

Machine Vision Solutions: Detect and Prevent Defects

Reducing quality defects—and the effort and costs they involve—is one of the biggest challenges facing the manufacturing industry today. Having to reengineer, rework, or even refund products for customers because they don't work as expected, or are not of an acceptable quality standard, can have a huge financial impact to a business's revenue (up to 40%). That's why many look for ways to prevent defects from making their way out the door.

But it's more than just identifying defects. The rise of Industry 4.0 puts pressure on manufacturers to make their factories smarter. To be successful and remain competitive, they need to uncover ways to prevent defects from even happening in the first place, and that requires an understanding of why and where quality issues happen.

Many have turned to machine vision solutions to provide defect detection, but up until recently these systems were difficult to deploy, maintain long term, scale, and go beyond just detecting anomalies.

Luckily, [vision solution provider Eigen Innovations](#) offers software and services designed to get users as close to zero-defect manufacturing as possible.

"It's about detecting and preventing defects, but also leveraging process data to help manufacturers understand more about what's happening within their process while they are occurring," says [Jonathan Weiss, Chief Revenue Officer](#) at Eigen Innovations.

Equipping Manufacturers with Smart Vision

Eigen does this by focusing on interoperability first and foremost. The company develops solutions that integrate directly into PLCs and support just about any industry-standard camera or sensor hardware available so manufacturers can easily get machine vision systems up and running.

Its intuitive user interface allows manufacturing companies to design and manage customized vision systems that can perform in-line quality inspection in real time, ensure presence of parts and components, optimize processes, and streamline root cause analysis for defects.

For example, when a large global pulp and paper manufacturer struggled with quality control for its large rolls of high-gloss paper and laminate coating, it turned to Eigen Innovations to implement a machine vision system.

"They were having an issue related to coating buildup that caused streaks in their specialty, high-gloss paper product," says Weiss. The company had no way to verify that the coating was applied evenly. Weiss adds, "If it was not, even for only 8-10 seconds, it caused an unplanned downtime and stopped the equipment from functioning."

By applying a smart vision system with the help of Eigen, the paper manufacturer was able to spot patterns within the laminate application process and identify areas where it had buildup. Being able to understand the root cause of the buildup and getting real-time alerts into when the issue started to occur, the manufacturer was able to save well over \$1 million a year, Weiss explains.

“A vision system needs to be able to identify a defect—and do something about it,” Weiss says. **(Video 1)** “Because it can communicate to the control network, our solution allows manufacturers to receive real-time alerts and trigger automated responses when issues are detected.”



Video 1. Eigen Innovations’ smart vision for the smart factory captures data that enables manufacturers to go beyond quality inspection. (Source: [Eigen Innovations](#))

Beyond inline quality inspection, real-time monitoring, and process optimization, Eigen can help manufacturers deal with the demand of regular required inspections.

For example, an automotive OEM that manufactures plastic components can produce upward of 15,000 parts per week, per plant. That’s 42,000 points of inspection it is expected to make in each of these facilities. This amount is not only impossible to handle manually, but the types of defects the manufacturer needs to look for—such as problems with weld integrity—are not easily identifiable with the human eye.

Originally, the OEM thought to pull random samples and perform destructive testing to check component integrity, but this resulted in unnecessary waste and rework, and could not guarantee all defects would be caught before shipping product to a customer.

“Ultimately, they needed an automated way to guarantee the quality and volume every week,” Weiss says.

By partnering with Eigen, it created a solution that leveraged thermal cameras to capture various views of the weld process. Those images are then fused together to create a digital twin of the part, and critical process data is mapped to the inspection area, offering real-time insights that the human eye could not provide.

“Every part is going through a verification process in real time, within seconds or milliseconds,” Weiss explains. “The sheer scale of what they are now achieving was impossible when they were relying only on human eyes.”

Continuously Improving Machine Vision Solutions

Eigen prides itself on providing user-friendly machine vision solutions. Machine operators can help train and label models in real time, ensuring that the solutions gain better accuracy and performance as time goes on.

“It’s so easy to use that we have machine operators and quality engineers doing machine learning without even knowing they are doing machine learning,” Weiss says. “For example, if they see a scratch on a surface that shouldn’t be there, they can flag it, update the model, and the software will recognize similar scratches in the future.”

The company’s multi-layer partnership with Intel allows it to quickly test, validate, adopt, and then ultimately introduce machine vision into factories. And with the OpenVINO™ toolkit, Eigen is not only able to optimize its model development and performance for users but work with a variety of different cameras and hardware depending on the use case.

“We have a lot of customers who have already tried vision systems, and the fact that we can use existing hardware is appealing to them,” says Weiss. “They don’t have to go through another large capital expense.”

Machine Vision of the Future

Going forward, Eigen sees [machine vision continuing to play a significant role in the manufacturing industry](#). As manufacturers face labor shortages and the inability to find skilled workers, machine vision solutions will be able to step in and fill in the gaps.

“Vision systems are going to be the eyes of the operators that no longer exist in that workforce,” says Weiss. “Our solution gives the people who are in the factory the tools they need to effectively do their jobs at the highest standards.”