

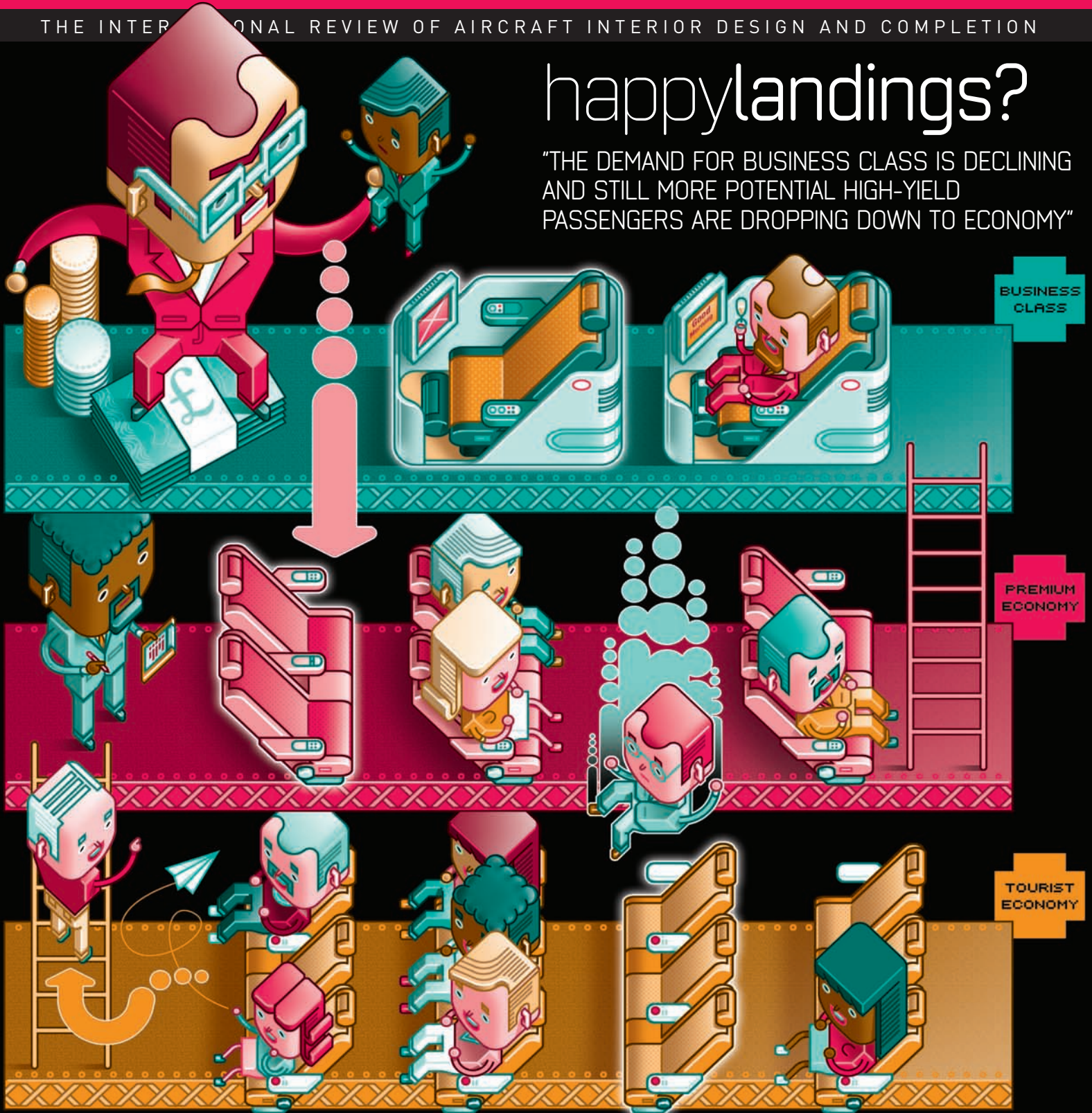
Aircraft *interiors* INTERNATIONAL

JUNE 2009

THE INTERNATIONAL REVIEW OF AIRCRAFT INTERIOR DESIGN AND COMPLETION

happylandings?

"THE DEMAND FOR BUSINESS CLASS IS DECLINING AND STILL MORE POTENTIAL HIGH-YIELD PASSENGERS ARE DROPPING DOWN TO ECONOMY"



RECARO

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All in one: the new **RECARO Smart Line 3510**.
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multiplechoice

Unless you've been living in a rather elaborate cave complex for the last six months, you've probably noticed that there's a bit of an economic crisis going on. We've seen huge multinationals go bust, banks nationalised, and billions wiped off the stock market. Suddenly, flying in business class to stay overnight in a swanky hotel before finalising a fat contract with a big customer seems less and less likely for more and more corporate travellers. But business has to go on, and it's during such desperate times that the really rich see the opportunities and make the real money – or so they like to tell us.

So business travellers still need to fly. It's just a lot less likely that their finance director is going to sign off a full business-class fare. However airlines can better protect their revenues by at least offering a cheaper product that still provides a level of service, privacy, space and comfort that better suits the needs of the often lone business traveller. Hence the sudden plethora of premium-economy products, covering a very wide range of seat pitches, widths, and degrees of recline. The apparent wild abandon with which airlines have thrown together their premium-economy offerings is a slight cause of concern for industry veteran, Klaus Brauer. "An increasing number of airlines offer premium economy, but there is little consistency in the product across the industry," he notes on page 39. "Industry observers can wonder whether the inconsistency represents finely tuned optimal responses to different markets or is a sign of an industry still searching for an optimum."

Brauer's own 'search for the optimum' led him to conduct an extensive study, which in turn led to its own fairly startling conclusion: "Even with the lesser demand levels studied for premium-economy class and one-tenth of business-class demand buying down to premium economy, total revenue increased by 2% – in the context of the small profit margins usually seen in the airline industry, even 2% gains in total revenue are absolutely huge."

Meanwhile it's not just the economy cabin that is evolving into differing niches to attract higher revenues. This year's Expo in Hamburg saw everything from super-first-class to high-density business-class products on display. However, as we noted in our last issue, increasing product diversity and customisation does of course bring with it particular cost implications in terms of both manufacturing and maintenance. The trick is to design seats with reduced part counts, while still allowing enough flexibility for brand differentiation. This is certainly the case with a new generation of economy seats currently entering the market or under development (see page 46).

However, as our feature on seat manufacturing (page 82) notes, there's still a lot of ground to be made up – but a few of the major manufacturers are stepping up to the plate, while it's possible the recent downturn in the automotive industry could see a challenge mounted from suppliers in that sector hungry for a new challenge. On that rather explosive note, I think I'd better head back to that cave complex – *Sopranos* boxset, anyone?

Anthony James, editor

THE DEMAND FOR BUSINESS CLASS IS DECLINING AND
STILL MORE POTENTIAL HIGH-YIELD PASSENGERS ARE
DROPPING DOWN TO ECONOMY

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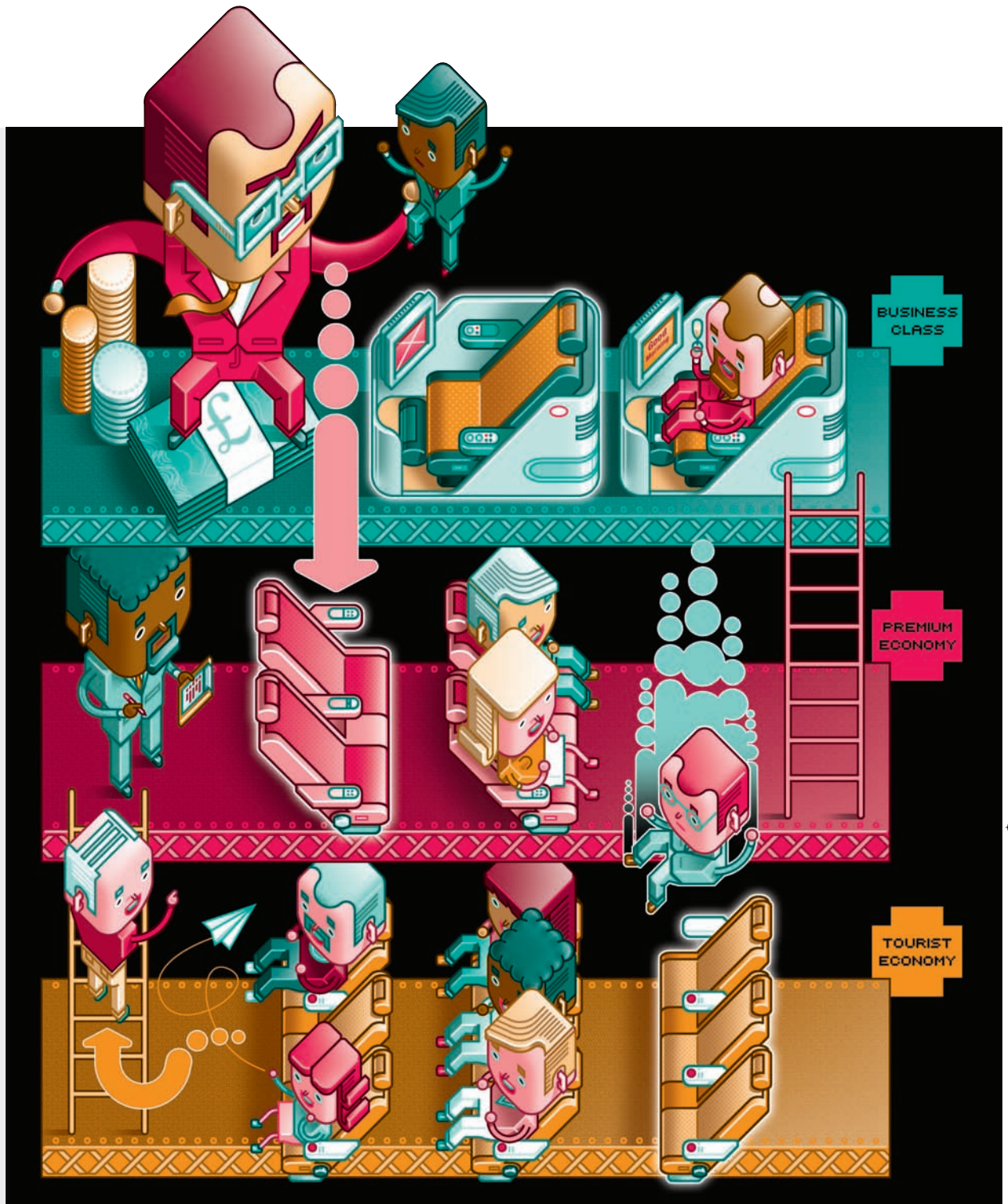
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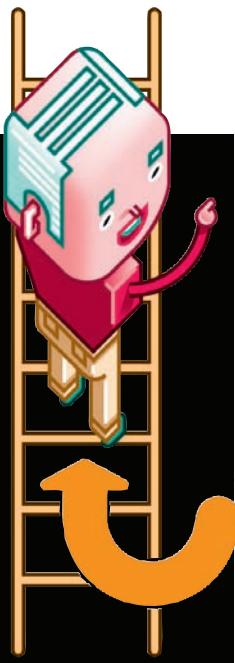
mind the gap 038

As companies continue to cut back on business-class travel, premium economy has a vital role to play in boosting airline revenues, but what is its optimum cabin configuration?

KLAUS BRAUER, AIRCRAFT INTERIORS INTERNATIONAL



features



seashell

Nautilus, a premium-class cabin concept for the Airbus A380 mock-up, boasts curves in all the right places

ANTHONY JAMES, AIRCRAFT INTERIORS INTERNATIONAL

032 sea shell

Nautilus, a premium-class cabin concept for the A380 mock-up, boasts curves in all the right places

ANTHONY JAMES, AIRCRAFT INTERIORS INTERNATIONAL

people's choice

Aircraft Interiors Expo 2009 saw a multitude of new economy seating products and concepts, all focused on reduced weight, low cost of ownership and improved living space and comfort

ANTHONY JAMES, AIRCRAFT INTERIORS INTERNATIONAL

Comfort Line 3520

Stingray

Smart Line 3510

046 people's choice

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ANTHONY JAMES, AIRCRAFT INTERIORS INTERNATIONAL

light entertainment

A look at the rise in popularity of in-flight entertainment (IFE) screens in single-aisle airliners and regional jets (including a comparison of some leading systems' vital statistics on page 71)

BRENDAN GALLAGHER, AIRCRAFT INTERIORS INTERNATIONAL

060 light entertainment

A look at the rise in popularity of in-flight entertainment (IFE) screens in single-aisle airliners and regional jets (including a comparison of some leading systems' vital statistics on page 71)

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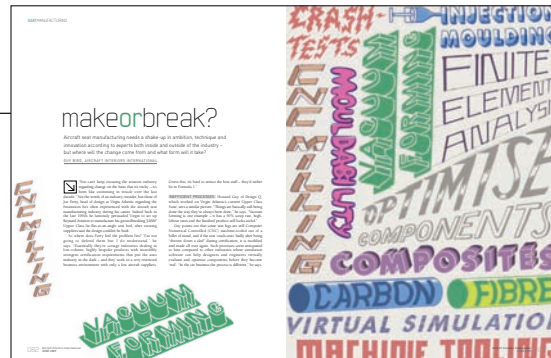
blue yonder 072

LED mood lighting, sculpted ceilings, and bigger bins and windows lie at the heart of the new Sky interior for the Boeing 737
 JAMES WALLACE, AIRCRAFT INTERIORS INTERNATIONAL



make or break? 082

Aircraft seat manufacturing needs a shake-up in ambition, technique and innovation according to experts both inside and outside of the industry – but where will the change come from and what form will it take?
 GUY BIRD, AIRCRAFT INTERIORS INTERNATIONAL



latin flavour 092

A new logo, new interiors and fresh food are designed to ensure Latin American airline TACA presents a contemporary image to international customers
 ANTHONY JAMES, AIRCRAFT INTERIORS INTERNATIONAL



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For more information on how your airline could benefit from SafTGlo. Visit us online at www.stgaerospace.com



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- Maintenance free technology - no costly servicing
- SafTGlo is the low-cost alternative to electrical emergency floorpath systems.



Etihad Airways presents new first-class cabin suite

Etihad Airways has unveiled its new first-class cabin, which contains 12 individual suites (from B/E Aerospace). The highlight of the US\$70 million first-class revamp is an extra-large seat that extends to a fully flat bed (80.5in long and 29.75in wide), equipped with built-in massager, lumbar support and adjustable headrest, as well as in-seat power sockets PCs, iPod connector, USB ports, Ethernet port and audio jack.

Each 82in-long private suite is accessed by its own Arabic-styled sliding door and includes a personal wardrobe and minibar, as well as a 23in widescreen LCD screen for access to more than 600 hours of on-demand entertainment. Spacious stowage compartments are built into and around the seat. Meals are served on a 24in x 25in wood-finished table.

The first-class cabin also features a large changing room with a full-length mirror, new style washbasin and leather fold-down seat to allow passengers to freshen up and change after take-off and prior to landing.

Other improvements include luxury leather upholstered by Poltrona Frau, and designer amenity kits.

"A downturn is exactly the time when an airline needs to demonstrate its commitment to the very highest standards of service excellence. The economic turbulence that the aviation industry is currently experiencing will give way to calmer times, and when it does our investment and product innovation will ensure that we have not simply remained competitive, but that we are the market leader," said James Hogan, Etihad Airways' chief executive.

The first aircraft with the new first-class cabin – a brand new A340-600 – is due to enter service at the end of August. The full roll-out of the new first-class suites in the airline's fleet is expected to be completed by the end of 2010. The airline is also upgrading its business and economy class cabins, with improvements to the seats and the on-demand in-flight entertainment system.

EGYPTAIR selects OnAir Swift-Broadband for new A330-300 fleet

EGYPTAIR has chosen to install full Mobile OnAir and Internet OnAir inflight passenger communications services on its fleet of twin-aisle Airbus 330-300 aircraft. These will be delivered over an 18-month period, starting August 2010, and will operate on European and North American routes as well as in the Middle East. Passengers will be able to make and receive phone calls, send and receive text messages and emails, and access the internet. OnAir will provide both GSM/GPRS as well as WiFi internet.

Gate Gourmet purchases United's Tokyo flight kitchen

Gate Gourmet has purchased United Airlines' flight kitchen at Tokyo's Narita Airport and has taken over catering and provisioning of United's flights in the Asian location under a new long-term contract. The transaction more than doubles Gate Gourmet Japan's meal production capacity at Narita.

"Moving into the larger facility will allow us to grow with our existing customers as they look to add additional flights when a runway extension is completed at Narita in October 2009," said Guy Dubois, CEO of gategroup.

Air Austral chooses eX2 IFE system for Boeing 777-300s

Air Austral has installed Panasonic's eX2 in-flight entertainment (IFE) system on two Boeing 777-300ER aircraft. Air Austral passengers will have a number of entertainment and communication options available at each seat, including audio and video on demand (AVOD), dynamic moving maps, games, and a variety of applications designed to generate ancillary revenue.

"eX2, an outstanding offering with deep maturity, will be a strategic tool to address the very competitive market between Paris and La Reunion," said Gérard Etheve, chief executive officer of Air Austral. "It will also be a major asset to our worldwide development, especially to Sydney, Australia."

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2009 Hamburg show review from Yarwood

The Maiden Flight for Kalorlite

Yarwood KalorLite, the worlds first genuine Heat Release (65/65) compliant leather was officially launched at Hamburg 2009. Soon after, it made its official debut onboard Swiss Airlines flight LX14 and arrived safely on time in New York's JFK airport. The new Contour made business class seat is the first to feature leather throughout in a business class lie flat bed, setting new standards of inflight comfort and luxury.



The Colour of Light

The latest addition to the aviation ranges at Yarwood leather is the SupaLite Pegasus range. Successfully launched by the Yarwood chalet girls, it proved a sure fire hit with over 30 colours available from stock. The range is made only using UK sourced raw material, giving excellent cutting yields whilst keeping the price very competitive!



Burns Test – Full Steam Ahead

The CAA recognised UKAS accredited burns test facility was greeted with enthusiasm by all and continues to go from strength to strength. Currently accredited for Seat Oil Burner testing and vertical flame testing and now approved by several leading UK based DOA's, the response was positively...Hot!



Plane Game winners



The launch of the SupaLite plane game got off to a flying start, with the exhibitions alive to the constant tapping of keypads as the competitive streak in attendees reached fever pitch!

The contest on day one was eventually won by **Rachel West of Heath Techna**, who positively beamed with her new ipod. On day two, **Leigh Courtney of Mobile Phone specialist OnAir**, inspired by the Brains Beer on flow posted a record score and he was pronounced winner of day two and the proud new owner of an ipod Touch.



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Oman Air has revealed its new business-class seat, which will be installed on its fleet of new A330-200/300 aircraft being delivered later this year. Its first-class product will be unveiled in July.

The business-class cabin features 20 seats (manufactured by EADS Sogerma) in a 1-2-1 layout, and 17in video monitors.

The airline has selected Thales' i5000 in-flight entertainment (IFE) system, which – combined with the Rockwell Collins Tailwind 560 platform – will provide Live TV, featuring news, sports and movie options to every seat on the

Oman Air reveals new A330 business-class seat

aircraft. Similarly, every passenger will have access to email, internet, and mobile phone/laptop connectivity.

In the economy cabin, the seats have a pitch of 34in, with three phase legrest positions, a four-way adjustable headrest, and 10.6in seatback video screen.

Virgin America first airline to offer Gogo WiFi on entire fleet

On 20 May, Virgin America became the first airline to offer the Gogo inflight internet service on every flight. Guests on any of Virgin America's 100 daily flights (regardless of route, aircraft type, or flight time) have the option to surf the internet, check email, or log on to their corporate VPN.

"The excitement people have about inflight WiFi has been reflected in the rave reviews we've received from our guests since we launched the service on our first aircraft back in November [2008]. Our tech-savvy fliers have already embraced the option, as we're regularly seeing up to one-quarter of guests on any given flight logged on," said Porter Gale, VP of marketing for Virgin America.

AirTran Airways is also partnering with Aircell to offer Gogo across its entire fleet of Boeing 737 and 717 aircraft. All 136 AirTran Airways aircraft are scheduled to be outfitted by mid-summer.

Similarly, Delta Air Lines made a commitment last year to equip its entire domestic fleet with Gogo, and later expanded its plans to include around 200 pre-merger Northwest aircraft. Once complete, Delta will have more than 500 aircraft offering WiFi.

"Now that Gogo is here and available, passenger demand has taken off, exceeding even our own expectations," said Jack Blumenstein, president and CEO of Aircell.

Gulf Air unveils B777 – with suites in first class

Gulf Air has previewed its first Boeing 777-300ER aircraft, configured in three classes – first, business and economy, with a total of 312 seats. The aircraft, leased from Jet Airways, will be used on a number of routes, including London, Kuala Lumpur, Bangkok and intra-Gulf routes, gradually replacing the airline's A340s.

First class comes with a private suite with a fully flat bed and personal wardrobe, while the herring-bone-designed business class offers a lie-flat bed with 180° recline and a privacy wall for personal space. The economy-class seat has a 130° recline and an adjustable hammock headrest.

"This is first of the four aircraft we have secured, while the rest will join our fleet in the coming weeks. We have ambitious growth plans as we expect more aircraft joining us progressively from this year onwards," said Björn Näf, chief executive officer of Gulf Air.

Norwegian Air Shuttle to install Row 44 broadband fleet-wide

Norwegian Air Shuttle ASA is equipping its entire fleet with high-speed inflight broadband from Row 44. The satellite-based broadband solution will offer passengers uninterrupted broadband services, including internet browsing, live international television, films, music, mobile phone use, texting, and e-commerce.

In addition to its current fleet, Norwegian has orders for nearly 50 new aircraft, all of which will be equipped with the broadband service. Row 44 will begin installing the system on Norwegian aircraft in the fourth quarter of 2009.

"Row 44's system will help us add exciting new productivity and entertainment services to our flights – creating more satisfied and loyal passengers and crew, giving Norwegian a strong competitive advantage, and adding significantly to our bottom line," said Bjørn Kjos, chief executive officer of Norwegian.

Qatar Airways has ordered "a few thousand" of Recaro's new Comfort Line 3620 (CL3620) economy-class seats. The first units are scheduled for delivery later this year.

CL3620 was introduced to the public at the Aircraft Interiors Expo in Hamburg and won a Crystal Cabin Award in the 'Passenger Comfort' category. The seat is based on a single-beam principle that gives the seat a leaner profile, maximising legroom even with a relatively short seat pitch.

"We are proud to be the launch customer for this award-winning product, which will further reinforce Qatar Airways' five-star service," said Akbar Al Baker, CEO of Qatar Airways.

Qatar Airways will operate a fleet of 110 aircraft by 2013 – almost double the existing size. The airline has ordered 80 A350s, 60 B787s and 32 B777s, with deliveries of the latter having started in November 2007. The airline has five A380s on order and scheduled for delivery from 2012.



Award-winning Recaro seat for Qatar Airways

BA launches first-class inflight amenity bag by Anya Hindmarch

British Airways (BA) has launched its new inflight amenity 'BAg' for first-class customers, designed by Anya Hindmarch. The new bag is one of the first new introductions leading up to the launch of BA's new 'First' first-class cabin later this year.

The Gladstone style bag is trimmed in cream and embellished with the original 'To Fly, To Serve' coat of arms which featured on BA tailfins between 1984 and 1997. The bag has been created in BA's signature navy blue, with colour changes planned each forthcoming season.

D.R. Harris is providing a range of products for the bag from its St. James based store, which has been supplying members of the British royal family for over 80 years. The collection of creams includes its 'cucumbers and roses' formula, designed to refresh and re-hydrate during a long flight.

"First bags have become prized possessions. The combination of classic heritage and contemporary design in the new BAg reflects the sleek new cabin look, which we will be unveiling later this year," said Silla Maizey, BA's director for customer.

Panasonic lands big order from American Airlines

Panasonic Avionics will install its Digital Overhead Audio/Video in-flight entertainment (IFE) system on multiple aircraft in long-time customer American Airlines' fleet.

New installations of the system are already in service on 58 B767-300s, 10 B767-200s, and four B737-800 aircraft in the American Airlines fleet. The new contract also includes retrofitting IFE systems on 106 B757-200s (to be completed by November 2015) and five B767-200s (to be completed by July 2009). The Panasonic IFE system is also in production on 72 B737-800 aircraft, to be completed by October 2010.

The agreement also includes retrofitting 18 B757-200 international aircraft with IFE systems for in-seat audio/video on demand in first class, and digital overhead audio/video capability in economy class. These retrofits are already in progress and are scheduled for completion by December, with the first two aircraft already in service.

"Panasonic is very proud to continue its long, successful relationship with American Airlines," said Paul Margis, CEO of Panasonic Avionics Corporation.

Southwest Airlines looks for new ways to generate revenue

Southwest is now allowing customers to bring along small cats and dogs in the aircraft cabin – for a fee of US\$75 each way. All pets must be in a carrier that fits under the aircraft seat, and the carrier will count as the customer's carry-on bag.

The airline has also added a service charge of US\$25 each way (in addition to the fare or Rapid Rewards Award ticket) for 'unaccompanied minor' customers (children aged five to 11 travelling without an adult). Unaccompanied minors may only travel on non-stop or direct flights.

Another change is to the service charge for a third or overweight bag (a bag that weighs 51-70 lb) – which has been doubled from US\$25 to US\$50.

