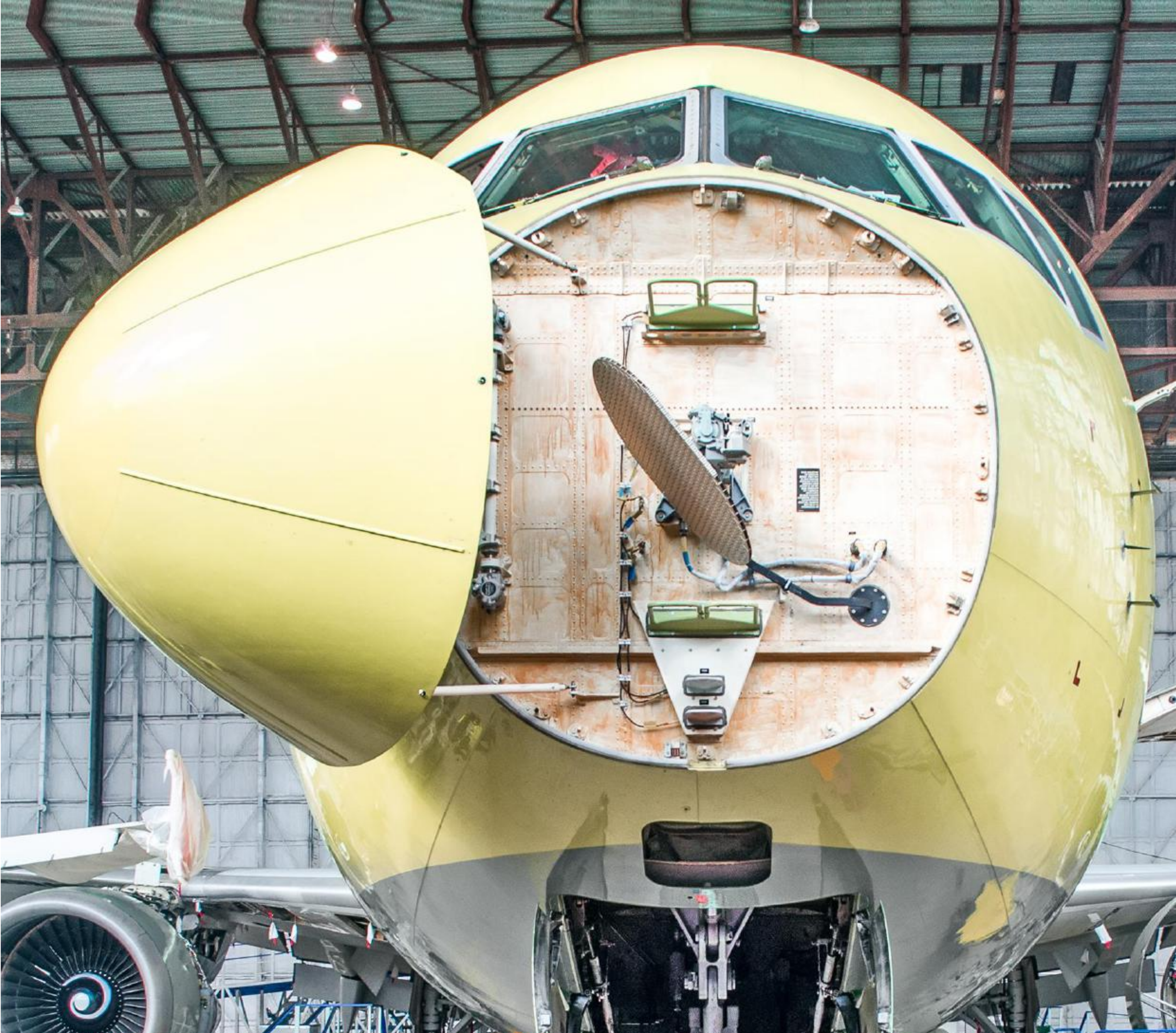
FROST & SULLIVAN

MRO 2025

IDENTIFYING OPPORTUNITIES TO ACCELERATE GROWTH



Operations and business models of Maintenance Repair and Overhaul (MRO) organizations are rapidly changing, driven by competitive forces and changing global dynamics.

Competition is intensifying day by day, threatening the sustainability of traditional business models. Evolving airline fleets and new entrants are disrupting the MRO business landscape and forcing players globally to come up with new business models.

