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Management



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Cover image design: Phil Couzens

EDITORIAL TEAM

CONTRIBUTING EDITOR

Colette Doyle

colette.doyle@realresponsemedia.com

ART DIRECTOR

Phil Couzens

SUB-EDITOR

Heather Ford

GROUP PRODUCTION MANAGER

Barnaby Moore

barnaby.moore@realresponsemedia.com

COMMERCIAL MANAGER

Ben Shea

ben.shea@realresponsemedia.com

CEO

Chris Pitchford

chris.pitchford@realresponsemedia.com

For subscriptions & enquiries:

Barnaby Moore

barnaby.moore@realresponsemedia.com

All enquiries

+44 (0) 20 8444 2554

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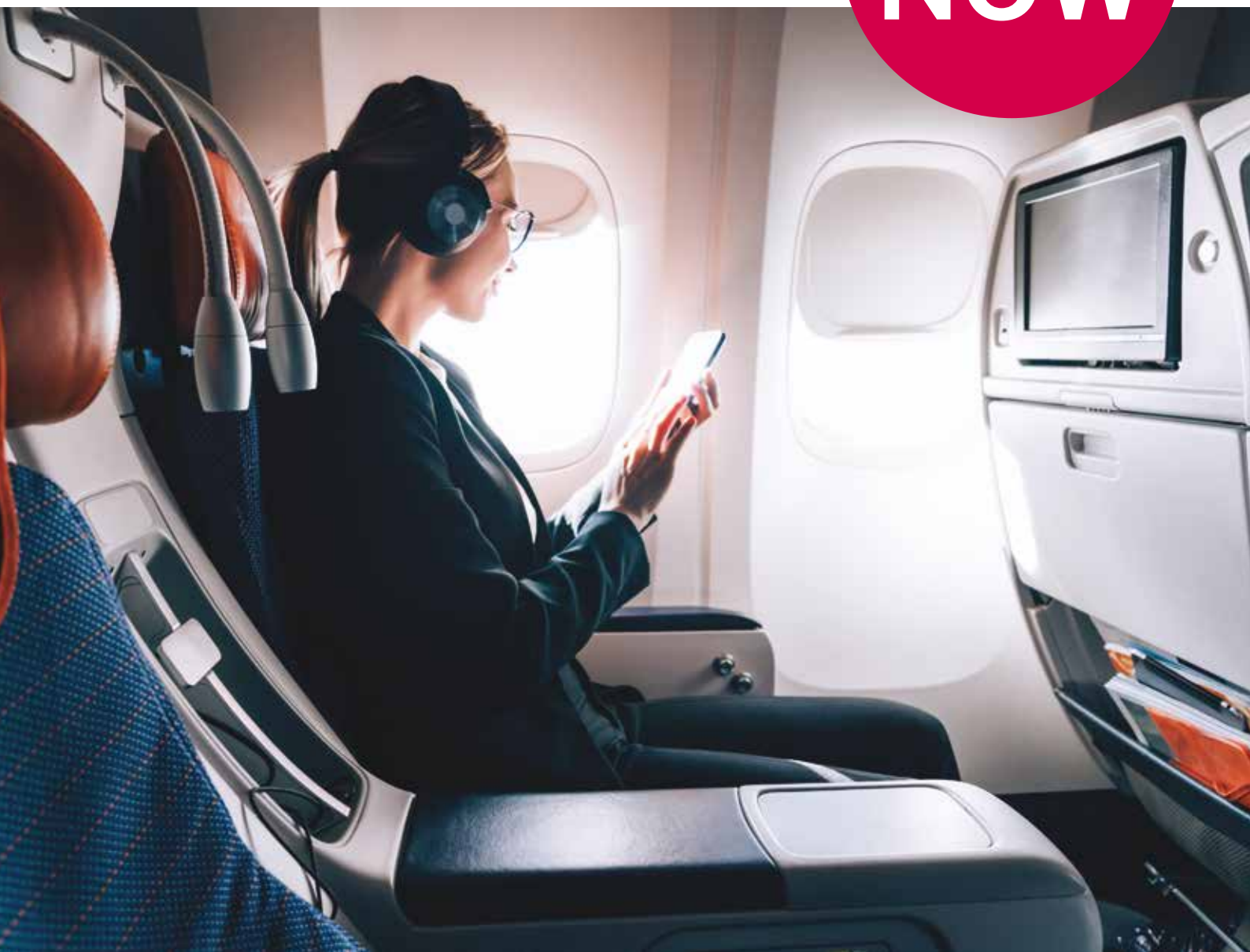


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Aircraft Cabin Management is the magazine informing airlines of key design concepts, the manufacture and operation of modern airline cabins – helping airlines to address the balance between passenger appeal and operational efficiency.

Reaching an audience of over 32,000 professionals, we aim to keep you fully informed of the latest news and developments from the sector.

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EDITOR'S LETTER

CONTRIBUTORS



PAUL EDEN
Contributor



BERNIE BALDWIN
Contributor

It may have wreaked havoc on the aviation industry, but the pandemic has also brought with it some valuable lessons. In the first of our Industry Voices columns in this issue, aerospace trade association ADS elaborates on how, since Covid shut down live events, it has reimagined the concept of the exhibition in a digital format.

The result is the Digital Cabin, which began life as a generic aircraft interior model that subsequently became customised as companies added specific elements such as seats, armrests or galleys. They provided their own CAD models and material customisations for ADS' creative agency to re-create in 3D and to scale – read all about this fascinating project on page 12.

In our second thought leadership piece on page 14, Franklin Products reflects on how there will always be the need to travel. Virtual communication may be convenient; however, it cannot replace the necessity for physical interaction. The important thing is to ensure that we are ready to take advantage of the opportunities ahead once things return to normal.

Recent events have sparked a greater interest in cleanliness in the context of the fight against the virus and, while refurbishment has always been an attractive alternative to new equipment, it is more appealing now than ever. This is a result of the way that airlines are looking to balance the need for cost-wise recovery with passengers' desires for spruced-up, clean-looking cabins (see page 22 for details).

With the welcome return of the hugely important trade show AIX earlier this month, albeit in virtual form, and IATA reporting "significant momentum" when it comes to the latest figures for both international and domestic air travel, it looks like aviation is bouncing back – and it can't come a moment too soon.

Colette Doyle

CONTRIBUTING EDITOR

colette.doyle@realresponsedmedia.com

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BUSINESS BRIEFING



STATISTICS

Latest IATA figures show passenger traffic boost

Both international and domestic travel demand showed significant momentum in July compared to June, although demand remained far below pre-pandemic levels, according to the latest figures from IATA. Extensive travel restrictions continue to delay recovery in international markets.

Total demand for air travel in July was down 53.1 per cent compared to July 2019. This is a significant improvement from June, when demand was 60 per cent below June 2019 levels.

International passenger demand in July was 73.6 per cent below July 2019, bettering the 80.9 per cent decline recorded in June 2021 versus two years

ago. All regions showed improvement and North American airlines posted the smallest decline in international RPKs (Data from Africa was not available).

Total domestic demand was down 15.6 per cent versus pre-crisis levels, compared to the 22.1 per cent decline recorded in June. Russia posted the best result for another month, with RPKs up 28.9 per cent versus July 2019.

"July results reflect people's eagerness to travel during the Northern Hemisphere summer. Domestic traffic was back to 85 per cent of pre-crisis levels, but international demand has only recovered just over a quarter of 2019 volumes," noted IATA director general Willie Walsh.

NORTH AMERICAN AIRLINES POSTED THE SMALLEST DECLINE IN INTERNATIONAL RPKs

He continued: "The problem is border control measures. Government decisions are not being driven by data, particularly with respect to the efficacy of vaccines. People travelled where they could, primarily in domestic markets. A recovery of international travel needs governments to restore the freedom to travel. At a minimum, vaccinated travellers should not face restrictions."

International Passenger Markets

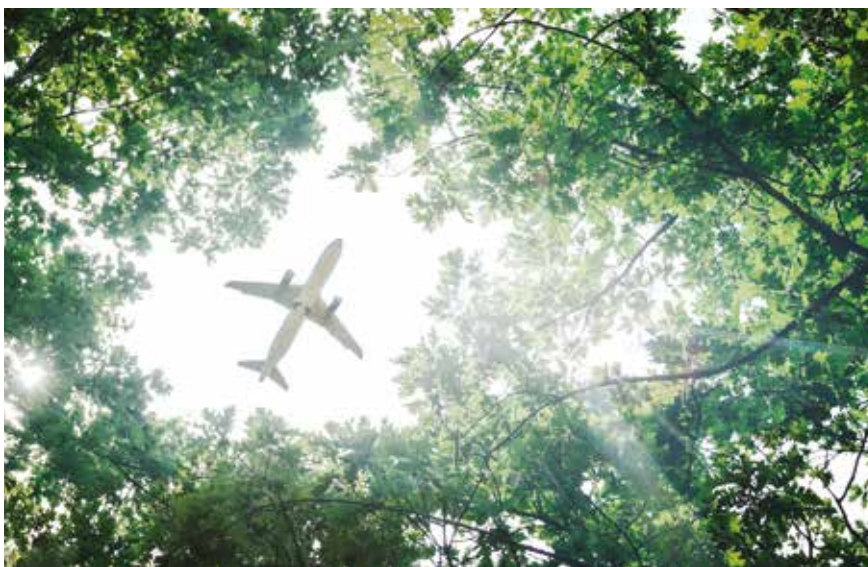
- European carriers saw their July international traffic decline 64.2 per cent, significantly bettering the 77 per cent decrease in June. Capacity dropped 53.8 per cent and load factor fell 19.9 percentage points to 69.0 per cent.

- Asia-Pacific airlines' international traffic fell 94.2 per cent, barely improved over the 94.7 per cent drop registered in June as the region continues to have the strictest border control measures. Capacity dropped 86 per cent and the load factor was down 48.2 percentage points to 34.3 per cent, by far the lowest among regions.

- Middle Eastern airlines posted a 74.5 per cent demand drop in July, surpassing the 79.2 per cent decrease in June, versus the same month in 2019. Capacity declined 59.5 per cent, and load factor deteriorated 30.1 per cent to 51.3 per cent.

- North American carriers' July demand fell 62.1 per cent, much improved on the 69.4 per cent decline in June. Capacity sank 52 per cent, and load factor dipped 18.6 per cent to 69.3 per cent.

- Latin American airlines saw a 66.3 per cent drop in July traffic, improved over the 69.8 per cent decline in June. July capacity fell 60.5 per cent and load factor dropped 12.6 per cent to 72.9 per cent, which was the highest load factor among the regions for the ninth consecutive month.



SUSTAINABILITY

BA shortlisted for government funding for decarbonisation projects

Four aviation decarbonisation projects supported by British Airways, and designed to help the industry achieve its targets of net zero carbon emissions by 2050, have been shortlisted for government funding.

The Department of Transport's Green Fuels, Green Skies (GFGS) competition has awarded the funding to develop the UK's first sustainable aviation fuel (SAF) production facility. In total, the government shortlisted eight projects to potentially receive a share of £15 million, all of which have a clear potential to produce SAF capable of reducing emissions by more than 70 per cent on a lifecycle basis when used in place of fossil jet fuel.

