

Indian MRO Market

Unlocking the \$7Bn Prize





The global aviation market is going through massive changes in demand, in line with structural shifts in economics, demographics & global geopolitics. These rapid changes create imbalances and consequently, opportunities to strengthen the enabling ecosystem. We therefore believe there is a key opportunity in the MRO sector as an enabler to the aviation sector, with India well positioned to leapfrog many incumbents. This paper outlines the basis for our belief and some key pillars on which future growth needs to be centered, if India is to capture this opportunity.

1. Demand shifts and opportunities

In commercial aviation, there is a clear shift of growth towards Asia over the traditional strongholds of Europe & North America. We estimate Asia will account for 50% of the global passengers (up from 37% in 2021) & 40% of the world's commercial aircraft fleet by 2040.

Closer home, the Indian commercial aviation market will be among the fastest growing globally. Indian airports catered to 187mn passengers in FY18 which is expected to grow to 1,124mn passengers in FY40 at an annual growth rate of 8%. India is expected to become the 3rd largest commercial aviation market by 2026 and see a 4x growth in fleet by 2040.

On the other hand, in defence aviation, we see three clear global trends driven by geopolitical tensions:

 Global defence spending is at an all-time high, growing at ~5% annually in the last 5 years.
 For comparison, global defence spending was stagnant in the preceding 5-year period from 2011-2016





- Thrust on self-sufficiency will reduce dependency on imports in the long run. For example, Japan launched a program in 2020 to develop nextgeneration fighter planes in partnership with a domestic player to replace some of their older F-2 jets which were imported from US
- Countries are investing heavily on modernization of their defence fleets, as evidenced by the fact that Canada recently finalized a proposal to replace ~100 ageing fighter jets worth ~\$20bn

We expect these trends to hold true for India as well. India's defence aviation budget is expected to grow at 6% supported by multiple policy interventions to promote indigenization (such as embargo on imports of transport aircraft, light combat helicopters etc.).



2. MRO Market: A \$7Bn Opportunity in India

One of the critical support industries for aviation is MRO. India has a rapidly growing MRO market currently worth \$1.7bn for its commercial aircraft fleet. This is expected to increase at ~9% annually to reach \$4bn in 2031 with commensurate growth in the fleet. However, only 15-20% of this market is currently being serviced locally while 80-85% is serviced overseas. Engine MRO accounts for ~50% of this market & is almost exclusively serviced overseas. India therefore is missing out on a significant value-add opportunity.

Additionally, the defence MRO market is expected to be worth \$3bn by 2031 to service India's fleet of 2000+ aircraft. The defence MRO market will be driven by India's ageing fleet which includes certain aircraft classes such as the Mig-21s that are 30+ years old. The MRO spend for such old aircraft is significant due to low reliability & obsolescence of parts. The BRDs (Base Repair Depots), usually operated by the Defence forces, would also need additional support to cater to the growth in requirements.

Figure 2 Growth of Commercial aviation in India



Defence aviation in India

Air Force Budget (in INR Cr)



Figure 3 Indian commercial & defence MRO market cumulatively estimated to be worth ~\$7bn by 2031



Engine Airframe Component Line

Sources: Secondary research, DGCA

Indian Defence MRO market (in USD Bn)



Sources: Defence experts



Sources: WDMMA

For example, there are platforms such as the Mi-17 series helicopters & IL76 aircraft that are reaching the end of their technical life and therefore, will require life extension programs and continuous maintenance. While the Base Repair Depots (BRDs) of the Indian Air Force (IAF) can carry out certain aspects of the maintenance and overhaul, they are largely dependent on OEMs for spare parts and technical support. To address this concern, IAF recently invited EOIs from Indian MRO players to take up complete repair and overhaul of the Mi-17 platform through a JV with the OEM.

Apart from the commercial & defence fleet, India also has a fleet of 302 aircraft & helicopters which are used for non-scheduled operations such as charters. This fleet presents an additional market opportunity for MRO over & above the segments highlighted above.

3. Potential barriers to realization of the opportunity

While India is likely to generate a \$7bn MRO market to support its growth across commercial & defence aviation by 2031, the choice of this industry to thrive in India is not automatic. The industry has been historically plagued by five key challenges – small scale players, limited investments, lack of value addition, limited ecosystem for spare parts, and delayed policy interventions – because of which the Indian fleet has been importing MRO services.

