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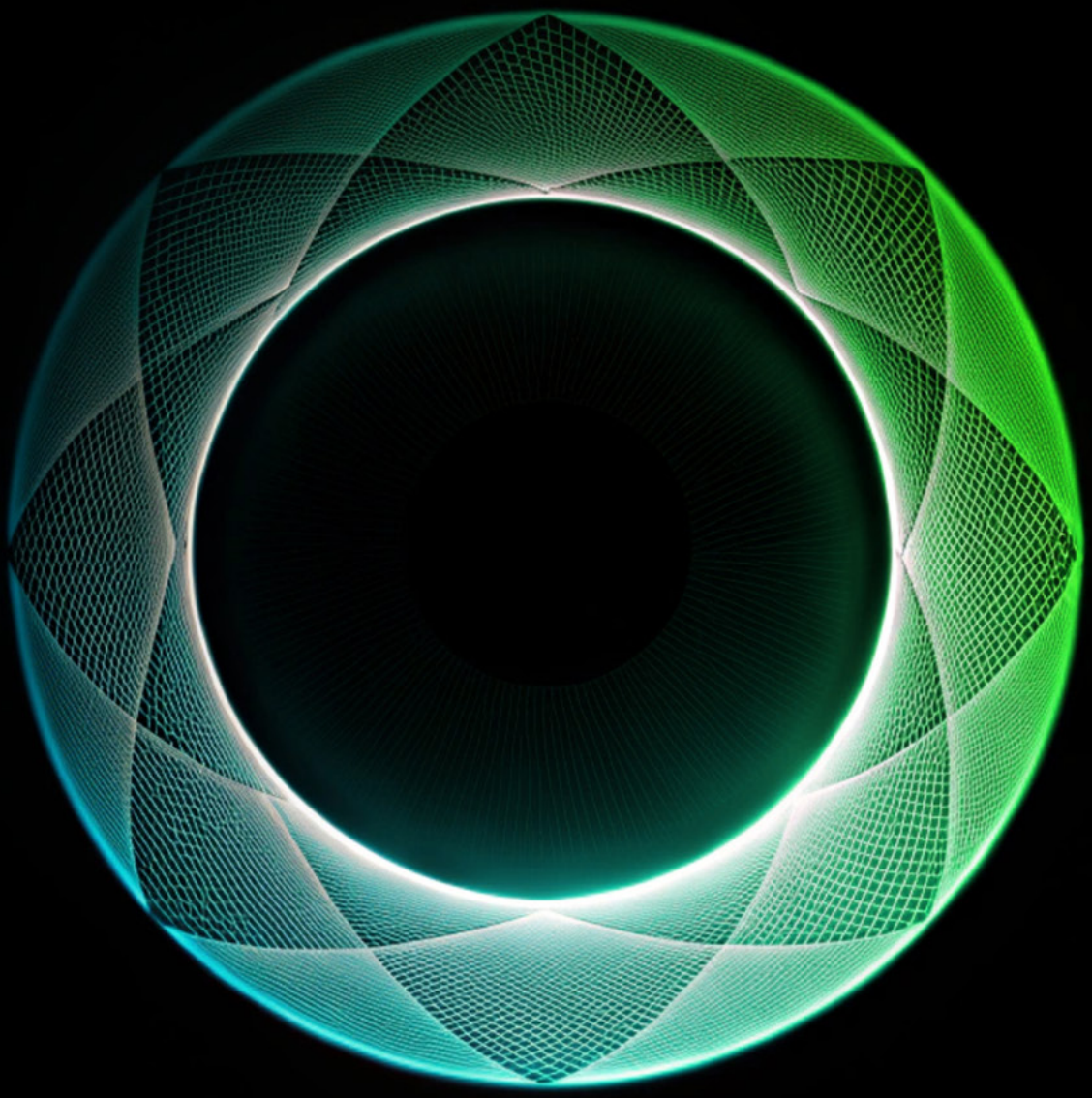


Maintenance operations
Transition from reactive to predictive with Oracle

February 2026

Table of contents

The problem statement

Unplanned downtime is no longer just an operations problem; it is a revenue, customer trust and ESG risk.

