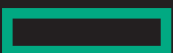


IMPROVING PRODUCT QUALITY WITH AI-BASED VIDEO ANALYTICS

Reduce defects with automated inspection

An AI-optimized platform enables manufacturers to improve and automate quality inspection processes. By enhancing quality control and management capabilities across their production environments with cutting-edge solutions for AI video and image analytics, companies can increase quality assurance and develop high-quality products faster and with less waste.





THE HIDDEN COSTS OF POOR QUALITY

For the manufacturing industry, quality control is essential to producing safe and effective products that meet or exceed customer expectations.

As products become increasingly connected and complex, manual inspection processes can be time-consuming, error-prone, and costly. The cost of quality (COQ) in manufacturing is projected at 15% to 20% of annual sales revenue, sometimes reaching as high as 40% of total operations—that's billions of dollars. The exorbitant costs stem from a variety of internal issues such as waste, scrap, defects, rework, and failure analysis as well as external causes including repairs and servicing, warranty claims, customer complaints, and returns. These issues can also have a major impact on workplace productivity.

Manufacturers are using the power of artificial intelligence (AI) to enable better quality control and management across entire factories. The use of AI with video cameras placed along the assembly line can greatly improve the speed and accuracy of inspection processes. Intelligent video analytics (IVA) is helping manufacturers analyze video data right at the edge, which allows them to make adjustments and solve problems instantly. Advances in AI are the key to maximizing quality assurance and bringing manufacturers one step closer to achieving zero defects.

Ensuring the quality of new and diverse products has never been more important. Rising customer expectations are fueling the need for innovation, including the choice of more product features and greater functionality at an optimal price point. As companies race to meet these demands, producing defect-free products has become more challenging. With product customization now happening at the point of manufacture, inspection processes have become more complex, making it harder for the human eye to spot irregularities. To compound the problem, companies are also expected to adhere to evolving societal and regulatory mandates such as environmental compliance, ethical sourcing, and industry guidelines—all of which can impact quality assurance processes.

This dynamic landscape puts pressure on manufacturers to make sure each stage of production is accurate and efficient. However, without the right technologies, many struggle to monitor their production lines and perform quality control activities in a timely manner. Legacy industrial vision systems have limitations that have kept them from widespread adoption. They are complex, often proprietary, and require high-priced staff with specialized skills to support and maintain. Most importantly, the data from these legacy vision systems tend to be isolated from other industrial data sets and applications such as manufacturing execution systems (MES), supply chains, and ERP.

Over the past five years, advances in video camera technology, plant floor connectivity, the Internet of Things (IoT), and edge computing have made video analytics a cost-effective and viable option to automate inspections, improve inspection speed and accuracy, and generate real-time product quality insights.

Automating the inspection process with AI-based video analytics has the obvious benefit of improving product quality. It can also improve overall factory productivity by reducing downtime, scrap, and rework and by improving product yields.

In order to succeed, manufacturers must reimagine how they work with a new breed of intelligent solutions for quality assurance.





HPE and NVIDIA are launching a new generation of smart manufacturing with an AI-optimized platform:

- Increasing the efficiency of production with automation
- Replacing long visual inspection processes with AI insight
- Driving the accuracy of quality assessment throughout production
- Rapidly detecting and resolving issues with complex products
- Helping improve throughput time by mitigating unnecessary rework

MAXIMIZING QUALITY ASSURANCE

Computer vision adoption is on the rise worldwide as manufacturers work quickly to extract more value from operational data. Manufacturers that invest in AI-based video analytics can merge video data with other process data, gain visibility on the factory floor, and integrate and correlate data from across the chain of production. This allows companies to detect process deviations and anomalies before they become an issue. Manufacturers are now leveraging these tools to enhance production in key ways:

- **Increased yield:** Boost efficiency and production throughput while reducing scrap
- **Consistent quality:** Enable repeated high accuracy under varying conditions
- **Fewer false negatives:** Optimize production costs and minimize downstream waste
- **Reduce false positives:** Decrease the need for manual reinspection with improved test sensitivity

AI-based video analytics is the foundation for quality assurance automation. The latest technologies are designed to enable fully automated inspection, quality control, and management right at the edge. With these groundbreaking capabilities, manufacturers can make ongoing adjustments and optimizations to increase first-pass yield while lowering the overall number of defects.

Manufacturers that make transformation a priority will see dramatic improvements in production quality and performance today and in the future. The results will be undeniable.

IMPROVING QUALITY ASSURANCE IN REAL TIME

Relimetrics is a powerful example of how Hewlett Packard Enterprise and NVIDIA® are integrating AI into manufacturing applications. An HPE OEM and NVIDIA Metropolis partner, Relimetrics helps customers transform how they design and create products by fully digitizing their quality audit cycles. The full-stack video and data analytics software apply GPU-accelerated video analytics and machine learning to inspect the configurations and properties of product components, improving the accuracy of detecting defects. Backed by the combined power of HPE compute with the acceleration of NVIDIA GPUs allows Relimetrics solution to train AI models in line.





