PRIMER ON AVIATION MRO

Summary and Market Information

Abstract

Continued OEM and supply chain issues are extending the life of already aging fleets, portending strong demand for years to come. This report outlines the aviation MRO industry and signals growth projections and technological advancements that will influence the industry for years to come.

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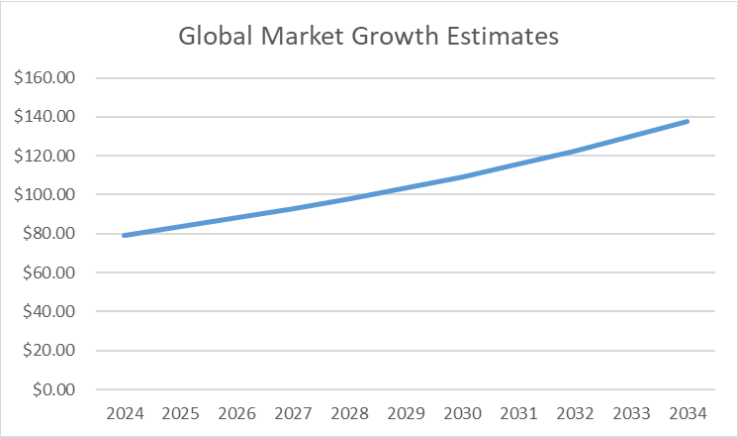
Executive Summary:

The global Aircraft Maintenance, Repair, and Overhaul (MRO) market is experiencing significant growth, driven by increasing air traffic, aging aircraft fleets, and the continued need to ensure airworthiness and operational efficiency. Projections indicate a robust Compound Annual Growth Rate (CAGR) of around 5.50% between 2024 and 2031. While North America currently holds the largest market share, the Asia Pacific region is poised for the most rapid growth. Key trends include a strong demand for engine overhaul services, the increasing role of airline/operator MRO capabilities, and a focus on environmental sustainability within the MRO sector. Supply chain challenges and rising costs are present, but the overall outlook for the MRO market remains positive, with potential for mergers and acquisitions.



Key Themes and Important Ideas/Facts:

1. Market Size and Growth:

- The global Aircraft MRO market was **USD $79.1 Bn in 2024** and is projected to grow at a **CAGR of 5.50% from 2024 to 2031.**
- This growth is attributed to the "rising passenger and cargo demands, supporting the continued operation of aircraft fleets around the globe." (Cognitive Market Research)

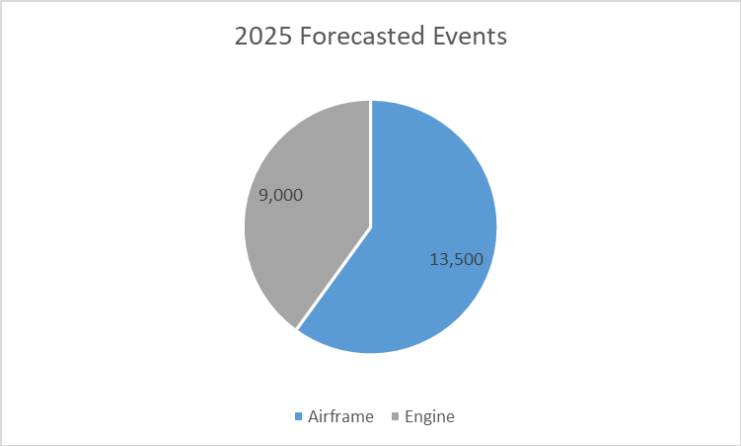
2. Regional Analysis:

- **North America** holds the largest market share (over 40% in 2024) with a size of **USD $31.6 Bn**, but its CAGR is lower at **3.7%** (2024-2031).
- **Europe** is the second-largest market with over 30% share and size of **USD $23.7Bn**

- **Asia Pacific** is the fastest-growing region with a CAGR of **7.5%** (2024-2031) and a 2024 market size of **USD $18.Bn**. This growth is linked to the rapid expansion in investments in aerospace infrastructure in countries like China (CAGR 7.0%).
- Other regions include Latin America (CAGR 4.9%), and Middle East and Africa (CAGR 5.2%), although they represent smaller portions of the global market.
- Eastern Europe is also noted as a rapidly expanding fleet region (9.2% annually in the first five years), despite a contracting fleet in Russia due to sanctions. Russia's narrowbody fleet is projected to decrease by a "stunning 44%" between 2024 and 2034. (Oliver Wyman)

3. Service Segmentation:

- **Airframe maintenance** have the highest events, while **Engine Overhaul** held the highest Aircraft MRO market revenue share in 2024.



