OliverWyman

GLOBAL FLEET AND MRO MARKET FORECAST 2025 2035

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25 YEARS OF THE GLOBAL FLEET AND MRO MARKET FORECAST

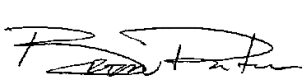
Oliver Wyman's Global Fleet and MRO Market Forecast 2025–2035 marks our firm's 25th assessment of the 10-year outlook for the commercial airline transport fleet and the associated maintenance, repair, and overhaul (MRO) market. We began this report at the dawn of the millennium, before we could conceive of the horrors of the September 11 terrorist attacks or COVID-19 pandemic that changed the industry forever.

Through it all, the forecast provided the sector with insights into what to expect next. We're honored and humbled to say that this annually produced research has become a staple resource for executives working in aerospace manufacturing, airlines, MRO, and aviation investment.

2025 has already been an eventful year for the aviation industry as passenger demand looks to expand beyond five billion passengers and the aviation industry races to keep up amid production shortfalls, delivery backlogs, supply chain delays, and worker shortages. As always, we hope you find the data and insights in our latest edition illuminating and helpful as you look to seize opportunities and better navigate the perils of the marketplace. We also invite you to take advantage of other signature research from Oliver Wyman, including the popular MRO and Flight Ops Surveys and the work done on ONE Order and sustainability. Later this year, we plan to launch a companion forecast on the global military fleet, so stay tuned.

The Global Fleet and MRO Market Forecast is part of our expanding aviation technical expertise. About a year ago, we brought together two dedicated teams, all driven by the same goal: raising the bar on aviation technical knowledge and expertise. The merger of Oliver Wyman CAVOK and SeaTec Consulting and the creation of Oliver Wyman Vector have been game changers for our firm, exponentially expanding our horizons. The data and analysis in this Forecast are the product of our dedicated Oliver Wyman Vector analysts and technicians and Oliver Wyman's Market Intelligence team.

While it has not been the easiest first half of the decade, we look forward to the next five and 10 years and feel confident they will be game changers for the industry as well. As they have for the past 24 years, our partners and vice presidents stand ready to answer questions and expand upon our 25th forecast. Oliver Wyman and Oliver Wyman Vector look forward to another year of collaborating with you.



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PRODUCTION SHORTFALLS AND THE AGING FLEET

While demand for air travel has grown beyond its 2019 peak, the production of aircraft has yet to match the high point it set in 2018. Every year since, the aerospace industry has fallen short of not only its all-time high but also of manufacturing enough aircraft to satisfy an expanding market for air travel.

Where in 2018 it produced over 1,800 aircraft, aerospace producers rolled out fewer than 1,300 by the end of 2024 — 30% less than it did six years before. Meanwhile, the number of passengers has hit an all-time high, and global revenue per kilometer (RPK) is up nearly 4% from its 2019 peak. Today, the backlog of unfilled aircraft orders stands at over 17,000 jets — the highest ever. Given current rates of production, those orders will take 14 years to clear — twice as long as airlines had to wait prior to 2019.

The shortage of aircraft means more airlines must fly older planes, which pushed up the average age of the global fleet by an unprecedented full year in 2024. It also is taking its toll on fuel efficiency, which benefits from the newer jets' improved design and technology. According to the International Air Transport Association (IATA), global fuel efficiency remained unchanged in 2024 — a significant departure from the 1.5% to 2% annual improvement that is typically realized as new aircraft enter the fleet. This hurts the bottom lines of airlines as well as the battle against climate change.

PLAYING CATCH-UP ON FLEET GROWTH

At the beginning of 2025, the global fleet comprised a little over 29,000 aircraft. Based on our analysis in the latest Global Fleet and MRO Market Forecast, it should expand to over 38,300 by 2035. While that represents a respectable 2.9% compound annual growth rate, the 2035 fleet will still be more than 2% below the number we predicted for the 2030 fleet in our last forecast before the declaration of the COVID pandemic.

The shortfall represents six years of lost growth. It also starkly illustrates the difficulty the industry faces in trying to expand production, as well as the struggles up and down the supply chain to support that effort. Based on current projections, we expect annual aircraft production worldwide to lag behind expected deliveries through 2030, with 2,000 fewer aircraft being produced than ordered through the midpoint of our current forecast period. In narrowbodies alone, we expect the sector to be short 1,200 aircraft.

While the aerospace sector is committed to moving forward, it faces challenges. Airbus, currently the world's largest aircraft manufacturer, has pledged to produce 75 A320 aircraft per month by 2027. But by the end of 2024, the European company had reached a monthly production rate of only 47 — more than 11% short of its 2019 peak of 53. Airbus attributes the lower production to supply chain delays and worker shortages.

Similarly, Boeing is producing narrowbodies at a level well below its 2018 peak of 52 aircraft per month and its stated goal of 56 per month. A production cap of 38 737 MAX jets per month, imposed by the Federal Aviation Administration after the blowout of an Alaska Air 737 MAX 9 door plug shortly after takeoff in 2024, is curbing monthly production.

HURDLES TO HIGHER PRODUCTION

What's clear from that incident and others involving various aerospace companies is that production problems go far beyond supply chain constraints and other lingering effects of COVID. The industry — once known for its tight quality control — has been plagued by production issues starting before the pandemic. First, it was the mass grounding of the 737 MAX in 2019 after two fatal crashes involving the aircraft, which took nearly 1,000 planes out of service for the better part of two years.

More recently, there were issues with Pratt & Whitney geared turbo fan (GTF) engines because of contaminated titanium metal powder used to produce engine parts. That discovery will result in hundreds of aircraft — mostly Airbus A320neos and, to a lesser extent, A220s and Embraer E-Jets — being taken out of service at various times through 2027 so engines could be checked.

The same tainted titanium powder affected some LEAP engines as well. In addition, CFM International LEAP engines — powering both A320s and 737 MAX aircraft — also developed durability issues in dusty and high-temperature environments and will require unanticipated engine visits to address the flaw. Finally, the FAA has delayed the certification of the 737 MAX 7 and 10 models as it further evaluates each aircraft's anti-ice system, likely pushing full production to the second half of 2025.

A GENERATIONAL TRANSITION AFFECTS THE INDUSTRY

What is behind the supply chain delays, quality control issues, and insufficient production in aerospace? One clear contributor is a shortage of the right kind of workers. Even before the pandemic, an aging workforce and diminishing numbers of younger candidates in the pipeline caused concern across the global industry.

It began in 2020 with the sidelining of hundreds of thousands of workers as COVID shut down production lines. Many decided to move on to other jobs or retire. But even without COVID, the massive retirements of baby boomers have cut into not only the size of the workforce but also the quality of it — with a lot of institutional knowledge and expertise hanging up their coveralls.

This global trend is changing the composition of the aerospace workforce, making it considerably younger and less experienced. In the United States, the median age of aviation technicians has dropped five years since 2018, and nearly one-quarter now have less than five years' experience, compared with 16% a few years ago. It is also leading to pronounced labor shortages globally among the sector's most highly skilled workers, including mechanics and aircraft maintenance

workers. In North America, for instance, Oliver Wyman estimates the gap between the number of workers available and the number needed will top 18,500 this year, more than doubling to 37,000 by 2028. A similar situation exists across other parts of the world, including Western Europe and some of Asia. While retirements are a big part of the squeeze, there is also an insufficient pipeline of Generation Z and millennial workers ready to take the places of those retiring. This is despite average wage increases in the US of 30% since 2023 and entry-level pay rising 12%.

Aerospace is hardly alone facing severe shortages in highly skilled labor, but it needs to follow the lead of other industries to bring in more new technology to help offset the skill and worker shortage.

NOT BAD NEWS FOR EVERYONE

The one segment of the industry on track to benefit from insufficient new aircraft is the maintenance, repair, and overhaul (MRO) aftermarket, which is experiencing a super cycle as a result. Spending this year is expected to reach $119 billion, surging past 2019's historic high by 12%. By the end of the current forecast period, total global MRO spend will reach $156 billion, up more than 31% from 2025 and 46% above its previous peak in 2019. As a result of the super cycle, the industry will see long queues and increased turnaround times at MRO facilities, where capacity across the board was already tight, particularly for engine MRO.

A big chunk of that increased demand is tied to the greater maintenance needs of an aging fleet. The average age of planes in service rose to 13.4 years in 2024 from 12.5 in 2023 — an unprecedented rise for just one year. For older aircraft, maintenance expenses grow as more servicing and parts replacements are required to ensure reliability and safety.

But it is not just the age of the fleet pushing up the cost of maintenance. The undersupply also means aircraft in service are regularly flying more hours. Average flight hours per aircraft increased almost 15% to 2,800 hours per year in 2024 from just over 2,400 in 2022. The more hours a plane flies, the more maintenance it needs — particularly in the engine, component, and line segments of MRO. In 2024, total global utilization of aircraft exceeded 78 million flight hours, three million flight hours above the 2019 record high. Utilization is projected to grow at an annual rate of 3.4% — slightly outpacing fleet growth — to more than 112 million hours over the 10-year forecast period.

Finally, the super cycle also reflects price inflation on both parts and labor, with increased demand pushing up against a dwindling supply of both. There are shortages of raw materials, such as composites and titanium, which have resulted in planes waiting for parts before they can be delivered.

HIGHER COSTS, HIGHER AIRFARES

These additional costs for ensuring aircraft safety and reliability are already trickling down to consumers, with airfares rising across the board. The expectation should be for more of the same, as it will be years before aerospace can stop playing catch-up on production. For airlines looking to capitalize fully on the current cycle of commercial opportunity, the best path for fleet expansion may be through acquisitions.

To expand production will require the industry addressing its many capacity constraints up and down the supply chain. This includes labor and raw material shortages as well as enough manufacturing capacity. Investment will be required, and the balancing act will be to ensure that the emphasis is not just on more but on more efficient.

FLEET AND MRO FORECAST SUMMARY

Region	North America	Western Europe	Middle East	China	Latin Am, Caribbean	Eastern Europe	Russia	Africa	India	Asia	Oceania	World
2025 Fleet												
Narrowbody	4,976	3,645	679	3,491	1,251	516	437	488	577	1,732	356	18,148
Widebody	1,417	1,133	801	750	175	51	64	179	66	1,038	103	5,777
Regional jet	1,616	367	57	244	212	77	197	223	7	88	106	3,194
Turboprop	494	330	25	1	170	55	32	248	74	328	203	1,960
TOTAL	**8,503**	**5,475**	**1,562**	**4,486**	**1,808**	**699**	**730**	**1,138**	**724**	**3,186**	**768**	**29,079**
2035 Fleet												
Narrowbody	6,498	4,922	1,190	4,857	1,821	916	407	803	1,412	2,679	693	26,198
Widebody	1,357	1,238	1,307	832	176	50	30	294	111	1,359	225	6,979
Regional jet	1,409	511	23	573	149	66	157	122	5	126	111	3,252
Turboprop	378	285	37	8	173	94	15	258	111	352	169	1,880
TOTAL	**9,642**	**6,956**	**2,557**	**6,270**	**2,319**	**1,126**	**609**	**1,477**	**1,639**	**4,516**	**1,198**	**38,309**
Fleet growth rates												
2025–2030	1.3%	2.8%	6.1%	3.0%	2.1%	5.2%	-1.7%	0.8%	8.4%	4.1%	2.0%	2.7%
2030–2035	1.3%	2.1%	4.0%	3.8%	2.9%	4.6%	-1.9%	4.5%	8.6%	3.0%	7.1%	2.9%
2025–2035	**1.3%**	**2.4%**	**5.1%**	**3.4%**	**2.5%**	**4.9%**	**-1.8%**	**2.6%**	**8.5%**	**3.6%**	**4.5%**	**2.8%**
2025 MRO (US$ in billions)												
Airframe	5.7	4.6	2.4	3.6	1.1	0.5	0.5	0.5	0.2	3.2	0.4	22.8
Component	5.8	4.2	1.6	3.1	1.2	0.4	0.5	0.7	0.5	2.7	0.5	21.1
Engine	12.5	12.6	11.4	6.7	3.0	1.0	0.8	1.6	1.4	8.7	1.5	61.2
Line	3.7	3.7	1.0	2.0	0.8	0.3	0.3	0.3	0.4	1.7	0.3	14.6
TOTAL	**27.7**	**25.1**	**16.2**	**15.4**	**6.2**	**2.3**	**2.2**	**3.1**	**2.5**	**16.4**	**2.6**	**119.7**
2035 MRO (US$ in billions)												
Airframe	6.0	5.4	2.4	4.2	1.4	0.8	0.4	0.7	0.7	3.5	0.5	25.9
Component	7.9	6.1	2.9	4.7	1.9	0.8	0.5	1.1	1.7	4.2	0.8	32.5
Engine	15.3	14.0	13.7	9.0	3.5	1.7	0.9	1.9	3.8	13.0	1.7	78.6
Line	4.5	4.7	1.6	2.8	1.1	0.6	0.3	0.5	0.8	2.5	0.4	19.8
TOTAL	**33.7**	**30.3**	**20.6**	**20.7**	**7.8**	**3.9**	**2.1**	**4.2**	**6.9**	**23.2**	**3.4**	**156.8**
MRO growth rates												
2025–2030	1.5%	1.5%	-0.7%	6.2%	2.8%	2.6%	-0.4%	2.7%	5.4%	3.0%	-4.8%	2.1%
2030–2035	2.5%	2.2%	5.6%	-0.1%	2.0%	8.0%	-0.6%	3.3%	16.2%	4.1%	11.0%	3.3%
2025–2035	**2.0%**	**1.9%**	**2.4%**	**3.0%**	**2.4%**	**5.3%**	**-0.5%**	**3.0%**	**10.7%**	**3.5%**	**2.8%**	**2.7%**

