Case Study

Smart Automation in Action: Enhancing Semiconductor Operations with AMR Integration

ROBOX300

Driving Efficiency in Semiconductor Manufacturing

Semiconductor manufacturing is a high-precision, fast-paced industry where operational efficiency and minimal downtime are non-negotiable. As the demand for higher performance and faster production cycles continues to rise, optimizing operations becomes essential - not only to stay competitive but also to ensure product quality and consistently meet stringent production targets.

Challenges

As a leading innovator in self-propelled robotics, IoT solutions, and Industry 4.0 technologies, the customer specializes in delivering cutting-edge products such as AMRs, RFID eRacks, and real-time location monitoring systems - empowering smart factories with exceptional flexibility and operational insight. To support its next-generation AMR deployments, the customer needed a robust and reliable controller capable of operating in harsh factory environments. In the semiconductor sector, where uninterrupted production is critical, any downtime can result in product loss, missed targets, and increased operational costs. A highly stable, responsive, and durable solution was essential.

Key Requirements:

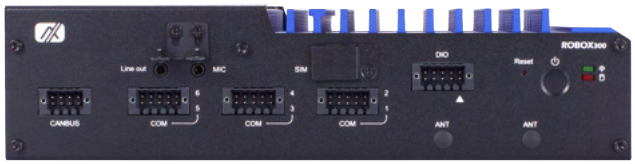
- Exceptional reliability and minimal downtime
- USB power management for rapid system recovery
- Rich I/O interfaces to accommodate a wide range of sensors and motor controls
- Compact form factor to fit various AMR configurations
- Advanced ROS 2-based SLAM and navigation capabilities
- Anti-vibration design to ensure durability in motion-sensitive environments

Enhancing Efficiency and Minimizing Downtime with AMR Automation

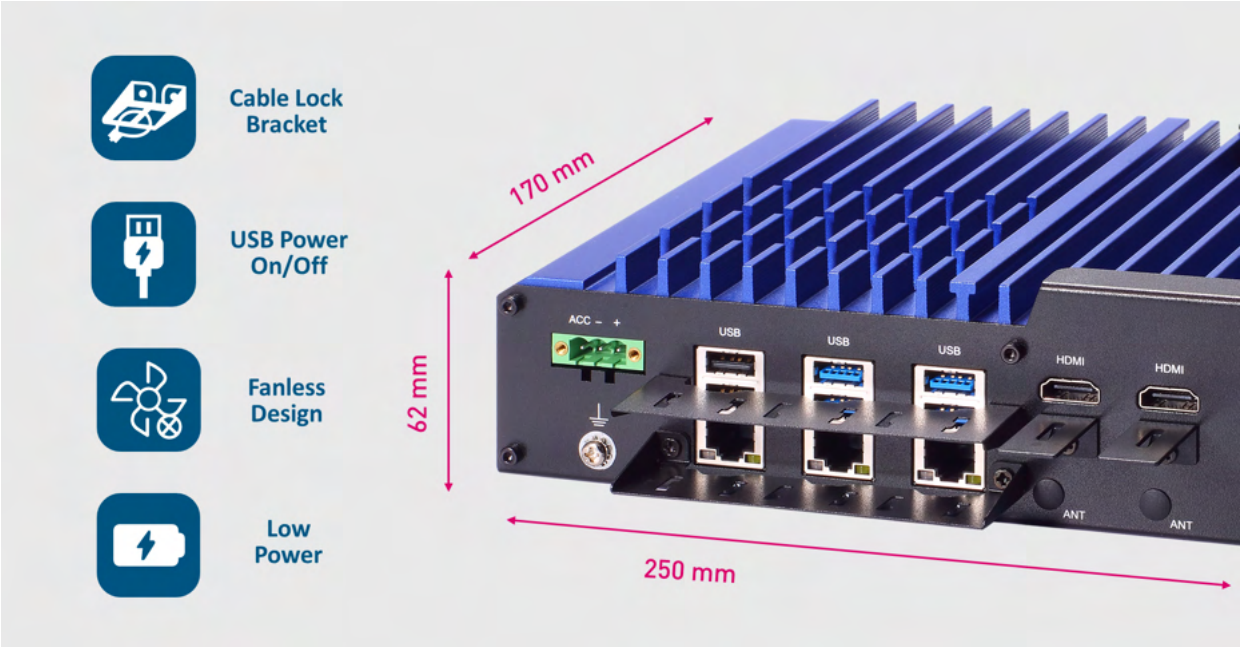
Axiomtek proposed the ROBOX300 to meet the customer's need for a dependable, energy-efficient AMR controller built for harsh and unpredictable factory conditions. Semiconductor facilities often face voltage fluctuations, space constraints, and continuous motion, all of which can compromise the performance and durability of automation systems. Purpose-built to meet these demands, the ROBOX300 supports a wide voltage input (9 to 60 VDC), offers a compact form factor ideal for space-constrained AMR designs, and features USB power control for fast and efficient system restarts.

Its compact form factor, ROS 2-based DigiHub, and secure cable lock bracket further enhance integration, reliability, and stability, making it an ideal solution for modern AMR deployments in semiconductor and other mission-critical applications.

