

# Airbus reveals A380plus details.

Airbus reveals details of the A380plus, a five-pillar programme of improvements of the current A380 specification and standard. Meanwhile, Boeing has released initial specification details for the 777-9X. A quick comparison reveals the 777-9X will have about 20 more seats and similar range to the 777-300ER.

Earlier in 2017 Airbus revealed a five point plan to launch an enhanced version of the A380; the A380plus. The resulting aircraft will have the same fuselage and airframe as the A380 in production, but will have 78 more seats, a range of aerodynamic and engine configuration improvements that will generate a 4% reduction in fuel burn, a few weight specification increases, and extensions to its main maintenance check intervals.

“The A380plus serves to provide an improved A380, and will be available from the production line in 2020,” says Frank Vermiere, head of A380 marketing at Airbus. “The A380plus is based on five pillars for improvement, and all five will be incorporated on some of the outstanding orders for the aircraft, and any new orders placed from now on. Some of the cabin changes to make more space for seats can also be retrofitted to existing aircraft.”

The first pillar of improvement centres around delivering a 4% improvement in fuel burn. There are several elements to achieve this.

The first is the addition of a Scimitar-style winglet. This is 3 metres long pointing up, and 1 metre long pointing down. Airbus has patents for this winglet, and is referred to as a split winglet.

The second element is a small aerodynamic twist to the wing, used to fine tune the aircraft’s aerodynamics. “This produces a small increase in the wing’s camber between the two engines, and so increases aerodynamic efficiency,” says Vermiere. “We have also introduced a small re-profiling of the upper belly fairing to result in a reduction in drag.”

The third element to achieve the 4% reduction in fuel burn is performance improvement programmes to both Rolls-Royce (RR) Trent 900 and Engine Alliance GP7200 engines. The range of improvement packages for the Trent 900 are known and the EP packages. These come in several stages, and the EP3 package is now already flying and in service. There will be further improvements post EP3.

These EP packages will be installed on the Trent 900 production line, and so all stages of the EP packages apply to later production engines. Some elements of the EP packages can be retrofittable during engine shop visits.

In addition to achieving lower fuel burn, another benefit of the EP packages is the aim of increasing the engine’s durability and its on-wing life between removals for shop visits.

“We need to be clear that the winglets and the aerodynamic changes to the

fuselage are for new production aircraft only, and these will be aircraft built from 2020 onwards,” says Vermiere. “We do not have plans at this stage to make these two features retrofittable to existing aircraft.”

The second pillar of improvement relates to system improvements. There are several elements of this. The first is the introduction of a fourth generation IFE system, which will provide up to 4K of resolution on all screens, improved system reliability and reduced weight. “This is the same system that is used on the A350, and one of its main advantages is that it reduces the number cables for the system to operate compared to previous generation IFE systems,” says Vermiere.

A second element will be the utilisation of new fuel pumps. These will be the same as those used on the A350, and they have the electronics used to control them built in. They also have induction motors.

A third element will be the replacement of four waste tanks with a twin tank system.

“The fourth element is the introduction of a new FMS,” says Vermiere. “This collects data from previous flights, adapts the data in its flight model, and uses it to improve the aircraft’s operational fuel burn. The algorithms are designed to optimise the aircraft’s track and climb profile, and it is consequently possible to get a 0.6% improvement in fuel burn.”

The third pillar of the A380plus is an increase of 72 seats from the current standard four-class configuration marketed by Airbus. The standard layout of passenger accommodations (LOPA) provides a total of 497 seats. This standard capacity is achieved through a combination of eight first class and 88 business class seats on the upper deck, and 52 premium economy and 349 economy class seats on the main deck.

The standard LOPA for the current



*The A380plus will be available from the production line in 2020. It features five pillars of improvement, including a 4% reduction in fuel burn, a re-configured LOPA and 72 higher seat count, and escalated base maintenance check intervals that allow a four-check base programme over a 12-year interval.*



*One major feature in the A380's re-configured cabin layout and LOPA is the re-design and e-positioning of the forward stairs. This increase space for seats on both decks.*

A380 links the main and upper decks through a straight, aft climbing staircase at the front of the cabin, and a spiral staircase at the rear of the cabin.

The standard main deck configuration is has a premium economy class cabin with eight seats abreast and in a 38-inch seat pitch. The cabin tapers to the front, and not all rows have eight seats abreast, partly because of the forward staircase.

Aft of the premium economy cabin is a galley. Aft of this is the economy class, with a standard 10 abreast configuration and a 31- or 32-inch seat pitch. There are four lavatories halfway through the cabin, and a galley at the rear.