Despite years of investment in digital systems, many organisations still struggle during execution. Critical operational knowledge, such as equipment manuals, standard operating procedures, service histories and spare-parts intelligence, exists across the enterprise but rarely converges into guided, real-time action when disruptions occur at the point of execution.

This disconnect highlights a broader industry challenge: Data abundance without operational intelligence. Leading manufacturers are now shifting their focus from system automation to decision enablement, embedding intelligence directly into the workflows where maintenance and manufacturing teams operate.

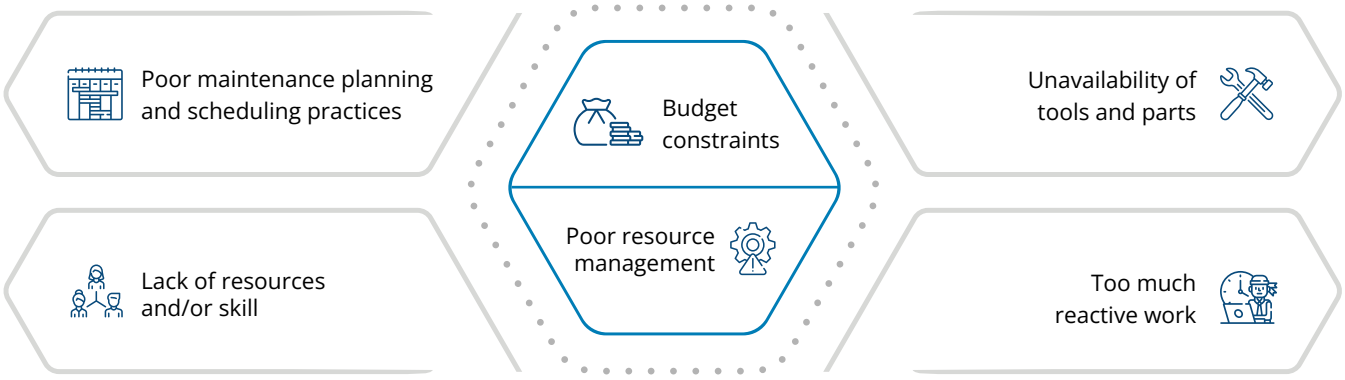
It continues to be one of the most persistent value leaks in manufacturing, eroding margins, disrupting supply commitments and undermining customer confidence.

Key loss categories and financial impact[1]

Category	Impact range	Key drivers	Potential financial impact
Unplanned downtime	40 lakh–2 crore/hour	Equipment failure and process disruptions	High-volume plants are most affected
Revenue leakage	2 percent–5 percent annually	Planning mismatch, expedited freight and missed dispatch	About 20–50 crore for 1,000 crore revenue
Excess inventory	10 percent–20 percent	Overproduction, lack of real-time scheduling and quality issues	Nearly 20–40 crore for 200 crore inventory
Productivity loss	15 percent–30 percent	Manual reconciliations, rework and diagnostic delays	Significant operational inefficiency
Overall impact	60–90 crore annually	Latency in intelligence	Mid-sized manufacturer estimate

[1]Benchmark for India unplanned downtime costs: ABB 'Value of Reliability' survey, Oct 11, 2023 — https://new.abb.com/news/detail/108271/abb-survey-reveals-unplanned-downtime-costs-inr-7-million-per-hour

Why does downtime persist



Fragmented operational knowledge

Critical maintenance information is scattered across various formats, causing delays during repairs.

Expert knowledge concentrated in a few individuals slows diagnostics when they are unavailable.

Tribal knowledge bottleneck

Lack of structured learning

The absence of documented lessons leads to repeated failures and missed opportunities for improvement.

Operational technology systems capture machine data but remain disconnected from ERP platforms, causing data silos.

Data silo challenges

Reactive maintenance limitations

ERP systems record maintenance only post-event, lacking real-time diagnostics and delaying corrective actions.

Reactive spare part processes cause stockouts and extend repair times, reducing asset availability.

