# Achieving Accelerating Growth and Global Competitiveness

*Opportunities and Challenges Ahead*

Shri K. Ramesh, GM (MRO), HAL

# Scale of the Opportunity

**1,700+**

**Aircraft by 2040**

700 today → 1,200 by 2030 → 1,700 by 2040

**USD 4–5B**

**MRO market by 2035**

Up from ~USD 1.7–2B today

**85–90%**

**Work goes abroad**

A national economic imperative to reclaim

*India is the world's fastest-growing aviation market — and the MRO opportunity cannot wait.*

# Problem Statement

01

## Revenue & Jobs Exported

Every year, thousands of crores of MRO revenue and skilled man-hours leave India for Singapore, Dubai and Malaysia.

02

## No Enabling Ecosystem

Despite intent from government, airlines and regulators, the structural ecosystem needed to retain MRO work has not been built.

03

## National Economic Imperative

This is not a niche industry problem — it is a macroeconomic challenge that demands urgent and collective action.

# Key Barriers · Part 1 of 2

01

## Taxation Cost Disadvantage

Import duty & GST on MRO spares, tooling and equipment makes Indian facilities more expensive than overseas alternatives. Airlines can send aircraft abroad and still spend less.

02

## Regulatory Approval Gap

Indian MROs need DGCA, EASA and FAA validation to attract international traffic. These approvals require significant investment and time — structured government support is critical.

03

## Limited OEM Partnerships

Airbus, Boeing, CFM, GE and Pratt & Whitney control proprietary data, tooling and CMAs. Without partnership, Indian MROs can only perform limited maintenance categories.

# Key Barriers · Part 2 of 2

04

## Skilled Manpower Shortage

India produces excellent engineers but the pipeline of DGCA-licensed AMEs — especially for heavy maintenance and engine overhaul — is inadequate for industry needs.

05

## Infrastructure Limitations

World-class MRO requires dedicated hangars, bonded warehousing, precision tooling and reliable utilities near airports. This infrastructure does not yet exist at scale in India.

06

## Lack of MRO Clusters

Concentrated, plug-and-play MRO zones with streamlined customs and shared infrastructure — as seen in Singapore and Dubai — are absent from India's airport ecosystem.

# The Digital MRO Imperative

## Predictive Maintenance

Real-time sensor data + ML reducing unscheduled removals and AOG events for global operators

## Digital Twins

Virtual testing of components before physical intervention, reducing downtime and risk

## AI-Driven Forecasting

AI-driven parts demand forecasting slashing inventory carrying costs across fleets

## AR-Assisted Maintenance

Augmented reality guiding technicians through complex procedures in real time

# India's Digital Advantage – Winning Strategy

## World-Class

**IT Ecosystem**

India's technology industry provides a ready foundation for building sophisticated MRO digital solutions

## Deep Pool

**Of Data Scientists**

Strong STEM talent bases and data scientists available at a cost structure that makes solution building economically viable against global peers

## Export Ready

**Digital MRO Stack**

Opportunity to build Indian-developed solutions that can be exported to MRO operators worldwide

*Make digital MRO a pillar of India's national MRO strategy.*

# Recommendations · Part 1 of 2

1

### Complete GST & Customs Rationalisation

Finalise tax relief for MRO spares and tooling in the upcoming budget cycle. Every rupee of concession returns multiples in retained MRO revenue and employment.

2

### Establish Dedicated MRO Clusters

Develop bonded-warehouse clusters with hangar infrastructure at Bengaluru, Hyderabad, Nagpur and Delhi as PPP projects — with DPSUs as anchor tenants.

3

### Fast-Track Global Recognition (EASA/FAA)

Bilateral MRO recognition agreements with EASA and FAA to enable Indian-approved facilities to service foreign-registered aircraft — unlocking significant international traffic.

# Recommendations · Part 2 of 2

**4**

### National AME Training Mission

Triple the output of DGCA-licensed Aircraft Maintenance Engineers over 5 years, with focus on practical heavy maintenance competency — modelled on defence skilling initiatives.