"These new programmes and processes are just the starting point with additional initiatives planned for later this year," said Gary Kelly, chairman, president and CEO of Southwest Airlines. "It is always our goal to be upfront with our customers and to set the right customer expectations. Our changes today associate a charge for items that are truly an extra service."

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automotive **interiors** EXPO 2010

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22, 23, 24 JUNE 2010 NEW MESSE STUTTGART, GERMANY

Automotive Interiors Expo will be launched in Stuttgart in June 2010 to provide the automotive design, development, engineering and manufacturing community with a first-class international showcase exhibition for car and truck interiors.



Created by the founders of the market-leading Aircraft Interiors Expo and Railway Interiors Expo and the five hugely successful and highly focused European automotive trade Expos that take place in Stuttgart every year, this new event will give the automotive interiors community a level of visibility for their products and innovations that has been amazingly lacking within the European automotive industry.



For more information on exhibiting at the event please contact:

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www.automotiveinteriorsexpo.com

Boeing has unveiled its new 737 Boeing Sky Interior, which features a 'blue sky' effect on the ceiling, created with coloured light-emitting diode (LED) lighting. Drawing on years of research used to design the interior of the 787 Dreamliner, the 737 Boeing Sky Interior features new 787-style sculpted sidewalls (integrating the air vent) and window reveals designed to draw passengers' eyes to the windows.

The first airlines to incorporate the 737 Boeing Sky Interior – starting in late 2010 – will be FlyDubai, Continental Airlines, Norwegian Air Shuttle ASA, Malaysia Airlines, TUI Travel PLC, GOL Airlines, and Lion Air.

The new design offers large, pivoting overhead stowage bins that give enough room for passengers to store a carry-on roll-aboard near their own seat. Stow bin latches are bi-directional for intuitive, easy passenger use. Boeing has also redesigned reading-light switches to make them easier to find. Speakers are integrated into each row's passenger-service unit to improve the sound and clarity of public address operations, while the new integrated air vent and improved noise-dampening materials reduce overall cabin noise.

However, changes to the Next-Generation 737 are more than cosmetic – Boeing is targeting a 2% reduction in fuel consumption by 2011 through airframe and engine improvements. Continental Airlines will make a Next-Generation 737-800 available to Boeing to flight test the performance improvements.



Boeing unveils improvements to Next-Generation 737s

Bluebox Avionics secures Air Baltic/LSG Sky Chefs contract

Bluebox Avionics has secured a rollout programme for the deployment of its portable in-flight entertainment (IFE) player, Bluebox Lite, on Air Baltic. Air Baltic plans to provide enhanced IFE options to both business- and economy-class passengers.

Content programming, integration and encoding will be handled by partner company Phantom Media.

"Bluebox offered innovative future services to support our growing business in the longer term," said Andris Balickis, MD of LSG Latvia.

WEPPS achieves Chinese approval for all B737NG aircraft

STG Aerospace's Wireless Emergency Primary Power System (WEPPS) has been granted a Validation of Supplemental Type Certificate by the Civil Aviation Administration of China for all B737NG aircraft.

WEPPS uses new operating protocols and approved 'fit-for-life' non-rechargeable battery modules to replace conventional NiCad battery/charger packs, and is designed to reduce operating costs by eliminating the emergency lighting system's entire maintenance schedule.

New climate-control foam could improve seating comfort

Foam manufacturer Eurofoam has collaborated with Lenzing, a specialist in cellulose fibre production, to create cellpur – a new foam that incorporates Tencel, a climate-regulating powder.

Tencel improves the foam's potential to absorb moisture, which could be used by airlines to further improve the comfort of their premium-class beds and long-haul seating. The moisture released by humans as they sleep is immediately absorbed and then quickly removed.



American Airlines reconfigures B757s for international use

American Airlines is in the process of reconfiguring 18 of its 124 Boeing 757s for use on international routes. Featuring new seats, new cabin interiors and updated in-flight entertainment (IFE) systems, the reconfiguration is scheduled for completion by the end of this year.

The business-class cabin, in a 2-2 configuration, features 16 Recaro next-generation angled lie-flat seats featuring drop-down armrests, the ability to track forward 10in, interlocking tray tables, and in-seat audio/video on demand (AVOD) IFE. The seat has a 58-59in pitch and is 21in wide (26in with the armrest down), with an 8.4in centre console.

The AVOD system offers up to 28 films, 33 hours of TV programmes, 15 games, 50 CDs, and 14 branded audio programmes via a touch-screen 10.6in tilting monitor. Premium passengers can fast-forward and rewind through the programme.

The economy cabin features 166 new seats (in a 3-3 configuration) designed for American by Weber Aircraft. The seat is 17.2in wide with a 31in pitch, with a bottom that articulates, producing a cradling motion designed to better distribute weight while increasing the recline angle. Economy class also has new 17in LCD monitors (replacing CRT monitors), and a digital media file server.

Successful lean manufacturing initiative at Recaro Aircraft Seating

Recaro Aircraft Seating has announced some of the results of its initiative to make its manufacturing processes as efficient as possible. The company set a new record in March, when workers at the company's plant in Schwaebisch Hall, Germany, manufactured 5,030 seats. Recaro also marked another top performance rating at the end of March – in the last 12 months, all 154 deliveries to Airbus were supplied in time. This was followed by a milestone at Boeing, when all 58 deliveries arrived on schedule in the same time period.

"Our in-depth optimisation programme in the Recaro operations department has had a very positive impact," said Dr Mark Hiller, chief operations officer in charge of procurement, production and quality at the company. His team implemented a package of actions in 2007. A total of 24 workshops were held over the past year. These resulted in 172 actions for improvement. For example, a new shipping line integrated into final assembly operations is designed to make the packing and transport process safer, easier and faster. "The overall investment of more than €500,000 was definitely worthwhile. The quality has further increased and we managed to reduce manufacturing costs by 30% compared to 2007," said Hiller.

"We will continue to look for opportunities to avoid errors, harmonise workflows and reduce costs," Hiller added.

EADS Sogerma and Lufthansa Technik cooperate on product

EADS Sogerma and Lufthansa Technik have agreed on a multi-year cooperation that will see EADS Sogerma offer the 'aerosleeper' (Lufthansa Technik's premium-class concept incorporating a bed that folds out over the seat) as an integrated variant of EADS Sogerma's 'Ultimate 17' super first-class suite. The combined first-class product will be called 'Ultimate Sleeper'.

EADS Sogerma will transfer the concept to production and plans to offer the new model from mid-2009. Lufthansa Technik is supplying technical expertise and will also continue to develop the concept.

United Airlines upgrades all its international Boeing 767s

United Airlines has now finished upgrading its international Boeing 767 fleet with fully lie-flat beds in first and business class.

The airline plans to upgrade its entire international fleet by the fourth quarter of 2011. So far it has also updated 18 of its 24 B747s and will begin reconfiguring its international Boeing 777 fleet in September.

"Our customers have been telling us for many months how comfortable and enjoyable their travels have been with our new first- and business-class service," says Graham Atkinson, executive vice president of marketing and president of Mileage Plus.

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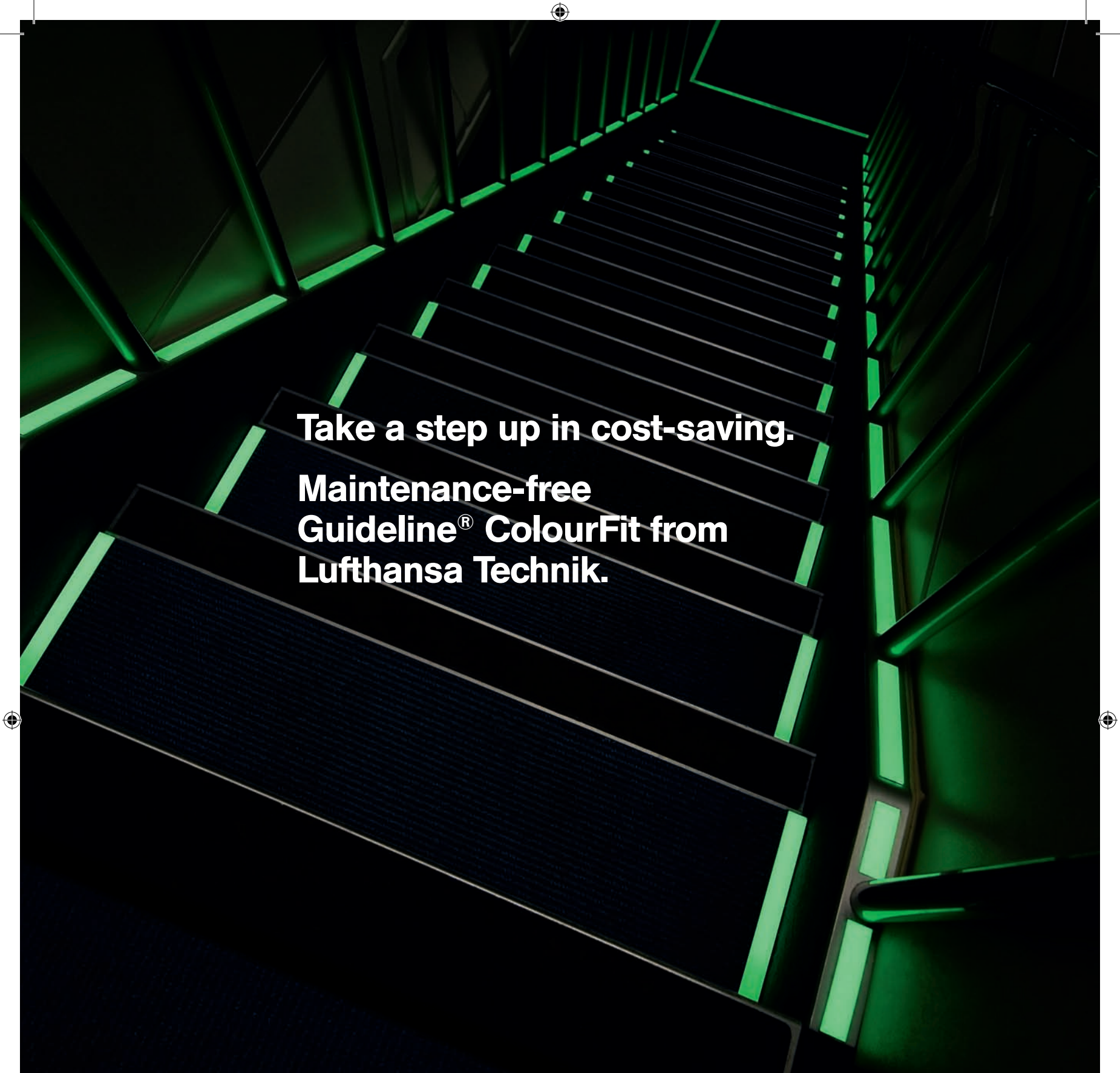
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Dassault Falcon collaborates with DesignworksUSA on new interior concept for Falcon 7X

Dassault Falcon has unveiled a new cabin interior design for the 5,950nm Falcon 7X, the result of a collaborative effort between Dassault and DesignworksUSA.

Falcon 7X s/n 44, which was presented on Dassault's static display at Geneva Airport during this year's European Business Aviation Convention & Exhibition (EBACE2009), was used in the development of this new interior - which will be available as an option for deliveries starting in the first quarter of 2011.

The 7X cabin has 28 windows, which are 10% bigger than previous Falcons. It also features a low inflight cabin altitude of 6,000ft, even while flying at 51,000ft, and an advanced temperature control system.

The new Falcon 7X cabin introduces subtle curves throughout the interior. A single arc carpet element is designed to visually stretch the cabin and connect the interior front to back, while curved bulkheads visually expand the main cabin volume and curves in the galley and main cabin create better flow. Cabin lighting techniques feature up-wash and down-wash ambient lights as well as light strips.



The combination of new lighting and more contrast between the carpet, the sidewalls and headliners is designed to emphasise openness, spaciousness and comfort.

"Our collaboration with DesignworksUSA further enhanced the advanced features and the comfort of the aircraft. Their unique

design successfully integrates functionality, technology and ergonomics into the Falcon 7X cabin. The result is an elegant yet sensible interior that meets the challenges of today's demanding business environment," said John Rosanvallon, president and CEO of Dassault Falcon.

Embraer selects audio/video and CMS for Legacy 450 and 500

Embraer has selected Honeywell's Ovation Select Cabin Connection Suite as the audio/video and cabin management system (AVCMS) for the mid-light Legacy 450 and mid-size Legacy 500 executive jets.

Individual touch-screen control panels provide controls for Blu-ray, LCD monitor, 3D moving map, lighting, temperature, cabin speakers, window shades and a media dock for carry-on A/V equipment such as iPods.

The Legacy 450 and Legacy 500 interiors were designed in partnership with BMW Group DesignworksUSA.

Eurocopter and Hermès deliver first 'l'Hélicoptère par Hermès'

The first 'l'Hélicoptère par Hermès' has been delivered to Falcon Aviation Services (FAS).

Hermès' redesign of Eurocopter's EC135 (a light multimission, twin-engined helicopter) combines a spacious cabin with seating capacity for four passengers, storage and lateral sliding doors.

Canvas 'Toile H' is used to cover the cockpit, while the seats and banquette are upholstered in naturally grained calf leather. The landing gear has also been redesigned to allow for easier and more elegant access to the cabin.

US\$150 million launch orders for aircraft waste water system

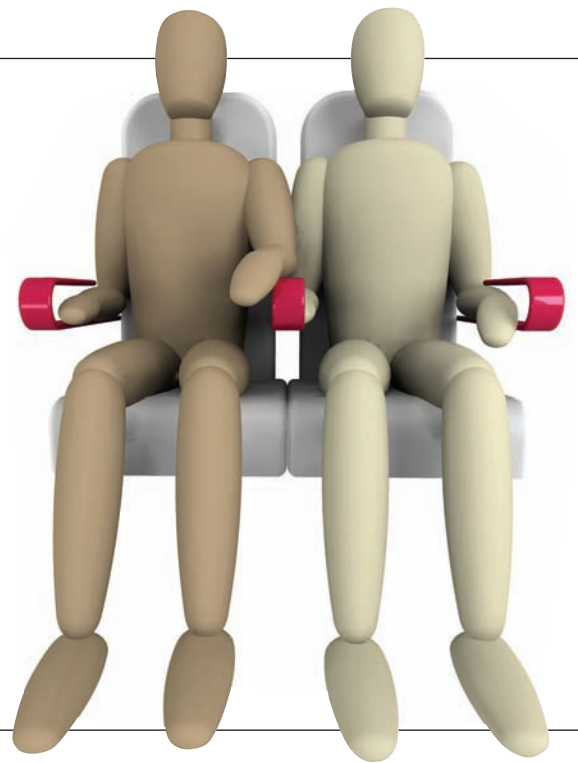
B/E Aerospace's vacuum waste system has been selected by a number of major business jet manufacturers for next-generation aircraft platforms. These programmes are initially valued in excess of US\$150 million, with volume production commencing in 2011.

The vacuum waste system - which won a Crystal Cabin Award this year - was selected for Bombardier's Learjet 85, Dassault's Falcon 7X, and Embraer's Legacy 450 and Legacy 500. It is designed to lower the overall cost of ownership, simplify maintenance and improve lavatory hygiene.

elbowroom

BRIEF: The narrow armrests shared between seats in economy class can be a major source of frustration and dispute for passengers. In response, James Lee (aged 25), who holds a Masters degree in aeronautics from Massachusetts Institute of Technology (MIT), has developed his 'Paperclip' armrest concept, which improves comfort for passengers without any increase in seat width. "Previous ideas (for example staggering shoulder space) have provided solutions for new aircraft deliveries, but may not be feasible for carriers wishing to retrofit, especially in the current financial climate," says Lee.

DESCRIPTION: The Paperclip armrest's simple geometry features a transversely offset double armrest that can support neighbouring elbows simultaneously, without bumping into each other – in effect doubling the usable arm resting space without increasing seat width. "It is usually the elbows that take up the widest lateral space when seated, however the elbow also adjusts easily to varying armrest heights," explains Lee. "When the armrest is low, the elbow stays close to the backrest, and when the armrest is high, the elbow swings upward and forward," he continues. "So instead of staggering the whole seat, the double-layered Paperclip armrest achieves a similar effect at a relatively low cost."

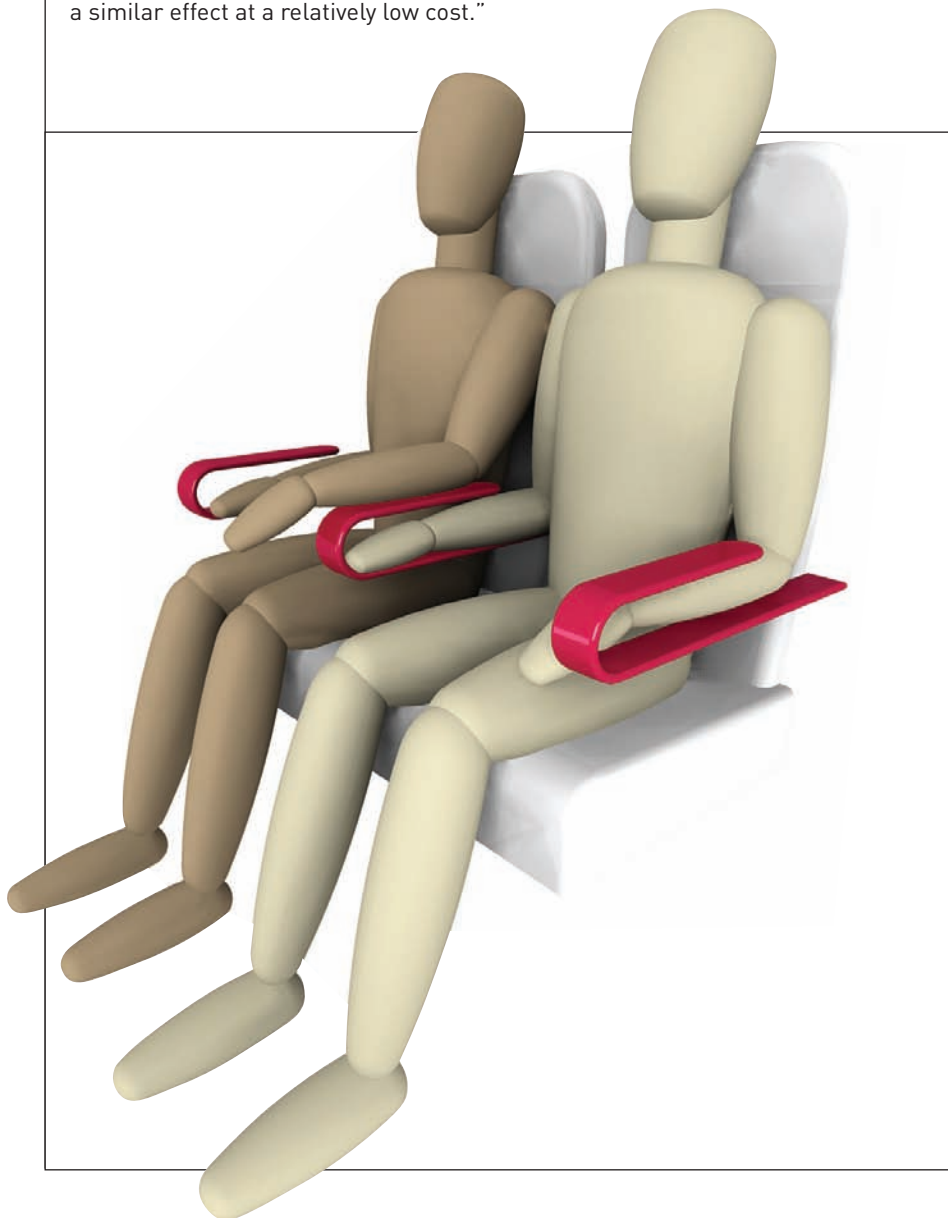


VERDICT: Just like an actual paperclip, this patent-pending concept is simple, effective and cheap – no wonder it went on to win the Judges' Commendation Prize at this year's Crystal Cabin Award. Recognising that the original version has some practical flaws – no space for electronics and seat controls, and a structure that is too thin to be strong enough – Lee has since produced another, more viable, variation of the concept (pictured, below). "First of all, the lower level is thick enough to demonstrate possible locations for the seat electronics. Secondly, the vertical support in the centre is a lot stronger and it also gives more privacy and separation between the two passengers," he says.



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knitpick

BRIEF: Developed by the Swiss-Austrian team of Greiner PURtec, Kobleder Knittec and ludekedesign, the aim of the aeras seat project is to improve economy-class seating comfort by reducing pressure points, stimulating the back and trunk muscles, and allowing the passenger to adopt any sitting position. With traditional economy-class seating, passengers may end up with neck and back stiffness from resorting to unnatural positions in an effort to relieve discomfort. Also, with no stimulation to muscles during sitting, even well cushioned chairs can create localised pressure points capable of interrupting blood flow.

DESCRIPTION: The design is based around the aeras knit, a textile boasting a continuous loop-in-loop construction and a carefully engineered proportion of elastic and non-elastic fibres that allow it to adjust in all directions to support various passenger sizes, body shapes and weights. The textile automatically adjusts to be more supportive in areas surrounding the body, allowing the passenger to take different positions (including sideways lounging) without mechanically reclining the seatback. The functional knit layer is attached to an inner frame (itself attached to the seat's backshell), and then finished with a cover knit. The seat's creators have tried to reduce unnecessary bulk, opening up space on either side of the lower backshell for more knee space or soft stowage. The seat also has an optional retractable front edge feature to make egress easier.



VERDICT: Two years in development, the seat has just completed long-term testing by the Darmstadt University of Technology in Germany. Among the overall positive results of the study, the evaluation of comfort level was shown to actually improve over time. The knit has several practical advantages – produced as a single finished piece off the machine, no cutting, sewing or finishing is required. As a single piece it is also easy to remove from the frame for dry cleaning, while inflight spot cleaning can be done with a standard office furniture cleaner. The seat's weight goal is 8kg per pax (excluding in-flight entertainment, life vest and seatbelt), and cost-wise, it should be in the same range as current economy seats. Its creators say the knit's durability can be guaranteed for three years under normal circumstances.



CONTACT

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factfile:taca



AIRCRAFT TYPE	A321	A320	A319	E190
No. of aircraft	5	18	9	7
Total seats	194	150	120	96
Number of seats	12	12	12	8
Configuration	2-2	2-2	2-2	1-2
Seat pitch	40in (101.6cm)	40in (101.6cm)	40in (101.6cm)	38in (96.5cm)
Seat width	20.5in (52cm)	20.5in (52cm)	20.5in (52cm)	20in (50.8cm)
Seat recline	7in (17.8cm)	7in (17.8cm)	7in (17.8cm)	7in (17.8cm)
Bed length	N/A	N/A	N/A	N/A
Seat supplier	Recaro	Recaro	Recaro	C&D
IFE system	MPES/eFX	MPES	MPES	eFX Lite
Business class	IFE supplier	Panasonic	Panasonic	Panasonic
Number of seats	182	138	108	88
Configuration	3-3	3-3	3-3	2-2
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	17.7in (45cm)	17.7in (45cm)	17.7in (45cm)	18in (45.7cm)
Seat recline	4in (10.2cm)	4in (10.2cm)	4in (10.2cm)	4in (10.2cm)
Seat supplier	Recaro	Recaro	Recaro	C&D
IFE system	MPES/eFX	MPES	MPES	eFX Lite
Economy class	IFE supplier	Panasonic	Panasonic	Panasonic

* TACA is in the process of retrofitting all its current Airbus aircraft in line with the cabin details shown, and adding new Airbus aircraft with this cabin installed as line-fit.

** All new A319, A320 and A321 aircraft will have Panasonic eFX AVOD IFE, while the retrofit cabins will retain the Panasonic MPES system.



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FULL NAME: TACA International Airlines

HEADQUARTERS: El Salvador

PARTNERS: Lufthansa, United, Avianca, Iberia, Cubana, Aerosur

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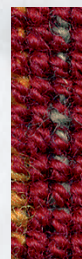
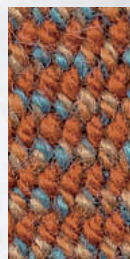
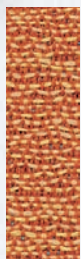
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15.30 – 16.00 | Innovation case study

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expo review

WHAT WERE THE KEY TRENDS FROM THIS YEAR'S AIRCRAFT INTERIORS EXPO IN HAMBURG?



seating

MARKET SEGMENTATION: Super first class, first class, high-density first class, premium class, business class, high-density business class, premium economy, standard economy, low-cost/short-haul economy – the airline sector continues to invent new product solutions and market niches to drive improved revenue. This has led to a proliferation of seating configurations and models, from luxury suites, to high-density herringbones, to a new wave of economy models.

NEW PLAYERS: Continuing segmentation has also provided opportunities for new seat manufacturers to ply their wares, particularly in the ever-widening economy sector, where high-volume production runs help justify the initial manufacturing investment required. It remains to be seen just how many of these new companies will still be around at future shows, as existing suppliers step up their game or buy out potential rivals.

REDUCED WEIGHT: Fuel prices may have softened for now, but as soon as the economy picks up, they are expected to rise. Carbon fibre has an important role to play in reducing weight, but its use will rely on design software and virtual simulation and modelling technology to better manage manufacturing and certification costs; and to ensure the most efficient use of material to provide structural stability and strength where required. However, it will be a few years yet until carbon fibre replaces aluminium altogether.



textiles/lighting

MOOD FOR CHANGE: LED mood lighting systems are firmly established as the mainstream. But now the industry is turning to the less glamorous but equally vital business of saving airlines cash by supplying LED and fibre-optic reading and other types of individual light fixture that last longer, take less power and pump less heat into the cabin.

