN COMBINED IN THE DIANA PROJECT TO CREATE A SINGLE VISION: THE AIRCRAFT CABIN OF TOMORROW”



1. THE GEOMETRIC CEILING PANELS IN THE DIANA CONCEPT CABIN CREATE DIFFERENT EFFECTS. CUSTOMERS CAN SPECIFY OTHER FORMS THOUGH
2. FOR THE CONCEPT, GEOMETRIC FORMS ARE CARRIED THROUGH THE CEILING PANELS AND KEY TOUCHPOINTS SUCH AS BIN LATCHES
3. EXCITERS INTEGRATED INTO THE CEILING MEAN THAT SPEAKERS ARE NOT REQUIRED, ADDING TO THE CLEAN CABIN AESTHETIC

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a place of well-being. Flying becomes an adventure!

LIGHTING

The lighting aspects of the concept have been extensively researched and analyzed, including how the lighting will be perceived by passengers, and the psychological and physiological effects of this lighting. Following this work, the vast amount of theoretical data gathered was efficiently turned into reality.

Dirk-Achim Schevardo, an expert for cabin lighting appearance with Diehl

Aerospace, explains, “Our aim was to create an interaction of surface and contours, of light and color, to capture a multitude of different moods and atmospheres that passengers can take with them into the different phases of their flight. The effects of the lighting go beyond the mere well-being of passengers. It is possible, for example, to alleviate the effects of jetlag by simulating daylight in order to maintain the natural circadian rhythms of passengers, and to gradually ease them into their new time zone.”



4. THE LAV HAS TOUCHLESS OPERATION TO AID CABIN HYGIENE

5. CUSTOMERS CAN WORK WITH DIEHL TO CREATE OTHER THEMES AND EFFECTS

6. DIANA'S ANGULAR MOTIF IS CARRIED INTO EVERY PASSENGER TOUCHPOINT. IT WOULD WORK WELL WITH ELECTROCHROMATIC WINDOW CONTROLS

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- Fraunhofer Gesellschaft, Department for Operational and Systems Reliability
- Fraunhofer Gesellschaft, Department for Chemical Technology
- Technische Universität Berlin, Section Fluid Systems Dynamic – Flow Technology in Machines and Equipment
- Technische Universität Dresden, Department for Lightweight Construction and Plastics Technology
- Universität Stuttgart, Aircraft Systems department

At the same time, these concepts enable the customization and individualization of a cabin, to align it with the needs of the operator or the airline.

SIMPLE LIVING

Similar effort has gone into devising other aspects of the cabin concept. For example, revolutionary new joint concepts facilitate the coupling of components; the new mobile luggage compartments are huge and passenger-friendly, made easy to use thanks to the intelligent suspension technology; and control elements integrated into the side paneling add a finishing touch to the harmonious cabin

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interior. In addition to all of this, the usability and comfort of the lavatories were improved, which at the same time lowers maintenance requirements. The new, intuitive folding door concept is ready, the new toilet seat moves without being touched, and a noise-optimized ventilation grid in the door reduces the effects of noise disturbance.

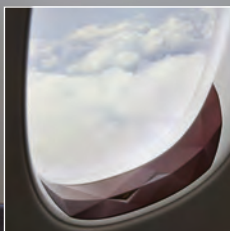
GREEN POWER

The holistic approach of Diana is also visible in the DACAPO concept, a standalone cabin power supply that saves energy. For this innovation Diehl received the prestigious Crystal Cabin Award in 2014.

In essence, the system separates power-consuming elements essential for flight operation from elements that are not essential. The additional power needed

for cabin functionalities and systems comes from alternative sources. One big advantage is that the system enables the use of efficient and sustainable hydrogen cell technology, so the passenger cabin runs on green energy.

In Diana, industry and research partners have created an all-new, holistic cabin. Most of the innovations, however, are not visible. First and foremost, Diana is a research project, which is why the various innovative elements may not all have the same degree of maturity. Some of the innovations are already being used in new aircraft, while others may soon be a reality. Customers will enable the realization of more concepts, bringing the vision of Diana becoming the 'cabin of tomorrow' ever closer. ☒



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GOING FORWARD

Italian seating manufacturer Geven has been developing its seating range to offer something special for every class of travel

With seating models that range from economy, to premium economy, to business class, Geven's family of seats can meet most airlines' needs.

There have been many recent additions to the Geven seating range, including the all-new Elemento, an economy class seat with a focus on comfort, accessories and state-of-the-art ergonomics. Elemento has been conceived as a response to myriad requirements typically asked of a long-range economy seat. Several features and customization levels can be specified to meet a variety of customer needs, including a design that can integrate the latest IFE equipment.

COMODA ALTA QUOTA

Another new development at the company is the Comoda Alta Quota seat, which blends the simplicity of an economy seat with the luxury of the successful Comoda single-aisle business class model.

The Comoda Alta Quota can offer true comfort in premium economy, with a spacious 19.5in seat width maximizing passenger comfort without encroaching on aisle width, and with many clever object stowage areas, a leg rest that can function at just a 36in pitch, and a generous recline up to 9in. IFE options can vary from a simple audio-only system, to full embedded seatback IFE of up to 13in, while the first row can be fitted with an in-arm 11in video display.



1. CREW CAN COMPLETE A SIMPLE OPERATION TO MAKE EMPTY SEATS INTO BEDS, GENERATING NEW REVENUE OPPORTUNITIES FROM VACANT SPACE

2. THE ALL-NEW ELEMENTO LONG-HAUL ECONOMY SEAT OFFERS SEVERAL OPTIONS AND CUSTOMIZATION LEVELS

“SEVERAL FEATURES AND CUSTOMIZATION LEVELS CAN BE SPECIFIED TO MEET CUSTOMER NEEDS”

The Piuma Sofà allows airlines to offer a bed in economy class



3

3. THE BACIO MODEL OFFERS BUSINESS CLASS, OR EVEN FIRST CLASS COMFORT, AT A MINIMUM PITCH OF 56IN



4

"THE SEAT REPRESENTS A STRONG DIFFERENTIATOR IN A COMPETITIVE INDUSTRY"

4. THE PIUMA SOFÀ IS BEING LINE-FITTED WITH A MAJOR FLAG CARRIER

5. THE COMODA ALTA QUOTA OFFERS REAL COMFORT IN PREMIUM ECONOMY

BACIO

What is needed to go the extra mile on modern wide-body aircraft is premium seating capable of affording passengers the fullest business class experience at a pitch that maximizes cabin density.

Bacio, Geven's brand-new entry into the wide-body first class/business class market, is able to do just that, combining comfort, style, the latest options and fabulous functionality, all at a minimum pitch of 56in. The Bacio model has enough options to satisfy the needs of the majority of airlines, and the use of all available space within the seat has been optimized without sacrificing the aesthetic design of the seat and its high degree of functionality.

The Bacio model blends modern sophistication with functionality, to

address business travelers' requirements for more flexibility, comfort and privacy. The features of the seat have also been designed to work intuitively to meet the passengers' every need and to give the seat a superior appearance with maximized personal space.

PIUMA SOFÀ

Last but not least, Geven's patented Piuma Sofà, which can be quickly converted from a long-haul economy seat into a full bed, is already being line-fitted at a major flag carrier. The Piuma Sofà enables passengers to experience the luxury of lie-flat beds in economy and provides a flexible space for families with small children. The seat represents a strong differentiator in a competitive industry, with potential for significant additional ancillary revenues.

Geven's new and extended family of seats ensures that everyone can be comfortably seated on long haul – even more so if they are lying down. ✕



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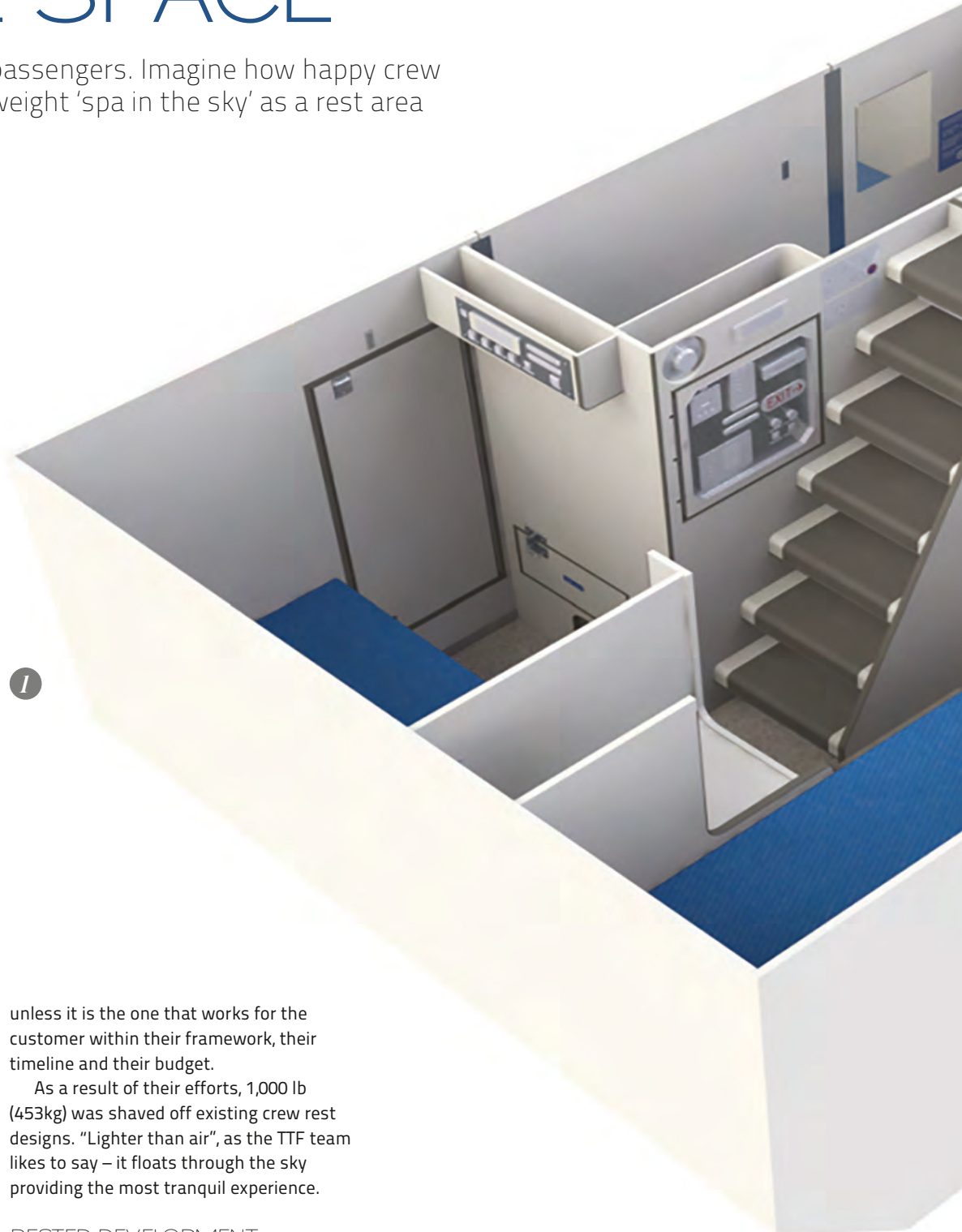
SERENE SPACE

Happy crew make for happy passengers. Imagine how happy crew would be with a special, lightweight 'spa in the sky' as a rest area

As with many a great story, it all started with a napkin. Two years ago, a customer asked TTF to create a new crew rest for its wide-body fleet. It didn't want to lose any seat revenue, so a main cabin solution was not practical. In the interest of promoting the best use of all aircraft space, a lower-deck crew rest was proposed. However, the customer was concerned about weight. One of TTF's brilliant minds sketched a crew rest on a napkin, showed it to a customer, and said, "This is how we will make you the lightest spa in the sky."

