

Carl ZEISS Microscopy Focuses on Service Excellence



By moving from reactive to predictive maintenance, ultra high-resolution microscopy maker significantly improves mean time to repair

Few companies can claim they've played a part in the discoveries that change our world, but ZEISS can. Founded in Germany 173 years ago, ZEISS employs over 30,000 people worldwide and provides technology in the fields of optics and optoelectronics.

When its founders discovered a repeatable way to achieve high-resolution optics, ZEISS became the first company to produce commercial microscopes held to consistent quality standards. Today its ZEISS Microscopy division provides one of the broadest microscope portfolios in the world. ZEISS instruments have powered the research of more than 20 Nobel Laureates in the fields of medicine, chemistry and physics.

Service Interruptions Can Cost Millions

Researchers and labs relying on instruments worth anywhere from \$500,000 to \$1.5 million to power their research can't afford any interruption in their service. According to Dr. Christian Schwindling, product owner of ZEISS Predictive Service, "Our customers had no way to foresee when their microscopes were in danger of downtime, which could leave them stranded."

For both researchers and laboratory facilities, the consequences of equipment downtime are significant. For researchers, equipment delays can extend completion of projects; in worst-case scenarios, it can force scientists to invalidate test runs or other work in progress.

Increasingly, ZEISS instruments are used as essential equipment in core imaging facilities. In such environments, facilities such as universities and life sciences companies populate a single facility with high-end microscopes. Renting out and scheduling access to the equipment for use by other departments and labs allows these facilities to share research costs.

When equipment is down, the facility cannot collect its fees. Researchers could take weeks to gain access to critical equipment. "It's imperative that these facilities and researchers can ensure peak performance of our equipment for numerous reasons. This includes the fact that it can take significant time to get back on a research schedule after recovering from downtime," explains Dr. Schwindling.

Why It's Challenging Ensuring Uptime and Availability

With so much riding on these instruments, ZEISS has long provided expert, white-glove service to its customers, dispatching service engineers whenever a customer experienced downtime. The cost is high for ZEISS to dispatch a service engineer for on site visits just to copy some data for diagnosis purposes. With over 800 service engineers worldwide, the company's service calls were eroding profits. As the company expanded its microscopy business, these service costs escalated.

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Dr. Christian Schwindling
*Head of Remote Service and IT Support
Carl ZEISS Microscopy GmbH*

Embarking on a Digital Transformation Journey

Ever striving to improve customer satisfaction, ZEISS conceived ZEISS Predictive Service. Designed as a remote condition monitoring program, the goal of this service was to more quickly diagnose equipment issues and increase system uptime. The anticipated benefits were enhanced diagnosis, faster service times and improved uptime. Just as important, the company would boost customer satisfaction while gaining more insights into how its equipment behaves in the field.

The service would take advantage of the Internet of Things (IoT) to gather data from the company's instruments in the field and process this data in the cloud, making it instantly available at headquarters. While this would initially enable ZEISS to rapidly diagnose instruments without dispatching a service engineer, it also paved the way for predictive service. Such a service would be one of the levers the company could pull to increase margins on its high-end products.

Launching a Pilot for Select Customers

ZEISS decided to pilot its new remote condition monitoring service for customers with Axio Scan.Z1, an automated slide scanning system for pathology that typically runs 24/7. To enable its predictive service, it called upon the Machine Cloud Service from Axeda (now part of PTC). An innovator in the IoT technology market, Axeda provided technology that

enables companies to establish secure connectivity and remotely monitor and manage a wide range of machines, sensors, and devices. It also offered a Connected Machine Management application set that empowers companies to remotely monitor and service products, and even deliver live software updates.

With the Axeda technology in place receiving data from sensors on Axio Scan, ZEISS launched the pilot with select customers in Germany, Austria, and Switzerland. After a five-year pilot, 85% of the company's customers across academia and in the biopharmaceutical industry were connected to the Axeda platform. "Our customers were impressed with the service. They loved that it enabled us to proactively detect and fix issues before they were impactful," explains Dr. Schwindling.



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Successfully Transitioning to ThingWorx in 4 Months

Based on the success of the pilot, ZEISS planned to deploy its predictive service around the globe and expand support to other products. However, after PTC acquired Axeda and launched the ThingWorx Industrial IoT (IIoT) platform, ZEISS faced a choice: To transition to ThingWorx, develop its IoT technology in-house, or start over with a new technology vendor.

The company knew the easy connectivity model it had used for Axeda would work similarly with ThingWorx, but in order to make a fully informed decision, it decided to undertake a comprehensive technical review and proof of concept.

The technical review considered a broad set of features, including connectivity options, application development tools and analytics. ThingWorx came out on top. The decision was bolstered by positive product reputation.

The selection was followed by a proof of concept in California. A customized agent based on the ThingWorx SDK collected data from ZEISS X-ray microscopes, processed the log files and sent them to the ThingWorx platform. This enabled the company to remotely measure X-ray sources.

"Our colleagues in California tested ThingWorx and were very pleased with it," recalls Dr. Schwindling.

The Microsoft Azure Advantage

The other major technology component was Microsoft Azure. ZEISS was already a long-term Microsoft customer using the Azure cloud environment. With Azure, ZEISS could quickly access rich platform services and set up needed infrastructure in hours versus months. Plus, deep integration between PTC and Microsoft meant ZEISS could easily scale and take advantage of rich functionality.

Combined, ThingWorx and Azure cloud provided best-in-class IoT development tools with enterprise-level security and scalability, enabling ZEISS to quickly build, manage and deploy applications on a global scale.

ZEISS was pleased to find it could complete the transition in just four months. It did this by harnessing PTC's knowledge of Axeda and partnering with a longtime PTC ThingWorx system integrator, Munich-based doubleSlash Net-Business GmbH. doubleSlash focuses on helping customers develop their capabilities in the Smart Connected Products area.

"We chose doubleSlash as our integration partner to make it happen since they had experience with both Axeda and ThingWorx. They guided us through the project in a structured way and enabled us to connect 450 systems in one year, which was quite impressive," says Dr. Schwindling.



Measuring the Benefits of Service Optimization

Since rolling out its new solution, ZEISS has experienced both quantitative and qualitative benefits. At an aggregate level, the company has improved first-time fix rate by 7% in 13 months, and reduced mean time to resolve remote fixes significantly in one year.

The remote predictive monitoring service and automated routines have enabled ZEISS to reduce calibration-related downtime from a day to one or two hours. "We can see when our X-ray systems should be calibrated and send a technician to launch a calibration routine. Going forward, we will notify our service technicians so they can contact the customer, who can initiate the self-calibration," explains Dr. Schwindling.

The Future Looks Bright

ZEISS is excited by the possibilities associated with its predictive monitoring service. It intends to create dashboards allowing it to monitor trends associated with its instruments and predict component failures in advance. This will enable fixing these by dispatching a service technician or increasingly through remote means.

"Though we test components before shipping our equipment to customers, it's impossible to test all components in combination as they are used in a laboratory. Our new service makes it possible to collect performance parameters to identify trends. In turn, we can introduce threshold alarms to warn customers that a certain component is likely to stop working soon and take reasonable precautions," says Dr. Schwindling.

Using Azure, the company plans to provide its customers insight into the performance of their systems. ZEISS is also introducing a customer portal – what it calls Digital Customer Companion – where customers can log in to see details about all the ZEISS equipment they're running, including status and usage.



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