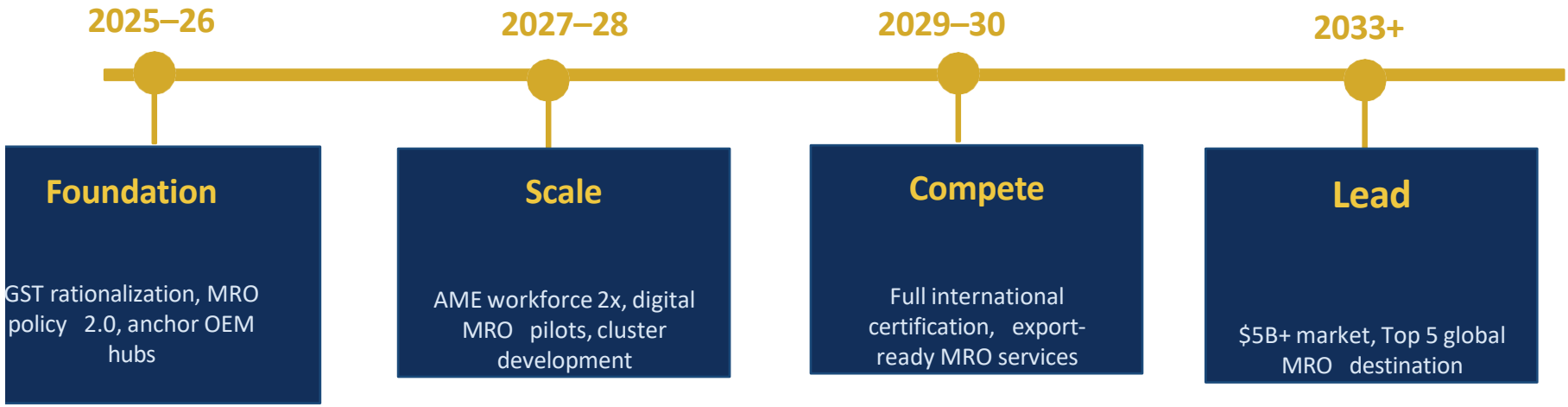
**5**

### India MRO Task Force

Constitute a MoCA-led task force with DGCA, defence, Private MRO players and Airlines — driving quarterly accountability for executing the national MRO agenda.

*5 concrete asks · Tax reform · MRO clusters · Bilateral recognition · AME training · Task force accountability*

# The Road Ahead




***The opportunity is real. The window is open. The question is: who will build India's MRO future — and how fast?***

# Conclusion

**T**

## Talent

India has world-class engineering and IT talent — the human capital to build a global MRO industry is already here.

**I**

## Infrastructure

Foundation infrastructure exists — at HAL and elsewhere. With the right enablers, it can be extended and scaled rapidly.

**M**

## Market

A USD 4–5B market by 2035 and the world's fastest-growing fleet provides the demand signal needed to attract investment.

*What India needs now is alignment — between government, regulator, airlines, OEMs and MRO providers.*

# Thanks a Ton

HAL

# HAL: Committed to India's MRO Future

- Committed cornerstone of India's MRO ecosystem — for defence and civil aviation
- Open to partnerships, knowledge sharing and collective action
- Our competitors in Singapore and Dubai are not standing still — the time to act is now

## Thank you · Jai Hind

Shri K. Ramesh, GM (MRO), Hindustan Aeronautics Limited

# HAL's Capabilities

### Production Divisions

MRO facilities in Bengaluru, Nashik, Koraput, Hyderabad, Lucknow, Kanpur & more

### Full-Spectrum Expertise

Fixed-wing aircraft, helicopters, aero-engines, avionics systems and accessories

### AS9100 Certified

World-class quality management systems certified to the highest aerospace standard

## DGCA Approved

HAL holds DGCA approvals for heavy maintenance, overhaul and repair across all aircraft categories.

Our quality systems, infrastructure and institutional depth are built over eight decades of continuous aerospace service.

This is world-class capability — ready to be extended to civil MRO with the right policy enablers.

# The HAL Advantage

## Bengaluru Facility Potential

Located near Kempegowda International Airport with precision machining, NDT and composite repair capabilities — a ready foundation for a major civil MRO node.

## 50+ Years of Institutional Knowledge

Maintaining complex aerospace systems, often without OEM support — reverse-engineering solutions and building indigenous procedures. A depth of capability unmatched by private MRO startups.

## Defence–Civil Convergence

NDT, composite repair and engine health monitoring technologies used in military MRO have direct civil applicability — opening a unique path for HAL to serve civil operators.