Edge Vision

Automated X-Ray Inspection System for Meat Processing

AXIOMTEK®

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Reliable X-Ray Inspection for Cold, High-Humidity Meat Processing Lines

Protein-processing plants operate under constant pressure to protect food safety, meet stricter quality expectations, and enable traceability at scale. In parallel, labor constraints and rising operating costs are accelerating automation across poultry, meat, and seafood production, increasing the need for inspection systems that can keep pace with high-throughput lines. Together, these pressures have made inspection a production-critical function rather than a final, optional checkpoint.

In this environment, X-ray inspection plays a critical role by detecting bones and other hard contaminants before products move downstream, helping protect both consumers and brand reputation. For equipment manufacturers serving this market, the priority is to deliver inspection systems that operate continuously, make reliable real-time decisions at line speed, and integrate smoothly into 24/7 production workflows.

Challenges

For the customer, a global leader in food-processing equipment for poultry, meat, and seafood production lines, the X-ray inspection platform had to operate under production-floor constraints. The system is deployed in chilled, high-humidity zones where condensation, thermal cycling, and continuous duty can accelerate hardware stress and increase the risk of intermittent faults.

At the same time, the computing core must maintain low-latency, real-time X-ray image processing at line speed, synchronize multiple sensors, control I/O, and maintain stable throughput as system complexity scales.

This combination of harsh environmental exposure, continuous uptime requirements, and real-time compute and connectivity demands made platform robustness and integration flexibility critical to overall inspection performance.

Key Requirements:

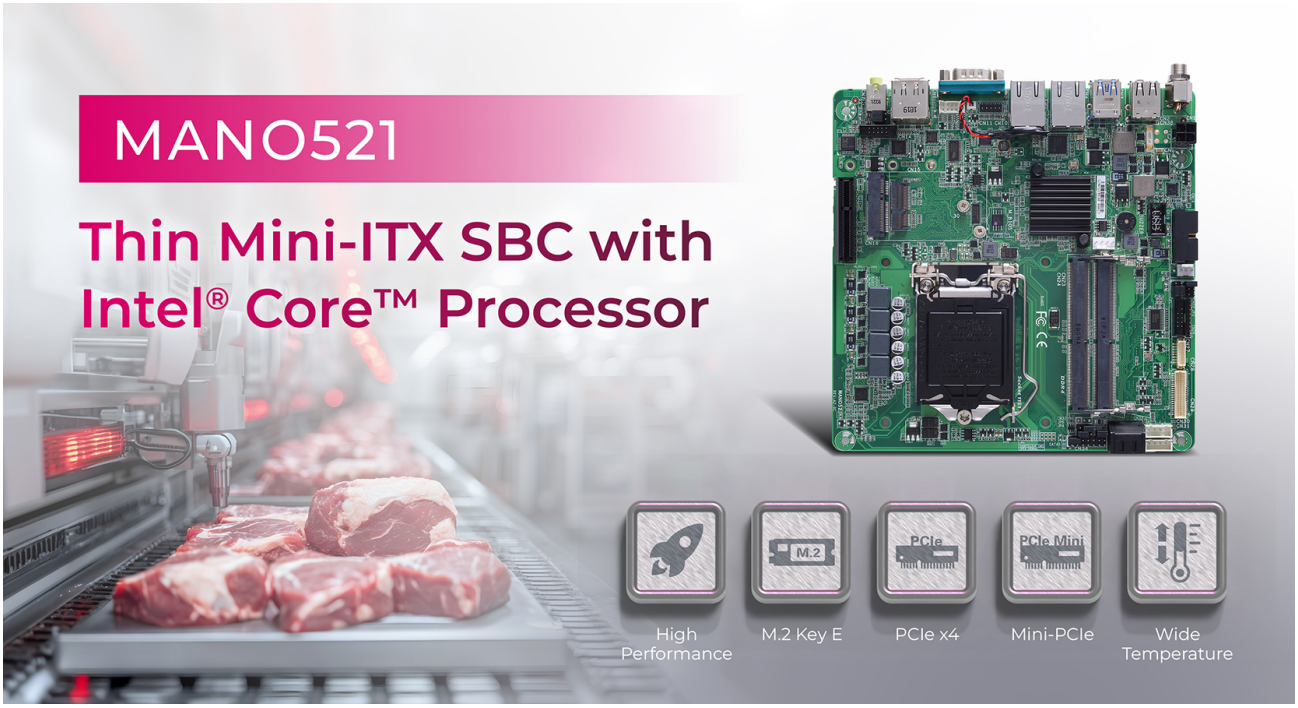
- High-performance Intel® Core™ CPU platform capable of sustaining real-time X-ray image processing at line speed
- Stable operation under cold, high-humidity conditions with continuous 24/7 duty
- Multi-device connectivity to integrate sensors, controller modules, and industrial peripherals through comprehensive USB and serial interfaces
- Compact, thin form factor to simplify mechanical integration and service access on production lines

X-Ray Inspection Solution

MANO521 Thin Mini-ITX as the Compute Core

Axiomtek proposed the MANO521 thin Mini-ITX motherboard as the embedded computing core of the inspection system. Based on the Intel® H310 platform, which supports 8th/9th Gen Intel® Core™ processors, MANO521 provides the compute headroom for real-time X-ray image processing and responsive control at line speed, while its integrated cooling design supports stable 24/7 operation.