On the upper deck, immediately aft of the front staircase, there is the first class section, with eight lie-flat seats, and a wardrobe to accompany each seat. Aft of this there is a galley, aft of which is the business class cabin. The standard Airbus LOPA configures the business class cabin as four lie-flat seats abreast, in a herringbone layout. These seats are set a pitch of 45 inches.

Vermiere explains how the cabin has been reconfigured.

"The first step is the reconfiguration of the premium economy class cabin to a nine-abreast configuration, and this adds 11 seats in the existing rows," says Vermiere. "We have also changed the economy class cabin to an 11-abreast arrangement, while maintaining seat pitch."

The new economy class seats will have the same 18-inch width between armrests that the A350 has, one inch less than the economy class seats on the standard A380. The 18-inch width between seat arms is partially achieved by the utilisation of a new generation seat with narrow seat arms. The armrests are too narrow to house any controls for lights, call button, or controls for the IFE system. This will thus require the

installation of a touchscreen, seatback screen IFE system, which will be provided by the fourth generation IFE system. Airbus claims these seats are wider than those used on the 10-abreast configuration of the 777's economy class cabin. There are 23 seats rows affected by the change, and so adds 23 economy class seats.

There are then changes to the LOPA on the upper deck. The first is the removal of sidewall storage cabinets under the window in business class. "This gains width at floor level, and allows a re-staggering of the herringbone layout with seats being placed at a different angle. This creates space for six more seats in business class," says Vermiere.

"Then there is a reconfiguration of the connecting staircases and the various monuments," continues Vermiere. "The first change is the replacement of spiral stairs at the rear of the cabin with conventional straight stairs. The area of the two decks is also re-designed so that galleys fit around these stairs on both decks. This re-configuration generates space for another 14 more economy class seats on the main deck, in addition to the 23 added by increasing to 11-abreast.

The second main reconfiguration change is the removal of the front stairs. These have been replaced with straight stairs that are placed in a re-designed galley and lavatory area at the front of the economy cabin on the main deck, and the area between the first and business class cabins on the upper deck. The new forward stairs have also been integrated with the crew rest area.

"The galley area has also been reconfigured to provide an additional six premium economy and 12 economy class seats," adds Vermiere.

The overall result is an increase in seats numbers of six for the business class, 17 for the premium economy, and

49 for the economy class cabins. This is a total increase of 72 seats. This takes the A380's standard LOPA to 569.

Most of the LOPA and cabin configuration changes can be incorporated during a heavy maintenance check, except for the installation of the new style forward stairs.

The fourth pillar for the A380plus is an increase in payload and increase in maximum take-off weight (MTOW) from 575 tonnes to 578 tonnes. "This increase in MTOW allows the aircraft to maintain its range with the marginally higher payload, when all the performance improvements are taken into consideration," says Vermiere. The A380 has a range of 8,300nm with a full passenger cabin. These payload and MTOW increases are easily achieved via a paper change to the aircraft's certified weights.

The fifth pillar of improvements to the A380 to achieve the A380plus are escalations of the A380's main maintenance check intervals. The A380's current A check interval is 750FH, and this will be escalated to 1,000FH. The C check interval will be escalated from its current intervals of 24 months (MO) and 12,000FH to 36MO/18,000FH. These escalations will come in a MPD revision during 2018.

The current base check programme is a cycle of six base checks, with a check every 24MO and the sixth check at 12 years. An intermediate heavy check is at a 72MO/six year interval.

Under the new maintenance programme, the aircraft will still have the intermediate heavy check and heavy check at the six- and 12-year intervals. This is because the intervals for the structural tasks will not be escalated in the MPD revision in 2018. The overall effect will be a change from a base maintenance programme of six base checks at 24MO intervals, with two heavy checks at 24MO intervals; to a programme of four base checks at 36MO intervals, with two heavy checks.

"The overall effect is a 15% reduction in maintenance downtime, and an increase in aircraft availability by an average of six days per year across the base maintenance cycle," says Vermiere. This will increase annual utilisation by 80-90 flight hours (FH) per year on the basis of most operator's rates of operation. The second main effect of



deleting two C checks from the base maintenance cycle will be a significant reduction in labour man-hours (MH) and other elements of maintenance cost inputs.

These changes to the maintenance programme will apply to all A380s in service.

Airbus estimates that the combination of increased seat numbers, reduced fuel burn and escalated check intervals and a re-organised base maintenance programme will result in 13% lower operating cost per seat. The 4% reduction in fuel burn is achieved without any changes to seat numbers. A higher payload will increase fuel burn, but fuel burn per seat will be reduced.

