VIEW POINT

TRANSFORMING MRO TECHNICAL SERVICES IN MANUFACTURING: FROM FRAGMENTED SITE AUTONOMY TO PREDICTIVE, PERFORMANCE-BASED MAINTENANCE

Abstract

Maintenance, Repair, and Operations (MRO) technical services play a critical role in ensuring asset reliability, production continuity, operational safety, and overall manufacturing performance. However, many organizations continue to manage maintenance activities through fragmented site-level models, complex supplier ecosystems, and activity-based commercial arrangements that prioritize interventions over outcomes. As manufacturers face increasing pressure to improve uptime, reduce costs, and enhance operational resilience, the industry is rapidly shifting toward predictive and performance-driven maintenance enabled by technologies such as IoT, AI, digital twins, and advanced analytics. In response, forward-looking organizations are adopting the Predictive Asset Performance Model (PAPM), a maintenance approach that aligns service delivery with asset performance outcomes rather than maintenance activity. By standardizing maintenance practices, rationalizing supplier networks, strengthening governance, and aligning commercial models with asset performance outcomes, manufacturers can improve reliability, optimize total cost of ownership, and create a scalable foundation for long-term operational excellence.

Infosys
Navigate your next

Executive summary

Maintenance, repair, and operations (MRO) technical services are critical to manufacturing performance, directly influencing asset availability, production continuity, product quality, and operational safety. Yet, despite their strategic importance, MRO services remain one of the most fragmented and under-optimized spend categories across manufacturing enterprises. Many manufacturers continue to experience significant losses from unplanned downtime, making maintenance effectiveness a direct business performance issue rather than simply an operational concern. Industry research indicates that a single hour of unplanned downtime can cost manufacturers between $100,000 and $500,000, while some estimates place downtime costs in the range of $50,000 to $150,000 per hour depending on operational complexity and scale. Compounding this challenge is a legacy commercial model that rewards maintenance activity rather than operational outcomes. Organizations often pay for labor hours, service interventions, and spare parts consumption, creating incentives that focus on repairing failures rather than preventing them. The result is higher maintenance costs, excessive interventions, limited reliability improvements, and poor alignment between supplier performance and business outcomes.

At the same time, the manufacturing industry is undergoing a significant shift toward predictive and performance-driven maintenance. Advances in IoT, AI, digital twins, remote monitoring, and OEM service capabilities are enabling organizations to move beyond reactive and preventive maintenance toward outcome-based asset performance management.

This point of view explores how manufacturers can transform MRO technical services by standardizing maintenance operating models, rationalizing supplier ecosystems, and adopting a Predictive Asset Performance Model (PAPM). The objective is to shift from fragmented, activity-based maintenance to a predictive, outcome-oriented approach that improves asset reliability, reduces total cost of ownership, and delivers measurable operational value at scale.

1. The structural problem in MRO technical services

1.1 A category left to site autonomy

MRO technical services have historically developed as a decentralized function, owned and operated at the plant level. Each site independently selects suppliers, designs maintenance programs, and negotiates contracts based on local needs and capabilities.

While this approach offers flexibility and responsiveness to site-specific requirements, it results in a lack of standardization across the organization. Similar assets are maintained differently across sites, supplier bases become duplicated, and there is minimal opportunity to leverage enterprise-scale buying power. Over time, this creates systemic inefficiencies and prevents organizations from managing MRO as a strategic category.

1.2 Fragmented supplier landscape

The MRO ecosystem is inherently complex, involving multiple types of service providers with varying roles and capabilities. OEMs bring deep equipment expertise, third-party providers offer specialized maintenance services, facility management companies manage broader site operations, and in-house teams provide on-the-ground execution. However, the coexistence of these providers without clear accountability boundaries often leads to overlapping scopes of work, inconsistent service delivery standards, and unclear ownership of asset performance. This fragmentation diminishes operational efficiency and makes it difficult to drive continuous improvement or enforce performance accountability.

1.3 Misaligned commercial models

The prevailing commercial structures in MRO technical services are largely based on activity-driven pricing models. Contracts are typically structured around time and materials, volume-based pricing, or fixed-fee preventive maintenance arrangements.

These models inherently reward the volume of maintenance activity rather than the effectiveness of maintenance outcomes. Suppliers are incentivized to perform more interventions, rather than to prevent failures or optimize asset performance. As a result, there is minimal linkage between maintenance spend and operational outcomes such as uptime, reliability, or lifecycle cost reduction.

1.4 Limited data and performance visibility

A critical limitation across most organizations is the lack of robust data infrastructure and performance visibility in maintenance operations. Systems such as CMMS or EAM are often used inconsistently, and key performance metrics like overall equipment effectiveness (OEE), mean time between failures (MTBF), and mean time to repair (MTTR) are not standardized or reliably tracked.

