

GLOBAL FLEET & MRO MARKET ECONOMIC ASSESSMENT

2020-2030

Air Transport Fleet & MRO

Fleet Size	27,884
2020-2030 Fleet Growth Rate	3.4%
MRO Market Size.....	\$90.7 B
2020-2030 MRO Growth Rate	3.7%

Business Aviation Fleet & MRO

Fleet Size	33,080
MRO Market Size.....	\$12.9 B

Global Civil MRO Employment

Firms.....	4,950
Small/Medium Enterprises (SME)	80.3%
Maintenance Employees	404,847

US Civil MRO Employment

Firms.....	4,026
Small/Medium Enterprises (SME)	84.6%
Maintenance Employees	193,857

US Economic Activity

Maintenance, Repair, and Overhaul	\$27.2 B
Parts Manufacturing/Distribution	\$25.4 B
Total Economic Activity.....	\$52.6 B

FOREWORD

The analysis in this report is provided by Oliver Wyman for ARSA and its membership.

Oliver Wyman's *Global Fleet & MRO Market Forecast Commentary 2020-2030* marks our firm's 20th assessment of the 10-year outlook for the commercial airline transport fleet and the associated maintenance, repair, and overhaul (MRO) market. We're proud to say that the annually produced research, along with our *Airline Economic Analysis* (AEA), has become a staple resource of aviation executives—whether in companies that build aircraft, fly them, or service them, as well as for those with financial interests in the sector through private equity firms and investment banks.

This research focuses on airline fleet growth and related trends affecting aftermarket demand, maintenance costs, technology, and labor supply. The outlook reveals significant changes that are important to understand when making business decisions and developing long-term plans.

As you will see from the report, the next decade holds great opportunities and challenges for the industry as both technological innovation and the move away from traditional energy sources redefine business as usual across industries and the globe. This will be an era of disruptive growth, driving companies to ask tough, fundamental questions about what it will take to stay relevant and expand.

In conjunction with the *Global Fleet & MRO Market Forecast Commentary 2020-2030*, we conduct an annual survey on hot topics, critical issues, and new opportunities in MRO. To participate in the 2020 survey, please contact the research team at MROsurvey@oliverwyman.com.

Oliver Wyman's Aviation Competitive & Market Intelligence team, partners, and vice presidents are available to assist with any questions about this forecast, as well as the *Airline Economic Analysis*. We hope you find the data and insights valuable as you refine your business models and develop strategies for moving forward.

Best regards,

A handwritten signature in black ink that reads "Steve Douglas". The signature is written in a cursive, flowing style.

Steve Douglas
Vice President

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EXECUTIVE SUMMARY



DECADE OF GROWTH AND CHALLENGES

The next decade, 2020 to 2030, will be more challenging for aviation despite the fact that passenger air travel demand continues to break records. The industry will have to contend with a slower pace of economic expansion, particularly in historically high-growth nations such as China and India.

In China especially, a cloud hangs over the economy in the short term because of the rapidly proliferating coronavirus. In the first three months, the disease — known as COVID-19 — has infected tens of thousands more people than the infamous 2003 SARS outbreak did in almost nine months. The highly contagious nature of the disease has prompted the lockdown of tens of millions of people and countless closures of businesses and factories. With the crisis still unfolding and the rising likelihood that the coronavirus will be declared a pandemic, it's difficult to calculate the ultimate economic impact. In the Scenario Analysis section, we review the dimensions of the threat.

There are other challenges likely to have longer-term impacts on the industry. As the decade progresses, increased maintenance costs will remain a consideration for airlines as will potential labor shortages in key areas, increased congestion in the air and at airports, and an existential threat that efforts to abate climate change may limit the industry's growth in the future.

All of these challenges are likely to test the industry in ways not entirely under its control, making the next decade pivotal. To get ahead of any concerns, aerospace manufacturers, airlines, and the maintenance, repair, and overhaul (MRO) aftermarket will need to be much more strategic and long-term oriented in planning — and willing to consider fundamental changes in the way they operate and the technologies they use.

