

Altitude Shift: Building India's Aerospace Stack

Global Supply Chain Re-Architecture Driving India's Growth

Sensex : 81,666
Nifty : 25,088



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01



Executive Summary

Global Supply Chain Re-Architecture Drives India's Growth

India's Emergence as a Structurally Relevant Node in Global Aerospace Supply Chains

Large, Visible, and Durable Demand Backdrop

Manufacturing Penetration Remains Structurally Low

Global Aerospace Supply Chains Remain Structurally Constrained

OEM Sourcing Strategy Structurally Shifting

India Emerging as a Preferred Secondary Manufacturing Hub

Supply-Constrained Segments Create Asymmetric Opportunity

Engines

- ❑ Next-generation engines improved efficiency but introduced step-change complexity
- ❑ Engine supply chains are structurally scarce, with aftermarket linkages
- ❑ Global engine supply constraints are pushing OEMs to accelerate supplier qualification in India
- ❑ Certification, metallurgy, and LLP validation create long-term stickiness
- ❑ Low base and rapid scale-up drive outsized growth

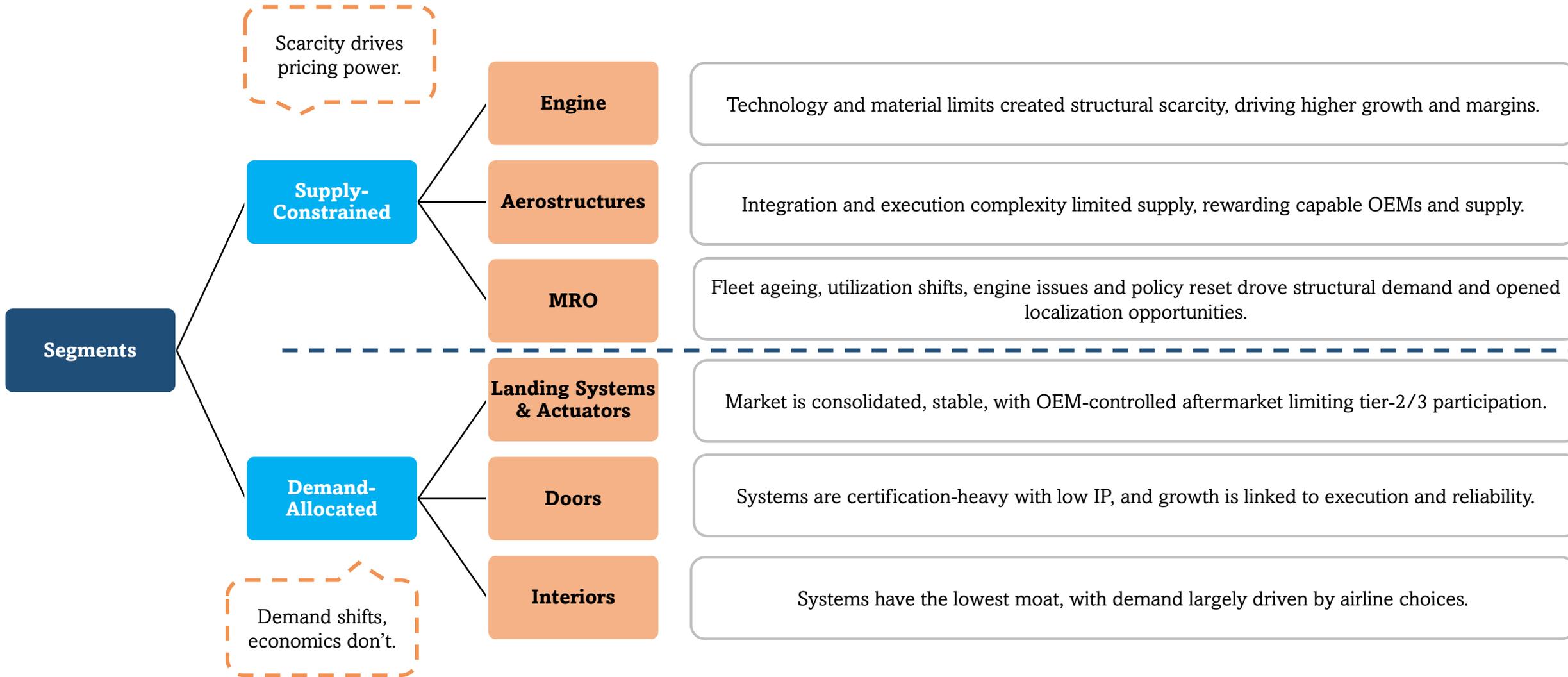
MRO

- ❑ Supply disruptions and engine issues have increased maintenance intensity
- ❑ MRO model is shifting from a traditional hub-based model to a more localized model
- ❑ India still imports ~90% of MRO despite a large, high-utilization fleet
- ❑ Policy reforms have narrowed India's cost and turnaround gap
- ❑ Mix is shifting from line checks to base, engine, and component MRO

Aero Structures

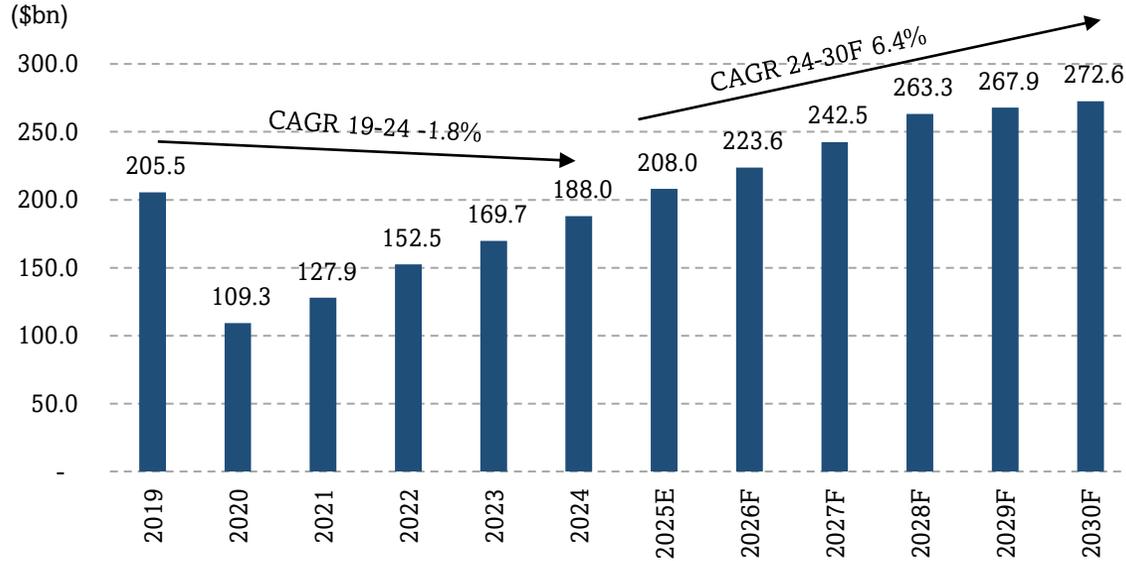
- ❑ Advanced materials reduced weight but increased execution complexity
- ❑ Supply chains consolidated as capable players moved up the value chain
- ❑ Ecosystem shifted from build-to-print to strategic OEM partnerships
- ❑ OEMs are diversifying away from China for IP-sensitive structures work
- ❑ Indian players are moving from Tier-II/III to Tier-I risk-sharing roles

Supply-Constrained Segments Offer Asymmetric Opportunity

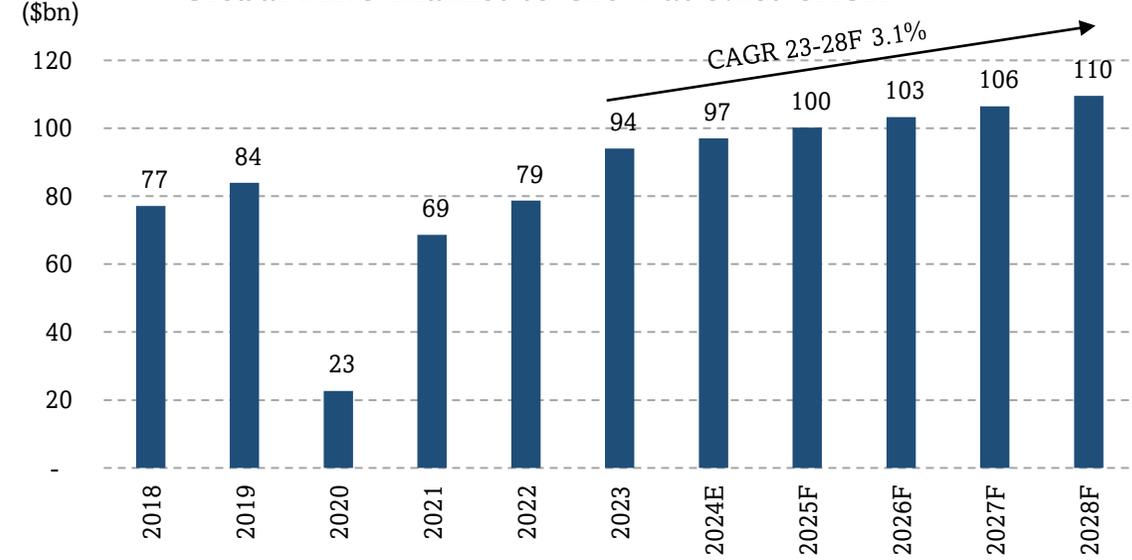


India Aircraft / MRO Growth at ~1.9x/~4.7x Global Rates

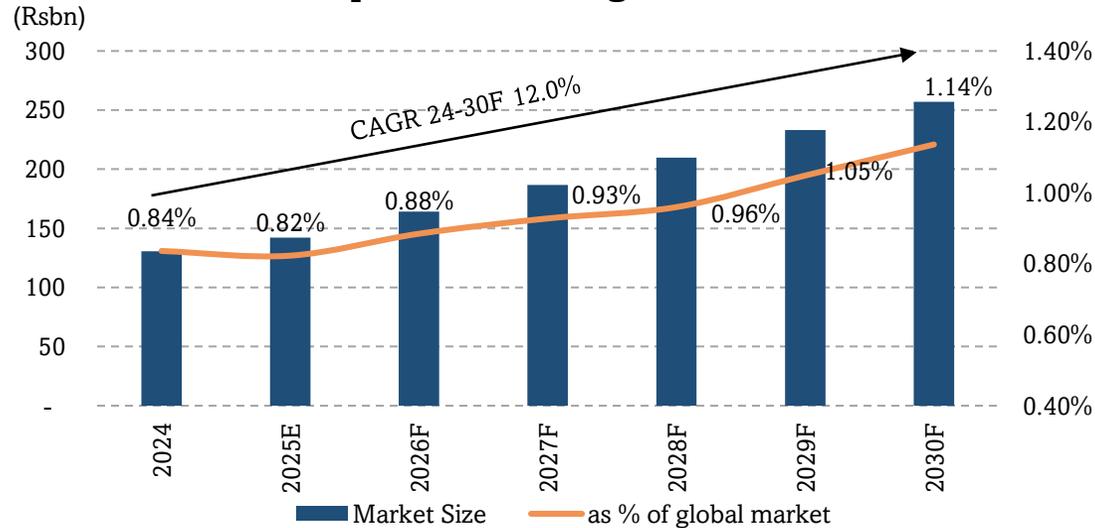
Global Aerospace Market to grow at 6.4% CAGR



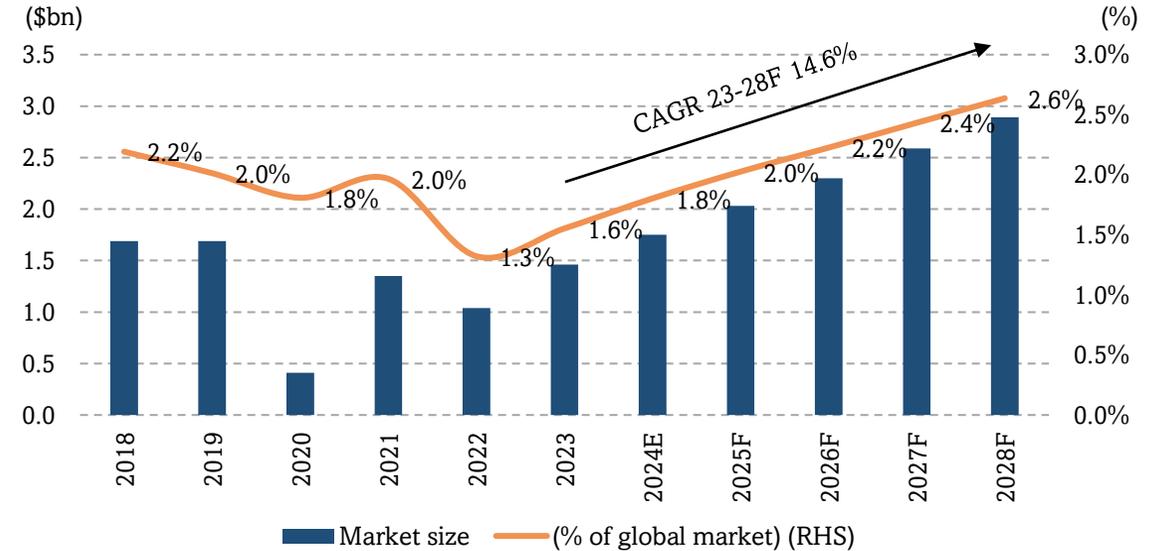
Global MRO Market to Grow at 3.1% CAGR



India Aerospace Market to grow at 12% CAGR



Indian MRO Market to Grow at 14.6% CAGR

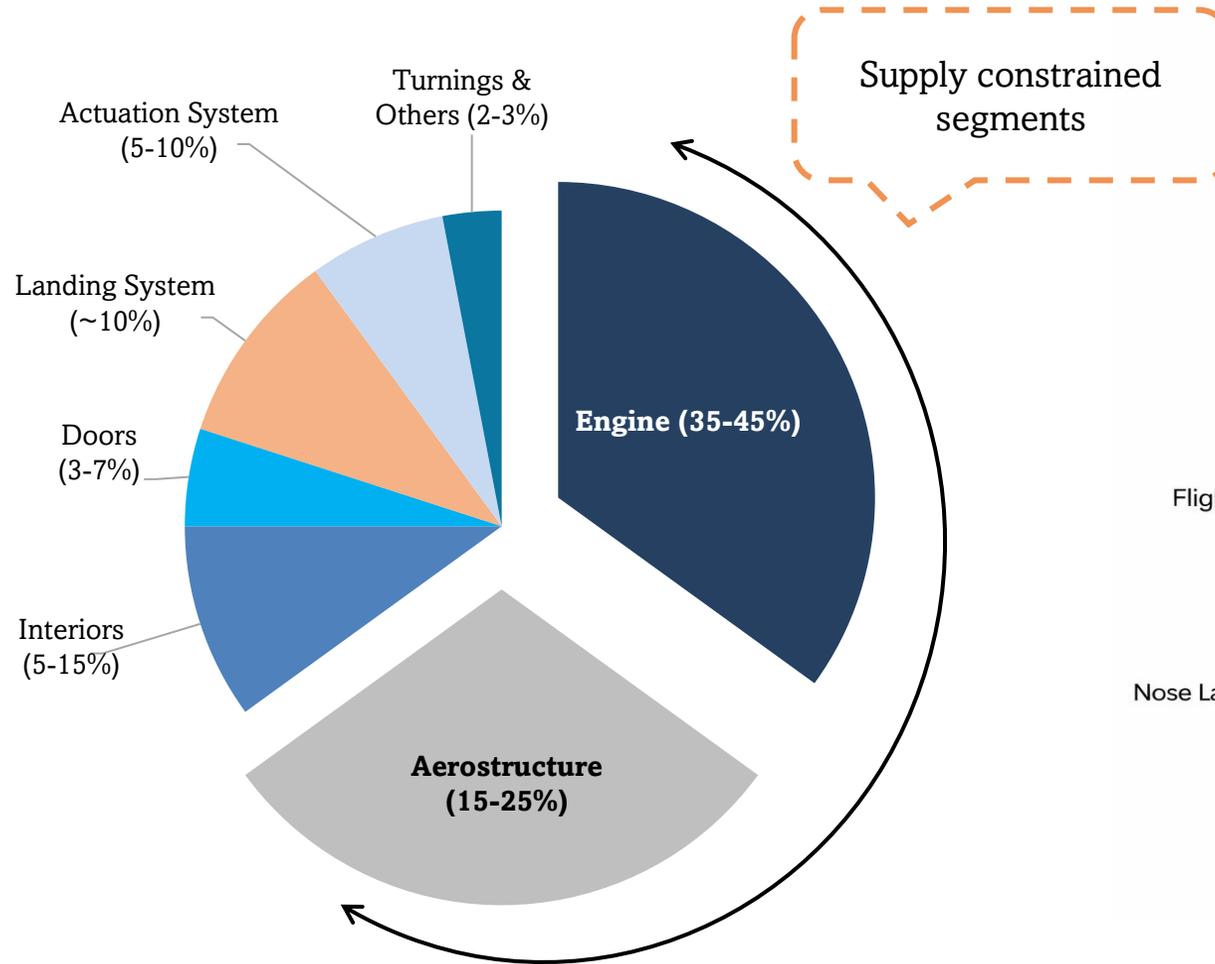


Engines & MRO offer highest growth potential

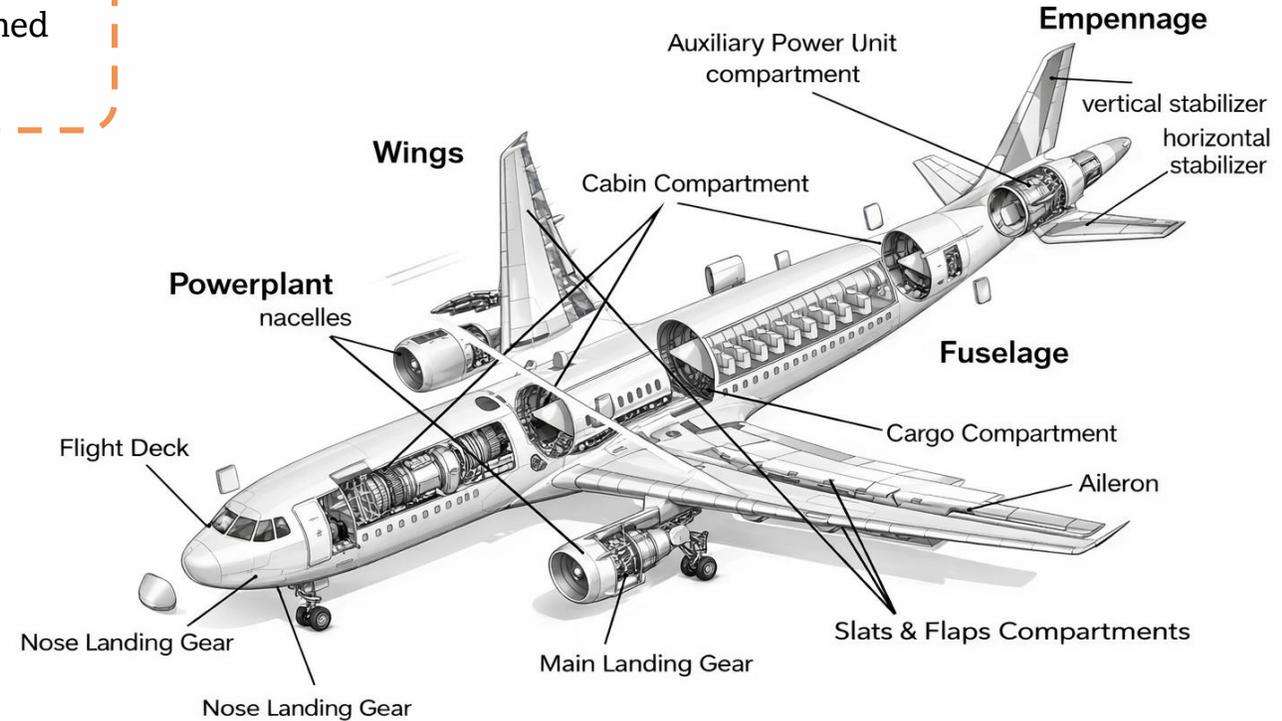
Segment	Global Size (\$ bn)	India Size (Rs bn)	India Share (%)	India CAGR (%)	Growth vs Global (x)	Key Indian Players
Engines	81.8	2.7	0.04%	29.0%	4.5	Azad Engineering, Godrej Aerospace, Aequs Ltd, Tata Advanced Systems, Maini Precision Products (Raymond Ltd), Sansera Engineering
Aerostructures	34.8	54.0	1.82%	11.7%	1.8	Tata Advanced Systems, Mahindra Aerostructures, HAL, Rangsons Aerospace, Aequs Ltd, TAAL
Landing Gears	24.5	20.2	0.97%	12.0%	1.9	Maini Precision Products (Raymond Ltd), Bharat Forge, Tata Advanced Systems, JJG Aero, Samvardhan Motherson, Aequs
Actuators	16.4	10.8	0.77%	13.0%	2.0	Maini Precision Products (Raymond Ltd), JJG Aerospace, Bharat Forge, Sansera Engineering
Doors	10.2	5.4	0.62%	5.6%	0.9	Dynamatic Technologies, Mahindra Aerospace, HAL, Godrej Aerospace
Interiors	16.4	6.7	0.48%	6.7%	1.0	Mahindra Aerospace, Aequs, HAL, Samvardhan Motherson
MRO	97.0	1.8	1.86%	14.6%	4.7	AIESL, Air Works India, GMR Aero Technic, Unimech Aerospace

~50–70% of Aircraft Value Is Supply-Constrained

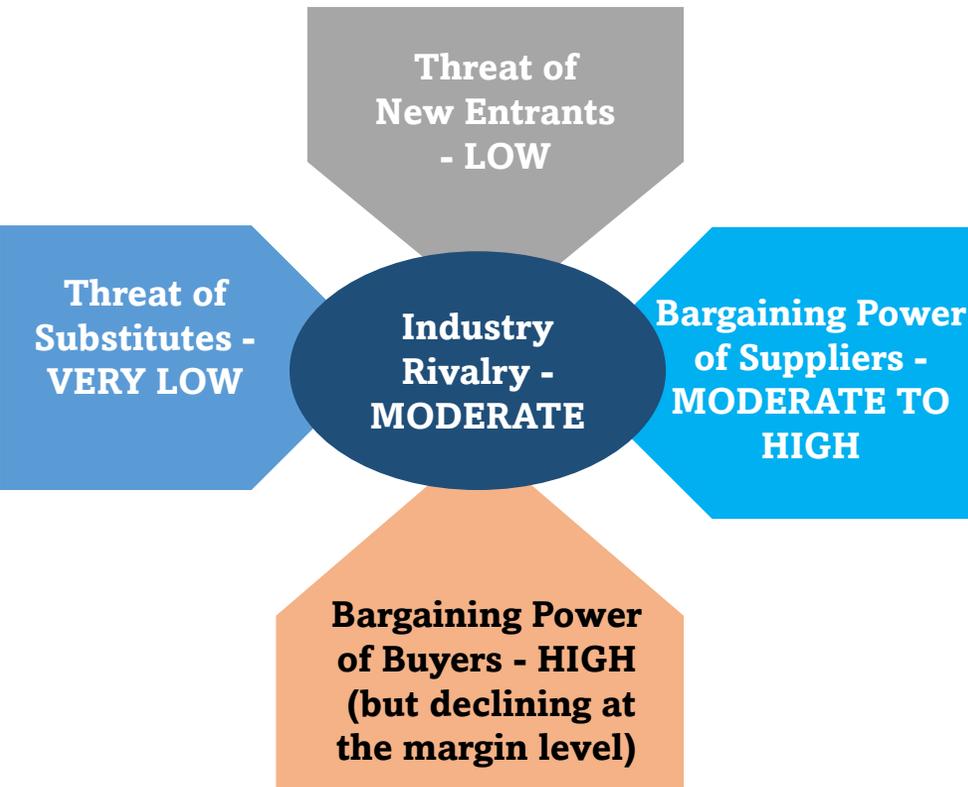
Supply-Constrained Segments Dominate Aircraft Content



Aircraft Sub-systems: Schematic View



Competitive Dynamics: Indian Aerospace Manufacturing



- High upfront capex (5-axis machining, composites and special processes).
- Long certification cycles (AS9100, Nadcap and FAA/EASA approvals etc.).
- Programme-specific qualification creates multi-year entry barriers.
- OEMs strongly prefer incumbents with delivery proven track records.

- Limited global capacity in aerospace-grade Ti-Ni alloys.
- Forging bottlenecks are structural, not cyclical.
- Nadcap-certified special process capacity is scarce.

- Highly concentrated customer base.
- Long-term contracts with periodic repricing.
- OEM control over IP and platform access.
- Current supply-chain stress has shifted leverage slightly towards proven suppliers.
- Qualified suppliers with delivery reliability enjoy better pricing stability.

- No substitute for certified aerospace components.
- Additive manufacturing is complementary, not a substitute.
- Requalification cost makes switching economically irrational.

- Where Competition is NOT High?**
- Competition is constrained by certification, not pricing alone.
 - Programmes are capacity-constrained, not demand-constrained.
 - OEMs actively want more suppliers, not fewer.
- Where Competition Exists?**
- In commoditised aero-structures and build-to-print work.
 - Less so in engines, LLPs and special processes.

02



Global Market Overview

India Emerging as a Key Aerospace Supply-Chain Node

Resilient Demand Amid Repeated Shocks

- Global commercial aircraft demand has remained resilient despite major disruptions such as the GFC and COVID.
- The global fleet is expected to nearly double by 2044, with Asia accounting for a growing share of incremental aircraft demand as traffic, low-cost penetration, and fleet replacement accelerate.

Supply Remains Structurally Constrained

- Aircraft deliveries remain below prior cycle peaks, with 2018 deliveries (1,606 aircraft) yet to be surpassed.
- Structural supply-side issues-aging supplier bases, labor shortages, and fragile Tier-II/III capacity-have tightened output, pushing median order backlog-to-delivery timelines to ~11.3 years versus ~8.4 years in earlier cycles.

Ecosystem Development Shapes Long-Term Participation

- In every major aerospace region, long-term relevance has followed the build-up of local manufacturing and supplier ecosystems.
- In the US, a deep and diversified supplier base has anchored aerospace activity despite cyclical aircraft orders.
- In Europe, coordinated ecosystem formation translated into structurally higher and more persistent ordering.
- In China, deliberate supply-chain embedment reshaped how aircraft orders were allocated over time.
- Together, these cases show that manufacturing depth-not demand alone-drives durable participation.

India Is Entering the Ecosystem Embedment Phase

- India's aerospace manufacturing has evolved from licensed production and offset-led work to scaled private-sector participation across Tier-III, Tier-II, and selective Tier-I roles.
- Capabilities have expanded from basic parts to complex assemblies, engine sub-components, tooling, systems, and MRO.
- With India accounting for ~11–12% of Airbus and Boeing order backlogs but less than 1% of global supply-chain value, the gap points to significant headroom for deeper ecosystem embedment.

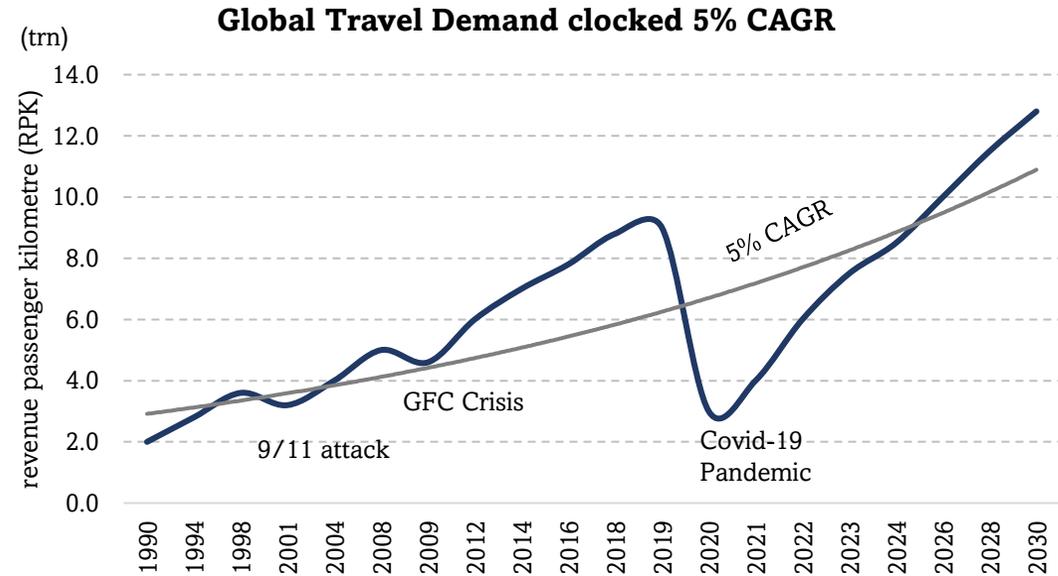
Global Demand Remains Resilient, EM to Propel Growth

Consistently rebounding stronger after every major shock, global air-travel demand has clocked ~5% CAGR since 1990.

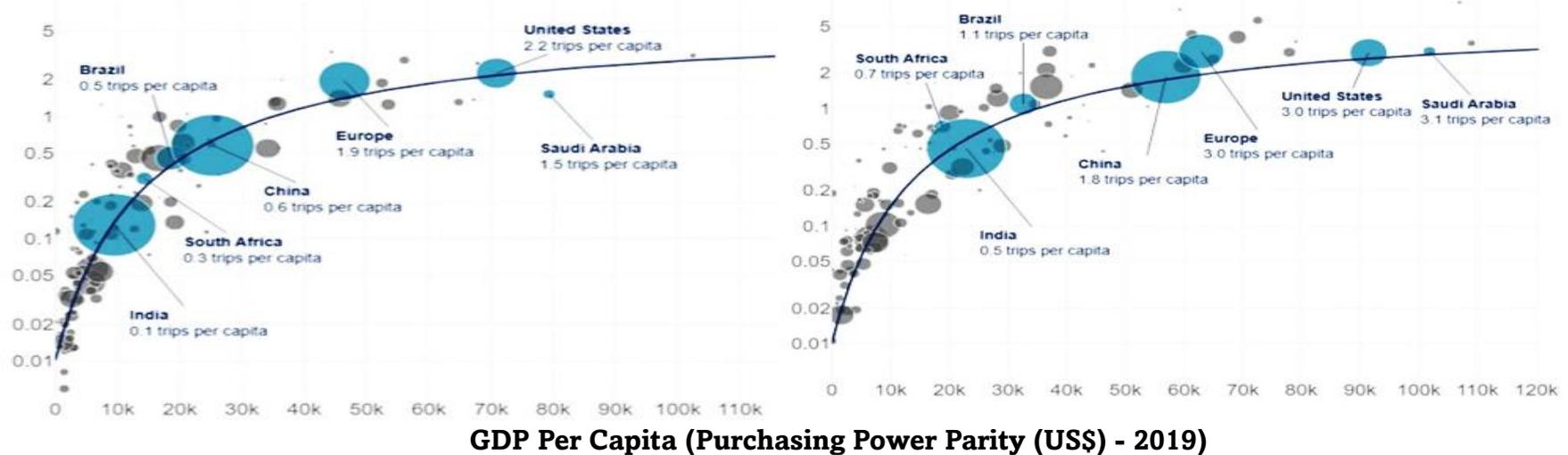
Per-capita trips in the EMs remain highly underpenetrated (India, China & Brazil), offering the largest structural growth runway.

By 2044, the EM trip intensity is likely to grow 2-3x, driving sustained aircraft demand across OEMs, engines, and MROs.

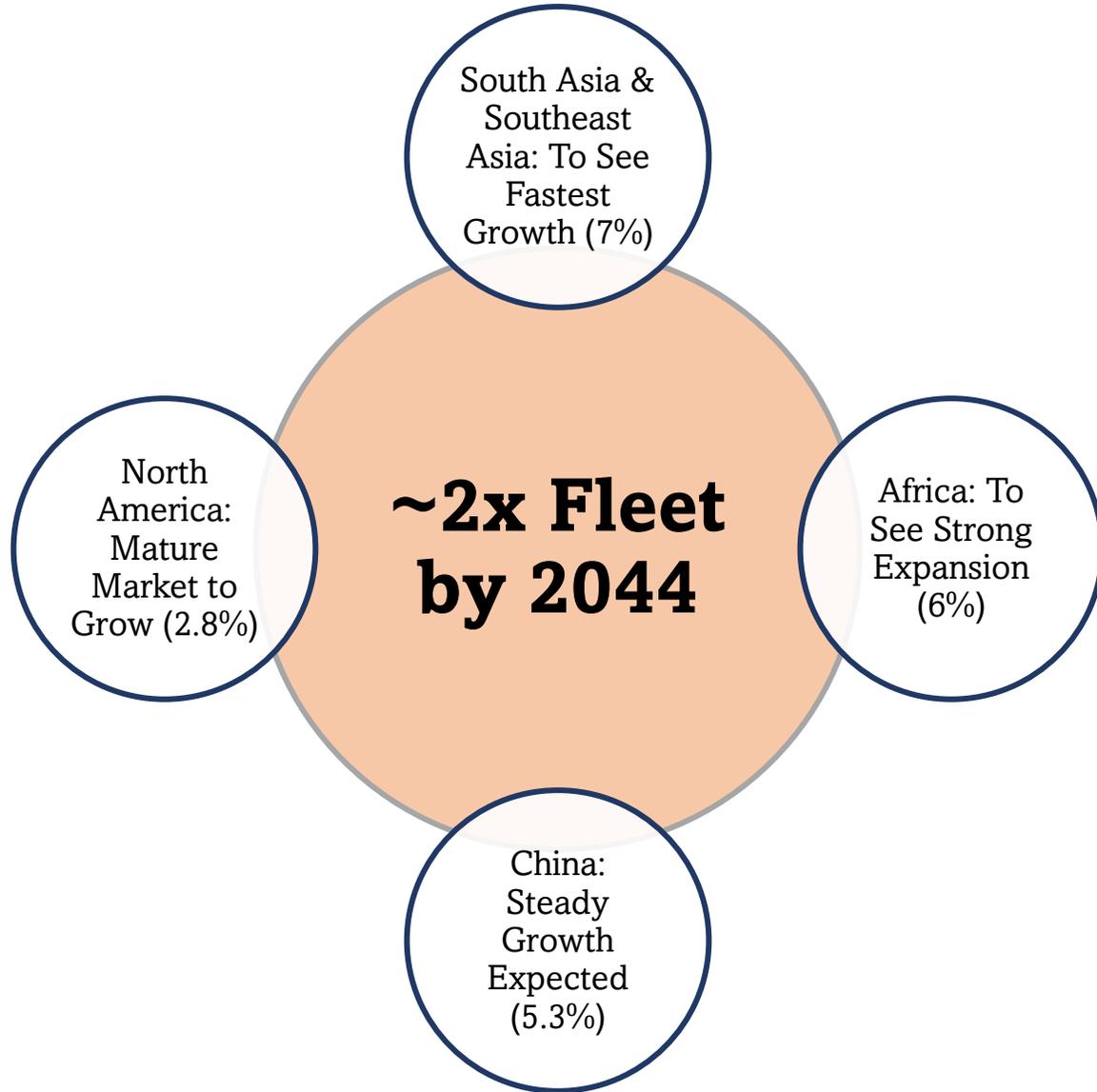
This creates a multi-decade, high-visibility growth cycle for the global aerospace ecosystem.