British Airways is directly involved in four of those projects which, pending the completion of grant agreements, can all press ahead with developing their feasibility and engineering plans.

The airline is partnering with technology company Velocys on the Alto project to build a commercial waste-to-SAF plant in Immingham, Lincolnshire. Alto will take more than half a million tonnes per year of household and commercial waste and

produce up to 80 million litres of cleaner burning SAF and naphtha. The project has already received planning consent from North East Lincolnshire Council and is in the final stages of preparation for Front End Engineering Design.

Project Speedbird is a collaboration between British Airways, LanzaJet and Nova Pangaea, with a goal of producing 100 million litres of sustainable fuel a year from 2025, sufficient to power 2,000 flights from London to New York. The technology is based on Nova Pangaea's REFNOVA process of converting waste wood into alcohol. LanzaJet's alcohol-to-jet (ATJ) technology, developed by LanzaTech and the Pacific Northwest National Lab, uses the alcohol for SAF and renewable diesel.

British Airways is also working on two further decarbonisation projects with LanzaTech and LanzaJet that could each produce more than 100 million litres a year of SAF. The first would involve capturing CO₂ from the atmosphere and converting it into SAF. The second would support the development of a SAF plant in Port Talbot, South Wales that would produce SAF from waste and industrial gases, with the potential to support significant jobs in the area.

THE GOVERNMENT SHORTLISTED EIGHT PROJECTS TO RECEIVE A SHARE OF £15 MILLION



AWARDS

Crystal Cabin announces finalists in special category awards

The Crystal Cabin Awards organiser has announced details of the 10 finalists in the special categories Clean & Safe Air Travel and the Judges' Choice Award. The winners were to be honoured on 15 September at the virtual Aircraft Interiors Expo.

The final shortlist for the Clean & Safe Air Travel category includes US company Rosen Aviation, which has developed its Holographic Controller. From Safran Cabin comes Beacon Clean Lavatory, a concept for anti-microbial surfaces in bathrooms. The in-flight safety concept with Lilac-UV from Collins Aerospace means both cabin crew and passengers can activate an ultraviolet disinfection lamp for cleaning.

MRG Foamtex's innovation is another invisible protective shield, and CleanAir from finalist Villinger promises to make germs and viruses harmless.

The second Crystal Cabin Award special category, the Judges' Choice Award, acknowledges entries that particularly impressed the jury. Toyota Boshuko has two ideas for upgrading economy class, the Cloud Capsule and Positively Economy concepts.

Safran Seats has the foldable Interspacewings, which can be retro-fitted to economy and domestic business class seats. Rosen Aviation's Maverick Project features a private jet cabin full of intuitive control panels and applications.

Lastly, Austria's FACC aims to make an aircraft that is more accessible to all. LAV4ALL promises 100-per cent disabled-accessible aircraft lavatories for retrofit in aircraft ranging from the Airbus A320 up to wide-bodied jets.



01

G700 launch

Qatar Executive has welcomed the world's first Gulfstream G700 jet aircraft to the State of Qatar, as part of a demonstration honouring QE as the launch customer.

Equipped with the all-new Rolls-Royce Pearl 700 engines and an advanced high-speed wing design, the G700 is able to fly at record-breaking speed and range with outstanding environmental efficiency, promoting sustainable business aviation.

The executive charter service provider has ordered 10 of the jets and will take delivery of the very first aircraft off the assembly line in Georgia, US next year.

02

Fast food for BA

British Airways has introduced a digital ordering platform for customers to purchase food and drink from its Speedbird Café menu in the air, directly to their seat. The service will initially be available on selected routes before rolling out across the rest of the short-haul network on flights from London Heathrow.

The service will run alongside the airline's pre-purchase menu, including items from its Tom Kerridge range. Pre-flight orders can also be made via highlifeshop.com up to 12 hours before departure. To place an order, customers simply connect to the on-board wifi free of charge.

03

The best of Singapore

Singapore Airlines (SIA) has launched the Singapore Showcase, an initiative to collaborate with leading Singaporean brands to offer unique on ground and in-flight experiences. Under the initiative, The carrier has worked with renowned Singapore-based hawker brands to enhance the airline's local fare options using their distinctive dishes, which means it will be able to offer a wider range of Singapore's iconic hawker cuisine.

This is also a celebration of Singapore's Hawker Culture, added this year to the UNESCO Representative List of the Intangible Cultural Heritage of Humanity.

Trend WATCH

Colette Doyle explores the latest developments across the industry, including a delectable foodie showcase at 30,000ft and the arrival of a world-first in business aviation

02



03





04

05



06



07

04 Buy before you fly

Emirates customers have been snapping up exclusive duty-free retail products from the airline's EmiratesRED duty free catalogue, but instead of doing this during their flight they are now opting to pre-order and purchase items before they fly.

Since July's soft launch at www.emiratesred.com, Emirates has seen a healthy response from customers, with items ranging from luxury fragrances *Creed Aventus* and *Boadicea The Victorious* to ever popular goods such as fine watches and the latest tech. All orders come in exclusive packaging, perfect for gifting.

05 Selectable snacks

Air New Zealand is bringing in new food offerings on board domestic flights. In a series of trials, the airline tested a range of things from trolley signage on Koru Hour flights, Grab & Go snack boxes in its lounges, and plenty of different goodies. During the six-week programme tests were run across 100 flights, involving more than 7,000 customers.

An array of snack products from New Zealand, including popcorn, crisps, muesli bars and chocolate will be rotated on a monthly basis and the airline's famous inflight cookie and lollies will also be available.

06 A first for SalamAir

Oman's SalamAir has taken delivery of its first A321neo aircraft. The A321neo delivers high levels of comfort while expanding seating capacity through optimised use of cabin space.

SalamAir is the first airline in the country to introduce the aircraft to its fleet. The aircraft's extra range capability of eight hours meets the airline's ambitious plans, as it can now connect Muscat and Salalah to new destinations across Europe, the Far East and Africa.

The new fleet mix will enable SalamAir to diversify its portfolio and support the Sultanate of Oman's tourism industry vision.

07 Football in flight

Football season is upon us and American Airlines is ready to connect customers to a TV football experience in the skies with live action for every game day.

The airline drafted a professional football legend to create a tongue-in-cheek social media video to help bring life to an inflight entertainment brainstorm.

Passengers travelling on any of American's domestic narrowbody aircraft will have free access to live sports and news networks 24/7. The beefed-up offering means fans of college and professional football won't miss a snap if they are flying during a big game.

DESTINATION: THE FUTURE

Tiina Tissari, vice-president of customer experience and products at Finnair, talks us through the varied and diligent measures the airline is taking to ensure a sustainable outcome for all

The pandemic has acted as a catalyst for many trends, not least of which has been the growing importance for travellers to live more responsibly – and to travel as sustainably as possible. At Finnair we believe our most important destination is the future, which is why sustainability is at the heart of our business and now informs every decision we make.

We work according to the ethos that ideas, new products and partnerships should be built around the goal of being as sustainable as possible. As an airline, we're leading the way when it comes to sustainable aviation and we're ambitious in our goals. Our aim is to be carbon neutral by 2045 and in the short term we have a target to half our net emissions by 2025.

We strongly believe that sustainable aviation goes beyond offsetting and making small changes, which is why earlier this year we signed a letter of interest with Heart Aerospace to acquire up to 20 new electric aircraft, something that we believe is the future of aviation.

Our focus on sustainability also extends deep into our customer experience. We're working towards reducing the waste and weight on board our aircraft, with a goal of reducing food waste by 30 per cent in 2022, in addition to the impressive waste savings already achieved.

Some of the steps we've taken towards this involve making sustainable material choices and streamlining our core product to focus on the essential parts we know our customers want. This choice-based offering means Finnair



customers can tailor and personalise their experience to suit their own needs. We also make sure that we maintain the premium level of product and service our customers have come to know and love.

These new changes extend to every touchpoint of the customer journey, from the booking process, check-in, our lounges and – of course – on board our aircraft. We've implemented a more focused selection for drinks and dining in our lounges and all main meal choices feature a vegetarian option.

Keen-eyed customers may notice that all plastic cutlery onboard has been replaced with birchwood, which is wrapped in paper, and we also have oat milk available, thereby giving our customers an additional, more environmentally friendly option.

We'll be stocking new Villi water bottles on board our aircraft soon; each

bottle is made from 100 per cent recycled PET, meaning that their production brings zero new plastic to the world. As well as this, we operate an efficient fleet with direct, short routes, to produce fewer emissions. We're also investing in more fuel-efficient flight planning and flying and increasing the sustainable aviation fuel usage with our partners.

The onus to make sustainable decisions extends beyond Finnair and its employees. We also educate and empower our customers to make the best choices for our planet – whether that's through tips on packing lighter luggage, or enabling inflight dining choices to be pre-ordered to significantly reduce waste on board.

The pandemic has also accelerated our digitisation

process as we look to reduce the amount of physical touch points, including our onboard menus, magazines and Finnair Plus membership. While I'm extremely proud of the measures we've taken and the goals we have in place to make our airline as sustainable as possible, I know that we still have a long way to go.

At Finnair innovating and growing sustainably is a welcome challenge and one in which I very much enjoy playing a part. 🌱



TIINA TISSARI
vice-president of
customer experience
and products at Finnair

In my view

A leap of faith

International marcomms strategist **Dominic Walters**, who has advised and held senior roles at a range of organisations, explains the need for seamless communication in an increasingly connected world

The concept of digitalisation held centre stage in the aviation industry's collective consciousness long before the impact of Covid-19 brought everything to a halt.

Even though the term has been bandied about for decades, it's still missing the lightbulb moment required to drive real change. Especially when we take into account the small steps that the industry has made compared to other industries, with its core infrastructure remaining unchanged.

There have certainly been innovative ideas and new technologies introduced, but there's plenty of room for improvement. Passenger experience is a good example where we still traipse through airport terminals, stand in queues to pass through security and wait around at passport control.

As the world puts pressure on the industry to improve efficiencies and value for money, lessen its impact on the environment and speed up the transportation of passengers and cargo, it's time for the industry to seriously look at digitalisation as a big driver to achieving these things.



It's essential for the industry to look beyond cost per megabits per second and comprehend connectivity's capacity to revolutionise the industry

DOMINIC WALTERS

Aircraft connectivity is an obvious enabler for this. The world of satellite communications is evolving at a rapid pace, with high-speed satellites capable of delivering super-fast connectivity with pinpoint accuracy anywhere in the world. On the ground, 4G and 5G networks are being transformed into highly capable connectivity solutions that can operate on aircraft.

In a world of connectivity, airports, aircraft, partners and suppliers should be able to communicate with each other seamlessly in a way that can drive efficiencies, savings and better passenger experiences. A lesson from our recent

past on how digitalisation can transform both the consumer and the corporate world is the dot-com boom over 20 years ago. Connectivity opened Pandora's Box for millions of innovators and creatives that resulted in a rapid change on a global scale, laying the foundations of the digital world we live in today with solutions we could not have imagined just a few decades ago. The internet was the backbone of the dot-com revolution and the world embraced change quickly because the right infrastructure was in place.

