

FORBES INSIGHTS

REVOLUTION ON THE FACTORY FLOOR



“Have you heard of Industry 4.0?” Jan Mrosik, COO of digital industries at Siemens, asks. He is referring to the onset of the fourth industrial revolution, which the World Economic Forum predicted “will fundamentally alter the way we live, work and relate to one another. In its scale, scope and complexity, the transformation will be unlike anything humankind has experienced before.”

Fueled by advances in artificial intelligence, the Internet of Things and computing speed, businesses — from auto to aerospace to retail — are changing the fundamental building blocks of how they operate.

By 2030, machine learning could contribute nearly \$16 trillion to the global economy, research shows.

For Mrosik and Siemens, the revolution is well underway. Manufacturing plants increasingly rely on smart machines and interconnected devices to build products cheaper, faster and more efficiently. In August of 2018, Siemens

89%

OF LARGE CORPORATIONS

already use AI in some parts of their business, according to a survey by Forbes Insights and Teradata of 600 senior executives and data scientists in Q2 2019.



unveiled a new strategy, Vision 2020+, an ambitious plan to revamp the 170-year-old behemoth into a shinier, new, AI-age version of itself, shedding older lines of businesses while investing in technology it believes will allow it to dominate in the digital era.

“This is why we changed: We were convinced that the digital and the real world — the shop floor and the design department and the software — would come together, and that was the moment we will become a full digitalization provider,” says Mrosik, who, as head of digital factories, has helped shape Siemens’ transformation from old world to new.

To see the fourth industrial revolution in action, take a trip to Siemens’ factory in Amberg, Germany. Here, in a facility that has been in production since 1989 — before most people knew the World Wide Web even existed — the transformation from analog manufacturing to analytics-fueled digital production is unfolding in real time.



JAN MROSIK
COO OF DIGITAL INDUSTRIES, SIEMENS

THE DIGITAL TWIN

The Amberg factory in Bavaria has a particularly complex job — the 100,000-square-foot facility manufactures more than 1,200 different products. This means its production line must change configurations approximately 350 times a day, says Mrosik. In the past, this was a laborious process that required workers to spend time making changes to equipment and machinery by hand. Now, before anything even hits the line, a computer model creates a digital version of the products, the production line and the manufacturing process itself, helping to streamline and speed up the time it takes to set up new configurations.

“We call these digital twins,” Mrosik says. A digital twin is a computerized replica of anything it builds — from a circuit board to a sneaker to an entire production plant. By running a digital dress rehearsal of, say, an engine’s assembly, the company can see where there might be bottlenecks, inefficiencies or unexpected needs, whether for additional materials or safety measures. These insights, harvested through analytics, help optimize production. For example, through digital twins, technicians can see quality defects in real time, immediately make design changes and adjust supplies and materials. The impact of digitizing the factory floor at Amberg has been extraordinary: productivity climbed 1,400%.

The Amberg factory is a microcosm of a much bigger story. What’s happening here is happening across manufacturing floors around the world using digital twins to accelerate product design and manufacturing. Automakers, for example, once had to create physical prototypes to design

and test new models; now they can create computerized versions that look and behave like real cars. A virtual model can go through a test drive or a wind tunnel or crash itself — and be re-built in seconds. Supermarkets can use simulations of their brick-and-mortar stores to see how to best stock shelves or lay out their aisles. Chemical plants, looking for ways to make their plants greener, more sustainable and energy efficient, have used digital twins to remodel labs and production processes.

And this is just the beginning. Siemens recently introduced augmented reality into its lineup of analytics-fueled manufacturing features to help managers visualize a product in space. On the horizon: augmented reality for the whole manufacturing process. In the same way gamers use AR, factory managers and designers will be able to insert themselves into virtual manufacturing spaces — inside areas like production lines or machinery — to experience them in ways never before possible.

THE IOT-ENABLED FACTORY

In the new industrial revolution, billions of devices are connecting factory floors to the cloud. This is changing everything about the way goods move on and off the production line. Sensors in machinery, cameras, thermostats and lights enable companies to monitor and analyze detailed data about their operations that have never before been accessible. They can know, for example, if a slight adjustment in temperature will make machinery run better or measure barely audible sounds that help predict malfunctions before they occur.

In 2016, Siemens launched MindSphere, an operating platform to connect industrial equipment and sensors to the cloud. It now connects an estimated 1.3 million devices and more than 1,000 customers. One major auto company, for example, now uses MindSphere in its cloud network, connecting machinery and equipment at more than 100 of its plants. Through MindSphere, Siemens, and customers from a range of industries, can access data directly from the factory floor, and use that to improve productivity and efficiency across production lines. At Siemens’ own factory in Amberg, sending data from the production floor to the cloud, where it’s analyzed and turned into decision-guiding insights, has





helped cut down on errors and design flaws, saving time and money. In one case, Siemens used MindSphere to analyze energy consumption at the factory, helping the company find inefficiencies and fix them. The result: within weeks the factory was saving thousands of euros.

More than just fix problems, says Mrosik, “the Internet of Things allows an entirely new business model that didn’t exist in the past.” Take, for example, one big trend in manufacturing: customization. “People want their own sneakers. They are being ordered on the internet, and they are being tailor made for them,” he explains. By connecting factory floors and machinery to the cloud, IoT technology allows companies to manufacture millions of products customized to individual preferences — at mass production prices. For example, if a customer wants a particular style of sneaker with blue and red stripes, manufacturers can receive that request immediately online, send it via the cloud to all the relevant parts of the production process — from the design team to suppliers to the factory floor. By interconnecting these disparate parts — including machinery and equipment — manufacturers can

make changes and additions to the production line in real time to produce and ship the exact sneaker the customer wants.

FUTURE IN FOCUS

Machines are increasingly teaching other machines to think and create. What this means for manufacturers, Mrosik says, is radical new thinking on how to design, build and ship products. He envisions a future similar to that of ride-sharing or web services, where manufacturers will no longer need to invest in their own equipment or production facilities — they will share time and space on remote factory floors. Already, he has seen some manufacturers renting time on machinery by the hour. This kind of on-demand factory line is just the start of more change to come, as the new industrial revolution heats up. For manufacturers, the main question now is: How will they keep up? At the Siemens annual meeting in January CEO Joe Kaeser told shareholders, “The world is changing too fast and those who hesitate or stand still will be passed by.” ■