AI-ENABLED AIRCRAFT ENGINE MRO

Infosys topaz



Infosys
Navigate your next

Transforming Aircraft Engine MRO into a Strategic Advantage

In aviation, every additional day of engine turnaround affects aircraft availability, fleet schedules and revenue. Every inspection finding can change work scope, parts demand, repair routing and the return-to-service date, while every decision must protect airworthiness and regulatory compliance. AI-enabled Aircraft Engine MRO is therefore a critical lever for fleet reliability and lifecycle economics.

Infosys helps aircraft operators, engine OEMs, airlines, MRO providers and lessors transform this environment. Combining aerospace engineering with Digital Twins, simulation, automation and AI, we connect the engine journey from induction and work-scope planning through inspection, repair, assembly, test-cell validation and release to service.



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AI enabled Smart MRO Offerings – PROCESS FLOW

From Induction to Release — Restoring Performance, Ensuring Safety, Extending Engine Life

1. Induction & Receiving Inspection	2. Work Scope & Planning	3. Disassembly & Cleaning	4. Inspection & NDT	Repair, Replace & Rework	6. Assembly & Balancing	7. Testing & Performance Check	8. Certification & Release to Service	Engine Leasing
• Verify engine identity & configuration • Check shipping condition • Review documentation & history • Record removal reason • Create work order	• Review OEM manuals, SBs & ADs • Define work scope • Plan resources, tools & parts • Risk assessment	• Disassemble per manual • Tag & track parts • Clean & degrease components • Initial visual check	• Dimensional inspection • NDT (PT, MT, UT, ET, RT) • Borescope inspection • Document findings • Evaluate serviceability	• Repair serviceable parts • Replace unserviceable parts • Special processes (welding, coating, plating) • Re-inspect as required	• Assemble per manual • Torque & alignment checks • Rotor & module balancing • Clearance checks • Configuration verification	• Test cell run • Monitor engine parameters • Vibration & leak checks • Performance validation • Record test data	• Compile certification • Release documentation (Compile certification and release documentation, e.g., FAA Form 8130-3 / EASA Form 1, as applicable.) • Return to customer	• Match engine availability to demand • Verify records & LLP status • Deliver & track component and module level status • Manage return & inspection documentation
Output								
Accepted engine with complete records & work order	Approved work scope & resource plan	Clean, tagged parts ready for inspection	Inspection report & disposition	Serviceable parts meeting standards	Assembled engine to specification	Test report & performance verification	Airworthy engine released back to service	Leased engine with records & agreed terms

CONTINUOUS TRACEABILITY & DOCUMENTATION

Infosys Engineering Intelligence Fabric

Infosys Topaz Fabric

Designing the Digital-First Engine MRO Facility

A greenfield engine MRO program can design shop operations, module flows, inspection cells, repair areas, tooling, skills and test-stand capacity as one system. Infosys integrates Digital Twins, virtual commissioning and AI into the facility blueprint, allowing variable work scopes, rework loops and capacity scenarios to be assessed before launch.

AI-enabled Smart MRO Offerings – Greenfield



Our Goal

Design, simulate, virtually commission, scale

Digital transformation

- MRO vision, value case and roadmap
- Factory, process and resource blueprint
- Priority use cases for TAT, quality and productivity
- Platform and integration strategy
- Governance and operating model



Digital twin

- Factory, process and resource twins
- Engine, work order and findings visibility
- Work scope, routing and repair intelligence
- Engineering, shop-floor and enterprise integration
- Real-time operational decision support



Virtual commissioning

- MRO flow and process simulation
- Variable work scope and rework scenarios
- Routing and repair strategy evaluation
- Capacity, skills, tooling and test-stand validation
- Bottleneck and turnaround-time risk analysis



Autonomous MRO factory

- Predict bottlenecks and turnaround delays
- Optimize workforce, tooling and test stands
- Recommend routing and repair alternatives
- AI-assisted planning and shop-floor decisions
- Twin Ops-enabled continuous optimization



Engine leasing

- Audit lease & engine records
- Spare-engine pool & demand planning
- Lease pricing & contract setup
- Digital engine & LLP records
- Optimize lease renewals & allocation



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Turning Every Engine Shop Visit into Connected Intelligence

Each engine shop visit creates critical information across configuration, removal reason, module history, non-destructive testing, repair dispositions, life-limited parts, assembly and test-cell results. Infosys connects these data through a trusted digital thread, giving engineering, planning, quality and shop-floor teams consistent engine context, stronger traceability and more predictable execution.

