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A TEAM OF EXPERTS  
HAS PRE-ENGINEERED  
A MODULAR CABIN FOR THE  
A220, AIMING TO DELIVER THE  
SPACE OF AN AIRLINER AT  
REDUCED COST AND RISK  
FOR THE CUSTOMER

*Words by Izzy Kington*

**T**wo years ago, the project manager, technical manager and designer behind the first VVIP BBJ 787-8 interior partnered again to tackle a new challenge. The *dramatis personae* are Stephen Vella, CEO of Kestrel Aviation Management, Thomas Chatfield, CEO of Camber Aviation Management, and Jacques Pierrejean, founder of Pierrejean Vision, respectively.

"We spotted a niche for an aircraft offering the cabin volume of an ACJ or BBJ but the risk and time profile of an ultra-long-range business jet," explains Vella. "With a green ACJ or BBJ, the programme risk is devolved to the customer, who has to appoint a designer and cabin outfitter, and the elapsed time and costs accumulate. Partly this is because the design is unique, so non-recurring engineering (NRE) costs are probably between a third and a half of the total cost of the cabin."

#### MODULAR APPROACH

The team decided to create a modular design for a narrow-body aircraft, the A220. "As well as essentially eliminating the risk, our approach is going to be nominally 20% cheaper than a BBJ Max 7 or ACJ319 completion, because a chunk of the NRE costs are amortised over multiple aircraft, and completion times are also reduced," says Vella.

The team split the cabin into seven zones, giving customers a choice of pre-engineered modules for four of these. "Very much like with a Bombardier Global or a Gulfstream, you can choose the layout you want and it's built for you," says Chatfield.

Zones one, three and four are dimensionally identical, and therefore interchangeable, creating a huge number

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of permutations. Modules include seating areas ranging from six-passenger to 14-passenger options, a guest lounge, private office, game room, cinema room and a bedroom for children. In zone two, which is larger, options include a dining/conference area, majlis and a lounge.

The three fixed zones – which Chatfield says are needed in any aircraft of this size – include the entry area, with a crew lavatory, galley, buffet and wardrobe; a mid-cabin lavatory with wardrobe opposite; and the aft private suite. Customers can choose the soft and hard materials used in all those areas, and the galley inserts from Iacobucci's range, but beyond that the components are fixed.

"We've got quite a generous budget for the interior," says Chatfield. "If a client really wants a Hermès fabric on a divan, then as long as we can certify it, it's possible. Unless the price is completely over the top, it's included."

#### MATURE DESIGN

Chatfield says the design is all feasible and build processes have been developed. "We've been working on this for two years," adds Vella. "It's ready to build, with all the detailed design and specification complete. Once a customer signs up and we obtain a platform, we can deliver the first aircraft in 14 months, and subsequent ones in nine months."

The design can be translated to types such as the BBJ Max, A319 or A320neo, which Vella says might add a month to the delivery time, to account for the different interfaces.

Vella credits the maturity of the concept to the team's mix of engineering expertise and Pierrejean's design talent: "Many designers don't get engineering feedback because typically the outfitter is downstream," he adds. "We've put everything upstream together, to create a mutually nurturing, iterative process."

The chosen interior fabricator, F/List, and integrator, Flying Colours, were brought on board early on. "The green aircraft will go to Flying Colours in Peterborough, Canada, where they will strip out the interior and do all the interface work," says Chatfield. "Meanwhile, F/List will build the interior and check it on a mock-up. Then it will be shipped to Flying Colours for integration and certification. It ensures

RIGHT: A GUEST LOUNGE

LEFT: CUSTOMERS HAVE PLUG-AND-PLAY OPTIONS FOR FOUR OF THE CABIN'S SEVEN ZONES

The lighting is RGBW, and each client will have eight pre-programmed scenes, plus the software to make other programming adjustments

***"It's ready to build, with all the detailed design and specification work complete"***

## THE FIRST VVIP BBJ 787-8

The first VVIP BBJ 787-8 interior was unveiled in 2016. The complex project involved a three-year completion cycle.

Kestrel Aviation Management managed the purchase, design, modification and sale on behalf of the owner, with design support from Pierrejean Vision, and technical support from

Camber Aviation Management. Greenpoint Technologies completed the engineering, installation and certification.

As it was the first completion of its type, Kestrel worked closely with Boeing to develop the BBJ 787 specification.

The project was covered in detail in the October 2016 issue.

we have one supplier for the interior, everything will fit exactly and the interfaces will work very well."