Making that backbone available at 30,000 feet and on a scale and quality similar to the ground is undoubtedly going to drive innovation and is why aviation needs to do more than dip its toes into the water when it comes to digitalisation. It is no secret that airlines operate on a knife-edge when it comes to profit margins, so it's understandable that they see connectivity as yet another expense. It's essential, however, for the industry to look beyond cost per megabits per second and comprehend connectivity's capacity to revolutionise the industry.

Change will require more than a few innovators; it will require a leap of faith from the industry, integrating AI, data and technology with our existing knowledge, as well as a shift of mindset from within. ☉

Dominic Walters was the driving force behind the unique online broadcast event FlightPlan that has become a regular feature in the aviation sector – find out more at dominicwalters.net



Exhibitions REIMAGINED

The pandemic's impact on trade fairs drove aerospace trade association ADS to reimagine its UK pavilion for the Department for International Trade. **Omar Kadhim**, head of business development at ADS, describes the opportunity for exhibitors and discerning buyers



There is no substitute for seeing a buyer's body language as they inspect your seat design, or shaking hands with a new international airline client at a trade show. Unfortunately, this hasn't happened for nearly two years because of the pandemic.

For some aerospace companies, buyers and sellers are still able to exchange performance data and make effective decisions. For aircraft interiors however, passenger experience goes beyond the buying metrics. It is a more tangible product and it is incredibly difficult to communicate the value of the experience, or product differentiation, when the customer can't see or feel the options available.

Yet, so much opportunity exists to innovate inside the cabin to address globally important issues in hygiene, emissions and airline economics. Members of ADS, the national trade body for UK aerospace and defence, were looking for a way to continue to do business and showcase their innovations.

UK interiors: rich and resilient

With an estimated 250 suppliers, it can be difficult to visualise the breadth and depth of the UK aircraft interiors industry. There are pockets of brilliance

everywhere: 30 per cent of the world's aircraft seats are made in the UK and London is home to an unrivalled concentration of airline design agencies. Despite the pandemic, these companies have remained resilient, upbeat and actively innovating.

Even before the pandemic, it was a challenge to summarise such a compelling national interiors offer. Covid offered an opportunity to revisit our assumptions about human behavior, business and indeed marketing. Enter the Digital Cabin.

A digital, visual solution

Adoption of 3D web technologies to enhance the sales process is increasing. It's possible to walk around the inside of an apartment from your tablet without leaving home. Not quite the real experience but, on the other hand, you don't need an appointment and it's

30%

30 per cent of the world's aircraft seats are made in the UK and London is home to an unrivalled concentration of airline design agencies. Despite the pandemic, these companies have remained resilient, upbeat and actively innovating

a convenient way to view. Once inside, furniture, fabrics and beautiful materials are all seen in context, making it more intuitive for the buyer.

From a B2B perspective, immersive experiences can improve buyer confidence in a product, which in turn can increase potential leads and sales. This was a compelling reason for ADS to experiment with this concept using an airline cabin and, when we pitched the idea to industry, the excitement was overwhelming.

We started with a generic aircraft interior model and invited companies to rent space for their chair, armrest or galley. They provided their own CAD models and material customisations for our creative agency, Ouno, to re-create in 3D and to scale. As it's a website, models can be updated and incremental innovations shown throughout the year. Plus, it beats the cost of shipping a mockup to a physical trade show.

Ultimately, we believed that companies can better represent themselves by their 3D products than by plain text and flat images – and so far the companies strongly agree.

Case studies prove the point

Through early conversations with potential vendors, we were able to adapt the functionality of the Digital Cabin for optimum presentation. Take Airtel,



Immersive experiences can improve buyer confidence

a consortium of award-winning design agency JPA Design, Williams Advanced Engineering and SWS certification. Its new business class seat does away with metallic frame parts using an advanced composite structure, saving weight and greatly enhancing passenger space. With the Digital Cabin, airlines can view this seat in a realistic 3D cabin geometry, experiencing the overall space and even an in-seat perspective.

Aerospace lighting partner of choice STG Aerospace quickly saw the potential of the Digital Cabin, allowing customers to visualise the positive impact of their lighting solutions. Buyers can experience the patented blue glow photoluminescent emergency exit marking (saf-Tglo). Daytime and nighttime scenes help airlines understand the effect of STG's emergency exit marking and lighting in a

real cabin, something difficult to portray even at a physical show.

It's not just about seats and whole cabins, as TT Electronics quickly saw. Existing generic seats can be customised to embed CAD models of passenger control units and electronics. Visitors to the Digital Cabin can sit in the premium TT seat demonstrator and get a passenger perspective of their window dimmers and seat controls.

As well as detailed CAD models, each supplier's page has further information such as data sheets, videos and contact details for interested buyers; shortening their decision-making and freeing up schedules. Altogether, the bandwidth of engagement, 24/7 access and the flexibility of exhibiting means the Digital Cabin was a compelling solution for the eight launch suppliers.

How to get involved

Airline, OEM and MRO buyers across the world are warmly invited to check in to the cabin regularly from their desktop and tablet using the url, digitalcabin.aero. Our vision is to showcase the breadth of UK innovation in aircraft cabin interiors. We encourage interested exhibitors to contact us, as we plan our next release later in the year. We look forward to welcoming you to the Digital Cabin soon. ☺



Omar Kadhim is head of aerospace operations and business development at ADS. Find out more at www.adsgroup.org.uk

Embrace INNOVATION

The pandemic has changed all of us and our world with it. Franklin Products president **Kerri Picard** says we need to learn from it and embrace the changes that ultimately resonate from it



Our lives will never be the same, the world will never be the same, but there will always be the need to travel. Virtual communication is convenient, easier; however, it cannot replace the necessity for physical communication. People need people.

After the tragic events of 9/11, safety came to the forefront of the aerospace industry. Passengers needed to feel safe before flying again. The need for change was inevitable, so this was implemented via travel policies, airline maintenance and aircraft interiors. Our travelling world changed for the safety of the flying passengers. As people started to feel secure again, these changes and many others brought the aerospace industry back to life.

The changes made today to combat the risks of Covid virus and other future viruses will once again bring the aerospace industry to life. We have already seen the start of it in the US, as well as in other countries.

Of course, there may be some setbacks, but it will be increasingly safe to travel again in the near future. There is a need to visit loved ones,

enjoy other cultures, and conduct business personally.

The question remains: will businesses be ready for the comeback and when will the comeback happen? The arrival of the Delta Variant has been a hinderance, leaving us questioning when, if ever, this will all end.

We at Franklin Products are a family-owned aircraft seat cushion and dress cover manufacturer and we have worked with airlines and seat manufacturers for over 30 years on providing the very best safe, comfortable and sustainable products. Businesses like ours are struggling with challenging decisions. It is a balancing act, but it's important that we keep evolving.

Over the last year we took the time to reevaluate infrastructure, resources, product offerings, customer and supplier relationships and also investments. The goal is to be a stronger business when the aerospace industry recovers and to put ourselves in a positive position to support growth.

These challenging times have elevated our focus on three areas: development of relationships, product innovation and product accountability and we believe that, by focusing on these three areas, we can and will be successful.

Development of relationships

People are important. People drive organisations. Customers, suppliers, and employees are the heart of any business. You need to treat people with respect and remember that respect is not a given, it is earned. Mutual respect for each other is vital. Relationships are essential to a business and understanding what is important to a person, whether it be a passenger, a fellow employee, a customer or a supplier is the key to success in business. Throughout the pandemic, this has become more and more relevant. The aerospace industry is a very tight-knit community and, although very competitive, there is a sense of comradeship. At Franklin Products we aim to focus on the customer experience from start to finish. Our employees and our supply base allow us to put the customer first. Our motto is passion, respect, dedication.

Product innovation

Product innovation and process innovation is critical to a business's growth and development. We continue to innovate through our product offerings with lightweight, cost-effective comfortable products. We



Left: Franklin is known for its groundbreaking innovations such as the Fly-Right seat

Below: The feel of the seat cover and cushion is the main touch point for all passengers so comfort is essential



touch point for all passengers and most will remember an uncomfortable flight. Franklin was a pioneer of on-site customer workshops. Through comfort trials and advanced pressure mapping studies, we work with the customer directly to develop the best possible product.

The Covid situation has made this very difficult to achieve, lengthening the lead time for development. As restrictions have eased it has been fantastic to welcome back our customers to work this way once again.

I have personally been in this industry for over 30 years and survived some trying times. The pandemic will change us but it will not define us. Ultimately, the aerospace industry will continue to thrive. We need to prepare ourselves for the comeback and continue to innovate, to embrace the changes and to live life. ©

The goal is to be a stronger business when the industry recovers

are well known for our groundbreaking innovations, such as the revolutionary Fly-Right seat (a cushionless, coverless seat comfort system) and Velocity, the ultimate quick install and removal dress cover system.

Most recently, we were excited to introduce Omni-Flex, a fantastic new diaphragm seating system that allows softer, lighter cushions to perform as long as existing heavier, firmer products. We need to continue to embrace change and innovation. Be the advocate for change because the world needs it.

Product accountability

We are accountable for what we market. We are accountable for what we provide to our customers. We have always been proud of the way that all the materials we use are rigorously tested to ensure they meet our requirements for comfort, sustainability, cost, weight, and durability. We work very hard to provide a high-quality product to the industry with the service and support to back it up.

Seat comfort is absolutely vital to the passenger experience. The feel of the seat cover and cushion is the main



Kerri Picard is the president of Franklin Products. Find out more at franklinproductsinc.com



In this issue's overview of the latest design trends in aircraft interiors, contributing editor *Colette Doyle* takes a look at a next-gen economy seat courtesy of the collaboration between Geven and PriestmanGoode, finds out more about Latam's newly refreshed fleet and discovers how French aerospace company Sogecclair has come up with a revolutionary new flooring idea



Left: Latam is boosting its environmental credentials as well as its connectivity with 70 new aircraft

Below: Geven and PriestmanGoode's Elemento seats have a host of features to increase passenger experience and comfort

Latam Airlines Group aims to strengthen operations in all its subsidiaries at regional level with its modern fleet

integrated table lighting; bespoke woven dress covers featuring a pattern inspired by the Geven 'V', and/or airline personalised trim and finish; adjustable PED holders; a cocktail table; large passenger stowage compartments; and quick installation fitting for ease of maintenance operations when needed.

The colour palette was inspired by the Geven brand colours and the Italian coastline at sunset, with light grey seats, deep blue headrests and seat frames with red accents. This combination is described as giving a fresh and clean visual chromatic experience, with bursts of warmth.

Bright whites have been used to highlight key features of the seats. Technical materials, like mesh, were chosen to keep the interiors contemporary and nod to Italy's heritage of designing high performance vehicles.

Sustainability was a key driver in the selection of finishes, and natural metal finishes were chosen to offer a more environmentally conscious approach, as well as reflect Geven's mission to deliver honest, hardworking, exquisitely crafted products.