One of the events already posing some challenges for global aviation is the grounding of the 737 MAX, unprecedented in its length, and the subsequent halt in production of one of the industry's most popular aircraft. At least for the next few years, repercussions from the MAX are likely to weigh heavily on the industry.

Originally expected to account for over a quarter of all global aircraft deliveries in 2020 and 2021, the MAX does not look like it will return to service before the summer and will have sizable regulatory hurdles to scale on its way back. As we prepared this report, new MAX information continued to be shared, yet considerable uncertainty still exists on the timetable for the aircraft's return to service and the rate of production ramp-up. Oliver Wyman believes the extended effects of the MAX grounding will remain a factor for airlines for at least 18 months and will impact MRO operations for years down the road.

Even with these challenges, the outlook for the global fleet and aftermarket continues to indicate growth. By the beginning of 2030, the global fleet should grow to over 39,000 aircraft, an average compound growth rate of 3.4 percent annually, driven by increases in orders and deliveries. Over the next 10 years, original equipment manufacturers (OEMs) will produce over 21,000 aircraft, an average of 2,100 annually and more than 30 percent above the production of the previous decade.

Half of these deliveries will be replacement aircraft, with aircraft retirements expected to accelerate at a rate of 3.5 percent over the next 10 years. Currently, almost nine percent of the global fleet — close to 2,400 aircraft — is over the age of 25 versus just five percent in 2010.

This aging fleet will have a positive effect on MRO demand over the decade, particularly in the first half of the decade. Along with a larger fleet, increasing utilization rates will push MRO demand to \$130 billion in 2030 from \$90 billion in 2020, an average annual growth of 3.7 percent.

Go-go to slow-go

After a decade of substantial growth, aviation will contend next with a period of slowing growth, with certain regions losing momentum faster than others. The major global economic monitors — the International Monetary Fund, World Bank, and United Nations — have recently downgraded expectations for the first few years of this decade. Asia — in particular, China and India — is slated to lead global fleet expansion, and while the projected slowing of growth in the region is not yet alarming, it does indicate the outlook is less certain.

Growth in revenue passenger kilometers (RPKs) — a measure of distance traveled by paying customers and the industry's metric for demand — is slowing even in fast-growth regions like China. The International Air Transport Association (IATA) forecasts average annual growth of 3.6 percent in global RPKs through 2030, a substantial slowdown from the previous decade's 6.8 percent.

In 2019, there was a decline in freight tonne kilometers (FTKs), the principal metric that measures cargo demand. In fact, FTKs have experienced 13 consecutive months of year-over-year declines for the first time since the 2009 global recession, which was at least in part attributable to the trade conflict between the United States and China.

Despite the drop in FTKs, the size of the cargo fleet did not see a similar decline; in fact, it grew five percent year over year. This deviation relates in part to the significant growth in e-commerce shipments in recent years. E-commerce cargo is lighter than typical air freight, which means it depresses FTKs and makes the metric less reflective of the state of cargo. Total shipments appear to have increased, which justifies the continued fleet growth for the largest parcel carriers.

The slowdown in RPKs and drop in FTKs contributed to lower-than-expected airline profits at year's end — 30 percent below predictions made at the beginning of 2019. The decline in profitability from 2018, seen in most regions, reflects a 3.8 percent increase in expenses and a slowdown in revenue growth to 3.2 percent in 2019 from 7.2 percent in 2018. North America was an exception and represents 65 percent of global airline profits in 2019, up from 47 percent in 2017. Still, along with tightening margins, the weaker performance indicates a period of slower growth and tougher times on the horizon.

MAX difficulties

The grounding of the 737 MAX in March 2019, followed by a series of reentry delays and an eventual pause in the aircraft's production, is partly responsible for slowing global revenues and capacity shortages. Currently, the industry is facing the likelihood that there will be no new MAX deliveries until at least the second half of 2020.

