



NAVEO
CONSULTANCY

Air Transport Fleet & MRO Trends

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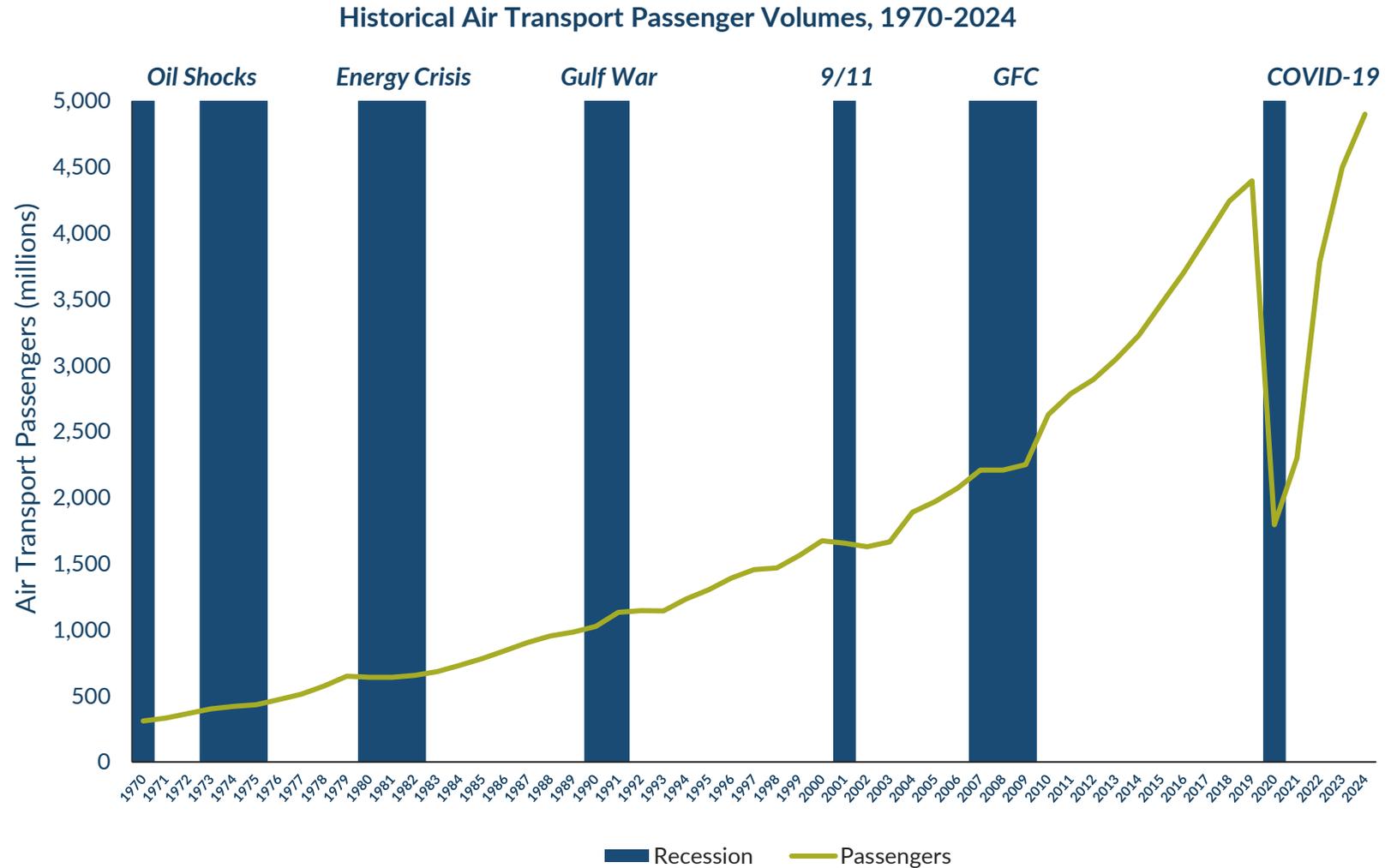
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- Air Transport Fleet Status
- Air Transport Utilization Recovery
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- Considerations

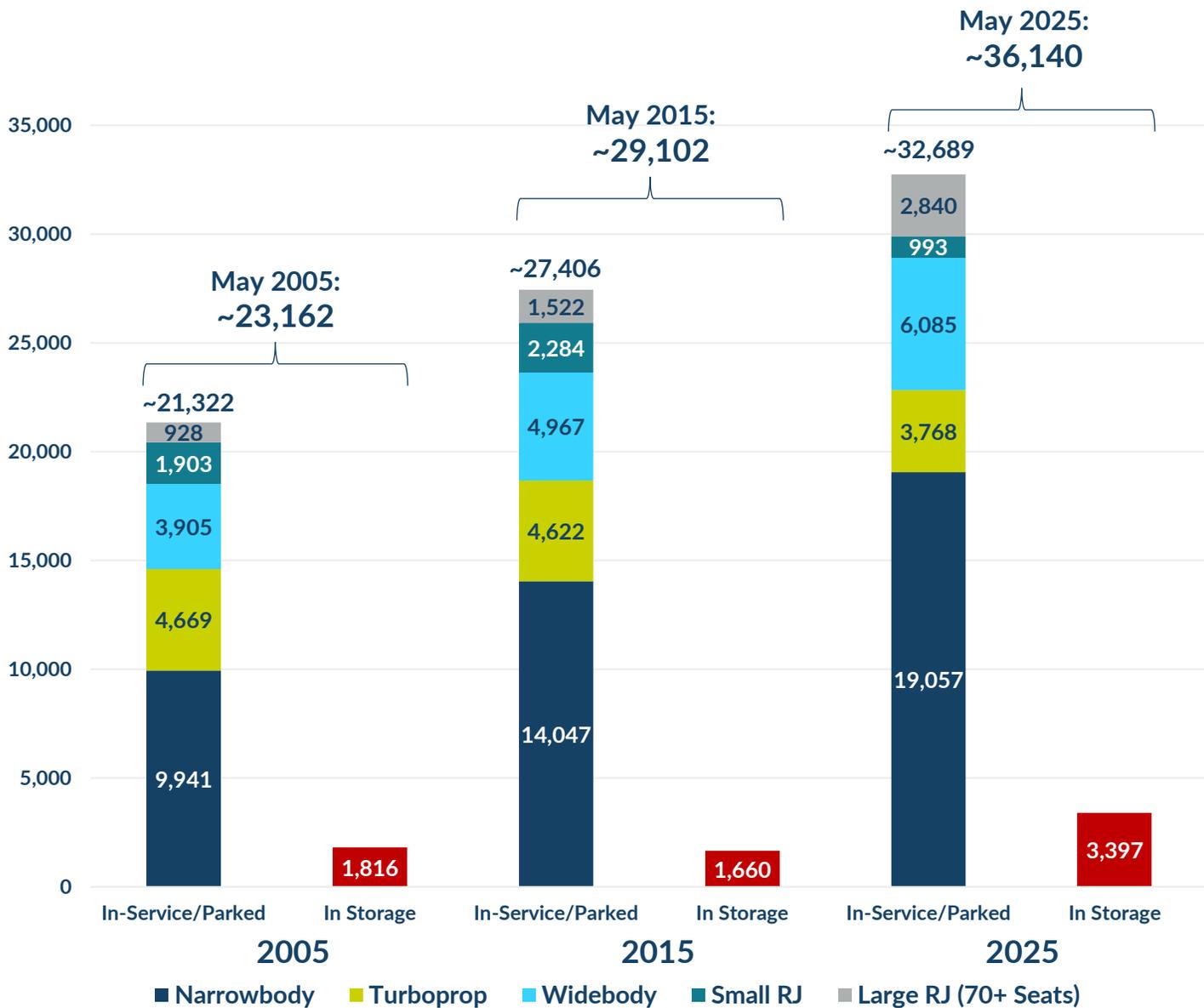


The aviation industry is resilient and has recovered to exceed pre-COVID levels. The pandemic wiped out over 20 years of passenger growth

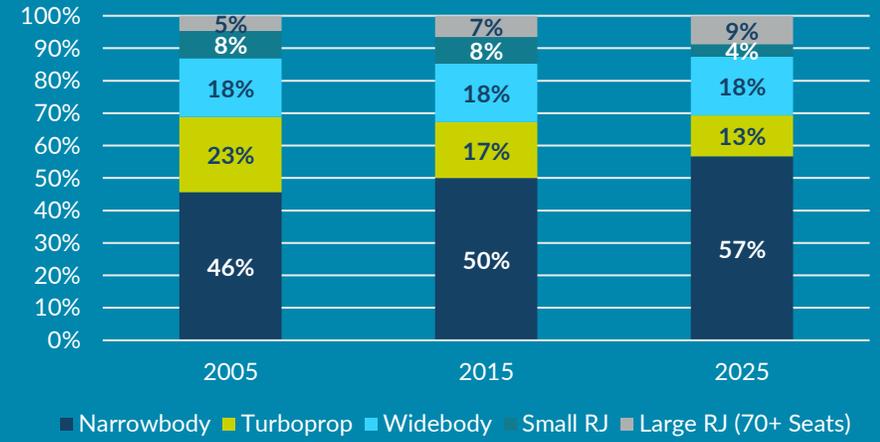
- ▲ The COVID-19 pandemic has disproportionately affected the aviation industry compared to other sectors of the economy
- ▲ Historically, the aviation industry has remained highly resilient in the face of global recessions and has consistently outperformed world GDP growth
- ▲ The COVID-19 pandemic is the exception to this rule, as governments impose severe restrictions on movement that affect both domestic and international travel markets
- ▲ 2020 saw the size of the market shrink across a variety of measures to levels not seen since the turn of the millennium
- ▲ 2021 global air passenger totals showed an improvement from 2020 but were still only half pre-pandemic levels
- ▲ Yet, aviation is resilient. Even though downturns cause growth to stagnate or decline, the sector has typically bounced back and returned to its long-term growth rate within a few years
- ▲ By 2024, passenger numbers had exceeded pre-COVID levels



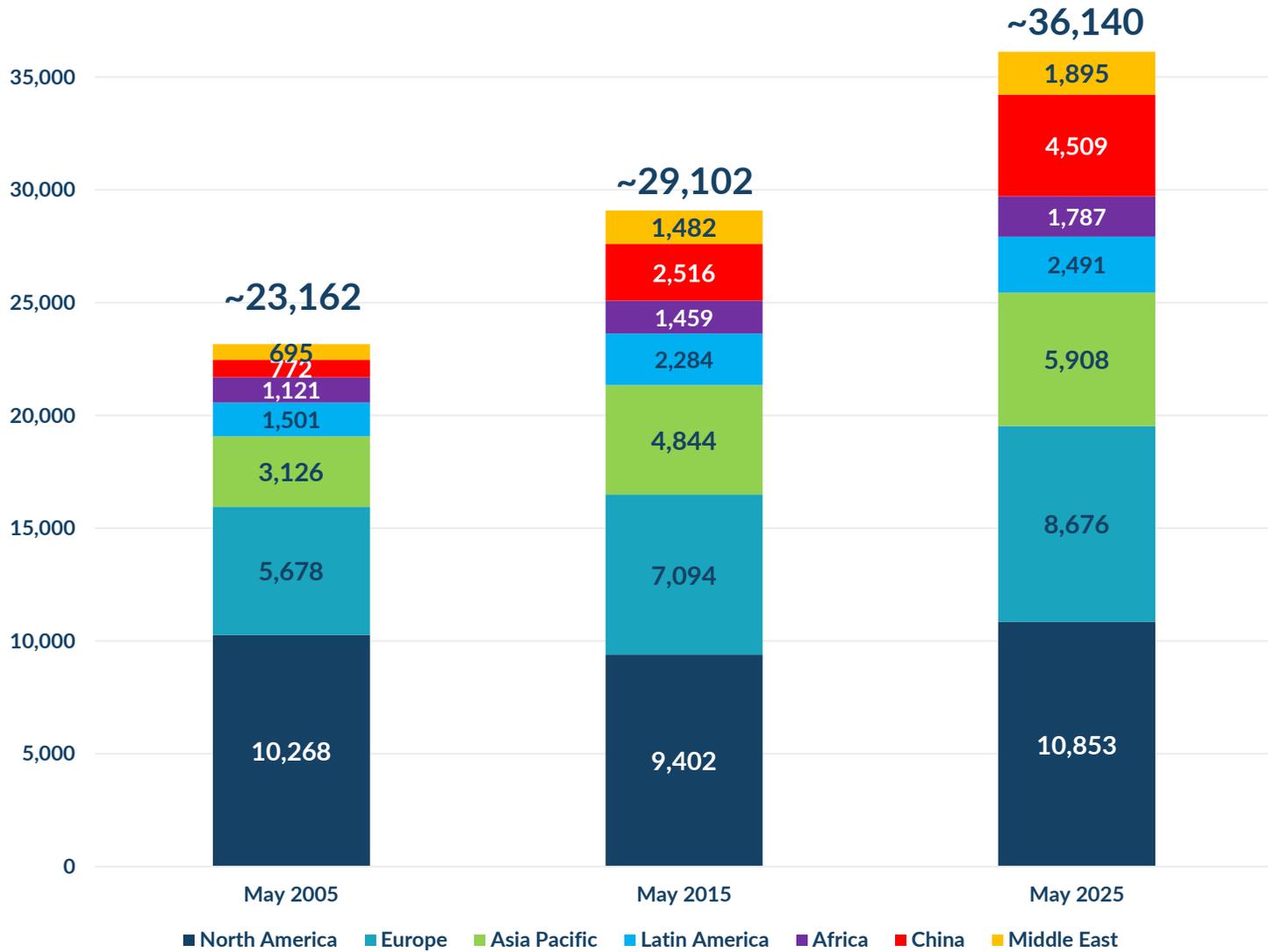
Air Transport Fleet Evolution 2005 to 2025 by In-Service/Parked & Stored (Qty of Aircraft)



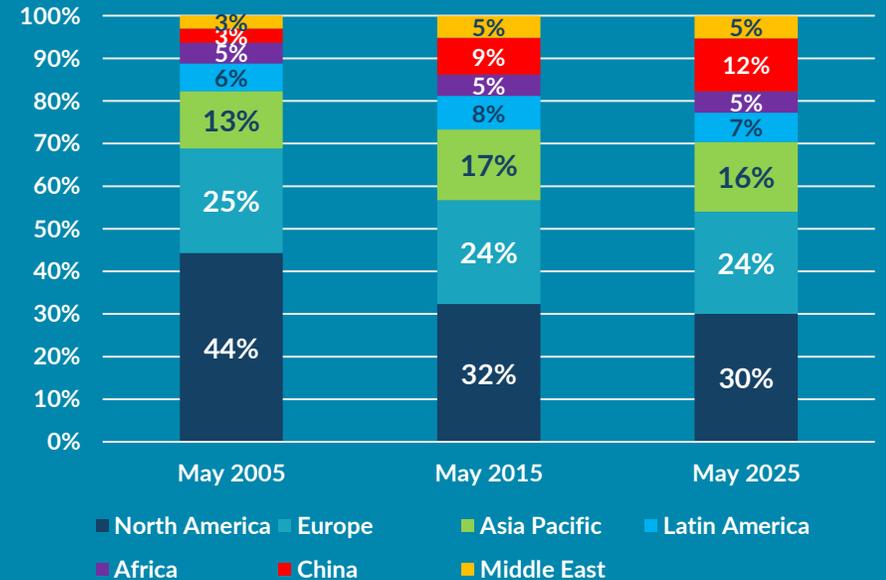
- ▲ The air transport fleet has grown from ~23,162 aircraft in May 2005 to ~36,140 in May 2025. That's a ~2.2% CAGR 2005-2025
- ▲ Today's fleet is 56% larger than it was in 2005 and 24% larger than it was in 2015
- ▲ The growth has mainly arisen from increasing narrowbody aircraft deliveries (A320ceo/neo and 737NG/MAX family aircraft). The narrowbody fleet has grown at ~3.4% CAGR 2005-2025
- ▲ In May 2025, narrowbody aircraft comprise 57% of the air transport fleet compared to ~46% back in 2005
- ▲ The turboprop fleet has reduced in size, particularly in the last decade, with a negative -1% CAGR
- ▲ Widebody fleet, ~18% of the fleet, has grown at ~2.2% from 2005 to 2025
- ▲ The large 70+ seat regional jet fleet size has grown as the smaller regional jet flew has reduced. Larger RJs now represent ~9% of the fleet compared to smaller RJs, comprising only 4% due to increasing retirements of smaller regional jets