STATE OF THE INDUSTRY

KEEPING UP WITH RELENTLESS DEMAND GROWTH

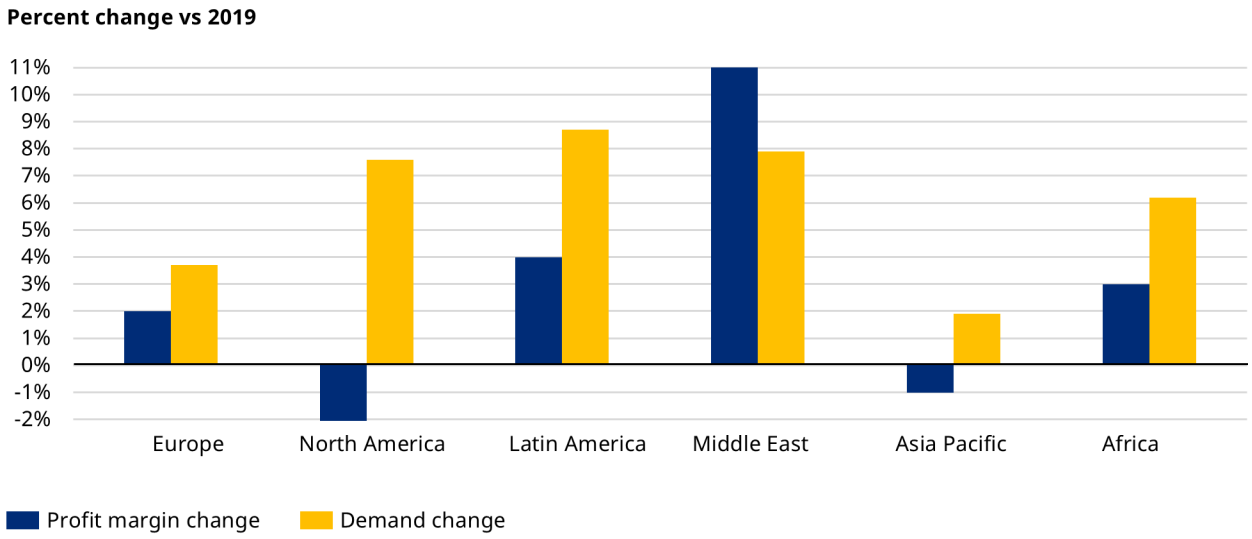
The aviation industry soared to new heights in 2024. Demand reached an all-time high, with about 4.8 billion passengers flying and global revenue passenger kilometers rose nearly 4% above the previous record set in 2019 before the COVID pandemic. Thanks to an ongoing rebound in international demand in Asia and between North America and Europe, 2025 is expected to continue to break records. Anticipated total global revenue this year looks to exceed $1 trillion for the first time, up 4.4% from 2024, while the number of passengers will top 5.2 billion.

As impressive as the new records are, they come with challenges for manufacturers and airlines, both of which have found it difficult at times to grow as fast as the demand for their services. For manufacturers, the struggles have been more pronounced with several years of unfilled production targets, beginning with 2019 and the grounding of the 737 MAX. Today, the backlog of unfilled aircraft orders is at an all-time high of more than 17,000 jets and will take 14 years to clear — twice as long as airlines had to wait for planes before 2019.

Because of lower-than-expected new aircraft production, airlines have been forced to fly record-breaking numbers of passengers with many fewer aircraft than they'd planned. This shortfall has been coupled with engine issues that will sideline hundreds of aircraft at various times between now and 2027 for inspection and repair. The insufficient number of new aircraft has pushed the passenger load factor to a record 83.4%. To compensate, airlines have been keeping older aircraft in service longer, which leads to more maintenance visits and higher operational costs.

Airlines are also dealing with rising wages as a result of new contracts and until August 2024 when central banks began loosening the reins, airline costs for capital and leasing were being pushed up by rising post-COVID interest rates. When it came to operating costs, the only bright spot last year was the price of jet fuel, which on average was about 18% less than in 2023. The higher expenses resulted in a lower profit margin for the sector — 6.4% versus 6.8% in 2023.

Exhibit 1: 2025 demand and profit margin forecasts by region versus 2019



Source: International Air Transport Association Global Outlook for Air Transport December 2024

THE IMPACT OF ECONOMIC GROWTH

2024's aviation records were also products of emerging market expansion, especially in Asia. The January 2025 International Monetary Fund World Economic Outlook shows emerging markets considerably outpacing advanced economies, and rising air travel demand usually tracks growth in GDP.

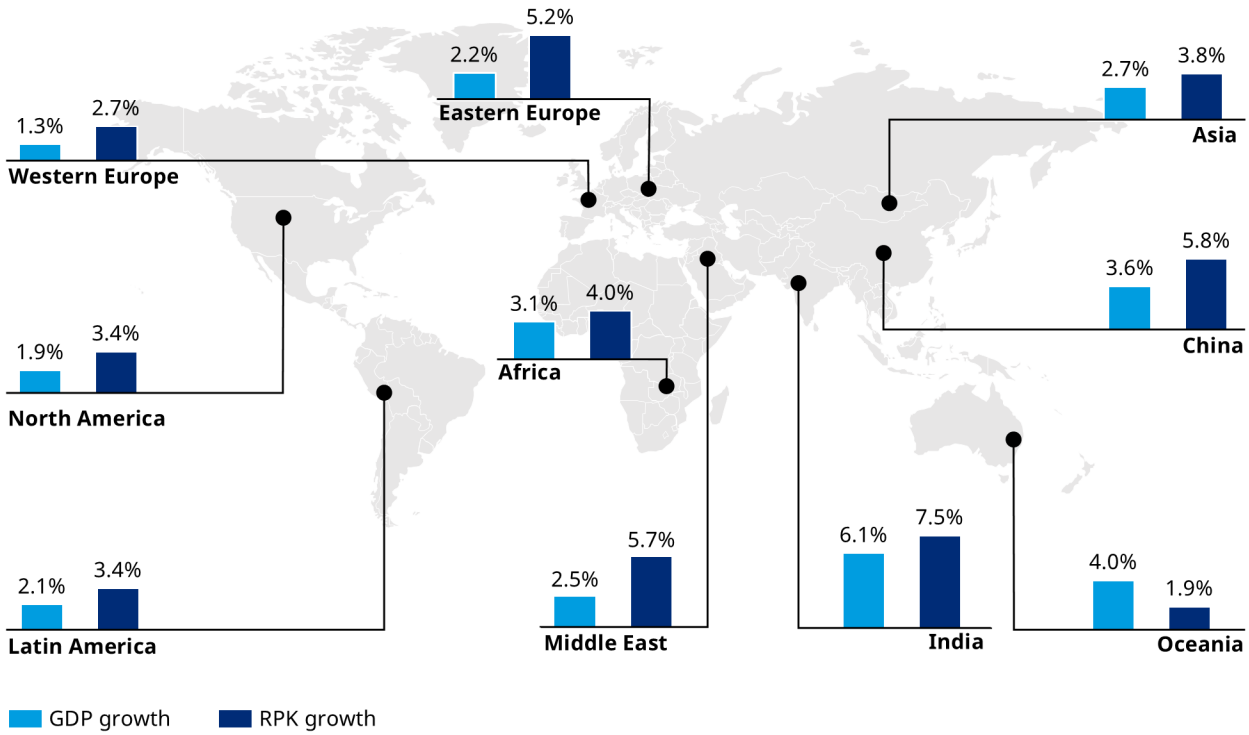
India is one of the big contributors to the growth in air travel for much of the forecast. Its GDP is slated to expand at about 6.5% in 2025 and again in 2026 because of the rapidly increasing number of households earning more than $10,000 annually, according to the IMF outlook. Meanwhile, China — traditionally the engine of growth pushing air travel demand globally — will experience more modest growth of 4.6% this year and 4.5% next. The top three markets leading aviation growth for the forecast period are India, China, and the Middle East.

Eastern Europe is another fast-growing region for air travel, driven by significant increases in low cost carrier traffic. The IMF report shows emerging and developing Europe, which is primarily Eastern Europe, growing at 2.2% in 2025 and 2.4% in 2026 — considerably higher than the rest of Europe, although slower than the 3.2% it clocked in 2024.

Growth in emerging markets like these is subject to other factors, including geopolitical risks and infrastructure constraints. For instance, India in response to its growth is making significant investments in infrastructure, with plans for 14 new airports across the country to accommodate anticipated demand and its burgeoning fleet and orderbook.

While carriers in the Middle East have largely escaped impacts from the conflict in Gaza, European carriers continue to deal with airspace restrictions imposed because of the war in Ukraine. Additionally, trips between North America and China continue to be limited to 100 a week, down from 150 pre-pandemic as American operators deal with additional routing challenges from airspace restrictions over Russia and other ongoing strained political and trade relations.

Exhibit 2: 10-year growth forecast for GDP and passenger demand, 2025-2035



Source: Oxford Economics, Oliver Wyman analysis

STUBBORNLY LOW PRODUCTION RATES

Since peaking in 2018, deliveries of new aircraft have fallen sharply over the intervening years. Initially, it was because of the grounding of the 737 MAX in 2019. Next came the COVID pandemic and the accompanying worker shortages and supply chain chaos — some of which persist today. But the current difficulty ramping up production is also connected to inadequate capacity throughout the entire supply chain, which likely reflects inadequate investment since 2018.

The same supply chain serves Boeing, Airbus, and smaller airframe manufacturers like Embraer. With the pickup in demand post-COVID, suppliers of all sizes have been operating at full capacity to try to meet the higher production levels promised by the two major aircraft manufacturers. This has put the entire supply chain — especially small and midsize suppliers — under intense pressure,

given that they were already struggling to meet lower targets. The challenge to increase capacity is made even more daunting because of current shortages of critical raw materials, such as composites and titanium, and labor.

The proposed production increases are particularly difficult for smaller suppliers, with less ability to absorb shipping delays and changes to production schedules. They are also more exposed if they get stuck with inventory if monthly production once again falls short of targets. In 2025, for instance, just over 1,400 aircraft deliveries are expected, well short of the nearly 1,700 ordered.

THE REASONS BEHIND THE PRODUCTION DELAYS

The ongoing supply chain delays and labor shortages raise questions about whether the same degree of quality can be realized at higher production rates under current conditions. For instance, an issue developed affecting a large number of engines on the latest generation of narrowbodies when it was discovered that contaminated titanium powder, starting in 2019, was being used to manufacture parts for geared turbofan and LEAP engines.

More than 3,000 engines will have been inspected between 2023 and 2027 to find and replace the affected parts, requiring hundreds of A320neo aircraft, and to a lesser extent A220s and Embraer E-Jets, to be taken out of service at various times. Some new LEAP engines also experience durability issues in dusty and hot conditions and will likewise see less flying time until that issue can be addressed.

There have been other incidents that show the strain on production capacity and the supply chain, including when an improperly secured door plug fell off a 737 MAX shortly after takeoff. In response, the Federal Aviation Administration capped production at 38 737 MAX jets per month and required additional inspections on the aircraft. Issues with anti-ice systems have also slowed the certification of the 737 MAX 7 and MAX 10. All these issues are curbing production and reducing aircraft available for airlines.

FACING A GENERATIONAL LABOR ISSUE

The global aviation industry, including both airlines and aerospace manufacturing, has more workers than ever before but still faces a pronounced labor shortage, especially among mechanics and aircraft maintenance workers. The labor squeeze has pushed up wages across the board, and while that helped address the pilot shortage, it has not remedied the supply gap in aerospace.

Thousands of older aerospace workers are still, the industry faces a pronounced labor shortage globally, particularly among mechanics and aircraft maintenance workers. Thousands of older aerospace workers are retiring or coming up to it. Not only does the industry have problems attracting Generation Z and millennial replacements, it is also losing the expertise of its older workers — a fact that could be contributing to the quality problems producers and suppliers have been experiencing.

This is particularly pronounced in advanced economies where the average age of the workforce is higher, and there are more baby boomers ready to retire. But shortages are also reported in China and emerging markets as well. Historically low unemployment rates in the US and European Union coupled with the aging workforce has compounded the shortage, with no relief expected anytime soon. In North America, for example, we estimate the shortage to be about 18,500 workers this year, more than doubling to 37,000 by 2028.

A CHANGING AEROSPACE MARKETPLACE

The challenges have helped Airbus gain market share. In 2024 Airbus outsold the US aircraft manufacturer by nearly 500 aircraft. Last year Airbus also outproduced Boeing for the sixth year in a row.

Last year, Airbus delivered over twice as many of its popular A320neo family narrowbody — 602 total aircraft — compared with its chief competitor Boeing, which only delivered 260 of its biggest seller, the 737 MAX. Airbus now holds a 52% share of the narrowbody market versus the 46% share it held in 2018.

The same is happening in sales of widebodies, where the US aircraft producer historically has had an edge. In 2024, Airbus delivered one more widebody than Boeing and netted 220 new widebody orders versus Boeing's 133.