3.1. Sub-scale operations

India's top 3 players (AIESL, Air Works, GMR Aero Technic) together account for only ~\$200mn revenues while major global players such as Lufthansa Technik & Air France Industries and KLM Engineering & Maintenance each have annual revenues of \$3.5-4bn. These global players are market leaders in their respective countries and service fleets from other countries as well.

	Revenue (USD mn)	EBITDA (%)	Line	Component	Airframe	Engine
AIESL	144	14	\checkmark	\checkmark	\checkmark	\checkmark
AIR WORKS	30	13	\checkmark	\checkmark	\checkmark	X
Aero Technic	31	22	\checkmark	×	\checkmark	×
Indamer We Know Your Aircraft	8	-1	\checkmark	\checkmark	\checkmark	×
НАЕСО	1844	9	\checkmark	\checkmark	\checkmark	\checkmark
 Lufthansa Technik 	3938	15	\checkmark	\checkmark	\checkmark	\checkmark
AIRFRANCE / KLM INDUSTRIES Engineering 6 Maintenance	3496	1	\checkmark	\checkmark	\checkmark	\checkmark
Indian Players	Global Players					

Table 1 Major MRO Players in India

1. EBITDA for Indamer is not publicly available; Source: CapIQ, company websites

Figure 4 **Growth in asset base**





Among the Indian players, only AIESL offers all 4 types of MRO services. However, their facilities have historically been grossly underutilized & only recently received international accreditation. Other Indian players have been restricted to 2-3 types of MRO services only. On the other hand, most major global players provide the entire range of services. Airlines prefer a one-stop shop solution as it provides them the convenience of coordinating with a single entity. It also significantly reduces the aircraft grounding time as multiple types of services can be carried out simultaneously instead of sequentially sending the aircraft to various MRO facilities.

3.2. Limited investments

In an industry that needs regular capex infusions, investments by Indian players have been limited. While AIESL & GMR Aero Technic have had negligible growth in asset base in the last few years, Air Works has grown its asset base by ~10% annually. On the other hand, global majors such as HAECO & Lufthansa Technik have grown their asset base by 13-15% annually in a similar time frame (and at a significantly larger scale of business).

With such limited investments, engine MRO, which alone requires investment of \$100-\$300mn, can be extremely difficult to execute for Indian players. Given the size of players in India thus far, appetite to invest significant capital to serve the needs of the future has been limited.

Figure 5 **Revenue per 1000 employees for select MRO players**



3.3. Low value-addition

MRO is a technology-intensive service. However, value-add per employee in Indian players has been far lower compared to global standards due to the nature of MRO work that is done in India coupled with the lack of focus on upskilling & upgradation of manpower. Consequently, average revenue per 1000 employees for Indian players is less than \$60mn which is much lower than average of global players at ~\$230mn, with SR Technics reporting \$400mn+ of revenue per 1000 employees.

3.4. Absence of ecosystem for spare parts

All Indian MRO players are forced to import spare parts based on requirements due to the absence of a local ecosystem for the same. This leads to logistical issues, high freight costs & time delays.

In the defence sector, the supply chain is completely dependent on the OEMs for spare parts which significantly increases risk. For the Russian fleet for example, delays sometimes run up to months causing the defence forces to have their aircraft grounded. Moreover, major policy interventions to support the industry have been implemented only recently (such as GST reduction, enhanced land allotment period, exemption on airport royalty etc.). It will take time for the impact of these interventions to reflect on the ground. Additionally, on import of spare parts for commercial aircraft, there is still ambiguity around the customs duties and GST to be levied along with a lack of uniformity in application of regulations such as those related to part segmentation.

On the other hand, countries such as Singapore & Malaysia have created attractive investment propositions for MRO players through tax credits on reinvestment.