Spare parts management issues

Evolution of maintenance

Reactive maintenance

Corrective maintenance after a breakdown

……..

Equipment is fixed only after failure occurs

……..

High downtime, high cost and disruptive

Preventive maintenance

Regular maintenance to reduce breakdown

……..

Activities are performed at fixed intervals

……..

Reduces unexpected failures, but can cause over-maintenance

Predictive maintenance

Use of sensors and software to predict breakdown

……..

Condition-based monitoring using IoT, data analytics

……..

Reduces downtime, optimises maintenance intervals

Prescriptive maintenance

Machine learning predicts breakdowns and identifies optimal solutions

……..

AI recommends the best action, not just prediction

……..

Maximises equipment life, minimises the total cost of maintenance

Context-first diagnosis

Automatically gathers asset info and history to prioritise causes, reducing manual searches and speeding diagnosis.

Guided resolution

Structured corrective steps with compliance checks replace trial-and-error, ensuring consistent quality and knowledge use.

Early spares identification

Maps failure modes to parts and approved equivalents early to prevent delays from missing inventory during repairs.

Institutional knowledge capture

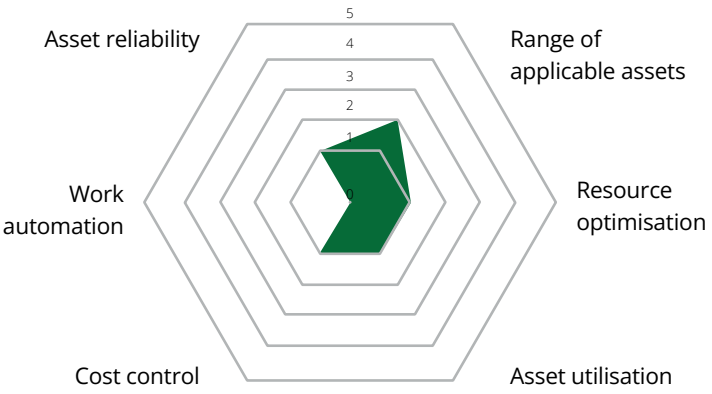
Documents fixes with standardised codes to build reusable organisational intelligence and reduce ad-hoc troubleshooting.

Standardised execution

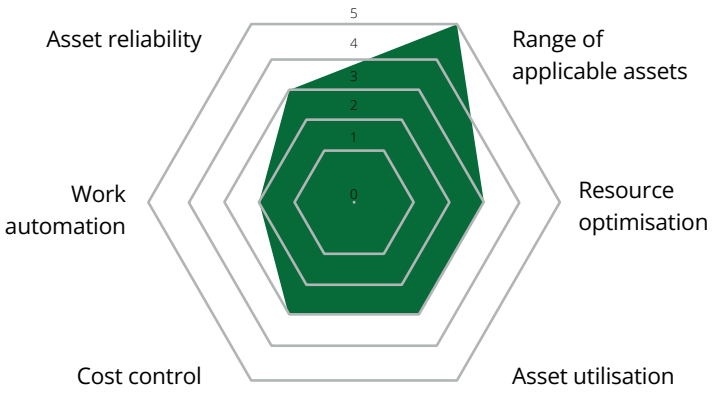
Ensures consistent safety and quality practices across shifts and sites, improving resilience and reducing variability.

