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WINNING FAVOR

s we approach the end of 2016, what are the major headlines to contemplate? The US presidential race? Brexit? Or how about Brad Pitt's new single status? That's the headline news as we go to press, a bombshell that Norwegian has exploited to promote a £169 one-way fare to Los Angeles to tempt frisky Scandinavians who WLTM a Hollywood megastar with a GSOH. This cheeky marketing ploy has earned the airline a few headlines of its own, as well as a few extra customers, though whether that's due to the low fare or the lure of a desirable singleton is undisclosed. But for airline executives, there is someone far more desirable than even Brad or Angelina: the business class flyer.

This year has seen airlines the world over invest huge amounts on courting these highly profitable customers, with the biggest demonstration of wooing being United's Polaris business class, which was revealed in June. The airline believes it has found the perfect proposal: flat beds and direct aisle access with no loss in cabin density. Polaris is to be fitted across United's entire wide-body fleet, making it one of the largest orders for business class seating in aviation history, at around 6,000 units. This is a real landmark program in aviation, a story we covered in depth in our September issue. This Showcase issue brings further insight into the project, with some of the key figures involved giving additional details of their roles, with Acumen discussing the inspired LOPA on p56, PriestmanGoode the branding challenges on p48, Zodiac the platform on which Polaris is based on p110, and Sekisui SPI explaining how it achieved some of the clever cabin finishes on p86.

Polaris is an impressive proposal, and certainly beats a box of chocolates although they will be served after dinner. However, rival Delta has also made a strong play for the affection of those business flyers, with something a little different: an enclosed suite. JetBlue introduced doors on some seats in its Mint business class in 2014, but the Delta One design offers full-height doors for every suite, giving flyers a taste of first class flying in a business class footprint. Factorydesign, the design house behind the project, shares its story on p52.

Polaris and Delta One are major projects, and join a lineup of truly impressive business class offers by airlines the world over, with rumors of more to launch over the next 12 months. This healthy competition also keeps airlines' relationships with business flyers alive as they work harder to charm existing customers to stay with them and new ones to join them.

Amid such innovation in business class it would be nice to see more disruptive design emerge in economy class, but if today's dense main cabins can enable 5,000-mile flights for fares as low as Norwegian's £169, that is a compelling proposition that can offset many comfort issues - and help soften the blow in the unlikely event that customers don't manage to hook up with any Hollywood A-listers while on vacation.

Adam Gavine, editor

WORLD CLASS ENGINEERING SOLUTIONS

"The seat recline control knob in BA first class is one of the greatest haptic pleasures in the sky" - Adam Gavine, Editor, Aircraft Interiors

-

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ACLIMEN. Innovative

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What's Important to You?



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STRONG GROWTH AND COMPETITION IN PREMIUM CLASSES ARE LEADING TO EXCITING CHANGES IN THE COMMERCIAL AIRCRAFT SEATING INDUSTRY Words by Jon Lundberg, Counterpoint Market Intelligence

igh rates of production continue to characterize the commercial aerospace industry, with build rates at Airbus and Boeing both reaching record levels. In addition, competition among airlines remains fierce, especially for premium passengers at the front of the aircraft. This competition between airlines and the resulting battle to equip new and retrofit aircraft has had a major impact on the interiors industry. Nowhere is this more apparent than in the premium aircraft seating market.

Stepping on board a commercial airliner used to be quite a predictable affair. Flying in a premium class from the 1930s-1960s was luxurious, and known as 'the golden age of air travel'. However, airlines shifted away from an elite passenger experience in the 1960s and 1970s and passengers had a choice of two classes: first or economy. The seating configuration for each of these classes did not differ much between airlines. Passengers had either a standard economy seat or a first class reclining seat featuring a greater pitch and seat width.

TODAY'S DESIGN-LED SECTOR

Things have changed quite dramatically over the past 35 years. The first major change in the commercial aircraft seating market was the adoption of a third class of seating in the late 1970s: business class. Major carriers began adopting business

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"The 'bed in the sky' was a catalyst to innovation in premium seating"

class around this time, including British Airways (October 1978), Air France (November 1978) and Pan Am (November 1978). Soon most major airlines joined in and introduced business class seating to their fleets.

The industry had come to the realization that business class seating offered an attractive business model for both airlines and seat manufacturers. Globalization and the corresponding growth of business travel created a need for a new class, falling between first and economy. Business class offered an affordable option to first class, while improving on the comfort and experience of economy.

Since then, the pace of cabin innovation has accelerated, especially at the front of the aircraft.

For wide-body aircraft, the market has gone from two to four classes (first class, business class, premium economy and economy). Within business class there has been a proliferation of seat configurations, including super business full lie-flat, high-density business class (HDBC, which itself comes in several different configurations), forward-facing lie-flat, angled lie-flat and recliner (wide body). Likewise in single-aisle aircraft the market has gone from two classes to three: economy, business and first.

By the early 1990s every airline started to offer the same basic premium class seating products. However, British Airways (BA) pioneered a new approach in 1994, to attract high-yield premium passengers. The carrier employed a process that would change the world of aircraft interiors,



1. THE STANDARD OF COMFORT IN THIS 1947 BOEING STRATOCRUISER WAS REMARKABLE

2+3. FOLLOWING THE LAUNCH OF THE FIRST BED IN THE SKY, BRITISH AIRWAYS THEN DEVELOPED A GROUNDBREAKING BUSINESS CLASS SEAT WITH A FULLY FLAT BED



using workshops that listened to customers' wants and needs, and engaging an industrial design house to take these wishes and create a first class environment that offered the first 'bed in the sky', as it was known.

The Counterpoint team credits this outboard-facing herringbone seat, which was launched in 1996, as being a catalyst to innovation in the premium seating market, as airlines realized that market differentiation is key to attracting high-yield customers.

As a result, industrial design houses proliferated, seizing business opportunities by applying their skills to develop new ideas, working directly with airlines and seat manufacturers. This development has seen the aviation industry become much more design-led over the past 20 years, with design houses also playing a role in fragmenting the seating market, alongside several other market forces.

However, in many ways that BA first class seat is the godfather to many of today's premium seat designs. The seat design was patented, ensuring differentiation among the many similar configurations it spawned.



SEAT SEGMENTS

The commercial aircraft seating market can be segmented into 11 distinct categories:

- Super first class (SFC)
- First class (FC)
- Super business full lie-flat (SBC)/high-density business class (HDBC) (herringbone, fore and aft, canted, staggered)
- Forward-facing lie-flat
- Angled lie-flat
- Recliner seats (wide body)
- Premium economy
- Economy for wide body
- Single aisle lie-flat
- Recliner seats for single aisle
- Single aisle economy

The overall aircraft seat barket is forecast to grow at a CAGR of 5.6% from 05.576 from

WHAT HAS CAUSED THE PROLIFERATION OF AIRCRAFT SEATING PRODUCTS?

Of the markets analyzed in Counterpoint's upcoming Aircraft Interiors 2016 report, none has changed as drastically in the past 20 years as commercial aircraft seating. In 2015 the aircraft seating market was worth an estimated US\$3.65bn (excluding regional, flight attendant and business jet/VIP seats).

Counterpoint forecasts that the overall seat market will grow at a CAGR of 5.6% over the period 2015 to 2025, which is almost double the market growth the team estimates over the same period for aerostructures. This is driven by the strong retrofit market and helps explain why the aircraft seating market is so attractive to new entrants.

Today, the commercial aircraft seating market can be segmented into 11 distinct categories, as listed above.

So why has there been such a proliferation in premium class seat configurations and the emergence of an entirely new seating class in the form of premium economy?

Unlike some markets, which are driven by a 'race to the bottom', in the premium seating market there is a 'race to the top', whereby airlines offer more amenities to

'There is a dichotomy between the top and the bottom of the seating market"

4. THE NEWEST BREAKTHROUGH SEAT DESIGN IS UNITED POLARIS

5. ONE OF THE TOP EXPERIENCES: SINGAPORE AIRLINES' A380 SUITES

6. AND THE TIGHTEST OFFER: SPIRIT AIRLINES HAS AN AVERAGE PITCH OF 28IN AND NO RECLINE distinguish themselves from the competition in order to lure business and first class passengers.

There is a dichotomy between the top and bottom of the seating market. At the bottom – economy seating – airlines provide as few amenities as possible to increase yield and profitability. At the top end of the market, such as super first class, airlines are in fierce competition to provide as many additional amenities as possible to distinguish themselves from the field. Hence the 'race to the top'.

One way airlines can differentiate themselves from the competition is through the passenger experience, in which aircraft seats play an important and integral part. The passenger experience is paramount to attracting high-end flyers. At the same time, airlines must balance this goal while achieving profitability. This has led to new seat configurations and even seat classes, as airlines explore cabin configurations that appeal to their customers while still packing as many premium passengers into the cabin as





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possible to increase yield. This is a defining characteristic of the long-haul aircraft seating market.

Competition has played a key role in both the growth and fragmentation of the seating market. The attractive growth rates forecast in seating are driven by the strong retrofit market. Retrofits are often triggered by new seating configurations on new aircraft deliveries to an airline, which then stimulate a wider refitting of the whole fleet to ensure commonality of product.

THE MARKET FOR TRADITIONAL PREMIUM CLASSES IS IN DECLINE AS NEW SEATING CLASSES EMERGE

When a passenger books an economy fare it is with the knowledge that it is a no-frills experience. One will be faced with, but accept, being cramped and close to others during the journey for a low cost.

Conversely, expectations are high when booking a premium class ticket due to the price differential. For example, first class can be in excess of 10 times more expensive than economy. Since Counterpoint's first interiors report in 2014, of the markets covered the team has noticed the biggest changes in the premium seating sector, as airlines and customers become more discerning.

For example, Counterpoint has noted that demand for forward-facing lie-flat business seats with a step over accounts for 19% of the new wide-body aircraft seat installations in 2015, whereas seats with all direct aisle access represent over 62% of 2015 new installations. According to its research, the Counterpoint team anticipates that the all-aisle access trend will continue, further fueling the creation of new seat designs.

FIRST CLASS IS EVOLVING

The growth of new seating markets such as super business class and super first class is directly correlated to the decline of the traditional first class market. First class is now dominated by super first class, as all major airlines move to a 'bed in a box' for their offering. In 2015, line-fit first class seats were delivered only to tier one airlines. Most smaller airlines are



"Individual private seats are now returning to the market"

7. FIRST CLASS GOES FULL CIRCLE, AND PROPER BEDS ARE BACK, WITH ETIHAD'S RESIDENCE BEING THE PINNACLE OF TODAY'S FIRST CLASS

8. RESIDENCE EVEN HAS ITS OWN SHOWER ROOM. THE EXPERIENCE IS SUPERIOR TO EVEN SOME BUSINESS JET CABINS

9. TO MINIMIZE THE DANGER OF REGULAR RESIDENCE FLYERS GETTING BORED WITH THE EXPERIENCE, THERE ARE THREE DIFFERENT CMF SCHEMES IN THE AIRLINE'S A380 FLEET

Seats with an rect aisle access account for more than 62% of new wide-body seat installations replacing or eliminating traditional first class seating with the new super business class and HDBC sub-segments.

Along with traditional first class seats, there is a similar decline in business class angled lie-flat and recliner seats. These segments are shrinking as the market moves to full lie-flat business class, including HDBC. HDBC seating configurations such as herringbone enable airlines to increase the number of premium seats in the cabin (thus increasing yield) while meeting customer expectations of a full lie-flat seat.

Individual private seats, which were a common feature in the 1930s, are now returning to the market.

A new business class configuration launching this year is a luxury blend/hybrid combining a herringbone concept with an in-line seat concept (for example, the





United Polaris suite). The concept of premium seating has been taken a step further, with the introduction of SFC suites which feature a living room, separate bedroom and en-suite bathroom – with amenities such as individual toilets and showers (the Etihad Residence, for example).

The premium economy market is strong and growing. It has shifted to a dedicated premium economy seat from being merely a standard economy seat with more seat width and leg room. Although premium economy is a small sector it is seeing quite high growth, driven largely by Asian carriers. It is noteworthy that a recent announcement by Emirates that it is considering premium economy is likely to fuel a market for the class in the Middle East by Emirates' competing carriers.

THE COMPETITIVE LANDSCAPE

Counterpoint has calculated estimates for the 2015 market shares for seating, as shown in the table top right. Zodiac Aerospace and B/E Aerospace dominate the premium seating market, a sector enjoying strong growth and thus skyrocketing demand for seats. However, Airbus and Boeing have been looking to diversify their premium seat supply chain to reduce risk and encourage competition. The result has been an opportunity for other players to capture some of this market. Thompson Aero Seating is one such player that has experienced phenomenal growth, 10. TAM'S B777-300ER FIRST CLASS CABIN IS A FANTASTIC EXAMPLE OF CONTEMPORARY LUXURY

> Can the market really accommodate more than 30 aircraft seating aircraft seating



with revenues doubling over the past two years. Aircraft OEMs have taken note. In April 2016 the company signed a BFE agreement with Airbus for its Vantage and Vantage XL products, which are now officially offered by Airbus on the A320 and A330 families of aircraft.

ROOM AT THE FRONT?

The big three players in aircraft seating – B/E, Zodiac and Recaro – represent 81% of the seat market, leaving 19% available for other suppliers. Counterpoint believes that industry consolidation is only just beginning. Can the market really accommodate over 30 seating suppliers?

Additionally, the OEMs surely cannot qualify this number of suppliers on new-build aircraft, and as retrofit is primarily driven by new aircraft installations, will some suppliers inevitably be merged or disappear? Outside the big three, it is likely that another level of consolidation might emerge, adding financial strength to the smaller players and eroding the market dominance of the big three.

In some respects, the premium class flying experience is returning to where it was during the golden age of air travel. The emergence of super first class mirrors the 1930s-1960s, when airlines pulled out all the stops to cater to and attract elite customers. Although the golden age is over, a new age, driven by competition, design and innovation, may just be starting.

ABOUT THE AUTHOR

Counterpoint Market Intelligence is an aerospace and defense market analysis consultancy, specializing in aircraft interiors, aerostructures, engine components, tooling and aerospace actuation. With over 50 years of industry experience, Counterpoint supplies research reports based on industry discussions and

projects, data analysis and modeling, and its own extensive experience.

The company analyzes markets at a global level, with a special emphasis on: Tier 1 and Tier 2 suppliers; segmentation by product and process; and assessment of current and emerging trends. Counterpoint also carries out consultancy projects specializing in deep dives into markets and products, strategy and competitive assessment, and market due diligence for mergers and acquisitions.

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OF AIR TRAVEL?

Images by Tascent

Words by Alastair Partington,

VP of identity programs, Tascent.

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hen was the last time you truly looked forward to taking a flight? In its heyday, air travel was a magical experience. Every passenger felt special and valued, with processes that put the traveler front-andcenter of the entire experience. With the rise of massmarket tourism and business travel, prices have tumbled and safety standards have soared, but the magic of air travel has faded. It's easy to see why when you consider the practical challenges of granting personal attention to individual travelers when they number in the millions. Today, truly personalized air travel is a premium granted only to a handful of fortunate fliers.

Biometrics – the use of physical or behavioral characteristics to confirm an individual's identity – is an ideal way for the aviation industry to address the increasing challenges associated with air travel. Today's biometric solutions are fast, accurate, user-friendly, cost-effective and personal. The best biometric implementations achieve their goals with a very light touch, so travelers needn't worry about the sophisticated technology working behind the

scenes. And biometrics can accurately and with ease confirm individual identity among a large set of travelers.

This means that a biometrically enabled system can achieve the rare goal of helping travelers negotiate airport processes faster and more smoothly, while delivering truly personalized services along the way. With airlines, airport operators and associated enterprises constantly seeking new ways to differentiate their services and Biometrics could make economy class passengers feel more like individuals

1. PASSENGERS COULD EVEN ENROL FOR BIOMETRICS PROGRAMS USING THE SEATBACK IFE SYSTEM.

2. PAYING FOR INFLIGHT SHOPPING WOULD BECOME SO SIMPLE THAT IT MAY ENCOURAGE MORE PURCHASES



"Biometrics is the gateway to effortless personalization"

maximize customer loyalty, turning to biometrics technologies as the gateway to effortless personalization – offering numerous ways to make the customer experience friendly, compelling and customized, at an affordable cost – has become a logical choice.

It's easy to argue that a technology with the power to make every traveler feel like an individual, not a ticket or a seat, should have a prominent place in tomorrow's air travel experience.

Given the great fit between today's traveler frustrations and the improvements that biometrically enabling systems can bring, Tascent points to a technology window of opportunity for the aviation industry to grasp – with biometrics at the forefront of ushering in a new 'Golden Age' of travel.

WHICH BIOMETRIC?

Making a decision to move ahead with biometrics is relatively simple. But with a multitude of biometric technologies available on the market, each backed by strenuous vendor claims, which is the right one to choose? Each biometric modality has its own strengths and weaknesses, and different vendor products offer varying levels of performance. It's easy to get lost in the weeds at this stage, but travelers won't wait for airlines and airports to make up their minds. Nor will they tolerate poorly implemented biometric systems, now that they are used to a multitude of user-friendly biometric offerings in the consumer space.

The specific requirements of the aviation industry – such as a high-throughput traveler base that is generally unfamiliar with each system that they will encounter, a



need for high levels of biometric performance, and health concerns driving an aversion to touching common objects such as fingerprint sensors - make it easier to narrow down on a biometric of choice. Iris recognition technology offers fast, contactless capture along with superlative matching accuracy. Iris capture systems are also intuitive to use, with sensors offering a large capture zone into which travelers can simply walk up, pause and move on, rather than requiring the user to 'chicken dance' their head into a tiny capture zone. As a result, iris recognition is emerging as a great fit for many current and future air travel scenarios.

NEXT-GENERATION BIOMETRICS APPLICATIONS IN AIR TRAVEL

Successful implementation and adoption of iris recognition could unlock a wide variety of possibilities in air travel. These possibilities include a number of traveler touchpoints encompassing both initial registration of users into a program (enrollment) and subsequent token-free recognition of travelers (identification).

The lounge is one location within an airport where premium travelers tend to feel under less time pressure, and as such it presents an excellent location to offer biometric program registration. Enrollment of a traveler's biometrics could be conducted in less than a minute by lounge staff using a mobile device anywhere in the lounge, without requiring the traveler to shift from their seat. Alternatively, enrollment could be offered in-flight - another time when travelers generally have some spare





"Expect biometric sensors and document imagers on aircraft in the next few years"

3 NO FISHING ABOUND FOR BOARDING CARDS: ELIGIBLE LOUNGE GUESTS NEED ONLY LOOK AT THE SENSOR TO GAIN ENTRY

4 ENROLI MENT INTO A BIOMETRICS PROGRAM COULD TAKE LESS THAN A MINUTE USING MOBILE DEVICES

5. LARGE CAPTURE ZONES ALLOW SECURITY CHECKS TO BECOME FASTER AND LESS STRESSFUL

Biometrics

time - again using a mobile biometric device. The days of requiring new users to sign up in a dedicated room are well and truly over, now that the enrollment station can come to them.

A further option for frictionless enrollment could leverage the free time that travelers have during their flight, but this time in a self-service mode. Given the increasing sophistication of seatback electronics, it is entirely reasonable to expect biometric sensors and document imagers to make their way onto the aircraft in the next few years. A traveler could scan their e-passport, upload biometrics from the passport chip and perform a biometric face match against the document to prove their identity, provide additional biometrics such as iris or fingerprint, enter their frequent flyer details, add payment information, select their privacy preferences, and choose which identity services they wish to enable - all from the comfort of their seat, with a drink in their hand. This is an optional convenience for the traveler, and consequently, an easy way for the airline to facilitate program uptake.

Once a traveler is enrolled into a biometric program, numerous value-adding opportunities open up. As a first example, consider self-service bag drops, which are being implemented today by leading airports. These simplify the bag-drop process and reduce the staffing overhead for airlines, but still require the traveler to provide a boarding pass (and sometimes also an identity document) as a means of authentication. A system using iris recognition on the other hand, would enable a traveler to simply walk up and look at the bag-drop system to be recognized; the system would link the traveler's identity to the reservation, and



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"On an aircraft that recognizes them, travelers can expect a new level of personalized experience"



accept the baggage. This arrangement would also be more secure than today's system, which relies upon a paper or mobile boarding pass token that can easily be swapped or stolen. This would mean a simpler process for the traveler, an opportunity to direct staff toward more customerfocused activities for the airline, shorter queues for the airport operator to accommodate, and a more secure system for all.

Frequent flyer lounges are a haven for the harried traveler, and offer a prime opportunity for airlines to differentiate themselves to their premium passengers. Today's lounges rely on the traveler presenting some kind of credential, often a boarding pass or frequent flyer card (sometimes both), to gain access. Biometrics obviates the need to challenge the traveler for a credential: enrolled travelers can simply walk up and glance at an iris sensor to unlock the doors to the lounge. As well as saving the traveler from fishing through their pockets for their boarding pass, the system might automatically pull up the traveler's flight status on a nearby TV screen at the same time, while sending a notification to the lounge staff to enable them to greet the traveler by name, enabling a truly personalized, welcoming lounge experience.

In the future of air travel, what will happen at the boarding gate? Travelers are recognized by their biometrics, granted access by auto-gates, and no one laments the demise of the boarding pass. Exceptions (last-minute upgrades, wrongly directed passengers, and those trying to jump the queue) can be processed by airline staff, who have more time available to focus on customer service with no boarding passes to handle. Self-boarding is being implemented today by some of the most forward-thinking airline/airport combinations; tomorrow it will be the norm. Individual favorites, from IFE and food, to seating position and temperature, can be recorded

6. WHETHER MOTORSPORT OR ROMANTIC COMEDY, THE IFE SYSTEM CAN AUTOMATICALLY OFFER YOUR FAVORITE CONTENT

7. IRIS RECOGNITION COULD MAKE BAG DROP SWIFT AND SECURE

PERSONALIZED AUTO-BOARDING WITH AIRCRAFT-BORNE EQUIPMENT

Cutting down the time taken to board passengers onto the aircraft remains a significant challenge facing airlines today. Although it offers no solution to the challenge of fitting oversized bags into overhead bins, biometrics can help make the boarding experience friendlier by recognizing passengers at the aircraft entrance, greeting them by name and providing a reminder of seat location. Busy stewards can be supported with live data on the proportion of the flight that is boarded, notifications of high-status frequent flyers as they cross the threshold, information as to whether passengers are (correctly) seated, and automating headcount, if required.

On an aircraft that recognizes them, travelers can expect a new level of personalized experience. Imagine your favorite TV programs being proposed when you take your seat; movies that remember you left off when you change aircraft; lighting, ventilation, seat adjustment,





and food and beverage preferences that follow you when you shift seats; engaging games that you can continue playing across multiple trips; all without any action on your part. Connecting flight and destination information, frequent flyer account status, and private messages could all flow to the seatback display, with biometric technologies making sure that only the intended recipient was reading them.

Airlines make a considerable proportion of revenue from inflight services, whether food and drink, entertainment, wi-fi or duty-free sales. Today, travelers must pay with cash or credit card, which can involve hunting around in the overhead bin for a wallet or purse. Simplifying purchases by introducing biometric payment, either with a seatback system or a mobile device operated by a crew member, reduces purchasing friction and is likely to improve uptake of these services. New revenue sources will also become viable. Want to upgrade your ticket? No 8. PASSENGERS CAN BE IDENTIFIED AT THE AIRCRAFT ENTRANCE, GREETED BY NAME AND REMINDED OF THEIR SEAT LOCATION

Increased ancillary revenue could be a major benefit of biometrics technology

EYE SPY (+) Implementation and adoption of iris recognition could unlock a wide variety of possibilities in air travel:

Program enrollment

Program enrollment using mobile biometric deviceInflight self-enrollment using seatback system

- Recognition/identification
- Expedited self-service bag drop
- Personalized welcome in frequent-flyer lounge
- Self-service boarding gates
- Personalized auto-boarding with aircraft-borne equipment
- Inflight personalization
- Inflight biometric payment
- Inflight immigration

problem: click a button, look at the camera to authorize payment, and move to your new seat.

Many travelers would relish the opportunity to use inflight time to complete immigration formalities if it meant shorter queues upon arrival. Likewise, immigration agencies would appreciate the opportunity to screen biometrics in advance of passengers landing. Inflight immigration could be achieved through self-service (using seatback displays) or assisted service (by a crew member, using a mobile device), according to the complexity and the degree of automation of the process, the biometrics that need to be collected, and the individual's degree of comfort. Forward-thinking airlines and government agencies are already adopting inflight immigration as a means of conveniently expediting travel. In a future world, this could also enable exit immigration processing, thereby removing a pre-departure checkpoint and proving beyond doubt that the travelers had left the country.

IS THIS THE FUTURE OF AIR TRAVEL?

The scenarios outlined above present a vision of an exciting future in which biometrics technologies simplify and personalize the air travel experience. Will each come to pass? Technically, they are all feasible, but each will require a thoughtful approach to security, usability, process and integration. The more straightforward use cases outlined above could be implemented today, independently, by forward-leaning airlines. Others, such as the immigration scenario, will take some considerable coordination effort between various stakeholders.

The prize of a new golden age of air travel is out there: it will be for the boldest airlines, airport operators, travel agencies, concierge services, hotel brands and car rental agencies to claim it.

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WITH MANY COMPANIES NOW LOOKING FOR ALTERNATIVES TO PHENOLIC RESINS, A UNIVERSITY TEAM HAS DEVELOPED A LABORATORY-SCALE SOLVENT PRE-PREG MACHINE THAT COULD HOLD THE ANSWER Words by Cecile Grubb and Nicole Larson, Western Washington University he development of novel materials is of the utmost importance to the aircraft interiors industry. Companies are faced with pressures from governmental regulatory agencies to create safer products for manufacturing personnel and end users, as well as from customers that want the latest and greatest product at the lowest possible cost and weight.

In 2013, Western Washington University (WWU) was approached by a major aircraft interiors manufacturer to conduct research into replacing phenolic resin. Phenolic resin is a relatively inexpensive but extremely flame-retardant material that is widely used in aircraft interiors. Despite its ability to meet the FAA's strict fire, smoke and toxicity regulations, the European Union has mandated the removal of phenolic resin from future aerospace materials due the hazard it poses to manufacturing personnel, namely the off-gassing of formaldehyde during processing.

As part of this investigation, the WWU research team designed and built a laboratory-scale, solvent-based pre-preg manufacturing machine (pre-preg treater). Pre-preg is a composite material that consists of a fiber cloth that has been impregnated with a resin matrix. It is frequently used in place of traditional hand lay-ups when more control is needed over part quality and reproducibility.