Also, while India is the largest supplier of aviation talent to the Middle East and APAC regions, the Indian MRO operators have not been able to retain good talent within the country. There is a dearth of qualified & skilled engineers & technicians to support the growing MRO industry. Key reasons for this dearth are the lack of quality specialized institutes & the low salaries offered by MRO players in India. For example, a technician (non-certifying) in the Middle East can earn 4-6 times the salary earned in India. While there may be multiple reasons for the ecosystem not being built yet, as indicated above, it is clear that local capability building will be a key catalyst for the growth of the MRO sector in India

Country Case Study – Turkey

In recent years, Turkey has established itself as a global MRO hub with Turkish Technic emerging as a key player. The growth in the Turkish MRO market has largely been driven by 3 factors –

- Aviation in Turkey: The aviation market in Turkey is booming with annual growth of ~14% over a 10-year period from 2009-2019. Due to this, the domestic MRO demand alone is expected to be ~\$3bn USD by 2025. The Turkish government has prioritized growth of the aviation market by offering a wide variety of incentives targeted at both airlines & customers ranging from discounts on airport tariffs to tax reductions in jet fuel. They have also invested heavily in infrastructure development as evidenced by the new Istanbul Airport which is among the biggest in the world
- Strategic location: Turkey has a locational advantage with 50+ countries being within a 3-hour flight from Istanbul which allows airlines to consider Turkey as a convenient destination for MRO services
- Cheap labour: Labour cost in Turkey hits the sweet spot between the higher rates of Western Europe & the comparatively lower salaries of Asia. This ensures competitive service rates compared to Europe & ability to attract quality talent from Asia

Moreover, the Turkish government has been proactive in promoting the MRO industry with active investments through the government-owned Turkish Technic. They have established a comprehensive one-stop shop facility in Istanbul spanning the whole gamut of MRO services.

4. Way forward

To capture the MRO market potential created by the Indian fleet, Indian MRO industry must think completely differently along five key aspects – building scale, shifting to a digital-first operating model, developing capability, creating talent pipeline and supporting the industry through additional policy interventions.

4.1. Scale

Indian industry needs a large-scale anchor player to take a leading position in the market. Time and again, it has been observed that large aviation markets have large-scale players that support the national carrier along with other fleets. Since continuous investment is a requirement in this sector, the ability to stay invested for the long-term is a critical success factor to build scale. For example, Germany has a fleet of ~700 with an MRO market size of ~\$2bn. Lufthansa Technik has captured almost 100% of the market share which accounts for <50% of its revenues. Majority of its revenues comprise of servicing aircraft from other countries.

A large-scale player can help invest in & establish a market for engine & component MRO within the country which has predominantly only covered airframe maintenance in the past. For example, Turkish Technic has setup multiple MRO facilities, wholly owned as well as through partnerships, in proximity to each other to cover the whole gamut of MRO services & provide comprehensive solutions to their customers.

4.2. Operating model

Most large global MRO leaders are saddled with legacy MRO practices and have traditionally enjoyed dominance owing to manpower excellence. Any new player can potentially change the game by adopting a digital-first approach to create a competitive advantage. Investing in a combination of technologies can provide a head-start to competing with the incumbents. Examples of digital technologies that can be deployed are provided below. These can help to enhance operational efficiency, improve service quality, ensure transparency with stakeholders with real-time tracking and aid in manpower development.



Figure 6 Examples of digital solutions

Enhancing Operational Efficiency	 AI-based visual recognition for part induction to reduce processing time by 80-85% Supply chain optimization models for better manpower planning & inventory control Digital documentation & signatures for seamless record-keeping RFID-based solution for tracking & management of tools to reduce unproductive time of technicians Automated systems to retrieve & transport material from warehouse for just -in-time and point-of-use operations 	AIRFRANCE Contention of Conten
Improving Service Quality	 Mobile - based solutions for mechanics to access detailed instructions, maintenance documents, request for materials, collaborate with engineers real - time etc. for easier coordination & improved troubleshooting Drones with visual recognition & robotic inspection to carry out physical checks to reduce dependence on technicians IoT, sensors, RPA across equipment for data collection & performance tracking 	SR Technics
Transparency with stakeholders & Predictive Maintenance	 Automated real -time cost reporting for airlines to track Real -time tracking & data analytics to reduce unplanned repair & undertake predictive maintenance 	AIRFRANCE Control Cont
Manpower Development	 AR & VR based training modules to reduce reliance on on-the-job training & help in saving costs 	AIRFRANCE / KLM INDUSTRIES Raintenance

Sources: Secondary research

4.3. Capability development

Indian players should also focus on developing value-adding capabilities for the long-term, especially for services such as engine MRO which have not been historically offered in India. Capabilities can be developed through partnerships with other stakeholders in the MRO ecosystem. Partnerships can take various forms:

Partnership with OEMs

 E.g. Turkish Technic has formed JVs with multiple OEMs for different types of MRO services – Pratt & Whitney for engines, Collins Aerospace for nacelles (component) etc.