Of course, all great ideas look easy when they're a sketch on a napkin, but creating a six-bunk crew rest in this limited space raised various structural, noise, temperature, lighting and safety obstacles. Structural modifications as well as numerous system modifications had to be implemented in the design, taking into consideration all airframe and certification requirements, to make this innovative concept into a reality. In addition to the structural restrictions, designing and substantiating a mounting system that allowed the crew rest to float inside the tail of a wide-body airliner, while still interfacing with a main deck staircase, was also an interesting challenge – but definitely not an impossible one for TTF Aerospace.

In an industry obsessed with lightness, the overall weight of crew rest had to be reduced. TTF took steps that had a major impact on the overall weight, including the use of a proprietary composite panel that was developed by TTF in-house. Extremely light, these panels can be optimized in a number of ways to achieve regulated loads and space-saving geometry. After implementing a few other innovative engineering tricks, the TTF team believed they had created the lightest crew rest on the market. As we know, in today's aerospace world, it has become extremely challenging to reduce even one pound of weight, but the TTF team was determined to make their customer's napkin dream a reality. And they did. There is no solution



unless it is the one that works for the customer within their framework, their timeline and their budget.

As a result of their efforts, 1,000 lb (453kg) was shaved off existing crew rest designs. "Lighter than air", as the TTF team likes to say – it floats through the sky providing the most tranquil experience.

RESTED DEVELOPMENT

TTF has set an ambitious goal of making sure every crew rest that comes out of its facility is qualified as a Class 1 Rest Facility in accordance with 14 CFR Part 117. The requirements to qualify as a Class 1 Rest Facility are difficult to attain.

Lighting control plays an important role in making each bunk more inviting and



Crew are isolated from noise, odors, vibration and other disturbances

"CREATING A SIX-BUNK CREW REST IN THIS LIMITED SPACE RAISED VARIOUS OBSTACLES"

1. TTF AEROSPACE INSISTED THAT THE CREW REST HAD TO BE A CLASS 1 REST FACILITY IN ACCORDANCE WITH 14 CFR PART 117

spacious for the occupant. With this in mind, TTF made sure the design addressed that by adding colored, dimmable area lights which create a feeling of tranquility, rejuvenation and serenity for all flight crew members.

In addition to a tremendous saving in weight, TTF's proprietary panel material had a significant effect on sound dampening. Isolation from intrusive noise, odors, vibration and other disturbances helps to make the space more comfortable for the flight crew during long-haul travel. These panels resulted in a noise level range of 70-75dB during cruising.

Each bunk is temperature controlled and every occupant can adjust the features to their liking using a PSU panel

located above their head. Privacy is an important consideration in Class 1 rest facilities, so TTF made sure all the bunks could be closed off with sound-dampening curtains. These curtains create a calm, private area whether the occupant is sleeping, reading a good book, watching a great movie, or daydreaming about exotic world destinations. The compartments also come with a range of comfort options, including stowage compartments, a folding table, interphones, a shaver socket and individual air supply, to name a few.

TTF recognizes the importance of always striving to innovate. The company is currently exploring and playing with conceptual design for a potential new crew rest that will bring the experience for flight

TTF Aerospace has also been refining its stowage bin designs



2. CAREFUL CONSIDERATION OF THE NEW CREW REST DESIGN SAW 1,000 LB (453KG) SHAVED OFF TTF'S EXISTING CREW REST DESIGNS

3. SIX CREW MEMBERS CAN SHARE THIS COMPACT SPACE IN COMFORT

crew to an even higher level. The curves and organic shapes are reminiscent of a luxurious spa, with the colors and exclusive materials playing a vital role in this heavenly experience for crew. It is TTF's goal that the new product characterizes a timeless design that cleverly incorporates its functionalities to keep the surfaces flush and clean, but also provides a natural and flowing appearance.

OTHER PROJECTS

Crew rests haven't been the only focus for TTF. Recently the company further refined its bin designs and it is now offering them to the aftermarket as a possible alternative to other manufacturers' bins. One of TTF's new bin designs has been delivered to a Tier 1 customer in record time, with the highest quality and attention to detail.

TTF also recognized an aftermarket need to make bins more spacious without replacing them, and went on to create a better, more cost-effective bin extension. The TTF bin extension kit uses lighter materials and improves latch reliability, while minimizing part count and complexity. There are no potted fasteners and no trim to glue, no painting, no potting compound, no adhesives – it is as simple as it gets.



Working with groundbreaking thoughts and ideas, no matter where they come from, and developing new solutions and products, are at the very core of TTF and its mission. Giving customers what they want, while providing exceptional service, is what a company strives for. An ambitious and driven team made TTF what it is today – an industry leader in crew rest design and manufacturing. A 1,000 lb (453kg) lighter lower-deck modular crew rest, a 'lighter than air' spa in the sky flying through clouds on wide-body aircraft, is proof of that. ✕

"THE CURVES AND ORGANIC SHAPES ARE REMINISCENT OF A LUXURIOUS SPA"

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MATERIAL GAINS

As designers and the airlines strive for the next generation of cabin advances, lightweight materials and advanced processing technologies can play a key role

The Studio Gavari prototype seat was created to inspire a fresh look at seat design

Is there a more relevant manufacturing topic in any industry today than 3D printing?

Additive manufacturing, as it is also known, has captured intense interest because of its many advantages, one of which is rapid prototyping.

SABIC recently employed the technology to create a prototype for a sleek, ergonomically advanced economy class aircraft seat, using a design by Studio Gavari, a design firm based in Italy. The seat was created to inspire seating suppliers to take a fresh look at seat design, and consider new ways of manufacturing various seating components, if not the entire seat.

To take the seat a step further toward being feasible, this 'proof of concept' design was fabricated using filaments made of SABIC's Ultem 9085 resin. An advanced thermoplastic material, it is highly compatible with 3D printing as well as being FAR 25.853 and OEM toxicity compliant. The material is often chosen for a wide range of aircraft interior applications because it offers low moisture absorption design flexibility and versatility (as a resin, it can be injection molded; as a sheet, it can be thermoformed; and it can also take the form of a non-woven material for fire blockers and acoustical panels). Use of 3D printing enabled the rapid prototyping of the design, resulting in a seat with fewer than 15 components, compared with a typical seat's 200 parts.





"3D PRINTING ENABLED THE SEAT DESIGN TO HAVE 15 COMPONENTS, COMPARED WITH THE 200 PARTS OF A TYPICAL SEAT"

1. SABIC AND STUDIO GAVARI CREATED A SLEEK AND ERGONOMICALLY ADVANCED SEAT DESIGN, PRINTED USING FILAMENT MADE FROM ULTEM 9085 RESIN, WHICH IS HIGHLY COMPATIBLE WITH 3D PRINTING AND IS FAR 25.853 AND OEM TOXICITY COMPLIANT

2. THESE SEATBACKS HAVE BEEN THERMOFORMED OUT OF LEXAN XHRL300 SHEET BY BIG BEAR PLASTICS PRODUCTS. USE OF THIS MATERIAL ENABLED A WEIGHT SAVING OF 36% (USING APPROXIMATELY 594G COMPARED WITH 928G OF PVC/PMMA SHEET), WHICH EQUATES TO APPROXIMATELY ANNUAL FUEL SAVINGS OF US\$220 PER TYPICAL SEATBACK IN A SINGLE-AISLE JET

THE WAY FORWARD

But what will be required for this evolving technology to fully benefit the aerospace industry? The adoption of additive manufacturing across all industries continues to increase as the technologies evolve and improve in speed, part performance and aesthetics. However, for additive manufacturing to reach its full potential as a manufacturing process for aerospace customers, the industry will require four main developments.

Firstly, a process that is able to produce thermoplastic parts that approach the performance of injection molding will be required – and this will require materials that are designed specifically for 3D printing.

Secondly, a broader range of material availability will be required, including materials with the same properties and features that are available today with other conversion technologies (flame retardancy, UV stability, etc).

Thirdly, the technology must be economical, with reduced material costs, increased print speeds and reduced secondary operations.

And perhaps most importantly, the first- and second-tier suppliers will need to become more proficient at designing for additive manufacturing by leveraging topology optimization and extreme part-consolidation techniques in order to realize the full value this technology can offer.

As a case in point, SABIC recently worked on a project for the lighting

industry – an industry that was searching for innovation and efficiencies in luminaire design and production. Using predictive engineering and 3D printing technology, SABIC created an integrated thermoplastic LED luminaire, which highlighted the opportunity to reduce parts by 84%, weight by 24% and assembly time by 65%, compared with a conventional metal luminaire. This was a great opportunity to demonstrate how using additive manufacturing technology can quickly turn an insightful idea into a potential cost-competitive solution for an industry.

SABIC is excited about the opportunity to help aerospace customers take advantage of the benefits of additive manufacturing technologies. Leveraging its global application development centers



The Studio Gavari seat was fabricated using Ultem 9085 resin filaments



around the world, SABIC is expanding its focus on additive manufacturing technologies including FDM, SLS and BAAM (big area additive manufacturing). The company is also continuing to expand its portfolio of 3D printing solutions – materials, design optimization and processing techniques – to help customers achieve improved part performance, enable design freedom, enhance part aesthetics, and provide more economical parts yields.

NEW MATERIALS OFFER LIGHTWEIGHT ALTERNATIVES

SABIC recently introduced an industry-first OSU compliant and lightweight Lexan XHR Light sheet series, an important expansion of its Lexan XHR sheet portfolio for aircraft interiors. Two new materials – Lexan XHRL300 and Lexan XHRL200 – open further opportunities for design flexibility and weight savings: two things paramount to aircraft OEMs and their tier suppliers.

The new sheets comply with industry heat release, flame and smoke regulatory requirements, as well as OEM toxicity standards, and are available in custom colors and textures, with excellent thermoforming characteristics that help designers achieve more distinctive interior components.

“THE NEW MATERIALS CAN HELP DESIGNERS STAY AHEAD OF DESIGN TRENDS”

The new materials can help aircraft interior designers and tier suppliers to not only stay ahead of design trends, but also to meet the demand for lighter-weight aircraft interior components that can help improve the overall fuel efficiency of an aircraft. SABIC's new patent-pending high-performance Lexan XHR Light sheet series is the lightest sheet with deep thermoforming ability available today, and can be used in applications where weight reduction is desired and high impact strength is not critical.

It is also the lightest thermoplastic sheet option available, regardless of base material, that meets stringent industry regulatory requirements, including heat release (OSU 55/55), flame, smoke density (FAR 25.853), and toxicity (BSS7239, ABD0031). With a density of 0.94g/cm³ and 1.07g/cm³ respectively, Lexan

XHRL300 and XHRL200 sheets offer up to 36% and 28% weight savings, respectively, when replacing traditional polyvinyl chloride and acrylic blend (PVC/PMMA)-based solid sheet products.

Using Lexan XHR Light sheet to replace PVC/PMMA-based solid sheet products on seatbacks can help increase fuel savings by approximately US\$660 for each kilogram of weight reduction. This can help create a saving of US\$33,000 in fuel costs each year, based on an average single-aisle jet with 150 seats. The potential savings are due to the innovative closed-cell structure of the Lexan XHR Light sheets, which can be thermoformed into complex 3D shaped parts with very thin walls, offering substantial potential for overall weight savings and fuel efficiency across an airline fleet.

