Siemens MindSphere Case Study

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Steve Bashada Executive Vice President of Siemens Cloud Application Services

About Siemens

Siemens is Europe's largest industrial manufacturing company, focusing on electrification, automation, and digitalization. The company produces technology for industries such as power generation, rail transportation, healthcare, and water treatment; it also offers related services and software. Founded in Berlin in 1847, it now employs 377,000 people worldwide and generates €83 billion (US$102 billion) in annual revenue.

Its factory in Monterrey, Mexico, employs about 1,500 people, and manufactures more than 28 million circuit breakers and switches a year for the US domestic and industrial markets.

The Challenge

The Monterrey plant embarked on an ambitious digitalization strategy in 2017. The company formed a department to drive this venture, working with the group chief technology officer in Germany to identify areas where the plant could use digital technology to increase efficiency. According to Digitalization Project Manager Luis Rodríguez, the goal is to become a great example of the next phase of manufacturing—Industry 4.0—which is driven by automation, the Internet of Things (IoT), and cloud computing.

The department identified several use cases for digitalization, the most pressing of which was monitoring overall equipment efficiency (OEE). Alejandro Prieto, manufacturing manager at Siemens, explains the significance of this metric. "Measuring the efficiency of a process in units produced per head, versus the price we get per unit, could only get us so far. It doesn't tell us where improvements can be made in the manufacturing process. The new OEE process

combines output with measurements of downtime and quality to give full transparency into our processes."

The team had initially planned to record OEE metrics manually and analyze the data each week, but decided to instead use the cloud.

Why Amazon Web Services

Siemens doesn't just produce physical components; software provides €4 billion (US$4.9 billion) of its annual income. In late 2017, the company announced that the latest version of its IoT operating system, MindSphere, would be hosted on Amazon Web Services (AWS). This gives plants like the one in Monterrey immediate access to the compute resources needed to build an industrial IoT system in a fraction of the time it would take to set up a physical environment.

Steve Bashada, executive vice president of Siemens Cloud Application Services, says, "We listened to our customers' demand for high availability and global scale, and we are embracing a new AWS-first approach to MindSphere. Thanks to our collaboration with AWS, Siemens customers and partners will have access to one of the best industrial IoT application programming interfaces, coupled with direct access to AWS services for faster application development."

The timing couldn't have been better for the Monterrey team. After senior Siemens executives in Germany made connections, a MindSphere team from Boston came to Mexico in late February 2018 to discuss requirements and begin building a pilot solution. This involved connecting physical machines to the MindSphere cloud environment and building the application that visualizes the various metrics that plant managers need to monitor.

The plant's IT security team also had to ensure that the data was protected both in transit and when stored in the AWS Cloud. In addition, it had to approve the installation of the MindSphere agent software on the local server that connects the production lines to the cloud. Prieto says, "The MindSphere and AWS teams worked with us on short notice to deliver this pilot. They made it quick and easy for us to run our IoT solution in the cloud." By mid-April, the pilot was in production.

The Benefits

According to Prieto, the main benefit of connecting the factory to the cloud is the ability to view the real-time OEE of production lines and make immediate improvements. While building the dashboard app, the team used historical production data. This uncovered a malfunctioning test machine, which was fixed, improving first-pass yield (the number of good units coming off the production line) by three percent. "If we had been able to correct this in real time, it would

have had a significant impact on our quality, and therefore OEE," says Prieto. "Moving forward, we'll be able to make those instant adjustments that improve our efficiency."

Because the factory built its IoT system using MindSphere on AWS, there was no need to learn new technologies or buy and deploy physical hardware. This helped the project go from conception to full production in less than 8 weeks. "The fact that MindSphere runs so seamlessly on AWS helped us avoid managing infrastructure altogether, so we could concentrate on creating value for the business quicker," says Prieto.

Right now, the plant's OEE is 40–50 percent, and next year, once the scheme is rolled out factory-wide, the team's target is 60 percent. Eventually, the goal is to reach 85 percent. "Using the Siemens MindSphere IoT platform on AWS will help us achieve world-class levels of manufacturing efficiency," says Prieto. The custom application built on MindSphere will also allow the team to monitor the efficiency of individual production lines for more detailed insight.

The Monterrey project is a model for Siemens plants worldwide, as well as a pioneering IoT use case for the local region. "We want to provide support for other manufacturers in Mexico so they can develop their Industry 4.0 capabilities," says Rodríguez. "Ours is the first Siemens plant to use the latest version of MindSphere on AWS, and we got it into production in less than two months. It's a proven solution in a production environment that can scale quickly beyond this pilot. By the start of the next fiscal year, most of the plant will be connected and working toward our OEE target."

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