SIEMENS
Ingenuity for life

MindSphere Asset Performance Monitoring

Benefits

- Increase operational transparency across machines, systems and sites
- Improve productivity
- Lower maintenance, repair, replacement and inventory costs
- Improve reliability and maintainability of assets
- Maximize uptime and availability of assets
- Protect workplace safety by identifying potential asset failures in advance

Features

- Configurable and intuitive multi-site management
- Near real-time, status-based condition monitoring of high-value assets
- Multi-condition, rule-engine-based early warning detection framework for assets
- Workflow-based event management for organized and transparent maintenance and service activities
- Out-of-the-box KPI calculations to outline industrial procurement and operating characteristics of assets

Increase operational transparency, improve productivity and lower maintenance costs of industrial assets

Summary
Asset Performance Monitoring is a MindSphere application that enables tracking key operating parameters of industrial assets to detect and alert users to deviations from normal operation conditions. With Asset Performance Monitoring, customers of all sizes can capitalize on Internet of Things (IoT) data, and benefit from maximum uptime and availability of machines and increased operational transparency.

Current situation
Improving productivity for a single industrial asset is difficult when it suffers unplanned downtime due to failure. This gets more challenging when there is a group or fleet of heterogeneous assets. This challenge stems from the lack of transparency into machine performance required to predict and prevent failures in the field. Asset maintenance also becomes challenging when the operational costs of outdated machinery mount in terms of more frequent maintenance, repairs, onsite replacements and hard-to-find spare parts. Further, it is becoming increasingly difficult as the people who have the engineering and maintenance know-how are retiring at a rapid pace.

Challenges
Customers who do not have the MindSphere Asset Performance Monitoring application are quite likely using reactive and expensive unplanned maintenance services for their machines and setups. Some customers go for the custom in-house platforms and applications that provide limited transparency and flexibility. Developing, maintaining and upgrading these solutions can be costly and also divert the company and employee focus from their core competencies and mission.

Solution
Asset Performance Monitoring is a feature-rich MindSphere application based on a wide range of digital services, and is designed to provide an intuitive user experience. The application enables customers to realize operational transparency across machines, systems and sites. Customers can connect, collect and analyze data from aging as well as leading infrastructures to immediately monitor assets on a configurable and intuitive multi-site dashboard. Near real-time status monitoring of critical assets enables maintenance teams to minimize downtime.

Customers can become more proactive in their asset maintenance practices when they have an early problem detection framework based on a multi-condition rule engine. Customers can protect the health and safety of employees and

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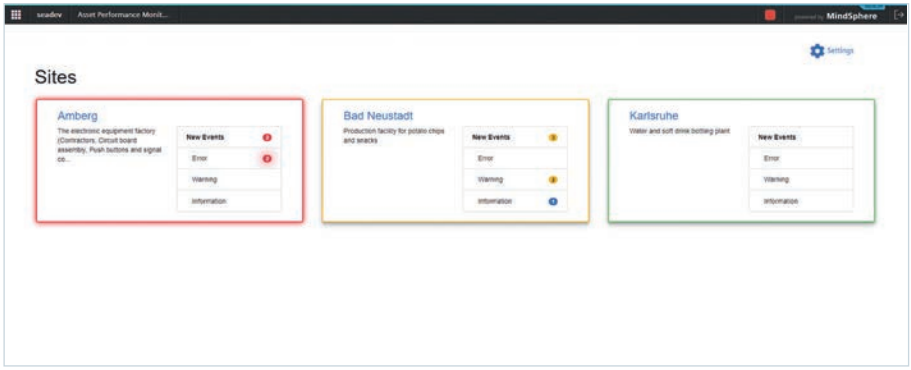
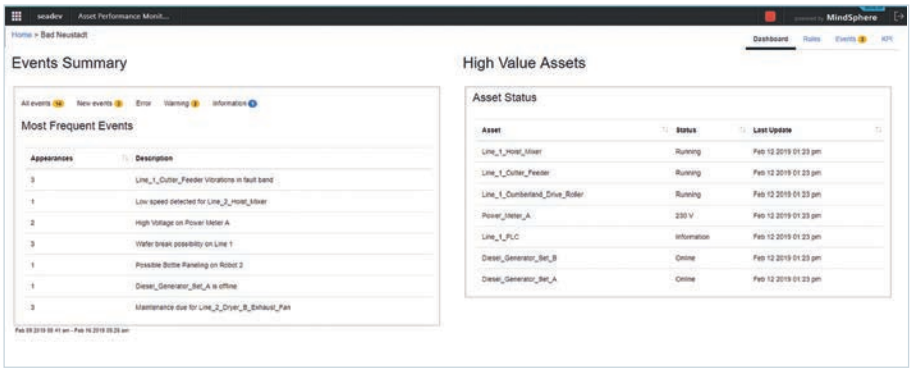
environment by avoiding undesirable asset incidents. Workflow-based event management makes it easier to coordinate maintenance and service activities. Out-of-the-box (OOTB) key performance indicator (KPI) calculations make it possible to outline the industrial procurement (reliability, availability and maintainability) and operating characteristics of an asset.