Pre-preg is manufactured using primarily using two processes: solvent coating and hot melt coating. In the case of a solvent-based system, the resin matrix is dissolved in a solvent, commonly an alcohol or acetone, to reduce its viscosity and increase its ability to surround, or wet out, the fibers during the impregnation process. Hot melt prepregging relies instead on a reduction in





viscosity of the resin due to elevation in temperature prior to application to fabric.

A laboratory-scale pre-preg treater is an extremely useful tool for small-scale production runs carried out by research teams involved in various projects related to advanced composites. It can be used to bridge the gap between the chemistry lab, which provides limited information about a material's ability to meet aerospace regulations, and expensive full-scale production runs. Such a machine can also be used in engineering and material science departments for valuable teaching purposes. However, industrial compact pre-preg treaters available for purchase are prohibitively expensive for most universities.

PRE-PREG TREATER DESIGN

A pre-preg treater can be broken into four major components: a bath section that houses the fabric supply, resin impregnation, tensioning and pinching; ovens that partially cure the resin and remove excess solvent; a ventilation system; and a take-up assembly that cools, tensions, controls line speed and applies a backing material to the pre-preg as it is rolled up for storage.

FIRST-GENERATION PRE-PREG TREATER

The original iteration of the WWU pre-preg treater was designed to be capable of batch processing by incorporating the fabric supply, tensioning, impregnation and backing material application into one unit. This operation was completely manual and required one operator to advance fabric via a hand crank and another operator to cut the impregnated fabric. This method of prepreg manufacturing required curing of the impregnated fabric in large ovens in batches, rather than as part of a continuous process. Although it was a good first step toward manufacturing pre-preg materials, the machine was incapable of producing quality, consistent product.

SECOND-GENERATION PRE-PREG TREATER The goal of the second-generation pre-preg treater design pre-preg treater is an extremely useful tool for small-scale production"

"A laboratory-scale

1. THE PRE-PREG TREATER WAS

FITTED WITH A HAND CRANK DRIVE

2. A CADCO XAF-188 COMMERCIAL

CONVECTION OVEN WAS SELECTED

The treater

can bridge the

gap between lab

FOR THE PROJECT

was to better mimic the pre-pregging process so that materials manufactured would be equivalent to large-scale production quality. A number of upgrades had to be completed to reach this goal: incorporation of the oven section into the system to create a continuous process, automation of speed control and tensioning, the addition of an resin agitation system to reduce resin separation, and the separation of the take-up assembly from the bath.

Selection of adequate ovens for the second-generation pre-preg treater was a critical but challenging task. Ovens are a key aspect of the pre-pregging process for solventbased systems, because they control the ability to properly and uniformly partially cure the material. Inconsistencies within the oven could lead to the production of unusable pre-preg. This work was additionally complicated by footprint, control, durability and budget restraints. Many avenues of structure and industry were considered, including vertical and horizontal layouts of industrial ovens, commercial baking and custom ovens.

Ultimately, a countertop convection oven was selected for the job. An adequate oven length of 60in could be achieved by placing two ovens in series. A number of modifications had to be made to the ovens to allow for fabric travel: relocation of electrical components, cutting of slots in oven sides, fabrication of custom seals and adjustable gates to modify slot opening, and attachment of the ovens into one unit. Cutting slots in the sides of the ovens required extensive familiarization with the ovens and components. Holes were cut through the inside and outside of the stainless-steel housings and fiberglass insulation.





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www.stelia-aerospace.com Contact: marketing@stelia-aerospace.com Custom folding design seals were cut using a waterjet and installed to contain insulation.

Uniform heating of resincoated fabric is vital for achieving consistently cured pre-preg. To ensure this was the case, the ovens were fixed together while facing in opposite directions. The heat source of each oven is located in the back, which raised concerns



Automation of the speed control and tensioning system was an essential task. The fabric movement was automated through the addition of a 230AC gear motor and removal of the original handcrank. The speed control system sets and monitors fabric line speed, using this gear motor, a compact power inverter, a microcontroller and rotary encoder located in the take-up assembly. A proportional feedback loop is used to maintain a consistent line speed as the take-up roll increases in diameter throughout a run.

A closed-loop tensioning system is used to control fabric tension in the pre-preg treater. This system consists of a second motor on the unwind roller, a magnetic particle clutch, load cells and a dead idle roller. This system is used to maintain even tension throughout a run and prevent stiction, which negatively affected pre-preg quality in earlier treater iterations.

An automated resin agitation system was required to ensure homogeneity of the resin through production runs. During first-generation treater experimentation, resin was manually agitated by the user between batches, a process that would be highly inconvenient during continuous prepreg production. Lack of space in the bath section required that this system be external. The system designed by the research team ultimately consisted of an external resin reservoir with an overhead stirrer with a 316 stainless-steel propeller and a peristaltic pump with chemical-resistant tubing to move resin to and from the bath.

The final required upgrade to the pre-preg treater from a batch to a continuous system was the construction of discrete take-up assembly. This section was made from extruded aluminum, matching the original bath section, to maximize design flexibility and versatility. As fabric exits the ovens, it is run across three aluminum conveyor rollers that can be moved to adjust the length of cooling distance and time. From there it runs between two sheets of plastic backing material and a set of padded pinch rollers and is then rolled up. This section also houses the electronic controls for the speed control and tensioning systems.

DEVELOPMENT OF SAFETY PROTOCOL

Because the pre-preg treater combines the physical hazards of a complex machine with the health, fire and environmental hazards of a chemical process, increased vigilance when developing protocols, features and fail-safes was required for this project.

A resin agitation

AND EXHAUST VENTS

4. THE BATH WAS DESIGNED AND SUPPLIED BY AN AEROSPACE PARTNER

The team worked closely with WWU's environmental, health and safety department to identify hazards and develop solutions. The major dangers of this system come from the chemical composition of the resin. Thus far, research has focused on an alcohol-based phenolic resin. The health risks associated with this resin come from the potential for exposure to formaldehyde. Two separate but complementary approaches were taken to prevent exposure: implementation of engineering controls in the form of a point-of-source capture system, and usage of extensive personal protective equipment. All manufacturing personnel are required to wear chemicalresistant Tyvek suits, nitrile gloves and full-face respirators with 6005 formaldehyde/organic vapor cartridges.

Additional concerns were raised about treater safety following an incident with a solvent-based treater system at a local aerospace material manufacturer's facility. Solventbased systems release significant amounts of flammable volatiles, creating the potential for an explosion in the event of volatile build-up in the machine in the case of ventilation or power failure. A PLC-based safety system was designed to monitor treater operation and automate shut down in case of emergency. Additionally, it contains a back-up battery to provide energy to the oven fans, alarm and other safety features in the event of a power failure. While more work is necessary to automate fully the shutdown procedure in an alarm state, the team believes this is a good starting point for preventing explosions and other safety incidents. 🔇

For details, contact Nikki Larson, professor of plastics and composites engineering at Western Washington University

"Automation of the speed control and tensioning system was an essential task"



system ensures homogeneity of the resin during production 3. THE VENTILATION SYSTEM DESIGNED FOR POS CAPTURE AT EACH END OF THE OVENS

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And I following

BOEING PUTS THE CASE FORWARD FOR MAINTAINING A RELATIONSHIP WITH THE OEM DURING AN AIRCRAFT'S LIFECYCLE Words by Blake Emery, director of differentiation strategy, Boeing Commercial Airplanes



n air traveler, just like any consumer, will judge an airline brand based on his or her experience with that brand.

If there is no space for a carry-on bag, if the seat seems dull and worn, or if the lighting feels dark and dated, chances are that person will feel dissatisfied and look for another airline.

Consequently, airlines need to keep their brands fresh. Cabins need to be current, comfortable and welcoming.

One way is to implement cabin architectures and inflight systems that are designed to keep passengers coming back. Airlines update their cabins for many reasons, but the most important of these is to attract and retain loyal customers.

WHAT CAN AN AIRLINE DO?

Boeing is known for its Sky Interior philosophy, which involves the use of dynamic LED-lit scenes, pivoting overhead bins and curved architecture inside the cabin – and the extensive research that goes into it. Boeing engineers strive to uncover passengers' deeper needs and design interiors to meet those needs.

"More than 90% of B737 customers choose the Boeing Sky Interior option"

1. THE LIFT SEATS BY ENCORE HAVE BEEN OPTIMIZED FOR THE BOEING SKY INTERIOR ARCHITECTURE

2. A REFRESHED INTERIOR GIVES A POSITIVE FIRST IMPRESSION FOR PASSENGERS WHEN BOARDING



The Boeing Sky Interior philosophy originated with the B787 and first entered revenue service as an option for the B737. More than 90% of B737 customers choose the Sky Interior

option and it will be the baseline offer on the B737 Max.

Additionally, Boeing is in the business of modernizing existing interiors, and it listens carefully to airlines' needs to help them find the right solutions. The upgrade and retrofit choices are almost limitless: an airline can remove an entire cabin and install a new one or, more conservatively, the airline can commit to smaller projects, like switching to new bin doors that add volume or making a lighting system upgrade – and still have a notable impact.

B737 NG ENHANCED INTERIOR

An airline that flies the Next-Generation 737 can choose a Boeing enhanced interior retrofit to enhance the overall flight experience. This option involves state-of-the-art architecture, accentuated by LED lighting, larger capacity stow bins, updated forward and aft entry coves, and Boeing Sky Interior sidewall panels and air grilles. Or an airline can select a partial enhanced interior upgrade.

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and its seating, sidewalls, stow bins and flooring removed to allow for a mandatory structural inspection. This can be an ideal opportunity to make changes to the cabin. Aesthetics can be addressed, upgrades can be installed, or something new can be added. A cabin retrofit at this point might offer the best return on investment for the future of the aircraft.

There are also smaller retrofit packages that can be completed relatively quickly, such as replacement cabin lighting.

INSPIRED BY BOEING SKY INTERIOR

Cabin modernization options are numerous and they can bring more of a Boeing Sky Interior aesthetic to the aircraft. For example: Space Bins.

Space Bins are an optional feature for Sky Interior and are offered as a line-fit option on the Next-Generation B737 and the coming B737 Max. Space Bins can increase bag capacity by 50% over Boeing Sky Interior standard bins. Space Bins are also available as a retrofit option for B737s and B757s.

Space Bins enable bags to go in wheels-first and on their side, rather than wheels-first and flat. This arrangement creates room for six bags rather than the four that can be fitted in standard bins, which require bags with wheels to be put in sideways. *"Optimized business class and twin-aisle economy seats are also under development"*

> 3. THE 737 ENHANCED INTERIOR UPGRADE REFLECTS A MODERN CABIN ATMOSPHERE

4. SPACE BINS CAN INCREASE BAG CAPACITY WHILE KEEPING TO THE "SKY" PHILOSOPHY The new Space Bins are generating a positive response from airlines.

The Sky Interior closets and windscreen stowage units come with machined door frames, easier-to-use latches, and an updated look and feel. These monuments feature accent lighting that emits the same color as the airline's cove lighting, complementing the Sky Interior architecture.

An Advanced Lavatory with the optional Spacewall feature offers cabin flexibility as the wall is sculpted to create additional cabin space. Spacewall helps to refresh the look of a cabin and creates room for more seats to be fitted and the seat pitch to be expanded. The Advanced Lavatory also features LED lighting and a more reliable toilet that uses less water and is easier to replace than conventional units.

Boeing can work with an airline to replace seats if it is on the modernization agenda. An airline that wants to fully complement the Boeing Sky Interior architecture can select Lift by EnCore economy class seats. These

seats have been structurally, spatially and aesthetically optimized to match the Sky

Interior architecture and they are available for the B737 family. Optimized business class and twin-aisle economy seats are also under development.

During modernization projects, Boeing partners with airlines to perform the work or to consult on projects. The age of the fleet, the routes flown and the projected length of

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design data eases the installation and certification process

Boeing says its proprietary



"Airlines often seek out" the OEM to modernize an aircraft interior"

service are major considerations. The team will then strive to find ways to best maximize seat capacity and fleet value.

IFE AND CONNECTIVITY

The latest IFE technologies can be supplied according to the customer's needs. Boeing can install most systems and provide the necessary parts, engineering and labor.

Major considerations for airlines offering IFE are that the systems - whether embedded in seats, mounted under the bins or a hybrid system - must work properly every time, system certification should go without a hitch, and it should be simple to upgrade the systems during the life of an airframe, because the technology tends to change so quickly.

More and more airlines are installing wireless capability. While Boeing doesn't supply live internet systems that have airto-ground connectivity, it can supply and install systems that stream movies and other digital content.

WHY USE AN OEM?

Airlines have a lot of choices when looking for help with updating a cabin, 5 THE SKY INTERIOR ARCHITECTURE IS ACCENTUATED BY CUSTOMIZABLE LED LIGHTING SYSTEMS

6. THE OPTIONAL ADVANCED LAVATORY SKYWALL CAN CREATE MORE CABIN SPACE

7. AS DIRECTOR OF DIFFERENTIATION STRATEGY, BLAKE EMERY STRIVES TO DESIGN AIRCRAFT THAT PEOPLE PREFER TO FLY IN, READ THE INTERVIEW WITH EMERY ON OUR WEBSITE FOR MORE DETAILS

but they often seek out the original equipment manufacturer to modernize an interior.

An OEM has intimate knowledge of the airframe. Armed with proprietary design data, the manufacturer can offer proper installation and certification services.

Boeing can develop a comprehensive makeover plan for a cabin project and can manage the makeover to include all supplier relationships, test installations and interfaces, as well as confirming that certification requirements are met, document configuration changed, and spares made available when needed.

It is highly advantageous for an airline to have one point of contact when wading through a multitude of suppliers, especially since airlines are busy enough with their day-to-day operations.

Boeing can provide multiple cabin upgrades and retrofits throughout the entire lifecycle of an airplane.

For Boeing, it is all about relationships. It's how a passenger interacts with a stow-bin latch or a seat. It's how these items are successfully introduced onto an airplane. It's how passengers choose their airline. 🔊



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LET'S GET PHYGITAL

Let's get with the times and acknowledge that the passenger pain point of the airport gate area needs a major user experience makeover, says Teague's Devin Liddell

or many consumers, how we travel in cars has already been transformed, through ridehailing and ridesharing brands such as Uber, Lyft, car2go, and DriveNow. These are phygital innovations, physical and digital breakthroughs made possible by the tight integration of hardware, software and services within thoughtfully considered, well-designed experiences. Car travel is poised to take an even bigger leap forward through another phygital innovation: the autonomous vehicle. And it's important to remember that this is not in the far-off future. Present-day vehicles from Tesla, BMW, Mercedes and other car makers already boast self-driving features, and last March General Motors and Lyft announced a US\$500m US collaboration on self-driving taxis, with plans to deploy test vehicles within a year.

While the big goings-on in the automotive industry may seem on the surface tangential to commercial aviation, they most certainly are not. For starters, car makers believe that autonomous vehicles are likely to take market share from short-haul air travel, making robot cars an emerging competitive threat. Second, the pace of change in automotive points to air travel falling behind when it comes to phygital innovations in the consumer landscape. This is particularly pronounced within the gate experience. In fact, with so many consumer electronics makers producing Internet of Thingsenabled devices, many passengers now have more cutting-edge technologies in their own homes than those they're likely to encounter at a typical airport gate.

POWER IN YOUR HANDS

Consider this: a passenger sitting at the gate today can monitor and adjust their home's HVAC system, check on the family pet, remotely lock and unlock doors, and even confirm the precise number of eggs in their refrigerator – all from their smartphone. And yet they will have arrived at that gate by maneuvering through a security screening infrastructure that



has remained broadly unchanged in more than 15 years.

At the gate itself, they'll submit to a sluggish boarding process that hinges mostly on audio announcements from a public address system, a technology that first appeared more than a century ago. During the boarding process, passengers will strain against the din to hear and understand those audio announcements, to the point of asking other passengers for clarification. Queue management will devolve to such an extent that passengers anxious about bin space will inch forward, crowding the jetway entrance in an amorphous blockade that can sometimes be found snaking across the terminal walkway. Think about that: the gate

"THE GATE EXPERIENCE IS SO FLAWED THAT IT NEGATIVELY IMPACTS PASSERS-BY"



experience is so flawed that it even negatively impacts passers-by.

It doesn't have to be this way and, honestly, it can't be this way if we hope to compete with other transportation modalities – present and future – that involve a lot less hassle than air travel. Thanks to a superior user experience, rail has already taken market share from air

travel in places like Spain and Japan, a trend poised to continue through the implementation of new high-speed rail networks planned in Europe, China, and even the highway-centric USA. In addition to autonomous vehicles, there's also the nascent build-out of SpaceX's Hyperloop system, whose capsules would be propelled through tubes at a similar speed

1 PHYGITAL INNOVATIONS HAVE THE CAPACITY TO MAKE THE MODERN AIRPORT GATE A SMART SPACE

to that offered by air travel. So air travel has plenty of disruptors lurking. And remember that the taxi industry could have prevented its potentially fatal disruption by the likes of Uber and Lyft if it had only fixed two basic problems: dispatch and payment. This raises an important question: what are the equivalents in air travel?

Setting aside well-worn passenger gripes about seat pitch and width and the necessary but intrusive annoyances of security screening, the current state of the airport gate experience appears a likely candidate for a transformative, passengerpleasing makeover. After all, passengers eschewing brief flights in favor of train journeys three-times longer aren't troubled by that brief time in the air; they're troubled by all the trouble on the ground before and after that flight.

SENSE, ADAPT AND EMPOWER

So how could we transform the airport gate experience? In the same way a shared car knows an individual driver or a Nest thermostat learns a homeowner's routines and preferences, phygital innovations have the capacity to make the airport gate a smart space. And smarter here really means the capacity to do three actions well: sensing, adapting, and empowering.

Teague's Poppi concept was a Crystal Cabin Awards 2016 finalist



2. IN THE POPPI CONCEPT, SMARTPHONE- AND WEARABLE-BASED AUGMENTED REALITY TECHNOLOGIES PROMPT PASSENGERS THROUGH THE BOARDING EXPERIENCE

Sensing is all about a smart space's ability to know what's happening; in the context of an airport gate, it's about knowing how many people (and their bags) are present, along with specific information about individual travelers and their unique itineraries and preferences. When you hear a gate agent ask over the public address system if a particular passenger is in the gate area, it's because they simply don't know.

Adapting is a smart space's capacity to be resilient; for an airport gate, it's about being truly flexible in the face of changing conditions. When you see an airport gate with passengers lined up against walls (even though there are open seats that are being "occupied" by bags), or a line has oriented itself across the terminal walkway, it's because the space can't tailor itself dynamically.

Empowering is an environment's talent for giving its occupants a course of action or sense of control; at an airport gate, it's about giving passengers transparent access to personalized information that they can make sense of and act on.

Beyond letting a lucky few charge their electronic devices, the current airport gate doesn't empower passengers to do much except sit and wait and listen for updates delivered by audio announcement, and it's why everyone stands up at the first mention of boarding.

Putting those design principles for smart spaces to work, here are a couple

"THE LINES BETWEEN DISCRETIONARY AND NON-DISCRETIONARY ACTIVITIES SHOULD BECOME BLURRED"

essential to-dos for the airport gate of the future.

BLUR THE LINES

The lines between discretionary and nondiscretionary activities should become blurred. Current airport gates separate mandatory processes – going through security, checking in, and so on – from elective ways to spend time such as shopping and dining.

Operationally, the current airport gate scenario brings passengers to the gate too soon, when they could be spending time (and money) more enjoyably in restaurants or shops. In the future, we'll be able to reduce "soft" queues at the gate – lines of passengers who don't actually have to be there all at the same time – through things like smart tables in restaurants.

A smart table, integrated with personalized real-time airline operations data, will offer individualized prompts to "right time" check-in and boarding processes.

LIBERATE BOARDING

Next, liberate the boarding process from self-inflicted inefficiencies; those caused by individual passengers at the gate end up impacting other travelers, especially when it comes to bags.

In the future, smart gates will be able to know precisely how many bags are headed on board, what kind of bags they are (weight and dimension, for example), who those bags belong to and where they're sitting, all so artificial intelligence – not gate agents - can dynamically plan and execute how to get people and bags on board in the frictionless way only an algorithm can deliver. This means the days of flyer status- and row-based boarding processes will mercifully come to an end; instead, smartphone- and wearable-based augmented reality technologies will prompt passengers through a largely queue-free system, personally guiding passengers to their seats and to systemdesignated bin spaces for their bags, smoothing the boarding process for every individual and the entire flight as an interrelated whole.

Yes, these ideas sound aspirational, but they're entirely achievable. They're also necessary to secure commercial aviation's rightful place in the future of travel.

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CO-FOUNDING THE FUTURE.

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

TEAGUE

HARMONIOUS DESIGN

A keen sense of the rhythms of air travel is helping a design studio to create a symphony in cabin design

he best aircraft interiors are elegant, simple, intuitive and on-brand. They function so well, both in terms of accommodating passengers and delivering value and efficiency to airlines, that it can be hard to grasp the extensive amount of work that goes into creating them. Outside the realm of the design industry, that work can remain esoteric. Design is often seen or thought of as a superficial thing, decoration if you will, rather than something intrinsic to how well a product works. So what does design really mean?

Defining or explaining the work that we do is actually very straightforward. Think of the conductor of an orchestra and you'll immediately get a sense of what we mean. Much as they direct complex symphonies with a flick of their baton, the conductor's work belies the incredible amount of hard work that has led to the performanceready piece. Conductors have the ability to understand how each and every person and musical instrument in their orchestra behaves, and at which point to engage them, in order to create a harmonious whole. This is what we do. We are conductors of the complex symphonies that are aircraft interiors.

Much like the conductor whose interest in music began at a young age, our designers all have one thing in common: they have an in-built drive to improve the world around them, to take it apart, see





"OUR WORK WITH AIRFRAME MANUFACTURERS BROADENS THE POSSIBILITIES FOR INNOVATION IN CABIN INTERIORS"

Videos, galleries and more details about the United about the United polaris cabins are available on our website



1-3. A CAREFULLY CONSIDERED MIXTURE OF COLORS, MATERIALS AND FINISHES GIVES THE UNITED POLARIS CABIN VISUAL INTEREST UPON BOARDING, AND THIS IS HELD THROUGHOUT A FLIGHT

UNITED

A STAR ALLIANCE MEMBER

how it's constructed, and how they can make it better. Our designers are not satisfied with the status quo and don't take things for what they are, but rather what they could be. Over the last three decades, we have built an international team that encompasses product designers, vehicle designers, materials specialists and visualizers, all of whom were selected for their outstanding creative and problem-solving skills. This team is our greatest strength, and has enabled us to broaden the scope of our work to encompass every aspect of the aviation industry, from airframe manufacturers, seat manufacturers and materials suppliers, to airlines. This gives us a unique and in-depth knowledge of the industry and allows us to think holistically about aircraft interiors, to see the cabin as an extension of a broader industry.

To design successful cabin interiors, you need to be aware of the limitations within which you are working and understand how to overcome these. Our work with airframe manufacturers is about just that. Working directly at the source of the 'metal tube' means we're able to affect the architecture of the aircraft, which in turn broadens the possibilities of creation and innovation in cabin interiors.

We have collaborated with all the main airframe manufacturers, and our design of the Embraer E2 jet was launched in 2014 to wide acclaim, both in the industry and with the wider public. Most recently, we worked in close partnership with Airbus on the new Airspace cabin design. Working with Airbus's in-house team, we used light and geometry to create 'floating' elements, an aircraft architecture that appears more spacious and offers passengers a more serene onboard environment.

Over the years, we have also worked closely with seat manufacturers and have developed many concepts that have proved commercially successful. Our close ties with seat manufacturers mean that we're in a better position to create customized solutions for airlines who may want to use a catalog product, but ensure that it retains enough difference with other airlines.

In April 2016, PriestmanGoode became an employee-owned company

> 4. THE STUDIO USED WIREFRAME VISUALIZATION TOOLS WHEN DEVELOPING THE CABIN FOR THE EMBRAER E2 REGIONAL JET

Our CMF (color, material and finish) department stands out as a progressive team that works tirelessly with suppliers to develop new products for use in aircraft interiors. We have an intimate knowledge of trends, not just in the aviation industry. but across other sectors including automotive and hotels. This, along with our understanding of the need for longevity of onboard materials, is instrumental in our work developing bespoke products, such as a patterninfused Kydex, which we worked on with Sekisui SPI. Our team has also been actively involved in the progression of translucent plastics for use in aviation. Both latter products can be seen in our widely lauded Polaris business class cabin for United Airlines.

Crucially, however, these close partnerships at every level of the development of an aircraft interior mean we are able to get the best results.

Over the years, we have managed to continuously innovate and improve aircraft interiors because we know how each part of that interior is made, we understand every element of the process, and appreciate that at each level the design must not only satisfy aesthetic needs, but commercial ones as well.

Our attention to detail during that process is another one of our strengths. Returning to the musical analogy, the conductor doesn't just lift their baton and

"WE ARE DRIVEN BY A DESIRE – AND A NEED – TO IMPROVE THE USER EXPERIENCE"

immediately know how to conduct a symphony. They listen, study, refine and practice over and over again until they are satisfied with the result. Our work as designers is the same.

Throughout the development process, we conduct extensive research with our airline clients, and with their internal teams – ranging from crew to maintenance and even marketing – to identify their needs – to understand how we can design an interior that makes their job more efficient, easier to conduct, and cheaper to execute. We build mock-ups, both in virtual reality software, as well as real, fullscale mock-ups, in order to test spaces.

Virtual reality mock-ups prove particularly useful at the early stages of the development process, as they enable us to give our clients a sense of what it feels like to be in a space. They allow us to show in real time the effects that a change in color or in light for instance, can have on the whole cabin. As for physical mock-ups, these are an intrinsic part of our working process. We develop simple foam models in our studio for every project, which enable us to understand how passengers will use a space, to get a feel for how open a seat environment might feel for instance. But we also build fully functioning mock-ups, with the materials that we have selected and developed. These are then used for extensive passenger and crew testing. The user is at the heart of everything we do, so these physical mock-ups allow us to see what works, what doesn't, and what needs to be fine-tuned, so that our final designs exceed expectations at every level.

Our work is about people. We are driven by a desire – and a need – to improve the user experience, whether it's for a first or economy class passenger, crew or the maintenance team. And this has been intrinsic to the way we operate as a company for the past 30 years. But no man is an island. Part of the conductor's skill comes from the way they connect with their musicians. Our relationships with our clients, with suppliers, with passengers, with crew... these are what allow us to constantly innovate, change the status quo, and push the boundaries of aircraft interior design. ⊗

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Working in partnership with Airbus to create a new cabin design.