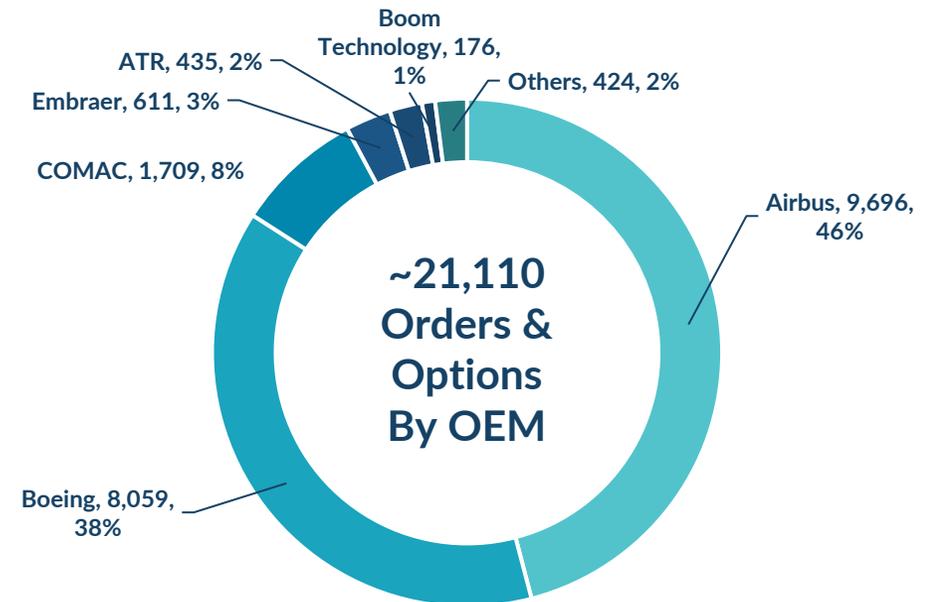
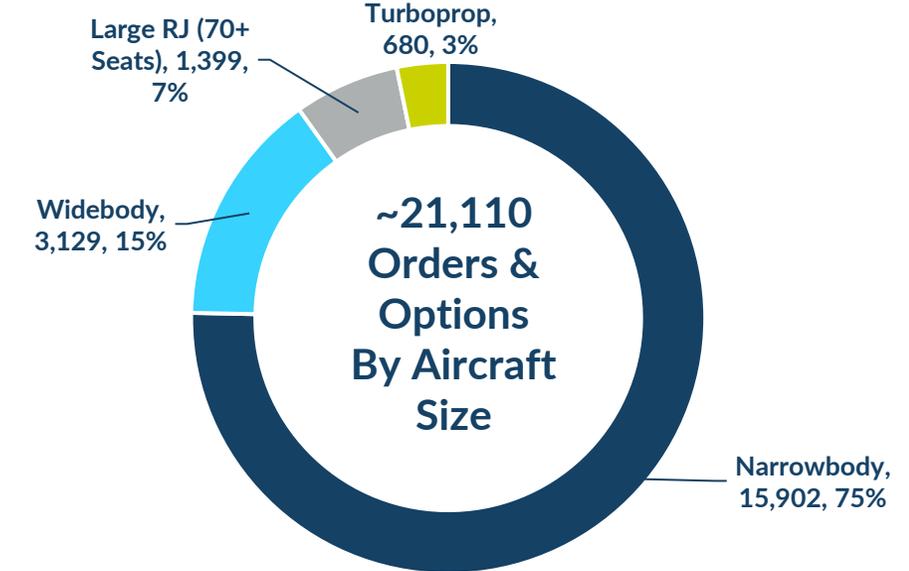
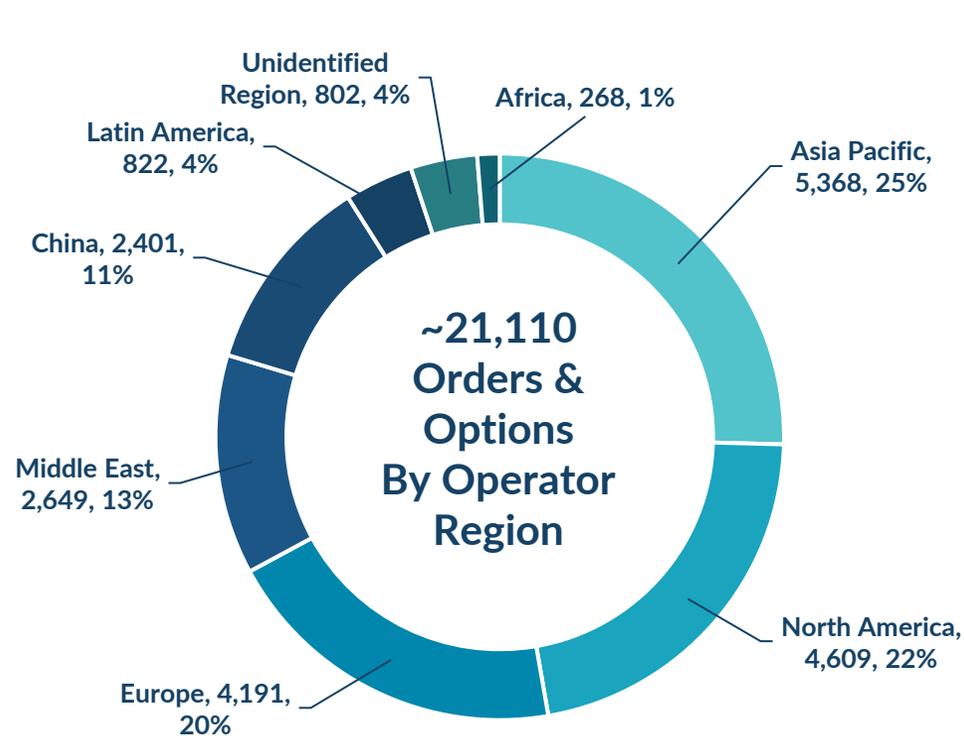
Air Transport Fleet Evolution 2005 to 2025 by In-Service/Parked & Stored (Qty of Aircraft)



- ▲ Real GDP growth has soared in emerging markets, which led to strong aircraft fleet growth from outside North America and Europe
- ▲ The North American fleet size has grown just 0.3% CAGR from 2005 to 2025. Europe has grown 2.1% in the same time
- ▲ In contrast, China has seen a fleet growth of 9.2%, while the Middle East fleet has grown by 5.1%. Asia Pacific fleet has grown at 3.2% CAGR 2005-2025
- ▲ Consequently, the relative share of the fleet by operator region has changed
- ▲ Today, China comprises ~12% of the air transport fleet, up from just 3% in 2005. Asia Pacific is 16% of the fleet, up from 13% in 2005
- ▲ The Middle East share of the global fleet has increased from ~3% in 2005 to 5% in May 2025



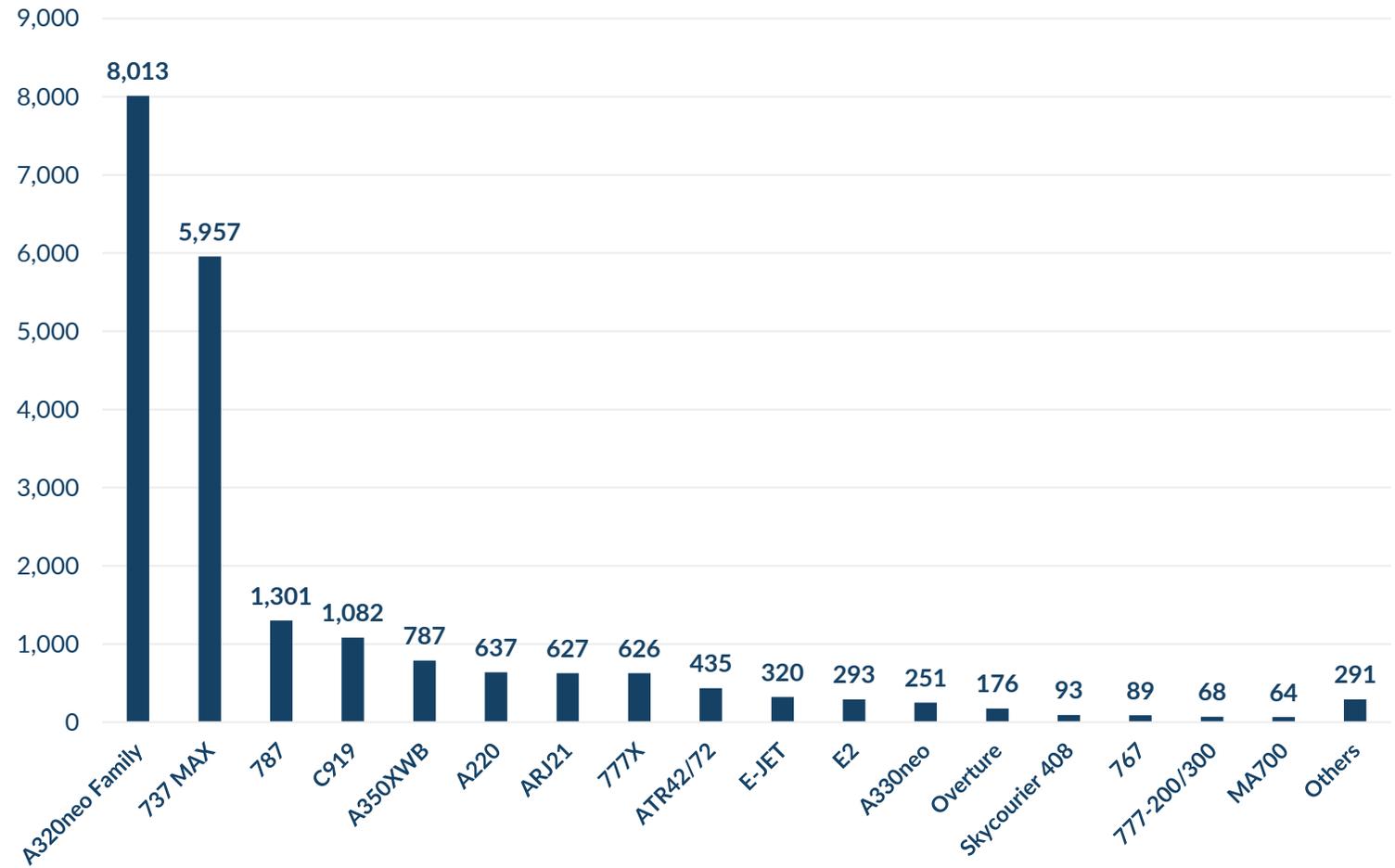
There is a huge order backlog of 21,110 air transport aircraft as of end of May 2025



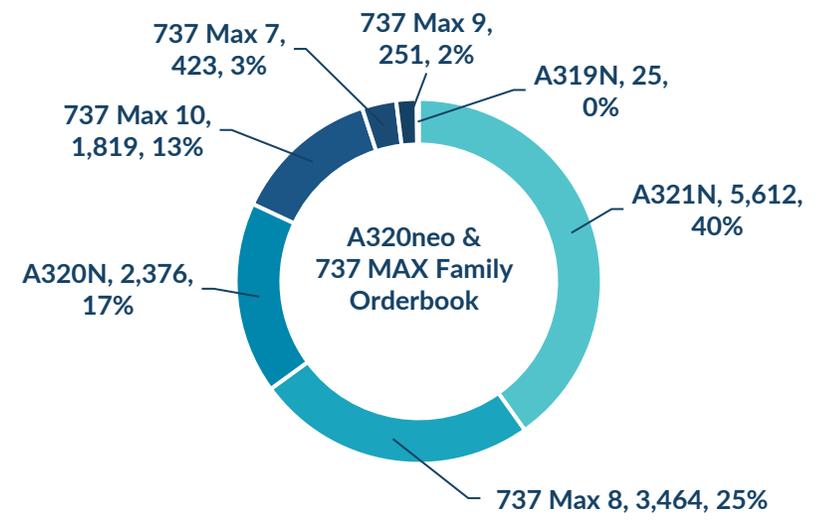
- ▲ There's a massive order backlog already placed by airlines and lessors, amounting to 21,110 aircraft on order and option in May 2025
- ▲ ~75% of the orders/options already placed are for narrowbody aircraft, which aligns with the trend towards a greater share of narrowbody aircraft in the fleet due to their superior capabilities in terms of range and passenger capacity (particularly the A321neo) compared to previous narrowbody aircraft
- ▲ Airbus and Boeing have the orders. Their challenge is to deliver the aircraft at the speed that expect

The Airbus A320neo and 737 MAX family account for ~66% of the current air transport orderbook

Air Transport Fleet Orders & Options by Aircraft Family – May 2025
Qty of Aircraft On Order/Option



- ~21,110 aircraft air transport are currently on order or option as of May 2025. The Airbus A320neo family and the Boeing 737 MAX lead the pack by a long way, with ~66% of the orderbook comprised of these two families
- Of the ~8,013 A320neo family and ~5,957 737 MAX on order/option (13,970 aircraft in total), it's the A321neo (~5,612 orders), 737 MAX 8 (~3,464 orders) and A320neo (~2,376 orders) that comprise ~82% of the A320neo family and 737 MAX orderbook

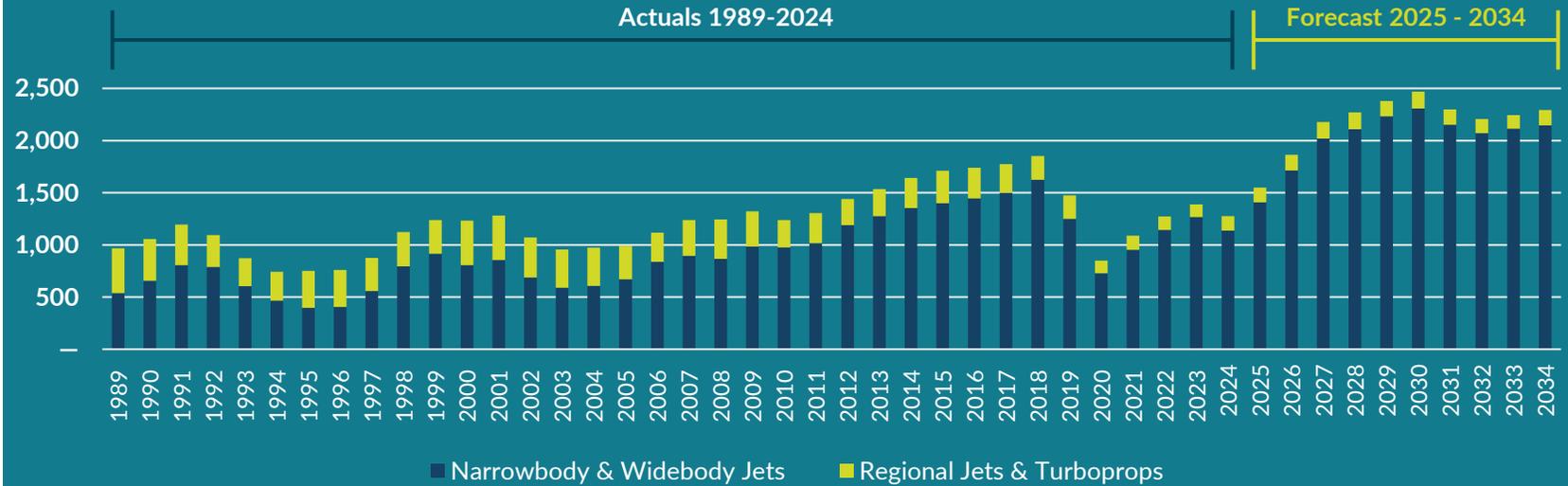


- There are 1,301 Boeing 787s and ~1,082 COMAC C919 aircraft on order, along with ~787 Airbus A350XWBs