Maintenance strategy maturity comparison

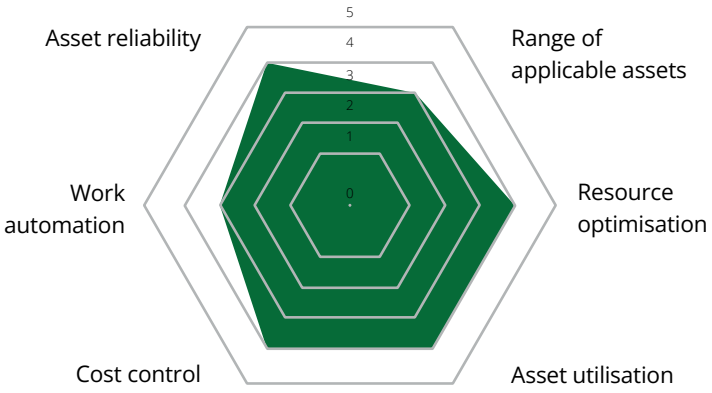
Run-to-failure maintenance



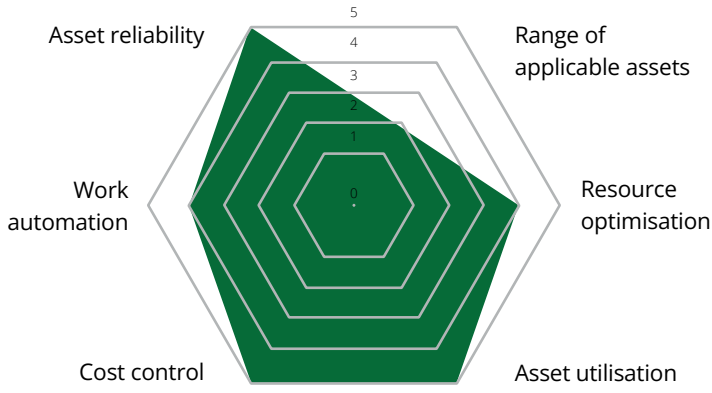
Preventive maintenance strategy



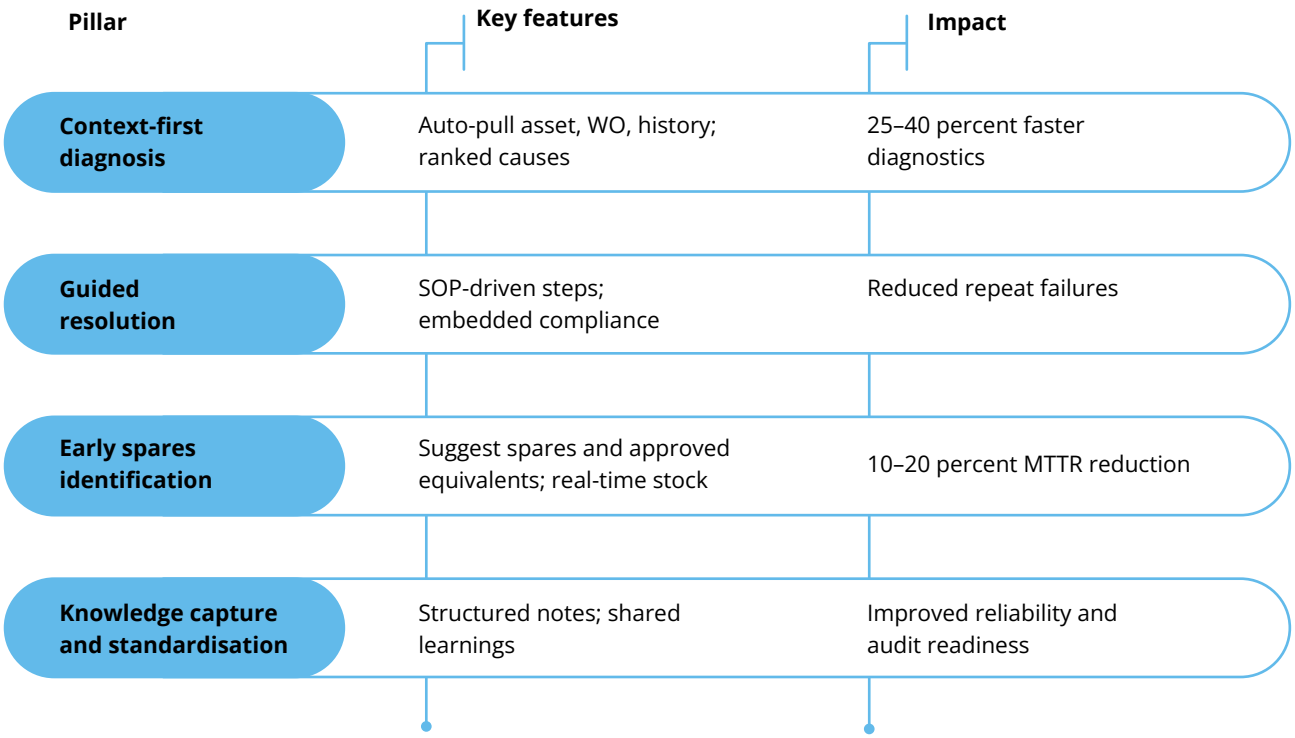
Condition-based maintenance



Predictive maintenance strategy



Improved maintenance state



Industry-validated performance gains[2]

Metric	Reactive model	Predictive model
Breakdowns	Baseline	↓ 70-75%
Unplanned downtime	High	↓ 35–45%
Maintenance cost	100%	↓ 25–30%
Annual loss	60–90 crore (Impact for 1000Cr Org)	Reduced by 20–30%
MTTR	10 hours	6–8 hours
Productivity	Standard	↑ 20–30%
ROI	Low	10×

[2] https://www.energy.gov/femp/articles/operations-and-maintenance-best-practices-guide-achieving-operational-efficiency

Getting started

Prioritise the assets that truly matter
Rather than attempting to instrument everything at once, high-performing organisations begin by isolating the 3–5 assets that represent the greatest operational, safety or financial exposure. By narrowing the aperture early, teams create sharper insights, accelerate learning cycles and demonstrate measurable value before scaling.

Anchor decisions in a reliable performance baseline
Establishing a fact base is essential. Using available maintenance logs or work-order histories, calculate preliminary MTBF and MTTR for these priority assets. A simple spreadsheet is sufficient at this stage; the goal is to create a transparent baseline from which improvement trajectories can be tracked and communicated.

Elevate data discipline across the frontline