On the technological front, MROs are investing in new technologies that improve their operational efficiency and service standards.

Airlines are gradually evolving from focusing on in-house fleets to customer-centric, third-party service offerings. There is also an increasing share of original equipment manufacturers (OEMs) in the aftermarket and changing fleet dynamics from full-cost carriers (FCCs) to low-cost carriers (LCCs). Now is the time for MROs to evaluate their current status and understand the implications of the industry changes to prepare for the future.

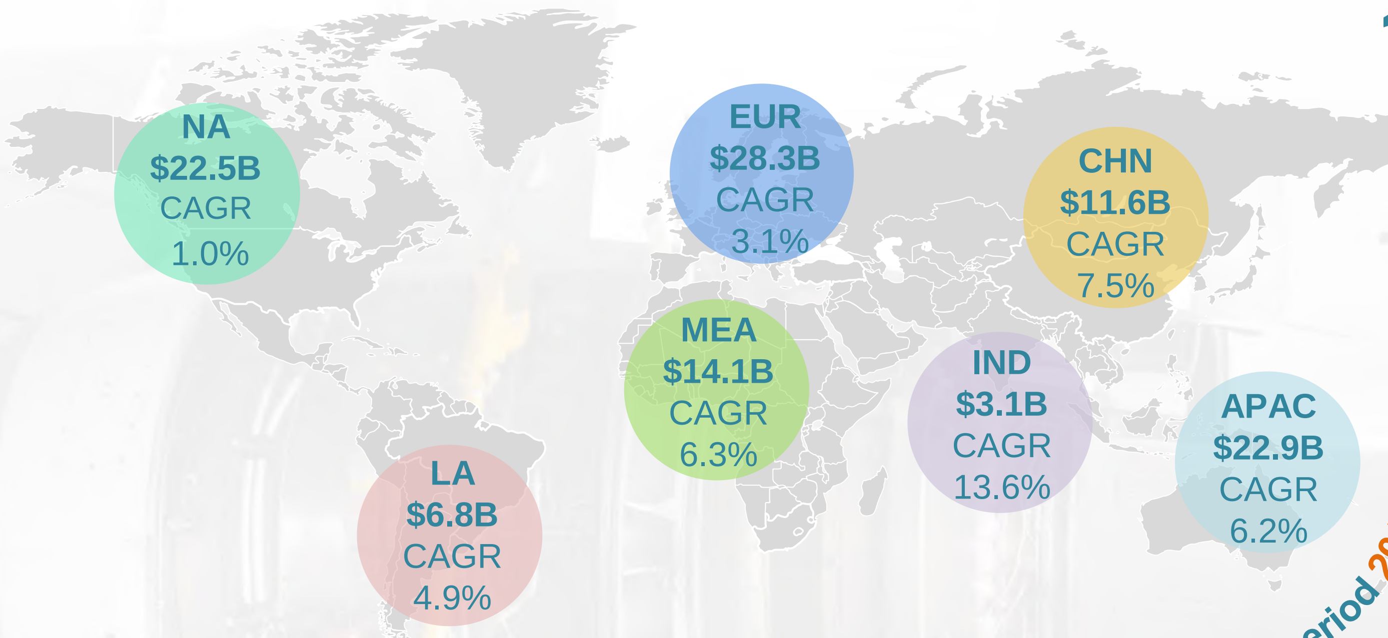
Frost & Sullivan has worked with technology vendors, airline and third-party MROs, OEMs, and aviation authorities to identify game-changing solutions, recommend business improvement and growth opportunities, and develop strategic plans.

MRO MARKET POTENTIAL

- Global MRO to grow by **$28B** in the next **7** years, from **$82B** in 2018
- Asia-Pacific will be the 2nd largest market, accounting for **21%** global value
- A320 and B737 families will contribute to **40%** of the total MRO output

MRO 2025

Global MRO spending to cross the $110B mark by 2025



Global MRO output is estimated to grow at a CAGR of 4.3% for the period 2018–2025

Airframe

Airframe MRO will grow by 1.29 times, from $6.1 billion in 2018, and reach $7.95 billion by 2025

Engine

Engine MRO to grow by 1.38 times, from $27 billion in 2018, and reach $37.4 billion by 2025