In addition to seatbacks, the sheets can be used for interior components such as armrests, tray tables, window shrouds, kick panels, side panels, seat trims, magazine holders, cockpit dashboard enclosures, partitions, luggage compartments and PSUs. ✕

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- Monitor covers and self-service refreshment stations
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- Divider panels, galley equipment panels, trolleys
- Protective panels, stairs/railing panels
- Mirrors, lighting lenses
- Door and refrigeration systems
- Applications that require graphic designs

BRIEF ENCOUNTER

The Sophia seat offers something new in the regional business class market, which can also be enjoyed in long-haul premium economy

Regional and low-demand routes are often flown using aircraft models with code-names that don't begin with an A or B. Passengers in those aircraft are often arranged in a four- or five-abreast configuration, and the newest designs that are entering the market in this sector are five-abreast: the Sukhoi Superjet 100 and Bombardier CSeries, as well as the Comac ARJ21, while the still recent Embraer 190 is four-abreast.

Many heritage models are still flying, proving their sturdiness despite the tough life of frequent take-offs and landings: Fokker 70s and 100s and some McDonnell Douglas aircraft are still in the market, often retired only because of unattractive fuel efficiency. There is also a large turboprop fleet buzzing around the world's regions, typically with four-abreast cabin configurations.

Those narrower fuselages differ from what is nowadays considered as an industry standard: the classic six-abreast of medium-haul aircraft, which becomes a large and sumptuous four-abreast if business class is fitted.

In those regional aircraft, the tight cross-section makes it difficult to arrange a conventional business class section. A high level of service is often needed since those seats are frequently occupied by passengers who are flying to connect with long-haul flights offering a luxurious environment. A business class passenger coming from an intercontinental flight may be really disappointed to find that the last, and most hated, hour of a long trip is a cramped experience in a narrow economy class seat, especially if the airline operating the regional flight is the same one that operated the previous intercontinental flight.

This is one of the reasons why business class is offered in small aircraft. But how can greater comfort be achieved in a narrow-body cabin?

Usually, in aircraft with a five-abreast economy class configuration, business class is furnished as four-abreast, and in





Sophia answers the increase in demand for short-haul business class

"SOPHIA FEATURES A LIGHT STRUCTURE AS FOUND IN ECONOMY CLASS, COMBINED WITH A BUSINESS CLASS STANDARD OF COMFORT"

a similar way, four-abreast aircraft become three-abreast.

Designing and installing such cabins is not a simple job, since the switch from odd to even and vice versa leads to a shift in the aisle path axis at the border between the two classes, and sometimes to a change in the layout of the overhead furniture, requiring special luggage bins that are a rare find in the airframers' standard lists. Also, the shape of the fuselage section does not help, with the rounded walls that taper close to the head area making the use of bulky backrests with extendable headrests impossible.

Some airlines try to avoid the problem of aisle misalignment by installing the same seating configuration in business as in economy class, but making the experience more premium by giving more seat pitch and by offering more features as in-arm tables, cup holders and adjustable headrests, together with a more personal service from the cabin crew. However, while skinny passengers might not notice the difference in width, the average demanding business passenger will.

Lightness is also a concern in narrow-body aircraft, for which fuel efficiency is crucial in order to gain revenues on secondary routes. Installing heavy equipment to provide comfort to passengers is not a welcome idea, especially since a heavy seat represents a higher percentage of ballast in a light aircraft than in a mid- to long-haul aircraft.

This means that the classic business class recliners made for medium-range jets do not suit regional jet cabins: they are full of padding, with structures that are devised to create high recline angles, and filled with heavy accessories, such as solid video arms and fully extendable leg rests.

The backrest structures are usually tall and almost straight to take advantage of the section shape of big aircraft, and the end-bays and center consoles are wide in order to house big tables and to separate passengers. The revolution that we have seen in the past decade for business class in twin-aisle aircraft has been the introduction of fully flat beds and exotic configurations; however, these do not fit into single-aisle aircraft. For such aircraft, if they are not fitted with convertible economy seats for business class passengers, the classic recliner rules in this category.

For regional aircraft with narrower fuselages, the classic recliner can hardly be installed and a specific business class seat is needed. Such a seat has to be truly comfortable by offering good contours and a wide space, with the restrictions that it can't recline that much, and it must be lightweight with a simple structure.

In these seats, the backrest has to be shaped in such a way that it will not interfere with the tapered window panels, while also providing a good support for the head and shoulders. The bottom cushion has to slide in conjunction with the recline movement of the backrest to allow for a further nap after a long intercontinental flight. The seat has to provide generous pockets and storage for personal belongings. Furthermore, in-arm tables have to be designed as a standard feature for seats that will naturally be located in the first row.

For this small but important market, Aviointeriors has developed a solution: Sophia. As with all Aviointeriors products, this seat is a highly customizable platform; it features a light structure as found in economy class seats, combined with a

1. SOPHIA'S PROPORTIONS WERE CONSIDERED TO ENSURE IT LOOKS LIKE A PROPER BUSINESS CLASS SEATING PRODUCT



2

"SOPHIA COULD BE INSTALLED ON A B777 IN A 2-4-2 OR A TIGHTER 3-3-3 PREMIUM ECONOMY"

2. SOPHIA'S OPTIONAL PED CRADLE CAN ACCOMMODATE EVERY TYPE OF DEVICE, FROM SMALL SMARTPHONE TO LARGE TABLET

business class standard of comfort. Sophia is shaped and sized to fit perfectly in regional aircraft and features an articulated seat pan to provide the best body support when the backrest is reclined. The balanced proportions of the seat ensure it doesn't look like a scaled-down version of a traditional business class recliner, nor a super-sized version of an economy class seat, but instead a proper high-class product that balances lightness and luxury.

IFE video systems are rare in these kinds of aircraft, so the Sophia seat has an optional personal electronic device (PED) cradle. This cradle can accommodate every

PED type, from a smartphone to large tablet devices.

This kind of lightweight short-haul business class seat can also be a good basis for developing a long-haul premium economy class product, since the seat size and comfort characteristics are very similar to those of regional business class. Customization in this case will be mostly limited to the backrest, since the straighter sidewalls of twin-aisle aircraft allow for a high and wide backrest that can accommodate the latest IFE screen models while providing the adjustments needed to provide comfort. As an example, the Sophia seat could be installed in a 2-4-2 or a tighter 3-3-3 premium economy configuration on a B777. ✕

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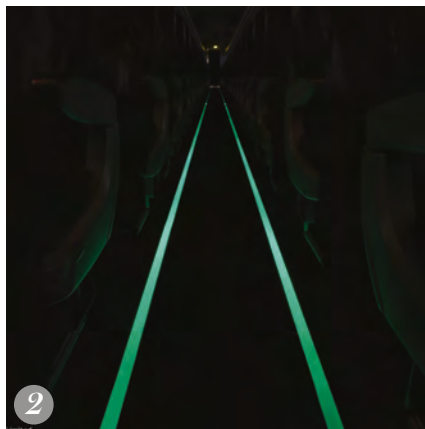
ONE VISION

Holistic lighting – what is it and why does it matter?

Aircraft cabin lighting has developed dramatically – from utilitarian, tobacco yellow bins and fluorescent strips, to more colors and controls than airlines know what to do with. While it is indisputable that lighting affects every passenger and has the power to influence their perception of both the flight itself and the airline, do aircraft really need systems offering 16.7 million colors?

Given the acquisition cost of these complex systems and the aircraft downtime required to install them – not to mention the fact that a significant number of airlines admit they don't use a fraction of the features available – then perhaps not. In fact some recent research from the University of Manchester in the UK has shown that a simple blue-yellow color change provides a more reliable method for demonstrating the transition to darkness for mammals than the reduction in intensity of mood lighting. So where does the future of cabin lighting lie?

To answer that, we need to go back in time. Human beings have evolved to thrive in dynamic natural light. Indeed, the color and intensity of light controls our circadian rhythms, positively affecting our bodies and minds throughout the day. In other words, light isn't just important for our visual performance; it is also important for our biological performance, and for our health and well-being. Disturbing our circadian rhythm can result in insomnia, disorientation and fatigue.



What are the implications of this for lighting in a closed environment such as an aircraft cabin? For a start, there are many components to cabin lighting. Even during daylight flights, natural light is having to work with (or against) the cabin's ceiling lights, its sidewall lights, its emergency signage and lights, its galley lights, its photoluminescent floorpath marking, and more. It's a complex cocktail of illumination. STG Aerospace believes that the future lies not only in ensuring that every area of cabin lighting is task-optimized, but also that lighting integrated

within a holistic cabin aesthetic can enhance the passenger experience, helping to promote the airline's brand identity and improve its metrics. After all, good-quality lighting makes everything better.

PHOTOLUMINESCENT LIGHTING
STG Aerospace's belief in this holistic approach is rooted in its long-standing record as a pioneer of innovative lighting technologies for the aircraft cabin. For example, STG was the first to develop and certify a photoluminescent floorpath marking system for the aviation market.

"LIGHTING INTEGRATED WITHIN A HOLISTIC CABIN AESTHETIC CAN ENHANCE THE EXPERIENCE"

STG was the first to certify a photoluminescent floorpath marking system



1. THE SAF-TSIGN RANGE OF PHOTOLUMINESCENT EMERGENCY AND INFORMATIONAL SIGNAGE DOES NOT REQUIRE POWER TO FUNCTION

2. THE SAF-TGLO PHOTOLUMINESCENT FLOORPATH MARKING SYSTEM IS USED BY ALMOST EVERY AIRCRAFT OEM

3. DUTCH CHARTER OPERATOR ARKEFLY CHOSE LITEMOOD LED LIGHTING FOR ITS B737-800 UPGRADES

Since then, the company has continued to develop the unique saf-Tglo product range. With an installed base of more than 10,000 aircraft worldwide, saf-Tglo is the system of choice for almost every major aircraft manufacturer and over 300 global airlines.

Designed to survive the harsh operating environment of the cabin floor, the latest saf-Tglo systems are the narrowest, lightest and most discreet photoluminescent systems available on the market and characterized by the ease with which they can be installed. A typical Boeing 737 installation can be completed

by two workers in one shift. Indeed, STG Aerospace supported the largest ever B737 cabin retrofit program – supplying an average of one saf-Tglo kit per day for two years – when Southwest Airlines embarked on the implementation of its new-look Evolve interior.

However, of equal importance given the subject of this article, is the emphasis STG Aerospace has always placed on aesthetic considerations; an emphasis reflected in the seriousness with which airlines are beginning to take branding within the cabin space. In 2005, for example, STG

achieved another industry first with the introduction and certification of colored photoluminescent floor marking systems, enabling airlines to coordinate an essential lighting component – traditionally thought of in purely functional terms – with the overall design and color scheme of the aircraft's interior.

The most recent version of the saf-Tglo range, launched in 2014, is SuperSeal UltraLite (SSUL), which has already been selected as line-fit equipment by Boeing and Embraer for the B737MAX and E2 programs, respectively.

STG has combined photoluminescent and LED technologies



4. LA COMPAGNIE'S ALL-BUSINESS B757S FEATURE BOTH THE SAF-TGLO AND THE LITEMOOD SYSTEMS

This combination of form and function is also evident in the saf-Tsign range of products, the leading brand of photoluminescent emergency and informational signage. With no power source required, saf-Tsign products are easy to install, 100% failsafe and have zero running costs. Highly visible in the dark, and offering long-duration illumination, their automatic activation means that no 'switch on' is necessary.

In addition, and despite the necessarily strict regulatory requirements in this particular area, saf-Tsign products can be produced to match even the most demanding cabin designs. Suitable for replacing expensive and radioactive Tritium type signs in the aftermarket, saf-Tsign has also been selected by numerous OEMs such as Embraer and AgustaWestland.

LED LIGHTING

Much research has been done into the subliminal effects of lighting, research which significantly influenced STG Aerospace in the development of its fully certified plug-and-play LED cabin lighting system, liTeMood.