Data quality is a cultural commitment, not a technical exercise. Bring technicians together for a short, focused alignment session to reinforce the importance of consistent timestamps, precise failure descriptions and correct use of failure codes. When teams share a unified understanding of how "time to repair" or "failure event" is defined, reliability metrics become far more actionable.

Make performance visible through a lightweight, shared dashboard
Sophisticated analytics can come later. To begin, create a simple, shared dashboard, whether on a whiteboard or in a collaborative spreadsheet, to track MTBF, MTTR and availability for your chosen assets. Update it weekly. Visibility drives ownership, and ownership accelerates adoption of reliability-centric behaviours across the shop floor.

Oracle as a platform and use cases

What leading manufacturers require is not another layer of reporting, but a cohesive operational intelligence foundation—one that connects data ingestion, contextualisation, advanced analytics and AI-driven recommendations directly into execution workflows. When insights, decisions and actions are unified within a single operating architecture, organisations can break functional silos, standardise best practices across plants and drive continuous performance improvement at scale.
Oracle provides a unified, end-to-end data and AI platform purpose-built for manufacturing, combining data ingestion, transformation, analytics, AI/ML and operational execution into one cohesive architecture. This eliminates silos and enables consistent performance improvement across plants.

What it does
The platform supports a full data lifecycle from collection through to prediction and action:

Discovery and data sources: Data from manufacturing systems (MES, CMMS, ERP), third-party systems and IoT/sensor feeds are collected for analysis.

