Monitoring and Diagnostic & Predictive Maintenance Solutions for Semiconductor Equipment

Intelligent equipment management for improving production efficiency

Effective use of monitoring and diagnostic solutions, to not only prevent equipment failure for enhancing the capacity and stability, but also to greatly save maintenance costs.
Smart Monitoring and Diagnostic & Predictive Maintenance Solutions

- Improving production efficiency
- Increasing the life of the machine effectively
- Reducing maintenance costs significantly

Real-time Equipment Information
Through Advantech solutions, users can immediately monitor the real-time machine status through the easy-to-use graphical control interface.

Instant Handling Abnormal Statuses
When an object in production or a machine develops an unexpected condition, users can respond quickly and effectively through the system, and decide to stop and repair the problem.
Complete Production Information Analysis
Keeping complete records of all types of production information can not only display the analysis of production efficiency and traceability, but also details of the manufacturing execution system utilizing useful information for process optimization and production scheduling management.

Smart Predictive Maintenance Solution
According to the real-time operational status of the machine, building an effective dynamic preventive maintenance solution ensures stable functioning and increases equipment reliability.
Real-time Monitoring and Diagnostics & Predictive Maintenance System for Vacuum Pumps

Machines rely on many vacuum pumps to maintain operation and after long term operation they require regular maintenance, and may face stability issues over the operational lifespan. There are thousands of vacuum pumps in an IT factory and the traditional method of manual inspection requires a lot of manpower and time, and cannot fully and immediately grasp the operational status. This system provides real-time analysis of the operating status and quickly transmits malfunction messages to the SCADA server to achieve intelligent equipment maintenance, significantly reducing manpower and time of manual inspection. The system can be combined with the existing FDC system for equipment and device communication. For production management, the system reduces mistakes and time generated from calculating statistics manually, reports the operation status of each device effectively, analyzes the performance and status of the device, and increases capacity through improvement.

- Improving traditional manual meter reading, real-time remote monitoring of vacuum pumps can significantly reduce labor costs
- Real-time monitoring and analysis through a simple-to-use and intuitive graphical control interface can greatly improve the efficiency of the vacuum pump maintenance

System Architecture

Applications

- Semiconductor Chemical Vapor Deposition equipment
- Semiconductor Physical Vapor Deposition equipment
- Semiconductor Dry Etching equipment
### System Specifications

#### Real-time Monitoring and Diagnostics & Predictive Maintenance System for Vacuum Pumps

**Monitoring Project**
- Major monitoring items include:
  - Vacuum pump distribution
  - Real-time information of vacuum pump
  - History graph
  - Event log of vacuum pump
  - Alerts and authority settings

- Real-time information of vacuum pump & history graph includes:
  - DP motor current
  - BP motor current
  - Chassis temperature
  - Back pressure
  - Cooling water
  - Nitrogen flow

<table>
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<tr>
<th>Edition</th>
<th>Standard</th>
<th>Premium</th>
<th>Professional</th>
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<tbody>
<tr>
<td>Vacuum Pump</td>
<td>64</td>
<td>320</td>
<td>640</td>
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<td>16-Port Serial Server</td>
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<td>SCADA Server</td>
<td>1 x 17-inch industrial touch panel computer</td>
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<td>WebAccess 600 tags</td>
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<tr>
<td>Advantech Monitoring and Diagnostic Tool Kit for Vacuum Pump</td>
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#### Main System Components

![Main System Components Image]

<table>
<thead>
<tr>
<th>Component</th>
<th>Advantech WebAccess</th>
<th>TPC-1771</th>
<th>EKI-1526</th>
</tr>
</thead>
</table>
| **Function** | Browser-based HMI/SCADA Software:  
  - Networking and remote monitoring capabilities for rapid development of a monitoring and diagnostic software  
  - Remote monitoring capability for users to control on-site status through the network anytime, anywhere, and to analyze and make decisions through remote connection  
  SCADA Server:  
  With built-in WebAccess SCADA monitoring and diagnostic software, the server was equipped with real-time data acquisition and powerful computing capabilities, low power consumption, and fanless design | SCADA Server:  
  With built-in WebAccess SCADA monitoring and diagnostic software, the server was equipped with real-time data acquisition and powerful computing capabilities, low power consumption, and fanless design | 16-Port Serial Server:  
  Transmitting real-time information of vacuum pumps |
| **Specifications** | Provide different I/O tags based on the different needs of systems. Please refer to the system specifications | Intel 174® Atom™ DS25, 1.8GHz Processor  
  - 17” SXGA TFT LED LCD  
  - Fanless cooling system  
  - IP65 front panel  
  - Support for PCIe and small PCIe expansion  
  - 8 DI/O, with backup SRAM  
  - Support for DDR3 SDRAM  
  - Serial port isolation protection | Ethernet ports: 2  
  - Communication interface: 10/100 Mbps  
  - Communication type: RS-232/422/485  
  - Baud Rate: 50 bps ~ 921.6 kbps |
Real-time Monitoring and Diagnostics & Predictive Maintenance System for Intelligent Robotic Arm Controllers