This lack of high-quality, consistent data prevents organizations from benchmarking performance across sites, validating cost savings initiatives, or making informed strategic decisions. Without transparency into maintenance drivers and asset performance, transformation efforts are inherently constrained.

2. Industry evolution: The shift to predictive maintenance

2.1 From reactive to predictive

Maintenance practices in manufacturing have evolved from reactive approaches where equipment is repaired after failure, to preventive models based on scheduled interventions. While preventive maintenance reduces unexpected breakdowns, it often results in over-maintenance or fails to address condition-specific risks. The industry is now transitioning toward predictive maintenance, where interventions are based on real-time equipment condition and failure prediction. This model significantly enhances reliability and efficiency but requires advanced data capabilities and digital integration. Industry research indicates that approximately 62% of discrete manufacturers in North America and Europe have already deployed predictive maintenance capabilities in at least one area of their operations.

Moreover, organizations implementing predictive maintenance initiatives have reported median payback periods of approximately 14 months, highlighting the growing economic viability of digital maintenance investments.

In an automotive manufacturing environment, predictive maintenance was implemented to reduce the costs and disruptions caused by unexpected equipment failures. By integrating an IoT-enabled predictive maintenance solution with its CMMS and deploying vibration and temperature sensors on critical assets, the company gained real-time visibility into equipment health and detected failures before they occurred. The initiative resulted in a 30% reduction in unplanned downtime, a 15% increase in overall equipment effectiveness (OEE), and annual maintenance savings of approximately $2 million. This case highlights how predictive maintenance delivers value through the combination of connected technologies, real-time insights, and proactive maintenance practices.

This reinforces that predictive maintenance is no longer an emerging concept; rather, it is becoming a practical, scalable lever for manufacturers looking to improve uptime, reduce cost leakage, and strengthen asset performance.

2.2 The role of digital technologies

The shift to predictive maintenance is enabled by a suite of digital technologies, including IoT sensors that capture real-time operational data, AI-driven analytics that predict failure patterns, digital twins that simulate asset behavior, and integrated CMMS/EAM platforms that centralize maintenance activities.

These technologies enable early detection of anomalies, optimize maintenance scheduling, and reduce unnecessary interventions.

The performance improvements are increasingly well documented. Across industrial environments, predictive maintenance programs have demonstrated the potential to reduce downtime by up to 50% while lowering maintenance costs by as much as 40%. Such outcomes are driving increased investment in sensor technologies, predictive analytics, and remote asset monitoring platforms.

In the food and beverage sector, predictive maintenance deployments have generated equally compelling results. Large-scale implementations have reported reductions of up to 42% in unplanned downtime and maintenance cost savings approaching 38%, demonstrating that advanced maintenance strategies can create value even in highly complex, high-volume production environments.

A chemical manufacturing facility also demonstrated how predictive technologies can create value beyond cost reduction. By installing sensors to monitor pressure and temperature in critical systems, automating alerts for leaks or overheating, and training employees on emergency response protocols, the facility improved incident response time by 50%, reduced safety-related downtime by 40%, and strengthened environmental compliance by avoiding potential fines of $1 million.

As a result, organizations can improve uptime while simultaneously reducing maintenance costs.

2.3 OEMs as strategic partners

OEMs are increasingly evolving beyond their traditional role as equipment suppliers. With access to proprietary data, advanced analytics capabilities, and deep technical expertise, they are becoming key partners in delivering performance-led maintenance models.

This evolution enables organizations to move toward long-term service partnerships, where OEMs share accountability for asset performance. It also supports the adoption of performance-linked contracts and shared risk-reward mechanisms.

3. Designing the future maintenance operating model

3.1 Establishing an asset-centric maintenance strategy

3.1.1 Why a one-size-fits-all approach fails

A uniform maintenance strategy across all assets is neither efficient nor cost-effective. Different assets contribute differently to production, quality, safety, and business performance.

3.1.2 Asset tiering based on criticality

Organizations should classify assets according to operational criticality, failure impact, and business value to determine the appropriate maintenance approach.

3.1.3 Aligning maintenance models to asset tiers

Critical assets require predictive and outcome-based maintenance, while lower-criticality assets can be managed through preventive, corrective, or in-house support models.

3.1.4 Benefits of an asset-tiered approach

- Optimized maintenance investment
- Better resource allocation
- Reduced service costs for non-critical assets
- Improved reliability for critical production equipment

3.2 Evaluating maintenance delivery models

3.2.1 Traditional maintenance contracting models

Most manufacturers rely on time & materials, fixed-fee preventive maintenance, or conventional performance-based contracts.

3.2.2 Limitations of traditional approaches

These models primarily reward maintenance activity rather than asset performance, resulting in cost inefficiencies, limited innovation, and poor alignment with business outcomes.

