Enabling Business Agility and Intelligent Decision Making with Connected Systems

Arbor Technology Incorporated provides the intelligent system solution for automotive manufacturer, connecting the production data from factories around the world to the automaker's cloud-based centralized monitoring network.

Introduction
A typical automotive plant comprises five manufacturing facilities that produce parts such as dashboards, tires, car shells, headlights, and engine systems, which are then assembled into complete vehicles. To pursue its aggressive drive for quality and efficiency, technology is applied to factories and established a cloud-based centralized monitoring network, relying on centralized servers via the Internet to consolidate production data collected from the factories around the world. With access to real-time data from the central offices, the management team is no longer dependent on estimations or guesswork.

Integrating Intel® Architecture into its manufacturing infrastructure at the factory enables the end-to-end cloud computing infrastructure that connects the production floor to the central office. This allows the management team to analyze the data collected from factories, identify issues instantly, and react nimbly.

CHALLENGES
• Dependable computing solution. The factory floor environment demands a computing infrastructure with a robust and rugged design in order to offer dependable operation in harsh conditions.
• Flexible implementation. Furthering manufacturing efficiency requires a compact computing solution — taking up very little space on the valuable factory floor — yet still providing the computing performance, flexibility, and connectivity to support the cloud-based centralized monitoring network.

SOLUTION
• Integrate fanless industrial panel PC into the manufacturing infrastructure. From Arbor Technology Incorporated, the TOKIN series industrial panel PC is a touch panel computing device based on Intel® Architecture, housed in a compact and fanless enclosure, and designed for durability and usability. In addition to a practical design that enables easy operation, the TOKIN series industrial panel PC manages the flow of data from sensors on the production floor to the servers located in the office of the factory. With the TOKIN series industrial panel PC as part of its cloud-based centralized monitoring network, automaker reaps the advantages of the consolidated real-time information from its factories, moving quickly and boldly to become a dynamic player in the automotive industry.
Taking the lead with intelligent system solutions based on Intel® Architecture

Driving Growth by Moving Quickly and Boldly

The cloud-based centralized monitoring network enables focus on high volume production with high levels of quality and automation. In order to achieve this aggressive strategy, automaker could not afford to be reliant on astute estimations. With the cloud-based centralized monitoring network, real-time production data from the manufacturing facilities is captured and stored in servers at central offices in each manufacturing facility. These servers then communicate with centralized servers via the Internet where the production data can be monitored and analyzed by the management team. By consolidating the production data, the management team can instantly identify any flaws or issues in the manufacturing process and quickly make informed decisions. The relevant information can then be shared to the workers at the factories, thus minimizing any disruption to the flow of parts and assembly.

Furthermore, a centralized network safeguards their computing infrastructure against security threats such as data interception and theft, viruses, and spyware that may disrupt business operations. With a centralized network, IT administrators can quickly investigate and determine any network problems, regulate user-access permissions across the network, and gain insight on the flow of data to help plan capacity and future scalability.

To augment the cloud-based centralized monitoring network, the TOKIN series industrial panel PC is integrated into the manufacturing infrastructure to collect the production data from the assembly lines in each of the five manufacturing facilities that comprises the factory.

Running Smoothly in Harsh Conditions

The factory floor is a harsh environment for the computing infrastructure, especially in a factory that produces automotive parts. However, the TOKIN series industrial panel PC proved easy
to integrate into the manufacturing infrastructure thanks to an intelligent design that focuses on dependable operation in harsh factory environments, practical and responsive touch operation, and powerful processing performance — all packed into a small fanless enclosure.

The TOKIN series industrial panel PC has a seamless resistive touch panel covered with a membrane that protects the system from dust and moisture, achieving an IP65 rating. This rating means the electrical components inside the enclosure are protected from water and dust in the factory environment, which may possibly damage the system. Furthermore, factory floor space is a valuable asset in a high volume production factory with high levels of quality and automation. Addressing this concern, the TOKIN series industrial panel PC has a small footprint design in a fanless enclosure, giving the added benefit of silent operation and improved reliability when operating in constrained spaces where airflow may be restricted.

Enabling these benefits is the design of the TOKIN series industrial panel PC that is based on Intel® Architecture. Without compromising computing performance, these power-efficient processors run cooler, allowing fanless operation. Furthermore, the TOKIN series industrial panel PC performs reliably under extended operating temperatures (from -20 °C to 60 °C), making the platform suitable for the harsh industrial environment.

**Simpler and More Efficient**

For processor-intensive applications, the Intel® Atom™ processor with two processor cores has Intel® Hyper-Threading Technology™ that allows each processor core to work on two tasks simultaneously.

In light of this, the TOKIN series industrial panel PC simplifies the computing infrastructure in the factory by performing two tasks efficiently:

- collecting and transferring production data generated on assembly lines
- controlling robotic arms to perform a variety of tasks

**Collecting and transferring production data**

Using Intel® Architecture in the TOKIN series industrial panel PC provides rich I/O capabilities, essential for enabling machine-to-machine communication. The TOKIN series industrial panel PC comes with the necessary external I/O ports — comprising two RS-232, two isolated RS-232/485, four USB 2.0, and two Gigabit Ethernet ports — to connect to sensors that capture the production data generated on the assembly lines. The data is then transferred using wired or wireless LAN to servers located at the central office of a manufacturing facility. A similar setup is found in the other four manufacturing facilities.

**Controlling robotic arms**

Besides managing the data communications in the factory, the TOKIN series industrial panel PC includes expansion slots to support peripherals. Internally there are two mini-card sockets and one PCI or PCIe slot, and externally there is a CFast slot. Through the PCIe slot, supported by Intel® Architecture, industrial standard expansions can be connected to the TOKIN series industrial panel PC. For example, COM Express® modules can be connected to the panel PC to provide the high bandwidth and high speed data communication required for vision processing, enabling the TOKIN series industrial panel PC to control the robotic arm to perform its designated task.

The Intel® Architecture that powers the TOKIN series industrial panel PC meets the requirements for processing performance, flexibility, and power efficiency, enabling reliable communication of production data from the assembly lines to servers at central offices, and supporting the vision processing to control the robotic arms in the factory.

**Making Connections**

With multiple manufacturing facilities producing different automotive parts — all connected to the cloud-based centralized monitoring network — the amount of production data generated puts great pressure on the computing infrastructure. Production schedules and product quality are uncompromising; computing infrastructure for cloud-based centralized monitoring network must be able to handle the workload of consolidating the data communications from all factories around the world.

Underpinning the computing infrastructure is Intel® technology. At the factory floor level, the TOKIN series industrial panel PC connects the data collected from the assembly line to servers at the central office. The panel PC offers the benefits of Intel® Architecture, which provides dependable operation, powerful and energy-efficient computing performance, and a standards-based architecture able to run commercial off-the-shelf hardware and software. This open environment enables organizations to scale the computing infrastructure rapidly as the business grows.

At the central office, single-board computers (SBCs) based on Intel® Architecture help minimize system size, weight, and power (SwA) — making SBCs ideal for cost-effective computing performance with low energy consumption in constrained environments.
Outmaneuvering Competitors

Integrating the TOKIN series industrial panel PC into the manufacturing infrastructure at the factory enables valuable production data to be collected and consolidated into the cloud-based centralized monitoring network. As the result, the production data lets the management team make faster decisions based on real-time information.

For more information on Arbor solutions based on Intel® Architecture, visit www.arbor.com.tw

SOLUTION PROVIDED BY:

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