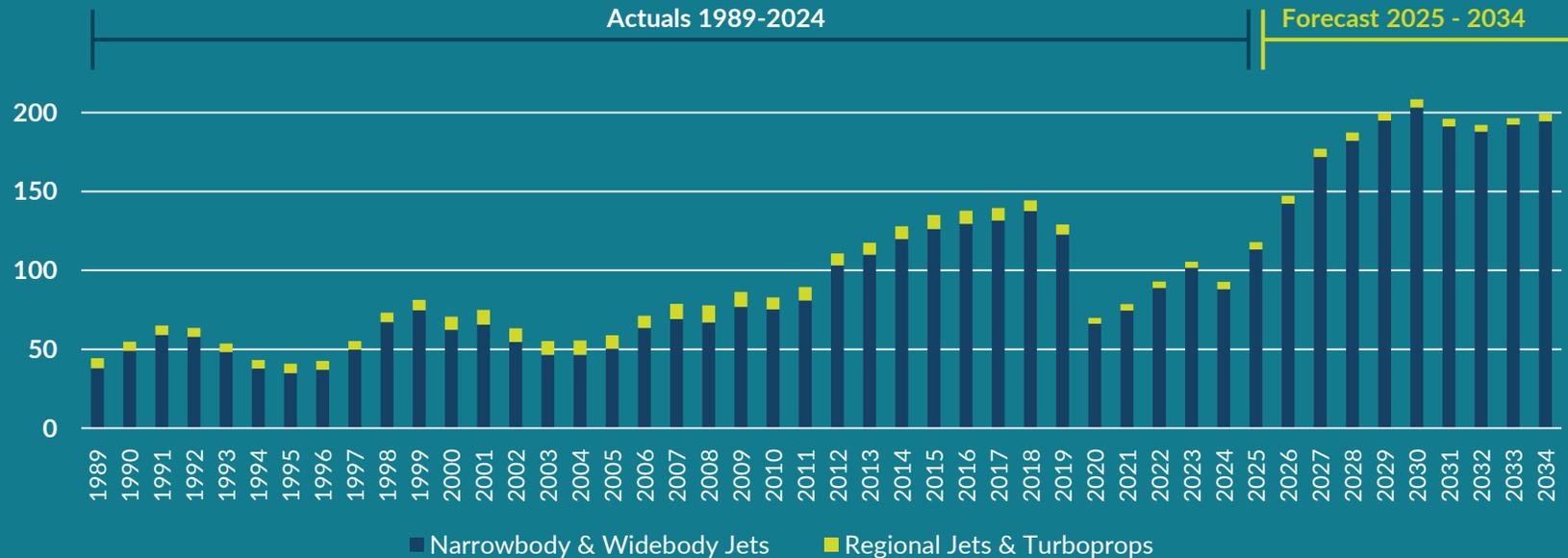
Between 2025-2034, there are ~21,746 forecasted new air transport deliveries valued at ~\$1,822B

- These are made up of ~20,272 narrowbody and widebody aircraft and 1,474 regional aircraft (jets and turboprops)
- Deliveries will likely take until 2026 to exceed 2018 levels. 2019 deliveries were lower due to the 737 MAX grounding
- Supply chain challenges, including the availability of skilled labor, strikes, raw materials, production capacity, durability and regulatory issues, continue to impact production ramp-ups and continue to put the ramp-up at risk
- Demand is strong, but manufacturers continue to struggle to meet that demand

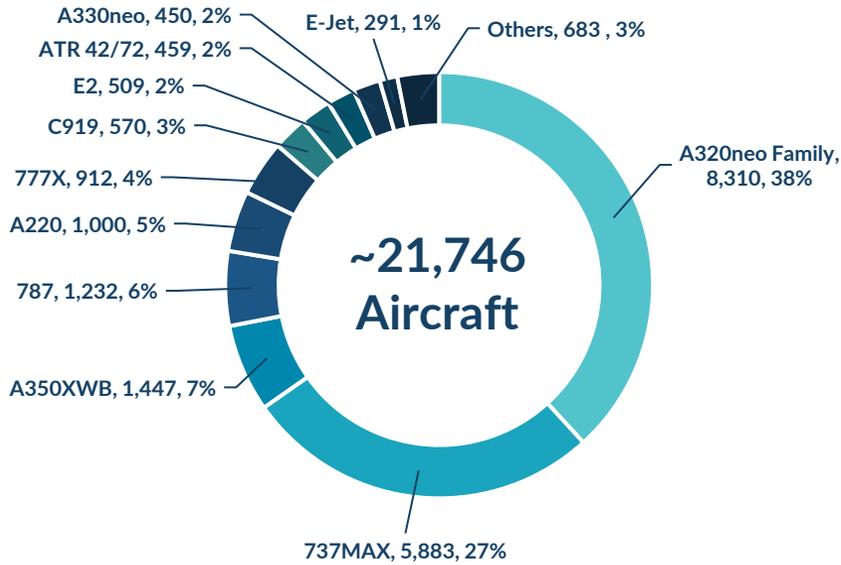
Air Transport Historical Annual Production & Delivery Forecast (Qty of Aircraft)



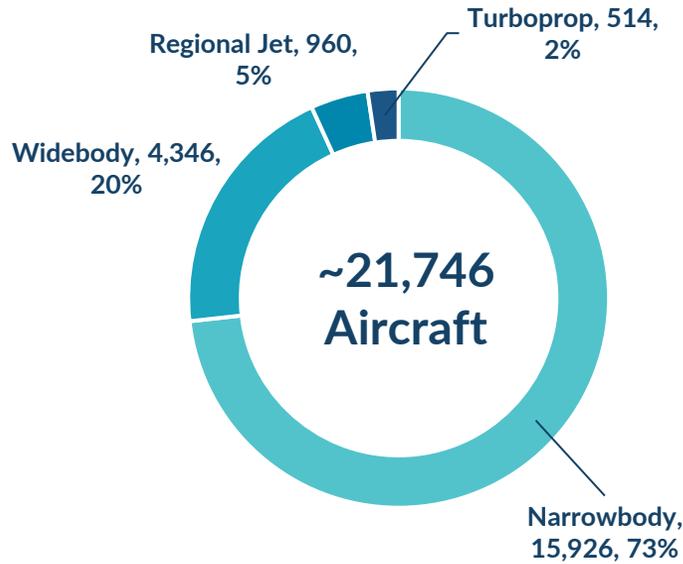
Air Transport Historical Annual Production & Delivery Forecast Value 2025 \$B



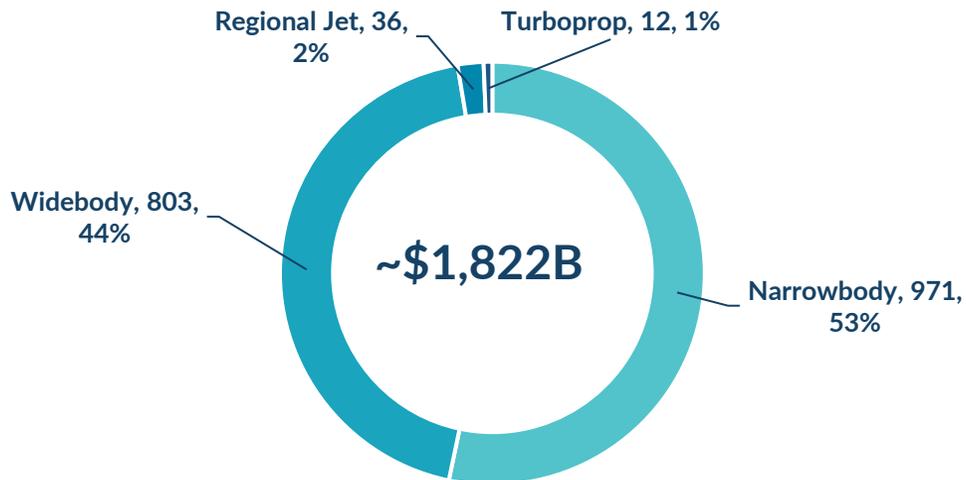
Aircraft Delivery Forecast Qty 2025-2034
(By Aircraft Family)



Aircraft Delivery Forecast Qty 2025-2034
(By Aircraft Size)



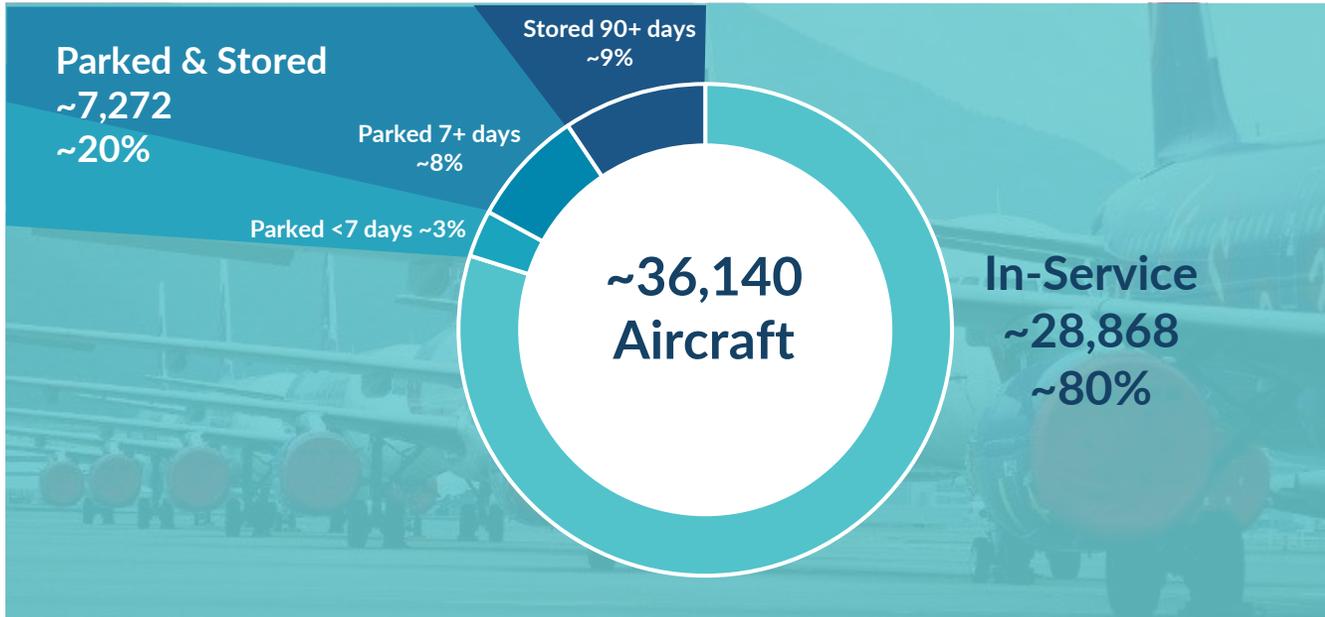
Aircraft Delivery Forecast 2025-2034
(Value of aircraft in 2024 \$B)



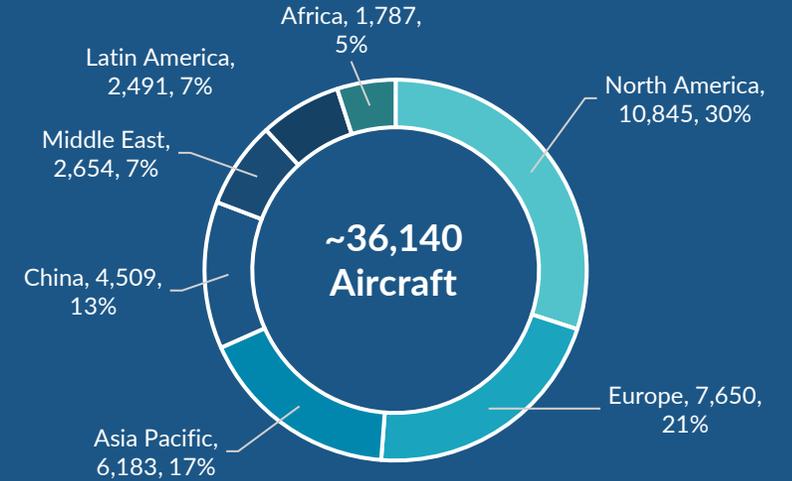
- ▲ ~21,746 new air transport aircraft are forecasted to be delivered between 2025 and 2034
- ▲ The A320neo family and 737 MAX represent ~65% by quantity (~14,193 aircraft)
- ▲ Of the ~8,310 forecasted A320neo family deliveries, the A321neo comprises 66% (~5,504 aircraft)
- ▲ The demand for fuel-efficient replacements for aging aircraft (e.g., 737 Classics, 737NG, A320ceo family, 757s, 767s) is driven by fleet renewal, continued passenger growth in emerging markets, and demand from low-cost carriers. This is driving demand for the new A320neo family, 737 MAX, A220s, A350s, 777Xs, and 787s
- ▲ Narrowbody aircraft represent ~73% of deliveries by quantity of aircraft (~15,926 aircraft). Widebody aircraft are forecasted to represent ~20% of future deliveries, with regional jets and turboprops comprising the remaining 7% of deliveries
- ▲ However, in terms of \$ value, due to the higher cost of widebodies, they make up a larger share, with widebody aircraft comprising ~44% (\$803B) and narrowbodies ~53% (~\$971B)

In May 2025, ~80% of the global air transport fleet is in active service, and ~20% is parked/stored

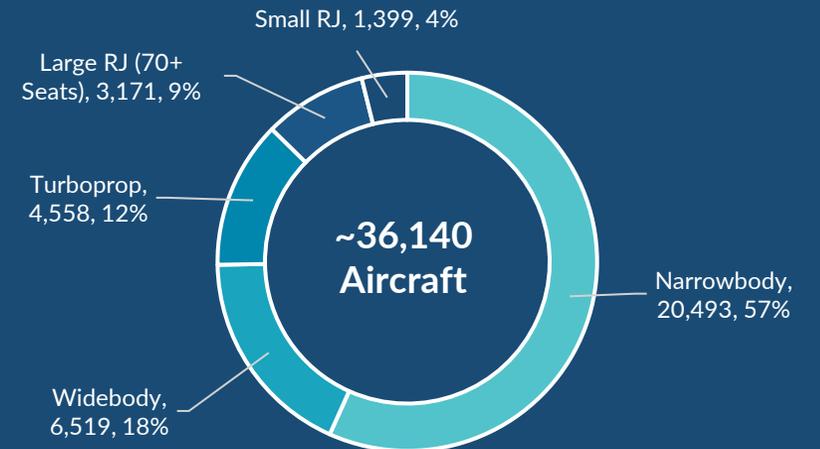
Air Transport Fleet Status May 2025
(Qty of Aircraft In-Service and Parked/Stored)



Air Transport Fleet By Operator Region
(Qty of Aircraft In-Service, Parked & Stored) – May 2025



Air Transport Fleet By Size
(Qty of Aircraft In-Service, Parked & Stored) – May 2025



▲ ~80% of the air transport fleet is in active service (~28,868), and ~20% (7,272) are parked or stored

▲ This is up 1% on May 2024, and the same as April 2025. It's the same as achieved in October 2024

