

# Aircraft *interiors* INTERNATIONAL

NOVEMBER 2009

THE INTERNATIONAL REVIEW OF AIRCRAFT INTERIOR DESIGN & COMPLETION



packagedeal

HOW IFE AND SEAT SUPPLIERS ARE  
EXPLOITING THE LATEST DISPLAY  
TECHNOLOGY TO DESIGN  
SLIMMER AND BETTER SEATS

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# RECARO

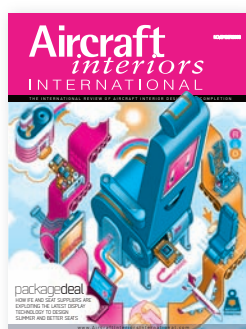
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## watchthisspace

Passengers confronted by bulky IFE screens housed in rather utilitarian and cheap-looking plastic shrouds in the back of some of today's economy-class seats must despair. It's all a far cry from the seamless joins and clean lines of their car interior back on the ground – even the cheapest, most basic auto models enjoy a level of form, fit and finish that far surpasses that found on the vast majority of aircraft flying today.

However, help is at hand. Panasonic's unveiling of its 'Fusion' integrated seat project at the recent WAEA show in Palm Springs points to a future of swish, slimline seats that ooze style and sophistication. And it's not just their good looks that will have passengers swooning. Older travellers in particular are likely to appreciate the fact that all controls are in one location and the touch-screen interface has been simplified. Meanwhile airlines will welcome the weight, power and volume savings, as well as lower operational costs and improved maintenance and reliability.

So what's behind this vast improvement? A greater cooperation between Panasonic and selected seat vendors, of course, with Teague throwing its industrial design expertise into the mix. But the main breakthrough is the result of a new generation of slimline monitors. "The screens are a lot thinner, which allows us to package the IFE in the seat better," says B/E Aerospace's Alex Pozzi when quizzed on the subject in our seat/IFE integration feature on page 40. The unsightly gaps and ridges of today's ill-fitted screens will soon be a thing of the past: "Evolution in display and touch-screen technology have made possible a mechanical design in the seat monitor that allows for flush mounting the display with the shroud," explains Panasonic's Cedric Rhoads. "Second, the thickness of the display is also influenced by LCD display technology as well as the move to our low-power EcoSeries Architecture," he continues. "These technologies allow for a mechanical design that is much more compact due both to thinner mechanical elements and structural components, and significantly lower thermal dissipation design requirements." So it's official – this really is 'cool' technology!

Interestingly, Pozzi says increased seat/IFE integration could see the end of active recline in economy: "You may see seats where now that the back is a lot thinner we just set the back at 20° of recline and leave it there," he says. Of course, fixed living space (but with 'forward recline') is a key element of premium economy, as evidenced by Air France's new Premium Voyageur cabin (see page 32), and ANA's premium economy on its new 777-300ERs – the latter aircraft providing a big clue as to what to expect to find on ANA's first 787 when it arrives late next year. For those that can't quite afford premium economy but still fancy a little more legroom, carriers are increasingly charging for the privilege of sitting in an emergency aisle seat – one wonders whether the aesthetic impact of slimline seats with flush-fitting screens will be a little lost on passengers facing a bewildering mix of evacuation signage and safety warnings!

Anthony James, editor

THE SCREENS ARE A LOT THINNER, WHICH ALLOWS US TO PACKAGE THE IFE IN THE SEAT BETTER

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The latest interiors news from around the globe

### 024 design briefs

Two seating concepts designed to increase capacity – Design Q's inward-facing MAXCABIN, and Aviointeriors' vertically staggered Third Dimension

### 028 fact file

US Airways' fleet at a glance

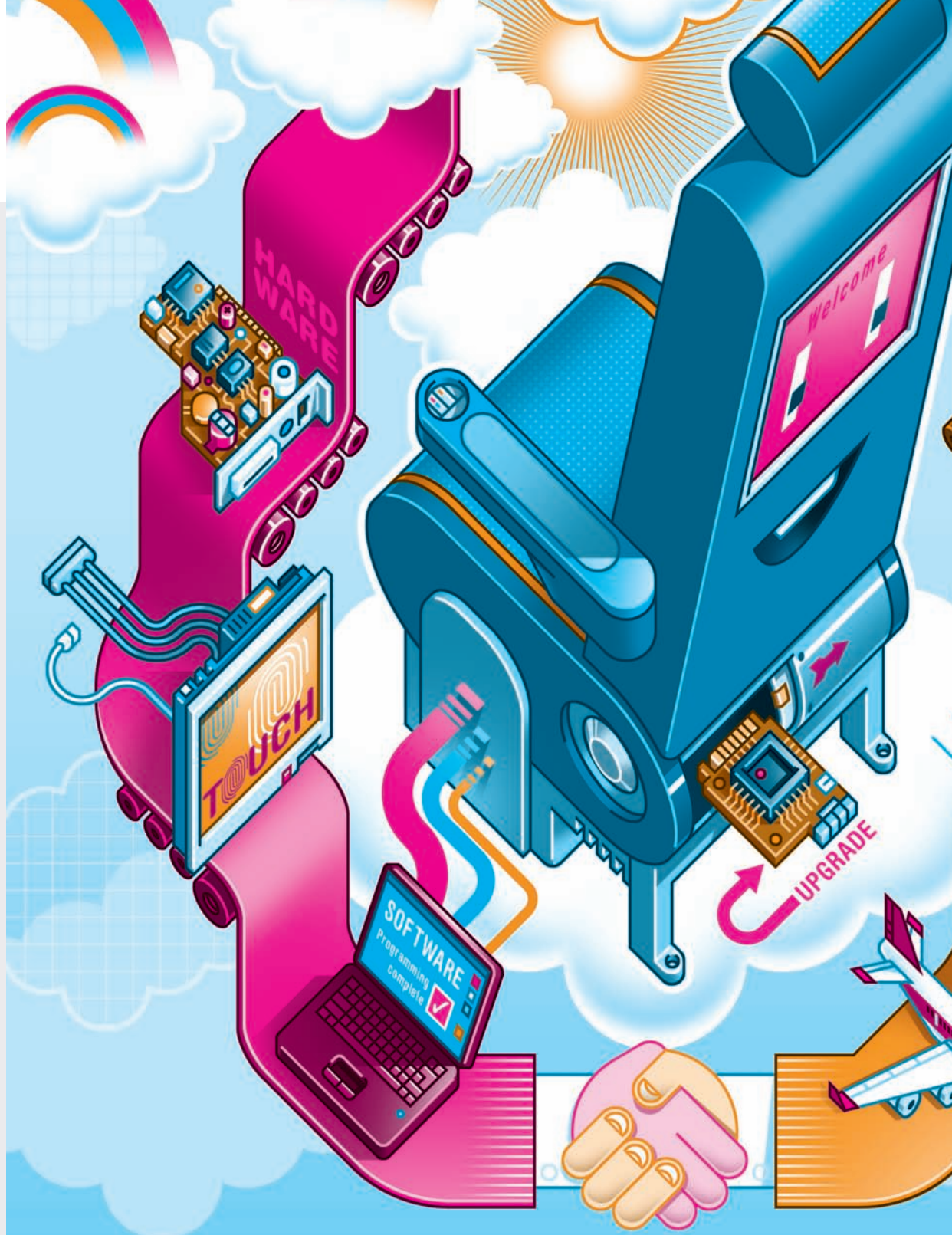
### 089 products and services

The latest product news from our advertisers

### 096 face space

Neal Stone explains why he moved on from head of design at British Airways to launch his own design firm

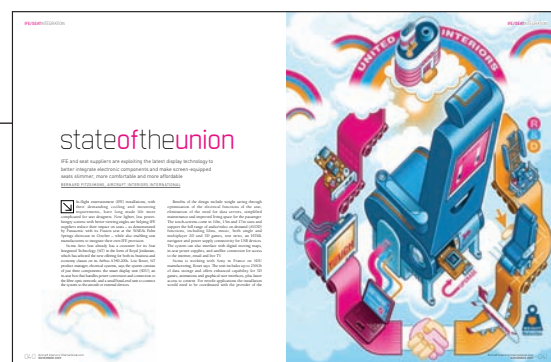
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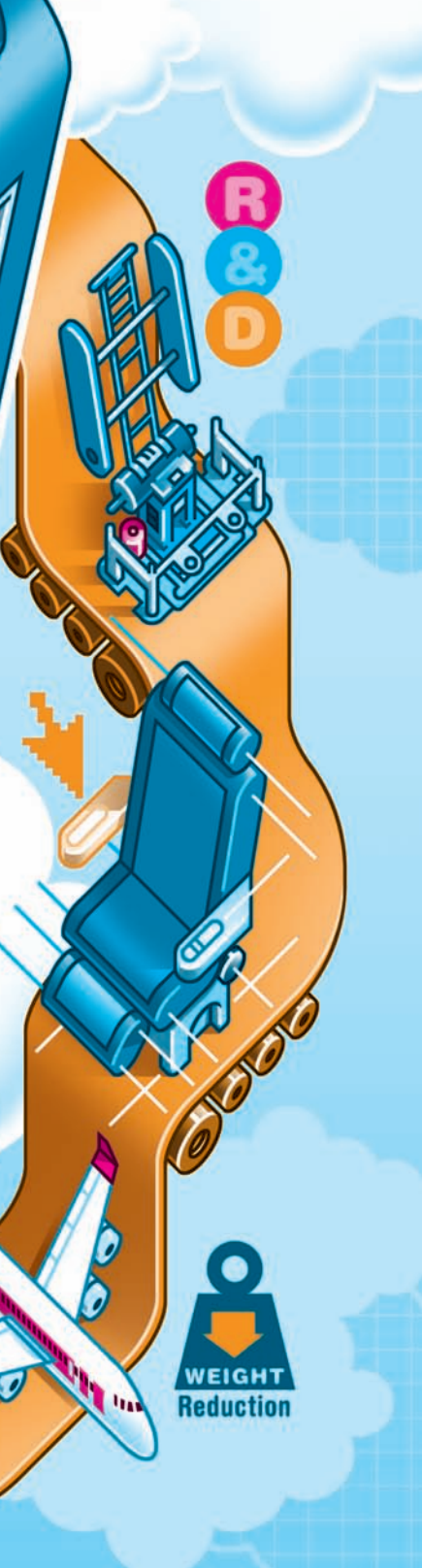


## state of the union 040

IFE and seat suppliers are exploiting the latest display technology to better integrate electronic components and make screen-equipped seats slimmer, more comfortable and more affordable

BERNARD FITZSIMONS,  
AIRCRAFT INTERIORS INTERNATIONAL





# features



## 032 bon voyage

Air France is the first European airline to offer a fixed-shell seat in premium economy

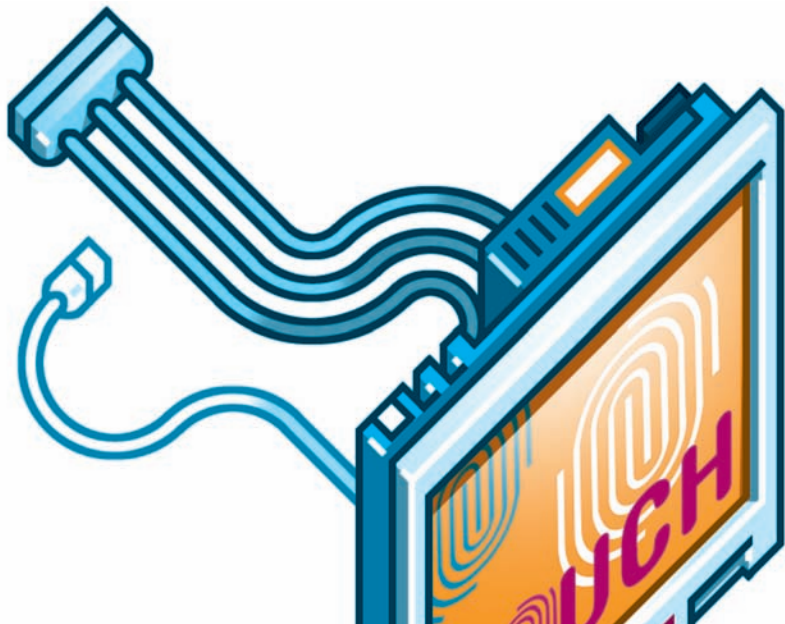
NATASHA EDWARDS,  
AIRCRAFT INTERIORS INTERNATIONAL



## 050 acute angle

How one key design decision makes all the difference to passenger comfort in US Airways' new Envoy Suite

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slim liners 058

Good things, they say, come in small packages: three new regional jets from northeast Asia are seeking to prove the proverb true with their promise of mainline comfort and space

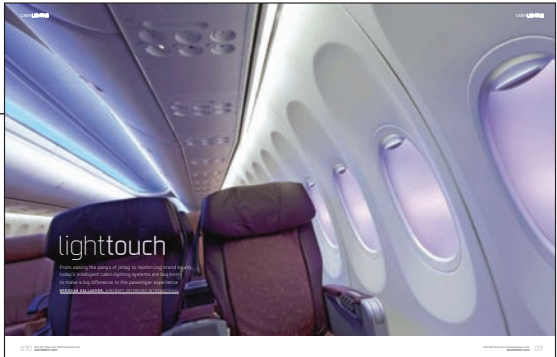
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AIRCRAFT INTERIORS INTERNATIONAL



light touch 070

From easing the pangs of jetlag to reinforcing brand loyalty, today's intelligent cabin lighting systems are beginning to make a big difference to the passenger experience

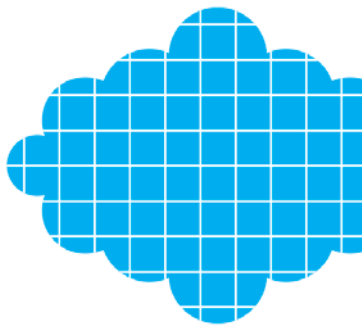
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spice time 080

Airbus is approaching decision time on whether to take its SPICE galley to market as a replacement for the decades-old standards that govern current equipment design

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Air France has received its first A380, fitted with 538 seats – becoming the first A380 operator to offer more than 500 seats. The upper deck features 80 seats in Affaires (business) and 106 seats in Voyageur (economy), while the lower deck has nine seats in Première (first) and 343 in Voyageur.

Première seating (pictured) is similar to the carrier's existing long-haul first-class product, supplied by Contour, but features improved movement controls, a new handset and Climatex fabric covers. There is a new changing cabin, with a dressing table and a window to provide natural light.

Affaires features Air France's existing, long-haul B/E-supplied seating but with a wider, 15in video screen. Pitch is 59in and each seat converts into a 2m (angled) bed. Both first- and business-class passengers have access to 'The Gallery' – an open plan area with sofa seating at the front of the upper deck, featuring bulkhead screens with static content from partner museums such as the Louvre.

Economy seating, supplied by Sicma, features armrests that are 30% wider, as well as seat electronic boxes integrated into the seat, rather than housed on the floor, to improve legroom. Seat pitch is 32in. Economy also features three self-service bars: two on the main deck and one on the upper deck.

The A380 does not feature Air France's new Premium Voyageur cabin – the carrier said "PV will probably be on our seventh A380."



## Air France welcomes the A380

### Lufthansa to relaunch FlyNet

Lufthansa is to relaunch FlyNet, its satellite-based onboard internet service, in mid-2010. Lufthansa first provided FlyNet on selected aircraft from May 2004 until the end of 2006, when the service was withdrawn by former partner Connexion by Boeing. Together with new business partner Panasonic, Lufthansa plans to equip a major part of its long-range fleet within the first year of operation. FlyNet will use Panasonic's Global Communications Suite, comprising eXConnect broadband, eXPhone GSM service (provided in conjunction with AeroMobile), and the Panasonic Airborne Television Network.

### TopSeries for Air France's A380

Air France's first A380 features Thales' TopSeries IFE system, providing passengers with over 100 on-demand movies, 300 audio CDs, 26 games, a live camera, moving map, in-seat chat and a customised menu option for children. USB sockets in business and economy enable passengers to download content such as flight schedules, information on Air France, destinations guides, games for children, as well as relaxation videos and podcasts. Thales and Diehl's joint venture, Diehl Aerospace, is providing the A380's cabin lighting system, which includes ceiling mood lighting throughout.

### B/E Aerospace receives FAA ODA

B/E Aerospace's integration and structures business unit (FSI) has received an Organization Designation Authorization (ODA) from the FAA. Under the ODA, B/E has authority to issue both design and manufacturing approvals, including the issuance of the Supplemental Type Certificate (STC). "This will allow our customers to take advantage of both the reduced downtime for the aircraft, and legitimate pre-staging of kits for follow-on aircraft, ultimately allowing them to get new and more competitive products to the market faster," said Trevor Skelly, B/E Aerospace FSI vice president/general manager.

This is Allison.

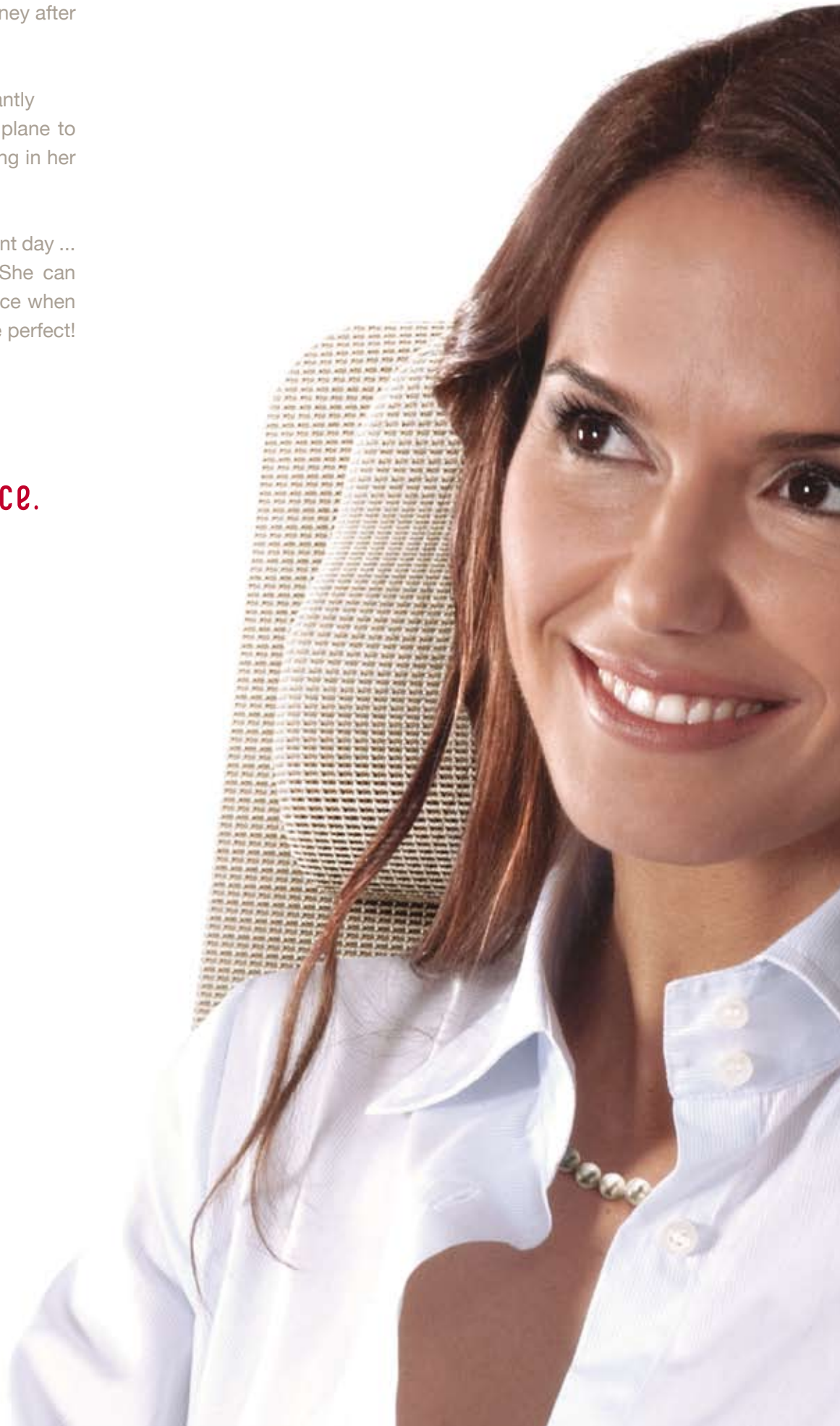
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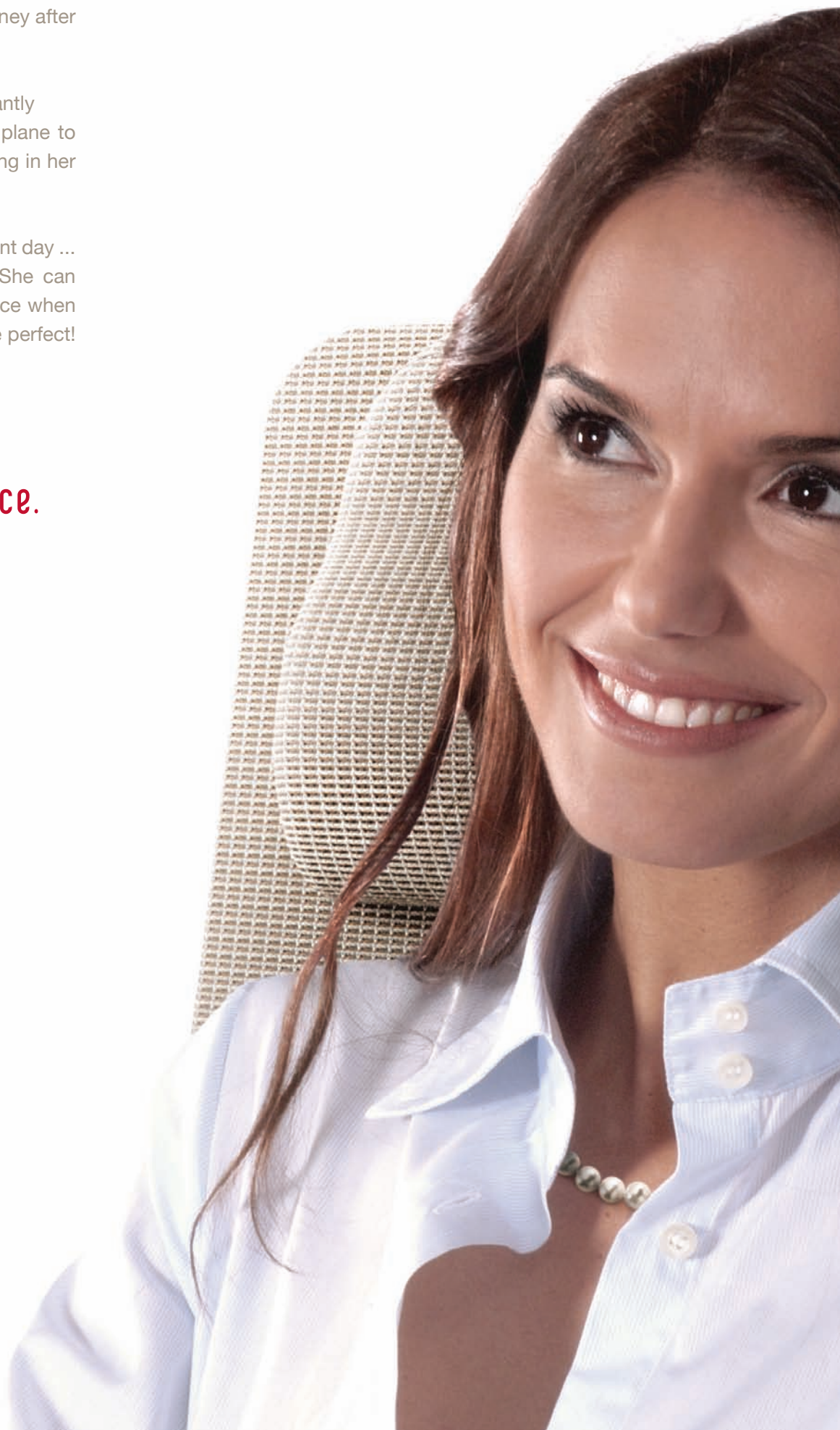
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## ANA to launch new international products and services on Boeing 777-300ER

ANA is launching new products next February on its Boeing 777-300ER fleet, beginning on routes linking Tokyo with North America and Europe. The 777-300ERs will feature eight seats in first, 68 in business, 24 in premium economy, and 112 in economy.

