MindSphere Closed-Loop Product Definition

Combines event analysis results with design data to improve product design

Benefits

- Improve product design with data from MindSphere combining event analysis results with design data

- Address field events faster as the design world and operational data are brought together

- Reduce surprises and uncertain events from the field to improve the efficiency of design engineers

- View summary of events from a fleet of assets which uses the same product and can be compared with existing product issues

- Examine the product's graphical view and the configured BOM of the field asset with Operational Engineer

Summary

Closed-loop refers to a digital replica of physical assets, processes, people, places, systems and devices that can be used for various purposes. The connection between the physical model and the corresponding virtual design by the exchange of time series data is a key characteristic of the digital twin.

Closed-Loop Product Definition is a MindSphere® application that enables customers to effectively connect the data model between its physical and virtual design and relate field events to the design world with operational data. This application allows the operational

engineer to view the complete design of a product with variant information. The application also enables users to manage the summary of events from the fleet of assets of different product variants. In addition, users can perform an analysis of events occurring on multiple assets which use a single design object. The user can do this by comparing Teamcenter® software issues and alert the design engineer by triggering new issues directly in Teamcenter.

Challenges

The digitalization process has led enterprises to develop virtual models for different aspects of their product and production process in dispersed applications like simulation to product lifecycle management (PLM) systems. These models need Internet of Things (IoT) data to gain real insight about the product and production. Operational conditions are an obstacle to find the field events happening on multiple assets from a single design object. Additionally, it takes an extended amount of time and
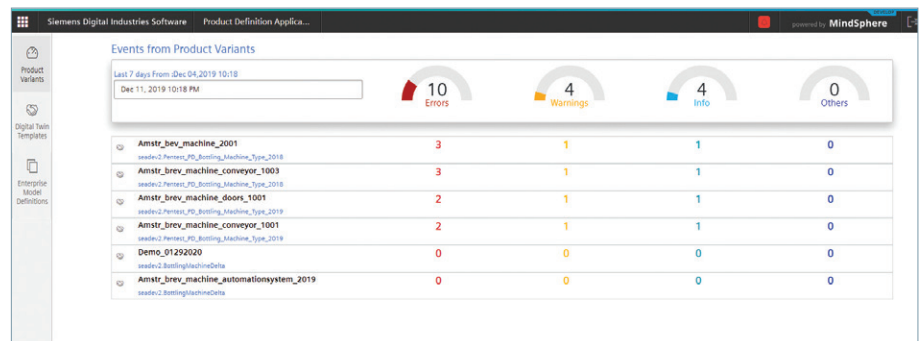

Figure 1: The user double clicks and opens the MindSphere Closed-Loop Product Definition application. The dashboard shows the product variants.

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MindSphere Closed-Loop Product Definition

Features

- Connects specific product configurations to onboarded assets

- Shows a summary of operational events generated for all product configurations

- Allows users to view operational events and related product defects for a specific configuration

- Creates new product defects for unaddressed events

- Provides access to Teamcenter using Active Workspace client

- Interfaces with Teamcenter using an out-of-the-box connector

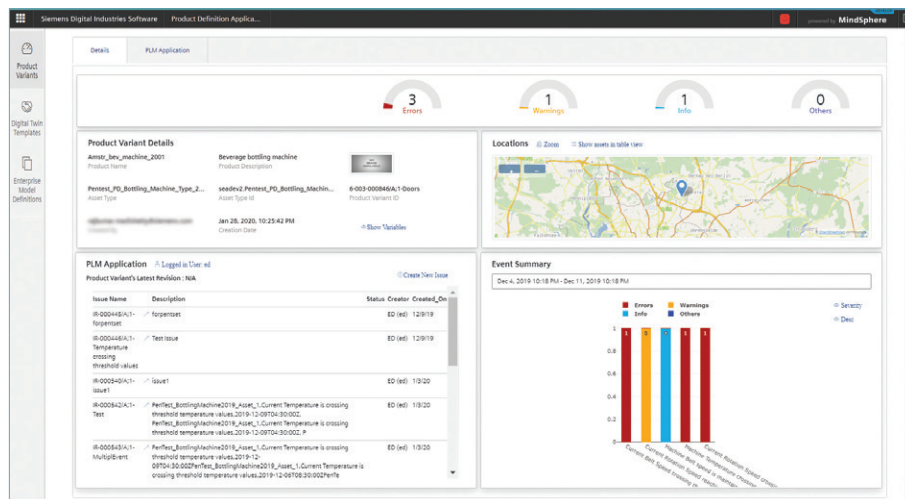- Interfaces with other PLM applications using custom connector

