SIEMENS
Ingenuity for life

Calvatis

Leveraging IoT data to enhance efficiencies in food safety

Product

MindSphere

Business challenges

Centrally manage cleaning systems in production plants of a food retailer

Manage system performance and provide maintenance as a service

Implement IoT solution on short project timeline

Reduce operational costs

Improve cleaning system quality

Keys to success

MindSphere cloud-based open IoT operating system for ease of expansion and scalability

Easily connect existing machines using MindConnect

Leverage advanced data analytics to accelerate and improve decision-making

Results

Reduced downtime by 10 percent

Reduced use of consumables by six percent

Installed the first cloud-based monitoring of washing lines less than six weeks after first consultation

Calvatis achieves a six percent reduction of chemical consumption by using MindSphere to analyze and visualize data from industrial washing lines

Protecting food safety with industrial hygiene

Dirty food crates are lined up and glide down into the washing machine. A few yards farther down the line, they leave the washing tunnel shiny, clean, dry and like new. This happens tens of thousands of times a day at four production sites of a large German food retailer. Cleanliness is the top priority in the food industry for consumer safety and adherence to industry guidelines. With global population expected to grow to 8.6 billion people by 2030, the optimization of resources is increasingly important. MindSphere is used to optimize resource usage including water, energy, detergents and additives.

A new challenge solved with IoT data

In 2015, Calvatis was asked by a large customer in the food industry to supply dispensing units and the cleaning detergents for its washing lines. The customer's requirements were demanding: Calvatis was tasked not only with supplying dispensing units and the cleaning detergents for its washing lines, but also with creating a central monitoring and control system. The challenge was compounded by the customer's request that Calvatis manage the performance and maintenance of the systems as a service. Furthermore, the customer required implementation of a solution in an extremely short time frame.
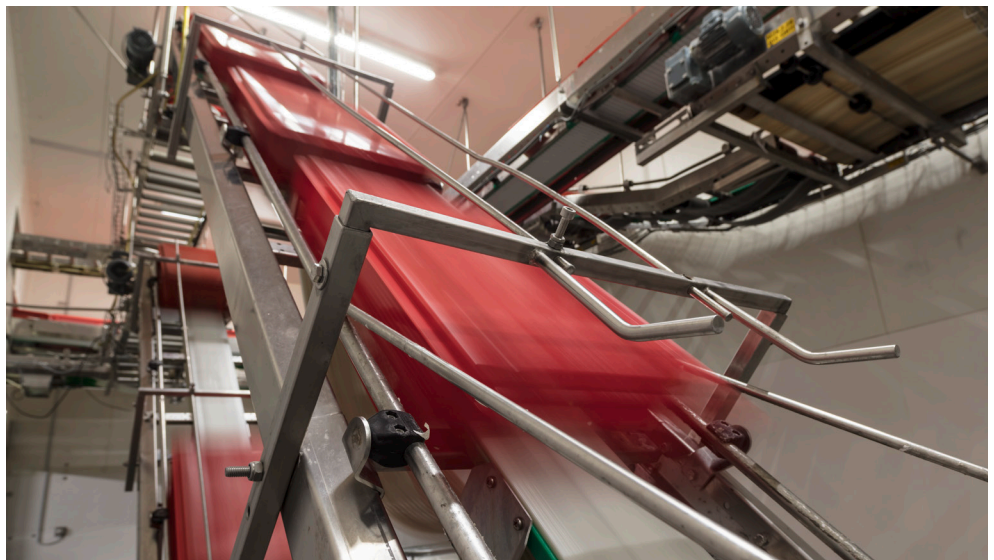
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Prior to this customer request, Calvatis monitored the washing lines' performance through on-site visits at regular intervals, and used sampling to assess the quality of the cleaning and disinfecting process. There was continuing uncertainty as to whether the cleaning and disinfecting processes used cleaning agents effectively and sustainably in accordance with food industry hygiene regulations.

