

## Predictive Maintenance

### Prevent Downtime with AI-Powered Predictive Maintenance

Unplanned equipment failures in manufacturing lead to costly downtime, financial losses, and disrupted production. The costs of these failures can range from thousands to millions of dollars, including lost production, emergency repairs, and supply chain interruptions. Waiting for equipment to fail is no longer a viable strategy for modern industrial operations.

An AI-powered predictive maintenance system helps solve this problem by analyzing sensor data to forecast equipment failures. This enables proactive maintenance that minimizes downtime, extends asset lifespan, and keeps production lines running smoothly. This approach empowers your teams to shift from a reactive to a proactive operational model, turning data into a powerful tool for progress.

### Improve Operational Efficiency with AI

An AI-driven approach makes predictive maintenance more accessible and scalable. It allows you to process vast amounts of sensor data from various sources, turning complex datasets into clear, actionable insights. This capability improves efficiency, reduces operational risks, and strengthens overall equipment effectiveness, all while using your existing data infrastructure. It helps your team move forward with confidence, knowing they have the insights to prevent problems before they start.

### Intelligent Predictive Maintenance Use Cases



#### Health Monitoring and Anomaly Detection

Use natural language to ask questions about equipment health and automatically detect anomalies in sensor data that may indicate a potential failure.



#### Root Cause Analysis

Analyze historical data to identify the underlying causes of equipment failures, helping to prevent recurring issues and improve long-term reliability.



#### Remaining Useful Life (RUL) Prediction

Forecast the RUL of critical components, allowing maintenance teams to schedule repairs and replacements at the optimal time to avoid unexpected breakdowns.



#### Optimized Maintenance Scheduling

Use AI-driven insights to create dynamic maintenance schedules based on the actual condition of equipment rather than fixed intervals.

### How it works

Organizations can carry out a powerful predictive maintenance solution to enhance operational oversight and efficiency. This process ensures you can quickly identify and address potential issues, leading to improved productivity and reliability. To do this, organizations should:



#### Integrate Data Sources

Connect sensor data, historical maintenance logs, and other relevant datasets to the analytics platform.



#### Train & Fine-Tune Models

Use machine learning models to analyze the data, detect anomalies, and predict failures.



#### Generate Insights

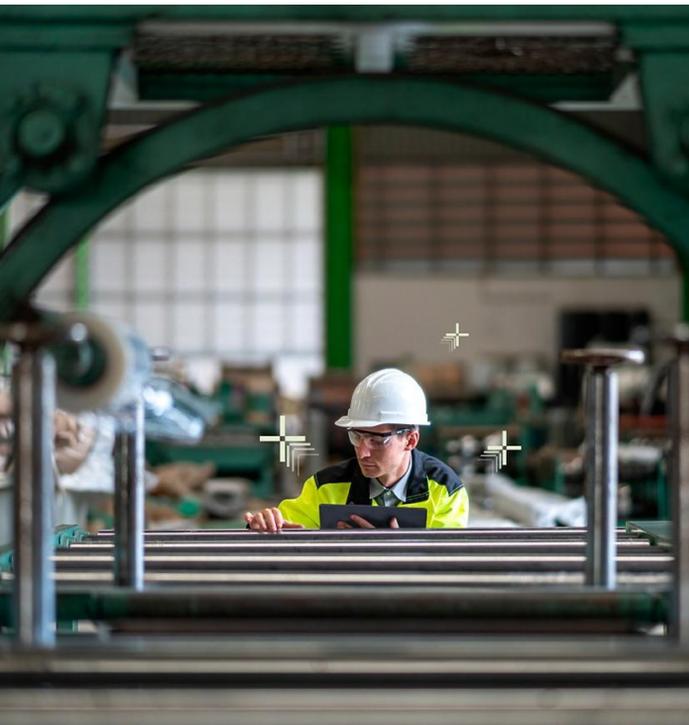
Interact with an AI agent using natural language to get reports, visualizations, and alerts about equipment health.



#### Act Proactively

Use the insights to schedule maintenance, order parts, and take other preventive actions to avoid downtime.





## An Agentic Workflow for Actionable Insights

A modern predictive maintenance solution is built on an integrated technology stack that delivers scalable, actionable results through an intelligent, agent-based workflow.

The process begins when a user asks a question in natural language. An AI agent, using NVIDIA NeMo and advanced language models, interprets the query. The agent then creates a plan and orchestrates a series of tasks, calling on specialized agents for SQL retrieval, anomaly detection, and RUL prediction.

These agents interact with the different engines of the Dell AI Data Platform. The Data Analytics Engine provides access to structured data, the Data Processing Engine trains and runs the machine learning models with NVIDIA RAPIDS, and the Data Search Engine serves as a vector database. This powerful combination of Dell infrastructure and NVIDIA software allows maintenance teams to get immediate, accurate answers and take decisive action.

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## Accelerate Enterprise AI with Dell and NVIDIA

The Dell AI Data Platform with NVIDIA, delivers a purpose-built, AI-optimized infrastructure that accelerates innovation and simplifies enterprise AI adoption.

Combining Dell's modular, scalable data engines, high-performance storage, and NVIDIA's industry-leading GPU acceleration, this platform provides unmatched performance, seamless integration, and enterprise-grade security. Couple with Dell Blueprints providing pre-validated architectures that streamline deployment and optimize AI workflows; enterprises can unlock value from all their data, securely and cost-effectively, without the pain of DIY.

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