INNOVATIONS

future

EXPERTS FROM THROUGHOUT THE INDUSTRY DISCUSS THE CABIN INNOVATIONS WE CAN EXPECT OVER THE NEXT DECADE

Words by Izzy Kington. Illustration by Sean Rodwell

IFEC AND CMS

There seems to be consensus that the trends for increased connectivity and use of PEDs will grow. "The challenge will be supporting a multitude of off-the-shelf platforms in terms of charging and input," says Tray Crow, director of interior design at Gulfstream.

For Inmarsat, which offers a Ka-band internet service with speeds up to 15Mbps, the key is to keep adding capacity. Kurt Weidemeyer, vice president of business and general aviation, says the company is talking to its hardware suppliers to introduce "proven" modem technology that will take streaming speeds to xxxMbps within the next two years. "We're also looking to get more efficiency out of the antenna," he says.

Also within the sphere of connectivity, Satcom Direct has identified the need to protect transmissions between the aircraft and the ground as key.

PEDs aren't the only technologies that could contribute to the demise of fixed displays, says Billie Noble, director of electrical engineering at Associated Air Center (AAC): "I would like to see some interior designs replace monitors with screenless TVs that work like holograms."

Yves Pickardt, VIP aircraft interior designer at Linda Pinto-led studio Alberto Pinto, has the same idea: "You can get rid of real monitors and display information on almost any surface."

Elisabeth Harvey, director design at the Jet Aviation Basel Design Studio, says fixed PCUs will be replaced by smart storage solutions and holding devices for PEDs, but that 3D screens will become more popular. In the near term, Vince Restivo, vice president of program management at Mente Group, says space-saving OLED/QLED screens aren't too far off. "Practical video-conferencing and voice-activated system interfaces will soon be prevalent," he says. "Camera and video screen improvements will also make virtual reality a part of the interior."

Pickardt of Alberto Pinto and Adam White, director of Factorydesign, also expect a move to voice control. Harvey of Jet Aviation expects certain developments in the car industry to translate to private aircraft interiors within the next 10 years. "Hologram touch displays or gesture control will give passengers much more freedom in the cabin," she says.

Jay Beever, vice president of interior design at Embraer Executive Jets, warns that importing from other industries has to be done carefully. "We do not want to accidentally incorporate something that becomes out of date quickly," he says.

Overall, Noble of AAC says the move is toward functions combining in more unobtrusive and lighter equipment: "Companies will start producing smart boxes that include all the functions needed."

The new Glass Cabin 3D moving map from FDS Avionics enables passengers to see through the cabin to the surrounding terrain in the direction they point their PED

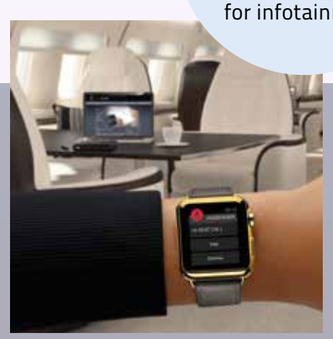
TOP: FDS AVIONICS' GLASS CABIN 3D MOVING MAP

CENTER: VISION SYSTEMS INTRODUCED GESTURE CONTROL FOR ITS SPD-SMART EDW

RIGHT: SATCOM DIRECT AND LUFTHANSA TECHNIK RECENTLY LAUNCHED A PED-FRIENDLY IFE CONTENT SERVICE DELIVERED VIA SMARTBOX

Inmarsat is launching the European Aviation Network, using a combination of satellite and air-to-ground technologies. In test flights, the service hit speeds of up to 75Mbps. Kurt Weidemeyer credits this to having a 30MHz frequency spectrum and using 4G LTE technology

The recent FCX-001 concept from Bell Helicopter envisages augmented reality being used for infotainment



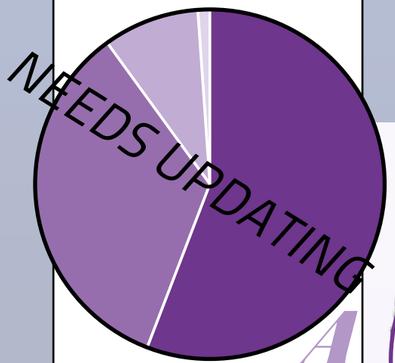
There is now a European Centre for Cyber Security in Aviation; members will be provided with intelligence on cyberattacks and on-demand means to face these threats

LEFT: IDAIR ENABLES CMS CONTROL FROM PASSENGERS' SMART WATCHES

RIGHT: GESTURE CONTROL IS ALREADY IN SOME CARS – INCLUDING THIS VW GOLF

Readers' poll

Q **What would you like seat manufacturers to prioritize when developing new products?**
As of publication day, our online readers say...