The software features three modules:

- **Training module:** Provides fast and automated product updates for self-sufficiency in training systems for new configurations
- **Quality audit module:** Enables 99.9% accurate digitized quality assurance with automated in-line training
- **Process control module:** Continuously and autonomously monitors the link between process and quality to prevent drifts

Together, Relimetrics, HPE, and NVIDIA enable customers to adapt to high-production variability. Relimetrics software supports a wide range of manufacturing use cases—including electronics assembly inspection, welding cell inspection, painting cell inspection, mobile robotic assembly, automotive assembly inspections, and object detection and counting.

Daimler AG is a German automotive manufacturer with 20 subsidiaries and 290,000 employees worldwide. The company needed a trained video analytics model using a combination of cameras and AI to increase productivity and reduce waste. To accomplish these objectives, Daimler deployed a solution built on the HPE ProLiant DL380 Gen10 and NVIDIA T4 GPU to analyze live on-site images of finished batteries. Through the use of AI, the solution can determine if a battery is defective and, if so, immediately route the product to a separate production line where workers are shown where rework is needed. Once the system confirms that the battery is fully functional, it is transferred to logistics. As a result, Daimler has drastically improved its quality assurance and is prepared to produce the next generation of electric cars.



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ADOPTING COMPREHENSIVE AI SOLUTIONS

HPE and NVIDIA are reinventing quality control with AI video and image analytics. Through a long-standing collaboration, we deliver breakthroughs in accelerated computing and computer vision technology to help you manage production quality from edge to cloud.

Supported by a rich independent software vendor (ISV) ecosystem, HPE and NVIDIA offer [comprehensive solutions and best practices](#) to bring new possibilities in smart manufacturing. Companies around the world are leveraging these impressive capabilities to overcome the challenges of production in disparate operating environments.

Designed to develop more accurate automated inspection processes, the goal for our joint solutions is to help manufacturers get closer to achieving zero defects and higher profitability. These industry-leading technologies come together to create a platform that is purpose-built for manufacturing.

We offer a scalable AI platform built on HPE systems that are NVIDIA-certified, enabling GPU-accelerated applications that power real-time quality control and management across manufacturing production lines and factories. The platform combines compute, storage, interconnects, software, and services for an end-to-end solution. HPE delivers platform components on-premises, hybrid, or in the cloud to simplify system and data management, reduce costs and complexity, and scale to accommodate changes in demand. Manufacturers can choose from a robust selection of HPE systems that are engineered for AI and powered by NVIDIA GPUs to streamline inspection workflows and harness unparalleled performance at any scale.

Our AI platform features turnkey enterprise-grade [NVIDIA Metropolis](#) application frameworks and toolkits that bring visual data and AI together to improve operational efficiency. The software stack offers pretrained models, optimization tools, deployment SDKs, CUDA-X libraries, and an extensive developer ecosystem to simplify the development and scaling of AI-enabled video analytics applications. NVIDIA Metropolis delivers reliable, scalable deployment from dozens up to millions of servers and edge devices with faster time to solution, so you can focus your resources on enhancing industrial inspection, increasing productivity, and expanding yields. Now, you can convert data from [trillions](#) of smart and connected devices into valuable insights when and where they are needed most.

[HPE Pointnext Services](#) offers a spectrum of services for industrial inspection quality management to operationalize and orchestrate AI across your operations. Working with leading ISVs in the manufacturing space, HPE Pointnext Services has developed fast start pilot services to help you scale quickly from proof of value to production. These pilots include consulting services, HPE technologies, and software to get started quickly and scale up or scale out, so your solutions evolve as you do.

[HPE GreenLake cloud services](#) give manufacturers choice in how to deploy the AI platform. We provide the agility and scalability of the cloud with the security, simplicity, and control of on-premises IT. You benefit from a cloud experience in any location you operate which helps eliminate large up-front investments and overprovisioning by paying just for what you use. You easily deploy resources, manage costs, and forecast capacity—all from one intuitive platform. HPE GreenLake experts can manage the entire platform for you with cloud-native, zero-trust security. With fully managed cloud services, you can focus on your quality assurance goals.



CONCLUSION

In today's highly competitive manufacturing industry, success is based on the quality of your products. HPE and NVIDIA are ushering in a new era of quality assurance using AI video and image analytics to achieve greater speed and accuracy throughout production. Our initiative is to help you automate the inspection of every manufactured product, part, and assembly so that you can outpace the competition.

For additional support, HPE Pointnext Services offers an [HPE Artificial Intelligence Transformation Workshop](#) that is focused on creating a road map toward your goals with AI. Our experts work with you to identify particular use cases followed by designing and implementing your ideal solution. We are ready to assist you with each step of your journey.

HPE and NVIDIA are preparing manufacturers to unleash the full potential of AI. Let us help you transform your quality assurance. [Contact us](#) to get started.

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