SOFT FURNISHINGS: A new generation of easy-to-clean lightweight leathers are set to challenge the preconception that fabric seat covers are always lighter. Meanwhile textiles continue to get... lighter. But airlines shouldn't be influenced by weight and price alone – durability and quality are equally important. For example, cheap flame-retardancy treatments can cause seat corrosion headaches further down the line.



ife/communications

BROADCAST IFE: Thales is currently Panasonic's only real challenger in the market for AVOD IFE systems. But until this year it seemed content to let the industry Number One contest the digital broadcast business with Rockwell Collins. All that changed in Hamburg, where Thales unveiled a new product – TopSeries Digital Single-Aisle – designed to raise the broadcast formula to new levels.

AVOD IFE: Over the years several would-be vendors have been lured by the siren call of AVOD, only to crash on the rocks of airline conservatism. But still they come. One – California's Lumexis – has even got as far as trialling its fibre-optic-based system with US Airways. Two brand-new hats – from Illinois-based InFlight Entertainment Products and ASL of the UK – sailed into the ring at this year's Expo.

HANDHELD IFE: With next to no installation costs and turnkey offers aplenty, handheld IFE looks like the answer to a recession-hit airline's prayers. But for some reason the fizz seems to have gone out of the sector. Top two suppliers The IMS Company and digEcor didn't have too much to say at this year's Expo, and a number of second-level players were conspicuous by their absence.

CONNECTIVITY: 2009 will be remembered as the year that connectivity came of age. But it brought disappointment for one aspiring Ku-band satellite broadband supplier. T-Mobile and its partners finally came out of the closet at this year's show, revealing they were in contention to replace Connexion by Boeing with Lufthansa. Alas, in the weeks following the show the German carrier decided in favour of Panasonic's eXconnect.



galleys/lavs

WHAT'S COOKING: Airbus continues to push ahead with SPICE – it recently completed caterer facility tests with GateGourmet and Servair. Galley suppliers are adding pull-down screens and dedicated storage/display areas to units for use in 'public' areas of the cabin. Induction heating and RFID technology continue to grow in influence, allowing a wider range of meals to be delivered more efficiently. Meanwhile luxury washrooms with 'boutique' designer fittings and even showers are finding a home on board some leading long-haul carriers, but elsewhere it's all about easy-to-clean surfaces, less parts and improved maintenance.



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seashell

Nautilus, a new premium-class cabin concept for the Airbus A380 mock-up, boasts curves in all the right places

ANTHONY JAMES, AIRCRAFT INTERIORS INTERNATIONAL

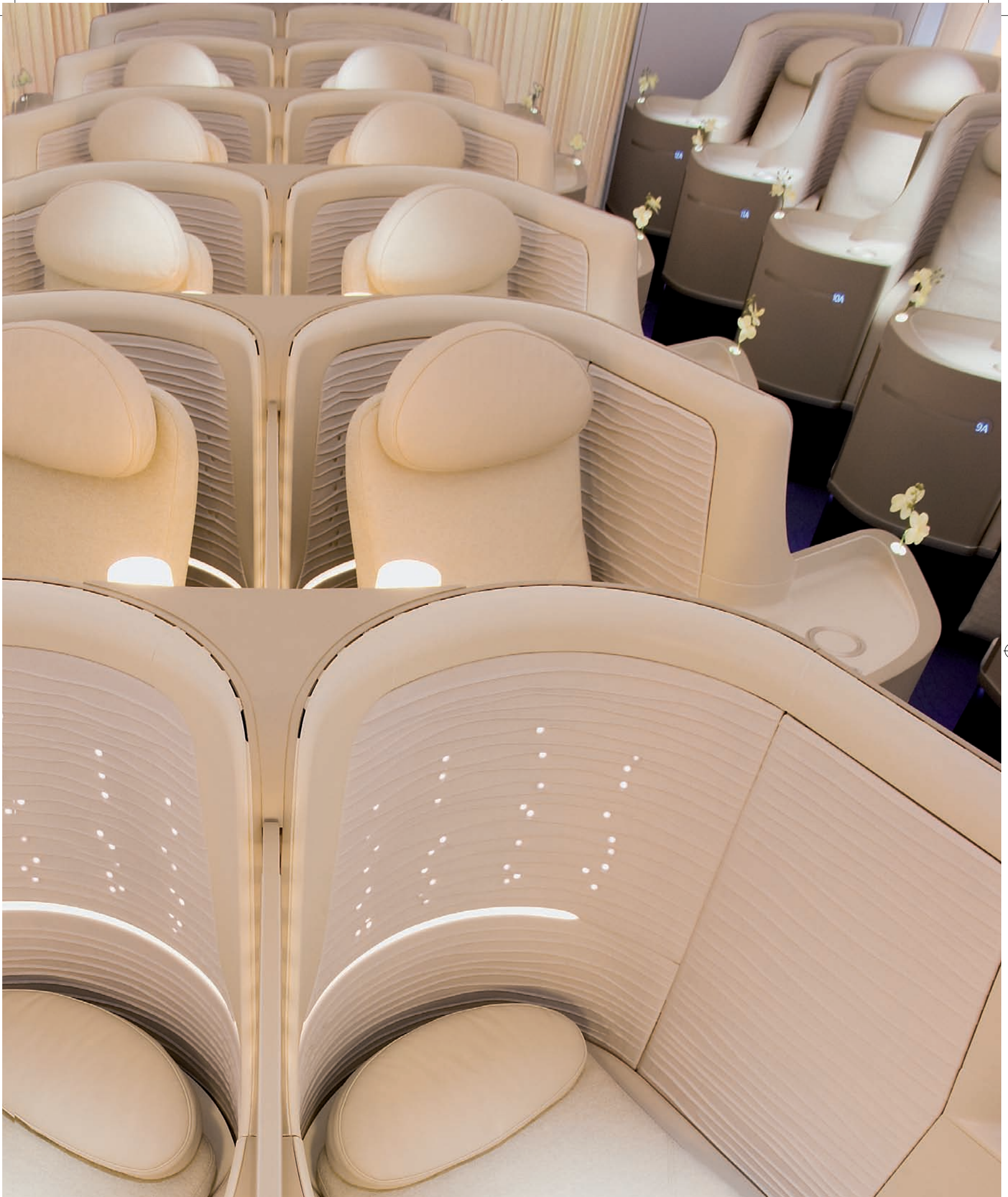
Inspired by the sea shell form of one of the ocean's oldest creatures, the 'Nautilus' high-end business-class cabin concept currently installed at Airbus's life-size A380 mock-up in Toulouse is proving a hit with airlines, according to Stefanie von Linstow, Airbus's product marketing manager for the A380: "The feedback has been very positive indeed," she says.

Nautilus features 26 seats installed in a 1-2-1 'herringbone' configuration between Doors 2 and 3 on the 'main deck' of the mock-up. A reception desk is included at the front, providing ideal storage for A380 marketing material. With seats at just 47in pitch capable of converting into 2m beds, the configuration balances efficiency and comfort extremely well, says Alexandra Collins of Design Investment, which worked with Airbus on Nautilus, as well as an earlier first-class concept installed in the front section of the upper deck of the mock-up. "An essential part of the competition was to carry out a study into the most efficient use of space," explains Collins. "Our results conferred with Airbus's own internal findings."

"The key words included in the brief for this project were innovative, full flat, efficient, comfort, an enhanced feeling of space, and something that would grab the attention of visitors to the mock-up," adds Airbus's von Linstow. "Sometimes visitors don't have that much time to look around, so we needed a design that they could 'get' quickly and that made a lasting impression – it needed to be eye-catching in some sort of way."

The 'catchy' name also went down well with Airbus's marketing team: "They fell in love with the name from the





NAUTILUS A380

“

WE REALLY WORKED HARD TO INTEGRATE
NAUTILUS WITH THE SOFTER LINE OF THE
A380 CABIN ”



02

very beginning,” says Collins. “Nautilus really captures some of the concept’s key ideas. It’s about a shell that protects you, with a rigid look and feel from the outside – but inside, it gives you a very cosy feeling of privacy and comfort.”

Airbus also liked the fact that it was tailored specifically to the A380’s cabin architecture: “Many premium products look great on their own, with lots of clean straight lines, but when you put them inside the curves of a cabin, they look out of place,” says Collins. “We really worked hard to integrate Nautilus with the softer line of the A380 cabin – having a design inspired by a more natural, rounded form helped.”

CLEVER CURVES Nautilus’s real triumph comes from its combination of a herringbone concept, which not only boosts efficiency but also ensures every passenger has direct aisle access, with its clever, sculpted ‘shell-like’ form, which gives the maximum living space where it is most needed – around the shoulders. Although the seat itself is only 20in wide, Nautilus has a much larger shoulder width (29in at its widest point) – only 5in less than the widest business-class product currently flying, on Singapore Airlines’ A380s (SIA has 60 34in-wide seats at 52in pitch across 60% of the upper deck), but within a more efficient layout.

When the seat is fully reclined, the curved armrests automatically retract down, creating room for the passenger to twist and turn to find a comfortable position to sleep. The seat also incorporates Lantal’s pneumatic seat cushion technology, which uses air pressure to adjust the softness or hardness of the seat/bed, according to passenger preference.

Meanwhile the inner shell features a padded fabric finish, cocooning the passenger in a soft and comforting

environment, described by Collins as a “micro suite”. The material was also chosen for its sound absorption qualities, which help reduce cabin noise levels even further – the A380 features the quietest cabin currently flying. “The material has been certified for use in a VIP aircraft project,” notes Collins. “It would need to undergo further testing for commercial aircraft use, but that’s the point of a project like this – to push the boundaries and look at new materials under development.”

The shape of the Nautilus shell is such that it facilitates easy access to the seat, while also providing a ‘soft centre’ – the perfect environment for passengers to relax and read or watch a movie in, whether the seat is fully flat or reclined at an angle. “A rigid shell in combination with a soft interior protects the passenger and guarantees his well-being,” says Collins. “The floating lines and soft finish of the interior appear comforting and very ‘Zen’.”

LIGHT SHOW Nautilus also uses accent lighting to help create a calm and relaxing impression – and to emphasise the personal space available to passengers. “The lighting strip incorporated into the shell surround was introduced as a mock-up feature, i.e. to make people aware of the seat’s USP when in bed position,” explains Collins. “An LED light animation creates a pulsing light above the round armrest. When the seat is in bed position, the light strip continues around into the seatback shell – this is when the ample bed space becomes evident.”

The fabric shell lining even includes illuminated floating bubbles – suddenly ‘sleeping with the fishes’ sounds less of a threat and more of a treat! “The whole thing has a show effect – you wouldn’t necessarily do that in reality,” admits

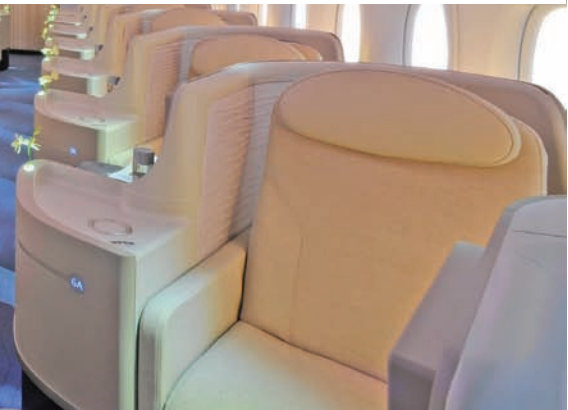
01. The herringbone configuration provides aisle access from every seat and increases efficiency
02. The sculpted form of inner shell provides passengers with ‘micro suites’ to relax in, as well as vital shoulder space when sleeping

project team

- Design Investment Sàrl, Geneva, Switzerland
- Airbus Design Team (Colour and Trim)
- Diehl Aerospace GmbH, Germany
- Hofmann Innovation Group AG, Germany
- Lantal Textiles, Switzerland
- Pelzer Acoustic Products GmbH, Germany
- Recaro Aircraft Seating GmbH & Co. KG, Germany



03



04

- 03. A lighting strip is integrated into the inner seat shell, along with illuminated bubbles
- 04. Feature lighting and sensuous curves make the most of the A380's cabin architecture

Collins, who worked with German lighting specialist Diehl Aerospace to perfect her ideas. Further lighting accents are found in the footwell, and even in a flower vase incorporated into the side console, as well as an illuminated place number. There's also a 'deco lamp' that Collins sees as a "metaphor to give a more home-like feel to the product".

Another nice touch sees a dedicated compartment for small personal belongings – described by Collins as a "vide-poche" (which translates as 'empty pockets'), it provides a convenient storage place for spectacles, a mobile phone and/or an MP3 player. "The vide-poche is a brown ultra-leather soft-lined amenity tray located under the deco light on the horizontal surface of the ledge," she says. "The idea was to offer an area where the passenger would feel comfortable to store his small but maybe also precious things. The objects are always in eyesight for the passenger, and there's a small power supply for charging electronic devices."

REAL DEAL? Despite being installed in a marketing mock-up, Nautilus could be easily realised as a commercial product, claims Collins. The first two seat rows (eight in total) installed in the mock-up are fully functional – based on Recaro's CL 6510 platform, each seat has five motors. (The partition between central seat pairs is manually driven). However, Collins says an airline interested in developing their own version would be free to work with whichever seat manufacturer they wanted: "In effect this concept could work with any seat mechanism," she says.

"There's a slot where the seat mechanism goes in and you could replace what's inside easily enough."

In theory Nautilus could work just as well on other aircraft types – keen observers at the recent Expo in Hamburg would have noticed the same concept in miniature inside a scale model of the A350 on the Airbus stand. However transferring the concept to another aircraft type would require changes to seat geometry and dimensions, in effect generating a new raft of part numbers. "As soon as you change the footprint, you also have to go through the certification process again," adds Collins.

Design Investment is currently working with a European airline on a new economy seating product – one doubts the carrier in question will opt for the same cream colour scheme (created in collaboration with Airbus's design team) of Nautilus, despite its space-enhancing qualities. "That's the difference," says Airbus's von Linstow. "This is a mock-up and as such we wanted to show off the possibilities of the A380's cabin. We don't have customers walking inside and saying 'we want this and we take it'. It's more an impression to take with them when they configure their own aircraft."

Collins concurs: "Beyond selling the A380, Airbus also wanted to show it is innovative and forward thinking – hence the design competition." With its intelligent mix of comfort and efficiency, Nautilus is a worthy winner. ☒

CONTACT

Airbus, Web: www.airbus.com



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Lantal 

mindthe gap

As companies continue to cut back on business-class travel, premium economy has a vital role to play in boosting airline revenues, but what is the optimum cabin configuration for such a product?

KLAUS BRAUER, AIRCRAFT INTERIORS INTERNATIONAL

 The state-of-the-art intercontinental business-class product often sells for a fare that is more than four times higher than economy, yet each seat may occupy only three times as much floor area as a tourist seat. What could be better? In truth, much could be better.

In most intercontinental markets, the majority of business travellers are seated in economy, paying tourist fares. That has been true for many years. Now, in the face of challenging times for businesses worldwide, demand for business class is declining and still more potential high-yield passengers are dropping down to economy class – to fare levels established to attract discretionary tourists. To make matters worse, the typical economy-class product, tailored as it is to the sensitivities of extremely price-sensitive and less space-sensitive tourists, is poorly suited to the needs of business travellers.

At the same time, retired baby boomers have time to travel and, in spite of the recent decline in investment values, are generally in a better position to fund their

travels than preceding generations of retirees. Like preceding generations, however, their joints are rather creakier than those of younger tourists. The standard tourist product just doesn't fit their needs, but the (four-times-economy) business-class fare is too rich for their blood.

The one-size-fits-all economy class, optimised for price-sensitive tourists, has left most business travellers and many tourists poorly served, while the yawning gap between business-class and economy-class fares is resulting in airlines not capturing the higher yield potential of those same groups. The mission, then, is two-fold: Stop travellers being pushed out of business class by their travel managers from falling all the way down to an economy-class fare; and attract selected tourists and the many business travellers currently travelling in economy to a more comfortable, higher-yield product.

NOT AN ENTIRELY NEW IDEA The idea of a class of service between business and economy, a 'premium-economy' class, is not new. An increasing number of





LOAD FACTOR

75 %

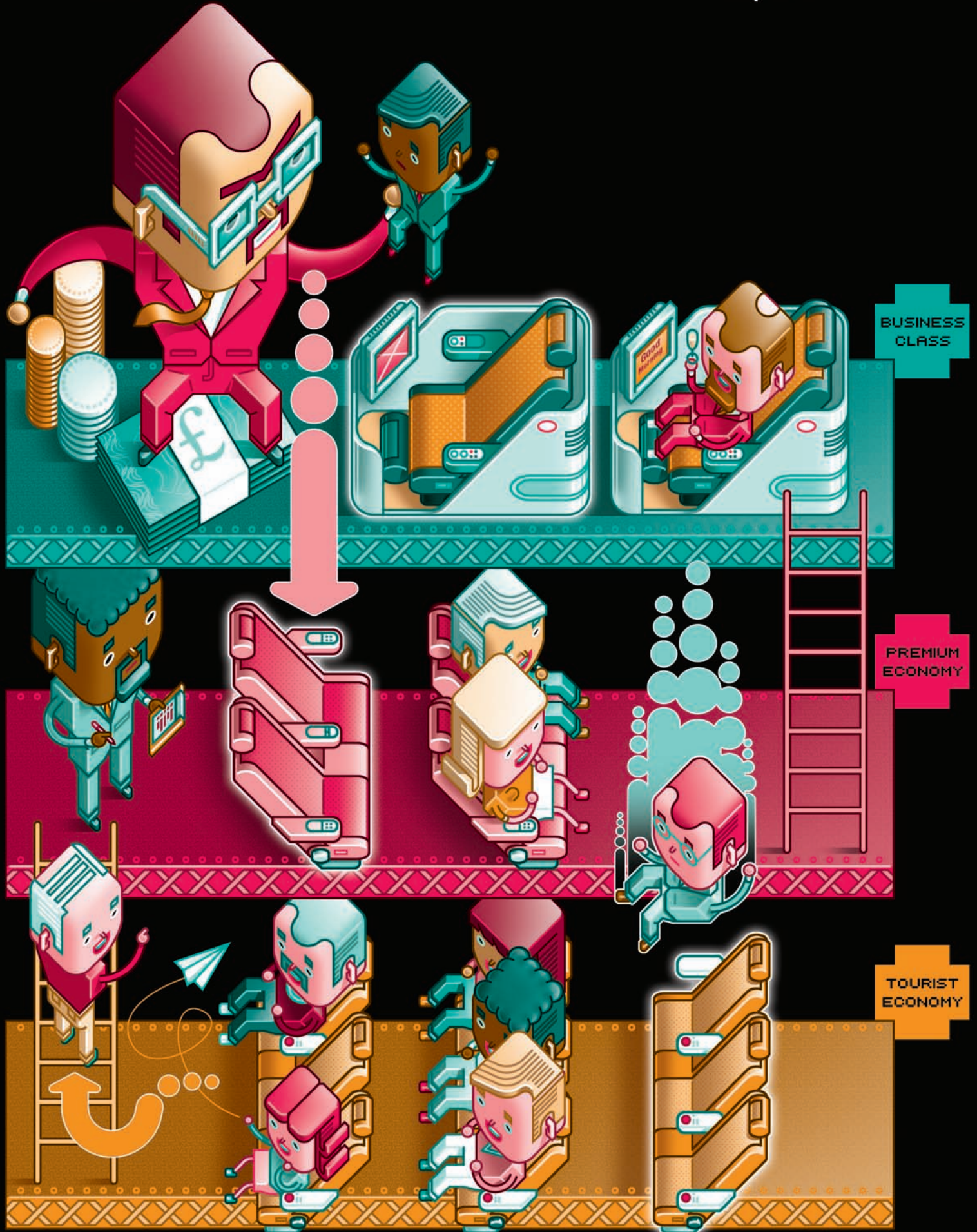
OVERALL REVENUE

103,478

PREMIUM ECONOMY

REVENUE SAVED

5,979



BUSINESS CLASS

PREMIUM ECONOMY

TOURIST ECONOMY



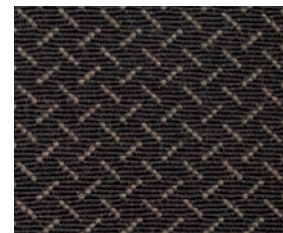
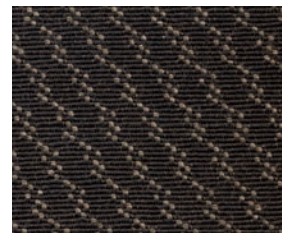
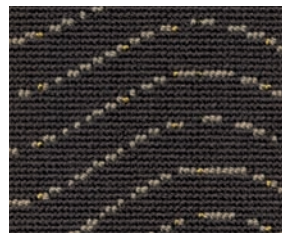
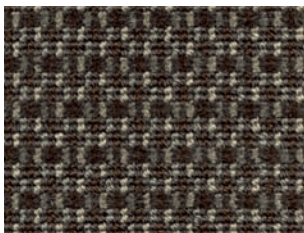
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cannibalisation risk?

The most widely cited risk of introducing a premium-economy class is that some travellers who are prepared to pay for business class decide premium economy is good enough for their purpose and buy down. While not as great a reduction in yield as that resulting from business-class travellers buying all the way down to tourist economy, any buy-down from business class to premium economy does represent a significant loss to the airline. Sensitivity analyses on the cases studied showed that the revenue advantage of premium-economy class was neutralised when only approximately 40% or more of business-class passengers bought down to premium economy. Such a high level of cannibalisation is unlikely to occur overnight and should be manageable through pricing or other means.

ILLUSTRATION BY LEE HASLER

airlines offer premium economy, but there is little consistency in the product across the industry. Today we find premium-economy products ranging from standard economy-class seats with a few additional inches of pitch – to products with the same number of seats per row as business class with more than 40in of pitch. Passengers are often uncertain about what the product represents and, as a result, are less likely to buy it. Industry observers can wonder whether the inconsistency represents finely tuned optimal responses to different markets or is a sign of an industry still searching for an optimum.

One can hope a more consistent approach to the product is optimal, or nearly so, for a wide variety of markets. Promoting the product to prospective passengers becomes less challenging when the general shape of the product is understood.

Premium-economy cabin sizes also vary widely today – from less than 10% of total seats to nearly 40% of total seats. If such variation is a result of narrow optima, in which the revenue benefits are lost if the cabin is only a few percent too large or too small, deploying the

product across a wide-ranging fleet will be challenging indeed. On the other hand, if the optimum cabin size is relatively broad, i.e. little is lost if the cabin is somewhat larger or smaller than perfect for a given market, there can be real hope for deploying the product consistently across a fleet.

FINDING AN OPTIMUM To better understand the key relationships, as the director of passenger satisfaction and revenue at Boeing Commercial Airplanes, I recently undertook a broad study including models ranging in size from the 787-8 to the 777-300, 24 different cabin layouts, 60 comparative study cases and many dozens of between-case sensitivity analyses.

Demand levels were based on earlier foundational research coupled with observations of current market behaviour. The revenue maximising point on the resulting study demand curve resulted in 23% of economy demand buying up to premium economy at a 75% premium. A lesser demand curve that resulted in 14% of economy demand buying up to premium economy at a 75% premium was also tested.



PREMIUM-ECONOMY CABIN SIZES ALSO VARY
WIDELY TODAY – FROM LESS THAN 10% OF TOTAL
SEATS TO NEARLY 40% OF TOTAL SEATS



NEW



The Floor is Yours

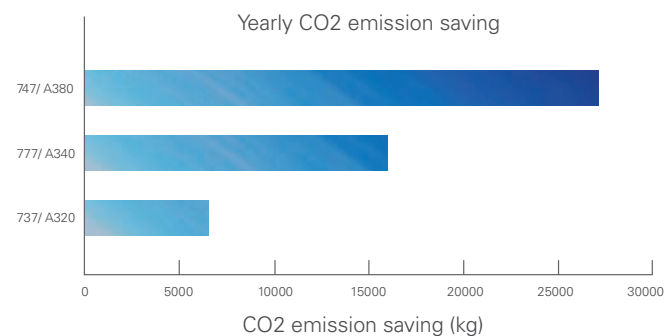
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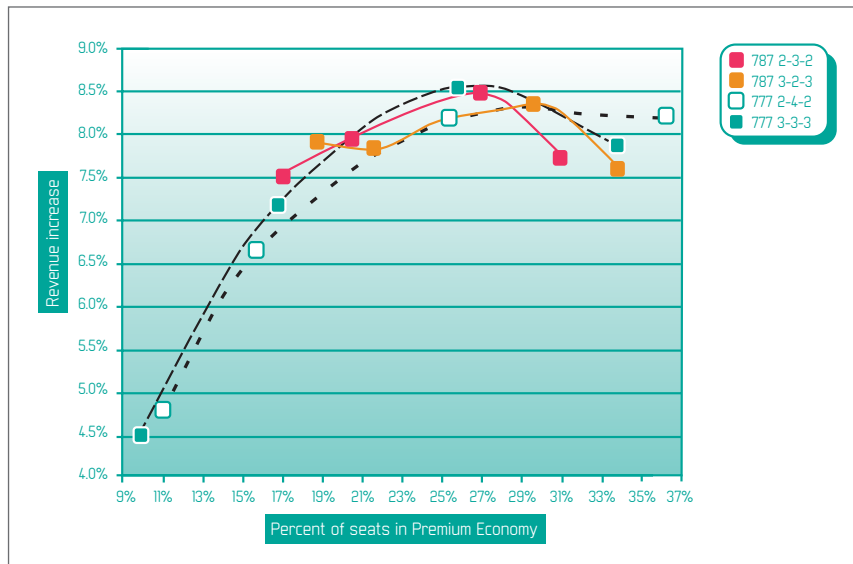
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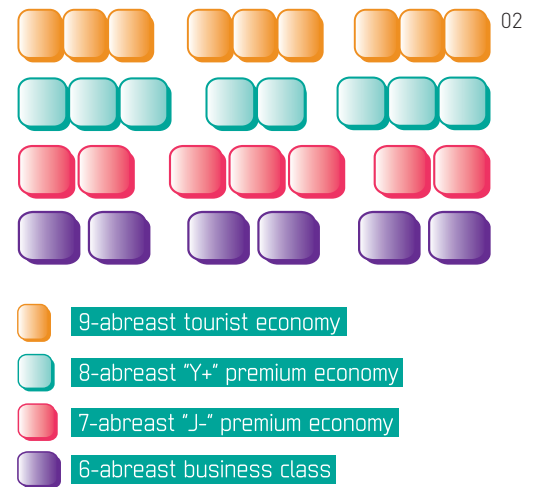
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01



02

To depict the impact of real-world airline practice on revenues and cabin size, revenue management system operation was emulated with six fare buckets fully nested across the three products: economy, premium economy and business.