% Greater reliability/durability
% Improvements to seat heating
% Improvements to massage functionality
% Integration of inductive charging
% Integration of new control technologies
% Enabling more customization
% Reduced cost
% Reduced weight

RIGHT: MODULAR FLOORING ON BELL'S FCX-001 CONCEPT ENABLES RAPID CHANGES TO THE SEAT CONFIGURATION

HAECO Cabin Solutions created a double-hinge headrest to support the head and neck better than static and articulating headrests. Arc has a five-segment, articulating-joint cushion system with adjustable tilt and height

SEATS

The modular nature of Inairvation's ETSO 9*g*- and 16*g*-certified Chair platform is one of the biggest recent changes in the seat market. Chair is the basis for a new design by Alberto Pinto, created as part of a showcase concept for the BBJ737 MAX 7, 8 and 9, with a brief to look good for the next 10 years. "We used their technology for a one-pedestal base, but designed a carbon-fiber shell with a Kevlar-ending surrounding," says Yves Pickardt of Alberto Pinto.

Features include massage, integrated speakers in the headrest and a compartment in the armrest for controls and storage. To see through his vision, Pickardt is pushing for research to be conducted on how to apply leather to foam without stitching. "The old way, stitching and cutting like tailoring a suit, belongs to the past," he says. "A new technology would be to glue and vacuum the leather directly to the shaped foam, which you would then just cut around. I am confident this technology could be developed, and it would enable a seat to be upholstered 10 times faster."

Meanwhile, Adam White, director of Factorydesign, is hoping to see new superlight structures, not growing out of the floor but apparently hanging in space. "I'd like to see structural, high-tech materials on show rather than have working parts hidden by styling and cosmetic covers that add weight," he says.

On the subject of materials, could we see magnesium used in future aircraft seat designs? Birmingham City University in the UK and magnesium component supplier Meridian are collaborating on research and development (and educational) programs to push its wider use. According to the university, magnesium, at 1.8g/cm³, is 75% lighter than steel and 33% lighter than aluminum; it is abundant; 100% recyclable; and can deliver high strength.

Taking Inairvation's Chair as its base, F A Porsche has created a seat concept incorporating titanium and carbon fiber

LIGHTING

Aircraft Lighting products can be adjusted via Bluetooth, saving passengers' data

Warja Borges, owner and designer at Unique Aircraft, hopes to see LED lighting replicate warmer, softer tones of yore. "It's very difficult to get an equal, smooth, neutral-warm light like old-fashioned bulbs," she says. "Some light sources change the color of your carefully selected surfaces, especially beige and gray ones, which is not what you want."

Others are excited by the prospect of using digital projectors to transform their cabins. "With some of the new projection systems, let's have passing constellations, cloud formations and brand-appropriate patterns – moving gently, of course," says Adam White of Factorydesign.

Likewise, Yves Pickardt of Alberto Pinto sees the opportunity to integrate LED lighting with thin glass products. "There is a French artist who creates fractal images of flowers or trees that grow; computer images with thousands of colors and shapes that move in front of your eyes," he says. "If you could combine that with LEDs, software and glass on an aircraft, then you would really break the mold."

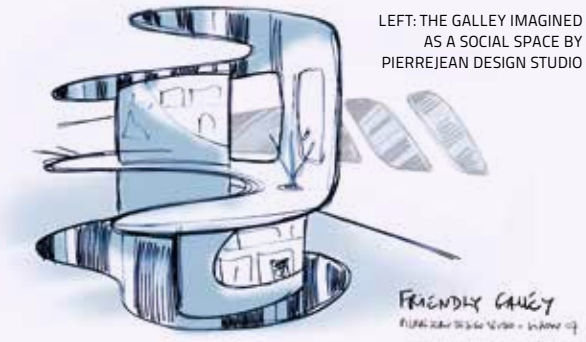
There could also be opportunities to improve controls. Sean Gillespie, executive vice president at Flying Colours Corp (FCC), says some clients want to eliminate switches. Meanwhile, Billie Noble of AAC is hoping for more opportunities to interface lighting and other systems using Bluetooth, to reduce the customer's bandwidth when using data. "Some lighting vendors have set off in this direction and I am expecting more to follow soon," he says.