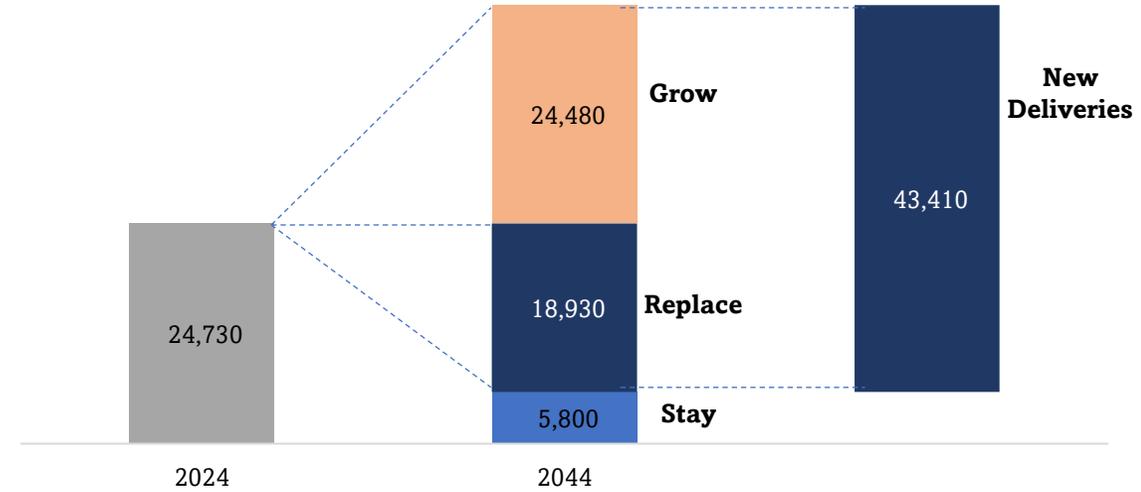
India yearly trips/capita expected to rise 5x to 0.5 by 2044



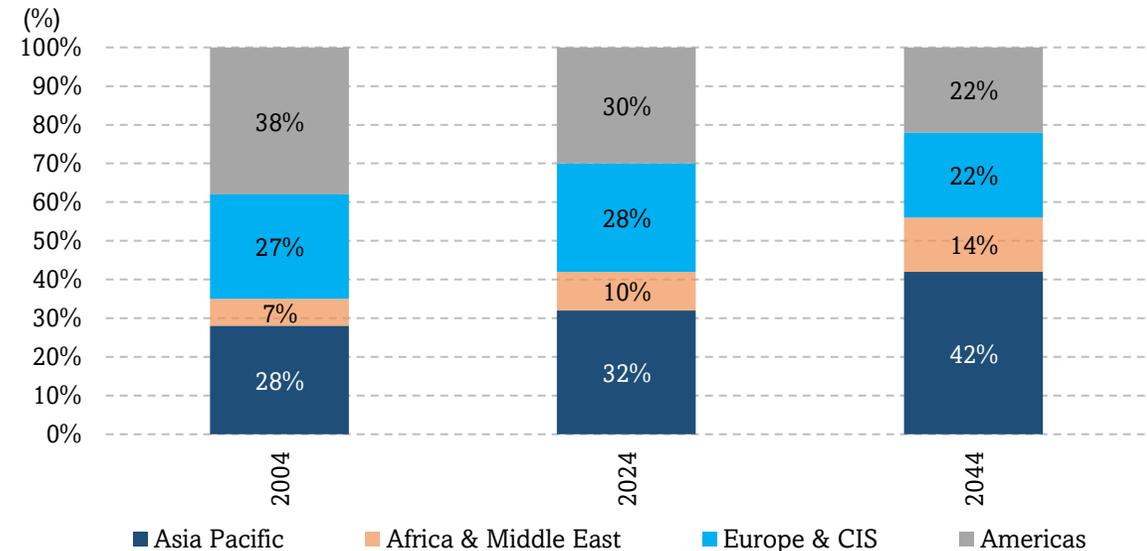
Global Fleet Set To Double, Asia at the Forefront



Fleet to grow 2x by 2044



Asia region share to rise to 42% by 2044 vs 32% currently



Demand Outpacing Deliveries, Backlogs Building

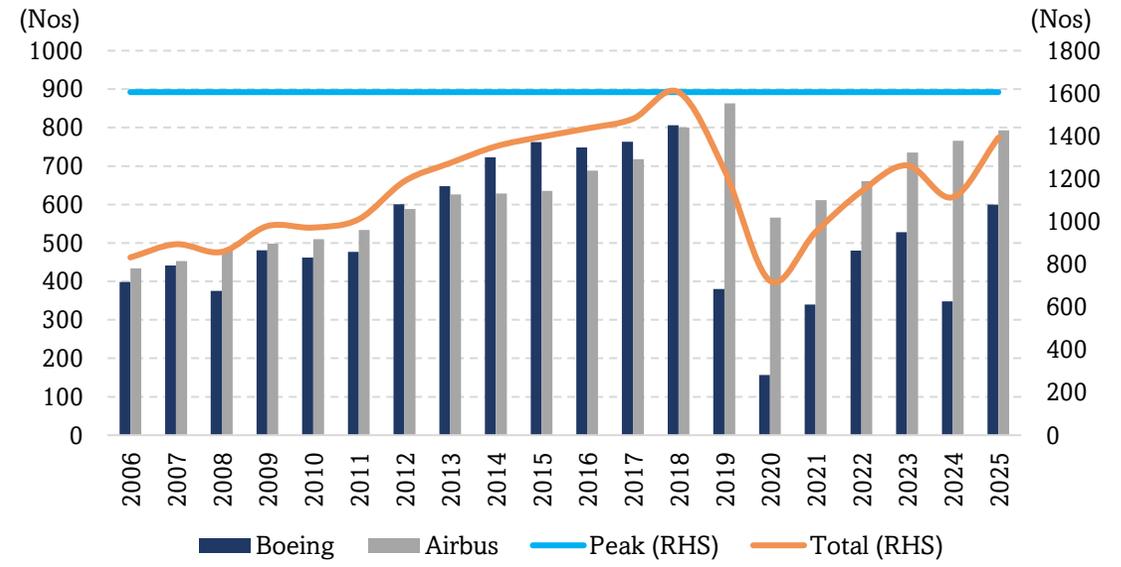
While demand for commercial aircraft remains robust, deliveries and production have not kept pace given ongoing supply-chain constraints.

Boeing's output has been significantly hampered after production caps and regulatory scrutiny post 737 MAX incidents, limiting its ability to ramp deliveries.

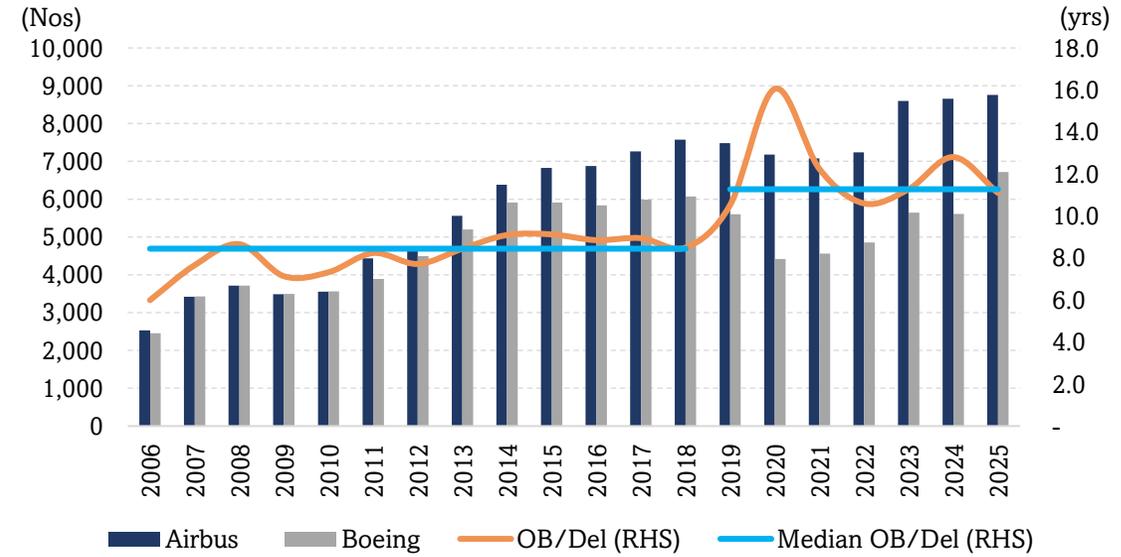
Airbus has faced its own challenges, largely driven by persistent supply-chain bottlenecks across Tier-II and Tier-III vendors, slowing recovery despite strong demand visibility.

This has driven a sharp rise in industry-wide order backlogs with median book-to-delivery rising to ~11.3yrs post-2019 from ~8.4yrs pre-COVID level

Delivery peaked at 1606 aircrafts in 2018



Median OB/del rose to 11.3yrs vs 8.4 yrs earlier



Source: Airbus and Boeing Reports, Anand Rathi Research

US: Cyclical Orders Anchored by a Deep Supply Chain

Early Innovation & Market Formation (1900s–1930s)

- Early OEMs such as Boeing, Douglas, Curtiss, and Lockheed drove breakthroughs in metal airframes, monoplanes, and propulsion, establishing the US as the global center of aviation innovation.

Scale-Up Through War and Domestic Demand (1930s–1940s)

- A growing domestic market and WWII production scaled aircraft manufacturing rapidly, creating a deep, multi-tier supplier base across structures, engines, materials, and avionics.

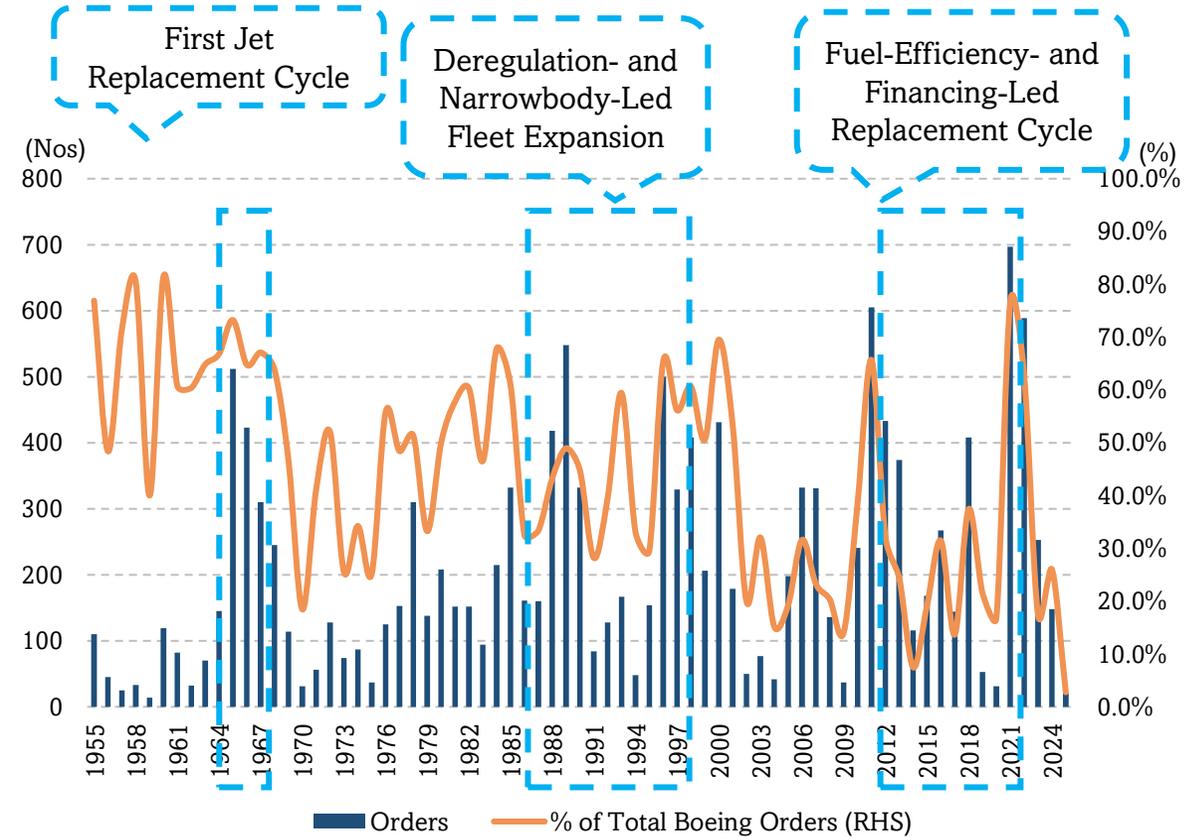
Technology Flywheel & Industrial Deepening (1950s–1970s)

- Cold War defense and space spending accelerated advances in jets, avionics, and electronics, embedding IP, certification depth, and technical leadership across the supply chain.

Consolidation into a Mature Ecosystem (1980s–2000s)

- Heavy federal funding for jets, avionics, space systems and missiles created a powerful R&D flywheel; OEMs accumulated deep IP across propulsion, aerodynamics, and electronics.

Technology- and Balance-Sheet-Led Order Cycles



US aircraft orders cycle with technology and airline economics, but a deep supply chain anchors long-term production.

Europe: Structural Orders Driven by Ecosystem Formation

Early Manufacturing Advantage (1900s–1918)

- France, the UK and Germany led early aircraft manufacturing, supported by strong industrial bases and engineering depth.

Civil Aviation Network Build-Out (1920s–1930s)

- Carriers like BOAC, Lufthansa and Aeropostale built structured long-haul networks that professionalized and scaled civil aviation across Europe and its colonies.

State-Backed Reconstruction & R&D (1945–1965)

- Post-war rebuilding relied on government funding, national champions, and university-linked R&D to restore aerospace capability.

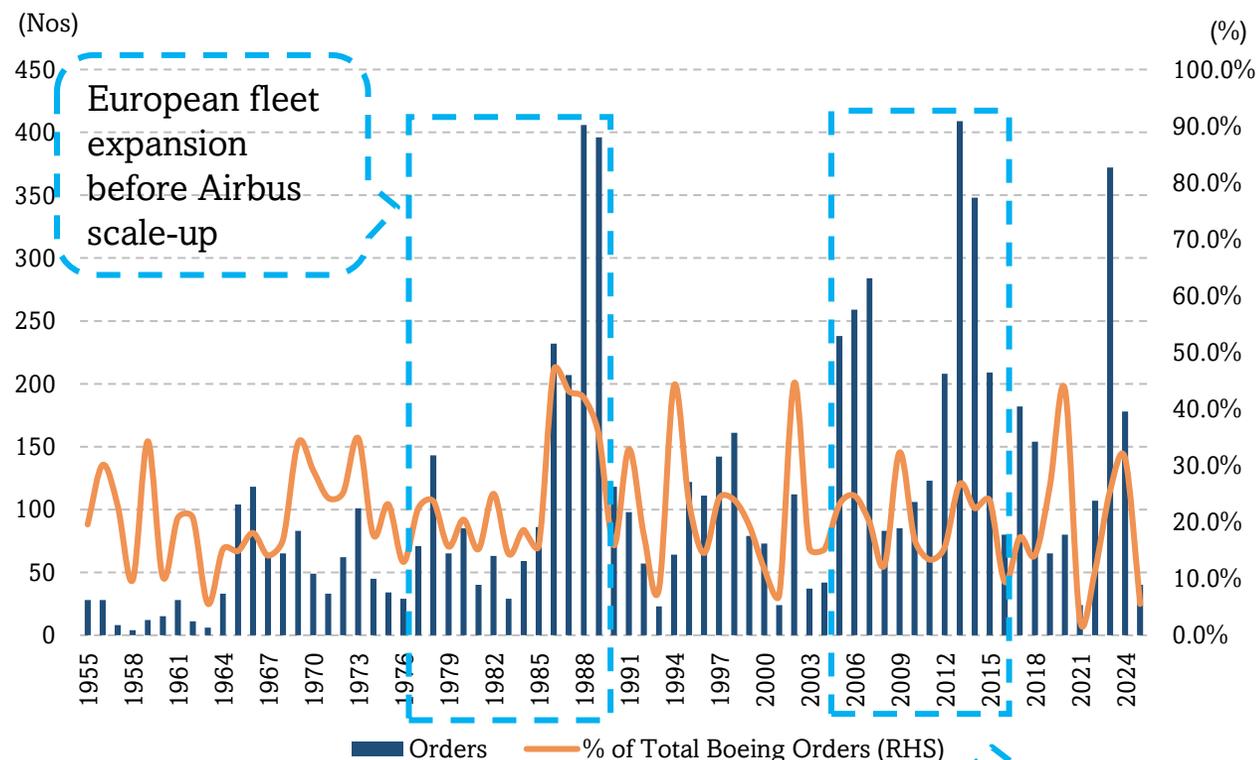
Airbus as a Structural Reset (1970–1972)

- Fragmented national OEMs were consolidated into Airbus, pooling capital and R&D to challenge US dominance.

Global Supplier Champions Emerge (1980s–Present)

- Europe built world-class Tier-1s across engines, avionics, landing gear and systems (e.g., Rolls-Royce, Safran, Thales, Liebherr), anchoring a resilient and globally embedded supply chain.

Structural Order Step-Up Post Consolidation



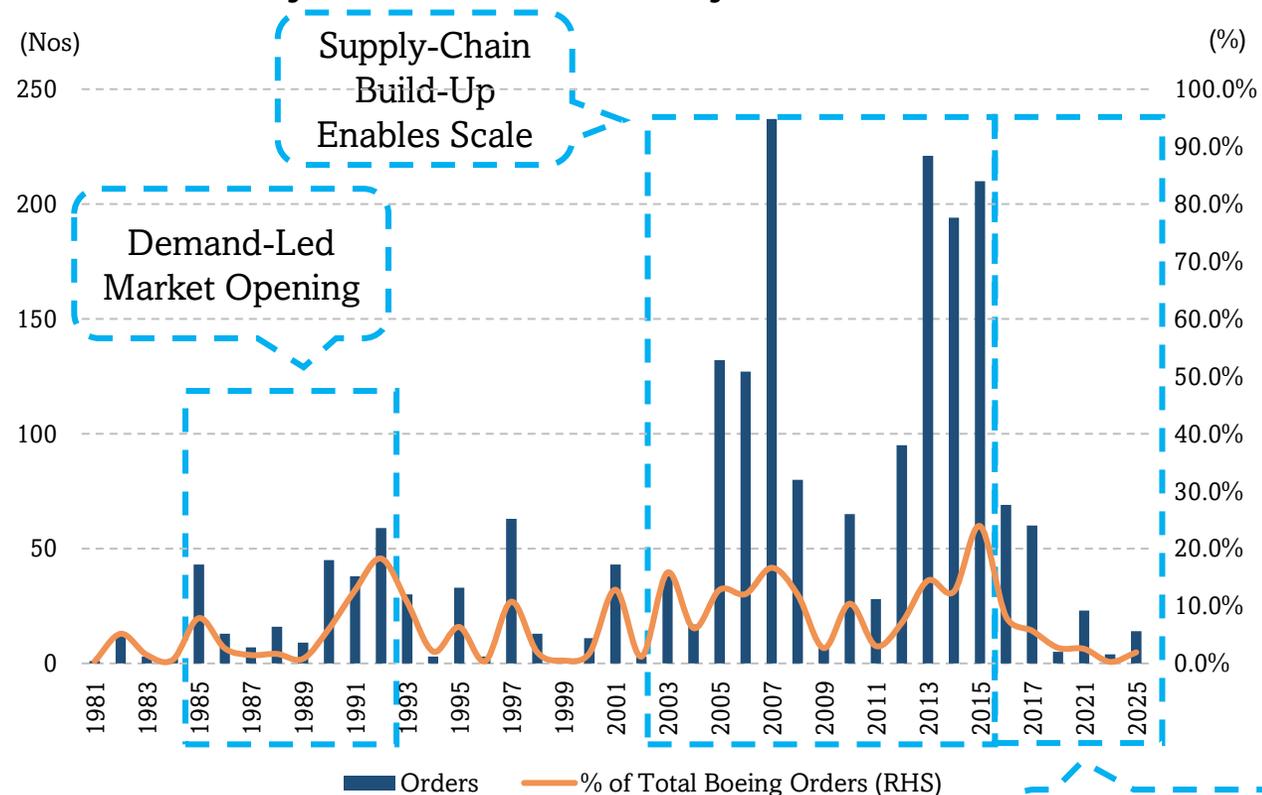
As Europe built a coordinated industrial ecosystem, aircraft orders shifted from cyclical spikes to sustained demand.

Low-cost carrier-led narrowbody expansion

China: Order Cycles Shaped by Strategic Ecosystem Embedment

<p>State-led Beginnings (1950s-70s)</p>	<ul style="list-style-type: none"> Aviation industry built around military production; licensed Soviet designs laid initial capability.
<p>JV Phase (1980s-90s)</p>	<ul style="list-style-type: none"> Partnerships with Airbus, Boeing, and McDonnell Douglas transferred manufacturing expertise into domestic factories.
<p>Rise as a Global Supplier (2000s)</p>	<ul style="list-style-type: none"> China became a major source of aerostructures and components for global OEMs.
<p>Indigenous Programmes (2010s)</p>	<ul style="list-style-type: none"> COMAC's ARJ21 and C919 marked China's entry into commercial aircraft OEM space.
<p>Geopolitical Realignment (2020s)</p>	<ul style="list-style-type: none"> OEMs reducing reliance on China due to IP/geopolitical risks (shifting opportunities to India).

Order Dynamics Shift with Ecosystem Embedment



As China expanded its aerospace supply chain, aircraft orders scaled before later shifting toward Airbus and COMAC.

Strategic Reallocation Towards Airbus & COMAC

India: Ecosystem Embedment Preceding Structural Orders

Capability Foundation & Global Integration (1950s–2000s)

- Defence-led manufacturing and licensed production built aerospace skills and certification discipline, while liberalization and offset policies integrated India into global OEM supply chains-enabling early BTP, precision machining, and composites work.

Private Manufacturing Scale-Up (2005–2015)

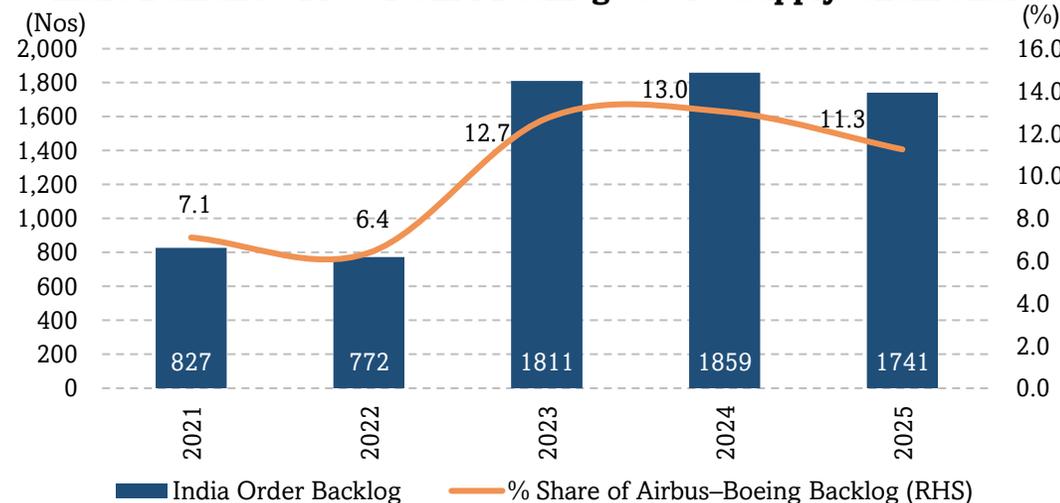
- Offsets and Tier-1 partnerships enabled private suppliers to scale machining, sheet metal, harnesses, tooling, and GSE, with multi-year work packages driven by cost, quality, and talent advantages.

Commercial Embedment & Supply-Chain Realignment (2015–Present)

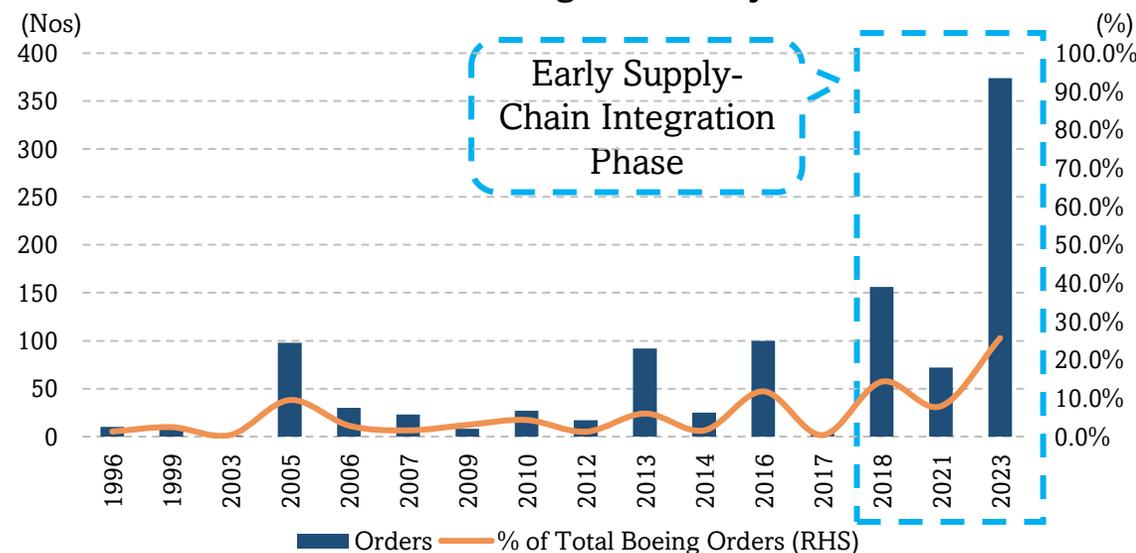
- OEMs expanded engineering, sourcing, and MRO footprints as Indian suppliers moved into complex assemblies, engine sub-components, and selective systems-accelerated post-COVID by global supply-chain stress and China de-risking.

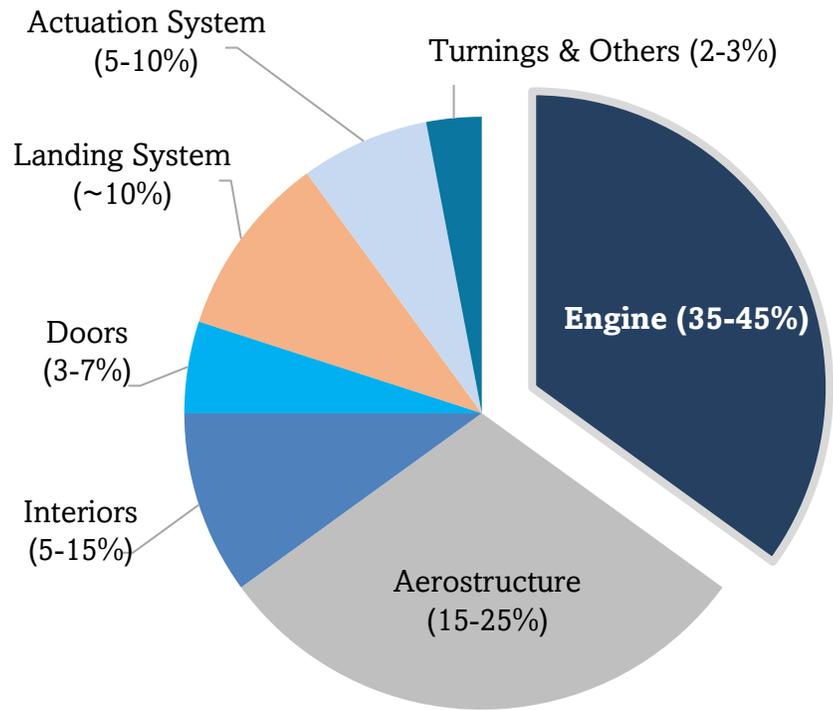
As India becomes embedded in global aerospace supply chains, aircraft orders are rising with improving durability.

India Demand ~11% of OEM Backlog vs <1% Supply-Chain Share



Orders Gaining Consistency





03  Engines

Multi-year Visibility, Scarce Supply, Aftermarket Opportunity



Platform lock-in drives visibility

- Aero-engines are tightly locked to aircraft platforms, with limited scope for substitution once a program enters service.
- Supplier empanelment typically spans the full OEM production run and the multi-decade aftermarket lifecycle, providing durable revenue visibility and lower volatility.

Next-gen engines create scarcity economics

- Next-generation engines introduced step-change complexity in materials, manufacturing, inspection, and certification. In narrowbodies, this transition was rapid and high-volume, exposing bottlenecks early and at scale.
- Widebody engines adopted similar technologies more cautiously, with greater test margins and slower certification.
- Across both segments, this has created a structurally capacity-constrained ecosystem where qualified suppliers are scarce, slow to add, and difficult to replace -supporting strong OEM growth, a larger and longer-duration aftermarket, and sustained pricing power for empaneled suppliers.

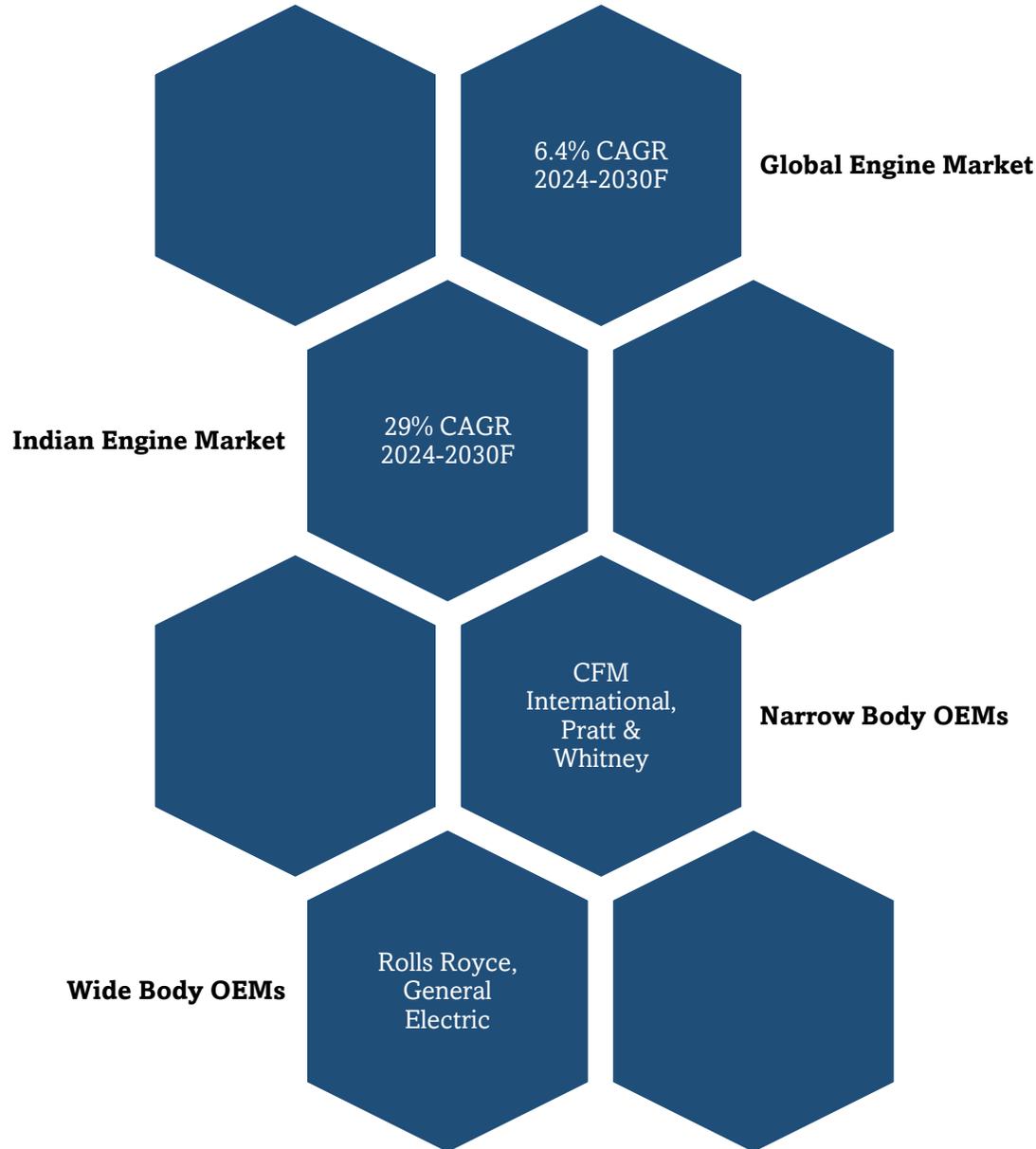
Efficiency-led architectures structurally lift the aftermarket

- These next-generation designs prioritize fuel efficiency and emissions performance through higher operating temperatures, pressure ratios, and advanced materials. While delivering lower fuel burn, they reduce durability buffers and tolerance margins, increasing wear rates and maintenance complexity.
- The result is structurally higher shop-visit frequency and a growing share of lifecycle value shifting from OEM delivery to the aftermarket, relative to prior durability-led engine generations.