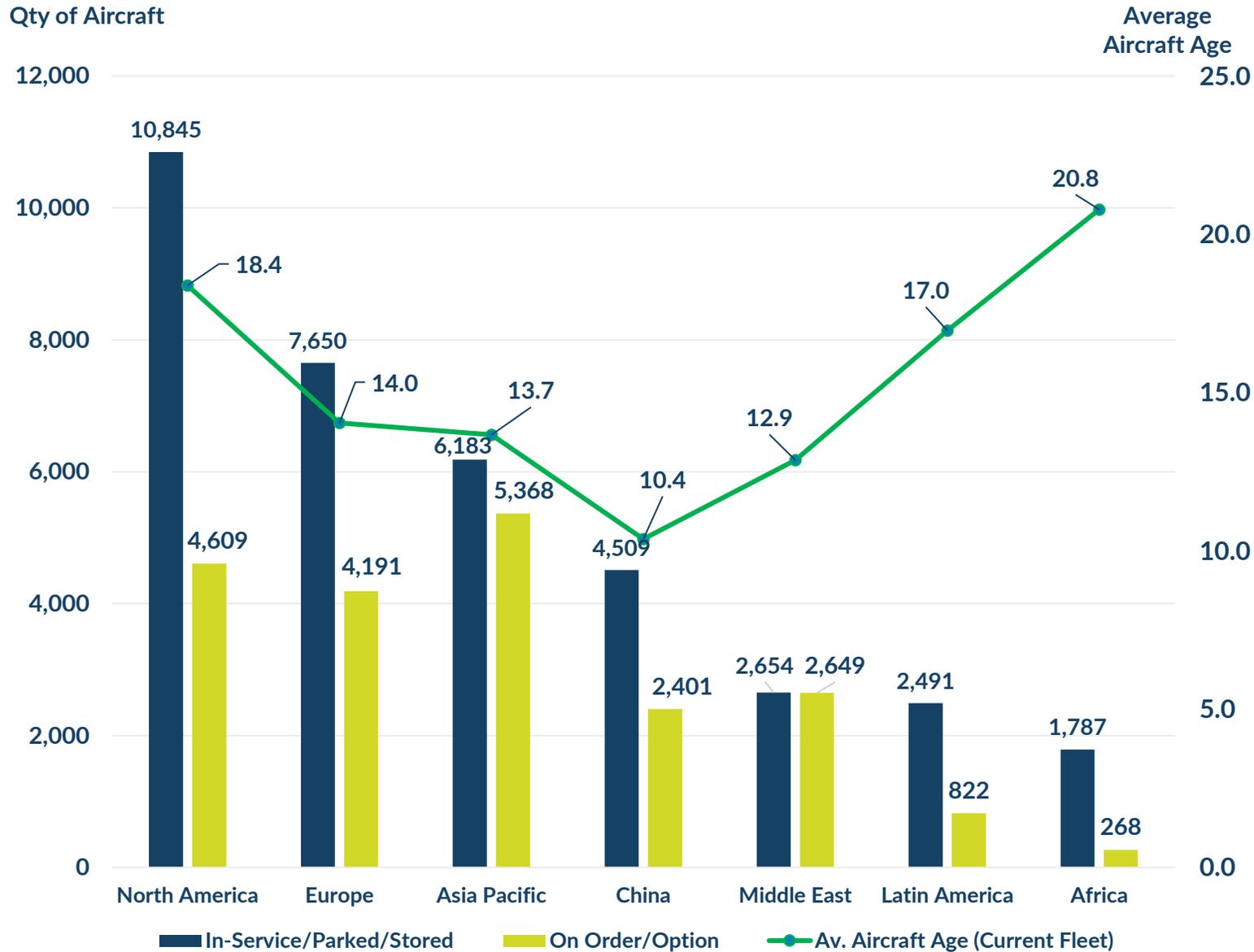
▲ There are many short-term aircraft parked for less than seven days (~1,112), and a further ~2,763 aircraft parked for more than seven days and less than 90 days (down from the 2,818 seen in April 2025 and slightly up on the 2,730 seen in May 2024)

▲ There are ~3,397 aircraft that have been stored for longer than 90 days. That down on the ~3,406 aircraft stored in April 2025 and the ~3,413 stored in February 2025. In May 2024, there were ~3,598 aircraft in storage

▲ The fleet is ~1.5% larger than May 2024

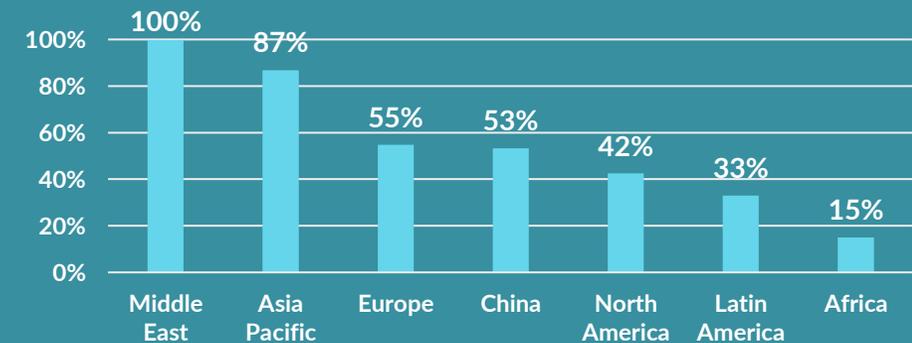
Air Transport Fleet In-Service/Parked/Stored & Average Age by Operator Region - May 2025

Quantity of Aircraft Ranked By Largest Fleet Size Left to Right



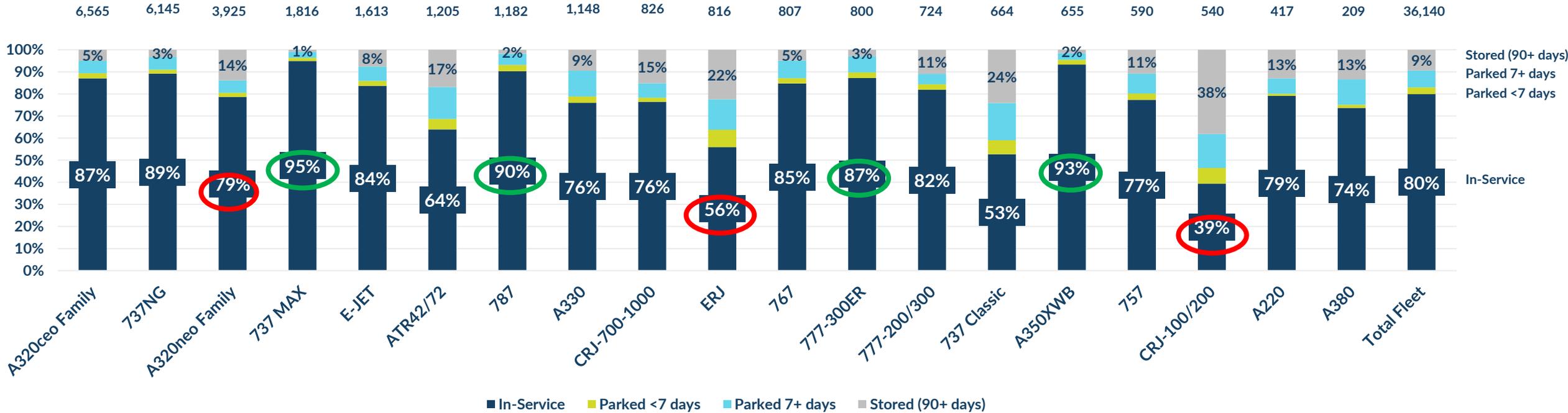
- ▲ The average global age of the current air transport fleet is a mature 15.3 years of age
- ▲ However, the average aircraft age varies by operator region
- ▲ China has the lowest average fleet age at ~10.4 years
- ▲ Asia Pacific's fleet is also relatively young at ~13.7 years
- ▲ Africa has the oldest fleet at ~20.8 years
- ▲ The North American fleet is also mature at ~18.4 years of age
- ▲ Orders/Options as a % of the current fleet shows that the Middle East orderbook has the highest (~100%), with the orderbook as large as the current fleet, boosted by the recent orders
- ▲ Africa, the oldest fleet, still has a small orderbook (15% of the current fleet)

Air Transport Orders as % of Current Fleet (May 2025)



The 737 MAX, A350XWB and 787 lead the way with the highest % of their fleet in active service

Top Air Transport Aircraft Families Fleet Status – May 2025
 % Aircraft In-Service/Parked/Stored – Ranked By Largest Fleet Size Left to Right

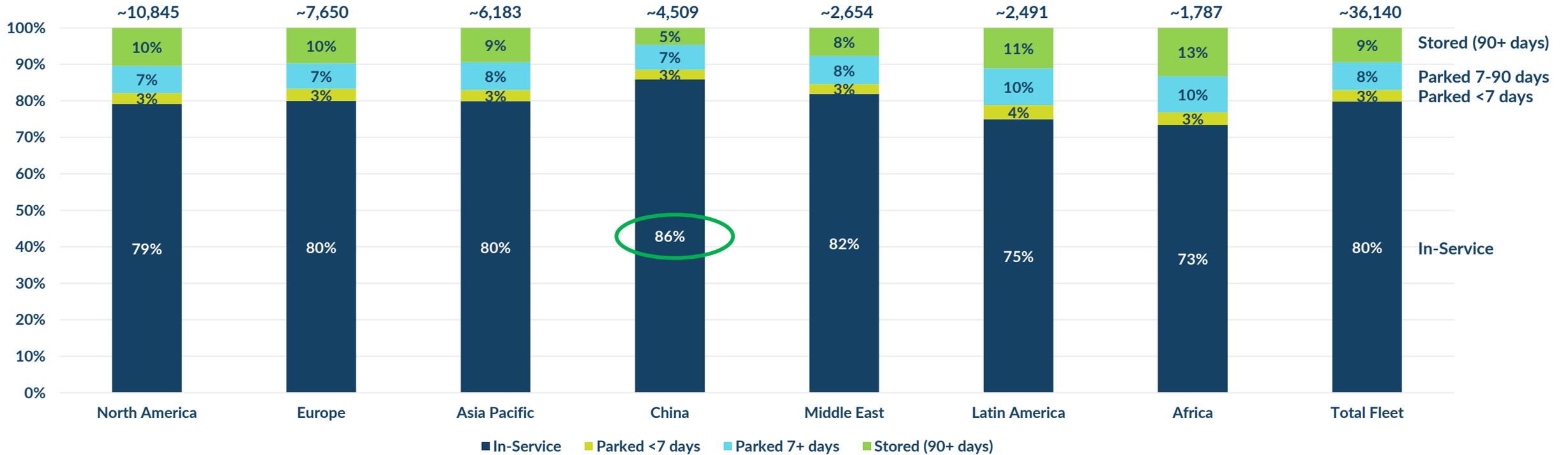


- ~80% of the air transport fleet is in active service. However, as can be seen, there are differences between the different aircraft families where the likelihood of an aircraft being in-service varies, and there continue to be winners (e.g. Boeing 737MAX, Airbus A350XWB and Boeing 787 leading the pack) and those that are struggling (e.g., Airbus A320neo family, Airbus A220, and the 50-seater regional jets)
- The Boeing 737 MAX remains the overall fleet leader, with ~95% of the fleet active in-service (the same as April, March, February 2025 and May 2024). This shows the fleet has stabilized.
- Compare this to the A320neo family, where only ~79% are in active service (up from 78% in March but down from 80% in February 2025 and 81% in September). This is due primarily to engine durability issues. The A320neo family has a lower percentage of aircraft in service than the A320ceo family. Engine issues impact the A220; hence, ~21% of the fleet is parked (only 79% of the fleet is in active service). In April 2025, ~75% of A220s were in-service

- The 737NG workhorse has 89% of its fleet in service (up 1% from February, March, and April 2024, but down from 90% in October 2024). It's the same as the 89% in-service achieved in May 2024
- The widebody leader is the Airbus A350XWB powered by Rolls-Royce Trent XWB engines, where 93% are in-service (down 1% on February 2025, same as October 2024 and March 2024 and the same as May 2024)
- The 787 has 90% of its fleet in active service (the same as in March 2025), but down from 92% in-service in October 2024 and 91% in April 2024. It's down on the 92% in-service in May 2024. Engine durability issues may explain some of the difference
- The new technology aircraft that are not in service are likely undergoing maintenance (including waiting for parts or engines) or lessor-owned aircraft waiting for their next operator

North America and Europe, the largest fleets, have ~79% and ~80% of their fleet in active service. China continues to lead the way with ~86% of its fleet in active service

Air Transport Fleet Status by Operator Region – May 2025
 % Aircraft In-Service/Parked/Stored – Ranked By Largest Fleet Size Left to Right

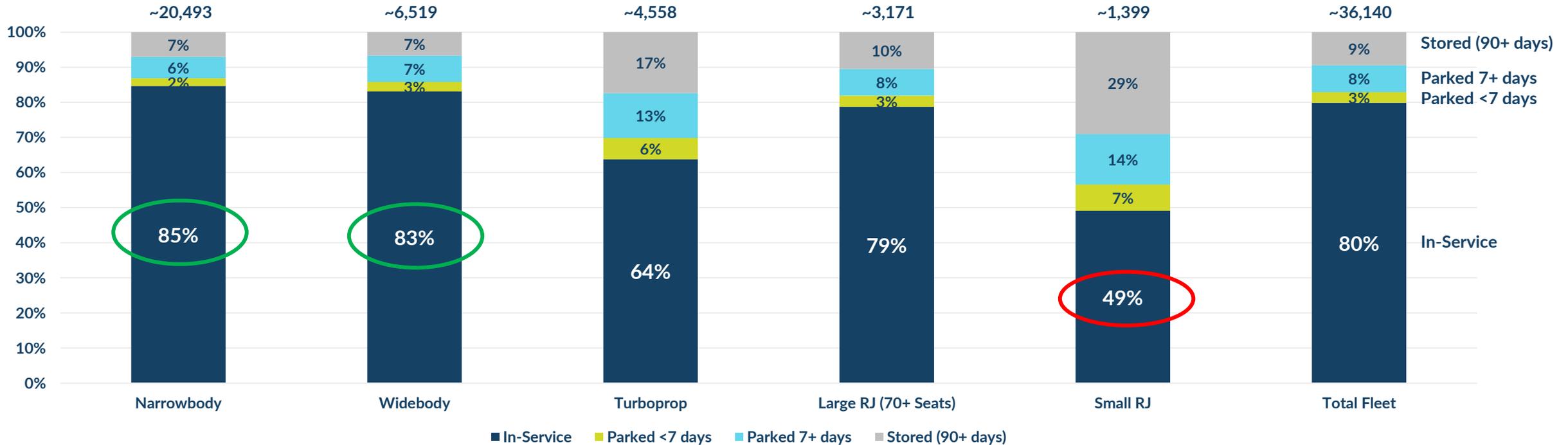


- Overall, ~80% of the global air transport fleet is in active service in May 2025 (same as April and up on the 79% in May 2024). However, there are some regional differences
- China has the highest percentage of its fleet in active service (86%), down 1% on April 2025 and down from 90% in February 2025 and 89% achieved in May 2024. Differences are likely due to maintenance, seasonal holidays and demand variations
- The Middle East fleet has ~82% of its fleet in active service (down from 83% in April but up from 80% in March 2025). It's down on the 83% in-service achieved in May 2024

- Europe has 80% of its fleet in-service, up from 78% in April and 75% in March. It's a good improvement on the 77% in-service achieved in May 2024
- North America, at 79%, is up one percentage point from 78% in active service achieved in February, March, April, and May 2024. It's the same as achieved in April and March 2025. We await the North American fleet to reach ~80%+ in active service. Maintenance and in-service durability issues, particularly with engines, have hampered the fleet's ability to recover quicker
- Latin America has ~75% of the fleet in active service (down on the 76% achieved in February, March and April 2025). It's the same as the 75% in-service achieved in May 2024

Narrowbody aircraft continue to lead the traffic recovery, with ~85% actively flying

Fleet Status by Aircraft Size – May 2025
 % Aircraft In-Service/Parked/Stored – Ranked By Largest Fleet Size Left to Right