AI-enabled Smart MRO Offerings – Brownfield



Our Goal

Assess, connect, modernize, optimize

Digital transformation

- Digital maturity assessment
- Current-state process assessment
- Business capability mapping
- Digital roadmap development
- Operating model definition
- Technology strategy
- Business case development
- KPI framework definition



Digital twin

- Factory, process and resource twins
- Engine, work order and findings visibility
- Work scope, routing and repair intelligence
- Engineering, enterprise and shop-floor integration
- Real-time operational decision support



Virtual commissioning

- MRO flow and process simulation
- Variable work scope and rework scenarios
- Routing and repair strategy evaluation
- Capacity, skills, tooling and test-stand validation
- Bottleneck and turnaround-time risk analysis



Autonomous MRO factory

- Digitize MRO processes
- Enterprise, Shopfloor Integration
- Predict bottlenecks and turnaround delays
- Optimize workforce, tooling and test stands
- Recommend routing and repair alternatives
- AI-assisted planning and shop-floor decisions
- Twin Ops-enabled continuous optimization



Engine leasing

- Audit lease & engine records
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Modernizing Live AI-enabled Aircraft Engine MRO Operations

Existing engine shops must improve without disrupting inductions, aircraft maintenance schedules or customer deliveries. Infosys enables phased modernization of legacy systems, manual workflows and fragmented engine records. Connected engineering and shop-floor data, simulation and AI improve planning, bottleneck prediction, repair routing, workforce deployment and test-cell utilization, creating a scalable path toward predictive MRO.

Key enablers & expected outcomes

Key Enablers
People, Process & Discipline

Skilled & Certified Technicians
Experienced workforce with continuous training

Approved Data & Processes
OEM manuals, SBs, ADs & repair schemes

Part Traceability & Control
Serialized parts, tagging & genealogy tracking

Quality Assurance & Audits
In-process QA, audits & conformity checks

Calibrated Tools & Equipment
Calibrated, capable tools & test equipment

Digital Records & Systems
Accurate, complete digital records & dashboards

Safety & Compliance Culture
Safety first, regulatory & airworthiness focus

Expected Outcomes

Safety Assured
Airworthy engine meeting all regulatory standards

Reliability Improved
Restored performance & reduced in-service risk

Downtime Reduced
Efficient process for faster turnaround

Cost Optimized
Right repairs, right parts, right time

Compliance Proven
Complete records, traceability & audit readiness

Engine Life Extended
Maximum value from every overhaul

Collaborators

NVIDIA, SAP, Dassault Systèmes, PTC, AWS, Neo4j, Bentley, iBase-t, Siemens, Oculus, Tulip, Microsoft Azure, DELMIA Apriso, HTC, OSIsoft, Google Cloud, iTwin, Critical Manufacturing

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Airworthiness Discipline. Digital Speed. Measurable MRO Outcomes.

AI-enabled Aircraft Engine MRO depends on certified technicians, approved maintenance data, service bulletins, airworthiness directives, serialized-part control, calibrated tooling and complete release records. Infosys reinforces these foundations with digital engine records, connected genealogy and AI-assisted decisions, improving reliability, audit readiness and confidence in return to service.



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Demonstrated Value Across MRO Clients: OEMs, Airlines, Independent MROs and Engine Lessors

OEM

Problem Statement
Disconnected MRO facilities, machines, and operational data limited end-to-end visibility, affecting productivity, equipment effectiveness, and timely decision-making.

Solution
Transformed more than 15 MRO facilities into a connected Digital Twin ecosystem, integrating over 2,000 machines and operations. AI-enabled monitoring, predictive insights, and intelligent decision support helped improve OEE, productivity, and operational efficiency.

Airlines

Problem Statement
Airlines required stronger maintenance planning, fleet reliability, technical documentation, troubleshooting, and regulatory compliance to improve aircraft availability and reduce AOG exposure.

Solution
Provided comprehensive airline MRO and TechOps support across maintenance program management, fleet reliability engineering, operational support, technical publications, safety investigations, and overhaul activities, improving maintenance effectiveness and execution efficiency.

Independent MROs

Problem Statement
Legacy systems, fragmented processes, and limited integration across engineering and shop-floor operations restricted visibility, resource utilization, and the scalability of MRO operations.

Solution
Developed a future-ready Digital MRO transformation strategy and an integrated Digital Twin-based factory architecture covering factory, process, resource, and engine-context models. The solution enabled simulation-led planning, virtual commissioning, capacity optimization, turnaround-time risk analysis, and a roadmap toward predictive and autonomous MRO operations.

Engine Lessors

Problem Statement
Manual and fragmented engine-record reviews made it difficult to verify life-limited-part history, assess AD/SB compliance, identify missing documentation, and efficiently support engine acquisition and redelivery.

Solution
Developed an AI-powered engine-records review solution with document classification, data extraction, cross-document validation, document splitting, and signature detection. The solution improved LLP traceability, compliance verification, inconsistency identification, and reviewer workflows for acquisition and redelivery.

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Why Infosys

Aerospace engineering depth

Aircraft propulsion and MRO expertise.

Engine lifecycle perspective

Induction through airworthy release.

AI with MRO context

AI grounded in engineering, engine-record and shop-floor context.

Connected operations

Connected engineering and shop-floor data.

Open ecosystem delivery

Best-fit aviation and enterprise platforms.

Built for measurable value

Airworthiness, turnaround and lifecycle value.

Building the Intelligent Aircraft Engine MRO Enterprise

The future of engine MRO depends on understanding every engine, anticipating the impact of inspection findings and optimizing each shop visit without compromising airworthiness. Infosys unifies aerospace engineering knowledge, engine records, shop operations, Digital Twins and AI-powered intelligence.

From the first engine use case to connected multi-site MRO operations, Infosys converts digital ambition into sustained aviation value. Together, we can build AI-enabled Aircraft Engine MRO that is connected across the lifecycle, predictive in the shop and optimized for safe return to service.

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