Case Study

Automated Defect Inspection for Steel Coils

Finding the defects after the rolling process and ensuring the steel quality

Steel is a crucial material in the world, and the steelmaking process includes cold rolling and hot rolling. After the processing, various defects such as porosity, impurities, scratch, hot tears, and cracks may affect the overall quality and result in financial loss and customer complaints. With the emergence of AIoT, more and more steel makers now have chosen Automated Optical Inspection (AOI) to inspect large volumes of steel coils to maintain the quality at a high level and save labor costs and time.

Challenges

In the past, the inspection relies on human eyes; but the steel coils could be hundreds of meters long. What's more, the production of steel coils is too fast for human eyes to keep up and the staffs often miss out on the defects. Therefore, the system the customer needs not only requires excellent processing capability but also GPU compatibility to enhance AI inference.

Main Requirements

- High computing performance
- A wide temperature range supported
- GPU compatibility
- Supports mainstream camera interface
- Wide range of power input

The industrial edge computing system with a GPU does not let go of any defect

Axiomtek proposes the PC974-519-FL, an industrial edge computing system with GPU support, for the application. It supports a powerful NVIDIA® GPU with up to 300W TDP for deep learning and automated optical inspection. The industrial system is powered by the Intel® Xeon® E3 v5, Intel® Core™ or Celeron® processors with the Intel® C236 chipset. It has four high-speed and full-size PCIe/PCI slots to support GPU, vision, motion, data acquisition, frame grabber and I/O cards.

In addition, Axiomtek provides four different types of I/O modules for COM, LAN, USB, and DIO.

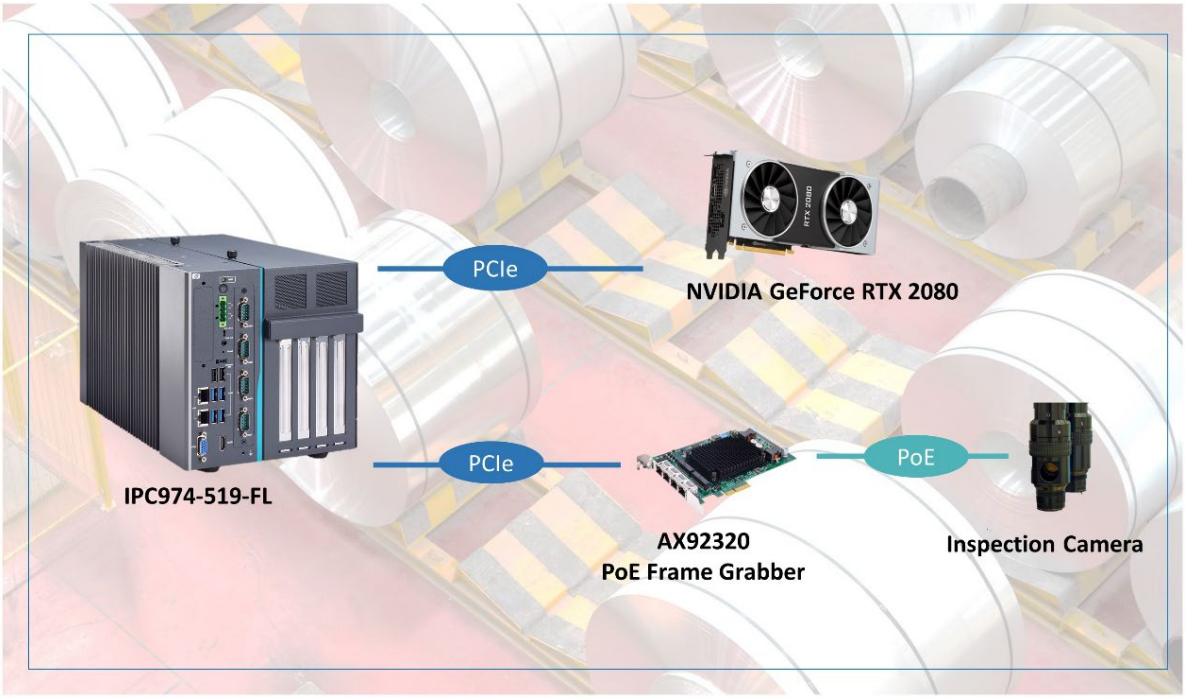
The IPC974-519-FL is equipped with four easy-swappable 2.5" HDDs with Intel® RAID 0,1,5 for extensive storage needs. There is also a full-size PCI Express Mini Card slot with a SIM slot (USB & PCIe interface) for 3G/LTE, GPS, Wi-Fi, Bluetooth, or other connections. Moreover, the IPC974-519-FL has two SMA type antenna holes. To satisfy the wide temperature variations, it offers an easy-to-install fan module to help dissipate heat generated within the system when high power consumption PCI/PCIe cards are installed. An optional built-in power board provides 300W power to add-in graphics card.

The system has a wide operating temperature range of -10°C to +70°C and a 24 VDC (uMin=19V/uMax=30V) DC power input for harsh operating environments. It also includes Intel® AMT 11.0 for easy remote management and Trusted Platform Module (TPM) 2.0 for optimum security.

Application

Deploying a high-performance system levels up the defect detection rate

The IPC974-519-FL provides stable and high performance to run the AI inference. Its high compatibility, wide operating temperature and small size make it a perfect fit for the steel factory. To enhance the inspection efficacy, an NVIDIA® GeForce RTX-2080 GPU is installed. Through a PoE frame grabber card from Axiomtek, the customer connects multiple IP cameras to replace the human inspection to achieve a higher defect detection rate and locate the defects at high speed.



System Configurations of the IPC974-519-FL

- LGA1151 socket Intel® Xeon® E3 v5, 7th/6th gen Intel® Core™ i7/i5/i3 & Celeron® processor, up to 80W (codename: Kaby Lake/Skylake)
- Intel® C236 chipset
- Supports 4 PCIe/PCI slots for full-size add-in cards
- Supports system power-on delay function
- -10°C to +70°C wide range operating temperature range
- Supports ECM BIOS setting
- Supports Intel® RAID 0,1,5
- Supports NVIDIA® GPU (up to 300W TDP)
- Supports TPM 2.0
- Supports Intel® AMT 11.0

*For detailed specifications, please visit www.axiomtek.com or go to Products > System & Platforms>Industrial PC> Industrial System for IPC974-519-FL

Why Axiomtek

With the AOI solution, as the quality of the steel coils turns out higher, the downstream customers are more satisfied, and the return rate has declined. As a leader in IPC, Axiomtek has rich experience in AIoT with reliable products and trusted services and is the most helpful and dependable long-term partner for digital transformation.

About Axiomtek Co., Ltd.

Axiomtek has experienced extraordinary growth in the past 30 years because of our people, our years of learning which resulted in our tremendous industry experience, and our desire to deliver well-rounded, easy-to-integrate solutions to our customers. These factors have influenced us to invest in a growing team of engineers including software, hardware, firmware, and application engineers. For the next few decades, our success will be determined by our ability to lead with unique technologies for AIoT and serve our key markets with innovatively-designed solution packages of hardware and software – coupled with unmatched engineering and value-added services that will help lessen the challenges faced by our systems integrator, OEM and ODM customers and prospects alike. We will continue to enlist more technology partners and increase collaborations with our growing ecosystem who are leaders in their fields. With such alliances, we will create synergy and better deliver solutions, value, and the expertise our customers need.

Axiomtek is a Member of the Intel IoT® Solutions Alliance. A global ecosystem of more than 800 industry leaders, the Alliance offers its members unique access to Intel technology, expertise, and go-to-market support—accelerating the deployment of best-in-class solutions.