Designed specifically for retrofitting in commercial aircraft cabins, liTeMood is quick and easy to install – a process typically accomplished in just a few hours – and features significantly increased reliability over traditional lighting systems, thereby reducing operational and ongoing maintenance costs. The system also delivers important environmental benefits. Not only is liTeMood up to 40kg lighter

than the typical original-fit fluorescent lighting it replaces, it also consumes 70% less power, increasing both the aircraft's fuel and electrical efficiency.

As with STG's photoluminescent products, however, the benefits of liTeMood transcend the purely functional. With its patented and easy-to-configure functionality, the cabin interior can be optimized to increase the passengers' sense of well-being, achieve impactful brand differentiation, and improve airline metrics by encouraging increased retail sales, for example.

Dutch charter operator Arkefly chose liTeMood for the upgrade of its B737-800s, while for Thomson Airways, STG Aerospace was involved in the simultaneous upgrade of two aircraft platforms when the carrier sought to upgrade nine B737NGs as well as 14 B757s – a project that involved the replacement of the legacy fluorescent systems to provide an improved and unified customer experience across the fleet. STG was able to replace four different legacy systems, leveraging the identical communication architecture existing in the aircraft without the addition of any external control or communication boxes.

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

COMBINING LED AND PHOTOLUMINESCENT LIGHTING
Most recently, STG Aerospace has fitted

both the latest saf-Tglo SuperSeal UltraLite system and a liTeMood system on the all-business class B757 operated by DreamJet trading as La Compagnie on flights to New York from Paris and London.

Installing this practical demonstration of the company's holistic approach to cabin lighting took place during an extremely short ground time; indeed, it was just two months from receiving the order to completed installation.

There is also an important technical point to be made here about the interaction between photoluminescent and LED lighting. Photoluminescent systems need the blue portion of white light to charge, so it is critically important that any LED system emits the necessary intensity of light with the appropriate wavelengths for charging to provide the required safety performance in photoluminescent systems.

As developers of lighting products embodying both technologies, STG Aerospace has particular expertise in this critical interaction. The company's team of experts are regular participants in aerospace committees, affording them critical insights into key areas of regulatory and technological advances.

But the key point is that by combining both photoluminescent and LED technologies, it is possible to turn a vision of holistic cabin lighting into reality. ☒

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WHAT DO YOU SEE?

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PERSONAL SERVICE

A focus on space-efficient luxury, with customization available within short lead times, is making Thompson's business seats a popular choice

Competition is increasing between airlines to differentiate brand offerings and deliver better business cabin experiences for passengers. This competition, combined with commercial pressures to maximize revenues, means that airlines are seeking out new partners to create better cabins and help generate higher revenues, with business class seating having been a major focus for airlines in recent years.

Thompson Aero Seating is now firmly positioned as one of the key partners that global airlines are increasingly trusting to deliver a pleasurable passenger experience and revenue maximization. So what are the reasons behind Thompson's success? Starting with the range of products, the efficient and flexible nature of Thompson Vantage and Vantage XL platforms span all main Airbus and Boeing aircraft. Added to this is the capability to offer each customer a highly bespoke product, allowing the airline to design the seat around the needs of its customers. Finally, the ability to deliver the end result to the agreed specification, on time and within a timescale to suit the airline. 'Let your need time define our lead time', Thompson advises potential customers.

"Over the past few years, Thompson has implemented significant investments in design and manufacturing capability. This makes us highly responsive to airline lead times and bespoke design requests," says Gary Montgomery, CEO of the company. "We have turned around blank sheet design to full seat delivery in less than 12 months, whilst building an enviable record for customer service and on-time seat delivery."

In an industry where demand is high and supply capacity is limited within reasonable timeframes, this is clearly a huge plus for Thompson. Thompson is attracting airlines seeking to work with a partner that can help them differentiate their product, deliver in a timeline that expedites new passenger cabin experiences, and help them drive immediate revenue.



"We have full in-house control of our design and manufacturing processes. This level of control has enabled us to respond to the requirements of our customers, and to deliver highly innovative, customized projects in timescales that significantly exceed industry norms," says Montgomery.

FLYING TODAY

Since the delivery of the first Thompson Vantage full-flat business seats to

Brussels Airlines, the Vantage and XL products have accumulated more than 14 million flying hours with an ever-expanding customer base that includes Qantas, American Airlines, SAS, SWISS and Aer Lingus. Already successfully installed on A321, A330, B767 and B777 aircraft and with several new programs in development across other Boeing and Airbus aircraft platforms, the Vantage and XL products are proving their versatility.

"WE CAN TURN AROUND BLANK SHEET DESIGN TO SEAT DELIVERY IN LESS THAN 12 MONTHS"

Flexibility and customization have been key to the success of the range



1. SWISS IS LAUNCHING ITS NEW BOEING 777S IN EARLY 2016, WHICH WILL FEATURE A FULLY CUSTOMIZED VANTAGE IN BUSINESS CLASS

doors had been certified on an Airbus single-aisle line-fit A321 program and also a first in the domestic US market.

AWARD-WINNING QANTAS Innovation and the ability to offer a full customization service, delivering on bespoke design briefs, are key factors in Thompson's continuing success in the global business class seating market. Qantas has recently been awarded 'World's best domestic business class seat' by *Australian Business Traveller* for the Thompson Vantage XL seat used in its domestic business class offering.

As *Australian Business Traveller* editor David Flynn said of the product, "There's not a domestic business class seat anywhere in the world which tops the new Qantas A330 Business Suite. With gate-to-gate recline, a fully lie-flat bed, direct aisle access, and plenty of shelving and stowage nooks for working inflight, the seat gets a confident thumbs-up from every business traveler."

The Qantas A330 Business Suite was also nominated as a finalist in the Australian Good Design Awards, in which it was described as "a game-changer in domestic and international business travel. Combining the luxury and privacy of a first [class] suite with the flexibility and

Among Thompson's most innovative projects is JetBlue's trans-American fleet of Airbus A321s and the 'Mint Cabin' customer experience. JetBlue worked with Thompson to create a 'Mint Seat' optimized for the narrow-body A321, based on a heavily customized version of Thompson's Vantage seat.

"Our competitors on the routes the Mint experience will be flying are all using the same off-the-shelf seats in business

class. We looked to Thompson because they were willing to work with us to create a fully customized seat. The reason this is so special to us and we think it will shake up the marketplace is that it truly is one of a kind," states Don Uselmann, JetBlue's manager of customer experience.

The Mint Cabin has 16 lie-flat seats, offering a bed length of 80in at a seat pitch of 46in. Within the cabin are four enclosed suites: the first time a suite with sliding

Thompson has full in-house control of design and manufacturing



2. AER LINGUS IS RETROFITTING THE VANTAGE TO ITS A330 FLEET

3. A LOT OF ATTENTION HAS BEEN PAID TO FINISHES IN THE QANTAS A330 BUSINESS CLASS, BASED ON THE VANTAGE XL MODEL

optimum comfort, privacy and customization opportunities, while maximizing cabin layout. Each seat converts into a fully lie-flat bed more than 2m long, and new features include headphone hangers and straps for storing tablets and magazines, along with increased personal stowage options.

AER LINGUS LUXURY

Thompson has also been active closer to home, working with Ireland's national carrier, Aer Lingus, on its retrofitted A330 business class. This program again highlights Thompson's agility and ability to deliver bespoke products within challenging lead times. The Aer Lingus program took less than 11 months from kick-off to first aircraft installation, with all shipsets manufactured, delivered and installed ahead of Aer Lingus's busy summer 2015 season.

Maximizing available cabin space, the spacious seat offers a wide range of features designed specifically to meet the requirements of Aer Lingus business travelers, with the theme 'Transform your seat into whatever you want it to be, a place to sleep, work, eat, or simply chill'. The customized Thompson Vantage seat extends to a full-flat bed at least 2m long and is equipped with Panasonic IFE, including a 16in HD touchscreen display. Featuring extended consoles in many positions, the work surface and stowage options are further increased, and all seats are equipped with power and USB outlets.

Innovation, relationships, responsiveness and quality seating lie at the heart of the Thompson business. In a market that is forecasted to experience continued demand over the next decade, the investments that Thompson has made in its business position it well to capture the requirements of global airlines that want to differentiate, deliver high business passenger satisfaction levels, and create maximum revenues. ✕

functionality of a business seat, the fully customized suite features a deep seat recline from gate to gate, an innovative 'do not disturb' function, and direct aisle access for every passenger".

"We are very proud of the product we have delivered for Qantas as it represents the core facets of the Thompson partnership with our customers: innovation, high levels of customization, and ensuring we meet the all-important delivery schedule," comments Andy Morris, VP of sales at Thompson Aero Seating.

SWISH SWISS

Thompson is continuing to expand its line-fit capability. The first B777-300

installation will take place in the coming months as the SWISS B777 deliveries begin in early 2016. The SWISS business class cabins feature a fully customized version of the Thompson Vantage seat.

The new business cabins will usher in a new standard of transcontinental business travel, with the totally redesigned cabin interiors providing comfort and aesthetics to meet the demands of the most discerning business travelers. The resulting cabins are luxurious, elegant and timeless, with the lightness of touch, precise craftsmanship and attention to detail that embody the airline's brand.

The innovative seat is based upon the Thompson Vantage platform and offers



3

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PAY DAY

There is no question airlines need to get on board with contactless payment, but creating the technology to make it possible has not been simple

Fancy buying a marriage proposal kit while you're flying? How about a purse made from a recycled life vest? These creative offers from El Al and Air France sit alongside the assortment of drinks, food, jewelry and watches that most airlines offer for sale. Something to sell + passengers with money and time on their hands = additional revenue. This sounds like a simple equation, but buying in flight brings special challenges.

On a logistical level, physical money can be involved, with crews visiting individual seats, handling currencies, counting out the change and providing the item from a cart (assuming it's available and they don't have to return to the galley to retrieve it). Alternatively, the crew processes a passenger's credit card – again at the seat – swiping the card using a handheld device, printing out a receipt and taking a signature. All these processes are time-consuming, prone to mistakes, and unlikely to encourage impulse purchases.

Imagine then, a different experience, one where the passenger browses an airline's virtual shop through the seatback IFE display, spots a 'selfie' camera, realizes that would be perfect for their upcoming adventure in Africa, selects it (oh, and a travel cushion as well), pulls out their payment-enabled smartphone, taps it on the small payment reader in their seat, and receives a couple of packages from a crew member 10 minutes later.

The benefit to the passenger can be summed up as easy instant gratification, but for the airline, the benefits are more complex and include streamlined logistics for stock management; efficiencies for crew and financial management; improved passenger experience; and at the top of the list, increased ancillary revenue.

Achieving this revenue nirvana requires the installation of contactless payment device readers that use near field communications (NFC). Getting to this point presents a unique challenge for airlines and IFE suppliers, but smart technology companies like Phitek are seeking to offer a solution.

