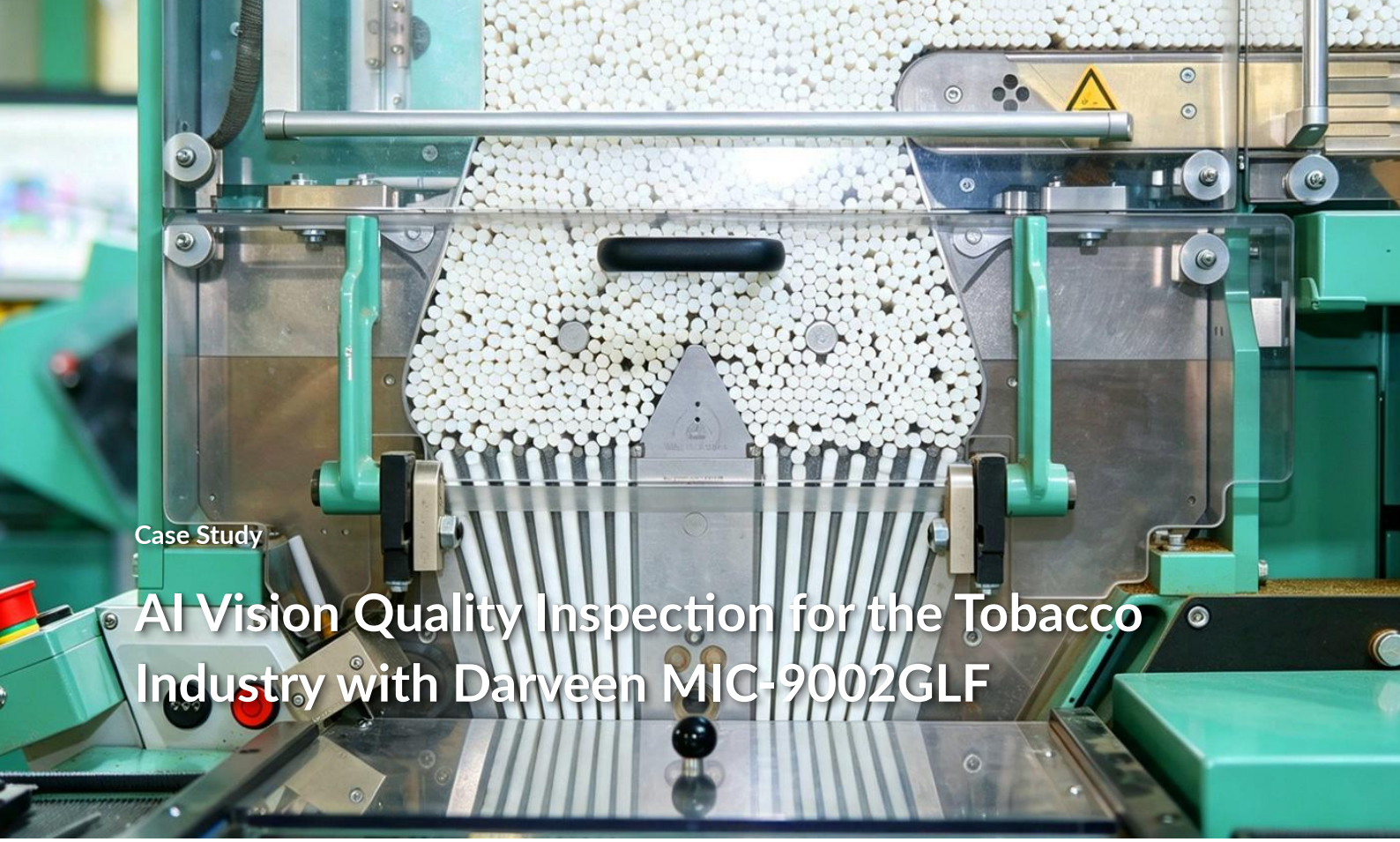




Case Study

AI Vision Quality Inspection for the Tobacco Industry with Darveen MIC-9002GLF

As AI machine vision continues to reshape modern manufacturing, it has become a key technology for industrial automation, smart manufacturing, and intelligent quality control. In the tobacco industry, manufacturers are accelerating digital transformation by adopting AI-powered quality inspection, packaging inspection, and quality control systems to improve product consistency, reduce defects, and increase production efficiency.

By combining AI vision technology with high-speed industrial cameras, manufacturers can perform real-time inspection of tobacco products and packaging, ensuring reliable defect detection throughout the production process.

Customer Background

The customer is a leading tobacco manufacturer in Asia operating multiple high-speed production and packaging lines. Its existing quality control process relied on manual visual sampling and conventional photoelectric sensors, which could no longer

meet the demands of high-speed production. To improve quality inspection efficiency and inspection accuracy, the customer implemented an AI vision inspection system supported by a reliable industrial computing platform.

Application

AI vision technology is deployed across the tobacco production and packaging process, including:

- **Product Quality Inspection:** Detection of product defects such as empty ends, missing products, reversed orientation, and cutting defects.
- **Packaging Inspection:** Inspection of missing packs, print verification, anti-counterfeit labels, box appearance, and packaging integrity.
- **Production Traceability:** RFID and QR code integration for product identification and quality tracking.