OVERSEAS COMPETITION

COMAC, China's only commercial airframe producer, has been trying for years to break into the global aerospace market. COMAC initially entered the Chinese domestic market with the ARJ21 and is now making inroads with a growing orderbook among Chinese airlines for its narrowbody C919 aircraft. But COMAC's possibilities continue to be limited by the aircraft's lack of certification in most markets, including the US and Europe. Not surprisingly, the C919 has yet to be ordered outside of China.

COMAC is striving to have the aircraft certified by the European Union Air Safety Agency (EASA), with positive reactions through the first two rounds of regulator review and the third round, including flight testing, expected in 2025. The company is also setting its sights on the widebody market, currently developing the C929 variant. US certification is probably much further off, given current trade tensions between the two countries.

But like the other producers, COMAC struggles with supply constraints. Similar to its rivals, the Chinese manufacturer is reliant on major western suppliers, including for GE LEAP engines, Collins and Safran components, and Honeywell auxiliary power units and landing gear systems. In an effort to reduce reliance on Western imports, COMAC and the Chinese government are considering the development of a domestically produced substitute for the LEAP engine.

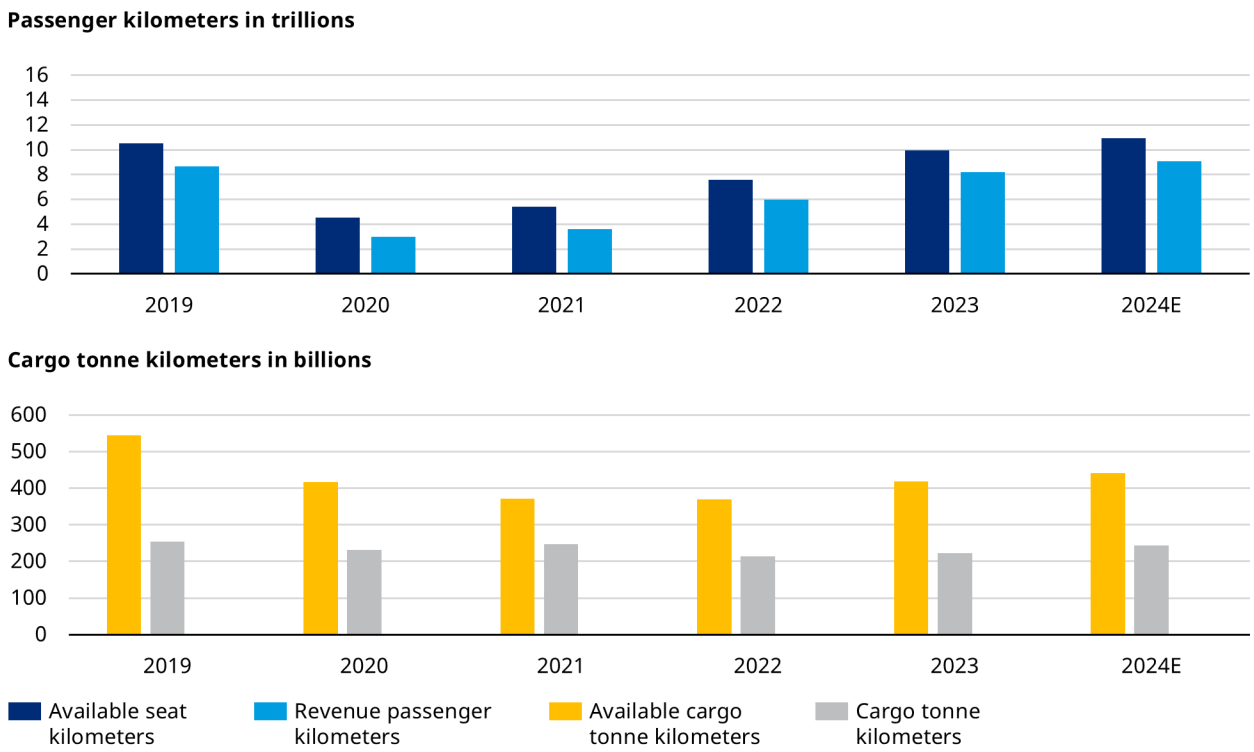
CARGO IS BENEFITING

Air cargo is also bouncing back, following a correction from pandemic-related peaks. In 2024, air cargo demand is expected to have increased 12%, according to IATA. This expansion will likely continue, driven by vigorous e-commerce and benefiting from constraints in ocean-going ship capacity.

Also, normalizing is the amount of cargo carried in dedicated freighters. This is being driven by the return of cargo space capacity in passenger aircraft.

Benefiting from the normalization of cargo space capacity, and possibly also from the unrestricted access they enjoy over Russian airspace, are cargo-carrying aircraft originating in the Middle East and Asia.

Exhibit 3: Passenger and cargo traffic, 2019-2024E



Notes: E stands for estimate; 2024 year-end data are estimated. Tonne is the equivalent of a metric ton.
Source: International Air Transport Association

WHY MRO COSTS ARE RISING

There are many pressures pushing up spending on maintenance, repair, and overhaul (MRO) — including ongoing engine problems, the rising average age of the fleet, labor shortages, and limited MRO capacity.

Because of production shortfalls, airlines have continued to operate aging aircraft, which require more time in the hangar to retain similar levels of reliability compared with newer aircraft. We estimate that in 2024 the average age of the global fleet increased by almost a year from 12.5 to 13.4.

Additionally, MRO shops confront many of the same supply chain headaches and component inflation that original equipment manufacturers face. These issues push up prices for MRO as well as delay servicing.

THE MRO SUPER CYCLE

While higher maintenance costs hurt airline bottom lines, they have the potential to be a boon for MROs globally. The dual effect of older fleets remaining in service longer and newer fleets requiring maintenance sooner than anticipated to address reliability and durability issues have created a "super cycle" for the aftermarket. And while the super cycle is good for MROs, it means global market capacity, particularly for engines, is tight and will continue to be constrained over the next few years. As demand continues to exceed supply, it also means higher costs and at times operational challenges for airlines.

For instance, earlier than anticipated engine shop visits have created a crunch for materials — some of which were already in short supply. There is a squeeze on titanium because of ongoing sanctions against Russia following its invasion of Ukraine. Shortages have further exacerbated supply chain bottlenecks. Prices have trended upward along with lead times, with increases of up to 30% in some cases. With production rates continuing to ramp up, these challenges are expected to continue into 2025 and beyond.

FUEL IS A BRIGHT SPOT

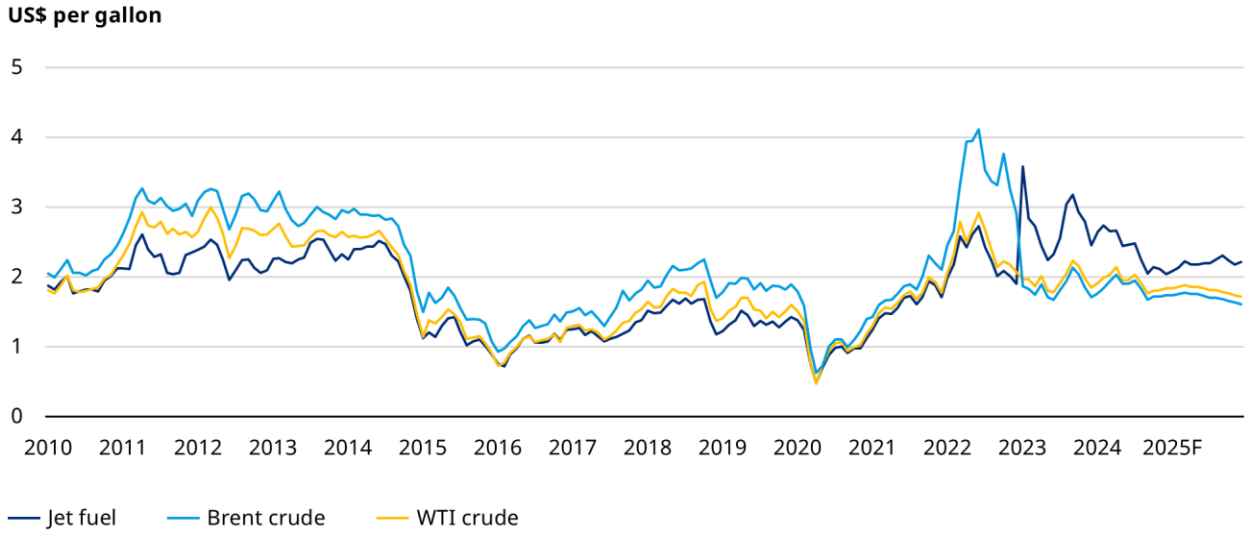
In 2024, jet fuel prices continued to decline from recent peaks in 2022. This trend is expected to continue through 2025, particularly given expectations for flat to declining global GDP growth.

According to IATA, global fuel efficiency remained unchanged in 2024, a departure from the 1.5% to 2% annual improvement that is typically realized as newer more efficient jets enter the fleet. Jet fuel costs made up nearly 30% of the total airline expenditures last year.

Another factor contributing to lower jet fuel prices is the current level of oil production exceeding demand. While previous declines in fuel prices, such as those seen between 2010 and 2014, resulted in lower fares, that will likely not be the case in 2025 when capacity constraints and rising operational costs would be expected to offset savings from fuel.

The industry faces challenges when it comes to replacing kerosene-based jet fuel with lower carbon alternatives, such as sustainable aviation fuel (SAF) which is 50% to 80% less carbon-intensive than Jet A-1, the most common jet fuel. Currently, SAF is two to five times more expensive than this fossil-based jet fuel, and IATA estimates that airline expenditures on fuel could eventually reach up to 45% of all costs if carriers are forced to switch to mostly SAF, depending on market pricing. This emphasizes the need for additional infrastructure and government subsidies to close the price differential between fossil-based and sustainable aviation fuels if decarbonization goals are to be met.

Exhibit 4: Spot prices of crude oil and jet fuel, 2010-2025F



Notes: WTI = West Texas Intermediate. Crude prices are calculated by dividing the price by the number of gallons in a barrel. F stands for forecast
Source: US Energy Information Administration

GLOBAL FLEET GROWTH AND TRENDS

A DECADE OF GROWTH IN NEW PLACES

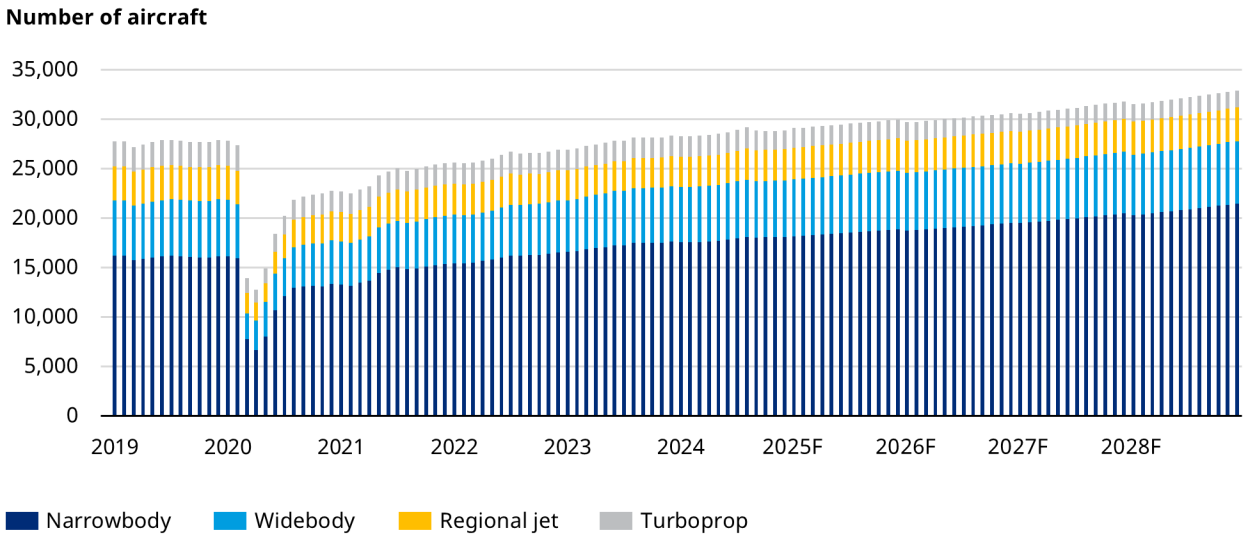
As we enter 2025, the global in-service fleet numbers slightly more than 29,000 aircraft, with a robust 32% expansion anticipated over the next decade. By Jan. 1, 2035, our analysis projects a fleet of about 38,300 aircraft, representing a compound annual growth rate (CAGR) of 2.8%.

While sizable, the 2035 fleet will still fall short of our final forecast before the declaration of the COVID pandemic, which projected a fleet of more than 39,000 aircraft by 2030. The differences between this year's forecast and the one issued in February 2020 equates to a loss of roughly six years of growth primarily because of COVID and related challenges.

By 2035, the fleet is also expected to be more scattered across the globe. While North America will maintain its status as the largest region, with a projected 25% share, the big growth markets will be China, which is expected to increase to a 16.4% share by 2035 from 15.4% today; the Middle East, up to 6.7% from 5.3%; and India, up to 4.3% from 2.4%.

Narrowbody aircraft will dominate the global fleet even more than today, comprising 68% by 2035, up from the current 62%. This buying pattern underscores trends of the past several years that show a sustained shift by the industry toward more efficient aircraft.

