



**NOVUS
AVIATION
CAPITAL**

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The Risk of a Twin-Aisle Aircraft Shortage

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A combination of factors driving both the recovery of international air travel and demand for twin-aisle aircraft, together with limited supply of the latter, support the view that there is likely to be a shortage of widebody aircraft in the medium term. This, in turn, should drive some recovery in widebody values and lease rates for certain aircraft types.

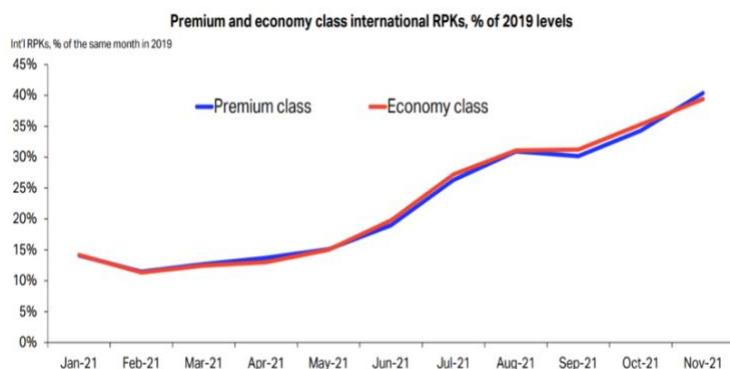
FACTORS DRIVING DEMAND FOR TWIN-AISLE AIRCRAFT

Improving overall outlook for the recovery of global air travel - tremendous pent-up demand driving rapid traffic recovery when travel restrictions are lifted

Notwithstanding a resurgence of COVID-19 case numbers globally with the emergence of new variants, the fundamental principles underpinning the long-term growth trend of the aviation industry, in terms of global economic and emerging market growth, based on current/our analysis, remain intact. Economic recovery has been faster than initially expected with many countries already back to 2019 GDP levels whilst COVID-19 vaccination levels are expected to reach 70% of the population by mid-2022 for most key markets. Tremendous pent-up demand for air travel evidenced by traffic recovering rapidly whenever travel restrictions are lifted, for example on transatlantic routes following the US reopening, is also driving the recovery. Cirium now expects 2019 demand levels to be achieved in 2023¹, whilst there is growing optimism amongst airline leaders with US carriers and European low-cost airlines already operating at or above pre-pandemic capacity levels.

Ultimately, passenger traffic is being constrained by travel restrictions, especially in Asia, not by a lack of public desire to travel and, therefore, demand is likely to snap back quickly as restrictions are relaxed. With the World Health Organisation now formally advising against travel restrictions in view of the limited impact measures such as travel bans and mandatory quarantine have on controlling case numbers, governments face mounting pressure to allow their countries to benefit from the vital contribution that air transport provides to economic growth and development.

Premium traffic is on track to make a full recovery which supports the business case for twin-aisle aircraft as airlines focus on restoring profitability



Source: IATA, January 2022

Aside from the basic requirement to operate long-haul routes and overcome airport congestion, the recovery of premium traffic is key for widebody fleet prospects as network airlines require twin-aisle aircraft and the larger premium cabins they can accommodate in order to restore premium class-driven profitability. IATA analysis reveals that premium and economy class international RPKs are recovering at the same rate suggesting that premium traffic

will make a full recovery. For the time being, premium demand is likely being driven by an increase in high yield leisure traffic with passenger preference for greater social distancing in the COVID era, which is offsetting lower business traffic levels.