As a result of the aircraft's popularity, the MAX troubles are causing substantial repercussions across the aviation industry that will last for the next few years. At the beginning of 2019, Oliver Wyman estimated that by the end of 2020, over 1,400 MAX aircraft would be in service across the globe. With the grounding and current production pause, that number is expected to be closer to 700 and could be as low as 150. Where the number of in-service MAX aircraft lands within that range will depend upon such factors as how fast the aircraft is cleared by the Federal Aviation Administration and other regulatory agencies, how fast pilot training requirements specific to the MAX are met, and how fast the MAX production line can be restarted. For example, the lack of available MAX flight simulators globally may constrain pilot training. Global regulatory approval may also create delays. While many of the major agencies plan to coordinate approvals with the FAA, authorization from the Civil Aviation Authority of China is expected to lag. Over 25 percent of the currently stored 737 MAXs are earmarked for Chinese operators, making CAA approval key to the speed of reentry into service.

Short-term impacts extend beyond operational shortages and reach into maintenance demand. Mass reentry into service — even if spread across nine to 12 months — will create demand spikes for calendar-driven maintenance checks over the next 24 to 36 months. While Boeing has approved extensions on certain calendar-driven tasks for aircraft in storage, the initial airframe check is likely to be more intensive than normal with catch-up reliability work.

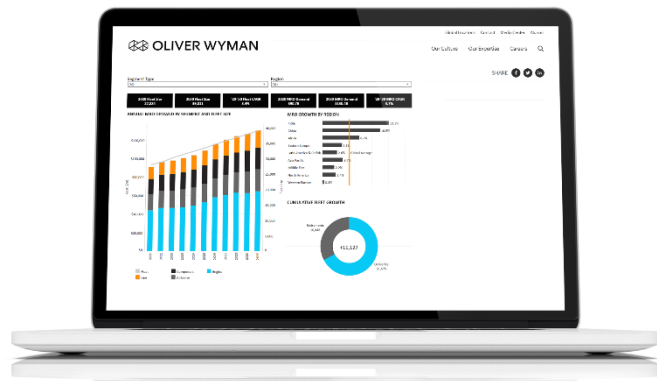
On a positive note, the long-term effects on global fleet size and MRO demand are likely to be minimal. Boeing still has a strong orderbook to fill over the next decade, and the demand for replacement aircraft is not expected to relent. But at least in the short term, it will remain a significant challenge facing the industry and one that could be expected to take years to work its way through the system.