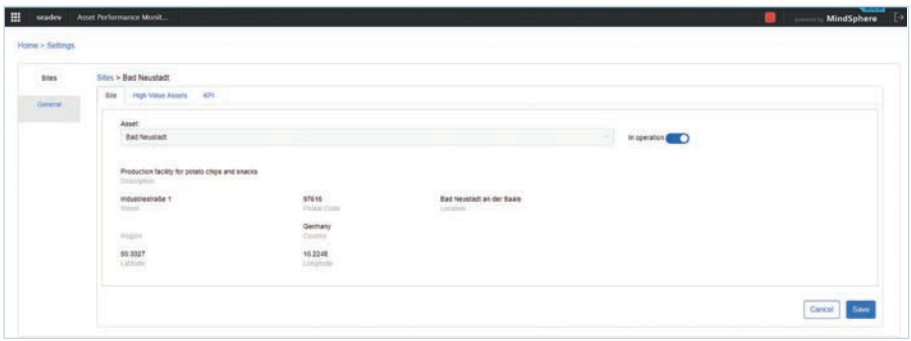
These features help make sure skilled field engineers are spending time on asset maintenance whenever needed, and it is cost effective and convenient. The MindSphere Asset Performance Monitoring application is designed to work for multiple industry domains, making it applicable to a wide range of markets and industries.

Multi-site monitoring
Remote monitoring of multiple sites is easy using the Asset Performance Monitoring application. It reads the IoT data model of your assets from the MindSphere platform, and allows you to set up multi-site and individual site dashboards. Intuitively presenting near real-time updates makes it easy for you to build situational awareness about events at sites.

Each site has its own settings for easy configuration of other features of the application. Monitoring for the individual site can be turned off with one click.







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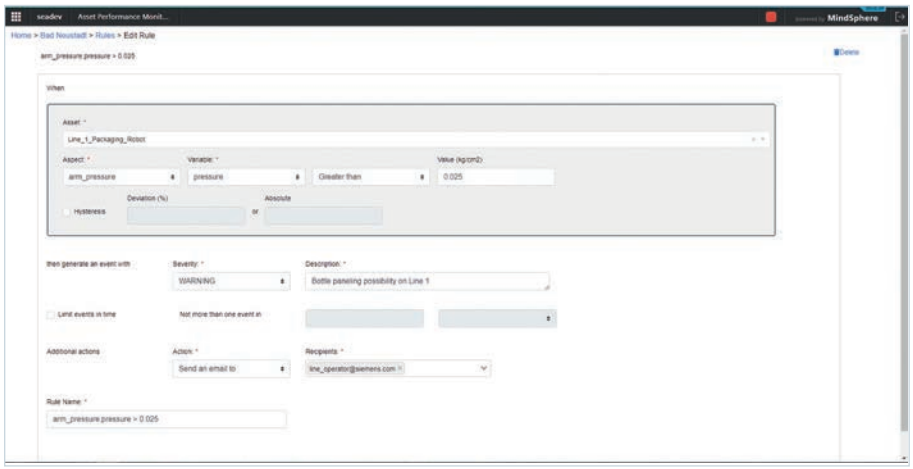
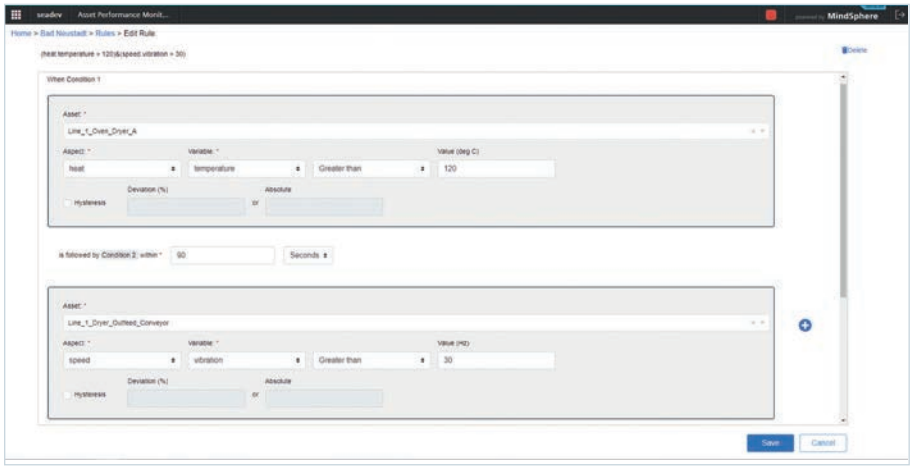
Rule management
With rule management, you can define, activate and manage single condition and multi-condition rules that process a continuous stream of IoT time-series data from assets, and generate events and notifications. Multi-condition rules allow you to set up a rule to identify warning and fault patterns of conditions across multiple assets. Rule management is a practical early warning detection frame-work that enables you to become more proactive in your asset maintenance practices.