- Other key service segments include Airframe Maintenance, Line Maintenance, Modification, and Components.
- The Boeing 737-800s and classic Airbus A320s are entering a phase requiring significant D checks. The CFM56 engine family is experiencing high overhaul demand.

4. Organization Segmentation:

- **Airline/Operator MRO** is a rapidly growing segment as "Airline companies and operators are depending more and more on their own maintenance departments to boost productivity, cut expenses, and keep control over the airworthiness of their fleets." (Cognitive Market Research)

- Independent MROs and Original Equipment Manufacturer (OEM) MROs are also significant players.

5. Aircraft Segmentation:

- The **Narrow-Body** aircraft segment held the major market share, driven by their "adaptability in the field, economy on fuel, and fit for short- to medium-distance travel." (Cognitive Market Research)
- Other segments include Wide-Body, Regional Jet, and Others (e.g., turboprops).

6. Environmental Concerns and Sustainability:

- The airline industry is responsible for 3% of global carbon dioxide emissions, driving a focus on reducing carbon footprints.
- While Sustainable Aviation Fuels (SAFs) are key, achieving net-zero will likely require carbon offsetting or alternative approaches like direct air capture (DAC), as pursued by United Airlines.
- In 2020 IATA had set a target of **2050 for airlines to achieve net-zero carbon emissions**, but has recently walked back from that commitment recognizing the headwinds with SAF adoption and hydrogen-powered aircraft concepts still not mature enough to make a material impact by 2050 – most notably Airbus delaying its original target of a hydrogen-fueled airliner by the mid-2030s.
- For MROs, achieving carbon neutrality is "less straightforward," but efforts include energy reduction programs, optimizing software, and a commitment to aircraft teardown and component recycling. AJW Technique highlights its "eco-friendly headquarters" with rainwater harvesting and solar panels, resulting in an "annual reduction of 425 tonnes of CO2 emissions to date." Louis Mallette of AJW Technique emphasizes their commitment to "aircraft teardown activities to ensure as many components as possible can be economically repaired and returned to service" and proper recycling of unusable parts.

7. Supply Chain and Costs:

- The MRO industry is operating in an "environment of significant demand offset by lead time and supply chain issues." (AviTrader-MRO)
- Rising costs (fuel, labor) are a factor in the aviation industry.
- The strength of the US dollar can present headwinds for global aviation as MRO and spare parts are typically sold in USD, leading to higher costs for non-US entities.

8. Mergers and Acquisitions (M&A):

- The MRO sector is emerging as a potential "M&A bright spot for years." (Aviation Week Network)
- "There truly is this desire by people to travel... As long as that boom continues, you will continue to see elevated MRO. Airlines have older airplanes because they can't get ahold of the new ones they ordered." (Stephen Perry, Janes Capital Partners)
- TransDigm's deal pipeline is reportedly stronger, indicating increased M&A activity.
- Proprietary aftermarket aircraft parts producers are attractive acquisition targets.
- Ventura Air Services' acquisition of AOG maintenance firm Alpha Aircraft Services demonstrates ongoing consolidation within the MRO landscape.

9. Importance of Forecasting and Inventory Management:

- Accurate forecasting is crucial for MRO profitability. "With every 2% of forecast accuracy achieved, there is a corresponding 1% decrease in inventory." (SGC)
- Improving demand forecasting by integrating planning processes and addressing data challenges can lead to better planning and reduced penalty costs associated with forecasting errors.

10. Key MRO Activities and Definitions:

- MRO encompasses services needed to guarantee aircraft airworthiness, safety, and operational effectiveness throughout their lifecycle.
- Routine MRO includes component replacements, upgrades, repairs, and inspection
- Specific service types include Engine Overhaul, Airframe Maintenance (repairing fuselages, wings, etc.), Line Maintenance (routine checks between flights), Modifications (upgrades), and Component maintenance.