The premium, premium + and business class seats will be unveiled later this year.

Latam Airlines looks to modernise

Latam Airlines Group has reaffirmed its fleet as the largest in Latin America following the purchase of 70 new aircraft in total, including 42 narrow body aircraft, as part of its modernisation and efficiency programme.

The integration of the A320neo family implies more efficient engines, aerodynamic improvements and the latest technologies that provide 20 per cent greater efficiency in fuel consumption and therefore lower CO₂ emissions, together with a 50 per cent reduction in oxide emissions nitrogen and 50 per cent of the acoustic footprint.

Following this agreement, the group aims to strengthen operations in all its

subsidiaries at regional level with its modern fleet and maximum efficiency in environmental matters, one of the pillars of its sustainability strategy. In turn, Latam is seeking to consolidate the largest range of destinations in and from Latin America and the Caribbean, together with its connectivity agreements with Delta, currently under review by various regulatory authorities in the countries where the group operates.

"The purchase of these highly efficient aircraft is a sign of the commitment we have made with the transformation towards a carbon neutral Latam in 2050. At the same time, these 70 planes reinforce the connectivity scale of the region," comments Latam Airlines Group CEO Roberto Alvo.

Airbus president for Latin America and the Caribbean Arturo Barreira adds: "The decision by Latam to continue incorporating A320neo aircraft demonstrates its great commitment to sustainability. The A320neo has the latest-generation engines, sharklets, and an innovative cabin, making it the most comfortable, fuel-efficient and environmentally friendly single-aisle aircraft in the world."



It's all elementary for Geven and Goode

Italian seat manufacturer Geven and London-based design agency PriestmanGoode have unveiled Elemento, the first model of the next-generation family line of aircraft economy seating. Elemento is part of the partnership's project to create an entirely new line of next-generation seats, focused on innovative features that deliver enhanced passenger comfort and benefits, whilst allowing for maximum airline customisation and easy configuration into different aircraft types.

The lightweight Elemento Economy class seat debuts with a host of features aimed at increasing passenger experience and comfort. The seat's modular design allows for easier installation and integration of the most varied latest generation monitors and PED holders, as well as ease of integration into both wide and narrow-body aircraft.

The design language for Elemento and the rest of the next-generation family of seats is driven by key attributes such as functionality, timelessness elegance, clean and sculptural contours and a distinct nod to Italy's unparalleled heritage of exquisite craftsmanship and design.

Features of the seat include adjustable privacy headrest, to give passengers extra head support and comfort; an

left: Geven and PriestmanGoode's Elemento seat can integrate the latest generation monitors and PED holders
Right: The Optimfloor concept passed the 16G crash test



The Optimfloor is an integral part of the aircraft structure and contributes to the overall stiffness

An optimal approach to aircraft flooring

The Optimfloor concept from Sogclair Aerospace is a composite floor structure that replaces metallic seat tracks with composite stiffeners directly integrated into the floor panels. Unlike current floor panels, the Optimfloor is an integral part of the aircraft structure and contributes to the overall stiffness.

The Optimfloor concept can support seats as well as galleys, lavatories and other aircraft furniture. Optimfloor offers 20 per cent weight reduction per square metre of the total floor weight in standard fuselage area. Indeed, the weight of the stiffener is reduced, thanks to composite materials that offer unique mechanical performance to weight ratios.

In addition, Optimfloor decreases the number of fasteners and nutplates needed to link the seat tracks to the floor panels. Optimfloor panels are homogeneous, bigger than current panels and seat-track pre-integrated, meaning easier installation and maintenance.

Besides, Optimfloor does not suffer from any corrosion issue while current seat tracks, which are made from extruded/machined metal alloys, face

severe corrosion in wet areas. The company has also designed a quick installation system called Easyfix, a quick fastener that is easy to install (you only need one hand to lock it) and that can be fixed in an eighth of a rotation. It is also a blind fixation that can be installed from only one side.

Sogclair choose pultrusion to manufacture the seat because it's an apposite process when it comes to hitting cost and volume targets. For instance, hundreds of metres of seat tracks are produced for the Airbus A350, while the Airbus A320 needs more than 60 kilometres a year. Replacing current metallic seat tracks with a competitive composite stiffener can be difficult without a continuous high rate and relatively low-cost process like pultrusion.

Designing and manufacturing the composite stiffener was the result of a long, back-and-forth process between Sogclair Aerospace for the design/stress part and Epsilon Composite for the chemical formulation and pultrusion parts. The stacking sequence of the stiffener was first optimised to sustain the maximum loads in the cabin area.

Once a satisfying stacking was reached, both parties could modify it and test its

feasibility. This process led to a rather complex stacking that combined cost-efficient carbon fiber tows with special fabrics designed for pultrusion and other mechanical and chemical specifications. Mechanical testing was one of the key milestones in the development. Sogclair reports that it was necessary, not to mention worthwhile, as it oriented the company towards useful design choices.

The floor panel must sustain a large load charge in the vertical direction and hence had to be tackled with pull-through. FEA simulation and mechanical testing helped to slow down this failure mode and it succeeded in passing the static tests where pull-through was involved.

Another achievement was to reach the damage tolerance goals. Impact damages are among the biggest issues of composite materials, so Sogclair set a very challenging damage tolerance goal from the beginning and had to work hard to develop the composite part accordingly, even though this meant making the pultrusion manufacturing more difficult. This part of the project was stressful, but the right solution to pass the impact tests was finally found.

The most recent achievement was the 16G crash test that was successfully passed. This test is required for aircraft seat qualification so Sogclair wanted to guarantee that the concept would pass. Apparently, no such test has been carried out before on composite seat tracks.

The next aircraft development programme will be a chance to go further with this solution by taking into account all manufacturer requirements. This new product allows the firm to use its industrial premises to boost its understanding of composite assembly. ●

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Intelsat

After acquiring Gogo's Commercial Aviation operation, Intelsat now offers airlines an unrivalled set of satellite and air-to-ground connectivity options. The company has truly global ambitions with its 5G network of networks, as Dana Dymek, director of product marketing and UX for commercial aviation, explains to *Paul Eden*

In December 2020, Gogo completed the sale of its Commercial Aviation business to Intelsat. Gogo still owns the network and provides air-to-ground (ATG) bandwidth to Intelsat's customers. How is the change reflected in the experience of your airline customers?

Intelsat is committed to creating sustainable, long-term growth for commercial airlines, with innovative business models, production roadmaps and managed services for inflight entertainment and connectivity (IFEC).

The integration of Gogo Commercial Aviation was a logical move with Gogo's technological solutions, global reach and operational excellence fitting perfectly with our advanced global network. This gives us a unique position to deliver more cost-effective, advanced commercial aviation broadband connectivity services.

The benefits are already visible to airlines, which no longer have to make trade-offs between speed, reliability, availability and coverage for inflight internet – even when flying at full capacity over busy airport hubs.

Intelsat's global network enables us to deliver capacity when and where airlines need it, to as many aircraft as required, while our end-to-end managed solutions remove airline pain points. We develop our services with airlines' unique needs in mind, making it easier for them to benefit from a hassle-free passenger experience with improved NPS and brand loyalty.

And we're not stopping there. Intelsat is also building the first global 5G satellite-based, software-defined 'network of



In just a few years' time, we're aiming to deliver 'at-home-like' inflight internet to everyone on board

DANA DYMEK
DIRECTOR OF PRODUCT MARKETING
AND UX FOR COMMERCIAL AVIATION

networks', which will support virtually any access technology and enable the next generation of global mobility, IoT and 5G services with never-before-seen simplicity, coverage, economics and performance.

What should passengers expect from Intelsat connectivity?

We know that a frictionless IFEC experience has become even more essential to today's digitally savvy travellers; we're seeing this from current take rates, which are already higher

than they were pre-Covid. Our customers' passengers benefit from uninterrupted and fast connectivity that enables everything from online browsing through video streaming to video conferencing and emailing. In just a few years' time, we're aiming to deliver 'at-home-like' inflight internet to everyone, and every device, on board an Intelsat-connected aircraft.

Gogo saw peak ATG network usage around 2017, after which operators of airliners large

enough for 2Ku antennas mostly switched to satellite connectivity. But ATG antennas are much smaller, so is Intelsat now serving smaller aircraft types better?

At Intelsat, we can service large commercial airliners, regional jets and even smaller aircraft, including business jets. Aircraft can rely on Intelsat's global satellite and terrestrial network to deliver connectivity anytime, anywhere, for a reliable and uninterrupted passenger experience, regardless of their size.

Our global satellite network – the world's largest – offers a number of benefits to aircraft, but there are also benefits to using ATG. The services have many elements in common, while hardware may vary to achieve the results.

Ultimately, we're focused on delivering the best connectivity services based on the end-user's unique needs, while building a network of networks that will eventually enable connectivity across multiple options. Our dedicated sales team works with each customer to evaluate their goals and recommend the best solution.



Intelsat's focus appears to be on delivering connectivity, regardless of whether its via ATG or satellite. But is it important to communicate the differences between ATG and satellite?

Providing connectivity to an airline's passengers is our core goal, and the technology the traffic rides on is largely dependent on what was available for the airlines to install at the time of selection, or specific aircraft limitations.

For example, the ATG system offers less capacity, but it is a more compact, lighter system. This is important for smaller aircraft, including regional jets, which is why many have our ATG system solution installed. That will change as satellite antenna technology continues to shrink.

It is important to communicate the differences in systems because the capabilities are different. However, it's also important to note that Intelsat is the only IFEC provider offering both system types, so an airline can make the right decision for its fleet.

Gogo supports its business aviation customers with connectivity and avionics

boxes. Does Intelsat do the same for its airliner customers?

Intelsat's ATG system shares some components; however it differs in the cabin hardware, since the aircraft connections and airline needs are different. We offer standard onboard equipment, depending on whether an airline selected our original ATG system, or our second-generation system, ATG4.

There isn't a typical router. Instead, there is an aviation-grade computer that handles network traffic, aircraft interfaces, and crew and passenger applications. Ultimately, our hardware configurations are based on number of passengers, aircraft size and distinct software solutions to support different passenger experiences.

There are 280 towers in the Gogo-owned ground network, plus ground stations and other facilities. With Intelsat sharing some of this infrastructure, how do you protect, monitor and move data securely through the ATG network?

All of the traffic is encrypted and very well protected. The cellular

infrastructure (ground stations, towers, etc) do belong to Gogo, but we interconnect with them; the passenger and crew traffic generated by Intelsat ATG aircraft is passed through Intelsat's commercial aviation data centre where traffic policy, permitted list and deep packet inspection tools are applied to ensure a secure and consistent inflight customer experience.

Some aircraft must fly through all or part of Intelsat's ATG coverage and then continue beyond it. Does the system switch between connectivity options depending on where they are?