Partnership with airlines

 E.g. MTU formed a JV with China Southern Airlines to setup a facility in Zhuhai, China. This facility is the market leader for engine MRO in China

Partnership with global MRO players

 E.g. Philippine MacroAsia Corporation formed a JV with Lufthansa Technik to setup an MRO facility in Philippines

Each type of partnership offers varied advantages as highlighted below –

For defence MRO as well, IAF has initiated the process to setup JVs with Russian OEMs for MRO of the airframe and all aggregates for Mi 17 series helicopters, IL76 etc. Similar JVs should be setup between HAL and private MROs with TOT agreements for all the helicopter types that are being manufactured by HAL.

On the commercial front, major aircraft, engine and component OEMs, who have hitherto been resistant to changing their regional hubs, can be offered much larger scale based out of India, given its fleet growth (-2500 by FY40) & thus be incentivized to set up value-added facilities here. Lead interest from anchor investors, as outlined earlier in this paper, can help build confidence and stability, even as bases shift.

4.4. Manpower

Industry & academia need to work jointly to create a pipeline of high-quality talent across levels – from high tech (engineering colleges) to blue collar (ITI). Moreover, major players need to ensure adequate pay for technicians to ensure lower churn towards higher-paying opportunities overseas.

Table 2Benefits of Partnership Models

Partner Stakeholder	Capability development	Transfer of technology for long-term	Assured volumes	Real-time data tracking & predictive maintenance	Support in manpower development	Regular capability updates for new aircraft/ engines
OEM	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark
Airlines	~		✓	\checkmark		
Global MRO players	\checkmark	\checkmark			~	

Multiple models can be explored for training and skill upgradation. Industry can foster creation of customized curriculum at vocational training institutions, working with ITIs. Joint skilling cum internship programs can be conceptualized for hands on training and education. Joint skill development programs can be conceptualized along with NSDC and rolled out at scale. With a growing edtech sector, digital skilling in the form of MOOCs (Massive Open Online Courses) can also be conceptualized and deployed at a large scale.

In Western geographies (UK and Germany), training cum apprenticeship programs have been set up by leading MRO players (e.g. Airbus, Lufthansa Technik) for college students/fresh graduates to attract young talent into the workforce and invest in their skills accordingly. Indian players should consider creating such programs for strengthening their talent pipeline.

4.5. Policy

While multiple policy initiatives have been taken to give this sector a boost, there is scope for additional policy interventions to further improve the attractive-ness of the industry such as –

- Extension of import embargo to defence MRO
- Establishment of clear regulations around customs duties & GST to be levied on imports of spare parts & ensure uniformity in implementation
- Offering tax credit to MRO providers on reinvestment of funds

5. Strategic Imperatives for Growth: Lufthansa Technik Case Study

Lufthansa Technik (LT) is one of the world's leading providers of technical aircraft services for commercial and VIP/special mission aircraft. Headquartered at Hamburg Airport, Germany, its workforce of 22,000 serves more than 800 customers and 4,500 aircraft under exclusive contracts worldwide.

LT was hived out of Lufthansa in 1996 as a dedicated group company providing MRO services for aircraft, engines, and components. LT rapidly grew in the 90s (refer Figure 8) with a winning value proposition of tailor-made solutions (including engineering and logistics services), guaranteed short production and minimal delivery times.

As Lufthansa Technik separated from Lufthansa Group to create it's individual entity due to growing international demand, it also retained the volume of expertise, technology, customers from Lufthansa Group. It's huge and diverse fleet along with numerous flight hour data provided Lufthansa Technik an unparalleled edge against it's competitors struggling to get similar expertise in the highly concentrated MRO market. It's organic growth through multiple strategic partnerships of Lufthansa Group (e.g. STAR Alliance) and joint ventures formed the backbone of its growth and success. Following Lufthansa's example, many airlines converted their in-house maintenance and repair facilities into standalone businesses, resulting in LT facing stiff competition from emerging players in the late 90s. Additional pressure was added on LT by manufacturers extending their own maintenance capacity to be able to offer technical backup services for their products.