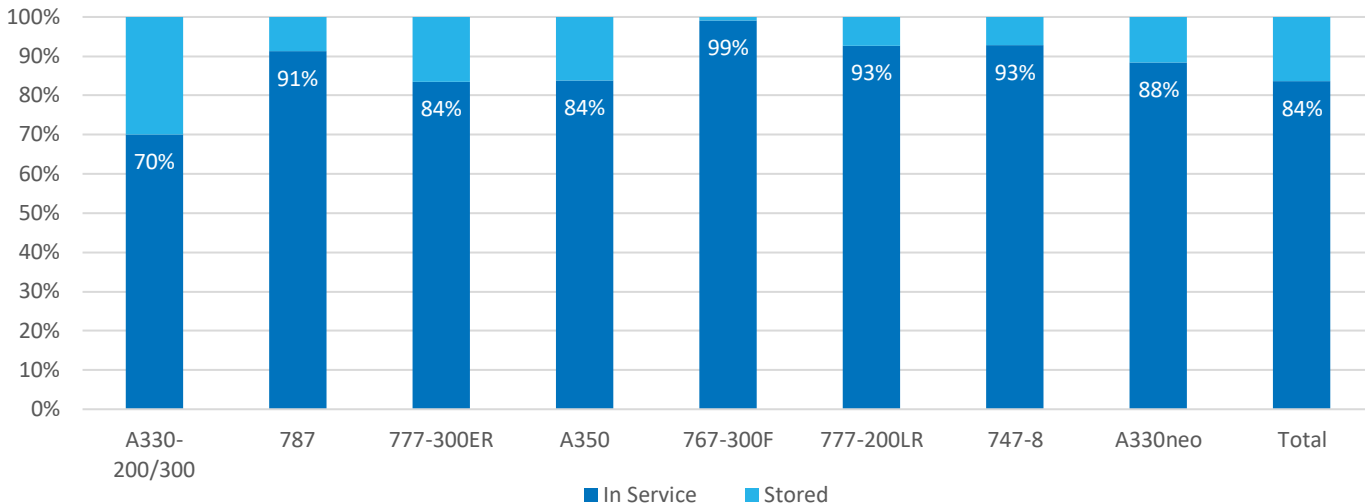
Nevertheless, despite the growth of video conferencing since the onset of the pandemic, the relationship value of face-to-face meetings will continue to underpin the need for corporate travel. As US based airlines

¹ Ascend by Cirium. September 2021

are already witnessing strong pent-up demand for business travel and the economic recovery progresses, Cirium anticipates that corporate traffic will return to pre-COVID levels by 2024/25².

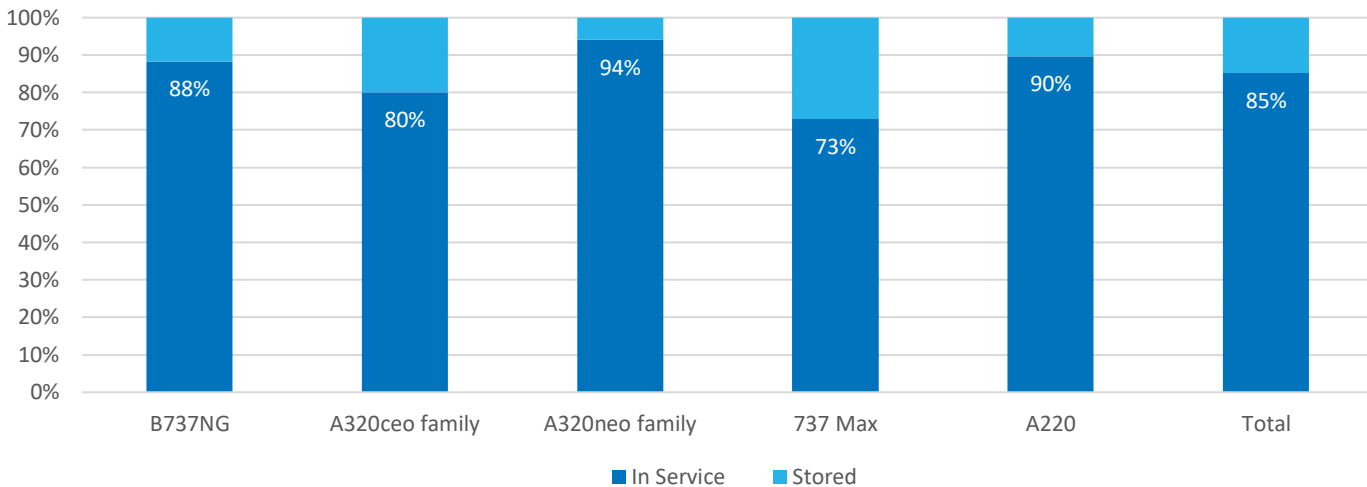
Low storage levels of new technology/in production widebodies demonstrate the relevance of these aircraft