3.2.3 The need for outcome-based maintenance

As manufacturers seek greater asset reliability and cost transparency, maintenance models must evolve from activity-driven execution toward performance-led service delivery.

3.3 The future state: Predictive asset performance model (PAPM)

3.3.1 What is PAPM?

The Predictive Asset Performance Model (PAPM) is an outcome-based maintenance framework where interventions are triggered by asset condition and suppliers are accountable for performance outcomes rather than predefined maintenance activities.

3.3.2 Key elements of PAPM

- Asset uptime and availability commitments
- Predictive and condition-based maintenance
- Reduced dependence on on-site intervention
- AI, IoT, and predictive analytics integration
- Total Cost of Ownership (TCO) optimization

3.3.3 Commercial transformation under PAPM

PAPM replaces activity-based pricing with a balanced commercial model comprising:

- Lower fixed base fees
- Performance-linked incentives
- Shared savings mechanisms

This aligns supplier objectives with operational and financial outcomes.

3.3.4 Realizing business value through PAPM

Improved reliability and asset performance: Greater equipment uptime, fewer unplanned failures, and enhanced operational stability.

Lower total cost of ownership: Reduced maintenance interventions, optimized spare parts consumption, and improved workforce productivity.

Sustainable long-term value creation: Extended asset lifecycle, predictable maintenance costs, and a scalable foundation for predictive maintenance at enterprise level.

4. Transformation roadmap: From current state to PAPM

Phase 1: Stabilize (0–12 months)

The initial phase focuses on establishing control and consistency by introducing structured contracts, rationalizing the supplier base, and standardizing rate cards. This creates immediate cost efficiencies and lays the foundation for further transformation.

Phase 2: Standardize (1–3 years)

The second phase involves implementing asset tiering, aligning maintenance models across the organization, and establishing a uniform KPI framework. This ensures consistent performance and governance across sites.

Phase 3: Transform (3–5 years)

The final phase focuses on deploying predictive technologies, transitioning critical assets to PAPM, and scaling the model globally. This delivers sustainable cost optimization and performance improvement.

5. Governance model – critical for success

Successful transformation requires strong central governance, standardized performance metrics, and structured engagement with internal and external stakeholders to ensure alignment and accountability.

5.1 Central vs site responsibility

A clear governance structure is essential to drive consistency and accountability. The central team is responsible for strategy, contracting, and governance, while regional engineering defines technical standards and asset classification. Site teams focus on execution and data capture.

5.2 Key requirements: Risks and mitigation

Transformation of MRO technical services involves risks such as resistance from sites, pushback from OEMs, fragmented data, and the potential for an overly complex operating model. A key watchout is stakeholder adoption. On-site teams may view centralization and standardization as a loss of control, while inconsistent processes and data quality can impact decision-making and delay value realization.

These risks can be mitigated through a phased pilot approach, prioritization of critical assets, and simple, scalable service models. Strong governance, shared-savings frameworks, and clear accountability will support alignment across stakeholders. Equally important is a robust change management program focused on leadership sponsorship, continuous communication, user training, and engagement to drive adoption and ensure sustainable business outcomes.

Conclusion: A strategic imperative

MRO technical services represent a significant opportunity for value creation in manufacturing, but realizing this potential requires a fundamental shift from fragmented, site-led practices to a more structured and strategically governed approach. This transformation demands alignment of operating models, supplier ecosystems, and commercial constructs toward enterprise-wide objectives.

Ultimately, organizations must transition from decentralized autonomy to central governance, from fragmented supplier networks to strategic partnerships, and from activity-based maintenance models to performance-driven outcomes, enabling improved cost efficiency, accountability, and long-term operational performance.

Authors

Alok Malaviya
Service Head - Client Operations

Alok Malaviya is a Global Operations Leader with over 28 years of experience in sourcing, procurement, and P2P operations across global organizations. As Service Head of Client Operations, he has led large-scale procurement transformations across APAC, EMEA, North America, and Latin America, with expertise spanning category management, contract management, spend analytics, supplier management, and compliance. His strong project management and stakeholder management capabilities have enabled successful delivery of business outcomes for leading FMCG clients.

Philip Jones
Principal Consultant - Solution Design

Philip is the Global Category Manager for Manufacturing Services with 40+ years of experience in MRO, maintenance, engineering and strategic procurement. Specialist in technical services, total cost of ownership (TCO) optimization, global category strategy and supplier performance, delivering sustainable cost savings and improved asset reliability across global manufacturing operations.

References

https://www.joltek.com/blog/what-is-mro-in-manufacturing

https://www.linkedin.com/pulse/how-smart-manufacturing-management-systems-reduce-s6q0f

MRO Trends 2025: AI, Sustainability & Digital Transformation

How MRO Optimization Transforms Manufacturing: Real-World Case Studies of Cost Savings and Safety Improvements

For more information, contact infosysbpm@infosys.com

Infosys
Navigate your next