The production process relies on robotic arms to transfer components. However, after long term operation, these arms will start to fail. In an automobile or IT equipment manufacturing plant there are hundreds of robotic arms and manual maintenance of them takes lots of time and manpower, and to when they are shutdown capacity is reduced. Real-time monitoring and diagnostics reduces labor and speeds up routine maintenance, by providing early warnings before mechanical problems happen. The system will also report mechanical issues, and evaluate the advantages and disadvantages of machines for improvement in order to increase productivity.

- Improving traditional manual meter reading and real-time remote monitoring of robotic arms can significantly reduce labor costs.
- Real-time monitoring and analysis through a simple-to-use and intuitive graphical control interface can greatly improve the efficiency of the robotic arm maintenance.

System Architecture

Applications

- Semiconductor plant
- Automobile plant
- Precision machinery factory
### System Specifications

**Real-time Monitoring and Diagnostics & Predictive Maintenance System for Intelligent Robotic Arm Controllers**

#### Monitoring Project

**Major monitoring items include:**
- Distribution of robotic arm controller
- Real-time information of robotic arm controllers
- History graph
- Robotic arm controller event log
- Alerts and authority settings

**Real-time monitoring information & history graph of robotic arm:**
- Torque
- Speed

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<td>Robot Arm Connection</td>
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<td>256</td>
<td>1024</td>
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<td>6 x Robotic Arms, 8 x Joints Each, 2 x Analog Points Every Joint</td>
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<tr>
<td>16-Port Serial Server</td>
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<tr>
<td>SCADA Server</td>
<td>1 x UNO-2178 Fanless Automation Computer</td>
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### Main System Components

**Component** | **Advantech WebAccess** | **UNO-2178** | **EKI-1526**
--- | --- | --- | ---
**Function** | Browser-based HMI/SCADA Software:  
- Networking and remote monitoring capabilities for rapid development of a monitoring and diagnostic software  
- Remote monitoring capability for users to control on-site status through the network anytime, anywhere, and to analyze and make decisions through remote connection | SCADA Server:  
Built-in WebAccess SCADA monitoring and diagnostic software, with real-time data acquisition and powerful computing capabilities, low power consumption, and fanless design. The most durable and reliable data acquisition platform | 16-Port Serial Server:  
Transmitting torque and speed of the robotic arm controller

**Specifications** | | | |
--- | --- | --- | ---
| Provide different I/O tags based on the different needs of systems. Please refer to the system specifications | | | |
Real-time Monitoring and Diagnostics & Predictive Maintenance System for Robotic Arm Controllers

The production process relies on robotic arms to transfer components. However, after long term operation, the arms will start to fail. In an IT factory, there are hundreds of robotic arms and manual maintenance takes a long time. This system reduces the amount of labor and the time it takes to do routine manual maintenance, whilst increasing the reaction time through the early warning of mechanical problems. For production management, the system reduces mistakes and the time generated from calculating statistics manually, by reporting mechanical issues effectively, and evaluating advantages and disadvantages of machines for improvement in order to increase productivity.

• Improving traditional manual meter reading, real-time remote monitoring of robotic arms can significantly reduce labor costs.
• Real-time monitoring and analysis through a simple-to-use and intuitive graphical control interface can greatly improve the efficiency of the robotic arm maintenance.

System Architecture

Applications
• Semiconductor plant
• Automobile plant
• Precision machinery factory
Real-time Monitoring and Diagnostics & Predictive Maintenance System for Robotic Arm Controllers

**Monitoring Project**

- Distribution of robotic arm controller
- Real-time information of robotic arm controllers
- History graph
- Robotic arm controller event log
- Alerts and authority settings

**Real-time monitoring information & history graph of robotic arm:**
- Current

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<tbody>
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<td>16 x APAX-5620</td>
<td>64 x APAX-5620</td>
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<td>Analog Signal Input Module</td>
<td>16 x APAX-5017H</td>
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**System Architecture**