**New Generation / In Production Widebody Aircraft In Service
Ranked by Fleet Size, February 2022**



Source: Cirium Fleets Analyzer

**New Generation / In Production Narrowbody Aircraft In Service
Ranked by Fleet Size, February 2022**



Source: Cirium Fleets Analyzer

Whilst many older technology and, in particular, four-engined widebody aircraft have been retired en masse during the pandemic with relatively few having returned to service, a high proportion of new generation and in production models are already flying. Perhaps surprisingly, the proportion of new generation and in production twin-aisle aircraft in storage is relatively low and comparable to narrowbody storage levels, albeit the picture is skewed somewhat by the MAX grounding and utilization levels are lower than pre-pandemic. This demonstrates the ongoing operational relevance of these twin-aisle aircraft models which airlines require and value for a variety of reasons including the ability to efficiently operate long range sectors to

² Ascend by Cirium, October 2021

congested airports as well as enabling the recovery of high yield traffic by housing premium cabins which will be key in helping network airlines restore profitability.

In addition, the booming freight market has provided a lifeline for many airlines during the pandemic and supports demand for twin-aisle aircraft given the larger belly hold space versus narrowbody aircraft. The B777-300ER has proven to be particularly popular in this regard given its class leading payload capacity which is driving high utilisation in order to service belly cargo/freighter operations and has spurred the launch of several B777 passenger to freight (P2F) conversion programmes.

Freight boom is driving record demand for feedstock aircraft for cargo conversion

With Freight Tonne Kilometers (FTKs) now 9% above 2019 levels and yields at exceptionally high levels, the freight boom, which is being sustained by a combination of factors including a structural shift towards e-commerce together with the availability of attractively priced feedstock aircraft, is driving record demand for P2F conversions. Since the start of the pandemic, Boeing has almost doubled its freighter conversion capacity with the opening of ten new lines and the OEM has indicated that the addition of further capacity is under discussion.

Medium widebody aircraft are becoming increasingly popular conversion candidates with widebody conversion slots sold out for the next several years and at least 240 A330 and B767 P2F conversions are expected between 2022 and 2025³. In the large widebody freighter segment, where the B777X and recently launched A350 freighter models have yet to enter service, burgeoning demand for B777-300ER P2F conversions is also apparent with the launch of several new conversion programmes (IAI, Sequoia and Mammoth Freighters). This demand for feedstock aircraft will/potentially reduce the pool of mid-life widebody aircraft available to potentially re-enter passenger, service and to some extent will support twin-aisle values and lease rates.

³ Novus Estimate

FACTORS LIMITING SUPPLY OF TWIN-AISLE AIRCRAFT

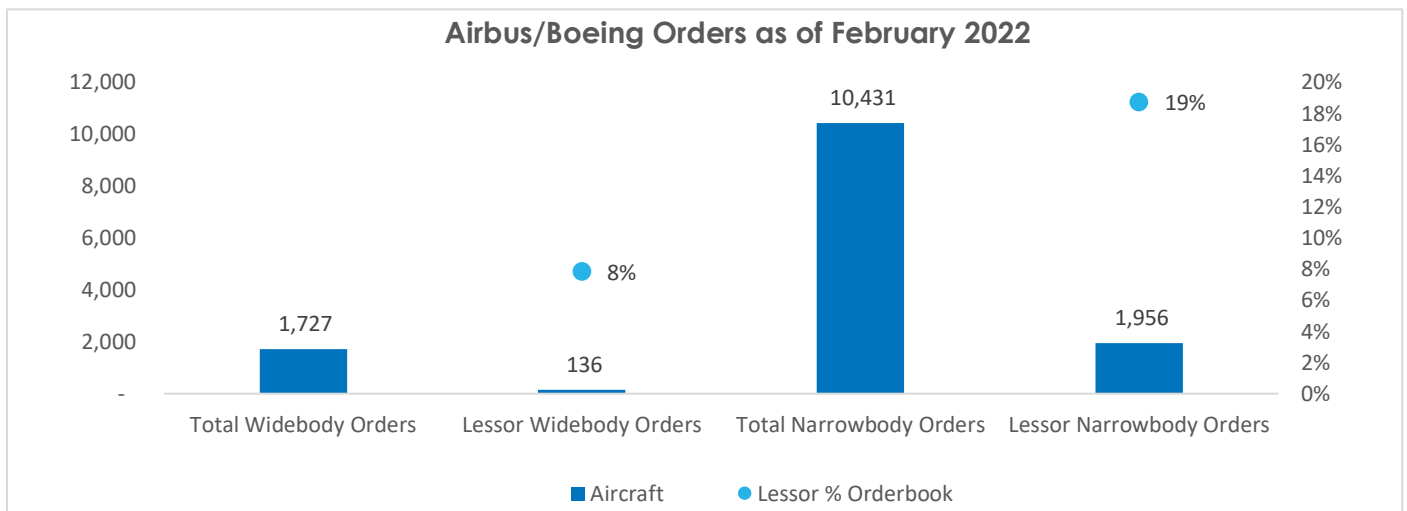
Accelerated phase-out of old technology widebody aircraft driven by the pandemic, rising fuel prices and growing ESG pressures