ABBORE

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SUITE TALK

Whether designing for first, business or economy class, it is vital to listen to customers' needs. However, occasionally something new is required, such as Delta's business class suites

n recent years, there has been an influx of luxury innovation in air travel. Across the board, first class cabins are increasingly incorporating the 'hotel in the sky' model – think private rooms, gourmet meals and formal, whitegloved service. Etihad's Residence has Savoy-trained butlers, while Singapore Suites staff provide the ultimate in personal care, with a turndown service. With such affluent offerings at the front of the aircraft, we are seeing a constant trickle-down effect into business class, and it is fair to say that the lines between the two classes are increasingly blurred.

As the most lucrative cabin for airlines, business class is an increasingly competitive sector, and the gap between it and first class is closing. Airlines wanting to create a truly first class experience now have to push the bar higher and higher to achieve this, and with each step taken, business is only one behind. Indeed the latest business class trend is the creation of suites.

According to a 2015 Investopedia study, business class accounts for as much as 75% of an airline's profits. Being the biggest source of revenue, there is only so far airlines will reduce the seat count in business cabins. Unlike first class suites - for example Etihad's A380 with nine private apartments and Singapore's with 12 – a typical business class will accommodate as many as 40 passengers. Almost every cabin flying already has direct aisle access - or it won't be long before they do. Lie-flat beds are the norm, and the menus are comparable to any Michelin-starred restaurant. So what's the next step?

Of course, suites have been around in first class for several years now, but in business class, innovation is led by different factors. Premium seats are ordered in far lower volumes than economy seats, and their manufacturing lines are capable of more customization.

Premium cabins have conflicting requirements: the need to provide plenty of space and ever more superior features,



without compromising on an acceptable passenger count.

This has resulted in the emergence of amazing new innovations, to ensure maximized passenger numbers alongside maximized features. Being under more commercial pressure has driven design in exciting directions with more adroit techniques. The concept of seats such as Thompson's Vantage XL, or Recaro's CL6710, with the bed extending out beneath the seat in front, has revolutionized cabin design, and these are prime examples of the ways in which designers must explore how to increase real estate in an ideally higher-density cabin, ideally with aisle access from every seat.

"AN ENCLOSED SPACE CAN OPEN UP VAST OPPORTUNITIES TO ENHANCE THE 'HOSPITALITY' EXPERIENCE"



CLASS DIVIDE

The real difference between business and first is that first class has no need to prove itself. First class travel is more casual and less demanding, as between the few passengers there are at the front, nobody has to wait around for anything. A first class traveler has not just arrived; they are already ahead of everyone else.



1. SLIDING DOORS ARE A SPACE-EFFICIENT WAY TO CREATE A DIFFERENTIATED EXPERIENCE

2. THE GREATEST BENEFIT OF THE DOOR IS FELT DURING SLEEP, WHEN PASSENGERS REALLY VALUE PRIVACY

First class is here to stay, but the truly interesting possibilities lie in the future of business class.

Business class is an expanding market and cabins are stretching further – to the dismay of economy passengers, whose space is creepingly encroached upon. The challenge now is to provide a sense of exclusivity and personal space among a large number of demanding travelers, with ever more ambitious and modern expectations.

Business class passengers require more than just a seat: by creating a suite you can provide a new level of privacy. There is the opportunity to add furniture a side table, a footrest, hooks and pockets to store belongings. Sliding doors mean little invasion on real estate and a way to

completely relax without any outside distractions, but without being so enclosed as to induce claustrophobia.

class suite for

letBlue's Mint

service

Although business does not experience the mad bustle of economy class, 40 is still a large number of people to share a confined space, and the goal of having suites is to reduce that stress a little more – to give passengers their own hotel room in the sky.

Within the suite, an enclosed space can open up vast opportunities to enhance the 'hospitality' experience. Mood lighting can be adjusted to each individual's taste. Wireless headphones mean complete cut-off from any hubbub outside, and consoles and screens can be added for IFE or gaming. Going further, Qantas recently experimented with Samsung



Gear virtual reality headsets, for first class on select routes.

The amount of furniture specified for each suite does carry the question of weight, but as seats are getting lighter, corners can be cut elsewhere. There is ample space now for passengers to set up home in their 'room' with their belongings about them and get stuck into a movie or book, the same as they would in the comfort of their own living room. Subject to passenger pressure, the realization has been born that if something is available on the ground, it can be available in the sky.

DELTA'S SUITE DEAL

The August announcement of Delta's new all-suite business class cabin confirmed beyond doubt that suites are the new benchmark in business class. The Delta cabins, created in parnership with Factorydesign and Thompson Aero Seating, are set to launch across the

"AN ALL-SUITE CABIN IS A BOLD STEP IN REDEFINING BUSINESS CLASS TRAVEL"

airline's A350 fleet by September 2017. Since news of the launch broke, the story has been covered widely across the media, and it has been incredibly well received by the public and industry alike.

To introduce an all-suite business class cabin is a bold step in redefining business class travel, and one that has created a huge buzz. Such a concept would have been unthinkable even five years ago, and is testament to the intriguing possibilities ahead.

Every aspect of the seat was customized, from the bespoke lighting

3. THE DIVIDING SCREEN IN THE CENTER SUITES CAN BE SLID FORWARD TO CREATE A MORE SHARED EXPERIENCE

to the contemporary trim and finish, to give a comfortable, residential feel – all the while staying true to the Delta brand. Delta's chief marketing officer, Tim Mapes, states that the objective was to create something "as close to a private jet experience as possible" and was "driven by our customers", highlighting the increasing demand for true luxury hospitality on board.

The production process of such a groundbreaking seat involves a huge amount of collaboration between designer, supplier and airline, and demonstrates the importance of research into an ever-changing market. Mapes explains the heavily consumerled design approach, based on business travelers' non-negotiable requirements: "Comfort and privacy are important to business travelers, and that's exactly what they'll get with the Delta One suite."

Mapes's comments highlight the importance of in-depth research when devising such a premium product, and are a perfect illustration of the ideal design ethos: to listen to what your customers want, then give them exactly that.

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Dreams realised

We're redefining the passenger experience. Our mission is to understand your customers, their local culture, their territory and to take it to the world.

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BIG IDEAS

For Acumen Design Associates, there is tremendous collateral value to be gained from big ideas. This is especially true of its innovative new business class layout

ne can be struck by inspiration in unexpected places. For lan Dryburgh, founder and CEO of Acumen Design Associates, a train journey home after a long week in the office offered the opportunity to pick up a pen and start sketching some ideas. As he enjoyed a gin and tonic and put some thoughts to paper, Dryburgh wondered if it would be possible to combine in-line and angled seats to create a layout that provided aisle access for every business class passenger but still matched the seat count of traditional business class 'step over' layouts. This sketch ultimately led to one of the largest orders of business class seating in recent history.

Dryburgh's initial line drawing was worked on over many months by the design team at Acumen, a group of designers who have been together for many years, some for decades. Combining experience of design innovation with a deep knowledge of aviation certification, the team honed the initial sketch into something both unique and commercially viable: a design that delivered an uncompromised passenger experience in terms of privacy and comfort, while retaining a competitive cabin density.

The next step was unusual. Such was Acumen's confidence in the cabin layout and seat design that the studio decided to apply for worldwide patent protection. Subsequently a version of Acumen's cabin layout and seat design became the basis for United Airlines' new Polaris business class offering. The design is extremely flexible, which appealed to United Airlines as it will be deploying the business class cabin layout and seat design across its B777, B787, B767 and A350 aircraft to deliver a consistent brand experience over the entire fleet. Acumen has since granted a worldwide sales and marketing license to a major seat vendor to secure airline orders outside North America.

HISTORY OF INNOVATION

Innovations in airline seat and cabin design are becoming increasingly rare









patent ref: WO 2008/122761 A1



due to a proliferation of seating patterns being patented over the past few years. Rarer still are designs that offer a vastly improved customer experience without compromise to commercial revenues. In a market where the user experience is a key driver for customer loyalty and brand differentiation, innovation has a hugely important part to play in generating revenues, not just for weeks or months (as is the case with price promotions) but for decades. How do airlines go about finding













patent ref: WO2014155

the key innovations that will improve passenger loyalty?

In Acumen's case, the story began in 1996 when the company was commissioned by British Airways (BA) to design a new first class product. Taking inspiration from the chevron parking spaces found in France, the design team at Acumen invented the iconic 'Bed in the Sky' first class 'herringbone' cabin layout for the airline, which became the world's first full-flat bed on a commercial aircraft.

Acumen

devised the

world's first

"HOW DO AIRLINES GO ABOUT FINDING THE KEY INNOVATIONS THAT WILL IMPROVE LOYALT







patent ref: WO2014155354 (pending)









patent ref: EP2783984 A1 (pending)

BA's flat bed marked a new beginning for the aviation industry. Believing in the power of Acumen's design, BA reduced the number of seats in first class to accommodate the flat bed layout. However, this loss in density was more than compensated for by the unprecedented demand to fly in the new cabin. Such was the popularity of the product that occupancy rates in the cabin were 100% and sold out for months in advance, creating a halo effect that also

generated increased sales in business class. Remarkably, even though 20 years have passed since its launch, the herringbone cabin layout that the BA Bed in the Sky was based on remains the most popular lay-flat configuration in the sky today.

1. ACUMEN HAS REGISTERED MANY

PATENTS, INCLUDING MORE THAN

15 FOR THE AVIATION INDUSTRY

2. ACUMEN HAS MADE A HUGE

COMMITMENT TO PATENT THIS SEATING LAYOUT, WHICH IS BEING

USED BY UNITED FOR ITS NEW

Acumen is one of the few innovation companies to consistently create new intellectual property in the crowded aircraft interiors market. The company has been responsible for more than 15

aviation patents, many of which have significantly shaped the industry. They include an inboard-facing herringbone cabin layout; a best-selling first class platform seat; the first single-aisle layout on a wide-body aircraft; the first three room, super VIP experience in commercial aviation; and the first lie flat seat to swivel. The innovation is always driven by the same criteria: improving the customer journey experience while enhancing commercial viability.





An in-depth study of Etihad's remarkable cabins can be found on our website



3. AS PART OF THE ETIHAD DESIGN CONSORTIUM, ACUMEN DESIGNED THE WELL-RECEIVED FIRST APARTMENTS FOR THE A380

4. THE ACUMEN TEAM TAKING SOME WELL-EARNED TIME OFF TO RECHARGE THEIR CREATIVE ENERGY

Over the past three years the company "THE COMPANY'S has reimagined passenger experiences across the entire aircraft, from nose to tail. Acumen has also won 12 international design awards in just two years, including victories in the Crystal Cabin Awards two years running. As part of the Etihad Design Consortium, Acumen created the seating for Etihad's The Residence, First Apartments, Business Studios and Economy products. Additionally the company has invested in new concepts that have helped to shape the latest developments in economy class.

POSITIVE CULTURE

This experience and expertise goes a long way to explaining the confidence that the Acumen team had in its business class layout, developed from Ian Dryburgh's original concept sketches. In addition to regular commissions from the likes of Etihad, Air France, Air Canada, Delta and United Airlines, Acumen increasingly dedicates time to its own patented seat designs and cabin layouts for commercial use. This approach has already paid dividends in the life sciences and FMCG sectors, where the company has invested in marketing and manufacturing facilities and has reimagined products as diverse as kitchen towels and medical equipment. **RECORD OF** PROTECTABLE INNOVATION IS DRIVEN BY ITS INTERNAL CULTURE"

In a similar vein to the original herringbone design, Acumen's business class product has the potential to deliver market leadership across the sector for decades. In choosing to patent the innovation and license, the company shows that it is comfortable in taking a more strategic and speculative approach, demonstrating that its close-knit team recognizes the true value of innovation.

Anthony Harcup, associate director at Acumen, believes that the company's record of protectable innovation is driven by its internal culture. "Many of the team at Acumen have been working together for decades," he says. "It feels more like a family at times than a workplace. The ethos of innovation is driven throughout the company, and the experience in the aviation sector has been built up and

retained over many years. The focus is on innovation that delivers – combining original thinking and creativity with commercial viability."

Modern airlines face a stark choice: compete on brand or compete on price. For the traditional airlines that offer both national and international destinations, the challenge is to compete with leaner and more agile companies such as the low-cost operators, while offering a superior service and experience to the lucrative premium market.

With brand success being increasingly driven by a superior passenger experience, airlines are really competing in the cabin environment. Design innovation can help airlines to differentiate their proposition, offering an authentic experience to passengers that they identify with.

Just as BA discovered in 1996. differentiation by design can help create an experience that has practical benefit and tangible meaning beyond the aesthetic. Differentiation, patent protection and long-term customer loyalty are rooted in this approach. 🔊

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BEFORE ACUMEN, AIRCRAFT SEATING WAS JUST SEATING.



WWW.ACUMEN-DA.COM

CONNECTED IN THE AIR

How new technologies could make life on board as seamlessly connected as life on the ground

n the near future, JPA Design believes, passengers can expect a good deal more when they fly. In what could be a quantum leap forward, merging and emerging technologies are set to make air travel more personalized, more interactive, more multisensory, with more choice and greater control for passengers, even over factors such as their immediate environment.

But can even the most connected cabin really keep up with the pace of development on terra firma?

JPA design director Tim Manson's aim is to make onboard technology every bit as connected, smart, dynamic and entertaining as we expect it to be in the rest of our lives.

"What we find exciting is the prospect of new technologies coming together, capable of creating new experiences, with unprecedented levels of personalization on board," he comments.

"Imagine passengers being able to individualize their seat space through lighting, sound and even smell; enjoy breakthrough initiatives in sleep and wellness; and engage with IFE that's more immersive and more interactive than ever before," adds JPA managing director, Ben Orson. "Imagine IFE being much more of an integrated experience."

Key to personalizing a range of experiences for future passengers will be data gathering. Work already being undertaken by IBM and Twitter, alongside innovations from Lufthansa and Air France-KLM, shows how automated





information can help airlines understand better what they're doing for their customers, and provide more nuanced responses to their preferences.

BUT WHAT OF THOSE

ONBOARD INNOVATIONS? Several emerging technologies – involving scent, color, temperature control and air filtering – can be used to enhance the immediate environment in and around a passenger's seat. Aroma specialists are working with the airline industry on the proactive use of scents on board. Could scents be used to aid better sleep, relieve stress and promote well-being? Could scent blockers prevent a sleeping passenger being woken by food smells?

Chromotherapy, the use of colors to create mood, is another emerging specialism. Specific colors are thought to have specific effects on the mind: for example blue/purple for relaxation, and

"TECHNOLOGIES CAN MAKE AIR TRAVEL MORE PERSONALIZED, MORE INTERACTIVE, MORE MULTISENSORY"

1. JPA DESIGNED THIS CONCEPT INTERIOR WITH DIRECTIONAL SOUND, IMMERSIVE ENTERTAINMENT AND BRAND AROMA TECHNOLOGIES

2. JPA'S CONCEPT INTERIOR WITH HEALTHIER CABIN AIR, CHROMO THERAPY, PERSONALIZED SECURE STORAGE AND LOCALIZED TEMPERATURE CONTROL

Technologies could improve every sensory element of the flight experience

red/orange for energy. Light therapy specialists believe this approach can be personally tailored for the best individual response from each passenger. In fact, JPA has already implemented colored lighting enhancements in its recent cabin redesigns for Air China, Singapore Airlines and American.

Good air quality is widely considered to be one of the key factors in combating jetlag, so it's good news that new airfiltering technology is emerging. Whereas in the automotive industry air can be filtered having entered the cabin through the vents, on an aircraft a different system is needed.

For example, a patented bioconversion technology was created by NASA in order to clean the air on the International Space Station.

"Although this isn't yet available on commercial aircraft," Manson acknowledges, "we believe the benefits could be very significant." The system works by drawing in the surrounding air, and forcing it through a reaction chamber where oxidation breaks down and destroys 100% of the pathogens at a molecular level. It then expels the clean, pure, healthier air back into the space or toward the passenger.

WHAT OTHER INNOVATIONS ARE COMING OVER THE HORIZON?

Near-field communication (NFC) is expected to be a standard feature in smart devices in all of our lives within five years. The same technology that allows users to pair a cell phone with their car by simply tapping it on the windscreen could be used for frequent flyers to 'log in' to their seat – such that it 'remembers' previous seating, dining and movie choices, for example.

NFC could also be used for ancillary revenue streams, by offering a digital account with the airline or simply a contactless payment system for onboard shopping or an inflight movie.

And, of course, IFE remains a key player. How will emerging technologies perform here?

JPA's belief is that the next generation of IFE will be about delivering much better

The Singapore Airlines business class seat design led to an increase in IFE satisfaction

> 3. THE JPA DESIGN TEAM HEAVILY CUSTOMIZED A SEATING PLATFORM TO CREATE SINGAPORE AIRLINES' PREMIUM ECONOMY PRODUCT

4. THE SEATBACK AND LITERATURE POCKET ON SINGAPORE AIRLINES' PREMIUM ECONOMY SEAT WERE REDESIGNED TO INCORPORATE A 13.3IN HD MONITOR AND TO ALLOW FOR EXTRA STOWAGE

the same time offering new approaches and experiences no one has seen before.

"Look at developments in onboard audio," comments Nick Goodwill, JPA's senior transport designer. "While noise cancellation, spatial and surround sound are becoming more sophisticated, directional sound technology could remove the need for headphones altogether. This provides passengers with a triple benefit: headphones can be uncomfortable over long periods, and DST promises not only more comfort but the added bonuses of a better all-round audio experience, while also enabling the crew to communicate more easily with passengers."

Virtual and augmented reality, although still in their infancy, will without question be among the transformative technologies in media and entertainment in coming years. And the immersive, multi-sensory experience that technology promises will undoubtedly be a key component of future IFE systems.

But of all the emerging technologies, surely none could be as game-changing as graphene. A million times thinner than a human hair, yet 200 times stronger than steel, and the most conductive material on Earth, graphene's potential seems limitless. In aviation, an industry where space and weight are at a premium, it could be used to make ultra-thin structures for seating and table mechanisms, and electronics.

versions of what's already on offer - but at "WHAT MATTERS IS THE PACKAGE OF TRANSFORMATIVE **TECHNOLOGY AND INSPIRED DESIGN**"

> Graphene is transparent: imagine, for example, ultra-thin IFE screens that almost disappear when not in use.

GOOD DESIGN IS CRUCIAL

Manson makes the point that while new technology is constantly emerging, "great design and a quality experience is a constant, and has to complement it".

Attention to detail, choices of materials, simply making spaces beautiful - and universally so for passengers from a wide range of cultures - can have an astounding effect on passenger opinion.

"With the Singapore Airlines business class seat, there was a notable increase in customer satisfaction on IFE despite the content being unchanged," says Manson. "It seems the new business class cabin environment and seat provided a halo effect. It shows that what really matters is the total package of transformative technology and inspired design."

JPA is passionate about how technology is accelerating forward to provide a new level of passenger experience. About

better performance of existing onboard benefits; new, previously unimagined things for passengers to enjoy; better data helping airlines personalize their offerings. And, crucially, about design - the one magic ingredient that goes beyond even the most exciting new technology.

DESIGN PULLS IT ALL TOGETHER

In the past year, JPA has seen the launch of its design for Singapore Airlines' very first premium economy cabin.

The studio has also been appointed to design all-new economy and business class cabin interiors for Garuda Indonesia's fleet of 50 737 Max aircraft, and retrofits for its Airbus A330-300s.

In other work, the studio has created the new restaurant at ilLido At The Cliff for the Sofitel Singapore Sentosa hotel and designed sumptuous interiors for Belmond's Grand Hibernian Orient-Express-style luxury trains. Ireland's first luxury sleeper train.

From planes to trains to hotels, JPA has always been intent on creating a special experience for clients' customers. A wave of emerging technologies looks set to put a range of new tools at their fingertips.

Moving into the future, the results for airlines and passengers could be very dramatic indeed. 📎

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JPA DESIGN



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JPA DESIGN FOR SINGAPORE AIRLINES SKYTRAX BEST BUSINESS CLASS WINNER 2016, 2015, 2014, 2011, 2010, 2008, 2007 jpadesign.com

WELCOME HOME

Three Door 2 concepts have been created that find freedom within the constraints of the aircraft and offer real benefits for the passenger experience

t is perhaps because of its constraints that an aircraft cabin is such a fascinating canvas for an industrial designer. Everyone has the same starting point, and the uses of the space are restricted due to the very nature of an aircraft. Added to this is the necessary functionality of items such as galleys, stowages and seating. To create differentiation for an airline is, therefore, a huge but exciting challenge for a designer.

Unusually, the design team at AIM Altitude was this year given a free brief to create concept schemes for the Door 2 entrance area of a generic wide-bodied aircraft, which could represent an A330 or B777, to name just two aircraft types. This was a rare opportunity for the team to show the true versatility of the aircraft cabin. It would also enable them to demonstrate just how important the entrance to the aircraft can be in terms of impact, brand reinforcement and cabin ambience.

The design team at AIM Altitude created three different designs, each one building on the last, and growing the concept in terms of imagination and ambition. This led to the creation of three styles – Classic, Space and Social.

CLASSIC

The Classic scheme is reminiscent of many Door 2 designs, with two galleys facing each other. This traditional configuration makes it a critical area for passenger and crew alike, thanks to its dual purpose as both greeting area and functional zone.





The challenge here was to make this operational area welcoming and aesthetically pleasing.

The design team at AIM Altitude upgraded the galleys to give them a contemporary feel. With the area being multi-use, features such as decorative roller blinds help to conceal operational items. Eye-catching lighting canopies and effective wash lighting enhance the impact of the area. As this space has high levels of crew traffic, it is often not ideal for passengers to be milling around the functional areas. To solve this problem, the passengerengaging endcaps have been moved into the aisles. This creates two outboard zones, which are more welcoming to passengers during the flight. Interactive screens have been included to show boarding details, flight information and duty-free offers. These screens can be

"THIS WAS A RARE OPPORTUNITY TO SHOW THE TRUE VERSATILITY OF THE AIRCRAFT CABIN"

The entrance is important in terms of impact, brand and ambience



adapted to be appropriate for boarding, disembarking and inflight messages.

In keeping with recent moves by many airlines to offer self-service areas, complimentary snacks and magazines can also be easily accessed by customers without encroaching on crew areas.

The environment has been designed to be synchronized with adaptive mood lighting to flow with the journey of the flight and enhance passenger well-being.

SPACE

Growing the concept, the Space scheme opens up the Door 2 area to offer clean, open sightlines. This is achieved using a forward-facing galley and half-height unit.

As an entry space, the area allows passengers to board in style. The creative thinking behind the scheme by the AIM Altitude design team revolved around the idea of it being dynamic, multifunctional and immersive.



1. THE SOCIAL ENTRYWAY CONCEPT REPLACES THE GALLEY WITH A DEDICATED SOCIAL SPACE

2. THIS CONCEPT BAR AND GALLEY CONFIGURATION FEATURED A 'BRIDGE'

3. THE CENTRAL FLOWING CANOPY MAKES THE SOCIAL CONCEPT A REAL STATEMENT PIECE OF CABIN DESIGN

AIM Altitude is keen to offer a growing level of flexibility to cabin designs. With this in mind, a partition system has been designed to adapt the forward-facing halfheight trolley monument throughout the journey, depending upon whether passengers are boarding, dining or sleeping. With a partition down, the space is open and welcoming for boarding. In flight, this space offers an open, airy feeling. During sleep phases or when food is being prepared, the partition can be raised to enclose the area. The partition incorporates a curved OLED screen and, to the rear, a modern and fresh galley unit that includes attractive trolley and meal box doors. Aisle modules have also been incorporated to include destination features for passengers.

Once again, lighting is vital in helping to achieve the mood and feel of the area. Dramatic flooring and ceiling lighting help to focus passenger interest, while mood lighting can be implemented to create a more calming or refreshing effect.

SOCIAL

The Social entry space takes the design concept to a new level, doing away with the galleys altogether and moving them to

AIM Altitude can demonstrate these concepts and more, using virtual reality



4. THE SPACE CONCEPT OFFERS CLEAN, OPEN SIGHTLINES BY USING A FORWARD-FACING GALLEY AND HALF-HEIGHT UNIT

5. ELEMENTS OF THE HAMBURG CONCEPT ARE NOW IN PRODUCTION

interest for particular airlines. At the 2014 Aircraft Interiors Expo in Hamburg, AIM Altitude exhibited a concept bar and galley configuration which featured a 'bridge'. Elements of this concept have since been incorporated into a client's design, which is currently being manufactured at AIM Altitude's new facility in Bournemouth, UK.

The three concept designs – Classic, Space and Social – were demonstrated using virtual reality at this year's expo in Hamburg, and again, an airline has shown interest in certain aspects of the design and is keen to pursue the idea of making the whole Door 2 area adaptable, with progressive features.

FREEDOM

Throughout this process, AIM Altitude was able to show real freedom of design, despite the constraints of the aircraft itself. The schemes offer a new perspective and show that the designs are scalable, depending upon the desires and budget of the airline. While this was an exercise in design alone, each of the schemes is entirely feasible under aircraft constraints and because of the airline's willingness to explore new avenues of possibility. ©

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the rear of the aircraft. Offering a new perspective on the Door 2 zone, the scheme creates a relaxing, social experience that would be used as a zone in which to unwind and socialize, rather than as a functional crew area.

Two bespoke seating units create a welcome space for a 'super' business class environment. The design team worked to promote the ideas of continuation, comfort and sophistication.

Intended as a vision of the future, the Social design incorporates a central flowing canopy as an iconic statement piece. The low-level sofas are cantilevered from the canopy, really opening up the sightlines and delivering feelings of floating and movement.

Smaller break-out zones have been created on the left- and right-hand sides of the main area. The outboard zones offer passengers a slightly more secluded and



"AN AIRLINE IS KEEN TO PURSUE THE IDEA OF MAKING THE DOOR 2 AREA ADAPTABLE, WITH PROGRESSIVE FEATURES"

> personal setting. To the left there are individual lower-level seating options for smaller groups. To the right, there are two café-style table areas, which provide the opportunity to stretch legs and circulate during a flight.

Striking lighting adds drama to the area, highlighting the fluidity of the design. The concept works with a thoughtful blend of hard and soft materials, including wood and leather. These, along with strong color contrasts, create a tactile and visually pleasing environment.