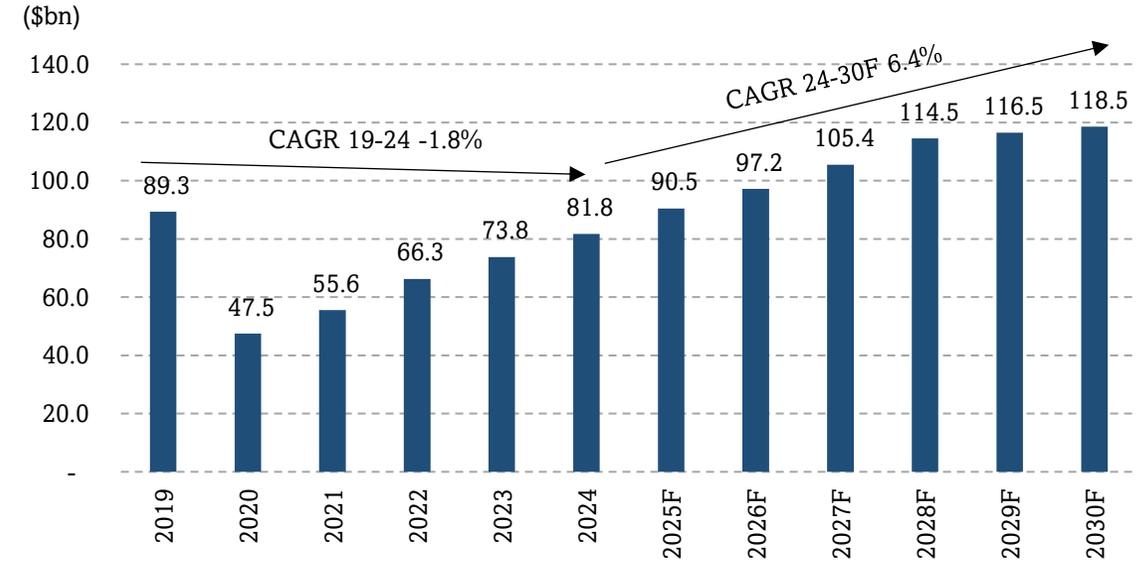
India: scaling Tier-2/3 engine suppliers

- Indian aerospace suppliers are increasingly embedded as Tier-2 and Tier-3 partners in global engine programs, primarily in precision-machined structural and cold-section components.
- While hot-section exposure remains limited, growing certification depth, execution consistency, and cost competitiveness support durable participation across long-cycle platforms and aftermarket flows.

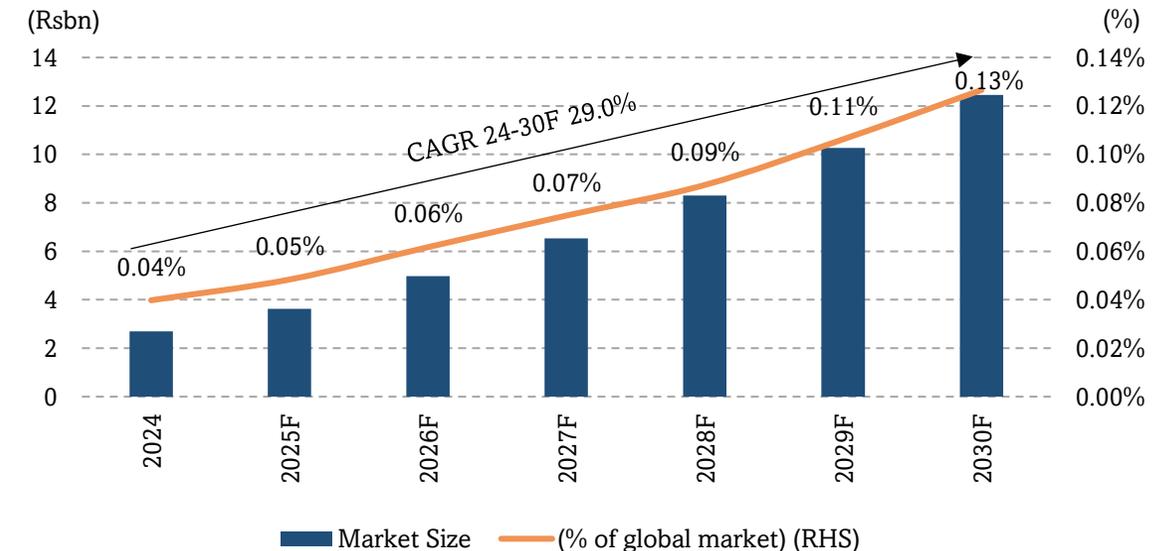
Engines: Indian Market to Grow ~4.5x Global Growth Rate



Global Engine Market to grow at 6.4% CAGR



Indian Engine Market to grow at 29% CAGR

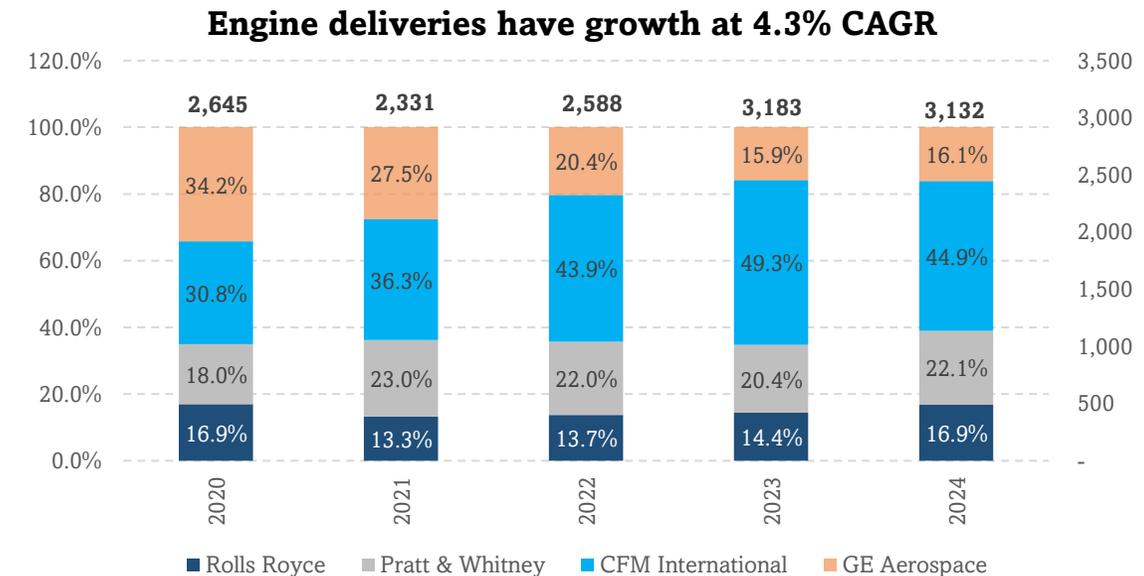


CFM International, P&W dominate engine market

Narrow Body		
Aircraft	OEM	Engines (in service)
A220	Airbus	Pratt & Whitney PW1500G (GTF)
A320ceo Family	Airbus	CFM56-5B (CFM); IAE V2500-A5 (Pratt & Whitney-led JV)
A320neo Family	Airbus	LEAP-1A (CFM); PW1100G-JM (Pratt & Whitney GTF)
Boeing 737 NG	Boeing	CFM56-7B (CFM)
Boeing 737 MAX	Boeing	LEAP-1B (CFM)
Wide Body		
Aircraft	OEM	Engines (in service)
A330ceo	Airbus	Rolls-Royce Trent 700; GE CF6-80E1; PW4000
A330neo	Airbus	Rolls-Royce Trent 7000
A340	Airbus	CFM56-5C; Rolls-Royce Trent 500
A350	Airbus	Rolls-Royce Trent XWB
A380	Airbus	Rolls-Royce Trent 900; Engine Alliance GP7200
Boeing 747-400	Boeing	GE CF6-80C2; PW4000; RR RB211
Boeing 747-8	Boeing	GE GENx-2B
Boeing 767	Boeing	GE CF6-80; PW4000; RR RB211
Boeing 777 (-200/-300)	Boeing	GE90; PW4000; RR Trent 800
Boeing 777X	Boeing	GE9X
Boeing 787	Boeing	GENx-1B; Rolls-Royce Trent 1000

Platform-locked engines underpin long revenue visibility

Narrowbodies drive engine market concentration



Evolution: Performance → Fuel Efficiency

Engine Type Evolution

Operational / Economic Impact

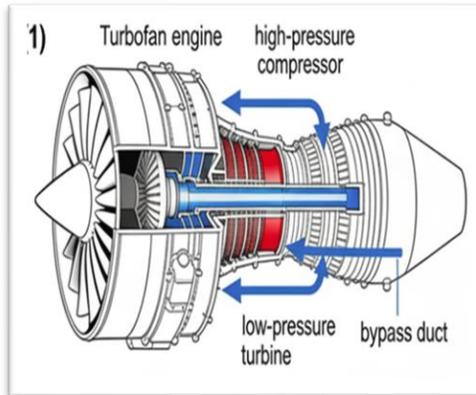
1960s	Piston → Early Turboprop / Low-bypass Turbofan	Enabled jet travel; high fuel burn and maintenance intensity
1970s	Low-bypass → High-bypass Turbofan	Structural fuel-efficiency gains; noise reduction; widebody economics unlocked
1980s	Medium → High-bypass Turbofan (NB & WB expansion)	Reliability improved; longer on-wing life; lower cost per flight hour
1990s	High-bypass Turbofan proliferation	Stable, predictable engine economics; long maintenance intervals
2000s	High-bypass → Advanced Widebody Turbofan	Higher thrust and materials complexity; aftermarket value per engine increased
2010s & onwards	High-bypass → Geared / Advanced Turbofan	Fuel efficiency prioritized over durability; higher MRO intensity and earlier shop visits

Engine design has shifted from durability to efficiency, increasing maintenance intensity and expanding the aftermarket.

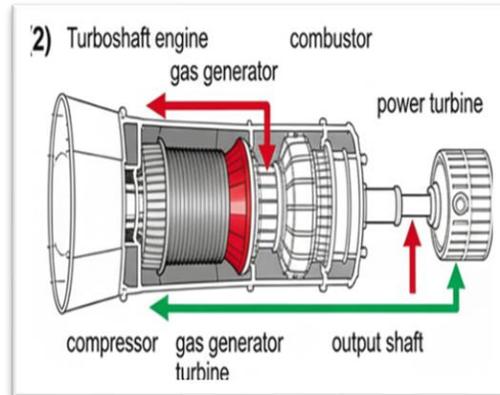
Fuel-Efficient Turbofans: Dominating the Market

Schematic Diagram

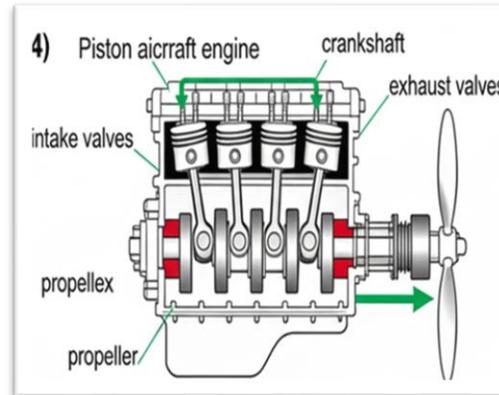
Turbofan



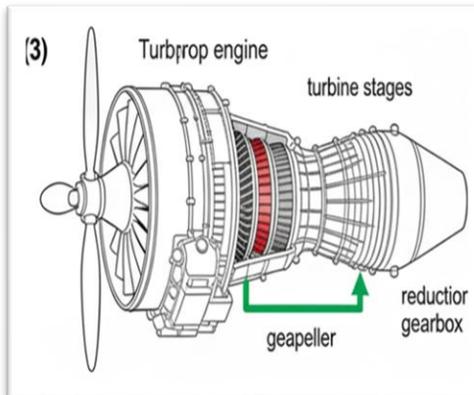
Turboshaft



Turboprop



Piston

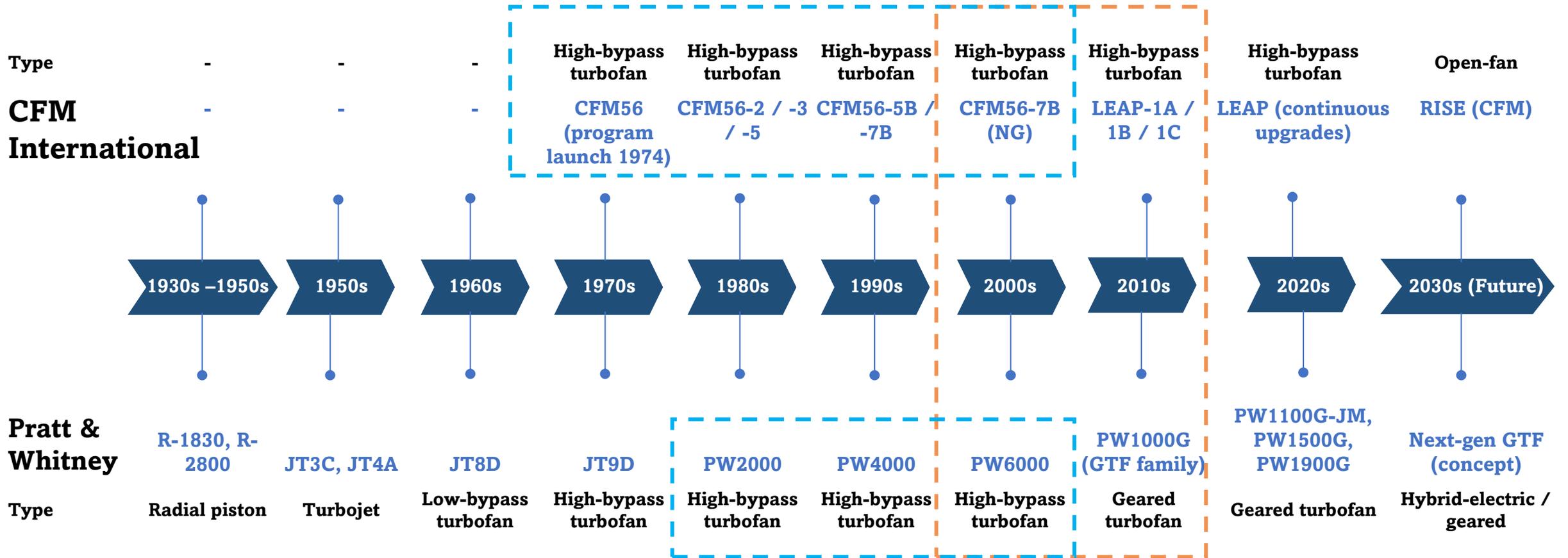


Market Share	65-75%	10-15%	8-12%	10-20%
Fuel Efficiency	Very high	High	High	Moderate
Speed Rate	Mach 0.75 – 0.88 (800–920 kmph)	< Mach 0.3 (depends on rotorcraft)	Mach 0.45 – 0.65 (450–670 kmph)	Mach 0.15 – 0.35 (150–350 kmph)
Altitude Range	30,000 – 41,000 ft	Sea level – 20,000 ft (some military up to ~25,000 ft)	15,000 – 25,000 ft	Sea level – 15,000 ft (some pressurised up to ~25,000 ft)
Noise Level	Low , Moderate	Moderate	Moderate	Moderate
Application	Commercial airliners	Helicopters, some fixed-wing aircraft	Regional airliners, cargo planes	General aviation, training aircraft

Narrowbody Tech Leap: Outpaced Supply Chains

Long engine lifecycles and incremental upgrades support predictable, long-term supplier growth.

The 2010s narrowbody technology leap strained global supply chains.

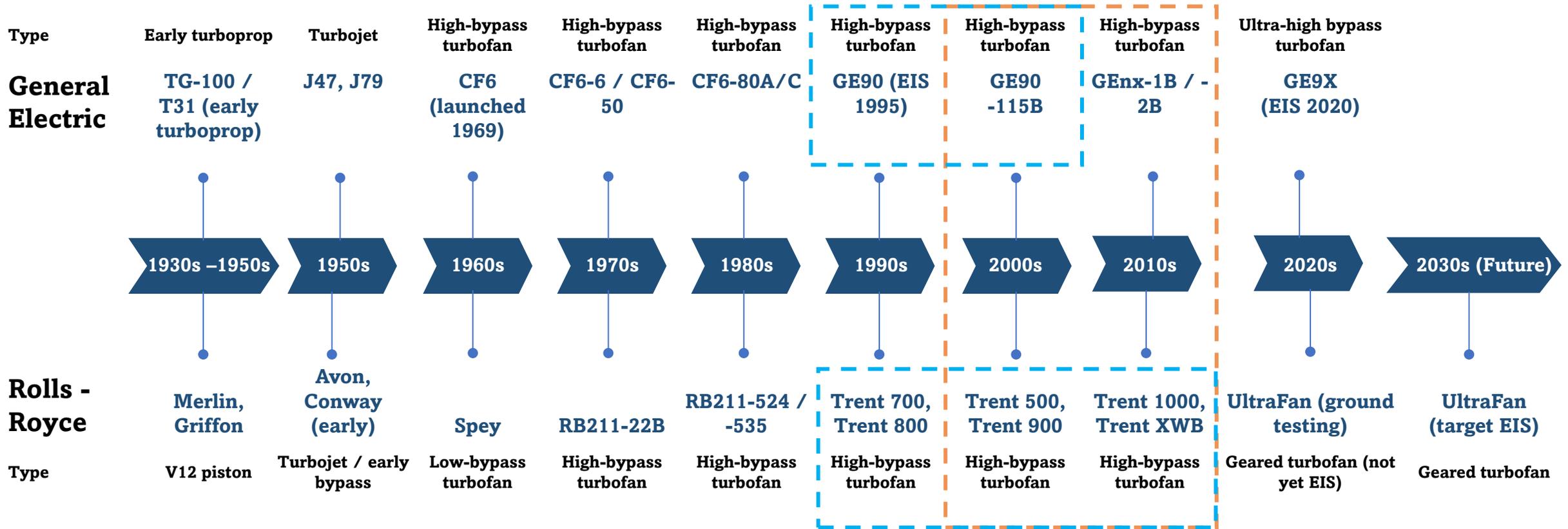


Source: CFM; Pratt & Whitney; Airbus fleet data; airline disclosures; Anand Rathi Research

Widebody Tech Evolution: Selective and Steady

Long engine lifecycles and incremental upgrades support predictable, long-term supplier growth.

The 2010s widebody technology upgrade was selective, keeping supply-chain stress contained.



Next-Gen Engines: Light, Efficient and Sustainable

1

- Ceramic Matrix Composites (CMC)
- Additive Manufacturing (3DPrinting)

Weight Reduction

2

- Open / Unducted Fan (RISE)
- Advanced High-Bypass & Geared Turbofans
- Boundary Layer Ingestion
- Ceramic Matrix Composites (CMC)
- Hybrid-Electric Assistance

Fuel Efficiency

3

- Sustainable Aviation Fuels (SAF)
- Hydrogen Propulsion
- Hybrid-Electric Assistance

Sustainability

4

- Digital Engines & Predictive MRO

Cost & Reliability

5

- Additive Manufacturing (3D Printing)

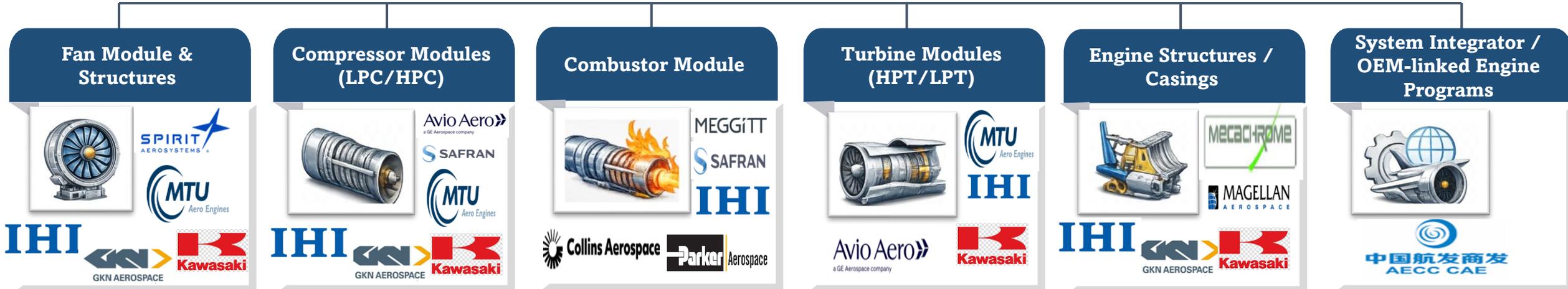
Manufacturing Efficiency

Indian Tier 2/3s: Rising from Capable to Credible

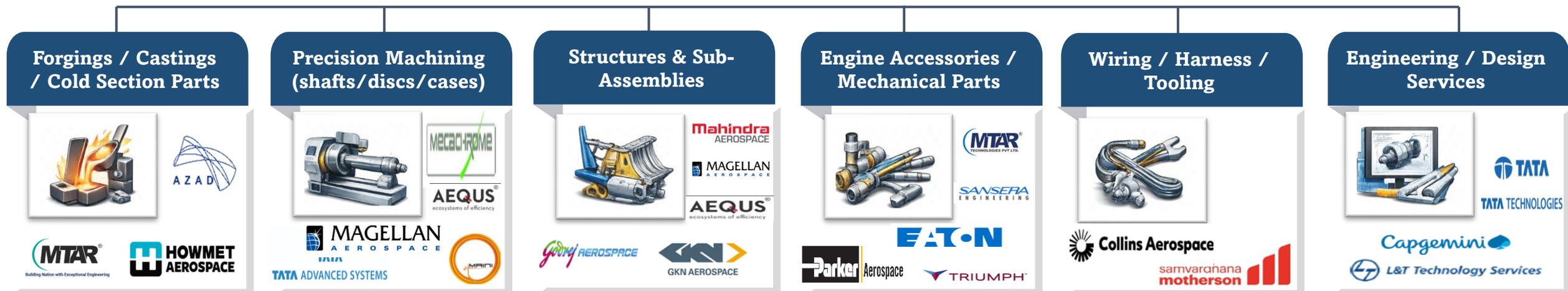
System Integrators (OEMS)



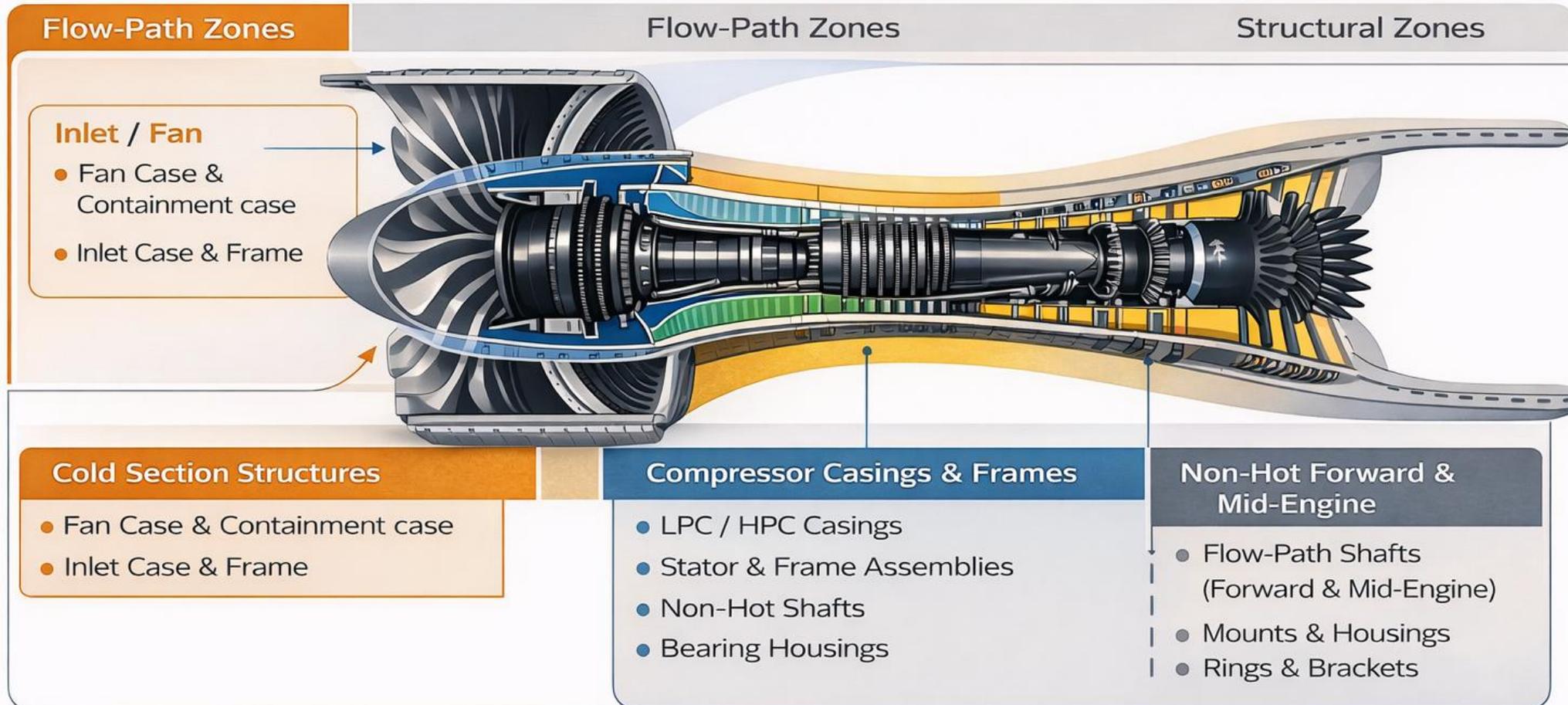
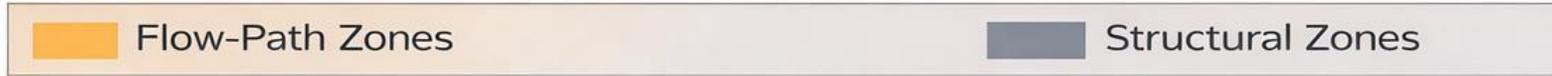
Tier-1: Major Systems Suppliers

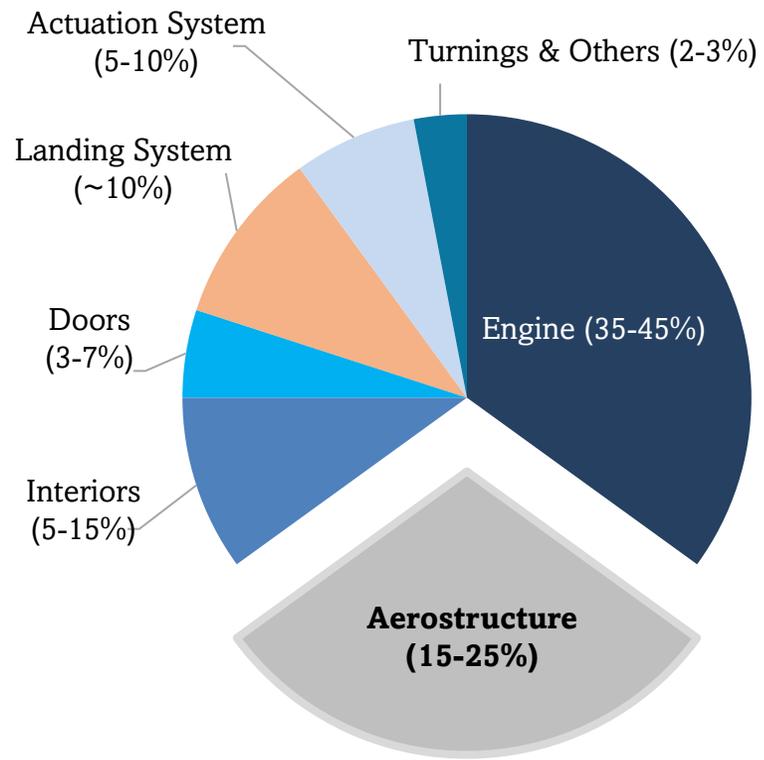


Tier-2: Major Systems Suppliers



Indian Tier 2/3s: Capabilities Across Cold & Structural Sections





04  Aero Structures



Sustained Demand, Execution Limits, Supply Consolidation

OEM-Led Demand, Narrowbody-Driven Volumes

- Boeing and Airbus dominate aircraft production, with multi-year order backlogs providing strong demand visibility. Post-COVID production ramps have been constrained by execution and supply-chain capacity rather than demand.
- Narrowbody aircraft drive the bulk of build rates due to superior airline economics and utilization, making aerostructures a high-volume, rate-sensitive segment where execution capability is critical.

Shift to Composites Raises Execution Complexity

- Aerostructures have transitioned from aluminium to composites to reduce weight and improve fuel efficiency.
- While this delivers clear performance benefits, composites are far more process-driven than metals.
- Manufacturing outcomes are embedded in layup, curing, and bonding, making quality and yield heavily dependent on execution discipline. As composite content rises, execution architecture increasingly determines program outcomes.

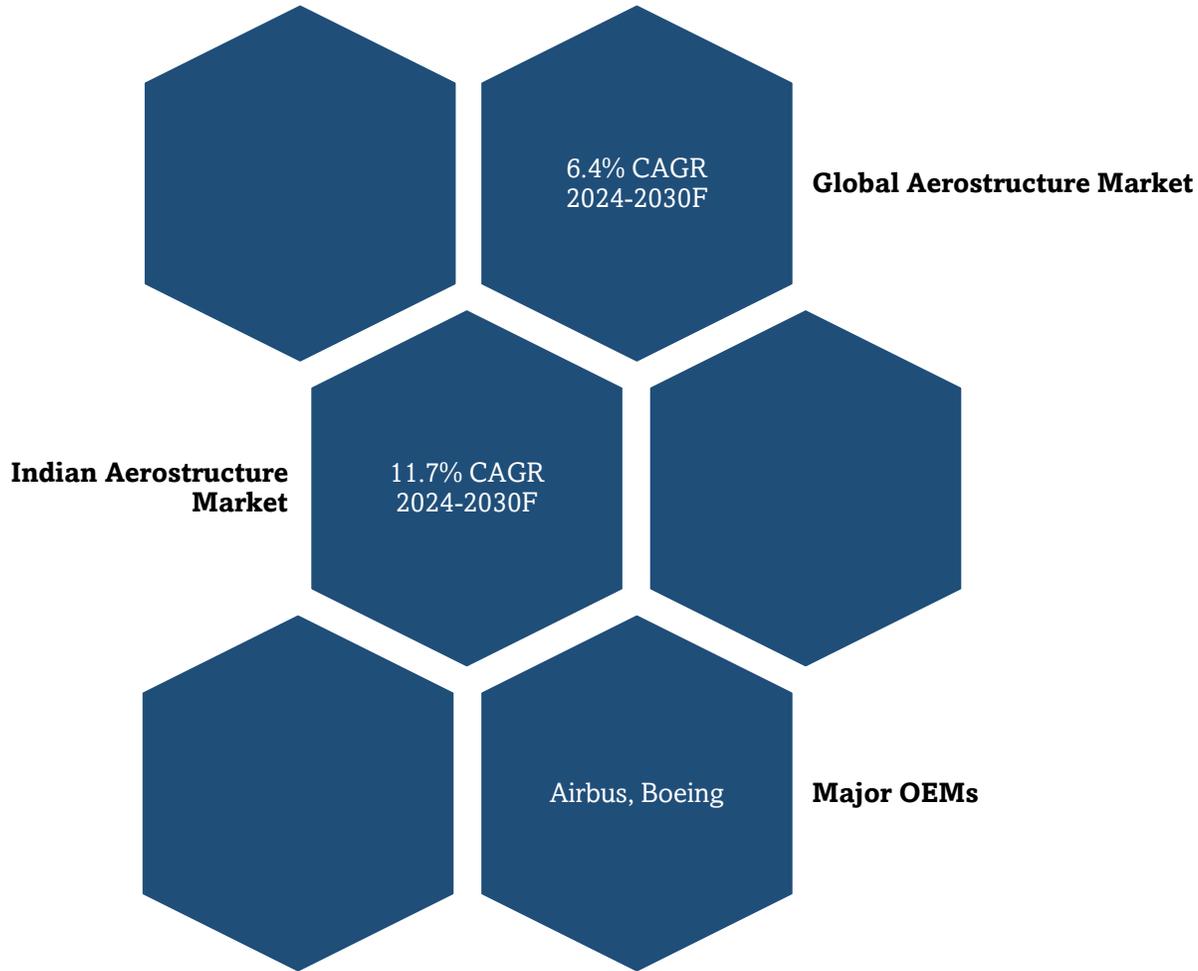
High Rates Amplify Disruption

- Widebody programs such as the 787 and A350 faced early rework as composite structures were introduced, but lower production rates helped contain system-wide disruption.
- In narrowbodies, even with lower composite content, high production rates magnify execution issues and propagate disruption across the supply chain.
- Airbus managed this transition relatively better through cleaner architectures and tighter industrial control, while Boeing's legacy designs and aggressive outsourcing exposed greater fragility.
- These pressures have accelerated supplier consolidation and increased work-scope concentration.

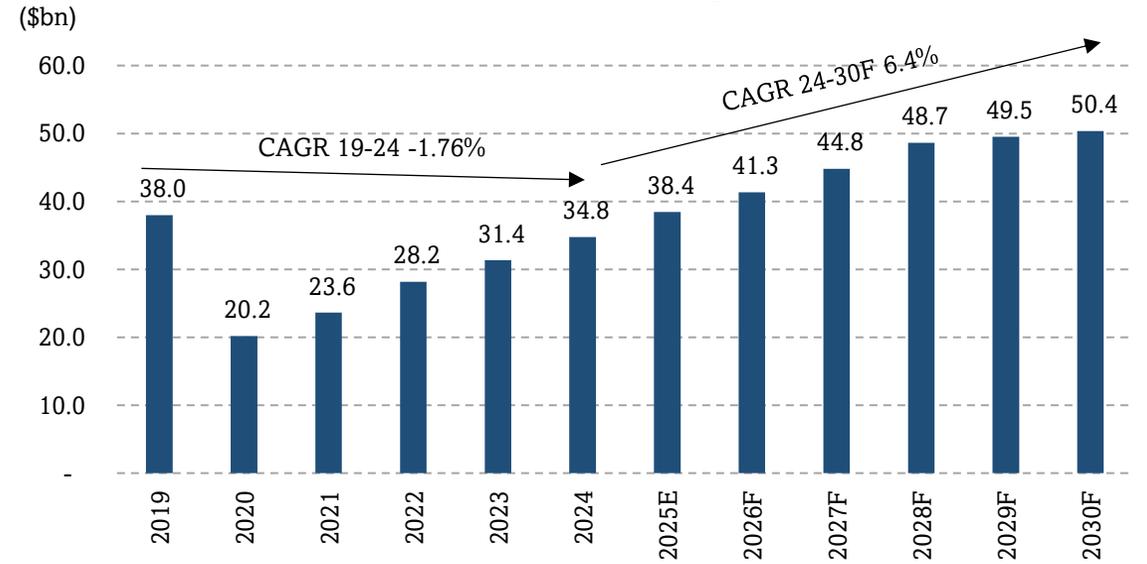
Indian Suppliers Moving Up the Value Chain

- India's aerostructures ecosystem has matured over the past decade from build-to-print manufacturing to execution-critical roles.
- Indian suppliers have established track records in quality, reliability, and scale, enabling higher content per aircraft and deeper program embedment.
- As global supply chains consolidate, proven Indian players are increasingly transitioning from Tier-2/3 positions toward Tier-1 roles.