ROS 2

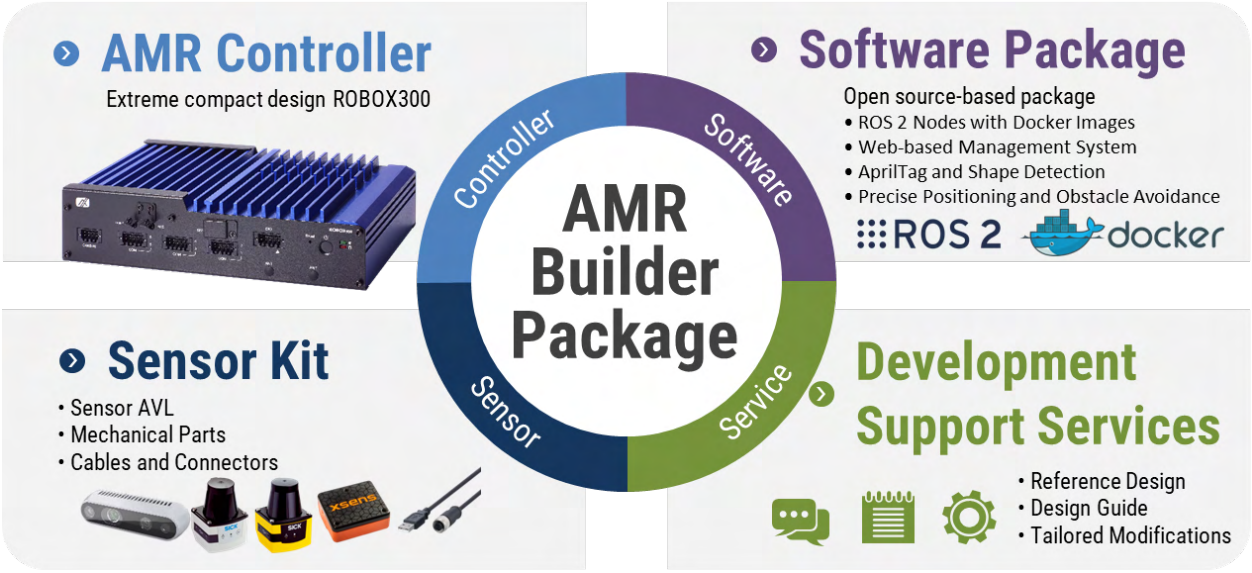


▲ ROBOX300



Application

Seamless Integration and Deployment for Semiconductor Automation



The Axiomtek ROBOX300 is well-suited for the demands of semiconductor manufacturing, offering advanced navigation, real-time localization, and smooth integration with a variety of sensors and motors. To facilitate efficient deployment, Axiomtek customized the COM I/O boot sequence to align with the customer's standard operating procedures (SOPs), ensuring a seamless transition and preserving established user workflows without disruption.

ROBOX300

System Configurations

AMR-Ready ROS 2 Controller for Harsh Industrial Environments:

- Intel® Core™ i5-1145G7E processor (15W)
- 6 isolated RS-232/422/485, 2 isolated CAN 2.0 A/B (1.5 kVDC)
- Wide operating temperature range: -40°C to +60°C
- Wide voltage input range: 9 to 60 VDC
- USB power on/off with smart ignition
- Supports Ubuntu 22.04 LTS & Axiomtek AMR Builder Package

Why Axiomtek

Axiomtek delivers reliable, application-ready solutions tailored to the evolving needs of industrial automation. With proven expertise in embedded systems, robust design engineering, and strong customer collaboration, Axiomtek ensures dependable performance, seamless integration, and long-term value, making it the trusted partner for innovative AMR and smart manufacturing deployments.

> **The Axiomtek ROBOX300 has delivered outstanding performance in addressing the challenges of autonomous material handling in semiconductor manufacturing. Its reliability, compact design, and advanced navigation capabilities have greatly improved our operations. This solution sets a new benchmark for industrial AMRs.**
>
> — Technical Director of the customer

About
Axiomtek Co., Ltd.

Axiomtek has achieved remarkable growth over the past 35 years thanks to our dedicated people, industry expertise, and commitment to delivering easy-to-integrate solutions. Celebrating 35 years of innovation, we continue to invest in our team of software, hardware, firmware, and application engineers who drive our progress.

As we look to the future, our success will depend on leading with advanced AIoT technologies and offering comprehensive hardware and software solutions. By providing exceptional engineering, value-added services, and innovative solutions, we help system integrators, OEMs, and ODMs overcome challenges and succeed in their markets.

In our 35th year, we are focused on building stronger partnerships and expanding our network of technology leaders. These alliances create synergy and enhance our ability to deliver the solutions and expertise our customers need.

Axiomtek is also a proud member of the Intel IoT® Solutions Alliance — a global network of over 800 industry leaders. This membership grants us exclusive access to Intel technology, expertise, and support, enabling us to deliver top-tier solutions to our customers.

With 35 years of experience behind us, we are excited to continue driving innovation and delivering value to our partners and customers.