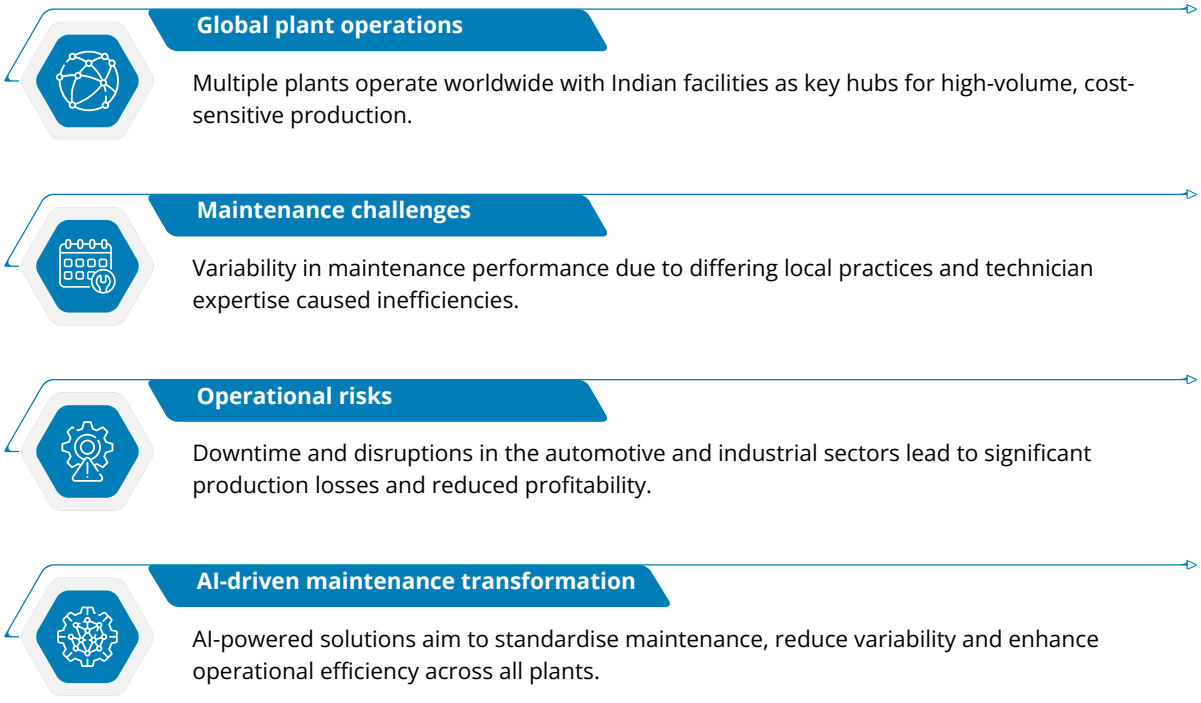
Ingest and transform: Both batch and streaming data ingestion capabilities enable fast and flexible data movement into a common platform.

Persist, curate and create: Curated and governed data lakes and data warehouses, including the use of Oracle Autonomous Data Warehouse and cloud storage for performance and scale.

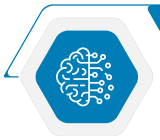
Analyse, learn and predict: Advanced analytics, machine learning, and visualisation tools support insights that drive predictive maintenance and performance optimisation.

Measure and act: Dashboards and operational insights allow teams to identify bottlenecks, optimise throughput and make data-driven decisions.

Business context in global discrete manufacturing

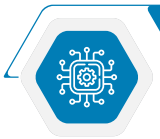


Use case 1: AI-guided diagnostics anchored to work orders



Embedded AI in work orders

Oracle's embedded AI agents automatically extract asset details and failure information to support diagnostics within work orders.



Automated pattern recognition

Historical work orders are analysed to identify failure patterns and predict probable causes.

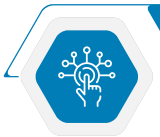
Improved technician performance

Junior technicians use AI diagnostics to confidently solve complex issues, reducing reliance on senior staff

Enhanced maintenance outcomes

Diagnosis time dropped, and MTTR improved by 25–30 percent, streamlining repairs and decision quality.

Use case 2: Digital work instructions generated from SOPs



Transformation of SOPs

Static SOPs are converted into dynamic digital instructions embedded in workflows, reducing errors.

Improved technician onboarding

Digital instructions accelerate new technician onboarding, enabling complex task performance quickly.

Enhanced operational reliability

Digital instructions improve first-time fix rates by over 20 percent and reduce task variability.

Continuous improvement feedback

Feedback loops from real-world data refine SOPs and bridge documentation with execution.

Use case 3: Integrated maintenance and manufacturing data platform

Unified data integration

The platform integrates maintenance and production data for comprehensive equipment performance insights under various conditions.