During this phase, LT focused on 3 strategic imperatives to protect its market share and continue its path of growth, viz:



Table 3Strategic imperatives of Lufthansa Technik

S.No.	Imperative	Action undertaken by LT
1.	Actively shape the market by introducing new products	Investments in portfolio
2.	Be close to its customers, both in terms of speed and geographic position	Reorientation of operating model and strengthening of capabilities
3.	Limit focus on services that other suppliers can offer at lower cost and the same quality	Provision of value-added services over and above core portfolio

1. Investments in Portfolio

Since its inception, LT has consistently invested over 1.7 EUR Bn in its portfolio to launch new products in the market and grow organically. Additionally, it has also made minor deals in mergers and acquisitions with aircraft/component manufacturers to be able to cater to a broader base of customers and different aircraft makes.

- a. **Organic Launch of New Products** Through a well-resourced, in-house R&D function, LT has consistently launched new products in the market, providing cutting-edge services of their time, such as:
 - i. **Flynet:** Flynet. High-speed broadband internet access via satellite for Lufthansa long-distance flights.
 - ii. Wireless LAN: A wireless network for a wide range of on-board digital applications that do not interfere with the aircraft's navigation systems or flight instruments.
 - iii. **GuideU:** A non-electrical luminescent floor guide to emergency exits.
 - iv. NICE (Network Integrated Cabin Equipment): non-wired network for cabin

management and in-flight entertainment systems. It also has interfaces for external communications systems.

- v. **ARP (Advanced Recontouring Process):** A unique process in which an industrial robot analyses the defective leading edge of an engine blade before polishing it back to an optimum profile.
- b. Inorganic M&A / JVs: To expand its portfolio and presence across the MRO value chain, LT has made strategic M&A deals in the past with aircraft and component manufacturers, such as:
 - i. Lufthansa Bombardier, 1997: Joint venture with LT, Bombardier Aerospace, and Execujet Aviations to provide MRO services to business jet customers
 - ii. Spairliners, 2005: Joint venture with LT and Air France to offer comprehensive component support solutions for A380 and Embraer E-170/175 and E-190/195 operators
 - iii. Heico Aerospace, 1997: Acquisition of an aviation electronics company for \$26 Mn to accelerate development of additional FAA-approved replacement parts for jet engines

Figure 7 Lufthansa Technik Y-o-Y Capital Expenditures

(in EUR Mn) 313 244 233 194 152 136 118 111 95 65 49 11 2000 2006 2007 2013 2014 2017 2018 2019 2020 2021 2001

Sources: Annual reports

iv. Hawker Pacific Aerospace, 2002: Acquisition of an aircraft landing gear components manufacturer for \$9.3 mn

2. Operating Model Reorientation & Capability Enhancement

(1) Reorientation of Operating Model

To be able to be positioned physically closer to global customers and serve them at a best-in-class turnaround time, LT reoriented its operating model by going in for strategic partnerships with OEMs – either globally or in specific geographies – to be able to serve customers of those OEMs in a better manner:

- a. Honeywell: Global partnership with Honeywell for maintenance of components installed on CFM International's LEAP series engines (used in Airbus A320neo Family, Boeing 737 MAX etc.). Along with ability to serve Honeywell customers faster with ready stock of components, this agreement also helps customers reduce life-cycle costs with more superior servicing
- b. **Meggitt:** Partnership with Lufthansa Technik Shenzhen, LT's partner for China, for the repair and servicing of its fire detector products on Chinese-registered aircraft
- c. **AvAir:** Partnership with AvAir, a leading inventory solutions provider for the aviation aftermarket, to serve markets in Europe and USA, where AvAir has taken over management of spare-parts inventory of 9000+ aircraft components, helping LT optimize inventory at its own warehouses while still maintaining best-inclass service levels with its customers in the aftermarket
- d. **Fokker Services:** Partnership of Spairliners and Fokker to service a variety of line replaceable units (LRUs) related to power generation, bleed air valves, starters and avionics for the Embraer E-Jet Family