Prior to the pandemic, four-engined aircraft represented 11% of the global passenger twin-aisle fleet compared to just 5% of the in-service fleet as of February 2022.⁴ This illustrates the extent to which the pandemic, combined with growing ESG pressures and soaring jet fuel prices, is accelerating the phase-out of old technology aircraft, in particular four-engined types (B747, A340, A380). Whilst the overall number of permanent aircraft retirements since the onset of the pandemic remains low versus historic levels due to limited demand for spare parts and used serviceable material (USM), it is anticipated that only a small proportion of the current stored old-generation widebody fleet will be returned to passenger service. In addition to the growing influence that ESG pressures are having on fleet planning decisions, especially in the current high fuel price environment, the cost of returning aircraft to service will also increasingly dissuade airlines from reactivating mid-life and older aircraft given that the cost rises with the aircraft age and length of time out of service.

As the recovery progresses, maintenance shop capacity will also constrain the number of, and speed at which, aircraft can be returned to service.

Airlines' limited ability and desire to place orders for costly new twin-aisle aircraft

Airlines currently have limited ability and desire to place orders for costly new twin-aisle aircraft over the near term given the pandemic's dramatic impact on their financial health and the expectation that long-haul/international traffic will continue to recover more slowly than domestic and regional traffic. Rising inflation and interest rates are also adding to the expense of new aircraft purchases thereby limiting orders and supporting the secondary market for used widebody aircraft.