Exhibit 5: Monthly in-service fleet forecast, 2019-2029F



Note: F stands for forecast
Source: Aviation Week Intelligence Network's Fleet Discovery, Oliver Wyman analysis

AIRBUS TAKES THE LEAD

Airbus currently has 47% of the total orderbook versus Boeing's 37%. The European aircraft manufacturer has positioned itself to capture a significant share of future aircraft deliveries as well, which could give it an even higher share of the total orderbook by the end of the forecast.

Narrowbody aircraft are set to play a crucial role in this shift, with Airbus securing over 8,570 narrowbody orders compared with Boeing's 5,700. The A321neo variants, including the newly introduced XL and XLR models, constitute a substantial portion of Airbus' narrowbody backlog and are expected to be key drivers of the company's financial outlook.

Conversely, Boeing maintains a larger share of the widebody order book, with over 1,770 aircraft compared with just over 980 for Airbus. The 787 variants, particularly the 787-9, account for the largest share of Boeing's orders.

While these orderbooks are impressive, they are not without risk. Several Asian airlines, for example, are chasing the same passenger growth, which is likely to lead to some level of over-ordering. We estimate that 20% to 30% of these orders could be considered at risk of cancellation. Nonetheless, narrowbody production will need to scale up significantly over the next five years to meet the anticipated demand from airlines.

While both Airbus and Boeing are actively trying to ramp up production across their platforms, supply chain constraints and production challenges have so far impeded their ability to achieve their targeted production rates. This has created a gap between supply and demand today, which is expected to extend through the next seven years of the forecast, with production finally catching up to orders in the later years.

PRODUCTION STRAINS UP AND DOWN THE LINE

With narrowbodies leading the growth trajectory, we project annual production rates to approach nearly 1,300 units in 2025, about 2,200 in 2029, and just above 2,400 by 2035. These projections include flagship models from both manufacturers, such as the Boeing 737 MAX and the Airbus A320neo series, alongside Airbus' smaller A220 and the Chinese COMAC C919.

Airbus has set an ambitious goal of producing 75 A320 aircraft per month by 2027, up from a peak of 53 per month in 2019. By the end of 2024, Airbus had reached a monthly production rate of 47 A320s. Achieving the higher production target will necessitate robust support from suppliers and the resolution of continuing supply chain constraints and labor shortages. Airbus holds a backlog of nearly 7,900 A320 aircraft across various configurations. Despite these production challenges, Airbus delivered about 720 aircraft of all types in 2024, over 600 of which were A320s.

Boeing also has set a higher production target for its 737 aircraft — 42 units a month by the end of 2025. While this falls short of its previous monthly record of 48 units set in 2018, it would be almost 11% higher than the 38 units per month limit imposed by the Federal Aviation Administration (FAA). This is also 27% higher than the 33 jets Boeing finished in September when production was

temporarily halted by a machinist strike; 27 of those were 737 MAX models. As a result of these challenges, Boeing postponed plans to open a fourth production line at its Everett, Washington, facility until early 2025. Additionally, intensified scrutiny from the FAA has delayed the certification of the 737 MAX 7 and 10 models, likely pushing timelines to the second half of 2025 over unresolved anti-icing concerns.

Complicating both airframe manufacturers' production ambitions is the fact that Airbus and Boeing share many of the same upstream components and materials suppliers, including consistently constrained casting and forging capacity for critical engine parts. This shared reliance is likely to hamper fulfillment of Airbus' and Boeing's aggressive production schedules, especially when their suppliers are already struggling to meet existing lower targets. Both aerospace giants fell short of their monthly production targets in 2024, sometimes by considerable margins.

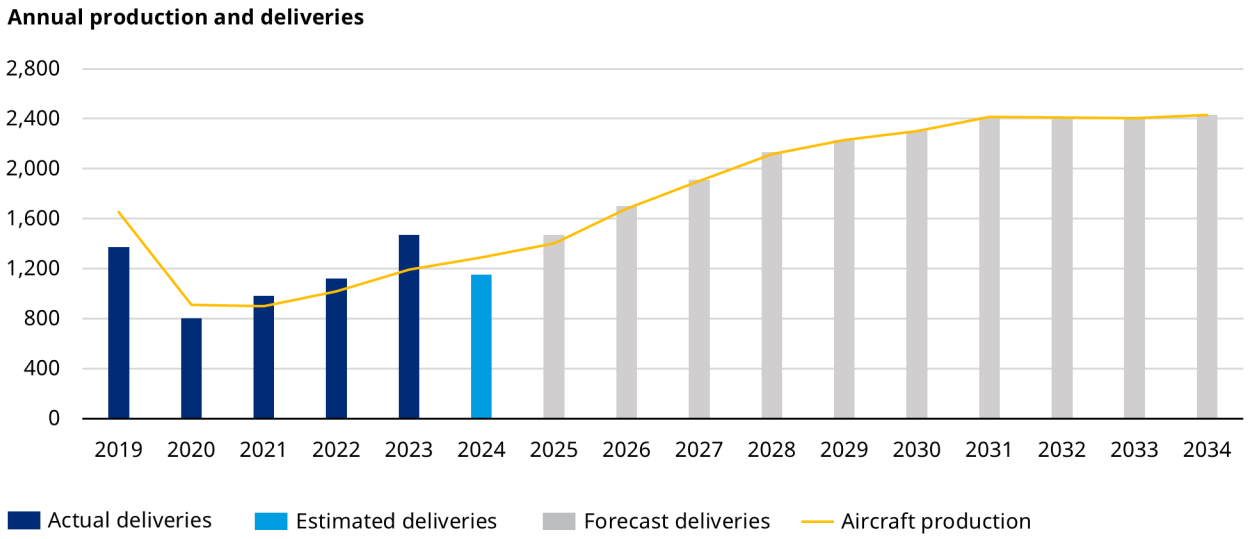
ADDRESSING PRODUCTION CHALLENGES

To achieve its stated production rate goals, Airbus would need to increase its production rate by almost 40%. That kind of expansion, especially when coupled with Boeing's, would create a cascading effect through an already overtaxed supply chain, given the two companies' shared suppliers for engines, components, and other parts. If Airbus and Boeing push to reach their goals, these suppliers will be under extreme pressure to follow suit and increase their own production capacities. The problem: Suppliers must expand production capacity without knowing for certain whether the aerospace giants will successfully meet their higher targets. If they fail, suppliers would be left with excess inventory, which could further weaken an already fragile supply chain.

There are also ongoing workforce challenges that originated during the COVID pandemic. The entire aerospace ecosystem is having trouble dealing with an onslaught of baby boomer retirements that siphon off important expertise from the workforce. In addition, Generation Z and millennials have not been stepping up in the numbers necessary to take the places of the retirees.

Airbus has adopted a global strategy to enhance production by adding final assembly lines in various regions, including France, Germany, the United States, and China. This strategy aims to expedite order fulfillment and delivery timelines. Meanwhile, Boeing has expanded its production footprint by adding three new lines for the 737 MAX in Renton, Washington. It is also consolidating all 787 production at its Charleston, South Carolina, manufacturing plant. But expanding airframe production capacity is not the entire answer as both aircraft manufacturers still have airplanes built that they cannot deliver because they are awaiting parts. That could track back to inadequate supplier capacity or an undersupply of raw materials.

Exhibit 6: Aircraft production and delivery actuals and forecasts, 2019-2034



Note: Aircraft production is based on forecasts beginning in 2024.
Source: Oliver Wyman analysis

MANUFACTURING ISSUES LIMIT PROGRESS

Increased regulatory scrutiny has already impeded efforts to reach higher production levels. In early January 2024, Boeing's 737 MAX 9 fleet was grounded for several weeks after a door plug detached midflight on an Alaska Airlines MAX 9. The FAA also intensified its oversight and imposed caps on Boeing's monthly production while investigations were conducted. As a result, Boeing's deliveries during January dropped.

Meanwhile, airlines were also required to inspect hundreds of Airbus A320neo aircraft over a issue related to the new geared turbofan (GTF) engine produced by Pratt & Whitney, one of the two engine options available for the aircraft. Contaminated metal powder used in the manufacture of GTF engine parts will have necessitated the removal of over 3,000 engines for inspection between 2023 and 2027. That will require parking up to 350 aircraft in each of the next two years for the work.

The other engine used in the A320neo is the LEAP engine, which previously dealt with a similar issue with metal powder and now needs updates to address a durability issue in dusty or high-temperature environments.

Another significant production change involves Boeing's 767 and 777 lines. Boeing has announced the termination of its 767 freighter program in light of new International Civil Aviation Organization (ICAO) noise and emission regulations, despite the FAA reauthorization bill that would grant the company a five-year emissions waiver. The 777 line is to be replaced by the 777X line, which has run into substantial delays and unexpected costs during its certification process. The scrutiny surrounding the certification process stems from lessons learned from the 737 MAX and associated

engine mount issues, contributing to delays in the 777X timeline. Deliveries are now anticipated no earlier than 2027.

The challenges faced by both airframe manufacturers, along with those encountered by engine manufacturers and other Tier 1 suppliers, raise concerns about the feasibility and advisability of managing accelerated production schedules effectively.

NEW COMPETITORS ON THE HORIZON

The production problems of Boeing and Airbus have opened the door to new competitors, but the price of entry is high in the passenger market and not many will easily qualify. China may be the one viable exception. The Chinese-produced C919 aircraft is a narrowbody passenger jet developed by the Commercial Aircraft Corporation of China (COMAC) to compete with Boeing's 737 and Airbus A320. It represents China's first domestically produced large passenger airliner intended for customers outside China. Since its commercial debut in 2023, it has successfully completed over one million passenger flights.

As of December 2024, COMAC had delivered 14 C919 jets to major Chinese airlines, which enabled them to launch 15 more routes. The C919 has also garnered a record 1,040 orders, underscoring its significance as China's first independently developed jetliner. But the C919's reliance on Western suppliers for engines, avionics, and components poses challenges for COMAC as it seeks to scale up production over the coming years. With tight supply, these vendors are likely to prioritize their larger, longstanding customers in the West.

Boeing recently delivered its first aircraft to China in four years and currently holds an inventory of about 140 narrowbody aircraft, more than one-third of which are earmarked for China. But we expect Chinese airlines to opt instead to buy from COMAC under pressure to support domestic production and because of ongoing trade tensions with the US.

A SHRINKING RUSSIAN FLEET AND CLOSURE OF RUSSIAN AIRSPACE

In contrast to China and other regions included in the Oliver Wyman forecast, Russia is projected to see a nearly 5% decline in narrowbody aircraft over the next decade. It's the only regional fleet in in our forecast to experience a downturn through 2035.

This decline is attributed to a struggling Russian economy and the ramifications of the invasion of Ukraine, which led to sanctions imposed by the United States and other NATO nations that prohibit the sale of aviation parts and aircraft to Russia. In our 2023-2033 forecast and a *Forbes* article by our partners, we previewed the likely decline of the Russian market.

With the closure of Russian airspace to US and European air carriers, India has seized the opportunity to capture market share, particularly through Air India. As US airlines withdrew from many routes due to the airspace restrictions, Air India expanded its operations, reintroducing and increasing frequencies on key routes such as San Francisco to Bangalore and Mumbai, as well as New York to Mumbai. This strategic move has allowed Air India to dominate the market as it increased its seat capacity significantly over the past decade.

Moreover, while the North American market has faced constraints, other regions — particularly the Middle East — have seen explosive growth in air traffic to and from India. The influx of Indian workers to the Middle East has driven demand, supported by major hub airports in Dubai and Doha that facilitate connecting flights. This dynamic showcases India's growing importance in global aviation as it continues to develop its air travel capabilities and leverage geopolitical shifts to its advantage. While the Russian aviation market faces a downturn amid geopolitical tensions, India is poised to benefit from these developments, positioning itself as a key player in the international aviation sector.

WIDEBODIES AND OTHER CLASSES

Over the past year, the order books for widebody aircraft have expanded, prompting increases in production rate targets to meet rising demand. The Middle East and Asia are leading in widebody orders, accounting for about 46% of the orders combined.

India and Oceania are expected to see the most significant growth in their widebody fleets, with both regions projected to double their currently modest fleet sizes over the forecast period. In the Middle East, the widebody fleet is expected to grow nearly 5% annually, reaching 1,300 units by the end of the forecast period. As of October 2024, Boeing commanded about 64% of widebody orders — primarily 787 and 777 orders — while Airbus held nearly 36%, mostly A350 orders.

In the next decade, the regional jet and turboprop fleets, mostly used for short domestic routes, are likely to face considerable challenges. Following the resolution of the pilot shortage in North America, aircraft returned to service rapidly. Additionally, the age of these fleets is increasing, leading to a rise in retirements with limited replacement opportunities.

The order books for regional jets and turboprops have increased to 2,000 aircraft, driven by the growing demand for replacements, particularly among carriers in North America, China, and Western Europe. However, the scope clause in US labor agreements limits regional carriers from operating larger aircraft like the E195-E2, preventing them from addressing North America's supply gap. As aircraft are retired in Western Europe and Asia in favor of new, more fuel-efficient aircraft, Oliver Wyman predicts they will migrate back to North America to maintain service levels. Following Embraer's decision to delay its re-entry into the turboprop market, the French and Italian joint venture ATR remains the only significant turboprop manufacturer.

NORTH AMERICA AND OTHER REGIONAL FLEET TRENDS

Over the next decade, the regional composition of the global fleet is expected to shift, with China, the Middle East, and India capturing a larger share. Despite substantial order books, growth in the global fleet remains modest because of the need to replace aging aircraft.