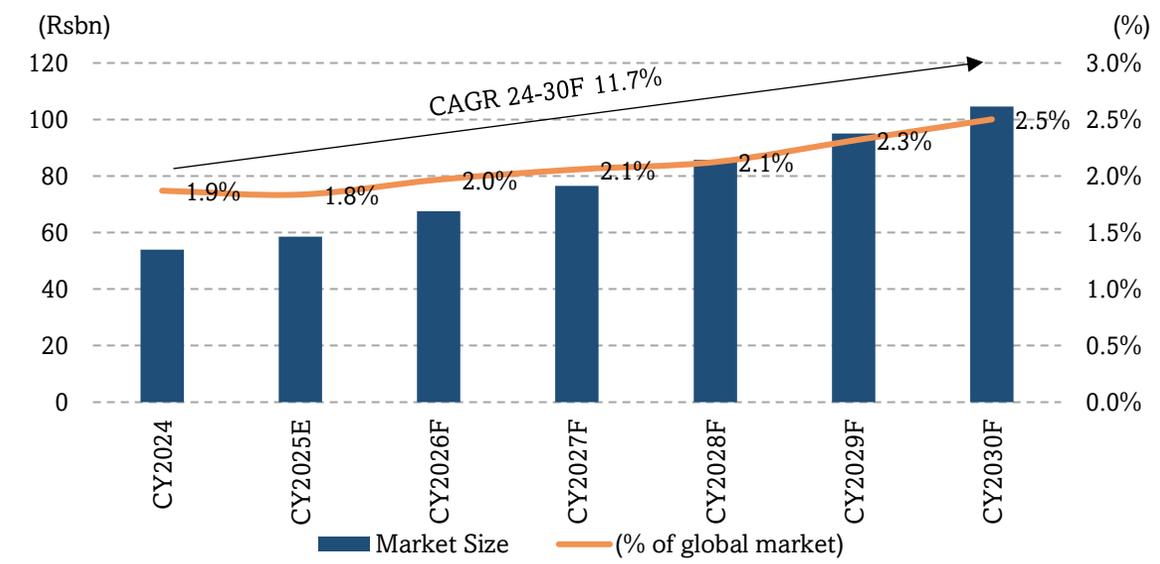
Structures: Indian Market to Grow ~1.8x Global Growth Rate



Global Aerostructures Market to grow at 6.4% CAGR



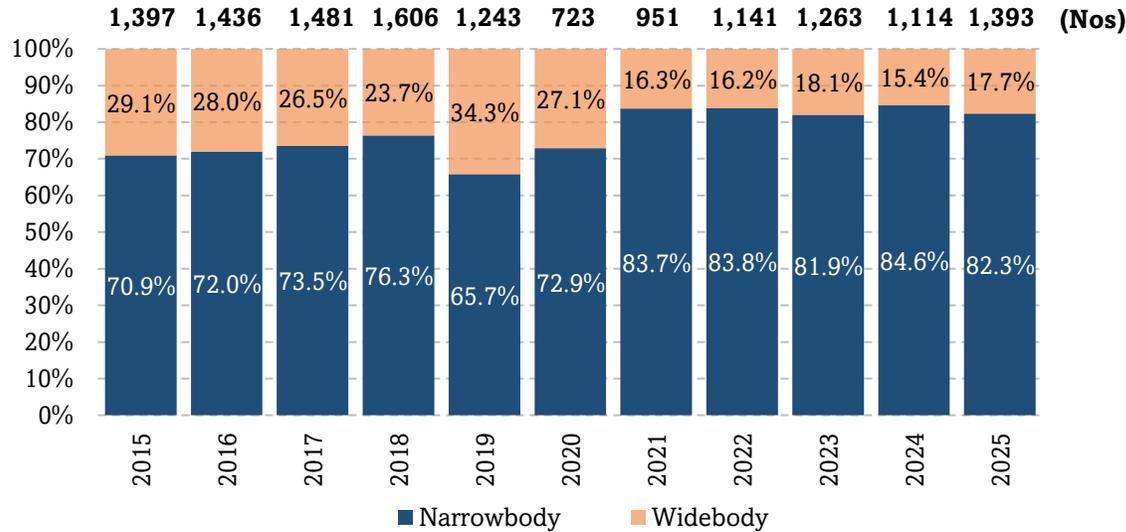
Indian Aerostructure Market to grow at 11.7% CAGR



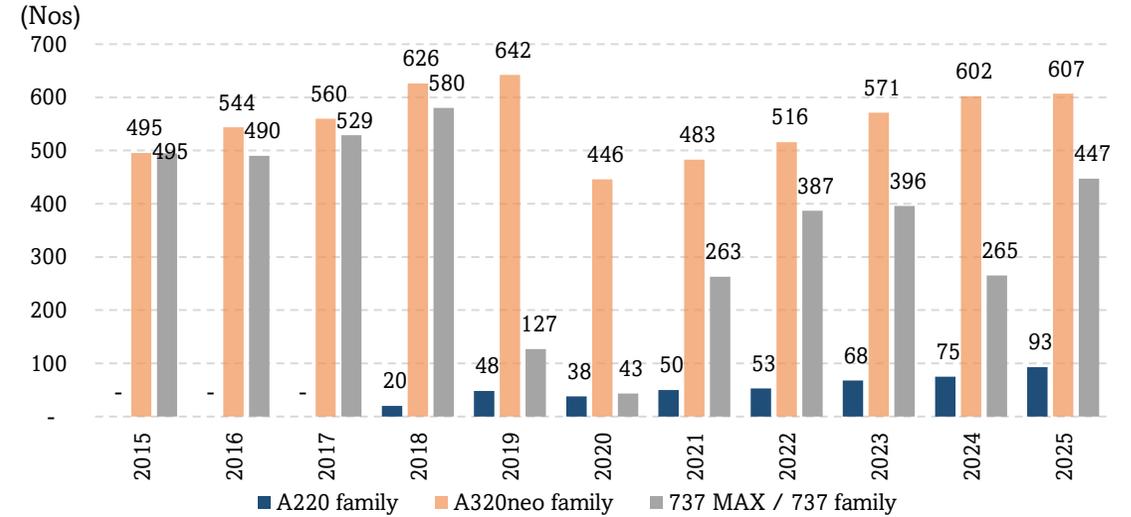
Source: Aequus RHP, Anand Rathi Research

Newer-Generation Programs Gaining Share

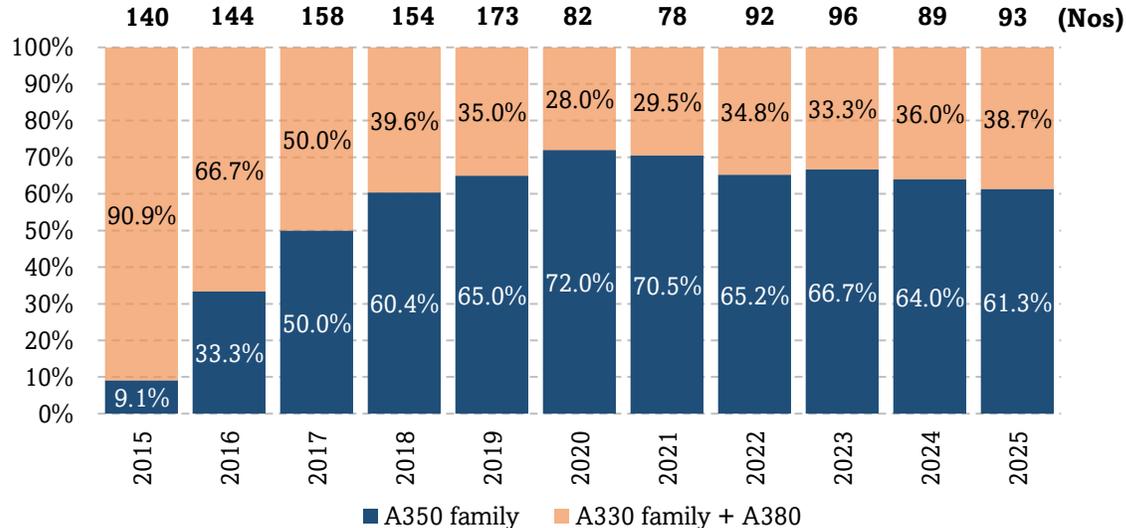
Narrowbodies Dominate; Deliveries Recover Gradually



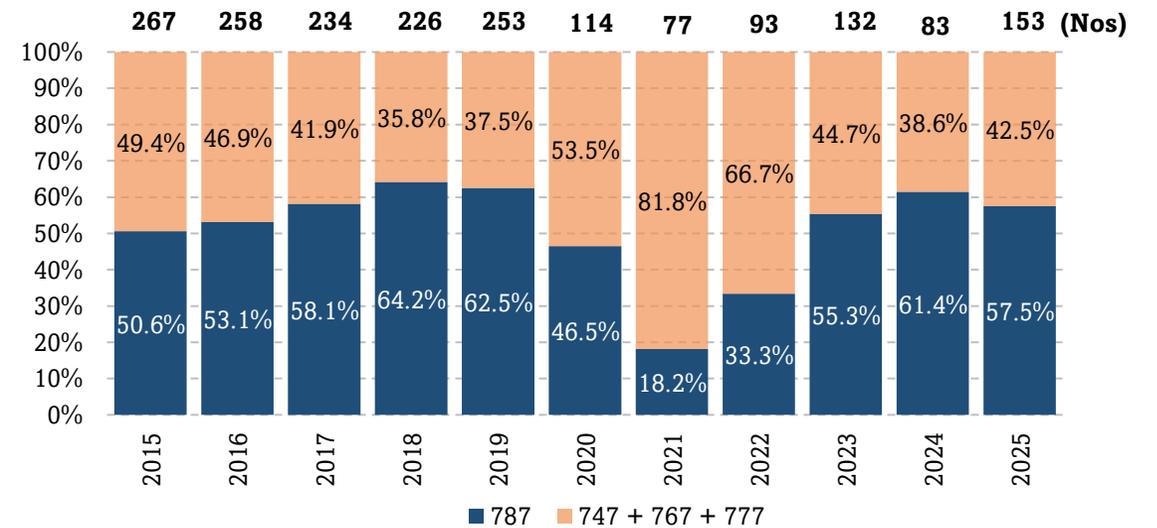
NB Programs: A220 Steady Ramp, 737 Volatile Recovery



Airbus WB: A350 Share Rising



Boeing WB: 787 Remains Core Platform



Evolution: Metal → Composites

	Material & Design Evolution	Operational / Economic Impact
1940s–1960s	Aluminium alloys; riveted sheet-metal structures	Heavy airframes; high fatigue and corrosion-driven maintenance
1970s–1980s	Improved aluminium alloys; limited composites	Better fuel efficiency; reduced inspection burden
1980s–1990s	Aluminium with selective composites; CAD-enabled design	Weight reduction; improved aerodynamics and reliability
2000s	CFRP introduced in primary structures; large monolithic parts	Step-change in weight savings; higher manufacturing complexity
2010s	CFRP-dominant primary structures; integrated fuselage/wing designs	Lower corrosion and fatigue; higher repair and certification complexity
2020s	Hybrid composites; advanced alloys; digital design tools	Lifecycle optimisation; faster turnaround, lower operating costs

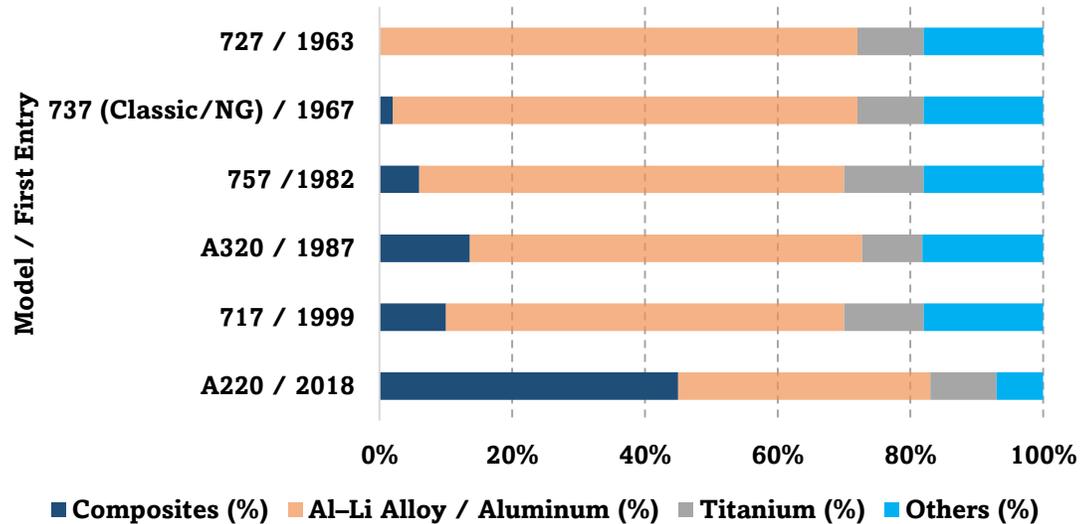
Aerostructures have shifted from aluminum to composite-heavy designs, delivering weight and fuel efficiency gains while making manufacturing, quality control, and certification far more process-intensive.

Composite Share Rising; Execution Complexity Increasing

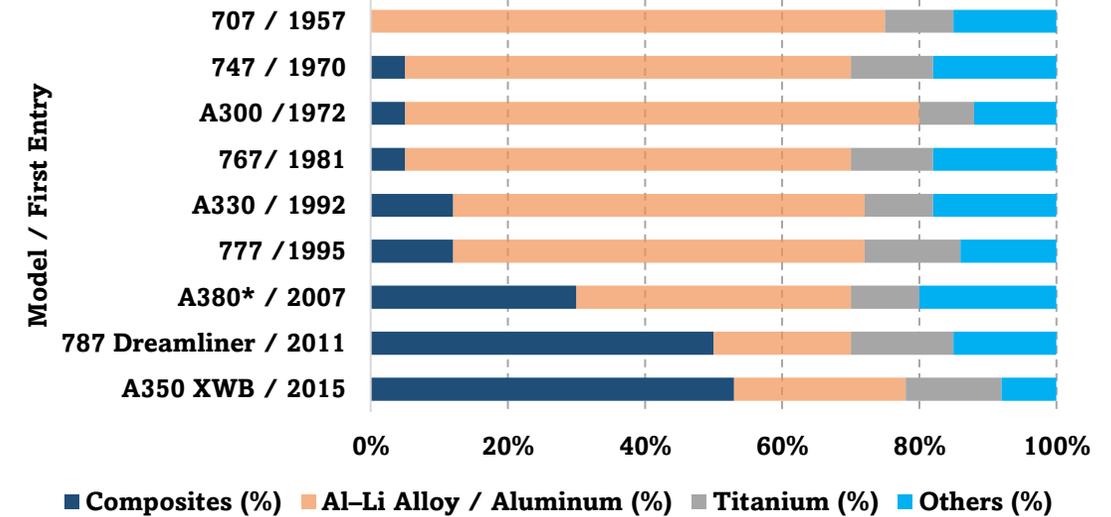
A220's clean-sheet design and lower initial rates enabled a smoother ramp, while the 737 MAX's legacy architecture and high outsourcing model exposed execution fragility at scale.

Early rework on the A350 and 787 was significant, but lower production rates helped contain system-wide disruption.

Composite Content Rising in Narrowbodies



Composite Content Rising in Widebodies



Higher composite content improves weight and efficiency, but outcomes increasingly depend on process control, supplier coordination, and execution architecture.

Note: Figures indicative and rounded; composites include CFRP & GLARE; CFRP/GLARE means Carbon Fiber Reinforced Polymer / Glass Laminate Aluminum Reinforced Epoxy.

Source: Airbus & Boeing program disclosures; OEM material composition statements; Anand Rathi Research estimates

Next Gen Structures: Lighter, Smarter and More Automated

1

- Digital Twin & Smart Manufacturing

**Faster
Development &
Lifecycle
Optimization**

2

- Advanced Composites (Carbon Fiber, Thermoplastics)
- Additive Manufacturing (3D Printing)
- Out-of-Autoclave (OOA) Composite Processing

**Weight Reduction
& Performance**

3

- Automated Fiber Placement (AFP) & Automated Tape Laying (ATL)
- Additive Manufacturing (3D Printing)
- Out-of-Autoclave (OOA) Composite Processing

**Production
Automation &
Throughput**

4

- Multifunctional / Smart Materials (Structural Health Monitoring)

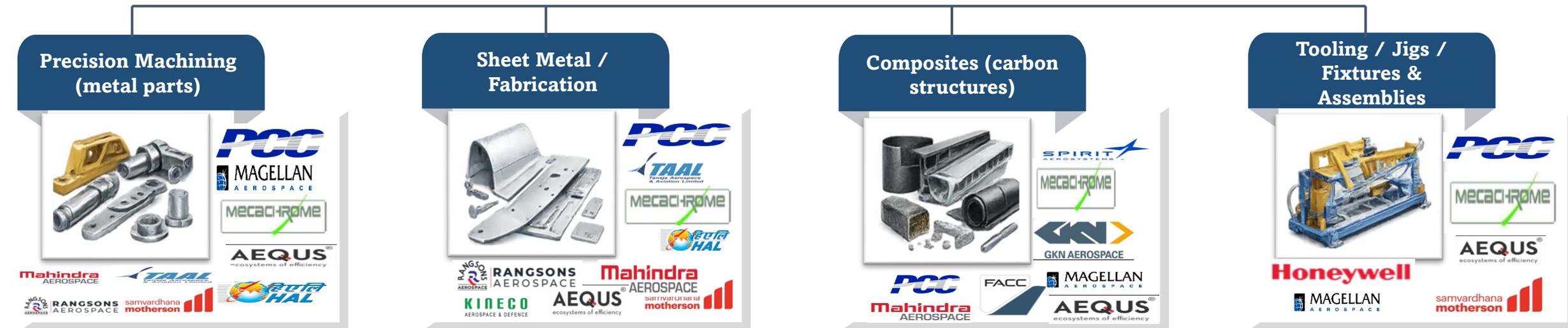
**Reliability, Safety
& Structural Health**

Indian Suppliers Transitioning to Tier-1 Roles

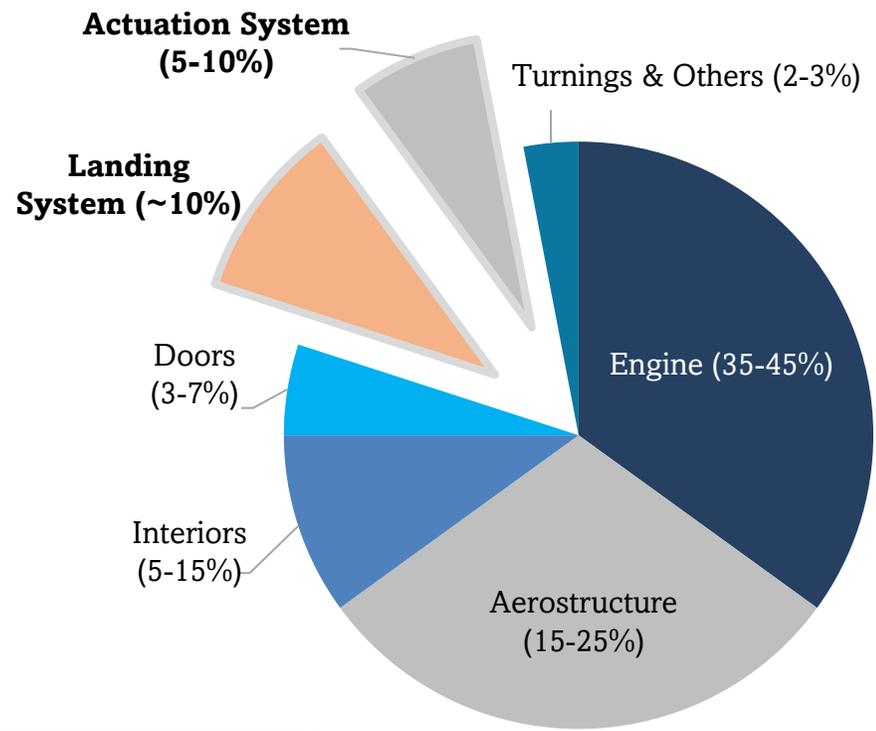
Tier-1: Major Systems Suppliers



Tier-2: Parts & Build-to-Print Suppliers

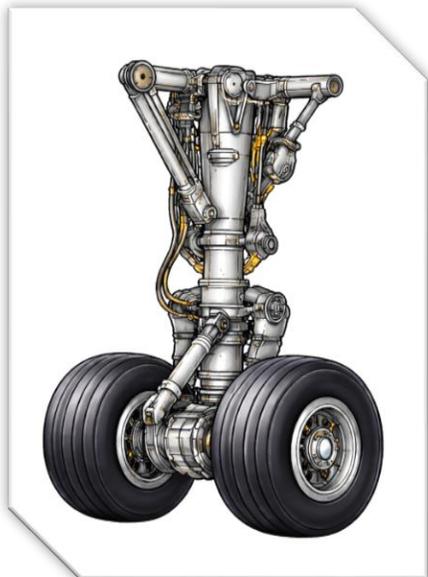


Source: Company disclosures, Airbus & Boeing supplier listings, industry publications; Anand Rathi Research. Note: Illustrative list; not exhaustive



05

Landing Systems & Actuators



Critically Stable Architectures and OEM-Led Market Structures

- Landing systems are designed as safety-critical subsystems with long qualification and certification cycles, resulting in single-source or duopoly market structures where OEMs and Tier-1 integrators retain control over platform positioning and aftermarket economics.
- Actuation systems are safety-critical and tightly integrated, leading to early design lock-in, consolidated system-integrator roles, and limited supplier change across aircraft platforms.

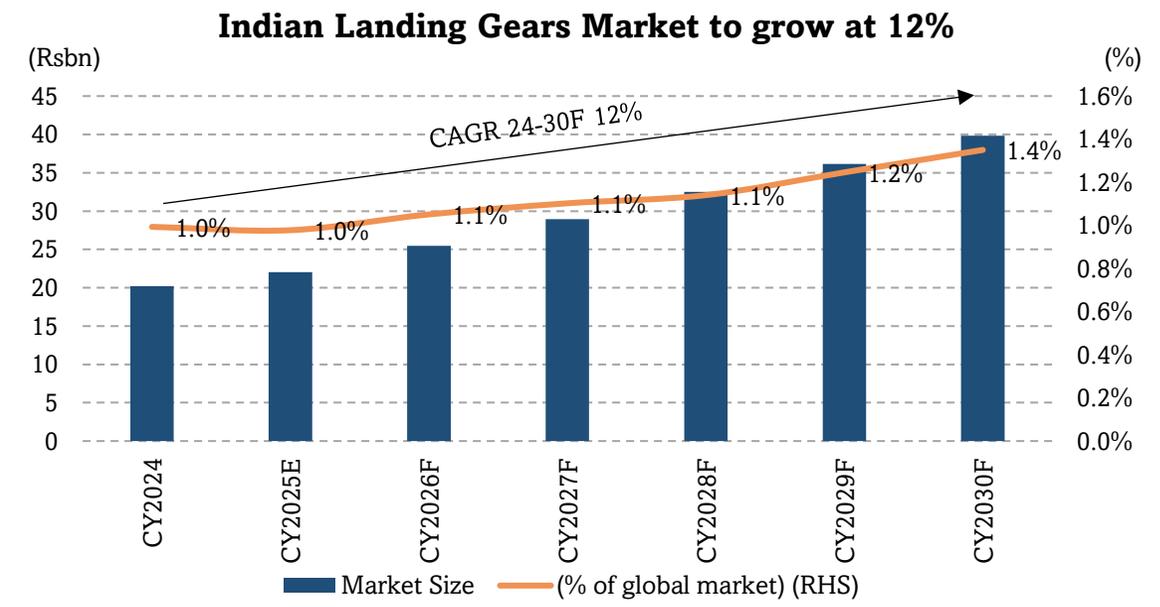
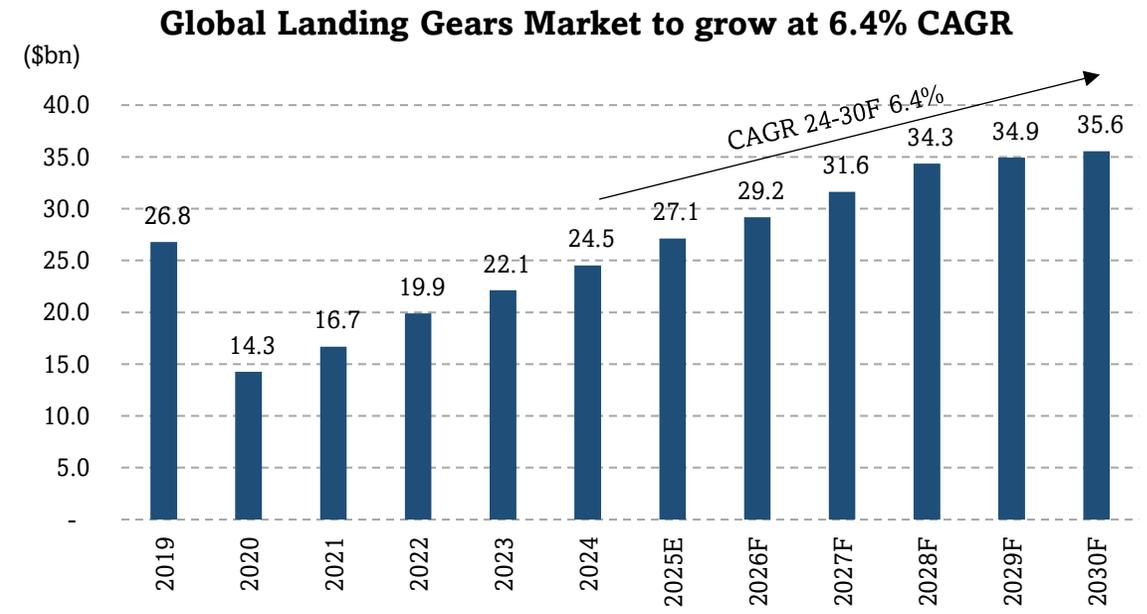
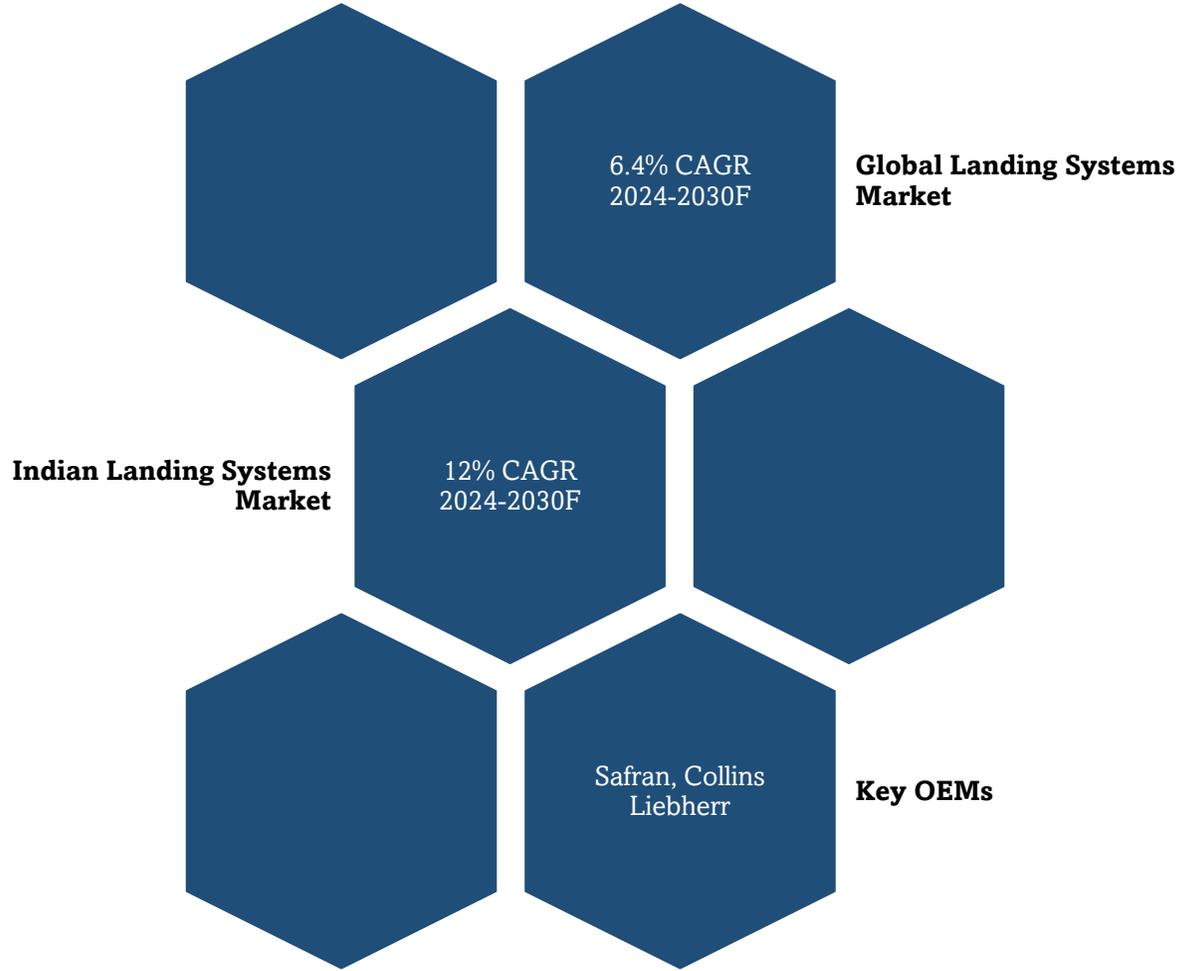
Incremental Technology Evolution Without Structural Disruption

- Landing systems have evolved from survivability-led designs toward weight reduction, reliability, and lifecycle optimization through incremental improvements in materials, braking, and health monitoring, without altering core system architectures.
- Actuation systems have transitioned gradually from centralized hydraulics toward more distributed electro-mechanical and power-by-wire architectures, improving efficiency and system optimization while remaining anchored to incumbent platforms.
- Across both segments, technology progression has been evolutionary rather than disruptive, allowing changes to be absorbed without certification shocks, production bottlenecks, or supply-chain disruption.

India's Role Largely Remains Tier-2/3 Capacity and Resilience Participation

- Indian suppliers are increasingly positioned as dependable Tier-2/3 partners in landing systems, contributing machining, fabrication, and sub-assembly capacity that supports production ramp-ups and supply-chain resilience for global OEMs and Tier-1s.
- In actuation, Indian participation remains focused on precision components and assemblies supplied to incumbent system integrators, providing incremental capacity and cost efficiency rather than system-level integration or aftermarket control.

LS: Indian Market to Grow ~1.9x Global Growth Rate



Single-Integrator Design Drives Structural Consolidation

Narrow Body	
Aircraft	Landing Gear OEM
Airbus A320 family (A320/A321/A320neo/A321neo)	Safran Landing Systems
Airbus A220	Liebherr-Aerospace (gear supplier)
Boeing 737 (NG/MAX)	Collins Aerospace (primary landing gear supplier)
Wide Body	
Aircraft	Landing Gear OEM
Airbus A330	Safran Landing Systems
Airbus A350	Safran Landing Systems
Airbus A380	Safran Landing Systems
Boeing 787 Dreamliner	Safran Landing Systems
Boeing 777/777X	Héroux-Devtek (contract supplier for gear systems)

Safety-critical design and long qualification cycles have resulted in consolidated markets with OEM- and Tier-1-controlled aftermarket. Demand is structurally stable and closely linked to aircraft production cycles.

Evolution: Survivability → Weight & Reliability

	Technical Milestone	Impact on Landing Gear Design / Operations
Pre-1950s	Fixed / rigid landing gear; leaf-spring designs; early oleo-pneumatic concepts	High shock loads transmitted to airframe; limited weight efficiency and operating envelope
1950s–1970s	Oleo-pneumatic struts; multi-wheel bogie configurations	Improved energy absorption; enabled higher landing weights and jet aircraft operations
1970s–1990s	Anti-skid braking; hydraulic disc brakes; improved wheel & tire materials	Safer braking on wet/contaminated runways; improved runway performance and dispatch reliability
1990s–2010s	Carbon brakes; high-strength alloys; digital Brake Control Units (BCU); autobrake systems	Significant weight reduction; longer brake life; improved thermal performance and braking consistency
2000s–2010s	Initial electrification (electric brake control, steering); more-electric aircraft architectures	Reduced hydraulic complexity; improved fault isolation; lower maintenance burden
2010s–2020s	HUMS / AHMS adoption; condition-based maintenance; enhanced sensors & health monitoring	Predictive maintenance; fewer unscheduled removals; higher aircraft availability
2020s →	Selective additive manufacturing; smart materials; limited electromechanical actuation; digital twins	Incremental weight reduction; lower life-cycle cost; faster MRO turnaround

Landing gear evolution has shifted from structural survivability toward weight reduction, reliability, and lifecycle optimization

Technology progression has been incremental and absorbed without structural disruption or production bottlenecks.

