

The Siemens logo is displayed in a bold, teal, sans-serif font.

Ingenuity for life

Executive brief

Condition monitoring for plants and machines

Are you listening to your machines?

Siemens MindSphere

How manufacturers can use MindSphere to optimize productivity
Staying competitive in manufacturing requires businesses to not only offer the highest quality product, but also to discover untapped efficiencies across the production process to reduce costs. A constant challenge that pressures profitability in the manufacturing industry is unplanned downtime from

disruptive asset failure. This challenge stems from the lack of transparency into machine performance required to predict and prevent failures on the factory floor or across plants. One way that companies can minimize risk of unplanned asset failure and damage is condition monitoring through digitalization.

Condition monitoring is the process of monitoring a specific asset's parameters including alarms and notifications on key performance indicators (KPIs) for anomalies against defined control ranges to provide performance transparency and inform when assets need to be inspected. Monitoring requires accurate and continuous input data from a wide variety of sensors and parameters in real time or near real time.

Digitalization is changing the industry landscape by opening the door to more advanced analytics and data collection directly from the shop floor. Currently, some manufacturers perform predictive analytics using custom in-house

applications that enable only partial operational transparency and incur heavy technical resource support burdens. Custom analytics applications tend to strain companies by requiring employees to build, maintain, and keep the applications relevant to the evolving shop floor. Compounding these challenges, varying non-standard communication protocols between legacy hardware and new equipment require continuous technical resource allocation. Dependencies between core enterprise systems and the in-house analytics applications limit how often maintenance and analytical improvements can be made to fine-tune algorithms to get actionable results without significant operational costs.

As an alternative to in-house platforms and applications, companies can take advantage of MindSphere, the cloud-based, open Internet of Things (IoT) operating system, to keep costs low. Offered as a Platform as a Service (PaaS), MindSphere enables customers to offset the costs of IT infrastructure,



programming tools, analytics services, and others as operational expenses with minimal or no infrastructure expenditure. Companies can focus on value-added activities around their core competencies rather than on IoT platform development and maintenance. Now is the time to select an end-to-end IoT solution to begin immediately collecting and monitoring machine data as well as integration with other enterprise systems to achieve full operational transparency.

Perform maintenance at the right time

Condition monitoring, along with predictive maintenance, asset integrity management and predictive forecasting are all approaches for collecting, visualizing, and analyzing asset health data. Asset performance information can be combined and shared across other departments or business units to create a more comprehensive view of production and asset performance. Plant operators and maintenance groups can coordinate around this aggregated information to protect throughput targets with reduced downtime, and look towards future product quality improvements for an enhanced customer experience.

Two ways to undertake condition monitoring are trend monitoring and condition checking. Trend monitoring is the continuous measurement and interpretation of data over time. As an example, a company could measure a specific parameter of a machine and study that trend alongside uptime to indicate when deterioration exceeds a critical rate point. Condition checking is a method that uses suitable indicators for machine condition while running to initiate regular condition checks. However, combining these two strategies helps to keep machines operational and make condition monitoring a more powerful solution to improve overall machine health. These operational insights are most useful for machines such as rotating equipment, pumps, electric motors, internal combustion engines and presses that fail at a more unpredictable rate and have the largest downtime impact. Since these machines take on higher rates of wear and tear, monitoring multiple specific asset parameters with predictive analytics

helps plant operators and manufacturing engineers schedule maintenance before a shutdown.

Amplifying the voice of your machines with the power of IoT data

With exponential increases in device connectivity options through cloud and edge computing, collecting real-time data from the entire value chain from ideation to realization has unleashed a new wave in digitalization with the IoT. Consumer products have dominated the IoT space, developing infrastructure for solution platforms, and now discrete manufacturing industries are looking to IoT as the next evolution in asset performance management (“Optimize APM with IIoT and Analytics,” ARC Strategies, Nov. 2017). For example, real-time data flowing from smart industrial devices paired with control system data will give companies the flexibility to engage in more powerful predictive maintenance applications that will not divert resources from core operations.

With IoT platform development and maintenance taken care of with MindSphere, plant operators and engineers can focus on interpreting input data surrounding specific asset parameters alongside process data to evaluate the full health of their machines. New intelligent IoT devices working together with IoT-enabled legacy equipment can capture more asset parameters through increased connectivity. The future of condition monitoring will focus on analyzing newly available data to

definitively understand machines that fail at a random rate and prevent unexpected downtime.

Expanding performance, scalability, visibility and insights with MindSphere

MindSphere offers an end-to-end solution from connectivity to analytics, including various industry-specific applications and solutions to address condition monitoring. MindSphere solutions are designed to remove much of the effort, time and expense of building into machines the sophisticated features and capabilities, such as turnkey analytics and Fleet Manager tools that come as standard capabilities with MindSphere. With MindSphere, your information technology teams and developers don't need to program IoT solutions from scratch. The proven, sophisticated features and capabilities included in MindSphere can be easily extended to meet company needs.

The cloud computing that MindSphere provides is already embraced by IT groups and developers in companies worldwide with:

- **On-demand IT infrastructure**, always up-to-date and highly secure with virtually limitless scale and no difficulty with maintenance, patches, updates, security and other ownership responsibilities
- **Capital expense savings**, plus savings in time, effort and skills to acquire, deploy, commission and maintain needed hardware





- **Flexible pay-as-you-go cost models**, via consumption-based pricing, help to avoid up-front capital costs of hardware, while aligning costs with usage – a model that can pass through to customers also, as both a benefit and a competitive differentiator.
- **Cost-effective access** to PaaS functions, such as high-performance computing, and to software-as-a-service (SaaS) applications, such as advanced data analytics built on MindSphere. MindSphere's open standards and interfaces give customers the flexibility to gather data and to match their solutions with their customers' infrastructure regardless of whether the equipment was manufactured by Siemens or third parties.
- **Access to world-class partner ecosystem** to address the broad scope and high complexity of business requirements across all industries. MindSphere has established an extensive network of world-class partnerships with broad domain expertise and IT capabilities to provide a robust offering of IoT solutions and services with the flexibility to match their solutions with customers' requirements.

Now is the time to start your IoT journey

The trend toward digitalization of the world's industrial plant facilities is already in motion, and companies must get started quickly to remain profitable and competitive. Now, operators can connect, collect and analyze data from aging as well as leading infrastructures to immediately monitor machines in one centralized location. Not only are the current operational costs of outdated

machinery mounting in terms of more frequent maintenance, repairs, onsite replacements, and hard-to-find spare parts, but the engineering and maintenance know-how is also quickly retiring.

With MindSphere and IoT data, customers can begin their own digital transformations in these ways:

- Deliver operational transparency with condition monitoring across products, plants, systems and machines
- Optimize asset utilization to ensure maximum uptime and availability
- Increase maintenance efficiencies, implementing predictive maintenance practices
- Drive cost-effective, flexible and scalable solutions as your business needs grow with no operational interruption
- Leverage data availability and centralized KPIs, for greater operational insights and accountability

With Siemens and MindSphere, manufacturers of all sizes can now capitalize on IoT data. It can help open doors to new markets that they previously could not afford to consider, including international ones, thanks to the global reach of the cloud. And MindSphere is supported by Siemens' domain expertise, sales and professional services as well as a world-class global partner ecosystem. To benefit from increased operational transparency and machine uptime, contact your local Siemens representative or global partner, or visit the Siemens MindSphere website to learn more.

Siemens
www.siemens.com/mindsphere

Americas +1 314 264 8499
 Europe +44 (0) 1276 413200
 Asia-Pacific +852 2230 3308