PROVING THE A321XLR AIRSPACE CABIN DESIGN IN FLIGHT

News / Manufacturer

The third A321XLR flight test aircraft – MSN11080 – also known as “FT3”, which is dedicated to the in-flight validation of its cabin-related aspects, is currently in the midst of its busy flight test schedule. This testing focuses on more than just the highly visible Airspace branding elements – such as new overhead stowage compartments (OHSC), ceiling panels etc. – but also the numerous ‘behind the scenes’ new system adaptations and features relating to thermal comfort, ventilation, water & waste, sound insulation, and so on. Together, all these aspects, among others, will contribute to achieving the best possible passenger and flight-crew experience, as well as airline and airport performance and flexibility – given the Xtra Long-Range routes on which this aircraft will routinely fly.

"While the first A321XLR aircraft – MSN11000 (FT1) – had earlier performed some basic functionality pre-testing of the waste water system as well as some acoustic tests, our focus is mainly on FT3, where the Airspace Standard Cabin comes in for the first time." - Tuan Wei Chung, the Cabin & Cargo (C&C) Lead for the A321XLR's 'Cross Functions'

More than meets the eye

Inside this dedicated cabin flight test aircraft the teams will be able to test all sorts of things which passengers don't actually see or hear but nevertheless do appreciate – such as water, waste and heating options available – notably including the optional 300 litre waste-water tank, the heated floor panels, the potable water storage and supply, and the associated freezing protection measures – which include 'tape heaters' for the water lines.

"With FT3 we also evaluate the more overt cabin comfort aspects, in particular the thermal (cabin temperature control – which was tested in November 2022 using passenger-heater-dummies) as well as the overall acoustic properties – ie the cabin quietness," notes Tuan.

The results from this campaign were recently validated by the programme's internal steering committee as meeting the design requirements. Subsequently, FT3 has been fitted with flight test instrumentation (FTI) installations for the cold temperature campaigns which are planned to take place in Iqaluit in northern Canada. The freezing protection and insulation of the water lines will be tested as well as the complete waste tank itself and lavatory areas – so this is a big campaign for the team

Later this year there will also be a flight test campaign more oriented to gauging passenger perceptions. "This will include a dedicated flight of up to seven hours with Airbus employees - acting as passengers - on board. Various comfort aspects will be asked, not only from the passengers, but also for the crew. We will conduct surveys, to assess the passenger comfort level on the aircraft during the long flights with regards to temperature and noise," explains Tuan.

The team will take the opportunity to make some direct 'spot' measurements – acoustic as well as temperature – using a hand-held sensing device. Crew noise exposure will be recorded, especially around the main door entrance areas.

The new Airspace cabin elements will be tested as well. For example, the new parts will be checked for any vibration or resonance during the phases of flight. Ergonomic aspects will also be assessed, such as how easy or hard it is to load and unload the new overhead bins. Airbus will also receive feedback on the visual aspects of the cabin.

Other design changes now being fine-tuned for the best possible in-flight experience inside the A321XLR include items such as the extra fuel pumps for the new underfloor Rear-Centre-Tank (RCT). There are additional pumps to supply fuel from this tank, and any acoustic energy they emit is monitored closely.

Higher requirements for the A321XLR long range cabin

For the XLR’s long range missions there are now higher thermal and acoustic requirements for the cabin. “We have added insulation in the forward fuselage section and developed a new lining as standard within the door and door-surround structures, says Mehmet Altay, Cabin & Cargo Engineering Project Leader.“We have also developed an optional thermal/acoustic ‘Textile Door Cover’ for Doors-1 and Doors-4 which can be attached via magnets to each door by the crew during flight. “Additionally, in the Doors-1 and Doors-4 entrance areas we have new heated floor panels, as well as a quieter fresh air vent outlet.”

Comfortable 6,000ft cabin altitude during cruise

A notable passenger/crew wellbeing-related feature of the A321XLR during long cruise at high flight levels is the latest 'cabin pressure control' standard (introduced across all the A320 Family). The system actively schedules proportional cabin altitudes depending on the flight level. For the A321XLR this means that a cabin altitude of less than 6,000ft is achieved when the aircraft is cruising at 33,000ft. Low cabin altitudes create a more comfortable and less fatiguing in-flight environment for passengers and crew.

Improved sidewall and ceiling panels

The teams have also developed a new visually improved lightweight sidewall and ceiling panels for the A321XLR. Of course the panels themselves are already qualified and have passed all the tests, and now the teams are making sure everything will be really robust in flight, as close as can be to airline operations.

New Flexible zone in forward cabin

Another key feature concerns the forward passenger cabin. “The cabin layout itself is becoming more complex than we used to know in the single-aisle business,” observes Mehmet. “While the galleys and other monuments haven’t really changed, we have many more combinations of monuments in the forward cabin.”

In particular, the XLR benefits from the so-called ‘full-flex zone’ which was first introduced on the A321neo “ACF” standard (ACF = “Airbus Cabin Flex”). This is the zone in the forward half of the fuselage between Doors-1 and Doors-2 where airlines can place monuments – such as galleys and lavatories – which conveniently allows them to segment the cabin into different seating classes. The trend for the -XLR is moving towards more ‘enriched’ cabins with at least two-class layouts and going to three-class.

Customer at Heart

Overall, all the products developed and decisions made by the teams were customer-focused. “We involved our customers by inviting them to our ‘*Customer Experience’* workshops in Hamburg,” says Tuan. “Having this interaction in the development phase was proven essential in getting useful feedback to improve our design.”

For example, based on the airlines’ valuable in-service feedback from their A321neos featuring the more recent ACF configuration, the C&C teams were able to define and implement further

improvements proposed for the A321XLR, including the enhanced thermal and acoustic comfort at the forward and aft entrance areas (eg. adjacent to Doors-1 and Doors-4) by introducing insulation means, gap closures and optional textile door covers. This would bring benefits in particular for the cabin crews' working environment, especially during long range flights.

Next step: MG13

"The next step is the Milestone MG13 'Maturity Gate'. That means everything that we have developed is now in the phase to obtain EASA Type Certification, and then to hand it over to the series production organisation for Entry Into Service," says Mehmet. "This is the main milestone we're heading for now. Stay tuned."

19 MARCH 2023

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