Although the global fleet is projected to increase at an average annual rate of about 2.8% from 2025 to 2035, this figure will vary significantly across the regions, reflecting the maturity and development of each market. While North America's older fleet is expected to maintain a modest CAGR of about 1.3%, emerging markets like India and the Middle East will see significant gains in market share, namely 8.5% and 5.1% CAGR respectively.

Still, North American airlines are looking to retire older aircraft to take advantage of the fuel efficiency of next generation models and contain MRO costs. The fleet is expected to add almost 5,000 new aircraft throughout the forecast period.

Despite those increases, North America's market share is expected to drop from 29% of the global fleet in 2025 to 25% in 2035. That's partly because the regional jet fleet in North America is forecast to stay relatively flat, declining 1.4% because of an aging fleet and lack of replacements. Instead, narrowbody aircraft will drive most of the fleet growth in the region during the 10-year forecast period.

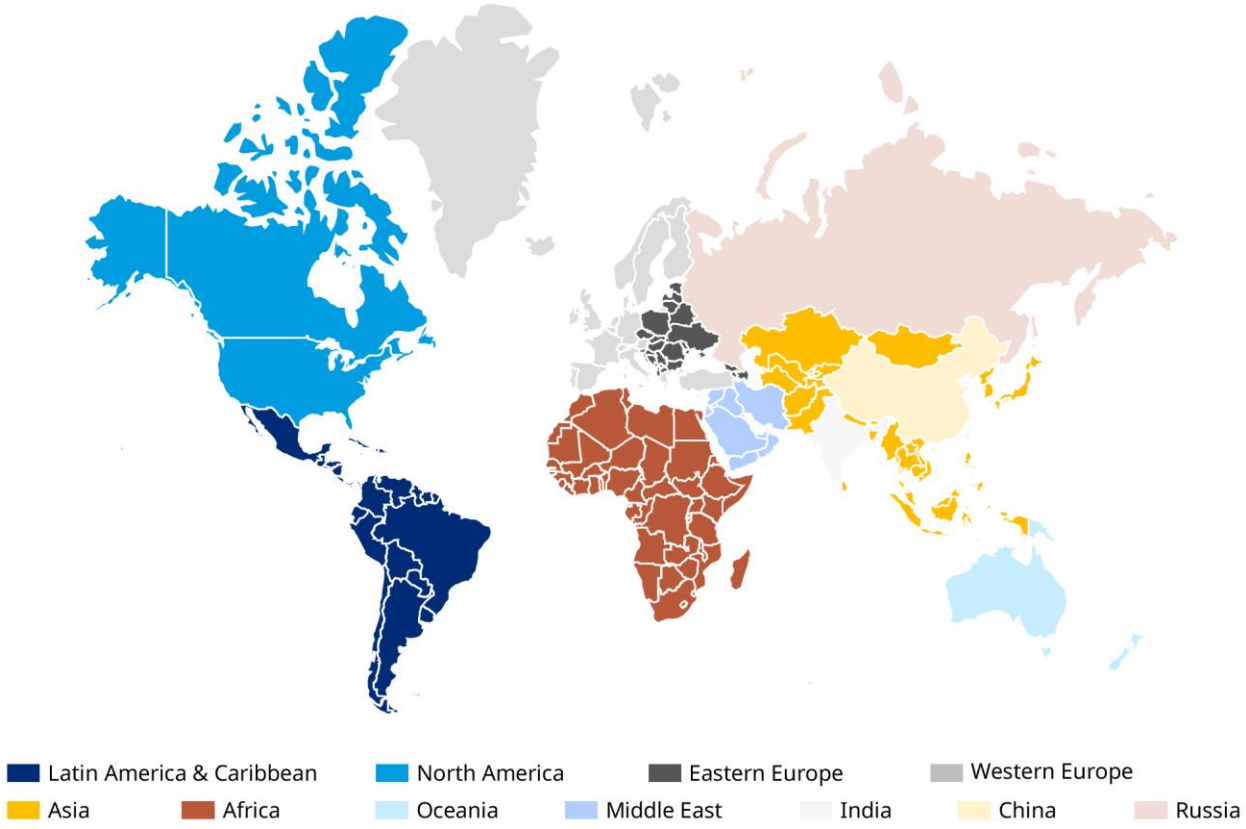
THE WESTERN EUROPEAN FLEET

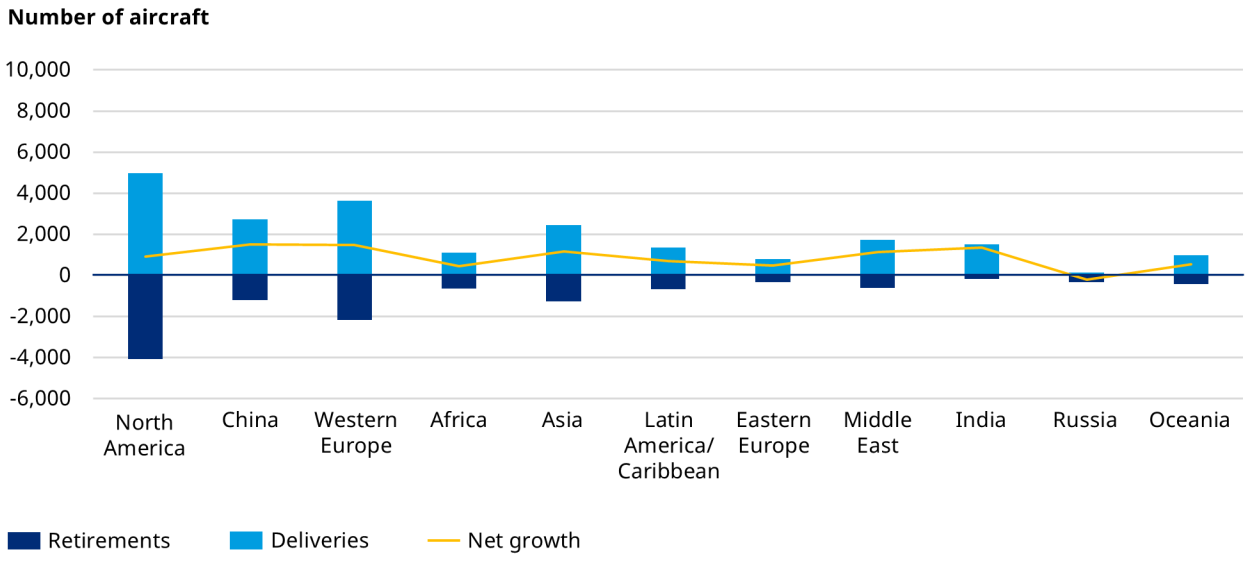
In Western Europe, annual growth is a healthy 2.4%, with a strong narrowbody and regional jet growth of about 3% each. But the competition between high-speed rail and regional jets in the region presents a complex landscape for travelers. For short journeys under two hours, high-speed rail is often the most time-efficient, comfortable, and affordable option. However, when travel times extend beyond five or six hours, budget airlines like Ryanair and easyJet become more appealing, particularly with their low fares.

As sustainability concerns grow, European regulators are considering measures to restrict short-haul air travel, further enhancing the appeal of rail travel. Nonetheless, budget airlines will continue to dominate on routes where rail travel is impractical. There will be a corresponding increase in the regional jet fleet from the addition of E195-E2 and E175 aircraft over the forecast.

In the forecast, North America and Western Europe emerge as the leading regions looking to buy new narrowbodies, together accounting for about 44% of new orders. Asia, India, and China boast impressive narrowbody order books, with Asia totaling 1,790 units and China nearly 2,000.

Exhibit 7: Projected fleet growth by region, 2025-2035





Note: Asia excludes China and India
Source: Oliver Wyman analysis

CHINA, ASIA, AND OCEANIA

Asia's fleet, now separated from the Oceania region, currently comprises nearly 3,200 aircraft, with projections indicating a 1.4-fold increase by 2035. Growth in Asia's in-service fleet is anticipated to be front-loaded, with over 4% growth expected between 2025 and 2030, tapering to 3% from 2030 to 2035. The region's airline market is undergoing healthy growth thanks to a growing middle class and the emergence of low-cost carriers that are changing air travel and raising the demand for new aircraft.

The commercial fleet in India, while relatively small at just over 720 aircraft, is projected to more than double by 2035 and holds 10% of the global order book. Strong economic growth and a rising middle-income population are fueling demand for passenger aircraft, particularly in the narrowbody segment. Conversely, China is likely to experience slower economic growth, with its fleet expected to expand 40% to nearly 6,300 aircraft by 2035 versus the previously forecast 56%. The narrowbody segment is projected to increase 39% in absolute numbers.

A slowing economy in China, largely from an implosion of real estate values, has cut into the initial rosier forecasts for fleet growth. However, the anticipated growth rate remains respectable at 3.4% CAGR, supported by a healthy order book. China is expected to receive over 2,700 deliveries throughout the forecast period. To further bolster its aviation sector, the Chinese government is directing substantial investments toward airport infrastructure, aiming to expand its network to over 400 airports by 2035. Additionally, China is enhancing its aircraft manufacturing capabilities, with companies including C919 maker COMAC turning out models.

Oceania is forecast to expand 4.5%, largely from its booming growth in widebodies and narrowbodies. The region has almost 460 aircraft on order, and deliveries are predicted to grow at a 7.5% annual rate over the decade. This growth is supported by the sustained economic development in countries like Australia and New Zealand, where disposable incomes and air travel demand have increased. The region's natural beauty and popular tourist destinations have attracted millions of visitors, further bolstering the aviation market. Infrastructure development, including the expansion of airports and the rise of low-cost carriers, has also contributed to making air travel more accessible and affordable, positioning Oceania for continued growth.

THE MIDDLE EAST

The Middle East commercial aviation market is expected to trend upward, supported by a growing demand for air travel, budget carriers entering the market, and significant aircraft orders. The region's fleet is projected to grow at an annual 5.1%, driven primarily by narrowbodies. In a region where widebodies have long dominated, narrowbodies will climb from 43% to 47% of the fleet over the decade, equaling widebodies' share of the fleet.

Representing just over 60% of this market, Saudi Arabia and the United Arab Emirates (UAE) are leaders of this growth in the region, with carriers in each serving the market differently. In Saudi Arabia, domestic flying makes up 45% of seats whereas UAE air travel is solely based on international traffic.

Both countries have plans to significantly grow and monetize their aviation-related assets. In Saudi Arabia, the Vision 2030 plan seeks to diversify the economy through investment, especially targeting growth in tourism.

The next largest is Qatar, representing another 15% of the market. The market has essentially doubled its capacity every six years.

Despite this growth, the region has struggled with profitability given the competitive nature of the market and the domination of Emirates and Qatar Airways in the region, particularly when it comes to product offerings.

EASTERN EUROPE AND LATIN AMERICA

Eastern Europe's fleet size today is slightly smaller than India's. The low-cost carrier market in Eastern Europe is experiencing rapid expansion, driven in large part by increasing demand for affordable travel and favorable regulatory frameworks. Significant growth in the narrowbody aircraft segment is expected. The region has an orderbook for over 450 aircraft — a majority of which are for the popular A321 and for Hungarian low-cost carrier Wizz Air. Over the next 10 years, Eastern Europe is expected to receive over 800 aircraft deliveries, made up primarily of narrowbodies.

Latin America has seen a quicker-than-anticipated recovery in domestic travel, particularly considering the economic conditions both before and after the pandemic. However, Oliver Wyman does not foresee a full recovery of regional jet fleets in the region because of shortages of replacement aircraft and pilots. Its commercial aviation market is being driven by aircraft deliveries and increasing passenger traffic, especially in Brazil, where the expanding middle class is significantly boosting air travel.

The total fleet in Latin America is projected to grow at an annual rate of 2.5%, with turboprops remaining relatively stable and regional jets declining 3.5% annually. Most of the growth will come from narrowbodies, expected to achieve an average CAGR of 3.8%, while widebody growth is anticipated to remain flat at just 0.1% annually over the decade.

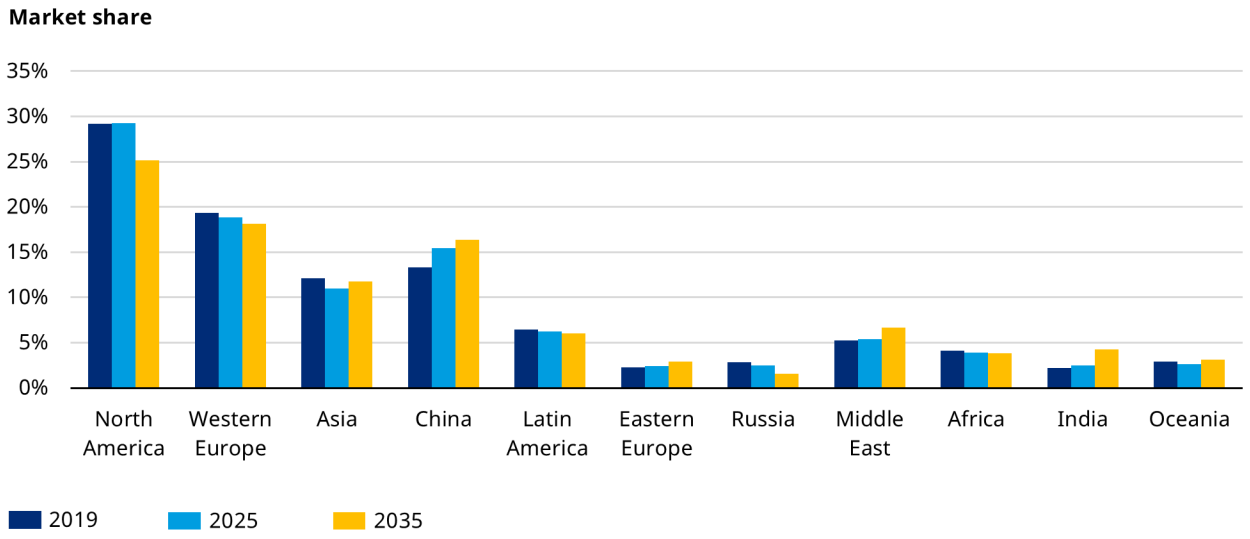
OTHER EMERGING MARKETS

Africa's aviation industry is starting to transform and set up for growth. Its air passenger traffic recovered to 108% of 2019 levels in 2023, and its air cargo sector is thriving, driven by the expansion of e-commerce in the region. While challenges such as political instability and inadequate infrastructure persist, some countries are making significant strides by investing in aviation infrastructure and expanding their airline operations.