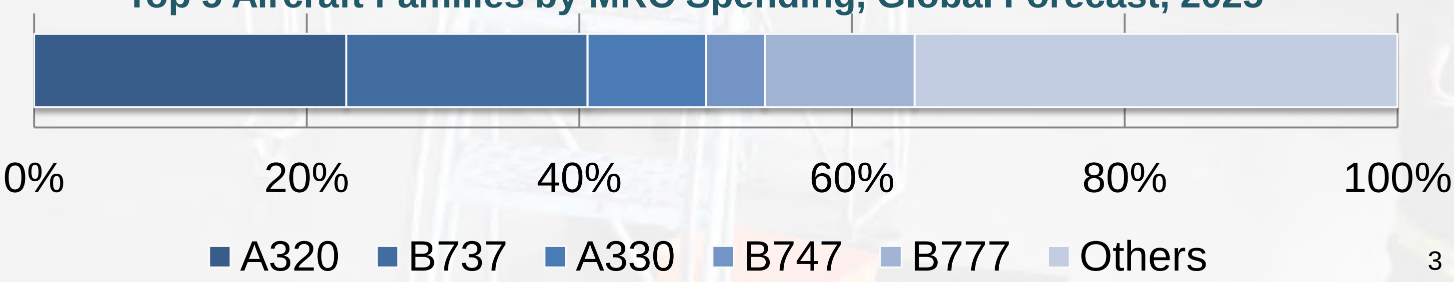
Component

Component MRO to grow by 1.34 times, from $31.7 billion in 2018, and reach $42.5 billion by 2025

Line

Line MRO to grow by 1.23 times, from $12.5 billion in 2018, and reach $15.3 billion by 2025

Top 5 Aircraft Families by MRO Spending, Global Forecast, 2025

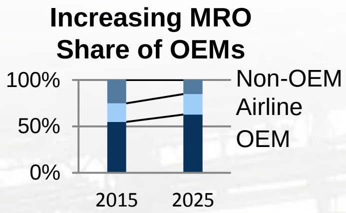


EVOLVING BUSINESS LANDSCAPE

The commercial aviation MRO landscape is changing across multiple facets, and it is imperative for businesses to develop strategies to align with or counter the impact of these changes to survive in this highly competitive space.

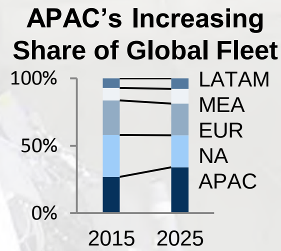
OEMs in the Aftermarket

OEMs across the board are looking to increase their share of revenue from the aftermarket.



Shift in Global Fleet Base

Asia-Pacific is set to host the largest fleet base going forward, overtaking North America and moving far ahead of Europe.



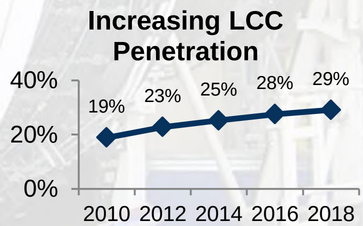
New-generation Fleet

MRO needs of new-generation aircraft are different due to the usage of new-age materials.

Composites by Weight	
Airbus A350	53%
Boeing 787	50%
Airbus A330	14%
Boeing 777	12%

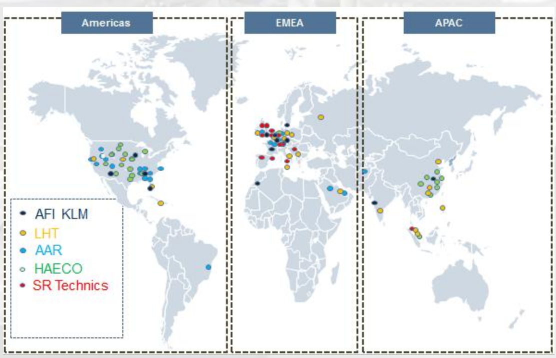
Low-cost Airline Growth

LCCs are highly cost-sensitive, forcing MROs to run efficiently to come up with competitive pricing.



Global Expansion of MROs

Established MROs such as Lufthansa Technik, AAR, SR Technics and AFI-KLM are have setup bases in APAC to tap the market.