FLEET AND MRO FORECAST SUMMARY

Region	Africa	Middle East	Asia Pacific	China	India	Latin America	North America	Eastern Europe	Western Europe	World
2020 fleet										
Narrowbody	454	534	2,218	2,914	490	1,089	4,195	945	3,328	16,167
Widebody	188	793	1,430	489	43	181	1,339	165	1,087	5,715
Regional jet	173	46	219	146	2	245	1,936	254	451	3,472
Turboprop	322	31	662	0	76	231	617	116	475	2,530
Total	1,137	1,404	4,529	3,549	611	1,746	8,087	1,480	5,341	27,884
2030 fleet										
Narrowbody	737	985	3,746	5,758	1,568	1,582	6,233	1,428	4,458	26,495
Widebody	439	1,013	1,749	1,301	113	205	1,556	287	1,048	7,711
Regional jet	95	30	168	168	6	128	1,704	205	195	2,699
Turboprop	190	77	635	9	269	185	386	75	280	2,106
Total	1,461	2,105	6,298	7,236	1,956	2,100	9,879	1,995	5,981	39,011
Fleet growth rates										
2020-2025	3.1%	5.0%	3.4%	8.8%	15.7%	2.0%	2.5%	3.0%	0.3%	3.7%
2025-2030	2.0%	3.3%	3.3%	6.0%	9.1%	1.7%	1.5%	3.1%	2.0%	3.2%
2020-2030	2.5%	4.1%	3.4%	7.4%	12.3%	1.9%	2.0%	3.0%	1.1%	3.4%
2020 MRO (US\$ in billions)										
Airframe	\$0.6	\$1.0	\$3.2	\$2.1	\$0.4	\$0.9	\$4.5	\$0.9	\$3.7	\$17.4
Engine	\$1.1	\$7.3	\$7.9	\$3.1	\$0.8	\$2.1	\$9.6	\$2.1	\$9.5	\$43.5
Component	\$0.6	\$1.0	\$2.7	\$1.7	\$0.3	\$1.0	\$4.8	\$0.9	\$3.4	\$16.3
Line	\$0.3	\$0.9	\$2.2	\$1.6	\$0.3	\$0.7	\$3.3	\$0.7	\$3.5	\$13.5
Total	\$2.7	\$10.1	\$16.0	\$8.5	\$1.7	\$4.7	\$22.3	\$4.6	\$20.1	\$90.7
2030 MRO (US\$ in billions)										
Airframe	\$1.1	\$1.5	\$4.2	\$4.2	\$0.9	\$1.1	\$5.6	\$1.3	\$4.1	\$24.0
Engine	\$2.6	\$8.3	\$11.8	\$11.4	\$2.6	\$2.9	\$12.5	\$2.9	\$9.3	\$64.2
Component	\$0.9	\$1.5	\$3.9	\$4.1	\$1.0	\$1.2	\$5.8	\$1.3	\$3.5	\$23.1
Line	\$0.5	\$1.2	\$3.0	\$3.4	\$0.7	\$0.9	\$4.4	\$1.0	\$3.9	\$19.1
Total	\$5.1	\$12.5	\$23.0	\$23.1	\$5.2	\$6.1	\$28.2	\$6.5	\$20.7	\$130.4
MRO growth rates										
2020-2025	7.5%	2.9%	4.8%	12.6%	13.2%	1.9%	1.3%	3.3%	-0.5%	3.6%
2025-2030	5.9%	1.4%	2.6%	8.4%	11.0%	3.4%	3.4%	3.7%	1.0%	3.8%
2020-2030	6.7%	2.2%	3.7%	10.5%	12.1%	2.6%	2.4%	3.5%	0.3%	3.7%

GET INTERACTIVE WITH THE FORECAST DASHBOARD

To enhance the 2020-2030 *Global Fleet & MRO Market Forecast*, our interactive dashboard lets users explore online the results of the forecast in a deeper fashion. The underlying data, which come directly from Oliver Wyman's forecast, can be filtered and viewed in ways that are most relevant to each user, providing a unique complement to the content within the report.



The dashboard is made up of two views. The first is a summary view that looks at the size, growth, and share of the global MRO market. With the ability to filter by aircraft class and within specific MRO segments, users can identify changing trends and the relative size of MRO demand in different market groupings.

The second view provides more granular insight into the size of the MRO market by year and growth of the market by geographical region. A breakdown of fleet growth in terms of deliveries and retirements is also provided. This view can be filtered by region and MRO segment, allowing users to identify the relative size and growth across specific geographies.

This dashboard highlights the strength and flexibility of the Oliver Wyman *Fleet & MRO Forecast* models. For questions or to discuss how to further expand on these insights, please go to AviationMarketIntelligence@oliverwyman.com.

Click to view the [Fleet & MRO Forecast Interactive Dashboard](#)



In 2019, Oliver Wyman launched the Oliver Wyman Forum to bring together business, public policy, and social enterprise leaders to help solve some of the world's toughest problems.

This initiative, which is separate from our commercial operation, combines rigorous research with opportunities to build partnerships across industries and geographic boundaries. Our goal is to develop a collaborative approach to technological disruption and work toward more equitable and effective remedies to mitigate its impact and enhance its potential.

