



ROBOTIC MANUFACTURING FOR AUTOMOBILES

Introduction

For decades the automotive industry has been the biggest users of automated robotic systems in the manufacturing sector. Though many have worried that automatic production is taking away employment, these robots have protected workers from hazardous fumes, hot moldings and other dangerous conditions, and have eliminated human error resulting from tedious operations and negligence caused by fatigue. The ever-increasing manufacturing speed and precision brought by advancements in robotic technology have given automakers an important competitive edge in producing premier quality autos. Safety, quality, and capability are the main reasons for adopting robotic technology.

Manufacturers change new car models every few years to keep up with the demand of car buyers, and different models mean different materials, so different tooling and different processes need to be implemented. A produc-

tion planning system with precise computer-controlled processes was necessary to implement high quality, high throughput, flexible production, seamlessly integrated processes and to provide end-to-end connectivity for monitoring and maintaining manufacturing assets.

In this case study, the compact-sized high performance [Advantech ARK-2250 fanless embedded computer](#) was used in a state-of-the-art automated assembly facility of a German leading automotive manufacturer. The [ARK-2250 embedded computer](#) was implemented into a networked process control manufacturing system that provides detailed information about parts that need to be installed and records production details for product quality control.

Application Requirements

To meet the customer's requirements for process control and information display, this

project also had demands for data acquisition, IoT data transmission and analytics, and remote monitoring control functions,. For example, when the controller detects a potential problem based on the data it collects from sensors and actuators, it will automatically close down the process, issue alerts and alarms including SMS to mobile devices. So, the PC controller used in this case has to be equipped with suitable computing and data storage capabilities, connectivity and a software platform for integrating IoT functions.

In addition, the system required a variety of I/O ports to meet diverse peripheral and connectivity needs.As the computer was to be mounted on the arm of a monitor providing task information at each workstation for operators to view, the system needed to enable the data to be accessible at multiple levels. The power, LAN, and cabling had to be securely connected to ensure operational reliability and stability. Wide voltage, dust and temperature range support was also needed for operation in the harsh manufacturing environment of a car production plant.

Solution

At each facility workstation , the Advantech [ARK-2250 embedded computer](#) was mounted onto the robotic monitor arms and connected to power, network, monitoring sensors, and actuators with lockable wires and cables;. To enable data acquisition, IoT data management and remote monitoring control functions, the [ARK-2250 embedded computer](#), as well as the backend server, are deployed with Advantech's IoT [WISE-PaaS/RMM](#) software platform.

With the hardware and software provided by Advantech, the system will be used to provide information about the next item that needs to be installed in the assembly process, and display the information on the mounted monitor for onsite operators to view. Meanwhile, it will also collect and export data to an SQL Server database to archive production records and

provide IoT data analytics reporting for future process improvement and preventive maintenance.

The ARK-2250 controller will also stop the process immediately when it discovers any problems based on data collected from the safety sensors, so as to avoid damage and reduce financial loss.

For display options, the [ARK-2250 embedded computer](#) provided all required display options, including HDMI, VGA, and optional 3rd party display interfaces. This display flexibility enabled a future-proof approach for different application scenarios.

Equipped with a state-of-the art 6th Gen Intel® Core™ i7 U-series processor, the [ARK-2250 embedded computer](#) delivers high computing performance in compact size to integrate nicely with the high speed automated automotive production lines.

Supporting a unique ARK-plus expansion module and iDoor I/O modules, the ARK system was able to easily expanded to enrich storage and industrial interfaces on an optional basis. When auto makers retrofit their production lines to produce new models, they can rely on ARK embedded computers to be flexibly adjusted or upgraded for reconfiguration to meet design changes.

In terms of software support in the most cost-effective way, all Advantech ARK embedded computers are deployed with the [Advantech WISE-PaaS software](#) platform, which aggregates and integrates the software resources needed for customers to develop their own industrial control, IoT, or cloud applications.