REALITY

While the three schemes were a conceptual exercise, such designs are often the beginning of a new reality for some airlines. Previous design concepts created by AIM Altitude have led to great

6. THE CLASSIC SCHEME TAKES A TYPICAL DOOR 2 GALLEY ARRANGEMENT AND MAKES IT MORE APPEALING





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PERFECT FINNISH

A studio in Helsinki has developed a design principle intended to enhance the feel of spaces. The concept has been successfully applied in the design of Finnair's entire passenger experience

n autumn 2015, Finnair became the first European airline to take delivery of the Airbus A350 XWB, with award-winning interiors designed by dSign Vertti Kivi.

"It was clear to us from the very beginning that we wanted to bring unique and fresh Nordic experiences to intercontinental travelers in a calming and peaceful environment that promotes wellbeing," says head of design Vertti Kivi of dSign Vertti Kivi.

Sticking to this idea throughout the long design process was the right decision, as evidenced by the positive customer feedback for the A350 and the fact that the design won the prestigious International Yacht and Aviation Award 2015. The interior was recognized for excellence in design and passenger comfort in the economy and business classes, with key factors in the selection of the A350 cabin interior being its fresh Nordic design, highquality materials and creative use of the aircraft's dynamic LED lighting system.

Ordering 19 A350 aircraft represented an enormous investment for the airline. Finnair wanted to create a consistent, modern look that sets it apart from other airlines through its quality, freshness and changing cabin moods. They wanted to offer the customer a cohesive experience.

The creation of a consistent customer experience was helped by Finnair appointing dSign Vertti Kivi to create the interior design of the aircraft, as well as its lounge areas at Helsinki Airport in Finland.





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

COMFORTABLE, WITH THE LIGHTING CREATING DIFFERENT MOODS 2. THE FEEL OF THE PASSENGER

LIVING SPACE ADAPTS TO AND COMPLEMENTS THE VIEW OUTSIDE

1. THE ECONOMY CABIN IS CALM AND







"We were lucky to have a customer like Finnair, which understands that interior design is an integral part of a company's image. It plays an extremely important part in streamlining the interface with customers," says Kivi.

FROM CRUISE SHIPS TO HOTELS TO A350S

dSign Vertti Kivi may be a new name in the arena of aircraft interior design, but the studio's talents have been proved and tested many times in cruise ship and hotel design, with one of the most recent projects being the highly praised Hilton Tallinn Park in Estonia.

3. THE ZODIAC CIRRUS BUSINESS CLASS SEATS HAVE BEEN FULLY CUSTOMIZED FOR FINNAIR

4. THE SPACE ALIVE LIGHTING CONCEPT CAN CREATE ANYTHING FROM A WARM MOOD FOR THE FAR EAST, TO A CLEAR BLUE NORDIC SKY 5. THE CABIN MAY LOOK ICE COOL WHEN APPROACHING HELSINKI, BUT PASSENGERS ARE ASSURED OF A WARM RECEPTION

6. THE REFLECTIVE SURFACES IN FINNAIR'S LOUNGE AREAS ENHANCE THE CAPABILITIES OF THE INNOVATIVE LIGHTING SYSTEMS

7. THE SEATING AREAS IN THE LOUNGES RELAX PASSENGERS BEFORE THEIR FLIGHT

"LIGHTING AND PHYSICAL ELEMENTS CAN BE TRANSFORMED USING REMOTE CONTROL"

The company is known for challenging the norm when looking to create new customer experiences. For example, the 'sea breaking' interior design for the M/S Viking Grace cruiseferry was awarded the prestigious Shippax Prize in 2012. The company is currently working on the 212m-long Tallink Megastar shuttle ferry, which will start operating on the Tallinn-Helsinki route in 2017 with capacity to transport 2,800 passengers.





SPACE ALIVE

Key factors in the Finnair cabins and lounges are fresh Nordic design and use of the studio's Space Alive concept. 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

In the Finnair lounge areas the concept of changeable spaces is used to create dynamic, living and peaceful spaces in continuity with the customer experience on board the aircraft. The mood, colors, lighting and wall patterns change according to time of day and season, and to complement the view through the panoramic windows.



The bright and spacious cabin interior of the A350 aircraft has numerous carefully considered design details and an innovative business class seating layout. Changes in atmosphere are achieved through the creative use of the aircraft's dynamic LED lighting system, with moods changing as the flight progresses. The ambient lighting can be programmed to gradually recall 24 different skyscapes as the flight progresses, such as sunrise or sunset and various cloud formations, which eases customers on long-haul flights into new time zones, destinations and seasons.

For example, when approaching the Far East from Finland, the cabin is flooded with warm sunset tones, and when arriving in the Nordic countries the surfaces are lit with the colors of the Scandinavian sky: from the Northern Lights to a clear blue sky.

The Space Alive concept is also enlivening the customer experience on the M/S Viking Grace and several hotel interiors created by dSign Vertti Kivi.

"Lighting design is always an integral part of our design process. Bad lighting can kill even the nicest interior, and no interior is nice in bad lighting," Kivi says. @

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TURN OFF, TUNE IN

Switching off airplane mode can have great benefits for the economics and the experience of commercial air travel

cross a century of commercial aviation, climbing aboard an airplane has meant cutting yourself off from the ground. Once this meant no telegrams or calls; more recently it has meant no emails or tweets. A ritual of modern air travel is when everyone hastily turns on their phone the moment they land and catches up with the latest in a cabin concerto of beeps and jingles.

Flying has been one of the rare situations in the modern world when people really are out of contact, with passengers in 'airplane mode' until the pilot touches down and says they can switch their lives back on again.

But no more. Inflight wi-fi is changing everything. Now available on many commercial routes, speeds are getting much faster and some airlines claim customers can already update their Facebook status, shop online, stream movies, or conduct a virtual business meeting at 35,000ft.

"The digital transformation is set to inspire a revolution in air passenger experience," says Tangerine CEO Martin Darbyshire. "But it is also a change that airlines know has the potential to make or break their businesses."

Within a matter of years, customers will simply demand the same level of connectivity they have on the ground when in the air, and those companies whose digital offer falls below expectations will be lucky to survive.



International design consultancy Tangerine has worked extensively with airlines around the world, including Virgin Australia, Cathay Pacific, Asiana, Azul and British Airways. The studio's revolutionary lie-flat business class bed for BA is credited with turning around the airline's fortunes and redefining the market.

Tangerine has also helped many carriers use a strategic design approach to transform the customer experience and strengthen their brands.

The studio has recently been working with IFE provider Thales and seating

manufacturer B/E Aerospace to reimagine the economy class passenger experience, through a project called Digital Sky.

Instead of the standard landscape screen, customers will interact with a large portrait digital seatback display that enables passengers to shop, play, listen, explore and watch simultaneously, using a split-screen feature.

"Airlines should be looking to create joined-up services and experiences that add value throughout the passenger journey, from online flight booking, checking in with an app, the onboard

"CONSUMERS RESPOND TO A COHERENT OFFER THAT HAS A CLEAR MESSAGE"

experience and activities that passengers can engage in, right through to a customer's arrival at their destination," Darbyshire explains.

WHICH WAY NOW?

There are many in the aviation industry who believe inflight connectivity could generate valuable revenue and deepen customer relationships. Tangerine argues that new technology should not be viewed as an add-on to the existing customer experience, but as being central to the business strategy.



"I think there are two really fundamental questions for the airline industry. Where do you want your business to get to? And how will you deal with the fact that the world is changing?" says Darbyshire.

Digital technology presents an existential challenge for many airlines, Darbyshire believes, but his two questions are deliberately put in that order.

"It's got to start from strategy because it is vital the business knows where it wants to get to before it can define what customer experience it should offer," Darbyshire says. "Does an airline want to have a reputation for the best price or the best service? You must answer that kind of question before you consider the inflight digital services."

For decades, Tangerine has been helping businesses in a range of sectors to identify the right personality for their brand and shape a strategy to drive that vision.

"We have developed a series of workshops that help companies understand how they see their core values or positioning, and how potential customers view them," says Tangerine's chief creative officer, Matt Round.

Managers are invited to think of their business in a different way. If your brand

The Digital Sky and Virgin Australia designs were Crystal Cabin Award 2016 finalists

> 1. GETTING INTO SWITCH-OFF MODE WITH VIRGIN AUSTRALIA'S NEW BUSINESS CLASS BAR AND LOUNGE

2. THALES AND B/E AEROSPACE'S DIGITAL SKY CONCEPT, EXPLORING THE FUTURE OF IFE

3. A TANGERINE WORKSHOP TO HELP COMPANIES TO REPOSITION THEIR BRANDS

were a film star, which star would you want it to be? Is it George Clooney or Russell Crowe? A car? Volvo or Ferrari? A dog? Labrador or terrier?

"You can't be a Volvo and a Ferrari at the same time," Round argues. "Consumers respond to a coherent offer that has a clear message underpinned by clear values. What we do is combine intensive management workshops with extensive consumer insight to improve the relationship between companies and their customers."

With the recently completed design of Cathay Pacific's long-haul cabins, for instance, Tangerine looked to capture the magic and 'wow' of Hong Kong in designing interiors for its new long-haul fleet – setting a creative direction that extended the airline's brand expression and brought innovation to economy class travel.

"We looked closely at all the touchpoints that really impact on a customer's experience and created a proprietary six-way headrest design especially for Cathay Pacific's economy seating," says Darbyshire. "It is not innovation for innovation's sake, though. We were thinking strategically to enhance Cathay's values and really improve the customer experience in a global context."



"THE FUTURE IS GOING TO BE ABOUT PERSONALIZATION – BUILDING CUSTOMER LOYALTY"

Tangerine believes digital technology is changing the rules of the game for all retailers and service providers, not least because of omnichannel capability.

"Omnichannel is the future," Darbyshire believes. "Everything will be linked – from the back office, to the warehouse, the store, the app, the loyalty card and, of course, the sale. Businesses must adapt to this new interconnectivity because the live data that emerges will guide them to greater profitability."

Omnichannel thinking lay behind Tangerine's recent project with the Innisfree cosmetics brand in South Korea. Part of the AmorePacific family, Innisfree wanted to become a global player, with ambitions to become a SPA brand, like Uniqlo, Zara and Muji. Key to that market is being able to respond very rapidly to changing consumer taste and demand, and having the infrastructure to respond flexibly to customer data on a daily or even hourly basis.

"Innisfree is putting in place a digital infrastructure that will allow it to achieve fast fashion retailing in the cosmetics sector – flexible shelving, digital displays and auto-dispensed fragrances with a wider product range will all provide valuable information and track consumer behavior."

What began as a request to help Innisfree redesign the interior of its flagship store in Seoul became an opportunity to develop a design strategy that will take the company to a new level. And Tangerine believes the same process will be repeated in the air.

"Airlines are already part of the way down the runway, with boarding cards on mobiles, texts to tell you the airplane is boarding, targeted upgrades and discounted shopping increasing sales and loyalty," says Darbyshire. "Taking that connectivity into the stratosphere opens up a whole new opportunity for building business and loyalty."

The risk is that, without a strategic vision, one element of customer engagement will undermine everything else. The offer needs to be seamless across every channel and that, Tangerine argues, means applying the same values across everything you do.

"The airline passenger experience is changing radically and the companies that successfully navigate the digital revolution

> 7. CATHAY PACIFIC'S UNIQUE PROPRIETARY DESIGNED SIX-WAY HEADREST



4. THE CATHAY PACIFIC ECONOMY CLASS SEAT BYOD BACKPACK

5. BRAND REPOSITIONING OF SKINCARE COMPANY INNISFREE THROUGH A NEW FLAGSHIP STORE

6. NEW CUSTOMER EXPERIENCES CREATE A UNIQUE RETAIL ENVIRONMENT FOR INNISFREE



"The 'experience' revolution won't translate to the bottom line unless companies get the basics right. Your strategy needs to be right and it needs to be clear. That then needs to translate into every aspect of your offer and behavior, from the seat reservation system on the app, to the smile of the stewardess when you arrive there."

The future, Tangerine suggests, is going to be about personalization – building customer loyalty by tailoring the experience to the individual. The winners of the digital revolution in the air will be those who can most effectively process the vast amount of data from the wired world to gain the clearest insight into their passengers.

"Consumer insight is the key to business success," Darbyshire says. "You need to understand your customer base but, increasingly, you need to know the customer. What people want above all is for an airline to treat them as an individual, not a passenger."

It is a simple button on your cell phone, but swiping out of 'airplane mode' is changing the economics and the experience of commercial air travel completely.

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"A tiny revolution"

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Colour, material and finish design for Cathay Pacific's new A350 cabin interiors and a game-changing economy class seat

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ON THE WATERFRONT

Formation Design Group discusses the development of the Waterfront seat and its design for flexibility from multiple perspectives

fter previous success with the Jazz economy seat concept, Formation Design Group once again worked for B/E Aerospace, in collaboration with Panasonic Avionics and Teague in 2014 to develop the Waterfront business class seat concept. Over the course of the 10-month program, Formation's designers and engineers grappled with bringing a new level of service, technology and integration to the concept's hard seating product, while Panasonic and Teague sought to redefine and unify the digital inflight experience for today's connected business traveler.

Alex Pozzi, B/E Aerospace's corporate VP of technology and seating development, brought the industry foresight and strategy acumen to the team with a design brief that called for features identified as key attributes to build into a nextgeneration Super Diamond seating concept, including further optimization of the seating/bed environment, brand adaptability, and a level of design and aesthetic that walks the line between business and first class. Panasonic brought the 24in 4K display and suite of device connectivity options to the program.

DESIGNED FOR IDENTITY

Formation sought to find opportunities for a paradigm shift in passenger experience and airline expression. Looking beyond an international hospitality aesthetic became a starting point for the conceptual





exploration. Boutique hotels that champion local products, cultural expression and bespoke experience are a growing market. Travelers yearn for uniqueness and authenticity, and to travel is to depart from the mundane. This trend is resonating in the air travel arena through recent moves to bring local culture and enterprise to the forefront of airline brand expression and marketing, from crew uniforms that harken back to traditional attire, to amenity kits that promote local brands, to meal service that represents the indigenous culinary pallet. Most importantly, these expressions are not static or established, but often change with the season or route. To introduce such expressions means to further enable and amplify this trend of carefully curated experiences and dynamic expression, and individuality became a core focus of the team's exploration.

The interplay between digital and physical elements of the seat environment was endemic to the design solution. The presence of the dynamic 24in 4K display warranted the need for the surrounding passenger environment to be equally

"A LEVEL OF AESTHETIC THAT WALKS THE LINE BETWEEN **BUSINESS AND FIRST CL**





1. THE DESIGN OF WATERFRONT APPEARING OVERLY COMPLICATED

SEAMLESSLY INTEGRATED INTO THE SEAT, AS ARE ITS FUNCTIONS

3. GENEROUS SIDE FURNITURE ALLOWS DEVICES TO BE PLACED TO

4 WHEN SLEEP IS REQUIRED THE SUITE BECOMES A LOW-TECH. COMFORTABLE AND PRIVATE SPACE

transformative, reactive and customizable. One of Formation's approaches to creating a truly immersive experience across the digital and physical environments was to introduce full-spectrum LED lighting that washed over nearly every surface of the suite. This lighting system was a custom in-house designed technology that enabled Panasonic's IFE and associated mobile devices to control and synchronize the color and intensity of the lighting with the position of the seat and content on the screen. The system also interacts with numerous modular texture panels, which

can be easily customized by the airline for more dramatic thematic changes.

The system enabled what the team referred to as "passenger modes". These modes coordinated passenger activity with IFE interface and content, seat position and lighting scheme, thus providing airlines with the ability to create transformative environments and experiences based on the stage of flight, destination or service, without the need to overhaul the hard product. Formation collaborated with Teague to harmonize their user interface with the suite lighting

and seat position to create a set of passenger modes centered around the business traveler: warm lighting and an upright position when in dining mode, dim and cool lighting for IFE content viewing in lounge mode, and bright, even lighting across work surfaces along with the ability to link to the IFE display in work mode.

While demonstrated with a predefined set of passenger modes, this flexibility for airlines to create and modify these immersive experiences became a key design solution for addressing the need for unique and evolving brand expressions.

Extensive mock-up trials informed the design of the Waterfront concept



DESIGNED FOR INTERACTION How a seat environment ties in with cabin service is often overlooked in the design process of a new seat. Formation pursued opportunities to enable and enhance new and unique service options through the hard product by designing them in from the ground up. Formation leveraged its past inflight research of over 28 business class products across 16 different airlines as a starting point. An extensive study of the interactions between passenger, flight attendant and hard product was then conducted to identify opportunities and obstructions in the improvement of the passenger experience, crew efficiency, and brand expression through service.

To conduct this study, a flexible mock-up with interchangeable modules and architecture was developed. This mock-up provided the Formation team with a means to simulate crew service and passenger activities, defining the key interaction zones between the crew, passenger, and proximate structures and features. The team synthesized a comprehensive representation of longhaul flight activities to look for design and service prospects waiting to be capitalized upon. Ergonomics, reach, line of sight, ingress and egress were carefully observed and photographed across 36 different scenarios comprising a long-haul flight.

The results of this study informed design decisions on every level. Notable features included the flip-down bar table placed between the passenger and the aisle that allowed for meal service without interruption of the IFE, and an aisle-facing customizable and dynamic OLED display for flight attendant alerts. Such features were emulated, evaluated and refined.

Careful observation of common interactions informed design decisions that helped reduce flight attendant reach, improve ergonomics, and reduce passenger interruption, such as the aislebiased secondary seat controls, tray

6 A SET OF COMMONPLACE FEATURES WERE REIMAGINED FOR IMPROVED USABILITY"

release buttons, and upper shell storage. The sketch nature of the mock-up was paramount in rapidly evaluating different alternatives for form, placement and mechanisms as they were fabricated in Formation's in-house prototype lab.

DESIGNED FOR

TRANSFORMATION Although the design of a seating environment is often centered on maximizing living space and comfort, Waterfront was also designed to address the transitions between the different roles that this space embodied. From transitioning from a work space to a private cinema, or from a dining area to a private bed suite, the actions of the passengers and crew were observed as part of the mock-up-based study.

The result was a set of commonplace features that were reimagined for improved usability and facilitation of passenger needs. The tray table was designed to be a single piece with translation mechanisms on both sides to provide a high-end, solid feel reminiscent of first class tables. The premium table was augmented with enhanced utility by adding a flip-down leaf on its leading edge and positioning it such that a TTL- 5. THE FORMATION TEAM BUILT A FLEXIBLE MOCK-UP OF WATERFRONT WITH INTERCHANGEABLE MODULES

6. ENTIRE LONG-HAUL FLIGHTS WERE SIMULATED IN THE MOCK-UP

compliant latched storage compartment was created below the IFE. A busy business traveler could take advantage of the time before take-off to use their laptop and quickly stow it by simply pushing it away to store it under the IFE. Careful placement of cable chases and passthroughs facilitates this action, as well as the transition of a laptop from tray table to side table upon the start of meal service.

The side table was optimized along with the positioning of the IFE. The pixel density of Panasonic's new display allowed the screen to be placed closer to the passenger without compromising fidelity, thereby opening up space to the side of the forward passenger to use as an auxiliary dining or work surface.

The B/E developed seat mechanism was able to transition to an extremely low bed height to provide additional footwell clearance, appropriate space for the tray table storage area, and the side table lowered to a functional height for working or dining.

DESIGNED FOR THE FUTURE

Waterfront ultimately is a showcase for innovative ways in which hard product can transform with specific airline needs. From aesthetic treatments to platforms for new service, Waterfront strives to enable airlines to reimagine the expression of their brand of passenger experience, and to evolve and transform that expression into the future.

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Formation Lie-Flat Cabin Concept



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BETTER BY DESIGN

Design Q directors Howard Guy and Gary Doy have some interesting experiences to share from their two decades of working in the aircraft interior design industry

y the time you read this, Design Q will be preparing to celebrate its 20th birthday. When the company was born in 1997, its directors were not new to design. Both Howard Guy and Gary Doy had spent the previous 10 years at Jaguar working on automotive design, and it was a scary step to leave the care of a large OEM and a comfortable industry to set up on their own.

"It has been a hell of a ride, with plenty of ups and downs, twists and turns, and good and bad moments. Late nights, air miles and launch shows. Times when we've learned a lot. Times when we've taught a lot," reminisces Guy.

Design Q has worked with some of the biggest names in the aviation industry and been involved in some of the most innovative moments in aerospace. Guy and Doy have loved it and are more than excited about the next 20 years.

HUMBLE BEGINNINGS

When they set up Design Q, the founders knew that to make it work they would need a lot of blood, sweat and tears, as well as a dose of good fortune.

Initially they stayed fairly close to what they knew, landing a big contract for a new Jensen car that was planned to be the rebirth of the brand. While that kept Design Q busy for the first 18 months, Jensen's financial difficulties resulted in late payment, and having to hold back the prototype.





EVERY CLOUD...

While a delay on the payment for the studio's very first project was not exactly welcomed, it ended up being a blessing in disguise. Design Q showcased the Jensen at the European Business Aviation Show in Dusseldorf, Germany, under the guidance of Adrian Wells from Trace Worldwide, which lead to the company's first aviation contract. It was a good move.

Guy and Doy took business cards from what seemed like everyone at the show, with a lot of important people purring over the Jensen, but it was one card in particular that stood out: David Longridge from Boeing, who at the time was BBJ's European sales director (now CEO of BBJ).

The board at Boeing invited Guy and Doy to London to showcase what they were capable of. Everyone present was very excited about some of the things proposed – a single private cabin with a fully flat bed, under-bed luggage stowage, a 32in IFE screen, a private personal bar and private door screens. Back in 1999, this truly was a world first, and even now

"WE WERE NEW TO AVIATION, AND CONSEQUENTLY WE WERE THINKING VERY DIFFERENTLY TO MOST DESIGNERS"

In 2000, Design Q secured a four-year contract as Virgin Atlantic's design house



would be an extraordinary proposal for commercial aviation.

"I think it was this 'out of the box' thinking that so impressed Boeing; we were new to aviation, and consequently we were thinking very differently to most designers at the time," says Guy.

A STANDING OVATION, STALLING AND BRANSON...

The job Boeing had earmarked for Design Q was a development of seven BBJs for one of its clients, and the studio won the



pitch. That day they truly felt like they had arrived in aviation.

Six months later, things were different, with Boeing's client turning out to be not what everyone initially thought. Eventually, Design Q had to take the difficult decision to pull the design, and at that point, they had to work out how to pay the rent.

Things were pretty desperate, and in the end, Guy made a bold move and contacted Virgin Atlantic (VAA) and requested a meeting with Richard Branson and Virgin's design director, Joe Ferry.

Just 24 hours later, Guy and Doy were invited to Virgin's HQ, and 24 hours after that Design Q was offered full funding for a new development and a four-year retainer to work exclusively for VAA.

WHAT COULD GO WRONG?

After 12 months of intense development, VAA's Upper Class Suite was born, with an array of new 'never seen before' features including the herringbone layout, large table and the remarkable flip-over seat that created the longest and flattest purpose-built bed in the air, as well as all the hidden stowages.

With Design Q's experience in building prototypes and full cars, VAA was keen for them to build a full-size B747 Zone B mock-up that would replicate exactly what 1. THE VIRGIN ATLANTIC UPPER CLASS SUITE WAS A LANDMARK DESIGN IN COMMERCIAL AVIATION

2. DESIGN Q'S PROPOSAL FOR A FIRST CLASS SUITE INTRIGUED BOEING

3. SADLY, FINANCIAL TROUBLES AT JENSEN MEANT THE STRIKING CV8 WASN'T A MAJOR SUCCESS

would be needed for production. It was their intention to present this model to suppliers and ask them to bid for the production manufacturing. Then 9/11 hit.

"The tragedy in New York made me realize just how vulnerable all industry is when something like this happens. Pretty much all aircraft programs were frozen, canceled or bankrupted, but thankfully for us, Sir Richard carried on with development, leading to a 2003 launch date," says Guy.

It was a smart move from Branson, giving the Upper Class Suite a minimum four-year advantage over the rivals that were left.

SPREADING THEIR WINGS

On the day their four-year exclusive contract with VAA ended, Cathay Pacific got in contact, and two days later Guy and Doy were in Hong Kong bidding for an range of programs, from cabins to galleys.

While it was nice to hear from Cathay, Design Q was not expecting to be awarded the contract, but for the next couple of years, the studio designed, delivered and built nearly an entire interior and shipped it all to Hong Kong.

It wasn't just Cathay Pacific. Bombardier had Design Q in its sights too, with a program to upgrade and redesign

Design Q can produce mock-ups and prototypes





all flight decks were gray and uninviting a stark contrast to their cabins – so Design Q was tasked with matching the two up.

The reason Bombardier chose Design Q was primarily because of its automotive experience. Bombardier wanted a quality flight deck more akin to a Bentley or Aston Martin, but needed a consultancy with experience of both automotive and aviation – Design Q ticked both the boxes. "This was the start of a truly wonderful relationship," says Guy.

The Global Vision Flight Deck was launched. The success and reward of this project led to many projects over the next decade, culminating in the most impressive project build Design Q has ever undertaken: the Global 7000, a 122ft noseto-tail marketing prototype, the largest ever made, which enabled customers to see exactly what they were purchasing.

Around the same time as Design Q's success with Bombardier, the company began to branch out into aircraft seating. The studio had considerable experience in automotive seating with Jaguar, Range Rover, Ferrari and more, and when considering commercial aircraft seating, realized that there was no seat available designed specifically for short-haul economy - that sparked their next move.

the Global Express flight deck. At the time, "DESIGN Q ENDED UP WITH THE FIRST FIXED-BACK CLOSE COUPLE ECONOMY CLASS SEAT "

> Starting with a blank sheet of paper, Design Q ended up with the first fixedback close couple seat. It was light, space efficient, had few parts, and looked fabulous.

The seat was shown at Aircraft Interiors Expo in 2008 to great acclaim and Guy recalls how he was amazed at the level of interest many of the airlines showed, leading Design Q to conclude that they were onto a winner - they had visions of this seat being their steady income through royalties or licenses.

But nothing happened. In fact, two of the biggest seating manufacturers told them independently that there was no market for such a seat.

"For a designer, one of the most frustrating things is having something you believe in, but not the cash to actually develop it. Eventually you get ripped off and copied, and during the period of time



4 DESIGN O DEVISED THIS BUSINESS CLASS SEATING CONCEPT FOR CATHAY PACIFIC IN 2005

5. THIS CATHAY PACIFIC LAVATORY DESIGN WAS CREATED IN 2006

6. THE LATEST EXCITING PROJECT FOR THE DESIGN O TEAM: THE AERION AS2 SUPERSONIC VIP IET

when we tried to get these seats to market, this happened numerous times," says Guy.