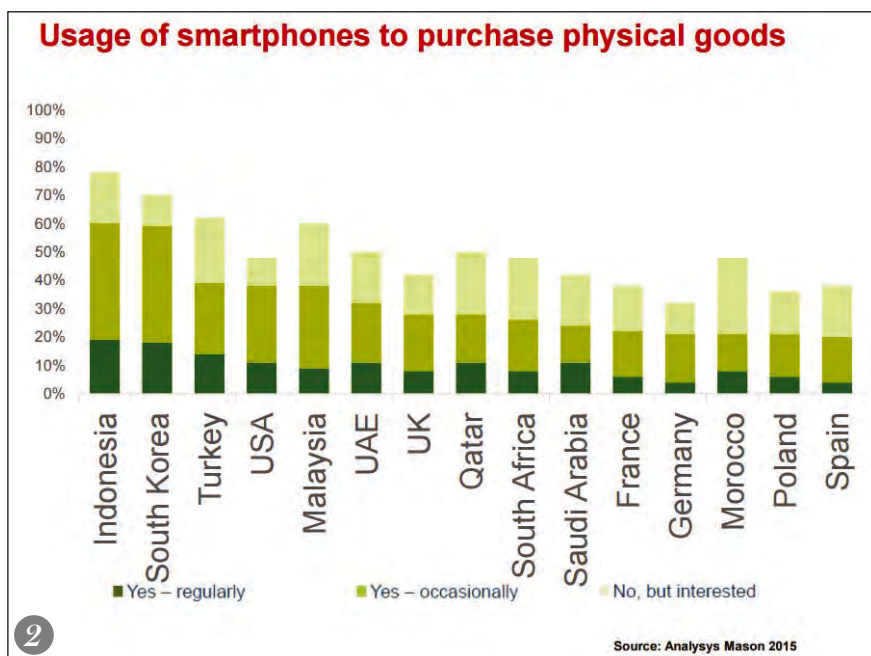
NFC could be key to simplifying and encouraging onboard sales



1

1. PHITEK'S NFC TECHNOLOGY USES MULTILAYERED FERRITE ANTENNA GRID TECHNOLOGY

"ACHIEVING REVENUE NIRVANA REQUIRES CONTACTLESS PAYMENT DEVICE READERS"



There has been a rapid uptake of NFC payments globally, especially since many countries now issue credit cards featuring embedded NFC technology as standard. Passengers will increasingly carry payment-enabled devices, whether that's a credit card, smartphone or smartwatch.

During 2014, the number of unique contactless users in the Asia-Pacific region rose by 49%, and in Europe the amount of contactless card transactions grew by 174%. In the UK alone, spending on contactless cards reached £2.32bn (US\$3.55bn) in 2014. Payment transactions using payment-enabled smartphones are projected to reach over US\$60bn per annum in the US by 2017.

However, there are a number of unique technical challenges for airlines to overcome before they can tap into this potential revenue source. For example, there is limited space in which to embed an NFC reader in a seat; they will be installed in an environment that is packed with metal that perturbs the NFC field; and the challenge of achieving payment transmission on an aircraft within the dual constraints of EASA/FAA aviation and payment-industry standards.

Have a look at the size of the payment reader when you tap and buy items at your local shopping center. The dimensions are typically much larger than the width of the armrest of an aircraft seat or the small area available on an economy class seatback around the IFE system. Alongside this small space the payment antenna – the element that essentially 'reads' a

passenger's payment-enabled device – has to channel the read field to meet both aviation and payment standards within the metal-packed environment of the aircraft. If you imagine touching the side of a soap bubble with your finger – your touch will distort the shape of the bubble. Metal has a similar distortion effect on a payment antenna's field.

FERRITE TECHNOLOGY

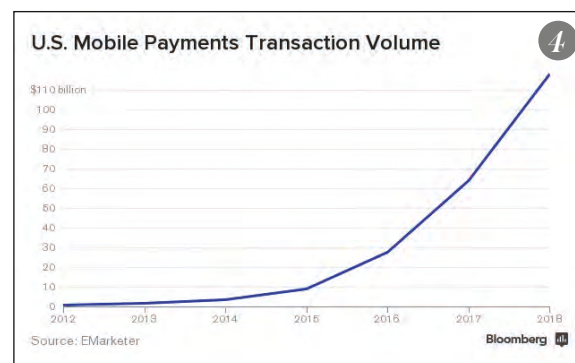
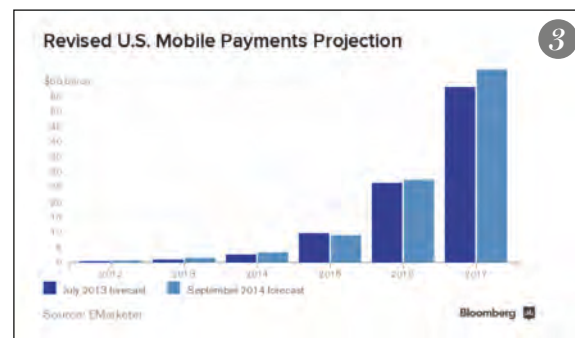
To address the size restrictions and metal distortion issue, Phitek has focused its R&D efforts on multilayered ferrite antenna grid technology connected to customized tuning subsystems to intensify the field strength. The ferrite minimizes the effect of the large amount of metal present in all aircraft seats. Phitek's solution – a patented micro-NFC antenna design that focuses NFC energy into passengers' NFC devices – means its antenna remains independent of where it is mounted. In other words, interference is minimized or eliminated and the antenna fits into a small form factor.

The other major challenge relates to the transmission of electromagnetic fields on board an aircraft. Aviation industry standards severely limit onboard transmission, yet, in contrast, a defined field volume is mandated by the payment industry. Unfortunately physics dictates that electromagnetic waves cannot be limited to a defined volume without some level of unintended transmission – the upshot is these two industry standards contradict each other. Phitek is working on

2. INDONESIA IS CURRENTLY LEADING THE WORLD IN TERMS OF SMARTPHONE PAYMENT

3. THE FORECAST FOR MOBILE PAYMENTS IN THE USA FROM 2012-2017

4. VOLUME GROWTH IN MOBILE PAYMENTS IN THE USA FROM 2012-2018



ways to resolve this contradiction using new antenna designs producing highly localized inductive field flux with a non-linear electromagnetic field boundary.

Providing airlines with a solution doesn't end with addressing these complex technical requirements – Phitek has also evaluated tailored options for different airline end-use needs. For premium cabins, the company has designed an NFC unit with embedded high-power USB charging. In economy class, a simpler unit can be delivered. For airlines evaluating a full solution, Phitek has partnered with a payment service provider to provide a purchase-to-payment solution that seamlessly delivers passenger payments from an onboard NFC transaction through to the airline's bank.

Helping airlines tap into the ancillary revenue available through NFC payments isn't an easy challenge, but it's an important one that Phitek's engineers are tackling head-on. ☒

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REAL DEAL

The polyurethane technology of Ultraleather can offer many of the benefits of leathers and textiles, and a few unique benefits of its own

The competitive nature of today's aviation market demands products that ensure maximum value to the end customer and help reduce the total cost of ownership. Faced with increasing pressure for fuel savings and weight benefits, airlines must find a seating material that answers these concerns while still giving passenger comfort and durability.

Constructing seat covers using engineered products allows for more consistency and greater ease of use during the cutting and sewing process. Additionally, such products provide consistency in terms of yield, color, weight and quality. Ultraleather's Takumi construction provides a balance of comfort, quality, durability and weight, helping create the ultimate seating experience.

Tapis offers airlines two versions of Ultraleather, each with distinct advantages to the seating market: Ultraleather Brisa HP and Ultraleather Promessa.

HOW IT'S ENGINEERED

The Ultraleather polyurethane is manufactured using proprietary technology, with four high-performance layers. A protective surface layer provides enhanced durability for the life of the product. It is resistant to liquids and safeguards against stains and the harmful effects of harsh cleaners and everyday disinfectants.

With unique polycarbonate resins engineered for maximum hydrolysis resistance, the top skin layer adds enduring strength and is color infused to provide long-lasting vibrancy and consistent grain retention.

The polycarbonate substrata provides added comfort and cushion. High moisture transfer supports thermal comfort for cooling the body.

The premium reinforced backcloth is woven for dimensional stability, provides a superior foundation for the highest performance, and aids in the impeccable upholstery and tailoring of the product.



Every extra 100 lb of weight on board an aircraft can reduce gas mileage by 2-4%

The combination of these four unique layers produces greater performance without compromising on softness.

Ultraleather can be engineered to achieve customer-specific requirements, including custom grains, colors, finishes and technical specifications. Tapis offers customization throughout every step of the process, from color and texture matching, to alternative backcloth options, including two- and four-way stretch properties.

LIGHTWEIGHT

Ultraleather weighs less than most genuine leathers – sometimes half as much – helping to reduce fuel consumption and overall cabin weight.

Some industry estimates say that an average aircraft can have 2-4% less gas mileage for every extra 100 lb of weight on board. Brisa HP is the lightest engineered product on the market today, at 340g/m².

DURABILITY

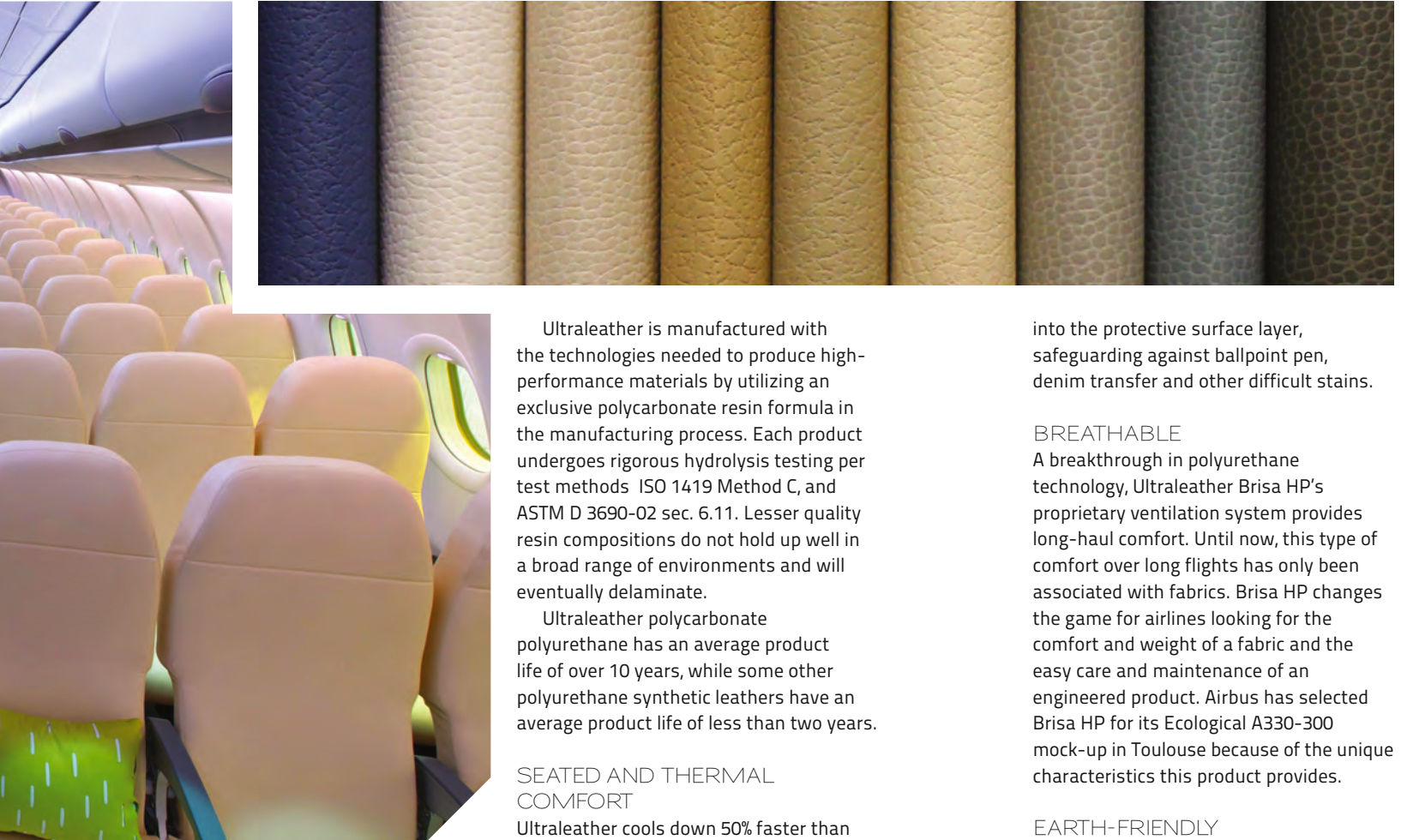
Ultraleather is produced using only custom engineered, premium-grade polycarbonate resins, and incorporates special strengthening components that exceed heavy-duty industry performance standards, while delivering the highest standards of quality, luxury and comfort.

