Google Cloud's Visual Inspection AI Reinvents Manufacturing Quality Control

New computer vision platform dramatically reduces defects, recalls, and returns for a broad range of manufacturers

Sunnyvale, Calif. – June 22, 2021 – Google Cloud today launchedVisual Inspection AI, a new purpose-built solution to help manufacturers, consumer packaged goods companies, and other businesses worldwide reduce defects and deliver significant operational savings from the manufacturing and inspection process.

Today, defects in products such as computer chips, cars, machinery, and other products cost manufacturers billions of dollars annually. In fact, quality-related costs can consume 15% to 20% of sales revenue[1]. In addition, high production volumes outpace the ability of humans to manually inspect each part.

Google Cloud has traditionally supported manufacturing quality control through its general purpose AI product, AutoML. Today, it is taking the next step by offering a purpose-built solution for manufacturers. Using Google Cloud's leading computer vision technology, Visual Inspection AI automates the quality control process, enabling manufacturers to quickly and accurately detect defects before products are shipped. By identifying defects early in the process, customers can improve production throughput, increase yields, reduce rework, and reduce return and repair costs. Visual Inspection AI operates across a wide range of industries and use cases, potentially saving manufacturers millions of dollars at each facility

Based on pilots run by Google Cloud customers, Visual Inspection AI can build accurate models with up to 300 times fewer human-labelled images than general-purpose ML platforms. This allows the solution to be deployed quickly and easily in any manufacturing setting. In addition, Visual Inspection AI customers improved accuracy in production trials by up to 10X compared with general-purpose ML approaches. And, unlike competing solutions that use simple anomaly detection, Visual Inspection AI's deep learning allows customers to train models that detect, classify, and precisely locate multiple defect types in a single image.

"AI has proven to be particularly beneficial in helping to automate the visual quality control process for manufacturers—a particular pain point felt by the industry. We've been delighted by the strong interest in Visual Inspection AI, and we look forward to supporting more organizations as they continue to find innovative new ways to deploy AI at scale," said Dominik Wee, Managing Director Manufacturing and Industrial at Google Cloud.

"We've been listening to the specific needs of the industry, and have brought the best of Google AI technologies to help address those needs. The outcome is an AI solution that, built upon years of computer vision expertise, is purpose-built to solve quality control problems for nearly any type of discrete manufacturing process," said Mandeep Waraich, Head of Product for Industrial AI at Google Cloud.

Building and training machine learning models typically requires deep AI expertise, as well as extensive databases containing thousands of labelled images. Such systems usually run in an on-premise data center or in the cloud, making them difficult to deploy at scale across the factory floor. With Google Cloud Visual Inspection AI:

- No special expertise is required. Quality, test, and manufacturing engineers can use the solution without any computer vision or AI subject-matter expertise. An intuitive user interface guides employees through all of the necessary steps.
- Engineers can get started quickly and build more accurate models. Machine learning models can be trained using as few as 10 labelled images (vs. thousands) and will automatically increase in accuracy over time as they are exposed to more products.
- Full edge-to-cloud capability: Inspection models can be downloaded to machines on the factory floor and run autonomously at the edge, whether it be for data governance reasons or to improve latency. At the same time, Visual Inspection AI is fully integrated in Google Cloud's portfolio of analytics and ML/AI solutions. This enables manufacturers to combine insights from Visual Inspection AI with other data sources on the shop floor and beyond, for instance to identify root causes of quality problems or to cross-reference with supplier and customer data.
- Problems are resolved faster. Not only does the solution flag a defective component, but also Visual Inspection AI can locate and identify the specific defect within each part, which reduces the time spent by engineers to diagnose problems, rework parts, and implement process improvements.

"Google Cloud's approach to visual inspection is the roadmap most manufacturing companies are looking for. Manufacturers want flexibility, scale, inherent edge-to-cloud capabilities, access to both real-time and historical data, and ease of use and maintainability", said Kevin Prouty, Group Vice President at IDC. "Google is one of those companies that has the potential to

bring together IT, OT and an ecosystem of partners that manufacturers need to deploy AI on the shop floor at scale."

Wide Range of Use Cases for Visual Inspection AI

Automotive manufacturers: A typical vehicle factory produces around 300,000 vehicles each year, and up to 10% of them may have parts that underwent rework or replacement during the manufacturing process to address some type of production defect [2]. By automatically identifying defects in paint finish, seat fabrication, body welds, and end-of-line testing of mechanical parts, Visual Inspection AI could save automakers more than $50 million annually per plant.

"Google Cloud's strength in machine learning and artificial intelligence is accelerating Renault's Industry 4.0 transformation. We are adopting innovative computer vision solutions like Visual Inspection AI, AutoML and Vertex AI to implement more accurate quality controls with a significantly reduced time to market at a lower cost. We are working now on deploying these new tools in every Renault factory. Renault is ready for future-oriented manufacturing and welcomes the partnership with Google Cloud," said Dominique Tachet, Digital Project Leader, Renault.

Electronics manufacturing services (EMS): Of the 15 million circuit boards produced each year in a typical EMS factory, as many as 6% may be reworked or scrapped during the assembly process due to internal or external quality failures, such as soldering errors or missing screws [3]. Reducing rework and material waste can save such a facility nearly $23 million each year.

"It's been amazing to work with Google Cloud to bring innovative machine learning and computer vision technologies to our quality processes. Engineers from FIH Mobile, a subsidiary of Foxconn, trust Google Cloud and we are achieving considerable product improvements through our collaboration. We cannot wait to roll out the Visual Inspection AI solution further across our extensive PCB manufacturing operations." said Sabcat Shih, Senior Associate Manager, FIH Mobile.

Semiconductor production: A chip fabrication plant that produces 600,000 wafers per year could see yield losses of up to 3% from cracks and other defects [4]. Implementing Visual Inspection AI can reduce production delays and scrap, saving up to $56 million per fab.

"With the shortage of AI engineers, Visual Inspection AI is an innovative service that can be used by non-AI engineers. We have found that we are able to create highly accurate models with as few as 10-20 defective images with Visual Inspection AI. We will continue to strengthen our partnership with Google to develop solutions that will lead our customers' digital transformation projects to success." said Masaharu Akieda, Division Manager, Digital Solution Division, KYOCERA Communication Systems Co., Ltd.

[1] "Cost of Quality," American Society for Quality (ASQ).

[2] "Internal documents reveal the grueling way Tesla hit its 5,000 Model 3 target,"Business Insider

[3] "Capturing the value of good quality in medical devices,"McKinsey & Company

[4] "Taking the next leap forward in semiconductor yield improvement,"McKinsey & Company

Additional Resources

- Visual Inspection AI solution webpage
- Visual Inspection AI launch blog
- Visual Inspection AI overview video
- FIH Mobile case study
- Keep up with the latest Google Cloud news on ournewsroom and blog

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About Google Cloud

Google Cloud accelerates organizations' ability to digitally transform their business with the best infrastructure, platform, industry solutions and expertise. We deliver enterprise-grade cloud solutions that leverage Google's cutting-edge technology to help companies operate more efficiently and adapt to changing needs, giving customers a foundation for the future. Customers in more than 200 countries and territories turn to Google Cloud as their trusted partner to solve their most critical business problems.

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