## Initial 777-9X specs

Boeing has revealed the first set of detailed specifications for the 777-9X, the replacement for the 777-300ER. The 777-9X and -8X has the same fuselage barrel as the 777-200/300 family, but features a host of other improvements. The -9X will be slightly longer than the -300ER, while the -8X is similarly sized to the 777-200.

The 777-9X is seven feet longer than the 777-300/300ER, giving the -9X more cabin capacity for passenger seating. Recent Boeing literature has put the -300ER's tri-class seat capacity at 368 and 370, with two different cabin layouts. The first is 22 first class seats in a six abreast arrangement and 61-inch seat pitch, 70 business class seats in an eight abreast arrangement at a 39-inch seat pitch, and 276 economy class seats in a nine-abreast and 32-inch pitch arrangement. The alternative LOPA has 12 first class seats at a longer pitch of 87

inches, 42 business class seats in a seven-abreast arrangement and a pitch of 50 inches, and 316 economy class seats in a nine-abreast arrangement. Many 777-300ER operators achieve similar seat numbers to this, but have longer business class sections to allow lie-flat seats, and compensate by having a 10-abreast economy class cabin.

The 777-9X's standard tri-class LOPA is configured differently to the -300ER. Total seat count for the -9X is 349, 21 fewer than the -300ER. This -9X's smaller seat count is explained by just eight first class seats, 49 business class seats, and 292 economy class seats.

The first class cabin has a four-abreast arrangement, with seats arranged in individual cabins. The business class cabin has seats arranged in a seven abreast layout, with adjacent seats facing in opposite directions. The consequent seat pitch is 85 inches. This longer pitch requires a longer section of the cabin to accommodate the 49 seats, and the economy class cabin is shorter than either of the standard Boeing LOPAs for the 777-300ER. The economy cabin in the -9X has fewer overall seats, despite being configured in a 10-abreast arrangement.

These differences in LOPAs for the -300ER and -9X make direct comparisons difficult. The 9X's seven feet longer fuselage, however, means that two or three rows of additional economy class seats can probably be accommodated over the -300ER, meaning that the -300ER would probably have about 272 seats if its first and business class cabins were configured in the same way as the -9X.

In addition to the cabin configuration, a few specifications have been released for the -9X. The first is that the aircraft

*Initial specification details have been revealed by Boeing for the 777-9X. The -9X is seven feet longer than the -300ER, meaning the -9X will have a cabin capacity of about 20 more seats than the -300ER with a comparable layout. The 777-9X will have a standard range of 8,700nm, almost identical to the -300ER's performance.*

will have the same MTOW of 775,000lbs as the -300ER. The -9X's maximum zero fuel weight (MZFW) is 38,000lbs higher than the -300ER's at 562,000lbs.

The aircraft's operating empty weight (OEW) has not yet been defined, although it is likely to be 407,000lbs. This compares to 370,000lbs for the -300ER. This will give the -9X a maximum structural payload of 155,000lbs, almost the same as the -300ER's payload of 154,000lbs. This similarity is explained by the -9X having an OEW that is 37,000lbs higher than the -300ER. It should be noted, however, that this figure of the -9X's OEW is not an official Boeing figure.

The -9X will have a usable fuel capacity of 52,300 US Gallons (USG); 4,410USG more than the -300ER's. The -9X will also be exclusively equipped with the General Electric GE9X engine. This will have the same fan diameter as the GE90-115 powering the 777-300ER, but the GE9X will have a lower thrust rating of 99,500lbs.

The 777-9X will have a range of 7,600nm with a full load of passengers. This compares to a range of 7,370nm for the -300ER. The GE9X engine should provide the -9X with 10% lower fuel consumption than the -300ER. The aircraft will also incorporate more carbon fibre composite in its structure, although this is not enough to offset the probable higher OEW compared to the -300ER. The -9X is therefore expected to have an overall 12-13% lower fuel burn than the -9X.

While there are few specification details for the 777-8X, it will share the same MTOW with the -9X. The -8X is also likely to have the same usable fuel capacity as the -9X. The -8X will have a 20-foot longer fuselage than the 777-200 it is replacing, and so consequently will be able to accommodate up to eight or nine more rows of economy class seating than the 777-200. The -8X will also be just 21 feet shorter than the -9X.

The 777-8X is projected to have a range of about 8,700nm with a standard passenger capacity of 350-360, a range that is about 150nm longer than the -200LR's with a standard passenger payload of 317. [AC](#)

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