The global high-throughput, software-defined satellite network we're building will dynamically allocate capacity precisely when and where needed, offering 'follow me' beams and predictive tracking. It will interact seamlessly with ground systems, cloud-based applications and other space-based platforms; no matter the orbit, the spectrum band or the terrestrial network, they all integrate natively into our global network of networks to make this kind of seamless switching possible. ☉



FIT TO FLY

Refurbishment has always been an attractive alternative to new equipment, but is it more appealing now than ever, as airlines begin to balance the need for cost-wise recovery with passengers' desires for new, clean-looking cabins. *Paul Eden* finds out more



Left: Diehl Aviation's Skypax monument incorporates a galley and two lavatories. A complex structure, it requires expert personnel and high levels of craftsmanship to construct and install

Known widely for its aircraft cabin equipment, including lighting, water and waste systems, environmental control, cabin management, overhead bins and monuments, Diehl Aviation also offers extensive cabin refit and repair services, typically alongside an MRO and working closely with an airline customer.

Sebastian Tivig, senior manager for cabin integration at Diehl Aviation is responsible for new cabin concepts, including certification, and explains that the cabin refit process typically begins when an airline comes to Diehl Aviation with a concept they've worked on with a design bureau.

"They'll have defined how the cabin should look and will only want certain items. But we have also had RFIs from major airlines asking for complete cabin concepts. In that case, it's usually a BFE [buyer furnished equipment] fit, where the airline is buying an essentially empty aircraft new from the OEM."

The situation at Vallair's Montpellier Méditerranée Airport site in southern France is quite different, as head of commercial and marketing Malcolm Chandler observes: "We took over the Montpellier site from Latécoère in 2016 and now more than 90 per cent of our activity there is lease-transfer work, with a significant amount of cabin content on all those aircraft."

Generally, it involves reconfiguring the cabin from the previous lessor's layout to that of the new one, usually during a simultaneous C Check. "We take a

90%

We took over the Montpellier site from Latécoère in 2016 and now more than 90 per cent of our activity there is lease-transfer work, with a significant amount of cabin content on all those aircraft

mixture of scheduled and unscheduled returns. Typically, a whole new cabin is required, including replacement seats, a PSU shuffle, cabin paint from front to back, changing galleys, floor coverings and floor path lighting, plus any customisation or branding."

While Diehl Aviation's role in cabin refit is primarily as a components manufacturer and realiser of concepts, Vallair's is to get inside the aircraft and physically change the layout. As such, it specialises in installing components rather than making them, although it can and occasionally does refurbish seats in-house.

It's a task rarely tackled though because, as Chandler points out, "Generally it's not cost effective for us to do it. A company in an industrial unit or warehouse can overhaul a seat faster and more cheaply than we can, because they don't have an airport overhead to support."

Refit planning

Careful planning is essential for an efficient refit, especially if the work involves modifications to the IFE or other cabin services. As Tivig notes, "The IFE cabling is normally as separate as possible from the core aircraft cabling. The electrics and vacuum water system all go either through the cross beams or triangle area, which is a very contested space. The water system may be rerouted

Vallair specialises in installing components rather than making them, although it occasionally does refurbish seats in-house



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Above: Diehl Aviation applies the same level of control and inspection to surface finish, regardless of whether an item is new or refurbished

just to the new lavatory or galley positions, but most airlines try to not to move the monuments.”

In some cases, an operational imperative does make reconfiguring elements of the water and waste system and moving monuments worthwhile, however. Chandler notes a 737-800 in which two lavatories were removed from the rear left side, allowing the installation of a high-density interior with additional seat rows and bins, new sidewalls and unblanked windows aft.

The ECS is also unlikely to be touched unless the business class space is being expanded and additional humidifiers are required. Humidification and ionisation systems could both play a part in countering the risk of Covid infection, but although they may be installed as relatively simple modifications within the ECS system, they nonetheless have a cost and there has so far been little market appetite for them.

Considering the need for careful planning and ensuring cabin items come out and are subsequently installed in

Sidewalls and overhead bins are easily modified; the latter's contents are typically reused to reduce costs

the correct order, Chandler says the removal process also depends on other maintenance work or modifications, which could include IFE upgrades and/or installing seat power. “Typically though, the first things out are the stowage units at the front and rear, opening up access to the doors, after which the seats come out.” Every cabin item must, at some point, pass through a cabin door, a process Chandler describes as akin to ‘wallpapering a bathroom through the letterbox’.

Painting using water-based, OEM-approved coatings mostly occurs off-aircraft, avoiding disruption to other work in the cabin. Overhead bin doors are typically among the components removed and repainted.

Much may, therefore, be achieved by changing how the cabin looks. Sidewalls

and overhead bins are easily modified and, in the case of the latter, Tivig says the contents of the bins – oxygen, lights and so on – are typically reused to reduce costs. On a

similar theme, Chandler says that when a lessee extends the business class section of a cabin, it is not uncommon for the least discoloured of the existing cabin light covers, which yellow with age, to be gathered forward in the business cabin, while the discoloured items are used aft in economy.

Conversely, over the past few years there has also been a trend for the introduction of premium economy as an additional class, at the expense of some business and, sometimes, economy seats. Tivig observes: “It clearly demonstrates the additional diversification of classes, even on lower cost flights.”

Repair and support

Whether Diehl Aviation is supplying an entire cabin for a brand-new, ‘empty’ aircraft, items for a cabin refit of an



Clockwise from left: Vallair refurbishments handle everything from new seats and cabin paint to floor coverings and floor lighting; Lavatories are an essential element and one in which Diehl Aviation has long experience; Aesthetic details play an important role in Diehl Aviation's cabin upgrades

Sustainability, wear and tear

Refit, repair and maintenance inevitably generate considerable quantities of removed, used material. Responsible airlines, MROs and manufacturers must therefore not only look to the problem of disposing used materials sustainably, but also ensuring their new cabin equipment is recyclable at the end of its life.

Vallair is an expert in reusing and recycling aircraft components and Chandler is optimistic for the future: "We work with Veolia, a large French disposal company, and I think that in two or three years we'll realistically be recycling as much as 98 per cent of an aircraft. There are already companies working with carbon fibres and other composites, and we've even had another approach us looking for seat covers."

Tivig reckons that in a typical cabin refit or maintenance operation, the items showing most wear are usually seat cushions. "They generally last between one and three years, depending on the level of passenger comfort expected and the materials used. The textile covers are probably the second fastest wearing items; leather and faux leather last longer but are more expensive. Seatbelts also get 'a lot of love', in the form of spills and other abuses." Chandler says carpets come in for rough treatment too, as do monuments in high-traffic areas, particularly galleys, which suffer regular knocks from trolleys and passenger bags.

"The overhead bins suffer lots of aesthetic damage, but they are extremely solidly built," Tivig continues. "And then there are the lavatories, where the most abused items are the seats, lids and shroud. Lavatories also see the most aggressive cleaning materials and these cause wear over time."

While a full cabin refit is occasionally necessary, much can be achieved by careful attention to aesthetics and addressing passenger comfort, through refurbished seats, new carpets and improved systems. Levels of refit, therefore, vary from little more than a campaign of repair, up to stripping the cabin bare and reinstalling with upgrades, but always reusing where appropriate and disrupting major systems as little as possible. ©

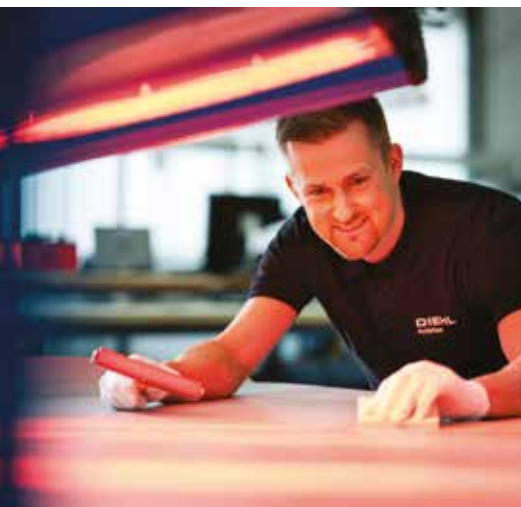
existing fleet, or simply providing a few components, it generally includes detailed installation instructions for the MRO performing the work. "In some cases where it is very complicated, new, or involves large monuments, like Skypax, which incorporates a galley and two lavatories in one monument, we send our own people to the MRO. They then typically train the MRO personnel while the first 10 to 20 shipsets are installed," notes Tivig.

Diehl Aviation holds spare parts at several locations globally, helping support customers in key areas more efficiently, but when installation support is required, personnel travel from Germany. Airlines generally undertake large retrofit programmes at major international airports with established MRO facilities, however, meaning infrastructure is good and challenges relatively easily overcome.



MROs are usually more cost effective than the larger aerospace suppliers when it comes to installation, but Diehl Aviation offers support even when none of its people are on site. Components are marked with details of their manufacturer, part and serial number for easy tracking, ensuring safe, efficient return to the manufacturer for repair or maintenance. Alternatively, if a part is time critical, it is easily replaced in the field.

This process of rectification is also applicable to in-service components, and Tivig explains that some of Diehl Aviation's customers keep 'rolling stock', treating the inventory items as rotables. "Certain parts, mainly in the waste system, and primarily the gas from liquids/solids separator, have a scheduled maintenance requirement. In some cases the airline has spares in stock, so when scheduled maintenance comes up, they use a spare and send the used part to us. We refurbish it and send it back into their stock."



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A resourceful substance

In passenger aircraft interiors, the versatile characteristics of foams are put to use in a variety of applications, as *Bernie Baldwin* reports



Clockwise from left: Zotefoams' Zotek F OSU is fast becoming the material of choice for interiors; MPSHybrid uses advanced manufacturing techniques; Zotek F offers a variety of applications in the cabin

The word 'foam' can conjure up a variety of images in the mind. One definition in the Concise Oxford English Dictionary, "a collection of small bubbles formed in liquid by agitation", leaves much to the imagination;

but another, "rubber or plastic in cellular mass", creates a much closer vision of the foams used in aircraft interior structures.

Even in this field, foams come in different forms and, given their varying mechanical properties, are put to use in different ways. David Howgego, manager for business development at MGR Foamtex, explains further.

"In terms of physical construction, there are two main types of foam used in the aircraft cabin," he begins. "Open cell foams are normally used for seating and closed cell foams are used in other areas, such as vertical panels. This is driven by both the required comfort properties and the ability of each type to meet the specific certification requirements of each application. At MGR, we use open cell PU (polyurethane) foams for cushions and closed cell PVDF (polyvinylidene) foams for our MGRSoftWall range of vertical wall coverings.

"Providing high passenger comfort and sufficiently durable foams is indeed a challenge that airlines face, especially for long-haul journeys. In addition to comfort and durability, passenger well-being and health is an increasingly important area that is key to both product differentiation and to meet ever-increasing passenger expectations," observes Howgego.

"Our new MPSHybrid product has been developed to address this particular market need and is specifically designed for long-haul. The MPS (Multi-Postural Seating) system uses patented and clinically proven technology to reduce

10%

Zotefoams' Zotek F OSU grade offers exceptional weight savings – 10 per cent of the density of a typical polycarbonate panel

discomfort and increase blood flow when seated for long periods," he continues.

