

Advanced Remote I/O for Robots and 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 server 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 a VM (Virtual Machine) server, 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 server needed to execute data analysis such as fault detection and classification (FDC) methods to enhance efficiency and reduce production downtime.

Project Implementation



ADAM-6217
8AI IoT Modbus/SNMP/
MQTT 2 ports Ethernet
remote I/O



ADAM-6250
8DI/7DO IoT Modbus/
SNMP/MQTT 2 ports
Ethernet remote I/O



EKI-2728
8GE unmanaged
Ethernet switch



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



UNO-3283G
Intel® Core™ i automation
computer w/ 2 x GbE, 2 x
mPCIe, HDMI, DVI-I

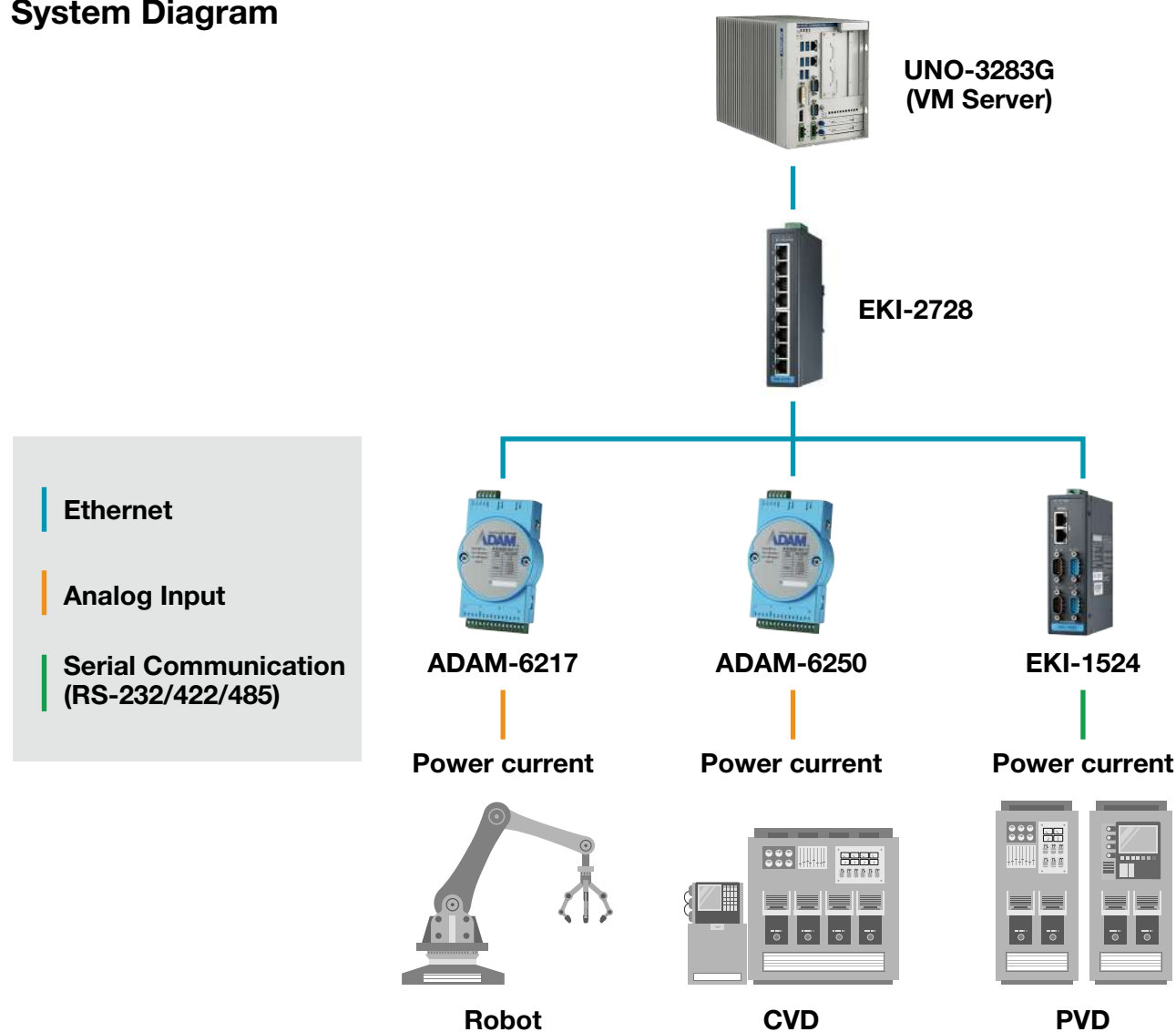
System Description

With a palm-sized compact design and daisy-chain topology, ADAM-6200 Ethernet/I/O series was installed close to each machine for minimum wiring between machine sensors, but also to ensure the best signal quality.

ADAM-6217 provides 8-ch analog input channels to collect machine voltage / current parameters (e.g. power current) in 1,000 samples per second sampling rates, which is then transmitted to a VM server automation computer UNO-3283G over Ethernet. Furthermore, users can dynamically adjust the IP address and port number according to host configuration through the Modbus/TCP protocol.

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 servers.

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 VM servers 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.