Design Q didn't give up, and eight years on, their seats are certified and flying with Monarch, and 2017 promises to be a landmark year for Pitch Aircraft Seating, the seat company they formed in 2010.

This whole episode taught Design Q the importance of being in control of as many aspects of a project as possible – the less you control, the higher your risk. The more you give out, the more you lose.

LOTS OF AIR MILES, LOTS OF FUN

The 20 years since Design Q began have been some of the most eventful and amusing of the directors' lives. They have lost count of the number of air miles, the late nights, the bids and the meetings, but looking back, how worthwhile it all appears to have been.

Design Q's latest win is to help develop the Aerion AS2, the world's first supersonic VIP jet – an enormous challenge, and one that they look forward to tackling. After all, being resilient, thinking outside the box and being one step ahead of the rest is what Design Q is all about. 🔊

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STAR QUALITY

United's new Polaris business class is about the journey, not the destination. This impressive program was made possible by close supplier collaborations

hen Continental and United Airlines merged in 2010, the new, stronger United Airlines began a journey to develop a look for its brand's future. The program began by considering how best to merge two different cabin styles to create a unique cabin interior. This project will ultimately result in one of the industry's largest rebranding endeavors, including a cabin overhaul for all United's narrow-body and international fleets, plus lounges, check-in areas, and passenger amenities.

United Airlines met the first public milestone of its five-year plan in September 2015, rolling out a customdesigned seat for its domestic first class. In June 2016, the airline launched the new Polaris premium lounge and cabin, an exclusive offer for United business passengers and intended to leave them feeling refreshed and rested. United Polaris, designed for the airline's international wide-body fleet, will begin rolling out in December 2016, starting with 10 new Boeing 777-300ERs.

A WELLSPRING OF MOTIVATION

Naturally, projects with the size and scope seen in the United program require meticulous planning. They also demand perfect execution by countless participants and exacting attention to detail. Daniel Cuellar, senior manager of onboard product development at United Airlines, attributes the program's success to having project partners with a shared motivation and the disposition to take the time to do it right.

"It all began with research. We closely examined our brand to determine how we could elevate the brand and our passengers' experience through it," explains Cuellar. "When we brought on PriestmanGoode, we conducted a complete audit of our entire fleet and completed upward of 12,000 hours of research. We interviewed hundreds of customers about their tiniest preferences, examined what our competitors were doing, and considered cross-industry design trends."



That extreme due diligence reflects the research-driven nature of United; much of the research was conducted at the Dreamliner Gallery in Boeing's Customer Experience Center in Renton, Washington, which features a fully outfitted B787 fuselage mock-up.

But Cuellar says research wasn't the only motivation: "We were fortunate to be given the opportunity to start with a practically blank slate. We were able to distinguish our brand through every physical detail, from how we use our logo, to carpet, to lighting. It was very inspiring."

DESIGNING THE BEST POSSIBLE BUSINESS CLASS

The design and development of the new United Polaris experience evolved alongside the research. Maria Kafel-Bentkowska, CMF (color, material and finish) external lead at PriestmanGoode,

"WE NEEDED A SOLUTION THAT MARRIED AESTHETICS AND PRACTICALITY"

Find out about another partner in the Polaris



project on P48

1. UNITED'S DOMESTIC FIRST CLASS SEAT FEATURES THE HEMISPHERE WEAVE PATTERN IN THE LOWER SHROUDS (IMAGE: UNITED AIRLINES)

2. SEKISUI SPI VIEWS ITS INFUSED IMAGING TECHNOLOGY AS THE ULTIMATE IN CUSTOMIZATION

> of our hemisphere weave pattern, with a high degree of maintainability. We needed a solution that married aesthetics and practicality in a way that commonplace painted seat shells cannot."

After extensive discussions with suppliers, teams at United Airlines and PriestmanGoode agreed that Kydex Thermoplastics' Infused Imaging technology had the ideal combination of required characteristics for the project.

"We were already familiar with Kydex Thermoplastics' Infused Imaging but for this design we wanted to use it more thoroughly to provide interest throughout the cabin," Kafel-Bentkowska adds.

As of today, the material features the hemisphere weave pattern in sacrificial panels in passenger-facing lower shrouds on the US domestic first class seats, in customer-facing aisle seat panels in the United Polaris cabin, and in decorative panels in the entrance areas.

explains that the team worked in close partnership with United to design the best possible premium experience - with a palette that could be used throughout the entire fleet.

The result, says Kafel-Bentkowska, is "a timeless, sophisticated aesthetic that conveys professional custom tailoring with a modern twist".

Cuellar adds, "PriestmanGoode's design also incorporates our globe logo in subtle

and extensible ways: we use four to five different patterns inspired by it."

Once the design was complete, the team solicited material proposals from approved suppliers, including those used in seats. As with all cabin interior projects, outfitting the design required balancing materials, regulations and maintenance.

Cuellar explains, "Particularly for the panels on the lower half of the seats, we needed a material that achieved the detail 3

See our September issue for an in-depth look at the United Polaris product

> 3. PROCESS IS PROGRESS. THE COMPONENTS OF THE POLARIS DESIGN BEING CAREFULLY COOORDINATED AT PRIESTMANGOODE

NOT JUST A PRETTY FACE

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. With the proprietary Infused Imaging technology, the design is an integral part of the polymer.

Jym Kauffman, Sekisui SPI's Infused Imaging director, explains, "Challenges with capping material and paint include delamination or chipping, especially when subjected to bags and heavy carts. The revealed substrate can make a part appear worn or broken and result in costly out-ofservice downtime for aircraft during replacement. With Infused Imaging, parts stay beautiful longer because the design is integral to the sheet."

In the new United cabins, if panels do become damaged or worn over time, maintenance crews can remove and replace individual sacrificial panels in seats and entrances during fit checks between flights with an everyday screw gun. The seats themselves do not need to be removed and replaced.

A UNIFIED DESIGN NEEDS A UNIFIED TEAM

The United program represents much more than a paradigm shift for the airline's brand. "I think this program is a perfect example of the innovation that becomes

THE PATTERN COMES OUT PERFECTLY EVERY TIME DURING THERMOFORMING"

possible when material suppliers, designers and carriers work together. It's the willingness to solve problems and create process together to get the details right that makes a program this complex work," says Kafel-Bentkowska.

The curve of the part meant it was challenging to get the hemisphere weave pattern right on the lower seat shroud panels. Technical service personnel from Sekisui SPI and the seat manufacturer partnered to optimize the pattern.

Cuellar explains, "Through technical expertise and trial and error, they devised a new production process to make certain the pattern comes out perfectly every time during thermoforming. On a project of this scale, that was critical. We can't afford lost time or wasted material."

EXPECTATIONS INSPIRE IDEAS

As seen in the United Polaris program, airlines are continually evolving to exceed

the demands of passengers with increasingly sophisticated tastes.

"Design onboard just isn't as simple for airlines as it used to be," Cuellar comments. "It requires a larger vision to put forward a passenger offer for a higherend overall experience."

That vision extends to the role of suppliers and designers too, asserts Kafel-Bentkowska: "Our job is to approach the carrier with solutions to problems. Suppliers who work collaboratively with project teams make that proactive approach possible."

Kafel-Bentkowska explains that it can be even more powerful when a design team and suppliers have a collaborative relationship that isn't project-specific.

"Suppliers who have research and development teams with a willingness to bring new products to the aviation market are key to the industry moving forward," she says. "When we see in-development products, as designers, we know what can be presented to clients in the future. In turn, design firms can advise suppliers if there is a market for the products." @

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CLASS ACTION

There are developments happening for every class of seat at Aviointeriors, but the company sees particular potential in long-haul economy

his has been a year of change for Aviointeriors: changes in how the company works, changes in how it builds seats, and changes to its product portfolio. Another development is that new sales team members have been appointed for the Europe and Singapore regions, demonstrating the importance of growth in those two markets for the company, while a new office in the USA, planned to open in 2017, will optimize Aviointeriors's presence in both North and South America.

At Aircraft Interiors Expo 2016, the company successfully launched the C4 seat, which is available in economy plus or premium economy versions, and Aviointeriors is looking to further enhance its premium economy product offering in 2017 with a possible upgrade in the design of the Sophia seat platform.

The range of Columbus economy seats is heading for a mid-life update, with weight reduction and improved product robustness being the main aims. The new Canova business class product will be launched later this year and will go into production for an important customer.

"AVIOINTERIORS IS LOOKING TO FURTHER ENHANCE ITS PREMIUM ECONOMY PRODUCT"

At APEX Expo 2016 in Singapore in October, Aviointeriors will showcase its latest spatial mock-up of the Adagio high-density premium business class product. This forward-facing, fully flat seat can be fitted eight-abreast on the B777 or B787, seven-abreast on the A330, and five abreast on the A321/ A320. The seat represents a major step forward for Aviointeriors in its future product offering. The company also hopes to develop a derivative product from the Adagio for a premium economy application. This product would be jointly developed with an unnamed airline that wishes to join up with Aviointeriors during the product definition stages.

Also, Aviointeriors' flip-up narrow-body seat design that was shown in Hamburg in 2012 is currently being re-evaluated as a possible solution for LCC operators, which 1. AVIOINTERIORS IS CONSIDERING AN UPGRADE OF ITS SOPHIA PREMIUM ECONOMY SEAT PLATFORM IN 2017

2. THE NEW CANOVA BUSINESS CLASS SEAT WILL BE LAUNCHED LATER THIS YEAR AND HAS ALREADY ATTRACTED A CUSTOMER

3. THE C4 SEAT IS AVAILABLE IN ECONOMY, ECONOMY PLUS AND PREMIUM ECONOMY VERSIONS







C2

The Mona Lisa first class design is being updated, and will be shown in Hamburg in 2017

C1

"THERE NEEDS TO BE FURTHER DEVELOPMENT IN LONG-HAUL ECONOMY SEATING"

need to deplane passengers in less time at turnarounds.

Turning to first class, Aviointeriors is further developing the design of its Mona Lisa suite and will be sharing the results with the industry at Aircraft Interiors Expo 2017 in Hamburg, Germany.

ECONOMY INNOVATION

Looking at the industry and how it is developing, Aviointeriors believes there needs to be a further development in longhaul economy seating so it offers greater comfort for overnight flights, while still meeting the prime needs of airlines for sustainability and profits.

The company has analyzed the industry and noticed a lot of investment in first class, business class and premium economy seating, but no developments in the economy class cabin that would make the window passenger on a long-haul flight more comfortable. The issue of egress is one that still frustrates the industry – as well as the seat users. Couple this with the issue of sleeping upright instead of horizontally and the experience is frankly unpleasant. Unless we find an airline willing to explore a way to offer a solution to this rather difficult set of issues, there will be solutions available, but no airlines brave enough to try them. We may see a development in 2017 – or maybe never – but it is an issue we need to work on.

As 2016 draws to a close, Aviointeriors is confident that its plans meet the needs of the aircraft interiors industry, and the company is hopeful that it will continue to grow and develop in the world of aircraft interiors.

FREE READER INQUIRY SERVICE To request more details from Aviointeriors, visit www.ukipme.com/info/aim C3

4. THE COLUMBUS RANGE OF ECONOMY CLASS SEATING IS DUE TO RECEIVE AN UPDATE, WHICH WILL REDUCE WEIGHT AND IMPROVE ROBUSTNESS



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FULLY ENGAGED

Life doesn't pause when travelers leave the ground, which is why IFEC developers such as Rockwell Collins are working to change the face of cabin connectivity for greater passenger engagement

hether during takeoff, landing or at 40,000ft, airline passengers want to have access to the same information – at the same speed – on their own devices that they enjoy on land.

Today many everyday activities are accomplished using personal electronic devices. In our professional and personal lives these extraordinary tools enable us to do what we want, when we want. We listen to the news, make calls, edit documents and send emails and text messages. We're also communicating, sharing information and entertaining ourselves through tweets, LinkedIn updates, Facebook connections, TumbIr blogs, YouTube videos and Netflix streaming movies – all at blazing speed.

However, once you enter a commercial aircraft cabin you leave behind a world with nearly endless options for high-speed connectivity and enter one where connectivity is hit or miss, if offered at all.

But that's changing. Companies such as Rockwell Collins are leading the way in making the connected aircraft a reality. In short, such companies are working to enable passengers to continue to experience the depth and breadth of their terrestrial lives even when they are no longer on the ground.

It's a big change and we're not there yet – but we are getting closer. As new aircraft come online, inflight broadband connectivity will become the norm, either free as a service or monetized to create new revenue streams. Rockwell Collins is helping to bring about this reality with its broadband connectivity solution powered by Global Xpress, a global satellite communications network.

A NEW NAME FOR A NEW EXPERIENCE

IFE systems have been around since the 1960s. Today, we've moved to IFEC, where the C stands for connectivity. This development marks a major improvement to the passenger experience, with many aircraft enabling passengers to plug in personal electronic devices,



while others enable passengers to purchase broadband connectivity for an even better experience.

But even IFEC no longer adequately describes what passengers now expect during a flight. As passenger expectations evolve from a passive 'please entertain me' to an active 'I want to entertain myself', the future of the passenger/cabin interaction can be best described as one of deep and ongoing engagement. A new term, in-flight passenger engagement (IFPE), more accurately describes an experience in the air that is equal in every way to how people use their devices on terra firma – and is a much better description of how the industry is evolving.

BREATHTAKING SPEED

New satellite connectivity solutions from Inmarsat are bringing the next generation of broadband. With a constellation of three

"THE BENEFITS OF THE CONNECTED AIRCRAFT DRIVE RIGHT DOWN TO AN AIRLINE'S BOTTOM LINE"





1. ROCKWELL COLLINS' PAVES WIRELESS SYSTEM CAN CONNECT WITH KA-BAND NETWORKS TO PROVIDE WIRELESS IFE, GEOTAINMENT AND CONNECTIVITY

2. THE PAVES IFE SYSTEM INCLUDES OVERHEAD BROADCAST AND IN-SEAT AUDIO VIDEO ON DEMAND

Rockwell Collins recently broke that barrier. With Inmarsat's GX Ka-band and Rockwell Collins's state-of-the-art wireless routing system, passengers will remain in constant touch with the world below, and at previously unattainable speeds.

IMPROVING THE BOTTOM LINE

Connectivity isn't just for passengers – it is also for the accountants, as the

benefits of the connected aircraft drive right down to an airline's bottom line.

Consider this example. Many passengers purchase inflight meals with a credit card. On long flights some also used a credit card to purchase that last minute, high-end duty-free gift. But depending on the circumstances of the flight, that transaction doesn't always go through to the credit card company in real time. The cost of the

I-5 satellites (and a fourth under construction), Global Xpress Aviation Ka-band provides mobile broadband virtually anywhere on the planet. It's changing the face of connectivity.

But getting a wider pipe to the aircraft is not the only challenge. Aircraft also need an onboard wireless routing system that reliably and consistently delivers highspeed connectivity to each of the hundreds of devices brought on board.



Inflight connectivity can save airlines millions of dollars in point-of-sale fraud

3. PRODUCTS SUCH AS PAVES ENABLE PASSENGERS TO ENJOY SECOND-SCREEN ENTERTAINMENT

4. ROCKWELL COLLINS IS TAKING ADVANTAGE OF THE POWER OF INMARSAT'S SATELLITE NETWORKS. PHOTO COURTESY OF INMARSAT

purchase is stored in the point-of-sale device until the aircraft lands and arrives at the gate.

Some passengers take advantage of this by using fake or expired credit cards. By the time the airline realizes the card is invalid, the passenger is out of the airport. Across the industry, that can result in losses totaling hundreds of millions of dollars a year.

But with a connected aircraft, airlines don't have to worry about losing a dollar to this type of fraud. Credit card transactions can be processed in real time. "PASSENGER LOYALTY WILL GO TO THE AIRLINE THAT DELIVERS THE BEST CONNECTIVITY EXPERIENCE"



THE CASE FOR CONNECTIVITY

The evolution of high-speed connectivity and advanced wireless cabin networks will be a winner for passengers and airlines alike. Passengers will give their loyalty – and an improved bottom line – to the airline that delivers a seamless transition between the connectivity experience at home or work and the experience available during a flight. The key is to continue to develop the richer, more engaging experiences that will meet and exceed these expectations and position airlines and the entire industry for success.

Information management teams in the aviation industry are harnessing aviation's information age and helping to deliver the connected aircraft. The possibilities are both endless and endlessly exciting.

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THE FLIGHT OF THE FUTURE

Think all this connectivity talk is just a pipe dream? It isn't. The newest generation of connectivity is coming – and it's coming to an aircraft near you.

What will it mean? Just imagine entering an aircraft cabin, walking to your seat, waking up your device of choice and seeing your favorite games, movies, music, magazines and digital books already waiting for you in a preloaded app.

Then, instead of waiting for the flight attendant to ask for your drink or snack preference, the attendant already knows what you'd like and brings it to you. Even your window shade position and reading light preference is stored, awaiting your arrival – all to ensure a highly tailored passenger experience.

Upon exiting the aircraft at your destination, a digital map of the concourse pops up on your smartphone and gives you step-by-step directions to your connecting flight – including up-to-the-second information on gate changes.

And at the end of your trip, wouldn't it be great to know if your bags are at baggage claim or spending the night in Chicago? If they're waiting, you'll receive directions to the right carousel, where you quickly pick up your bags and are off.

So yes, soon we'll actually look forward to spending five hours at 40,000ft.

One of 40 million secure connections we make every day. To her, it's everything.



Over 14,000 commercial aircraft rely on Rockwell Collins to stay connected, ensuring safe and efficient operations. Imagine what we can do for your passengers – engaging, entertaining and empowering them – even beyond the cabin. Because when you connect them to their world, they connect with yours.

IFE systems for today and tomorrow Global broadband connectivity Applications and value-added services



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SPACE CONCEPT

A concept for the next generation of onboard lavatories has been developed and refined by Diehl Aerosystems to create enough additional space to fit up to six extra seats

irlines are interested in profit. This often means that the number of seats in an aircraft can have a direct effect on financial returns. More often than not, more seats equates to higher profits. But at the same time, as far as is possible, there should be no (or as little as possible) detriment to the passengers' comfort – which presents a challenge for airlines, OEMs and suppliers alike.

It was against this background that Diehl Aerosystems developed a new lavatory concept, named Space³ (space cube). Where there were once two lavatories, there are now three. This extra space is due to the new, modular and highly cost- and production-optimized NG8 interior concept.

SPACE

Space³ is designed for long-range aircraft, which not only need to have plenty of lavatories, but also need to provide lavatories for passengers with reduced mobility (PRM).

Passenger cabins with four seats between the aisles often have a similar distribution of the onboard lavatories. In the Door Three area (just behind the wings) there is typically a four-lavatory arrangement: the so-called 'block lavatory', which takes up the space of four to five seats and two lateral lavatories. Space³ replaces this block lavatory, which is precisely why it has been designed to the width of four seats: 76in. It takes up almost exactly the same amount of space as a block lavatory, but also offers a lavatory for PRMs.

During the development of the lavatory, two considerations were paramount. Firstly, the space requirement had to be calculated according to the 95th percentile American, a typical specification for the larger aircraft manufacturers. Secondly, there could be no restrictions on passenger comfort or the options typically offered for the simple reason that, particularly on long flights, passenger comfort and the associated design are 1. MODEL OF A LAVATORY MODULE WITH EXPANSION FOR USE BY PASSENGERS WITH REDUCED MOBILITY

equally important for both passengers and airlines.

The development team at Diehl Aerosystems started out by defining the minimum dimensions of the lavatory. In doing so, their first consideration was the width of the lavatory seat and the availability of a slim washstand with a sufficiently large basin. They then analyzed the minimum space requirements of the 95th percentile American, in 3D. The surprising result was that only 410mm are needed between the wash-stand and the sidewall. This meant that Space³ could be just 52in-long (the standard is 48in) and in only 4in of 'lost' floor space it can house an extra lavatory.

These efficient dimensions have a further advantage: Space³ is made up of three structurally identical modules, each of which can fit through the aircraft door –

"WHERE THERE WERE ONCE TWO LAVATORIES, WITH SPACE³ THERE ARE NOW THREE"

0

2. THE ONBOARD LAVATORIES ARE CHARACTERIZED BY INTELLIGENT USE OF SPACE COMPLEMENTED BY A MODERN DESIGN

The three modules of

Space³ have over 95% parts

0

commonality

and the three modules have over 95% parts commonality.

Similarly, the water, vacuum and power supplies have been simplified. All the modules are supplied from central system interfaces and need only one single connection per system to the aircraft. In terms of retrofitting, this makes the task considerably easier.

The second consideration was maintaining the requirements of airlines - for example, only allowing access from the main aisles of the aircraft. The first version of Space³ had one access point from the cross aisle, which made its internal dimensions bigger – something Diehl was also able to improve on. Lights and mirrors were adapted to create the illusion of greater space, the colors were lightened, and the position of the lavatory optimized.

The Space³ concept was first demonstrated to the public at Aircraft

Interiors Expo 2016 as a 1:5 scale model. The space-saving issue was further highlighted with a model of the floorplan of a long-range aircraft. The response of visitors was overwhelming: one of the large European airlines wanted a quote there and then. Other airlines and even one OEM showed considerable interest in the concept and were keen to get more information about it. For all the airlines, it was the possibility of gaining an extra four



(A330) to six (A380) seats that was the key factor.

NG8 (NEXT GENERATION 8)

Space³ has only been made possible thanks to the new NG8 space and design concept from Diehl Aerosystems. Essentially, the concept pursues two aims: a cost reduction of at least 20% and the reduction of space requirement by about one-third. The development team was able to draw on previous positive experiences from the tender for the Boeing 777X, which contained the NG8's predecessor, the NG7. This concept established the basics and principles for efficient design, which shaped the new concept.

In terms of cost reduction, the aim was to reduce material costs by around 20% and production time by around 50%. Experience has shown, however, that it is not always possible to realize such a target by completion. But, in order to achieve such reductions, Diehl's developers had to think outside the box.

As with NG7, an aim for NG8 was greater standardization. Consistent use of injection-molded and thermoformed components is the best way to keep costs down, hence why NG8 was developed in such a way that it could be used on all current Airbus aircraft, as well as on virtually all Boeing aircraft (with the exception of the B737). Such composition "THE AIM WAS TO REDUCE MATERIAL COSTS BY 20% AND PRODUCTION TIME BY AROUND 50%"

still means that – regardless of the aircraft and the location on board – around 85% of the components are common parts.

THE INTERIOR

Diehl Aerosystems' aim was to move from the current lavatory length of 37in to a length of 27in. This wasn't good enough for the company's engineers, who reduced it down to a mere 26in. To achieve this, the use of space in current onboard lavatories had to be analyzed in depth. The result: the wash-stand takes up the most room, followed by the mirrored cabinet, and finally the lavatory casing. The depth of the wash-stand was halved during the course of the development. And even though the NG8 wash basin is approximately 80mm shallower than a standard unit, both the usable surfaces and the usable volumes are only marginally smaller than the classic A330

3. THIS OFFER OF SPACE IS, HOWEVER, NOT AS LUXURIOUS AS A FIRST CLASS LAVATORY. THE DIVISION OF SPACE IS NEVERTHELESS VERY FUNCTIONAL AND OFFERS THE AIRLINES A WHOLE EXTRA ROW OF SEATS

variation, thanks to better use of space and a smaller trash receptacle.

To save additional space, a mirror with a light was installed in place of the mirrored cabinet. In the event that storage space is still required, the Diehl concept offers the option to install a cupboard above the lavatory – naturally still leaving enough head room for passengers.

With Space³ and NG8, Diehl Aerosystems really has achieved the miracle of optimizing space without compromising passenger comfort. The new onboard lavatories are efficient, costeffective to manufacture and install, and enable airlines to use the space they free up to install more passenger seating.

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ITALIAN STYLE

More and more well-established airlines are looking at Geven's growing range of seating with serious interest

s part of its ongoing quest for success, Italian seat supplier Geven is seeking to widen its already substantial customer base by exploring new markets.

Thus the company is promoting its new line of modern, upbeat, classy and comfortable products in new markets such as Central and South America, the old European Eastern bloc, the markets of the former Soviet Union, and new frontiers in Asia, not to mention the company's determined marketing focus on the North American market.

Geven is enjoying an immediate return from its promotional work in Central and South America, as it has secured large and prestigious contracts with all of the major Mexican carriers.

The company was able to cater to the high cabin density arrangements required by the Mexican carriers with its already proven and widely sold Piuma Evo economy class product, in both its reclinable and its fixed recline variants.

The more southern American carriers are mostly interested in the medium- to long-haul Elemento economy class product, to such an extent that their interest has led Airbus to allow the seat to be specified on the A350. Also of considerable interest in South America is Geven's new premium economy seat for wide-body aircraft, the Comoda Alta Quota.

A GROWING RANGE OF SEATING

Geven's new family of seating products includes the brand new Essenza highdensity seat, which is minimal in terms of form, maintainability and weight, but luxurious in terms of the living space and comfort it offers.

The Essenza (which means 'essence' in Italian) is available with many options and has Italian appeal, according to Geven. The seat has been conceived in two different variants, one pre-reclined for high-density configurations and the other reclinable (up to 6in) in order to increase the product's flexibility and offer the widest range of customer options. The Essenza proved



"GEVEN HAS SECURED LARGE AND PRESTIGIOUS CONTRACTS WITH ALL OF THE MAJOR MEXICAN CARRIERS"

Geven has also developed piuma Sofa – an piuma Sofa – an triple that economy triple that converts into a bed

> 1. THE MEDIUM- TO LONG-HAUL ELEMENTO ECONOMY SEAT CAN BE SPECIFIED FOR THE AIRBUS A350

a favorite with some large LCCs in the USA during recent evaluations.

For the long-haul market and for narrow-body mixed class arrangements, the entry-level Elemento model (which means 'element' in Italian) has been conceived to cater to high-density longhaul cabins, whilst maintaining an extremely wide range of options and IFE integration solutions, and an unquestionable level of long-haul comfort.

The brand-new Elemento seat has been designed to provide better flexibility, reliability, maintainability, living space and comfort on board, and to reduce the time and cost required for installation, .

Geven is also attracting strong interest from the Asian markets, including previously unexplored audiences such as Korea, and an ever-increasing number of Indian operators. A number of US, Middle Eastern and Eastern European operators have also recently shown interest in Geven and its new family of products.

