



White Paper for Manufacturing AI

Use Case for Manufacturing: Predictive Maintenance with Agentic Intelligence

In manufacturing environments, even a minor equipment failure can disrupt production lines, drive up maintenance costs, and impact delivery timelines. Traditional monitoring systems rely on manual inspection or static rule-based alerts, which often fail to detect early warning signals.

Overview

This Manufacturing AI use case, powered by **SUPERWISE®**, redefines this process through an **agentic predictive maintenance framework** that continuously analyzes live machine sensor data to forecast potential failures, optimize maintenance schedules, and maximize operational efficiency.

This demonstration uses **synthetic sample data** to showcase how intelligent **SUPERWISE® agents** autonomously monitor machinery, identify high-risk components, and generate actionable insights – all within a governed, auditable AI operations framework.

Machine Health Analysis & Risk Classification

The SUPERWISE® agent works as a diagnostic analysis agent and focuses on real-time evaluation of sensor data collected from multiple machines, such as vibration, temperature, current, and pressure readings.

- Ingests streaming sensor data and maintenance records.
- Performs **multi-parameter anomaly detection** using predictive models.
- Assigns **risk classifications** (Low, Medium, High) with confidence scores.
- Detects **imminent failures** and estimates **day-to-failure** timelines.

This process produces a **machine-level health matrix**, giving maintenance teams early visibility into which assets require immediate attention. This reduces unplanned downtime and service disruptions.

These insights also enable future development of:

- Automated alerts & dashboards

- Maintenance schedule report
- ROI projections
- Integration with existing ERP systems.

Why This Matters

This demonstration illustrates how **agentic systems** can transform industrial operations by combining predictive analytics with built-in governance:

1. **Operational Efficiency:** Early detection of equipment anomalies prevents costly downtime.
2. **Knowledge:** **SUPERWISE®** enables integration of diverse data sources - file-based (e.g., PDFs, text), relational and vector-databases, web-based content by configuring "sources" and linking them to datasets for ingestion, schema detection and exploration.
3. **Agents:** Within **SUPERWISE®**, you can deploy agents backed by selectable large-language-model providers (e.g., OpenAI, Google AI, Anthropic, Vertex AI Model Garden) and define custom prompts and workflows for them by combining model orchestration with governance.
4. **AI Safety Guardrails:** Ensures predictions are made only on valid, operational machines and filtering out end-of-service or non-functional units.
5. **Data Quality Assurance:** Input validation and telemetry monitoring maintain reliable model performance.
6. **Compliance and Governance:** **SUPERWISE®** agentic guardrails enforce traceability, logging, and ethical AI usage.
7. **Observability:** **SUPERWISE®** provides dashboards, query-builders, and monitoring capabilities to gain in-depth insights into your agent's performance and behavior. This allows you to visualize, explore, and generate alerts on the health of your data and models.
8. **Policies:** Policies in **SUPERWISE®** let you proactively monitor agent datasets, models, and pipelines and define metrics, thresholds, and alerting destinations so you can automate issue detection and scale data/ AI operations safely and efficiently.
9. **Scalability:** The modular framework can integrate across factories, ERP, or IoT ecosystems.

Key Takeaways

By orchestrating diagnostics and maintenance through intelligent, governed agents, **Manufacturing AI** showcases how **SUPERWISE®** enables factories to move from reactive maintenance to **predictive, autonomous, and auditable operations**.

This use case highlights the practical power of **agentic AI governance and operations** and ensures that industrial automation remains **smart, explainable, and enterprise ready**.

Accelerate your digital manufacturing transformation with **SUPERWISE® AI**
The enterprise platform for **agentic governance, observability, and operations**.

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