The optimum for cabin sizes proved very broad indeed (see Figure 1). With the demands used in the study, near-maximum revenues resulted with the premium-economy cabin comprising anywhere from 20% to more than 30% of total seats. However, in the real world of configurations, particularly reconfigurations, lavatory and galley positions are often not where you might like them. The broad cabin-size optimum makes it relatively painless to make the premium-economy cabin a bit larger or smaller to include lavatories or galleys in the cabin, or avoid orphan rows and additional front row setbacks.

PREFERRED ROW ARRANGEMENTS Fewer seats per row in premium economy than in tourist economy provides the additional width valued by passengers, typically business travellers, who are not seated beside a family member.

In addition, a different number of seats per row from both tourist economy and business class provides important visual differentiation from the adjacent products. As a result, in the 787 both eight-abreast 'Y+' and seven-abreast 'J-' premium-economy seating were tested as complements to the nine-abreast tourist-economy and six-abreast business-class seating (Figure 2).

Before consideration of cannibalisation, at typical demand levels the J- and Y+ products generated virtually identical total revenues. The benefits of higher demand for the J- product and the higher seat count of the Y+ were in balance.

Both the traditional 2-4-2 row arrangement and the newer 3-2-3 arrangement were tested for the eight-abreast Y+ product in the 787. The 3-2-3 arrangement offers the same adjacent empty seat advantage over 2-4-2 that led to the popularity of the nine-abreast 3-3-3 arrangement over the traditional 2-5-2 arrangement. In addition to higher demand resulting from the adjacent empty seat advantage of 3-2-3, the relatively straight aisle transition between 3-2-3 and the 3-3-3 tourist economy cabin resulted in two additional seats in some configurations. The higher

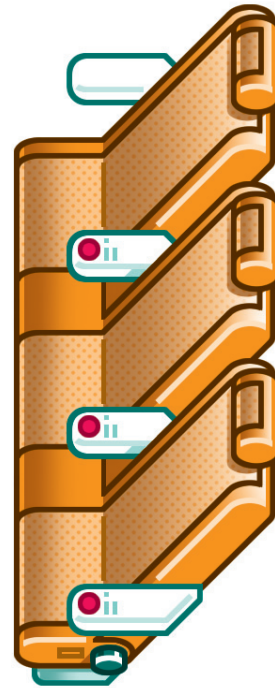
- 01. A wide range of total seats in premium economy - from 20% to 30% - generated near maximum revenue increases
- 02. Chart showing various row arrangements available to airlines



“ FEWER SEATS PER ROW IN PREMIUM ECONOMY THAN IN TOURIST ECONOMY PROVIDES THE ADDITIONAL WIDTH VALUED BY PASSENGERS ”

touchy subject

Business travellers have different sensitivities to space than pleasure travellers – most particularly, they are more sensitive to width. Survey data shows this to be true for groups of business travellers compared to groups of pleasure travellers. Logic teaches that it is true for individuals. A single individual is more likely to be made uncomfortable by the passenger seated beside them when on a business trip than when on a pleasure trip. The riddle is easily understood. On a business trip the passenger in the next seat is likely to be a stranger, perhaps a perfectly nice person, but someone with whom physical contact is uncomfortable and psychologically stressful. On a pleasure trip, by contrast, the passenger in the next seat is very likely to be a close family member – someone with whom contact can be comforting, both physically and emotionally. It is a fortunate coincidence that one source of the pleasure traveller's price sensitivity – the need to buy tickets for multiple family members – also results in a lessened sensitivity to width. But it does mean that the ideal product for pleasure travel is less than ideal for business travel.



demand and equal or higher seat count of the 3-2-3 configuration resulted in it consistently generating significantly more revenue than 2-4-2.

The ability to provide product features on the wider 'J'-seat may lead an airline to prefer 'J-'. On the other hand, the desire to minimise 'cannibalisation' – the number of business-class fare-paying passengers who find the premium-economy product acceptable and, as a result, buy down from business class to premium economy – favours a larger comfort gap between the business and premium-economy products, i.e. favors 'Y+'.

MONEY TALKS The revenue increases indicated by the study are very large indeed. With the study demand levels, before consideration of cannibalisation, total revenue increases in the 8% range were typical with optimal premium-economy cabin sizes. Cannibalising one tenth of business-class demand would reduce these revenue increases to the 6% range. Even with the lesser demand levels studied for premium-economy class and one-tenth of business-class demand buying down to premium economy, total revenue increased by 2% in the study. In the context of the small profit margins usually

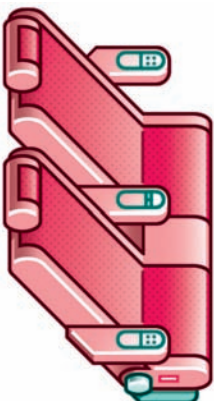
seen in the airline industry, even 2% gains in total revenue are absolutely huge. Due diligence requires that any airline considering a new product investigate the demand expected at planned fare levels. In the case of premium-economy class, the potential gains make such research well worth the effort and expense.

FINE TUNING The range of travellers served by economy class today is extremely broad. Many are extremely price sensitive and less sensitive to comfort. At the same time, there are many willing to pay significantly more for a product that offers more comfort and amenities than an all-purpose economy product optimised for the price sensitivity of most tourists. Simply put, the revenue gains come the old-fashioned way, from selling at a premium price a product that better suits the needs of selected customers. ☒

N.B. Klaus Brauer recently retired from Boeing Commercial Airplanes, where he was director of passenger satisfaction and revenue.

CONTACT

Klaus Brauer, klaus.brauer@alum.mit.edu;
Ken Price, Boeing, kenneth.g.price@boeing.com



IN THE CONTEXT OF THE SMALL PROFIT MARGINS
USUALLY SEEN IN THE AIRLINE INDUSTRY, EVEN 2%
GAINS IN TOTAL REVENUE ARE ABSOLUTELY HUGE



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people's choice

Aircraft Interiors Expo 2009 saw a multitude of new economy seating products and concepts, all focused on reduced weight, low cost of ownership and improved living space and comfort for passengers

ANTHONY JAMES, AIRCRAFT INTERIORS INTERNATIONAL

Recaro

Comfort Line 3620

Recaro's Comfort Line 3620 economy seat is designed for ultra-long-range flights up to 20 hours, and is an improved version of Recaro's ground-breaking CL3610 unit (in service on Qantas's A380s), which featured a carbon fibre single-beam support structure. "The CL3620 is more comfortable and weighs less than the CL3610," says Recaro Aircraft Seating's CEO Axel Kahsnitz. "This new economy-class seat responds to market demands for lowering costs by reducing weight. One of the new features is that the entire beam is made from aluminium – the innovative mounting concept also helps reduce weight."

Beyond saving weight, replacing the two support beams found in conventional economy seats with a single beam gives the seat a much leaner profile. This increases legroom – even at a relatively short seat pitch. "The CL3620 sets new standards when it comes to ergonomic

features and living space," says Kahsnitz. "The flexible material in the headrest, the foot net, the ultra-thin backrest and other innovations all add up to an exceptionally comfortable experience for airline passengers.

"The CL3620 is also more maintenance friendly for airlines – because the parts are easier to replace," adds Kahsnitz. A triple seat set has 800 fewer parts than the CL3610, which simplifies assembly and reduces weight. Recaro says the CL3620 is also easier to install in a wide variety of long-range aircraft models as it can be flexibly adapted to different airline cabin layouts: "The CL3620 features a modular design to reduce complexity."

The CL3620 won first prize in the 'Passenger Comfort' category at the 2009 Crystal Cabin Awards. "All engineering tests have been passed and certification is ongoing," reports Kahsnitz. Qatar Airways is the 3620's launch customer.

Recaro's CL 3620 features an aluminium single beam that saves weight and improves legroom



Minimum pitch: 29in
Seat bottom width: 20.5in
Seatback width: 18.7in
Recline: 9in (backrest recline and seat bottom travel)
Approximate weight: Undisclosed
Standard features: Six-way headrest, seat articulation, bi-fold table, literature pocket, cup holder
Options: Coat hook, foot net, IFE, hammock headrest, reading light
Web: www.recaro-as.com



Minimum pitch: 28in
Seat bottom width: 18.5-20.5in
Seatback width: 16.7in
Recline: No recline (fixed seatback)
Approximate weight: 16kg (36 lb)
 per seat triple
Standard features: Tray table,
 literature pocket
Options: Cup holder
Web: www.recaro-as.com

Stingray

A new economy-class seat concept presented by Recaro for the first time at this year's Expo, Stingray weighs in at only 5.4kg per passenger, setting new standards in the field of lightweight construction. "Stingray is the ultimate approach to weight reduction," says Recaro's CEO, Axel Kahsnitz.

In terms of looks and comfort, the prototype is similar to the new Smart Line 3510 seat, but Recaro decided to take things a step further with this concept, maximising weight reduction to show what is possible in an aircraft interior. "This is not an exercise in lightweight construction at any cost," notes Kahsnitz. "We also strove to ensure typical Recaro values such as quality, seating comfort and reliability. Although Stingray is a prototype, it is very realistic – we have conducted simulation tests to verify the weight reduction. This seat could feasibly be built and certified."

Recaro's engineers reduced the weight of the seat by integrating intelligent new designs and using innovative materials in the primary structure: "The seat structure was reconfigured using the latest analysis techniques. At the same time, a new aluminium alloy was implemented along with titanium and additional CFRP materials."

Recaro says there are currently no plans for series production, however some of the lessons learned from Stingray's development will be used for new seating programmes in the future.

Recaro

Stingray generated a great deal of interest at the Expo, where visitors were invited to literally lift a seat triple unit from the ground!

Recaro

Smart Line 3510

The SL3510 is Recaro's new seat model for the short-haul economy market, designed for flights of up to four hours. The seat weighs just 9kg per passenger place. "Airlines that offer daily short-range flight services with frequent, fuel-intensive take-offs need extremely lightweight seats," explains Recaro's CEO, Axel Kahsnitz. "At the same time, they place high demands on seat reliability and easy maintenance – the SL3510 is designed to meet those needs. Its extremely low weight helps airlines save fuel."

A drastic reduction in the number of parts, and the use of high-strength materials from the auto industry ensure the SL3510 is extremely sturdy, lowering maintenance costs. Meanwhile its ultra-thin profile enables airlines to use cabin space more efficiently. Recaro also paid close attention to seat ergonomics: "The backrest structure was optimised for a relaxed sitting position, comparable to a former recline seat," says Kahsnitz. "Its aluminium frame is covered with a netting material that adapts to the contour of the passenger's spinal column. Furthermore, the extremely thin backrest ensures maximum living space. Even at 28in pitch, the SL3510 offers more legroom compared to similar models."

Recaro says the seat is currently "in the process of certification", having passed the "FE calculation" stage. First delivery is expected before the end of this year, to an undisclosed launch customer. The SL3510 took first prize in the 'Industrial Design/Interior Concept' category of the 2009 Crystal Cabin Awards.

Recaro's Smart Line 3510 uses a fixed seatback to reduce weight and save on maintenance costs

Minimum pitch: 28in
Seat bottom width: 18.5-20.5in
Seatback width: 16.7in
Recline: No recline (fixed back)
Approximate weight: 27kg (59.5 lb)
 per seat triple
Standard features: Tray table,
 literature pocket
Options: Cup holder
Web: www.recaro-as.com



Pinnacle

B/E Aerospace claims its new economy seat product line, Pinnacle, is the lightest in its class. "The new seat model is up to 20% lighter than comparatively featured seats offered in today's market, and is pre-engineered for the latest IFE offerings," explains Alex Pozzi, research and development director. Despite its many features, Pinnacle still weighs in at an impressive 30kg (66 lb) per triple: "The development process was focused on providing the lowest weight and lowest total operating cost to be fully aligned with the economic challenges facing airlines today."

Pinnacle was developed using an intelligent 'plug and play' approach, enabling customers to choose from a range of modular comfort features. "The new platform is scalable and caters to both narrow-body and wide-body configurations to provide class-leading comfort and living space," says Pozzi. The seat includes a full-sized tray table, standard recline, full-length arm and back rests, standard bottom and back cushions.

B/E claims Pinnacle offers increased shin room, under-seat clearance and distance between seats (passenger chest to back of seat) for improved living space and comfort. This is accomplished by improving the usable volume for the passenger, including thinner tray tables, backs and headrests and reduced frame thickness. The tray tables and armrests have also been raised to give more leg space and hip room. The cushion height has been lowered, while the seatback height has been raised to accommodate passengers in the 95th percentile. "The enhancements are made with attention to durability and flexibility to meet stringent certification standards," says Pozzi.

Pinnacle incorporates a woven-netting diaphragm for the seatback and bottom – a concept first introduced into B/E's seating range in 2001. The diaphragm suspends

Customers can choose from a range of modular comfort features

the passenger and adjusts to the individual body shape providing enhanced comfort and cushion durability.

Similar to B/E's successful Spectrum seating range, Pinnacle uses 'platform development' principles to encompass all narrow-body and wide-body aircraft, including the new A350. "This helps reduce complexity, makes maintenance and inventory simpler and the increased standardisation helps drive economy of scales to better control costs," notes Pozzi. "A typical A configuration is a narrow-body, no-IFE, short-haul product at 28-33in pitch, with recline between 4-6in and a non-moving bottom pan," he continues. "The B version uses the same seat, but adds an articulating seat bottom, increases the recline to 7in, has full featured video and is aimed at the long-haul, twin-aisle market. A C type is the same seat, but with cradle motion and 9in of recline, with a pitch of between 36-44in, aimed at the premium-economy or mechanical business-class market."

B/E has three (unnamed) launch customers for Pinnacle, with TSO certification expected before the end of the year – the company says it has used dynamic simulation and upfront cycle testing to identify and correct potential problem areas well in advance of delivery.

B/E's Pinnacle range uses 'platform design' principles so it can be scaled and specified to fit a wide range of aircraft types and product niches



Minimum pitch: 28in
Seat bottom width: 17.9-20.5in (six standard widths, depending on aircraft type)
Seatback width: 15.3-18in
Recline: 33° from vertical
Approximate weight: 30 kg (66 lb) per seat triple
Key features: Contoured back and bottom with fabric diaphragm; infinitely adjustable recline using mechanical push button; one-piece, sliding, in-back tray table; literature pockets with spring wire frame; additional stowage/amenities pocket
Options: 9 or 10.6in IFE screen;

back-mounted handset or top-mounted in-arm PCU; articulation; cradle motion; coat hook; four-way adjustable headrest; two-position fabric or multi-position ratcheting paddle footrest; front-mounted legrest; back-mounted amenities pocket; PC power; USB; escape path lighting; secure life vest stowage; bi-fold, back-mounted sliding food table
Web: www.beaerospace.com



- Minimum pitch:** 31in
- Seat bottom width:** 18in
- Seatback width:** 22in
- Recline:** 5in (seat pivots forward and down)
- Approximate weight:** 38kg (84 lb) per seat triple (without IFE)
- Standard features:** Sliding meal tray, literature pocket, life vest holder, up to 14% more seats per aircraft
- Options:** Adjustable headrest, rear footrest, Jet Rest base cushion, coat hook, drinks holder
- Web:** www.thompsonaero.com

Cozy Suite

Thompson Solutions' Cozy Suite uses a staggered cabin configuration to deliver increased comfort for passengers and improved revenues for airlines. "Cozy Suite gives the passenger a dedicated sleeping area, more legroom, an individual armrest and improved shoulder room," explains Brian Rogers, Thompson's vice-president of sales.

Its design was perfected following numerous prototype and passenger trials to minimise the step-back of the seats: "You do not feel like the seats are even staggered, allowing interaction between you and other passengers, while reinforcing a high level of privacy," says Rogers.

The Cozy Suite can be installed from 31-38in pitch on wide-body aircraft – Rogers says intensive 3D sculpting of the backshell profile has enhanced available space and comfort: "Even at 32in pitch, your leg and knee space is a massive 31in," he says. With a fixed backshell, the seat reclines by sliding down and forward, without disturbing passengers seated behind. A patented tip-up seat pan enables easy egress and allows passengers to better stretch their legs during long flights.

Despite each seat being an impressive 18in wide, Rogers says the Cozy Suite can provide up to 14% more seats, which can deliver US\$3 million more revenue for

each aircraft every year. "Cozy Suite provides a real competitive advantage as adding more seats reduces break-even load factors and the operating load factors will also benefit by the increased comfort attracting customers from other airlines," he says. Alternatively, depending on individual routes and market conditions, Rogers say one in seven aircraft could be retired and the same number of passengers carried.

"The Cozy Suite has passed both technical and customer tests with flying colours and we eagerly await the conversion of hot interest from customers to orders for delivery in 2010," concludes Rogers. "We have listened to both airline companies and their passengers and in Cozy Suite have delivered the first major change in economy seating in 50 years. To date no economy seat product has been able to offer such an increase in passenger comfort while at the same time changing the economics of flying wide-body aircraft."

It was reported at last year's Aircraft Interiors Expo that Thompson Aerospace has secured Delta Airlines as its launch customer for the Cozy Suite. The airline plans to install the product on its entire Boeing 757ER and 777 fleets.

Thompson Solutions

The Cozy Suite's staggered configuration increases revenue for airlines while improving comfort for passengers

ECO

ECO is the brainchild of ZIM Flugsitz GmbH, a new German seat manufacturing company, founded by former Recaro engineers. ECO combines high-strength aluminium alloys with carbon fibre materials to reduce weight but still provide strength, where needed. "We add material where it is important to have it, but we pare it away where it would only increase the weight," says ZIM Flugsitz's sales manager, Michael H. Linnig.

A modular architecture allows width and seat pitch to be adjusted easily to customer requirements. "Seating configurations within all current Airbus or Boeing layouts are adjustable, using standard parts without any adaptors, thereby cutting down on parts and reducing maintenance costs," explains Linnig. The seat can be adjusted to double, triple or quadruple seat configurations, to suit either single-aisle or wide-body aircraft.

The seat comes in three versions – short range, medium range and long range. The basic short-range seat (ECO-01-S) weighs only 9kg per seat for a triple seat configuration, making it especially suitable for low-cost carriers. The medium-range seat (ECO-01-M) also stays below 10kg per seat, while offering 6in of recline, a tray table integrated into the backrest, a movable armrest

and literature pocket. The long-range version (ECO-01-L) adds features including 9in of recline, IFE provision and an adjustable headrest.

An assembly shop is currently under construction opposite ZIM's engineering headquarters in Markdorf, Germany. "We expect to receive production facility approval from the German LBA by July," says Angelika Zimmermann, ZIM's CEO. The seat has already achieved TSO-C127 certification.

"The key benefit is the seat's lower weight," concludes Linnig. "Beyond this and the modular concept of our economy-class seats, it's the flexibility of a young dynamic company that our customers appreciate."

The seat can be adjusted to double, triple or quadruple seat configurations

Zim's ECO seating boasts a fully modular architecture and is available in three versions



Minimum pitch: 28in

Seat bottom width: 18.5-20.9in
(depending on model)

Seatback width: 18.1in
(standard model)

Recline: 6-9in (depending on model)

Approximate weight: 30kg (66 lb)
per seat triple (standard model)

Standard features: (ECO-01-M):
Seatbelt, life vest box, low positioned literature pocket, coat hook, standard cushion, 6in recline, movable armrest, steward step, comfortable tray table

Options: Adjustable headrest, articulated seat pan, footrest, cup holder, leather dress cover, quick-change fittings, IFE provision

Web: www.zim-markdorf.de;
www.zim-flugsitz.de

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STANDARD HORIZONTAL LIE FLAT	42
ADDITIONAL SEATS	13 (31%)

VANTAGE SEAT WIDTH	23"
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Cozy Suite

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B767-300 SEAT ARRANGEMENT

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STANDARD SEATS	180
ADDITIONAL SEATS	26 (14%)

COZY SUITE SEAT WIDTH	18"
COZY SUITE SHOULDER WIDTH	22"

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Q Close Couple Seat (QCC)

The Q Close Couple seat is designed for 28in pitch, but by paying close attention to the seat's structural profile, Design Q says the QCC provides the equivalent legroom of a standard economy seat set at 31in pitch. "The additional space is provided by redefining the shape and construction of the seat and fixing the seatback in the optimum position," explains Design Q's Gary Doy. "With a well-designed seat on a short-haul flight, there is little need to have a reclining seat," he continues. "In most cases it is better to have a fixed seat, especially if the pitch is tight. The aim was to produce a very robust, light and comfortable seat that can be mounted at 28in pitch with a stylish and modern look."

A fixed seatback reduces part numbers, while weight and maintenance costs have been reduced further through the use of lightweight materials and a careful study of construction methods. A one-piece structural backrest is contoured to optimise passenger space, especially in the knee area. A modular tray table and literature pocket system allows for ease of maintenance and alternative options for airlines. Open gaps and food traps have been "designed out", while a tailored leather dress cover ensures

the seat should stay clean looking for longer. "The slimline form language of the seat is tempered by a comfortable, high-quality tailored look to the leather trim, and a unique dress cover system ensures the covers will still look good over time and can be replaced quickly in service," adds Doy. "Although the seat is very slim, it has been designed to have an upmarket and luxurious appeal, challenging the usual expectations in this market sector. All the visible parts on the seat play both a functional and aesthetic role to ensure there is no additional weight designed in to the seat."

Design Q says it is now working on a second generation of the concept with "a number of customers".

A one-piece structural backrest is contoured to optimise passenger space

Design Q

Design Q's Close Couple Seat - possibly the best-looking economy seat ever designed?



- Minimum pitch:** 28in
- Seat bottom width:** 18.9in
- Seatback width:** 18.9in
- Recline:** No recline (fixed back)
- Approximate weight:** 25kg (55 lb) per seat triple
- Standard features:** Literature pocket
- Options:** Cup holder, tray table, IFE pack, USB port and phone/MP3 storage, alternative trim cover and backrest colours, lower storage pocket
- Web:** www.designq.co.uk

Clark

Acro has developed Clark, a seat specifically designed for the short-haul economy market. Acro claims it is the lightest seat in its class – at 31kg (68 lb) per triple. Acro already has a launch customer – Jet2.com, which operates from six UK airports. The first of eight Boeing 757 aircraft belonging to the airline is currently being fitted, with fleet completion in the summer. Clark is suitable for B737 Classic & NG, B757, A320 family and ATR aircraft.

"It's the details that set this seat apart – and we've focused hard on them," says Acro's commercial director, Chris Brady. "We've eliminated the unnecessary features, reduced the part count to 60 and lowered the cost of ownership dramatically. The table, magazine pocket, armrest, seat pan or seatback can each be changed in less than two minutes with an Allen key. The QuickFit dress cover system can be removed and refitted in less than a minute, with guaranteed straight lines and no trailing Velcro. It is EASA 16g certified and meets the toughest fire, smoke and toxicity requirements."

Brady is keen to emphasise the seat's overall strength and robustness – an important consideration for the short-haul market: "Clark isn't the lightest seat being promoted at the moment, but it is probably the lightest 16g HIC compliant seat actually being delivered," he says. "We pride ourselves on robustness and longevity – weight always grabs the headlines, but the seat has to be sturdy enough to survive the short-haul environment."

In the event that a seat does require replacing, it can be disassembled "with four sizes of Allen key and one

spanner," notes Brady. "No single part takes more than two minutes to change and no part requires the removal of another to gain access to it. It is a seat designed for turnaround maintenance."

Brady says Clark also offers improved legroom and is easier and quicker to clean for fast turnarounds: "Clark's bucket seat and mono-spar construction delivers incredible leg and shin room – a point which leaps off the page to any one who has sat in it."

"The seats really do deliver extra legroom and comfort, which will enhance our passengers' travelling experience, plus they look smart, which improves the cabin design," adds Philip Meeson, chairman and CEO of Jet2.com. "In addition, they are tough and hard-wearing, important for durability purposes, and will help keep our maintenance costs at rock bottom – an absolute must for us as a business."

Acro and Jet2.com have been collaborating on the development of the seat since 2006, culminating in an advanced prototype that the airline used for inflight comfort and usability trials during January 2008. Acro also has a recline version under development, which will fully support seatback IFE.

Acro will manufacture the seats at its own Part 21G approved facility in the UK: "Construction-wise, we use conventional materials, primarily aluminium to keep the purchase price low, and ongoing maintenance costs down – no exotic repairs to composites, for example, are required."