#### NEW WAYS OF WORKING

The pandemic has forced many to turn to virtual ways of collaborating, but it's nothing new for this team. With so much of the engineering brought upstream compared to normal, and with the partners' disparate locations, online tools have been used for the vast majority of the work.

"We were able to show where the water pipes are going to come up, for example, so F/List could understand the interface point and make recommendations for the cabinetry, all virtually," says Chatfield. "When working on the conference table, I was with F/List in the workshop, and Flying Colours and Pierrejean were able to join us over video, jumping in with their ideas. It was a fantastic way to do business; we were able to take care of the issues in one day and build a prototype that works."

Vella says it was important to achieve cross-platform compatibility for different companies' design software. Chatfield thinks virtual tools won't replace the need for

Passenger capacity varies from 16 to 32, depending on the layout chosen

LEFT: A DINING/CONFERENCE MODULE THAT CAN BE PLACED IN ZONE TWO

## Common systems

NRE costs have also been "drastically" lowered by implementing common systems for water, waste, satcom, IFE, lighting, and to a lesser extent, the galley. "Systems such as the satcom and IFE are often disproportionately expensive to put into a single aircraft," says Thomas Chatfield of Camber Aviation Management. "We've included absolute top-of-the-line systems so the owner doesn't have to play around. The only place you need more flexibility is the galley, because the choice of equipment depends on what you're cooking, which is very personal."





In response to COVID-19, the team is working with suppliers for antibacterial surfaces to be used throughout the cabin



“The team includes engineers, fabricators and certification specialists, but also many who have operated and maintained aircraft around the world, so we know where the pinch points are,” says Chatfield. “This allowed us to design a very high level of reliability into it.”

### PRACTICAL INSIGHTS

Chatfield wrote his master's thesis on maintenance programmes, and with his previous experience including a role as vice president technical for Qatar Executive, he understands how vital it is to make certain components easy to access. “The philosophy is that everything in this cabin can be accessed, replaced and tested within 60 minutes,” he says.

A tailored maintenance programme will be created for each client, whereby they are asked to demarcate two one-week downtime periods a year, giving clarity around scheduling and increasing aircraft availability. Modifications can be completed at the same time; and here the concept's modularity is beneficial again as clients can ‘drop-in’ new zones to meet changed requirements, even overnight for some features if they require that level of mission flexibility. ☒

## “Everything in this cabin can be accessed, replaced and tested in 60 minutes”

completions managers to physically check installed parts, but they could reduce the amount of time needed on-site.

The aforementioned table is not the only unique design element. Vella also notes the seats are a departure from the norm, and involved in-house and external resources. All second- and third-tier suppliers for the cabin are on board, and “under very strong NDAs to protect our IP,” says Vella. “In some cases we’ve worked with suppliers to bring new technologies to market.” Vella also says the positioning of the 75in 4K monitor in the media centre is unique. In addition there is a buffet – with a tri-mode chiller – that opens up to cater for those who want to help themselves to drinks, snacks or even ice cream.

### CLEVER DESIGN SOLUTIONS

In the private bedroom, the double bed is formed from two single beds, and the outer bedside table can be moved in-between these by the crew between flights, to cater for cultural differences. Then in the private washroom there is a steam shower big enough for two. A stone bench is positioned over the steam generator so it can be used as a hammam or steam bath. “We will run a very slight negative pressure in there to vent the steam overboard and avoid condensation problems,” says Chatfield. “The washroom also has heated wooden flooring by F/List, helping eliminate moisture and making it very comfortable to walk barefoot.”

Chatfield explains that in many areas, the number of seats exceeds TTOL capacity, so people aren't bound to one spot. The “very generous” standard emergency equipment list includes defibrillators, a Medaire kit and Tempus vitals monitor with virtual onboard doctor.

All emergency equipment is hidden behind panels, freeing up space under divans for storing bedding, right where it's needed.

ABOVE: ALL THE WOODEN AND STONE FLOORS – INCLUDING HEATED FLOORING IN THE PRIVATE WASHROOM – WILL BE SUPPLIED BY F/LIST

TOP RIGHT: THE PRIVATE BEDROOM INCLUDES A DOUBLE BED THAT CAN EASILY BE CONVERTED INTO TWO SINGLE BEDS

## IFEC EQUIPMENT

There are two fixed IFE servers on board, plus a third, portable one for loading content on the ground. Each server has capacity for 2TB of data.

“Having two main servers means that if there is a failure at any one point, the system will switch automatically to the other server,” says Chatfield.

As well as enjoying installed monitors, passengers will be able to stream IFE content to iPads and make use of Bluetooth headsets, all included. The iPads will be charged inductively.

The connectivity architecture uses separate systems for the cabin and cockpit, for security.