(2) Strengthening of Capabilities

To support its growth trajectory, LT invested extensively in its human resource and technological capabilities, viz.:

- a. **Manpower:** To develop and sustain talent, LT has undertaken large-scale training cum apprenticeship programs with college graduates across Europe and in particular Germany. In 2022 alone they recruited 186 apprentices as aircraft mechanics and avionic technicians to serve German airports.
- b. **Technology:** Over the years, LT has developed extensive in-house technological infrastructure, in particular its digital flagship AVIATAR, a cloud-based platform that provides a suite of digital services to LT customers from data monitoring, fault detection, predictive maintenance, to scheduled maintenance. In addition, LT has also invested in Cabin 4.0 technologies that allows linkage of a passenger aircraft cabin with integrated digital products and services, provide landing gear noise reduction, and on-board Internet to enhance the MRO space with new technologies and stay ahead of the curve.

3. Value-Added Services

Over and above the core portfolio of maintenance and repair, LT has become an industry leader in offering value-added services to customers such as:

- a. Aircraft lease return, including contract analysis, planning, lessor handling and MRO coordination
- b. Flight data recorder analysis
- c. Cabin modification, including retrofitting and equipping fleets with high-end connectivity
- d. Aircraft electrical load analysis and consulting

Through these value additions, LT is able to offer a holistic value proposition to its customers, enabling it to become a one-stop shop for all needs the customer has in the market.

Figure 8 Lufthansa Technik Y-o-Y Revenues



Sources: Annual reports

Impact of Growth Imperatives:

Over the years, Lufthansa Technik has emerged as an industry pioneer, introducing technologically-advanced products through R&D investments, inorganic acquisitions, and reorienting its operating model through regional partnerships.

With the advantage of a ready customer base in the captive market provided by Lufthansa and its subsidiary airlines and through successful implementation of its strategic imperatives, LT has been able to grow its topline consistently at a rate of ~8% CAGR per annum (over 1997 to 2019) and is positioned as a market leader in the MRO market.

6. Next steps: Unlocking the \$ 7Bn prize

If the above aspects are addressed in sync, multiple benefits can be unlocked for India in this critical sector. An industry worth \$7 bn can be created which will create a massive employment opportunity in the country with ~25,000 high-value skilled jobs (for instance, global leaders such as Lufthansa Technik had ~21,300 employees in 2021). Further, India will be established as a regional MRO hub catering to other countries in our neighbourhood. Aircraft fleets from SAARC countries like Afghanistan, Bangladesh, Bhutan, Maldives, Nepal etc. can be attracted to fulfill their MRO requirements in India. They have a combined fleet of 200+ aircraft but limited local ecosystem to service their requirements.

The opportunity available to us in aviation MRO is huge, and multiple stakeholders need to come together to realize this opportunity for the country. The time to act is now.

About Adani Defence & Aerospace

Adani Defence & Aerospace has aligned its vision and roadmap to national requirements thus focusing on future ready technologies of strategic importance for India. Intelligence, Surveillance and Reconnaissance across our land and naval borders would require a combination of unmanned, cyber and satellite technologies; unmanned being an area where Adani has been a pioneer in establishing a robust ecosystem within the country and bringing India on the global map for exports. The counter drone technologies will become crucial to counter the threat of rogue drones.

Being the first private sector company to have set up an end-to-end manufacturing ecosystem of Small Arms including assault rifles, light machine guns, sniper rifles, carbines and pistols, the company is transitioning from manufacturing to design of next generation technologies integrating Artificial Intelligence and Machine learning into our weapons. Small calibre, medium calibre and large calibre ammunition coming up in South Asia's largest ammunition complex being setup by Adani Defence.

Working closely with DRDO, Adani has been able to industrialize design & prototypes into tested products across Long-range guided bombs, Unmanned launched precision guided missiles, VSHORAD which successfully cleared the control flights recently, and the NGARM.

Aircraft MRO is the new niche of industry Adani is making its strong presence in. There is a demonstrated capability to handle major maintenance requirements of commercial aircraft, business jets, Defence aircraft and helicopters under multiple global approvals across 27 locations in India.

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