Source: Cirium Fleets Analyzer

⁴ Cirium Fleets Analyzer

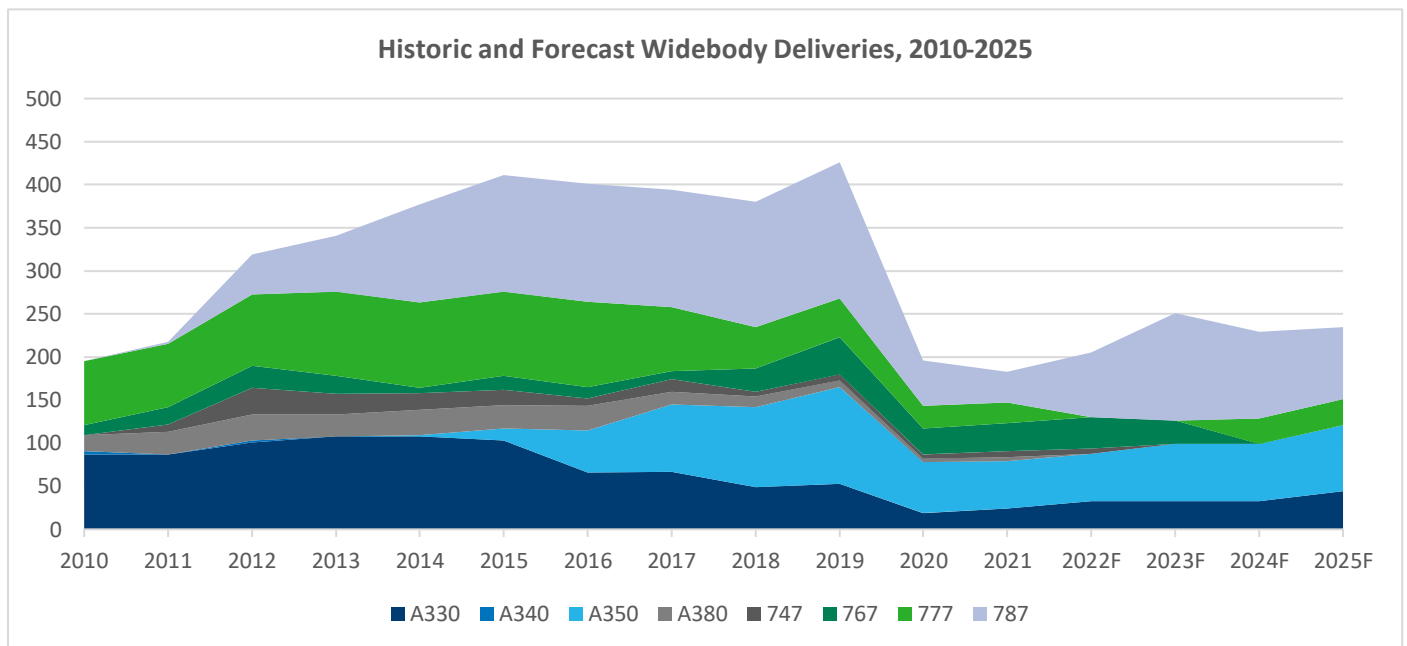


Source: Cirium Fleets Analyzer

As a result, airlines are likely to continue to rely more heavily on lessors throughout the recovery (lessors' share of the global market has increased by 2.2% points since December 2019 to c.50.3%)⁵ and yet the lessor widebody orderbook is very small and is limited to a select number of lessors. In our view, widebody SLBs will also be hindered by appraiser negativity on future values.

Significant and sustained reduction in widebody production rates

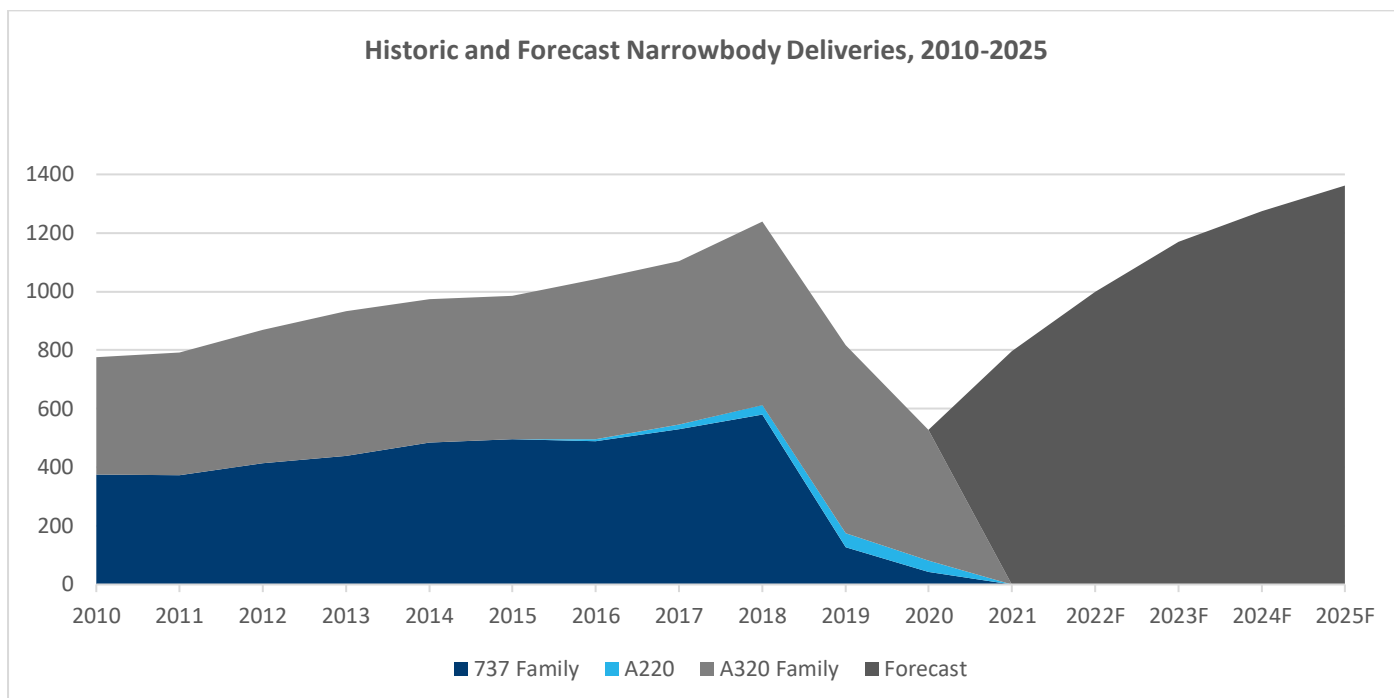
Probably the biggest driver behind the potential widebody capacity shortage is the extent to which OEMs have slashed twin-aisle production rates since the onset of the pandemic, with limited ramp-up anticipated in the medium term.