The new Sicma-supplied first-class suite (pictured) is called ANA First Square, and will be configured in a 1-2-1 layout. Each suite features tall partitions (but no doors) for privacy, a 23in wide-screen LCD monitor, a baggage compartment and mini-closet for jackets and other personal belongings. Materials such as machined aluminium and a woodgrain-design wallpaper are designed to create a calm, sophisticated ambience.

Business class (also Sicma) sees a new full-flat seat, ANA Business Staggered, installed in a staggered 1-2-1 configuration for more space, with access to the aisle and a 17in wide-screen LCD monitor at every seat. There's also a large side table, shoe storage and a small in-seat baggage area.

Premium economy (Koito) sees a 2-4-2 layout, and boasts 42in pitch (up from 38in) and 12in IFE screens. A fixed back shell prevents passengers from encroaching on the space of those seated behind while large moveable dividers provide further privacy.

Economy class also features a fixed back shell, as well as sliding headrests and footrests, adjustable in three angles. Pitch has been increased from 31in to 34in with seats in a 2-4-3 layout. Each seat features 10.6in monitors, universal power port, iPod connector and USB port.

ANA is also launching new fragrances to create a relaxing mood in the aircraft, as well as heated water 'washlets' (bidets) in first- and business-class toilets.

Panasonic's eX2 AVOD IFE system is available in all classes and ANA says first- and business-class passengers will be able to order meals via the IFE system from April 2010. Passengers in all classes can view their own iPod and other personal media content on the in-seat display using the iPod, USB and audio jacks.

### Iberia takes out seats to make more room in business class

Iberia is removing an entire row of seats from its Business Plus cabins on its A340 fleet, increasing the room between rows from 152cm to 183cm. The number of business-class seats in its A340-600s will be reduced from 52 to 42, and in the A340-300s from 42 to 36. Iberia has modified three aircraft so far – the job takes about 300 working hours per aircraft – and the last unit will be finished in March 2010. Meanwhile, the company is working towards introducing a brand new Business Plus cabin product for 2012.

### Free WiFi for American Airlines passengers, courtesy of Lexus

Passengers travelling on American Airlines WiFi-equipped aircraft during the first week of November were able to enjoy free WiFi courtesy of car manufacturer Lexus, which used the service to promote its new 2010 Lexus LS line. The carrier's Gogo inflight internet service allows customers to access internet and email from their laptops, smartphones and PDAs. American launched onboard broadband WiFi in August 2008, and the service is currently available on its Boeing 767-200 aircraft and selected MD-80 aircraft.

### Preferred seat option – at a price!

Air Canada is now offering a Preferred Seat option that gives travellers seeking additional leg room the chance to pay to reserve specific exit row and bulkhead seats with extra seat pitch in the economy cabin on all Air Canada flights. Customers can select a Preferred Seat on any Air Canada or Jazz flight, at the time of booking or any time prior to check-in, subject to availability. The number and location of Preferred Seats available on a flight varies with each aircraft type. Preferred Seat prices start at US\$14 per one-way trip and are based on length of flight, fare purchased and frequent flier status.



## Continental Airlines' flat-bed BusinessFirst seat takes to the skies

Continental Airlines' new BusinessFirst seat has taken to the skies, on a Boeing 777 used on long-haul routes. Customers will also begin seeing the flat-bed seats on Boeing 757-200 aircraft by the end of 2009, with installation on the airline's 767-200ER and 767-400ER aircraft starting in 2010, and on its the 787 fleet as they are delivered.

Each BusinessFirst seat converts into fully flat 6ft 6in (2m) bed. With the armrest fully lowered, seat width is 25in. Laptop power, headset and USB plugs are tucked above the customer's shoulder and iPod connectivity is also available at the seat.

BusinessFirst seats on the Boeing 787 and Boeing 777 aircraft feature a 15.4in video monitor for customers to enjoy on-demand movies, music and games. Seats on the Boeing 757 aircraft will feature 10.6in monitors. The new seat also has a privacy shell that allows for seclusion from other travellers. The Boeing 777 features 50 seats in BusinessFirst and 235 seats in economy class.

Continental began researching new seat options in the autumn of 2006 when planning its BusinessFirst service for the 787 Dreamliner, and selected B/E Aerospace to create designs.

### Panasonic and Weber reveal integrated seat project at WAEA

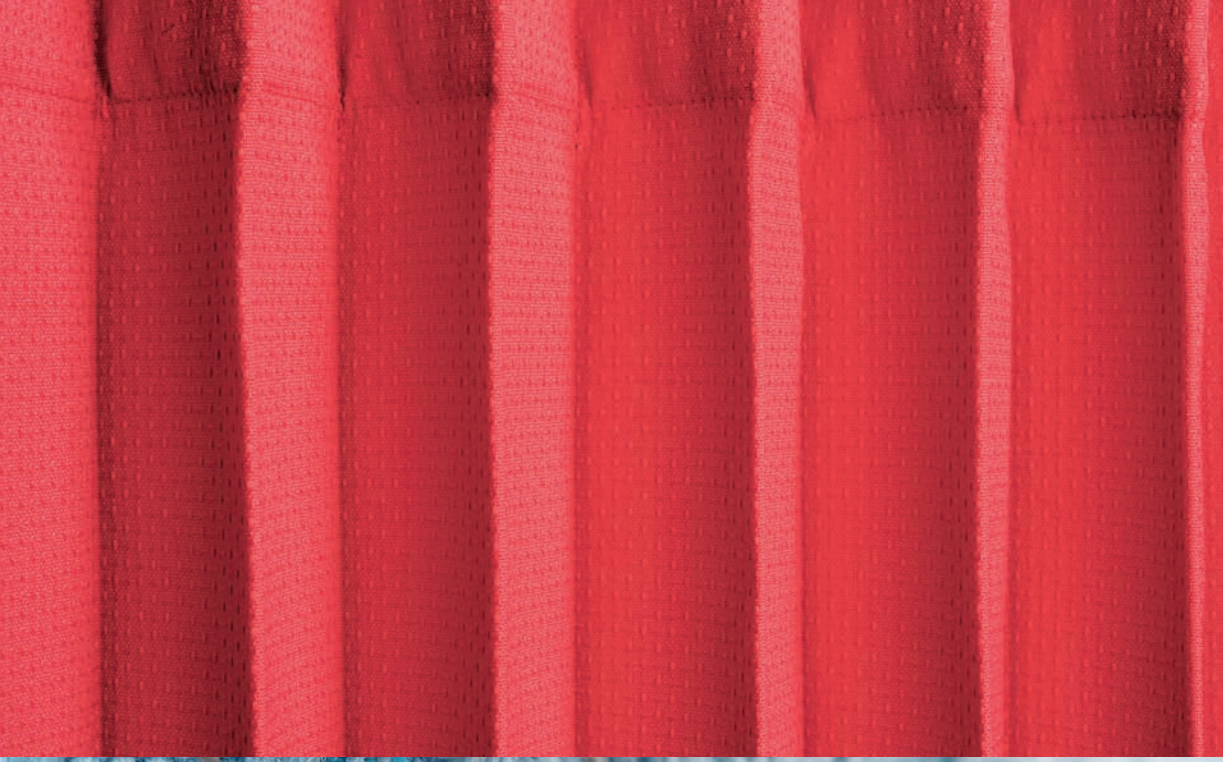
Dubbed 'Fusion' and based on Weber Aircraft's 5751 economy seat, the first prototype of Panasonic's integrated seat project was the talk of the recent WAEA show in Palm Springs. Passengers benefit from improved aesthetics, usability and comfort, while Fusion's slimline monitor and reduced electronics packaging allows seat designers to create far thinner seat backs – giving carriers the choice of returning that space to passengers or adding additional seats. Another benefit, according to Panasonic, is Fusion's improved reliability, and reduced cost, power and weight when compared to conventional IFEC solutions. On-screen navigation, flight attendant call, reading light control, audio jack, and even USB port are incorporated into the monitor, eliminating the complexity of in-seat harnesses, and additional seat components. Illuminated jacks and a card slot are easy to find in all cabin lighting. "The integrated seat project was initiated by Panasonic together with select seat manufacturers to leverage Panasonic's significant expertise in electronics packaging and design with the unique expertise of seat manufacturers in aesthetics, certification and requirements to come up with a significantly optimised and seamless integrated seat product," said a company spokesperson.

### New portable IFE offerings

AIRVOD has launched a new IFE portable player – Crystal 7. The new player offers up to 100 movies on demand, boasts a new capacitive multi-touch display and offers a 20-hour battery life. A standard trolley can store 160 players, each of which weighs 490g. Meanwhile, handheld provider digEcor is partnering with China-based Lefee Media Technology to develop two new IFE players. The prototype digEplayer L7 and L10, featuring 7in and 10in capacitive touch-screens respectively, debuted at the WAEA Annual Conference & Exhibition in October.

### Saudi Arabian Airlines picks OnAir

Saudi Arabian Airlines has chosen to install full SwiftBroadband Mobile OnAir and WiFi Internet OnAir services on its A330 fleet. The airline is expecting delivery of the first A330 in April 2010. Passengers will be able use their own mobile phones or BlackBerry-type devices to make and receive phone calls, send and receive text messages and emails, and access the internet. Passengers will also be able to access the internet and VPN networks by connecting their laptops either wirelessly or via a wired connection – OnAir will provide both GSM/GPRS and WiFi internet.



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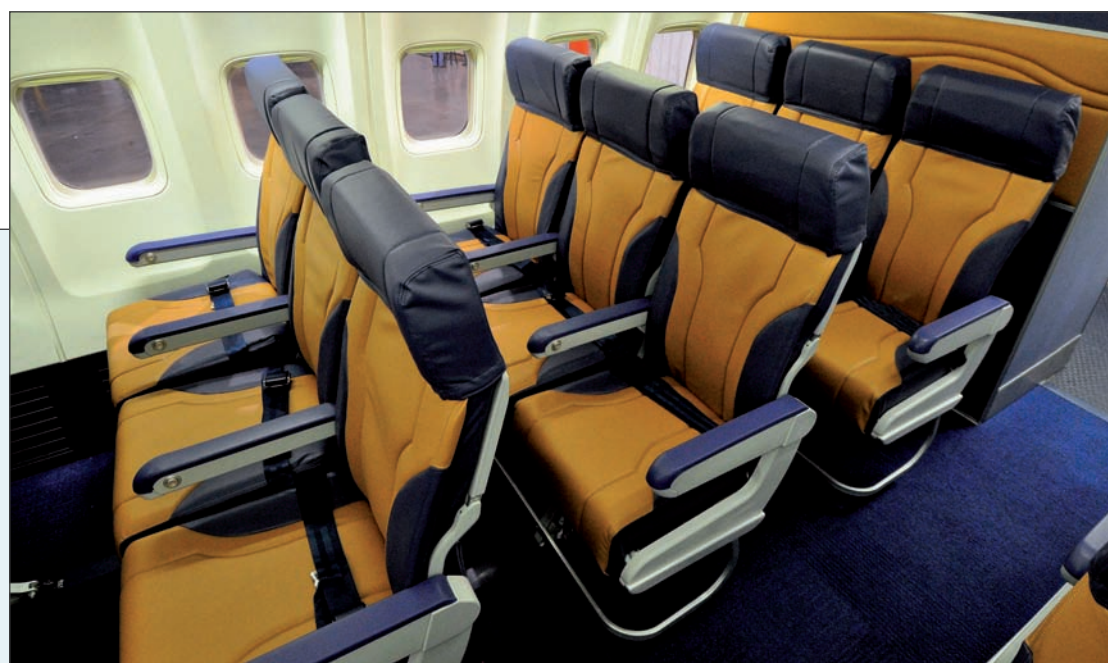
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Southwest Airlines has unveiled a 'Green Plane' – a Boeing 737-700 kitted out with environmentally responsible products – to test ways of reducing weight in the cabin and therefore benefit the environment. The airline says that the initiatives tested on the Green Plane will equate to a weight saving of almost 5 lbs per seat. The new products also add recyclable elements to the cabin interior and reduce waste. These products include InterfaceFLOR Carpet, which is installed in sections, thus eliminating the need for total replacement of areas such as aisles, where the airline currently uses a single piece of carpet. The 100% recyclable carpet is returned to the manufacturer at the end of its service life to be remade into new carpet. Southwest Airlines is also testing two new seat cover products, which it says offer more than twice the durability of its current leather seats, along with a weight saving of almost 2 lbs per seat. On one side of the aisle, e-Leather is used – a lightweight product made from recycled leather. On the other side of the aisle, IZIT Leather is used. This is a faux leather, designed to look and feel like real leather, as well as being economical, durable and lightweight. The airline has also used a



## Southwest Airlines goes green with weight-saving interior

lighter weight foam fill from Greiner PURtec for the back of the seats. New life vest pouches offer a weight saving of 1 lb per passenger, replacing the current metal container with lighter durable canvas. The airline has also switched from plastic to aluminium for its passenger seat rub strips – a move it says will help with durability, reducing waste.

### Air France cuts prices but keeps the service on European routes

From April 2010, Air France will offer a new medium-haul service that it says will offer customers simplicity, clarity and more affordable fares. The airline will continue to offer two clearly separate cabins, the Voyageur cabin and the Premium cabin, in which Premium customers have a choice between two products – Premium Eco or Premium Business. Voyageur includes a 23kg baggage allowance, choice of seat at check-in, a choice of newspapers and inflight catering. Customers can specify their preference for a window or aisle seat free of charge on reservation. Premium customers benefit from a dedicated check-in area, dedicated security and priority boarding. Inflight catering has been upgraded and Premium Business customers enjoy a wider seat, with no one sitting next to them.

### EPA issues final aircraft drinking water rule

The US Environmental Protection Agency (EPA) is issuing a final rule to ensure that safe and reliable drinking water is provided to aircraft passengers and crew. The rule provides multiple-barrier protection through requirements for coliform sampling, best management practices, corrective action, public notification, monitoring and operator training. "This rule is a significant step forward in protecting people's health when they travel," said Peter S. Silva, assistant administrator for EPA's Office of Water. "EPA has taken this step to make sure the public has drinking water that meets standards, both in the air and on the ground." The final aircraft drinking water rule tailors existing health-based drinking water regulations to fit the unique characteristics of aircraft public water systems.

### JAL introduces premium economy on Tokyo – Sydney Route

Japan Airlines (JAL) is introducing a premium-economy service on its Tokyo (Narita) – Sydney route, starting from 1 December 2009. The once-daily flight, also equipped with the airline's JAL Shell Flat Seat in business class, is operated with a Boeing 777-200ER aircraft. JAL's premium-economy Sky Shell Seat boasts a 9in personal TV screen and provides 20% more legroom than the airline's regular economy class with its shell-shaped sliding seatback design, which ensures passengers' private space is undisturbed even when the seat in front is reclined. Special meals are also served on board, with a variety of light snacks and beverages available. At the airport, passengers can take advantage of the dedicated check-in service at both Sydney and Tokyo, along with access to the airport lounge. Baggage services offered include a 30kg baggage allowance – an extra 10kg per person above the usual economy-class baggage allowance, and priority baggage service. Meanwhile, JAL has also announced some service cuts – on 4 January 2010 it will terminate its newspaper service for business- and economy-class passengers flying on domestic flights, and economy-class passengers on international flights. The airline will also close some of its toll-free telephone numbers.

## Oman Air unveils A330-300 with new first, business and economy class

Oman Air has unveiled its new A330-300, featuring new seats in all three classes. The first-class cabin features six Mini Suites in a 1-2-1 configuration. Each seat (supplied by Sogerma) transforms into an 82in-long fully flat bed, with 85.5in pitch and 25.5in seat width, and is equipped with electrically operated backrest, leg rest and seat depth controls and an eight-point massage system. Each Mini Suite features a 23in monitor, wireless handset, backup handset, two USB ports, Ethernet socket (RJ45), audio and video assumption (RCA) plug, PC power outlet, one-piece table, cocktail table, folding side armrest, buddy seat, and reading and mood light controls.

The aircraft has 20 business-class seats (also by Sogerma) in a 1-2-1 configuration, and each seat transforms into a fully flat bed with electrically controlled backrest and leg rest. Bed length in business is 77.5in, seat width is 22in and seat pitch is 82in. Each passenger can enjoy a 17in monitor, two USB ports, Ethernet socket (RJ45), audio and video assumption (RCA) plug, PC power outlet, cocktail table, one-piece table, buddy seat and folding side armrest.



At 34in pitch, economy class features seats with adjustable head and foot rests, a bi-fold sliding food table, and padded dress cover – all within a one-piece composite seatback structure. Each seat also features a 10.6in IFE screen and handset, USB and RCA video multiplug, and coat hook. An

Ethernet socket (RJ45) and PC power port is provided for every double seat.

IFE is provided in all classes via the Thales i5000 in-seat audio/video on-demand (AVOD) system, integrated with Rockwell Collins' Tailwind Live Satellite TV, broadcasting across eight channels.

### Take-away option for Iberia

Iberia is rolling out a new economy-class menu for flights less than four hours long. Since November, passengers have been able to choose whether to eat during their flights or later, under Iberia's new 'take airway' scheme. Passengers can order their meals from any cabin attendant, and the meals are prepared in a bag that can be used to carry them after the flight. The new Fresh & Good menu includes new Spanish foods such as tapas, Manchego cheese, cured Iberian pork loin, and olives; and new health food options such as vegetable soup and goats cheese, roast courgette, red pepper and pesto sandwiches.

### Ryanair caters for smokers

Ryanair has launched a new range of Smokeless Cigarettes to ensure passengers can get their nicotine hit without breaking the law. Smoking on commercial flights has been illegal since the 1990s, but in a recent survey, over 24,000 Ryanair passengers said they would like to smoke during flights. Hence Ryanair has introduced Similar Smokeless Cigarettes, designed to look and feel like a real cigarette and deliver a small amount of nicotine through inhalation, without smoke. The cigarettes are only available to passengers over 18 years of age, and are sold in packs of 10 onboard all Ryanair flights for £6.

### Fashion update for United

United Airlines is partnering with fashion designer Cynthia Rowley to create new uniforms for its flight attendants, pilots, customer service representatives, and ramp service and maintenance crews. United says the new uniforms, available in mid-2011, will provide a modern, consistent look, increased functionality and more breathable and durable fabrics. The airline says the new uniforms will be more cost-effective as a result of updated fabrics and a streamlined inventory process. "This is a key investment in our company and our people, who are the face of United," said John Tague, the airline's president.

# Marathon Winner 2008



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## Greenpoint Technologies delivers BBJ ahead of schedule

Greenpoint Technologies completed its 16<sup>th</sup> Boeing Business Jet in October, months ahead of the contractual delivery date. The interior was designed by Greenpoint's in-house designers, working closely with the client's representative – Dina Tkacheva, development director for Petroff Air. "Greenpoint provides a versatile design team and its installation team is highly knowledgeable and meticulous with details," said Tkacheva.

Meanwhile Greenpoint has developed its own patent-pending, ground-to-main deck lift for the Boeing 747-8 VIP aircraft – Aerolift. The lift transports up to four passengers from the ground to the main deck, providing elegant and secure boarding. "From a security standpoint, the enclosed carriage descends directly to the tarmac, reducing the occupant's exposure from public view and permits close-quarters boarding of awaiting ground transportation," said the company.

