What prospects for the return to widebody combi aircraft?

Back to news listing

A combi aircraft is one where a substantial part of the main deck space normally given over to passengers is transformed instead to a fully certified cargo compartment. With the final 747-400 Combis retired last year, will lessons learned during the COVID-19 pandemic mean we see widebody versions of these niche aircraft again?

Historically, combi aircraft — short for combination — have been sized all the way from Boeing 747s down to the currently-offered ATR 72 turboprop, passing through narrowbody and widebody aircraft on the way.

These aircraft can be very useful indeed for airlines, as Cristian Sutter, chief executive officer at cargo conversion specialists Avensis Aviation, tells us. “There are airlines that have historically operated combi aircraft due to the nature of their routes and its country-of-origin export requirements, such as KLM exporting high volumes — with low weight — of tulips.”

Functionally, says Sutter, “a combi aircraft needs to have the ability to blend seamlessly within the ground operations infrastructure of any airport that manages both passenger and cargo. In other words, combi aircraft work well if they are equipped with cargo loading systems that allows them to load and offload standardised containers and pallets, via utilising existing cargo handling equipment.”

The last combi widebody to be developed was the 747-400M, which first flew in 1989 and was retired by KLM, its final operator, in 2020. The aircraft had one final hurrah as an air-bridge service to China during the early stages of COVID-19.

What would a modern widebody combi look like?

The platforms for a large next-generation combi aircraft are, on the Airbus side, the A350 and the A330neo. On the Boeing side, it's the 787, the forthcoming 777X and, at an elderly pinch, the 767.

There are multiple pieces to the combi puzzle, with the most critical for a modern airline being the availability of rear main deck cargo doors and a modern engine.

The cargo doors exist in various linefit and retrofit options on the A330ceo (with fuselage read-across onto the A330neo), 777X, and 767, and will soon exist on the forthcoming A350 freighter. Modern engines, meanwhile, exist on the A330neo, A350, 787 and 777X.

When it comes to the technical changes and integration required, analogies to the current generation of military tanker aircraft — Airbus' A330ceo-based MRTT and Boeing's 767-200-based KC-46 — are aplenty, although these aircraft do lack modern engines.

"For Airbus, I would look at the A330neo as a combi," Addison Schonland, partner at consultancy AirInsight Group, says. "The A330neo is the sleeper at Airbus — we see it has a better fuel burn than the A350, which is amazing. The A330 design lends itself to this already because we see how it already works as the MRTT, which is essentially a combi."

"At Boeing, I think the 767F would play the same role given its combi already as a tanker," Schonland says, although the last passenger 767 delivered was to Kazakh airline Air Astana in 2014, and the airframe has not received an upgraded engine generation to avoid competing with the 787.

Schonland concludes that what the combi needs would be "a twin-aisle that offers the best compromises and tradeoffs, and that is A330neo and 767. Of these two the former is clearly a better baseline to start with: much more modern and vastly better engines. Also, Boeing has not covered itself in glory in developing new aircraft for a long time."

With Airbus offering a freighter version of its A330-200ceo and supporting passenger-to-freighter conversions of both its A330ceo airframes, the cost to develop an A330neo Combi would be relatively minimal.

Airbus also has an operational benefits story to tell with the A321neo, and particularly the A321LR and XLR variants: airlines are already using the Mixed Fleet Flying that Airbus' flight deck commonality enables to split operations between Airbus narrowbodies and widebodies, with the latest being Japan's ANA.

An airline could thus operate an interchangeable fleet of A321XLRs for light cargo days, A330neo for light-to-medium cargo days, A330neo Combi for medium-to-heavy cargo days, and even an A330F for heavy cargo days — all with the same flight crew pool.

Certification is a hurdle, but a late-model combi could offer smart digitalisation options

"Certification requirements around flammability and fire protection have come a long way since the days when the Boeing 747-400 was certified, or any other contemporary aircraft being certified at that time," Avensis' Cristian Sutter explains, noting that "when it comes to modern certification requirements, a combi aircraft would fall within Class E or Class F cargo compartment. This indicates a need for modified environmental control systems and specific smoke detection systems for fire detection, mitigation and suppression in the cargo area, as well as separated ones in the passenger section of the aircraft."

Yet the drive to add the necessary systems and technologies to create these cargo-class compartments will also provide an opportunity for airframers and systems integrators to install upgraded digital tools to manage the cargo and the cabin.

"Smart and connected cabins at aircraft level will facilitate a more efficient cabin management system for the passenger and cargo area," Sutter suggests. "This will allow crew to manage and control both vastly different operations within the same aircraft whilst maintaining the right levels of comfort, service and most importantly, safety for passengers, crew and cargo."

"What we have learnt over the last couple of years with the Coronavirus pandemic alongside global conflict," Sutter highlights, "is that the aviation industry reacts very well to global challenges. This is particularly true regarding shifts in demand of both passenger and cargo aircraft – there has been a level of flexibility in the operation of the aircraft and assets which has bolstered trust and resilience throughout the sector."

"Due to the pandemic," he notes, "many airlines have ventured into the Cargo market, so there are several carriers that now have a Cargo division feeding into the airline bottom-line that did not exist before. This combined with the ever-increasing number of ACMI carriers makes for a very diverse market mix picture."

Does that picture include new widebody combi aircraft within it? AirInsight's Schonland suggests it might.

"The past is prologue here," he says. "Who used to operate these? Taiwan, Netherlands, Africa (SAA) — so that is where I think we might see interest again. The naturals include KLM, China Airlines and I think Brussels. Combis work best as light high-value freighters with a half load of pax. Africa needs this for imports. Asia needs this for exports. So add Ethiopian to the list."

"The challenge isn't technical. It's the market: how big is it? Who needs it?" Schonland concludes.

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