For instance, Ethiopian Airlines has seen substantial revenue growth and plans to increase its cargo capacity significantly, while Morocco's Royal Air Maroc aims to quadruple its fleet by 2037. Rwanda is also investing heavily in aviation infrastructure, including a new cargo hub and the Bugesera International Airport project, seeking to enhance its position as a regional cargo powerhouse.

Additionally, the region has historically seen significant aircraft migrations from other regions. This trend will be a factor throughout the forecast period, given the region's small order book of new aircraft. Oliver Wyman anticipates over 600 used aircraft joining the continent's fleet from other regions, accounting for the majority of its 2.6% annual growth over the decade.

Exhibit 8: Fleet market share by region, 2019-2035



Source: Oliver Wyman analysis

RETIREMENT TRENDS

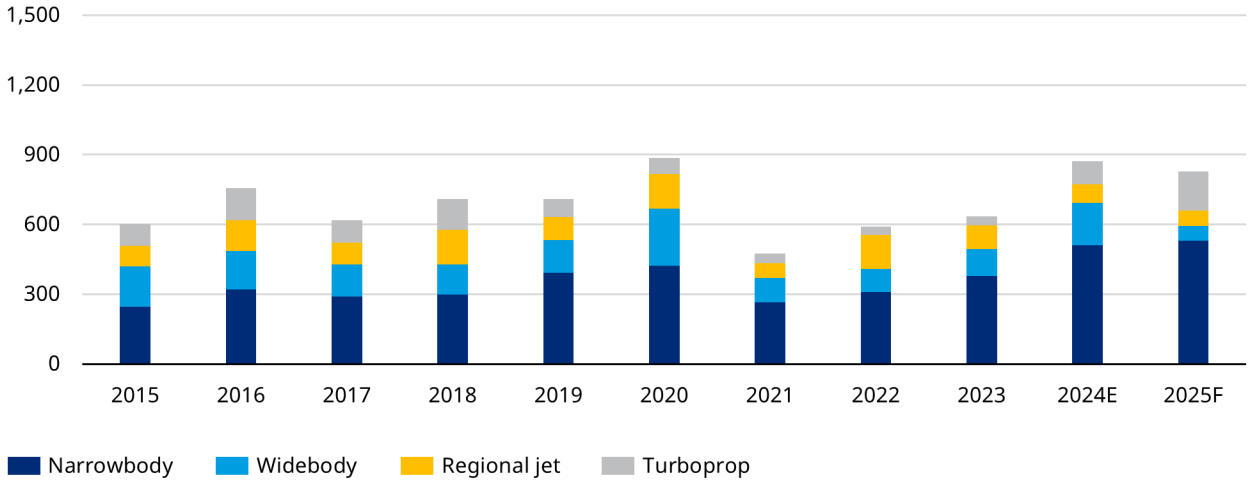
Capturing retirements in real time is challenging, as aircraft can remain in storage for extended periods before being officially retired. We anticipate an average of about 1,000 aircraft retirements annually over the forecast period. The average age of an aircraft at retirement throughout the forecast is 25.8, with all aircraft classes retiring one to three years older than their historical average. Over the near term, production constraints and less availability of new aircraft will increase fleet utilization and delay retirements, leading to a spike of removals at the end of the forecast.

Given the massive order book for the narrowbody fleet, the average retirement age for the class is expected to slip slightly to 24 years in 2035 from the current 26 years old. The widebody fleet will follow the same pattern, with the average retirement age falling from 28 to 24 over the decade. For widebodies, typically kept in service longer, the retirement age will remain high on the front end of the forecast while the industry waits for production constraints to ease.

From 2000 to 2001, the average number of regional jet deliveries was about 91 per year. This figure surged to about 200 deliveries annually from 2002 to 2004, then gradually declined in subsequent years. The jump in deliveries two decades ago has led to today's spike in the retirement of these aircraft, with a projected 76% increase in regional jet retirements by 2031. As their numbers decline, so too will their retirements.

Over the next decade, more than 1,350 regional jets will be retired, creating heightened demand for narrowbody aircraft as replacements. This shift toward narrowbody aircraft is driven not only by the limited replacement options for regional jets but also by the need for greater efficiency. Similarly, turboprops face a challenging future with an aging fleet, limited replacement options, and a rough average of 115 retirements per year throughout the decade.

Exhibit 9: Annual retirements, 2015-2025F



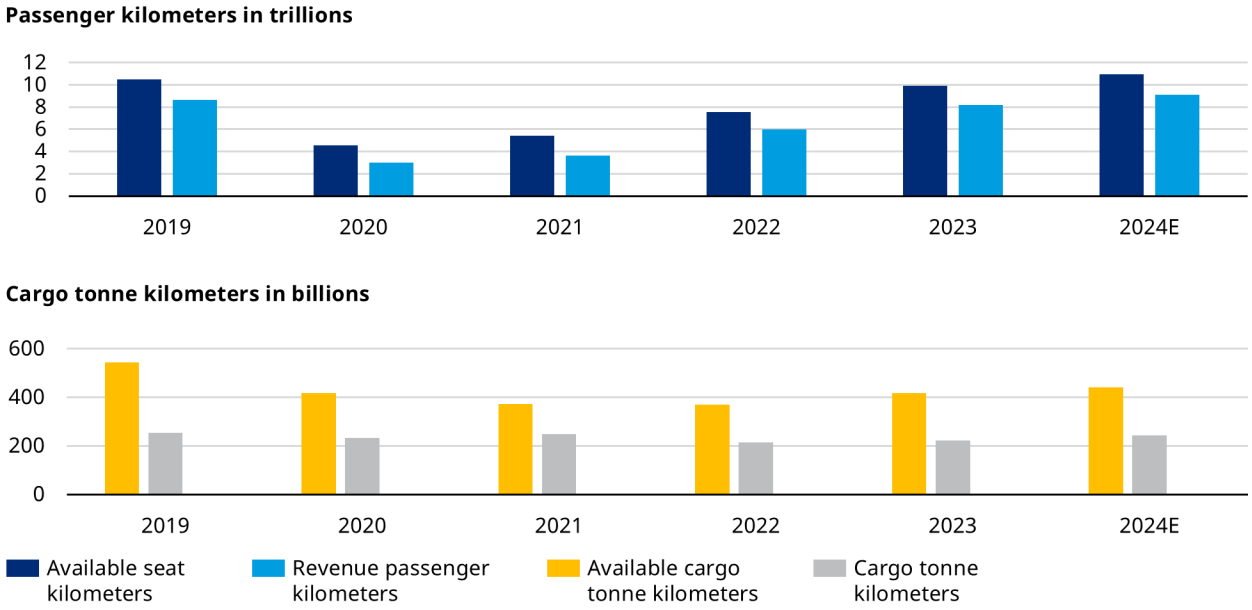
Note: E stands for estimated, F stands for forecast
Source: Oliver Wyman analysis

In recent years, the global share of fleet retirements for North America and Western Europe has risen to 53% from its historical average of 51%. The regions will continue to have the highest proportion of retirements, given their older fleets that need to be modernized with more fuel-efficient aircraft.

CARGO TRENDS

The International Air Transport Association released 2024 data showing capacity (measured in available cargo tonne kilometers, or ACTK) rose nearly 6% in 2024, while cargo tonne kilometers (CTK) grew almost 10%, thanks to a return of belly capacity as more widebodies took to the air to meet the rebounding long-haul travel demand.

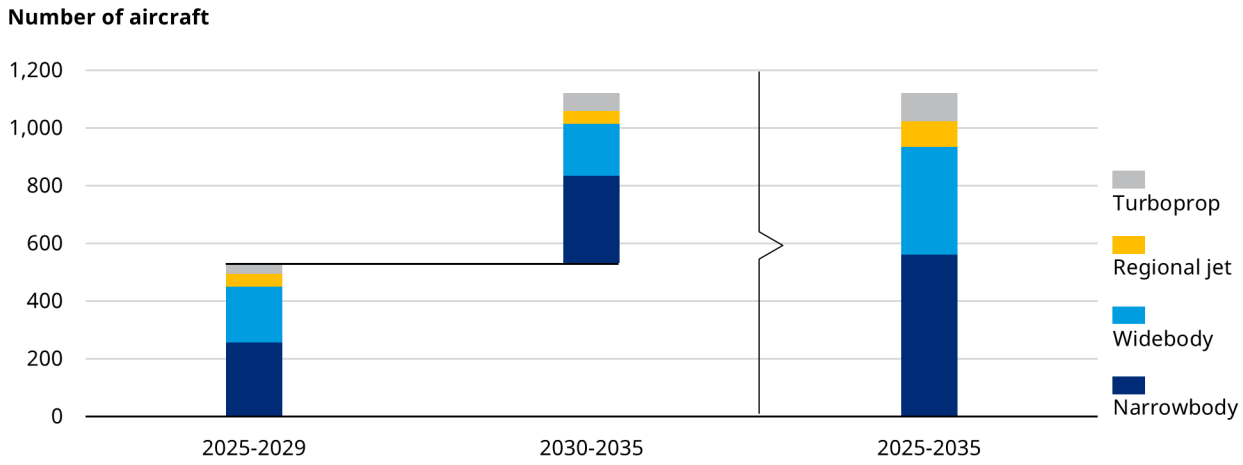
Exhibit 10: Passenger and Cargo Traffic, 2019-2024E



Notes: E stands for estimate; 2024 year-end data are estimated. Tonne is the equivalent of a metric ton.
Source: International Air Transport Association

Still, belly capacity remains insufficient to support the current strong cargo volume growth as well as that expected over the decade. To address this gap, we forecast just over 1,100 passenger-to-freighter conversions by 2035, with an average year-over-year increase of almost 1%. But the demand for passenger-to-freighter conversions will gradually soften with the return of belly capacity in the passenger market.

Exhibit 11: Passenger-to-freighter conversions 2025-2035



Source: Oliver Wyman analysis

MRO MARKET

SUPER CYCLE

Global maintenance, repair, and overhaul (MRO) has entered a “super cycle” for demand, with 2025 on track to hit $119 billion in total revenue, surging past 2019’s historic high by 12%. Fueling the explosion in demand is a combination of an aging fleet, with higher maintenance requirements to remain in service, and newer aircraft with unexpected durability and reliability issues requiring maintenance sooner than anticipated.

High air travel demand and an undersupply of new aircraft also mean jets staying in service for more years and flying more hours annually than ever, which also pushes up MRO needs. Since 2022, average flight hours per aircraft increased almost 15% to 2,800 hours per year from just over 2,400. The increase in average aircraft utilization is particularly hard on an older fleet, with the average age of planes in service rising to 13.4 years in 2024 from 12.5 in just one year. In 2019, the average age of the global fleet was just 11.2 years.

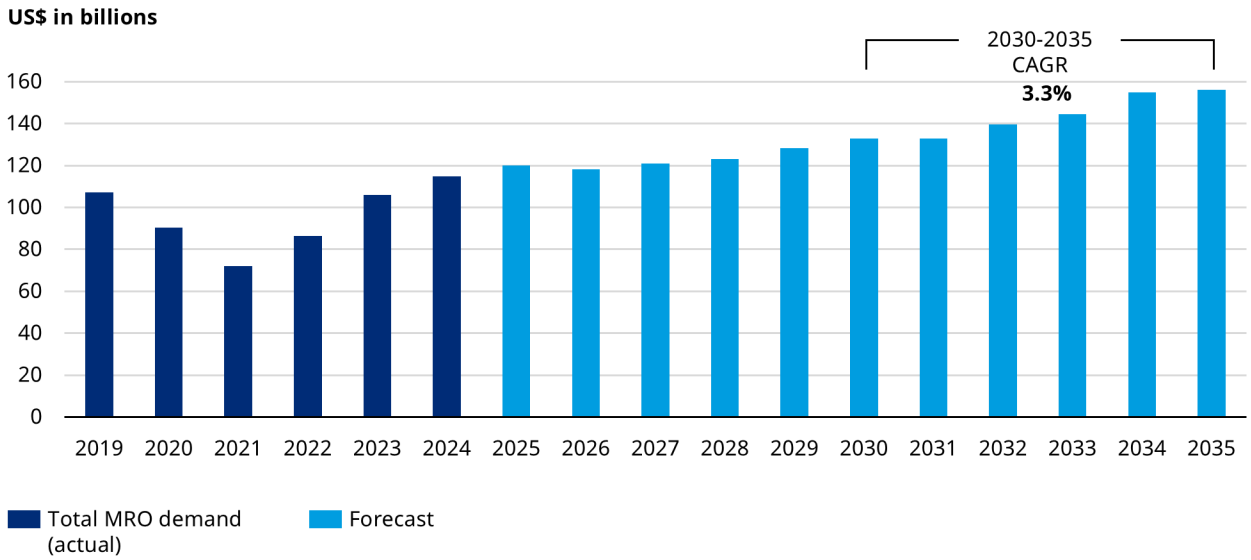
Finally, the super cycle is not only the product of higher demand for parts and labor or the age of the fleet. It’s also a reflection of the escalating prices for both. Pushing up prices on parts have been shortages of some raw materials such as composites and titanium, as well as supply chain delays because of inadequate production capacity and worker shortages. Average engine MRO pricing is up 7.5% over a year ago. While this annual increase is a bit lower than in previous years, it helps illustrate the relentless cost pressures and other challenges airlines have faced in the market since the pandemic.

