

USE CASE

Semiconductor Fab Harnesses Big Data With ADLINK Edge DAQ Modules Introduction

The manufacturing of semiconductor chips demands the highest degree of precision processing. With the inception of big data analysis, edge computing, and artificial intelligence (AI), the semiconductor industry is embracing intelligent automation where big data collection is crucial. Most semiconductor manufacturing equipment is now provisioned with networking capabilities and can automatically upload processing data, but this data is insufficient for the AI training needed to achieve optimal production. A Korean semiconductor company decided to deploy the ADLINK Edge DAQ system in its recently expanded facility in China to collect comprehensive equipment and environmental data to build a truly smart factory.



Challenges

When it comes to deploying AI-based intelligent systems to factory production lines, the biggest headache for the IT department and data experts at the headquarters is how to acquire data thoroughly from the shop floor. How do you pick suitable data acquisition devices from the plethora of available options? How do you ensure the accuracy of sensor data acquired from equipment in consecutive processing? Are the sampling rates and accumulated data quantity sufficient for big data analysis and deep learning at the backend? Will the DAQ devices operate reliably enough in the harsh manufacturing environment to ensure data credibility? Each question poses a big challenge.

In their existing facilities, this Korean semiconductor company uses low-speed DAQ with sampling rates as low as 10 S/s. Given the high speed of manufacturing devices, this was insufficient for AI big data analysis. When the company decided to increase investment in China, they decided to deploy the ADLINK high-performance Edge DAQ modules in their new facilities to collect equipment and environmental data. These helped them implement AI-based preventive maintenance and quality management systems with the goal of zero downtime, decreased cost, and increased revenue.

The Solution

The ADLINK MCM-200 Edge DAQ product series provides analog-to-digital signal conversion at a sampling rate ranging from 10kS/s to 250kS/s with 16- or 24-bit resolution. With embedded software and multiple signal conditioning circuits, the ADLINK MCM-200 series is a plug-and-play device that can support over 80% of sensors on the market. It is convenient to install and boasts the highest cost-performance ratio. The Korean company has deployed many ADLINK Edge DAQ modules in its new facility in China to acquire data from sensors and transmit processed data to the cloud. The pre-processed data merges with production data uploaded from processing machines, ready for analysis by data experts at the headquarters.

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- ***Built-in web console for remote data access***

ADLINK Edge DAQ modules support data transmission via Ethernet or WiFi, and two sets of 20-pin detachable terminal connectors make it easy to connect sensors. In addition, Edge DAQ has a built-in web console, allowing users to remotely configure devices and start data collection tasks without writing programs. Users can process the data acquisition easily and quickly.

- ***Built-in ARM processor, providing edge computing capabilities***

The built-in ARM Cortex-A9 processor can provide the required edge computing capabilities for various signal pre-processing algorithms, mathematical calculations, and control logic. Users can use the customized algorithm function provided by Edge DAQ to load the compiled algorithm library to the device for operation.

- ***Embedded signal conditioning for connecting various types of sensors***

Most commonly used plug-in data acquisition cards that can only measure voltage signals. ADLINK Edge DAQ data acquisition modules have multiple signal conditioning circuits to connect directly to various common sensors without adding costly signal processing units. Compatible sensors include voltage and current output sensors, accelerometers, microphones, thermocouples (TC), resistance temperature detectors (RTD), load cells, and strain gauges.

- ***High sampling rate and high resolution for precision measurement***

The ADLINK Edge DAQ product series supports 16- or 24-bit resolution data acquisition with a maximum sampling rate of 250kS/s. The following DAQ modules are available for different high-precision measurement applications:

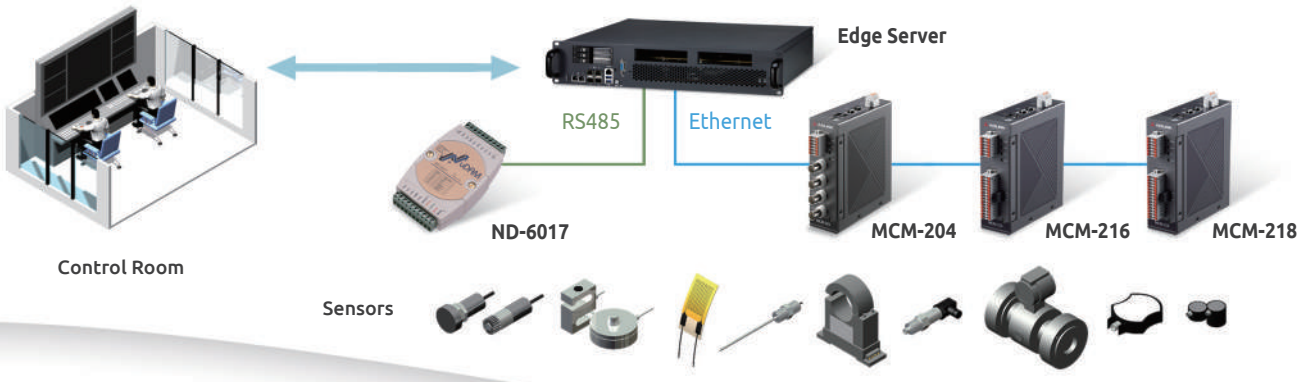
  - MCM-218 Current Input Module: 8-CH Multifunction AI, 0-20mA, 16-bit, 250KS/s, 2 AO, 4 DIO
  - MCM-216 Voltage Input Module: 16-CH Multifunction AI, ±10V, 16-bit, 250KS/s, 2 AO, 4 DIO
  - MCM-204 Vibration Input Module: 4-CH Simultaneous AI, ±10V, 24-bit, 51.2KS/s, Support ICP type sensor

- ***Rich software support reduces time to market***

ADLINK Edge DAQ modules support RESTful API, TCP socket, Modbus TCP, and other standard interfaces, allowing users to quickly develop and integrate to obtain the required data, significantly reducing development manpower and time. It can support functions such as data record storage, data monitoring alarm, data export to Microsoft Excel, and real-time FFT spectrum analysis. Users can easily get started through the intuitive graphical interface for parameter and measurement setup without writing a program.

Customer Benefits

- Streamline product sourcing: ADLINK's comprehensive product lineup means that, in addition to DAQ modules, we provide all the products you need to deploy intelligent systems, from data acquisition to edge computing and AI development.
- Reduce large-scale deployment cost: The ADLINK Edge DAQ products feature ease-of-use, flexible expandability, and extreme reliability. These features significantly reduce the manpower, time, and resources needed for system development and deployment and minimize system maintenance costs over the device service life.
- Reap the benefits of intelligent manufacturing: According to current estimates, comprehensive data acquisition from the ADLINK Edge DAQ system helps reduce equipment maintenance costs by 30%, reduces defective items and scraps by 40%, and improves production efficiency by 20%.



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LEADING EDGE COMPUTING

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