The solar endurance properties of the product prevent fading and spotting, and the climate control technology ensures resistance to the effects of temperature

"BRISA HP IS THE LIGHTEST ENGINEERED PRODUCT ON THE MARKET TODAY, AT 340g/m²"

1. THE BRISA HP ULTRALEATHER AS USED IN AIRBUS'S ECOLOGICAL A330-300 MOCK-UP. PHOTO © AIRBUS S.A.S. 2015 – PHOTO BY MASTER FILMS / H. GOUSSÉ

2. THE PROMESSA AND BRISA HP LINES CAN BE SPECIFIED IN A WIDE RANGE OF COLORS AND FINISHES



Ultraleather is manufactured with the technologies needed to produce high-performance materials by utilizing an exclusive polycarbonate resin formula in the manufacturing process. Each product undergoes rigorous hydrolysis testing per test methods ISO 1419 Method C, and ASTM D 3690-02 sec. 6.11. Lesser quality resin compositions do not hold up well in a broad range of environments and will eventually delaminate.

Ultraleather polycarbonate polyurethane has an average product life of over 10 years, while some other polyurethane synthetic leathers have an average product life of less than two years.

SEATED AND THERMAL COMFORT

Ultraleather cools down 50% faster than a genuine leather and 22% faster than vinyl, creating a neutral body temperature, regardless of the environment. It is exceptionally resistant to the effects of temperature changes, stays cooler to the touch in warm environments, and resists stiffening and cracking in the cold.

EASY TO CLEAN

Ultraleather is easy to clean. The protective surface layer makes it a breeze to keep surfaces looking their best. Most spills and stains clean easily using soap and water, and can even be disinfected using a 5:1 water/bleach solution without affecting the color or the grain.

One of the customization options is an enhanced ink- and stain-resistant technology. This treatment is incorporated

into the protective surface layer, safeguarding against ballpoint pen, denim transfer and other difficult stains.

BREATHABLE

A breakthrough in polyurethane technology, Ultraleather Brisa HP's proprietary ventilation system provides long-haul comfort. Until now, this type of comfort over long flights has only been associated with fabrics. Brisa HP changes the game for airlines looking for the comfort and weight of a fabric and the easy care and maintenance of an engineered product. Airbus has selected Brisa HP for its Ecological A330-300 mock-up in Toulouse because of the unique characteristics this product provides.

EARTH-FRIENDLY

Ultraleather is the only polyurethane to be Greenguard certified. It is 100% free of PVCs, HFRs (halogenated flame retardants), plasticizers or phthalates, and meets the most stringent VOC standards for healthier indoor air quality.

For customers looking for an alternative to leather and fabric that meets, and exceeds, the highest expectations for quality and performance, Ultraleather is the answer.

Tapis Corporation's operations are certified to the AS9100 and ISO 9001:2008 International Quality System Standards. ✕

change. The top-quality polycarbonate resins exceed the rigorous standards for light fastness, helping to keep the colors rich and vibrant over time.

Lesser polyurethanes are made using cheaper resins that don't hold up to hydrolysis resistance and use over time (they are degraded by the environment, heat, humidity, and cleaners, etc). Tapis uses high-grade resins to ensure the product retains its integrity over a long period of time.

The inherently anti-microbial Ultraleather Promessa is the most durable construction in the Ultraleather line. It combines extreme durability with luxurious comfort and will stand up to the most demanding environments.

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The Create PINK concept is certifiable and ready to order

CREATE PINK

A study to demonstrate how daring briefs can be translated in a state-of-the-art concept



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

At this year's Aircraft Interiors Expo in Hamburg, two leading manufacturers in premium aircraft textiles – rohi and Anker – launched the Create PINK concept. It was created from an internal design study that set out to test both companies' ability to meet the most challenging of briefs: to design a range of fabrics and carpets featuring a dash of pink that would not only look at home in an aircraft cabin, but would actually enhance and invigorate its overall appearance. Philipp Dahm, rohi's managing director, and Alexander von Fuchs-Nordhoff, Anker's sales director, are both very satisfied with how well this creative concept was received at the Expo.

"We wanted to test and demonstrate our ability to work with a daring brief but

still deliver a coordinated and considered response," says von Fuchs-Nordhoff. "The project set out to challenge rohi and Anker to think creatively and to deliver solutions relevant to our airline customers. Whatever the brief, we can translate it into textiles that make a difference."

Create PINK is an eclectic concept of fabrics and carpet divided into five themes: Elegant, Powdery, Clear, Sunny, and Tropical. The concept is fully certifiable and ready to order.

"This project is not just about creating a fabric or carpet ready to manufacture or a blueprint for others to copy," continues Dahm. "It demonstrates our approach to design and the exceptional creative energy of our experienced and dedicated team when challenged by a customer or interior designer to bring new ideas to life. We wanted to show that rohi and Anker can translate any theme, vision or task into a state-of-the-art concept, ready to fly."

The resulting concept is both exciting and mature, intelligent yet playful, and bright without being dazzling. "Pink is not typical for the aircraft industry," agree Nina Leonhard and Alexandra Plank, two of the leading designers on the project. "It has many different characteristics, which are reflected in the concept's five themes. Each of these themes underlines the different ways that pink can be understood – loud, quiet, elegant, cool – it's a very versatile range featuring solutions that will stand the test of time demanded by the cabin environment."

Such innovation comes naturally to rohi and Anker, family-owned companies that make their product in Germany. Both manufacturers have already won design awards for their work. Their client lists include Emirates, Lufthansa and Singapore Airlines, as well as cutting-edge, contemporary domestic furniture brands such as Cor, Knoll International, Rolf Benz, Thonet and Vitra. ✕



1. THE CREATE PINK CONCEPT IS DIVIDED INTO THEMES OF ELEGANT, POWDERY, CLEAR, SUNNY AND TROPICAL

2. PINK IS NOT OFTEN USED IN AIRCRAFT INTERIORS, BUT IT IS SURPRISINGLY VERSATILE

3. EACH OF THE FIVE THEMES UNDERLINES THE DIFFERENT WAYS THAT PINK CAN BE UNDERSTOOD



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Create **PINK!**

A study that illustrates how we translate a design challenge into inspiring textile cabin interior that makes a difference – fully certified, tried and tested.

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ROHI

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LUXE LIFE

The Stelia Aerospace brand isn't just a new name for Sogerma and Aerolia; it symbolizes the aircraft seating giant's return to its artisan roots

Born of a merger between Sogerma and Aerolia, Stelia Aerospace is marking the creation of its new premium passenger seating brand with a return to the original roots of Sogerma, founded in the early 20th century as an artisan du luxe, in the spirit of the best French fashion and design houses.

Luxury and innovation are guiding principles of the company, from conception of ideas through program management, to production and delivery. Recognized as top seat supplier in the Airbus supplier ratings for three of the last four years, Stelia Aerospace is consolidating its position as the number-three supplier in the premium seating segment with the latest incarnation of the best-selling Solstys seat and its growing product range within the first and business class segments.

Solstys, the best-seller that shook up aircraft cabins when it was first introduced to the market, was presented at the 2015 Aircraft Interiors Expo in the new Solstys III configuration. This latest version brings even more living space (2in more seat and bed width and 2.5in more bed length at the equivalent pitch), as well as improved ergonomics. New customization options have been developed, such as a bi-fold table, additional stowage possibilities, and a personal electronic device holder. Launch customers for Solstys III have already been secured. It will take to the skies in 2017.

In conjunction with the AGI design house, Stelia Aerospace is focusing on bringing innovation to the look and feel of the seat environment.

1. THE SOLSTYS III BUSINESS SEAT COMBINES SPACE EFFICIENCY WITH LUXURY

2. GENEROUS SURFACE SPACES, STOWAGE AND IFE PROVISION ARE FURTHER BENEFITS OF SOLSTYS III



1

Today's premium class seats need to provide an environment that allows travelers to personalize their own space. Whether resting, working or interacting with onboard or personal devices, flying for business or pleasure, airlines wish to provide passengers with a space they can make their own. Once the basic seat design is determined, it is the detail that makes the difference.

Thierry Kanengieser, VP of cabin interiors at Stelia Aerospace, explains, "Airlines want more comfort without sacrificing density. Each airline makes its own decision where that trade-off is to be found, but once that decision is made, the detail in the design and the quality of the materials used plays a huge role in customer satisfaction. Whether at the higher end of the market or the more cost-sensitive airlines, we bring our expertise to select the optimum solutions."

New materials and finishes enhance the luxurious feel of Stelia Aerospace's products, allowing airlines to be on trend without adding weight or certification complexity. This led the Stelia Aerospace team to investigate finishes that resemble

wood or metal, *trompe l'oeil* effects to surprise and delight the passenger, or more practical solutions that allow maintenance and power reductions, such as accent lighting innovations and more durable materials to ease cleaning tasks. New technologies are allowing cushions to be thinner and lighter with no comfort penalty, and when paired with new textiles, comfort levels are maintained or even enhanced.

All of this combined with the state-of-the-art recline position (resembling the zero-gravity position originally developed by NASA to relieve astronaut stress) created for the Celeste regional business seat means that Kanengieser is looking forward to an exciting future. Travelers in all classes are becoming more sophisticated, and premium passengers in particular have high expectations for their onboard experiences to complement their 'on ground' lives. Stelia Aerospace continues to invest in these new technologies to provide an additional richness of experience for its passengers and exciting branding opportunities for airline clients. ✕



2

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*Solstys® III
Luxury
and comfort
Selected
by the best*

Photo by Gettyimages, Astronaut Images

Our company values of quality, innovation, design and performance lead us to create bespoke products bringing more living place, improved ergonomics, additional stowage...

We place a growing focus on enhancing the experience of your passengers !



CONTACTS :
mariepascale.jouaville@stelia-aerospace.com
claire.nurcombe@stelia-aerospace.com

www.stelia-aerospace.com

STELIA 
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ALL SYSTEMS GO

The STC approval of Gogo's 2Ku service by the FAA will see 70Mbps delivered to aircraft by the end of 2015

For more than 20 years, Gogo has pioneered new ways to deliver inflight connectivity to any aircraft. And now, by receiving the final required Supplemental Type Certificate (STC) from the FAA, Gogo is ready to launch the next leap in IFC technology evolution: Gogo 2Ku, the next-generation satellite connectivity service.

"This is a great milestone for Gogo and a seminal event for inflight internet," says Gogo's chief technology officer, Anand Chari. "We believe this will be the best-performing technology for the global commercial aviation market bar none. Clearing this regulatory hurdle brings us one step closer to enabling our airline partners and their passengers to enjoy the future of inflight internet."

2Ku features a dual antenna – one for the forward link, which transmits data to the aircraft, and one for the return link, which receives data. This unique antenna design leverages existing Ku-band satellites to deliver unprecedented peak speeds of 70Mbps. When next-generation spot-beam satellites become available, 2Ku will have the capacity to perform at peak data speeds of up to 100Mbps. In addition to supporting all of Gogo's existing services, 2Ku's capacity allows for Gogo TV and enables Gogo Connected Aircraft Services: innovative applications of connectivity that drive new efficiency in every area of airline operations.

Capacity isn't the only place where 2Ku can outshine the competition. Conventional aerospace antennas produce wide beams, which cause interference with neighboring satellites, leading to diminished performance as aircraft approach the equator. However, 2Ku's unique design produces narrow beams, which avoid interference with adjacent satellites, delivering uninterrupted performance across the globe and significantly outperforming conventional area antennas – especially in equatorial regions.