Next-Gen Landing Systems: Electric, Efficient and Safer

1

- Electrification of Landing Systems
- Lightweight & Advanced Materials

Efficiency & Electrification

2

- Advanced Braking & Anti-Skid Systems
- Emergency & Autonomous Features

Safety & Reliability

3

- Additive Manufacturing
- Modular Landing Gear Design

Manufacturing & Design Innovation

4

- Health & Usage Monitoring Systems (HUMS)
- Digital Twins & Predictive Analytics

Maintenance & Lifecycle Optimization

Indian Tier-2/3s: From Capacity Providers to Capacity Resilience

System Integrators (OEMS)



Tier-1: Major Systems Suppliers

Actuation (retraction/extension)



Steering & Control



Wheels & Brakes



Shock Absorber / Oleo



Tier-2: Parts & Build-to-Print Suppliers

Forgings & Castings



BHARAT FORGE



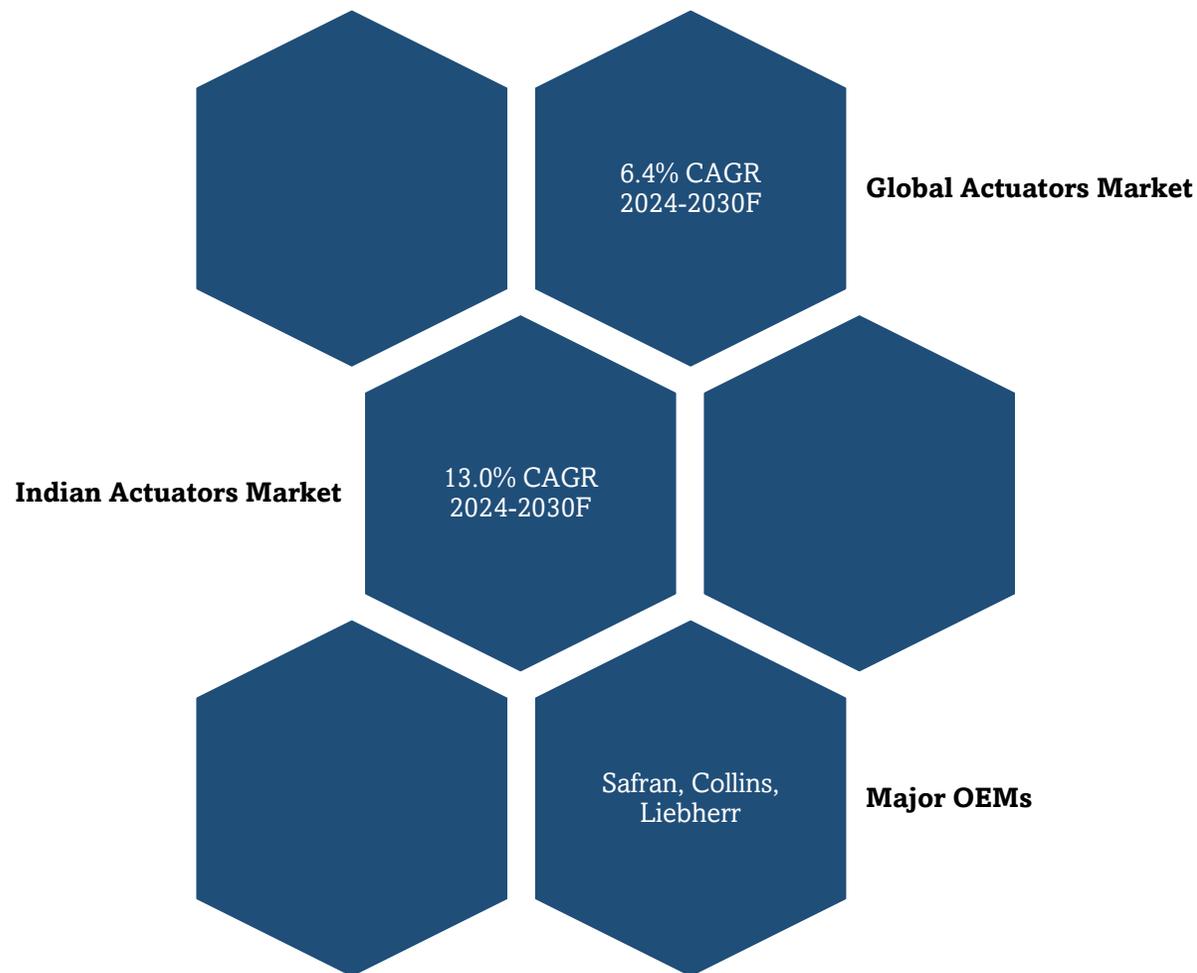
Precision Machining



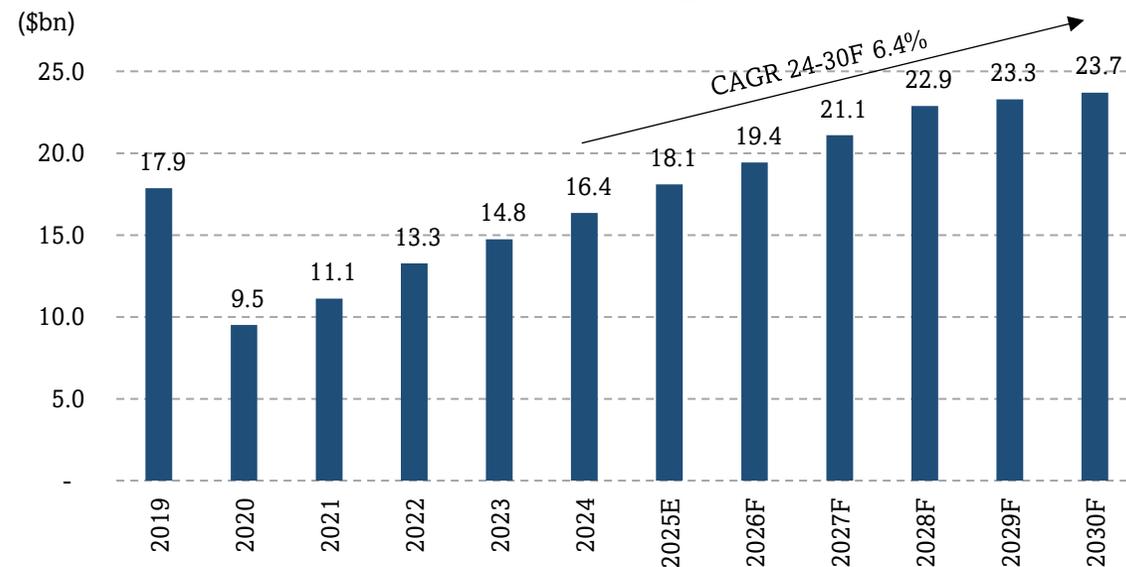
BHARAT FORGE



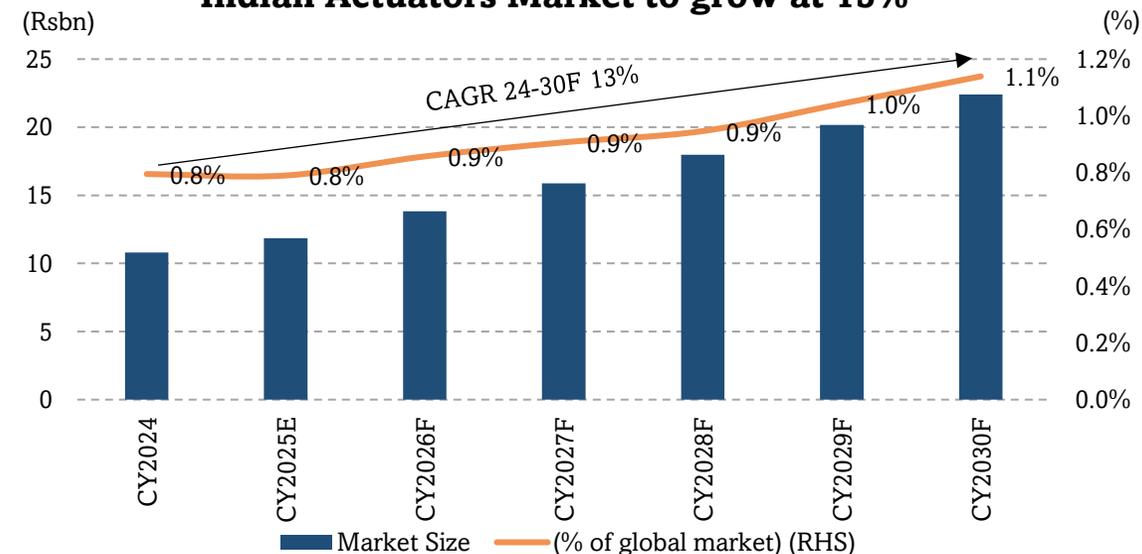
Actuators: Indian Market to Grow ~2x Global Growth Rate



Global Actuators Market to grow at 6.4%



Indian Actuators Market to grow at 13%



Stable Architectures Drive Incumbent Consolidation

Narrow Body					
Aircraft	Flight Control Actuators	Landing Gear Actuators	Braking Actuation	Nacelle / Thrust Reverser	Engine / Utility Actuators
A320 / A321 / A320neo / A321neo	Safran Electronics & Defense, Collins Aerospace*, Moog Inc.*	Safran Landing Systems	Safran Landing Systems	Safran Nacelles	Safran Electronics & Defense
A220	Safran Electronics & Defense, Collins Aerospace*, Moog Inc.*	Safran Landing Systems	Safran Landing Systems	Safran Nacelles	Safran Electronics & Defense
Boeing 737 NG / MAX	Collins Aerospace*, Nabtesco Corporation**, Moog Inc.*	Safran Landing Systems	Safran Landing Systems	Safran Nacelles / Collins Aerospace	Safran Electronics & Defense
Wide Body					
Aircraft	Flight Control Actuators	Landing Gear Actuators	Braking Actuation	Nacelle / Thrust Reverser	Engine / Utility Actuators
A330	Safran Electronics & Defense, Liebherr-Aerospace, Moog Inc.*	Safran Landing Systems	Safran Landing Systems	Safran Nacelles	Safran Electronics & Defense
A350	Safran Electronics & Defense, Liebherr-Aerospace, Collins Aerospace*, Moog Inc.*	Safran Landing Systems, Liebherr-Aerospace	Safran Landing Systems	Safran Nacelles	Safran Electronics & Defense
A380	Safran Electronics & Defense, Liebherr-Aerospace, Moog Inc.*	Safran Landing Systems	Safran Landing Systems	Safran Nacelles	Safran Electronics & Defense
Boeing 787 Dreamliner	Safran Electronics & Defense, Moog Inc.*	Safran Landing Systems	Safran Landing Systems	Safran Nacelles	Safran Electronics & Defense
Boeing 777 / 777X	Safran Electronics & Defense, Liebherr-Aerospace, Nabtesco Corporation**, Moog Inc.*	Hérroux-Devtek	Safran Landing Systems	Safran Nacelles	Safran Electronics & Defense

Stable architectures reinforce incumbent integrators and platform-locked workshare, with growth tied to aircraft build rates.

Notes:

*- Moog Inc acts as a system integrator on select platforms for flight control actuators

** - Nabtesco corporation– acts as a system integrator on select Boeing platforms for flight control actuation

Evolution: Centralized Hydraulics → Distributed Electrification

	Technical Milestone	Impact on Actuators / Operations
Pre-1950s	Mechanical linkages and basic hydraulic systems	Limited control authority; suitable only for small aircraft and low aerodynamic loads
1950s–1970s	Centralized hydraulic systems become standard	Enabled high-force actuation for large control surfaces and landing gear; foundation of modern jet aircraft
1970s–1990s	Electro-hydraulic servo valves and redundancy concepts	Improved precision, reliability, and fault tolerance; supported wide-body aircraft and early fly-by-wire
1990s–2010s	Electro-Hydrostatic Actuators (EHA) and distributed hydraulics	Reduced hydraulic plumbing, improved safety and maintainability; early step toward “More Electric Aircraft”
2000s–2010s	Electromechanical Actuators (EMA) enter service	Shift toward all-electric architectures; weight reduction, higher efficiency, simpler maintenance
2010s–2020s	Smart actuators with sensors, health monitoring, digital control	Predictive maintenance, higher dispatch reliability, real-time diagnostics
2020s →	High-power electric actuation, power electronics, advanced materials	Enables next-gen aircraft (More-Electric, Hybrid-Electric); lower energy use and lifecycle cost

Actuation evolution has moved from centralized hydraulics toward distributed electro-mechanical systems, enhancing efficiency, reliability, and system-level optimization.

Technological evolution selective and modular, , avoiding disruption to OEM production or supply chains.

Next-Gen Actuation: Electric, Intelligent and Reliable

1

- Shift to EMAs
- More-Electric Aircraft

Weight & Architecture Simplification

2

- Hybrid Actuators (EHA / EMHA)
- Higher Power Density

Efficiency & Performance

3

- Increased Redundancy
- Digital Fly-by-Wire Integration

Reliability, Safety & Redundancy

4

- Smart Health-Monitoring Actuators
- Lifecycle Cost Optimization

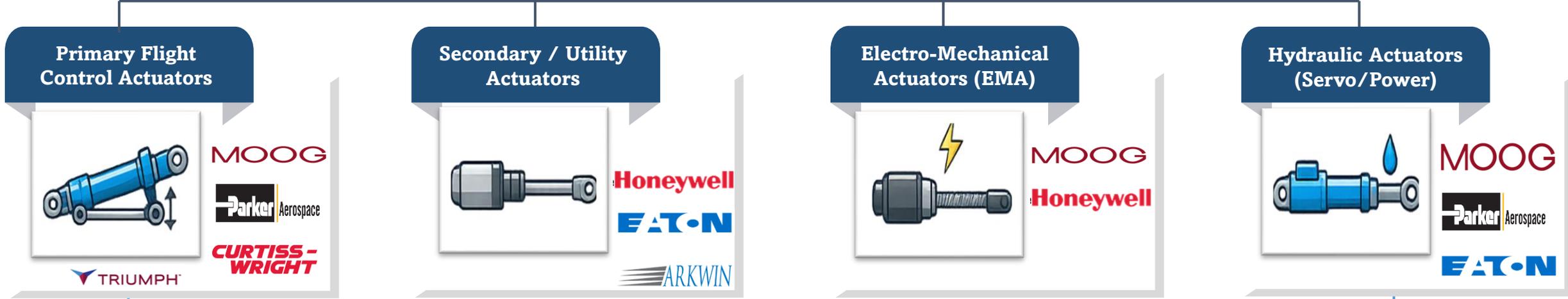
Lifecycle Cost & Maintainability

Indian Tier-2/3s: From Incremental Content to Certified Capacity

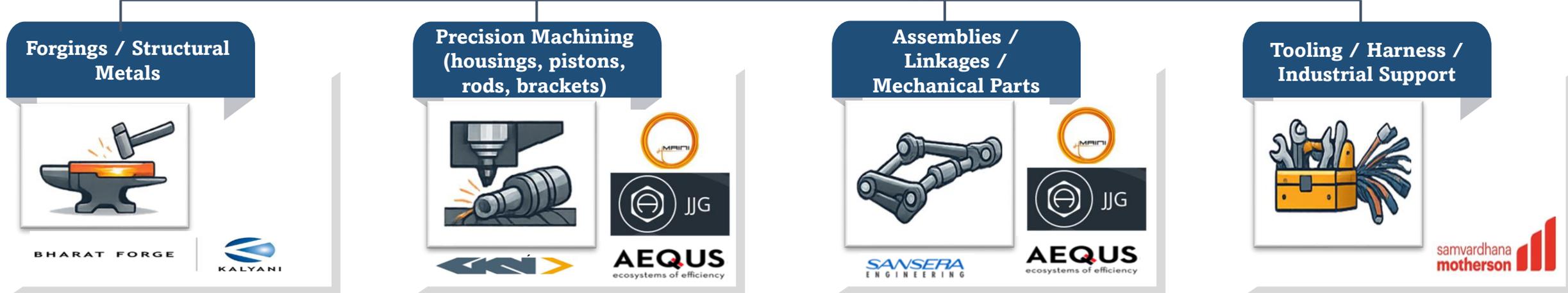
System Integrators (OEMS)

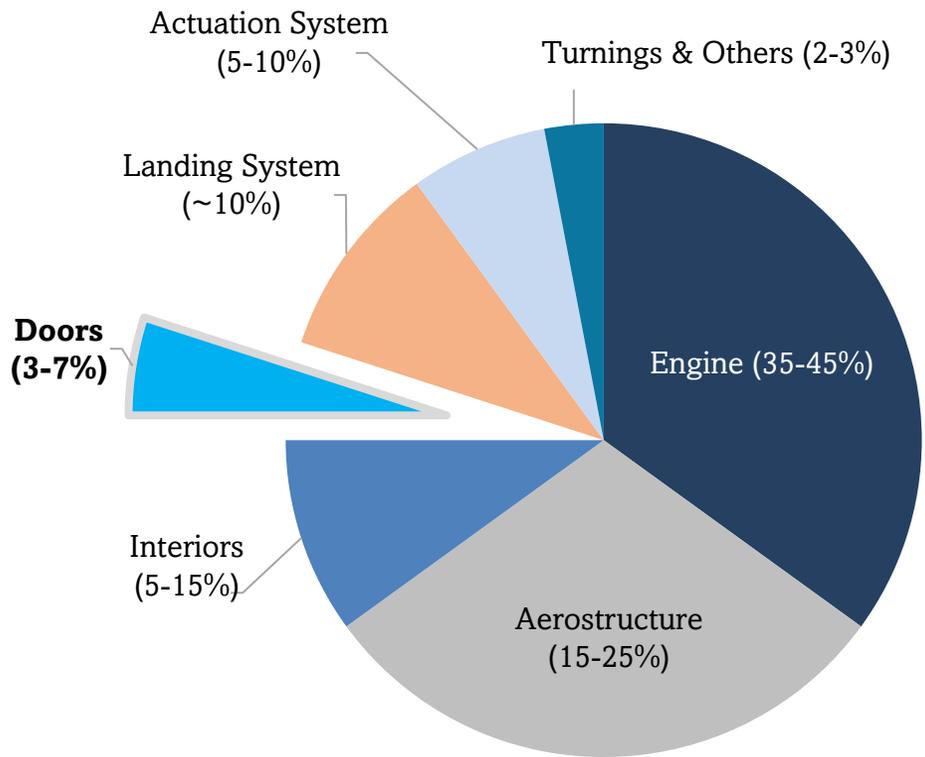


Tier-1: Major Systems Suppliers



Tier-2: Parts & Build-to-Print Suppliers





06  Doors



Structurally Critical, Execution-Led Economics

- Aircraft doors are safety-critical and certification-intensive but mechanically bounded with limited IP disruption.
- Conservative design philosophies and long qualification cycles keep innovation incremental.
- Once embedded, door programs scale with aircraft build rates and work-package allocation rather than aftermarket leverage or pricing power.

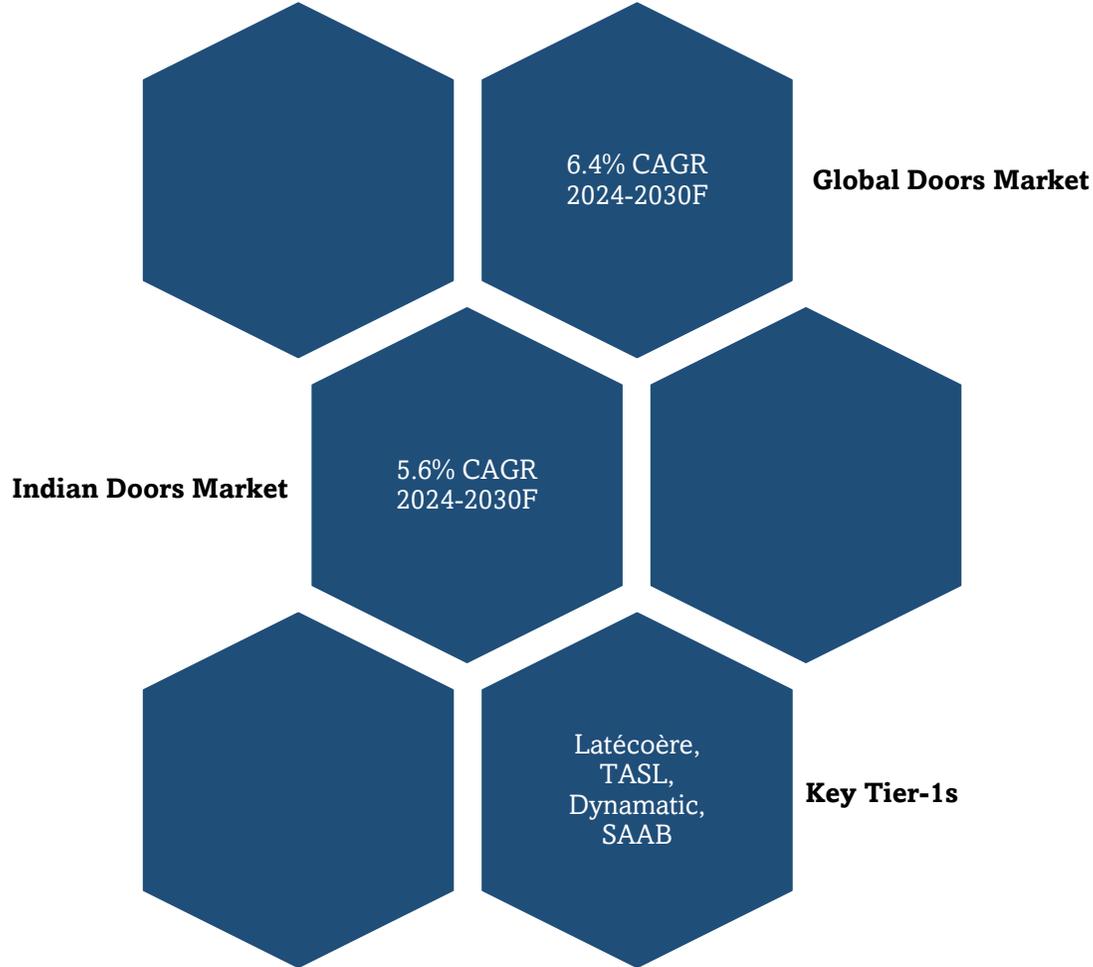
Conservative, Non-Disruptive Technology Evolution

- Door evolution has progressed from basic mechanical closures toward improved weight optimization, structural integrity, monitoring, and certification-driven reliability.
- While technology content has increased, change has remained conservative, avoiding architectural resets, execution failures, or production bottlenecks across the supply chain.

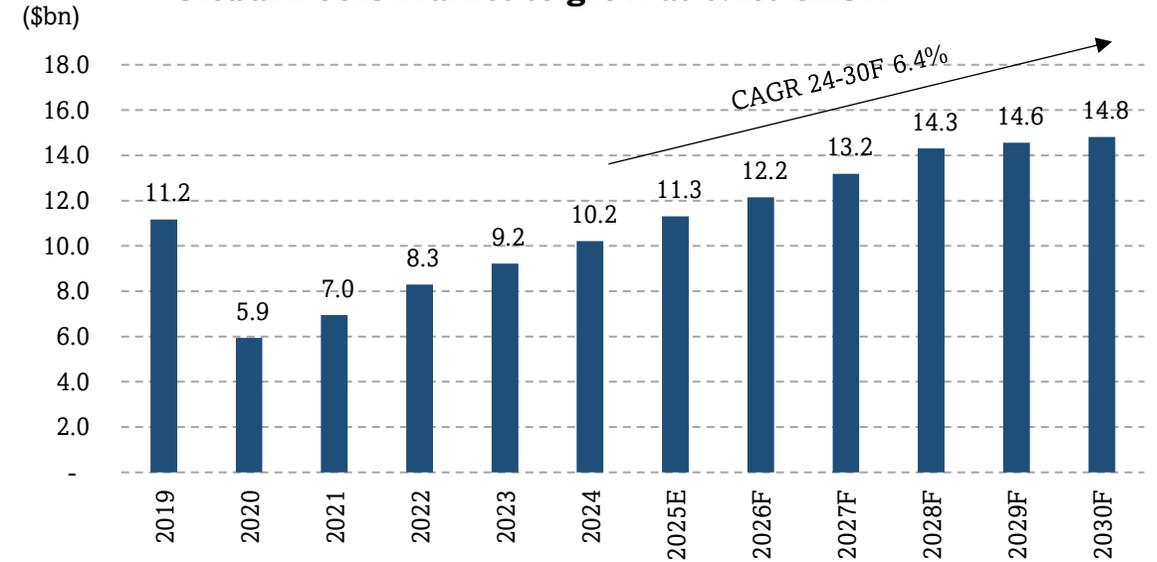
India's Role transitioning reliant Tier-2 suppliers to Program-Level Tier-1s

- Indian suppliers have built a strong Tier-2 foundation in machining, fabrication, composites, and assembly, supporting global door integrators.
- Select players are now transitioning into program-specific Tier-1 roles, expanding scope and responsibility within door work packages rather than reshaping industry economics.

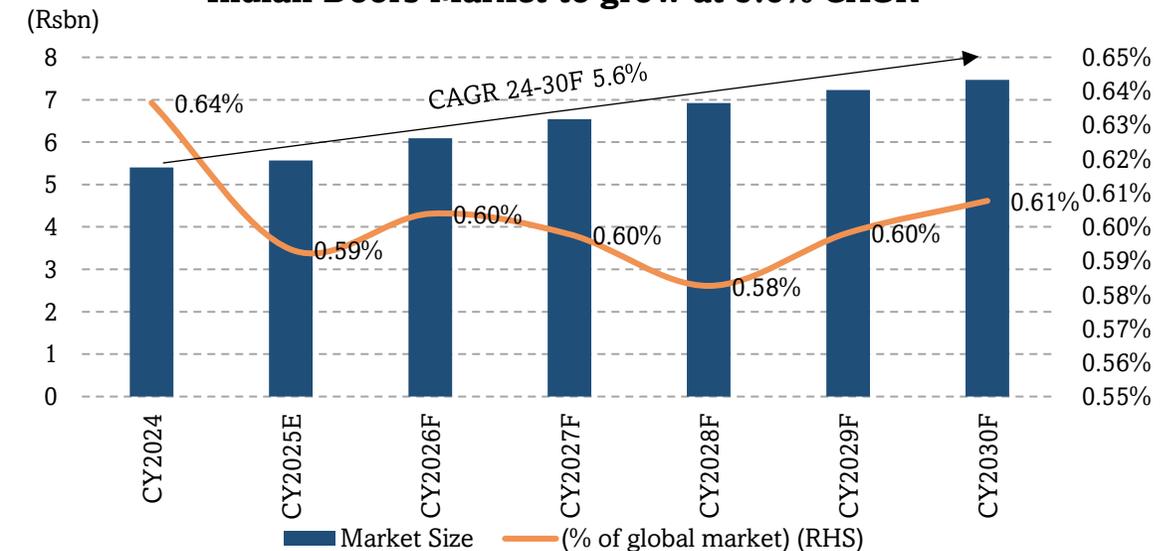
Indian Market to Grow \approx Global Growth Rate



Global Doors Market to grow at 6.4% CAGR



Indian Doors Market to grow at 5.6% CAGR



Conservative Design Drives Execution-Led Integration

Narrow Body		
Aircraft	Major Certified Tier-1	Door Type
Airbus A320 Family	Groupe Latécoère	Passenger & service doors
	Tata Advanced Systems Limited	Cargo & bulk cargo doors
Airbus A220	Dynamatic Technologies Limited	Passenger, service, cargo & over-wing doors (full shipset)
Boeing 737 (NG / MAX)	Groupe Latécoère	Passenger & service doors
	Spirit AeroSystems, Inc.	Plug doors / fuselage-integrated door structures
Wide Body		
Aircraft	Major Certified Tier-1	Door Type
Airbus A330	Groupe Latécoère	Passenger & service doors
	Airbus Operations SAS	Cargo doors
Airbus A350	Groupe Latécoère	Passenger & service doors
	Airbus Operations SAS	Cargo doors
Airbus A380	Groupe Latécoère	Passenger & service doors
	Airbus Operations SAS	Cargo doors
Boeing 787 Dreamliner	Saab AB	Cargo doors & crew escape doors
	Groupe Latécoère	Passenger & service doors
Boeing 777 / 777X	Groupe Latécoère	Passenger & service doors
	Saab AB	Cargo doors (select positions)

Doors are mechanically bounded and safety-critical, with conservative design and limited IP churn. Once qualified, program economics scale primarily with aircraft production rates and work-package share.

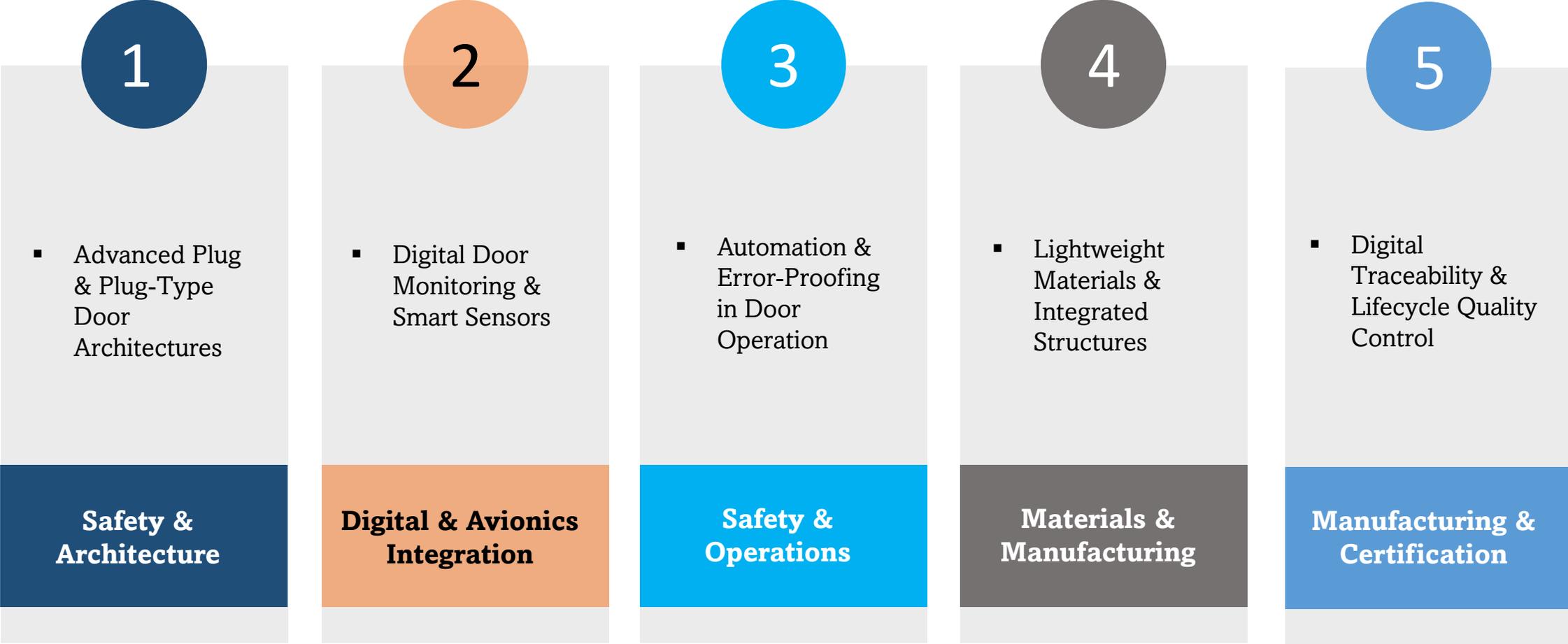
Evolution: Mechanical Closure → Certified Structural Reliability

	Technical Milestone	Impact on safety, operations & manufacturing
Pre-1950s	Outward-opening, mechanically latched doors on early airliners	Limited pressurization capability; higher structural risk at the door; largely manual inspection and operation, simplifying early manufacturing
1950s–1970s	Introduction and adoption of plug-type doors on pressurized aircraft	Step-change in safety as cabin pressure loads reacted by the door; enabled higher-altitude, long-haul jet operations
1970s–1990s	Improved locking mechanisms, fail-safe latches, and warning/indication systems	Reduced in-service failures; tighter regulatory standards post cargo-door incidents; improved maintenance reliability
1990s–2010s	Composite and hybrid metallic door/fuselage structures; improved sealing systems	Weight reduction; better fatigue and corrosion performance; lower leakage rates and improved cabin environmental control
2000s–2010s	Deeper system integration with avionics, door sensors, and cockpit door-status displays	Real-time door status monitoring; enhanced safety interlocks; reduced human-error risk during closing and arming
2010s–2020s	Advanced plug-type and door-plug architectures; improved indication, interlocks, and human-factors design	Incremental improvements in installation efficiency, maintainability, and service access, with reduced operational error risk
2020s →	Enhanced certification scrutiny; digital traceability and lifecycle quality controls	Increased design margins; tighter supplier oversight; stronger focus on door-system integrity and end-to-end monitoring

Door evolution has moved beyond basic mechanical closures toward better weight optimization, structural integrity, and certification-driven reliability.

Innovation remains incremental and non-disruptive, preserving stable supplier structures and avoiding production bottlenecks.

Next-Gen Doors: Safer, Lighter, Smarter



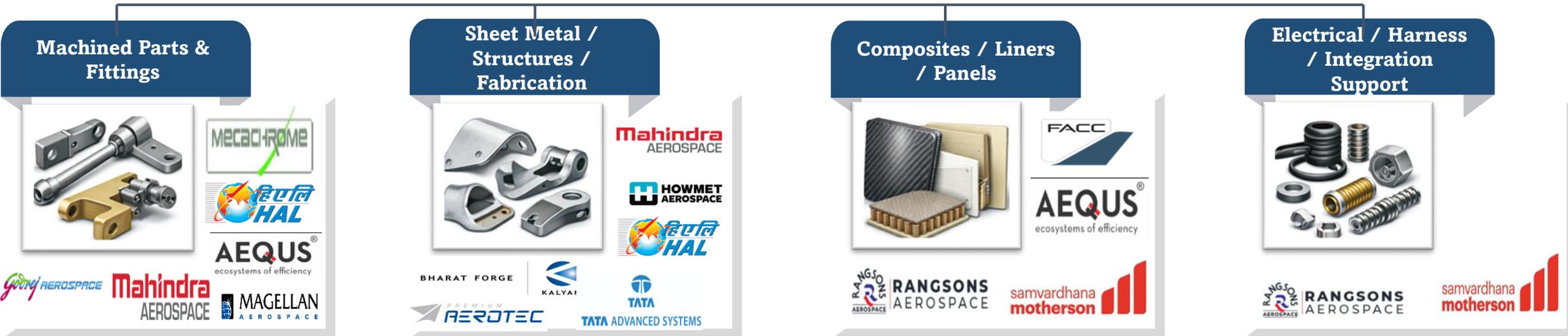
Source: Airbus aircraft systems documentation; Boeing aircraft systems manuals; Collins Aerospace door systems disclosures; Safran Aerosystems disclosures; Liebherr-Aerospace disclosures; Anand Rathi Research

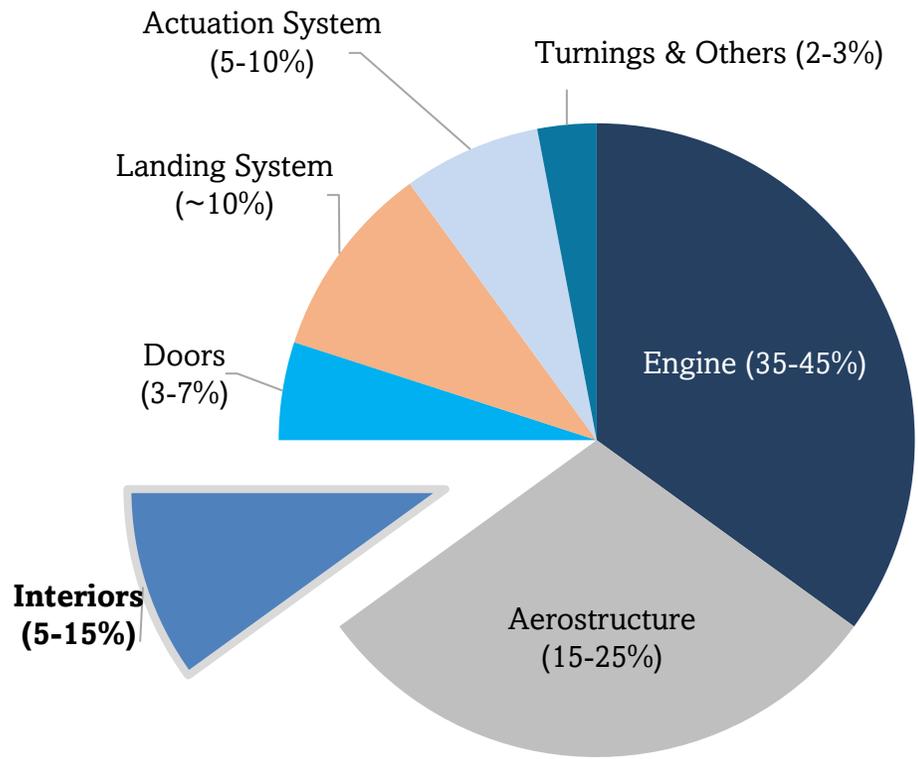
Indian Suppliers Transitioning to Program-Specific Tier-1 Roles

Tier-1: Major Systems Suppliers



Tier-2: Parts & Build-to-Print Suppliers





07  Interiors



Airline-Led Economics and Structural Overcapacity

- Aircraft interiors are the weakest moat across major aerospace systems.
- They are airline-specified and easy to re-source, with multiple qualified suppliers and low capital intensity.
- This results in fungible capacity, structural overcapacity, and airline-led pricing, with economics tracking airline cycles rather than aircraft programs.