11. Industry Landscape and Performance (2023 Overview from IATA):

- In 2023, the global fleet consisted of 32,654 aircraft, with 85% being active.
- Airlines participating in IATA's MCX program reported a total fleet of 2,307 aircraft and a total spend of $11.67 Billion in FY2023.
- The airline industry saw a net profit in 2023, recovering from previous years.
- Global MRO spend represented 11% of global airline revenues in 2023.

Competitive Landscape

Airline MROs

- Lufthansa Technik
- Air France Industries and KLM Engineering & Maintenance
- Delta TechOps

Third Party MROs

- AAR Corp
- StandardAero
- VSE Corporation

OEM MROs

- Airbus SE
- Boeing Global Services
- GE Aviation

Risks

Global economic factors and geopolitical issues are significantly impacting the MRO industry's growth and recovery in 2025, creating both challenges and influencing trends.

Impact of Global Economic Factors:

Supply Chain Disruptions: The MRO sector continues to grapple with **perennial supply chain problems** affecting the availability of aircraft, materials, and parts. These issues, exacerbated by the pandemic and slow production ramp-ups by OEMs, are expected to persist into 2025. This can lead to **longer lead times and significant backlogs** for maintenance providers.

Rising Costs: Airlines and MRO providers face **increasing input costs**, including **labor and material costs**. Labor costs saw a significant jump, and while some slowing is expected, they are likely to remain higher than pre-pandemic levels in 2025. Similarly, material costs have risen, impacting spare parts and components. These rising costs can pressure MRO spending decisions and service providers' profit margins.

Inflation and Potential Economic Slowdown: Concerns about **inflation and/or economic slowdown** are significant disruptors for the MRO industry. High interest rates contributing to modest global economic growth can temper the pace of fleet expansion, which in turn affects MRO demand growth.

Fuel Prices and Volatility: Although not directly an MRO cost, **volatile fuel prices** can impact airline operational costs and potentially their MRO spending priorities.

Strength of the US Dollar: The **strong US dollar** can create headwinds for global aviation as MRO services, spare parts, and jet fuel are often sold in US dollars, leading to higher costs for non-US entities.

Labor Shortages: The MRO industry faces a **significant challenge in attracting and retaining a skilled workforce**. This shortage drives up labor costs and can limit the capacity of MRO providers to meet demand, potentially leading to maintenance backlogs.

Impact of Geopolitical Issues:

Global Unrest and Conflicts: Major global conflicts and geopolitical tensions are having an impact on the commercial aviation industry and, consequently, the MRO sector. These events can disrupt air travel patterns, affect supply chains, and create economic uncertainty, indirectly influencing MRO demand and operations.

Sanctions: Sanctions imposed due to geopolitical events can strain the global energy market, affecting fuel prices, and potentially disrupt supply chains involving sanctioned regions, which could impact the availability and cost of certain MRO services and parts.

Overall Impact on Growth and Recovery in 2025:

Despite these challenges, the MRO market is expected to experience continued growth in 2025, driven by factors like increasing air traffic and aging aircraft fleets. Forecasts indicate a high volume of MRO work coming through shop floors in 2025, particularly for airframe heavy maintenance and engine events. The demand for MRO services is anticipated to remain strong, potentially exceeding pre-COVID levels for some segments like engine MRO.

However, the pace and profitability of this recovery will be significantly influenced by the aforementioned economic and geopolitical factors. **Supply chain constraints and labor shortages are likely to remain the most significant short-term impacts**, potentially limiting the industry's ability to fully capitalize on the strong demand. MRO providers are focusing on **increasing operational efficiencies through digitalization, new**

technologies like AI, and optimized processes to mitigate these challenges. The ability of MROs to adapt to these economic headwinds and geopolitical uncertainties will be crucial for their success in 2025.