RIGHT: PROJECTION AND CARBON-FIBER CLAD READING LIGHTS ON THE PAGANI ACJ319NEO CONCEPT

GALLEYS

Lufthansa Technik began European Technical Standard Order (ETSO) testing for its Induction Cooking Platform in August 2017. It enables fresh food preparation using a pan, toaster or pot, and has an integrated fume hood, odor filter system, and pot containment system

RIGHT: AEROLUX SAYS WEIGHT REDUCTION IS THE BIGGEST CHALLENGE AHEAD



LEFT: THE GALLEY IMAGINED AS A SOCIAL SPACE BY PIERREJEAN DESIGN STUDIO

LEFT: LUFTHANSA TECHNIK'S INDUCTION COOKING PLATFORM

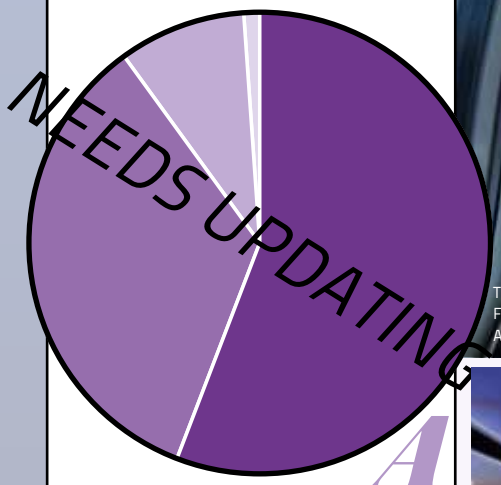
Warja Borges of Unique Aircraft would like to see aesthetic improvements in this area. "It would be great to have more modern-looking galley equipment that could also blend smoothly into the front surface with a cover," she says.

Beyond simple changes to the look, however, Sean Gillespie of FCC has seen a lot of demand for completely bespoke equipment, including one client who wanted an ice drawer to chill his vodka to a certain temperature. "We had to test it all, it was expensive," says Gillespie.

Galley insert specialist Aerolux has also responded to many such requests over the years (see page 144), but says the major challenge ahead will be meeting weight reduction demands. "A 60kg oven that was acceptable yesterday will need to be 30kg in the future – everyone's demanding lighter and lighter equipment," says Glenn McQuire, engineering manager at Aerolux. "We're looking at new materials and advances in construction technology, but a big issue with thinner and lighter fabrications is maintaining strength and resilience to damage. However, we're also looking on this development as a positive, because in the search for weight reduction, others may make inferior products. At Aerolux we won't compromise on quality; we build our galley equipment to have a 25-year lifespan or longer."

Readers' poll

Q **Which of these window innovations would you most like to see become commonplace over the next 10 years?**
As of publication day, our online readers say...

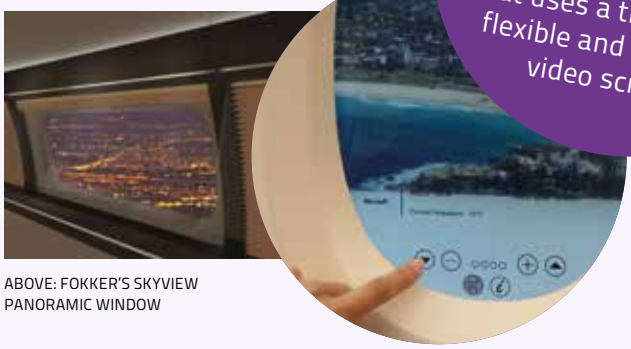


Electronic adjustment of tint/opacity
Integration of IFE/CMS controls
Much larger windows
Replacement by camera-fed displays

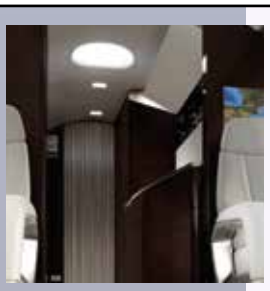
THE LATEST AS2 CONCEPT FROM DESIGN Q INCLUDES A 'SKYSCREEN'

Vision Systems has developed an electronically dimmable window integrating an interactive video display that uses a transparent, flexible and thin color video screen.