Source: Novus Estimate

⁵ Ascend by Cirium, October 2021

Based on current production plans, over the five-year period 2021-2025 over 40% fewer twin-aisle aircraft will be produced per annum compared to 2019 levels⁶. In contrast, narrowbody production is set to ramp up rapidly and reach 2019 levels this year.



Source: Novus Estimate

Furthermore, of the estimated 1,622 aircraft due to be delivered this year according to IATA⁷, it is anticipated that a good proportion of the delivery stream may be delayed further or even cancelled. Material uncertainty remains as to when Boeing will be able to recommence B787 deliveries given the number and complexity of the technical issues identified, especially given the heightened regulatory scrutiny that Boeing aircraft are now subject to in the wake of the MAX grounding, whilst the B777X launch date remains unclear. Airbus also faces challenges on their widebody production in terms of the surface paint issues identified on the A350. In light of these production challenges, the market duopoly and with the B777-300ER due to end production shortly, there will be limited new twin-aisle products available in the short to medium term which will, in turn, support the values and lease rates of existing twin-aisle aircraft.

Supply chain constraints may jeopardise OEMs' ability to meet current production targets and will limit any production ramp-up in the short to medium term

Whilst aircraft production rates were slashed swiftly during the height of the pandemic in response to the collapse in demand, OEMs will not have the ability to ramp-up production as rapidly as demand returns. The scale of headcount reductions implemented threatens a skilled labour shortage, whilst suppliers are experiencing difficulties in purchasing raw materials due to shortages and significant price increases driven by inflation. Adding to the pressure on production lines is the sizeable backlog of undelivered aircraft, which includes over 100 B787s⁸, many of which will require rework before they can be delivered. Airline

⁶ Novus Estimate

⁷ IATA, October 2021

⁸ Boeing, January 2022

frustration is already mounting as OEMs continue to unilaterally push back delivery schedules as suppliers experience difficulties in the early phases of the production ramp-up.

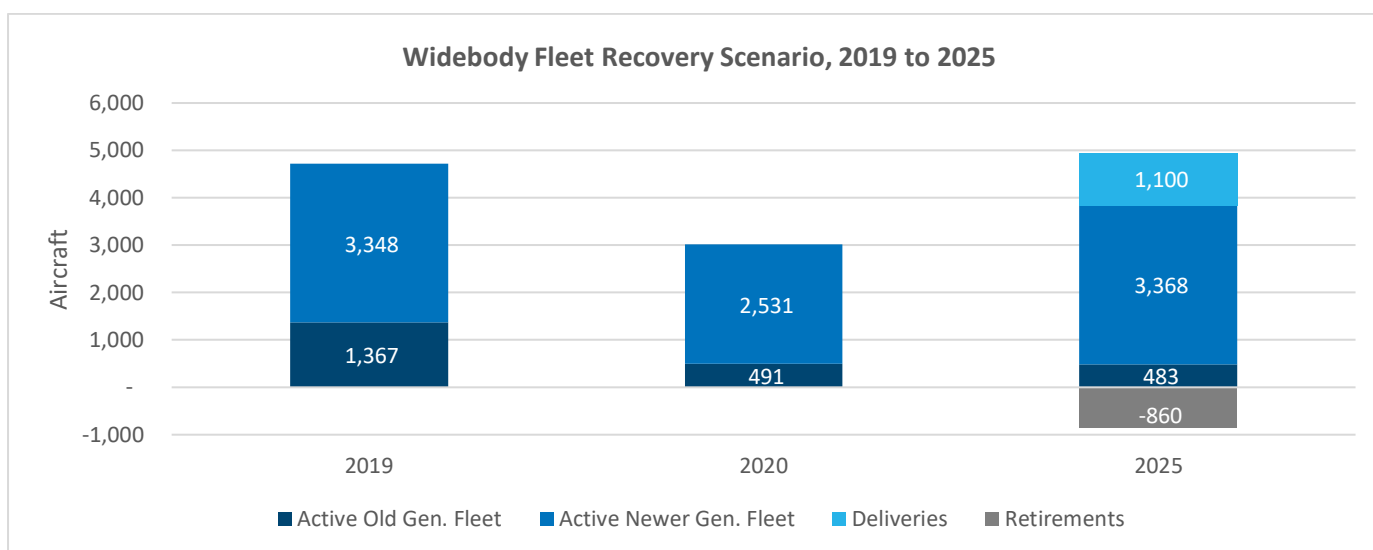
A further consideration is that such is the strength of demand for new technology single-aisle aircraft, both Airbus and Boeing have filled narrowbody production slots for the next several years, based on what appear to be ambitious production targets. It is, therefore, conceivable that OEMs may choose to prioritise narrowbody production, diverting resources away from twin-aisle lines and, thereby, further reducing the already limited supply of widebody aircraft.