### Flying Colours selects DeCrane seats for green Challenger 850s

Flying Colours has chosen DeCrane Aerospace Aircraft Seating's (DAAS) 16g Nexus linear bearing seats and 16g divans for three green Challenger 850 completions it is carrying out at its main facility in Peterborough, Ontario, Canada, and its US affiliate Jetcorp Technical Services, based in St Louis, Missouri. DeCrane will supply single seats, double seats and divans for integration into the Challenger 850 aircraft. "We have had great success in the past integrating the DeCrane Aerospace Aircraft Seating products into the aircraft," said Eric Gillespie, sales and marketing manager for Flying Colours.

### Embraer launches Legacy 650 large executive jet

Embraer has launched its new Legacy 650, based on its super-mid-size Legacy 600, but which will provide longer range for up to 14 passengers. The cabin interior features leather seats, divan, credenza, and tables for meals or meetings. There is also a spacious galley for preparing hot and cold meals, an aft lavatory, wardrobes, cabinets, and an IFE system with DVD and satellite communication. Optional high-speed data (HSD) SwiftBroadband equipment and WiFi technology will enable customers to browse the internet, access emails and transfer files during flight.

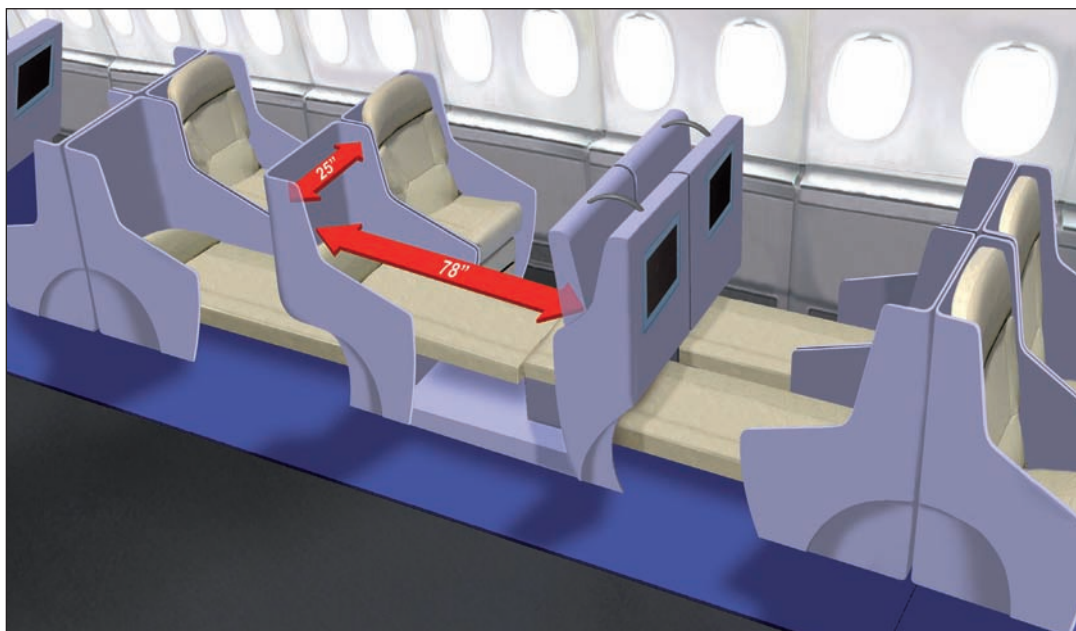
### Bombardier offers Learjet 60 XR Signature Series interiors

Bombardier Aerospace is now offering two new cabin configurations for its mid-size Learjet 60 XR aircraft – the Signature Series Red and Signature Series Black. Both cabins feature soft colour schemes, dark wood veneers and a larger galley. The Signature Series Red floorplan offers seating for six passengers. The stand-up cabin features a 15in (38cm) aisle and streamlined side ledges. The redesigned cabin seats feature berthing capability, removable armrest caps and panels, as well as larger storage drawers. There's also a larger galley with multiple storage units, an optional built-in espresso machine and work surface for complete meal preparation on board. The IFE system features SwiftBroadband, supporting simultaneous WiFi connectivity for laptops and personal electronic devices and Satcom cabin phone. The private aft lavatory includes an unveiled window for increased natural light, as well as a larger and more functional vanity cabinet. The Signature Series Black interior also seats six passengers, and combines the cabin design and features of the Signature Series Red with a media credenza featuring a 24in flat-screen monitor opposite a two-seat divan.

# threeforall

**BRIEF:** Aviointeriors' 'Third Dimension' concept seeks to increase the density of flat-bed business-class seats while maintaining the same level of comfort. "With conventional business-class cabin configurations, the typical minimum pitch required to have a fully horizontal bed suitable for a 95<sup>th</sup> percentile occupant is 77in," says Aviointeriors' Gaetano Perugini. However, Perugini claims Third Dimension delivers "a bed equivalent to a typical 80in pitch first-class seat installation" – but at a pitch ranging from 63in to 67in.

**DESCRIPTION:** Third Dimension combines an elevated seat above two lower seats – one forward- and one aft-facing. Vertically staggering the seats provides a 78in-long bed with 25in of width in the shoulder area, but at 63-67in pitch (depending on aircraft type). Aviointeriors says the resulting density is the "highest possible in a business-class cabin, including herringbone arrangements". Aviointeriors says it can fit 21 Third Dimension seats into a cabin length of 187in – five more than can be accommodated in an opposed or herringbone configuration, and nine more than is possible with a 'Swiss-style' staggered arrangement. The company also points out that Third Dimension does not require overhead stowage bin removal for its installation and existing stowage bins and floor tracks continue to be used. Aviointeriors has developed a full scale mock-up, which it says "has demonstrated that the theoretical advantages in terms of comfort and density can actually be reached".



**VERDICT:** As we noted in our last issue, vertical space offers the greatest potential yet to increase density and efficiency, while also improving passenger comfort. Unlike some of the more outlandish schemes out there, Third Dimension appears easy enough to implement – Aviointeriors says the final weight would be comparable to standard full-flat business-class seats currently available. But what about certification? "Out of the three seats that comprise the module, the forward-facing is comparable to a current seat; and the aft-facing is subject to the same issues as existing aft-facing seats," says Perugini. "The central seat is about 6in higher than the other ones, presenting higher floor track interface loads, but these can be neutralised by increasing the distance between the front and the rear studs, along with the use of an adequate energy absorber."



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**For more information on exhibiting at the event please contact:**

**Jason Sullivan** Sales Manager

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# classact

**BRIEF:** Having worked with a UK school on a project to convert an out-of-commission aircraft into a working classroom, Design Q realised many aspects of its solution were also applicable to the short-haul airline market. "The aim of the Maxcabin concept is to address some of the opportunities that specifically apply to short-hop journeys," says Design Q's Howard Guy. "It's all about prioritising travellers' needs when flying short distances (less than one hour) – under such circumstances their requirements are very different to those currently served by conventional forward-facing, short-pitch seating that is actually geared to much longer journeys."

**DESCRIPTION:** An inward-facing configuration effectively creates two aisles in the cabin – helping speed entry and egress, allowing even faster aircraft turnaround times. Design Q says it also allows easier movement within the cabin, and creates a much more open and sociable environment. "Numbers of seats also increase; however the structures required to seat the occupants can be substantially simpler, lighter and require less investment," says Guy. However, Guy notes the proposal would probably require a four-point safety harness rather than a lap belt in order to secure the occupant safely.



**VERDICT:** Maxcabin has been criticised in the mainstream press as a further erosion of passenger comfort in the name of increased airline profits. Similar seating schemes on trains or buses are commonplace and accepted by commuters, but the sideways placement of passengers is far from ideal when it comes to withstanding the 16g forward loads that could be expected in an impact-survivable accident. However, Guy points out that there are inward-facing divans on many VIP jets currently certified for take-off and landing, and says a number of airlines are interested in taking the scheme further.



## CONTACT

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# factfile:us airways

AIRCRAFT TYPE		A319	A320	A321	B737-300 (TYPE 1)*	B737-300 (TYPE 2)**
No. of aircraft		93	70	51	10	15
Entered service/refurbishment		1998/2009	1999/2009	2001/2009	1987/1995	1987/1995
Total seats		124	150	183	126	134
First class	Number of seats	12	12	16	12	8
	Configuration	2-2	2-2	2-2	2-2	2-2
	Seat pitch	36in (91.4cm)	36in (91.4cm)	36in (91.4cm)	37in (94cm)	36in (91.4cm)
	Seat width	21in (53.3cm)	21in (53.3cm)	21in (53.3cm)	20.3in (51.6cm)	20.3in (51.6cm)
	Seat recline	12°/5in (12.7cm)	12°/5in (12.7cm)	12°/5in (12.7cm)	15°/6in (15.2cm)	15°/6in (15.2cm)
	Bed length	N/A	N/A	N/A	N/A	N/A
	Seat supplier	B/E Aerospace, Brice	B/E Aerospace, Brice	B/E Aerospace	B/E Aerospace, Weber	B/E Aerospace
	IFE system	N/A	N/A	N/A	N/A	N/A
	IFE supplier	N/A	N/A	N/A	N/A	N/A
Economy class	Number of seats	112	138	167	114	126
	Configuration	3-3	3-3	3-3	3-3	3-3
	Seat pitch	31-32in (78.7-81.3cm)	31-32in (78.7-81.3cm)	31-32in (78.7-81.3cm)	31in (78.7cm)	31-32in (78.7-81.3cm)
	Seat width	18in (45.7cm)	18in (45.7cm)	18in (45.7cm)	17in (43.2cm)	17in (43.2cm)
	Seat recline	5°/2in (5.1cm)	5°/2in (5.1cm)	5°/2in (5.1cm)	10°/4in (10.2cm)	10°/4in (10.2cm)
	Seat supplier	B/E Aerospace, Weber, Brice	B/E Aerospace, Weber, Brice	B/E Aerospace, Weber	B/E Aerospace	B/E Aerospace, Weber
	IFE system	N/A	N/A	N/A	N/A	N/A
	IFE supplier	N/A	N/A	N/A	N/A	N/A

AIRCRAFT TYPE		B737-400*	B757-200 ETOPS (TYPE 1)**	B757-200*	E190
No. of aircraft		40	8	9	19
Entered service/refurbishment		1990/2009	1985/2009	1992/1995	2007
Total seats		144	190	193	99
First class	Number of seats	12	14	8	11
	Configuration	2-2	2-2	2-2	1-2
	Seat pitch	37in (94cm)	36in (91.4cm)	37in (94cm)	36in (91.4cm)
	Seat width	20.3in (51.6cm)	20.2in (51.3cm)	20.2in (51.3cm)	19in (48.3cm)
	Seat recline	15°/6in (15.2cm)	15°/6in (15.2cm)	15°/6in (15.2cm)	16°/8in (20.3cm)
	Bed length	N/A	N/A	N/A	N/A
	Seat supplier	B/E Aerospace, Weber	B/E Aerospace, Weber	Weber	C/D Interiors
	IFE system	N/A	TEAC VE-801 Hdi	N/A	N/A
	IFE supplier	N/A	TEAC, Goodrich	N/A	N/A
Economy class	Number of seats	132	176	185	88
	Configuration	3-3	3-3	3-3	2-2
	Seat pitch	31-32in (78.7-81.3cm)	32in (81.3cm)	32in (81.3cm)	31in (78.7cm)
	Seat width	17in (43.2cm)	17in (43.2cm)	17in (43.2cm)	18.3in (46.5cm)
	Seat recline	10°/4in (10.2cm)	10°/4in (10.2cm)	10°/4in (10.2cm)	10°/4in (10.2cm)
	Seat supplier	B/E Aerospace	B/E Aerospace, Weber	B/E Aerospace	C/D Interiors
	IFE system	N/A	TEAC VE-801 Hdi	N/A	N/A
	IFE supplier	N/A	TEAC, Goodrich	N/A	N/A

\* Aircraft operated by US Airways prior to 2005 merger

\*\* Aircraft operated by America West prior to 2005 merger

AIRCRAFT TYPE	B757-200 ETOPS (TYPE 2)*	B767-200	A330-200 (TYPE 1)	A330-200 (TYPE 2)
No. of aircraft	13	10	3	1
Entered service/refurbishment	1994/2009	1987/2007	2009	2009
Total seats	176	204	258	258
Number of seats	12	18	20	20 (Envoy Suite)
Configuration	2-2	2-2-2	2-2-2	1-2-1 reverse herringbone
Seat pitch	60in (152.4cm)	53-55in (134.6-139.7cm)	60-70in (152.4-177.8cm)	48-49in (121.9-124.5cm)
Seat width	19.5in (49.5cm)	18.5in (47cm)	19.5in (49.5cm)	20.5in (52.1cm), 25.5in (64.8cm) with armrest down
Seat recline	160°/39in (99.1cm)	170°	160°/39in (99.1cm)	180°
Bed length	N/A	77in (195.6cm)	N/A	76-80in (193-203.2cm)
Seat supplier	Contour	Sicma	Contour	Sicma
IFE system	PAV 705	PAV 705	PAV 705	eX2
Business class IFE supplier	IMS	IMS	IMS	Panasonic
Number of seats	164	186	238	238
Configuration	3-3	2-3-2	2-4-2	2-4-2
Seat pitch	31-32in (78.7-81.3cm)	31-32in (78.7-81.3cm)	31-32in (78.7-81.3cm)	31-32in (78.7-81.3cm)
Seat width	17in (43.2cm)	17-18in (43.2-45.7cm)	16-17in (40.6-43.2cm)	16-17in (40.6-43.2cm)
Seat recline	10°/4in (10.2cm)	10°/4in (10.2cm)	9°/4in (10.2cm)	9°/4in (10.2cm)
Seat supplier	B/E Aerospace	B/E Aerospace, Weber	B/E Aerospace	B/E Aerospace
IFE system	TEAC VE-801 Hdi	TEAC VE-801 Hdi	eX2	eX2
Economy class IFE supplier	TEAC, Goodrich	TEAC, Goodrich	Panasonic	Panasonic

AIRCRAFT TYPE	A330-300	A350 (TYPE 1)	A350 (TYPE 2)
No. of aircraft	9	To be determined	To be determined
Entered service/refurbishment	2000	Delivery 2014	Delivery 2014
Total seats	293	270	330
Number of seats	30	36	36
Configuration	2-2-2	To be determined	To be determined
Seat pitch	94in (238.8cm) for Envoy Sleeper in row one, 60in (152.4cm) for the rest	To be determined	To be determined
Seat width	19.5in (49.5cm)	To be determined	To be determined
Seat recline	180° for row one, 160°/39in (99.1cm) for the rest	To be determined	To be determined
Bed length	79in (200.7cm) for row one, N/A for the rest	To be determined	To be determined
Seat supplier	Sogerma for row one, Contour for the rest	To be determined	To be determined
IFE system	Passport	To be determined	To be determined
Business class IFE supplier	Rockwell Collins	To be determined	To be determined
Number of seats	263	234	294
Configuration	2-4-2	To be determined	To be determined
Seat pitch	31-33in (78.7-83.8cm)	To be determined	To be determined
Seat width	16-17in (40.6-43.2cm)	To be determined	To be determined
Seat recline	9°/4in (10.2cm)	To be determined	To be determined
Seat supplier	Weber	To be determined	To be determined
IFE system	Passport	To be determined	To be determined
Economy class IFE supplier	Rockwell Collins	To be determined	To be determined

HEADQUARTERS: Tempe, Arizona, USA

PASSENGERS CARRIED IN 2008: 81 million

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# bonvoyage

Air France is the first European airline to offer a fixed-shell seat in premium economy

NATASHA EDWARDS, AIRCRAFT INTERIORS INTERNATIONAL



With the launch of its first four-class, long-haul flight to New York at the end of October, Air France introduced its new Premium Voyageur cabin, which features a 19in-wide seat at 38in pitch that the carrier claims offers 40% more space than its standard economy product. By the end of 2010, the new premium economy cabin will be available on all of Air France's international long-haul flights (excluding the Caribbean and Indian Ocean network) operated by its Boeing 777s, Airbus A340s and A330s.

"We have been working on this project for about two years," explains Christophe Attard, director of marketing, Premium Voyageur. "We realised that by constantly improving our business class over the past 20 years, we had created a hole between economy and business class. At the same time we had more and more passengers in economy who desired more comfort yet were not able or prepared to pay for a ticket in business class."

Attard adds the new cabin had "to express modernity and innovation" – hence the carrier's decision to go for a fixed-shell seat, which he says has the advantages that no-one can lean back on you when they recline, as well as more closely resembling a business-class product, providing an image of both comfort and privacy. "We are the first European airline to introduce a fixed-shell seat in premium economy – it is an attribute of the best of business travel," he says.

**01.** Air France claims Premium Voyageur offers 40% more space than its standard economy product



THE SEAT HAS A VERY  
SPECIFIC COMFORT  
STRUCTURE CALLED A  
FLEXBACK ”





03

## bad for business?

With such a great new premium-economy cabin, isn't Air France afraid that business-class travellers will trade down? Christophe Attard, director of marketing, Premium Voyageur, takes a realistic stance: "We have to offer an intermediary cabin or passengers will simply go somewhere else," he says. "There was a request from passengers and the market for more comfort at a more affordable price – if we are not offering this product, others will, and our customers will go to other brands. The latest figures from IATA show that more and more business-class passengers are falling into economy. We have created an intermediary step to reduce the impact of that on our business." Air France also believes the new product will persuade some economy passengers to trade up to the new cabin, helping to offset shrinking business-class revenues.

Attard dismisses any concerns regarding the extra cost of offering four classes on board each aircraft: "We are not adding any complexity to the logistics – we are taking some parts from economy and some from business," he says. Premium Voyageur passengers receive business-class amenity kits, blankets, pillows and headphones, but are given the same catering as economy passengers. "It's the same on the ground," continues Attard. "Premium Voyageur customers enjoy access to business-class check-in and the same baggage allowance."

"We began from the point of view of the passenger who travels in economy class but for business motives and seeks more comfort," explains Attard. "First more space and then to be able to work in ease and privacy. The new seats are big enough even when working with confidential material. A smaller cabin also helps create a more calm, serene atmosphere."

Air France chose to base its Premium Voyageur offering on B/E Aerospace's Icon seat, already in service with Japan Airlines and Cathay Pacific. "We chose B/E because they had a proven product in the marketplace but we have completely redesigned and improved it," says Attard. To do so, Air France called upon industrial designer Mark Collins of Geneva-based Design Investment, which has recently worked with Air France on its first and business classes, to look at the concept from an ergonomic and practical perspective, and to ensure the seat was compatible with a number of aircraft types. Meanwhile, Paris-based consultancy Brandimage Desgrippes & Laga, already involved in harmonising the airline's overall cabin style and graphic identity, provided advice on trim, colour and material selections.

The brief was to create a new seat more suited to European taste, specific to Air France, which Tom Plant, vice president of B/E's seating products group, describes as "a next-generation product". B/E devoted more than ten design engineers to the new seat, as well as a dedicated assembly line at its Northern Ireland-based factory.

At 38in pitch, the seat was never going to offer a flat bed, but the airline has managed to ensure the seat reclines to an impressive 123°. "The seat has a very specific comfort structure called a flexback, which is very thin, almost like an office chair. The idea is that somebody, even a tall person, can lie straight at an angle, causing the seat cushion to rise up at the back to create one long mattress at an angle," explains Collins.

**CLEAR THE DECK** Air France is also particularly proud of the way it has managed to get rid of all the clutter normally found under the seat – hence its claims to provide the largest amount of legroom in premium economy, despite offering the same 38in pitch provided by a number of key competitors. "It was a challenge because as well as the electric cabling for the video, there were the power sockets and individual reading lights, which meant a lot of electric cabling," explains Attard. "We needed to create storage space too. We offer a bottle of water to each client and an amenity kit," he continues. "The clever solution was to create a sort of backbone or column between the seats, inside which we have placed all the electronics. This clears the space for the legs – it is how we have the most space of its category."

"All the different IFE elements had to fit in this central element," confirms Collins. "Air France was absolutely adamant that all the boxes had to fit in the central column, plus air bottles for the airbag [for the seatbelts] – it was

02. An adjustable leather headrest and smart white stitching reinforce a feeling of understated luxury

03. Each seat is 19in wide – just an inch less than Air France's business class



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04

quite a jigsaw puzzle. Our challenge was to find a place for all the stuff that we knew was going to be there. After a lot of discussion with B/E, which also had to provide for heat dissipation between the two seats, we have found space for water bottles, amenity kits, headphones, magazines and safety cards, as well as creating a space flexible enough to put the blanket there too, while leaving space for a business traveller to use the very generous double-fold table.”

The central column also helps block sightlines between the rows to increase the sense of privacy.

**CERTIFICATION HEADACHE** As with business-class fixed-shell seats, the principal certification headache came from meeting Head Impact Criteria rules. “For certification, the testing and engineering workload is as complex as a business-class seat,” says Plant. “In a fixed living space, meeting head injury and flammability criteria is much more complex. Head impact becomes a technical challenge when you have a seat in front of you that won’t move.”

The B/E solution is an airbag within the seatbelt intended to inflate before the head can hit the seat in front. Its drawback, according to Collins – in addition to yet more cabling and compressed air cylinders to fit into the

### Key features

- Fixed-shell seat, featuring a seatback that slides down inside the shell without intruding on the space of the passenger behind (Air France is the first European airline to offer such a seat in premium economy).
- The seat reclines to 123° within the fixed shell, while adjustable legrest, footrest and headrest features further aid comfort.
- Seat pitch is 38in (97cm) and each seat is 19in (48cm) wide, with 10cm-wide leather armrests.
- 10.4in (26cm) IFE monitor with 85 films available in nine languages, and noise-reducing headset.
- Video control box incorporated into the seat, rather than beneath it, to enhance legroom.
- Laptop power, generous table and individual, directional reading light provide an enhanced work environment.
- Pure wool blanket, feather pillow, bottle of water and amenity kit.



05



IN A FIXED LIVING SPACE, MEETING HEAD INJURY AND FLAMMABILITY CRITERIA IS MUCH MORE COMPLEX



central column – is that the seatbelt originally looked rather like a sausage, something that they succeeded in slimming down in the design process.

