

Calendar-Based vs Use-Based vs AI-Powered Maintenance

Category	Calendar-Based Maintenance	Use-Based Maintenance	AI-Powered Maintenance
Trigger Type	Time-based (e.g. every 6 months)	Use-based (e.g. hours, cycles, miles, output)	Real-time sensor data, historical patterns, and AI risk modelling
Data Use	Minimal: Relies on fixed intervals and routine scheduling	Operational usage data such as runtime, throughput, or mileage	High-frequency condition data with historical performance + failure data
Responsiveness	Low: Can't adjust to changing workload or environment	Moderate: Adjusts to asset activity but not condition	High: Adapts to asset condition, operating context, and emerging risk
Failure Prevention	Reduces risk of neglect but may miss early signs of wear	Improves timing of service but can't detect subtle deterioration	Detects anomalies and early warning signals before thresholds are crossed
Risk of Overservicing	High: Maintenance may occur regardless of asset condition	Lower: Service tied to actual usage	Low: Work triggered by measurable signs of wear or elevated risk
Risk of Underservicing	Moderate: Failures can occur between intervals	Lower: Service aligns more closely to wear patterns	Low: Continuous monitoring identifies risk before failure
Technician Efficiency	Low: Routine tasks may not reflect actual need	Moderate: Workload aligns with asset activity	High: Technicians focus on high-risk assets and priority interventions
Resource Planning	Based on fixed schedules and forecasts	Based on expected use trends	Based on live risk, enabling proactive allocation of labor and inventory
Asset Longevity	Can be shortened by unnecessary intervention or late detection	Improved compared to calendar-only scheduling	Extended through condition-aware servicing + fewer catastrophic failures
Cost Control	Higher labour and parts costs due to inefficiencies	More controlled spending through better timing	Less downtime + targeted interventions + optimized inventory = lower cost
Ease of Implementation	Simple: No advanced infrastructure required	Moderate: Requires access to usage data and CMMS integration	More complex: Requires sensors, data integration, and AI-enabled CMMS
Scalability and Improvement	Limited: Schedules remain static unless manually revised	Moderate: Thresholds can be refined over time	High: AI models continuously improve as more data is collected
Strategic Value	Operational discipline and compliance	Improved operational alignment	Decision support across maintenance, production, staffing, and finance