

Solution Brief

AI and Computer Vision
Defect Detection



Rosmart Accelerates AI-Powered Inspection in Manufacturing

Automated defect detection optimized with the Intel® Distribution of OpenVINO™ toolkit and tested on Intel® DevCloud for the Edge



“Rosmart provides automatic defects detection machines to do the visual inspection work. It can always keep the high-quality standard, high inspection efficiency, and low labor cost.”

— Alex Zhang, R&D director, Guangdong Rosmart Technology Co., Ltd.

Global manufacturing for electronics and electronic components relies heavily on visual inspection for quality control. But this generates a bottleneck in the production line, and today’s manufacturers need to increase their units per hour (UPH) output while maintaining quality standards to stay competitive and meet increasingly high expectations from consumers and business clients.

New computer vision (CV) techniques, powered by AI and deep learning, make it possible to automate visual inspection to keep up with the pace of global demand and competition. Guangdong Rosmart Technology Co., Ltd. builds and provides AI-powered machines for visual inspection, optimized using the Intel® Distribution of OpenVINO™ toolkit. Now manufacturers can boost their daily production output without sacrificing quality and benefit from the enhanced processing power and cost savings of optimized architecture.

Challenge: Overcoming production line bottlenecks

A production line is only as fast as its slowest station. Visual inspection by human operators generates a huge bottleneck and also means that scaling up capacity comes with an equally steep rise in labor costs. Manufacturers are increasingly turning to AI-powered solutions for visual inspection. However, this presents new challenges in the extreme graphics processing requirements that AI-powered CV demands.

Challenge summary:

- Bottlenecks at the inspection level are slowing down global production lines
- Manual inspection generates high labor costs and difficulty in scaling capacity
- High GPU requirements present obstacles to deploying AI-powered solutions

Solution: Optimize AI-powered visual defect detection

Automating the visual inspection process is the key to delivering faster UPH while maintaining high quality. Rosmart, an Intel® IoT Solutions Alliance member, supports electronics manufacturers with visual defect detection machines that operate using the Intel Distribution of OpenVINO toolkit. The machines provided by Rosmart empower manufacturers by delivering up to 5x higher UPH compared to production lines with human inspectors.¹

To help deal with the intense inference workloads that defect detection requires, R&D director Alex Zhang used Intel® DevCloud for the Edge to test various hardware configurations. He was able to identify the best processor with an integrated GPU that delivered on performance while reducing the need, and overhead, for a stand-alone GPU.

5X↑
MORE
UPH¹

AI-powered defect detection vs.
human operators



Solution summary:

- Rosmart delivers AI-powered inspection with the Intel Distribution of OpenVINO toolkit
- Automated defect detection machines help ensure quality and increase UPH by 5x¹
- Intel DevCloud for the Edge helps identify the best hardware for the job

From AI modeling to deployable software

For Zhang and his team, the key benefits of the Intel Distribution of OpenVINO toolkit were that it was easy to learn, was compatible with Windows, and helped them achieve their goal of lowering hardware costs. The first step was to train the deep learning model with various images of hardware products and potential defects. Then they converted the optimized model to an intermediate representation (IR) model. An accuracy check verified that the models were nearly identical, and that the IR model could be used directly. Using a C++ API, they compiled the validated IR model into a DLL library and integrated the library into Rosmart K Vision Visual Inspection software. Using the Intel Distribution of OpenVINO toolkit accelerated inference performance and made it possible to avoid the cost of a stand-alone graphics card.

A crash course in computer vision

Computer vision, or simply put, the ability for an AI system to interpret and classify images, powers the defect detection machines provided by Rosmart. CV applications demand serious graphics processing power in order to crunch the visual inputs with this amount of data. This is the primary challenge that Rosmart faced in developing their automated solution: how to increase computational throughput to handle increased processing loads while reducing overhead.

Optimizing for cost-effectiveness and throughput

The Intel Distribution of OpenVINO toolkit optimizes CV workloads across Intel® hardware, making it easy and cost-effective to deploy graphics-intensive CV across edge-to-cloud infrastructure. The toolkit also uses deep learning inference to accelerate visual recognition from existing and pretrained model libraries, aiding in defect detection.