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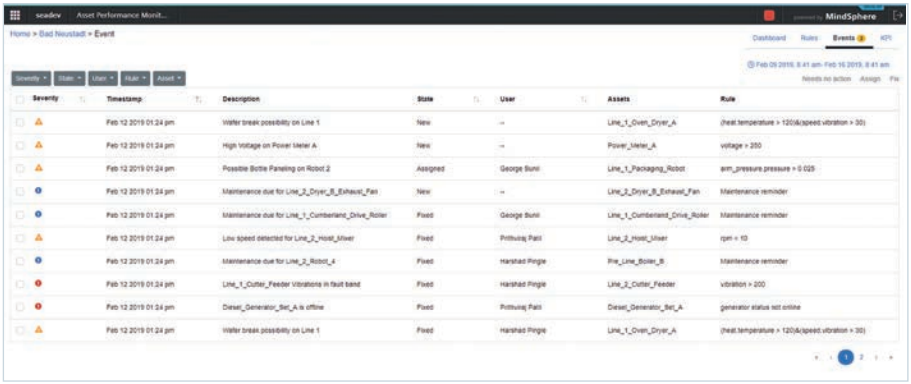
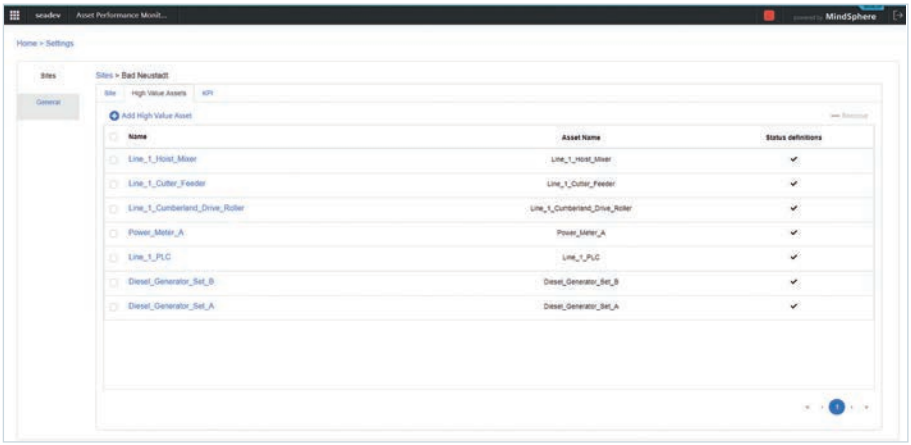
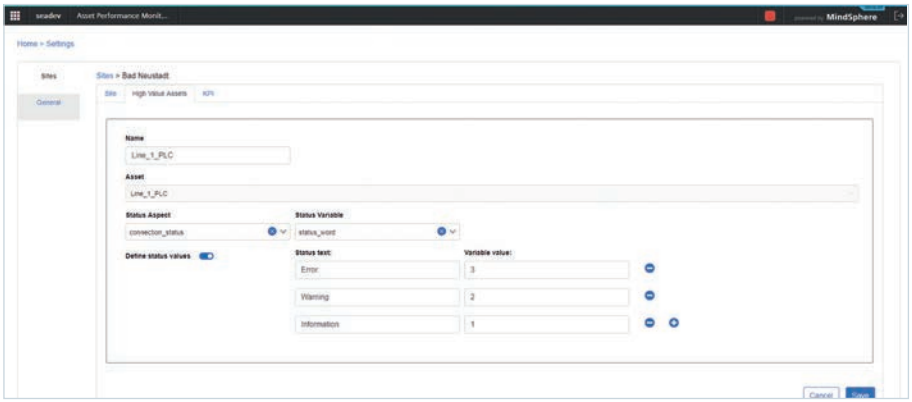
Event management
The event summary view provides a wealth of information about events at the site. Keeping track of events becomes easier with a variety of available filters and sorting options. The built-in workflow allows maintenance supervisors and field engineers to coordinate activities from the application. Event state options enable you to maintain a record of decisions associated with events.