The washing lines operated by Calvatis on behalf of their industry customers are enormous compared to conventional household dishwashers. In a washing line, for example, meat crates are transported by a conveyor belt through a series of washing machines. The crates complete a three-step washing and drying process consisting of pre-cleaning, main washing, and post-washing/rinsing. The crates are pressure-washed with a water/detergent fluid. The cleaning fluid is injected by dispensing units supplied by Calvatis and controlled by Siemens' SIMATIC S7-1200 controllers. Regulations

require either a continuous processing temperature of over 82° Celsius or oxidative cleaning which uses a water/detergent mixture instead of pure water. Due to low energy usage and water consumption, oxidative cleaning is preferred, but it requires keeping the process parameters stable.

The industrial washers also come with sophisticated technology for optimal dispensing of detergents. Sensors determine the mix of water and detergent as well as the consumption of chemicals and the machine temperature. Access to this sensor data facilitates optimization of the process to minimize the consumption of energy and detergents.

But the data is not only valuable in day-to-day operations. It enables increased transparency of the consumption of detergents and chemical additives. This, in turn, allows benchmarking of various plants and optimization of the ordering of additional materials in the purchasing process. For this
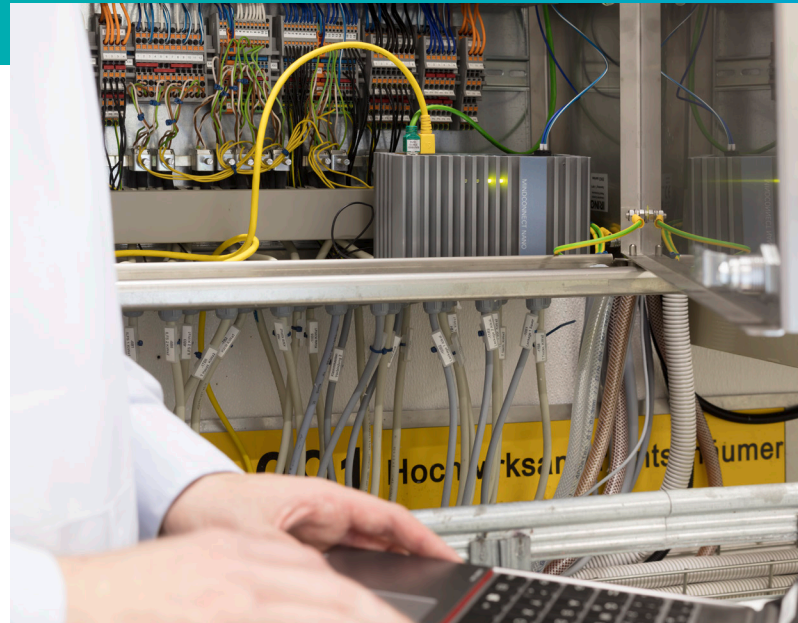
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Matthias Schäfers
Head of Business Development
Calvatis

reason, companies that operate washing systems across multiple plants are highly interested in collecting and analyzing as much data as possible in a centralized location.

"A lot has changed in recent years," says Matthias Schäfers of Calvatis. "Our customers expect more and more detailed information about the cleaning process." This level of detail was also of interest to Calvatis' customer. The customer wanted to regularly calculate the consumption of water, detergent and chemical additives per box and per hour – and to do so in the cloud, so that all results are readily available and can be accessed from a central location. To fulfill its customer's requirements, Calvatis turned to Siemens, and after a brief consultation established the key parameters of a solution using MindSphere – the cloud-based, open Internet of Things (IoT) operating system on AWS. MindSphere enables companies to connect products, plants, systems and machines to harness the wealth of data generated by the IoT with advanced analytics. Calvatis was extremely open-minded and understood the opportunity of the IoT. With secured end-to-end solutions for connecting devices, storing data and developing and running applications on a managed service platform, MindSphere was an ideal choice for the solution.

Calvatis needed to create a digital twin of its cleaning systems, built from performance data. From this data, the company could develop key performance indicators (KPIs) as a basis for controlling the cleaning and disinfecting processes. Another challenge was to make these KPIs accessible to the respective on-site production managers as well as a quality manager responsible for the entire company – all of which MindSphere is capable of.