Zhang notes that his primary incentive to use the Intel Distribution of OpenVINO toolkit, in addition to its ease of use and support for Windows, was to replace his existing stand-alone GPUs in Rosmart machinery while “keeping accuracy and [deep learning] inference performance.” By deploying on CPUs with integrated GPUs, Zhang estimates they were able to save USD 1,400 per machine.

Benefits of Intel Distribution of OpenVINO toolkit

- Supports deep learning inference from edge to cloud
- Accelerates AI workloads including computer vision (CV)
- Speeds time to market with pretrained model libraries

Finding the best-fit hardware with Intel DevCloud for the Edge

To help optimize further, Zhang and his team used Intel DevCloud for the Edge to test their AI-driven edge computing builds on different Intel® architecture to discover the best fit vs. cost in their defect detection machines.



Intel DevCloud for the Edge gave Zhang and his team access to Intel hardware platforms to test-drive their setup across different processors. Doing this, they found that the Intel® Core™ i7 processor best supported a requisite four cameras in each machine, helping achieve a 360° view of an inspected component, with zero dead angles.

Benefits of Intel DevCloud for the Edge

- Preinstalled Intel Distribution of OpenVINO toolkit
- Support for AI models such as Tiny YOLO v3 and DeepLabv3
- 30 days access, with extensions available

Automated Defect Detection Delivers Quality and Results¹

Built with Intel® Distribution of OpenVINO™ toolkit

 Human operators	 Rosmart defect detection
87% accuracy	98% accuracy
SLOW UPH	5x higher UPH
5% underkill	0% underkill
10% overkill	5% overkill

Note: Underkill is insufficient disposal of defective output. Overkill is excessive disposal of nondefective output.

USD
70K ↓
reduction in labor costs¹
per production line per year

Conclusion: From production line to bottom line

We can't emphasize enough the magnitude of the results. By switching over to AI-powered defect detection, they achieved 98 percent inspection accuracy, up from 87 percent, and a USD 70K reduction in labor costs per production line per year.¹ And Rosmart's solution has been

adopted by leading manufacturers, including Shenzhen Sunlord Electronics Co. Ltd. and TDK-EPC Corporation in Zhuhai. These innovations have empowered manufacturers to scale and meet high demand—with exceptional accuracy and without high labor costs dragging down their bottom line.

Learn more

Intel Distribution of OpenVINO toolkit

The Intel Distribution of OpenVINO toolkit is free software for developers that accelerates performance, deep learning, and computer vision inference from edge to cloud. It supports heterogeneous processing and asynchronous execution across multiple types of Intel® processors.

Introducing Long-Term Support

Developers can now choose between standard support releases or Long-Term Support (LTS) for the Intel Distribution of OpenVINO toolkit. Standard releases provide new versions of the toolkit every quarter, ideal for early-stage projects and developers looking to take advantage of the latest innovations in deep learning. LTS offers long-term maintenance and support, a great choice for later-stage developers focused on leveraging the toolkit's existing features and functionality.

Long-Term Support benefits:

- Focuses on deployment and is designed to be taken into production
- Includes critical bug fixes for one year and security patches for two years, postrelease
- Enables shipping applications with reliability in existing capabilities and compatibility

[Learn more >](#)

Intel DevCloud for the Edge

Intel DevCloud for the Edge is a cloud-based sandbox that empowers enterprise developers to test, prototype, and benchmark AI edge models across multiple platforms in real time, from nearly anywhere in the world. This makes it easy to identify the best hardware configurations for AI edge applications, accelerating time to market and reducing costs.

[Learn more >](#)

About Rosmart

Established in 2010, Rosmart and its subsidiaries focus on research and development of visual inspection technology for the manufacturing industry.

gdrosmart.com



1. Source: Internal Rosmart performance data.

Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy.

Intel® technologies may require enabled hardware, software, or service activation.

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