



From the factory floor to the cloud: integrating predictive analytics with real-time manufacturing

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JABIL

A lot of noteworthy things happened in 1958: Sir Edmund Hillary reached the South Pole, the United States launched its first satellite, and Jack Kilby from Texas Instruments invented the integrated circuit. And while the first two events have inspired millions of people, it's the creation of the integrated circuit, or microchip, that has arguably been the most influential. Since then, electronics manufacturing has steadily evolved, influenced by factory automation trends from the automobile industry, international quality standards, global economic shifts, and market demand. Today, consumer trends are shaping the manufacturing world in new and transformational ways, and Jabil is at the forefront of the digital factory.

Facing changing expectations

Established in 1966, Jabil is one of the world's largest and most innovative providers of manufacturing, design engineering, and supply chain management technologies and services. With global operations spanning 102 locations and 28 countries, Jabil helps leading companies in a diverse range of industries become more competitive.

And in recent years, staying competitive requires more than just offering newer, better products. "One of the biggest industry trends we're seeing is the desire for flexibility and independence," says Matt Behringer, Chief Information Officer, Enterprise Operations and Quality Systems at Jabil. "We feel a continuous pull that says we want to have things the way we want them, and we want them quicker." Behringer says that the modern consumer's expectation of faster, more personalized services has permeated the industrial world, bringing a "whole new level of complexity to organizations."

The challenges are more complex than just getting products to market faster. Now, companies might make a product only once, with even very large global corporations behaving much like boutique manufacturers with one-off production lines. As a result, traditional inspection techniques for ensuring quality are quickly becoming outdated. For example, in a process called first-article inspection, an initial model is manufactured, checked, and verified at multiple steps, and then reworked as needed before the production line kicks off. For decades,

wasted time and material were just part of the manufacturing process.

That expectation has changed. Now, the first product run might be the only one created, or there might be smaller lots of 5 or 10 items and no time for multiple iterations. Even automated inspection equipment might not speed the process enough to meet the customer's deadline. "We have many products that customers expect to be in their shops within a week," says Behringer. "And that's including transit."

Jabil wanted a better solution than just throwing more equipment and people at the problem, so the company turned to Microsoft for help. Behringer says, "For me, creating the 'Factory of the Future' means increasing the throughput of products while simultaneously decreasing the need for human touch, because then we'll remove the chance of waste every time."

Advancing digital manufacturing with predictive analytics

For Jabil, an Internet of Things (IoT) approach based on the Microsoft Azure Cortana Intelligence Suite was the only solution that made sense. Behringer says, "If you think about the IoT mindset, and the ability to connect equipment, sensors, people, and whatever else you can think of, we had to look at our factory from the viewpoint of system capability, and then see what we could do to move forward in a way that enables us to be competitive and differentiated."

"Connecting our data sources, such as sensors and environmental controls, to the Azure platform will enable us to use advanced analytics to start to see trends. We'll be able to improve our efficiencies, cut costs, and decrease our lead times, which tie directly to our customers' requirement to increase flexibility."

Matt Behringer, Chief Information Officer, Enterprise Operations and Quality Systems, Jabil

Customer Name: Jabil
Industry: Manufacturing
Country or Region: United States
Customer Website: www.jabil.com
Employee Size: 180,000+

Customer Profile:
Jabil is one of the world's largest and most innovative providers of manufacturing, design engineering, and supply chain management technologies and services. The company has operations in 28 countries and 102 locations, and reported revenue of \$US 17.9 billion in 2015.



With the Cortana Intelligence Suite, Jabil gained the predictive analytics and integration capabilities it needed for its new roadmap. “You start saying, ‘What technology platform can do all these things? What am I going to do to interact this way?’ We did look at other solutions, and they were very capable,” says Behringer. “But when I look at being able to do what we need to do at the speed our customers expect, it’s difficult to achieve that level of scalability and flexibility with anything but Azure.”

In the next step along the road of digital manufacturing, Jabil and Microsoft collaborated on a pilot project that connected an electronics manufacturing production line to the cloud. Collecting more than 1 million data points from each assembly across a 32-step, four-hour manufacturing process, Jabil was able to anticipate and avert more than half of circuit board failures at the second step in the process, and the remaining 45 percent at step 6. This effectively means that by using machine learning,

board errors can be detected early in the production line. As a result, the errors can be corrected prior to adding expensive electronic components and creating costly errors that end up on shop shelves. The end results are a reduction in scrapped materials and warranty costs, and an increase in customer satisfaction.

“One of the things we’re able to do with predictive analytics in Azure is reduce waste, whether it’s from a process or design issue, or as a result of maintaining excess inventory to ensure we have

enough for shipment,” says Bruce Young, Director of Systems Architecture at Jabil. “We’re confident that we can produce a good-quality product all the way through the line. It’s a sort of just-in-time system. We’re able to pull instead of push the product and increase both our capacity and our ability to meet our deadlines.”

Building a stronger competitive advantage

The new predictive analytics manufacturing solution connects an in-house shop floor control tool that collects all the information pertinent to production, such as machine data, and sends it to Azure for real-time analysis. Then, the system automatically alerts staff, including engineers and machine operators, if a potential error is detected. The new platform not only monitors individual production lines, but it also collects data from every Jabil factory and product worldwide. And in addition to improving inspection processes, the solution can optimize the operation of individual machines in an increasingly intelligent feedback loop. The company plans to scale out the solution to more facilities and integrate environmental controls and other data sources.

By integrating predictive analytics with its manufacturing processes, Jabil is ready for more than just consumer demands for just-in-time delivery. Freed from the limitations imposed by traditional inspection methods, the company can take on future challenges such as the production of increasingly smaller

components. Jabil also looks forward to extending its new IoT platform to improve the supply chain, including its customers’ own manufacturing environments.

“Connecting our data sources, such as sensors and environmental controls, to the Azure platform will enable us to use advanced analytics to start to see trends,” says Behringer. “We’ll be able to improve our efficiencies, cut costs, and decrease our lead times, which tie directly to our customers’ requirement to increase flexibility. The faster we can turn products, and the later in the game we can make changes to an order, gives each one of our customers a competitive advantage in the marketplace.”

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Software

- Microsoft Cortana Intelligence Suite
- Microsoft Azure Machine Learning