Launching a project in six weeks
Working with MindSphere Services, Calvatis was able to launch the project at one of their customer's plants in a compressed time frame – less than six weeks after the initial consultation with Siemens. A crucial factor for Calvatis was that the installed washing systems could be easily

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connected to the cloud and the data could be monitored and analyzed with minimal effort. The dispensing devices for the washing systems were already fitted with SIMATIC S7-1200 controllers from Siemens, which can collect and output a high volume of data. All that was required to connect the washing machines was the MindConnect Nano with a plug-and-play connection to the internet and the cloud – which offered the additional benefit of not requiring additional programming work. Another ambitious objective in the initial project involved linking the washing lines to MindSphere and Calvatis via SSL-/TLS-encrypted data transmission.

The initial project began in 2016 in the first plant. The customer was quickly impressed with the quantifiable improvements in efficiency and cost along with improvements in cleaning quality. Improvements included a 10 percent reduction in downtime and a six percent reduction in the use of cleaning fluid plus a proportionally high reduction of water usage – the detergent content in water is fixed at one-half percent. After good experiences with the first project, MindSphere was quickly expanded to all other meat processing plants of the customer.

New business options in service

The collected performance data can be easily analyzed. MindSphere offers users options for data analysis such as Product Intelligence and Visual Analyzer, which Calvatis also uses for analyzing dispensing data. It analyzes the incoming data, monitors washing machines installed worldwide and enables new functions such as predictive maintenance, energy data optimization, and resource management.

Thanks to MindSphere, Siemens and Calvatis were able to implement the cloud project on the mandated project schedule. "In the meantime, we and the employees at our customer site have an up-to-date overview of all data at all times," says Schäfers. "Via online access, we can use Visual Analyzer to review how high chemicals consumption is, what the plant temperature is, and the current conductivity of the water and detergent mixture. Our customer uses the data intensively. It has become a key tool for identifying faults and for planning the work of service technicians."

By using MindSphere, Calvatis will also be able to monitor automatic cleaning systems and foam cleaning devices in the future.

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Customer's primary business

Calvatis GmbH is one of the major independent manufacturers of detergents and disinfectants for the food industry. Based on vast expertise, experience and a future-oriented dedication to industrial cleaning processes, Calvatis has served the global market for more than 75 years. With its own production and sales offices around the world and a network of business partners on five continents, Calvatis develops and sells cleaning and disinfecting agents under the Calgonit Industrial brand name as well as components for hygiene systems. The company supplies dispensing units in varying sizes, carefully managing the supply chain to make certain that all components, installations and systems comply with the highest standards for design, quality, cost-efficiency and environmental friendliness.
www.calvatis.com

Customer location

Ladenburg
Germany

And by relying on data in the cloud, the service team can organize its work more effectively – because technicians can predict what problems are occurring in the plant.

Calvatis now has a new three-level service model in the pipeline. With the basic offering, Calvatis customers obtain reports at scheduled intervals. The advanced offering allows access to standard dashboards in the cloud, and with the professional offering customers can initiate analyses anytime themselves. "The response from our customers is very good," says Schäfers. "In particular among customers that operate globally and have plants all across the world, we are seeing substantial interest in solutions like this."

Leveraging IoT ensuring food safety, improving operational efficiencies and differentiating through new value-added services

As outlined, IoT solutions are more and more frequently requested by customers in the food and beverage (F&B) industry due to three main reasons:

1) Food safety: The process parameters of the washing lines need to be closely monitored and documented to comply with food safety regulations. MindSphere is the ideal system to monitor the process and create alarms in case process conditions are not within the specified tolerances.

2) Operational efficiencies: A key challenge in all F&B is the optimization of resource usage: water, energy, detergents and food ingredients. In this case MindSphere helped to achieve a 10 percent reduction in downtime and a six percent reduction in the use of cleaning fluid.

3) New value-added services: MindSphere is an effective solution to position Calvatis as a company offering additional value-added services and to facilitate access to new customers by being able to differentiate from competition."Our business is part of a commodity business, but a special solution like MindSphere is not a commodity. That is a good solution we can offer our customers," says Thomas Mohr, Managing Director.

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