Clark has been designed to meet the needs of the short-haul economy market

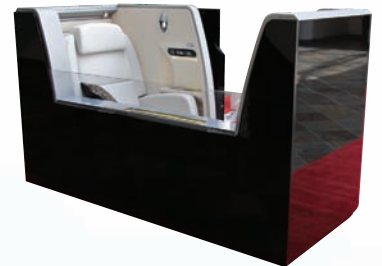


- Minimum pitch:** 28in
- Seat bottom width:** 19.9in
- Seatback width:** 18.7in
- Recline:** No recline (fixed back)
- Approximate weight:** 30kg (66 lb) per seat triple with fabric covers (31kg with E-Leather covers)
- Standard features:** Only 60 parts; bucket seatback design provides maximum leg and shin room; innovative magazine stowage
- Options:** Cup holder; audio-only IFE
- Web:** www.acro.aero





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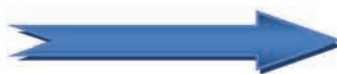
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SleepSeat

Blue Sky, a member of Farnborough Aerospace Consortium (FAC) in the UK, has developed SleepSeat, which features an aft beam raised above knee level so that knee room is only 1in less than seat pitch. Moving the aft beam higher allows free access to otherwise inaccessible space under the seat in front. Meanwhile the forward beam has been lowered, allowing the seat to incorporate a mechanism that moves the seat pan forward and downward, permitting up to 6in more legroom and increasing the rake of the inside back to allow up to 40° of recline to facilitate sleep. A fixed back shell ensures passengers sitting behind are not disturbed when the passenger in front reclines.

The company says the seat requires no more floor space than a conventional seat: "With our cantilever design, there is no under seat structure to impede knee room, legroom or access to under seat space, and the geometry of the inside and outside backs provides a

Seats can be activated by swipe cards anywhere in the aircraft

passenger safety cell in the event of an accident," says Blue Sky's CEO, Dominic Robinson.

Blue Sky has also developed a cabin configuration tool, which it claims could offer airlines the flexibility to adjust the distance between seats to offer upgrades either online, at check-in or even on board: "What is really exciting is that the design of the SleepSeat has made it possible for us to create our unique CALM (Cabin Layout Management) System," says Robinson. "SleepSeat can be supplied as a basic economy seat or fitted with a single actuator and slide mechanism, which allows the seat to move forward 6in and downward 3in to provide greater comfort," he adds. "Assume all seats are set at 32in pitch – activation of the mechanism converts an economy seat into a premium seat, offering 32in pitch and 6in of travel, which is equivalent to 38in effectively, with a 40 degree angle of recline as well."

Such flexibility would allow to quickly and efficiently change the normally fixed cabin layout to provide upgrades according to demand, says Robinson: "This even works for the low-cost business model, where seats can be activated by swipe cards anywhere in the aircraft, generating huge additional revenue."

Robinson says the seat has undergone Finite Element Analysis (FEA) during development to prove its structural integrity and will shortly undergo 9g and 16g testing, with the product available from early 2010.

Blue Sky

An actuator and slide can move each SleepSeat forward by up to 6in, allowing airlines to reconfigure their cabin on the fly



Minimum pitch: 29in
Seat bottom width: 20.1in
Seatback width: 16.4in
Recline: 6in (seat pivots forward and down)
Approximate weight: 30kg (60 lb) per seat triple (basic model); 39kg (86 lb) per seat triple (premium model)
Standard features: Literature pocket, meal tray, fully retractable armrests
Options: IFE, cup holder, adjustable headrest, up to 40° recline for premium model
Web: www.blueskydesigners.com

Series 3000

Timco Aerosystems has introduced a new-generation economy seat that combines an articulating bottom and lower lumbar to offer the equivalent of 5in of conventional recline – without encroaching on the space of the passenger behind. Designated the Series 3000, this latest model is part of Timco's FeatherWeight range, which are lighter and feature fewer moving parts than traditional seats. In addition, Timco says Series 3000 offers improved comfort, flexible back and bottom diaphragms, greater perceived space at 31-33in pitch, very low cost of ownership, a high back structure (45in), wider egress due to shorter armrests, and increased legroom due to its newly designed structure.

Series 3000 is available with a wide array of options, and can be fitted with IFE systems that feature a top-mounted DPCU. It is 9g static and 16g dynamic certified, and complies with HIC regulations. Timco is yet to announce a launch customer.

Series 3000 complies with HIC regulations and is fully certified

An articulating bottom and lower lumbar offer the equivalent of 5in of recline



Minimum pitch: 31in

Seat bottom width: 17.9-18.9in (depending on seat variant)

Seatback width: 17-17.9in

Recline: 3in (note: articulating bottom and lower lumbar equivalent to 5in of conventional recline)

Approximate weight: 27.8-29kg (61.3-64 lb) per seat triple

Standard features: Articulating sliding seat bottom and lumbar; flexible back and bottom diaphragms; padded seat covers – no seatback cushion; armrest with sliding recline control buttons; 10in rear-mounted pivoting food trays; integrated flight attendant step; under-seat life vest pouch; literature net pocket

Options: IFE screen; emergency path lighting installation; three-way adjustable slim headrests; new lightweight passive headrest; tamper-proof life vest box; spring-loaded literature pocket; fire-blocked polyurethane foam; coat hook.

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In-flight entertainment (IFE) screens are sprouting in single-aisle airliners and regional jets as competition intensifies and systems shrink in size and cost

BRENDAN GALLAGHER, AIRCRAFT INTERIORS INTERNATIONAL



To the untutored eye, Virgin America and Kuwait's Wataniya Airways look like very similar operations. Both fly Airbus A320s, both have put a lot of thought and investment into their products, and both offer a two-cabin service with in-flight entertainment (IFE). But there the resemblance ends.

The low-fare US carrier makes no bones about using the Panasonic eFX audio/video on demand (AVOD) system, available at every seat, to maximise ancillary revenues. For Wataniya, recently likened to a five-star boutique hotel chain by its chief executive, it's all about quality of service for an all-premium clientele.

Whatever the motivation, IFE is now finding its way aboard growing numbers of single-aisle aircraft. It's even in regional aircraft – AVOD aboard Air Canada's Bombardier CRJ705s and Embraer 175s and 190s, live satellite television in the Embraer 195s of Brazilian domestic carrier Azul, overhead broadcast screens in the ATR 72 turboprops of India's Kingfisher Airlines.

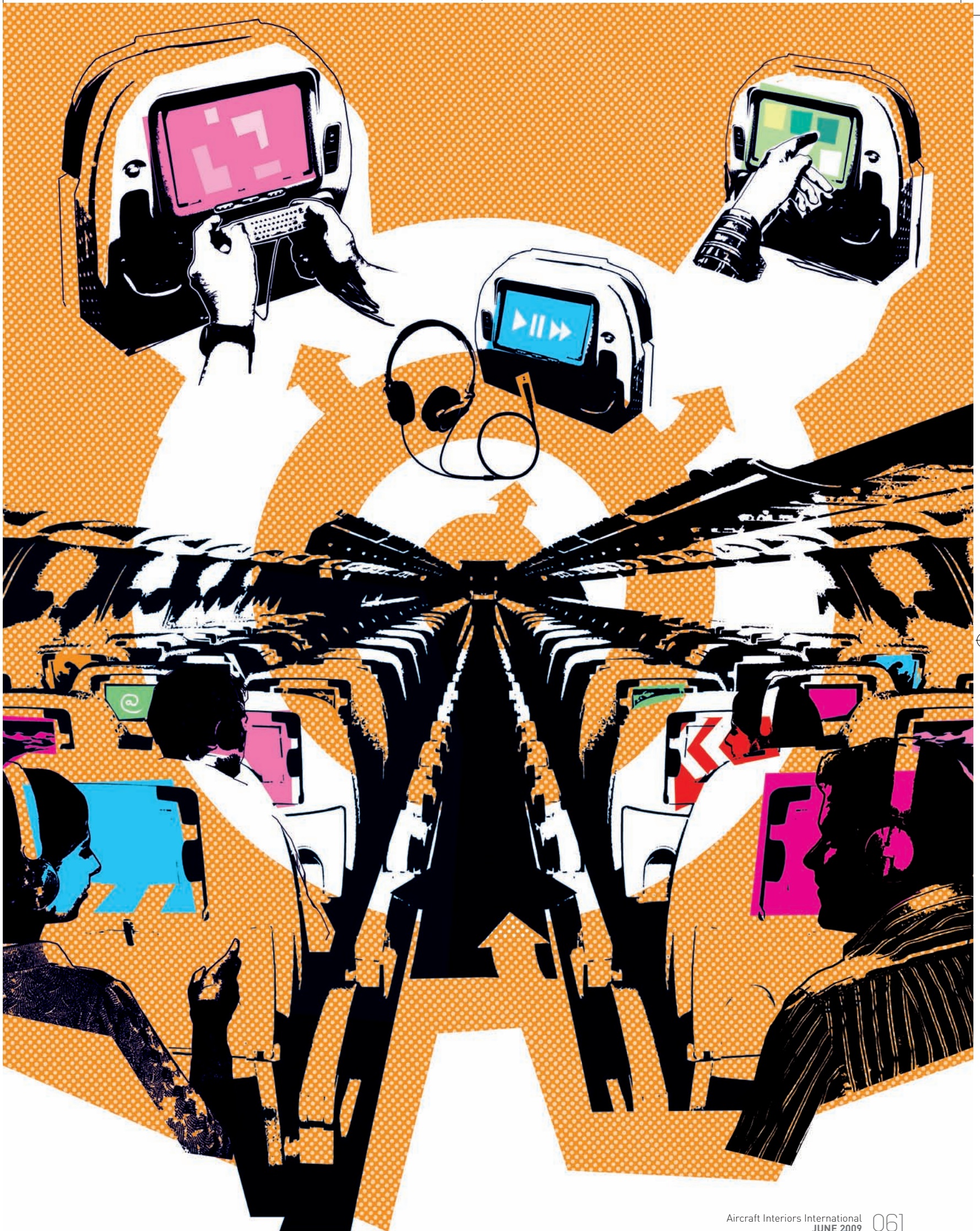
Air Canada was a key trendsetter, deciding in 2005 to fit Thales's TopSeries AVOD across its entire fleet,

from intercontinental wide-bodies to regional jets. George Reeleder, the airline's senior marketing director at the time, explains the reasoning that led to this multimillion-dollar investment.

"The biggest driver was product consistency," he says. "We knew we had to put AVOD in our wide-body aircraft to be competitive internationally. But we also used wide-bodies coast-to-coast in Canada, and that immediately raised the prospect of our not being consistent across our domestic operations. So we decided we had to equip all our single-aisles and ultimately the RJs [regional jets] as well. The Embraers fly durations of up to five-and-a-half hours, so IFE certainly makes sense from the passenger's point of view."

Domestic competition was also a factor – "Our largest competitor in Canada, WestJet, was going to have LiveTV, so we decided we would have to offer something at least as good" – as was the desire for a service differentiator to justify higher seat prices and so generate more revenue.

First announced in 2005, the Air Canada programme has just been completed, with a total of more than 200 wide-bodies, single-aisles and RJs equipped. It was the last



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“

IT STEPS UP THE SINGLE-AISLE BROADCAST FORMULA A NOTCH BY PROVIDING INTERACTIVE AND ON-DEMAND CAPABILITIES

”



01

category, with their very much smaller cabins, that brought out the best in IFE vendor Thales and Montreal-based installation specialist Inflight Canada.

“All the available AVOD systems had a traditional architecture, with substantial head-end units feeding area boxes, distribution boxes and finally seat boxes at each double- or single-seat assembly,” explains Inflight Canada’s president, George Smallhorn. “No matter how we tried to cram in all these units with their associated wiring, it was clear that they simply wouldn’t fit into an RJ.”

NO MORE BOXES Drawing on experience with its unique iCACHE underfloor IFE installation solution, Inflight Canada worked with the airline to come up with a proposed architecture for consideration by the system vendors. “It featured a reduced head-end and eliminated the various cabin boxes altogether,” says Smallhorn. “Thales stepped up to the plate with its TopSeries i-4500 design, which is lighter, requires less power and leaves the cabin uncluttered with cables and underseat boxes.”

Thales sees i-4500 as a solution for the RJ and single-aisle retrofit market. “If you want a lightweight AVOD system throughout the cabin and are prepared to give up a little functionality, i-4500 serves the purpose well,” says Alan Pellegrini, general manager of the company’s IFE business. “We have also been very successful in the market for full AVOD for wide-bodies. But when an airline wants something more basic for its A320s or 737s, our competitors have so far dominated with their broadcast systems. So we decided to scale our TopSeries family to fit this need.”

The result is what Pellegrini describes as “not a me-too product”. Introduced earlier this year and due to enter service this September aboard the first of 42 new Airbus A320s belonging to Saudi Arabian Airlines, TopSeries Digital Single-Aisle (D-SA) does indeed seem to be something out of the ordinary. “It steps up the single-aisle broadcast formula a notch by providing interactive and on-demand capabilities at the seat, while costing significantly less than the millions of dollars associated with AVOD,” explains Pellegrini.

01. Thales’s TopSeries IFE system installed in a single-aisle aircraft



IT CAN GATHER CONTENT DATA DIRECT FROM THE HEAD-END, AVOIDING THE NEED FOR A SEATBOX



02

- 02. Rockwell Collins's dPAVES digital broadcast system
- 03. Panasonic X Series on a Virgin America A320

Designed to supplant Thales's existing i-2000 broadcast system and to compete with Digital MPES from Panasonic and dPAVES from Rockwell Collins, TopSeries D-SA is designed in basic form to provide broadcast overhead video and distributed audio, while also being scaleable to full AVOD.

"It's particularly suitable for airlines who want AVOD in their premium classes and overhead video in economy," explains Pellegrini. "But even in its most basic configuration it will have functional advantages compared with existing broadcast systems. For example, D-SA is inherently interactive, offering audio on demand at every seat – 100 channels on demand compared with a typical 12 broadcast channels today."

D-SA combines existing TopSeries technology and hardware – digital video distribution, a Gigabit Ethernet network, servers and cabin management terminal – with a new passenger control unit called the ePCU. "This incorporates an MP3 player with its own Ethernet switch," explains Pellegrini. "It can gather content data direct from the head-end, avoiding the need for a seatbox."

COMPETITIVE MARKET With D-SA Thales is taking on prime competitor Panasonic, as well as Rockwell Collins, which gave up the high ground of wide-body AVOD a few years ago to focus on its dPAVES broadcast system for single-aisle aircraft. Panasonic's equivalent is Digital MPES. In both cases digital technology has been applied to squeeze weight and power demands out of products that first entered the market in analogue form by replacing racks full of video playback equipment with compact, capacious content servers.

The two systems have hit the mark with the airlines. In March Rockwell Collins announced orders from three airlines for more than 60 examples of dPAVES. Sharjah-based low-fare operator Air Arabia wants it for a total of 49 Airbus A320s. Spanish leisure carrier Air Europa plans to install the system in 12 of its Boeing 737s and has options on a further 13 shipsets. Canadian charter airline CanJet ordered the system for a pair of Boeing 737-800s. At the heart of the installations will be the Broadcast Digital Server (BDS) – this offers 160Gb of content storage, enough for several entertainment play periods.

03

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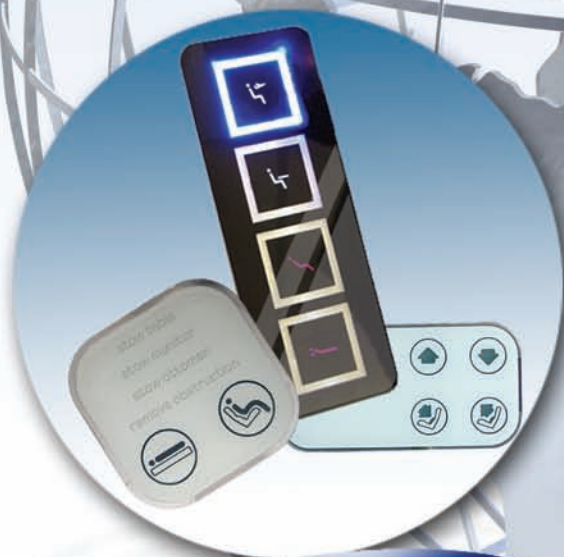
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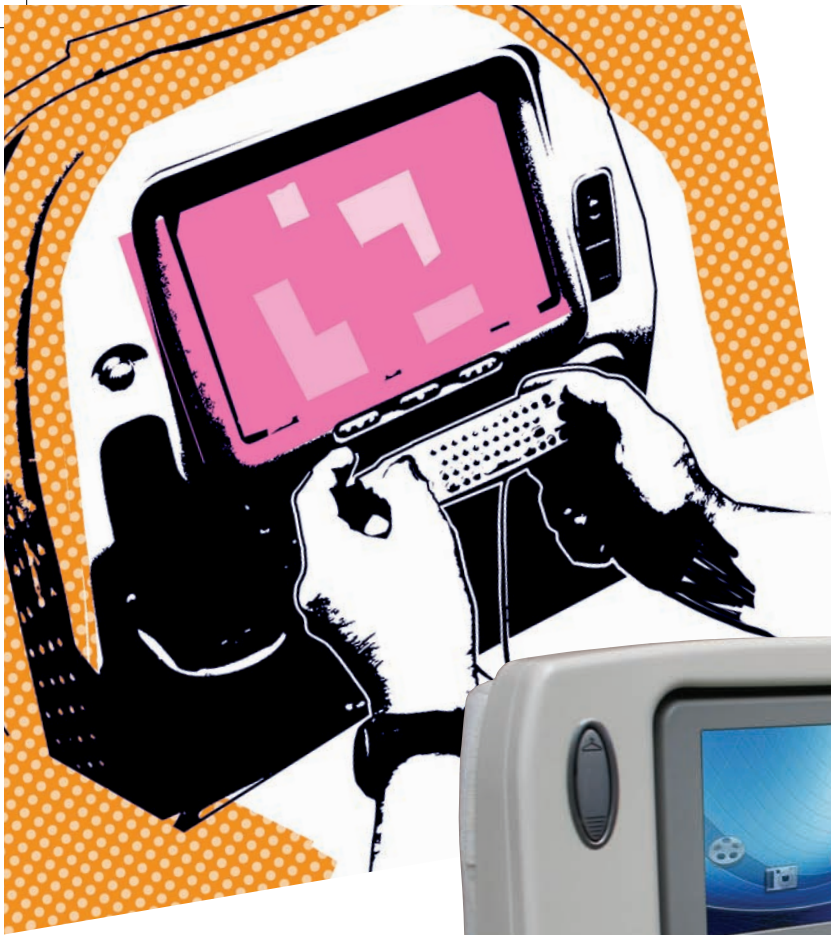
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“ THE CHALLENGE IS TO DEVELOP AN ON-AIRCRAFT INFRASTRUCTURE WITH ENOUGH BANDWIDTH TO MEET THE DEMAND ”



Recent successes for the Panasonic broadcast product include an order from Singapore-based SilkAir for installations in 12 Airbus A320-family aircraft. But the Lake Forest, California-based company is making even bigger inroads into the market with its eFX, an AVOD system specifically developed for single-aisle applications.

Announced takers for eFX include Air India (Boeing 737-800), Air New Zealand (Airbus A320-200), Continental (757-200), Egypt Air (737-800), Jet Airways (737-700 and -800), Sonair (737-700), and LAN Chile, Philippine Airlines, Starflyer, TAM and Virgin America (all A320 family).

NEW ARRIVALS The current dominance of mainstream IFE by Panasonic, Thales and Rockwell Collins – not to mention the formidable barriers to entry created by the airlines' demands for long-term product support – has not deterred a number of new players from trying their luck in recent years. And all of them are promoting systems with the compact, lightweight qualities required for admission to the single-aisle world.

Among the vendors looking to provide the power and user-friendliness of in-seat AVOD at a fraction of the cost and weight of the products offered by the incumbents are California's Lumexis and Thompson Aerospace; a US/German team combining cabin systems manufacturer VT Miltope and German communications technology provider TriaGnoSys; Hong Kong-based SkyGem; Alster Aero of Hamburg; and France's Sicma, hitherto best known for its seating products.

BANDWIDTH CHALLENGE Each claims a technological 'secret sauce' that will form the basis of a new paradigm for IFE. As passengers come to expect more and more in the way of content choice and richness, the challenge is to develop an on-aircraft infrastructure with enough bandwidth to meet the demand.

Sicma, for instance, is banking on an architecture that shifts the system's computing power from a central server to a powerful in-seat unit able to support new applications such as 3D games and animated and 3D graphical user interfaces. Thompson Aerospace says it has a new network

04. Sicma Aero Seat's Seat Integrated Technology (SIT) IFE system

SINGLE-AISLE LIFE



- 05. Lumexis's FTTS system is undergoing trials on a US Airways A320
- 06. Panasonic X Series on board a Jet Airways Boeing 737



05

06



LOW WEIGHT AND REDUCED VOLUME ARE ALSO ATTRACTING THE ATTENTION OF THE REGIONAL JET COMMUNITY



management method that will allow multiple types of service to be offered simultaneously. And Lumexis has decided simply to offer physical infrastructure with enough data throughput capacity to meet all conceivable bandwidth needs for many years to come.

The company's lightweight fibre optic-based Fibre to the Screen (FTTS) AVOD system is on trial in a US Airways Airbus A320. Lumexis claims that FTTS is cheaper, lighter, more compact and more powerful than any competing product, offering enough bandwidth to accommodate current emerging applications and even more demanding ones in the future.

The system was designed originally with the single-aisle and wide-body markets in mind, but its low weight and

reduced volume are also attracting the attention of the regional jet community. Among the manufacturers showing interest is Bombardier, which has asked Lumexis to quote for a CRJ installation.

Pre-trial questions about the robustness of FTTS have been answered, according to Lumexis chief executive Doug Cline. "Not only have we never delayed the aircraft in some 300 flights so far, but we have also not once had to reset the system," he says. "And while we've replaced a few screens, we've had no failures of a head-end server switch unit or screen power supply. I believe that's a record for a newly introduced full-AVOD system."

NEW HORIZONS Five years ago, passengers on regional and most short/medium-haul flights were usually well advised to bring a good book to pass the time. Now vendors old and new are queuing up to offer innovative systems that can give them an IFE experience of the highest standard, and at a price in dollars, weight and power consumption that more and more airlines can afford. ☒

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makeyourselection

A COMPARISON OF THE LEADING SINGLE-AISLE IN-FLIGHT ENTERTAINMENT SYSTEMS

BROADCAST

PANASONIC DIGITAL MPES

PRIMARY FUNCTIONS: Distributed overhead video and audio, public address, pre-recorded announcements and boarding music

SERVER CAPACITY: 160Gb

MAXIMUM AUDIO/VIDEO CHANNELS: 24 audio and three video channels

PRINCIPAL LRUS: Head-end – SC-A (4MCU) and Main Multiplexer (2MCU); Network – One overhead-screen tapping unit for every two screens, and one seat electronics box for every three seats

NETWORK TECHNOLOGY: Composite video and analogue audio

CONTENT LOADING: Hard Disc Drive Onboard Media Loader, USB, or PL1000 portable loader

TOTAL WEIGHT (150 SEATS): Depends on the features and functions selected by the airline

POWER REQUIREMENT (150 SEATS): Depends on the features and functions selected by the airline

INSTALLATIONS IN SERVICE: 114

ROCKWELL COLLINS DPAVES

PRIMARY FUNCTIONS: Broadcast digital audio and video, Airshow 4200 moving-map, dynamic scripting, pre-recorded announcements and boarding music

SERVER CAPACITY: 160Gb

MAXIMUM AUDIO/VIDEO CHANNELS: 60 hours of video in two separate zones for up to eight periods, and 128 hours of audio on 16 MP3 channels

PRINCIPAL LRUS: Broadcast Digital Server (BDS – 4MCU), Flyable Data Loader (FDL)

NETWORK TECHNOLOGY: Analogue RF

CONTENT LOADING: FDL (Pentium-based computer) can update BDS content from a Blu-ray drive or USB port. An Ethernet port is provided to simplify maintenance

TOTAL WEIGHT (150 SEATS): 30 lb plus weight of cables and screens

POWER REQUIREMENT (150 SEATS): 60W (BDS), 75W (FDL), plus screen requirements

INSTALLATIONS IN SERVICE: More than 20 (more than 1,500 for PAVES)

HYBRID

THALES TOPSERIES DIGITAL SINGLE-AISLE (D-SA)

PRIMARY FUNCTIONS: Broadcast audio and video, scaleable to AVOD

SERVER CAPACITY: 800Gb

MAXIMUM AUDIO/VIDEO CHANNELS: 260 interactive audio channels (in broadcast-only system)

PRINCIPAL LRUS: Servers (4MCU), screens and ePCU for passenger interactivity

NETWORK TECHNOLOGY: Gigabit Ethernet

CONTENT LOADING: High-Speed Portable Data Loader and USB

TOTAL WEIGHT (150 SEATS): Not supplied

POWER REQUIREMENT (150 SEATS): Not supplied

INSTALLATIONS IN SERVICE: None – installations are due to start later this year

AUDIO/VIDEO ON DEMAND (AVOD)

PANASONIC EFX

PRIMARY FUNCTIONS: AVOD, public-address audio, pre-recorded announcements and boarding music. Can also support broadcast audio and video

SERVER CAPACITY: 160Gb (System Controller); 150-300Gb (file server – typically two or three are used)

MAXIMUM AUDIO/VIDEO CHANNELS: 24 audio and three video channels (broadcast)

PRINCIPAL LRUS: Head-end – One SC-A (4MCU), two or three file servers (4MCU each); Network – One overhead-screen tapping unit for every two screens, one DC seat electronics box for every three seats, one seat power module for every three seats, and one or two area distribution boxes

NETWORK TECHNOLOGY: 100 Base-T Ethernet

CONTENT LOADING: Hard Disc Drive Onboard Media Loader, USB or PL1000 portable loader

TOTAL WEIGHT (150 SEATS): Depends on features and functions selected by the airline

POWER REQUIREMENT (150 SEATS): Depends on features and functions selected by the airline

INSTALLATIONS IN SERVICE: 477

THALES TOPSERIES I-4500

PRIMARY FUNCTIONS: AVOD

SERVER CAPACITY: 800Gb

MAXIMUM AUDIO/VIDEO CHANNELS: N/A

PRINCIPAL LRUS: Servers (4MCU) and in-seat screens

NETWORK TECHNOLOGY: 100 Base T Ethernet

CONTENT LOADING: High-Speed Portable Data Loader and USB

TOTAL WEIGHT (150 SEATS): Not supplied

POWER REQUIREMENT (150 SEATS): Not supplied

INSTALLATIONS IN SERVICE: Nearly 300

THOMPSON AEROSPACE 1NET

PRIMARY FUNCTIONS: AVOD, point of sale, passenger information and connectivity

SERVER CAPACITY: 1Tb

MAXIMUM AUDIO/VIDEO CHANNELS: One server can supply up to 2Mbps to each of 254 seats simultaneously

PRINCIPAL LRUS: Connectivity Server Unit (2MCU), Ethernet Switch Power Supply and in-seat screens ('clients')

NETWORK TECHNOLOGY: Gigabit Ethernet over copper cable

CONTENT LOADING: Depending on size of update, 3G cellular, USB port at cabin crew interface or content loader with flash drive

TOTAL WEIGHT (150 SEATS): 445 lb including all cables, trays and brackets (for an A320)

POWER REQUIREMENT (150 SEATS): 2.2kW maximum (for an A320)

INSTALLATIONS IN SERVICE: None

LUMEXIS FIBRE TO THE SCREEN (FTTS)

PRIMARY FUNCTIONS: AVOD, credit/debit card transactions, satellite TV and internet connectivity

SERVER CAPACITY: 1Tb per Server Switch Unit

(SSU). Two SSUs provide fully redundant service for up to 264 seats

MAXIMUM AUDIO/VIDEO CHANNELS: N/A

PRINCIPAL LRUS: SSU (4MCU), screens and screen power supply units

NETWORK TECHNOLOGY: Gigabit Ethernet over fibre optic cable

CONTENT LOADING: Content Loader Unit accepting removable cartridges automatically uploads content in background while system continues to deliver AVOD.