High-value asset monitoring
The seriousness of each event is considered based on its impact on several business levels, including safety, compliance, operations and maintenance cost. Near real-time status monitoring of critical assets enables maintenance teams to minimize downtime.

Using intuitive configuration, you can map raw value from IoT time-series data into a meaningful status for each asset.





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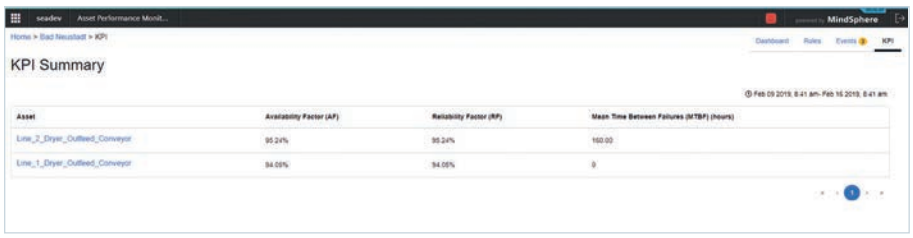
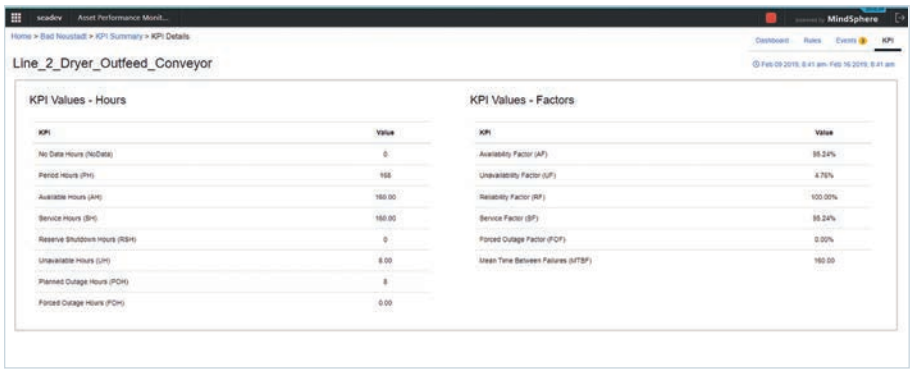
KPI calculations

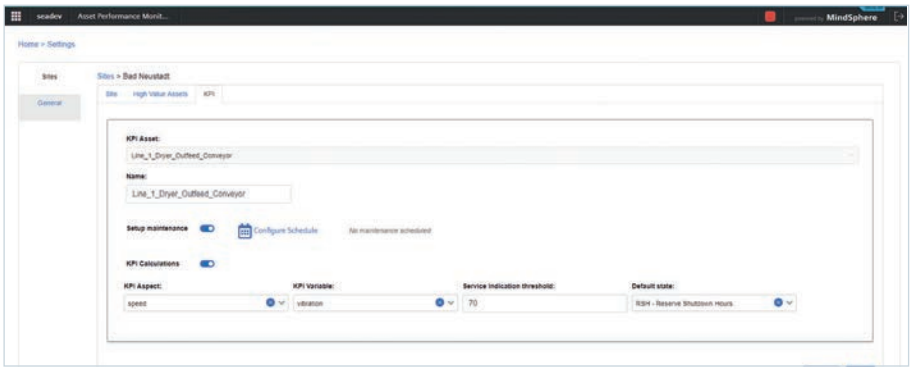
Based on a KPI calculation service from MindSphere, this feature enables you to get a unified view of an asset. The MindSphere KPI Calculation Service offers a set of computational procedures based on International Organization of Standardization (ISO) 3977-9:1999. Calculations are done for a given period of time using IoT time-series data and maintenance-calendar data for an asset. The service presents the output in the form of KPI states and factors, which make it possible to outline the industrial procurement and operating characteristics of an asset.

KPI states are composed of asset states that operate for a given period of time: available hours (service hours, reserve shutdown hours), unavailable hours (forced outage hours, planned outage hours), and unknown hours (no data). KPI factors are probability values of availability, reliability and maintainability of asset.

KPI calculation configurations allow you to set up ad hoc calendar entries for the maintenance of each asset. It also allows you to inform the application about different operating states of the asset.







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MindSphere is the cloud-based, open IoT operating system from Siemens that connects real things to the digital world, and enables powerful industry applications and digital services to drive business success. MindSphere is an open platform as a service (PaaS) system, which enables a rich partner ecosystem to develop and deliver new applications.

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