Industrial Focus

Semiconductor Industry Production Management and Maintenance Strategies

Edge Data Collection, Process Monitoring, AI Integrated Solutions and Services

Companies operating in the extremely competitive global semiconductor industry need to keep pace with advanced processes and adopt smart manufacturing strategies that boost productivity and expand plant capacity. The recent scramble for automotive chips demonstrates the importance of strengthening production capacity using smart technologies. Indeed, semiconductor producers that use these strategies typically attract more orders and generate more revenue/profit.

Advantech leverages 30 years of industrial computer software/hardware experience and the ability to deliver innovative IoT applications that meet intelligent automation demands in the semiconductor industry. In addition, Advantech provides semiconductor manufacturers with integrated solutions — ranging from entry-level hardware services to advanced AI data analysis solutions — that address complicated production line problems, boost production efficiency, and improve industry competitiveness.

Tip 1

Collecting line data stabilizes production

Data collection is the first step towards improving smart production in the semiconductor industry. As such, line managers leverage data collection equipment to record raw material/production information and calibrate production line processes. Semiconductor fabricators value stable data collection equipment as malfunctions result in costly production halts. Lengthy semiconductor manufacturing processes and the varied devices used at workstations necessitate data collection equipment that supports and expands input/output interfaces.

Advantech's Ei-52 miniaturized edge intelligent system provides multiple I/O and built-in WISE-DeviceOn software with remote control and maintenance functions that meet myriad production challenges. It integrates Acronis system backup and McAfee anti-virus software, enabling quick system restore while blocking malware attacks. When used in congress, these features reduce equipment failure risks and the resulting production downtime. In addition, the system's excellent stability satisfies semiconductor production data collection demands.

Tip 2

Monitoring process environment ensures quality

Production line data collection is the first step in smart manufacturing. Semiconductor manufacturing involves environmentally sensitive processes — such as yellow light, etching, and diffusion. As such, smart manufacturing necessitates a complete environmental monitoring solution that surveils temperature, humidity, and air pressure. Likewise, traditional infrastructure in semiconductor plants necessitates smart devices that enable real-time facility monitoring and management.

For example, the gas used in semiconductor packaging diffusion equipment requires stable pressure to function properly. The plant delivers gas in uniform PSI to individual units. As such, individual units need to lower/raise air pressure to varying levels for each production line. Relying on such equipment to monitor and analyze gas pressure at the source is near impossible, and may cause unstable production and low yield rates.

Advantech's customers have adopted Advantech's EIS-D210 Edge intelligence solutions in response to this problem. EIS-D210 helps users leverage DeviceOn/iEdge (Intelligent Edge Management) industrial app (I.App) in their production facilities. Users can use I.App communication protocols and data integration to enable data collection while utilizing edge computing and analysis. It is further applicable to the collection and analysis of real-time on-location air pressure information. The production line dashboard displays this information through the remote monitoring and central management system. This enables production line staff and management to monitor and manage air pressure on site or from a central control room. In sum, this solution enables plant operators to reduce production shutdowns caused by air pressure abnormalities.

Tip 3

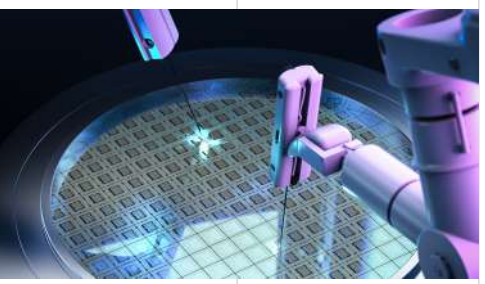
Integrating peripheral device data boosts smart production

Semiconductor plants must further integrate peripheral device data to facilitate more smart applications. For instance, monitoring peripheral device operating conditions in clean rooms and sending the related data to production management systems augments smart production. At present, data collected from peripheral devices must comply with standard data communication formats for semiconductor plants: SECS/GEM.

Advantech collaborates with professional software developers to convert all data generated by equipment and machines into SECS/GEM. This data is transmitted via Ei-52 to the semiconductor plant's databases. Collaborating with ecosystem partners to provide industry-dedicated integrated solutions places Advantech at the forefront of cutting-edge technology and in a unique role promoting IoT solutions.

Tip 4

Collecting and pre-processing equipment data accelerates AI development



Semiconductor plants are continuously moving towards smart manufacturing. Promoting AI-based data analysis and applications helps semiconductor plants leverage smart production. To this end, access to powerful computers for big data analysis is critical.

An international semiconductor company, seeking to monitor robotic arm motors in real-time is developing a set of preventive maintenance systems that combine AI and big data technology. They are using Advantech's EIS-D150, equipped with Core i-class processors, to accomplish this goal. EIS-D150 collects voltage and current data from motors, then leverages industrial-grade transmission capabilities to pre-process it at the edge before converting it into spectrograms. This enables their data analysts to construct functional preventive maintenance models based on spectrograms quickly. It also endows a better understanding of motor failure risks, and addresses problems in advance to avoid production downtime.

Advantech's software/hardware support solutions and software integration services are excellent solutions for devices at every level of IoT. Advantech prides itself on helping semiconductor plants augment smart production and advance toward industry 4.0.

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