Cirium anticipates that the stored fleet surplus will be largely eliminated by the end of 2022⁹ and, therefore, suggests that production increases will be required from 2023-25 to cater for capacity expansion. However, it is apparent that supply chain constraints will limit the OEMs’ ability to ramp-up production in the medium term, bearing in mind that material uncertainty remains around whether even current production targets are achievable.

Widebody Fleet Development

Analysis of the anticipated widebody fleet development over the next few years also lends weight to the view that there will be a shortage of twin-aisle aircraft once demand recovers to pre-COVID levels.

A study carried out by Novus indicates that by 2025, the overall supply and demand of widebody aircraft should be balanced, with a potential undersupply in the large twin-aisle segment. This is based on the assumptions that traffic will return to 2019 levels in 2023 and that there will be approximately 860 widebody retirements and 1100 twin-aisle deliveries over the period 2020-2025.



Source: Cirium Fleets Analyzer, Novus Estimate

in the event that a) insufficient aircraft are returned to service due to prohibitive costs/bottlenecks in maintenance shop capacity and b) OEMs fail to achieve delivery targets as a result of ongoing production issues and supply chain constraints.

⁹ Ascend by Cirium, September 2021

Summary

Based on current analysis, in our opinion, once international traffic recovers to pre-pandemic levels, it is anticipated that demand for twin-aisle aircraft will arguably exceed supply on the following assumptions:

- Demand for long-haul air travel will recover swiftly once restrictions are lifted given the strength of GDP growth and passengers' undiminished desire to travel, whereas aircraft supply will take longer to rebuild;
- A high proportion of the new technology/in production twin-aisle fleet is already back in service which demonstrates the relevance of these aircraft in terms of range, passenger/cargo capacity and the ability to house premium cabins;
- The structural shift in e-commerce will continue to underpin robust demand for twin-aisle freighter aircraft which are already in short supply due to production capacity constraints for both factory-built and converted freighter aircraft;
- Older technology aircraft, especially four-engined widebodies, are at a growing risk of permanent retirement thereby reducing capacity as ESG pressures and soaring fuel prices increasingly influence airlines' fleet planning decisions;
- Bottlenecks in maintenance shop capacity together with the rising cost over time of reactivating stored aircraft will limit the number of aircraft that can be returned to service in a timely fashion;
- With weakened balance sheets that will potentially take years to rebuild, airlines will increasingly look to lessors to support their re-fleeting needs though the lessor twin-aisle order book remains very small and limited to a handful of players;
- Widebody production rates have been slashed by over 40% and yet production issues, labour shortages and other supply chain constraints are likely to jeopardise the OEMs' ability to achieve current targets, let alone any additional production ramp-up in the medium term.
- Given the foregoing, a shortage of twin-aisle aircraft, which should drive the recovery of widebody values and lease rates, is anticipated in the medium term.

At the time of writing it is still too early to fully determine the ramifications that the current developing geopolitical situation in Ukraine/Russia will have on the aviation industry, but the impact is potentially significant.