**FROM THE GROUND UP** The hard product is matched by an improved service, with the emphasis on efficiency rather than the superfluous. “What we propose for Premium Voyageur travellers is simplicity and rapidity,” says Attard. Passengers do not have access to the business lounge (unless they are Flying Blue Elite Plus members or they opt to pay a fee) but do benefit from priority check-in and baggage delivery. They can also board when they want without queueing, and they benefit from the same generous weight limits as in business class – for example, two bags of up to 32kg each on New York flights.

Meals are the same as in economy class, although Attard is quick to point out that Air France is “the only airline

- 04. Power supply is provided for laptops, smartphones or iPods
- 05. A 10.4in IFE monitor delivers close to 500 hours of programming per month



“

WE HOPE TO ATTRACT A LARGE NUMBER OF BUSINESS TRAVELLERS WHO CURRENTLY TRAVEL IN ECONOMY ”

06. Early renderings showing front and back views

that offers all our passengers champagne”. Premium Voyageur customers also receive the same pure wool blanket, feather pillow, bottle of water and amenity kit as their business-class counterparts.

Air France has brought in some highly competitive pricing – a return flight to New York at €1038 in Premium Voyageur is more than half the €2638 it charges for an Affaires (business) ticket. The airline charges €573 for an economy fare on the same route. Flying Blue members flying Premium Voyageur earn 25% more air miles than in economy.

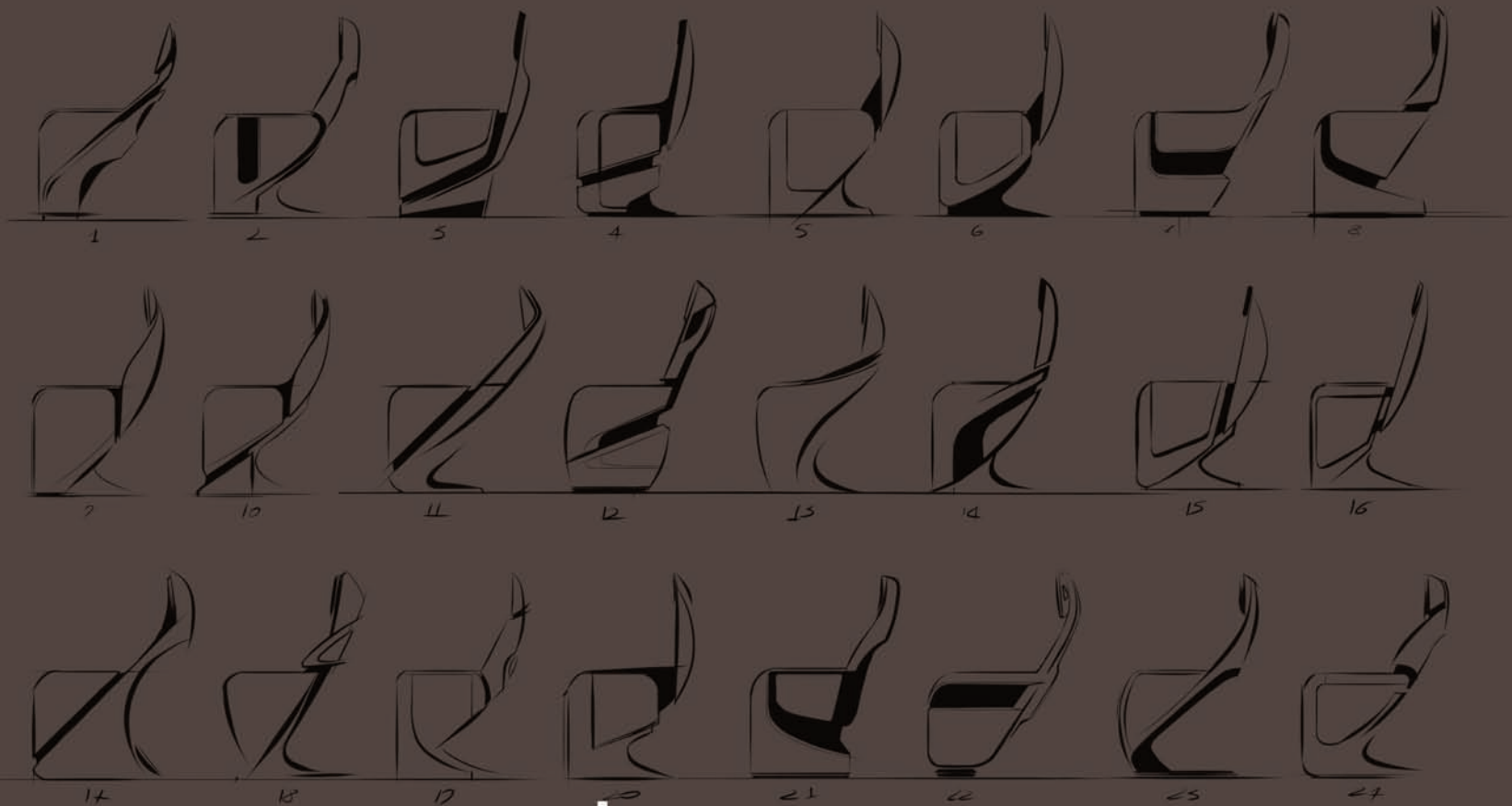
**RETROFIT SCHEDULE** Following its inaugural flight to New York on 25 October 2009, the service will be introduced to Tokyo in November, Beirut and Singapore in December, Beijing and Hong Kong in January 2010. The company hopes to install the new product on 76 of its long-haul aircraft by the end of 2010, with a retrofitting budget of approximately €75 million. It takes one week to retrofit one aircraft. The new product will not feature on its Boeing 747s, which are gradually being phased out, nor will it feature on its 777-300s serving Caribbean and Indian Ocean destinations, which already have an intermediate class, called ‘Alizé’.

On average 22 new Premium Voyageur seats will replace 40 economy-class seats, providing roughly 10% of seats on each flight, with slightly different configurations according to the exact aircraft type: 21 seats in the Airbus A330 and A340 in a 2-3-2 configuration; 24 seats in the Boeing 777-200 ER in a 2-4-2 configuration; and 28 seats in the 777-300ER in a 2-4-2 configuration. Premium Voyageur cabins will also eventually be introduced on the A380, although given existing delivery delays, the new cabin will not feature the carrier’s first A380, due to enter service in November 2009.

With many companies cutting back on air travel, Air France clearly thinks that Premium Voyageur’s triple strategy of more comfort, better service and tight pricing will fill a niche. “When you look at business travellers, there are already many who travel in economy class, especially from small- and medium-sized businesses,” says Attard. “This new product is intermediary, it does not have all the features of business class but we hope to attract a large number of business travellers who currently travel in economy.” ☒

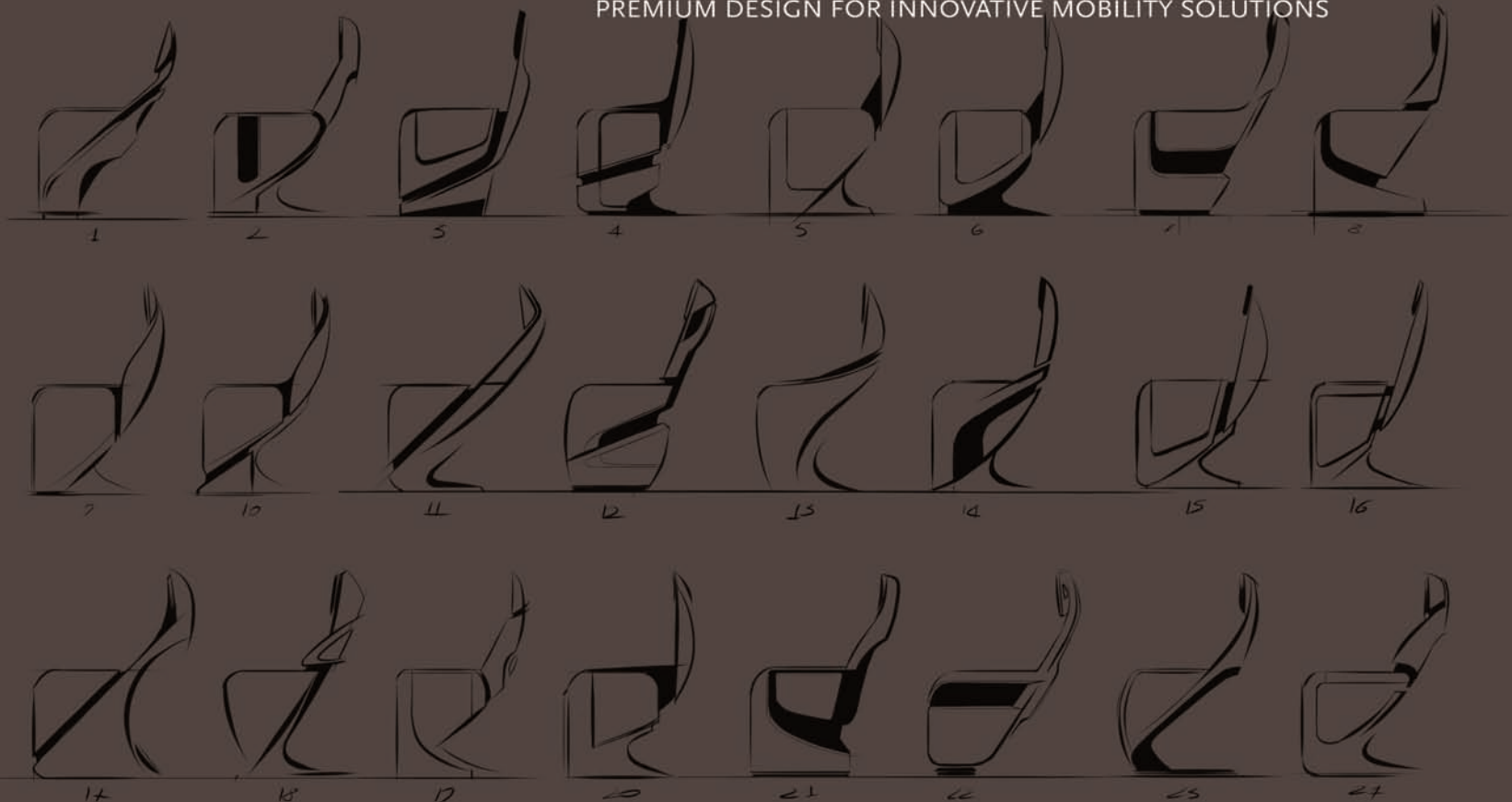
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DESIGNER OF AIR FRANCE'S NEW PREMIUM VOYAGEUR SEAT

# state of the union

IFE and seat suppliers are exploiting the latest display technology to better integrate electronic components and make screen-equipped seats slimmer, more comfortable and more affordable

BERNARD FITZSIMONS, AIRCRAFT INTERIORS INTERNATIONAL



In-flight entertainment (IFE) installations, with their demanding cooling and mounting requirements, have long made life more complicated for seat designers. Now lighter, less power-hungry screens with better viewing angles are helping IFE suppliers reduce their impact on seats – as demonstrated by Panasonic with its Fusion seat at the WAEA's Palm Springs showcase in October – while also enabling seat manufacturers to integrate their own IFE provision.

Sicma Aero Seat already has a customer for its Seat Integrated Technology (SiT) in the form of Royal Jordanian, which has selected the new offering for both its business and economy classes on its Airbus A340-200s. Loic Bouet, SiT product manager, electrical systems, says the system consists of just three components: the smart display unit (SDU); an in-seat box that handles power conversion and connection to the fibre optic network; and a small head-end unit to connect the system to the aircraft or external devices.

Benefits of the design include weight saving through optimisation of the electrical functions of the seat, elimination of the need for data servers, simplified maintenance and improved living space for the passenger. The touch-screens come in 10in, 15in and 17in sizes and support the full range of audio/video on demand (AVOD) functions, including films, music, both single and multiplayer 2D and 3D games, text news, an HTML navigator and power supply connectivity for USB devices. The system can also interface with digital moving maps, in-seat power supplies, and satellite connection for access to the internet, email and live TV.

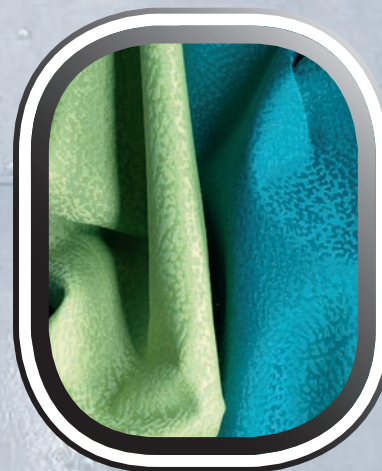
Sicma is working with Sony in France on SDU manufacturing, Bouet says. The unit includes up to 250Gb of data storage and offers enhanced capability for 3D games, animations and graphical user interfaces, plus faster access to content. For retrofit applications the installation would need to be coordinated with the provider of the





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01. Zodiac Aerospace's new AVOD IFE system - SiT (Seat Integrated Technology)

01

supplemental type certificate, a process that often leaves the aircraft manufacturer out of the loop. Any line fit, though, needs to be agreed in advance by the aircraft manufacturer, and Sicma has engaged with Airbus in the offerability process for the A330/A340.

The ability to offer a complete integrated package of seat and SiT was a key factor in winning the Royal Jordanian selection, according to Sicma. Bouet says the company's commercial approach is to try to offer both seats and IFE, but for various reasons, "we have to cut the offer in two parts." Smaller airlines, he adds, seem more interested in having a single-source solution, "but many airlines don't want to have only one choice regarding the seats." Sicma, accordingly, has "definitely confirmed that the SiT product is compatible with every kind of seat," not just those from the Zodiac group.

**FUSION PLATFORM** Panasonic has developed the Fusion concept with seat-makers B/E Aerospace and Recaro, as well as Sicma's fellow Zodiac subsidiary Weber Aircraft – whose lightweight, slim '5751' economy seat was shown with the Fusion installation at the WAEA show. The company is also in discussions with several other seat vendors, says the company's director of product marketing, Cedric Rhoads. Technically, he says, "there were a variety

“

A COMPLETE INTEGRATED PACKAGE WAS A KEY FACTOR IN WINNING THE ROYAL JORDANIAN SELECTION ”

of obstacles to overcome that historically have not been addressed because of the nature of all prior IFE/seat integrations.”

With Fusion, he says, the effort from the outset was focused on how to change the established paradigm by creating IFE and seat elements that took each other into consideration: "Each party worked carefully with the other to craft a design to meet the objectives of improved aesthetics with a sleek and elegant appearance, increased passenger space by reducing overall seatback thickness, significant reductions in weight, power and heat, and reduced wiring complexity.”

The company also placed specific emphasis on total cost of ownership aspects by reducing the time required for IFE equipment maintenance.

Technologically, Fusion takes advantage of several advances in materials and components to achieve new





02



03



THE SCREENS ARE A LOT THINNER,  
WHICH ALLOWS US TO PACKAGE THE IFE  
IN THE SEAT BETTER ”

02. Panasonic demonstrated its Fusion concept using a Weber 5751 seat at the recent WAEA show in Palm Springs

03. Panasonic says Fusion delivers improved aesthetics and ease of use

standards in power consumption and, consequently, heat generation. In addition, Rhoads says: “Advances in LCD display and touch-screen technology has reduced the overall thickness of the display and allowed for the flush mounting of the display and seat shroud. These advances create the seamless transition from seat to display in one contiguous plane as well as the reductions in overall seatback thickness.”

Any new seat design must succeed in passing significant requirements for certification including 14/16g and head impact criteria (HIC) testing; this process, Rhoads comments, is “long and arduous”. So Panasonic is working with the seat vendors, OEMs and regulatory authorities to make it more efficient in an effort to bring the Fusion product to market as quickly as possible.

“The value proposition with Fusion applies to any seat,” says Rhoads. “Reduced weight, power, complexity and components, as well as the opportunity to reduce seatback

thickness, is attractive to any airline as well as the OEMs.” The company hopes, accordingly, to see Fusion applied to many seat designs. In fact, Rhoads says, one of the benefits of Fusion is that it allows for a broad array of industrial design solutions by the seat vendors, thus maintaining the unique aspects of their individual seat models. The Fusion monitor, he adds, is designed to be as small and flexible as possible so that it can be integrated into many seats: “It does not include a standardised cut-out as the intent is to blend and incorporate the monitor into the industrial design of the seat.”

**BIG DIFFERENCE** B/E Aerospace has always worked with the IFE suppliers to integrate their equipment and address issues such as regulatory requirements, cooling and head injury criteria (HIC), says Alex Pozzi, vice president, research and development. But the new monitors make a big difference: “The screens are a lot thinner, which allows us to package the IFE in the seat better.”

The monitors also take less power – just 7W in the case of the current Panasonic screen – and generate less heat, so cooling is simplified. And they have much wider viewing angles of +/- 85°, so there is no need for a tilt mechanism. “We used to put a three-quarter inch gap behind the monitor just for cooling,” says Pozzi. “It was just wasted



  
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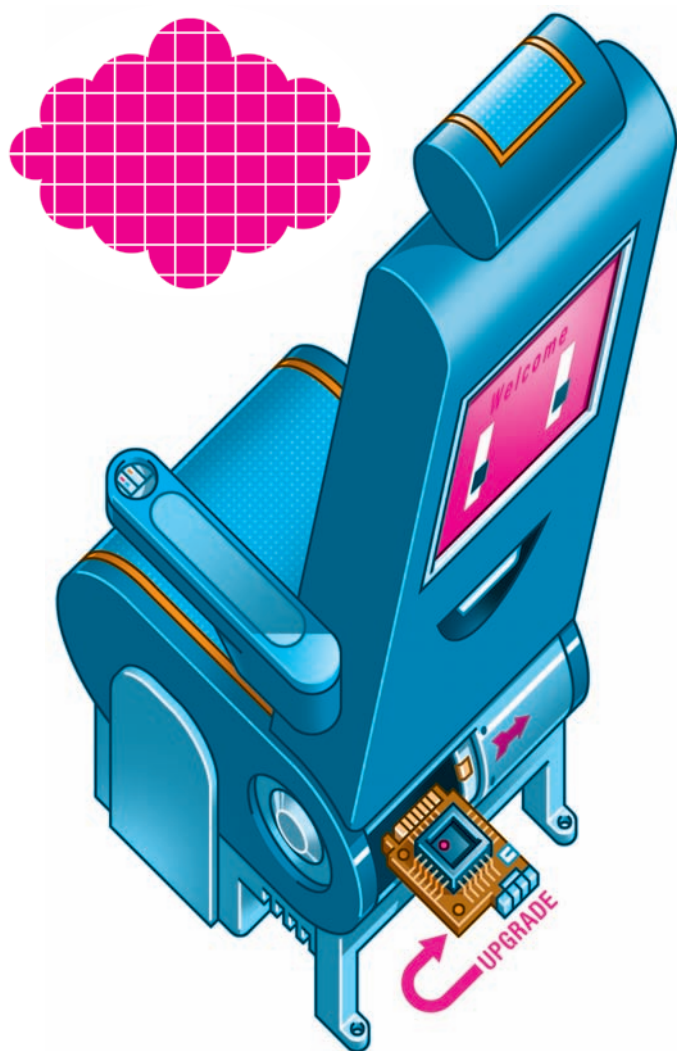
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space.” There were also gaps around the monitor to vent the screens that both looked bad and tended to attract foreign objects: “With the new system you don’t have to do that, so it looks seamless.”

Eliminating the tilt mechanism, meanwhile, saves weight and cost as well as the space for the screen to rotate. “All those tilt mechanisms have to go through cycle testing and load requirements,” comments Pozzi. “Typically, you have to make a tilt mechanism specific to each monitor, so if you had a different IFE system you had to go change that. Now you could probably just make a small trim bezel and accommodate different sizes quite easily without it being ugly.”

Integration, too, is easier. The monitor incorporates on-screen navigation, flight attendant call, reading light control, audio jack and even USB port, so there is no need for a separate passenger control unit or armrest jack, which means less cable routing and easier assembly. And maintenance is simplified too: “The way we have the system set up, it’s very easy to pick the shroud off, replace the monitor and put the shroud back on,” says Pozzi. “A lot of it’s done with quick release hardware or quarter-turn fasteners, and that really makes things easier for the airline.”

Where the conventional combination of monitor, tilt mechanism and other components might add 5 lbs of

## trading standards

Thales is also working closely with seat vendors: “A closer integration between seats and IFE is both imperative and inevitable,” says Jeff Sare, vice president of sales and marketing for Thales’ IFE business. “There are too many technical and financial benefits to believe otherwise. While we do not wish to provide details of our ongoing projects, Thales is working with a number of vendors to discover additional ways to improve both the products and processes for seat-IFE integration.”

In the near term, Sare believes the relationships between seat manufacturers and IFE providers may evolve in a similar way to the relationship between suppliers and airframers: “A selection of pre-defined, standardised seat/IFE combinations could become the norm,” he says. “Identical IFE equipment is already used in multiple seat models and in multiple configurations. The difficulty is that each of the different configurations has to be designed and certified which is expensive. The development of, and adherence to new standards for everything from physical interfaces to size, weight and connectors has the potential to limit the cost by limiting the number of configurations, but may also limit the number of choices an airline has to select from.” In the future, Sare says airlines and suppliers will have to learn to differentiate their products more by what features and functions are provided and less by the technology used to provide them.