Figure 2: When the user clicks on a product variant in the dashboard, the product variant details page will be shown.

is sometimes impossible for the design world to know the issue's operational condition. The other challenge is connecting the enterprise applications which support these virtual designs to an industrial IoT solution like MindSphere.

Solution

MindSphere Closed-Loop Product Definition offers a solution to these challenges by providing a mechanism to map the virtual design with the physical model and apply it consistently to different domains like product and production. It allows the user to define the mapping at type level and reuse it at individual instances of the asset.

Enterprise model definitions

Enterprise model definitions allow the IoT value plan user to export a virtual model's definition in a JavaScript Object Notation (JSON) format and import it into the MindSphere Closed-Loop Product Definition. This specification is used to map between the virtual object and the asset type. The Enterprise model definition file is stored in MindSphere, allowing the user to manage the metadata. MindSphere is a part of Xcelerator™, a comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software.

Virtual and physical mapping

The Digital Twin Template allows users to build a closed-loop twin model by connecting the virtual model definition from the enterprise model definition with the asset type in MindSphere. The mapping allows the link between the PLM object in the virtual model and the asset type. Once the Digital Twin Template is built it can be installed for a
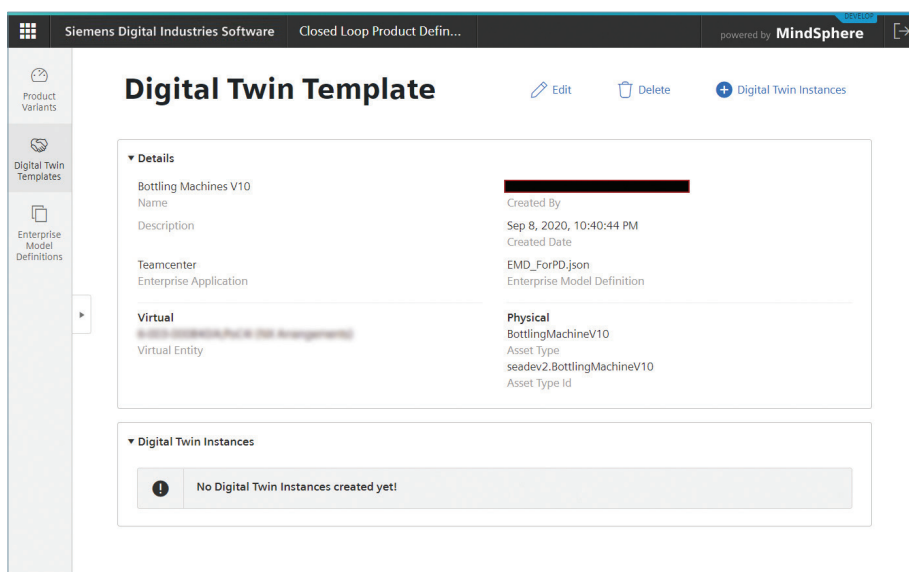
Figure 3: Map the PLM object to an asset type.

specific asset instance. The Digital Twin Template and digital twin instance are then used to set up the configuration for tracking field events.

In the product variant's view, the user can see the cumulative events in one location for all the assets. The product variants will be listed by the amount of error events. The user can open any product variant that needs to be addressed to find more details and get a closer look at the product issues and events in a combined view.