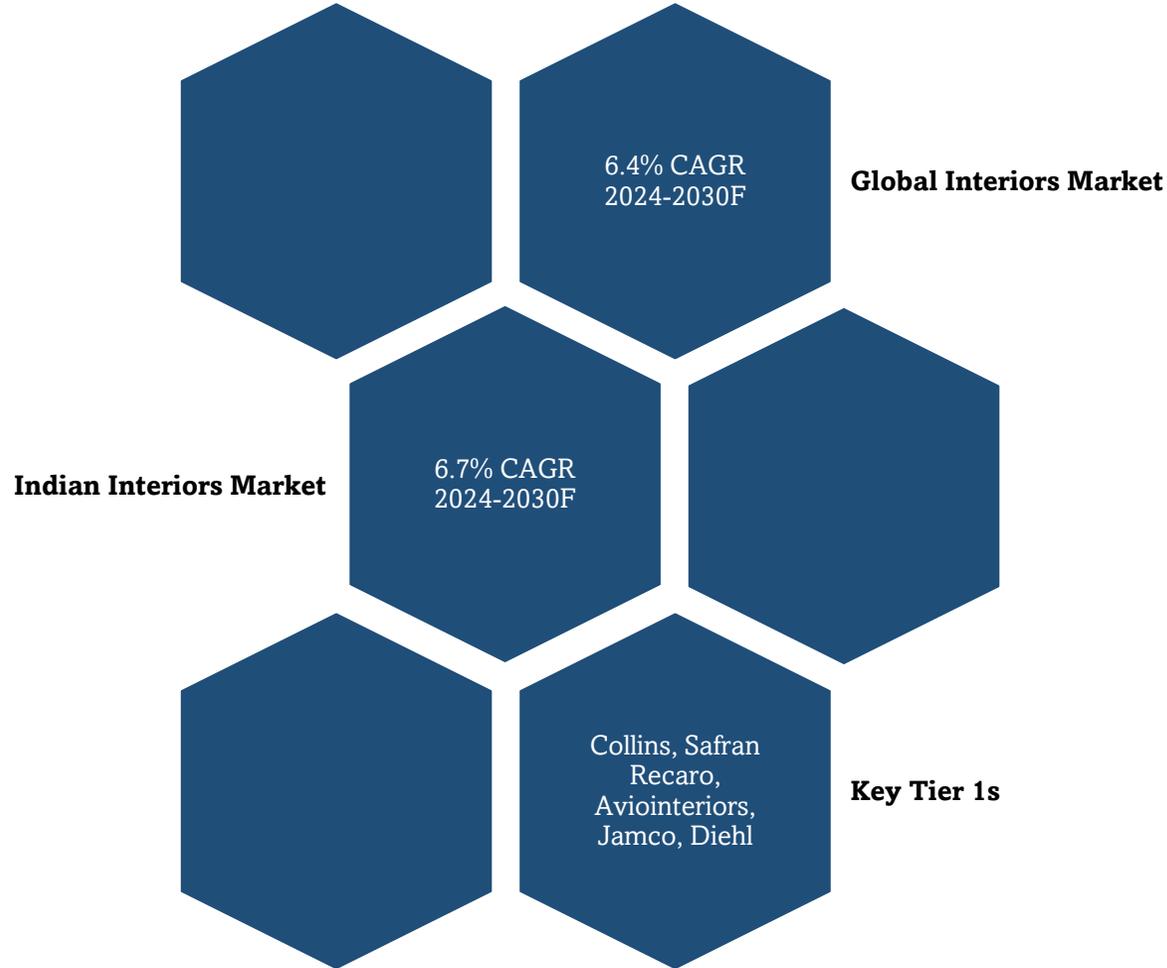
Evolution Without Structural Reset

- Interiors have evolved from basic furnishings to more certified, experience-led cabin systems. However, technological progress has been incremental and conservative, focused on comfort and layout rather than architecture.
- This evolution did not create supply bottlenecks, durable lock-ins, or a reset in industry structure.

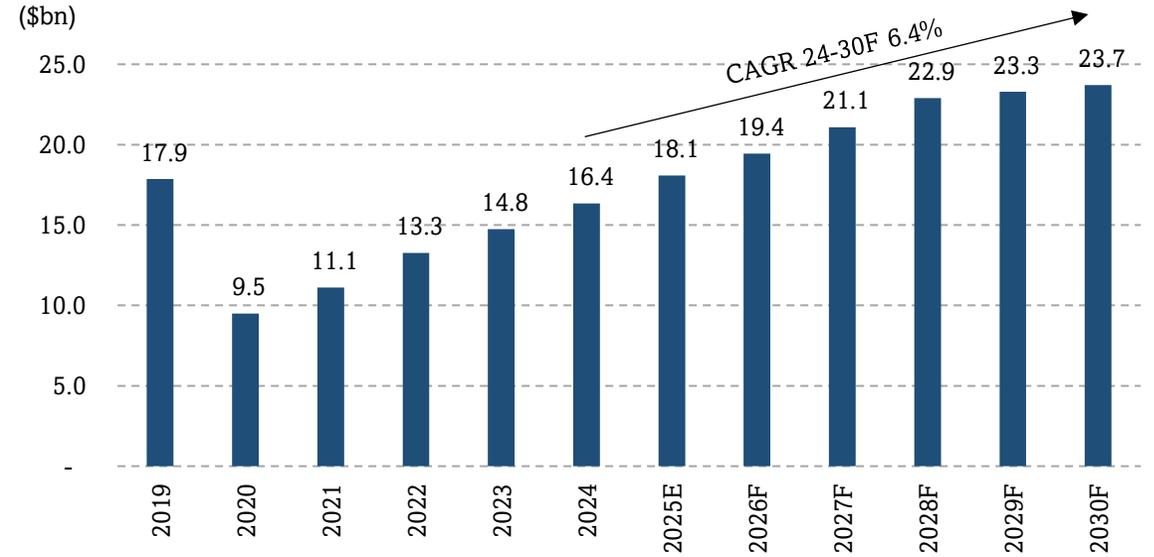
India's role remains broad-based participation with limited embedment

- Indian Tier-2/3 suppliers participate across a wide range of interior work packages, largely driven by cost and execution.
- Engagement remains broad but shallow, with limited long-term embedment or exclusive program positions.
- As a result, interiors provide volume exposure and learning benefits but limited strategic leverage.

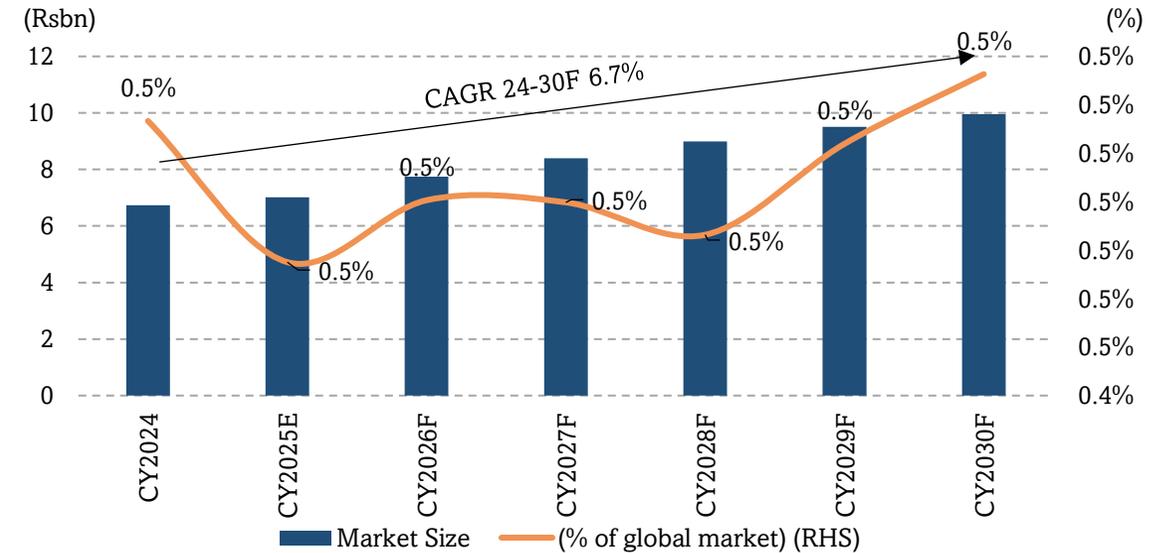
Interiors: Indian Market to Grow \approx Global Growth Rate



Global Interiors Market to grow at 6.4% CAGR



Indian Interiors Market to grow at 6.7% CAGR



Source: Aequs RHP, Anand Rathi Research

Airline-Led Design Drives Competitive Allocation

Narrow Body		
Aircraft Platform	# of Meaningful Suppliers	Major Certified Tier-1 / Tier-2*
Airbus A320 Family (A320 / A321 / A320neo / A321neo)	5–6	Collins Aerospace; Safran Cabin; Recaro Aircraft Seating; Aviointeriors; Jamco Corporation; Diehl Aviation Laupheim
Airbus A220	3–4	Safran Cabin; Collins Aerospace; Recaro Aircraft Seating
Boeing 737 (NG / MAX)	4–5	Collins Aerospace; Safran Cabin; Recaro Aircraft Seating; Jamco Corporation; Aviointeriors
Wide Body		
Aircraft Platform	# of Meaningful Suppliers	Major Certified Tier-1 / Tier-2*
Airbus A330	3–4	Safran Cabin; Collins Aerospace; Diehl Aviation Laupheim
Airbus A350	3–4	Safran Cabin; Collins Aerospace; Diehl Aviation Laupheim; Recaro Aircraft Seating
Airbus A380	3+	Safran Cabin; Collins Aerospace; Diehl Aviation Laupheim
Boeing 787 Dreamliner	3–4	Collins Aerospace; Safran Cabin; Recaro Aircraft Seating
Boeing 777 / 777X	3–4	Collins Aerospace; Safran Cabin; Recaro Aircraft Seating

Note:
* - Certified suppliers with demonstrated installation history across airlines and cabin configurations; sourcing is airline-specific and non-exclusive.

Aircraft interiors are modular and airline-specified, with low IP stickiness. Sourcing is allocation-led, and economics track airline fleet and refurbishment cycles rather than aircraft programs.

High supplier density and non-exclusive sourcing prevent scarcity dynamics or sustained pricing power.

Disproportionately High Supplier Density

Segment	Suppliers per Platform
Engines	1–2
Landing Gear	1–2
Aerostructures (major sections)	1–3
Interiors	3–6

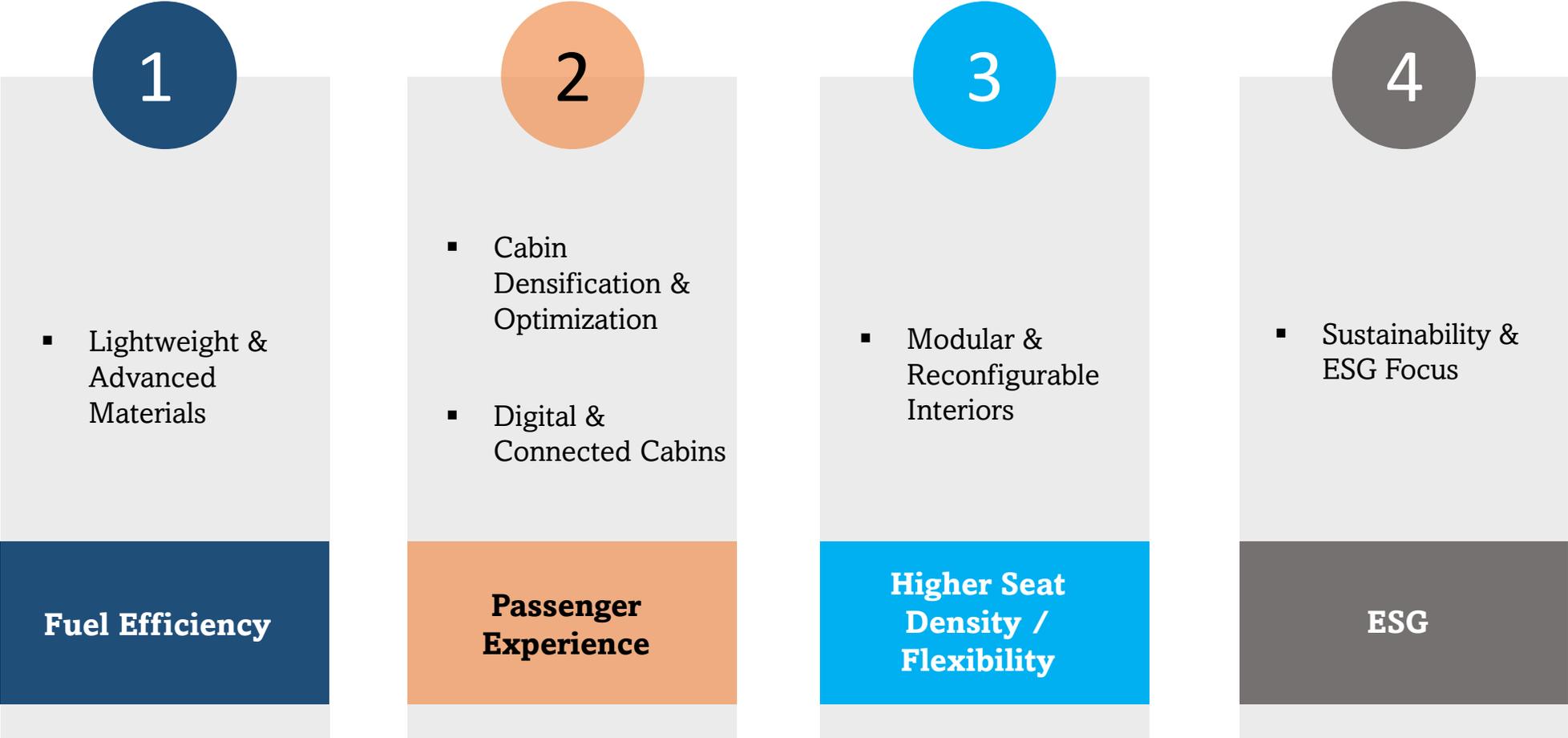
Evolution: Basic Furnishings → Experience-Led Cabins

	Technical Milestone	Impact on Interiors / Operations
Pre-1950s	Basic, non-modular interiors; metal frames, minimal furnishings	Low comfort; interiors non-critical; manual, non-standard installs
1950s–1970s	Pressurized cabins, fixed seating layouts, early galleys and lavatories	Major comfort jump; interiors become safety-critical; certification begins
1970s–1990s	Improved seat ergonomics, flame-retardant materials, modular panels	Better safety + maintainability; faster install/rework; specialized suppliers emerge
1990s–2010s	Lightweight composites, modular monuments, advanced seating and lav systems	Weight + fuel savings; more airline customization; higher certification effort
2000s–2010s	Digital IFE, in-seat power, LED lighting, integrated cabin electronics	Rise of connected cabins; higher electrical content; new electronics players enter
2010s–2020s	Connected cabins, smart lighting, improved human-factors design	Better passenger experience + crew efficiency; higher software/integration complexity
2020s →	Sustainability-focused materials, digital twins, lifecycle traceability	Stronger regulation; focus on weight + recyclability; data-driven maintenance; deeper OEM–Tier-1 integration

Interiors have evolved from basic furnishings toward more certified, passenger-experience-driven systems, while remaining modular and non-embedded.

Comfort and feature upgrades remain incremental and airline-led, with no architectural disruption or supply-chain reset.

Next-Gen Interiors: Lighter, Smarter, Greener



Source: Airbus cabin technology roadmaps; Boeing interiors innovation publications; Collins Aerospace disclosures; Safran Cabin disclosures; industry sustainability publications; Anand Rathi Research

Indian Tier-2/3s: Establishing Breadth, Not Embedment

Tier-1: Major Systems Suppliers



Tier-2: Parts & Build-to-Print Suppliers





08



MRO

Utilisation-led MRO Supercycle

- MRO upcycle today is driven less by fleet growth and more by utilization stress. Current fleet is flying longer due to delivery delays and limited spare capacity, while fleets are ageing in service.
- At the same time, next-generation engines are entering shops earlier than planned.
- Lease contracts have also become stricter, requiring heavier maintenance and cleaner redeliveries. Together, this has made MRO demand more frequent, deeper, and harder to defer.

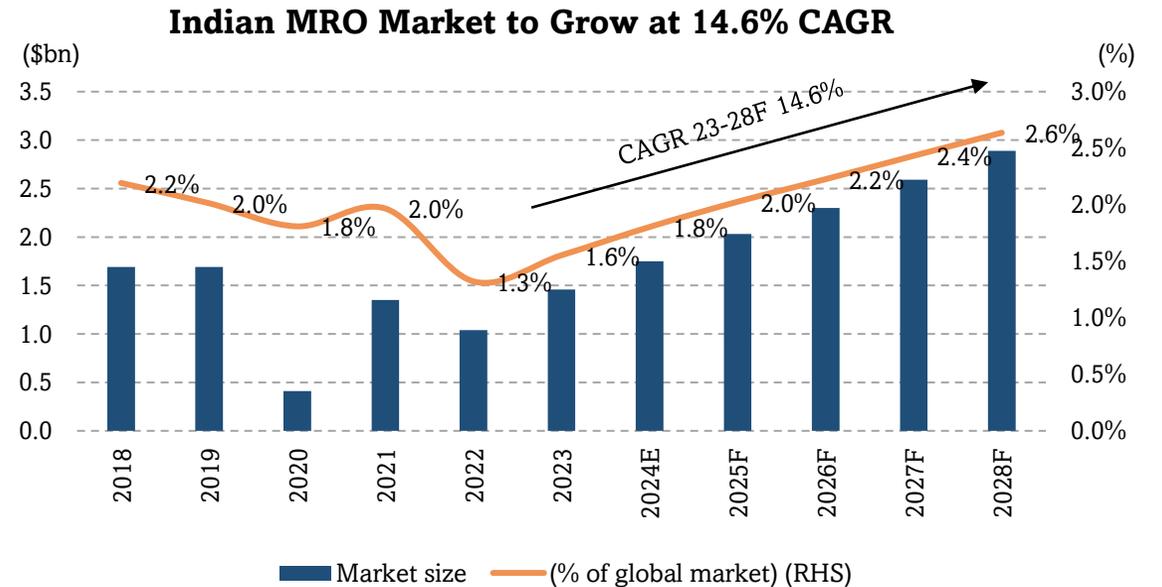
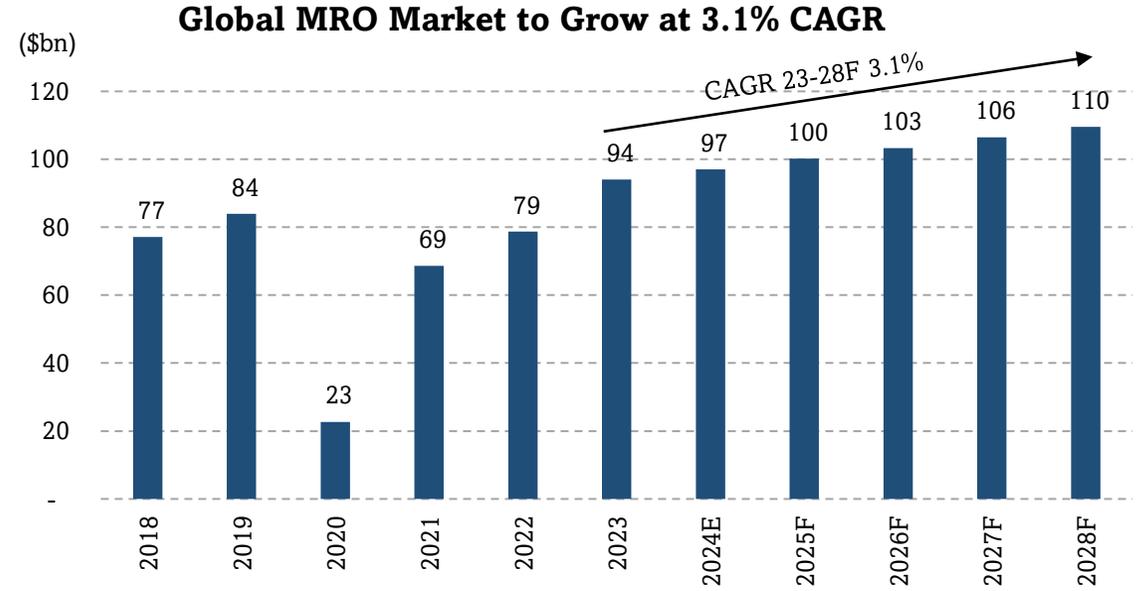
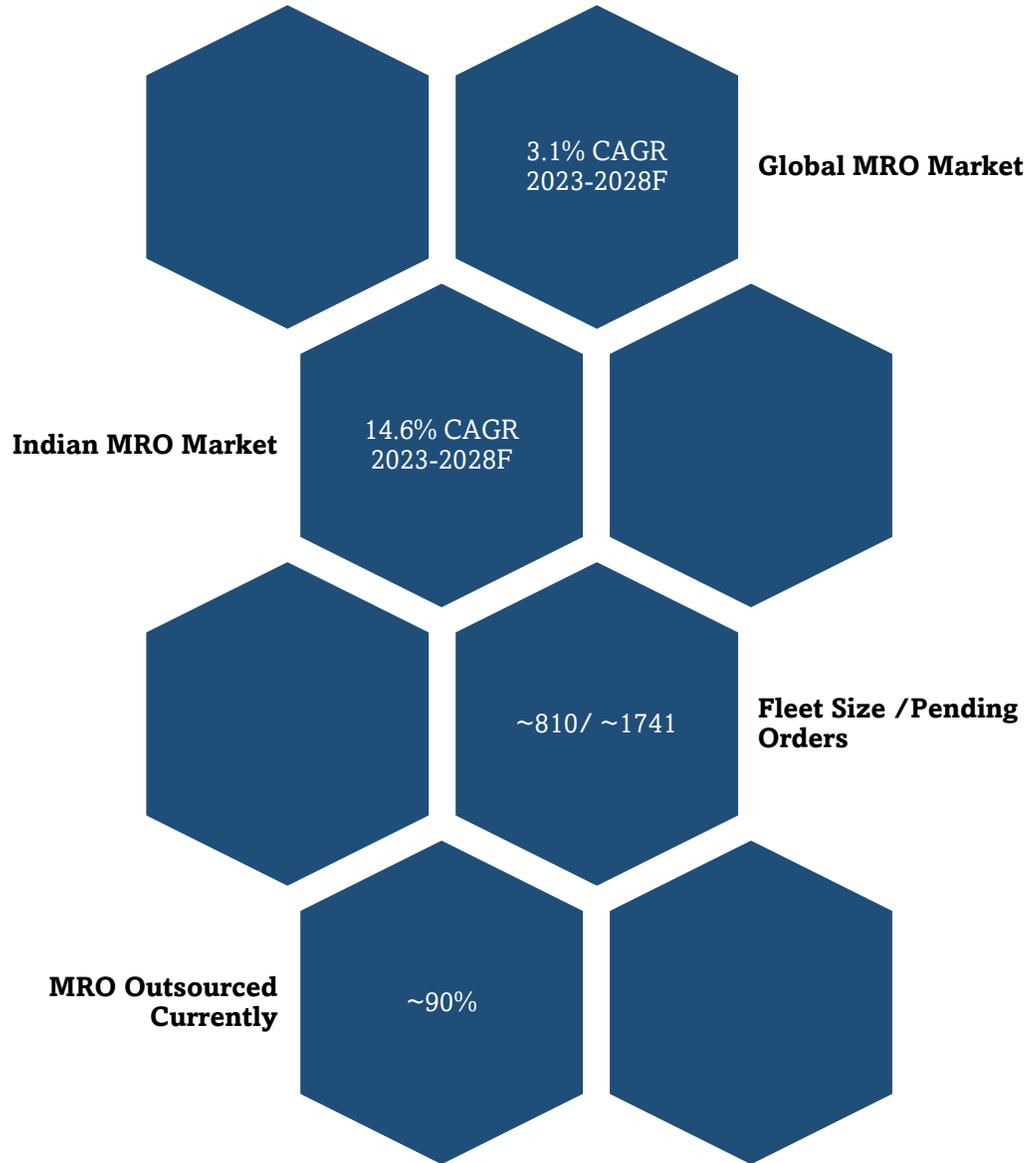
Shift from global hubs to localized MRO capacity

- Traditional MRO hubs in the US, Europe, Singapore, and the Middle East are facing labor, land, and slot constraints. As a result, adding capacity in these locations has become slow and expensive.
- Airlines and lessors are increasingly favoring MRO closer to operating bases to reduce downtime, ferry costs, and scheduling risk.
- This is driving a gradual shift away from hub-centric MRO toward regional and domestic capacity.

India emerging as a structural beneficiary

- India is well positioned to benefit from this shift. The market is moving beyond line maintenance and basic A-checks into C- and D-checks, with early progress in engine and component MRO.
- New MRO clusters are being built around major airports, supported by improving policy, tax, and regulatory frameworks.
- With scale, cost advantages, and proximity to demand, India is narrowing the gap with established global hubs.

MRO: Indian Market to Grow ~4.7x Global Growth Rate



Source: Unimech RHP, Niti Aayog Report, DGCA India, Boeing Airbus Orderbook Data, Anand Rathi Research

MRO Supercycle Is Taking Shape

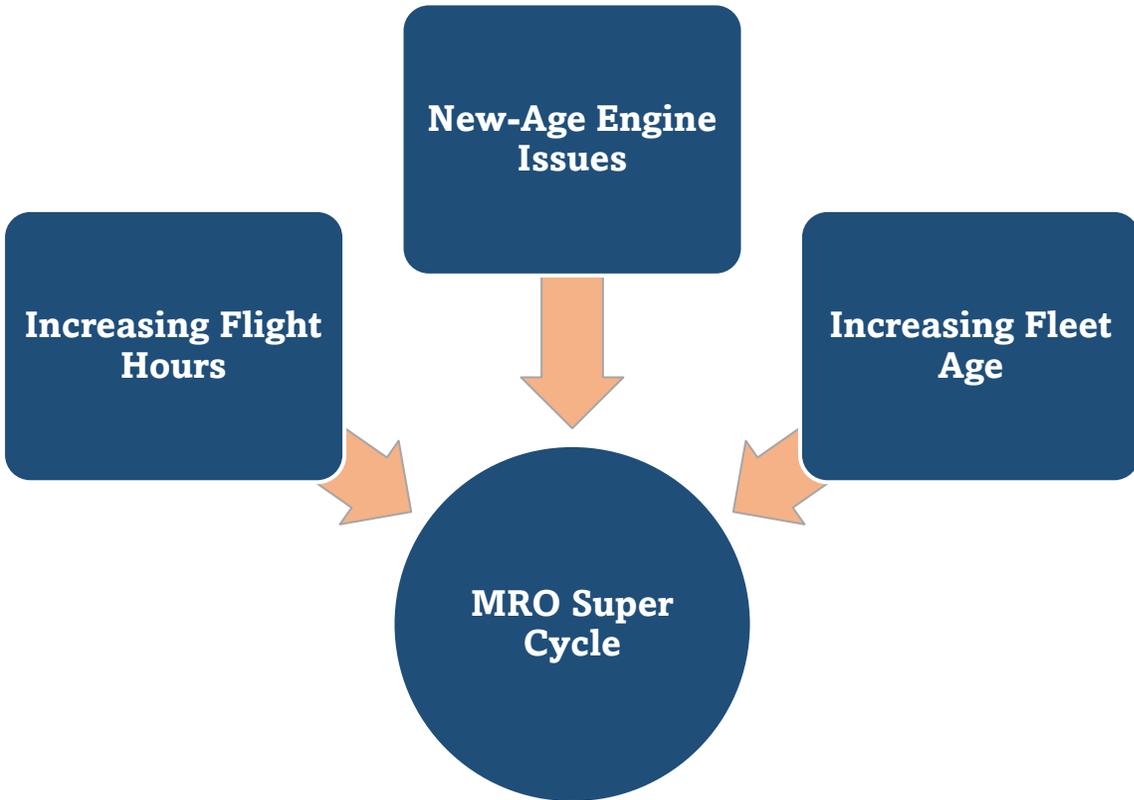
Delivery Delays Extending Fleet Lives

Year	Average age (years)
2017	11.2
2019	11.2
2023	12.5
2024	13.4
2025	13.4+

GTF & LEAP Issues Are Pulling Forward Shop Visits

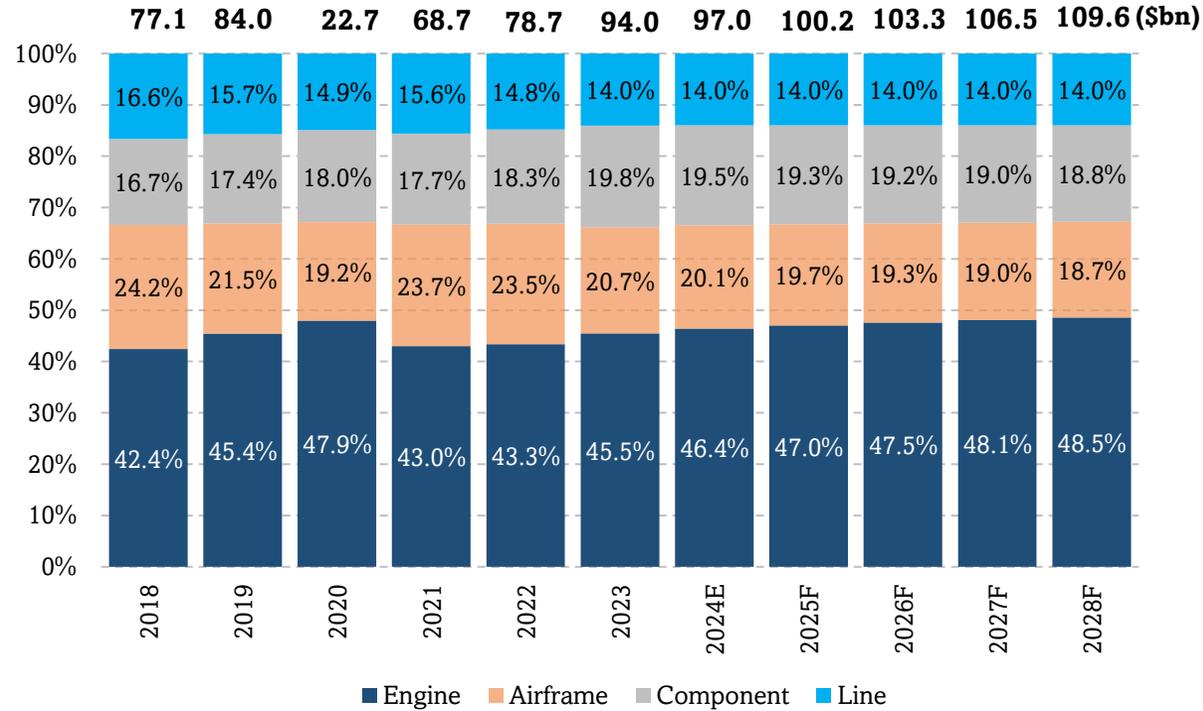
Engine Family	Issue	Fleet Exposure (Cumulative)	Cycles at Early Shop Visit
PW1100G (GTF)	Powder-metal contamination → HPT/HPC disk durability	30–40%	3,000–7,000
PW1100G (GTF)	Premature seal, bearing & hot-section distress	15–25%	2,000–6,000
LEAP-1A / 1B	Fuel nozzle coking & combustor durability	15–25%	~5,000–8,000
LEAP-1A / 1B	Earlier-than-planned shop visits vs CFM56 expectations	10–20%	6,000–10,000

LEAP / GTF: ~20–40% / ~30–70% earlier shop visits vs ~10,000–12,000 cycle planned assumption.