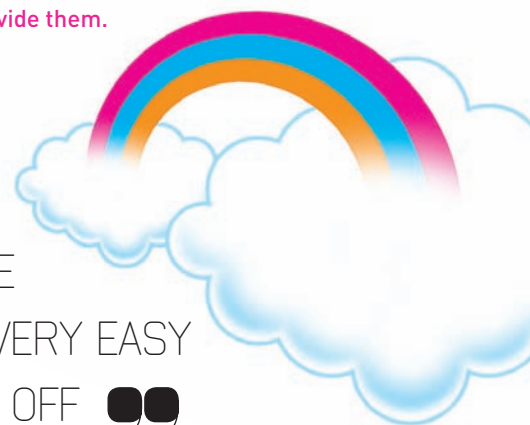
THE WAY WE HAVE THE  
SYSTEM SET UP, IT’S VERY EASY  
TO PICK THE SHROUD OFF

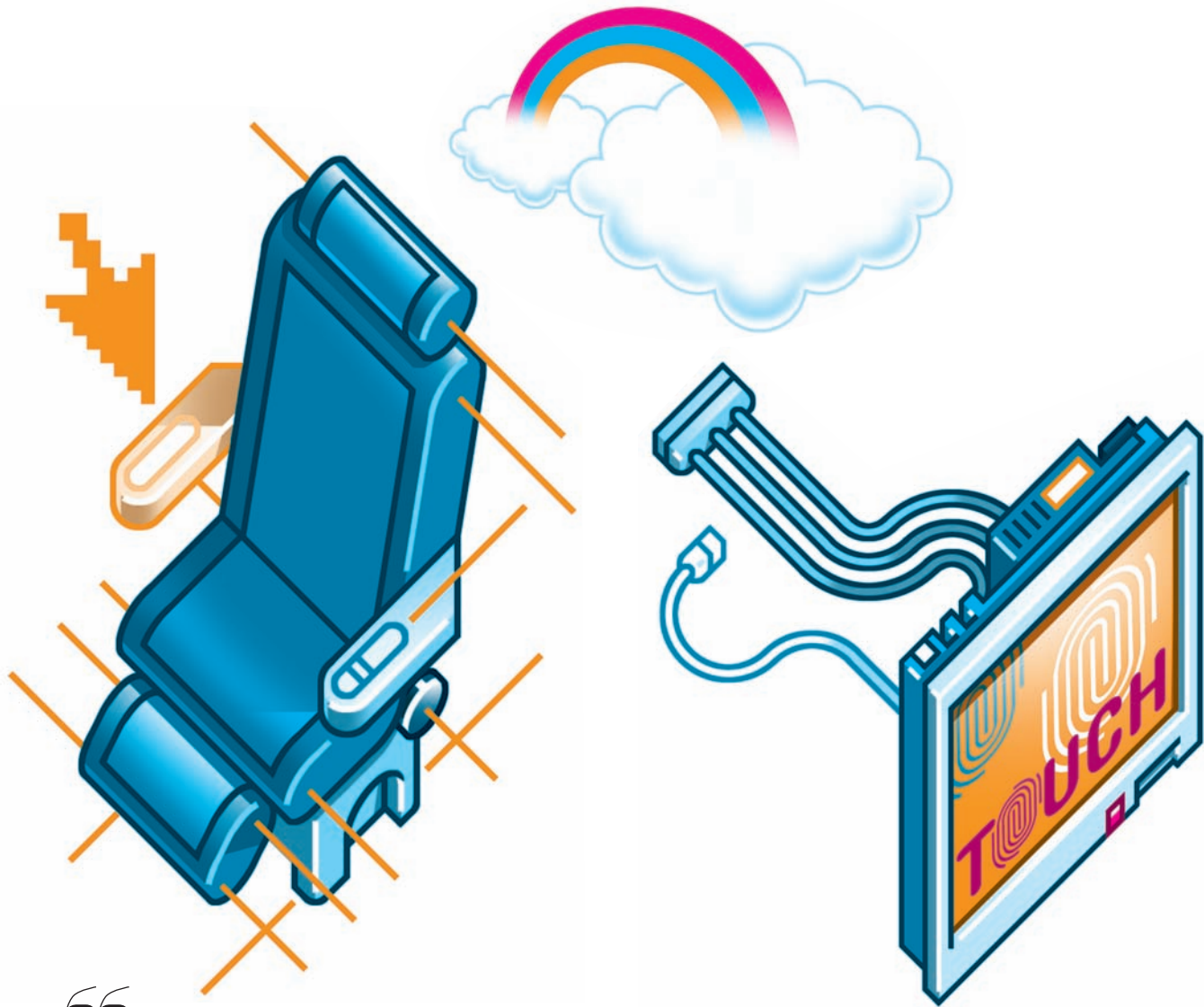


weight to the top of the seat, the new monitors promise to impose less than half that burden. “That 3 lb weight saving doesn’t sound like a lot,” says Pozzi, “but during dynamic testing it makes a big difference as to what kind of load that structure has to carry. So we can certainly reduce the amount of material in the structure.”

**LIVING SPACE** It also means the seats can be slimmer: “That goes back to some added living space for the passenger, which in economy class is always at a premium.” It could even help make them thin enough to reduce seat pitch without compromising living space.

It may also help the introduction of fixed living space in economy class: “Typically in the past you had a back that reclined, you had a monitor, you couldn’t see the monitor so you always had to put it on a tilt mechanism so that you could see it,” explains Pozzi. “With this kind of





I THINK YOU'LL PROBABLY SEE  
A TREND TOWARD LITTLE OR NO  
RECLINE IN ECONOMY CLASS



monitor, having a fixed back and living space just really works out a lot better, so I think you will see a trend towards that in economy class as well."

**NO MORE RECLINE?** However, fixed living space in economy class is likely to mean non-reclining seats rather than a seat that reclines in its own footprint.

"I think you'll probably see a trend toward little or no recline in economy class," says Pozzi. Where a typical seat might have the back preset at a 15° angle when upright and recline to 20 or 25°, "you may see seats where now that the back is a lot thinner we just set the back at 20° of recline and leave it there. So it's preset at the same level of comfort but you get rid of the recline mechanism and you get rid of all the weight, you provide the same level of comfort and you don't have to worry about somebody reclining it into you any more, and there's less maintenance

on the aircraft as well. And part of that is achieved because the monitor is so thin."

The 9in screen demonstrated by Panasonic suggests economy-class applications, and the reduced weight, size and cost of the new systems may encourage more widespread introduction of in-seat IFE on single-aisle aircraft, where it could even help compensate for the elimination of food, beverage and other once-customary frills. "We've had experiences where we've supplied the exact same seat, one with video, one with no video, to two different carriers," says Pozzi. "The ones with video always get better ratings from passengers in terms of actual comfort, even though they're identical."

Panasonic says it is aiming to complete testing and make the integrated monitor available by November 2010. The airframers' cooperation will be needed for new aircraft installations, but the development certainly seems to represent a substantial breakthrough. "It really just makes seat design a lot easier," concludes Pozzi. "And it should help drive down price. It should improve comfort, it should improve maintainability, so all around I think it's a win for everybody." ☑

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# acuteangle

How one key design decision makes all the difference to passenger comfort in US Airways' new Envoy Suite

BRENDAN GALLAGHER, AIRCRAFT INTERIORS INTERNATIONAL



From December 2009, US Airways will start introducing a new business-class product on the Airbus A330-200s now entering its fleet to serve transatlantic routes. And one of the first things to claim the attention of passengers as they come aboard will be a change of direction by London-based seat designer James Park Associates (JPA), which worked with seat supplier, Sicma.

They will see a cabin containing 20 lie-flat seats with all the usual trimmings – a privacy shell, generous storage, Panasonic audio/video-on-demand (AVOD) in-flight entertainment (IFE), satellite connectivity, and power and data sockets for work and play. But it's the orientation of the seats that makes US Airways' Envoy Suite really stand out from the crowd, according to JPA senior designer Ben Orson.

"We were asked to design a high-density business-class product that would improve on existing forward-facing and angled solutions," he says. "The result is an individual suite that, for the first time ever, is angled (23.5°) away from the aisle in a reverse herringbone arrangement, yielding greatly improved privacy. And in the US Airways aircraft they are arranged 1-2-1 across the aircraft to provide every passenger with direct aisle access."

The advantages don't end there. "If you're travelling with a partner or colleague you can sit in a pair of inward-angled centre seats and converse very readily. If you're beside someone you don't know, the innovative curvature of the shell provides plenty of privacy. And the single outboard seats offer a nice individual space that faces towards one or two windows, depending on the pitch of the seat."

**TIME FOR A CHANGE** US Airways seized the opportunity to do something quite new in its business class when it ordered 15 Airbus A330-200s to supplement the nine -300s it has operated since the beginning of the decade.

"In recent years we've had six lie-flat seats in the front row of our A330-300 business class," says Karyn McAlphin, the carrier's senior manager for marketing and branding. "In 2007 we decided to install the Envoy Suite and its lie-flat seat throughout business class in the new A330-200s. And

01. Each Envoy suite is angled away from the aisle in a reverse herringbone pattern



“WE HAVE BEEN ABLE TO MAINTAIN DENSITY WHILE STILL OFFERING THE PASSENGER A GOOD BED SPACE”



02

03

we plan to have the suite retrofitted in all our A330-300 business cabins by the end of 2012. But we won't be putting it into our Boeing 767s, which will leave the fleet before long, or our narrow-body short/medium-haul 757s.”

The airline stuck to its guns through the recession and first installations are now well advanced in readiness for next month's service introduction and completion of the A330-200 programme by the end of 2011. “The A330-200 cabin seats 20 people compared with 24 in the A330-300s,” says McAlphin. “The A330-200 is a smaller aircraft, of course, but we also wanted a business-class cabin with a more intimate, private feel than those of some of our competitors, which have 60+ seats.”

**STRETCH OUT** Snug within the confines of their own suite, passengers will enjoy exceptional levels of comfort. For sleep, the seat converts into a flat horizontal bed measuring 76-80in in length depending on the location in the cabin. Width is 20.5in plus an added 5in from the drop-down armrest. These figures mean a lot to Orson, who's keen to distance the Envoy Suite from other high-density business-class products, which have sometimes been accused of lacking passenger-pleasing “wiggle room”.

“Our bed length and width are pretty much the same as those of conventional forward-facing lie-flat seats that do offer plenty of wiggle room,” he asserts. “With our design we have been able to maintain density while still offering the passenger a good bed space. And it really scores in seated mode – you can wave your arms around to your heart's content and you won't impinge on the neighbouring passenger or the aisle.”

Working and dining space comprises a raised side table and an easy-access tray-table. “Some business seats have a bi-fold table that you have pull out of the stowage and unfold it to its full area,” comments McAlphin. “The Envoy tray table

02. US Airways is installing 20 Envoy Suites in a 1-2-1 layout on its A330-200s

03. Each seat converts into a bed up to 80in long



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04

slides up and out in one piece. And the side table allows you to put drinks, snacks and other items out of the way so you're not held captive by the contents of your tray-table."

The electronics in the Envoy Suite centre on Panasonic's eX2 AVOD IFE system, an Inmarsat Classic Aero-supported phone, and a useful side-panel-mounted technology console featuring a reading light, Panasonic-supplied laptop power, a USB port for charging personal electronic devices, and a dual-purpose phone/IFE controller.

IFE content available via a fold-out 12.1in touch-screen includes the usual dozens of films, television programmes and music collections, plus Berlitz language tuition, solo or inter-passenger games, and the Rockwell Collins-developed Voyager interactive moving-map. Two standard Panasonic features are designed to help the airline keep its IFE offering and other services up to scratch – a passenger survey facility, and the PAXUS Web-based content usage tracking and analysis tool.

The telephone works through first-generation, 10.5 kbps Inmarsat satcoms hardware. "But we are also working with both Panasonic and Thales to incorporate live text news," says McAlphin. "We know our customers want to stay current with what is happening in the world while they are onboard with us."

As well as seeking to provide something that is completely fit for modern purposes, US Airways has also gone to some lengths to make the Envoy Suite and the cabin look good. The cabin monuments are finished with laminate in a hue described as "golden cherry pearl" by the airline. "This is new and really helps to warm up the cabin and give it an upscale, modern appearance," comments McAlphin. "It also ties in with the bird's-eye maple on the suite tray-table, side table and other furniture."

**UNPALLETABLE TRUTH** Looks aren't everything, of course, and beneath the breathable fabric of the seat lies one very interesting piece of engineering. Normally, modern premium-class accommodation comprises the seat itself – with its aluminium frame, motors, actuators, cushions and

## fibre provider

US Airways' new A330-200s are being fitted with IFE from Panasonic, which contests leadership of the wide-body AVOD market with Thales. But earlier this year the carrier trialled a system from an aspiring provider that is knocking on airline doors with a product that could threaten the established order.

The company is Lumexis of California and the system is Fibre-To-The-Screen (FTTS). Combining lightweight, scaleable head-end equipment with a fibre optic network designed to deliver gigabits of data direct to advanced high-definition screens, FTTS promises significant savings in weight, installation and running costs, and all the capacity in the world to accommodate new bandwidth-hungry applications.

Starting in March, US Airways tried out FTTS in service aboard an A320 flying between Santa Ana (California), Phoenix and Atlanta. The system offered 227 options totalling more than 250 hours of content: 30 films, 86 television programmes, four audio books, 100 music CDs and seven games.

"We're proud to have contributed to the development of this system," said Andrew Nocella, US Airways' senior vice president for marketing and planning, at the start of the trial. "We plan to learn more about the programming our customers want and how they want to pay for it. The data we gather will also help us determine our long-term domestic IFE plans."

The trial was completed in mid-year and US Airways has yet to announce any further commitment. But Lumexis chief executive Doug Cline was jubilant at the performance of his system. "The trial revealed an unprecedented level of reliability and performance in AVOD delivery, games and commercial transaction support," he declared. "This technology will lower the cost of ownership of full AVOD and fundamentally change the competitive landscape."

Cline's optimism appeared to have been borne out this September, when Lumexis announced that FTTS had been selected for installation in the entire fleet of an undisclosed carrier, starting in 2010.

In the meantime, he remains hopeful of further action with US Airways: "We are not yet offerable for line-fit in their A330s and are working hard to achieve that," he says. "The situation could then change significantly. When we wrap up initial deliveries to our launch customer, we expect to be well positioned for an acceleration of business as capital becomes more available to airlines."



04. A generous table and a dedicated technology console provide an ideal work environment  
05. Early design sketch

## key features:

- Unique, four-abreast 'reverse herringbone' configuration ensures uninterrupted aisle access for every Envoy customer
- Each 20.5in-wide (between armrests) seat converts into a bed from 76-80in in length (depending on the suite's location in the cabin)
- Each seat is fully adjustable, with three pre-set positions: taxi, take-off and landing; relax (z-position); and full-flat (bed position)
- A fixed shell, manually adjustable armrest, large sliding tray-table, and generous personal stowage capacity help put the passenger in control of their own environment
- 12.1in fully adjustable video monitor, USB port and 110V universal power outlet

06. Entertainment is provided via Panasonic's eX2 AVOD IFE system

outer textile covering – and accompanying furniture made of carbon- and glass-fibre panels. The whole assembly is then mounted on a carbon-fibre pallet, which is then bolted to the aircraft floor.

However, that's not the case with the new Envoy Suite: "In this industry the use of composite materials like carbon-fibre is now a standard practice that leads to valuable weight savings," observes Orson. "What's more, I think we still have some way to go before we maximise the application of composites to seats. But in this platform we have eliminated the pallet and instead use transverse aluminium bars for a saving in installed weight of 10-20 lb per seat. So we've

replaced a composite component with parts made of a more traditional material and still cut weight."

Orson also points to the less glamorous bread-and-butter work that went into the Envoy Suite's reverse-herringbone configuration. "This is a genuinely new configuration," he says. "It may not sound like much that we've managed to get it working flexibly across different aircraft types, but in fact it's quite a big deal. There's a lot of risk in developing something that Airbus and Boeing aren't familiar with, and in getting this product to market with US Airways we have surmounted a lot of regulatory hurdles."

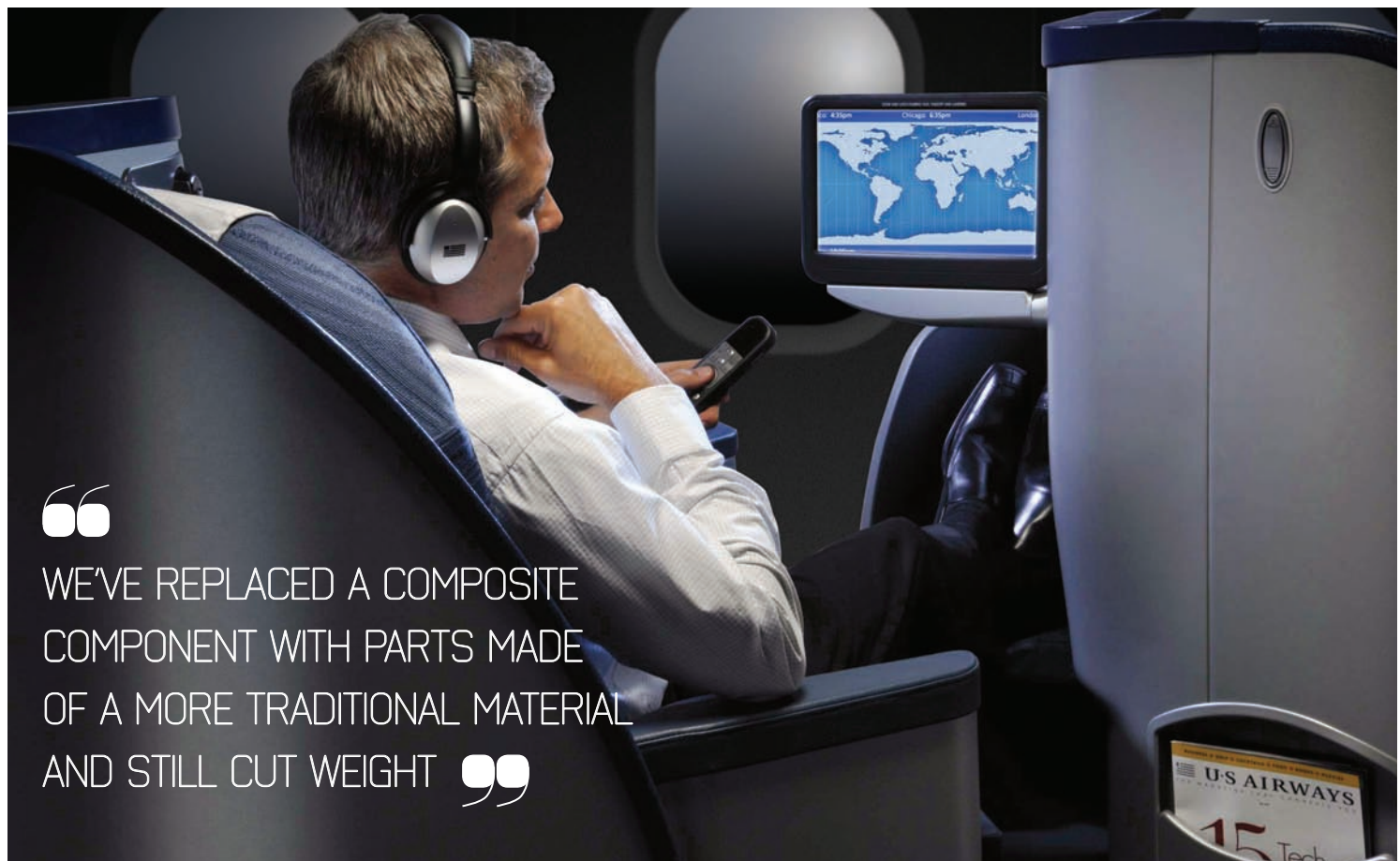
The result is a product, Orson believes, that sets new standards of space-efficiency: "And the larger the cabin, the more efficient it gets," he maintains. "We're very close to competing with conventional forward-facing lie-flat seats in terms of space, while offering a significantly better passenger experience."

The first paying customers will sample that experience in a few weeks' time. Karyn McAlphin sums up what they can look forward to: "Envoy Suite in 1-2-1 configuration offers the best of all worlds for our business-class passengers," she says. "Most of them are travelling alone and will be happy in the single window seats. But the centre doubles allow you to socialise if you are not travelling alone, and when you lie back to sleep the angle provides plenty of separation and privacy." ☒

### CONTACT

JPA Design, Web: [www.jpadesign.com](http://www.jpadesign.com)

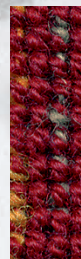
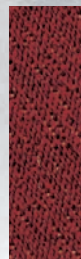
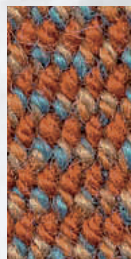
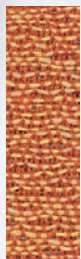
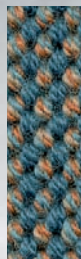
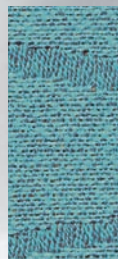
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# slimliners

Good things, they say, come in small packages: three new regional jets from northeast Asia are seeking to prove the proverb true with their promise of mainline comfort and space

BERNARD FITZSIMONS, AIRCRAFT INTERIORS INTERNATIONAL

01. Promotional poster for the new Mitsubishi Regional Jet



Manufacturers in Canada and Brazil have made profitable niches from regional jets. Now Russia, China and Japan are attempting to get in on the act with a new generation of regional aircraft. At Komsomolsk-on-Amur in Russia's Far East, facilities used to build Sukhoi fighters during the Cold War have been transformed into a modern commercial aircraft factory for the Superjet 100. In Shanghai the newly formed Commercial Aviation Corporation of China (Comac) has rebuilt the site used for the short-lived MD-90 Trunkliner programme in the 1990s as a production base for the ARJ21. And in Nagoya, where Mitsubishi Heavy Industries (MHI) makes the composite wing box for the Boeing 787, the Mitsubishi Regional Jet (MRJ) is taking shape.

All three aircraft promise much improved operating economics and enhanced environmental acceptability. But their makers give equal weight to the promise that passengers will benefit from comfort at least as good as that offered by current-generation narrow-body mainliners, namely Boeing's 737 NG and the Airbus A320, and maybe even more space for their bodies and bags.