The details page of a product variant shows:

- The product variant details with mapped variables

- The locations tab with a view of all assets (which uses the same design object) in map view and with assets in table view

- An event summary tab with severity and based on description; allows the user to change the view based on selected date range

- A Teamcenter issues list and creation of issue based on event(s) details

The user can create an issue if any event(s) are missing. The issue description will be populated with event details, then the issue will be directly created in Teamcenter and it will be related to the product.

Embedded Teamcenter Active Workspace can be opened to a view of the mapped object design, bill-of-materials (BOM) and a 3D image of the design.

MindSphere
MindSphere is a leading industrial IoT as a service solution that uses advanced analytics and AI to power IoT solutions from the edge to the cloud. Built on the Mendix™ software application platform, it empowers users to quickly build personalized IoT applications.
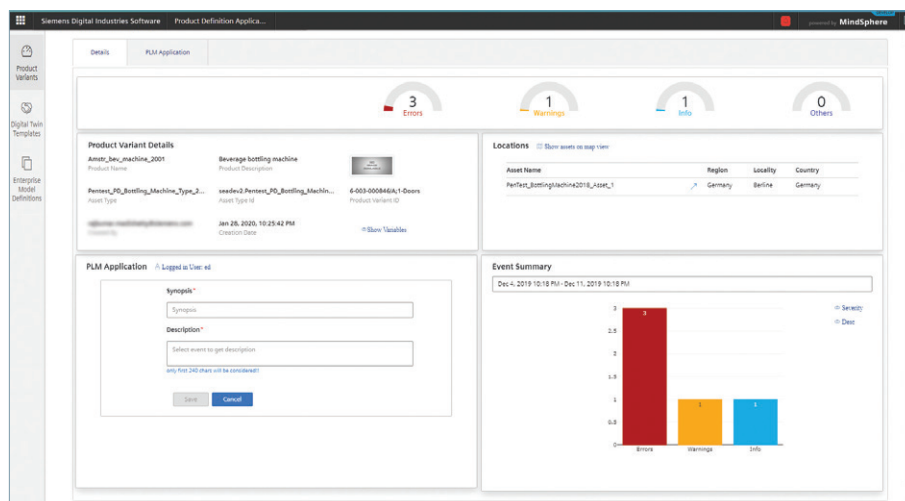

Figure 4: The user can change the view chart in the event summary tab based on the severity.
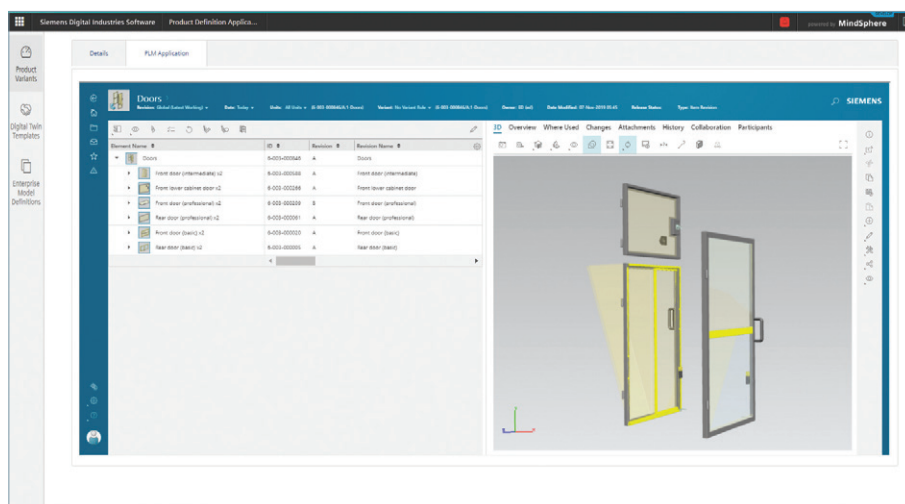

Figure 5: The user can click on the PLM Application tab and enter the user's credential, which opens the product design full view of the Teamcenter Active Workspace client.

Siemens Digital Industries Software
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Americas   +1 314 264 8499
Europe   +44 (0) 1276 413200
Asia-Pacific +852 2230 3333