MindSphere for Prescriptive Maintenance

Solution brief

Siemens

The Industrial Internet of Things (IIoT) has created synergies between information technology (IT) and operational technology (OT) that drive new levels of efficiency and productivity for industrial organizations. Those looking to realize these benefits can do so with MindSphere, the cloud-based, open Internet of Things (IoT) operating system from Siemens that enables you to easily and securely connect the physical world to the digital world.

Prescriptive maintenance helps industrial organizations maintain assets on a need-only basis, while also infusing greater automation into the process. Compared to traditional maintenance approaches, prescriptive maintenance boosts asset availability because it virtually eliminates unplanned downtime and unnecessary maintenance. As a result, industrial organizations can significantly reduce maintenance costs, prolong asset life and optimize factory productivity.

How it works

MindSphere for Prescriptive Maintenance enables your teams to establish parameters for the proper operating conditions of your factory assets, and compare those conditions to real-time performance and health data to proactively identify anomalies. When anomalies occur, your team receives an alert that includes suggested remedial actions. The ability to simulate various maintenance scenarios allows you to better predict the outcomes of each solution and choose the resolution that aligns with your operational and financial needs.

Furthermore, MindSphere for Prescriptive Maintenance helps you understand when the operating conditions – such as running a pump at a supplier's recommended discharge pressure or temperature – are leading to suboptimal health or performance so you can proactively correct them.

Challenges

- Minimize asset downtime and maximize utilization
- Enhance production output
- Reduce the amount of wasted materials and labor

Solutions

- Perform maintenance only when needed
- Boost asset availability by virtually eliminating unplanned downtime
- Gain greater insight into the health and performance of critical assets
- Better predict asset failure and act before downtime occurs

Results

- Significantly reduce maintenance costs
- Prolong asset life
- Optimize factory productivity

The challenge: Existing maintenance approaches limit production

Minimizing asset downtime and maximizing utilization are critical to meeting production goals in industrial sectors. This is because even brief periods of unplanned downtime or suboptimal performance can reduce production and lead to wasted raw materials and labor. Many industrial organizations, however, continue to use outdated maintenance approaches that fail to fulfill uptime requirements and in turn, limit production outputs. This includes reactive maintenance and schedule-based maintenance practices.

Reactive maintenance is when industrial organizations allow factory assets to run until failure, enabling them to avoid the cost of recurring services and large maintenance staffs. These advantages are far outweighed by the negatives, however, as this approach tends to lead to more serious mechanical failures that could be avoided with a more proactive maintenance approach. The unplanned downtime incurred from these kinds of asset failures limits revenue potential and overall productivity as processes cannot continue until the necessary parts arrive and repairs are complete.

Schedule-based maintenance is an approach in which full or partial maintenance is performed at predetermined intervals, which is decided by the asset builder and aligns with their perception of the asset's expected lifespan. Although this approach presents a step up from reactive maintenance, it still fails to maximize uptime as assets are constantly taken offline for planned maintenance. Industrial organizations taking this approach risk experiencing failure in between scheduled servicing

or performing maintenance on healthy machines, incurring unnecessary costs. Additionally, this approach typically requires industrial organizations to purchase and maintain a large spare parts inventory.

The solution: Optimizing maintenance with IIoT-driven approaches

Industrial organizations can use IIoT to gain greater transparency into the health and performance of critical assets and use this insight to optimize maintenance approaches. These optimized maintenance approaches enable industrial organizations to better predict asset failure and act before downtime occurs, while also eliminating unnecessary maintenance that drives up costs.

A comprehensive IIoT-driven maintenance approach includes a combination of predictive and prescriptive maintenance. Predictive maintenance increases an asset's lifespan and helps maximize its availability by monitoring its condition in real time to predict failure before it happens. With this information, industrial organizations can better understand the root cause of failure and perform maintenance at the optimal time before downtime occurs. Prescriptive maintenance takes IIoT-driven maintenance one step further.

MindSphere for Prescriptive Maintenance maximizes health and production

Prescriptive maintenance is a practice that includes advanced analytics and artificial intelligence/machine learning to not only predict when failure will occur, but also suggest the proper remedial action to take. This allows you to perform maintenance on a need-only basis (such as with predictive maintenance) and infuse greater automation into the process. With the insights from prescriptive maintenance solutions, you can also consider the financial and operational ramifications of the different maintenance actions, enabling you to select the solution that best accommodates your needs.

For example, if a motor is overheating, you might be able to continue operations and mitigate failure by running it at lower intensity that would reduce its temperature. A prescriptive maintenance solution would pinpoint this anomaly, alert your user, and present the options of halting operations for maintenance or prolonging them at lower level performance. Adopting prescriptive maintenance empowers your team to leverage these kinds of real-time insights and make informed decisions that align with your needs.

Core components

A combination of emerging technologies power prescriptive maintenance practices. MindSphere comes equipped with these technologies, providing an end-to-end platform to help customers more easily realize success. Core components of the solution include:

Predictive Learning

The Predictive Learning component of MindSphere allows data scientists to build prediction models using machine-learning techniques. This enables a greater understanding of the sequences of events that lead to failure so you can take the proper actions before incurring downtime. Predictive Learning also helps you better forecast asset performance.

Asset Manager

Asset Manager is a component of MindSphere that gives you the ability to model the structure of an industrial process. It creates this model using assets (digital representations of machines), types (preconfigured templates for assets) and aspects (components with an asset). By using the Asset Manager configuration, you are able to track specific data sources that are relevant to determining machine performance.

Fleet Manager

Fleet manager is another component of MindSphere designed to give you an overview of your assets. With Fleet Manager, you can define your assets' properties and configure events that you wish to know about, as well as specify the preferred type of data visualization. Your production configuration is mapped 1:1 thanks to individual floor plans and a map view. Built-in alerting capabilities allow you to set alarms tied to specific key performance indicators (KPIs), which in turn allows you to immediately see each of your assets as a pin, with colors to indicate the presence of relevant information, such as a warning or an error associated with a particular asset.

Analytics Services

Analytics Services is a collection of application programming interfaces (APIs) for time series data. These APIs empower you to turn raw asset data into insights that help detect issues early. Included amongst these APIs are KPI calculations, anomaly detection, event analytics, signal validation, signal calculation and trend prediction.

Begin your IIoT journey

By using MindSphere for Prescriptive Maintenance, you can not only predict when asset failure might occur, but gain a thorough understanding of the best way to respond. This enables you to improve plant reliability, reduce maintenance costs and boost productivity. MindSphere makes it easy to get started by facilitating the seamless connection of all factory assets and enabling a centralized view of performance and health. Further, using MindSphere empowers your team to better understand the outputs of various maintenance tasks, allowing them to make informed decisions that align with your operational and business needs. To get started, visit our website or contact your local Siemens representative.