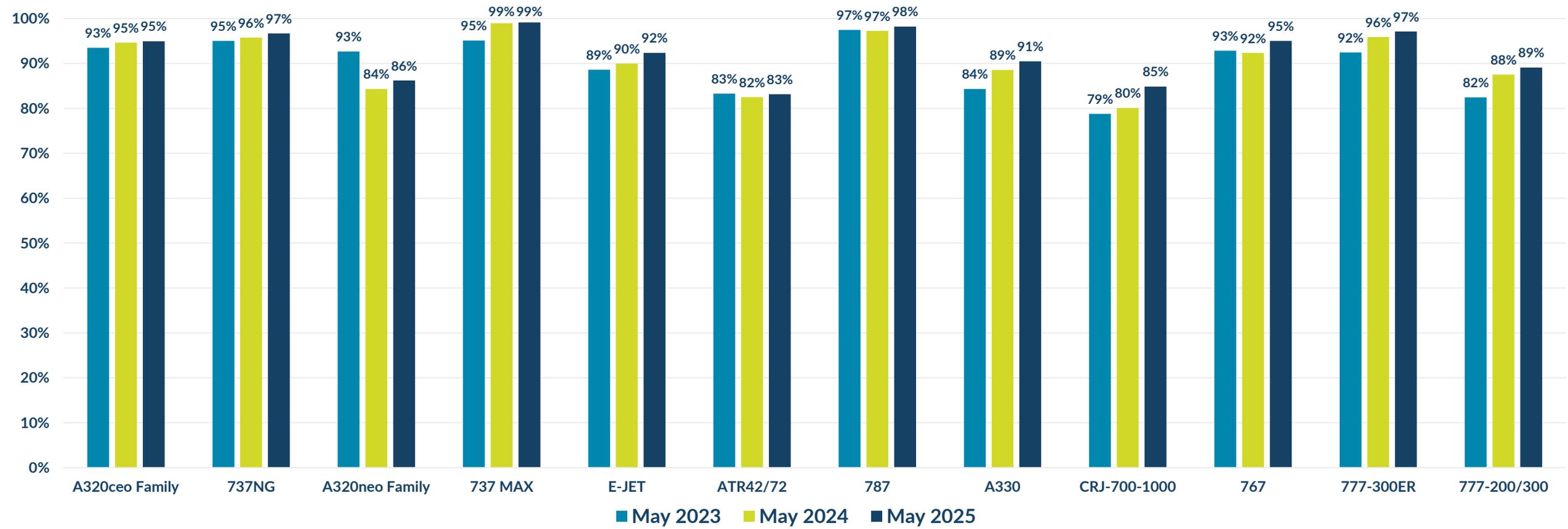


- ▲ Narrowbody aircraft such as 737NG/MAX and A320ceo/neo family are vital to the traffic recovery and continue to lead the % of fleet in-service with ~85% in active service (up from 84% in April and 83% achieved in May 2024). It's down from 87% in-service in September and 86% in October and June 2024)
- ▲ ~83% of widebody aircraft are in-service (same as April 2025 and up from the 82% in-service in February and March 2025) but down from ~84% seen in September. It's the same as the 83% achieved in October 2024). It's also up from the 81% in-service in May 2024
- ▲ Larger Regional Jets have ~79% of the fleet in active service. This is up on 78% seen in April 2025 and up on the 74% in-service in May 2024

- ▲ Smaller regional jets (e.g., Embraer 145 family and CRJ200s) continue to struggle, with a large proportion (~49%) of the fleet parked or stored. The smaller regional jets have fallen out of favor as many airlines upgaged to larger aircraft (e.g., E-Jets, E2s, A220s). Higher relative fuel prices haven't helped smaller RJs either
- ▲ Note how widebody aircraft (at 83% in active service) now have a higher % of the fleet in-service compared to turboprops (64%) or larger regional jets (79%)– which shows the recovery of international traffic and continued new aircraft deliveries

Comparing the current percentage of the fleet in-service with May 2023 and May 2024 shows most key aircraft have a higher proportion now in-service/parked than in previous years

% of Fleet In-Service/Parked. May 2023 vs May 2024 vs May 2025 Top 10 Aircraft Families. Excludes Stored Aircraft (Qty of Aircraft)



Most key aircraft families have a higher proportion of their aircraft in-service or parked (less than 90 days) compared to May 2023 and May 2024. The data excludes those aircraft stored (in active 90+ days). The A320neo, due to ongoing engine durability issues, is the outlier with 86% in-service/parked. This compares to 84% in May 2024 but is much lower than the 93% achieved in May 2023

Note how the backbone of the fleet, the workhorse 737NG and A320ceo family have ~97% (737NG) and 95% (A320ceo family) in-service/parked

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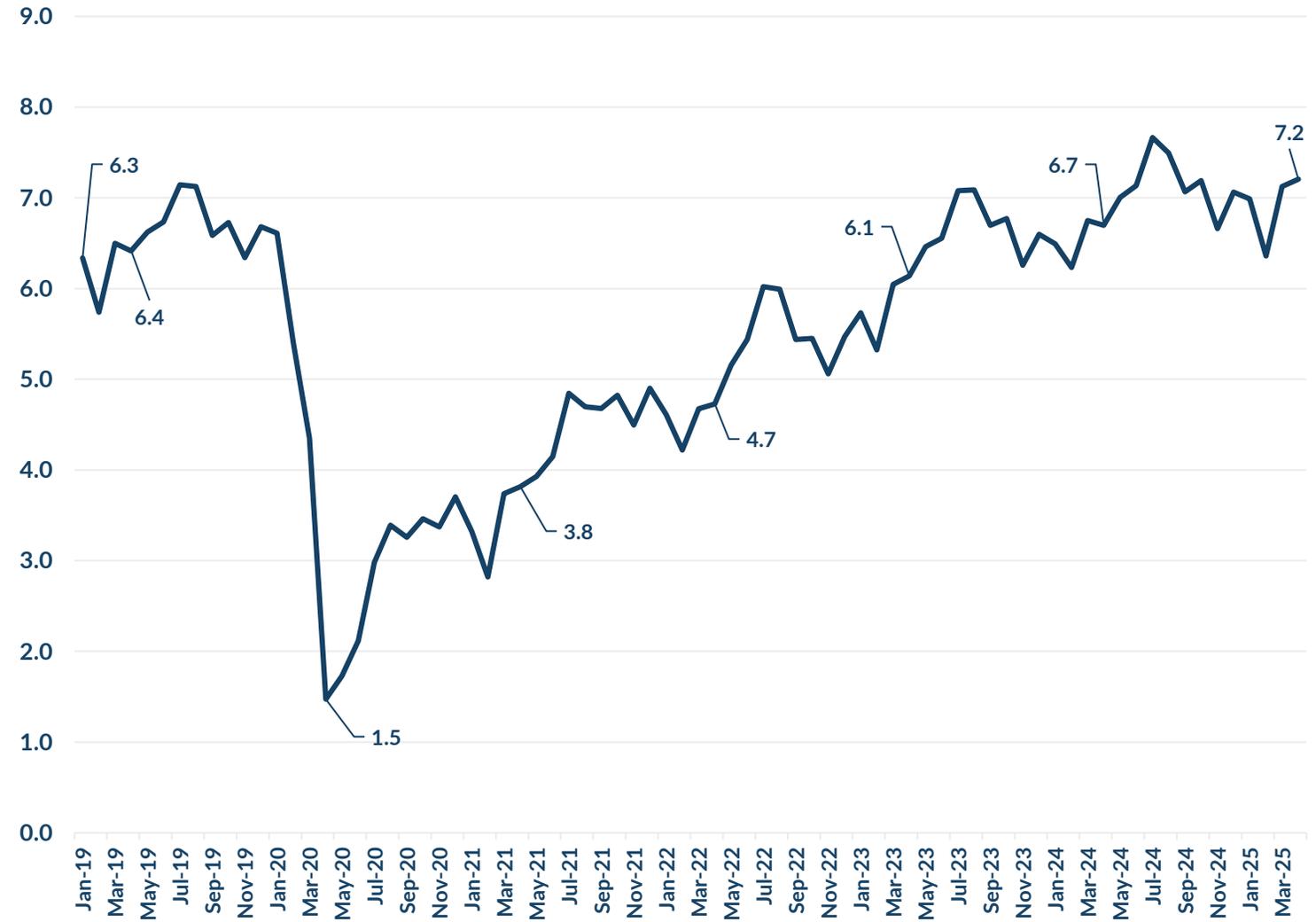
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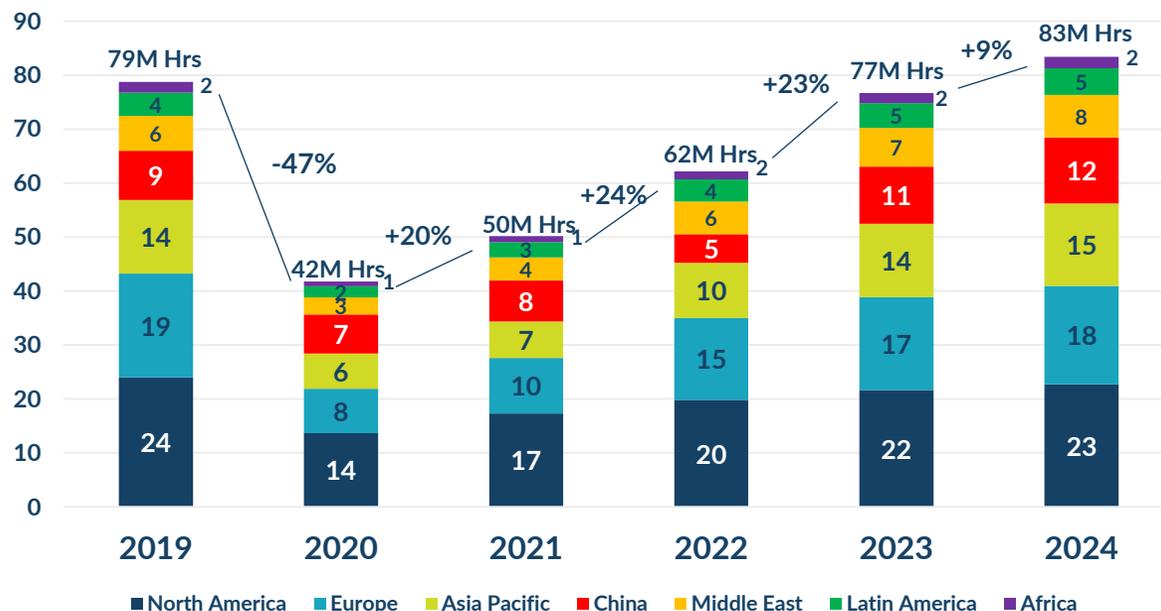
Global air transport total fleet flying hours continue to be above pre-COVID levels

- ▲ It took five years, but 2024 was the first full year where air transport fleet flying hours were above 2019 (pre-COVID levels) every month
- ▲ Since July 2023, air transport flying hours have been at or very close to 2019 levels
- ▲ In 2024, monthly flying hours were 102-109% of 2019 flying hours
- ▲ 2024 total flying hours were 106% of 2019, and 2024 flying hours were up 9% on 2023 (and 2024 was itself up 34% on 2022 total flying hours)
- ▲ 2025 has started well with monthly hours up 8-11% on 2024. April 2025 was up 8% on April 2024 and up 12% on April 2019

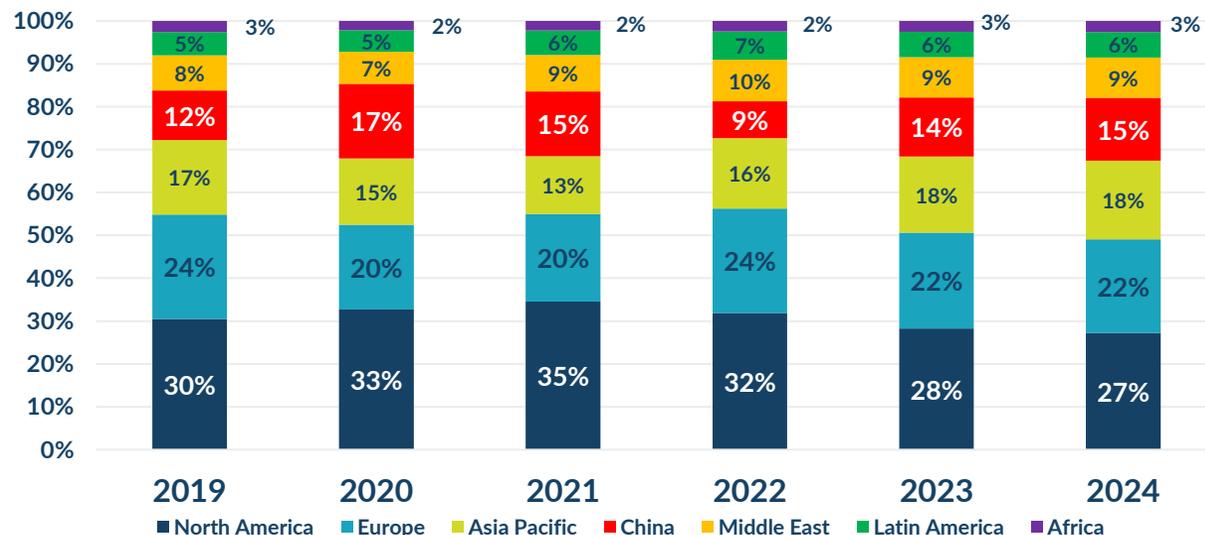
Global Air Transport Aircraft Utilisation 2019 to April 2025 (Millions Flying Hours Per Month)



Air Transport Yearly Flying Hours by Operator Region (Millions Hrs)



Air Transport Yearly Flying Hours Share by Operator Region (Millions Hrs)

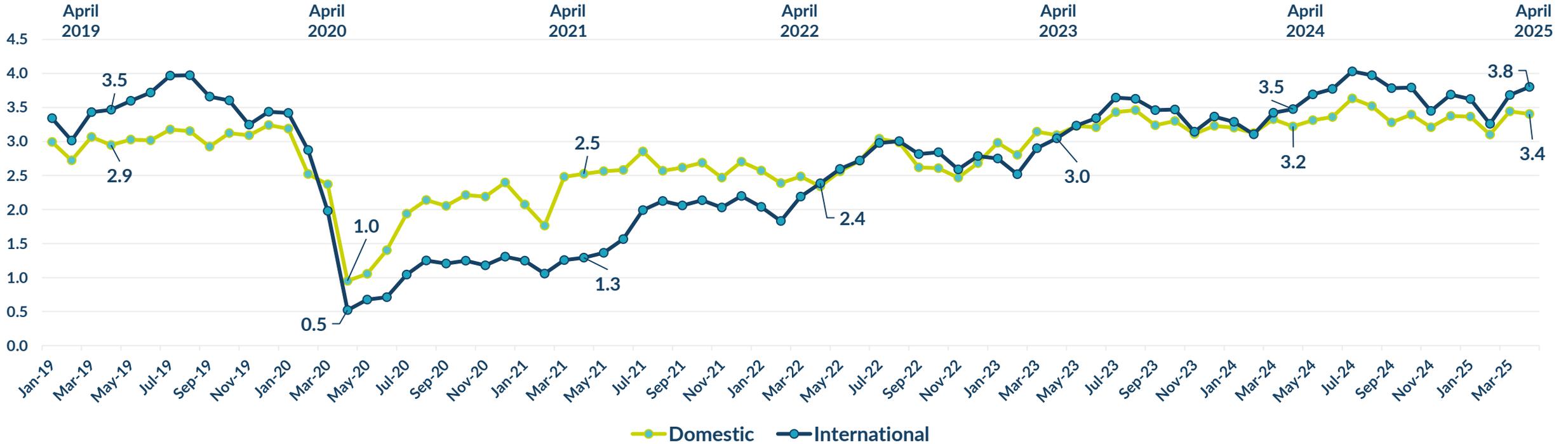


Global air transport total flying hours for 2024 were up ~9% compared to 2023

- ▲ 2024 global flying hours were ~106% of total 2019 flying hours
- ▲ Comparing 2024 total hours with 2023, flying hours were up 9%, meaning that 2024 was the year that exceeded pre-COVID flying hours
- ▲ However, there are regional differences, with some regions recovering faster than others
- ▲ European operator flying hours in 2024 still had not recovered to pre-COVID 2019 hours (2024 hours were 95% of 2019 hours)
- ▲ North American flying hours in 2024 were also ~95% of 2019 hours
- ▲ Asia Pacific flying hours (excluding China) in 2024 were ~112% of 2019 hours. Included in Asia Pacific are Indian operator hours, which increased 83% in 2024 compared to 2019. Australian operator hours in 2024 were ~90% of 2019 hours
- ▲ China operator flying hours in 2024 were ~134% of 2019
- ▲ Comparing January to April 2025 flying hours with January to April 2019 hours, North America is still only 97% of 2019 hours, and Europe is 96%
- ▲ Hence, we are still waiting to see flying hours from North American and European operators exceed pre-COVID hours
- ▲ Note also how North America's share of global flying hours has declined from ~35% in 2021 to ~27% in 2024. China and Asia Pacific have picked up share, with China's share in 2024 at 15% of global flying hours, up from ~12% in 2019