Predictive maintenance planning

Correlating equipment stress and failure recurrence enables predictive maintenance to anticipate and prevent breakdowns.

Collaborative optimisation

Shared intelligence fosters collaboration between maintenance and manufacturing to optimise asset reliability and production efficiency.

Use case 4: Governed workflows with full observability

Deterministic workflow sequence

The governed workflow follows clear steps: Diagnose, validate, check spares, execute and capture learning.

Traceability and auditability

Every AI recommendation is fully traceable and auditable, fostering trust among technicians and auditors.

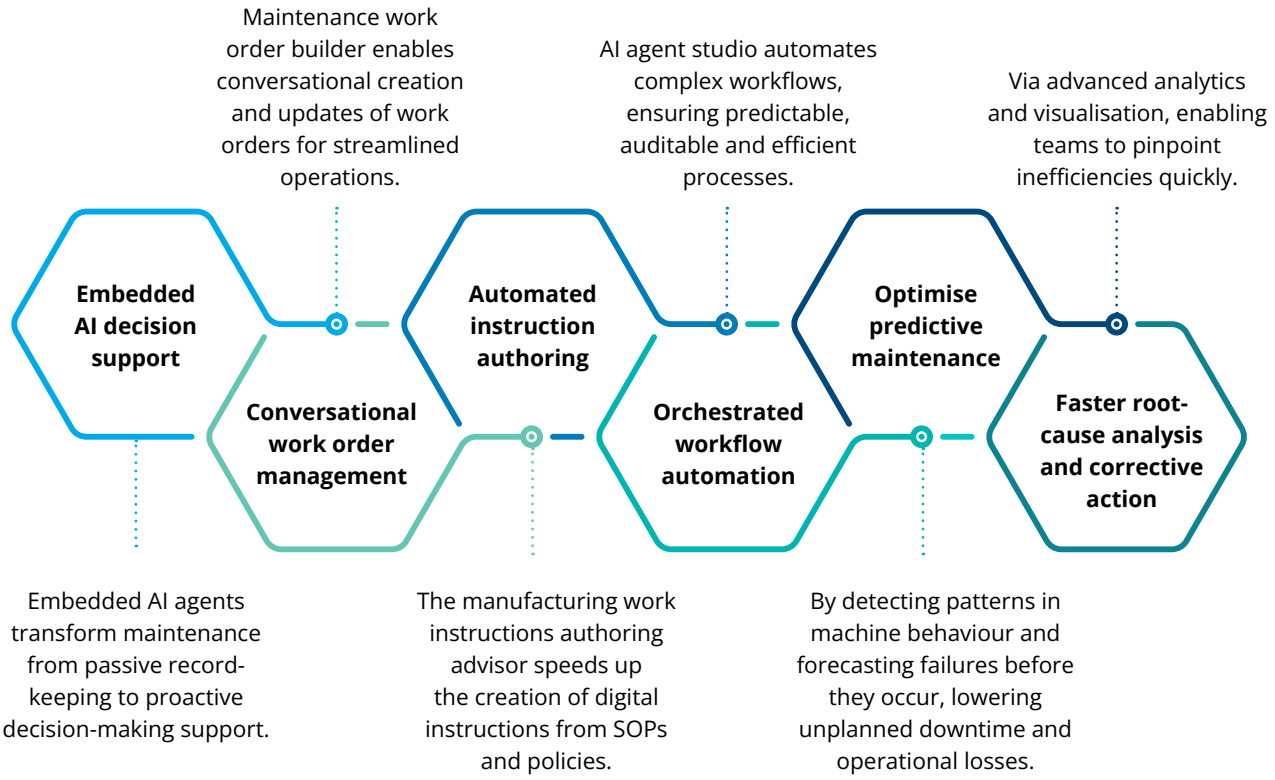
Compliance and safety governance

Governance ensures regulatory and safety compliance, critical for high-risk industrial environments.

Continuous improvement and observability

The observability framework enables continuous tuning of AI recommendations through feedback and metrics.