Meanwhile, one of the Japanese carriers has been particularly impressed, not only by the Elemento economy class product, but also by the Elemento Sofa variant, which offers a flat sleeping position in economy class.

The Comoda AQ completes the range as a compact long-haul premium economy/ business class seat.

Rodolfo Baldascino, Geven's marketing and sales manager, reports that this new



2. THE ESSENZA IS AVAILABLE IN TWO VARIANTS, ONE PRERECLINED AND THE OTHER WITH UP TO 6IN

3. THE COMODA AQ MODEL CAN SERVE AS A LONG-HAUL PREMIUM ECONOMY OR BUSINESS CLASS SEAT

premium economy product was selected by the recently relaunched Alitalia-Etihad Group for a substantial B777 retrofit and has received resounding praise for the finished result.

"The new Elemento and Comoda AQ are also in pole position to cater to the everincreasing demand for quick turnaround reconfigurations for the many wide-bodies

"COMODA AQ WAS SELECTED BY ALITALIA-ETIHAD FOR A SUBSTANTIAL B777 RETROFIT"



AIRCRAFT INTERIORS EXPO ASIA

Doria De Chiara, business development manager at Geven, says she is pleased to see Aircraft Interiors Expo returning to the Pacific Rim area: "It was at a previous Aircraft Interiors Expo in Hong Kong that Geven secured its first launch customers, and with a whole new family of products to launch we are of course hoping that the Singapore event will again be our Cape Canaveral."

At the event, Geven expects to meet many Asian airlines, an audience that currently represents the biggest growth area in aviation on the planet.

Visitors can find Geven at Stand E10, at Aircraft Interiors Expo Asia on October 25-27 in Marina Bay Sands, Singapore. 📎

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ELEMENTO An element of seduction

10

Elemento: Geven's new Long Haul Economy Class Seat. Where all the elements of comfort, luxurious living space, fresh and trendy Italian appeal and high optionality play together as one natural element.



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SEAT INTELLIGENCE

The Internet of Things is a key factor in Recaro's future seating product development strategies

ecaro Aircraft Seating is a step ahead – and not just in terms of its lightweight seats. Performance figures and full order books for the current year bear witness to the rapid rise of the company from Schwäbisch Hall in southwest Germany. With sales of €409m (US\$462m) in 2015 – a historic high – and six major new contracts in the first half of 2016, the company is expanding its leading position in the international market. For Recaro, 2016 has been all about 'intelligent seats' and tailor-made applications for customers.

"With a reinvestment rate of over 10% of sales into research and development, we are ahead of other seat manufacturers. This shows just how important innovation and satisfying customer needs are to us," says Dr Mark Hiller, chief executive officer and shareholder at Recaro Aircraft Seating.

"As a premium brand in the supplier sector, we see ourselves as trendsetters and thought-leaders. With the increasing demand for highly customized seating solutions for OEMs and airlines, we are attractive to customers," he adds.

Recent work includes the modular design system of Recaro's various seat components, which can be selected and brought together by customers. One example is the CL3710 seat, which enjoyed a very positive response at Aircraft Interiors Expo 2016. The lightweight seat is already a bestseller, not least due to Recaro's skill in blending functionality, ergonomics and aesthetics.

The seat design has been honored with coveted international design awards including an iF Design Award (automobiles/ vehicles/bikes product category) in 2015, gold prize in the Public Design category of the German Design Awards 2016, and a final place in the Passenger Comfort Systems category of the Crystal Cabin Awards in 2014. The seat offers several ingenious details, such as a high literature pocket, a fold-out footrest and IFE integration for multimedia, as well as


"AS A PREMIUM BRAND, WE SEE OURSELVES AS TRENDSETTERS AND THOUGHT-LEADERS"





a highly efficient cabin configuration. And passengers can look forward to what is most probably the greatest benefit of all: a real gain in space. Eighteen individual patents contribute to making the seat what it is today: both a classic and a highly versatile quick-change artist which, at less than 12kg in weight and offering many customizing options and high serviceability, promises a long service life.

A further seat development that will be keeping Recaro busy well into 2017 and beyond, is its cutting-edge premium economy class seat. The PL3530 features everything passengers need to enjoy a relaxed long-distance flight. Not least because the backrest adjustment of up to 9in can be tilted into an extremely Recaro's CL3710 economy seat has won international awards recognition



1. UNIQUE MOMENTS, UNIQUE SEATS, FOR A SUPERB FLYING EXPERIENCE. PASSENGERS CAN ENJOY A REAL GAIN IN SPACE WITH THE RECARO CL3710 MODEL

2. MINIMUM WEIGHT, MAXIMUM COMFORT: THE LONG-HAUL CL3710 SEAT WON A GERMAN DESIGN AWARD 2016

comfortable resting position. Along with the exceptionally wide legrest – adjustable in both length and inclination – the premium economy seat ensures a level of comfort more commonly associated with business class. An innovative headrest that can be individually adjusted in height as well as in shape and position also adds to seat comfort.

INTELLIGENT SEATS ARE COMING

The next year will also see Recaro heavily involved with an innovation topic that goes well beyond previous definitions of seat functionality: the 'intelligent seat', which was introduced at Aircraft Interiors Expo 2016. With this in mind, the CL6710 business class seat is being adapted to

RECARO AIRCRAFT SEATING

Recaro views seats with onboard diagnostics as a future trend

"AN INNOVATION ALVAYS NEEDS TO GENERATE GREATER VALUE FOR OUR CUSTOMERS"

automatically deliver information on its operational status. At any time, the cabin crew and engineers on the ground can monitor whether a seat is fully functional and ready for use. The technology and hardware for this premium seat form the basis for this solution in the context of the Internet of Things.

Recaro is developing user-friendly software solutions for airlines that can communicate information pertaining to the seat's functionality and condition. The aim is to capture valuable load data and statistics on seat use in the cabin, and then communicate it to the ground station. The market analysis and business outlook for this project are positive. 3. RECARO'S VISION: THE CL6710 'INTELLIGENT SEAT'. THE SEAT DESIGN EMBRACES THE INTERNET OF THINGS

"An innovation always needs to generate greater value for our customers and their passengers – one that ensures easier operation and enhanced compatibility. And of course, a new technological achievement or improvement also needs to deliver a financial benefit to Recaro customers," confirms Hiller.

IMPROVED CUSTOMER SERVICE

Over and above these seat innovations and increased customization, further improvements in customer service are also at the forefront of Recaro's strategy over the coming months. Aftersales services are becoming increasingly

WORLDWIDE PRODUCTION AND NETWORK

Every third economy seat for single-aisle aircraft comes from Recaro. This is made possible by the regional distribution of Recaro's production facilities in Fort Worth, Texas, in the USA; in Europe, with the company's headquarters in Schwäbisch Hall, Germany, and the Recaro site in Poland, founded 10 years ago; and its production facilities in China, which have been expanded to open up additional capacity in Asia.

"We are a globally active company with a strong German heritage. We have developed our lean production processes to achieve our objectives and to benefit our employees and our customers. We see ourselves as a premium brand and a Tier 1 system supplier in a very dynamic environment that challenges us every day to keep our company exceptionally efficient and lean. This gives us the freedom to react to market changes quickly and flexibly, and to proactively meet our customers' wishes and requirements," says Dr Mark Hiller. "And we are extremely optimistic heading forward." important for customers in their purchasing decisions. More than 180 participants of a recently carried out major online survey confirm that Recaro already performs very well in this area. In 2016, the company was given especially good customer ratings in the areas of 'on-time delivery/delivery deadlines' and 'updates/modifications'.

"Overall, we have been able to maintain our high level of customer satisfaction among airlines and OEMs compared to the previous year. The customer service area was given a 'good to very good' rating from 80% of companies surveyed," says Hiller.

This is certainly a reflection of the fact that Recaro has improved and expanded its entire customer service portfolio, giving it the highest priority. With close to 200 employees in service worldwide, a growing number of Recaro Service Centers, and 13 partner representative offices, Recaro is in fact closer than ever to its customers.

There is further evidence to support the company's strategic focus on aftersales. In 2016, a special award was given for extraordinary achievements in the field of customer service and aftersales. For its industry-renowned Supplier Support Rating, Airbus surveyed all major airlines and Recaro was the clear winner. The company was especially strong in customer focus, response time and client service. Recaro therefore has yet another title to defend in 2017: Excellent Supplier.

"Since our customers place their confidence and trust in us, Recaro is always able to improve. And we see ourselves as a true solution provider and no longer 'just' as a seat manufacturer," says Hiller. ©

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BALANCING ACT

Direct aisle access with no penalty in cabin density or passenger comfort. This may sound like a dream, but with Optima, Zodiac Seats believes it has achieved the seemingly impossible

ne of the biggest challenges for the design teams at Zodiac Aerospace is working out how to continually meet the requirements of today's business class travelers, while still satisfying the evolving needs of commercial airlines worldwide.

This statement may seem obvious, but it is a difficult balance to achieve when the focus of airlines remains on increasing load factors and improving cabin yield, yet the expectations of the passengers are continually rising.

Over the past few years, business class products offering greater cabin density have been more popular than ever, allowing airlines to increase passenger volume in what is typically the most profitable section of the cabin.

The high-density market segment has been dominated by a few products that satisfy the load factor requirements of the airline, but are often heavily compromised for the passenger. Typically, the configuration of these products means that where there are outboard seat pairs, the passengers sitting next to the window will have to step over the aisle seat passenger's legs or feet to exit their seat, which creates privacy issues for both passengers. In addition, stowage is often limited and the seat designs lack the surface area to accommodate a laptop or personal items when the meal table is in use.

However, as new generations of widebody flagship aircraft have entered the market – such as the B787 and A350 – it is clear that airlines are making direct aisle





"A COMPLETELY NEW APPROACH... A BRAND-NEW CABIN LAYOUT LIKE NOTHING ELSE FLYING TODAY"

G12

There are several customization options for the Optima seating

> 1. AN ADDITIONAL BENEFIT OF THE LAYOUT IS THAT IT GIVES AISLE PASSENGERS SIGHT OF A WINDOW

2. COMBINING IN-LINE AND HERRINGBONE LAYOUTS CREATES A SPACE-EFFICIENT CABIN WITH DIRECT AISLE ACCESS FOR ALL

access for all passengers a priority. Indeed, they are willing to compromise their revenue potential to maintain a satisfied and loyal frequent flyer base, as competition intensifies on major networks and key routes.

This is a difficult decision for most airlines to make, and it also poses a big challenge for Zodiac Aerospace. The company's intimate relationship in designing premium aircraft seating with many of the world's leading airlines meant that it knew a completely new approach had to be introduced to the market, a brandnew cabin layout like nothing else flying today.

THE SOLUTION? OPTIMA

The Optima design is a uniquely configured staggered seating arrangement that offers direct aisle



access for all passengers, while still achieving the same passenger count as the step-over products that have traditionally dominated this segment. This is a truly revolutionary cabin configuration.

Coupled with intuitive ergonomics and the sensory satisfaction of the highestquality materials, Optima completes an experience so immersive for passengers that they will forget they are in one of the most optimized business class cabins in the world.

Offering passenger interaction for those traveling together, or an exclusively private environment for business travelers wanting to relax and unwind, Optima caters to all with impressive ease. The seat configuration offers inherent privacy for most seats, with a dropping privacy screen providing adjustable privacy for the center seats.

As an exclusive option, Optima is able to provide a double-bed experience for the center seats, with the privacy screen

OPTIMA IS ABLE TO PROVIDE A DOUBLE-BED EXPERIENCE FOR THE CENTER SEATS"

completely dropping to below the bed height to form one large sleeping area.

Provisioning for a double bed and class-leading bed dimensions create a passenger experience that would typically be associated with a first-class suite.

The unique configuration is a fresh approach to business class travel, with each seat offering gate-to-gate in-flight entertainment, generous surface areas and stowage for all the personal amenities that accompany today's business travelers. 3. THE CENTER DIVIDER CAN BE LOWERED TO CREATE A MORE SHARED ENVIRONMENT, OR EVEN A DOUBLE BED

However, while Zodiac has paid close attention to the needs of the passenger, its engineers have not forgotten the requirements of airlines: to improve the bottom line, through increased cabin density and revenue per kilometer.

Optima's unique market positioning has gained significant interest from airlines and airframers, with a major US airline recently selecting a bespoke version of Optima as its new business class for all future wide-body aircraft.

A marriage of empathetic design and innovative engineering, Optima represents the dawn of a new era in business class travel. 🛇

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GRAND ENTRANCE

Introducing a new company and new seating product to the interiors industry is tough, but ComFly believes it has the right mix of innovation and flexibility to be a success

00

ollowing an intense period of introduction into the aircraft industry during 2016, including a major launch at Aircraft Interiors Expo in Hamburg, now is a good time for ComFly to outline its many attractive and exciting initiatives.

ComFly's vision and strategy is to continue to increase the development of its range of seating products, as well as its design, certification and production activities. The company is also working with potential customers and partners to create innovative new technologies.

A particular high point this year was the inclusion of the company's Mare concept in the Crystal Cabin Awards 2016 shortlist. The design is a special armrest that gives economy class passengers more space and easier seat access.

ComFly has embraced every possibility to talk with airlines and listen to their needs, discuss the latest materials innovations with suppliers, and to collaborate with universities on projects, all with the aim of leveraging this work to improve the design of its seating products. The company is aiming to produce seats that provide the perfect combination of passenger comfort and light weight, to generate more profits for airline customers.

THE CFY-OO

ComFly introduced the aviation industry to its capacity and capabilities at Aircraft



1. A FUNCTIONING MOCKUP OF THE CFB-01 BUSINESS CLASS SEAT WILL BE AVAILABLE TO TRY OUT AT AIRCRAFT INTERIORS EXPO 2017

2. THE CFY-02 LONG-RANGE MODEL IS THE FINAL DEVELOPMENT IN COMFLY'S ECONOMY CLASS RANGE

Interiors Expo with the CFy-OO, a prototype seat designed to show its strong, reliable and lightweight properties. The company was keen to show the industry that it has the capacity to be a seat supplier: this is not easy when you are a new name, but ComFly felt it could convince the industry by demonstrating that it understands all the critical aspects of aircraft seating.

The CFy-00 has received a lot of interest, in particular from the Russian market, and ComFly has signed an agreement with a large company to introduce the seat into this market. Together with this partner, the seat will be introduced for the MS-21 aircraft and the retrofit market. Following a showcase presentation in late 2016, the seat will be introduced to an aeronautical authority.

ComFly is also developing the highdensity CFy-01 seat model for application in short- and medium-range aircraft such as ATRs, the Bombardier C Series, the Sukhoi Superjet, the Embraer 190, and other ranges of aircraft, including the Boeing 737 and Airbus A320.

The company is also in talks with a Chinese airline that is very interested

"COMFLY IS AIMING TO MAKE THE SEAT AN IDENTIFIABLE PART OF AN AIRLINE'S BRAND"



in the design of the CFy-01, and it has been invited to visit their headquarters later this year.

ComFly believes that the attention and interest the industry is showing in its products is a clear signal that the market needs a new and reliable partner.

The company's economy class seating range is being completed with the CFyO2 long-range model. This seat represents the logical path of ComFly's development for economy class seating, and key features include upgrades of the materials and ergonomics.

BUSINESS CLASS UNDERWAY

Due to growing interest from potential customers, ComFly is also working hard to develop the CFb-O1, a mechanical business class seat for short and medium range, in time for introduction at the next Hamburg Show. The company is aiming to include Italian style and customization options that can make the seat an identifiable part of an airline's brand.

Thanks to the experience of ComFly's design and engineering teams, the CFb-01 seat will be suitable for regional aircraft, with the capacity to be flexible to meet

3. THE CFY-02 DESIGN FEATURES A MIX OF MATERIALS TO OPTIMIZE COMFORT AND MINIMIZE WEIGHT

4. OPTIONS FOR THE CFY-02 INCLUDE A SEATBACK DEVICE HOLDER

5. A WIDE RANGE OF CUSTOMIZATION OPTIONS WILL ENABLE CUSTOMERS TO TAILOR THE CFY-02 MODEL TO THEIR BRAND

With production facilities under construction, ComFly means business

"THE COMPANY IS WORKING THROUGH CERTIFICATION FOR THE SEAT DESIGNS"

6. THE CFB-01 MECHANICAL BUSINESS SEAT WILL BE SUITABLE FOR REGIONAL AIRCRAFT TYPES

7. CLEVER FEATURES OF THE CFB-01 INCLUDE A SPACE-EFFICIENT IN-SEAT TRAY TABLE DESIGN

customers' needs in terms of technical and commercial adaptation.

COMPANY GROWTH

ComFly is building an expert and motivated team that will be one of the its strengths. The team is currently working through the certification process for the seat designs, and they are confident that they will meet the formal requirements over the coming months.

The modularity of the company's range of seat products enables it to bring new



product to the market in a very short time, making it competitive in terms of delivery times.

A NEW FACTORY

Another important aspect of ComFly's strategy is the building of its factory, designed with lean manufacturing in mind, in order to get the best results in terms of quality of manufactured parts in a really short turnaround time.

Furthermore, continuous monitoring of production lines will enable the company's engineers to identify and fix any kinds of problems in real time. This strategy produces time and cost savings that can be passed on to ComFly's customers.

Last but not least, ComFly is talking with some important aeronautical companies that have shown interest in partnering for synergies, to increase competence and improve customer service.

The aviation market requires suppliers that are reliable, deliver on time, and are available for support 24 hours a day – and all at affordable prices. The secret is to choose a company that can adapt to these needs – ComFly is ready.

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INNOVATING SPACE

In cabin configuration optimization, improving passenger comfort and revenue is essential; working with the right partner is key

he capacity of a single-aisle, mid-range aircraft may vary by almost 30 seats, depending on the cabin configuration of the carrier. Seating capacity is a crucial factor in driving route profitability, improving revenues – and enhancing passenger comfort.

Influenced by a multitude of factors, such as maintenance requirements, financial aspects, customer demands and the competitive situation, the cabin optimization process puts high demands on those handling the configuration.

Frankfurt-based Lufthansa Consulting has close to three decades of experience in this field and excels in aligning strategic, commercial and operational objectives in the best possible way. To optimize the cabin configuration process, Lufthansa Consulting relies on the abilities of Pacelab Cabin, a configurator which allows its consulting experts to conduct in-depth feasibility studies.

Pacelab Cabin, the leading commercial aircraft and cabin configuration software, was developed by Berlin-based software provider Pace It helps set up a full aircraft definition, including the selection and positioning of all interior items as well as further product options for cabin systems, avionics and engines. Used by aircraft manufacturers' technical sales and marketing teams, and engineering and fleet planning departments of leading airlines, Pacelab Cabin provides the most comprehensive decision-making support available.

COMPREHENSIVE CONFIGURATION SUPPORT

Set up in 1988 and backed by the expertise of the entire Lufthansa Group, Lufthansa Consulting helps advance the business activities of its international customer base with a wide range of services. In addition to its headquarters in Germany, the consultancy has offices in Moscow and Rio de Janeiro and draws on a strong track record of almost 3,000 successfully completed projects.



Airlines approach Lufthansa Consulting with different use cases, looking to start up their business, optimize an existing cabin configuration, or set up a configuration for a newly introduced aircraft type. Other objectives span entire fleets, such as an overhaul in accordance with a new seating or service concept, or a new positioning in the market.

Prior to drafting rearrangement options, Lufthansa Consulting will conduct

a thorough analysis of the factors influencing its clients' earning capacity, to tailor the optimization strategy accordingly. Every individual project involves different optimization strategies to drive the generation of revenue, and the Pacelab Cabin software supports this complex evaluation process with detailed cabin investigations and fast generation of layouts of passenger accommodations (LOPAs).

"REAL-TIME RENDERING DELIVERS IMMEDIATE VISUALIZATION OF THE EFFECTS OF LAYOUT CHANGES"



The software provides consultants and airline product development teams with a clear understanding of the available configuration scenarios, enabling them to evaluate their options without having to solely rely on information supplied by their technical departments.

Real-time rendering delivers immediate visualization of the effects of layout changes. In addition, all configurations undergo automated checks to validate their technical feasibility and compliance with certification standards. Customizable output formats facilitate coordination between consultancy and client.

Despite this functional scope, the software's user interface ensures instant productivity, even for new users. Fully automated routines capable of applying complex, class-specific optimization strategies provide further assistance and greatly speed up the setup of LOPAs. "Integrating Pacelab Cabin into the assessment process has proved highly beneficial to all parties involved," says Christine Weigner, associate partner at Lufthansa Group. "The fast evaluation of different configuration scenarios helps us to substantially shorten the duration of our assignments, which is of course an advantage to our clients."



And last but not least, there is another customer to please: the airline passenger. One of the drivers of customized configuration concepts – customer opinion – is certainly a measure of success, which is why targeting the right customer mix and differing demands receives particular attention during the optimization process.

"An optimized cabin configuration taps the full potential of the passenger's willingness to accept a fare by offering the right product, in the correct capacity and on the right routes", explains Weigner.

BETTER LAYOUTS FASTER

Leveraging Pacelab Cabin's intelligent positioning options, Lufthansa Consulting was able to evaluate and fine-tune a wide range of improvement measures to meet complex optimization requirements, including the reorganization of service concepts to free-up galley space, and maximizing seating capacity while maintaining the current living space.

"During one project we developed multiple alternative LOPA scenarios and

"WE WERE ABLE TO CARVE OUT AN IMPROVED EARNING CAPACITY PER FLIGHT OF 15%"

were able to carve out an improved earning capacity per flight of up to 15%," Weigner recalls. While the profit margins obtained differ depending on the individual situations of the respective clients, their competitors and their customers, Pacelab Cabin's unique range of configuration features provides the consultants with a powerful toolkit fit for every use case.

Having established its flagship product as a market leader, Pace aims to further strengthen its leadership status in the field of aircraft configuration. In response to the requirements of an increasingly mobile workforce, the company presented its first mobile application in early 2016 and continues to develop such applications. "We are very pleased to see that Pacelab Cabin provides this high level of support that helps our partner find the most profitable configurations for its customers," says Frank Ehlermann, vice president of sales at Pace.

"We are collaborating intensively with Lufthansa Consulting to further improve the capabilities of the product and to address future use cases that engage airlines even more directly into the decision-making process."

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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



s 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 XHRI.300 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 APPROXIMATE 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 partconsolidation 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



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 singleaisle jet with 150 seats. The potential savings are due to the innovative closedcell 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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DIFFERENT CLASS

By regarding aircraft seating as furniture design, not equipment design, and by developing an extra-spatial approach, Acro believes it has achieved a unique offer of comfort and space

ith more than 100% growth yearon-year for the past four years, Acro has become one of the fastest-growing aircraft seating companies in the world, as evidenced by its winning numerous awards and industry recognition for its products and business performance. The company puts comfort at the heart of its seats, approaching their design as it would pieces of furniture rather than items of aircraft equipment, while fully understanding the commercial realities of cabin economics. All this results in comfortable, robust, maintainable and lightweight seats with a low total cost of ownership.

More than just a manufacturing business, Acro is driven by an entrepreneurial spirit, supported by a dedicated team ranging from designers and engineers through to sales, support and back-office staff.

COMFORT IS FOUND IN THE SPACE BETWEEN THE SEATS

Designing and manufacturing seats for discerning airline passengers is an exercise in balancing two important considerations: passenger experience and cabin economics. That is why everything Acro does starts with considering the passenger. Each Acro design is rooted in the philosophy that seats can't be comfortable – only passengers can – and that comfort is found in the spaces between the seats. The design team explores and designs around these hidden dimensions, in a way that creates extraordinary and unexpected differences.

Acro's extra-spatial design approach is a way of exploring and designing to maximize the opportunities that can be provided by the micro-spaces within seating, which are often overlooked. Seatbacks curve gently around the passenger's behind (left to right and up and down), creating a bucket shape that creates an ergonomically correct shape and returns the otherwise wasted space to the left and right of the passenger's hips to the person seated behind. This design



"SEATS CAN'T BE COMFORTABLE – ONLY PASSENGERS CAN "

1. THE SERIES 7 SEAT CAN BE OFFERED AS A BUSINESS/FIRST CLASS PRODUCT ON NARROW-BODY AIRCRAFT AND AS A PREMIUM ECONOMY SEAT ON WIDE-BODY INSTALLATIONS

2. COMPOSITE MATERIALS ENHANCE THE COMFORT AND APPEARANCE OF THE ACRO SEATING RANGE



creates around 2in more room at knee height and allows someone 191cm (6ft 3in) tall to stretch their legs out at a 28in pitch without touching the seat in front. When Acro's designers think about space, they see freedom, opportunity and possibility; not space accepted for what it first might appear to be, but explored for what it can offer.

Inspired by 20th century furniture design icons such as Charles & Ray Eames and Mies van der Rohe, who demonstrated that simplicity is sophisticated, with everything present and nothing omitted, Acro believes that good design comes from the application of common sense, engineering rigor, practical understanding of the cabin and a healthy dose of courage to challenge the status quo. By looking at the 'space within the space', this approach optimizes hidden dimensions in a way that creates extraordinary differences to the passenger experience.

SERIES 6: SIMPLE, ELEGANT, HONEST AND INTUITIVE

A recent addition to Acro's range of seats is Series 6, a totally new design of economy class seat with a style and simplicity that could only come from the unique way Acro looks at cabin space.

The key innovation of the seat – which commences Airbus line-fit operations in June 2017 and retrofit in Q2 2017 – is the simplified and shrunk structure, which sees the standard aluminum seatback frame removed and redesigned as a composite skeleton that is as beautiful as it is efficient, resulting in more living space for the passenger and a 50% reduction in



3. THE SERIES 6 DESIGN SAW THE STANDARD ALUMINUM SEATBACK FRAME REPLACED WITH A COMPOSITE SKELETON THAT IS BOTH BEAUTIFUL AND EFFICIENT

4. SERIES 6 IS AVAILABLE IN FIXED BACK AND RECLINING VERSIONS, AND ITS FEATURES INCLUDE AN INTEGRATED TABLET HOLDER

parts – meaning fewer spares and lower costs of operation.

A philosophy of simplicity through design has led to increased passenger comfort, a more sophisticated appearance with greater legroom and width, lighter weight and superior durability – all of which means an 18in-wide economy seat can be fitted on the B737. Available in fixed back and reclining versions, Series 6 is the future of economy class seating, using passenger experience orientated design features, including an integrated tablet holder. The Series 6 seat is the ultimate demonstration of Acro's extra-spatial design philosophy, unlocking the 'space within the space'.

UNLOCKING ALL CABIN SPACE

In common with every seat Acro has ever made, Series 6 mines the space between the rows for every last millimeter of living room, but with this seat the team has examined the spaces to the left and right and found some precious extra space between the seat and the sidewall.