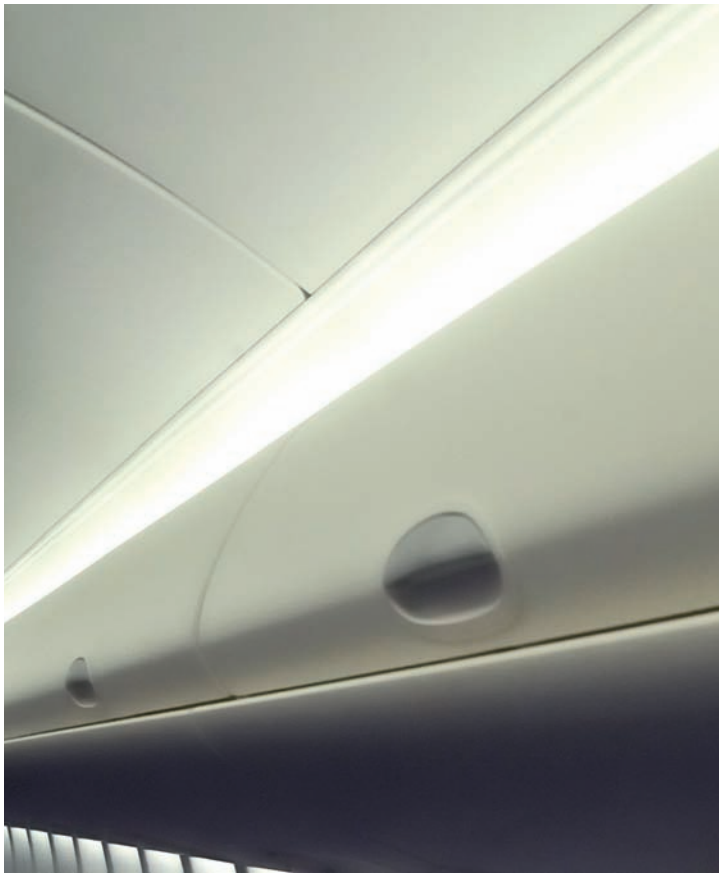
The new entrants can take hope from the success of Embraer, whose 170/190 series offers anywhere from 70 to

122 seats. Meanwhile, Canada's Bombardier is set on leapfrogging its Brazilian rival with the still bigger CSeries – just as Embraer has rejected the regional tag for its E-jets, Bombardier refers to its CSeries as simply a commercial aircraft rather than a regional jet, though quoted performance figures are based on a 500-nautical mile North American operating segment. But while the smaller regionals attempt to equal or better existing single-aisle comfort levels, the Canadian manufacturer is aiming for “wide-body feel”.

**RUSSIAN STYLE** Russia's Superjet 100, initiated by the Sukhoi Civil Aircraft Company (SCAC) that now forms part of United Aircraft Corporation (UAC), is closest to service entry, with first deliveries to Armenian national carrier Armavia planned before the end of the year. At the Paris Air Show in June, Sukhoi showed the second flight test aircraft with a partial interior that bore out the promise of mainline comfort and space.

“The airlines said they want a new 100-seat aircraft with the same capabilities as the 737 or A320,” says Anatoly Mezhevov, SCAC's deputy vice president for sales. “They don't want their passengers to feel uncomfortable,





02



WE DON'T NEED A REGIONAL AIRCRAFT,  
WE NEED A SMALL AIRCRAFT WITH  
THE CAPABILITIES OF A BIG ONE ”

- 02. Sukhoi has worked hard to maximise bin volumes
- 03. Launch customer Aeroflot's Superjet 100 interior
- 04. Pininfarina-designed ceiling panel for the Superjet's entrance

so they are looking for regional aircraft economics with big aircraft feel. One European major airline said, 'we don't need a regional aircraft, we need a small aircraft with the capabilities of a big one'."

B/E Aerospace is responsible for the complete interior. Trevor Skelly, vice president and general manager of B/E's integration and structures business unit (FSI), says the company's internal industrial design group produced a selection of styles. Sukhoi and Boeing, which was acting as consultant on the programme, then selected their preferred style. "This was our internal industrial design group," Skelly points out. "We were able to take all the surfaces and styles and link that directly into our CAD system and our 3D model, so there was no loss of interpretation between the industrial design and the detailed design for the final interior."

Through B/E's intimate relationship with airlines and regional operators, he says, "we felt that we brought to this party the voice of the customer in terms of LOPA optimisation. We were able to really optimise the interior

to maximise the flexibility for the operator in terms of available and certifiable configurations."

In terms of passenger needs, Sukhoi was keen to have very large bins: "We were very successful at achieving that by integrating into the structure of the bins a lot of the wiring and oxygen systems in a way that allowed us to maximise the volume of the bins," explains Skelly.

One attractive feature of the Superjet, he says, is its wide fuselage: "It gave a lot of flexibility to the operators and to us as designers." And there are specific benefits to the 3 + 2 configuration: "For the same load factor on the aircraft, more people are likely to have an empty seat next to them." The two-abreast seats are ideal for couples or people travelling for pleasure, he explains, while the three-abreast seats across the aisle should suit business travellers, whose preference is often to maximise the chance of an empty seat next to them.

In addition to a generous 32in seat pitch, he says, the seat selected for the aircraft has also enhanced living space. "We look at the volume of space between any two rows of seats and maximise that through relocation of hard points away from the passenger in the seat behind, strategically positioning the pivot point of the backrest to maximise knee room, even with the seat in front reclined." The result is "a perception of at least one more inch of pitch." For passengers who want to work, he says, "we've done some pretty good things with the height of the meal tray relative to your knees."



03



04

B/E was also able to influence the height of the windows and seats, which Skelly says are key to the passenger's perception of space and well-being. The same attention to detail was applied to the LED lighting system: "We've done some pretty clever things with the colour temperatures of the lighting, again to provide a good experience for the passengers."

In-seat power IFE systems are not baseline options, though the seats can accommodate a power supply. No customer has asked for IFE, but "it is definitely possible to install it," says Skelly.

The use of 3D models in the design is standard practice, he adds, giving "full credit to Sukhoi that they really have created a complete 3D solid model mock-up of this aircraft. So all our models are submitted to Sukhoi and everything is integrated in 3D on their system. All the models have the weights and centres of gravity built in, so they have a pretty comprehensive digital mock-up of this aircraft."

Overall, Skelly sums up: "We're pretty much doing 'art to part, nose to tail'. We're doing the whole interior, and that speaks to B/E Aerospace's total value proposition, which is to pull together all the interior components from within the group with a common look and feel, and then have the technical integration capabilities and the certification capabilities to not only design and manufacture it but to integrate it into the aircraft and to certify it."

## Sukhoi Superjet 100

SCAC originally proposed both 78-seat SSJ-100/75 and 98-seat SSJ-100/95 variants of the Superjet, though only the bigger model has found buyers so far and the company seems likely to drop the smaller model in favour of a stretched version.

The Superjet's cabin is 127.48in (3,238mm) wide and 83.46in (2,120mm) high, economy-class seats are 18.3in (465mm) wide and aisle width is 20in (510mm). Business-class seats are 20in (50.8cm) wide, allowing for a 24in (610mm) aisle. Overhead bins provide an average of up to 70 litres per passenger, and the passenger doors are similar in size to those used on the Boeing 737.

The SSJ-100/95 seats 98 in an all-economy layout with 2 + 3 seats at 32in pitch, an aft galley big enough to accommodate three trolleys, a small forward galley with room for three half-trolleys, two flight attendant seats and lavatories usable by handicapped passengers forward and aft. Reducing the seat pitch to 31in enables an extra row of seats to be added, pushing passenger count to 103. In two-class layout the two rows of 2 + 2 business-class seats at 36in pitch plus an additional full-size galley forward and a second aft lavatory reduce the Y-class seat count to 78, for a total of 86 passengers and four flight attendants.

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05



06

**ITALIAN ALTERNATIVE** Alenia Aeronautica has a substantial minority shareholding in SCAC and is the major partner in Venice-based marketing and support joint venture Superjet International (SJI), which is responsible for completions of aircraft sold to western operators. Last year SJI unveiled the styling mock-up of a new interior developed by Pininfarina in close cooperation with Alenia that it says will be offered as an alternative to the standard B/E design.

Francesco Lovo, R&D director with Pininfarina Extra, says that the design project was carried out strictly respecting all SCAC requirements. Avoiding modification of the LOPA primary structure, fixing points of secondary structure for baggage rack suspension, seat tracks and main environmental control system (ECS) pipe line systems, limited the scope for innovation: "That is why some solutions are quite traditional," he says. "The design degree of freedom is not so high, we have a lot of boundary conditions that we must respect." The very large volume of the stowage bins and the seat pitch, for example, were other requirements specified by SCAC.

Alenia designed a preliminary configuration, Lovo says, then Pininfarina started to research "shapes, materials and finishes able to create a comfortable environment but also a visually comfortable environment for the passengers." The strategy was to create an interior that was more comfortable than the traditional regional jet: "Usually regional jets are not so comfortable, everything is very small, you have no room for your legs, the stowage bins are not so big so you cannot bring bigger luggage with you, and so on. So the first concept was just try to change this kind of perception and make the flying experience more comfortable, shapes, the colour and surface treatment of panels, the type of curtain, the light."

The lavatory is "another area where we did quite an interesting job," Lovo says. "In the traditional space we managed to create a more comfortable and cleanable lavatory." The toilet cover turns it into a seat, while the washbasin and mirror are designed to enhance the perception of space.

On entering the cabin, the aim was to create a fresh and relaxing environment, with colours and treatment inspired by Mediterranean landscapes and Italian style, Lovo continues: "The idea was to let the passenger feel a welcoming and relaxing environment that it is very well designed in each small detail."

Now Pininfarina is refining the design using feedback from customers, which involves further improvements to all the details, paying attention to manufacturing feasibility, and retuning the shapes and adding more features to the seats, walls and side panels. The idea, Lovo says, is to increase passenger comfort as much as possible, "not only the biometric parameters but also the visual perception of the comfort and the wellness environment inside the aircraft."

To that end the company has designed every detail, from the stow bins, side panel and passenger seat shapes

**05.** Western Superjet customers will receive the Pininfarina interior

**06.** Business-class seating on Superjet International's Venice-based mock-up



LAST YEAR SJI UNVEILED THE STYLING  
MOCK-UP OF A NEW INTERIOR DEVELOPED  
BY PININFARINA



## Comac ARJ21

The ARJ21-700 cabin has a maximum width of 123.7in (3,143mm) and a length of 749.3in (19,033mm) between flight deck and rear pressure bulkhead; the stretched ARJ21-900 has a fuselage 114in (2,895.5mm) longer overall. The manufacturer says a modular interior facility organisation is flexible enough to suit different airlines and customer groups: "Seat number, pitch, [overhead] luggage rack arrangement, the specification and location of the galley, lavatory, stowage and wardrobe of the front and rear service cabins can be reasonably configured according to the user's requirements."

The standard layouts shown so far depict all-economy layouts with 90 seats at 32in pitch in the -700 and 105 in the -900. Installing two rows of 2 + 2 premium seats at 38in pitch leaves room for, respectively, 70 and 90 economy seats. The seats themselves are 18in (457mm) wide with 3in (76.2mm) between seatbacks leaving room for a 19in (483mm) aisle. Maximum cabin height is 80in (2,030mm) and minimum height of the overhead bins is 59in (1,500mm).

Lines, colours, patterns, illumination and practicability have all been considered in defining the cabin, the manufacturer says, and engineering psychology theory has been applied to maximise comfort.



07

07. The ARJ21's lavatories will be supplied by JAMCO

08. ARJ21 bins and sidewalls are three frames in length



08

down to the graphics on the passenger seat and the lavatory: "All the signage, the pictograms in the cabin have been redesigned completely in order to create a more modern and stylish perception on board."


**CHINESE CHOICE** Comac is proposing the ARJ21 Advanced Regional Jet for the 21<sup>st</sup> century in baseline ARJ21-700 and stretched -900 variants. All three of the ARJ21 flight test aircraft flown so far are -700s, and projected business jet and freighter variants share the baseline model's overall dimensions. Comac flew the third aircraft in September and planned to have the fourth flying before the end of the year, with certification expected from the domestic regulator before the end of 2010 and from the FAA in 2012.

Comac predecessor AVIC I Commercial Aircraft (ACAC) awarded the contract for the design and production of the ARJ21's cabin interior to FACC of Austria in March 2004. Sven Maushammer, program manager interiors, says FACC worked with two design companies, BMW Group's DesignWorksUSA in the United States and iDS in Germany, to benchmark interior features for the ARJ21 against competing products from Embraer and Bombardier and identify major improvements for the ARJ21 cabin.

ACAC and FACC selected the design proposal from iDS. FACC's major partners on the project are JAMCO for galleys, lavatories and flight deck door; B/E Aerospace for passenger service units (PSUs) and emergency oxygen boxes; and Vaupell for the main cabin window. Schneller is supplying all the decorative materials except carpets.

FACC designed the interior to provide maximum passenger comfort, a spacious, bright and friendly appearance, passenger appeal and a baggage rack volume of 2.2ft<sup>3</sup> per passenger. The ceiling panel is designed for spacious headroom and the LED reading lights, switches and air blowers are recessed into the overhead panel for maximum seated headroom.

The sidewalls are designed to provide "extraordinary" shoulder room and cover three frames for good visual appearance and commonality with the ceiling and baggage rack design. Three frames is also the maximum length accommodated by the overhead bins. The panels use snap-in fastenings on the top edge for ease of installation, and the window assemblies can be removed without removing seats or sidewall panel assemblies. The ceiling panels are shaped to give an impression of width, with no split lines on the visible surface: designed for easy installation, they have a slide-in bracket on one side and a quick-release fastener on the other, and can be replaced without affecting other components.



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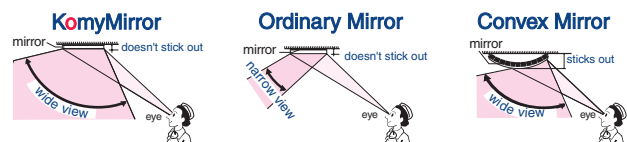
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09

Customisation possibilities include a choice of five colours for the sidewall panels, two for the sidewall panel dado area, five for the bulkhead, galley and lavatory sidewalls and class dividers, four for the main cabin carpet, two for the galley floor and three for the galley and main cabin curtain.

There are two types of galley: G1 has two half-size carts, two ice drawers, a coffee maker, water boiler, hot cup and water faucet, two ice compartments and a waste compartment; and G2 accommodates three full-size carts along with two steam ovens and a waste compartment. The lavatory is designed with a lightweight granite-look composite counter, a corner cabinet for amenities dispenser with indication lights and a vertical corner light. It includes a seat cover dispenser and there is provision for an attendant handset, with a diaper board and oval mirror as options.

**JAPANESE CONTENDER** Further away is the Mitsubishi Regional Jet (MRJ), whose latest production schedule envisages a first flight in the second quarter of 2012 and first deliveries in the first quarter of 2014. Hideo Egawa, president of the Mitsubishi Aerospace Corporation (MAC) that Mitsubishi Heavy Industries (MHI) formed last year with a clutch of minority shareholders to handle design, procurement, sales and customer support, says a bilateral agreement with the United States means the FAA will accept the Japanese certification; the company has also applied for EASA certification. MHI itself will build and test the aircraft.

At the Paris Air Show in June, where MAC showed a cabin section mock-up in the privacy of its chalet, SVP

## Mitsubishi Regional Jet

The MRJ's cabin width of 108.5in (2,760mm) enables the 18in-wide seats to be positioned with a distance of 21in between centrelines. The two variants confirmed so far, the standard MRJ90 and shortened MRJ70, will provide 92 and 78 economy-class seats respectively in 2 + 2 rows at 29in pitch, with an 18in (460mm) aisle and galleys and single lavatories fore and aft. The Type C passenger doors are 31in (790mm) wide and 72in (1,830mm) high, while service doors are the same width and 54in (1,370mm) high.

The revised configuration that Mitsubishi finalised during the summer on the strength of market feedback increased the height of the fuselage by 2.5in, raising the cabin ceiling 1.5in to 80.5in and increasing the volume of the overhead bins by 12%. They now accommodate roll-on bags of up to 560 x 450 x 250mm (22 x 17.7 x 9.8in). There is also a single 644ft<sup>3</sup> baggage compartment aft, which should improve handling and stacking efficiency compared with the original arrangement, which split that volume between compartments in the rear and lower forward fuselage.



MITSUBISHI'S NEW SLIM SEAT PROVIDES A NOTICEABLE IMPROVEMENT IN COMFORT OVER STANDARD SEATS



sales and marketing Yosuke Takigawa echoed the same theme: the company's vision, he said, is to "apply advanced mainline jet technology to create a new standard of next-generation regional jets and offer unprecedented value for the environment, passengers and airlines."

Mitsubishi's new slim seat, developed by automotive and Formula One seat manufacturer Delta Kogyo using patented 3D-Net fabric, provides a noticeable improvement in comfort over standard seats while presenting a remarkably thin profile. Where conventional urethane cushions compress in a way that creates pressure points, Takigawa says, the 3D-Net textile, with its layer of pile yarn between the surface and reverse side layers and an overall thickness of just 0.25in, supports the body directly and eliminates the stress points. Along with the improved comfort, he elaborates, it offers weight as well as thickness savings, better shock and vibration absorption and superior durability and maintainability.

Takigawa points out that the 21in spacing of the seats is the same as that on a Boeing 787 in eight-abreast configuration. Most operators have specified nine-abreast economy seating, so the MRJ will actually offer more width, while the narrow profile of the seats provides more legroom at 29in pitch than conventional seats at 31in.

09. MRJ interior rendering



10



11

## Bombardier CRJ Series

The CRJ Series fuselage accommodates a 129in-wide (3,277mm) and 84in-high (2,134mm) cabin plus a cargo compartment below it. That makes room for rows of 2 + 3 economy seats, four of them 18.5in and the seats in the middle column of the three-abreast row 19in wide, plus a 20in aisle. Seats in the optional 2 + 2 business-class compartment forward are 20in wide with a 22in aisle. The windows are unusually large at 11 x 16in (279 x 406mm) and Bombardier says there is at least one at each seat row.

In standard all-economy-class configuration with the seats at 32in pitch, the CRJ100 offers 22 rows for a total of 110 seats, with galleys and lavatories fore and aft. Reducing the pitch to 30in and with a smaller galley and reduced stowage forward makes room for another three rows, or 125 seats in total, in the high-density version. And with four rows of business-class seats forward, along with a full-size galley and lavatory, and an expanded galley plus two lavatories aft, there is still room for 100 passengers (row 5 has just four economy seats). Similar arrangements in the longer CRJ300 give seat counts of 130 in standard, 120 in mixed and 145 in a high-density configuration.

Bag stowage is a recurring preoccupation in the new generation of regionals. Bombardier reckons the CRJ Series has the largest overhead bin cross-section in its class, offering 20-25% more volume per passenger than current state-of-art narrow-body aircraft and enabling carry-on bags measuring 24 x 17 x 11in (610 x 430 x 280mm) to be stowed wheels first.

“

SWISS PLANS TO USE THE NEW TYPE IN 115-SEAT CRJ100 FORM TO REPLACE ITS 20 AVRO RJ100S FROM 2014 ”

10. Bombardier says its CRJ Series bin offers 20-25% more volume per passenger than current narrow-body aircraft

11. The CRJ Series features five-abreast seating in economy

Mitsubishi Aircraft has also produced detailed comparisons of the clearance between the centre of the window seat and the sidewall: better than 13in at the armrest, nearly 12in at shoulder height and more than 6in at head height, it offers more space than the Embraer 170/190 at each point, which in turn scores better than the A320, 737 and CRJ700/900 at all three levels.

Target list price for the MRJ90 is US\$40 million, and the aircraft is being developed without direct government subsidies, Takigawa adds. Mitsubishi is also examining the market potential for a 100-seat stretched variant.

**WIDE-BODY FEEL** Meanwhile long-term regional jet manufacturer Bombardier says it is on track to deliver the first CRJ Series aircraft – which it describes as a single-aisle airliner rather than a regional jet – in 2013. Launch customer Lufthansa's subsidiary Swiss International Air Lines plans to use the new type in 115-seat CRJ100 form to replace its 20 Avro RJ100s from 2014, citing high

passenger comfort alongside lower operating costs, quieter engines and reduced carbon dioxide emissions as the prime criteria in its selection.

“Wide-body comfort in a single-aisle aircraft” is one of the features that makes the CRJ Series a game changer, according to Bombardier, which selected C&D Zodiac among the first batch of key suppliers to the programme. The interior package that C&D will design and produce includes the seats, linings, monuments, bins, galleys, lavatories and oxygen, lighting, insulation, waste and water systems.

Bombardier subsequently announced that Panasonic would supply the cabin management and passenger address system (CMS) for the aircraft. As well as providing control, monitoring and diagnostics of cabin functions such as temperature and lighting, the CMS also provides embedded digital audio functions covering passenger address, interphone and pre-recorded announcements and music. Panasonic says it is committed to “enhancing the entire passenger experience, including CMS, IFE and communications systems.”

The airframer has confirmed that it is monitoring the evolution of IFE systems, with a particular eye on the potential use of wireless distribution for IFE content, though no decision is likely until much nearer the in-service date. Panasonic, meanwhile, has indicated that it sees the CRJ Series as a potential application for its newly unveiled Fusion seat. ☒



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# lighttouch

From easing the pangs of jetlag to reinforcing brand loyalty, today's intelligent cabin lighting systems are beginning to make a big difference to the passenger experience

**BRENDAN GALLAGHER, AIRCRAFT INTERIORS INTERNATIONAL**





01



Boeing/Teague

02

“

AS LITTLE AS FIVE YEARS  
AGO, NOT EVERYONE  
UNDERSTOOD THE  
POWER OF INTELLIGENT  
LIGHTING ”

01. Airbus's Future Cabin Vision combines intelligent lighting with glossy surfaces to great effect

02. Boeing identified mood lighting as a key element when developing the new Sky interior for the 737



Plenty of space, a comfortable seat, good food and service, and entertainment on tap – for years these have been the pillars of a successful cabin offering.

But recently they have been joined by something less substantial but just as important to the passenger experience – mood lighting. Though the notion of cleverly modulating the quality and level of light to influence the passenger's sense of well-being seems to have been around for quite a while, it's taken longer than expected for some airlines to catch on. "As little as five years ago not everyone understood the power of intelligent lighting," says Steve Scover, general manager of lighting systems for Florida-based interiors giant B/E Aerospace. "But now, instead of saying sit down, buckle up and we'll get you there, the airlines want to make their cabins welcoming, and they recognise that lighting can help to do that very cost-effectively."