Key benefits and ROI modelling



KPI framework and ROI modelling

Reliability metrics
Key reliability KPIs include MTTR, Mean Time to Detect and asset availability to measure equipment performance.

1

2

Execution and inventory KPIs
Execution KPIs track first-time fix rates and work-order cycle times, while inventory KPIs monitor stock-outs and reservation lead times.

3

Quality, safety and financial KPIs
Quality and safety KPIs assess rework and incident rates; financial KPIs quantify downtime costs avoided and OEE improvements.

4

ROI modelling and sensitivity analysis
ROI modelling includes baseline metrics, decision latency reduction, spares readiness and sensitivity analysis for investment decisions.

Typical implementation roadmap options

For Oracle EBS customers	For Oracle Fusion Cloud customers	ERPs
Stabilise and optimise EBS footprint	Rapid cloud-native implementation	Integrate using Oracle Integration Cloud (prebuilt adapters)
Adopt EBS + Cloud coexistence architecture	CRP-driven design validation	Modernise manufacturing/data platforms
Migrate to OCI for performance and cost benefits	Structured data migration + mocking cycles	Introduce Oracle AI/ML + automation
Extend with manufacturing, SCM and OPM modules	OIC-led integrations	Optional phase-wise migration to Oracle Cloud ERP

Implementation roadmap: Organisations on Oracle Cloud

Phase	Timeline	Key activities	Expected outcomes
Phase 1	Weeks 1–3	Planning, stakeholder alignment and KPI definition	Clear roadmap and governance
Phase 2	Weeks 4–10	Platform setup, AI agent studio integration and data pipeline configuration	Foundation for AI-driven diagnostics
Phase 3	Weeks 11–14	Pilot execution, AI-guided work orders and digital instructions	Validated improvements in MTTR and FTFR
Phase 4	Weeks 15–45	Enterprise rollout, predictive planning and workflow governance	Operational scalability and continuous optimisation

Conclusive remarks

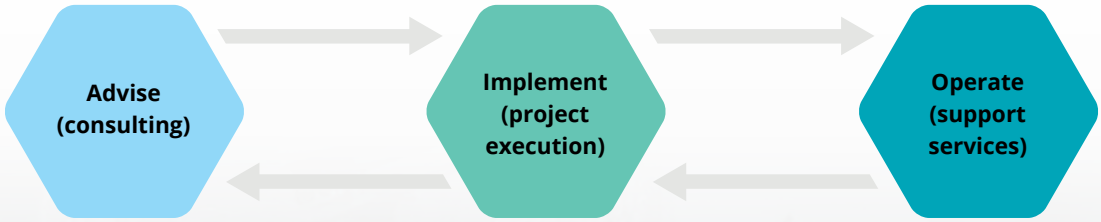
Predictive maintenance has evolved from an operational improvement to a strategic business imperative. The global predictive maintenance market is expected to reach about US$14.1 billion in 2025 and expand rapidly in the coming decade, with forecasts projecting upward of US$40–50 billion by 2030 and even higher towards 2033, reflecting strong adoption across sectors driven by AI, IIoT and digital transformation strategies.

For CFOs and business leaders, investing in predictive maintenance is not just a technology decision; it is an investment in risk mitigation, operational resilience and competitive advantage. The differentiator is no longer whether predictive maintenance works, as the data clearly demonstrates its value, but whether organisations can articulate a financial case that the business understands and trusts.

Turning predictive maintenance from a maintenance cost into a measurable performance lever requires clear baselines, realistic timelines and outcomes tied directly to business objectives such as uptime, cost avoidance and throughput improvements. Organisations that master this translation, supported by the right platform, governance and execution discipline, will unlock resilient, intelligence-driven operations that set the industry benchmark.

Predictive maintenance market sizing examples: Mordor Intelligence — 2025: $14.09B; 2030: $63.64B — https://www.mordorintelligence.com/industry-reports/predictive-maintenance-market ; Grand View Research — 2025: $14.29B; 2033: $98.16B — https://www.grandviewresearch.com/industry-analysis/predictive-maintenance-market

How can Deloitte work alongside us as a collaborator throughout this journey?



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