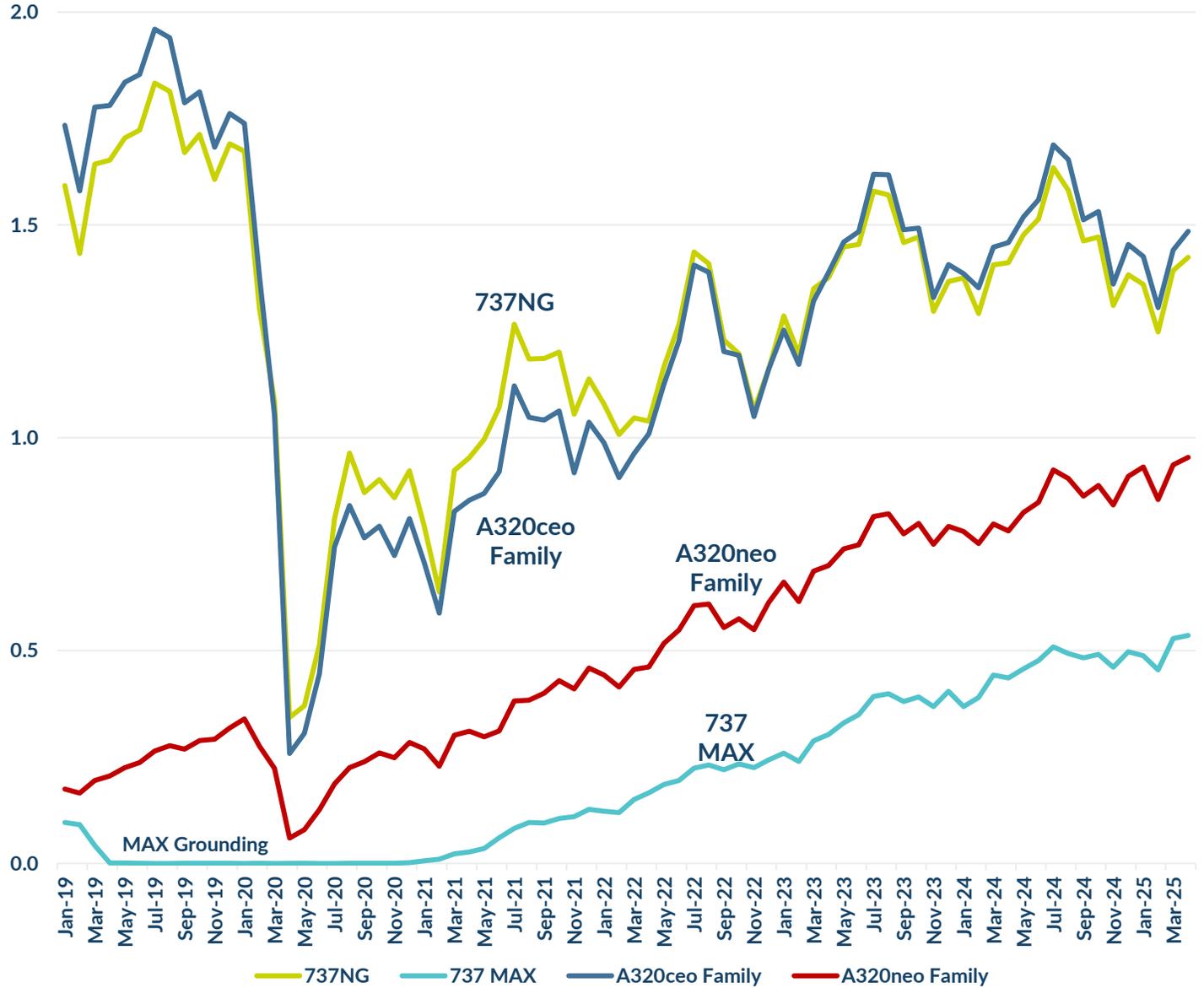
International flying hours in April 2025 were up an impressive 9% on April 2024, and domestic flying hours were up 6% on April 2024

Air Transport Monthly Flying Hours by Destination Type
January 2019 to April 2025 (Millions Hrs)



- It took until February 2024 (with the extra Leap Day) and March 2024 for international flying hours to exceed the pre-COVID hours for the same months in 2019
- Domestic flying hours returned to pre-COVID levels one year earlier, in January 2023
- International flying hours continue to be greater than domestic flying hours. In January 2025, international hours were ~5% greater than domestic hours. In February 2025, despite February 2024 having an extra Leap Day, international flying hours in February 2025 increased by 5% compared to February 2024. Due to the extra day, domestic hours in February 2025 were 99.3% of February 2024. By March 2025, international flying hours were up 7% on March 2019, and domestic hours were up 12% on March 2019
- In April 2025, domestic hours were 6% above April 2024 and 15% above April 2019. International hours were up 9% on April 2024 and 10% up on April 2019. Currently, international flying hours are ~12% greater than domestic flying hours

Global A320ceo/neo family, 737NG & 737 MAX Monthly Flying Hours
January 2019 – April 2025 (Millions Hours)

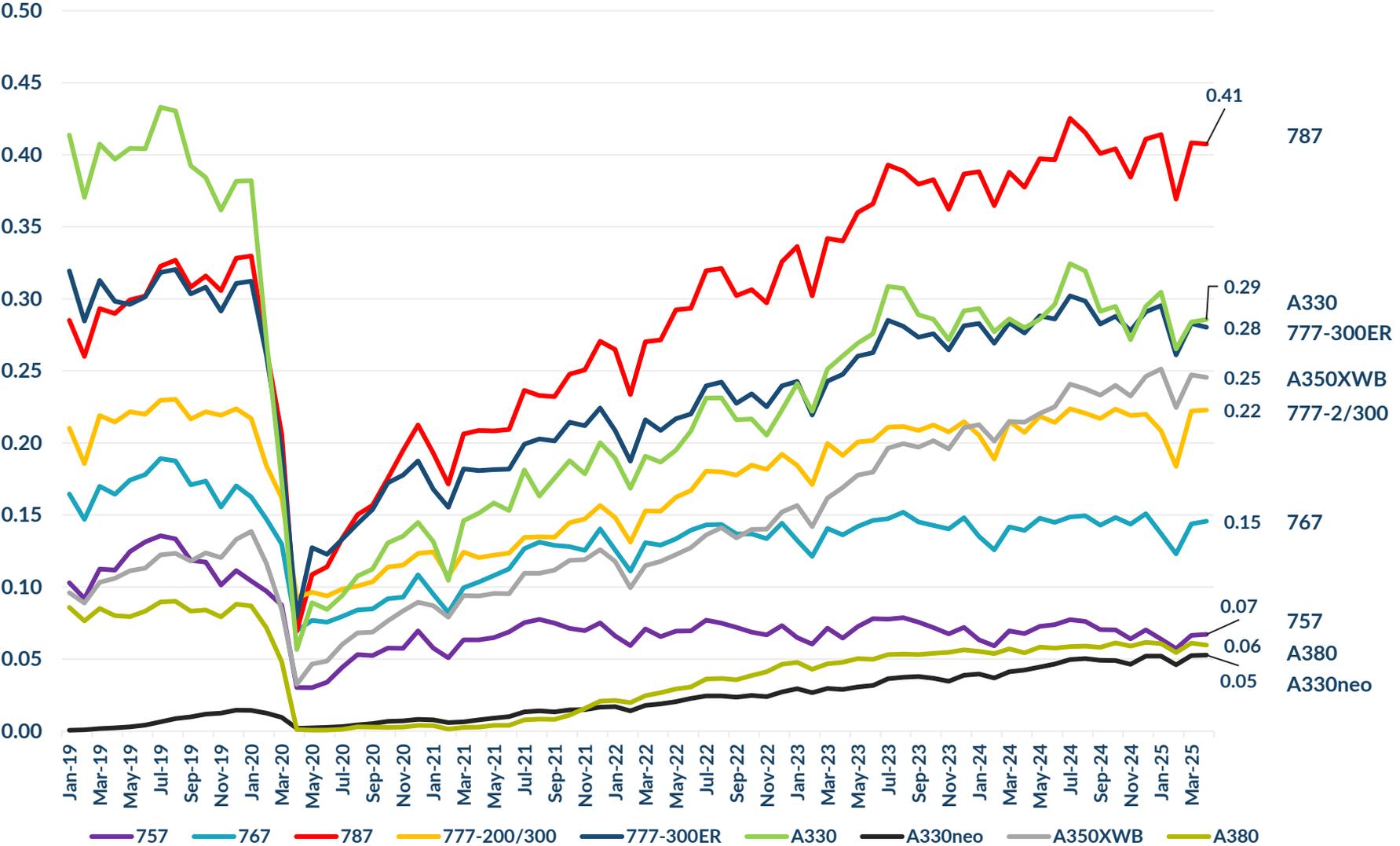


The A320neo family and 737 MAX are both above pre-COVID hours (due to new aircraft deliveries)

- ▲ The 737NG and A320ceo family, the backbone of the Air Transport fleet, are the vital in-service narrowbodies driving the recovery. They account for ~35% of the current air transport fleet
- ▲ There are ~5,481 Boeing 737NGs and ~5,717 Airbus A320ceo family aircraft in active service in May 2025
- ▲ Neither the 737NG nor the A320ceo family have reached pre-COVID hours. Since neither is in air transport production and retirements have occurred since 2019, 737NGs and A320ceo family hours are below pre-COVID and will remain so
- ▲ A320ceo family aircraft are flying ~83% of pre-COVID hours in April 2025 and 737NG are flying ~86%
- ▲ April 2025 hours for A320ceo were up ~2% compared to April 2024. 737NG were up 1%, A320neo family hours were up 22% on April 2024, and 737 MAX were up 23%, both driven by new aircraft deliveries
- ▲ The A320neo family fleet, due to a larger fleet (~3,089 in active service aircraft) compared to the 737 MAX (~1,724 in-service aircraft), flew ~1.8X the total hours of the 737 MAX fleet in April 2025

For other aircraft models, April 2025 flying was up on April 2024 apart from the 757 which was down 1%

Global A320ceo/neo family, 737NG & 737 MAX Monthly Flying Hours
January 2019 – April 2025 (Millions Hours)

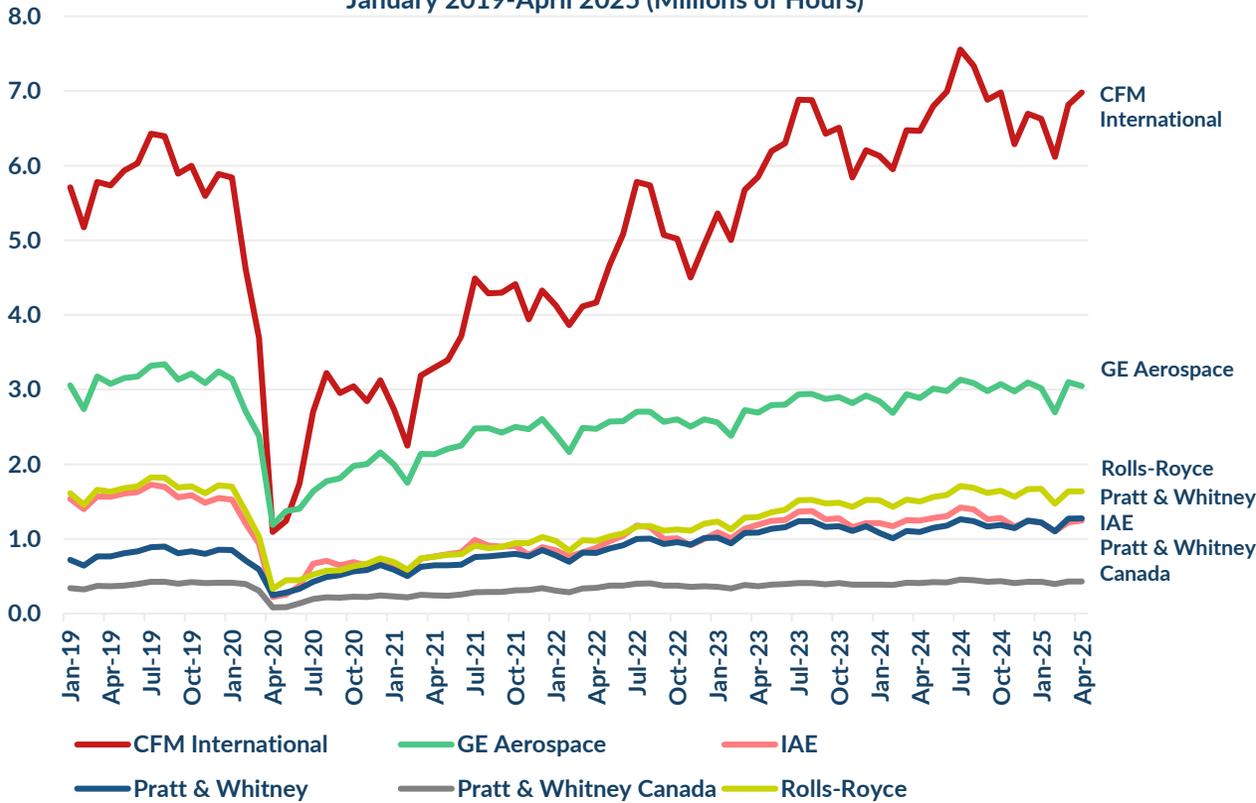


Flying Hours Comparison

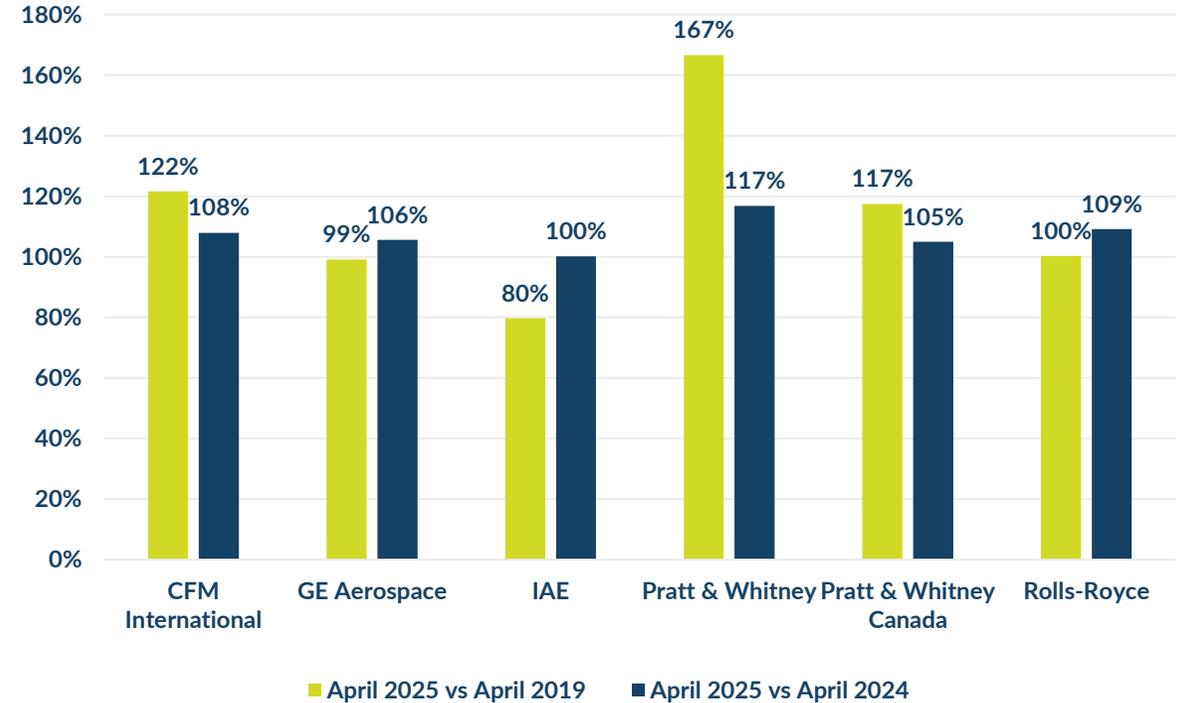
| Aircraft | April 2025 vs April 2019 | April 2025 vs April 2024 |
|-------------|--------------------------|--------------------------|
| 787 | 141% | 108% |
| A330 | 72% | 102% |
| 777-300ER | 94% | 101% |
| A350XWB | 231% | 115% |
| 777-200/300 | 104% | 107% |
| 767 | 89% | 105% |
| 757 | 60% | 99% |
| A380 | 74% | 110% |
| A330neo | 2414% | 125% |