ABOVE: A TECHNICON CONCEPT USING CAMERA-FED SCREENS



ABOVE: FOKKER'S SKYVIEW PANORAMIC WINDOW



TOP: THE UPCOMING DASSAULT FALCON 5X WILL HAVE A SKYLIGHT

ABOVE: THE PORTRAIT WINDOW ON EMBRAER'S LINEAGE 1000E

WINDOWS

FCC'S Sean Gillespie reports that windows can be a deciding factor in an aircraft purchase: "We have a client that loves his Global 6000 but is buying the Global 7000 because he wants the windows, which are gigantic. He's going to put a Global 6000 layout into the Global 7000 because he just wants the windows."

Designs such as Fokker's SkyView Panoramic Window, which envisaged a huge window the width of three standard ones on a BBJ, and Embraer's portrait window on the Lineage 1000E, have caught the imagination. Meanwhile, some designers have explored the idea of removing windows completely, instead lining the sidewalls with camera-fed displays. Jay Beever of Embraer comes down on the side of big windows rather than none. "We would like to advance with regard to large windows and see technology allow for greater integration with the environment," he says.

Meanwhile, Warja Borges of Unique Aircraft is looking forward to seeing the first panoramic windows installed. "It would be great if engineering and design could work closer together on such special features as both perspectives are important to develop a perfect solution," she comments.

Elisabeth Harvey of Jet Aviation provides a reminder that in the end all will be decided by customer demand. "It will be interesting to see how far OEMs go to embrace change and how willing clients will be to adopt an aircraft that is either windowless or much more open," she says. "Panoramic windows, which will also control the amount of natural light, the cabin humidity and temperature, will be an interesting development."

RIGHT: F.LIST'S MICROLUMBAR TECHNIQUE CREATES THE IMPRESSION OF SOLID WOOD

AMAC Aerospace has created a new building process for lightweight cabinets that involves applying veneer to a new composite panel. The company says the weight reduction per monument could be as much as 30%

HARD MATERIALS

There have been huge advances in this area over the past 10 years, particularly in flooring, giving Gulfstream's Tray Crow faith in the industry's ability to make precious materials lightweight and durable. Adam White of Factorydesign also mentions the imperative for hard and durable materials: "Nanotech products are getting cleverer every year and we should have surfaces that look so good they defy being on board," he says.

Frank McKnight, CFO/partner of Signature Plating, senses appetite for new plating finishes. "No new precious metals have been discovered, so the direction is to alter the color of current finishes while keeping them in a platable and durable state," he says. "This can be easily done with a painted finish."

While Jay Beever of Embraer believes advances in composite, synthetic and recycled materials will play a crucial role, depending on acceptance, Yves Pickardt of Alberto Pinto calls for new technologies putting a new spin on real wood or marble: "I don't think we will ever get rid of natural materials, but there will be new treatments and ways of working with them," he says.

"I see hard materials becoming lighter, stronger and more flexible," says Elisabeth Harvey of Jet Aviation.

Jormac Aerospace is finding more uses for carbon fiber – including profiles, tie rods, periphery lining panels and support structures

Real stone with underfloor heating is now available from F/List. The product is 11.1mm thick, with a construction height of 17.1mm, can be heated to presets between 23°C and 33°C, and is "only negligibly heavier" than the non-heated version

Leather flooring is now available from F/List and Boxmark

SOFT MATERIALS

Tray Crow of Gulfstream would like to see more efforts to advance flame treatment so that leather has a more natural feel, with a softer hand. "In addition, we will continually be challenged to increase perceived quality, while also decreasing weight," he says.

Mary Lee, senior completions designer at Duncan Aviation, says the trend is to replicate looks from the automotive, residential and yacht industries. "We work closely with material, carpet and leather vendors and suppliers to help recognize and support these trends and requests," she says.

Likewise, Chad Evans, director of aviation sales at Moore & Giles, sees the industry leaning on seat designs from the high-end automotive industry. "Unique stitches and perforation are hot right now," says Evans.

But could more upholstery work be taken over by machines? Sean Gillespie of FCC says while a lot of leather work is automated now, at least the cutting stage, highly customized designs will still require a craftsperson's attention. "Recently a client wanted double French stitching in two colors – that has to be done by a person," he says.

Meanwhile, Jennifer Kirchgessner, creative director at Scott Group Studio, says lead time is a crucial area for development. "Designers are working under tighter timelines," she says. "We are constantly working to develop tools and technology to make their jobs easier, and provide reduced lead times."