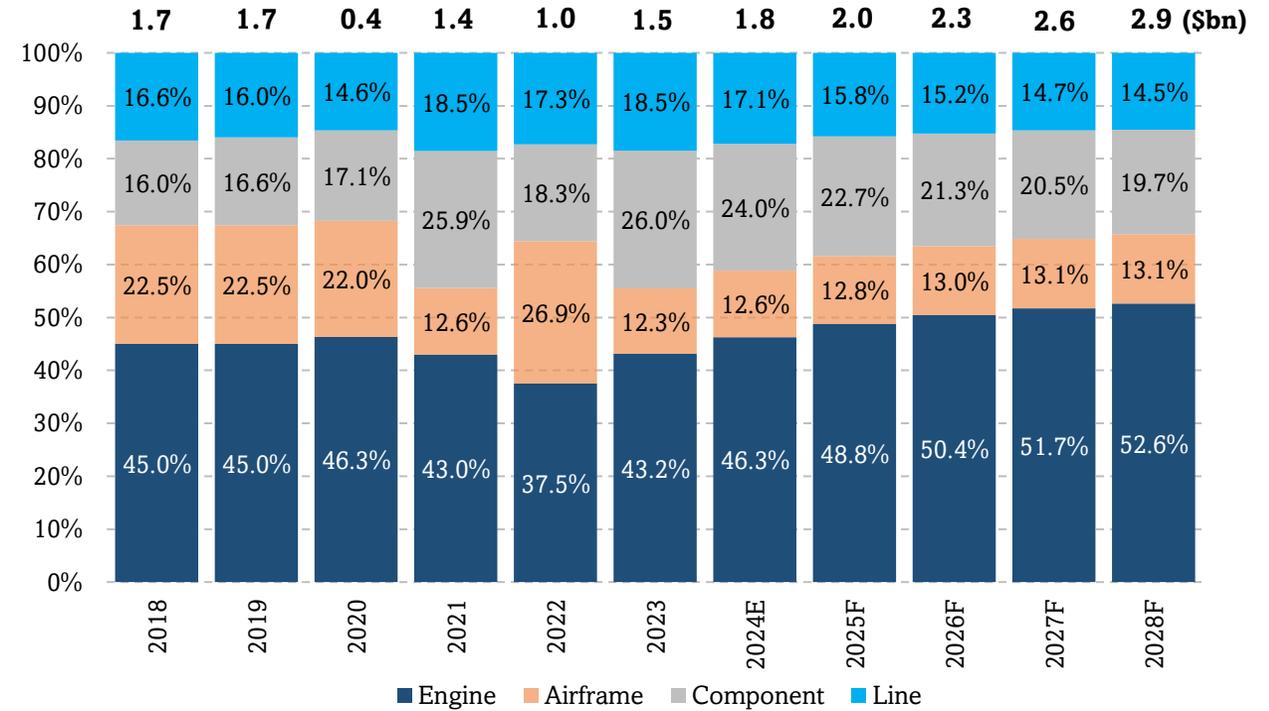


MRO Demand Localizing, Engine Stress Drives Growth

Global MRO Grows Steadily, Engine MRO Remains the Core

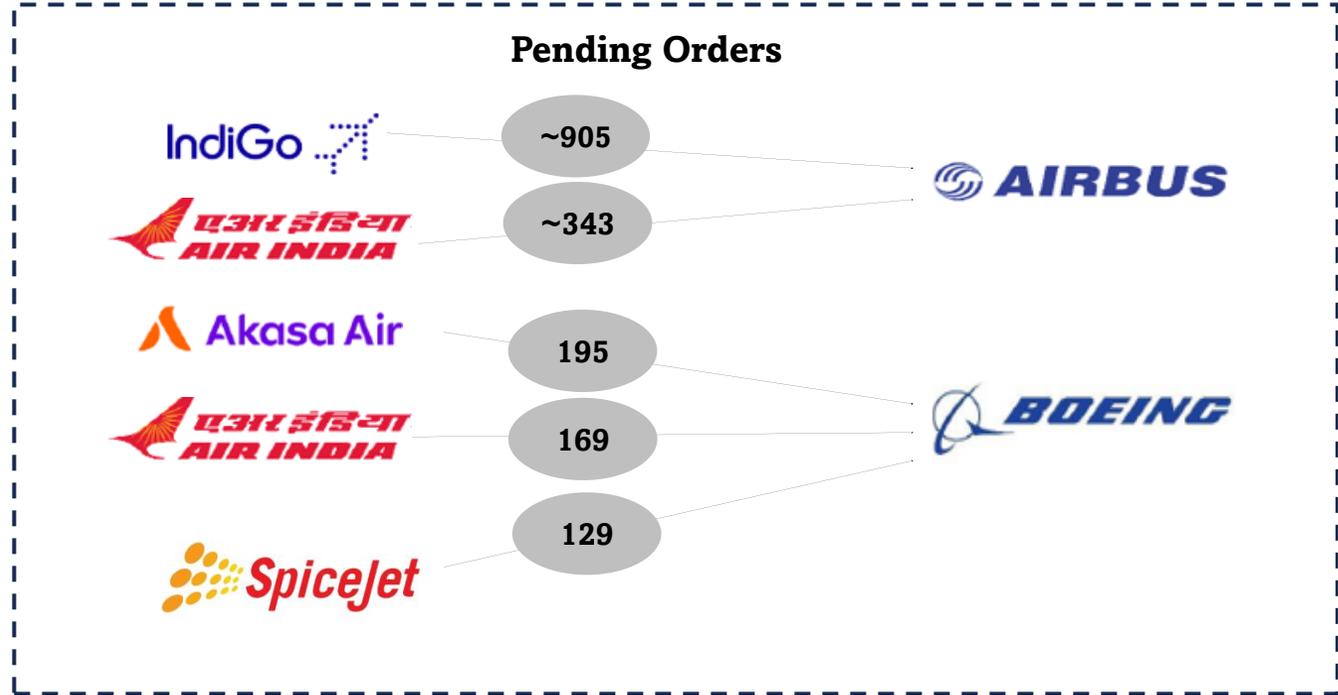
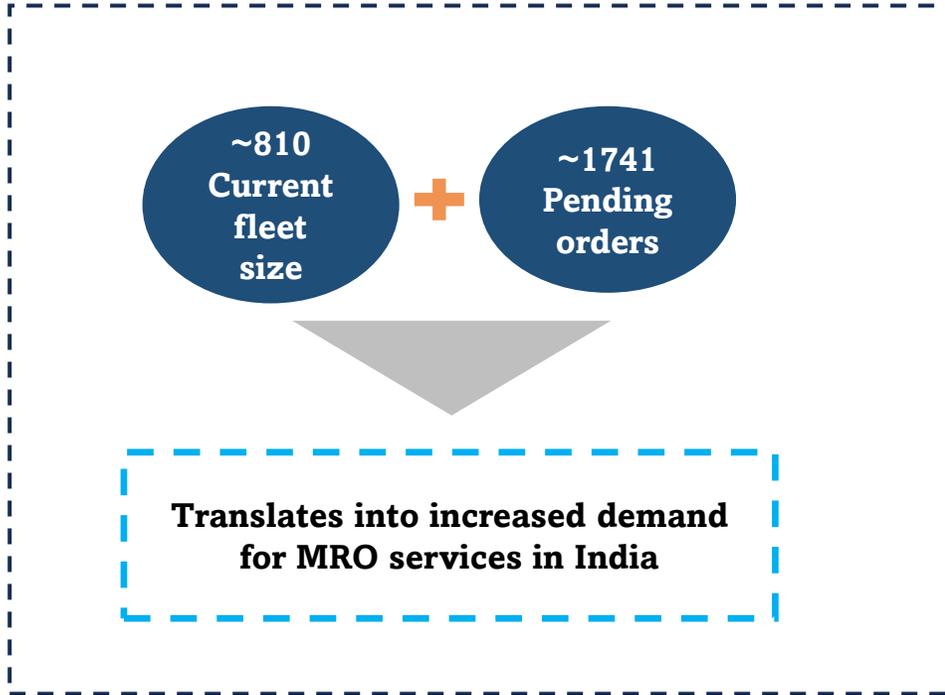


India Outpaces Global Growth, Engine MRO Leads (~19% CAGR)



As utilization rises, MRO demand is shifting closer to the fleet. India's faster growth reflects this localization, with engine MRO leading due to higher cycles and tighter global shop capacity.

Fleet Scale and Growth Underpin Structural MRO Demand



Current Scenario in India...

90%

of MRO services are outsourced to countries like Singapore, UAE, and Sri Lanka.



Line maintenance and airframe maintenance are done in India.



Heavy maintenance (engine and components) is outsourced.

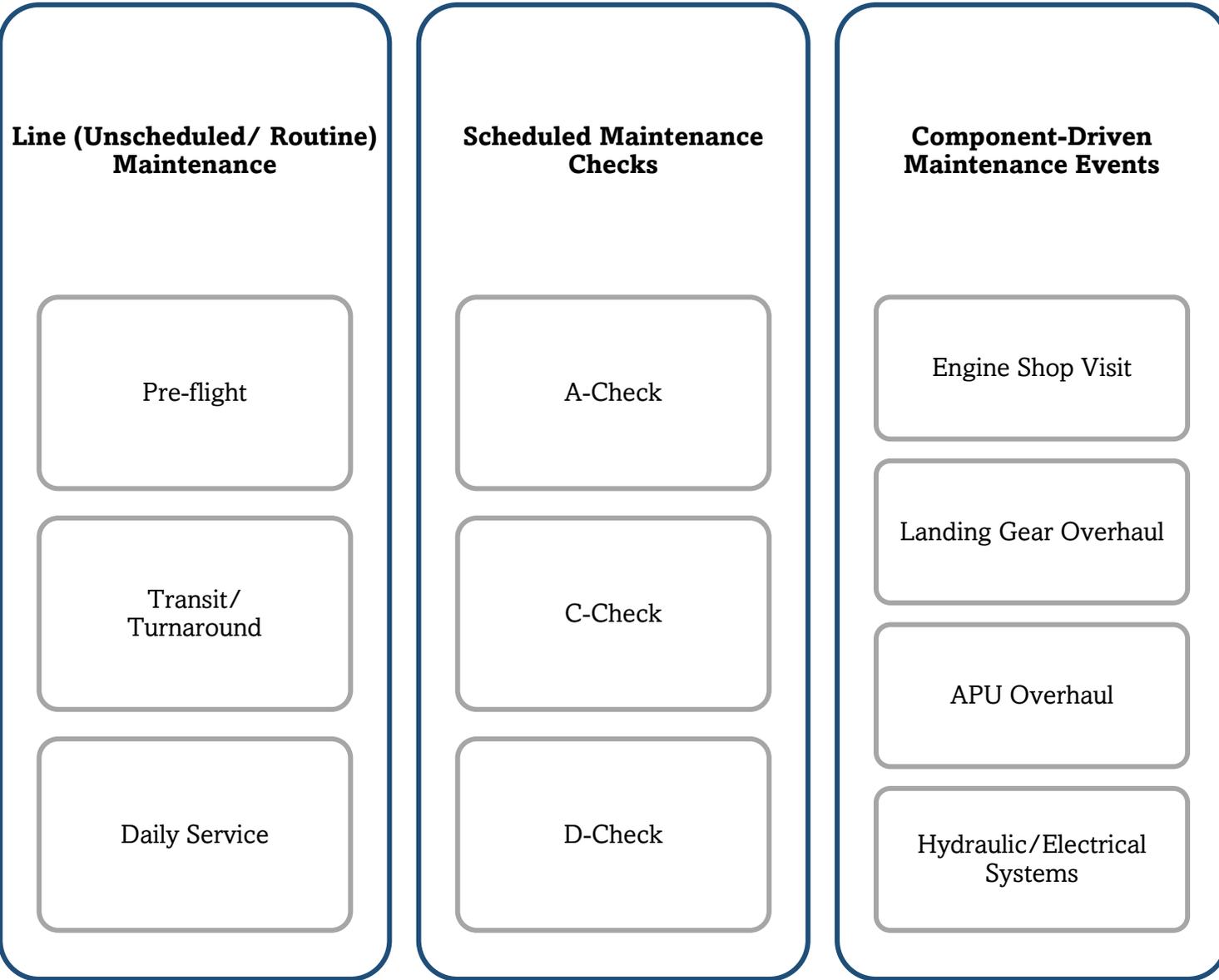
INR Rs97bn

Annual MRO services import by Indian carriers in 2021.

12-15 %

of overall airline revenue is spent on maintenance.

Value Concentrates in Heavy Checks and Components



Line Maintenance	Typical Trigger / Frequency	Downtime
Pre-flight	Before every flight	10–30 min
Transit/Turnaround	Every flight or 2–4 hrs	20–60 min
Daily Service	Every 24–48 hrs	2–4 hrs

Scheduled Checks	Typical Trigger / Frequency	Labor (Narrow/Wide)
A-Check	750–1,200 FH / 40–120 days	50–120 MH/ 100–200 MH
C-Check	7.5–12k FH / 18–36 mo	3,000–6,000 MH/ 4,000–8,000 MH
D-Check	6–12 years (type-dependent)	30,000–50,000 MH/ 40,000–60,000 MH

Component Maintenance	Typical Trigger / Frequency	Downtime
Engine Shop Visit	6–15 years (EGT/cycles margin)	30–90 days
Landing Gear Overhaul	8–12 years or 2,000–4,000 landings	2–4 weeks
APU Overhaul	15–25 years	2–3 weeks
Hydraulic/Electrical Systems	Condition-based (CBM) or 8–10 yrs	Varies (few days–1wk)

India MRO Moving Up the Stack

Operator / Facility	Location	Capability	Status
AIESL – Mumbai	Mumbai – CSIA, Maharashtra	Airframe, Engine, APU, Components	Operational
AIESL – Nagpur (MIHAN)	Nagpur – MIHAN SEZ, Maharashtra	Base Airframe MRO	Operational
AIESL – Line Stations	Delhi, Kolkata, Hyderabad, Trivandrum	Line & Base Maintenance	Operational
Air Works India	Hosur (TN); Mumbai, Delhi	Base & Heavy Maintenance, Components, Paint	Operational
GMR Aero Technic (GAT)	Hyderabad – RGIA, Telangana	Base Airframe MRO	Operational
SpiceJet Technic	Hyderabad; Gurgaon; Metro hubs	Line & Base Maintenance, Components	Operational
Indamer / Horizon Aero (Adani Group)	Nagpur – MIHAN SEZ, Maharashtra	Base Airframe Maintenance	Operational
HAL + Airbus (Civil MRO Wing)	Nashik, Maharashtra	Heavy Checks (C-Checks)	Operational (Civil since 2025)
Safran SAESI – Engine MRO	Hyderabad – GMR Aerospace Park, Telangana	Engine Overhaul	Operational (Nov 2025)
Thales – Avionics MRO Centre	Gurgaon, Haryana	Avionics Repair, Testing, Upgrades	Operational
Lufthansa Technik – India (Partner Network)	Hyderabad, Bengaluru, Mumbai, Delhi	Component MRO, Engine/APU Support, Engineering & Pooling	Operational
StandardAero (India Support)	Pan-India	Engine MRO Support	Operational (Support agreement active)

India MRO Moving Up the Value Stack from line and A-checks toward C/D checks and engine-component MRO

India MRO Capacity Pipeline Taking Shape

Operator / Facility

Location

Capability

Status

UNDER DEVELOPMENT / EXPANDING

Aequis + Magellan Aerospace	Belagavi – Aequis SEZ, Karnataka	Component MRO, Aero-structures	Development / Scaling
IndiGo – In-house MRO	Bengaluru – KIAL, Karnataka	Base & Heavy Airframe Maintenance	Under Development (2027–28)

PLANNED / TARGETED

Air India – Mega MRO	Bengaluru – KIAL, Karnataka	Wide & Narrowbody Base MRO	Target ~2026
SIA Engineering (Air India JV)	Bengaluru, Karnataka	Wide/Narrowbody Base Maintenance	Projected 2026

PROPOSED / STATE-PLANNED

Inavia Aviation (Proposed)	Bhopal – Raja Bhoj Airport, Madhya Pradesh	Line & Base Airframe Maintenance	Proposed / State-Planned
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From Standalone Shops to Emerging MRO Clusters, Capabilities are increasingly co-located and scaling together

Regulatory reforms puts India MRO at par with Singapore/Dubai.

Tax & Cost Competitiveness	Regulatory & Operational Ease	Investment & Capacity Enablement
<ul style="list-style-type: none"> ▪ GST on MRO services reduced to 5% ▪ Duty-free import window extended to 3 years ▪ Simplified customs procedures for spares 	<ul style="list-style-type: none"> ▪ Foreign aircraft allowed to stay up to 6 months ▪ Export/re-import timelines extended (1–5 years) ▪ Single GST registration for MROs 	<ul style="list-style-type: none"> ▪ 100% FDI under automatic route ▪ Airport land lease extended to 30 years ▪ AME liscence validity extended to 10 years

Parameter	India (Post-Reform)	Singapore	Dubai
GST / VAT	5% GST with full ITC	8% GST	5% VAT
Customs friction	Rationalised	Minimal	Minimal
FDI	100% automatic	Open	Open
DGCA / CAAS / GCAA credibility	Improving	Mature	Mature
Cost structure	Lowest	High	Medium

09



Government Initiatives

Aviation Policy Supports Ecosystem Depth and Scale

Manufacturing & Localization

- **Aerospace & Drones PLI:** Value-add incentives (Rs12bn outlay)
- **iDEX/Innovation:** Defence-led innovation grants

Regulatory & Ease of Doing Business

- **Bharatiya Vayuyan Adhiniyam, 2024:** Risk-based, modern aviation law
- **FDI Policy (Civil Aviation):** 100% FDI for MRO

MRO Competitiveness & Scale Enablers

- **Civil MRO Policy (GST, Customs):** 5% GST with full ITC
- **Airport Infrastructure (AAI + PPP):** MRO-ready land and hangar development
- **Aviation Skilling:** AME & technician pipeline

Demand & Ecosystem Pull

- **UDAN:** 600+ regional routes
- **GIFT City (IFSC):** Tax-advantaged leasing hub

Strategic Direction: Policy aims to deepen ecosystem participation rather than create aircraft OEMs, with the focus on scale, capability, and competitiveness over platform ownership.

MRO: The most directly supported aviation segment, where tax, customs, and regulatory reforms materially improve cost competitiveness and ease of doing business.

Civil Manufacturing: Policy support is concentrated on component manufacturing rather than full systems, strengthening Tier-1 and Tier-2 suppliers while complex, IP-heavy systems remain OEM-led.

Aerospace Manufacturing Is Becoming Cluster-Led

Cluster	Model	Ecosystem Depth
Tamil Nadu (Chennai–Hosur)	Industry-facilitated	Broad, still forming
Belagavi (QuEST)	Anchor-led	Narrow but deep
Hyderabad	State + OEM-led	Broad and integrated
Lepakshi (Andhra Pradesh)	Policy-led	Emerging
Devanahalli (KIADB)	State-led	Broad and scaled
Bengaluru (TAAL)	SEZ-led	Limited

Cluster Formation: Aerospace manufacturing in India is increasingly cluster-led, driven by proximity, talent pools, and policy support rather than dispersed standalone facilities.

Ecosystem Depth: Cluster outcomes vary widely, with state-led and anchor-driven ecosystems achieving greater supplier density than policy-only parks.

Strategic Implication: Future manufacturing scale-up is likely to concentrate in a few deepening hubs rather than spread evenly across regions.

India's aerospace ecosystem has shifted from SEZ-led development to state-led, cluster-based execution, with the focus moving from infrastructure creation to scale, depth, and integration.

10  Risks

Key Risks to our Thesis

Risk Category

Trigger Event

Probability

Impact

Primary Exposure

OEM Structure Risk

COMAC aircraft (C919/C929) receive FAA/EASA certification

Low

High

Engines, Structures

Aftermarket Normalisation

GTF & LEAP reliability improves faster than expected

Medium

Medium–High

Engines, MRO

OEM Strategy Shift

Airbus/Boeing increase vertical integration

Medium

Medium

Structures, Engines

China Competitiveness

China retains cost/scale advantage despite geopolitics

Medium

Medium

Structures

Execution & Certification

Delays in Nadcap, OEM audits, AME shortages

Medium

High

Engines, MRO

Aftermarket Control

OEMs tighten control over LLPs & repairs

Medium

Medium

Engine MRO

Cycle Timing Risk

Aircraft cycle turns before India scales capacity

Low–Medium

Medium

All

11



Company Section

Overview

- An integrated aerospace manufacturing company with a strong presence across aerostructures, machining, forging, and precision components.
- Capabilities include precision machining, closed-die forging, surface treatment, and integrated assembly.
- Operates across B2P and integrated B2S work packages

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

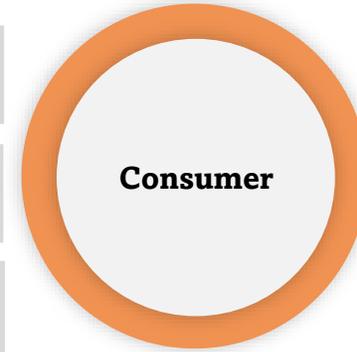
Financials (Rs m)

	FY23	FY24	FY25
Revenue	8,121	9,650	9,246
EBITDA	346	1,223	733
PAT	(1,094)	(142)	(1,023)

Product Portfolio

Aerostructures	Wing and fuselage parts, ribs, spars, and machined structural assemblies
Precision components	Engine and airframe machined parts, brackets, and fittings
Forgings	Aerospace-grade aluminum and titanium forgings

Other Segments



Key Clients



Leadership Team

Name	Current Designation
Aravind Shivaputrappa Melligeri	Executive Chairman & CEO
Rajeev Kaul	Managing Director
Dinesh Iyer	Chief Financial Officer
Ravi Guttal	CTO & SVP
Mohamed Bouzidi	President

Overview

- High-precision engineering company focused on critical rotating and structural components.
- Capabilities include 5-axis machining, exotic material processing, advanced metrology, and special processes.
- Operates across B2P and B2S manufacturing, with high entry-barrier parts.

Product Portfolio

Aero-engine components

Turbine blades, discs, shafts, and rotating parts

Precision Assemblies

Engine and turbine sub-assemblies

Other Segments

Defense, Energy, Oil and Gas

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Financials (Rs m)

	FY23	FY24	FY25
Revenue	2,517	3,408	4,574
EBITDA	723	1,165	1,613
PAT	85	586	865

Key Clients



Leadership Team

Name	Current Designation
Rakesh Chopdar	Chairman & CEO
Murli Krishna Bhupatiraju	Managing Director
Jyoti Chopdar	Whole-Time Director
Vishnu Pramodkumar Malpani	Whole-Time Director
Ronak Jajoo	Chief Financial Officer

Overview

- Focused presence in aerospace precision engineering through its JK Maini Group.
- Capabilities include precision CNC machining, complex geometry processing and aerospace-grade inspection.
- Operates primarily under a B2P model, with selective progression toward higher-value integrated work packages

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Financials (Rs m)

	FY23	FY24	FY25
Revenue	NA	NA	19,470
EBITDA	NA	NA	1,764
PAT	NA	NA	478

Product Portfolio

Aero-engine components	Precision-machined metallic parts and sub-assemblies
Structural components	Brackets, housings, casings, and load-bearing machined parts

Other Segments



Key Clients



Leadership Team

Name	Current Designation
Rakesh Tiwary	Group Chief Financial Officer
Gautam Maini	Managing Director – Engineering Businesses
Jatin Khanna	Head -Corporate Development
Navin Sharma	CFO -Engineering Business

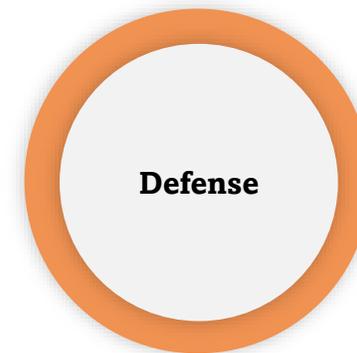
Overview

- Aerospace and defense electronics company focused on indigenisation of avionics and mission systems.
- Capabilities include electronics manufacturing, system integration, and testing.
- Has both Built-to-Print (B2P) and Built-to-Specification (B2S) Capabilities

Product Portfolio

Avionics systems	Displays, control panels, mission electronics, EWIS
LRUs	Airborne electronic modules and subsystems
Interconnect & harness solutions	Cable and wire harnesses, EWIS assemblies

Other Segments



Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	1,864	2,170	2,597
EBITDA	289	321	351
PAT	119	112	79

Leadership Team

Name	Current Designation
Harsh Mohan Gupta	Executive Chairman
Rishab Mohan Gupta	Managing Director
Senthil Balasubramanian	Chief Executive Officer (Ex-Collins Aerospace; former senior roles at ITT Interconnect)
Zeena Philip	Chief Operating Officer
Jayanth V	Chief Financial Officer

Overview

- Founded in 2016, it is a Bengaluru-based aerospace manufacturing company.
- Capabilities include complex CNC machining, assembly, and special processes.
- Operates mainly under B2P with selective B2S work.

Product Portfolio

Aero tooling & GSE	Tooling, fixtures, and ground-support equipment
Precision components	Machined metallic parts and assemblies

Other Segments



Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	942	2,088	2,429
EBITDA	346	792	921
PAT	228	581	835

Leadership Team

Name	Current Designation
Anil Kumar Puttan	Chairman & Managing Director
Ramakrishna Kamojhala	Whole-time Director (Finance) & CFO
Mani P	Whole-time Director (Operations)
Rajanikanth Balaraman	Whole-time Director (IT, BD & Growth)
Preetham S V	Whole-time Director (People & KAM)

Overview

- Engineering, technology, and manufacturing solutions.
- Capabilities include avionics design, embedded systems, electronics manufacturing, qualification testing, and MRO engineering support.
- Operates across B2P electronics manufacturing and B2S/design-led delivery models

Product Portfolio

Aerospace electronics & systems

Avionics LRUs, electronic subsystems, control units

Engineering services

Design, stress analysis, wiring design, certification support

Other Segments

Defense, ESAI

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



BOMBARDIER



Financials (Rs m)

	FY23	FY24	FY25
Revenue	8,220	9,551	10,307
EBITDA	1,455	1,332	1,424
PAT	(47)	334	750

Leadership Team

Name	Current Designation
Dr. Sampath Ravinarayanan	Founder, Chairman & Managing Director
K. P. Mohanakrishnan	Deputy CEO & President – Aerospace
Sharadhi Babu	President – Defense
Sharadhi Babu	Executive Director
Dr. Sampath Ravinarayanan	Founder, Chairman & Managing Director

Overview

- Electronics systems and manufacturing company with a dedicated focus on aerospace, defense, and space electronics.
- Capabilities include electronics design support, manufacturing, integration, and environmental testing.
- Operates across B2P and B2S electronics manufacturing.

Product Portfolio

Aerospace electronics

PCBAs, box-build units, avionics electronics

Mission systems

Power electronics, control electronics, and ruggedized systems

Other Segments

Space, Defense, Communications, Industry, Energy, Medical, Transportation, Automotive

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	9,229	10,908	11,554
EBITDA	761	858	967
PAT	67	(27)	(19)

Leadership Team

Name	Current Designation
Apparao V. Mallavarapu	Chairman & Managing Director (ex-Wipro)
Nikhil Mallavarapu	Joint Managing Director (ex-Analog Devices)
Sundararajan Parthasarathy	Chief Financial Officer
Vinod Chippalkatti	President – Strategic Electronics
Jagadish Singh	President – EMS Business

Overview

- Electronics manufacturing arm of the Cyient Group, focused on safety-critical systems for aerospace and defense.
- Capabilities include electronics design support, manufacturing, integration, and testing.
- Has both Built-to-Print (B2P) and Built-to-Specification (B2S) Capabilities

Product Portfolio

Avionics electronics	PCBAs, box builds, cockpit and mission electronics
Interconnect solutions	Cable and wire harnesses
System integration	Enclosures, racks & cabinets, and integrated electronic sub-systems

Other Segments



Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	8,320	11,919	15,196
EBITDA	877	1,110	1,372
PAT	317	612	681

Leadership Team

Name	Current Designation
B V R Mohan Reddy	Chairman
Siddharth Dholakia	Managing Director & CEO
Vinay Raghuram	Chief Financial Officer
Venkataramana Gade	Director
Rajendra Mane	Director

Overview

- A diversified manufacturer of high-precision engineered products and systems for aerospace, automotive, hydraulics, and defense.
- Capabilities include complex machining, precision fabrication, lightweight structures, and integrated assembly. Operates primarily under B2B/B2S and process-led manufacturing.

Product Portfolio

Aerostructures	Wing, fuselage and structural aircraft components
Aircraft doors	Passenger and cargo door structures and assemblies
Actuators	Flight control and landing gear actuation components

Other Segments



Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	13,157	14,293	14,038
EBITDA	1,812	1,594	1,583
PAT	427	1,218	430

Leadership Team

Name	Current Designation
Mr. Pierre de Bausset	Chairman (Ex-President and MD – Airbus Group India)
Dr. Udayant Malhoutra	CEO and Managing Director
Mr. Chalapathi P	Executive Director and CFO
Prof. Pradyumna Vyas	Independent Director (former Director of National Institute of Design (NID))
Mr. Dietmar Hahn	Non-Executive and Non-Independent Director

Godrej Aerospace (part of Godrej & Boyce Manufacturing)

Overview

- Founded in 1985, part of the diversified Godrej Group.
- Capabilities: Machining, Fabrication, and Assembly of high-complexity aero-engine components and mission-critical structural parts.
- Has both Built-to-Print (B2P) and Built-to-Specification (B2S) Capabilities

Product Portfolio

Aero-Engine Modules	Ventilation assemblies, ducts, shafts, casings, rotating and stationary parts
Flight-critical systems	Actuators, manifolds, and control hardware for advanced defense platforms
Aircraft structural modules	Wing and fuselage structures, pylons, nacelle components, frames, panels, and sub-assemblies

Other Segments



Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Leadership Team

Name	Current Designation
Nisaba Godrej	Executive Chairperson (Group level leadership)
Anil G. Verma	Executive Director & Chief Executive Officer Aerospace, Godrej & Boyce
Jamshyd N. Godrej	Chairman & Managing Director, Godrej & Boyce Mfg. Co. Ltd.
Manek Behramkamdin	Executive Vice President & Head – Aerospace Business, Godrej & Boyce (Former senior executive at Rolls-Royce Aerospace)
Sainath Pisute	Manufacturing Manager – Aerospace, Godrej & Boyce

Overview

- LMW Limited has diversified from textile and machine tools into aerospace through its Advanced Technology Centre (ATC) (set up in 2010).
- LMW ATC manufactures high-precision aerospace & defense components across metallics and composites, including structural parts, sub-assemblies and assemblies

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

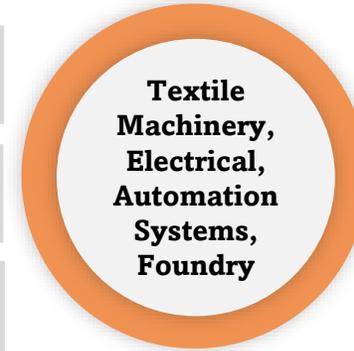
Financials (Rs m)

	FY23	FY24	FY25
Revenue	47,191	46,958	30,120
EBITDA	4,491	4,349	1,392
PAT	3,736	3,840	1,026

Product Portfolio

Precision Machined Components	High-accuracy metallic structural parts
Composite Aero-structure Parts	Composite components for aircraft structures, including bonded / fabricated parts
Aerospace Sub-assemblies	Integrated build packages and sub-assemblies

Other Segments



Key Clients



Leadership Team

Name	Current designation
Sanjay Jayavarthanelu	Chairman & Managing Director, LMW
Jaidev Jayavarthanelu	Director, LMW
M. Sankar	Director – Operations, LMW
K. Soundhar Rajhan	Chief Strategy Officer, LMW
Jayaramappa Raghu	Head – Engineering & Production (Sheet Metal & Welding Value Stream), LMW-ATC Aerospace & Defense Division

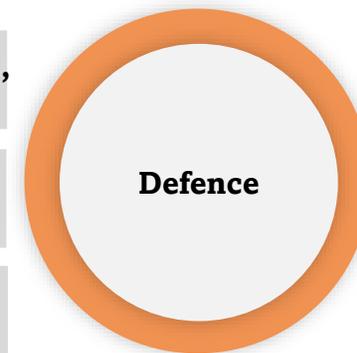
Overview

- Aerospace manufacturing vertical of the Mahindra Group.
- Manufacturing capabilities include precision machining, sheet-metal fabrication, composite processing, surface treatment, and final assembly.
- Has both Built-to-Print (B2P) and Built-to-Specification (B2S) Capabilities

Product Portfolio

Aerostructures	Fuselage/wing components, empennage structures, ribs, spars, brackets, and sheet-metal assemblies
Aero-engine components	Precision-machined metallic parts and structural engine hardware
Integrated assemblies	B2S sub-assemblies supplied into OEM and Tier-1 production lines

Other Segments



Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	1,560	2,339	NA
EBITDA	107	230	NA
PAT	(64)	5	NA

Leadership Team

Name	Current Designation
Arvind Mehra	Managing Director & CEO (Heads the aerospace business)
Vinod Kumar Sahay	President - Aerospace & Defense
Karthik Krishnamurthy	Whole-time Director - Mahindra Aerostructures
Subrahmanya Sarma T.	Chief Financial Officer - Mahindra Aerostructures
Shriprakash Shukla	Director - Mahindra Aerostructures
Abanti Sankaranarayanan	Director - Mahindra Aerostructures

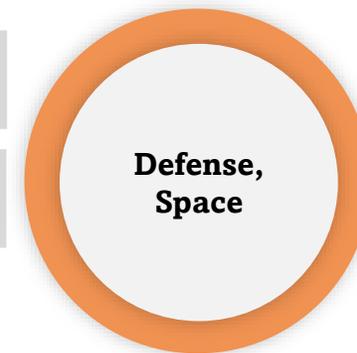
Overview

- Government-owned strategic materials company specializing in advanced alloys and special metals.
- Capabilities include vacuum induction melting, vacuum arc remelting, forging, and advanced metallurgical testing. Operates under a B2S, metallurgy-driven manufacturing model with stringent material qualification requirements

Product Portfolio

Aerospace-grade materials	Titanium alloys, nickel-based superalloys, special steels
Engine & propulsion materials	Forgings, bars, billets, plates for aero-engines and space systems

Other Segments



Defense,
Space

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	8,719	10,726	10,741
EBITDA	2,574	1,941	2,180
PAT	1,562	917	1,108

Leadership Team

Name	Current Designation
Dr. S. V. S. Narayana Murty	Chairman & Managing Director
Madhubala Kalluri	Director (Finance) & CFO
Padavittan Babu	Director (Production & Marketing)
V. T. Rema	Independent Director
Amit Satija	Government Nominee Director

Overview

- Founded in 1963, it is a specialized manufacturer of high-precision titanium and superalloy castings for aerospace and defense.
- Capabilities include precision casting, machining, and metallurgical testing.
- Operates primarily under B2S and proprietary process-led manufacturing

Product Portfolio

Titanium castings	Engine and airframe components
Superalloy components	High-temperature aerospace parts
Precision machined components	Complex structural and engine-critical parts

Other Segments



Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



GE Aerospace



Financials (Rs m)

	FY23	FY24	FY25
Revenue	2,192	2,568	3,080
EBITDA	586	726	752
PAT	258	422	610

Leadership Team

Name	Current Designation
Sachin Agarwal	Chairman & Managing Director
P R Agarwal	Executive Director (Marketing)
Alok Agarwal	Director (Technical)
Smita Agarwal	Director & CFO
James Collins	Chief Technology Officer

Overview

- Aerospace and defense systems company within the RPSG Group ecosystem, focused on high-reliability airborne and ground systems.
- Capabilities include electronics manufacturing, system integration, qualification testing, and lifecycle support. Operates under B2S and licensed manufacturing models

Product Portfolio

Avionics & electronics	Turbine blades, discs, shafts, and rotating parts
Electrical systems	Wiring harnesses, panels, and power distribution units

Other Segments



Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Financials (Rs m)

	FY23	FY24	FY25
Revenue	363	633	1,184
EBITDA	69	121	240
PAT	284	45	161

Key Clients



Leadership Team

Name	Current Designation
Pavan Ranga	Founder & Managing Director
Anuradha V	Director

Overview

- Precision aerospace machining and sub-assembly company headquartered in Bengaluru, focused on global commercial aviation supply chains.
- Capabilities include multi-axis CNC machining, tight-tolerance processing, and aerospace-grade inspection.
- Operates primarily under a B2P model, supplying directly into OEM and Tier-1s.