Pratt & Whitney continues to lead the recovery in engine flying hours –boosted by a solid exposure to new narrowbody aircraft deliveries

Air Transport Engine Monthly Flying Hours by Engine OEM
January 2019-April 2025 (Millions of Hours)



Engine OEM Monthly Flying Hours Change Hrs. Comparing April 2025 with April 2019 and April 2024



- ▲ CFM International dominates engine flying hours, driven by strong positions on the 737NG, MAX, A320ceo and A320neo aircraft families. CFM’s monthly hours in April 2025 were 2.3 times those of the nearest OEM, GE Aerospace (which is itself a 50% shareholder in CFM International with SAFRAN)
- ▲ In April 2025, engines powered by CFM, Pratt & Whitney, Pratt & Whitney Canada, and Rolls-Royce exceeded pre-COVID April 2019 hours. GE Aerospace and IAE have seen engine retirements
- ▲ By April 2025, CFM was up 8% on April 2024, and GE Aerospace was up 6%. Pratt & Whitney was up 17%, Pratt & Whitney Canada was up 5% and Rolls-Royce was up 9% on April 2024

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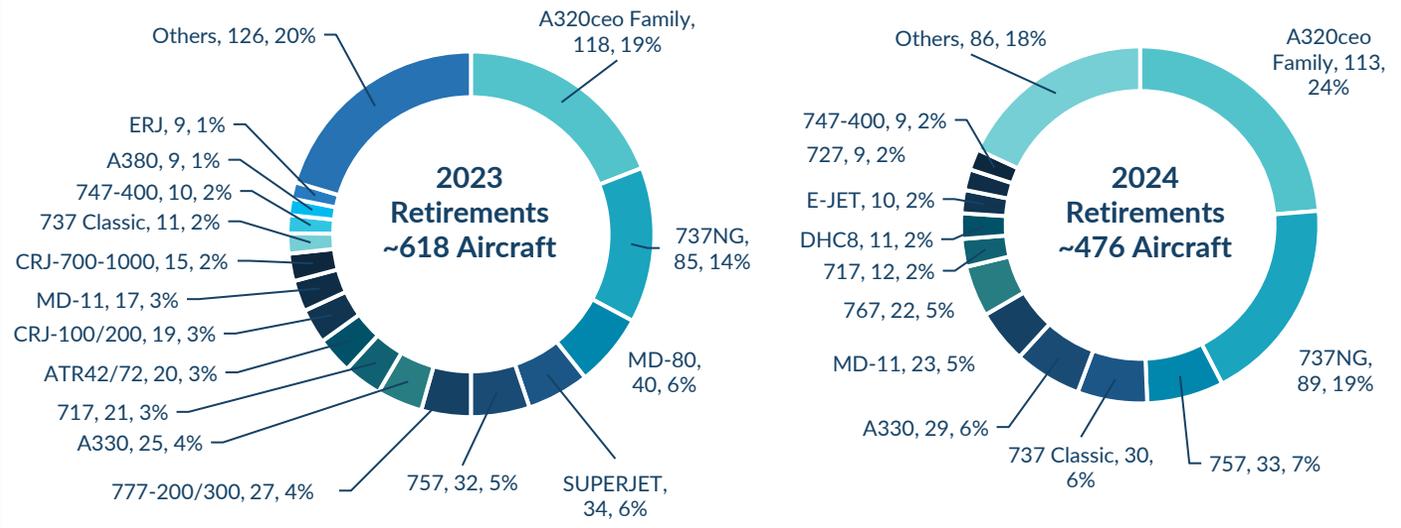
- Air Transport Fleet Status
- Air Transport Utilization Recovery
- Air Transport Aircraft Retirements
- Considerations



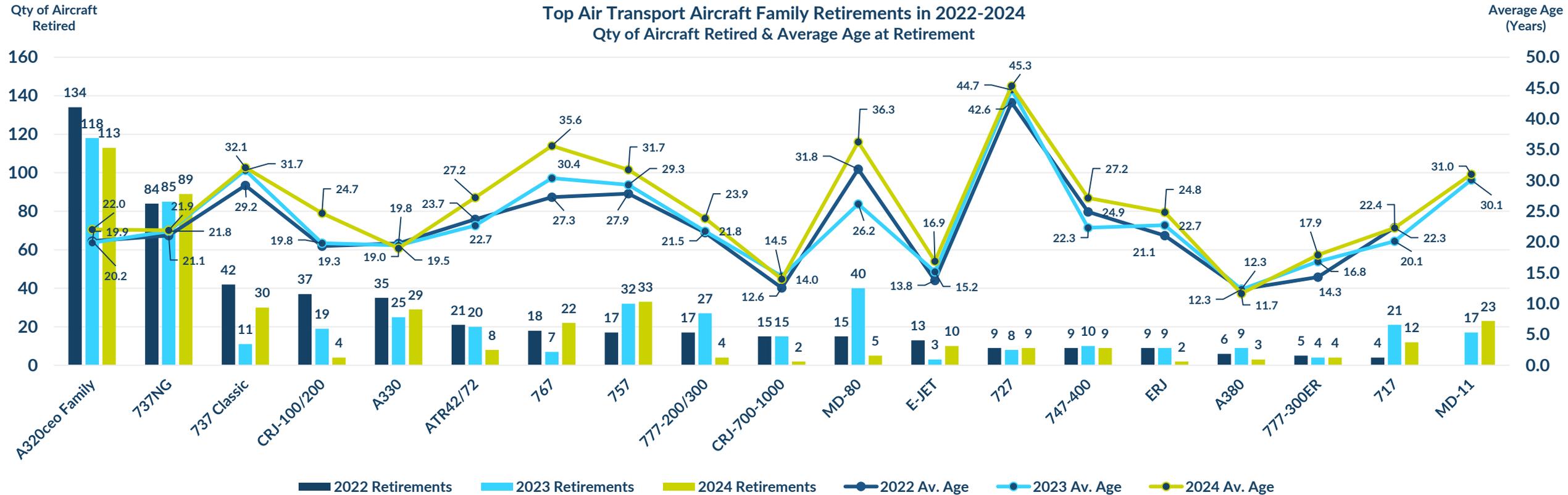
~476 air transport aircraft have so far been identified as having retired in 2024

- ▲ ~618 air transport aircraft retired in 2023. This is up on the ~582 aircraft that retired in 2022 but still below the ~858 aircraft that retired in 2020
- ▲ We can identify ~476 aircraft that have been retired in 2024 and ~150 so far in 2025
- ▲ There's a lag in the data, so some aircraft described as "parked/stored" will likely already have been retired, and the total number for 2024 and 2025 will increase as the data catches up with reality and the year progresses
- ▲ The key factor keeping aircraft in-service is continued strong traffic demand, aircraft production issues causing delivery delays, and in-service durability issues, mainly related to the latest narrowbody engines
- ▲ There's some softness in the cargo market, so some older cargo aircraft will likely head to retirement now that belly capacity from passenger aircraft is back online
- ▲ As the in-service fleet normalizes and returns to service, and new aircraft production/reliability issues are addressed, aircraft retirements will increase
- ▲ As a % of the active fleet, retirements have typically hovered between 1.7% and 3.5%. However, the average has been 2.5%. The rate in 2022 was 1.9%, and 2023 was 2.0%. In 2024, the rate was lower at 1.5%. This will likely increase as data catches up on the additional 2024 retirements

Air Transport Global Identified Aircraft Retirements 2001 to May 2025



The average age of air transport aircraft retired in 2023 was ~24.1 years, and in 2024, it was 26.2 years



- 🚩 The average age of the ~582 aircraft retired in 2022 was ~24.3 years. Then, in 2023, the average age of the 618 aircraft retired was ~24.1 years. For the ~476 aircraft identified so far as having retired in 2024, it was 26.2 years
- 🚩 COVID-19 impacted some aircraft more than others. For instance, the A380 was prematurely retired by several operators (with an average age of ~12.3 years for the 9 aircraft retired in 2023 and 11.7 years for the three retired in 2024)
- 🚩 The Embraer E-Jet has seen young aircraft retired, with an average retirement age range of 13.8 to 16.9 years
- 🚩 Some retired aircraft had long lives. 767s (30.4 years average age for those retired in 2023 and 35.6 years for those retired in 2024), 737 Classics (~29.2 to 32.1 years average age) and 757s (~27.9 to 31.7 years average age)
- 🚩 The 737NGs and A320ceos have had similar retirement ages. In 2024, the average age of the ~ 89 737NGs retired was 21.9 years of age. The A320ceo's average retirement age for the 113 aircraft retired in 2024 was 22.0 years
- 🚩 777-200/300s (not -300ERs) had average ages at retirement of 21.5-23.9 years. A handful of 777-300ERs have retired each year, and these have had younger average ages at retirement of 14.3 (in 2022) to an average of 17.9 years of age in 2024

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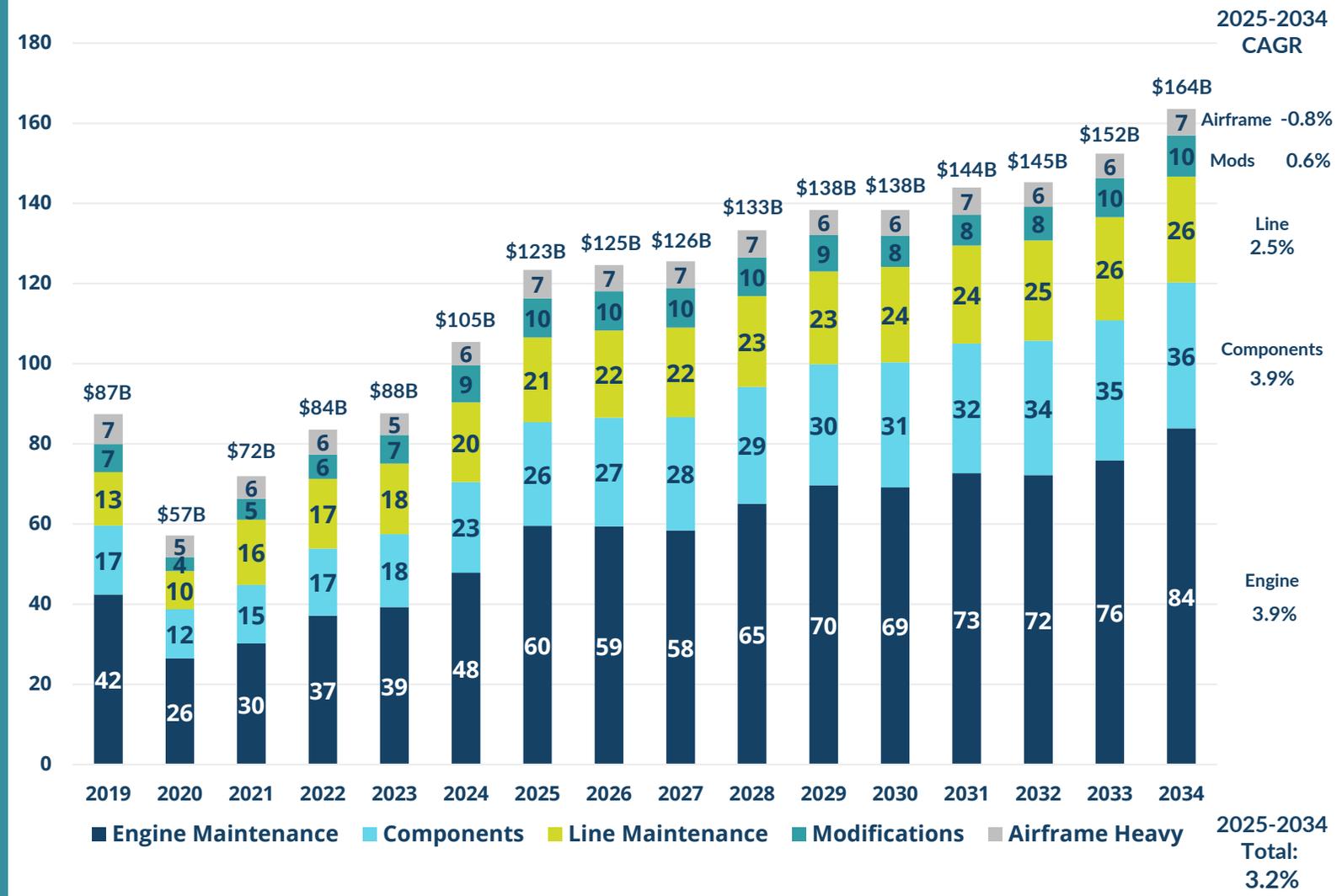


MRO spending has returned to pre-pandemic levels and is forecasted to hit \$164B by 2034 (constant \$)

- ✦ The MRO market is forecasted to be \$123B in 2025, far exceeding 2019 pre-COVID levels and grow to \$164B by 2034 (constant 2024 \$, no inflation)
- ✦ 2025-2034 CAGR growth rate (constant 2024 \$) is forecasted to be 3.2%
- ✦ Engine maintenance is the largest spend, followed by components, line, modifications and airframe heavy maintenance
- ✦ Airframe maintenance is forecasted to shrink over the next decade (-0.8%) – in constant \$, no inflation - due to the retirement of maintenance-intensive aircraft and their replacement by less maintenance-intensive aircraft
- ✦ Line maintenance is forecasted to grow at 2.5%, modifications at 0.6% out to 2034 (constant \$)
- ✦ Engine and component maintenance are forecasted to grow at the same rate of ~3.9% CAGR to 2034 (constant \$)

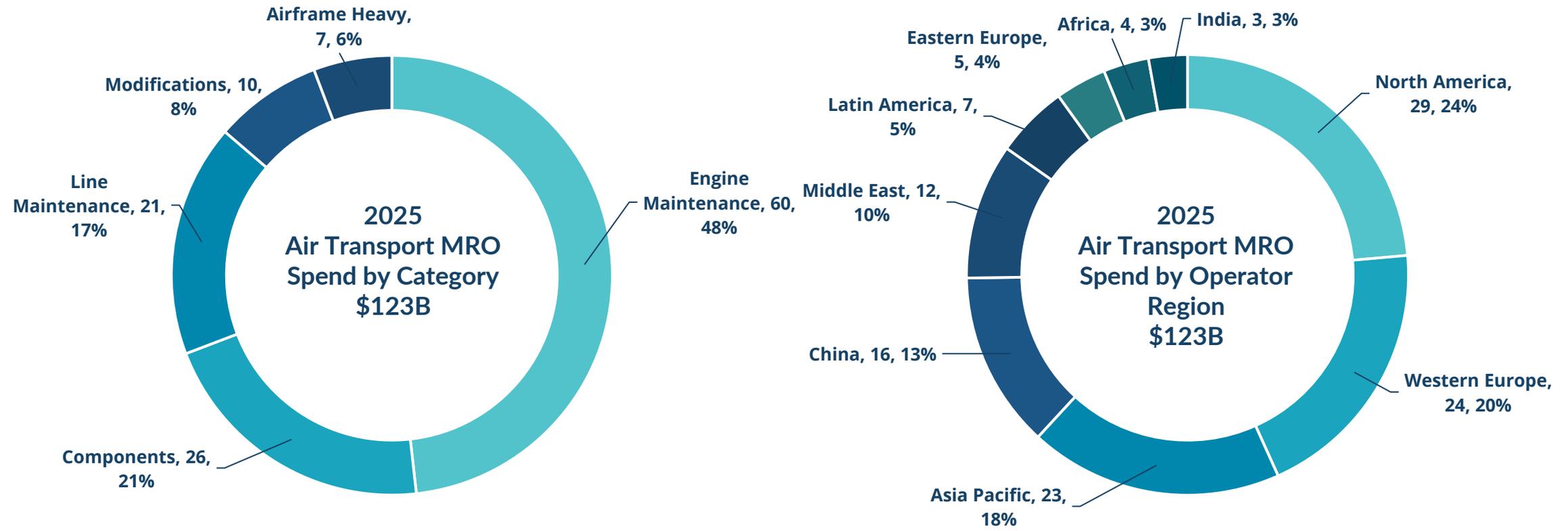
Air Transport MRO Market Forecast, 2019-2034 By MRO Category

