

# Advanced Remote I/O for Robots and CVD/PVD Equipment in Semiconductor Manufacturing



Location: **Taiwan**

## Background

The semiconductor industry has a well-established manufacturing process, from IC design, wafer fabrication, board assembly, and testing. Many of these manufacturing processes are equipped with automation machines and robots. For instance, robots can be designed to move wafers from different production lines to increase the production yield. Additionally, Physical Vapor Deposition (PVD) and Chemical Vapor Deposition (CVD) machines are commonly used to form a thin film on wafers. To enhance the efficiency of these CVD/PVD machines, devices are required to effectively measure power current and other key parameters.

This project needed advanced data acquisition capabilities to capture data from robots and CVD/PVD machines. Advantech's remote I/O solution can effectively capture key parameters of machines and simultaneously transmit their data to the gateway and MES for machine efficiency management.

## System Requirements

Due to limited installation space around the machines, a compact remote I/O module was needed with a small footprint to acquire power current and other key parameters of major equipment in real time through stable Ethernet cables. Additionally, when data is transmitted to an edge gateway, it is necessary to allow dynamic IP addresses and port number assignments to meet the customer's security policy and system configuration requirements according to production line tasks. Furthermore, while I/O modules are collecting and transmitting data, the gateway and MES needed to execute data analysis such as fault detection and classification (FDC) methods to enhance efficiency and reduce production downtime.

## Project Implementation



**ADAM-6017**  
8AI/2DO IoT Modbus/  
SNMP/MQTT Ethernet  
Remote I/O



**ADAM-6317**  
8AI/11DI/10DO IoT  
Modbus/OPC UA  
Ethernet Remote I/O



**EKI-2728**  
8GE unmanaged  
Ethernet switch



**EKI-1524**  
4-port RS-232/422/485  
Serial Device Server



**UNO-348**  
Compact Embedded Edge  
Controller with 10th Gen  
Intel® Processor

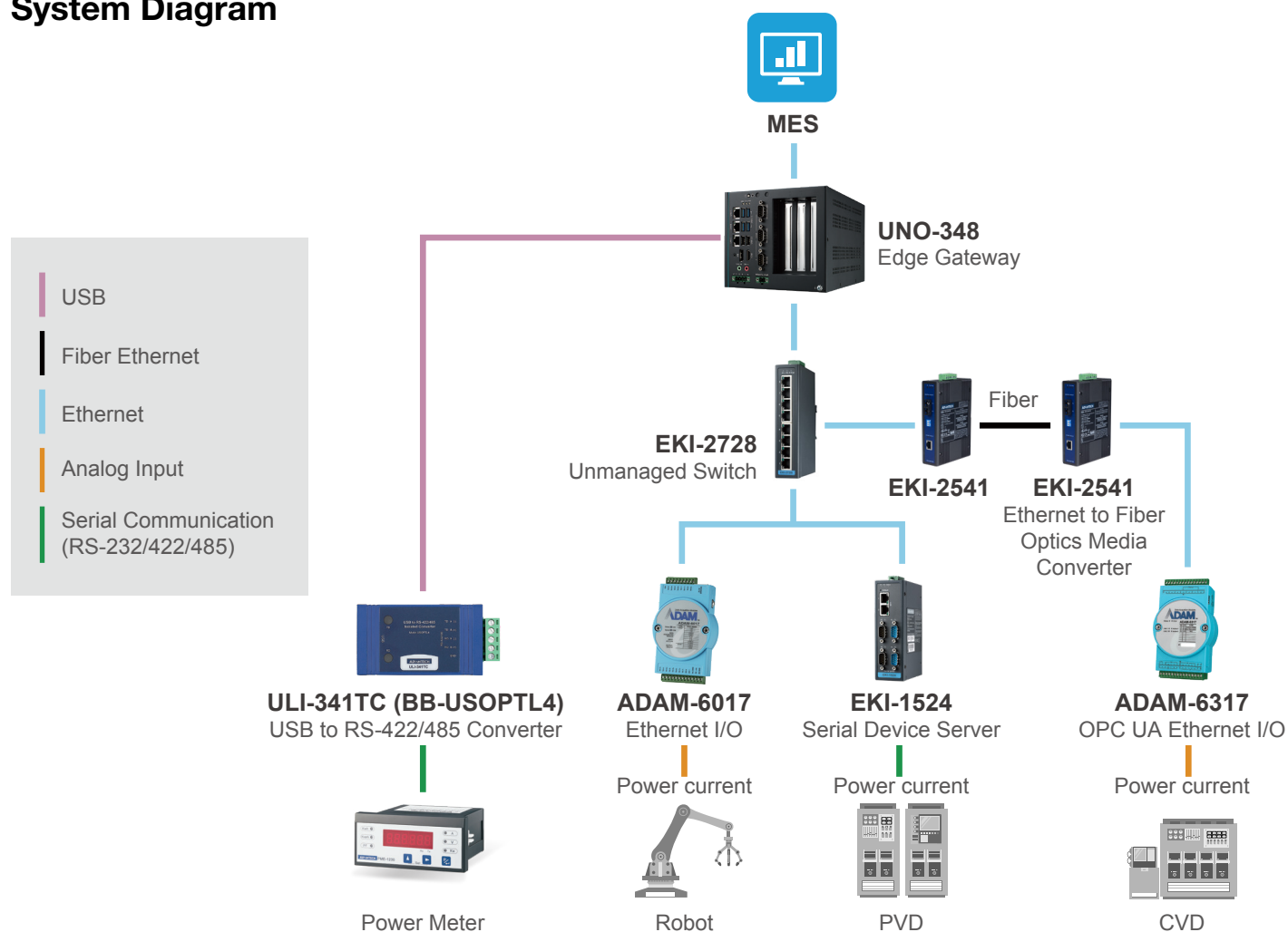
## System Description

To build a robust MES system, Advantech offers a series of remote I/O, serial device server, unmanaged switch, and edge gateway to make the solution happen. With a palm-sized compact design and daisy-chain topology, ADAM-6000 series Ethernet I/O, and ADAM-6300 series OPC UA Ethernet I/O were installed close to each machine for minimum wiring between machine sensors, but also to ensure the best signal quality.

ADAM-6017 and ADAM-6317 provide 8-channel analog input to collect machine voltage / current parameters (e.g. power current) in 1,000 samples per second sampling rates, which is then transmitted to an edge gateway UNO-348 over Ethernet. ADAM-6317 OPC UA Ethernet I/O also offers hardware and software double security protection to avoid malware attack.

For versatility, the customer can mix and match different ADAM I/O modules to fulfill diverse project requirements in the future. Advantech's EKI-2000 series Ethernet switches also offer a range of product models with different port and PoE selections to secure reliable data communication and connectivity to the gateway.

## System Diagram



## Summary - Why Advantech?

Continuous machine operation and production yields are the key for semiconductor manufacturing customers. Advantech industrial remote I/O modules and switches acquire and transmit data to the edge gateway for data analysis, which improves management capabilities, machine efficiency, stability, and scalability. Advantech's abundant customization experience can successfully fulfill various project requirements for the semiconductor industry.