The company's A320 seat offers window and aisle passengers 18in between the armrests, and the center passenger 19in. Wth Series 6 all three passengers benefit from more elbow room, while maintaining an 18in-wide aisle.

Following certification, Series 6 will be delivered to Airbus in June 2017 for a launch customer, a major flag carrier with an A320 and A321 fleet.

INTRODUCING THE SERIES 7 PREMIUM ECONOMY SEAT

The Series 7 seat can be offered as a business/first class product on narrow-body aircraft and as a premium economy

A GREAT PASSENGER EXPERIENCE IS ABOUT CHOICE: FREEDOM TO MOVE, A SPACE TO 'BE'"

seat on wide-body installations. Supremely elegant and refined, the Series 7 embodies all of Acro's characteristics of comfort, robustness, maintainability and lighter weight. The seat was designed to offer passengers a premium experience, while ensuring that every component justified its presence, with nothing gratuitous included.

The modular platform design, styled to resemble a lounge chair, is optimized for use as both a wide-body premium economy seat and also a narrow-body business class product. This means the seat can be configured to fit a wide range of aircraft and cabins, while retaining the maximum amount of shared components. The various configurations can be tailored to optimize passenger comfort across a wide range of aircraft, with a minimum amount of modifications.

A great experience is about choice: freedom to move, a space to 'be'. Which is why Acro thinks that a journey should be as rewarding as arriving at the destination.

The narrow-body first/business class variant's seat width will be 60in. Each passenger has a side console, which provides additional space for personal stowage and increases the separation between passengers, as well as an elegant single-leaf table.

Although Series 7 is still in development, Acro expects its first retrofit customer to take delivery in December 2018.

SHAPING THE FUTURE

Being flexible, agile and innovative enables Acro to take on challenges that other manufacturers simply won't entertain. These are qualities that drive new product development, allow the company to meet requests for bespoke customization, aid product support, and make Acro excel at managing the delicate and complex relationship between designing for passenger comfort and meeting the demands of aircraft cabin economics.

Since 2007, Acro has designed, certified and delivered more than 80,000 seats, with installations on B717, B737, B747, B757, B767, A319, A320, A321, A330, Fokker, ATR and Saab aircraft. In addition to supporting considerable growth of seat production, the company's facilities enable it to bring more testing in-house and speed up its development and delivery process. A major recent development is that Acro has installed a static test rig to enhance its in-house testing capabilities.

During 2016, Acro substantially increased its regionally centered sales and product support team with additional offices located in Miami, USA and Kuala Lumpur, Malaysia.

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BELOW THE SURFACE

Engineered Ultraleather products offer many of the benefits of leathers and textiles, and a few unique benefits of their own

he competitive nature of today's aviation market demands products that ensure maximum value for the end customer and help reduce the total cost of ownership. Under increasing pressure to deliver weight reductions and fuel savings, airlines must find a seating material that answers these concerns while enhancing passenger comfort and durability.

Constructing seat covers using an engineered product allows for more consistency and greater ease of use during the cutting and sewing process. In addition, such a product provides consistent yield, color, weight and quality. Ultraleather's Takumi construction provides a balance of comfort, quality, durability and weight, helping create the ultimate seating experience.

HOW IT'S ENGINEERED

Ultraleather by Ultrafabrics is manufactured using proprietary technology to create four-layer highperformance fabric. This process does not use adhesives or bonding agents, thus creating an extremely durable product and eliminating the risk of delamination.

The first layer is a protective surface that provides resistance to liquids, stains and the harmful effects of harsh cleaners and disinfectants. It is responsible for the product's easy-to-clean surface and can even be enhanced to resist ink and denim staining.

The next layer is the top skin, made with unique polycarbonate resins engineered for maximum hydrolysis





resistance. This layer adds enduring strength to provide long-lasting vibrancy and consistent grain retention. It has a wide range of leather and non-leather textures and limitless color selections.

The third layer is a polycarbonate foam layer for added comfort and cushioning. Additionally, this layer has been designed to transfer body heat and moisture away from the passenger, creating a comfortable seating experience, even for long-haul flights.

The last layer is a premium reinforced woven backcloth for dimensional stability. It is the foundation and is responsible for the fabric's mechanical properties. The backcloth can be customized based on the specific application and upholstering technique, creating a seat which looks great throughout its life. The combination of these four unique layers produces greater performance, without compromise. Ultraleather can be engineered to achieve customer-specific requirements, including custom grains, colors, finishes and technical specifications. Tapis can adjust the gloss level, weight, breathability and thickness, and incorporate improved inherent properties such as an enhanced ink and stain protection for seating applications. This custom process has the unique ability to resist the toughest stains, including denim dye and ink.

LIGHTWEIGHT

Ultraleather weighs less than leather – in some cases more than 75% less – significantly reducing cabin weight and fuel consumption. At 330g/m² this Ultraleather can provide fuel savings of US\$56,000 annually on a single-aisle aircraft

"TAPIS' IN-HOUSE LAB HAS BEEN ACCEPTED AS AN FAA TESTING FACILITY"

1. THE VERSATILE ULTRALEATHER TECH COLLECTION

2. ULTRALEATHER IS AVAILABLE IN A WIDE RANGE OF SPECIFICATIONS, COLORS AND FINISHES

has tested a number of common aircraft seating materials. They found Ultraleather can be customized to allow the heat transfer to be adjusted to mimic anywhere between a fabric or leather, without creating condensation (i.e. stickiness).

Whether it's a short regional flight, or a long overnight flight, Ultraleather can be tuned to meet the comfort requirements of passengers.

EASY TO CLEAN

Ultraleather wipe-clean surfaces are engineered to be long-lasting. They maintain their top-quality look and feel without having to remove covers and incur laundering costs. The product can be cleaned with common industrial cleaners, including bleach.

EARTH FRIENDLY

In addition to all of the operational and maintenance benefits, Ultraleather helps airlines meet their environmental responsibilities. When a single-aisle aircraft is switched to Ultraleather, the airline can save more than 12,000 gallons of fuel and cut 155 tons of CO₂ per year, and even save 90 cows.

Ultraleather is Greenguard-certified, 100% animal-free, contains no PVCs, HFRs (halogenated flame retardants), plasticizers or phthalates, and meets the most stringent VOC standards for healthier indoor air quality.

For customers who are looking for an alternative to leather and fabric that meets and exceeds the highest expectations for quality and performance, Ultraleather is the answer.

VERTICAL SURFACES

Tapis has developed a custom Ultraleather specification that is specifically designed for vertical applications throughout



commercial aviation. It is manufactured with low heat-releasing FR resins to meet heat release and smoke density regulations FAR25.853, Appendix F, Part IV and Part V and ABD0031.

3. A GEVEN SEAT COVERED IN ULTRALEATHER BRISA HP

This new Ultraleather product provides customers with a reliable and proven product solution that gives them the flexibility to use the product with various composite buildups and move through the certification process smoothly.

Ultrasuede BHC and TapiSuede BHC-SS maintain the same characteristics as standard Ultrasuede and TapiSuede products, but are extremely lightweight and meet the stringent flame-retardant requirements for commercial aircraft.

Tapis is also delighted to announce that its in-house lab has been accepted as an FAA testing facility for smoke density, OSU heat release and Bunsen burner test procedures, allowing for quick turnaround and the ability to conduct tests as needed.

Clients can be reassured that Tapis Corporation's operations are certified to the AS9100 and ISO 9001:2008 international quality system standards. ®

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product is even lighter than most seating materials made from cloth, and this weight difference can provide fuel savings upward of US\$56,000 annually on a single-aisle aircraft.

SEATED AND THERMAL COMFORT

As it relates to the seating fabric, comfort is defined as the ability to dissipate heat and moisture away from the body without allowing vaporous perspiration to condensate on the fabric's surface. This definition explains why cloth seats have become the benchmark for long-haul comfort and why leather seats become hot and sticky over time.

The Hohenstein Institute, an independent laboratory in Germany dedicated to evaluating seating comfort,

MAGNETIC ATTRACTION

By replacing pin-based connectors with magnetic technology, airlines can reap benefits in terms of reliability, customer satisfaction and cost savings

here are as many variations of connector configurations as there are airlines wanting to offer a personalized service to their passengers. Whether it's audio that can handle all different types of headphone plugs - including those that passengers bring with them - or a way to charge passengers' laptops, tablets or smartphones – there are as many variations of requirements for seat cutouts, functionality, pin configurations and IFE systems. This variety can present a lengthy and costly challenge for airlines retrofitting their aircraft cabins, often across a variety of legacy aircraft, to provide new passenger services and stay up-to-date with technology changes.

Phitek, an innovative technology company that produces a range of solutions to assist airlines and system integrators in the in-flight entertainment (IFE) space, has recently received Part 21G approval through independent verification by the European Aviation Safety Agency (EASA). Together with the AS9100 qualification that the New Zealand-based company achieved in November 2015, Phitek is now in a unique position to offer airlines, MROs and seat manufacturers its patented connector technology already certified to aviation standards.

Customized connectors are designed to be able to meet the specific requirements of airlines wanting to offer a personalized service to their passengers. With the addition of Part 21G, Phitek is positioned to utilize its technology to offer any variation of audio or USB power connector to airlines for their cabin retrofit needs. Audio can be delivered through the traditional ARINC pin configurations or through the patented Phitek magnetic connector, while USB power can be provided on a separate jack or embedded into any Phitek jack.

The aim is to enable airlines to choose from different connector solutions for headsets, USB connections and various functionalities and pin configurations with minimal up-front investment and a fast lead time to delivery.

The Phitek magnetic connector is specifically designed to remove the need for traditional 3.5mm and 2.5mm pins, replacing them with magnets that force a series of pins to touch together in such a way that will deliver premium audio from the IFE system to the headphones. If the headphone cable is pulled, the magnets simply release and there is nothing inside the connector to break. Additionally, by eliminating traditional pins, Phitek connectors are designed to last for more than 250,000 connection cycles.

Phitek CEO Roy Moody says, "We are extremely proud to have achieved Part 21G and AS9100 certification, a recognition of our technical expertise in the aviation market. Achieving these certificates gives us the opportunity to offer customers our magnetic connectors, which helps solve 1. THE PHITEK RANGE CAN DETECT WHAT TYPE OF HEADPHONE HAS BEEN PLUGGED IN

2. THE MAGNETIC CONNECTOR MODEL IS BACKWARD-COMPATIBLE WITH PIN-BASED HEADSETS

a problem many airlines have with headphone jacks.

"For example, a passenger may leave their seat and become tangled in their headphone cable. When the cable gets snagged, the angle and force of the tug often breaks the pins from the plug, leaving them inside the jack. More than half of all jack failures are caused by this problem, which costs airlines millions of dollars each year in part replacement, unsold seats and maintenance downtime," Moody says.

Phitek's range of audio connectors have the feature of detecting what type of headphone is plugged in, whether the headphones can support noise cancellation, and what type of plug is used to adapt how audio is delivered. Recognizing that passengers with a strong interest in audio often bring their own headphones, Phitek's magnetic connector is designed to be backward-compatible with old-style pin-based headsets.

"The Phitek team aims to bring intelligent design to every passenger touchpoint in IFE. While our proprietary active noise-canceling technology is now sourced by many of the major airlines and



Eliminating headphone jack failures can save airlines millions of dollars a year

"PHITEK IS POSITIONED TO OFFER ANY VARIATION OF AUDIO OR USB POWER CONNECTOR"

manufacturers of IFE systems, Phitek can now offer its patented magnetic connectors as a solution from premium through to economy," Moody adds.

Alongside the range of Connect Smart products, the company continues to improve its wireless content delivery system. As airlines want to deliver an excellent passenger IFE experience and at the same time generate ancillary revenue, Phitek has developed a compact, lightweight and battery-powered onboard system that streams content to passengers' own devices, providing an economic alternative to traditional IFE.

Passengers can watch a movie, play games, purchase services or duty free, and read inflight magazines on their own devices. Airlines gain an opportunity to generate auxiliary revenue, either through digitalized onboard shopping or advertising. In-built redundancy prevents aircraft-wide IFE outages and provides reliable content streaming. As the system is battery operated, the high-quality media streaming to passengers' personal electronic devices can be achieved with only minor aircraft modifications.

Phitek's range of connectors and wireless content delivery system will be shown alongside the entire range of headphones at the MRO Europe show in Amsterdam, Netherlands (Stand 10-833, October 18-20, 2016) and at APEX Expo in Singapore (Stand 1729, October 24-27, 2016).

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TOURIST ATTRACTION

Having secured the first orders for its Tourist Class model and built a new R&D center, Lift by EnCore is becoming a big player in seating

fter turning heads at this year's Aircraft Interiors Expo, where it announced a collaboration with Boeing to provide seats for the B737, Lift by EnCore is very excited to announce the award of its first two customers. With aircraft orders totaling more than 50 Max aircraft, Lift seats will be flying on the B737 in 2017.

The launch product, Tourist Class Seating, is the first seat specifically designed to complement the B737 Boeing Sky Interior and is spatially, structurally and aesthetically designed to perfectly integrate into the cabin.

The seat provides a 17.9in seat width between the armrests – making it the widest economy class seat option for the B737 – while retaining a generous 18in aisle width. The design is simple, yet elegant and functional, with a focus on creating a holistic product that addresses the needs of all key stakeholders, from the airline to the passenger, while also ensuring long-term reliability. Comfort is the primary focus of the seat design. A sculpted seat pan and ergonomic seatback provide comfort with minimal padding and an elegant appearance.

Among the appealing features are a power port above the tray table, electrical boxes located out of the passengers' footspace, and a centrally located recline actuator that ensures ease of use and minimal maintenance. There is also a wide range of pre-certified options to suit the needs of most airlines.

Lift by EnCore is a new aircraft seating company, part of the EnCore group of aerospace companies that was founded in 2011 by Jim Downey and Tom McFarland. The EnCore group serves the commercial aerospace sector with a broad range of products including seats, floor-to-floor interiors, galleys and monuments, and composite aircraft structures.

According to Elijah Dobrusin, VP of development and strategy for Lift, since launching Tourist Class Seating, the response from airlines and leasing companies has been



Expect a big announcement from Lift by EnCore from Lift Interiors at Aircraft Interiors Expo 2017

1. MUCH OF THE TOURIST CLASS SEAT IS CONSTRUCTED FROM COMPOSITES, MEANING ITS CONTOURS COULD BE SCULPTED TO REDUCE PITCH WITHOUT LOSING COMFORT

OUR GOAL IS NOT TO BE THE BIGGEST COMPANY, BUT RATHER, A GREAT COMPANY"

overwhelmingly positive. "The combination of a great product that is designed from the ground up for the B737, and is offered directly by Boeing, is very appealing," Dobrusin says.

To support the ongoing growth and ensure on-time delivery, in September Lift opened a brand new development center at its headquarters in Huntington Beach, California. The development center is a state-of-the-art facility that combines engineering, certification and prototyping all under one roof, allowing for rapid product development and minimizing any certification risks. After more than nine months of construction, including filling a 12ft hole with more than a million pounds of steel and concrete to absorb the enormous energy from the 16g dynamic tests, testing is now ongoing. While dynamic testing is the centerpiece of the development facility, it is only one aspect.

Lift has the ability to 3D print parts for testing and prototyping and now also has the equipment to 3D print plastics that meet all regulatory requirements and can be installed directly into an aircraft. There is the prototype space for building representative and functional prototypes where engineers and customers can experience their product throughout the development process.

In addition, there is the cycle and abuse lab to ensure the long-term reliability and maintainability of the Tourist Class Seat. Finally, in the dedicated flammability lab, all materials can be tested in-house, ensuring the most stringent requirements are met and allowing Lift to innovative quickly with new materials and processes.

The growth of Lift and the entire EnCore group has far exceeded expectations and with the recent new business for the seats, galleys and composite structures group, the backlog is nearing US\$1bn.

CEO Tom McFarland stresses, "We have grown with foresight and caution. Our goal is not to be the biggest company, but rather, a great company, as judged by our customers and employees."

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Taking off on the MAX in 2017

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CI FAN UP

A new range of lightweight water system components can improve operator efficiency and the passenger experience

The HE lavatory water heater reduces weight, size and hot water recovery time

aving cabin weight is essential for efficient aircraft operations. With this in mind, International Water-Guard Industries (IWG), a leader in UV potable water treatment and water protection for aircraft, has developed new lightweight water system components that greatly contribute to a reduction in the overall weight of an aircraft for OEMs, commercial airlines and completion centers worldwide.

The newest additions to the company's product line are the HE (High Efficiency) Light Weight Lavatory Water Heater and the Light Weight Motorized Valve. These technologies offer the industry reduced weight, smaller size, increased reliability and a more intelligent overall solution for water distribution systems onboard both airline and VIP business aircraft.

In the mid-1960s, lavatory water heaters were developed for and adopted by most aircraft OEMs. The problem is that "FULL DO-160G today. This dated equipment is heavy and inefficient, and the hot water recovery time inadequate, so most passengers never have enough hot water to wash properly when using the lavatory.

IWG has developed an innovative lavatory water heater that is lower in weight and smaller in size than those outdated units, while providing hot water recovery in one third of the time. The unit offers flow-through heating technology with precise water temperature setting and an internal environment that drastically reduces calcium build-up on the heater elements and eliminates bacteria growth. The HE Light Weight Lavatory Water Heater was designed to meet the operational and efficiency requirements demanded by aviation and full DO-160G certification is expected by April 2017.

IWG has also introduced the Light Weight Motorized Operating Valve for its product range, which weighs only 1.2 lb (0.54kg) while maintaining an MTBF reliability of 45,000 hours. Even better, IWG offers a shorter lead time than is currently offered by competitors.



1. THE LIGHT WEIGHT MOTORIZED OPERATING VALVE WEIGHS JUST 1.2 LB (0.43KG)

2. THE HE LIGHT WEIGHT LAVATORY WATER HEATER IS CLAIMED TO BE 25% LIGHTER AND SMALLER THAN SOME COMPETITOR'S UNITS

CERTIFICATION IS FXPFCTFD BY APRIL 2017"

The company strives to continuously meet or exceed the unique needs of aerospace Tier 1 systems integrators and to improve customers' competitiveness by designing and building the industry's best aerospace components. The company offers turnkey engineering, manufacturing and logistics services, which enable it to provide complete, integrated supply chain solutions to Tier 1 aerospace partners.

IWG understands customers' need to lower their overall cost of doing business while delivering world-class performance, safety and quality. To this end, the company has built its business around providing product improvements to the market by transitioning mature products into low-cost solutions with proven manufacturing processes, while developing innovative designs with its engineering centers. ◎

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VISIT IWG BOOTH 6A79 2017 AIRCRAFT INTERIORS EXPO HAMBURG, GERMANY

RAISE A GLASS

The Create Spirit design study has taken a little inspiration from cocktail bars, distilled it, and mixed it into a meaningful textile concept

hat would you like to drink? A familiar question, with a multitude of possible answers, depending on your taste. But how would you translate your favorite tipple into an individually crafted cabin scheme? A little more difficult to answer, but the resulting concepts will leave you thirsty for more.

At this year's Aircraft Interiors Expo in Hamburg, Germany, rohi and Anker, two leading manufacturers of premium aircraft textiles, launched the Create Spirit design study. Inspired by a range of their favorite drinks, it was the result of a joint project to test their ability to interpret any idea into a concept of stunning fabrics and carpets. Philipp Dahm, rohi's managing director, and Alexander von Fuchs-Nordhoff, Anker's sales director, were equally curious as to how this creative study would be received at the Expo.

"We were sitting in a cocktail bar, talking animatedly about design, about interiors and about textiles," explains von Fuchs-Nordhoff. "All of a sudden we thought 'could we design some of our favorite drinks into fabrics and carpets'? Which colors, which patterns and which structures would be right to represent the world of whisky, for example? And for other drinks? Can we translate those atmospheres into textiles?"

The answer is a clear 'yes', given the five custom-designed cabin concepts that have been 'distilled' during the project: Whisky, Gin & Tonic, Bloody Mary, Teguila Sunrise and Pina Colada.

"We wanted to create unique and characteristic concepts for each atmosphere. Take Whisky for example we think of a cosy lounge in muted light, we smell wood and tobacco, we feel genuine leather and metal, and we see



"CREATE SPIRIT BRIDGES CLASSICISM AND MODFRNITY"

predominantly warm colors and classical patterns, interpreted in a modern way. Blues in combination with earthy tones bring in an exciting contrast of cold and warmth. That way, we bridge classicism and modernity and give this world a timeless elegance," says rohi's head of design and managing director, Katrin Hielle-Dahm.

Create Spirit took pride of place on rohi and Anker's combined stand at this year's Aircraft Interiors Expos in Hamburg and



Singapore. "This project again underlines our belief in creating unique solutions for our customers," says Hielle-Dahm. "It is a great way to showcase our design talents and our ability to translate any source of inspiration, however disparate, into a meaningful textile concept."

The Pina Colada

"Our goal is to inspire the industry. We wanted to test and demonstrate again our ability to work with a daring brief but still deliver a coordinated and considered response," adds von Fuchs-Nordhoff.

"The project set out to challenge rohi and Anker to think creatively and to deliver a package of solutions relevant to our airline customers. Such innovation comes naturally to both companies, which are proud of their family-owned history and product quality. Both manufacturers have won numerous design awards for their work, while their clients include some of the world's leading airlines, such as Emirates, Lufthansa and Cathay Pacific. 🔊

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CREATE

A new challenge. A new

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journey. Another example.

kywi

Our latest design study released at AIX Hamburg 2016!

TOHI

ANKER

UNLIMITED OPTIONS

Cabin designers can create new and exclusive environments by making best use of four classes of FAR-rated sheet

o 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





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.



New

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

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. 🔊

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World's widest range of FAA-Rated Sheet offers infinite design possibilities

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CLEAR AND TRANSLUCENTS 65/65-Rated clear and translucents

in a range of opacities



INFINITE TEXTURES

10 Standard surface textures, and custom textures with low minimums





INFINITE PATTERNS

Infinite custom patterns with low minimums and fast turnarounds



INFINITE COLOURS Infinite solid colours with low minimums and fast turnarounds INFINITE METALLICS

Integral metallic colouration for unmatched brilliance, scratch resistance



Sheet products that make aircraft components excel

SUPER CHARGE

Compact in-seat charging port technology can give power to passengers and the increasing number of devices they bring on board

here's an ongoing power struggle on most aircraft today: there's not enough power for all the electronic devices that 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 highpower 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



"THE TA102 **PROVIDES** 2.1A OF **POWER PER** CHARGING PORT"

and business productivity 'on the fly'. This small, economical, easy-to-install charging port delivers just that.

Tom Genovese, True Blue Power account manager, 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 nextgeneration 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 lifespan 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. 🔊

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THE DUAL-PORT TA102 ENABLES TWO HIGH-POWERED DEVICES TO BE CHARGED AT THE SAME TIME

True Blue


HIGH POWER USB Type-C and Type-A configurations

The new name in cabin power solutions.

There's an ongoing power struggle on most aircraft today — not enough power for all the electronic devices pilots and passengers bring on board. The solution is True Blue Power[®]. The TA102 and TA202 Series USB Charging Ports power consumer products requiring a USB interface. These next-generation in-seat, cabin and cockpit power sources enable nonstop entertainment and business productivity on the fly.

They're all the power you need in a small, economical, easy-to-install package.

telephone: +1 316 630 0101 toll free: +1 800 821 1212 email: tbp@mcico.com www.truebluepowerusa.com TA202 Series High Power USB Charging Port

TRUE BLUE

A division of Mid-Continent Instrument Co., Ind

Simultaneously provides 3.0 amps per port



TA102 Dual USB Charging Port

Simultaneously provides 2.1 amps per port

CRITICAL CONNECTIONS

Carlisle Interconnect Technologies is ushering in a new generation of interconnectivity



1. WHATEVER YOU WANT TO USE INFLIGHT CONNECTIVITY FOR. AN UNINTERRUPTED SERVICE IS ESSENTIAL

one are the days of reluctantly putting away your cell phone 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 add the final touches to 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 threeyear-old gets antsy on a 10-hour flight, hitting that magical play button on the seatback monitor quells their unrest; and during the snowstorm 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 fiberoptic cable are intricately woven through the walls and seats of an aircraft, using cutting-edge technology to bring life to in-flight entertainment systems. CarlisleIT's Octax 10Gbps Ethernet assemblies transfer data throughout an aircraft faster than ever before, and the recently launched FlightGear ARINC 791

Ka/Ku Universal Installation sits atop an aircraft, working with satcom systems to transmit broadband connectivity across multiple frequency bands to 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 when performance matters. 📎

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Can Your Fleet Support the Future of Connectivity?

FlightGear[™]ARINC 791 Ka/Ku Universal Installation

- Less down time and lower overall cost of ownership
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- Simplified upgrade path saving both time and money





LUXURY LIGHTING

Carefully considered lighting can enhance cabin design and the passenger experience

ith demand for luxury air travel at an all-time high, the industry is experiencing a shift in what customers expect from their travel experience. Whether it's gourmet food in airport lounges, inflight bars where travelers can socialize with each other, or the increasing availability of onboard wi-fi, today's high-end passengers are looking for a luxury experience comparable to that of a 5-star hotel.

PERSONALIZATION

To create a more luxurious passenger experience, the focus of airline interiors is turning to personalization. Rather than feeling like just another flyer, passengers want to be treated like individuals. The products and services they interact with can help considerably with this.

EVOLUTION

Airline interior lighting has come a long way from the one-color, fluorescent brightness of early passenger airplanes. According to the Airbus presentation at this year's 'Up in the Air' conference, lighting is now a major consideration for airline passengers.

With reading being one of the most popular activities while in the air, in-seat lighting is particularly important. After recognizing that glare from LEDs was not producing the best reading illumination, a specialist and pioneer in LED in-seat reading lights, Beadlight, began researching alternative solutions. The result is a patented light diffusion technology, a groundbreaking technique that offers a clear, even and glare-free solution to inflight reading that no other light can.





"IT'S CLEARLY AN EXCITING TIME FOR THE INTERIOR LIGHTING INDUSTRY"

A BESPOKE EXPERIENCE

Beadlight's lights are designed to be suitable for the seating environment they serve, whether this is for reading lights, mood 'color washing', or even seat brand lighting. Each light is customized for the individual airline, through a choice of finishes, switch positions on the upper or lower light head surface, and a range of optional light intensities. Each light is then handcrafted to order.