ABOVE: LUXURY CARS SUCH AS THIS MCLAREN 570S SPIDER WILL CONTINUE TO INFLUENCE UPHOLSTERY TRENDS

TOP: THE CARPET ON A BBJ777 CONCEPT BY UNIQUE AIRCRAFT

ABOVE: PART OF SCOTT GROUP'S NEW AERIAL COLLECTION

RIGHT: AGT RECENTLY ADDED METALLIC COLORS TO ITS RANGE OF REAL GLASS

With the Natural Collection, cabin designers will have a choice of more than 300 varieties of wood veneer, which will be laminated with Air-Craftglass's glass to produce a scratch-proof and UV-resistant surface

GLASS

With the release of Amendment 19 to EASA's certification specifications for large aircraft (CS25), AeroGlass mirrors and transparencies from AviationGlass & Technology (AGT) can be installed as minor modifications, without requiring additional certification or STCs.

Now AGT and fellow specialist Air-Craftglass are releasing a host of glass-based products, giving designers a new palette of colors and functions, including the ability to integrate lighting. "Our mirrors and transparencies are becoming smarter," says John Rietveldt, CEO of AGT. "Messages and signs light up and shine through translucent glass to create a more captivating onboard experience."

Warja Borges of Unique Aircraft would like to see real glass available in larger parts, ideally frameless: "This would be a great improvement for mirrors, but also for decorative elements, etc," she says.

"We will see more and more glass, because we see it more and more in architecture," says Yves Pickardt of Alberto Pinto.

CTT is working to adapt its humidification system for traditional business jets; the key challenge is the small amount of space available

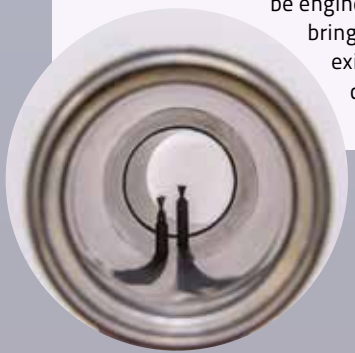
AIR QUALITY

Does the launch of Aviation Clean Air's air and surface purification system indicate a growing focus on cabin air quality across the industry?

"Aviation remains one of the few major industries in which discussion has not really started regarding the use of more sustainable materials and materials that actively improve the space around them," says Elisabeth Harvey of Jet Aviation. "I anticipate much more focus on air quality and environmental issues in the next 10 years. Clean air coatings, which already exist outside the industry, could be developed, together with enhancements to the already existing solutions of air ionization."

Adam White of Factorydesign says cost will be the biggest factor in the wider roll-out of air quality technologies: "Putting aside fume events, which can be engineered out, it's all about bringing down the cost of existing filtration and conditioning technologies."

A European Commission study is underway on cabin air quality, following two recent studies into the subject



ABOVE: AVIATION CLEAN AIR'S PURIFICATION TECHNOLOGY

Zodiac Aerospace has created a fragrance diffuser, which it says is certifiable and can be installed throughout the cabin

SOUNDPROOFING

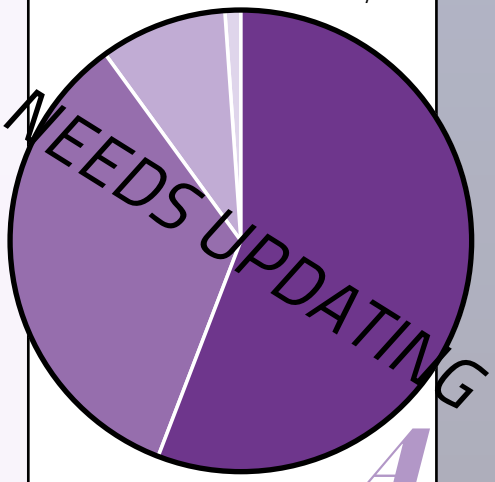
"Traveling on the B787 and A350 show the improvement with sound generally when new materials are used for aircraft construction," says Adam White of Factorydesign. "However, there are also increasingly sophisticated electronic systems that help deaden noise, which I expect to see increasingly employed."

Warja Borges of Unique Aircraft adds that there is always a balance to be made between soundproofing and range. "New lightweight materials for soundproofing would be a great innovation to reach both targets, especially to support the advantages offered by the new Max and Neo narrow-bodies," she says.

Meanwhile, Bell Helicopters believes technology such as its Speech Interference Level Enhanced Noise System could become the standard for VIP/business helicopter cabins of the future, enabling passengers to converse without head-sets.

Readers' poll

Q **Which aspect of the cabin environment is the most important for people purchasing a business jet?**
As of publication day, our online readers say...



Air quality
Altitude
Humidity
Sound levels
Stability
Temperature control