TOTAL WEIGHT (150 SEATS): 430 lb (including LRUs, fibre optic cable and connectors), plus power cables, trays and mounting structures

POWER REQUIREMENT (150 SEATS): 3.6kW

INSTALLATIONS IN SERVICE: One

SKYGEM SKY1000

PRIMARY FUNCTIONS: AVOD, live inflight TV, games, point of sale and moving-map

SERVER CAPACITY: Up to 1Tb (more than 500 hours of video and 500 hours of audio)

MAXIMUM AUDIO/VIDEO CHANNELS: N/A

PRINCIPAL LRUS: Head-end server, area distribution units, seat boxes and screens

NETWORK TECHNOLOGY: 10 Gigabit Ethernet

CONTENT LOADING: Data content loader, replaceable drives.

TOTAL WEIGHT (150 SEATS): Less than 500 lb (for 137 seats on a B737-700)

POWER REQUIREMENT (150 SEATS): Less than 2kW (for 137 seats on a B737-700)

INSTALLATIONS IN SERVICE: Trial planned for 2010

BOEING737



blueyonder

LED mood lighting, sculpted ceilings, and bigger bins and windows lie at the heart of the new Sky interior for the Boeing 737

JAMES WALLACE, AIRCRAFT INTERIORS INTERNATIONAL



Standing inside the 737 cabin mock-up at Boeing's Seattle-based Customer Experience Center, Kent Craver, director of passenger satisfaction and revenue for Boeing Commercial Airplanes, points out all the changes the company is making to update the interior of its workhorse single-aisle jet.

Craver adjusts the cabin's new LED lighting in the ceiling and sidewalls to show a dark blue evening sky, one of about eight predefined settings that will be available to flight attendants to create a different cabin mood during various stages of flight. Just for fun, Craver flips a switch and the unappealing fluorescent lighting now found in 737 interiors replaces the softer and more colorful LED lighting. It's a dramatic change. Airlines, of course, would not have the option with the new interior to also have fluorescent lights. But who would want to?

Wallpaper*
City Guide



01

02

01-02. 'Blue sky' effect LED ceiling lighting increases the sense of cabin space

From redesigned and bigger overhead luggage bins to re-sculptured sidewalls and windows that look bigger but really aren't, the new Boeing Sky Interior represents the first major cabin overhaul since the Next-Generation 737 family of jets went into service with Southwest Airlines in December 1997.

"This is the future," Craver told reporters in the cabin mock-up in late April when Boeing revealed the Sky Interior, which is based on interior concepts developed for Boeing's 787 Dreamliner. "We have learned so much about this new interior. Why would you want to stay with something that has an age mark to it? Even though the current Next-Generation interior is a great interior, when this starts flying, airlines will want it."

PASSENGER RESEARCH The 737 Sky Interior is the result of Boeing's extensive passenger research for the 787 programme and before that the ill-fated Sonic Cruiser. "The 787 interior connects passengers with a brand new

flying experience," says John Hamilton, Boeing's 737 chief project engineer. "So does the Sky Interior – it will create a new type of flying excitement in the aircraft."

That research, according to Craver, essentially found that most passengers, regardless of culture, are bored when they fly, but all fondly recalled the first time they ever flew on an aircraft. In response, Boeing has used LED lights, a redesigned entrance area and the biggest windows of any Boeing or Airbus jet to better connect with passengers on the 787. That same philosophy has been incorporated into the 737 Sky Interior, although the 737 windows remain the same size as those on current models, but Boeing engineers have enlarged the window reveals.

"Humans love to fly," explains Craver. "So the over-reaching goal of this new interior philosophy reconnects people to the magic of flying. We wanted to create a welcoming environment. It is difficult for airline staff to greet every single passenger. So we have the architecture of the plane actually create this welcome. It is the icing on the cake."

The 737 Sky Interior also feels more spacious because of the sculptured sidewalls and the way the bigger overhead storage bins are designed. The new, sharply curved 737 bins, like those introduced on the 777, pivot down when opened, but when closed, they tuck into the ceiling and provide more headroom – aisle-seat passengers can now stand up without hitting their heads on the bin. Craver says the Sky Interior bins will hold four more standard 9in x 14in x 22in 'roll-on' bags than the current

“ THE OVER-REACHING GOAL OF THIS NEW INTERIOR PHILOSOPHY RECONNECTS PEOPLE TO THE MAGIC OF FLYING ”

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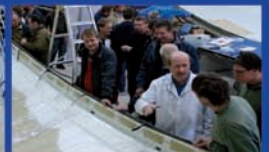
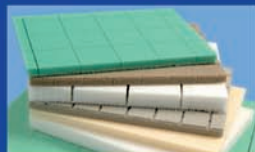
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INTERIOR IMPROVEMENTS WERE DESIGNED TO BE 'WEIGHT NEUTRAL' – BUT WE ARE ACTUALLY DOING BETTER THAN THAT



03



04

737 overhead bins. That's four extra bags per aircraft, says Craver, regardless of the Next-Generation model – 737-600, 737-700, 737-800 or 737-900ER.

Boeing has also redesigned the passenger service unit (PSU) above each seat – the light controls are now located next to the reading lights and the cabin attendant call button has been moved so passengers are less likely to push it by mistake when turning on the lights. It is also a different colour.

Reading, sidewall and ceiling lights are all LED, replacing all indirect fluorescents in today's 737 cabin. Boeing says switching to LED lighting will save airlines money and maintenance because the reading lights for each seat typically must be replaced about once a year. LED lights weigh less and last about 10 times longer than the old lights.

The improved 737 cabin will also be quieter, as a result of an integrated air-return grille in the sidewalls that reduces some of the air noise. New skin dampening material also helps reduce cabin noise levels. Boeing estimates the Sky Interior will provide a noise reduction in the cabin of from 2-4dB over the current 737 interior.

Further changes include new speakers in each passenger row for better sound quality; and an option to install life vests in the overhead compartments – with the vests dropping down like oxygen masks. This will save time on security inspections (required by the TSA) that must be made before the first flight of the day. Lavatories and other monuments are not being changed, as they remain customer options.

The various cabin changes will not require any significant structural modifications to the airframe, according to Boeing. The interior improvements were also designed to be "weight neutral" according to Boeing. "But we are actually doing better than that," says John Hamilton, Boeing's 737 chief project engineer.

One feature that added a little weight is an assist mechanism that makes it easier to close the new Sky Interior pivot bins. When fully loaded, the bins can be closed with the same force required to close the outboard bins on a 777. Given the much shorter turn-around times

03. New overhead bins provide storage for four more bags per aircraft; and improve headroom for aisle-seat passengers

04. Learning lessons from the 787, the Sky Interior reinforces the notion of 'greeting' passengers

fuel savings

The interior changes on the 737 are part of a makeover that includes airframe and engine improvements that Boeing and its 737 engine partner, CFM International, believe will reduce fuel consumption by about 2% – a calculation based on an average flight of just under 1,000 nautical miles. Boeing estimates the engine improvements and lower drag will save airlines about US\$1.3 million per aircraft on a 737-800 over 20 years, assuming a fuel price of US\$2.58 per gallon. That's roughly US\$150,000 per aircraft per year. The improved engine also will have fewer parts, which should help reduce maintenance costs by about 4% over that of the current 737 engines, depending on thrust. CFM International says the engine improvements represent an investment of about US\$100 million.

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05

for the 737, Boeing engineers decided to make it even easier to close the Sky Interior bins. “It’s a really neat feature,” says Hamilton.

FIRST CUSTOMERS Fly-Dubai, a low-cost carrier that is just starting operations in the United Arab Emirates with a couple of 737s, will be the first customer to get a 737 with the Sky Interior. That aircraft is likely to be delivered in the third quarter of 2010. Other launch customers include Continental Airlines; Norwegian Air Shuttle ASA; Malaysia Airlines; TUI Travel PLC, based in London, UK; GOL Airlines based in Sao Paulo, Brazil; and Lion Air, based in Jakarta, Indonesia.

For existing 737 customers, the Sky Interior will be an option once it is ready for airline service in 2010. Those airlines will still be able to take delivery of new 737s with the current interior in order to maintain fleet commonality. But any new 737 customers will have to take aircraft with the Sky Interior once it becomes available. Boeing plans to gradually introduce the new interior into its 737 production system rather than to make the switch over with a one line break. “As we slowly ramp this Sky Interior into production, as we come out of the current downturn,



THE AMOUNT OF HEAD SPACE YOU HAVE AS YOU WALK UP AND DOWN THE AISLE IS AMAZING



single-aisle replacement?

Although airlines that have so far opted for the new Sky Interior say they are excited about the changes, customers continue to press Boeing – and Airbus – for all-new single-aisle replacements for the 737 and A320 families. A few years ago, Boeing and Airbus were saying they expected that all-new replacement to arrive by no later than 2015 and perhaps as early as 2013. Now, neither manufacturer sees such a replacement happening until the end of the next decade. Engine technology will drive the timing for an all-new aircraft, they say, while stating it does not make sense to invest billions of dollars in an all-new jet unless customers can get about 20% better efficiency. That kind of efficient gain is what Boeing claims the 787 Dreamliner will offer customers over the 767 that it will replace. Airbus is also developing the A350 as a competitor to the 787 as well as the 777.

we will be ready to go as the market recovers,” explains Hamilton. Boeing says its single-aisle production rates will remain steady at 31 aircraft per month, despite the slump, which is one of the worst in the history of the airline industry – both Boeing and Airbus have already announced cuts to wide-body production rates.

Continental is scheduled to receive its first 737 with the new Sky Interior in late 2010. After that, any 737 on order by Continental will feature the new interior, according to Mark Bergsrud, senior vice president of marketing and distribution for Continental.

“It is a much more pleasing environment,” says Bergsrud of the 737 Sky Interior. “The amount of head space you have as you walk up and down the aisle is amazing. That’s what you really notice. And the bins, like those on the wide-body planes, give you much more room. We think the overhead space is really important to our customers. It also speeds up the boarding process when you have bigger bins.”

The Sky Interior will cost more than the current 737 interior, but Boeing will not say how much more. The cost will be “slightly more” than a customer would pay to have the big bins on current 737s, says Boeing’s Hamilton.

05. A new air grille design integrated into the sidewall reduces cabin noise levels – it also cuts the time it takes airlines to perform inspections before flights



BOEING DOES NOT ANTICIPATE HAVING A RETROFIT OPTION FOR AIRLINES THAT MIGHT WANT TO MODIFY THEIR EXISTING JETS



06



07

- 06. LED mood lighting gives airlines more options to express their brand values
- 07. Bigger bins and more overhead space will improve boarding times

Bergsrud says the improvements are a good investment: “A modern jet fleet with the most modern interior tells your customers that you are a clean, safe and reliable airline and that you keep your equipment up to speed and that you are making all the right investments for what’s important to them,” he says. “For us, part of our brand has always been a clean, safe and reliable airline. There are many things that add value and incremental revenue, but if you are not clean, safe and reliable and don’t have professional employees, nothing else matters.”

GOOD TIMING? Even though the industry and airlines are struggling through one of the worst downturns ever, this is the “right time” to introduce the new 737 Sky Interior, as well as the performance improvements, according to Hamilton, the 737’s chief engineer. “This is the perfect time,” he says. “We have seen some of our best customers struggle to maintain profitability. So any type of improvement you can make to the aircraft is welcomed. The Sky Interior creates a new brand of excitement.”

There are some 2,900 Next-Generation 737s in service today, but Boeing does not anticipate having a retrofit option for airlines that might want to modify their existing jets with the new interior. Some customers have asked

about a retrofit option, according to Hamilton, “but we think it would be tough for an airline when they study the hard numbers and the labour of changing out the interior. So we are not advertising any retrofit.”

Hamilton says these may not be the last changes to the 737 before an all-new single-aisle jet arrives on the scene to replace Boeing’s longtime workhorse, possibly late in the next decade.

“I think we will continue to find other improvements that we can bring into this aircraft and further extend its life,” he says of the 737, which was introduced into airline service in the late 1960s – it was quickly nicknamed ‘Fat Albert’ by some of the pilots who flew those early 737-100s and 737-200s. Nearly cancelled in those early years when sales slowed to a trickle, Boeing delivered its 6,000th 737 earlier this year. Depending on the model, a 737 can seat upwards of 200 passengers.

“Our current 737 interior is still modern and the flying public believes in that interior,” says Hamilton. “Millions of passengers fly on a 737 each year and they enjoy that interior. But the new one is even better.” ☒

CONTACT

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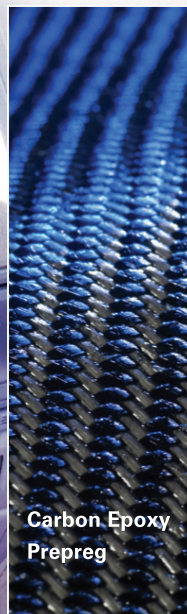
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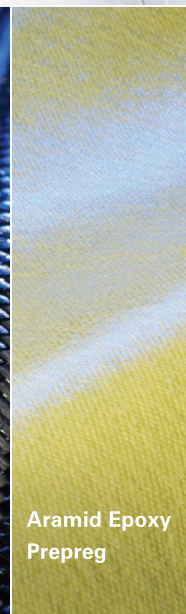
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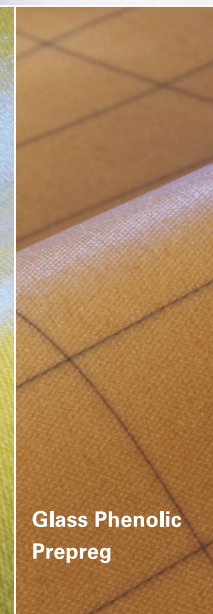
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makeorbreak?

Aircraft seat manufacturing needs a shake-up in ambition, technique and innovation according to experts both inside and outside of the industry – but where will the change come from and what form will it take?

GUY BIRD, AIRCRAFT INTERIORS INTERNATIONAL

ENGINEERING

“You can’t keep excusing the aviation industry regarding change on the basis that it’s tricky – it’s been like swimming in treacle over the last decade.” Not the words of an industry outsider, but those of Joe Ferry, head of design at Virgin Atlantic regarding the frustration he’s often experienced with the aircraft seat manufacturing industry during his career. Indeed back in the late 1990s he famously persuaded Virgin to set up Reynard Aviation to manufacture his groundbreaking ‘J2000’ Upper Class lie-flat-at-an-angle seat bed, after existing suppliers said the design couldn’t be built.

So where does Ferry feel the problem lies? “I’m not going to defend them but I do understand,” he says. “Essentially they’re cottage industries dealing in low-volume, highly bespoke products with incredibly stringent certification requirements that put the auto industry in the dark – and they work in a very restricted business environment with only a few aircraft suppliers.

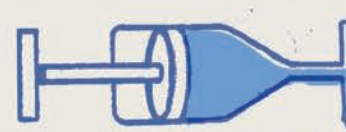
Given this, it’s hard to attract the best staff – they’d rather be in Formula 1.”

INEFFICIENT PROCESSES Howard Guy of Design Q, which worked on Virgin Atlantic’s current Upper Class Suite, sees a similar picture: “Things are basically still being done the way they’ve always been done,” he says. “Vacuum forming is one example – it has a 50% scrap rate, high-labour rates and the finished product still looks awful.”

Guy points out that some seat legs are still computer numerical controlled (CNC) machine-tooled out of a billet of metal, and if the seat ‘crash-tests’ badly after being “thrown down a sled” during certification, it is modified and made all over again. Such processes seem antiquated to him compared to other industries where simulation software can help designers and engineers virtually evaluate and optimise components before they become ‘real’. “In the car business the process is different,” he says.

VACUUM FORMING

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INJECTION MOULDING

ENGINEERING

Tool Databases

VACUUM FORMING

FINITE ELEMENT ANALYSIS

OPTIMISE COMPONENTS

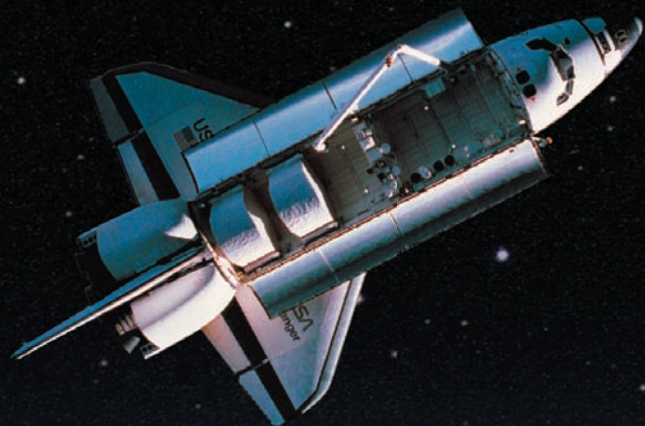
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IT COULD COST £500 TO MACHINE A SEAT LEG BUT IF YOU MAKE MORE OF THEM THEY DON'T GET MUCH CHEAPER”



TUAL SIMULATION

“Everything is tested electronically before you ever test the physical part.”

There is a high initial cost to such intense early virtual feasibility work, which can require bigger volumes to make sense – Guy estimates it costs £2 million or so to tool up for a new pair of car tail lights – but reckons the pay-off that can result from this intensive early work is a final piece price of only £10 per light.

Such economies of scale just don't apply in the aviation seating sector: “It could cost £500 to machine a seat leg but if you make more of them they don't get much cheaper,” says Guy. “Twenty years ago the car industry was the same but now it is the norm to use electronic design processes.” In an effort to show how things could be improved, Design Q recently developed its own Q Close Couple (QCC) seat featuring an injection-moulded support beam – normally such a part would be machine tooled.

LONG CYCLES Mike Gilmore of ARRK, consultants to the likes of Bentley, Ford and Bombardier, believes the lack of frequency in aircraft seat replacement cycles is another contributing factor to the industry's slow pace of progress. Aircraft seats have to survive 10 to 15 years of punishing service, while cars are generally face-lifted every three years, creating far greater impetus for innovation. “With automotive seating, the optimisation programme for the future face-lift kicks in as soon as the current seat is signed off for production – automotive engineers immediately begin to see if parts can be merged, made lighter or reduced in number,” says Gilmore.

A lack of competition in the aircraft seat manufacturing industry, with demand from airlines recently outstripping supply, is another factor, with four-year waiting lists and

how B/E is improving its seat manufacturing processes

a DESIGN FOR MANUFACTURE AND ASSEMBLY

By using design for manufacture and assembly (DFMA) tools, B/E Aerospace says it has reduced part counts by 30%, shortened build times by 30%, and greatly simplified product design and development. DFMA processes give B/E the ability to cost a product throughout the entire development lifecycle, optimising manufacturing assemblies and build times. Understanding costs early in development enables products to be optimised from a sourcing, manufacturing, and design perspective which reduces total manufacturing costs.

b DESIGN FOR MANUFACTURE

Design for manufacture (DFM) is a systematic approach that anticipates manufacturing costs early in the design process. DFM provides engineering and supply chain management a unique opportunity to have knowledge of a costed bill of materials (BOM) early in the design process. This information facilitates productive discussions with suppliers about predicted cycle times and costs.

c DIGITAL SIMULATION

Lean manufacturing layouts require optimised production lines prior to the assembly of any product. B/E uses digital simulation technology – a 4D solution (3D layout of production lines and time) – to create ‘what if’ scenarios incorporating variables such as volume fluctuations and cycle times. The benefits include quick decision making for ‘what if’ scenarios (volume and labour), optimised ‘Takt’ time per seat model (maximum time allowed to produce a product in order to meet demand), calculated material flow, line fill, work in process (WIP), dwell times, operator work load percentage monitoring and floor space reduction.

ILLUSTRATION BY TOMI OLADIPO

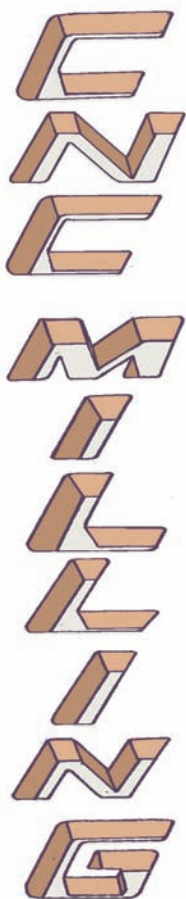


YOU CAN TELL HOW GOOD AN AUTOMOTIVE INTERIOR IS WHEN YOU GET IN A RENTAL CAR WITH 20,000 MILES ON THE CLOCK – IT WILL BE KNACKERED



VIRTUAL SIMULAT

VACUUM FORMING



20,000-unit minimum orders stipulated by some seating suppliers, according to Guy.

QUALITY ISSUES Until very recently, outdated manufacturing technologies and long product cycles have been blamed for an end product that does not compare favourably with that produced for other transport types. ARRK's Gilmore cites the disparity between driving to the airport in a low-cost Ford Fiesta with its slick Motorola phone-inspired dashboard and well-bolted together soft-touch interior and then stepping into a low-cost carrier's economy seat: "The raw edges of the plastics, and the way the cushions lift off when you hold them – this simply wouldn't be allowed in cars."

However, Tom Plant, B/E Aerospace's vice president and general manager for seating products, says the aero/auto comparison is nonsense as aircraft seating has to do so much more than car seating. This includes passing several incredibly stringent flammability and cantilevered load-bearing tests, as well as having to survive the wear and tear of constant inflight service. "You can tell how good an automotive interior is when you get in a rental car with 20,000 miles on the clock – it will be knackered," he says.

Plant also points out that the end user of an aircraft economy seat does not have the same personal attachment to the product that a private car owner has. "Private car owners tend to look after their seating better because

they own the product and have to live with it every day – not just interact with it for holidays or occasional short trips," he says.

Nonetheless, some airlines – especially international long-haul carriers where the customer will be spending more time and money – see the benefit in higher quality economy seats. The Recaro-supplied CL3610 seat for Qantas's A380s features an exposed carbon fibre back shell – an aesthetic USP for Qantas suggested by its creative director Marc Newson – to bring a high-end sports car feel to the cabin. And it's real carbon fibre too, rather than a 'fake' film. The seat is also notable for its emphasis on lightweight materials.

LIGHTWEIGHT DESIGN The current economic crisis and sky rocketing oil prices of 2008 – though stable again at present – has helped focus the minds of all transport industries on the need for better fuel efficiency to be more cost-effective. This is an area where the aircraft seating industry can hold its head up high: "I can pick up a triple economy-class seat and lift it comfortably above my head but a single car seat would be very different," says B/E's Plant. But further weight reductions in the aircraft interior are still possible through the use of lightweight materials and new production techniques.