Regardless of whether they want to spend their flight reading, working or enjoying seatback entertainment, every passenger has different needs in terms of the lighting they require, and their in-seat lighting should reflect this. With Beadlight's range, passengers can adjust their light from cool to warm on certain models, depending on their requirements and preferences. Most importantly, however, Beadlight's innovative diffusion technology means that the light is kept within the confines of each seat. This According to Airbus, lighting is a major consideration for airline passengers

> 1. BEADLIGHT'S READING LIGHTS FEATURE PATENTED LIGHT DIFFUSION TECHNOLOGY

2. BEADLIGHT USES STATE-OF-THE-ART MANUFACTURING TECHNIQUES

enables passengers to tailor their experience while remaining courteous to their fellow travelers.

When executed correctly, lighting acts as a guide for passengers for the duration of their flight. It coaxes them into sleeping during overnight flights, or being awake for tasks such as reading or enjoying a meal. On a deeper level, new lighting technology can transform a flight into a highly personalized, interactive experience that enhances each passenger's mood and keeps them happy, from take-off through to touchdown.

TOMORROW'S AIR TRAVEL

With personalization now an essential part of luxury air travel, offering passengers the ability to adjust their seat lighting based on their own wishes is something that's likely to be seen more and more. With Beadlight's innovative light diffusion technology, this bespoke experience is becoming a reality. And, with so many other new ideas and concepts emerging, it's clearly an exciting time for the aircraft interior lighting industry.

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FOCUSED ON THE DETAIL.

MADE IN BRITAIN

WE DESIGN, ENGINEER AND MANUFACTURE THE ULTIMATE AEROSPACE READING LIGHTS.



THERMAL COMFORT

The next level of luxury for premium travelers will be the ability to tailor their personal in-seat microclimate

he first and business class travel experience has improved vastly over the past decade. Advances in cabin design, seat design and connectivity have greatly improved the level of comfort for travelers, but to compete for premium passengers, the premier airlines must also provide the kind of immersive luxury experience to which these travelers have become accustomed in their daily lives. Increasingly, this luxury is found in the passengers' ability to customize their environment and, while premium class accommodations offer many choices, missing from this set of luxury amenities is the ability to personalize the thermal environment.

Inspiration can be found by looking at the luxury automobile and how it caters to the well-being and comfort of passengers. The average first and business class passenger travels to and from the airport in the luxury of an automobile that offers in-vehicle wi-fi, luxurious interiors, high-fidelity entertainment and thermal comfort choices, resulting in a personal microclimate, centered around their climate-controlled seat. On board the aircraft, most of these same amenities remain, with the exception of thermal comfort. In their automobiles, passengers are able to personalize their thermal environment through adjustment of seat and surface heaters, active seat cooling and multizone climate control systems. This personalization ensures that, regardless of outdoor temperature or other occupants' preferences, a luxury automobile passenger can control their individual microclimate to match their current need and optimize their travel experience. This same luxury, if applied to aircraft seating, can increase relaxation, productivity and sleep continuity, which are all luxury experiences that premium passengers have come to expect. But this innovation, so ubiquitous in luxury automobiles, has not been made available to aircraft interiors – until now.

Gentherm, a leader in automotive thermal comfort systems, and a pioneer



1. THROUGH SEAT AND SURFACE HEATING AND COOLING, PASSENGERS CAN CREATE THEIR OWN MICROCLIMATE

"THIS INNOVATION HAS NOT BEEN MADE AVAILABLE TO AIRCRAFT INTERIORS - UNTIL NOW"

in microclimate solutions, is shifting the paradigm for premium passenger comfort by making personally controlled thermal comfort on board aircraft a reality. Providing this comfort requires the ability to individually control and deliver energy and airflow on demand to targeted surfaces for each passenger – something current aircraft environmental control systems are unable to deliver. The seat surface, which is the largest, single contact area for a given passenger, makes it the ideal anchor for efficient thermal comfort and a personalized microclimate.

With 40 years of thermal comfort experience in the luxury automotive industry, and millions of systems sold worldwide, Gentherm's solutions have proven to be consistently high performing, safe and reliable. The company's solidstate thermoelectric heat pumps,

proprietary air distribution systems and other heating technologies, offer an array of solutions that allow the seat OEM and airline to optimize system performance based on specific power, weight and reliability requirements.

cushions to

the hard seat

surfaces can be

adjusted

Gentherm understands that each passenger has unique thermal comfort requirements and its engineers can solve the most complex thermal management problems. Gentherm systems provide customers with uniquely tailored thermal technology that creates a personalized thermal comfort environment and enhances the prestige and value of the air travel passenger experience. 🔊

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LUXURY THERMAL COMFORT

We are the industry-leading expert in thermoelectrics and their application for the improvement of passenger thermal comfort. For more than forty years, we have provided our customers uniquely tailored, thermal technology to create personalized thermal environments that enhance the prestige and value of the passenger experience.



INNOVATION WORKSHOP

Visions merge with innovations in Boxmark's workshops to form customized product solutions for aircraft interiors

1

he desire for a perfect and unique piece of design is the starting point for all projects carried out by Boxmark. A quick understanding of a customer's ideas, attention to detail and creativity, as well as highly qualified employees, provide the basis for the reliable realization of visions.

The company tackles all kinds of challenges. Be it new leather seats for vehicles, sophisticated and well-designed furnishings for aircraft, ships and trains, trendy and stylish wall coverings and building constructions, or classic seating furniture – Boxmark produces leathers for all types of interiors. With its innovations in development and production, however, Boxmark competes not only in the market for interiors, but also for exteriors.

Boxmark uses only high-quality materials for its projects, including the finest leathers and fabrics, substructures and upholstery materials, as well as sewing and embroidery cottons – and these are only some of the materials in the company's wide range of products. The products meet all test criteria of international industry standards and customers are therefore assured that they will receive the best quality.

When it was granted its Production Organization Approval certificate in 2013, Boxmark became an authorized and certified producer for the aeronautics industry and thus a supplier to the international aircraft industry.

To safeguard the company's future, Boxmark is constantly investing in the development of market-oriented products. The state-of-the-art and environmentally friendly manufacturing of quality products is a big part of Boxmark's corporate policy.

Boxmark's newest product is the luxurious Luxury Traveler sofa for aircraft. Created in cooperation with the internationally renowned designer Jacques Pierrejean, the sofa offers sophisticated air passengers an extraordinary amount of space, incomparable comfort and numerous extravagant features. The finest leather and high-quality materials are

"BOXMARK INVESTS IN DEVELOPING MARKET-ORIENTED PRODUCTS"

processed at Boxmark with diligent skill and guarantee a stylish atmosphere in the first-class sections of commercial aircraft, as well as in business and private jets.

Further innovative products are a leather floor and 3D leather sidewall panels for aircraft interiors.

The leather floor was developed with F/LIST. F/LIST leather flooring is available with a customized tiling concept in a range of colors and structures, and meets all certification requirements, such as flammability and slip resistance. A very stringent qualification program ensures that F/LIST leather flooring exceeds the most demanding customer expectations. As with all quality leather products, the material improves with age, and does not suffer from wear and tear. The flooring High-quality leather products can actually look better with age and use

> 1. ATTRACTIVE EFFECTS CAN BE INCORPORATED INTO 3D LEATHER SIDEWALL PANELS

2. EXQUISITE FINISHES ON THE LUXURY TRAVELER SOFA

3. THE LUXURY TRAVELER SOFA OFFERS COMFORT, SPACE AND A LITTLE EXTRAVAGANCE



develops a rich texture that looks beautifully lived in, enriching the style and atmosphere of an aircraft cabin.

The 3D leather wall panels by Boxmark are outstanding innovations that can be used to create a unique aircraft cabin environment by adding elegance, sophistication and a luxurious appearance.

Boxmark is one of the world's leading manufacturers of high-quality upholstery leather. As a trendsetter of chrome-free tanning, Boxmark specializes in the manufacture and processing of high-end products for the upmarket indoor and outdoor sectors.

The company's heritage in leather production goes back more than 200 years. Based on this tradition and state-of-theart manufacturing techniques, Boxmark can offer full custom-manufacturing services and the complete range of leather refining and processing services.

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LUXURY TRAVELLER







This luxurious sofa for aircraft was created in cooperation with the internationally renowned designer Jacques Pierrejean. "Luxury Traveller" offers sophisticated air passengers an extraordinary amount of space, incomparable comfort and numerous extravagant features. The finest leather and highquality materials are processed at BOXMARK with diligent skill and guarantee a stylish atmosphere in the first-class sections as well as in business and private jets.



BOXMARK Leather d.o.o. Industrijsko naselje 10, SI-2325 Kidricevo Phone: +386 2 7991-0, Fax: +386 2 7991-641 si.office@boxmark.com | www.boxmark.com



SEE THE LIGHT

A simple and effective retrofit LED cabin lighting system can not only improve the appearance of a cabin, but also actually improve an operator's return on investment

fundamental belief among the experts at STG Aerospace is that improving cabin lighting can improve an airline's metrics in a number of ways: from enhancing brand identity to increasing inflight sales and reducing maintenance costs. To get the lighting right, you need the right products. And to achieve that, you need a precise, expert approach to product development.

With the liTeMood plug-and-play retrofit LED mood-lighting system, STG Aerospace thinks it has the right product. With the system having been chosen by a number of airlines across Europe and North and South America, it is becoming the system of choice for operators of narrow-body Boeing fleets looking for a best-in-class but cost-effective solution for upgrading dated cabin lighting.

FAA and EASA approved, the blue/ white bi-color system creates a calming and fresh cabin ambience by delivering outstanding quality and consistency of light throughout the cabin.

As STG Aerospace's director of innovation, Dr Sean O'Kell explains, "It's not just about the quantity of light, it's also the quality of the light. It's how it affects someone's photobiological response as well as their photometric response – how it impacts you physically rather than just visually. The phrase we like to use is 'human-centric lighting'".

A liTeMood system can typically be installed in under five hours by an operator's technical staff, independent of and with minimal impact to other cabin maintenance, using the aircraft's existing wiring mounting points, connectors and control panels. There are many other benefits for aircraft owners when upgrading existing fluorescent cabin lighting with liTeMood LEDs.

The difference to the cabin interior is instantly noticeable; however, it is the long-term benefits that deliver real impact. UV rays emitted by fluorescent bulbs have a negative impact on materials such as plastics and cloth, which deteriorate over time. Replacing the fragile



Read an interview with innovation director Dr Sean O'Kell on our website

1. TITAN AIRWAYS IS VERY SATISFIED WITH THE SWIFT INSTALLATION OF THE LITEMOOD LED LIGHTING SYSTEM

EVERY ELEMENT NEEDS TO BE INTEGRATED WITHIN A HOLISTIC OVERVIEW"

fluorescents with liTeMood LEDs helps prevent this while also increasing lifetime performance, with a typical LED lasting in excess of 50,000 hours.

Considerably more reliable than traditional fluorescent lighting systems, liTeMood helps reduce maintenance and operational costs, offering up to a 36kg weight reduction and a reduction in power consumption of at least 50%, while also substantially increasing both fuel efficiency and electrical efficiency.

Properly optimized LED cabin lighting also makes everything else in the cabin look cleaner, brighter and even newer – including interior surfaces that are being routinely and expensively repainted, re-surfaced or replaced. Such is the dramatic enhancement of the interior that STG Aerospace reports feedback from several customers who have said that following installation of liTeMood, the better lighting has enabled them to defer other significantly more expensive maintenance activities such as replacing or recovering sidewall panels and seats. As Alastair Willson, director of charter carrier Titan Airways, the latest airline to install liTeMood, says, "The simplicity and speed of installation was exactly as described and the transformation of the cabin was breath-taking."

At the heart of STG Aerospace's product development philosophy is an understanding that there are many components to cabin lighting and a belief that not only should each element be task-optimized, but that every element needs to be integrated within a holistic overview of the cabin. It's a philosophy that underlies the recent launch of a number of ancillary LED lighting products within the liTeMood range, including overwing exit lights, recessed ceiling, and forward and aft entry lights.

There is also an innovative reading light, which delivers a high quality, uniform, square light pattern, providing a better reading environment and also helping to define the passenger space, eliminating light spill onto neighboring passengers. As O'Kell says, "By using the ceiling and sidewalls to give the best quality of ambient light, everything looks better. It's all about perception."

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At STG Aerospace, we see cabin lighting from the outside in.

It's our vision for your Airline, which has resulted in a new breed of beautiful, practical LED cabin lighting designed to transform your cabin environment.

Developed by the makers of saf-Tglo[®] and saf-Tsign[®], liTeMood[®] has a simple interface, can be retrofitted within a few hours – and has customisable programming that reinforces your brand and gives every passenger an upgraded experience.

Find out more at stgaerospace.com **Vision beyond.**

liteMood[®] from **stg** aerospace

BRAND VALUES

A seat supplier can interpret contemporary life and translate brand values into cabin designs

positive reputation cannot be bought by a company: it has to be earned. Reputation mostly comes from the opinions of customers who rate their satisfaction by comparing the expected values versus the delivered products and/or services.

Optimares can make an airline's cabin design consistent with the values of its brand – a cabin able not only to satisfy, but also to surprise the passenger by exceeding their expected travel experience. The travel experience is not an objective thing, measurable with matrices and numbers, but is a personal choice, an expression of modernity or fact, of being contemporary.

These days, traveling is not just simply about going from point A to point B; passengers are increasingly seeking airlines that propose a concept of travel that suits their own positive and seamless projections of a trip. They are looking for an experience where they can find themselves in their own contemporary world. An airline's differentiation is built around that concept – the proposed travel experience that might start with the online booking and end with the passenger drop-off with the airline's rental car at the final destination.

Optimares aims to help airlines design a major part of this traveling experience: the flying experience.

"We help the airlines with the opportunity to build a cabin that would allow them to propose that projected positive experience to the passenger," says Marco Tonucci, head of business development at Optimares.

"This way, the cabin is an asset. It is a strategic tool in the hands of the airline to offer a differentiated service and convince its clientele to fly with them, not only for the schedule or price of the ticket, but for the unique travel experience that passengers can enjoy during their trip," adds Tonucci.

Optimares's vision is to balance design possibilities and the sophisticated engineering and certification constraints



THE CABIN IS A TOOL FOR THE AIRLINE TO OFFER DIFFERENTIATED SERVICE"

of the aircraft cabin and to be able to offer that opportunity to an airline.

Sophisticated state-of-the-art technology can generate a feeling of confidence and relaxation that will transform a trip into an experience of the senses, where everything we see in the cabin has been designed around us. Representing the airline when developing a cabin results in passengers feeling in touch with the culture of the airline's home base.

This is exactly the approach Optimares has taken with the development of the Hawaiian Airlines cabin. The airline is a strong brand tied to a strong island culture, yet the team has been able to translate it into a technological, yet soft and pleasing product that conveys the 'spirit of Aloha' to its premium customers.

"We have reinvented a cabin, creating a new class, the 'premium leisure' class, developed to balance the professional needs of business travelers and the luxury Hawaiian Airlines is the aunch customer for Optimares's new Maxima 1. STYLE MEETS CRAFTSMANSHIP AT OPTIMARES'S PRODUCTION FACILITIES IN LAZIO, ITALY

2. THE FLOWING CURVES ON THE SEATBACK ARE INTENDED TO BE EVOCATIVE OF THE WINDS AND THE OCEAN



expectations of honeymooners and highend tourists," explains Alessandro Braca, CEO of Optimares.

Walking into the front of a Hawaiian Airlines A330 is like walking into a luxury experience that is an expression of one of the elements of the magical islands of Hawaii.

The ability of the Optimares team to be in tune with its audience gives airlines the opportunity to work with a seat supplier that thinks like a sophisticated traveler.

With the Hawaiian Airlines deal, Optimares has demonstrated to its airline partner that it is able to translate a brand value into a cabin.

Optimares has validated its business model by introducing a disruptive innovation. The company is now working on various cabin developments using the same approach it used with Hawaiian Airlines – translating the strategic vision of the client into differentiating products built around the airline's core brand.

The company has created an outstanding network of competencies and partners and has won several prestigious industrial design awards. 🔊

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THE JOURNEYS DE ALLS

TRAVEL WITH US TO A BRAND NEW CONCEPT OF SPACE.

Technology joins passion and experience to bring a brand new seat concept to life. Take your customers' travel experience to the next level.





PLANS IN MOTION

Astronics PGA Avionics is expanding its range of innovative in-seat motion systems

stronics PGA Avionics, a global manufacturer of in-seat motion systems for 20 years, recently expanded its Carat Motion products family with the Gen VII ECU. The innovative, optimized seat motion electronic control unit (ECU) offers an unprecedented number of features housed in a highly compact unit. The unit has exceeded internal capability testing and has also passed the latest Airbus and Boeing tests. The Gen VII ECU is certified for the latest A350 family and ready for the incoming Boeing 777X.

Adaptive design makes the Gen VII ECU compatible with every type of seat configuration and it is scalable to any seating electrical options. The Gen VII ECU was developed and designed with special consideration to sustainability and environmental impact. The combination of lower weight (savings of 650g), compact design (30% less volume), increased functionality, easier maintenance and lower operating costs, compared with some rivals, makes the company confident that the Gen VII ECU is the best-in-class product for aircraft seating motion control.

Astronics PGA Avionics is again expanding its Carat Motion offerings with the introduction of Easy Monitoring Solutions (EMS), a new single maintenance and configuration software suite that provides access to a comprehensive set of user-friendly features and instant control over the full actuation system. The new EMS interface, available for tablets or laptops, was designed with users in mind, both on the assembly line at seat manufacturers, or directly in the cabin for maintenance operations. New EMS functions make ECU software configuration accessible for customization, enabling easy modification of all system parameters including lights, actuators, passenger keyboards, internal software and hardware parameters.



"ADAPTIVE DESIGN MAKES THE ECU COMPATIBLE WITH EVERY SEAT CONFIGURATION"

INNOVATIVE SEAT MOTION

Astronics PGA Avionics is an innovative designer and builder of in-seat motion control systems. The company's range of actuators has been upgraded to increase seating comfort for passengers, providing smoother and quieter motion and increased power and performance, all at the same size and weight as the previous generation. Reliability levels remain unmatched, making these recent product innovations ideal choices for seat manufacturers striving to fulfill the expectations of airlines.

These new products and features illustrate just a few examples of how Astronics PGA Avionics is a technology leader, and an innovative designer and builder of in-seat motion, lighting and IFE systems for commercial, VVIP and business jet aircraft. In the coming year, the company will further expand its Carat offerings with new products and features that support lower cost of operation such as ease of maintenance, smarter fault detection and wireless connectivity. PGA will also be looking to add features to its offerings that make the passenger flight experience more relaxing, with systems that immediately adapt to the cabin and environment.

Additional information on the Gen VII ECU, EMS and other Astronics PGA Avionics products and systems can be found on the company's website. Astronics PGA Avionics is a subsidiary of Astronics Corporation, a leading supplier of advanced technologies and products to the global aerospace, defense and semiconductor industries. Astronics' products and services include advanced, highperformance electrical power generation, distribution and motion systems, lighting and safety systems, avionics products, aircraft structures, systems certification, and automated test systems. @

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THE DESTINATION FOR THE AIRCRAFT INTERIORS INDUSTRY.

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4-6 April 2017, Hamburg Messe, Germany

Aircraft Interiors Expo is the world's market leader event dedicated to airlines and the supply chain to source the latest innovations, technologies and products for the cabin interiors, inflight entertainment, connectivity and passenger comfort industries.

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GOOD TIMES

From innovative seating products and major airline contracts, to industry recognition and a growing network, the new Stelia Aerospace brand is proving to be a success

reating luxury premium seats that offer the optimum passenger experience is at the heart of Stelia Aerospace's raison d'être. Its products range from the best-selling Solstys family, which offers one of the widest and longest beds on the market, to Opal, the latest addition to its portfolio of high-comfort premium seats.

Launched at Aircraft Interiors Expo 2016 in Hamburg, Germany, Opal has been designed for efficiency. Its innovative industrial design means it can be extensively customized while meeting an airline's program constraints and creating room for up to four additional passengers.

Stelia Aerospace's ability to manage highly customized programs with 100% reliability is valued by its customers. Its staff are proud to be recognized by Airbus for the third year running as the bestperforming buyer-furnished-equipment seat supplier, and this year as a gold standard supplier by Boeing.

As Thierry Kanengieser, VP of cabin interiors at Stelia Aerospace, says, "Industrial excellence is a driving force. From start to finish, our program management, engineering, commercial and aftersales teams can support customers."

The company's Ultimate 17 first class platform has been selected by two new customers this year. Bringing a spirit of French luxury to client briefs drives Stelia toward highly individual solutions, incorporating customizable features such as doors, lighting and working surfaces. This customization, combined with the use of innovative materials, creates a distinctive branded experience with which the airline can welcome their most loyal customers, and in which the passenger can feel immediately at home.

Stelia Aerospace has also been extending the customer base for Celeste, its innovative medium-haul seat for single-aisle aircraft. With customers in three different regions, and deliveries starting in early 2017, this futuristic seat offers exceptional comfort due to its swinging cradle recline motion.



1. THE CELESTE MEDIUM-HAUL SEAT FOR NARROW-BODIES IS ATTRACTING NEW CUSTOMERS

"WE HAVE HAD A PHENOMENAL COUPLE OF YEARS"

The company's engineers are also working towards the next-generation passenger experience. Having been the first to patent the use of vertical space in the cabin with the highly efficient Equinox family of seats, Stelia Aerospace is now turning toward a more holistic view of the passenger experience. Researching and combining technologies from diverse fields to create a well-being 'bubble', the SeatZen concept is extended to create a fully immersive traveling experience for first class passengers.

Stelia Aerospace is continually extending its reach. The company's global sales and support network extends close to all its customers, ready to support them seven days a week, 365 days a year via its internal and external partners in Seattle, Miami, Rochefort, Dubai, Abu Dhabi, Bangkok, Singapore and Beijing.

Kanengieser is already looking forward to the challenges to be met in 2017: "We have had a phenomenal couple of years since the creation of the Stelia Aerospace brand. We have secured three new customers for Celeste, secured on-time and on-quality delivery of all of our customer programs – including businessclass seats on A350s for Vietnam Airlines and Thai Airways – and extended our customer base by welcoming several new customers, including Singapore Airlines for its B787s and A350s.

"2017 promises to be another grand cru with the extension of our product range, a mix of programs for our customer base and new customers across Boeing and Airbus platforms," says Kanengieser. @

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A very good year

AS THESE HIGHLIGHTS SHOW, 2016 HAS BEEN A PARTICULARLY INTERESTING YEAR FOR THE AIRCRAFT INTERIORS INDUSTRY

JANUARY

The year began with an unexpected announcement from Ryanair. Over the years, this Irish LCC has been rumored to be fitting everything from standing seats to coin-access lavs – hardly refinements to the passenger experience – so it was a pleasant surprise when it revealed improvements for its new B737-800s, including a Boeing Sky Interior architecture, a mellower yellow color scheme, and seat comfort enhancements. This is the latest development in Ryanair's 'Always Getting Better' strategy, which is seeing an improved passenger experience rewarded with record passenger numbers.

FEBRUARY

Jumbo lovers were excited to see British Airways (BA) put another refurbished B747 into service – the sixth out of 18 BA has earmarked for a major makeover. The refits, being carried out by BA engineers in Wales, involve a cabin interior refresh to bring them in line with the airline's newest A380s and B787s. The work includes fitting an additional 16 business class seats, new seat foams in economy and premium economy, mood lighting in every cabin, and Panasonic eX3 IFE.

MARCH

Ahead of the 2017 launch of the Airbus A330neo, Airbus unveiled a consumer-centric cabin interior for the aircraft, which also forms the basis of a new brand: Airspace by Airbus. The concept continues the design language introduced in the A350 cabin and will form the basis of future Airbus cabin designs, across all aircraft families. For the full story and a video tour, visit our website.

APRIL

This was a big month for commercial aviation, with Airbus's US manufacturing facility in Alabama completing its first aircraft, an A321, for delivery to JetBlue. Airbus only broke ground on this US\$600m single-aisle assembly line in 2013, and the company anticipates delivering four aircraft per month from the Mobile plant by the end of 2017.

In other April news, Gogo's 2Ku technology officially took flight with launch customer Aeroméxico.

MAY

Cathay Pacific received the first of its 48 A350-900s, featuring new business, premium economy and economy products, designed in conjunction with Tangerine (see p72) and Porsche Design. Of particular interest is the economy seat, which features innovative seatback stowage and a proprietary six-way adjustable headrest.

JUNE

A real milestone of 2016 was the reveal of Polaris, United Airlines' new intercontinental business class product. The 'herringline' LOPA was devised by Acumen (see p56), with PriestmanGoode (see p48) working on a complete overhaul of the United business class passenger experience. United reports that more than 12,000 hours of research were conducted over the course of the development of Polaris, with some interesting findings. For the full story and a video tour, visit the Articles section of our website.

JULY

Virgin Atlantic and Airbus announced a US\$4.4bn order for 12 A350-1000s as part of the airline's fleet modernization program. The airline's passenger experience team is undertaking in-depth research on the cabin design – which uses the Airspace by Airbus cabin architecture – but expect an Upper Class bar area and a development of the Upper Class Suite – as well as a few surprises.

All these stories and more featured in the weekly news updates on our website: www.aircraftinteriorsinternational.com

AUGUST

Things are heating up in the US business class arena, with Delta's announcement that its new Delta One business class suites will be fully enclosed, with sliding doors. Delta is billing this product as "the world's first all-suite business class", and it involved some heavy customization work by Factorydesign (see p52). The product will launch in autumn 2017 on the A350.

SEPTEMBER

Ahead of the 2018 launch of Embraer's E-Jet E2, the company inaugurated a manufacturing facility for its premium seating subsidiary, Embraer Aero Seating Technologies (EAST), in Florida. The operation will produce seats for Embraer's business and commercial aviation products. For an in-depth look at the E2 cabin design, visit the Articles section of our website.

OCTOBER

Something different for fans of Aircraft Interiors Expo: an event in Singapore (October 25-27), which will be co-located with APEX Expo and Future Travel Experience Asia. To see what's going on, there are show previews in our September issue (also available on our website).

NOVEMBER

November sees the inaugural flight of American Airlines' first B787-9, which will be fitted with the latest development to emerge from the airline's more than US\$3bn investment in improving the customer experience: premium economy. The 21 leather-trimmed seats (arranged 2-3-2) will offer 38in of pitch, and extendable foot, leg and head rests.

DECEMBER

As United's Polaris product begins operations, so *Aircraft Interiors International* prepares for the year ahead. We already know there are a lot of exciting developments in store for 2017...

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