That flash of inspiration has led to an upsurge in developments on both sides of the Atlantic. Besides B/E Aerospace, US suppliers include Luminator Aircraft Products. In Europe, Diehl Aerospace and Schott, both located in Germany, are among the leading lights.

Mood lighting is all about manipulating passengers, making them feel at home the moment they set foot aboard the aircraft, easing them off to sleep, and nursing them as gently as possible towards the destination timezone to minimise the effects of jetlag. But do the same types of light work for all? It has been suggested that people from temperate climates prefer 'warm' (yellowish) light, while those from countries closer to the equator like bright, 'cold' white light.

B/E's Steve Scover has presided over a wide range of programmes, from one of the earliest, with trend-setter Cathay Pacific, to the current jewel in the crown – cabin lighting for all of Boeing's Next Generation 737s, with deliveries set to begin next year. He believes that while there are indeed some differences in response, they depend more on culture than geography. "The Europeans and North Americans tend to prefer the warm approach, simulating candle and firelight," he says. "But in regions like Asia-Pacific they want sharp illumination and clarity."

Gerhard Zwickel led the aircraft lighting programme launched by Mainz-based Schott to exploit its core expertise in fibre optics and other high-quality technical glass. The product line includes a combination of LED light sources and fibre optic cable that is ideal for the creation of 'starry nights' on the cabin ceiling and a variety of other mood-lighting effects.

He agrees that lighting designers and airlines need to be ready to account for differences in the passenger demographic. "Different cultural backgrounds and living environments certainly have an effect on the perception of colour," he says. "For example, people who live among lush vegetation recognise many more shades of green than the average European."

This can lead to complications, Zwickel points out. "It's a challenge to design cabin lighting for aircraft that will carry passengers with totally different cultural backgrounds, as so many of them do. Fortunately, the airlines increasingly have a good insight into their

A collage of images representing various communication protocols. The central image is a globe. Overlaid on the globe are several images and text labels:

- 802.15.4** (top center)
- RS232** (top left)
- Discrete** (top right)
- CANbus** (middle left)
- i2C** (middle right)
- USB** (bottom left)
- RS485** (bottom right)

The central image is a circuit board, likely a microcontroller board, with various components labeled. The board is white with a green border. It features a central microcontroller (U10), several resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100), capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100), and other components like a diode (D1), a relay (K1), and a buzzer (B1). The board is labeled with "W.A.S.P. LTD.", "SERIAL NO. 123456", "MOD REC 123456", "INSP TC JULY/09", and "U10".



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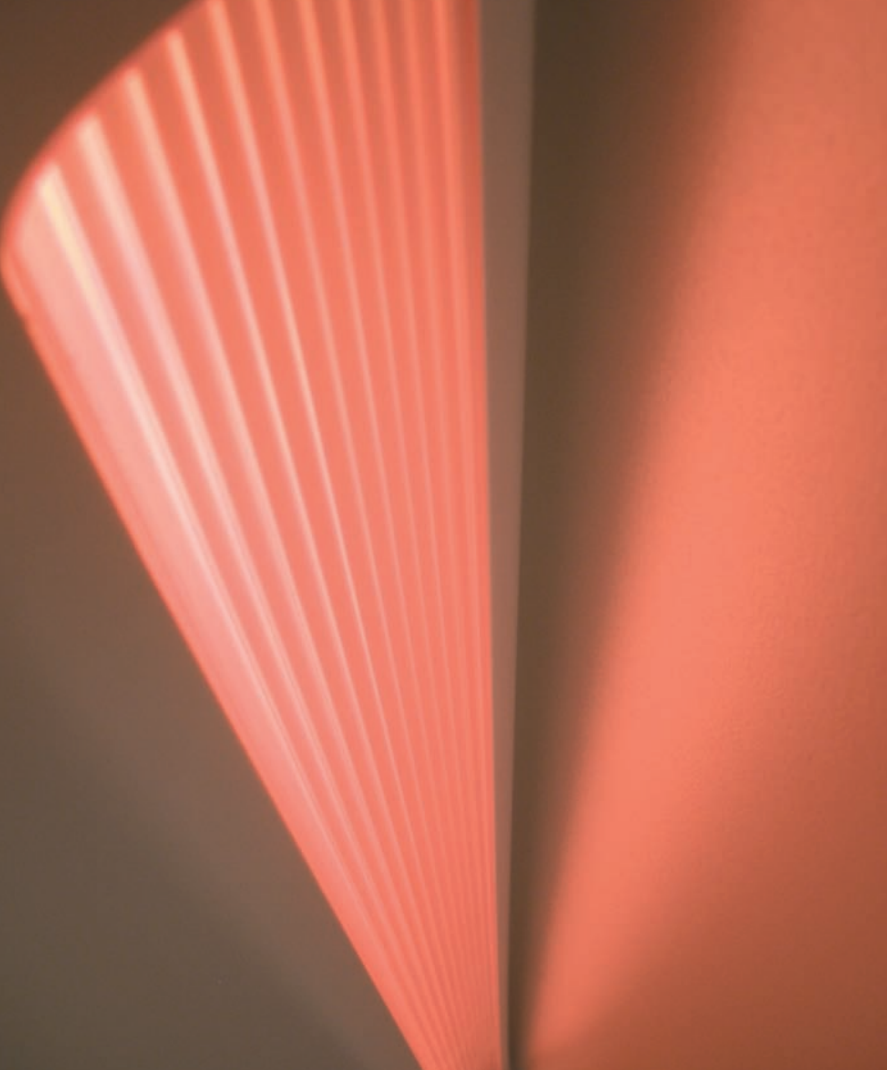
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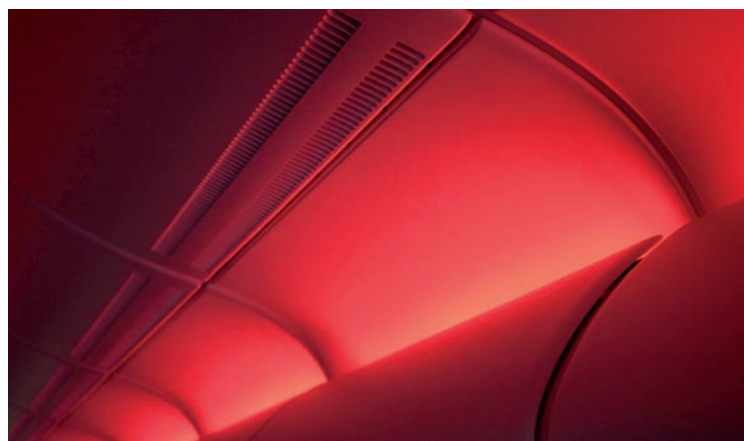
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AT MEALTIME PASSENGERS EXPECT  
THEIR SALAD TO LOOK GREEN AND  
THEIR STEAK BROWN ”

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03



04

passengers' expectations, and good design companies to help them produce something that will work well."

**FOOD FOR THOUGHT** The airlines take no chances with their lighting systems and scenarios, however, and test them rigorously before throwing the switch in a working cabin. "Lighting affects the look of not only the cabin furnishings but also the people in it and the food and drink they consume," says B/E's Scover. "We do some simulation work, certainly, but we have found that the true proof of where we are with a design is to build a physical mock-up before putting the first installation in an aircraft. When all the science has been completed, we like to get the product into a mock-up for a final visual check."

Gerhard Zwickel of Schott knows what can go wrong if suppliers and airlines don't do their homework. "At mealtime passengers expect their salad to look green and their steak brown," he explains. "Get the colour temperature wrong and the meat can appear greyish and very unappetising."

Nuremberg-based Diehl Aerospace supplies cabin lighting for all the top air transport programmes, including the Airbus A350 and A380 and the Boeing 787. Its success reflects years of painstaking preparatory work in cooperation with airlines and aircraft manufacturers. Activities included measurements of passenger response to lighting scenarios, as well as changes in pressure and vibration, in the cabin mock-up Flight Test Facility at the Fraunhofer Aviation research centre in southern Germany.

"It's very important to take a close look at how a particular lighting effect might impinge on the passenger," says Dirk-Achim Schevardo, the company's application

engineering manager for cabin interiors. "We have to ensure that there won't be any undesirable outcomes – the excessive use of red lighting can sometimes provoke aggression, for example. So we learned as much as we could about possible effects before offering our products."

**SIGNATURE EFFECT** One welcome effect to emerge over the last few years is the realisation that intelligent lighting can be a powerful reinforcer of the airline's brand in the minds of its customers. "Advanced lighting systems allow the airline to project its brand look and feel – the colours and graphical styles – throughout the cabin," says Melissa Parsons of Luminator Aircraft Products, which supplies a variety of lighting products for Boeing aircraft types.

Scover of B/E Aerospace agrees that this is something whose time has come. "The airlines have recognised the opportunity offered by branding by light and now it's a matter of their cashflow catching up with the idea," he says. "We can expect to see more and more lighting systems echoing the colour schemes of the airlines. But it must be subtle – passengers don't want to walk down the jetway and suddenly be bombarded by a rainbow of bright colours."

There's another reason for exercising the power of lighting with care, according to Gerhard Zwickel. "Much depends on what the brand itself represents – lifestyle and fun, like Virgin, or something much more conservative," he says. "If it's the latter, splashing the brand in first class could be counter-productive."

Whatever the airlines decide to do with their new lighting systems, there's little doubt that they are getting more value for

**03-04.** Air France's new A380 features signature lighting in Premiere, its first-class cabin



05



06



07



IN THE SHORT TO MEDIUM  
TERM THE TRUE TECHNOLOGY  
ADVANCES WILL BE ACHIEVED  
WITH LEDS



- 05. Employee observing process of the run-in-wall at Diehl Aerospace
- 06. Fibre optics are ideal for tight spaces
- 07. Light designers verifying different light scenarios in a mock-up at Diehl Aerospace

their money all the time. “The credit goes to the continuing advances in light-emitting diode (LED) technology,” says Scover. “We’re getting more and more in terms of light output for every dollar spent. At the same time, system life is still increasing, though it should be said that LEDs have always been highly reliable, while power consumption and heat output are going in the opposite direction – the power demand has been cut by 20% over the last six years.”

Today’s intelligent lighting systems are usually based on various combinations of LED light sources, fibre optic cable and processors to run the scenarios – a typical offering includes day/night simulation plus lighting appropriate to work, sleep, dining and relaxation.

Variations on this formula include Diehl’s system for the A380. Called Hybrid Integrated Ballast Unit (HIBU), it combines LEDs with conventional fluorescent light tubes. The company says it is superior to earlier installations on long-range aircraft because its Modular Enhanced Low Dimming (MELODY) technology allows for a wider variety of scenarios than ever before – the lights can be dimmed to 0.1% of the maximum and then very gradually raised again to simulate dawn. Diehl’s solution for the A350 features LED strip lights with segments that can be individually controlled to yield harmonious colour transitions and flowing effects.

**BRIGHT FUTURE** As for the future, the system suppliers believe that there is still plenty to come from LED technology. “We have done some work with electroluminescence but that’s never going to be used as a primary light source,” says Scover. “In the short to medium term the true technology advances will be achieved with LEDs.”

Diehl has invested heavily in LED and is looking to maximise its return before moving on to something new. “It took nearly a decade to bring LED into the cabin, starting with feature and accent lights and moving gradually to today’s all-LED installations,” says Schevardo. “The technology still has plenty of potential in terms of greener operation and advanced designs, so it’s likely to be our preferred option for some time to come. But we’re also looking at new technologies, of course, and we’ll bring them into aircraft programmes as soon as they mature.”

One of those technologies could be organic LED (OLED), with its promise of reductions in weight and power. “We’re keeping a very close eye on OLED, which offers the possibility of another step-change in cost-effectiveness,” says Scover. “But it’s expensive at the moment, and the aviation community will have to wait until wider adoption by the consumer electronics industry drives down prices. When that happens, we will embrace OLED.”

Cabin lighting has come a long way in the last decade. Something that was essentially binary in nature – on or off, light or dark – now offers a multitude of choices that can be subtly deployed not only to make passengers feel better but also to persuade them to choose the same carrier next time out. The mood is buoyant among the suppliers and their airline customers, and there’s more to come. ☒

## CONTACTS

B/E Aerospace, Web: [www.beaerospace.com](http://www.beaerospace.com)  
 Luminator Aircraft Products, Web: [www.luminatorusa.com](http://www.luminatorusa.com)  
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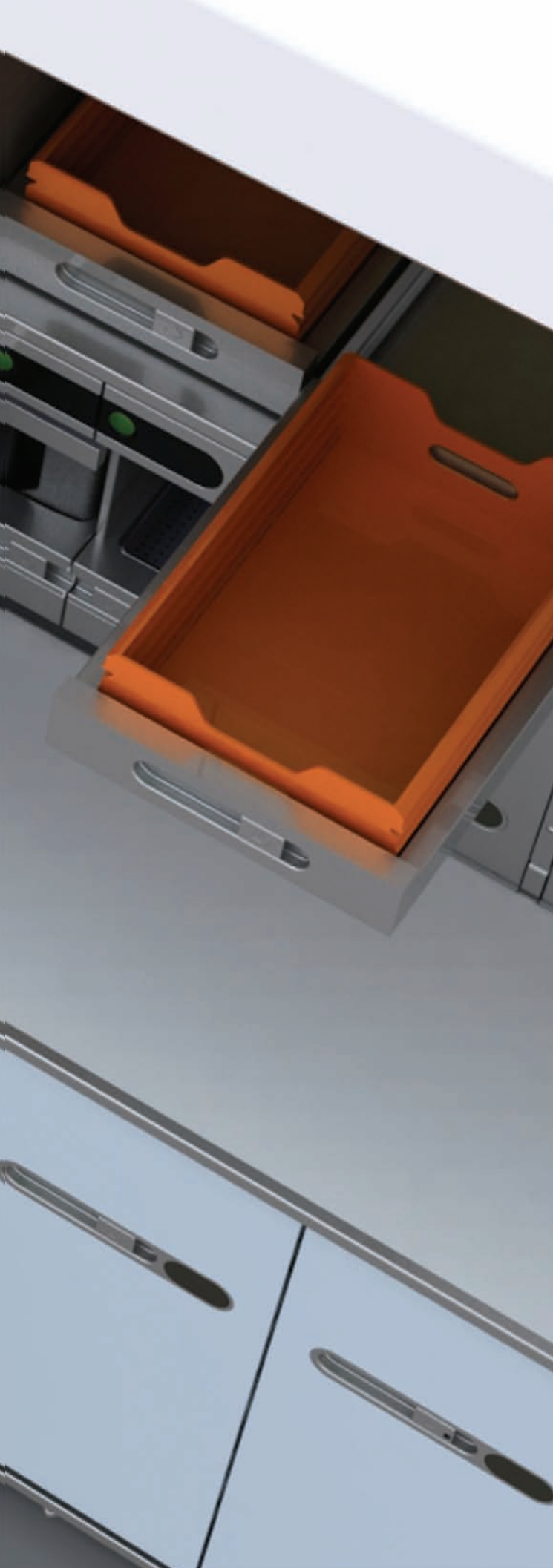
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# spicetime

Airbus is approaching decision time on whether to take its SPICE galley to market as a replacement for the decades-old standards that govern current equipment design

BERNARD FITZSIMONS, AIRCRAFT INTERIORS INTERNATIONAL



The SPICE galley, fruit of Airbus's effort to develop a new standard for onboard catering equipment, has progressed from award-winning concept to prototype hardware, already tested with caterers and flight attendants. The next step is full-scale cabin testing to allow complete validation before deciding on offerability.

Designed around the ATLAS tray size, the basic unit of the most widely used of three standards that have defined aircraft galleys for the last 40 years, SPICE stands for SSpace Innovative Catering Equipment. And the motivation behind it is not simply the age of the existing standards. By eliminating the traditional service cart and making better use of the volume above the counter, it aims to liberate cabin space, save weight and improve crew productivity.

Instead of the conventional serving trolleys, SPICE uses foldable service carts that remain on board and big loading carts from which standard units slide directly into the galley. A power-assisted lifting device, the transfer table, helps crew move the standard units to and from higher positions, so that they can be stored above as well as below the counter.

In 2007 the concept scooped the inaugural Crystal Cabin award for Comfort and Health. So how has it translated to physical reality, and where does it go from here?

“

SPICE GALLEYS  
CAN BE LOADED  
IN THE SAME SORT  
OF TIME AS ATLAS  
GALLEYS”

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01. SPICE replaces today's meal trolleys with lighter meal boxes, which are then transported in the cabin using a folding serving cart

**PROTOTYPE TRIALS** “We have worked on building a prototype equipment for handling trials, including galley, transfer table and folding service cart,” says Jonathan Norris, vice president cabin design, Airbus Operations GmbH. “We have also produced new concepts for galley inserts (GAINs). The prototype is now complete and functional with mock-up galley inserts.”

Airbus has also worked with all the major caterers to design equipment to enable them to move SPICE boxes around on the ground. “We produced a simple device called a skater, which effectively just adds wheels to a meal box,” explains Norris. “Since this was developed we have completed tests in three flight kitchens to ensure the compatibility of SPICE with their current production processes.” The results were very encouraging, he says, uncovering no showstoppers from the caterers' point of view.

The final test focused on aircraft loading using the prototype galley: “The important thing here is that it doesn't take any longer to load an aircraft that has SPICE galleys, something that could impact aircraft turnaround times.” The results of trials with three caterers were “excellent,” says Norris, showing that SPICE galleys can be loaded in the same sort of time as ATLAS galleys.

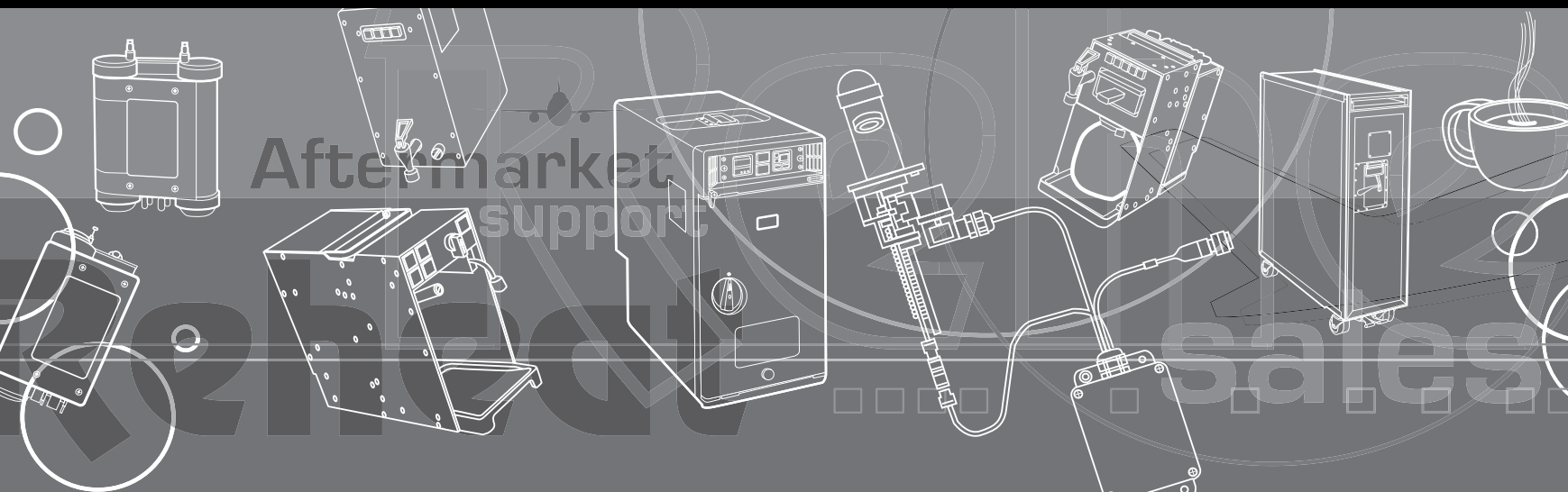
Apart from the introduction of the skater, the trials led to only minor modifications of the galley concept itself. Testing with flight attendants, for example, revealed the

need for alignment aids in the form of markings on the galley and the folding service cart to make it easier to put the cart in the right place for loading meal boxes.

Suppliers involved in the production of equipment so far include Aerocat, which is providing lightweight plastic SPICE boxes; and Diethelm-Keller, which is supplying metal SPICE boxes. “We have also worked with DeSter to design new packaging concepts that take advantage of SPICE's 9g compartments,” Norris adds. “In terms of the monument itself, we are working with a very well-known supplier of cabin equipment for design and production of both galleys and inserts.” Commercial sensitivities prevent him from identifying the galley maker at this stage.

In parallel with the physical trials, meanwhile, Airbus has completed numerous assessments of the value of SPICE to airlines: “The most obvious economic benefits are in the weight saving and increased seat-count,” says Norris, “but we have also found that SPICE has great potential for improving crew productivity.” The calculations factored in quantified extra costs on both the airline and caterer side as a result of “recatering events” and caterer investment in skaters for example.