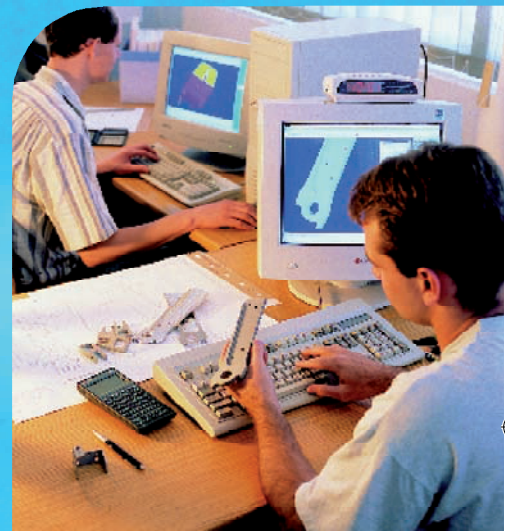
Historically, Plant says steel, aluminium and plastics have been used in B/E's products, but now the seat

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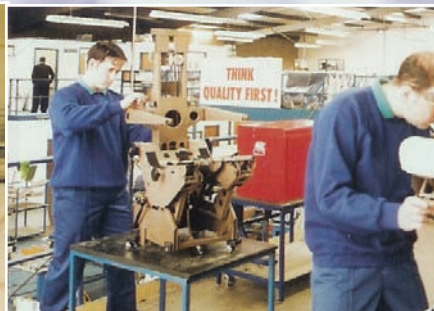
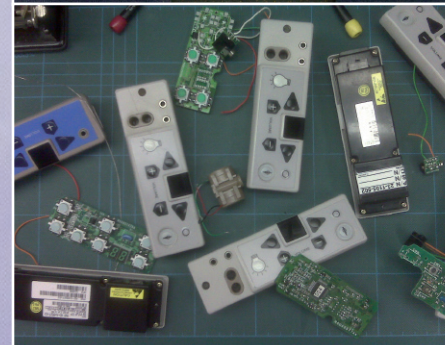
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 A graphic featuring a blue syringe-like nozzle on the left, pointing towards the text 'INJECTION MOULDING' which is written in a bold, blue, 3D-style font.

key processes

a VACUUM FORMING

Vacuum forming is a simplified version of thermoforming, whereby a sheet of plastic is heated to a forming temperature, stretched onto or into a single-surface mould, and held against the mould by applying a vacuum between the mould surface and the sheet.

b INJECTION MOULDING

Injection moulding is a manufacturing process for producing parts from both thermoplastic and thermosetting plastic materials. Material is fed into a heated barrel, mixed, and forced into a mould cavity where it cools and hardens to the configuration of the mould cavity.

c FINITE ELEMENT ANALYSIS

Finite element analysis (FEA) consists of a computer model of a material or design that is stressed and analysed for specific results. FEA is used to verify that a proposed design will conform to the client's specifications prior to manufacturing or construction. In cases of structural failure, FEA may be used to help determine the design modifications required to meet the new condition.



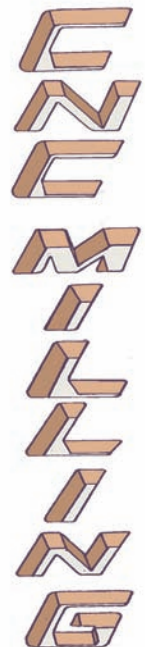
manufacturer is beginning to introduce previously too-expensive high-end grade aluminium. He also sees the potential for other lightweight materials such as titanium to replace steel in structural areas, while carbon fibre and various composites are increasingly used for secondary structures and aesthetic components.

Phil Hall of Cologne-based Composite Designs is another consultant with an F1 motor racing background, currently eyeing the aviation industry with interest. Unsurprisingly, given his company's name, he's a strong advocate of composites: "You can only go so far with aluminium, steel and plastics – composites are never as cheap as aluminium but they are always lighter." Hall is looking to launch a concept at next year's Aircraft Interiors Expo in Hamburg, featuring a composite primary structural part that he predicts could deliver a weight saving of 50% on that part alone.

RISKY BUSINESS Recaro has already commercialised a carbon fibre seat – the CL3610 – with the material not only used in secondary components such as the seatback, but also in a primary structural beam. But the development was not without its problems: "We were able to certify it and sell it but it was too expensive to make," concedes Hartmut Schürg, Recaro's vice president of product development. "Great weight savings are possible with carbon fibre but it has limitations with regard to current 16g testing."

Schürg says certification rule changes brought in half-way through the development process meant Recaro had to do much more expensive testing and inspections than would have been the case with more conventional materials. So much so in fact, for the CL3620 'face-lift' of the CL3610 seat, Recaro reverted back to an aluminium beam to make significant cost savings but – by reducing the part count – still managed to make the seat 15% lighter. Despite its initial setback, Schürg is positive structures will be made of carbon fibre in the future and is working with universities and other research and development bodies to help understand the material better.

Composite Designs' Hall acknowledges that composites can be tricky to model in certain situations – particularly under twisted loads – but says it is just a matter of designing a composite structure in a different way. "When designed poorly, composites can cause big headaches," he says. "But we have 15 years' experience in



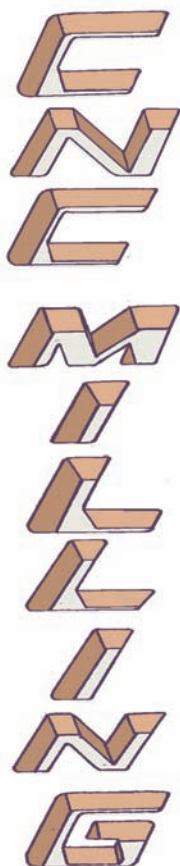
COMPOSITES ARE NEVER AS CHEAP
AS ALUMINIUM BUT THEY ARE ALWAYS
LIGHTER



THE ANSWER IS NOT TO BEAT UP THE SEAT MANUFACTURERS BUT FOR AIRLINES AND MANUFACTURERS TO COLLABORATE



VACUUM FORMING



designing F1 structures tested to 60g loads so the current 16g loads of current aircraft certification is no problem.”

Hall says his firm is an expert in finite element analysis (FEA) of composites – in basic terms working out how the material will behave under certain loads and stresses – but concedes metals are much easier to test as they exhibit similar qualities in all directions. “With composites you need to tailor the structure according to what it has to do – it could be 1mm thick in one area and 2mm in others,” he explains. “More fluidity and ‘mouldability’ of shape is possible with carbon fibre too, without the need of a sub-structure to support it – that’s another selling point.”

Hall does concede composites and carbon fibre still command a premium over other materials, although he says carbon fibre producers have been upping their output due to higher demand from airlines for aesthetic parts – but says ultimately airlines need to work out whether using composites is more costly than paying for the fuel to fly around the extra weight of other materials.

FUTURE TACTICS B/E’s Tom Plant believes real innovation will only come when airframes and their interiors are no longer designed independently – he says “a more holistic approach” is needed (*see box on page 85*).

Recaro is also moving forward with an integrated product development team using its knowledge of both automotive and aviation seating for advances in both industries. As well as material innovations, Schürig says its

processes have also changed – the manufacturer has been using virtual simulation for almost two years now, as well as clay modelling and CAD technology.

Design Q’s Howard Guy says his criticism of the industry is only motivated by a desire to see it become stronger: “We want the aviation industry to be better, slicker and smarter and if we see obstacles to that happening we’ll challenge them,” says Guy. “Now companies with automotive backgrounds are itching to get into the aviation industry given how hard things are in the car business, so there will be an inevitable knowledge transfer.”

Virgin Atlantic’s Joe Ferry believes whatever material or technique is favoured in the future, the end customer needs to be kept in mind more by all parties – from seat suppliers to airlines – as he concludes: “Our customers are driving Porsches and BMWs and have similar interior expectations when they get on to our aircraft. However, the answer is not to beat up the seat manufacturers but for airlines and manufacturers to collaborate and slowly move the suppliers out of their comfort zone. Take risks with new products but don’t push them so far that the system breaks. After all, it’s in the airlines own interests for seat manufacturers to achieve and succeed.” ✉

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For the last eight months, TACA International Airlines has been undergoing a rigorous rebranding campaign to freshen up the look and feel of the airline, complete with a new logo, new uniforms, and new aircraft. The rebranding has been substantial – everything from the ticket counters to new inflight amenities are designed to give customers a completely updated experience. “We feel that this goes beyond a change of logo and colours,” says Roberto Kriete, chairman and CEO of TACA. “We’re transforming our products and services into something that engenders a positive emotional response toward our brand and the experience that we offer on board our aircraft.”

BACKGROUND Since the company’s founding in 1931, TACA has been a leader in air travel throughout North, Central and South America and beyond. This has been further solidified over the last decade, as Iberia, United Airlines and Lufthansa have formed partnerships with TACA, which itself has three major hubs in Peru, Costa Rica and El Salvador. So why the makeover?

“What we found in surveys was that there was a disconnect between how our customers saw us and how we wanted our customers to see us,” says Roger Diaz, customer experience manager for TACA. “We wanted to change customer perception – in order to achieve this we created a new customer experience,” he continues.

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02

01



“

WE SPENT A GOOD DEAL OF TIME
TALKING TO PEOPLE AND
DETERMINING WHO EXACTLY
TACA WAS ”

With the help of US branding consultancy Lippincott Mercer, TACA got the ball rolling on one of the largest changes in its history, involving a new livery, new seating and other inflight amenities; new uniforms for all TACA employees; and a new focus on service overall.

TAKE FIVE TACA and Lippincott began by working with customers and employees to decide what they wanted the new TACA to be. “What we came up with were five ‘pillars’ that we used to drive the entire rebranding process,” says Diaz. “Those were attentive, kind, reliable, friendly, and Latin.”

The next task involved coming up with a new logo. This step was critical, as it created a style that would permeate all other aspects of the rebranding. And it was more complicated than you might expect, says Lippincott creative director Randall Stone. “There’s a lot more to it than just picking a logo,” he says. “We spent a good deal of time talking to people and determining who exactly TACA was, who its customers were, and how they wanted to present themselves and their company to the customers.” Stone says the new logo reflects a bolder, more contemporary image: “It still features the ‘guacamaya’, the Central American parrot that was a key component of the old logo, but with a more abstract, sophisticated look,” he says. “Pairing that elegant logo with a contemporary type-face on the word ‘TACA’ completed the transformation.”

INSIDE JOB Now it was time for Lippincott and TACA to carry the sleek, sophisticated feel of the logo throughout the airline’s operations. This began with the livery, as well as the aircraft interiors. Changing the interiors was a multi-stage process that involved several components, including completely redesigned seats, new lighting, new carpeting, and new audio/video on demand (AVOD) in-flight entertainment (IFE) systems.

A key impetus for the project was the decision by TACA to add 11 new Embraer 190 aircraft to its fleet, featuring the new interior. TACA will have eight Embraer 190s in service by the end of this year. To ensure it offered its customers a consistent brand experience across the whole fleet, TACA decided to retrofit its existing Airbus fleet (nine A319s, 18 A320s and five A321s) with the same interiors. The retrofitting is being carried out by both TACA Technical Services (TTS) and Aeroman, a subsidiary of AVEOS, at facilities in El Salvador.

The changes started with the seats, which received an upgrade in both business class and economy, with the seat covers changing from fabric to fine leather (Aeristo) in two tones of grey (light grey in business class; dark grey in coach).

The new business-class seats incorporate memory foam and TACA has also increased seat pitch to further enhance comfort: “We made investments to alter the arrangement of

- 01. TACA’s A320s feature the latest mood lighting and leather seat covers from Aeristo
- 02. Red seatbelts provide a shot of colour to the cabin

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the business cabin to provide more space and reclining angle for the seats, so that passengers in business class can travel more comfortably," says Kriete. "As a result, in business class we have a standard of 40in of space between seats, with up to 7in of recline." Economy seats retain a seat pitch of 31 to 32in, offering 4in of recline.

TACA is the launch customer for Recaro's BL 3510 seat in economy, which features a composite backrest and high literature pocket. "The advantage of this seat is its reduced weight and that we can have in-seat video without losing the high literature pocket, which gives an extra inch of space at knee level," explains Diaz. TACA has opted for Recaro's CL 4400 units in business. TACA's Embraer aircraft feature seating from C&D Aerospace.

TOUCH AND GO Another important change involved the onboard entertainment. TACA passengers can now enjoy AVOD IFE entertainment, provided by Panasonic's eFX single-aisle IFE system on its Airbus fleet. Individual seat screens are 7in wide in economy and 9in wide in business class. In the future, the units will also offer a moving map function, and inflight duty-free shopping.

TACA is also Panasonic's launch customer for its eFX 'Lite' system (developed specifically for regional aircraft), which it will install on its Embraer fleet. "TACA expressed a desire to have an easy-to-use, colourful, and inviting graphic user interface (GUI) that would be intuitive and serve first-time users well," says Theresa Yeoh with Panasonic Avionics Corporation. "They wanted the interface to

nuevo latino

"We are focusing on what we have defined as 'Latino Moderno'," says TACA's Roger Diaz. "This is more a way of life, rather than a strict demographic. However it is important our branding does not exclude other customers – on the contrary it should attract them. This is why many aspects of the customer experience are international in character, but with a Latin touch. Our inflight meals have an international option and another that is more Latin, while our IFE features content a Latino Moderno would watch at home, as well as the latest Hollywood movies." Diaz is quick to dismiss any negative associations: "We are very strict on our on time performance (OTP) – every employee knows that OTP is key and with every new process or product we take in consideration OTP impact."

represent the updated, professional image that TACA is presenting to their customers. The GUI had to match the branding campaign actively underway at the airline."

Adding the Panasonic AVOD IFE system also created another challenge with the seats, as they still needed room to accommodate literature and amenities, in addition to the components of the eFX system. "To keep the best possible space at knee level in economy, Recaro designed a new seat that maintains a high literature pocket and supports the in-seat screen," says Diaz. "We are going to be the first airline in the world to fly this new seat."

TACA's existing Airbus fleet will be retrofitted with the new colour scheme and leather seat covers, but not the AVOD IFE system or new Recaro seating, notes Diaz.

03. TACA's new logo and livery were inspired by the 'guacamaya' parrot

04. TACA's business class features Recaro's CL 4400 units, set at 40in pitch



05

06



WE NEED TO GIVE OUR CUSTOMERS
WHAT THEY VALUE AND ARE WILLING TO
PAY FOR



- 05. TACA has opted for Panasonic's eFX AVOD IFE system
- 06. Inflight meals feature international and Latin-inspired options

SOFT TOUCHES While the seats and entertainment systems represented major changes to the interior of TACA's aircraft, they were by no means the only changes that took place. "We exchanged the seatbelts for ones that match the bold red and grey colours used throughout the rest of the cabin," explains Diaz. "The lighting was updated with soothing reds and blues to create different moods throughout the flight experience, making the design of the cabin warmer," he continues. "Even the carpet got replaced with a high-quality selection [from Anker GmbH], designed to avoid stains and hide dirt."

The same elegance was also carried over to the new TACA uniforms, created by renowned Colombian designer Isabel Henao. "Styled with bold red and grey accents, they are both bright and a perfect fit for the new cabin environment," says Diaz.

FREE MEALS Another key change is the return of the inflight meal. While other airlines are doing away with meals for cost reasons, TACA has decided to bring them back. "Business-class passengers now enjoy a meal service served on porcelain dinnerware for an added touch of elegance," explains Diaz. There are even cappuccino-esspresso machines and steam ovens on board to enhance the dining experience. Business-class customers also receive a comfort kit that includes high-quality items such as gel eye shades and a massage ball. All pillows and blankets throughout the cabin have also been updated.

Meals are also free for economy passengers on flights over an hour: "Our strategy is simple – we focus on

reducing costs every day in a very aggressive manner but in things that do not impact the customer experience in a negative way," explains Diaz. "We need to give our customers what they value and are willing to pay for."

Diaz says the menu is changed every month, economy passengers have two meal options and there's an open bar of soft and alcoholic drinks. "We also change the graphic design of the meal packaging every three months to give a perception of variety," adds Diaz.

FIRST PRIZE For the last two years, TACA's effort to revamp and renew its brand has been a major undertaking, involving literally thousands of people, dozens of companies, and millions of dollars. And in 2009, those efforts were rewarded with TACA winning no less than three Skytrax awards: best Central American airline, best regional airline, and the best cabin staff in Central America.

"We are very pleased with the results," says Estuardo Ortiz, TACA's executive vice president and chief operating officer. "It is important to be able to validate that we are working in the right direction, listening to our customers, and developing products and services based on their specific needs. We view these awards as a result of our personnel's effort and enthusiasm in strengthening our customer service culture and making sure that our passengers have a pleasant flight experience." ☒

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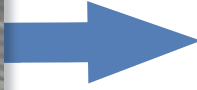
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The winners and runners up from this year's Crystal Cabin Awards
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104
 ENTERTAINMENT
 AND
 COMMUNICATION

105
 GREENER CABIN,
 HEALTH AND
 SAFETY

107
 INDUSTRIAL
 DESIGN/INTERIOR
 CONCEPT

108
 MATERIALS AND
 COMPONENTS

The Crystal Cabin Awards were set up in 2007 by the Free and Hanseatic City of Hamburg to award excellence in aircraft interior design and technologies. This year there were 51 applications by companies from 14 countries, which were short-listed to three nominees in each of the five categories – Entertainment and Communication; Greener Cabin, Health and Safety; Industrial Design and Interior Concept; Materials and Components; Passenger Comfort. A sixth award – the Judges' Commendation Prize – is awarded to the entry that the judges agree deserves special mention. The winners were announced at this year's Aircraft Interiors Expo in Hamburg.

"We are convinced that it is now fully established – the press coverage was impressive, with hundreds of articles published worldwide," says Walter Birkhan, project director, Crystal Cabin Award. "Every finalist and winner should make the best of it and use the award as a marketing tool with particular resonance."

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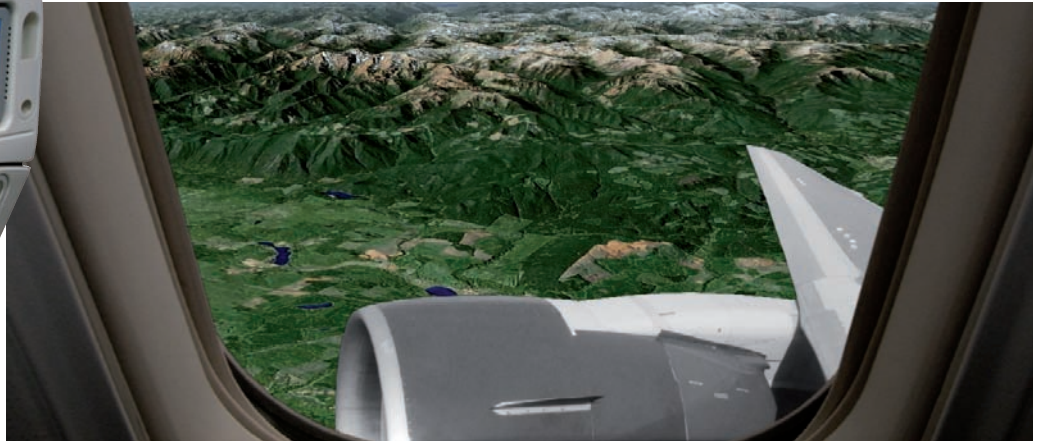
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01

02



- 01. Sicma Aero Seat's Seat Integrated Technology
- 02. Lufthansa Technik's niceview system

Entertainment and Communication

“ EVERY PASSENGER CAN EXPERIENCE A VIRTUAL REAL-TIME VIEW IN 3D AS SEEN FROM A WINDOW SEAT OR THE COCKPIT ”

Winner: Lufthansa Technik

niceview

Lufthansa Technik's new 'infotainment' system – niceview – allows passengers to view high-resolution 3D maps. Every passenger can experience a virtual real-time view in 3D as seen from a window seat or the cockpit, whether it is day or night, independent of weather conditions. Any data received by niceview from aircraft systems can be configured to be shown on aircraft displays as overlays – including ticker or banner views. niceview is also able to display pictures, movies, multichannel audio, safety briefings and airport information, as well as play boarding music and audio announcements.

Runner up: Aircell

Gogo inflight internet service

Gogo can be used to turn a commercial aircraft into a WiFi hotspot, enabling passengers to surf the internet, instant message, check email, and log on to corporate VPNs using their own WiFi-enabled devices. The service aims to make the flight more productive and enjoyable for passengers, as well as provide airlines with a competitive advantage and ancillary revenue opportunities. Aircell has signed deals with Delta Air Lines, Virgin America and Air Canada to offer the Gogo service fleet-wide, and expects it to be deployed on 2,000 commercial aircraft by the end of 2009.

Runner up: Sicma Aero Seat

Seat Integrated Technology

Sicma Aero Seat's Seat Integrated Technology (SIT) is a new audio/video on demand (AVOD) in-flight entertainment (IFE) system. The in-seat displays include a powerful embedded computer with its own processor and storage capacities (250Gb). This approach increases system capability for 3D video games and animated and 3D graphical user interface solutions. The company says that SIT is easily upgradeable and eliminates heavy, expensive central servers that may be hard to integrate. The network between all the displays is designed to provide centralised content refreshing, multiplayer games or other applications, passenger announcement and passenger services functionalities. Copper cables remain only for in-seat connections, while the system backbone is now designed with multimode optical fibres. This technology allows high-speed transfers (1Gbps) for lighter weight and simpler raceway integration.



THE 100% RECYCLABLE
CARPET IS RETURNED
TO THE MANUFACTURER
AT THE END OF ITS
SERVICE LIFE AND
COMPLETELY RECYCLED
INTO NEW CARPET



03. AeroCat's airline catering trolley
04. The A-LogEqu system by B&W Engineering



03

Greener Cabin, Health and Safety

Winner: Boeing - The Concept Center Recyclable Aircraft Carpet



The Boeing 100% Recyclable Aircraft Carpet is designed not only for the benefit of the OEM and the airline but, most importantly, for the environment. For the OEM, kitting times have been shown to be reduced as the product arrives in predetermined square or rectangle sizes with no edge finish required, thereby eliminating both the water jet cutting process and carpet-end surging. Airlines enjoy savings as the carpet can be installed quickly, with the seats in place. As a 'closed loop' product, the 100% recyclable carpet is returned to the manufacturer at the end of its useful service life and completely recycled into new carpet.

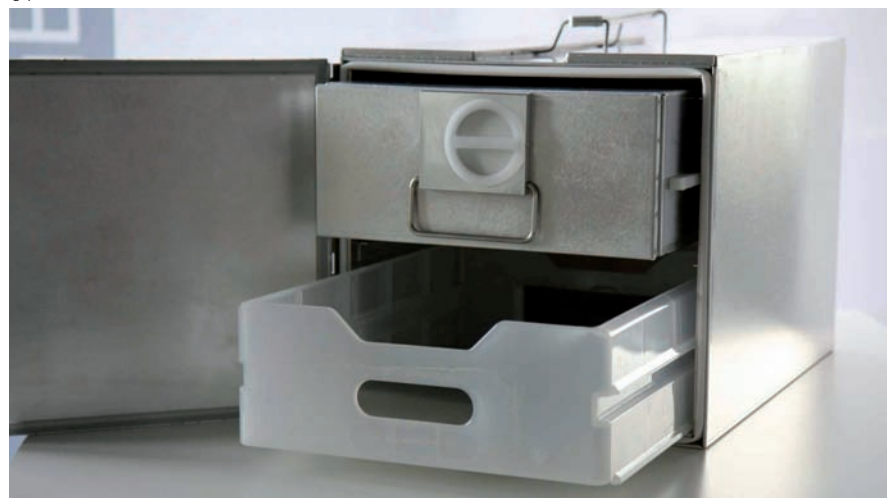
Runner up: AeroCat Airline catering trolley

AeroCat has created an EASA-certified full polymer trolley. While airline catering trolleys are usually made from aluminium, AeroCat's has a full-polymer design. AeroCat says its trolley is lighter, more ergonomic and more environmentally friendly than traditional trolleys (it is suitable for closed-loop recycling), offers attractive total cost of ownership and is designed for high production volumes. Furthermore, it is equipped with radio-frequency identification (RFID) technology to optimise catering logistics.

Runner up: B&W Engineering A-LogEqu

A-LogEqu (Aviation Logistic Equipment) by B&W Engineering is a maintenance-free and eco-friendly system of galley inserts. It is designed to counter problems that may be found with common ovens, fridges and coffeemakers – high maintenance, costly energy consumption, heavy wiring and hygiene problems with piping. The company says the modular containers can be used to store hot and cold goods, prepared by the caterer, for up to 20 hours without any energy consumption on board. Liquids can be filled in bag-in packs and stored in modular A-LogEqu units.

04



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Smart Line 3510



Comfort Line 3620

**Two seating innovations
Two Crystal Cabin Awards**

**One leader in mobile seating
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05. Teague's design for Emirates Airlines' 777 Door 1 entry and first-class cabin
06. Recaro Aircraft Seating's SL3510 seat model
07. The Video Control Insert by Airbus Deutschland

05 06



07



Industrial Design/Interior Concept

Winner: Recaro Aircraft Seating SL3510

With its Smart Line 3510 Recaro Aircraft Seating has attempted to address airlines' need for a more weight- and space-efficient short-range economy-class seat. With several brief trips each day, short-range operators face many fuel intensive starts that make it imperative for them to fly an extremely lightweight seat. At the same time there is a demand for fast turnaround times, making reliability and ease of maintenance just as important for operating efficiency. The SL3510 weighs well below 10kg per pax and at the same time is designed to offer excellent material quality, ease of maintenance and passenger comfort. The seat features a table mounted to the backrest, a polycarbonate armrest with soft padding, and special seatpan clips that enable the seatpan to be exchanged within a few seconds. Recaro says the thin profile of the seat allows passengers to sit in comfort with pitches as low as 28in.