Meanwhile, industry wages have risen dramatically since the COVID pandemic, with the average hourly wage 30% higher than it was in 2023, according to our research. Given historically low unemployment, there are fewer candidates, and record baby boomer retirements are cutting into the workforce. Entry-level wages are up 12% since 2023 in an effort to lure Generation Z and millennial workers to the sector.

We expect the global MRO market to expand at a CAGR of 2.7% between 2025 and the beginning of 2035, compared with a growth rate of just 1.9% between 2019 and 2025. This growth is driven by an aging fleet, its heavy utilization, a shortage of workers, unexpected maintenance and inspection needs of next-generation aircraft, and rising parts prices.

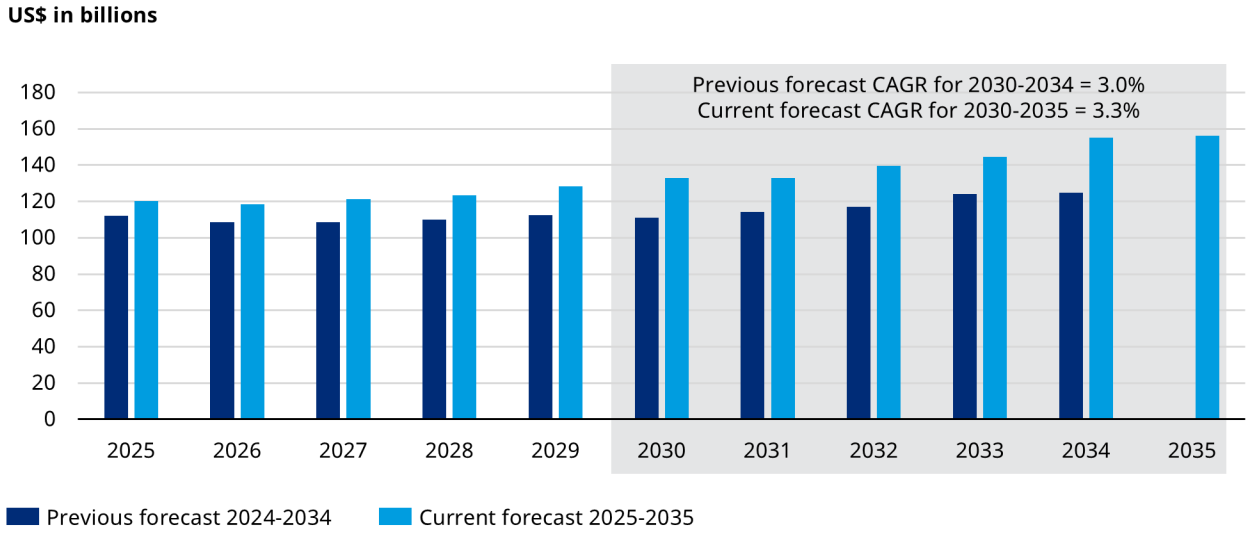
By the end of the current forecast period, total global MRO spend will reach $156 billion, up more than 31% from 2025 and 46% from the former peak in 2019. As a result of the super cycle, MRO facility capacity across the board — already under pressure, particularly for engines — will continue to remain tight, with long queues and increased turnaround times

Exhibit 12: MRO Demand, 2019-2035



Note: The forecast runs through Jan. 1, 2035. CAGR stands for compound annual growth rate.
Source: Oliver Wyman analysis

Exhibit 13: MRO Demand, 2019-2035



Note: CAGR stands for compound annual growth rate
Source: Oliver Wyman analysis

THE IMPACT OF THE GTF ENGINE PROBLEMS

The challenges associated with the geared turbofan (GTF) engine family dominate the MRO sector with literally hundreds of aircraft currently grounded and likely to remain so into 2027. These groundings are the result of engine inspections and maintenance to comply with regulator demands and address quality and durability issues. This affects the MRO segment in two ways: first, the engine visits needed to inspect and repair the aircraft — mostly A320s, but some A220s and E-Jets — and second, by forcing heavier utilization of other aircraft, leading to more maintenance needs.

That said, the parked aircraft are not in use and will lower demand for component and line maintenance by nearly $700 million in 2025 and $2 billion over the next several years while these aircraft remain out of service. The capacity crunch for engine maintenance — driven by GTF inspections and durability and reliability issues on the LEAP fleet — have resulted in challenges for airlines as they seek to capture growing demand and operate as efficiently as possible. Airlines also may expand the work scopes of GTF inspection visits, taking advantage of the downtime to conduct more extensive maintenance tasks.

Airframe maintenance is likely to be less affected, as maintenance intervals are mainly driven by calendar schedules, but operators may leverage the downtime of aircraft to complete larger checks involving the airframe. By doing this, airlines can ensure that once the planes are back in service, they will not require significant maintenance soon.

Airlines across the globe are affected, with those that took early deliveries of the A320, A220, and E-Jet family of aircraft most impacted. Asian operators, excluding those in China, are among the most affected by the GTF inspections. We expect GTF to reduce spending across non-engine MRO segments by over $500 million in 2025, driven by the reduced utilization of these aircraft as they remain grounded awaiting engines.

As a result of ongoing production and entry-into-service issues for aircraft with GTF and LEAP engines, the CFM and V2500 engine families have remained in service significantly longer than initially anticipated. However, it’s worth noting that the recent upgrades made to the LEAP-1A turbine as part of the ordered overhaul will increase reliability and extend the time between shop visits for aircraft using the engine, ultimately reducing some MRO needs and the number of older engine substitutes required. Improvements to the GTF family are also anticipated to be approved by regulators in 2025.

REGIONAL MRO TRENDS

In the next decade, several regions will see their share of the global MRO market change. India and Asia (excluding China) will see significant growth in their global market share, with expansions of $4 billion for India and $6 billion for Asia by 2035 versus 2025.

North America, where new aircraft with lower maintenance requirements will replace an aging fleet, will grow from $28 billion to $34 billion by 2035. This dynamic closely aligns MRO growth

with fleet growth in the region, where the 10-year CAGR for maintenance of 1.9% through 2035 slightly outpaces the projected fleet growth rate of 1.3%. As the decade progresses, MRO demand for regional jets in North America will decrease significantly as RJs retire without replacement options from the same class.

Western Europe will surpass its previous record for MRO demand in 2025, with the trend continuing upward at an annual growth of 1.7%. Similar to the situation in North America, the region features aging fleets, especially in the turboprop family. Scattered refleeting will lead to maintenance holidays, suppressing market growth throughout the forecast as many maintenance checks will occur beyond 2035.

Asia, excluding China and India, is the third largest of the markets in 2025 and will grow at a rate of 3.5% annually, reaching over $23 billion by 2035. That would be up from $16 billion in 2025 and $14 billion in 2019. The region's widebody fleet size and associated MRO demand continue to fall short of 2019 peaks but are expected to start growing again by 2029.

The Middle East will continue to see its global MRO market share increase, driven by a large order book, especially for the narrowbody A320 and 737 MAX aircraft. Legacy widebody fleet types, such as the A380 and 777, will raise MRO demand, along with new entrants including the A350 and 777X. While currently comparable in market size to Asia's MRO demand, MRO in the Middle East will grow at a slightly more modest annual rate of 2.4% over the next 10 years. Despite this lower rate, the region will gain 25% in market size by the end of the forecast period.

Meanwhile, aftermarket growth in China will be smaller than projected in previous forecasts but still strong at an annual rate of 2.9%, reaching nearly $21 billion in 2035. This expansion in MRO demand is related to slightly slower fleet growth, which is the result of the more modest economic growth forecast for the nation. Most of the spend in this region will go to narrowbodies, based on the region's larger order book for the aircraft. This includes a small but growing COMAC C919 fleet owned by Chinese airlines, with an increasing share of the narrowbody market in the region.

Latin America's MRO demand is expected to be just over $6 billion in 2025 and will grow at an annual rate of 2.5% through 2035 to $7.8 billion. This growth is driven entirely by expansions in the region's narrowbody fleet to meet travel demand. Meanwhile, more retirements of regional jets and turboprops are expected because of age and are unlikely to be replaced within the forecast period.

As the second-fastest growing market over the next 10 years due to its relatively small size, Eastern European MRO will expand at a CAGR of 5.2% over the forecast period and add $1.5 billion annually by 2035 to achieve a total market size of $3.9 billion. In 2025, it is projected to reach $2.3 billion, approaching its 2019 peak of $2.5 billion and driven by fleet growth, particularly from Wizz Air and other low-cost carriers.

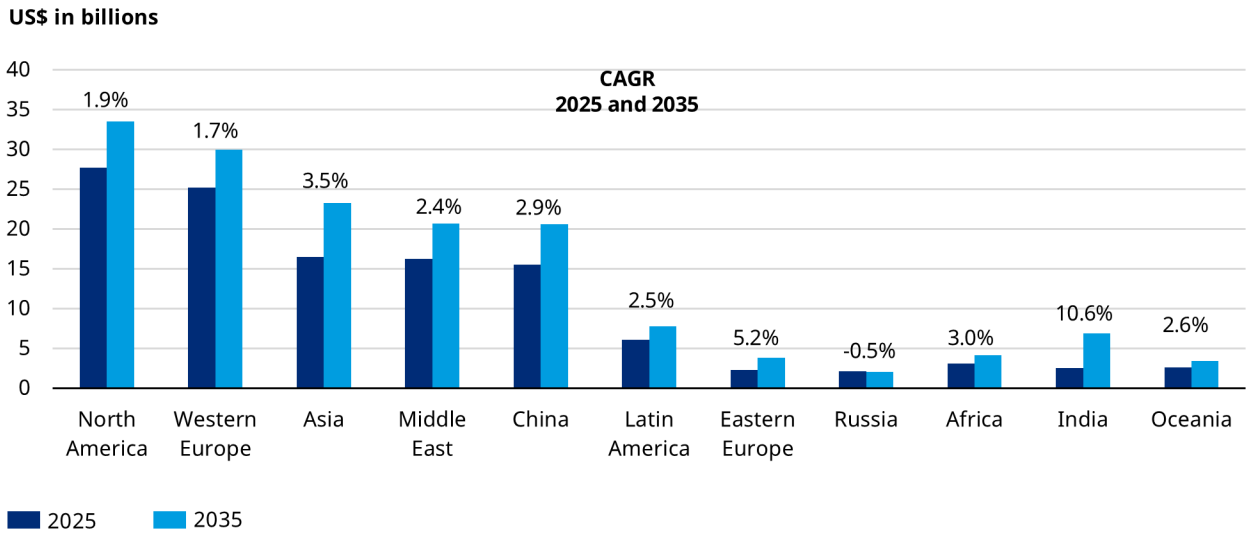
By 2035, Africa will see up to $4.1 billion per year in MRO spending at an annual growth rate of 3%, compared with just over $3 billion in 2025. Its historical practice of buying used aircraft from other regions will continue to drive MRO demand. In the middle of the forecast period, widebodies will create a surge in demand for scheduled maintenance, driving most of the region's MRO growth.

While currently one of the smallest MRO market regions, India will become the global growth leader with its impressive order book. Excluding Russia, India is the second smallest market globally behind Eastern Europe but will experience a strong growth rate of 10.6% annually, almost tripling in size to become the sixth largest of the 11 regional markets by 2035.

India's strong order book is a major contributor to this expansion, with new narrowbody orders driving most of the growth. To keep up with demand, MRO firms are announcing major investments in new regional capacity. Air India, for example, has broken ground for an in-house MRO facility in Bengaluru along with its own maintenance training school. Concurrently, the state of Odisha has announced plans to bring in more MRO investment, with the goal of becoming a center of activity for airlines, aerospace producers, and MRO providers operating in India.

Oceania, the latest addition to Oliver Wyman's regional analyses, is currently recognized as the third-smallest market, encompassing countries such as New Zealand, Australia, and Pacific Island nations, among others. The region is expected to expand to $3.4 billion in 2035 from $2.6 billion in 2025, with a modest CAGR of 2.6% over the forecast period. A notable factor in Oceania's growth is the doubling in MRO demand for widebody aircraft within the region — a staple, given the distance between most destinations.