Challenges



Deploying AI vision inspection systems in high-speed tobacco production environments presented several challenges:

- Conventional industrial PCs and low-power embedded systems struggled to process multiple high-resolution camera streams simultaneously, increasing the risk of missed defects on production lines operating at speeds exceeding 400 packs per minute.
- Tobacco dust, elevated temperatures, and continuous vibration created a harsh operating environment that could affect system stability and reduce production uptime.
- The application required support for a PCIe frame grabber card, NVIDIA GPU acceleration, industrial cameras, lighting controllers, and PLC connectivity, demanding greater expansion flexibility and extensive I/O capabilities.
- Manual inspection was labor-intensive, prone to human error, and unable to meet the demands of continuous 24/7 quality inspection.

Solution: MIC-9002GLF as the Core AI Computing Platform

Darveen MIC-9002GLF serves as the core computing platform for AI-powered quality inspection and packaging inspection. Supporting NVIDIA RTX A4000 GPU expansion, independent CPU/GPU power design, and extensive PCIe expansion, it delivers the performance and reliability required for continuous AI vision applications in demanding industrial environments.

Key Features of MIC-9002GLF:

- **Powerful AI Computing**

Powered by 12th–14th Gen Intel® Core™ processors, **MIC-9002GLF** supports full-length NVIDIA GPUs up to 300W for real-time AI inference and high-speed image processing.

- **Industrial-Grade Reliability**

Its robust aluminum chassis withstands dust, vibration, and operating temperatures from -10°C to 50°C, ensuring stable operation in harsh production environments.

- **Flexible Expansion**

Rich I/O and PCIe expansion simplify the integration of GPUs, a frame grabber card, industrial cameras, PLCs, and other devices.

- **Stable High-Speed Processing**

High-capacity memory and high-speed storage enable reliable processing of multiple industrial camera streams under Windows or Linux for continuous AI vision inspection.

Results & Business Impact

- **Higher Inspection Accuracy**

AI vision inspection achieved over 99.5% detection accuracy while significantly reducing missed defects.

- **Improved Production Efficiency**

Automated quality inspection reduced manual labor requirements and increased production efficiency.

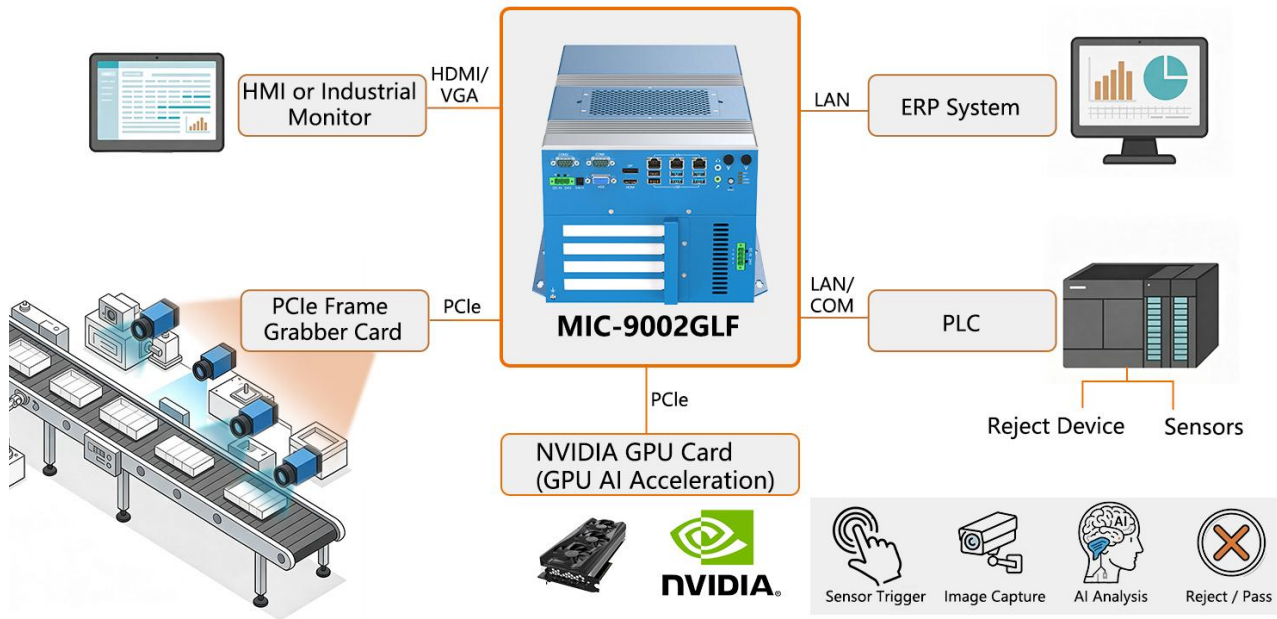
- **Enhanced Quality Management**

Digital inspection records simplify quality control, production analysis, and process

optimization.

- **Lower Operating Costs**

Improved packaging inspection reduced product defects, rework, customer complaints, and quality-related costs.



About Darveen

Established in 2007, Darveen is dedicated to developing rugged industrial computing solutions tailored to the diverse needs of vertical industries. Our product portfolio includes vehicle mount computers, industrial panel PCs, industrial displays, embedded box computers, and rugged tablets. With nearly two decades of experience in product design and manufacturing, Darveen's solutions are widely adopted in smart ports, warehousing and logistics, and heavy-duty vehicle applications. Riding the Industry 4.0 wave, Darveen is expanding its reach into edge computing, smart manufacturing, industrial automation, healthcare, and marine sectors.

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