(All Air Transport Aircraft). Forecast from 2025 in Constant 2024 US\$



2025 air transport MRO spend is forecasted to be ~\$123B. Of this engine and component maintenance comprise ~69%

Air Transport MRO Market Spend 2025 \$



- 2025 air transport MRO spend is forecasted to be \$123B. This is driven by engine maintenance, the largest spend category, at \$60B (48%), followed by component maintenance at \$26B (21%). Next is line maintenance MRO at \$21B (17% of spending), followed by modifications (\$10B) and heavy airframe maintenance (\$7B)
- North American operators generate the most MRO (\$29B, 24% of the market) followed by European operators (\$28.9B, 28% of spending when Western and Eastern European operator spending is combined)
- Asia Pacific operators (excluding China) generate \$23B, followed by China's operators at \$16B

Demand for alternative material, part repairs and cost-conscious workscopes is increasing

- ▲ COVID taught airlines and MROs to be in cash-conservation mode, avoiding maintenance expenses where they can
- ▲ As MRO recovers from COVID, Naveo expects that MRO sourcing practices will continue to evolve and take into account:
 - ▲ Cost-conscious workscopes, module swaps, alternatives to new OEM material
 - ▲ More repair rather than replace (e.g., part repair, DER, approved repairs)
 - ▲ Evaluation of USM surplus parts and PMA (where allowed) as alternatives to new OEM material for restocking inventory and substitute for repair
 - ▲ Whether their current MRO contract makes sense (e.g., long-term flight-hour contract vs. fixed price vs. time and material)
 - ▲ Deferral of non-essential maintenance (e.g., cabin upgrades) until airline revenue recovers
- ▲ These changes impact OEM profitable new part sales, and USM substitution for repair can impact component and Engine MROs, particularly on older platforms

#1 Surplus Parts (USM)

- ▲ Used Serviceable Material (USM) is aircraft/engine parts that have been previously used by operators, MROs or OEMs
- ▲ The majority of USM is sourced from retired aircraft/engines. Excess inventory is the remaining source
- ▲ ~\$5B spend pre-COVID

#2 Part Repair

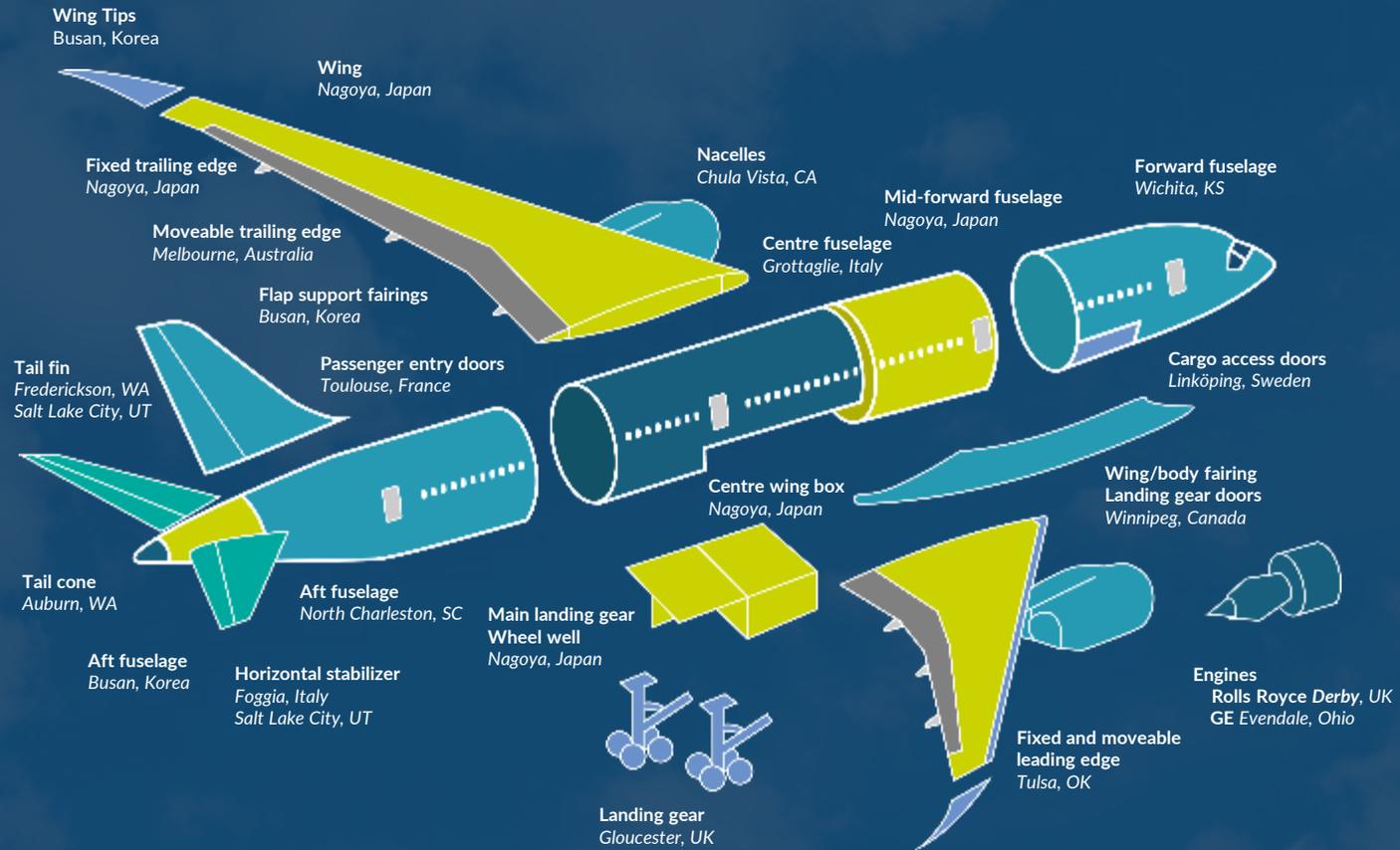
- ▲ OEM approved or DER approved repairs to aircraft and engine parts – where a repair can be actioned rather than substitution by a new part
- ▲ DER refers to Designated Engineering Representatives, FAA approved engineers who can approve technical data for repairs and modifications outside the CMM
- ▲ Design Organization Approval (DOA), is a blanket approval for an MRO organization to develop internal repairs
- ▲ \$6B spend pre-COVID

#3 PMA Parts

- ▲ PMA (Parts Manufacturer Approval) is FAA approval granted to a non-OEM manufacturer of aircraft parts
- ▲ There are two types of PMA: Licensed & Competitive
- ▲ Many airlines and lessors prohibit use of PMA parts in flight-critical parts of the aircraft and engine without authorization
- ▲ PMA growth has been strong in non-flight critical areas such as the cabin, particularly in areas touched by passengers
- ▲ ~\$750M spend pre-COVID

The aerospace industry's global supply chain, long planning horizons, and difficulties in moving parts make aerospace particularly vulnerable to tariffs

- ▲ Aerospace has an extended global supply chain that are easily and significantly impacted by trade disruptions
- ▲ Unlike other industries, tariffs are relatively new to Aerospace and the industry hasn't developed the mechanisms to deal with them
- ▲ The effort involved in managing this amount of change is a significant resource drain
- ▲ Even if tariffs didn't go into effect, the on-again / off-again nature of the current environment creates uncertainty
- ▲ Countries impacted by US Tariffs are responding not just with tariffs but also with non-tariff sanctions



To date, the greatest geopolitical impacts have been seen in aerospace production

Geopolitical Impacts to Date on Aviation and Aerospace

Production

- ▲ Western buyers shift spend away from VSMPO (but can only do so slowly due to capacity constraints)
- ▲ 777 landing gear forging was made in Samara (Arconic JV)
- ▲ Boeing Moscow design office closed
- ▲ Russification of the Superjet and MS-21
- ▲ Chinese airlines pivot away from Boeing and shift narrowbody orders to C919
- ▲ China forbids export of commercial parts also used for foreign military programs
- ▲ Brazil-China technology development agreement (along with other aerospace and aviation cooperation initiatives)
- ▲ Tariffs on aluminum, steel, and other materials
- ▲ No new sourcing from Chinese suppliers?

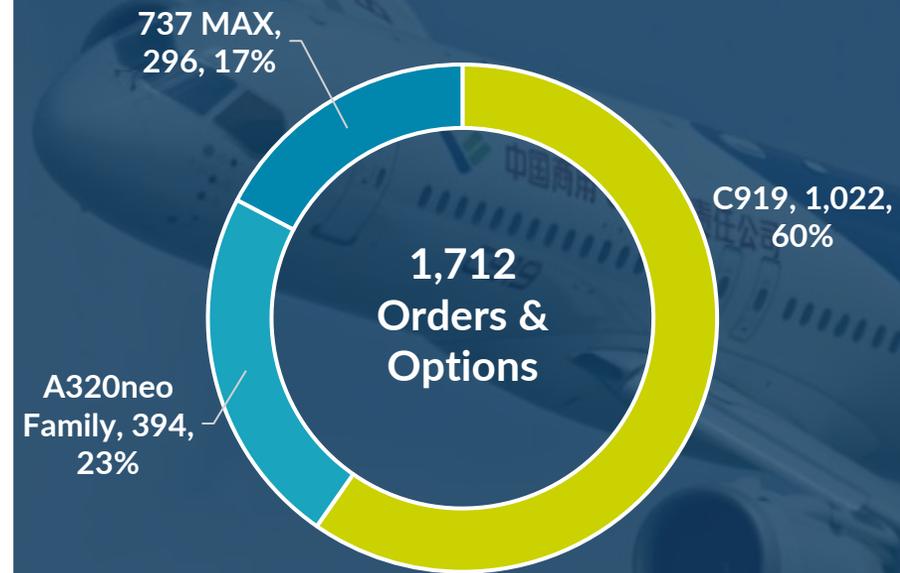
Air Traffic

- ▲ Russian air traffic went
- ▲ Can no longer overfly Russia (e.g., London-Tokyo is 3 hours longer)

MRO

- ▲ Russian fleet can't get replacement parts

COMAC Share of Chinese Airline Narrowbody Orders





The tariff situation is very fluid, and the impacts are being evaluated

- ▲ It's early days in what is a global renegotiation of trade relations
- ▲ Tariffs are being used by the Trump Administration to drive economic fairness negotiations as well as to force national security actions
- ▲ The regulations are complex and are easy to change (and have changed as we've seen)
- ▲ The administration has often provided little guidance when it has made changes – and it has made changes frequently
- ▲ The big question for the aerospace industry is who ends up footing the bill – that's subject to negotiation between buyers and suppliers. Some suppliers are already sending out letters saying that they will increase prices
- ▲ Understanding the impact of tariffs will consume a lot of industry bandwidth – unlike some other industries, we are not prepared to deal with this issue.
- ▲ Country of origin information is proving difficult, if not impossible, for aerospace suppliers

Air Travel demand has returned but the production and aftermarket supply chains have struggled to keep up

Production & MRO Market Issues



Labor Constraints

COVID-19 caused talent to leave OEMs, MROs and airlines, exacerbating skills shortages. Recruitment is occurring, but new workers might be less skilled and take time to train



Parts & MRO Capacity Shortages

Shortages of key parts (e.g., castings), assemblies (e.g., engines), engine, part and component repair shop capacity are constraining MRO and causing longer turn times



Reliability & Regulatory Issues

Engine durability (e.g. GTF) issues and regulatory issues (e.g. Boeing) are requiring early removals and hospital visits, grounding aircraft, constraining engine slot capacity, and causing older aircraft to remain in-service longer



Inflation, Interest Rates & Payment Terms & Tariffs

Higher interest rates have made it harder and costlier for some sub-tier suppliers to obtain working capital to fund the production and MRO market ramp-up. Long payment terms with OEMs aren't helping smaller supplier cashflow

Tariffs have created uncertainty and management distraction

Naveo's consultancy expertise is broad. Our capabilities include:

STRATEGY & MARKET ANALYSIS

- ▲ Strategy and growth planning
- ▲ Additive manufacturing and 3D printing
- ▲ Aerospace cluster strategy planning and support
- ▲ Aftermarket value proposition research, design, and testing
- ▲ Airframe, component, engine, and cabin interior market
- ▲ Big data and connectivity, aircraft health monitoring, prognostics and diagnostics
- ▲ Competitor analysis
- ▲ Customer satisfaction research, implications and action plans
- ▲ Customer segmentation and buying behavior
- ▲ Engine parts repair market Operations and supply chain improvements
- ▲ Mid-life to end-of-life aircraft market
- ▲ Original equipment production and MRO aftermarket forecasting
- ▲ PMA parts market
- ▲ Aircraft retirements
- ▲ Surplus parts / used serviceable material (USM)

M&A TRANSACTION SUPPORT SERVICES

- ▲ Acquisition search
- ▲ Due-diligence advisory
- ▲ Market assessment and trends
- ▲ Demand and supply outlook
- ▲ Competitive positioning, strengths, and weaknesses
- ▲ Independent revenue and margin commentary
- ▲ Expansion growth vectors
- ▲ Potential bolt-on acquisitions (or divestitures)
- ▲ Exit considerations



Air Transport



Business Aviation



Rotary Wing



Military Aviation



NAVEO
CONSULTANCY

Established in Spring 2019, Naveo is a focused boutique aerospace consultancy dedicated to serving the needs of global clients, large and small. Highly responsive and backed by timely, relevant thought leadership, and in-house intellectual property

Naveo aims to provide a new, fresh consultancy. One that brings together aerospace expertise, passion, energy, and a great team ready for the many challenges that aerospace will face over the next decade and beyond

We support revenue growth and business optimization across the production value chain – from raw materials to operators and financiers – and aircraft lifecycle – from entry-into-service to retirement and part-out

Aerospace is fast-moving, so we understand how your

in-house analytical, operational, and strategic resource is challenged with constantly evolving issues. Naveo provides fresh, dynamic, and relevant advice to help you understand the critical issues that impact revenue growth, efficiency savings, and strategic options



NAVEO is led by experienced aerospace consultant, Richard Brown

- ▲ Richard has over 24 years of experience in aerospace, including 19 years of focused aerospace consulting. He is based in London
- ▲ Prior to Naveo, Richard led the ICF Aerospace consulting practice, leading a team in London, New York, Boston, and Singapore and managing a global roster of aerospace clients
- ▲ Before ICF, Richard was part of the European practice at AeroStrategy – a boutique aerospace consultancy. Before consulting, he spent five years at Goodrich (a component OEM) in various marketing and strategy roles
- ▲ Expertise in strategy and market analysis projects with a broad global client base, including airlines, manufacturers, and financiers
- ▲ Areas of particular interest include OE and aftermarket strategy, market sizing and forecasting, aircraft, engine and component manufacturing, business aviation, aftermarket repair and support, big data analytics, and health monitoring
- ▲ Richard has a BSc. In International History from the London School of Economics and an MSc. In Air Transport Management from Cranfield University
- ▲ A regular conference chairman, presenter, moderator at events, including AviationWeek Conferences, Royal Aeronautical Society, African Aviation, MARPA, Aviation Suppliers Association, and internal strategy sessions, and offsites with clients. He is regularly called upon by the media for his insights into aviation issues

Naveo provides analysis covering a broad range of topics including...



Air transport traffic forecasts

Available Seat Kilometers (ASK) capacity forecasts and analysis against historical data by key geographic region.



Air transport & business aviation flight hours/cycles analysis

Hours/cycles flown by aircraft type, engine type, operator region.



Aircraft production forecast

Forecast of new aircraft production, systems, raw materials.



Aircraft retirement forecasts

Forecast of aircraft retirements and analysis against historical data.



Maintenance, Repair and Overhaul (MRO) forecasts

Forecast of MRO spend by type of maintenance (e.g. engine, component, airframe, line, modifications), type of aircraft/engine, region, etc.



Used Surplus Material (USM) forecast

Forecast of USM market (\$) by key part types (e.g. engine, components, airframe), aircraft, engine, etc.



NAVEO

CONSULTANCY

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Aerospace is fast-moving, so we understand how your in-house analytical, operational, and strategic resource is challenged with constantly evolving issues. Naveo provides fresh, dynamic, and relevant advice to help you understand the critical issues that impact revenue growth, efficiency savings, and strategic options



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