Conclusion

The Aircraft MRO market presents a significant and growing opportunity within the aviation industry. Driven by fundamental factors such as fleet growth and aging, the demand for maintenance services is expected to remain strong. While challenges related to supply chains and costs exist, the industry is adapting through technological advancements, sustainability initiatives, and strategic M&A activities. The Asia Pacific region offers the most significant growth potential, and the engine overhaul and narrow-body aircraft segments are key areas to watch. Accurate forecasting and efficient operations will be crucial for MRO providers to capitalize on this expanding market.

Frequently Asked Questions

- **What is the current size and projected growth of the global Aircraft Maintenance, Repair, and Overhaul (MRO) market?** The global Aircraft MRO market was valued at approximately USD 79.15 billion in 2024 and is projected to grow at a compound annual growth rate (CAGR) of 5.50% between 2024 and 2031, reaching a significantly larger value by the end of the forecast period. This growth is driven by the increasing global air traffic, the aging aircraft fleet requiring more maintenance, and technological advancements in MRO services.
- **Which regions currently dominate the Aircraft MRO market, and which are expected to experience the highest growth rates?** In 2024, North America held the largest share of the global Aircraft MRO market revenue (over 40%), followed by Europe (over 30%) and Asia Pacific (around 23%). However, Asia Pacific is anticipated to be the fastest-growing region with a projected CAGR of 7.5% from 2024 to 2031, driven by rapid expansion in aerospace infrastructure and increasing technology adoption in countries like India and China.
- **What are the key service segments within the Aircraft MRO market, and which one currently holds the largest revenue share?** The Aircraft MRO market is segmented by service type into Engine Overhaul, Airframe Maintenance, Line Maintenance, Modification, and Components. In 2024, Engine Overhaul held the largest share of the market revenue. This highlights the critical and often costly nature of engine maintenance in ensuring aircraft operational reliability and efficiency.
- **Who are the major players in the Aircraft MRO industry?** The Aircraft MRO industry includes a diverse range of participants, including airline/operator MRO departments, independent MRO service providers, and original equipment manufacturer (OEM) MRO divisions. Some of the top companies identified in the report include AAR Corp, Airbus SE, Delta Airlines Inc (Delta TechOps), Lufthansa Technik, MTU Aero Engines AG, and Singapore Technologies Engineering Ltd, among others.
- **How are environmental concerns impacting the Aircraft MRO industry?** The aviation industry, including the MRO sector, is increasingly focused on reducing its environmental footprint. Airlines are exploring Sustainable Aviation Fuels (SAFs) and direct air capture (DAC) technologies to lower carbon emissions. For MROs, achieving carbon neutrality is more complex, but efforts include energy reduction programs in facilities and a commitment to aircraft teardown activities to repair and

recycle components, minimizing waste. Operational-optimizing software is also playing a role in achieving environmental targets.

- **What are some of the current challenges and trends affecting the Aircraft MRO market?** Several factors are influencing the MRO market, including rising costs, supply chain disruptions leading to longer lead times for parts, and a significant demand for MRO services. A key trend is the increasing number of narrow-body aircraft, like the Boeing 737 Next Generation and Airbus A320 families, entering the age where they require heavy maintenance checks (D and C checks) and engine overhauls, particularly for engines like the CFM56. Additionally, there's a growing interest in mergers and acquisitions within the MRO sector.
- **How does forecasting accuracy impact MRO operations and profitability?** Accurate forecasting of maintenance requirements is crucial for efficient MRO operations and profitability. Improved forecasting accuracy directly correlates with reduced inventory levels and associated costs. For instance, achieving a 2% improvement in forecast accuracy can lead to a 1% decrease in inventory. Better understanding demand drivers and integrating planning processes are key to enhancing forecasting in the MRO industry.
- **What are the different types of aircraft and organizational segments within the MRO market?** The MRO market caters to various aircraft types, including narrow-body, wide-body, regional jets, business jets, general aviation aircraft, and helicopters. Organizationally, the market is segmented into Airline/Operator MRO (maintenance performed by the airlines themselves), Independent MRO (third-party maintenance providers), and Original Equipment Manufacturer (OEM) MRO (maintenance services offered by the aircraft and component manufacturers). Narrow-body aircraft currently hold a significant market share due to their widespread use in short- to medium-distance travel.

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