TECHNOLOGY TRANSFORMATION IN MRO

Heavy Maintenance

Inspections Take Up Majority of Downtime
Due to the sheer size and complexities of an aircraft, a lot of time and money is spent only on assessment

Inability to Forecast Maintenance
Growing fleets are leading to increasing unplanned jobs, disrupting routine maintenance

Cost Competitiveness
The rapid growth of LCCs has increased the demand for cost-efficient maintenance

Line Maintenance

Expansion and Addition of Terminals
Expanding airports require services to support larger areas while maintaining efficiency

Inefficiencies in Resource Allocation
Dynamic changes in flight schedules require quick deployment of manpower and equipment

Increasing Need for Shorter Turnaround Time (TAT)
More than ever, need to reduce lead time for resource deployment

Workshop

Unavailability of Real-time Monitoring
No visibility into incoming jobs from heavy maintenance, cabin services, or line maintenance

Difficulties in Parts Handling and Storage
Very strenuous and time-consuming to manually move heavy parts in and out of the shop floor

Increasing Aircraft Complexities
New-generation aircrafts are leading to longer downtimes due to increased difficulties faced by technicians

Fleet Management

Unstructured Repair Management
Lack of a centralized repository to perform smart sourcing for repairs

Lack of Unified Solution
Use of multiple separate programs in parallel by various departments, causing confusion and resulting in delays and losses

Delays and Losses in Delivery of Spares
Lack of visibility into the delivery status and location of spares and components

Nanocomposite Sensors
Sensors that can be sprayed on the surface to detect faults

Autonomous Vehicles
Autonomous load transfer platforms for ease of movement

Big Data and Analytics
Cumulative analyzed data sourced from multiple points

Real-time Tracking
Use of RFID, barcode, and NFC to track, store, and retrieve parts

Dynamic Resource Allocation
Use of handhelds and wearables to deploy resources dynamically

Over-the-air Assistance
High-speed connectivity to link technicians and experts

Automated Inspection
Use of autonomous drones and robots to carry out usual pre-flight inspection

Modern Mobility Solutions
Self-driving vehicles to quickly mobilize engineers

Digitized Job Cards
Online work card library to collaborate across departments

Automated Repair
Use of robots to carry out time-consuming and difficult repairs

Digital Aid
Use of holographic mock-ups to practice repair jobs

Automated Parts Handling
Use of autonomous and semi-autonomous tools to handle parts

Connected Fleet
Tool that can cumulatively monitor and analyze multiple aircrafts

Blockchain
Advanced analytics and monitoring to track shipments

Artificial Intelligence
Ability to predict faults and prescribe optimum repair procedure

Unified Solutions
Software that can source information from multiple departments

WHY FROST & SULLIVAN?

For over 50 years, Frost & Sullivan has pioneered growth and guided organizations by providing a 360-degree view of industry intelligence, as well as interaction with the world's best and brightest analysts, economists, and futurists helping organizations make crucial decisions.

If you face challenges predicting the future of the industry and understanding how changes could impact your organization, positively or negatively, we can help provide the answers you seek.

Business Strategy

- MRO JV Strategy
- MRO Business Strategy
- MRO Investment Strategy
- Airline MRO Strategy
- Airport MRO Strategy

Roadmaps and Policies

- Technology Roadmap
- MRO Industry Roadmap
- Aerospace Cluster Roadmap
- Aerospace MRO Policy Framework
- National MRO Development Roadmap

Feasibility and Master Plan Study

- Master Planning
- Aerospace/MRO Park
- MRO Cluster Benchmarking
- Best Practices for Cluster Development
- Aerospace MRO Industry Promotion

RESEARCH PROGRAM COMPONENTS

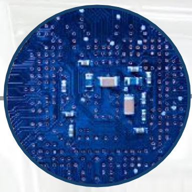
STRATEGIC INSIGHT
Analysis of key topics driving market development

MARKET SIZING
Market assessment and forecast

MRO BENCHMARKING
Insights into new developments of the major hub technologies

HOW FROST & SULLIVAN CAN SUPPORT YOUR STRATEGIC PLANNING PROCESS:

Develop Market Entry & Local Partnership Strategy



Perform Global Best Practices and Benchmarking Study

Support Drafting of Policies, Regulations, and Incentives

Perform Market and Competitor Analysis to Assess Size of Opportunities

Develop Master Plans for MRO and Aviation Clusters

Develop and Implement Technology Roadmap for MROs

Support Strategy Execution

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