With its low profile and streamlined radome, the cost-efficient 2Ku offers 50%



With next-generation spot beam satellites, 2Ku will have peak data speeds of 100Mbps

"THIS IS A GREAT MILESTONE FOR GOGO AND A SEMINAL EVENT FOR INFLIGHT INTERNET"

1. THE 2KU TECHNOLOGY IS UNDERGOING TESTING ON GOGO'S BOEING 737-500 TEST AIRCRAFT

2. THE 2KU RADOME IS LOW PROFILE, FOR EFFICIENT DRAG AND FUEL BURN FACTORS

less equivalent weight penalty than gimbaled radomes, resulting in reduced drag and fuel burn. This minimized weight penalty stems from having fewer moving parts than conventional aerospace antennas, meaning that airlines can expect higher reliability and lower total cost of ownership. Additionally, 2Ku's antenna, which doubles the spectral efficiency of conventional aero antennas, delivers more throughput at less cost, leading to reduced cost per megabyte to the aircraft.


2Ku is a viable and sustainable solution for commercial aircraft, providing a solid foundation for a long-term, low-risk capital investment. Gogo stands behind 2Ku's ability to outperform the competition with an upfront service level agreement, guaranteeing 2Ku's performance on multiple levels. Gogo is the only provider to offer this assurance to airlines.

Currently, this technology is installed on Gogo's B737-500 test aircraft and is now cleared for inflight testing. Seven commercial airlines have signed up for either a trial or fleet deployment of 2Ku, covering more than 500 commercial



aircraft. Gogo expects to launch commercial service in late 2015, while rapid installations of its 500-aircraft backlog are already underway. ✕

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“ This is a significant milestone for Gogo and a seminal event for in-flight Internet. ”

Anand Chari
Chief Technology Officer

2Ku

High-performance inflight connectivity

- › Peak data speeds of 70+ Mbps, and up to 100 Mbps with next-generation satellites
- › Reduced drag and fuel burn for increased cost efficiency
- › Superior equatorial performance
- › Unmatched capacity for Gogo® TV and Gogo® Connected Aircraft Services
- › Installations currently underway
- › Guaranteed performance with upfront SLA

Find out what you can do with 2Ku
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PERSONAL POWER

As passengers increasingly demand to charge devices on board, a compact solution is essential

In-seat power is fast becoming a feature that passengers expect

There's an ongoing power struggle on most aircraft today: there's not enough power for all the electronic devices passengers and crew bring on board. These include electronic flight bags, tablets, smartphones and noise-canceling headsets. The True Blue Power TA102 dual-USB charging port offers a solution. This compact in-seat, cabin or cockpit power source converts the aircraft's power into all the power needed for a passenger's portable technology.

The TA102 is engineered to simultaneously provide 2.1A of power per charging port to any consumer product requiring a USB interface. This dual port enables passengers and pilots to charge two high-powered devices at the same time. Other dual-charging devices are built with one low-power and one high-power port.

The TA102 is designed and manufactured specifically for aviation applications by an aerospace company with more than 50 years of industry experience. FAA TSO and EASA ETSO certified, the intelligent power source protects itself and the charging devices from short-circuit, power surges, and over-current potential. And while the rugged aluminum case withstands aircraft vibrations, shock and humidity, its compact, 1.5in² by 1in-deep size fits conveniently within an armrest, interior cabin wall or instrument panel.

A long list of options provides flexibility during installation, including lit and non-lit (hermetically sealed connector) units. The power connection can be positioned on the back or the bottom of the unit for a tight fit, and four mounting options are available: rear; circular; an instrument hole adaptor; or a cosmetic bezel that can be plated to match any aircraft interior.

As demand for support of onboard personal electronics and portable technology continues to grow, commercial and private aircraft look to reliable products, such as True Blue Power's TA102, to ensure non-stop entertainment



and business productivity 'on the fly'. This small, economical, easy-to-install charging port delivers just that.

Tom Genovese, director of sales at True Blue Power, states, "Airlines rely on the TA102 as an economical alternative to

installing digital media equipment in each seat. It provides passengers with access to uninterrupted in-flight entertainment via their personal electronic devices."

True Blue Power specializes in the design and manufacturing of next-generation power solutions for the global aviation community. All True Blue Power products are housed in signature 'true blue' casing and combine proven technology with superior quality, ingenuity and decades of experience.

The True Blue Power product line includes USB charging ports, DC-to-AC inverters, AC-to-DC converters, emergency power supplies and advanced lithium-ion aircraft batteries. Select products feature proprietary nanophosphate lithium-ion cell chemistry, which offers stable chemistry, faster charging, consistent output, excellent cycle life and superior cost performance. All this translates into smaller, lighter products that can be less than half the size and weight of some existing solutions. ✕



1. THE TA102 IS FAA TSO AND EASA ETSO CERTIFIED

2. TA102 CAN PROVIDE 2.1A OF POWER PER CHARGING PORT

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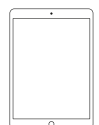
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UNLIMITED OPTIONS

Cabin designers can create new and exclusive environments by making best use of four classes of FAR-rated sheet

To create award-winning aircraft interiors, designers should understand how sheet design palettes differ by method of production. Only with knowledge of what is attainable can designers create exclusive environments that break new ground.

CUSTOM-COLOR SHEETS

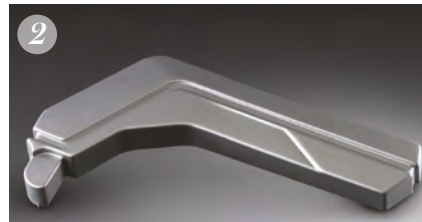
Single color, monolithic sheet remains the most commonly specified sheet type for the thermoforming of aircraft interior components. Generally extruded, the sheet is offered in an infinite range of colors, from dark, intense shades, to delicate pastels, to translucent tints. Solid colors typically serve as the primary color of the interior and as colored substrates of composite sheet products. The integral color of the sheet renders scratches and gouges inconspicuous. Depending on the polymer or alloy from which it is extruded, solid color sheet can be washed repeatedly using strong cleansers, without risk of fading, thereby preserving the components' like-new appearance and allowing undetectable field replacements.

METALLIC COLOR SHEETS

To achieve a true metallic appearance, metallic pigments can be combined with clear thermoplastic alloy resin, and calendered to create a durable metallic cap layer that is permanently fused to a substrate extruded in infinite solid colors (Figure 2). The resulting composite metallic sheet produces a deep, reflective appearance that allows thermoformed components to closely resemble clear or dyed anodized aluminum in an unlimited range of colors.

TEXTURE SHEET PRODUCTS

Unlike extrusion and calendering processes, in which textures are limited to a relatively small number of available embossing rolls, the "press laminating" process uses heat and pressure to emboss an infinite range of textures into extruded or calendered sheet offline, with significantly lower minimums. Infinite custom textures allow designers to



1. SINGLE COLOR, MONOLITHIC SHEET IS OFFERED IN INFINITE COLORS, FROM DARK, INTENSE SHADES, TO PASTELS, TO TRANSLUCENT TINTS

2. A DURABLE METALLIC CAP LAYER CAN BE FUSED TO A SUBSTRATE

3. TEXTURED SHEET PRODUCTS CAN CREATE A CARBON FIBER EFFECT

"DESIGNERS HAVE THE FREEDOM TO TAKE AIRCRAFT INTERIORS TO NEW HEIGHTS"

produce parts that are both stunning and unique, since textures can impart sheet products with dramatic visual effects.

The carbon fiber texture shown in Figure 3 is achieved by press-laminating monolithic, solid-color sheet, which is then thermoformed to produce aircraft seatbacks, closely resembling the actual compression-molded and vacuum-bagged thermoset composites associated with ultra-high performance products. The press-laminated thermoplastic part resembles a carbon fiber composite, not only on flat surfaces, but also on sharp outside corners and in deep recesses, while maintaining uniform wall thickness.

Press-laminated custom textures can be reproduced from virtually any existing or newly created patterns, including repeated company/brand ID patterns, providing aircraft interior designers with an unprecedented opportunity to produce environments that are dramatic and sophisticated, as well as unique.

PATTERN SHEET PRODUCTS

In addition to embossing of custom textures, press laminating can impart virtually any custom pattern to extruded or calendered sheet offline, including abstracts, wovens, woodgrains and corporate ID, all with low minimums.

To designers, infinite decorative patterns provide the freedom to create environments to suit any aircraft interior, with individuality and exclusivity never before possible, all while meeting stringent FAR requirements.

CONCLUSION

To comply with FAR fire ratings, thermoplastic sheet products previously sacrificed aesthetics, severely limiting the palette of visual effects, initially to solid standard colors. Over more than a decade, the addition of metallic pigments and additional standard textures provided an incremental improvement in the options available to designers.

Not until the introduction of composite sheet products, infinite textures and infinite patterns, however, have designers had the freedom to take aircraft interior environments to entirely new heights. ✕

New technologies mean aesthetics aren't sacrificed for FAR ratings

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CRITICAL CONNECTIONS

Carlisle Interconnect Technologies is ushering in a new generation of interconnectivity



Octax Ethernet transfers data through an aircraft at 10Gb/sec

PRAXISPHOTOGRAPHY/GETTY IMAGES

1. WHATEVER YOUR AGE, WHATEVER YOU WANT TO USE INFLIGHT CONNECTIVITY FOR, AN UNINTERRUPTED SERVICE IS ESSENTIAL

Gone are the days of reluctantly putting your cell phone away as you board a flight, and envying your neighbor who is happily entertained by a good book. We have entered an age where gate-to-gate connectivity is expected by airlines and passengers alike, and flight time no longer equals downtime.

With only hours until the big meeting, you upload and share project files as you put the final touches on your presentation; after a somber farewell to your vacation, you relive the memories as you compile and share photos on social media throughout your flight; when your three-year-old gets antsy on a 10-hour flight, hitting that magical play button on the seatback monitor quells their unrest; and during the snow storm of the year, the cockpit relies on communication with air traffic control and GPS to guide them home safely.

"WE HAVE ENTERED AN AGE WHERE GATE-TO-GATE CONNECTIVITY IS EXPECTED"

At ground level or at 35,000ft, Carlisle Interconnect Technologies (CarlisleIT) understands that connections are critical. That's why the company's products work discreetly behind the scenes to help ensure seamless, uninterrupted connectivity on an aircraft.