[WISE-PaaS/RMM software](#) is part of Advantech WISE-PaaS cloud solution, and focuses on remote device management and monitoring. [WISE-PaaS/RMM](#) serves as an IoT device management platform that manages connected devices remotely, providing centralized management features, including HW/SW status monitoring, remote control, system backup/re-

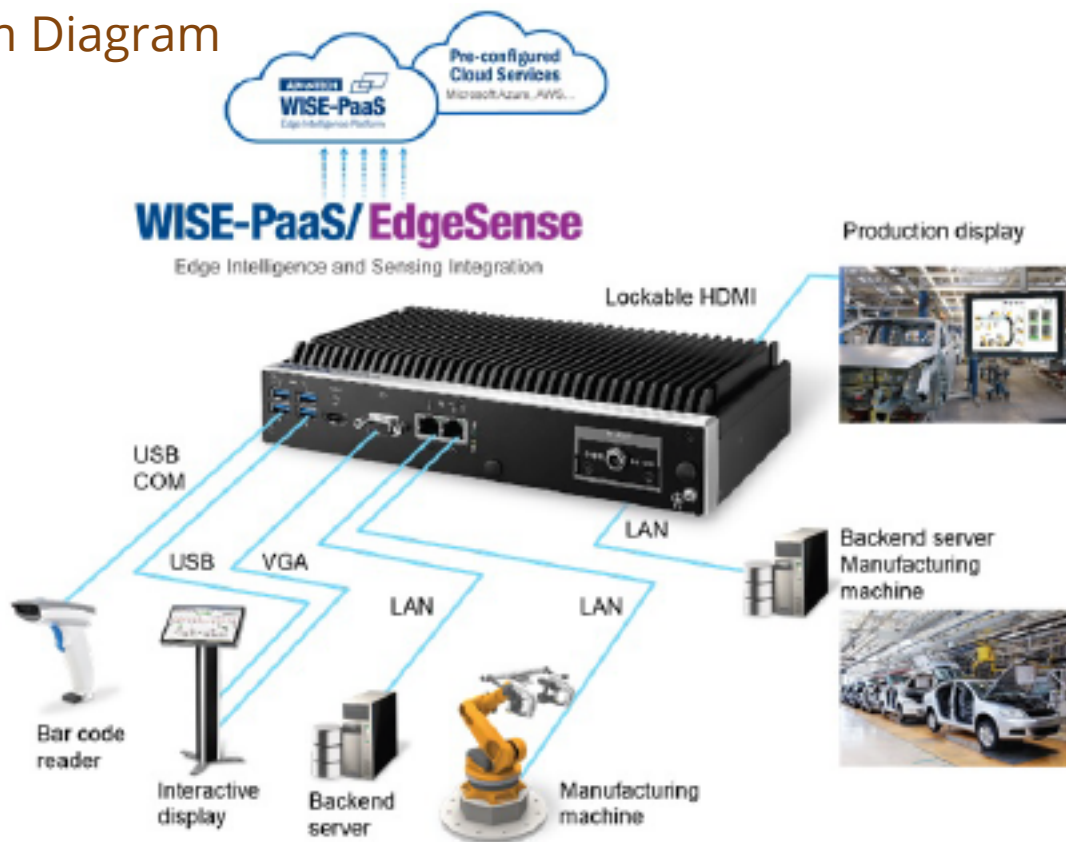
covery.

Advantech's WISE-PaaS/RMM software was leveraged for IoT data management and remote monitoring control. WISE-PaaS/RMM, the system was interoperable with the plant's current IIoT plan, including services for advanced data analytics and data prediction applications. It provided a very easy-to-use dashboard builder that allowed the system integrator to develop their own cross-platform and cross-device dashboard. Now the factory managers can view data and quickly understand the status of their production lines via any browser-based computer, smartphone, or other mobile device from anywhere at any time.

Benefits

- . Reliable fanless/wide-voltage/wide-temperature/ lockable cables design ensured reliability and stability for industrial applications
- . VGA /HDMI/optional 3rd party for versatile display
- . High computing performance leveraging Intel i7 CPU and rich I/O support to accommodate data collection and analytics requirements
- . Pre-installed [WISE-PaaS/RMM software](#) to enable IoT data management and remote monitoring with easy connection and fast deployment
- . Longevity support with long availability of Advantech products and services

System Diagram



For more information on Advantech's Embedded Computers check out

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