SigmaStream

preempt

AI and ML Predictive Maintenance

BENEFITS

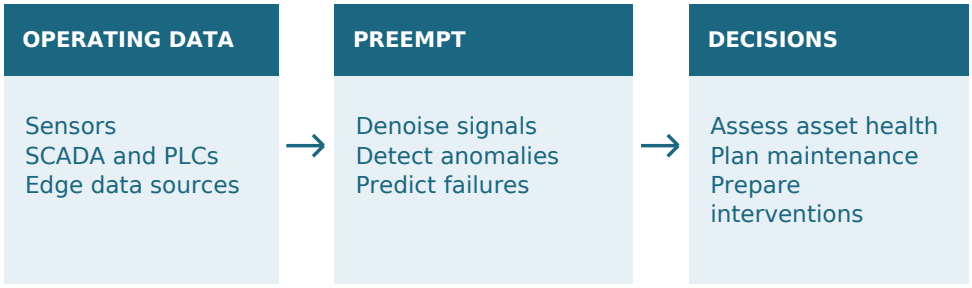
- Earlier visibility into emerging equipment problems
- Condition-based maintenance informed by asset health
- Long-term forecasts for maintenance planning
- Short-term forecasts for contingency planning
- Denoising of noisy sensor signals
- Detection of subtle operating anomalies
- Support for multiple industrial asset types
- Integration with SCADA, PLCs and edge data sources
- On-premise or cloud deployment
- Dashboards with health scores, thresholds and failure probabilities

Overview

Preempt is SigmaStream's predictive maintenance and anomaly detection solution for industrial operations. It uses real-time streaming data, statistical modeling, AI and machine learning to identify emerging equipment problems before they develop into failures.

Preempt denoises sensor signals, detects subtle changes in operating behavior and forecasts potential equipment issues. Operators gain visibility into asset condition so they can plan maintenance, prepare for impending failures and intervene earlier.

Two prediction approaches serve different decisions. Long-term prediction assesses equipment health over days for strategic maintenance planning. Short-term prediction matches operating patterns over hours to support contingency planning.



From streaming operating data to informed maintenance decisions

Prediction Horizons

Days ahead | Strategic planning
Assess the progression of equipment health from normal operation toward failure. Example prediction horizons include 10, 20 and 30 days.

Hours ahead | Contingency planning
Identify patterns resembling equipment failure behavior. Example horizons include 1, 2, 10 and 24 hours.

Prediction horizons and performance depend on the asset, available data and the model validated for that application.

DEPLOYMENT

Environment
On-premise or cloud

Data sources
SCADA, PLCs and other edge data sources
Historical operating time series

Supported asset types
Pumps, generators, rotary systems and downhole tools

Validation inputs
Maintenance logs and historical failure records for application-specific validation

System sizing
Hardware, operating system and storage requirements to be confirmed for the deployment.

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Features

The key features of Preempt are:

Signal Denoising	Processes noisy sensor signals to expose underlying operating behavior and make subtle deviations easier to identify.
Anomaly Detection	Uses real-time streaming data and statistical modeling to identify changes in equipment behavior that may precede failure.
Long-Term Prediction	Evaluates equipment health and its deterioration over time to forecast potential failures on a horizon measured in days, supporting maintenance planning.
Short-Term Prediction	Uses pattern matching to identify equipment exhibiting characteristics similar to failure behavior, with prediction horizons measured in hours.
Health Dashboards	Presents real-time health scores, thresholds and failure probabilities to support decisions in field and corporate settings.
Data Integration	Can integrate with SCADA, PLCs and other edge data sources. Historical time-series operating data supports the development and validation of predictive models.
Multiple Asset Types	Supports pumps, generators, rotary systems and downhole tools. The predictive approach can be applied to multiple subsystems of heavy equipment.
Deployment Options	Runs on-premise or in the cloud, allowing deployment to be aligned with operational and infrastructure needs.
Phased Adoption	Begin with non-critical components and run models alongside the existing maintenance schedule. Validate performance and build confidence before expanding to critical components.

Application Evidence

Drilling top drive - For a US drilling contractor, historical operating data was used to identify leading indicators of AC electric motor failure. Predictions on a days-ahead horizon were verified against maintenance logs.

Automotive production systems - A case study reports greater than 95% accuracy in predicting impending failures in an automotive production and resource planning system. This is an application-specific result.