Exhibit 14: Total MRO Growth Forecast by Region, 2025 and 2035



Note: CAGR stands for compound annual growth rate
Source: Oliver Wyman analysis

HOW UTILIZATION AFFECTS MRO

The size of the global MRO market is influenced not only by the number of aircraft in operation but also by how they are operated. This makes utilization — the hours and cycles an aircraft is flown — a key factor driving the demand for MRO services. This is particularly true for engine, component, and line maintenance, which are directly driven by utilization. In contrast, airframe maintenance is typically tied to calendar limits and modifications, thus more aligned with aircraft age and fleet management practices.

In 2024, total global utilization exceeded 78 million flight hours, three million flight hours above the 2019 record high. While these numbers vary depending on the segments or regions, total global utilization over the next decade is projected to grow at an annual rate of 3.4% — slightly outpacing fleet growth — to over 112 million hours annually from just over 80 million expected in 2025. This growth results in higher MRO demand, particularly for utilization-driven segments such as line and component maintenance.

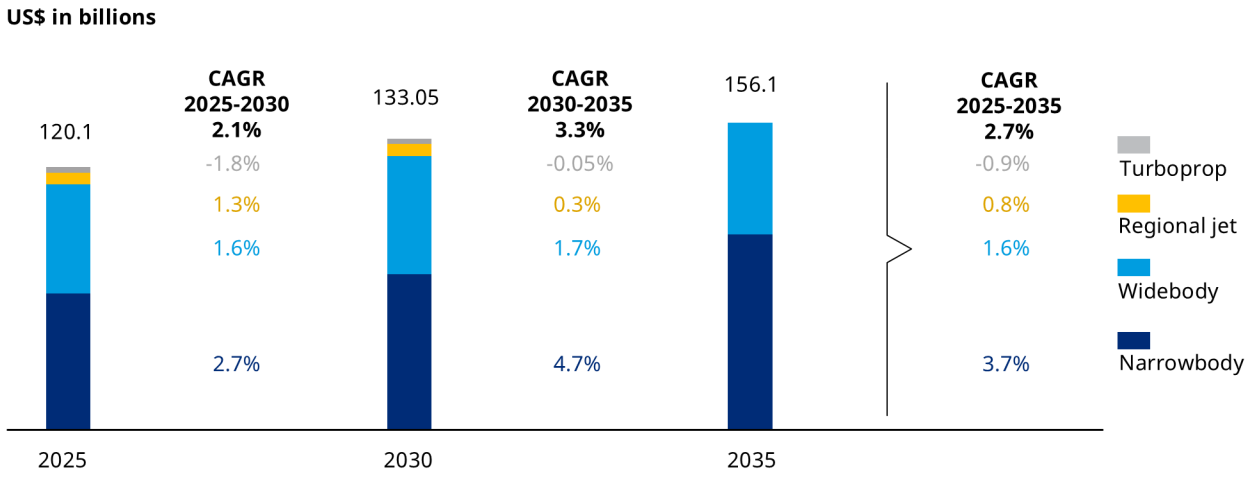
THE EFFECT OF VARIOUS PLATFORMS ON DEMAND

In the coming decade, the MRO market will undergo considerable changes regarding which class and model of aircraft drive the largest demand. The current narrowbody mainstays, the 737NG and A320ceo models, will gradually give way to the more fuel-efficient 737 MAX and A320neo aircraft. Likewise, in the widebody segment, newer technologies such as the 777X, 787, A330neo, and A350 will take the place of the established A380, 767, and A330ceo fleets.

By 2035, these newer fleets are projected to account for over $104 billion in MRO expenditures, representing about two-thirds of the total demand forecast. Additionally, by 2035, the market share of GTF and LEAP engines is expected to rise from just 9.6% to 41% of engine demand. In contrast, by 2035, CFM56 and V2500 engines, which currently power aging 737NG and A320ceo fleets, are predicted to decline from 35% of engine MRO spending to 8.3% as the aircraft they serve are phased out.

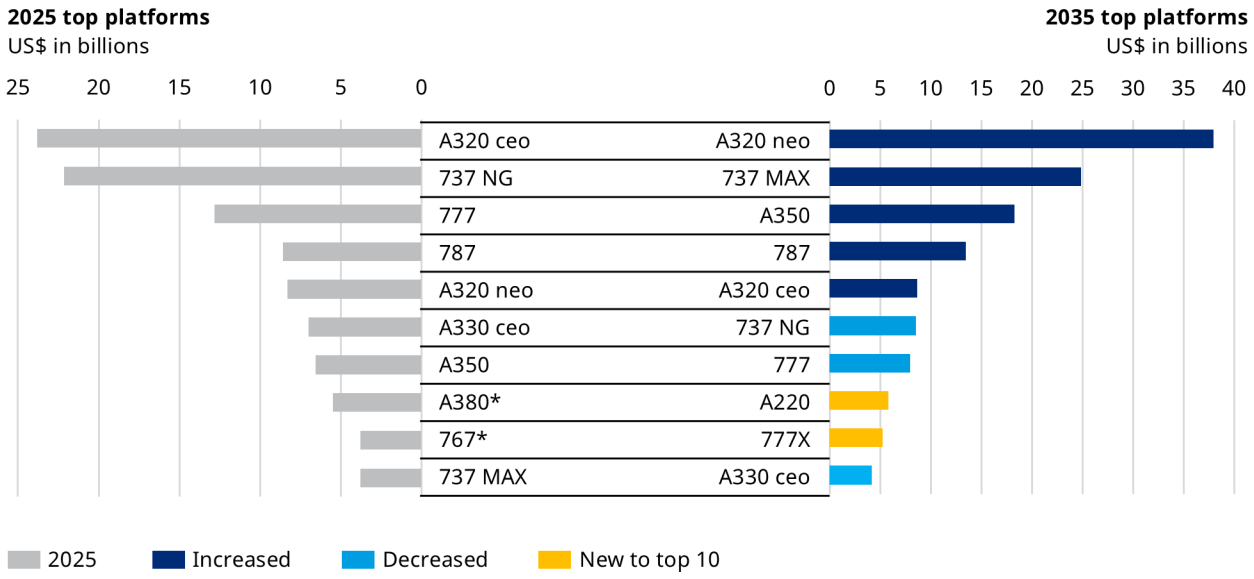
Despite their decline in numbers over the next 10 years, older fleets such as the A320ceo, A330ceo, and 737NG will account for 28% of all demand over the entire forecast period. Spend on them will be highest in the middle years of the forecast period as these aircraft remain in service longer than anticipated due to slow production of newer, more efficient aircraft. This legacy demand coupled with the growing need for maintenance on newer fleets is driving the current super cycle.

Exhibit 15: MRO Demand Forecast by Aircraft Class, 2025–2035



Note: CAGR stands for compound annual growth rate
Source: Oliver Wyman analysis

Exhibit 16: Total MRO Forecast by Region, 2025 and 2035



*Not in 2035 top 10
Source: Oliver Wyman analysis

A LOOK AT MRO BY SEGMENT

Engines will be the largest segment of the market over the decade with a CAGR of 2.4%. As next-generation engines enter their maintenance cycles, the cost per service visit will be higher than that of their predecessors due to the advanced materials required and overall higher costs of those materials. Concurrently, newer engines — such as the LEAP and GTF but to some extent the Trent 7000 and XWB — have experienced entry-into-service challenges, resulting in earlier than expected shop visits. These early visits, coupled with limited repairs being available on these new fleets, are playing a crucial role in the length of the super cycle, elevating costs and straining capacity.

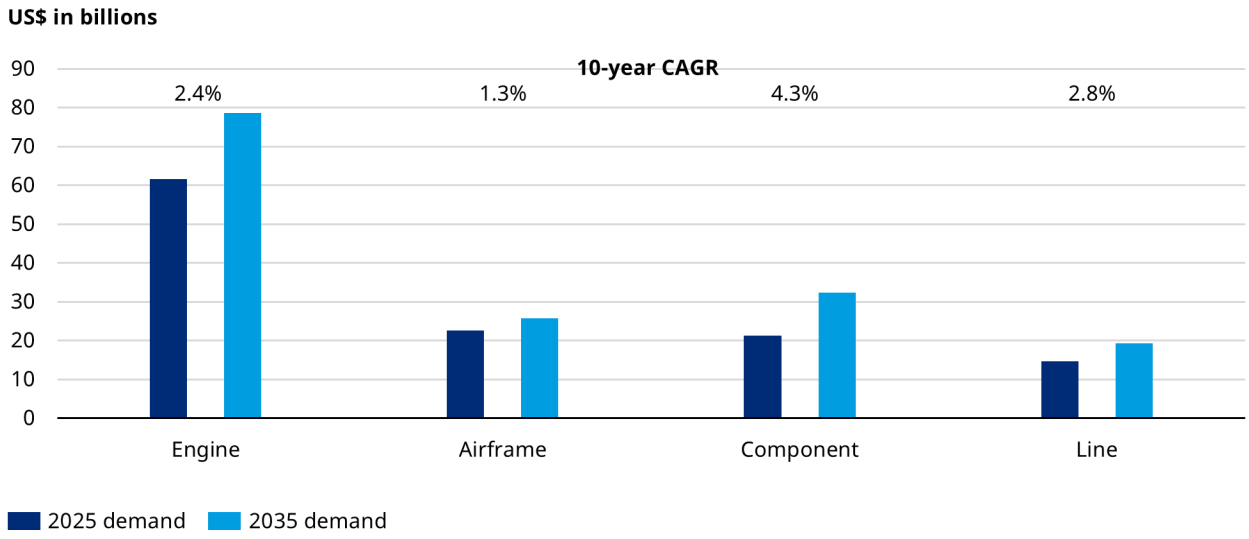
But while the LEAP and GTF have not yet achieved the same on-wing performance as their predecessors because of these issues, this trend is anticipated to change in the next few years as performance and durability enhancements are completed. They include the CFM International LEAP's high-pressure turbine kit, which was certified by the FAA and EASA in December 2024. Similarly, Pratt & Whitney's advantage derivative for the GTF is reported to be on track for certification in early 2025.

In contrast to the other segments, airframe MRO will expand more slowly, with an annual growth rate of only 1.4%. Airframe maintenance is primarily driven by calendar schedules, meaning airlines with newer fleets can take advantage of maintenance holidays before their aircraft require heavier airframe checks. With a significant number of new aircraft entering service during the forecast period and older fleets retiring — fleets that previously needed larger work packages during each visit — base maintenance is expected to remain relatively flat, with larger airframe maintenance checks on newer aircraft not slated until after the forecast period.

Unlike airframe maintenance, line maintenance does not benefit from delayed maintenance visits for new fleet entries. Consequently, the line maintenance segment is expected to grow at a robust rate of 2.8%, following on the heels of fleet growth. Its growth is more akin to the engine maintenance market, since it is heavily influenced by utilization.

Component maintenance represents a hybrid approach to maintenance practices. Certain components, such as landing gear, are driven by calendar limits, with newer fleets provided maintenance holidays, while other components, such as auxiliary power units, are driven by utilization and incur costs earlier in the aircraft life cycle. This results in component maintenance experiencing slightly higher growth than engine maintenance, with a CAGR of 4.3%, reaching $32 billion by the end of the forecast period.

Exhibit 17: Total MRO Demand Forecast by Segment, 2025 and 2035



Note: CAGR stands for compound annual growth rate
Source: Oliver Wyman analysis

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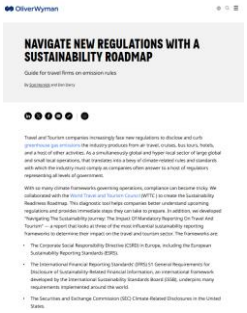

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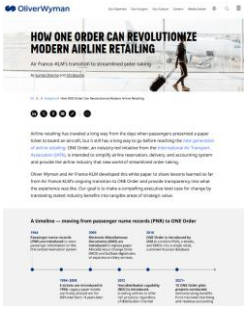

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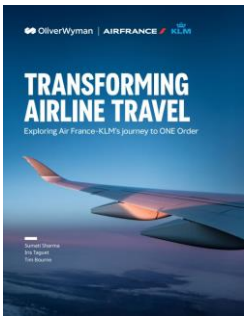

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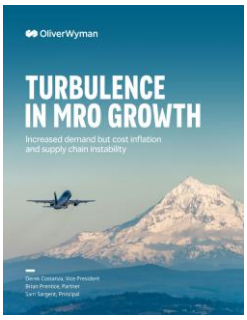

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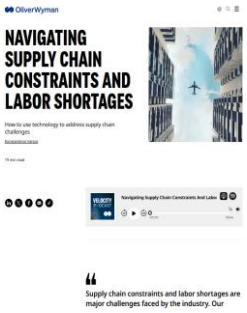

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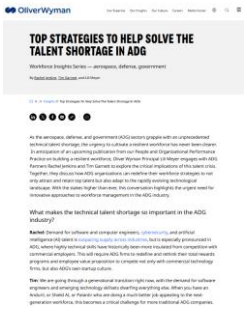

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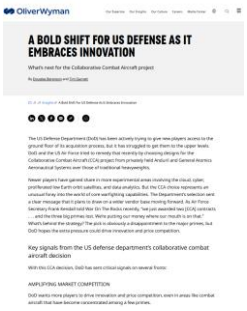

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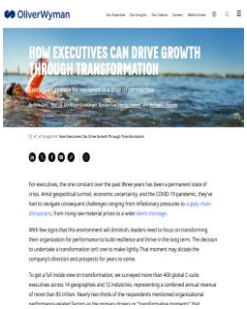

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