"Previously limited only to First Class and premium Business Class applications, MPSHybrid uses advanced manufacturing techniques to combine the MPS element with a moulded seat base to reduce costs. The result is that MPSHybrid brings super-premium comfort at a much more affordable price."

Rosemary Alton is group marketing manager at Zotefoams, whose Zotek F OSU, she notes, is "fast becoming the material of choice for many applications in aircraft interiors due to its luxury feel, exceptional processing versatility and outstanding fire, smoke and toxicity (FST) properties". For aviation seating, the company offers two main grades from its Zotek F range: Flexible and Semi-Rigid.

"With Zotek F OSU Flexible being the lightest and softest grade, it is applied in seating areas where comfort and feel are of the highest priority. Providing a luxurious, soft finish, this flexible OSU grade foam can be incorporated in a variety of coverings including ultra-leathers, ultra-suedes and other

fabrics while taking advantage of its extremely low OSU [heat/smoke] test values and creating a variety of aesthetic possibilities," Alton adds.

"Zotek F OSU Semi-Rigid, on the other hand, is a slightly firmer grade, making it perfect for applications where support is the priority – in armrests for instance. As Zotek F benefits from a uniform cell structure, its physical performance is compatible with a wide range of forming methods: this allows the production of complex shapes such as the increasingly detailed designs of the latest business and first-class armrests, whilst retaining an A-grade surface finish."

Zotefoams also provides firmer grades of foam – Zotek F OSU Rigid and Extra-Rigid – which, according to Alton, have been successfully incorporated into other areas of the aviation seating market.

"Zotek F OSU Rigid fits perfectly as a composite core in seating panels, creating a self-insulating panel and eliminating the need of extra insulation layers on the outside, offering the advantage of saving space in the aircraft cabin," she explains.

"Zotefoams' most recently launched Zotek F OSU grade is the Extra-Rigid (XR) grade; this has been specifically developed as a disruptive technology to replace solid plastics in semi-structural applications in the aircraft cabin. This new foam offers exceptional weight savings, being just 10 per cent of the density of a typical polycarbonate panel.



The Multi-Postural Seating system uses patented technology to reduce discomfort and increase blood flow

Right: Zotefoams' XR is suitable for seat, sidewall and head form applications

XR is already in use in seat, sidewall and head form applications: it can be bonded with other grades such as Zotek F OSU F without the use of adhesives, creating a very lightweight component with excellent flammability credentials," Alton reports.

The operational structural properties of these engineering foams do not just come from their chemistry. How easy they are to form and the different types of forming they undergo create the properties needed to perform the function of the final product.

"Zotek F benefits from a uniform cell structure, offering the same properties in all directions, providing exceptional processing versatility," confirms Alton. "These characteristics derive from Zotefoams' unique three-stage manufacturing process, which uses temperature and pressure rather than a chemical agent to expand foams.

"This gives all Zotefoams products an extremely fine and consistent cell size, as well as the isotropic mechanical properties mentioned above. These factors combine to ensure Zotek F is one of the easiest foams to cut, shape and mould into any design imaginable.

"Complex shapes, such as snap-fit gap fillers and flexible ducts, can be one-shot moulded with Zotek F. With such a unique cell structure, Zotek F grades can be fabricated via multiple methods, allows maximum flexibility and efficiency," the group marketing manager elaborates.

Howgego picks up on the question of forming the foams, giving details for the products which use MGR's offerings. "Seat cushions are typically moulded for high volume applications. Liquid foam is poured into a custom mould and



Zotek F is one of the easiest foams to cut, shape and mould into any design imaginable

then expanded to create the final shape required," he states. "Alternatively, for more complex cushions (that may use multiple different foam types or are being produced in lower volumes) then finished cushions will be fabricated with individual elements cut to size before being joined together.

"For other products, such as our MGRSoftWall and MGRSoftWall NextGen vertical wall products, vacuum forming is normally used where 3-D shapes are required," he adds. "Historically, a formed thermoplastic backing would be used to support the foam. However, with the development of semi-structural extra rigid foam – such as Zotek F OSU XR – we are able to vacuum form the foam itself to remove the rigid thermoplastic support and reduce weight by 50 per cent. The formed extra rigid foam can then be combined with other grades where a softer touch is required."

Briefly mentioned earlier, the fire, fume and odour standards that materials

must meet before being put into use in aircraft are some of the most stringent regulations in any industry, according to Howgego.

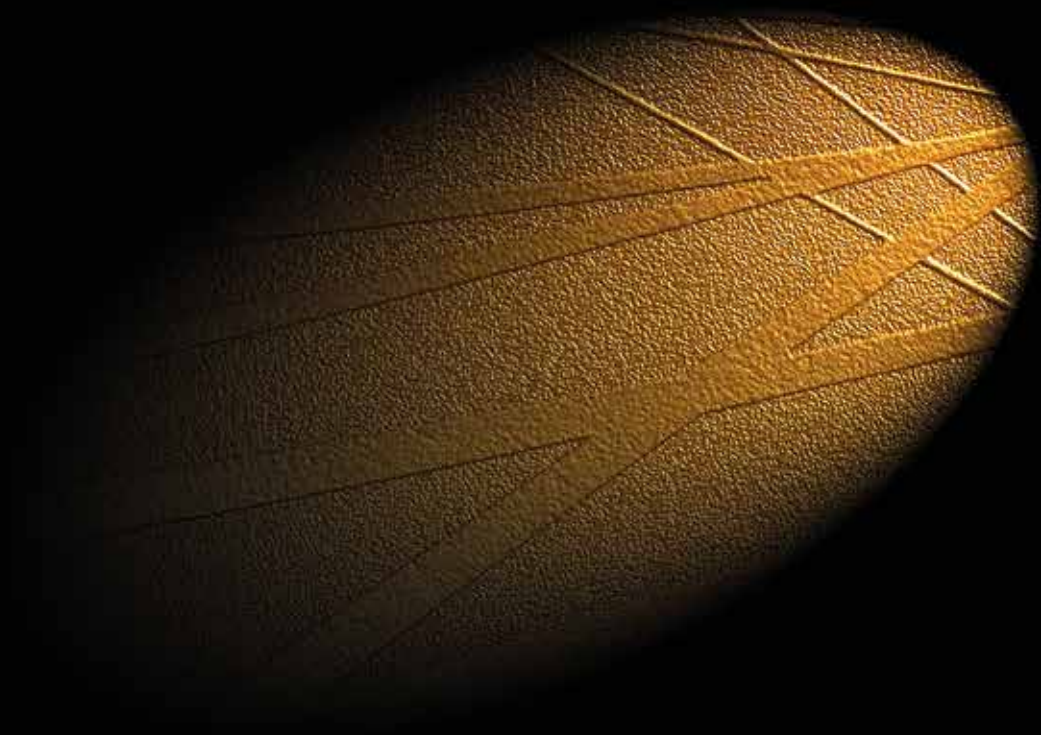
"Cabin certification standards for flammability are demanding and differ for specific applications," he confirms. "The technology has developed to meet the different requirements. For seat cushions, MGR supplies its DAX Graphite impregnated open cell foam.

"The graphite is inherently fire retardant and provides greatly improved flammability characteristics. Where necessary, a separate fire-blocker layer can be added between the foam and the cover material.

"For cabin components that are not part of the seat itself, the flammability certification requirements are even more demanding and will include heat release and smoke density tests (part of a suite of requirements called 'OSU')," Howgego adds. "Very few materials can meet these requirements. Our MGRSoftWall range

50%

we are able to vacuum form the foam itself to remove the rigid thermoplastic support and reduce weight by 50 per cent





Right: Zotek XR has been specifically designed to replace solid plastics in semi-structural cabin applications

Zotek F has excellent chemical resistance, even to aviation fluids and chemicals, and it is biologically inert

of soft-touch vertical panels meet all OSU certification requirements.”

Regarding these requirements, Alton comments first on their stringency. “The aviation industry prides itself on being the safest transportation industry in the world, and this is in no small part down to the infinitesimal detail that goes into every single one of the millions of parts fitted to an aircraft. Aviation flammability standards are tough, each soft-touch part is scrutinised under a variety of burn tests, with everything from smoke, toxicity, and even heat release measured and quantified,” she remarks.

“This creates a ‘survival-of-the-fittest’ environment where only the highest performing materials can compete and eventually make their way onto an aircraft seat; this is why Zotek F OSU has been so successful in the aviation seating industry.

“It is an inherently flame-retardant material, releasing very little heat and small quantities of smoke during combustion and therefore meeting stringent aviation flammability standards,” Alton expounds. “Achieving a pass in many of these tests is one thing; passing with flying colours, however, can make a huge difference to the design of a seat.”

Zotek F OSU’s performance in heat release tests has been exceptional, which opens up possibilities “for exciting coverings that create a more aesthetically pleasing environment for the passenger,” the Zotefoams exec explains.

Since Covid-19 became prominent in 2020, cabin materials providers have sought to incorporate anti-microbial

technology into their products and specialist foam providers are no different, although Alton reports that Zotefoams products have many of those characteristics already.

“Zotek F has excellent chemical resistance, even to aviation fluids and chemicals, and it is biologically inert, making it resistant to mould and bacteria. As a closed cell foam, it does not absorb water and so water is unable to collect and cause corrosion.

“Moreover, ASTM standards testing demonstrates that the material does not promote microbial growth on its surface. Plus, Zotek F is completely unaffected by UV light, so UV sterilisation is another option,” she confirms.

Howgego addresses the use of anti-microbial technology from a slightly different standpoint. “Incorporating such technology into the foam itself would be of limited value as the foam is always covered and is not a contact surface with the passenger for virus transmission,” he points out.

“However, the seats themselves are indeed the highest frequency touchpoint

for all passengers and are an area that is often neglected.

“While airlines will endeavour to wipe the hard surfaces in the cabin before every flight, the soft furnishings including the seat cover generally go untouched. In fact, seat covers typically only get changed after several months when removed for dry cleaning – which can mean up to 1,000 different occupants between cleaning. Viruses can survive on seat cover fabric for extended periods, as can other unpleasant contaminants.

“To address this, we have developed MGRSafeWall, which is a highly effective anti-microbial protection system for the aircraft cabin and is ideal for soft furnishings,” Howgego elucidates.

“Applied as a simple one-time spraying process, it provides long term, inherent protection to the entire finished part. Treating complete assemblies means that there are no gaps, no shadows and no untreated areas, which we refer to as Total Encapsulation.

“MGRSafeWall has been demonstrated successfully against SARS-CoV-2 – the actual virus that causes COVID-19 – as well as a broad range of other threats such as other viruses, bacteria, fungus and mould, ensuring it is both effective now and will provide post-COVID value in the future.” That’s why Howgego finishes with the reminder that MGRSafeWall is a finalist in the 2021 Crystal Cabin Awards.

Both aircraft OEMs and airlines like it when structures are lightweight and structural foams are delivering the necessary properties to keep them happy. ©

1,000

seat covers typically only get changed after several months when removed for dry cleaning – which can mean up to 1,000 different occupants between cleaning.