Product Portfolio

Machined aerospace components

Structural parts, fittings, and precision assemblies

Sub-assemblies

Integrated machined and assembled aerospace hardware

Other Segments

Defense, Telecommunications, Industrial, Medical, Automotive

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	2,268	2,978	4,158
EBITDA	420	400	437
PAT	208	135	83

Leadership Team

Name	Current Designation
Kunal Malani	Director
Rajesh Goel	Director
Laksh Vaaman Sehgal	Director
Anekere Shankaranarayana Umesh	Whole-time Director
Srikanth Garani Sheshadri	Whole-time Director

Overview

- Precision engineering company that has expanded into Aerospace & defense.
- It manufactures ready-to-fit, high-precision machined aerospace parts (notably aluminium & titanium components) and supplies to global aerospace programs as a Tier-1/Tier-2 supplier, including relationships with Airbus and Boeing.

Product Portfolio

Precision Machined Aero-structures

High-precision machined parts (Al/Ti/SS)

Actuation Systems Components

Machined parts / linkages / sub-parts

Doors & Interiors

Door components and selected interiors hardware

Other Segments

**Automotive,
Semi
Conductor,
Defense**

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Financials (Rs m)

	FY23	FY24	FY25
Revenue	23,460	28,114	30,168
EBITDA	3,848	4,799	5,148
PAT	1,483	1,875	2,169

Key Clients



MEGGITT



Leadership Team

Name	Current designation
S Sekhar Vasan	Chairman and Managing Director
F R Singhvi	Joint Managing Director
Praveen Chauhan	Head of Corporate Strategy
Vikas Goel	Chief Financial Officer
Hari Krishnan	CEO – Aerospace, Defence & Semiconductor (ADS) division

Overview

- An integrated special steel manufacturer that is expanding into Aerospace & defense materials through its Super Alloys portfolio.
- The company produces high-cleanliness, high-performance alloy steels / superalloys using advanced refining routes (EAF + Ladle Refining + Vacuum Degassing, ESR/VAR)

Product Portfolio

Alloy Steel Bars	High-strength alloy steel long products for aerospace/defense components
Forging-quality Special Steel	Steel for critical forgings (shafts, pins, fasteners, hardware)
Stainless Special Steel	Corrosion-resistant steel bars for aerospace/defense hardware

Other Segments



Construction,
Automotive,
Defense and
Railways

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	34,884	34,153	35,356
EBITDA	4,464	3,750	3,891
PAT	14,353	14,355	16,208

Leadership Team

Name	Current designation
Pranav Bhardwaj	Managing Director
Dev Dyuti Sen	Chief Executive Officer (CEO)
Ramchandra Vasant Dalvi	Whole-time Director (Technical) / Director – Technical
S. Mahadevan Iyer	Chief Financial Officer (CFO)
Ravi Bhushan Bhardwaj	Non-Executive Chairman

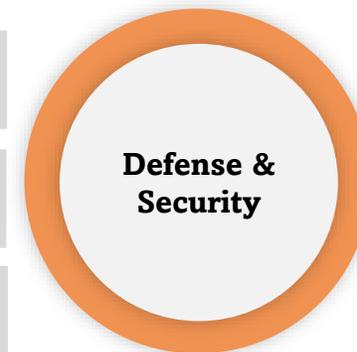
Overview

- Aerospace and defense platform company of the Tata Group, engaged in airframe manufacturing, systems integration, and platform-level execution.
- Capabilities include advanced composites, large-structure assembly, precision machining, systems integration, and testing.
- Has both Built-to-Print (B2P) and Built-to-Specification (B2S) Capabilities

Product Portfolio

Aero-engine modules	Fuselage sections, wings, empennage parts, doors, structural assemblies
Composite structures	Aerostructures, fuselage & wing assemblies, nacelles, pylons, doors and interiors
Flight-critical actuation systems	Linear & rotary actuators, electro-mechanical assemblies, manifolds, and flight-control hardware

Other Segments



Defense & Security

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Leadership Team

Name	Current Designation
Sukaran Singh	Managing Director & CEO - Leads TASL's aerospace & defense platform
Banmali Agrawala	Chairman
Jitendra R. Muthiyan	Chief Financial Officer
Arvind Nanda	Director

Financials (Rs m)

	FY23	FY24	FY25
Revenue	33,473	46,763	50,512
EBITDA	2,718	6,524	6,950
PAT	NA	905	665

TATA Boeing Aerospace Limited

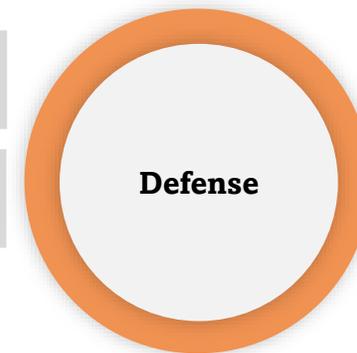
Overview

- Joint venture between Tata Advanced Systems Limited and Boeing, focused on aerostructures for global Boeing platforms
- Capabilities include large-structure fabrication, machining, assembly, and quality assurance
- Operates predominantly under a B2P, rate-based production model

Product Portfolio

Aerostructures	Fuselages and primary structures for helicopters
Composite structures	Complex B2P structural assemblies

Other Segments



Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	4,580	5,194	4,471
EBITDA	1,147	1,098	519
PAT	788	762	355

Leadership Team

Name	Current Designation
Sukaran Singh	Managing Director & CEO - Heads the JV operations
Salil Anil Gupte	Director (President of Boeing International Corporation India Pvt Ltd)
Maya Swaminathan Sinha	Director
Bontha Prasada Rao	Director
Norman Anil Kumar Browne	Director
Kathleen Rae Jolivette	Director

Overview

- Precision engineering company focused on the aerospace and defense sectors, delivering complex, high-accuracy manufacturing and engineering solutions.
- Trusted partner to OEMs, defense PSUs and Tier-1 suppliers across critical aerospace and defense programs.

Product Portfolio

Aerospace & Defense Tooling	Assembly tooling, jigs & fixtures, MRO tooling, ground support equipment
Precision components	Tight-tolerance structural & mechanical parts
Automation Systems	Automated assembly lines, special purpose machines

Other Segments

Defense,
Industrial
Automation,
Precision
Mfg

Operating in Segments

Aerostructures	Engines	LG & Actuators
Avionics	Doors & Interiors	MRO

Key Clients



Financials (Rs m)

	FY23	FY24	FY25
Revenue	264	388	495
EBITDA	41	68	86
PAT	13	28	31

Leadership Team

Name	Current Designation
Nimesh R. Desai	Managing Director & Promoter
Kalpana N. Desai	Non-Executive Director
Manish Gupta	Independent Director
Haridas N. Bhabad	Independent Director

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Annexures

Engine - Annexure

Evolution: Performance → Fuel Efficiency

Decade / Year	Engine Type Evolution	Common Engine Type	CFM Engines	Pratt & Whitney Engines	GE Engines	Rolls-Royce Engines
1960s	Piston → Early Turboprop / Low-bypass Turbofan	Turboprop / Low-bypass Turbofan	-	PT6, JT8D	CF700, CJ610	Spey (low-bypass turbofan)
1970s	Low-bypass → High-bypass Turbofan	High-bypass Turbofan	-	JT9D	CF6, CF6-80	RB211
1980s	Medium → High-bypass Turbofan (NB & WB expansion)	Medium / High-bypass Turbofan	CFM56-2 / -3 / -5 / -7	PW100, PW200, PW4000	CF34	Trent 700, 800, 500
1990s	High-bypass Turbofan proliferation	Business Jet / Wide-body Turbofan	-	PW300, PW6000	GE90	Trent 700, Trent 800
2000s	High-bypass → Advanced Wide-body Turbofan	High-bypass Turbofan	-	-	GP7000 (Engine Alliance JV*)	Trent 900, 1000, XWB
2010s & onwards	High-bypass → Geared / Advanced Turbofan	Geared / Advanced High-bypass Turbofan	LEAP-1A / 1B / 1C	PW1000G family (PW1100G-JM), PW1500G, PW1900G)	GE9x-1B / -2B, GE9X, Passport, Affinity	Trent 7000, Pearl

Fuel-Efficient Turbofans: Dominating the Market

Segment	Sub-Segments	Description / Key Insights
By Engine Type	<ul style="list-style-type: none"> • Turboprop • Turboshaft • Turbofan • Piston 	Different engine architectures address distinct performance envelopes - turbofans dominate commercial aviation due to superior fuel efficiency and range, while turboprops and turboshafts are optimized for regional, short-haul, and rotary-wing operations. Ongoing advancements focus on higher bypass ratios, noise reduction, and lower emissions.
By Technology	<ul style="list-style-type: none"> • Conventional • Electric 	Conventional propulsion remains the backbone of commercial aviation, particularly for medium- and long-haul aircraft. However, electric and hybrid-electric technologies are gaining traction for short-range, regional, and urban air mobility applications, driven by decarbonization goals and regulatory pressure.
By Component	<ul style="list-style-type: none"> • Compressor • Turbine • Gearbox • Fuel System • Combustion Chamber 	Engine performance and lifecycle economics are heavily influenced by the efficiency and durability of core components such as compressors, turbines, gearboxes, and fuel systems. Innovations in materials, cooling technologies, and combustion design are critical to improving thermal efficiency and reducing operating costs.
By End Use – Commercial	<ul style="list-style-type: none"> • Narrow & Wide Body • Business Jet • Helicopter 	The commercial aviation segment represents the largest demand driver, supported by sustained fleet expansion, rising air traffic, and replacement of older aircraft. Narrow-body aircraft dominate engine volumes, while wide-body engines command higher value due to complexity and long-haul requirements.
By End Use – Commercial	<ul style="list-style-type: none"> • Narrow and Wide body • Business Jet • Helicopter 	Commercial aviation is the largest demand segment, driven by fleet expansion and replacement of older aircraft. Narrow-body engines dominate volumes, while wide-body, business jet, and helicopter engines contribute higher value and specialized performance requirements.

Next-Gen Engines: Light, Efficient and Sustainable

Technology	Description
Digital Engines & Predictive MRO	Engine-embedded sensors and analytics enable real-time health monitoring, fault prediction, and optimized maintenance scheduling.
Hybrid-Electric Assistance	Integration of electric motors with conventional engines to improve fuel efficiency, reduce emissions, and support electrified aircraft systems.
Open / Unducted Fan (RISE)	Ultra-high-efficiency open-fan propulsion concepts delivering step-change reductions in fuel burn and CO ₂ emissions.
Advanced High-Bypass & Geared Turbofans	Next-generation turbofan architectures that increase propulsive efficiency, lower noise, and reduce operating costs.
Boundary Layer Ingestion	Propulsion integration technique that ingests slower airflow over the aircraft surface to reduce drag and improve overall efficiency.
Ceramic Matrix Composites (CMC)	High-temperature, lightweight materials enabling hotter engine operation, higher efficiency, and longer component life.
Additive Manufacturing (3D Printing)	Advanced manufacturing method allowing complex, lightweight engine components with fewer parts and faster production cycles.
Hydrogen Propulsion	Use of hydrogen as an energy source—via combustion or fuel cells—to achieve near-zero in-flight carbon emissions.
Sustainable Aviation Fuels (SAF)	Drop-in alternative fuels produced from sustainable feedstocks that significantly reduce lifecycle carbon emissions.

Aerostructure - Annexure

Aircraft Variants

Airbus: Narrow-body Models

Model	Important Variants
A220	100, 300
A318	100 (with different engine options)
A319	100, CJ, Neo
A320	100, 200, Neo
A321	100, 200, Neo (LR, XLR)

Airbus: Wide-body Models

Model	Important Variants
A300	B1, B2, B4, 600, 600ST (Beluga)
A310	200, 300
A330	200, 300, 800Neo, 900Neo
A340	200, 300, 500, 600
A350	900, 900ULR, 1000

Boeing: Narrow-body Models

Model	Important Variants
717	200
727	100, 200 Advanced
737	100, 200, Classic (300/400/500), NG (600/700/800/900), Max (7/8/9/10)
757	200, 300

Boeing: Wide-body Models

Model	Important Variants
707	100, 200, 300, 400
747	100, 100SR, 100BSR, 100B, 100SP, 200, 300, 400, 8
767	200, 200ER, 300, 300ER, 300F, 400ER
777	200, 200ER, 200LR (Worldliner), 300, 300ER, 8, 9, X
787	8, 9, 10

Aerostructure - Annexure

Airbus & Boeing Material Composition Evolution

Narrow-body		
Model	Entry / First Flight	Primary Composite / Metal Parts
A320	1987	Composite tail, fairings; metal fuselage and wing box
A321	1993	Composite tail, fairings; metal fuselage and wing box (stretched variant)
A319	1995	Composite tail, fairings; metal fuselage and wing box (shorter variant)
A318	2003	Composite tail, fairings; metal fuselage and wing box (smallest A3XX family)
A220	2013 (C-Series), Airbus 2018	Composite wings (CFRP), empennage; aluminium-lithium fuselage
Wide-body		
Model	Entry / First Flight	Primary Composite / Metal Parts
A300	1972	Aluminum fuselage, wings, tail; limited fiberglass fairings (pioneer wide-body)
A310	1982	Composite tail units; metal fuselage and wings (early composite adoption)
A330	1992	Primary structure aluminum; Composite tail, nacelle cowlings, fairings; metal fuselage and wings (twin-engine)
A340	1993	Primary structure aluminum; Composite tail, spoilers, floor beams, fairings; metal fuselage and wings (four-engine)
A380	2007	CFRP centre/outer wing box, tail, floor beams; GLARE aluminium-fiberglass upper fuselage; metal fuselage panels (~30-35% composite content)
A350 XWB	2015	Composite fuselage barrels, wings, empennage (~53% composite content); aluminum-lithium and titanium secondary structure (industry-leading composite integration)

Narrow Body		
Model	Entry / First Flight	Primary Composite / Metal Parts
727	1963	Aluminum fuselage, wings, tail; composite nose radomes and fairings
737	1967	Aluminium fuselage, wings, tail; secondary-structure composites (rudder, elevator, fairings, radomes)
757	1982	Aluminum fuselage and wings; composite tail, rudder, and control surfaces
717	1999	Aluminum fuselage and wings; composite rudder, elevator, and fairings
737 MAX	2017	Aluminum fuselage and wings; composite rudder, elevator, winglet structures, and fairings (enhanced vs. 737 NG)
Wide Body		
Model	Entry / First Flight	Primary Composite / Metal Parts
707	1957	Aluminum fuselage, wings, tail; limited fiberglass fairings
747	1970	Aluminum fuselage, wings, tail; limited composites in control surfaces and fairings
767	1981	Aluminum fuselage and wings; composite tail, rudder, elevator, and fairings
777	1995	Aluminum fuselage and wings; composite tail, nacelle cowlings, floor beams, fairings
787 Dreamliner	2011	CFRP fuselage barrels and wings (~50% structural weight); titanium and aluminum-lithium for secondary structure

Note: Figures indicative and rounded; composites include CFRP & GLARE; CFRP/GLARE means Carbon Fiber Reinforced Polymer / Glass Laminated Aluminum Reinforced Epoxy.

Source: Airbus & Boeing program disclosures; OEM material composition statements; Anand Rathi Research estimates

Aerostructure - Annexure

Next Gen Structures: Lighter, Smarter and More Automated

Technology	Description
Digital Twin & Smart Manufacturing	Virtual models connected to real-time data to optimize design, production efficiency, and lifecycle management.
Advanced Composites (Carbon Fiber, Thermoplastics)	High-strength, lightweight materials offering improved fatigue resistance, corrosion resistance, and fuel efficiency over metals.
Additive Manufacturing (3D Printing)	Layer-by-layer fabrication enabling complex, lightweight aerospace components with lower material waste and faster production.
Out-of-Autoclave (OOA) Composite Processing	Composite curing methods that eliminate autoclaves, reducing manufacturing cost, energy use, and infrastructure needs.
Automated Fiber Placement (AFP) & Automated Tape Laying (ATL)	Robotic composite lay-up technologies that enhance precision, repeatability, and structural performance.
Multifunctional / Smart Materials (Structural Health Monitoring)	Sensor-embedded materials that enable real-time monitoring of structural integrity and damage.

Landing Systems & Actuator - Annexure

Next-Gen Landing Systems: Electric, Efficient and Safer

Technology	Description
Electrification of Landing Systems	Replacement of hydraulic functions with electric actuation to reduce weight, improve reliability, and simplify maintenance.
Lightweight & Advanced Materials	Use of high-strength alloys, composites, and titanium to reduce landing gear weight while maintaining durability and safety.
Health & Usage Monitoring Systems (HUMS)	Sensor-based systems that track loads, cycles, and wear to enable condition-based maintenance and improve reliability.
Digital Twins & Predictive Analytics	Virtual landing gear models combined with operational data to predict failures, optimize maintenance, and extend component life.
Additive Manufacturing	3D printing of complex landing gear components to reduce part count, lead times, and overall manufacturing cost.
Modular Landing Gear Design	Standardized, interchangeable sub-assemblies that simplify maintenance, upgrades, and aircraft variant customization.
Advanced Braking & Anti-Skid Systems	Electronically controlled braking systems that enhance stopping performance, reduce tire wear, and improve runway safety.
Emergency & Autonomous Features	Smart systems enabling automatic retraction, emergency extension, and fault-tolerant operation under abnormal conditions.

Landing Gear & Actuator - Annexure

Understanding Actuators & Types

A device that converts electricals, hydraulic or pneumatic power into motion, executing commands from pilot or onboard computers



Landing Gear & Actuator - Annexure

Next-Gen Actuation: Electric, Intelligent and Reliable

Technology	Description
Shift to EMAs	Transition from hydraulic to electromechanical actuators to reduce weight, improve efficiency, and simplify aircraft systems.
More-Electric Aircraft	Increased use of electric power across aircraft systems to enhance efficiency, reliability, and maintenance economics.
Hybrid Actuators (EHA/EMHA)	Combination of electrical and hydraulic actuation delivering high force capability with improved redundancy and efficiency.
Smart / Health-Monitoring Actuators	Actuators embedded with sensors and diagnostics to enable real-time condition monitoring and predictive maintenance.
Higher Power Density	Advanced motor, material, and thermal designs allowing more force output from smaller, lighter actuator systems.
Increased Redundancy	Multi-channel and fault-tolerant architectures ensuring continued safe operation in case of component failure.
Digital & Fly-by-Wire Integration	Seamless integration of actuators with digital flight control and fly-by-wire systems for precise and responsive control.
Lifecycle Cost Optimization	Design focus on reducing total ownership cost through improved reliability, lower maintenance, and longer service life.

Doors and Interiors- Annexure

Next-Gen Doors: Safer, Lighter and Smarter

Trend	Crisp Description
Advanced Plug & Plug-Type Door Architectures	Wider adoption of pressure-assisted plug doors and door-plugs to improve fail-safe behavior and reduce blow-out risk under pressurization
Digital Door Monitoring & Smart Sensors	Embedded sensors provide real-time status of door locking, latching, and pressurization to cockpit and maintenance systems
Automation & Error-Proofing in Door Operation	Increased automation in door closing, arming, and indication logic to minimize human error during ground and turnaround operations
Lightweight Materials & Integrated Structures	Greater use of composites and hybrid metallic designs to reduce weight while maintaining structural integrity and sealing performance
Digital Traceability & Lifecycle Quality Control	End-to-end digital tracking of door parts, builds, inspections, and service history to support certification and aftermarket reliability

Next-Gen Interiors: Lighter, Smarter and Greener

Trend	Description
Lightweight & Advanced Materials	Reduces aircraft weight to improve fuel burn and operational efficiency.
Cabin Densification & Optimization	Optimizes cabin layout for more seats while balancing comfort and operational efficiency.
Modular & Reconfigurable Interiors	Allows rapid cabin reconfiguration and customization across airlines and routes.
Digital & Connected Cabins	Integrates sensors, infotainment, and connectivity to enhance passenger experience and operational insight.
Sustainability & ESG Focus	Use of eco-friendly materials, energy-efficient systems, and compliance with environmental regulations.
Aftermarket & Retrofit Growth	Upgrades existing cabins for comfort, functionality, and revenue optimization over aircraft lifecycle.

Door Source: Airbus aircraft systems documentation; Boeing aircraft systems manuals; Collins Aerospace door systems disclosures; Safran Aerosystems disclosures; Liebherr-Aerospace disclosures; Anand Rathi Research

Interiors Source: Airbus cabin technology roadmaps; Boeing interiors innovation publications; Collins Aerospace disclosures; Safran Cabin disclosures; industry sustainability publications; Anand Rathi Research

Types of MRO

Line Maintenance (Unscheduled / Routine)

Check Type	Typical Trigger / Frequency	Downtime	Scope of Work
Pre-flight	Before every flight	10–30 min	Walk-around inspection, cockpit checks, fluid level verification, tire/brake condition, exterior damage assessment, emergency equipment operational check
Transit/Turnaround	Every flight or 2–4 hrs	20–60 min	Visual inspection between flights, hydraulic/fluid checks, tire & brake condition, obvious damage verification, minor component replacements (bulbs, fuses), cabin cleaning & restocking
Daily Service	Every 24–48 hrs	2–4 hrs	Light inspection, fluid servicing, cabin checks & cleaning, screen washing, minor troubleshooting, quick component replacements to maintain airworthiness

Scheduled Maintenance Checks

Check	Typical Trigger / Frequency	Labor (Narrow / Wide)	Scope of Work
A-Check	750–1,200 FH / 40–120 days	50–120 MH / 100–200 MH	Routine airframe/engine/systems inspection; filter & fluid changes; brake/tire verification; exterior visual; avionics checks
C-Check	7.5–12k FH / 18–36 mo	3,000–6,000 MH / 4,000–8,000 MH	Comprehensive structural inspection (fuselage, wings, skin); systems/hydraulic/electrical tests; NDT; landing gear & avionics detailed inspection; lubrication; component teardown (1–4 wks downtime)
D-Check	6–12 years (type-dependent)	30,000–50,000 MH / 40,000–60,000 MH	Complete airframe teardown; structural corrosion treatment; interior removal (seats, galleys, lavatories); engine/APU overhaul; landing gear rebuild; full systems revalidation; painting & restoration (4–10 wks downtime)

FH = Flight Hours | Wide-body (esp. B787) extended intervals due to modern materials (composite) & design; higher labor intensity but lower frequency = better fleet economics

Component-Driven Maintenance Events

Component	Typical Trigger / Frequency	Downtime	Scope of Work
Engine Shop Visit	6–15 years (EGT/cycles margin)	30–90 days	Full engine disassembly, inspection of all rotating & static components, blade damage assessment, bearing & seal replacement, compressor/turbine refurbishment, test cell run & certification
Landing Gear Overhaul	8–12 years or 2,000–4,000 landings	2–4 weeks	Complete teardown & inspection; actuator, cylinder & bearing replacement; wheel/tire rebuild; brake system service; reassembly & functional testing with shimmy damper inspection
APU Overhaul	15–25 years	2–3 weeks	Engine-style disassembly & inspection; fuel system servicing; electrical/hydraulic support systems check; component replacement per engine serial & cycle limits; functional ground testing
Hydraulic/Electrical Systems	Condition-based (CBM) or 8–10 yrs	Varies (few days–1 wk)	Fluid sampling & analysis, hose & line inspection, pump/valve functional testing, motor & actuator bench checks, electrical connector corrosion treatment, replacement per condition or time limits

Operational MRO centers in India

Operator / Facility	Location	Capability	Aircraft Types	Approvals	Status
AIESL – Mumbai	Mumbai – CSIA, Maharashtra	Airframe, Engine, APU, Components	A320 family, B737, B787, A330	DGCA, FAA (select), EASA (components)	Operational
AIESL – Nagpur (MIHAN)	Nagpur – MIHAN SEZ, Maharashtra	Base Airframe MRO	A320 family	DGCA, EASA	Operational
AIESL – Line Stations	Delhi, Kolkata, Hyderabad, Trivandrum	Line & Base Maintenance	A320 family, B737	DGCA	Operational
Air Works India	Hosur (TN); Mumbai, Delhi	Base & Heavy Maintenance, Components, Paint	A320, B737, ATR	DGCA, EASA	Operational
GMR Aero Technic (GAT)	Hyderabad – RGIA, Telangana	Base Airframe MRO	A320 family, B737	DGCA, EASA	Operational
SpiceJet Technic	Hyderabad; Gurgaon; Metro hubs	Line & Base Maintenance, Components	B737, Q400	DGCA	Operational
Indamer / Horizon Aero (Adani Group)	Nagpur – MIHAN SEZ, Maharashtra	Base Airframe Maintenance	A320 family	DGCA, EASA	Operational
HAL + Airbus (Civil MRO Wing)	Nashik, Maharashtra	Heavy Checks (C-Checks)	A320 family	DGCA	Operational (Civil since 2025)
Safran SAESI – Engine MRO	Hyderabad – GMR Aerospace Park, Telangana	Engine Overhaul	LEAP-1A, LEAP-1B	DGCA, EASA, FAA	Operational (Nov 2025)
Thales – Avionics MRO Centre	Gurgaon, Haryana	Avionics Repair, Testing, Upgrades	A320, B737, A330, B787	DGCA, EASA	Operational
Lufthansa Technik – India (Partner Network)	Hyderabad, Bengaluru, Mumbai, Delhi	Component MRO, Engine/APU Support, Engineering & Pooling	A320 family, A330, A350, B737, B787	DGCA, EASA, FAA (via Lufthansa Technik)	Operational
StandardAero (India Support)	Pan-India	Engine MRO Support	LEAP-1B	DGCA, OEM approvals	Operational (Support agreement active)

Upcoming MRO centers in India

Operator / Facility	Location	Capability	Aircraft Types	Approvals	Status
UNDER DEVELOPMENT / EXPANDING					
Aequis + Magellan Aerospace	Belagavi – Aequis SEZ, Karnataka	Component MRO, Aero-structures	A320, B737, A350 (components)	DGCA, EASA, AS9100	Development / Scaling
IndiGo – In-house MRO	Bengaluru – KIAL, Karnataka	Base & Heavy Airframe Maintenance	A320 family	DGCA (planned), EASA (planned)	Under Development (2027–28)
PLANNED / TARGETED					
Air India – Mega MRO	Bengaluru – KIAL, Karnataka	Wide & Narrowbody Base MRO	A320, A350, B787	DGCA (planned), EASA (planned)	Target ~2026
SIA Engineering (Air India JV)	Bengaluru, Karnataka	Wide/Narrowbody Base Maintenance	A320, B787, A350	DGCA (planned), EASA (planned)	Projected 2026
PROPOSED / STATE-PLANNED					
Inavia Aviation (Proposed)	Bhopal – Raja Bhoj Airport, Madhya Pradesh	Line & Base Airframe Maintenance	A320 family, ATR	Planned	Proposed / State-Planned

MRO Players in India

Operator / Facility	Products	Services	Customer Name(s)
AIESL – Mumbai / Nagpur / Line Stations	Airframe, Engines, APUs, Components	Line maintenance, Base checks (A/B/C), Engine & APU overhaul, Component repair	Air India Group (AI, AIX, AI Express), Alliance Air, Vistara (legacy), foreign lessors & charter operators
Air Works India	Airframe, Components, Paint	Heavy & base maintenance, structural repair, aircraft painting	IndiGo, SpiceJet, regional operators, business jet & charter airlines
GMR Aero Technic (GAT)	Airframe	Base & heavy maintenance	Akasa Air, IndiGo (select checks), foreign narrow-body operators
SpiceJet Technic	Airframe, Components	Line & base maintenance, component support	SpiceJet, Akasa Air (limited), third-party line maintenance customers
Indamer / Horizon Aero (Adani Group)	Airframe	Base maintenance, C-checks	IndiGo, charter & ACMI operators
HAL + Airbus (Civil MRO Wing)	Airframe	Heavy maintenance (C-checks)	Air India Group (A320 family)
Safran SAESI – Engine MRO	LEAP Engines	Engine overhaul, repair, test & shop visits	IndiGo, Air India Group, Akasa Air, global LEAP operators
Thales – Avionics MRO Centre	Avionics systems	Avionics repair, testing, upgrades	IndiGo, Air India Group, SpiceJet, international airlines via pooling
Lufthansa Technik – India (Partner Network)	Components, APUs, Engineering services	Component repair, APU MRO, engineering & parts pooling	IndiGo, Air India Group, Akasa Air, multiple global airlines
StandardAero (India Support)	Aircraft engines	Engine repair & technical support	SpiceJet (LEAP-1B), airline customers via OEM support
Aequis + Magellan Aerospace	Aircraft components & structures	Component MRO, aero-structure repair & machining	Airbus/Boeing supply chain, airline components via OEMs
IndiGo – In-house MRO (Upcoming)	Airframe	Base & heavy maintenance	IndiGo (internal fleet only)
Air India – Mega MRO (Upcoming)	Airframe (WB & NB)	Base & heavy maintenance	Air India Group, third-party airlines (planned)
SIA Engineering (Air India JV – Planned)	Airframe	Base & heavy maintenance	Air India Group, regional & international carriers (planned)
Inavia Aviation (Proposed)	Airframe	Line & base maintenance	Domestic narrowbody & regional airlines (TBD)

Government Initiatives (1/3)

Aerospace & Drones PLI

- Incentivizes domestic manufacturing of select civil aerospace components based on incremental value addition, under a combined aerospace-and-drones PLI (~Rs12bn), with variable incentive rates up to ~20%. 
- **Civil Aerospace Impact**
 - Strengthens Tier-1/Tier-2 component manufacturing
 - Encourages localization of structures, avionics, and systems
- **MRO Relevance**
 - Indirect only, via improved local availability of parts and tooling
 - MRO is not a stated objective of the scheme

Bharatiya Vayuyan Adhiniyam, 2024 (New Aviation Law)

- Replaces the Aircraft Act, 1934 with a modern aviation framework covering design, manufacturing, MRO, leasing, and operations. Introduces risk-based oversight, self-certification, and streamlined compliance, aligned with ICAO best practices. 
- **Civil Aerospace Impact**
 - Regulatory clarity for manufacturers and suppliers
 - Faster certification cycles with reduced compliance friction
- **MRO Impact**
 - Predictable approvals and lower regulatory uncertainty
 - Improves ease of doing business for domestic and foreign MROs

Civil MRO Policy Reforms (GST, Customs & FDI)

- Comprehensive reform package aimed at positioning India as a global MRO hub, including 5% uniform GST with full ITC, extended export/re-import timelines for repairs and warranties, and 100% FDI under the automatic route. 
- **Impact**
 - Enables material cost reduction potential versus overseas MRO hubs
 - Improves turnaround times and capital efficiency
 - Strongly enhances India's competitiveness in global MRO tenders

Government Initiatives (2/3)

Aircraft Leasing & Financing – GIFT City (IFSC)

- Establishes India as a competitive aircraft leasing and financing hub through tax exemptions, relaxed withholding taxes, and simplified regulations under IFSC GIFT City.
- **Civil Aerospace & Airline Impact**
 - Lower leasing and financing costs
 - Reduces dependence on Ireland and Singapore
- **MRO Linkage**
 - Enabling rather than automatic
 - Facilitates lease-linked maintenance, redelivery checks, and transition checks within India



UDAN (Ude Desh ka Aam Nagrik)



- Drives affordable regional air connectivity, significantly expanding regional, turboprop, and narrowbody operations across underserved routes and airports.
- **MRO Impact**
 - Higher demand for line maintenance and regional MRO
 - Limited relevance for widebody or heavy maintenance



Airport Infrastructure Expansion (AAI + PPP)

- Large-scale expansion and modernization of airport infrastructure through AAI investment and PPP models, supporting fleet and traffic growth.
- **MRO Impact**
 - Provision of MRO-ready land, hangar zoning, and airside access
 - Actual MRO development varies by airport and operator execution

Government Initiatives (3/3)

Aviation Skilling & Human Capital Development

- Focused on building aviation human capital across pilots, AMEs, MRO technicians, and aerostructure specialists, led by MoCA, state skill missions, and industry participation.



- **Strategic Importance**

- Addresses AME shortages, a key binding constraint for MRO scale-up
- Critical enabler for both manufacturing and maintenance expansion



IDEX / Innovation Support (Dual-Use Technologies)

- Primarily a defence-led innovation platform, with indirect civil aerospace relevance through dual-use technologies in materials, electronics, propulsion subsystems, and manufacturing processes.



- **Civil Aerospace Impact**

- Supplier ecosystem development
 - Spillover benefits to civil OEM and Tier-1 programs
- **Not a direct civil manufacturing policy**



FDI Policy – Civil Aviation

- Liberal FDI regime allowing 100% FDI under automatic route for MRO, with high foreign ownership limits in airports and regulated participation in airlines.

- **Impact**

- Attracts global capital into MRO and infrastructure
- Supports capacity creation and technology transfer
- Airline FDI remains policy-sensitive but strategically supportive

Aerospace Manufacturing Is Becoming Cluster-Led

Tamil Nadu (Chennai - Hosur Belt)

CII-Led Aerospace Cluster Development

- An industry-facilitated aerospace corridor, where CII-led coordination has supported OEM–supplier engagement and infrastructure alignment, resulting in a gradually deepening multi-tenant manufacturing ecosystem.

Belagavi, Karnataka

QuEST Global Precision Engineering SEZ

- An anchor-led, limited-tenant ecosystem centered on QuEST Global’s precision engineering SEZ, focused on high-complexity machining, assemblies, and engineering services for global aerospace programs.

Telangana

Hyderabad Aerospace & Defence Cluster

- A mature, state-supported aerospace cluster driven by OEM and Tier-1 partnerships, spanning aerostructures, avionics, engine components, and MRO-adjacent activities across civil and defence.

Anantapur District, Andhra Pradesh

Lepakshi Aerospace Park

- A policy-enabled, dual-use aerospace park designed for integrated R&D, manufacturing, and maintenance, with ecosystem depth still in the scaling phase.

Devanahalli, Karnataka

KIADB Aerospace & Defence SEZ

- A state-led, multi-tenant aerospace SEZ leveraging Bengaluru’s talent base, hosting a dense concentration of Tier-1 and Tier-2 suppliers across civil and defence programs.

Bengaluru, Karnataka

TAAL Aviation-Focused SEZ

- An aviation-focused SEZ with limited ecosystem impact to date, reflecting the absence of strong anchor tenants and broader supplier agglomeration.

Appendix

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