One of the Forum's first missions was to assess the transformative impact of New Mobility's emerging technologies on global economies and everyday lives. The Mobility initiative is working with executives from the transportation, communications, and energy industries as well as technology innovators, investors, academics, government officials, and insurers and other risk managers. The world is our laboratory as we conduct working sessions in key frontiers of change — from centers of new technology and finance like San Francisco, Shanghai, and New York to hubs of city reinvention like Dubai and Singapore.

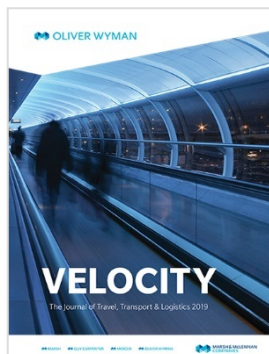
Forum partners have begun to convene stakeholders in a series called Global Mobility Executive Forums. The first, held in Paris in November 2019, had more than 450 executives and officials in attendance. More Executive Forums are planned for San Francisco, Dubai, and Berlin. If you would like information on the Executive Forums or the Forum, please contact us at OWForum-Mobility@oliverwyman.com

Please visit the Forum's website to review our work on the future of mobility, city readiness for artificial intelligence, the future of data, and cyber risk

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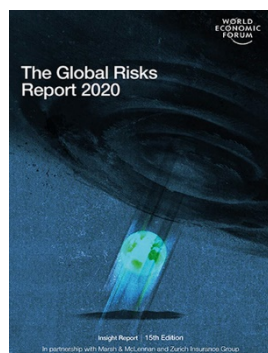
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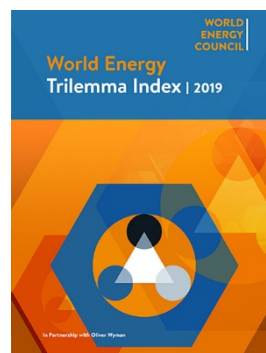
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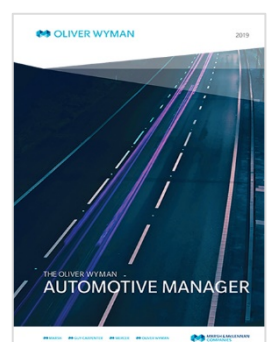
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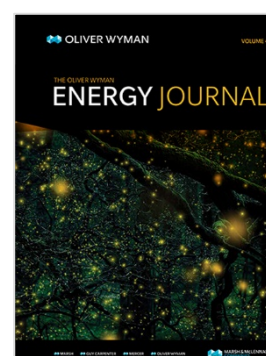
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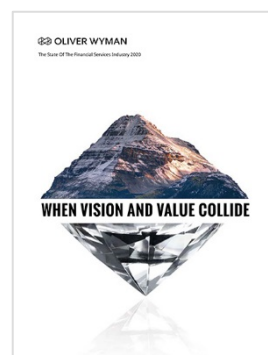
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About Oliver Wyman

Oliver Wyman is a global leader in management consulting with offices in 60 cities across 29 countries.

Our aviation, aerospace, and defense experts advise global, regional and cargo carriers; aerospace and defense manufacturers and suppliers; airports; maintenance, repair and overhaul companies; and other service providers in the transport and travel sector. We grow shareholder and stakeholder value, optimize operations, and maximize commercial and organizational effectiveness.

The team's capabilities also include: CAVOK, technical consulting on safety and compliance, maintenance programs, and certification (www.cavok.oliverwyman.com); analytical data tools at PlaneStats.com; and strategies and modeling for market share, network, and fleet planning analyses via our Network Simulation Center.

This deep industry expertise and our specialized capabilities make us a leader in serving the needs of the sector.

Oliver Wyman is a wholly owned subsidiary of Marsh & McLennan Companies [NYSE: MMC].

For more information, visit www.oliverwyman.com
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