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MATERIAL BENEFITS

Much of an airliner's cabin comprises composite material and the latest technologies are opening up advanced manufacturing possibilities, while simultaneously improving the prospects for recycling at end-of-life, as *Paul Eden* discovers



Step into an airliner cabin and much of what you will see around you, the stowage area and monuments at the entrance, the seat shells, cabin sidewalls, passenger service unit housings, bulkheads, bins and even smaller, functional items, are likely to be made of or include composite, or laminate, materials.

Composites are created by combining materials in layers. Typically employing fibres held in a matrix, they are generally relatively light in weight and very strong. They may be manufactured as simple sheets for use in constructing panels or larger structures, or permanently formed into a finished product shape. Given the variety of laminate composition and vast array of construction possibilities laminates provide, the subject is complex, but David McConnell, associate director of advanced materials and processes at Collins Aerospace provides a useful summary.

“Collins Aerospace has a wide product portfolio and applications across our interiors business unit, so numerous composite technologies can be utilised. Application ranges from traditional composite sandwich panels to many different types of composite structures, using laminates for both simple and more complex structural parts. Uses exist

across seating applications, systems for cabin monuments like lavatories and galleys, to pressure vessels and tanks.”

In some cases, composite components may be formed by laying materials into a mould before applying heat and pressure, as McConnell explains. “The layup of laminates is essentially an additive process, so parts can be designed and manufactured with less waste compared to subtractive machining of metals, so an improved buy-to-fly ratio can be achieved, especially with new automated robotic processes.

“Traditional autoclave processing has been among the most common methods for curing structural thermoset materials owing to the high pressure and heat required to produce structural parts for aerospace applications. However, the disadvantages of autoclaves are the high processing costs and long cycle times. Therefore, many technologies today are focused on ‘out of autoclave’ processes, including compression moulding and stamp forming of thermoplastics, in order to reduce costs and meet the high rate volumes needed for many interiors applications.”

LIGHTER THAN ALUMINIUM

Manufacturing processes, including automation, and materials selection, are important factors at Sekisui Aerospace. The company employs OptiPart, a proprietary system used during component definition, to optimise manufacturing using data on load, mounting, operational and manufacturing parameters and part size. The result is a range of bespoke composite components that, if manufactured from chopped carbon fibre, may be as much as 50 per cent lighter than the aluminium equivalent and without the waste associated with machining from an aluminium block.

Across its four US facilities, Sekisui Aerospace nurtures manufacturing



New thermoplastic composite technologies offer better opportunities for recycling and a sustainable circular economy

expertise with a wide variety of thermoplastics and thermoset materials. Equipment varies between sites depending on product output, but includes large, computer-controlled autoclaves, curing ovens and thermoplastics moulding set ups.

The company has also developed the Qforge thermoplastics moulding process, capable of producing replacements for aluminium parts that are 40 per cent lighter, but match the metal equivalent for strength and stiffness.

Headquartered in Austria but with facilities around the world, Isovolta's Aviation & Transportation arm offers an equally impressive range of products and services to the aviation industry, including its Airpreg pre-preg.

Composites generally comprise fibres or other elements impregnated with resins and held within a matrix. They may be 'laid' within a mould to create complex component shapes, before combinations of heat, pressure and chemical reaction cause them to harden.

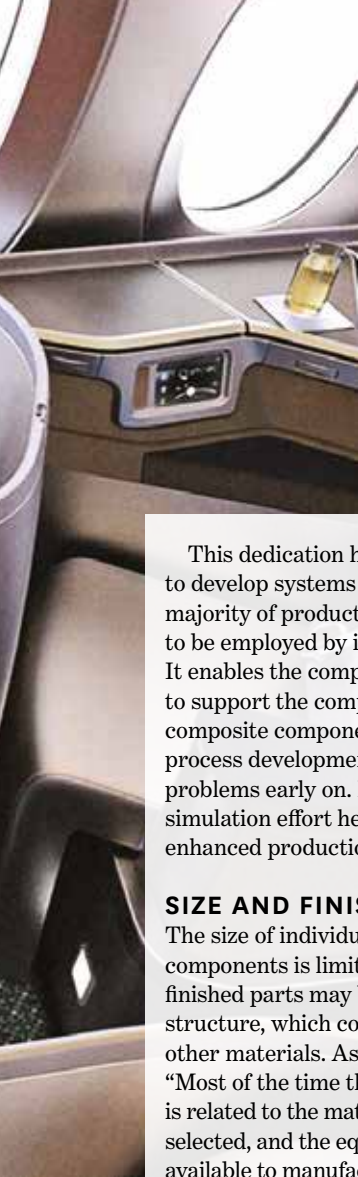
Handling, versatility and manufacturing are greatly improved using fibres pre-impregnated with resin – pre-pregs – enabling the type of batch process necessary for high production rates.

The Airpreg composite range embodies essential qualities for aircraft cabin construction, including the lightweight and strength typical of such materials, and fire, smoke and toxicity-retardant (FST) characteristics, enabling it to meet

strict certification criteria. Isovolta also offers Airvolt, incorporating fibre glass, for larger panels, but offering similar FST qualities and available according to customer requirement with a Tedlar polyvinyl film finish on one side.

Compliance with FST regulations and regular testing to ensure subsequent batches continue to comply, is essential to achieving cabin safety. It is therefore not unusual for composite manufacturers, including Isovolta, to operate in-house fire test laboratories.

However, the Austrian company's lab also works alongside technology and research laboratories, part of a research and development effort aimed at constant product development and improving processes.



Left: Almost every item in this Collins Aerospace business class configuration is at least partially assembled from composite materials. **Right:** This first class suite from Collins Aerospace demonstrates the finish quality and precision engineering possible with modern composite materials



LAMINATES

This dedication has enabled Isovolt to develop systems for simulating the majority of production processes likely to be employed by its aviation customers. It enables the composite manufacturer to support the companies producing composite components, promoting process development and identifying problems early on. In addition, the simulation effort helps Isovolt deliver enhanced production process training.

SIZE AND FINISH

The size of individual composite components is limited, but several finished parts may be combined into a structure, which could include parts in other materials. As McConnell observes: “Most of the time the size limitation is related to the material and process selected, and the equipment capabilities available to manufacture the product.

“But new material technologies, like thermoplastic composites and processes, offer lots of opportunities to rethink the composites design space and advanced architectures by enabling designers to combine similar and dissimilar materials through consolidation, joining and welding technologies.”

He continues: “There are a number of important parameters to consider in making these successful, but some limitations include material/chemistry compatibility and key aspects for

processing, such as thermal properties and parameters. Hence, digital engineering and simulation can be key to helping improve the development time to market, costs and quality.”

Based in the UK, the Attwater Aerospace division of the Attwater Group manufactures polyamide glass and phenolic cotton composites, the former especially suited to use in high temperature environments, while the latter is particularly adept at accepting surface finishes, including paint and engraving.

The scope for creating finished composite products is an important consideration so far as quality is concerned. Parts must be smoothly finished, textured and coated to suit customer requirements and there may, for example, be requirements for specialist primers before paints are applied. McConnell says the level of surface preparation needed is dependent upon the materials and process chosen.

“For example some materials traditionally used for aircraft interiors, including phenolics, have required lots of surface preparation due to the nature of the outgassing of the condensation curing reaction during manufacture, which can cause imperfections in the moulded surface. Conversely, new FST resin systems and thermoplastics can be ‘paint ready’ from the tool to reduce secondary processes and cost, but some do need special surface treatment and primers due to chemical resistance of the base resins.”

SUSTAINABLE FUTURE

For a decade and more, aircraft end-of-life processes have increasingly focused on reusing and recycling materials. Soon, as much as 98 per cent of an aircraft could be recyclable, but composite materials have traditionally been impossible or very difficult to deal with in an environmentally responsible manner – landfill or burning have been common solutions.

Some panels have found their way to recreational vehicle enthusiasts, where their strength and light weight are appreciated at knock-down prices, but this represents a tiny percentage of the material released. Now the situation is

changing, with new technologies in the manufacturing process and consideration for what happens when composite components are scrapped.

McConnell explains: “Many thermoset resins used to make traditional laminates have challenges around recycling unless the resin can be ‘burned off’ with chemical or high energy processes. However, new thermoplastic composite technologies offer better opportunities for recycling and a sustainable circular economy, from insourcing/production to end-of-life products.”

The responsibility for ensuring the industry continues to enjoy the benefits of composites while addressing the challenges of sustainability sits at every stage in the process, from the selection of raw materials, through manufacturing to assembly and beyond.

Clearly cognisant of the effects its processes may have on the environment, the Attwater Group operates in accordance with a robust environmental policy recognising that the company’s future success will be measured “not only by the quality of its products and services, but also by the impact the business has on the shared environment”.

Notably, Attwater’s environmental policy seeks to “ensure that hazardous materials are as far as practicable eliminated from processes and from products and that any hazardous waste or by-products of the operations are identified and as far as practicable eliminated or disposed of as proscribed.”

Much of an airliner’s cabin, not to mention cargo hold liners and other components passengers will never see, are made of composite, or laminate, materials. The facts that these materials are increasingly recyclable at the end of their life and manufacturers are looking at processes with minimal cost to the environment is very good news indeed. ●

40%

The company has also developed the Qforge thermoplastics moulding process, capable of producing replacements for aluminium parts that are 40 per cent lighter, but match the metal equivalent for strength and stiffness



Turn on & Tune in

In our regular round-up of developments in inflight entertainment and on-board connectivity, contributing editor **Colette Doyle** hears from Panasonic about plans for its 4K ultra-high-definition cabin, while Galgus outlines the pitfalls of MAC randomisation. Elsewhere, Inmarsat unveils what it is calling “the communications network of the future” and Intelsat delivers for Cathay Pacific

FULL-SERVICE SOLUTION FROM PANASONIC

“In August this year, Panasonic Avionics delivered a world first when its 4K ultra-high-definition IFE full cabin officially entered service with Cathay Pacific Airways. This innovation from Panasonic pushes the boundaries of IFE and provides airlines with the highest quality seatback screens in the world.

“Passengers have become accustomed to 4K content on the ground and have been looking for these types of advancements in the air as a natural replacement for HD. Panasonic has been at the forefront of developing and

introducing 4K technology to the skies, launching the 43-inch, 4K display at the Aircraft Interiors Expo in 2019, which is now flying.

“Our 4K IFE solution entering service with Cathay Pacific incorporates on-demand services with one of the largest movie and TV libraries available on a regional single-aisle aircraft. It also includes Bluetooth audio streaming, enabling airline passengers to watch the latest Hollywood blockbusters in 4K using their own Bluetooth-enabled headphones.

“Our screens provide colour quality never seen onboard an aircraft and leverage the R&D technology from

Panasonic’s consumer electronics and camera divisions. Our exclusive cutting-edge, optical bonding technology eliminates the air gaps between the LCD panel and glass, resulting in sharper, crisper images that reduce glare by up to 65 per cent. The better contrast enables a brighter, more vivid colour offering.

“Our 4K system provides a simple, scalable IFE solution that can be distributed locally throughout the cabin. The lightweight technology we have developed saves cabin space and provides a welcome weight reduction for airlines with a resultant decrease in fuel consumption and emissions.