For multi-device integration, it offers flexible connectivity, including multiple USB ports and dual COM ports, along with SATA, mSATA, and NVMe-ready M.2 storage options for inspection workloads, logging, and future expansion, all in a compact form factor suited for industrial integration.

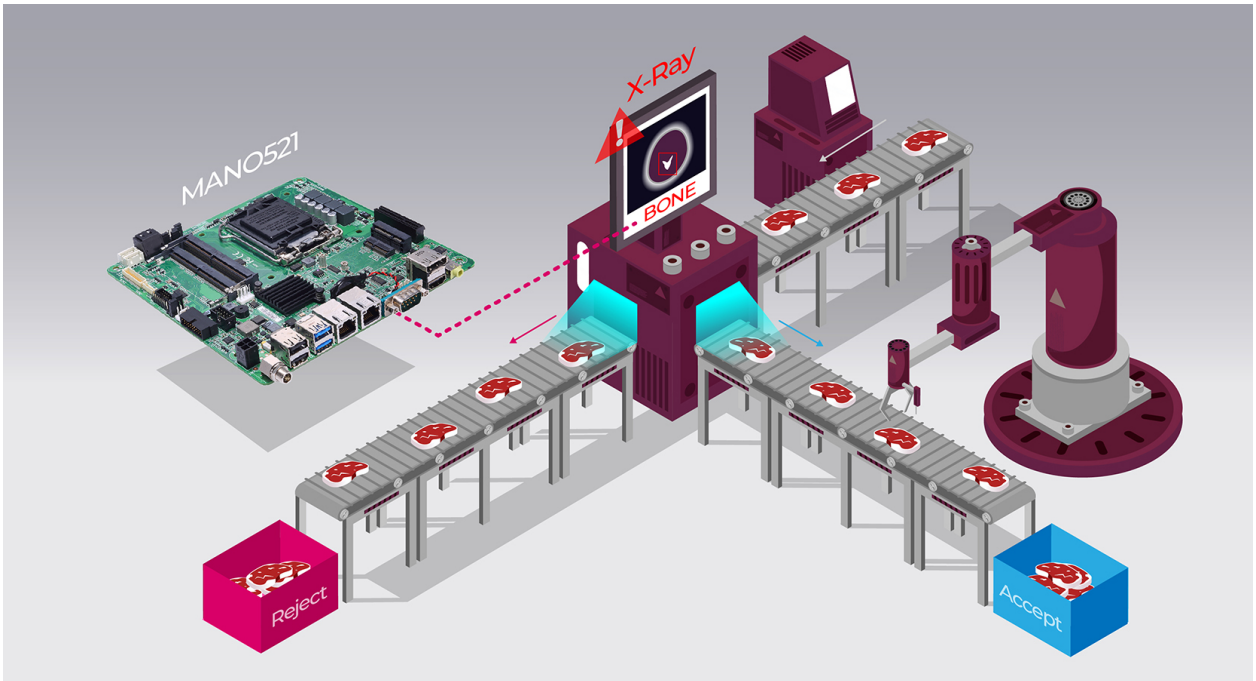


Application

Real-Time X-Ray Analysis and Time-Critical Reject Control

With the Axiomtek MANO521 serving as the embedded computing core, the automated X-ray inspection system is integrated directly into high-throughput protein-processing lines to continuously acquire X-ray image data and perform real-time analysis to detect bones and other hard contaminants in protein products.

The MANO521 sustains line-speed processing by running the image pipeline and coordinating time-critical control responses, triggering downstream reject or sorting actions when contamination is detected. Through flexible I/O, it interfaces with sensors and control modules to synchronize image capture, conveyor motion, and ejection timing.



System Configurations

MANO521:

- LGA1151 9th/8th gen Intel® Core™ i7/i5/i3 processor
- Intel® H310 chipset (Q370 optional)
- 2 DDR4 SO-DIMM for up to 64GB of memory
- 4 USB 3.0 and 4 USB 2.0 ports
- 2 COM ports
- 2 SATA-600, mSATA and M.2 Key M (NVMe)
- PCIe x4, M.2 Key E, PCI Express Mini Card slot

Why Axiomtek

Axiomtek helps equipment manufacturers build automated inspection systems for food-processing lines by providing industrial-grade embedded platforms that sustain real-time image analysis, integrate cleanly with multiple sensors and control devices, and remain stable in harsh food-processing environments.

> **The integration of Axiomtek MANO521 into our X-ray inspection system has exceeded our expectations. The motherboard delivers reliable performance in our challenging production environment and provides the computing power required for real-time processing. Beyond the hardware quality, Axiomtek's responsive support and consistent service have been instrumental in keeping our operations smooth and efficient.**
>
> — Technical Team Lead

About

Axiomtek Co., Ltd.

Axiomtek is a global provider of industrial-grade embedded computing solutions. We offer a broad portfolio that includes embedded boards, industrial motherboards, embedded systems, industrial PCs, and rugged platforms. Our platforms are designed for real-world deployment constraints, with a focus on reliability, integration flexibility, and long-lifecycle availability to support product continuity.

Our solutions are widely adopted across industrial automation, machine vision and inspection, transportation, energy and utilities, smart retail, healthcare, and edge AI applications. With flexible I/O and expansion options, scalable performance choices, and consistent platform roadmaps, we help customers simplify integration, reduce redesign effort, and accelerate deployment across diverse operating environments.