Nevertheless, he says, “when we put our conservative numbers into a fleet-plan model to quantify the financial effects over time, we find that SPICE typically generates US\$2.5 million to US\$3.5 million of additional value per



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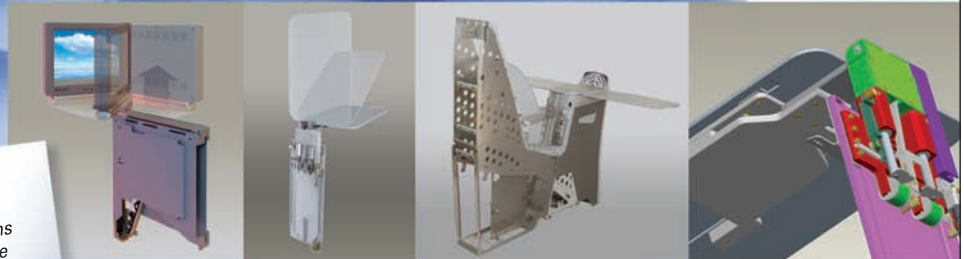
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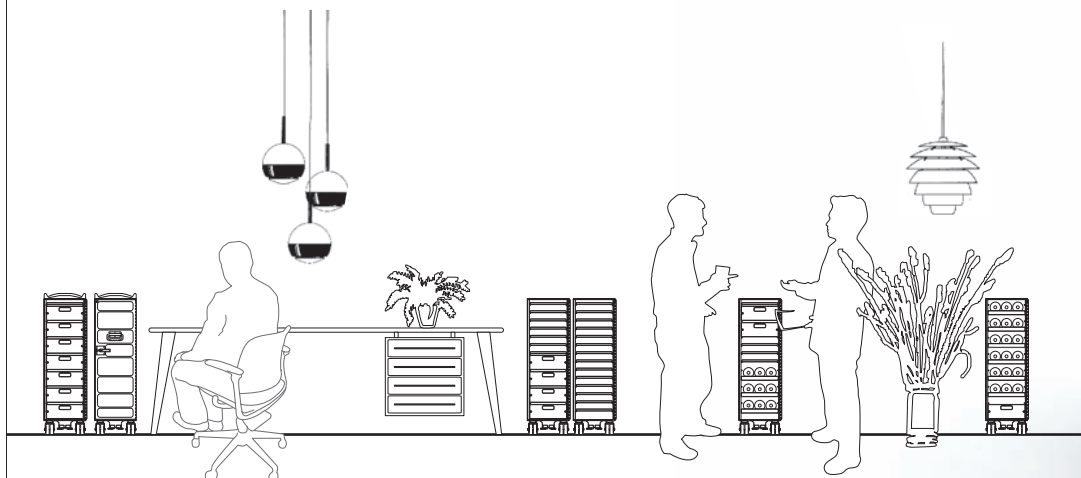


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new-delivery twin-aisle aircraft, depending on how far the airline is prepared to go in embracing SPICE's innovation potential." In retrofit cases, he calculates that payback takes between three and five years, again depending on how much of SPICE's potential the airline embraces.

**SAVINGS SPECIFICS** The SPICE team found that the typical weight saving would be about 600kg on a twin-aisle aircraft and double that for an A380. This is mainly as a result of the fact that SPICE boxes do not need wheels or a 9g-capable structure, since SPICE galley compartments are certified to 9g and allow flexibility in the choice of materials for transportation of service items. "We can use cheap, lightweight plastic boxes weighing 6.5kg in place of today's trolley," says Norris. At the same time, bulk items such as bagged snacks, IFE headsets, blankets and so on can be transported in simple cardboard boxes or even just wrapped in plastic film to keep them dry and clean.

There is also the potential to improve seat count. "We have now compared 3D definitions of SPICE galleys for over a dozen delivered aircraft galley configurations," Norris says. "We found that a typical twin-aisle aircraft can gain two to three economy-class seats. SPICE galleys are much more space efficient than today's galleys because we have harmonised the GAIN and box sizes to the galley compartments, which produces a much more geometrically efficient design."

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THE SPICE TEAM FOUND THAT THE TYPICAL WEIGHT SAVING WOULD BE ABOUT 600KG ON A TWIN-AISLE AIRCRAFT

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03

Another benefit is that the use of the transfer table will enable airlines to remove health and safety policy restrictions on how many boxes can be stored in the upper part of the galley, because it reduces the need to lift and carry things around the galley. "There are also improvements in GAIN design which enable us to create denser capacity or do away with some GAINs altogether," says Norris. "For example, unlike today's galleys, SPICE's upper storage compartments are all chilled, which means that airlines won't need to provision space for 3-Mode chillers to chill drinks."

**CREW BENEFITS** In terms of improving crew productivity, Norris continues, there are two main areas where SPICE is better than ATLAS: "Firstly, SPICE solves many of the main causes of occupational hazard within galleys, namely the impact of lifting on shoulder and back pain, and the problem of blocked trolleys causing finger injuries." SPICE solves the lifting issue through the use of the transfer table, and avoids the blocked trolley issue because SPICE boxes are moved on rollers that roll only forward and backward, unlike trolleys, which have castoring wheels that can flip around into any orientation like a supermarket trolley.

The second area where SPICE improves crew productivity, Norris says, is by making service delivery

- 02. Airbus says SPICE greatly improves working conditions for crew
- 03. The folding service cart



04

04. Meal boxes weigh as little as 6.5kg

more efficient. For example, SPICE's 9g compartments make it possible to use boxes that both contain drinks and other items for transportation and are used directly during the service: "That means service items can be pre-prepared for service by the caterer, come straight out of the galley for service and slot directly onto the folding service cart." Today, by contrast, everything must first be taken out of standard units then rearranged into Vario drawers before being placed on top of the trolley.

**COST CONSIDERATIONS** Airbus has also been working to quantify the costs involved. The biggest, Norris says, are the recurring cost impacts caused by operating dual galley standards: "The cost here is driven by what we have called re-catering events, when an aircraft needs to be swapped and the airline can only put in place a replacement aircraft with a different galley standard. That means the caterer has to rebuild the catering load, which can take up to three hours."

Fortunately, there are many factors that reduce this cost, mainly the fact that crew type rating considerations usually force airlines to schedule the same aircraft type.

There are likely to be extra costs for the caterers, too, Norris admits: "They will probably be the ones who have to invest in simple devices, like the skater, to move the SPICE boxes around on the ground." They may also need to rent extra floor space in some locations for storage of dual sets of galley equipment: "These are items that are likely to feed back into their pricing, although they themselves say that it is difficult to quantify by how much when competition between caterers is taken into account."

“

THE PROTOTYPE IS CURRENTLY BEING USED FOR MARKET VALIDATION ACTIVITY WITH UP TO 15 AIRLINES, AS WELL AS CATERERS AND SUPPLIERS”

”

**WAY FORWARD** The prototype is currently being used for market validation activity with up to 15 airlines, as well as caterers and suppliers. Airbus will use the feedback from this customer focus group to decide on the offerability status of SPICE. Because it has not yet been launched, the galley B/E Aerospace is developing for the A350 is based on the existing ATLAS and ARINC 810 standards.

Given a positive decision on offerability, Norris says, the next step will be to produce full engineering prototypes for galleys and GAINS – an activity that is already under way with the galley supplier.

Ground tests will then be carried out to prove galley performance parameters such as loading, chilling, cooking times and quantities. Then there will be flight tests to examine the behaviour of the galley during flight, establish the maturity of key elements such as the transfer table, and to complete trials with passengers and caterers benchmarked against today's ATLAS performance: "We hope to complete this part of the activity with a willing partner airline."

Finally, he says: "Taking the prototype to production standard for availability next decade means deciding on our strategy for offerability on our individual programmes, then identifying suppliers and clarifying the offer details."

So the reaction of the airline focus group is crucial: "We have yet to meet an airline which hasn't encouraged us to push ahead with SPICE after seeing the prototype, but the devil is in the detail and it is here that we have to prove to our customers that SPICE makes sense" ☒

## CONTACT

Airbus, Web: [www.airbus.com/en/corporate/innovation/spice](http://www.airbus.com/en/corporate/innovation/spice)

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## leadinglight

Six years ago, SELA developed and manufactured a 28VDC 10W halogen MR11 dichroic bulb designed for installation in dome lights, reading lights and spotlights. Since then more than 7,000 of these bulbs have been manufactured and installed in aircraft cabins. Now the company has developed a new alternative to this halogen technology – a 28VDC MR11 LED bulb.

The transition for the customer is easy – the old halogen can simply be replaced with the new LED bulb. The new lamp is completely fit and form with any MR11 28VDC bulb, and the company says its lighting level is 30% higher than the halogen lamp. It also offers a choice of white temperatures as required (such as warm, natural, cool etc). The company says the product's other major advantages are a lower power consumption, high mean time between failures (MTBF), and that it uses PWM for dimming.

SELA has also developed a 28VDC midget flange LED-based lamp to replace the incandescent bulbs used behind cockpit instruments or in galleys. This new LED bulb features a bipolar supply, and can create different lighting temperatures. The company also says the product's electrical consumption is 50% lower, and it boasts better light rendering.

## climatechange

Continuing its tradition of regularly bringing new products to the marketplace, B&W Engineering has launched EVO II, the second generation of its range of thermally insulated A-LogEqu airline catering containers.

Like the EVO I series, the EVO II containers do not need any electrical power supply, nor any connection to the galley to keep their contents (solid or liquid) within the required temperature limits. However, the EVO II development also included the use of high-performance polymers and alloys to improve the thermal insulation performance by 25%. B&W Engineering says hot or cold contents can now be kept within the right temperature range for up to 24 hours – and beyond, depending on the application.

The A-LogEqu EVO II containers are designed to store contents at a temperature range from as low as -80°C (-112°F) to as high as 120°C (250°F). Another development goal was to reduce the product's weight when empty – the EVO II containers are 10% lighter than the EVO I series.

All the improvements have been incorporated while using the same ATLAS drawer and standard unit container dimensions as the EVO I series. Versions for KSSU trolleys are also available. Thus, the EVO II series A-LogEqu containers are as easy to implement into onboard service concepts as the EVO I series.

Easy handling and operation were development goals too. For the dispenser versions, a modular, easy-to-operate double-safety tap has been developed, and for the top loader versions a spring lock design has been incorporated. Furthermore, the EVO II series dispenser drawer is equipped with a solid inner tank so the bag-in-box disposables system of its EVO I predecessor is no longer needed, for the majority of the applications. B&W Engineering expects that development to save many tons of plastic bags and cardboard boxes every year. However, the bag-in-box system will still be available for applications such as storing juices.

"The A-LogEqu EVO II series provides new passenger food and beverage service options whereby costs will be saved, and in addition, provides savings of tons of CO<sub>2</sub> because of weight and onboard power consumption savings," says Hubert Walter, founder and managing director of B&W Engineering.

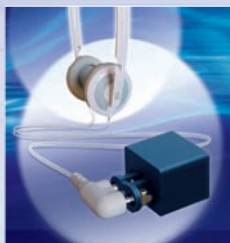


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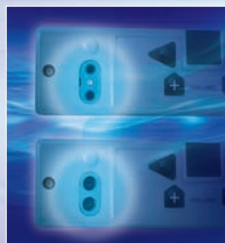
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## businessclass

In response to the industry's growing demand for high-tech accessories and VIP interiors, and the implications this creates for design certification, Aerospace Design and Certification (aeroDAC) has launched a new cabin safety certification course.

With a reputation for excellence in global aerospace design and certification, aeroDAC has utilised its vast experience and training expertise to create a course based on what it says are the three main principles of cabin safety certification – occupant protection, extending time for egress and increasing the speed of egress.

The new airworthiness requirements have grown in response to the rapid development of technology including in-seat power, in-flight entertainment, portable electronic devices and airbag seatbelts. New designs must also adhere to Electrical Wiring Interconnection System (EWIS) specifications.

Particular difficulties that design organisations may face when working on

aircraft interiors include design modifications aimed at renewing and re-designing soft furnishings that must meet flammability regulations, while also ensuring compliance with dynamic seat requirements. "VIP interiors present further concerns regarding compliance, as many suppliers of furnishing and equipment are not approved, and therefore the design organisation must take responsibility for certification," says Terry Gibson, managing director of aeroDAC. "EASA does not approve burn test laboratories and one of the more controversial areas that our clients encounter is that multiple audits of test facilities can be time wasting."

aeroDAC would like to see better understanding of the certification implications surrounding new designs before they reach the final stages of completion. "aeroDAC's new cabin safety certification and EWIS courses assist organisations by providing comprehensive training in, and understanding of, all of these areas," says Gibson.

## coat tales

Spectrum, established in 1979, is a leader in performance finishing technologies such as hydrographics, decorative paints and electrodeposition coatings. The coatings are supplied to the aerospace industry on a tier-two basis, and are ultimately built into aircraft at Airbus, Boeing, Cessna and Cirrus.

The company's product lines include traditional wood grains, carbon fibres, brushed aluminium, marbles and straight opaque paints. Surface finishes are protected with multiple top coats ranging from matte, satin, high gloss and even a soft-touch coating system, which can be applied over hydrographics to enhance the feel and bring customers a new level of luxury. This combination allows designers to work with a vast palette of ideas, which Spectrum helps translate from the imagination into production.

Spectrum's facilities encompass over 130,000ft<sup>2</sup> and are 100% automated, from the application of the decorative coating to the application of the top coat, allowing for a very robust and consistent appearance.



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## branddesigns

Serving the airline market for over 50 years, Lantal has gained in-depth competence in interior materials, design, branding, and the needs of the global aviation industry. "Airlines can benefit from a clearly projected brand identity with a coherent interior design and premium materials," says Daniela Grunder, director of brand communication at the company.

Every year, Lantal's experts anticipate trends and compile these patterns, colour schemes and materials into its Conceptual Forecast. In 2009, the designers focused on lightness, and even the composition of the textiles reflects the theme – with seat cover fabrics in lightweight qualities, polyester curtains, and new carpet textures woven with a special lightweight technique.

Various airframe makers and airlines around the world rely on the company for design concepts, fabrics, carpets, leathers and pneumatic comfort systems. These products are complemented by services such as laboratory testing, ready-made textiles, and digital interior visualisations – for single-source convenience.

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## adroitodrink

In October, the US Environmental Protection Agency (EPA) announced it is issuing final rules requiring airlines to increase scrutiny over the drinking water being served to aircraft passengers. "The new rules may prove costly as airlines are forced to develop ways to test and disinfect aircraft water systems across diverse aircraft fleets," says George Stachowski, manager, airline sales and customer support at Monogram Systems – TIA Division. "In addition, the increased compliance costs come at a time when airlines are aggressively working to reduce costs and remain competitive."

However, Monogram Systems – TIA Division has anticipated the ruling and is launching the 1604 pour-over coffee brewer. This new brewer has an internal water tank that is filled by using bottled water and is therefore separate from the aircraft water system. "The TIA pour-over technology has proven its reliability over thousands of hours in business aviation and cargo aircraft," says Stachowski. "In addition to its better tasting cup of coffee, this new coffee brewer is up to 5lbs lighter than existing units and is available in ATLAS and ARINC standards. With the 1604 coffee brewer airlines now have a cost-effective alternative to 'standard' coffee makers by further reducing maintenance cost and increasing reliability." The 1604 coffee brewer is also fully interchangeable with existing installed rails, saving additional costs on retrofit programmes.



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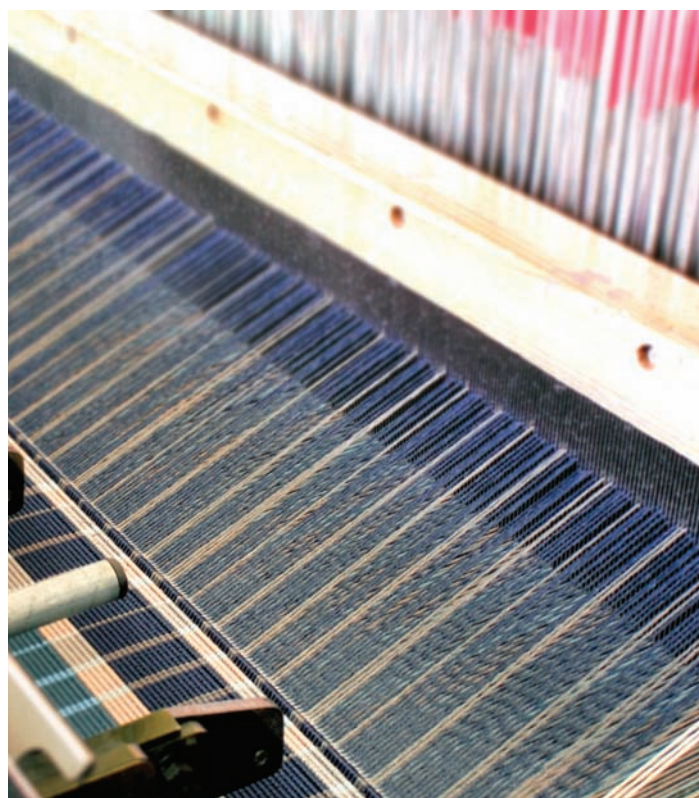
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# measure of success

The award-winning Swiss company TISCA TIARA mobility textiles has developed the capability to produce aircraft carpets in any width, to match clients' specifications exactly. "This special flexibility allows airlines to minimise waste and off-cuts during cutting and installation, resulting in a cost reduction of up to 30%," says Matthias Tischhauser, division manager of the company's mobility textiles business.

Embroidered carpets are produced in any size and up to 13.5m in width, in one piece and without any seams, precisely matching the aircraft's floorplan or other measurements. The company also manufactures woven carpets in any width from 1- 4.6m, to clients' exact specifications. This flexibility in production is designed not only to reduce costs for airlines, but also to minimise the consumption of resources and raw materials, thus conserving the environment and supporting airlines' efforts to become greener businesses.

TISCA TIARA has been owned and run by the same family for three generations. This year alone the company has won a red dot design award, awards for the best woven carpet and the best colour line from Wools of New Zealand, an iF Product Design Award and the AIT Innovation Prize for the fourth year in a row. Furthermore the company has been nominated for the Designpreis Deutschland 2010 [Design Award of Germany 2010].



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# nealstone

Want to know more about key industry individuals, but haven't got the time to search for their Facebook profile or linkedin page? November's 'FaceSpacer' is Neal Stone, who quit his position as head of design at British Airways at the end of 2008 to launch his own design management firm, leapSTONE ([www.leapstone.co.uk](http://www.leapstone.co.uk)) – so how's he been getting on and why did he decide to leave BA?

**01 WHEN DID YOU FIRST KNOW YOU WANTED TO BE A DESIGNER?** I'm one of those lucky few people who knew what I wanted to do from an early age. Everything revolved around designing, drawing and making things. I enjoyed building structures with Lego and illustrating English essays (which I'd get told off for). I joined the Product Design course at Brunel University which taught me that good design needed to both look good and work well.

**02 AND HOW DID YOU GET INTO AIRLINE DESIGN?** I joined the design team as a young graduate from Brunel University. My experience up to that point had been university projects and two great six-month work placements – one in Turin and the other at BA – who went on to sponsor my major final year project. I became fascinated at the idea of designing products that would go on to be installed on aircraft: the constraints were numerous and complex and the target audience varied. Also, it seemed to me there was an imperative to innovate: the basic offer of flying people from A to B was easily replicated, whereas innovation and design could help you to stand out from the crowd.

**03 WHEN DID YOU FIRST START AT BRITISH AIRWAYS?** I joined BA in 1996. It was so exciting and glamorous and I was incredibly proud to have earned my position there! Within days of joining I had been asked to do so many amazing things and it was an excitement that never waned. I think it was the myriad challenges that made it such an exciting space to work in. During my time there I led the design of the first flat beds in business class, created a new fourth long-haul cabin (World Traveller Plus) and steered several cabin refresh projects. Furthermore, since we were a design management team who looked after all the aspects of the brand, we'd look at creatively steering all the customer touchpoints – terminal spaces, lounges, signage, communications, website and catering offers. It was a blast.

**04 SO WHY LEAVE?** I had worked on various projects and travelled the world during my years at BA and had become very airline focused. Despite an exciting secondment to railway company GNER as head of design in 2001, I left BA at the end of 2008 in order to spread my wings as a design manager and to diversify into other (non-aviation) market sectors and disciplines. It was an emotionally difficult decision since I had built a great team around me and in turn I'd worked with some great people.



**05 WHAT HAS YOUR EXPERIENCE AT BA TAUGHT YOU?** That the best brands are built from attention to detail to the biggest step-change innovation. In the airline and travel sector customers have the chance to scrutinise the tiniest details and they all add up to an impression of a total brand experience. I concluded that creatives thrive on constrained design briefs and that (by and large) the best briefs in turn are rooted in a deep insight and knowledge of your customer. I also learned that great teamwork is pivotal to the success of any project and that external secondments are a unique opportunity to retain and inspire talent with an organisation.

**06 DO YOU FEEL DESIGN IS VALUED ENOUGH AT BOARD LEVEL AT MOST AIRLINES?** I think that you can tell the carriers who value and nurture design and those who have yet to experience the value it can add. Inevitably those who have taken a leadership position on exploiting design will reap the rewards. It seems to me as though customer-facing design in the aviation sector is still in a very nascent stage, compared to say, consumer electronics.

**07 WHERE DO YOU SEE THE MOST OPPORTUNITY FOR IMPROVING AIRCRAFT INTERIOR DESIGN?** There is ample scope to think much more about a cradle-to-cradle design philosophy i.e. how is a product's footprint minimised in production? What happens to it once it's been used? How is it dismantled and re-used? With such scrutiny of the industry about its green credentials, it is an obvious place to go next. We are living a lifestyle that demands the resources of three Planet Earths, so some smart thinking is needed. Of course design isn't just about creation or adding value, but can also be used as a smart way to cut cost too – something that I'd have thought would have captured most airline executives' attention just now. Smart insight into design for assembly or design for maintenance can save a lot of money over a product's lifecycle.

**08 WHAT'S THE HARDEST ASPECT OF RUNNING YOUR OWN BUSINESS?** Making the time and space to craft a direction for where I want to take leapSTONE next. I've been very fortunate to go from a standing start to winning two fantastic clients, despite launching in the middle of a recession, but sometimes it's a challenge to stop and focus where I want to take it next. I have so many ideas and have to work hard to balance executing and planning. It's difficult when you're so passionate about your work.

**09 AND THE BEST?** The total freedom to drive leapSTONE in whatever direction feels right or exciting continues to be a revelation. Approving random Tuesdays as leave at short notice to go sailing (the other passion in my life) is a real bonus too!

**10 FINALLY, WHAT STILL MAKES BRITAIN 'GREAT'?** Without a doubt it's our nation's design talent, inventiveness and creative industry – it's an amazing source of income for the country and I'm sure will continue to be a key point of competitiveness for UK PLC.

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