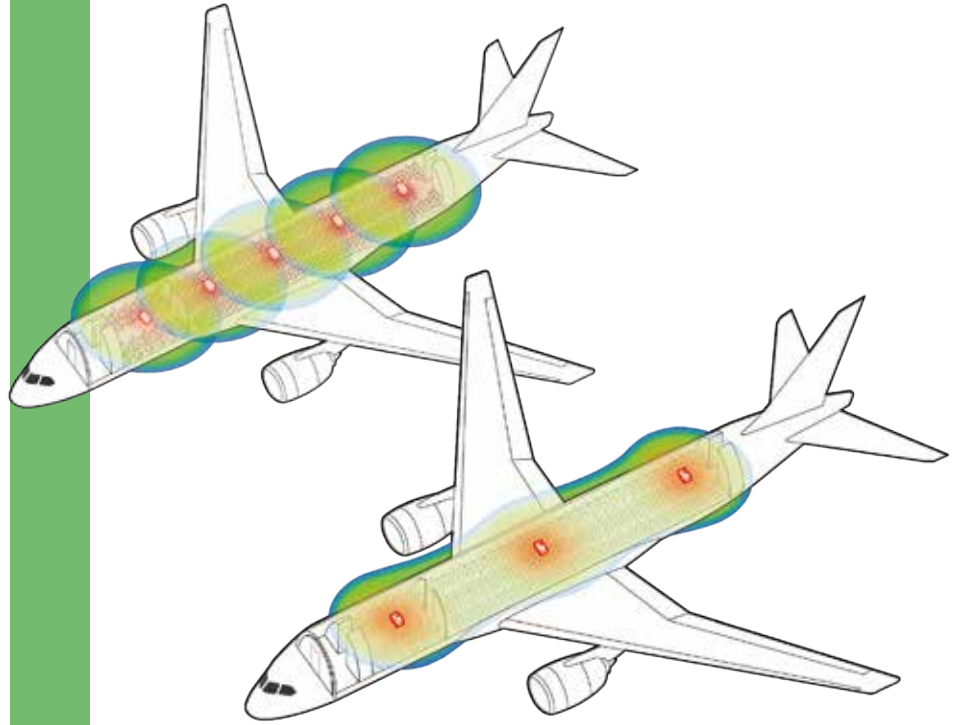
This is what's next

"The 4K screens are an integral part of Panasonic Avionics' Next IFE Series – the industry's most powerful inflight entertainment system. Next incorporates the latest advancements in aircraft architecture to deliver an augmented cinematic experience and simplified seat integration for every cabin class. The high-speed, fibre-based backbone of our Next system supports our 4K services, which includes a huge internal memory to store high-definition movies onboard.

"Panasonic Avionics is actively working to bring more 4K content to the cabin. We have been able to upscale lower resolution content to 4K resolution following the most stringent requirements such as the industry's APEX standard of the highest rate and quality possible. In addition to supporting the various 4K content already available today, Panasonic is also working with numerous Hollywood studios to make more 4K digital rights management content available exclusively for our airline partners."

ANDY MASSON

Vice-president of product
and portfolio management
Panasonic Avionics



Airlines need to be aware of the impact of MAC randomisation on their aspirations for passenger engagement



Clockwise from left: Covid means more passengers rely on their own devices; Galgus's wifi offers a solution to MAC randomisation; Intelsat's 2Ku antenna lets airlines access the global Intelsat network

CONNECTIVITY NEEDS CAREFUL APPROACH

"We all see the importance of giving back passengers the confidence to travel again and to feel protected, connected and informed throughout their journey. Meanwhile, there are many solutions in the market to support that physical comfort and protection, ranging from new cleaning chemicals to apps for checking on the bathroom queue.

"The Covid situation has certainly accelerated the pre-existing trend that elevated the role of the passenger's Personal Electronic Device (PED) during

the journey. These PEDs have evolved from a pleasant travel companion to an essential tool for the passenger to gain information, control, and entertainment. They have also become a fantastic tool to engage with passengers, achieve major cost and weight reductions and increase customer satisfaction.

"In that respect the Covid crisis is helping the airline product to become much more passenger-centric and therefore successful. Key to all this is proper connectivity on the aircraft, as well as throughout the journey.

"Unfortunately, the connectivity landscape is not as unified as the increasingly loud demand for seamless

connectivity from passengers, airlines and connectivity bodies such as the Seamless Air Alliance might require. On top of that, there is a worrying trend called MAC randomisation that is brewing in the background without much awareness amongst operators.

"MAC randomisation, i.e. the latest generation of PEDs masking their true MAC address on a particular wifi network, has a major impact on the passenger journey by denying the recognisability of the device. Hence the attempts by operators to unify and smooth the connected experience throughout the journey, which requires the identifiability of the passenger, are



Left and below: Cathay Pacific's installation of Intelsat's 2Ku system provides a reliable, high-performance inflight entertainment and connectivity experience for passengers

Inmarsat maintains Orchestra will eliminate the industry-wide challenge of congested network 'hot spots'

being hampered by the very devices that the operators were hoping would enable that deep engagement.

"Apart from the inconvenience for the passenger of having to re-enter wifi networks repeatedly, there is the problem of the impact of randomised MAC addresses on statistics and analytics for the wifi system, its performance and usage. They will distort anything from "counted" passengers to the analysis of passenger flows, wifi consumption patterns and so on.

"In their quest for the perfect passenger experience, airlines need to be aware of the impact that MAC randomisation is having on their aspirations for deeper passenger engagement. Currently, Galgus' suite of software-defined wifi is one solution that has the capability to negate the negative impact of MAC randomisation."

MARKUS GILGES

Director of business development
Galgus

INMARSAT ORCHESTRATES THE NETWORK OF THE FUTURE

Inmarsat has unveiled plans for Orchestra, which it is describing as a "first-of-its-kind network" that will seamlessly integrate existing geosynchronous satellites (GEO) with low earth orbit satellites (LEO) and terrestrial 5G into one "harmonious, high-performance solution".

The company says Orchestra is designed to "meet evolving connectivity needs in the mobility market with a service unmatched by any competitor offering, planned or in existence".

Orchestra is said to be unique because it draws together the benefits of multiple technologies to create one cohesive solution. LEO, GEO and terrestrial networks have never been combined at scale before to create a unified connectivity service for mobility customers.

The result is a "dynamic mesh network" that will deliver high-performance connectivity everywhere. Bringing together the lowest average latency and fastest average speeds with unique resilience, Orchestra will eliminate the industry-wide challenge of congested network 'hot spots', maintains Inmarsat.

Inmarsat's existing GEO satellites – both GX and L-band – will continue to provide global coverage, high

performance, security and resilience. Terrestrial 5G adds ultra-high capacity in busy 'hot spots', such as ports, airports, and sea canals. A small constellation of LEO satellites will layer additional high capacity over further high-demand areas such as oceanic flight corridors. As a result, the network will offer the highest capacity for mobility users worldwide. The network will also benefit from 'dynamic mesh' technology, which allows individual customer terminals to direct traffic to and from other terminals.

INTELSAT CONNECTS TO CATHAY PACIFIC

Intelsat recently delivered the first factory-installed 2Ku system on an A321neo aircraft. The 2Ku system was installed by Airbus at its factory in Hamburg, Germany as part of its High Bandwidth Connectivity Service (HBCS) and delivered to Cathay Pacific. The carrier's A321neo aircraft will fly regional routes from its base in Hong Kong.

The Intelsat 2Ku antenna enables airlines to access the global Intelsat network and, in turn, a reliable and high-performance inflight entertainment and connectivity (IFEC) experience for their passengers and crew. The ability to offer the factory-installed option to airlines means Intelsat's services are available immediately at the time an airline receives its new aircraft.

"We're honoured to work with Airbus and Cathay Pacific to create this substantial catalogue offering. Being part of the world's largest satellite company creates a great opportunity to expand the services we offer and the fleets we serve," says Intelsat's senior vice-president of the commercial aviation division, Dave Bijur. "We have been working with Airbus to deliver linefit aircraft and are pleased to now make that a reality," he adds.

Intelsat is currently leveraging its unparalleled global orbital and spectrum rights, scale and partnerships to build the world's first global 5G satellite-based, software-defined "network of networks." The Intelsat network will be capable of supporting virtually any access technology, enabling the next generation of global mobility, IoT and 5G services with never-before-seen simplicity, coverage, economics and performance, according to the Virginia, US-based operator. ©





JETLINER CABINS: EVOLUTION & INNOVATION

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Career PATH

Tell us how you got to be where you are today

After graduating from Hatfield Polytechnic with an Aerospace Engineering degree I realised that engineering was a career worth progressing. In spring 2001, I was invited to help start up a new engineering design office. We had an early September start date. That same summer I decided to move house and get married, so nothing too stressful!

On 4 September of that year Aerospace Engineering Solutions was incorporated and this year I am delighted to be celebrating its 20th anniversary.

What is the most interesting part of your job?

I have a fantastic team at AES and enjoy working with them. My job can take me anywhere, meeting existing and new clients to discuss their Part 21J design engineering needs and find the simplest, cost and time-effective solutions.

My 20+ years of technical experience in structural and cabin interiors design engineering enables me to interpret airworthiness requirements. This, coupled with understanding what customers are seeking, puts me in a wonderful position to



Andrew Dolby, director of Aerospace Engineering Solutions, on being an 'aeronerd' and the importance of a good breakfast

suggest a workable solution that can be understood by all.

What would be your alternative career?

My passion is aviation, so I would say being a commercial pilot or cabin crew would be highly rewarding. I grew up near Gatwick Airport and while studying I worked in the terminal, as an aircraft cleaner, a baggage handler and airport security, loving every minute of it. Just being near or in an aircraft made it worthwhile – it's safe to say I am a bonafide aeronerd!

What is your flying routine?

I like to fly economy coupled with accessing the airport lounges, as that means I can have a good breakfast before flying and some rest time. Depending on the flight duration I catch up on emails but also find the time to relax and switch off. I listen to my

playlist and explore the airline inflight entertainment.

What is your favourite on-board meal?

I enjoy a good curry. Whether it's meat or vegetarian, spiced dishes from around the world are always a pleasure. (I always try to be super-careful as I usually wear white shirts!)

What content would catch your eye on the IFE System?

The last 20 years have seen a monumental shift in IFE, something that I am proud to say AES has played a fundamental part in the certification process for many airlines.

Having access to "on-demand" classics such as *Only Fools and Horses* or US cartoon *Family Guy* is always a treat. Long-haul flights may lean me towards a box set that I've wanted to watch. It's



all a far cry from the days of watching a projected film on a flip-over screen, listening to music piped through pneumatic hoses.

How do you see the aircraft cabin evolving in future?

As data is stored locally on SSD and compression ratios are increasing, I see more content being available to the passenger. Onboard streaming systems using your device is a real game-changer and will continue to grow.

Streaming music, watching films, browsing magazines, as well as ordering food, drink, and duty-free products via the IFE system makes the travel experience so much more enjoyable. ©





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