Runner up: Airbus Deutschland Video Control Insert (VCI)

The Video Control Insert (VCI) enables airlines to move away from the traditional video control centre (VCC) to a plug-and-play module for in-flight entertainment (IFE) equipment that can be integrated in cabin monuments on long-range Airbus aircraft. Eliminating the VCC can create more space on board for passengers, and save time and money in development. The company says the standardised nature and reduced complexity of the module lowers costs for airlines, suppliers and Airbus – through reduced lead-times, non-conformities and maintenance. The unit also allows airline and IFE suppliers greater flexibility. The VCI is currently under investigation for use on the A380.

Runner up: Teague

Emirates Airlines' 777 Door 1 entry and first-class cabin

Teague's goal for the Door 1 entry and first-class cabin on Emirates Airlines' 777s was to present a modern and iconic design, but with echoes of the rich history of the airline's hub, Dubai. Every detail was considered to ensure that the Emirates first-class experience was both unique and representative of the brand. The redesigned architecture features 3m-high ceilings in the first-class cabin, majestic sweeping arches and advanced LED lighting that emulates the night sky as viewed from 25°18'N, the exact latitude of Dubai.

“

THE THIN PROFILE OF THE SEAT ALLOWS PASSENGERS TO SIT IN COMFORT WITH PITCHES AS LOW AS 28IN

”



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“THE VACUUM WASTE SYSTEMS PROVIDE A MINIMUM OF 30% WEIGHT SAVINGS AND ELIMINATE THE NEED FOR COSTLY HARDWARE REMOVALS”

Materials and Components

Winner: B/E Aerospace

Aircraft vacuum waste systems

B/E Aerospace says its advanced series of designs for vacuum waste systems provide a minimum of 30% weight savings and eliminate the need for costly hardware removals – all at a reliability improvement of more than 20%. The improvements include replacing the traditional stainless steel, Teflon-coated toilet bowl with an all-composite removable bowl; replacing two control assemblies with one integrated system controller; an advanced vacuum generator that the company says saves between 12-14lb per device; a vortex separator to minimise the number of inlets and outlets needed for the vacuum waste tank; and an improved waste tank sensor system.

Runner up: FLASIN Faser

Natural fibre composite material

FLASIN Faser has developed a new natural fibre material for aircraft interiors to replace glass fibre composite materials. The company says the advantages compared to glass fibre composite materials are a 10-30% weight reduction in components because of the lower density of the natural fibres (glass fibres are typically 2.6kg/dm³, natural fibres are typically 1.5kg/dm³); better sound reduction; better heat insulation; and the possibility to recycle without residue.

Runner up: Iacobucci

H-box

Iacobucci has developed a new dry-ice drawer designed to make the dry ice last much longer and improve food quality. It does this by replacing the aluminium dry-ice box with one made from an ultra-light stainless steel sheet material with an air gap inside, which has a lower thermal conductivity and therefore ensures the trolley's contents are cooled more evenly. The company says the H-box is also 15% lighter than the average aluminium dry-ice box. As well as saving money (through lighter weight and using less dry ice), the company says the H-box cuts CO₂ emissions from dry ice by up to 50%, increasing passenger comfort in the cabin.

08. Iacobucci's H-box

09. FLASIN Faser has developed a natural fibre composite material

08 09



Dessert Menu

Whether its colourful and fun or modern and classy your after-
Take your pick from our tantalising selection.....

Raspberry Ruffle

Raspberry ruffle brings a sense of fun and originality to the collection. With its mix of chocolate panels, sweet raspberry coloured leather and assorted 'pick and mix' coloured cloth – this seat is longing to stand out from the crowd



Cappuccino Amaretto

For those who like the finer things in life - this seat exudes elegance and class. With its frothy milky texture complimented with a spike of amaretto colouring, Cappuccino shows a quiet but powerful confidence



Vanilla Espresso

Inspired by a single shot of espresso black colour shaken with smooth vanilla vodka tones, this seat is a real energy boost. Integrated with the fun and funky idea of chessboard design on the tables, Espresso is for the young at heart



Café crème with Rum

With its smooth warm taste, this seat is so moreish it will keep you coming back for more. Blended perfectly with the coffee tones and lavish design, this seat is relaxation at its best



Turkish delight

With its contrasting mix of smooth cream leather, laced with strong purple tones – Turkish delight has an air of classiness exuded by its elegant lines and finish



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10. Recaro Aircraft Seating's CL3620 seat model

11. aeras seat project's economy-class seat



Passenger Comfort



THE SEAT'S COMFORT FEATURES INCLUDE RECLINE, AN ARTICULATED SEAT BOTTOM PAN, FOOT NET, HAMMOCK HEADREST AND SMALL ARMRESTS



Winner: Recaro Aircraft Seating CL3620

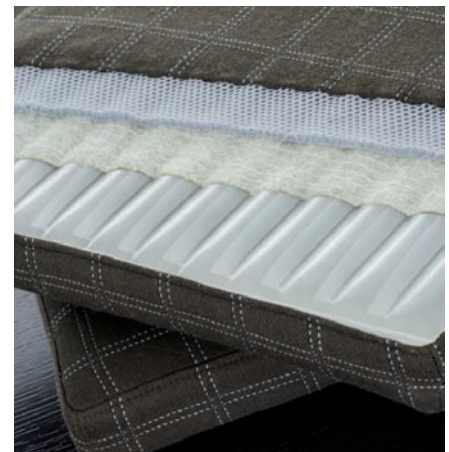
The CL3620 model is an economy-class seat for the long- and ultra-long-range market. To maximise living space and shin clearance, the seat has a single-beam structure. The seat's comfort features include recline, an articulated seat bottom pan, foot net, hammock headrest and small armrests (to maximise seat width). The seat has already attracted a large order from Qatar Airways.

Runner up: aeras seat project

Developed by Greiner PURtec, Kobleder Knittec and ludekedesign, the aeras seat project replaces the traditional cushion and dress cover in economy class with the 'aeras knit'. The functional knit layer is attached to an inner frame (itself attached to the seat's backshell), and then finished with a cover knit. This package can be applied to various seat leg structures. The open knit construction (with elastic and non-elastic fibres) adjusts in all directions, adapting to various passenger sizes, shapes, weight and changes in posture, constantly supporting the body. The knit is produced as a single finished piece off the machine – so no cutting or sewing is required.

Runner up: Lantal Textiles Pneumatic Comfort System

Lantal's pneumatic cushion system replaces conventional foams in seat cushions and mattresses with air. Passengers can adjust the firmness of the cushions to their personal preferences throughout the flight. At the same time airlines profit from weight and cost reductions – the company says that replacing standard foams with the air cushions saves up to 2-3kg in business class and 3-5kg in first class per passenger seat, thereby reducing operating costs, fuel consumption and CO₂ emissions.



- 12. James Lee's Paperclip armrest concept
- 13. Bombardier's Global XRS Shower
- 14. The courier/crew rest module by CeBeNetwork GmbH Engineering & IT

Judges' Commendation Prize

Winner: James Lee
Paperclip armrest

James Lee's Paperclip armrest is a patent-pending concept design. Its transversely offset double armrest levels make use of the mobility of the elbows to allow two adjacent passengers to rest their arms on the armrest simultaneously, without bumping into each other, as if being given a few inches of extra width.

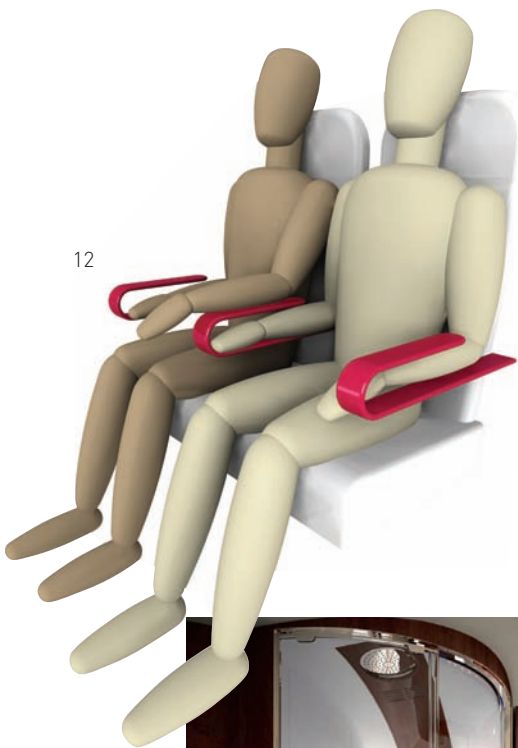
Runner up: Bombardier
Global XRS Shower

Bombardier has developed the Global XRS Shower, a stand-up shower for the fuselage segment of the aircraft. The Global XRS Shower uses the aisle space of the central axe of the cabin, maximising the vertical space available to the user and thereby enabling passengers to stand up while showering, despite the size restrictions.

Runner up: CeBeNetwork GmbH
Engineering & IT

Courier/crew rest module for freighters

The courier/crew rest module is for use in the main deck area of freighters. The bunk folds out from a compact container in one step, and consists of a tubular aluminium frame with a stretched fabric cover and a memory foam mattress within. The company says its concept reduces weight, takes up less space in the aircraft than alternatives and is comfortable and easy to use. The product is not limited to a specific platform or operator.



Next year

Next year's Crystal Cabin Awards ceremony will take place on 18 May 2010 at the Aircraft Interiors Expo, which is moving from its traditional March slot.

CONTACT

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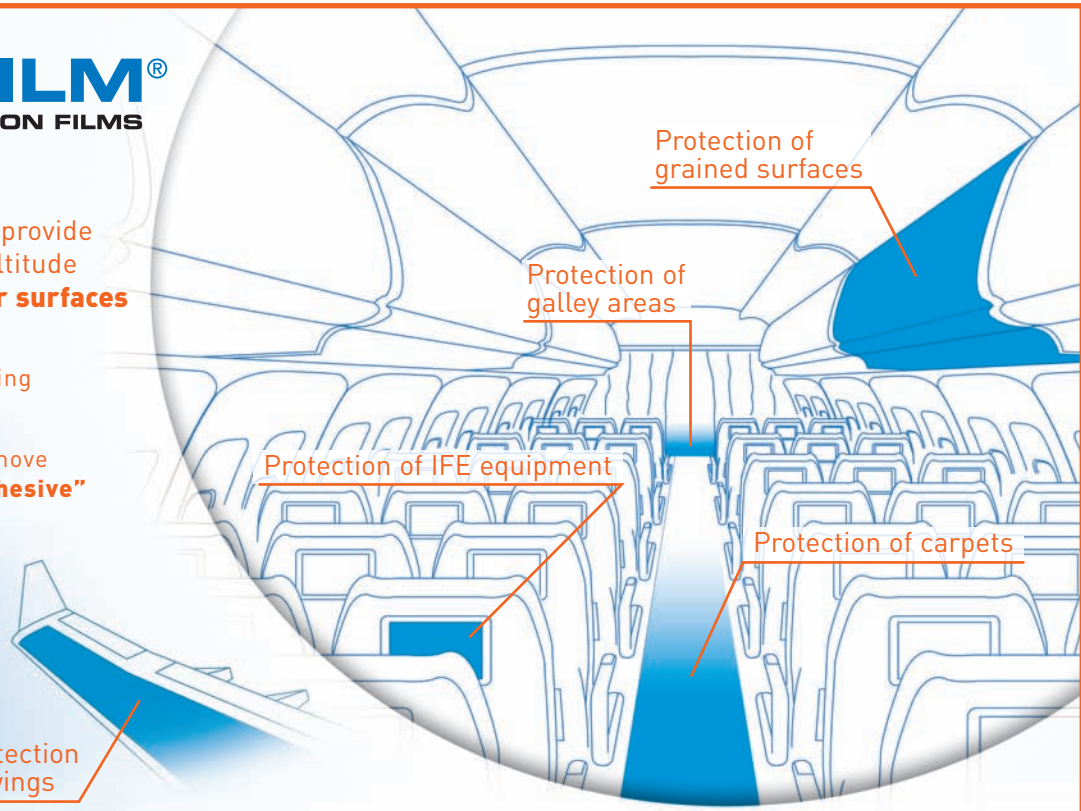
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KYDEX has
launched new
varieties of its
KYDEX FST
thermoplastic
sheet

plasticfantastic

KYDEX has developed new varieties of its KYDEX FST aviation-grade thermoplastic sheet. The sheet is now available in a lower gloss finish, as an integrally coloured metallic sheet, with a new texture called PB-brushed metal, or as an injection-moulding resin.

KYDEX FST is formulated to meet all Boeing and Airbus flame-smoke-toxicity requirements, and also has Microban antimicrobial protection built in so it won't wash or wear away. Microban technology helps keep the surface clean and inhibits the growth of bacteria that can cause stains, odours and product deterioration.

The KYDEX FST sheet is available in a width of 121.92cm (48in), thicknesses from 1.2-4.75mm (0.047-0.187in), and lengths from 60.96-243.84cm (24-96in).

"We recognised a need to develop an aviation-grade sheet that was available in a lower gloss finish as well as a fully compliant injection-moulding resin," says Ronn Cort, international business manager at KYDEX. "Like other KYDEX sheet materials, this product is available in the industry-standard P3 velour matte texture, but the enhanced KYDEX FST sheet was developed in response to our clients' expressed needs."

Providing an injection-moulding resin enables greater aesthetic consistency in the cabin. "The injection moulding is important to customers because very often, thermoformed parts made from thermoplastic sheets need to coordinate and be colour-matched to the injection-moulded parts, as they are side-by-side," says Cort. "For example, a seatback shell made from thermo-

plastic might surround a monitor shroud made from an injection-moulded plastic. By having both materials (a thermoformed sheet and injection-moulded part) made from the same resin supplied by a single source, it alleviates the challenge designers and seat constructors face when trying to match or coordinate dissimilar materials from different suppliers."

KYDEX also offers KYDEX FST as an integrally coloured metallic, so the colour is the same throughout, not applied as a film or foil on the surface. This means that even if the part is scratched or gouged (for example by trolleys or luggage), its appearance is not ruined.

The company's line of thermoplastic sheet products for the aircraft interiors industry also includes KYDEX 6565, KYDEX 6565(d), and KYDEX 5555 products. These sheets are available in over 3,500 custom colours, multiple surface textures, and thicknesses from 0.028-0.5in (0.071-12.7mm). KYDEX says its sheet products are resistant to a wide range of concentrated chemicals, so they can be cleaned repeatedly using harsh cleansers with no staining or fading.

All of the company's aviation-grade sheet products are readily thermoformed, fabricated, and machined, making them suitable for forming two- and three-dimensional aircraft components such as air ducts, armrests, bulkhead laminates, escape-slide pack boards, galley parts, instrument panels, lavatory floor pans and shrouds, life vest shrouds, lighting housings, passenger-service units, sidewall panels, tray tables and window reveals.

Ronn Cort
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Reader Enquiry No. 501

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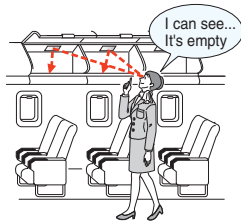


This is a true service of the airline.

Felicia in New York



● For Flight Attendants



For security check

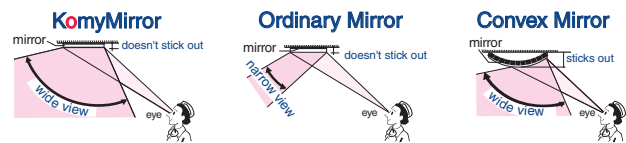
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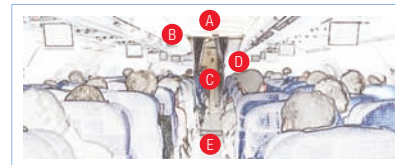
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Lantal's developments are designed to optimise cost-effectiveness on all levels – through weight savings, premium quality, and tailor-made all-in-one solutions.

Coping with the current economic climate and rising costs, airlines carefully calculate the weight of the products installed in their aircraft. Weight can affect operating cost, fuel consumption, and CO₂ emissions decisively. Only 1kg saved can translate into €100-300 in kerosene savings per year.

Lantal reports that its lightest fabrics and carpets weigh up to 32% less than conventional ones, saving costs. The company's pneumatic comfort system (pictured, right) is also designed to reduce weight – replacing standard foams with air-filled seat cushions can save up to 2-3kg in business class and 3-5kg in first class.

Still, the weight of a product is not the only cost factor. Lifetime and service intervals, additional serging costs, and the effort involved in replacements also have an impact. Using high-quality textiles translates into an extended lifecycle, saving frequent replacements and the related stripping and re-installation costs.

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marketvalue

Reach Aero Services is an EASA part 145-certified organisation specialising in the refurbishment and supply of passenger seats. To offer a reliable source of second-hand seats to airlines and aircraft maintenance bases, the company has recently launched a free online 'seat market' at www.reachaero.fr. Members interested in buying second-hand seats (of all types, all classes and for all aircraft types) can identify seats that are displayed for sale by other members. Reach Aero Services will enable the transaction, and if necessary refurbish and recertify the seats for the buyer.

The company also provides technical assistance to cabin equipment suppliers. Its teams of mechanics work on the Airbus final assembly line in Toulouse and Hamburg on behalf of these OEMs, on tasks ranging from the correction of minor defects, to the complete assembly and adjustment of 'super-first-class' seats for the A380.

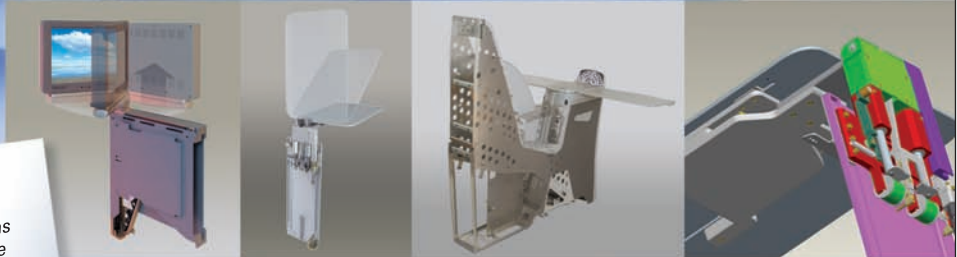
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look no further

Komy has developed a flat-surfaced convex mirror that can be used in the aircraft cabin. KomyMirror is made of special shock and flammable-resistant materials and can be installed in stowage bins to help flight attendants check easily for belongings, and speed up security checks. Passengers can also use the mirror to check if they have left something behind in the bin.

Unlike ordinary mirrors, the KomyMirror doesn't require cleaning. The same advanced technology that gives the mirror a wide field of view also ensures that smudges or ordinary amounts of dust don't cloud the image.



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Reader Enquiry No. 504



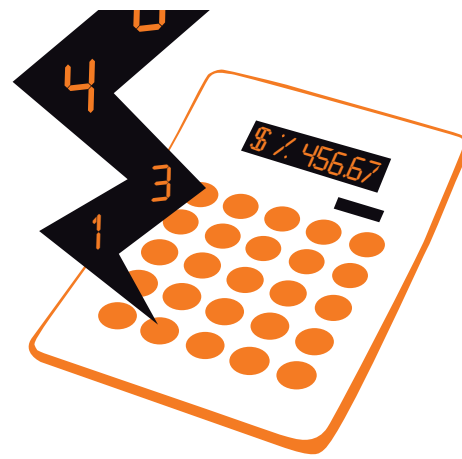
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klausbrauer



Want to know more about key industry individuals, but haven't got the time to search for their facebook profile or linkedin page? This issue's 'facespacer' is Klaus Brauer, a leading authority on aircraft cabin configuration and seating comfort. Klaus recently retired from Boeing, where he was director of passenger satisfaction and revenue.

01 WHEN DID YOU FIRST START TAKING AN INTEREST IN AVIATION? AND STATISTICS?! Consistent with the universal fascination with flight Boeing encountered in its 787 research, I've been interested in aviation ever since I was a child, I can't even recall when the interest began. My interest in statistics really took off in graduate school at MIT. I had a wonderful professor, Arnie Barnett, who is extraordinary at making statistics relevant to our daily lives – and fun, too. Another former professor, the economist Lester Thurow, deserves much credit for teaching me by example the joys of mathematical modelling. How do you like that – you just got 'statistics', 'mathematical modelling', 'fun' and 'joy' together in a couple of sentences! I mean it all. I can trace much about my modelling of personal space, passenger choice and airline revenue back to the influences of Arnie, Les and some other wizards I was lucky enough to study under.

02 HOW DID YOU GET INTO INTERIORS? I came to specialise in interiors in a very roundabout way. I was frustrated about everyone just waving their arms about one thing being better than the other when comparing interiors. No one put meaningful numbers to it. In fact everyone was 'sure' that the impact of interiors couldn't be quantified. I took the nerdy point of view that you can model and quantify nearly anything you've got data for – and I quickly learned we had mountains of passenger satisfaction data at Boeing just waiting to be mined and modelled. The data, as Alan Mulally would say, set me free. Of course as time passed and responsibilities grew, I also fell under the spell of things that are not easily quantified – psychology and industrial design. In these fields I've had some greats to work with at Boeing – if you like to see men hug, you should be there when I visit Teague, our industrial design partner – I love those folks – they do magic.

03 WHY SHOULD ENGINEERS CARE ABOUT DESIGN? If I can speak in generalities because there are many exceptions, I think it is only natural that most engineers are torn about interior design. On the one hand, on a very fundamental level, like any human they enjoy good design; but the engineer's professional discipline is totally immersed in the cost side of the equation – weight, drag, fuel burn, manufacturing cost, etc. To make it a bit worse, not being accountants, they don't have the instinct that constantly reminds them of the other side of the customer's equation, the revenue side. The raison d'être of interior design

lies on the revenue side of the equation, wholly apart from the engineer's discipline. Alan Anderson, chief engineer of Payloads Systems at Boeing, is one of the many exceptions I mentioned – I think Alan and I became fast friends years ago because I rambled on about the business logic behind the great aesthetic design his heart was so strongly drawn to.

04 WHAT ADVICE WOULD YOU OFFER YOUR SUCCESSOR? It is all about understanding passenger satisfaction as well as the relationship between passenger satisfaction and airline revenue and then helping develop products that make the most of that understanding. Our industry is full of nice people who want passengers to be happy, but that is not enough. The airline industry is a business – you have to get the revenue part right or the airline doesn't survive to fly on into the future.

05 WHAT NEXT FOR SEATING COMFORT? The biggest challenge now, particularly in economy class, is not just in providing for average, high-percentile or low-percentile individuals, but in optimising a single design for the greatest range of body sizes. I've been visualising data – loads, demands, yields – as distributions rather than averages for enough decades now that I visualise anthropometric data in the same way, as distributions rather than points – averages, 95th percentile male or 5th percentile female points. I see further opportunities to improve economy-class seating by looking at the challenge in that same way. A complementary challenge as we see a continued movement towards splitting economy class into a tourist product and a solo traveller (premium-economy) product is to tailor the seating in those products more towards the different sensitivities of those different traveller types.

06 TELL ME AN INTERESTING STATISTIC? The revenue generated each day from a square metre of floor space in a commercial aircraft (think of a 737 in the service of a low-cost carrier) is one thousand times greater than the daily rent per square metre for the most expensive real estate in Seattle. We are not likely to find our next great idea on Main Street!

07 HOW ARE YOU ENJOYING YOUR RETIREMENT? It still seems like a long weekend. Best of all, I get to spend more time with my family. I got to help my son with his high school senior project (building a carbon fibre bicycle frame) – what could be better than that? I also really enjoyed my retirement party – I was thrilled by the number of people who thanked me for answering their questions over the years. As each of them approached I prepared to apologise for the emails I haven't responded to – they seem to have forgiven me, for which I am grateful. I am sure there are Aircraft Interiors International readers whose emails I have not answered. I hope they forgive me as well.

08 SILLY QUESTION TO END – IF YOU COULD BE ANYONE FOR A DAY, WHO WOULD YOU CHOOSE? I'd choose to be the lucky soul who is married to my wife. I could never fully explain why – it is just how I feel.

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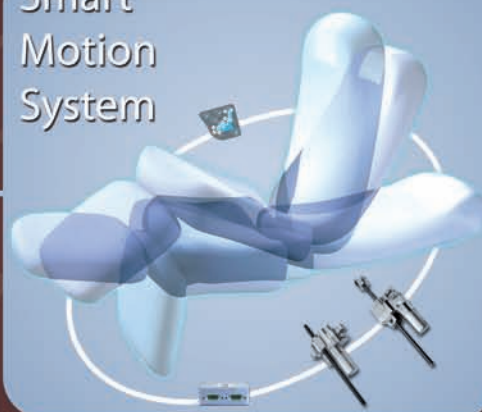
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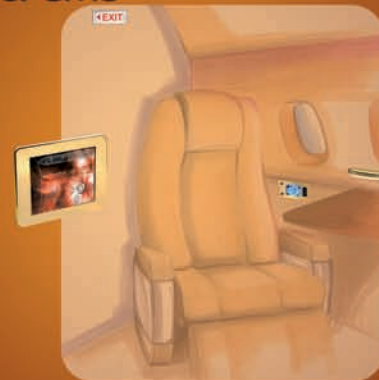
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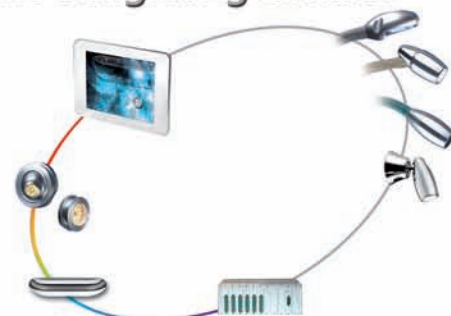
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