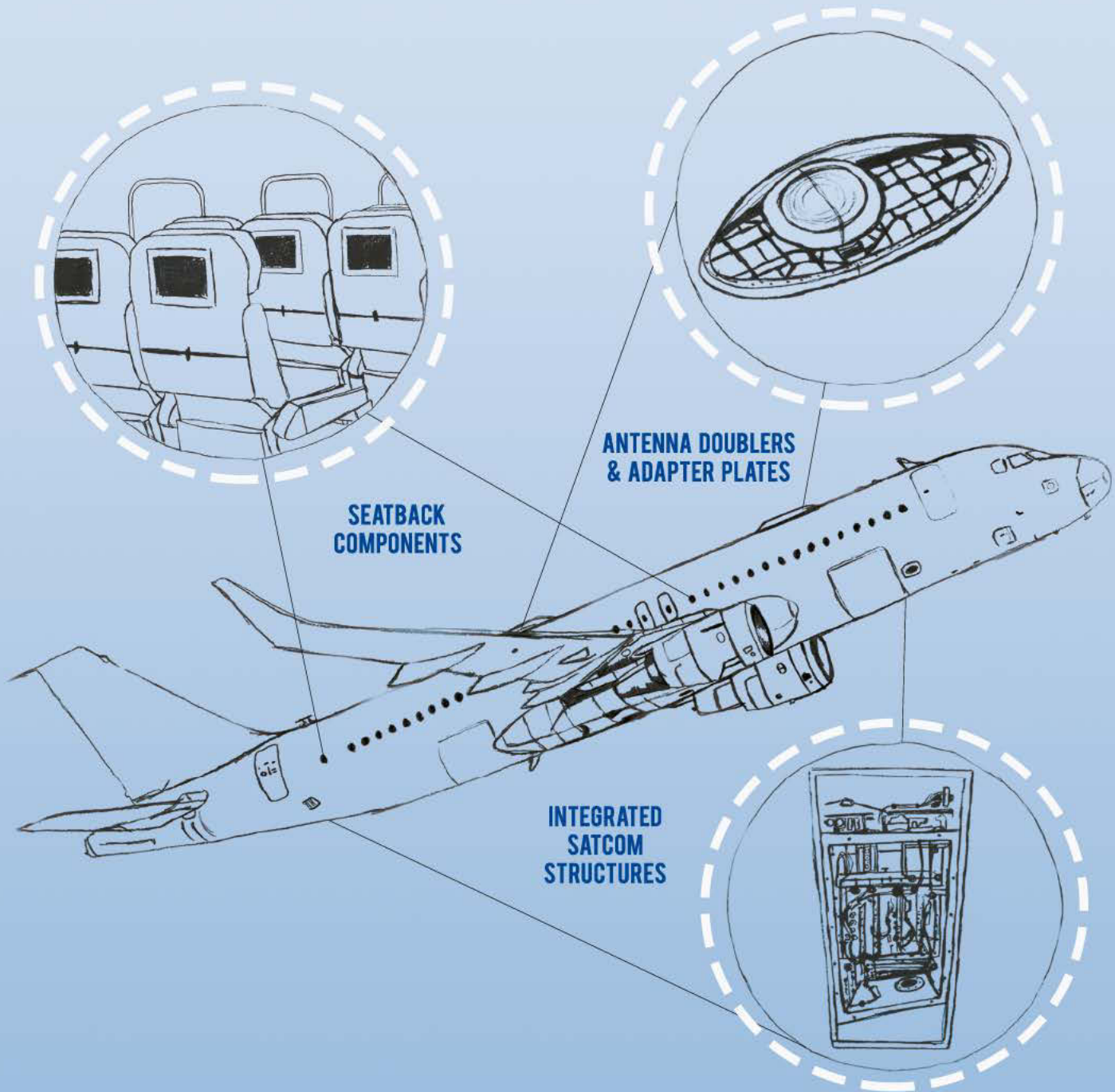
Thousands of feet of LITEflight fiber-optic cable are intricately woven through the walls and seats of an aircraft, using cutting-edge technology to bring life to IFE systems. CarlisleIT's Octax 10Gb/s Ethernet assemblies transfer data throughout an aircraft faster than ever before, and the recently launched FlightGear Ka/Ku Universal Installation

sits boldly atop an aircraft, working with SATCOM systems to transmit broadband connectivity across multiple frequency bands to both passengers and crew. This just scratches the surface of a well-stacked deck of CarlisleIT products and services – the company has risen confidently to the challenge of providing better, faster and higher connectivity.

CarlisleIT makes critical connections where performance matters. ✕

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BIG IDEAS

A focus on R&D is the driver behind Industrial Neotex's ambition to offer products for the entire cabin interior

The company has developed a fabric with a new fiber and a new yarn twist

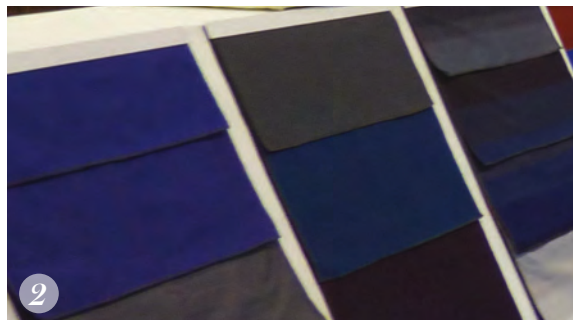
The aircraft interior market is growing and that growth is leading to increased demand for new products, lighter products and new design possibilities.

To satisfy industry demand, aircraft interiors manufacturers have no choice but to invest in research and development. Industrial Neotex is one such company, and as a result of that R&D expenditure, it can offer new products to its customers every year.

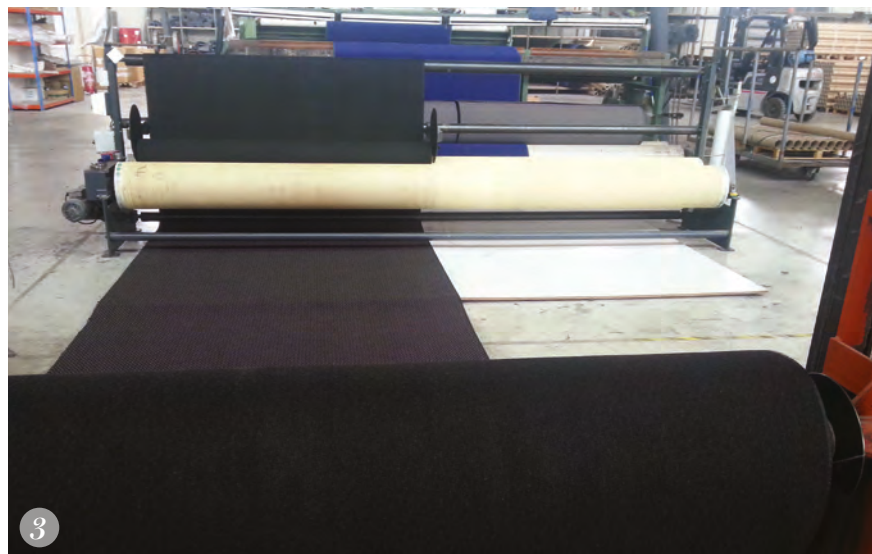
For example, Industrial Neotex has developed a fabric that uses a new fiber and a new way of twisting the yarn. This enables designers to create any jacquard design, suitable for use in partition walls or any other vertical surface. The new fabric collection will be introduced at Aircraft Interiors Expo 2016 in Hamburg in a wide range of different colors and designs, all of which will comply with the OSU/heat release tests.

Industrial Neotex is expanding its range of products, and can now offer a range of lightweight trolleys, including half-size and full-size lightweight models.

The company's research and development department never stops working, and it is preparing to introduce even more new products to the market in 2016.



1. INDUSTRIAL NEOTEX IS EXPANDING ITS TROLLEY RANGE TO INCLUDE HALF-SIZE AND FULL-SIZE MODELS
2. AIRCRAFT CABIN CARPETS ARE JUST ONE OF THE COMPANY'S MANY PRODUCT RANGES
3. TO ENSURE ITS PRODUCTS ARE UP TO DATE, INDUSTRIAL NEOTEX IS UPDATING ITS PRODUCTION TECHNOLOGY



Industrial Neotex is also investing in new facilities, as well as expanding and updating its older facilities with the most up-to-date technology and machinery.

The range of aircraft cabin products offered by Industrial Neotex includes upholstery fabrics, curtains, leathers, carpets, seat cushions, and now galley products such as meal carts, coffee makers and boilers. The company will continue expanding its range, in a bid to offer a complete range of products for all aspects of cabin interiors. ☒

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Happy days

2015 WAS YET ANOTHER BUMPER VINTAGE FOR THE AIRCRAFT INTERIORS INDUSTRY, AS THESE HIGHLIGHTS OF THE YEAR SHOW



JANUARY

Aircraft Interiors International attended the Doha delivery, to Qatar Airways, of the world's first Airbus A350-900 XWB. It's a great aircraft and cabin design, but CEO Akbar Al Baker made the event even more exciting with the revelation that from 2016 the airline's current super business class seat, as found on its B787s and A380s – and indeed the freshly delivered A350-900 – “will be obsolete”. The replacement, he revealed, will be a proprietary product “unrivaled in our industry”, offering “a double bed at a business class fare”.

FEBRUARY

Singapore Airlines (SIA) revealed its premium economy product, which represents an investment of US\$80m. The customized BC-01 seat from ZIM Flugsitz will be fitted to its B777s and A380s, all of which are configured 2-4-2 at a 38in pitch. For more details, see p50.

MARCH

When we received a phone call about a composite monocoque seat with a folding mechanism and three-point harness, we were a little skeptical. However, further investigation revealed that this short-haul economy seat is very real, with its creator, Rebel.Aero, having conducted a full feasibility study with a certification company, with static 9g tests, full FEA analysis, and a bill of materials and supply chain in place. With the seat pan folded up, the occupant can stand up in the footwell to aid ingress and egress, and a passenger can even sit on the folded part during flight. We are watching this one with great interest.

APRIL

At Aircraft Interiors Expo in Hamburg, *Aircraft Interiors International* attended a special behind-the-scenes unveiling of Jamco's DoveTail upper-business class seat, designed

with JPA Design along the principles of the reverse herringbone layout, while also offering something a little different by adding a stagger to the configuration. More details on p50.

MAY

Following in the footsteps of Porsche Design and BMW Designworks, May saw Mercedes-Benz Style enter the aircraft interiors arena. The studio's first work is a collaboration with Lufthansa Technik on a luxurious and integrated cabin concept for short- and medium-haul VIP aircraft. Independent spatial zones are created in the unusual design by using a dynamic, spiral layout akin to a DNA helix that sees floor, wall and ceiling flow into each other.

JUNE

Boeing released its annual Current Market Outlook, which projects a demand for 38,050 new airplanes over the next 20 years, valued at US\$5.6tn. According to the report, the world commercial airplane fleet will double from 21,600 airplanes in 2014 to 43,560 in 2034. Boeing says the single-aisle market will require 26,730 airplanes over the coming two decades, while the widebody segment will require 8,830 new airplanes, led by small widebody airplanes in the 200- to 300-seat range.

JULY

SWISS revealed cabin designs for its flagship fleet of nine B777-300ERs, due for delivery from 2016-2018. The designs for the airline's first Boeing aircraft are a “natural evolution” of its successful A330 cabins, offering enhanced seat designs and a subtly updated cabin color palette, while maintaining key elements of the brand's identity. SWISS worked with PriestmanGoode across all three classes, as well as the monuments, galleys and entrances. See p38 for more details.

AUGUST

Korean Air became the first to take delivery of a B747-8i with an all-new Dreamliner-inspired cabin architecture with a curved, upswept architecture for a greater feeling of space. The 368-seat jet features the new First Class Kosmo Suite 2.0, which includes a sliding door and higher partitions for added privacy (see p38).

SEPTEMBER

British Airways took delivery of the first of its 22 B787-9s and revealed plans for the extra 20ft in length it offers over the B787-8 – a bespoke first class cabin. The eight suites have been specifically designed for the B787-9, with all the key seat functions controlled by intuitive touch mechanisms, including a ‘jog-dial’ and a tablet-like controller. Quilted upholstery and a smart metal trims add to the luxurious experience.

OCTOBER

Believing that people will pay more for a brand that believes in something, Teague revealed Poppi, its vision of an airline with core beliefs. Poppi values ‘love over loyalty’, the ability of the airline to ‘know the journey’, and the concept that ‘membership matters’. Intrigued? See p34.

NOVEMBER

ViaSat is working with Boeing on the evaluation process for airlines to specify line-fit installation of ViaSat's inflight wi-fi connectivity system. In mid-2016 the company expects to launch its ViaSat-2 satellite, which will expand capacity and extend service to transatlantic, Central American, Caribbean and European routes.

DECEMBER

As BA's B787-9 begins operations, so *Aircraft Interiors International* prepares for the year ahead. We already know there are a lot of exciting developments in store for 2016, which we look forward to sharing with you...

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