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<th>APAX-5017</th>
<th>CTL-10-CLS</th>
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- Networking and remote monitoring capabilities for rapid development of a monitoring and diagnostic system  
- Remote monitoring capability for users to control on-site status through the network anytime, anywhere, and to analyze and make decisions through remote connection | Industrial PC:  
- For intelligent monitoring and diagnostic system | Analog input module  
- Sensor signal input | Clip-on current transformer:  
- Auxiliary converter for power current measurement |
| Specifications | Provide different I/O tags based on the different needs of systems. Please refer to the system specifications | XScale CPU  
- Support Ethernet, RS-485 communications interface  
- Support Modbus/TCP, Modbus/RTU communication agreement  
- Operating ambient temperature -10 ~ 55°C  
- Operating humidity 0 ~ 95% | 12-channel analog input  
- Support V, mV, mA, and other Input/Output format  
- Modbus TCP protocol  
- Operating temperature -10 ~ 60°C  
- Operating humidity 5 to 95%  
- Each input channel can be defined in different form and scope | For current (primary side):  
0.01 ~ 80A (50/60Hz) RL ≤ 10Ω, maximum current: 120Arms  
- Adaptive frequency: 50Hz ~ 200KHz  
- Second volume(n): 3000 ± 2T  
- Secondary impedance: 420Ω ± 20% |
Choose Advantech as Your Best Partner

Founded more than thirty years ago, Advantech has become an intelligent service industry leader, and has offices around the world. Through close cooperation with a vertical field of systems integrators, Advantech provides a wider range of applications in each industry, and comprehensive smart city and Internet of Things (IoT) solutions in order to facilitate a convenient and smart life.

Advantech’s mission is to continue to drive the earth to become more intelligent, to drive innovation of smart city, to build the model IoT industry, to assist industries to accelerate intelligence operations to become the most influential global businesses of smart city and Internet of Things (IoT).

Smart city solutions

Advantech’s five major smart city solutions make the system able to fully utilize Internet of Things (IoT) architecture for comprehensive sensing, reliable communications, and intelligent processing. These solutions provide a more intelligent experience to the public, business, and government, improving the overall quality and image of a city.

- Digital Retail and Hospitality
  - Ustore Manager
  - iCloud Solution
  - In-Store Management
  - Central Control and Cloud Management
  - Restaurant Management

- Intelligent Hospital
  - Integrated Operating Room
  - Quality Nursing Care
  - Intelligent Outpatient Services

- Digital Logistics and Fleet Management
  - Logistics & Warehousing Management System
  - Fleet Management System

Why Advantech

Designing specific solutions according to industry characteristics

In order to offer the market new value-added services, and to meet the needs of as it moves from “product” to “services”, Advantech provides innovative SRPs (Solution Ready Packages) for various professional industries. Advantech also provides application solutions for industry-specific hardware and more intelligent services to its customers, allowing customers to focus on their work, and make application integration easier.

Perfect cloud integration solutions

Advantech has been cultivating various industries for many years, understanding the purposes and needs of users, and providing appropriate hardware and software to match solutions. With particular emphasis on the product development of cloud-based architecture in recent years, WebAccess+, a new industrial cloud software, provides comprehensive evolution of intelligent remote detection management service that instantly detects and accurately grasps the system state.
Model Corporate Citizen

Advantech is committed to being a model corporate citizen by helping to preserve the environment and by giving back to society. Our environmental program focuses on reducing, reusing, and recycling materials used in our manufacturing operations. Advantech’s environmental compliance effort includes the following:

- ISO 9001 Certification
- ISO 14001 Certification
- ISO 13485 Certification
- OHSAS 18001 Certification
- TL9000 Quality Management System
- RoHS Directive Compliance
- WEEE Directive Compliance
- Authorized Sony Green Partner

After Service

Product Warranty
When the basic product warranty expires, users can buy warranty extensions. We provide a full-service to customers to lower maintenance costs.

Professional Installation
All new settings are tested by Advantech’s professional team and we offer optional installation and integration services. After installation, we set the management and operation via the internet immediately, providing real-time information.

Complete Training
With a total training solution which including multimedia player software with user demonstrations and hands-on experience system maintenance staff can learn to operate their system in no time.

Industry-Leading Quality Assurance
Advantech is a global embedded computing researcher, developer, and manufacturer, providing various industries a variety of industrial PCs, touch screen, data acquisition modules, and other products. With stable quality assurance, Advantech products can not only be used in inside, but also outside in harsh environments. With the support of Advantech industrial computers, Advantech provides intelligent and stable project planning to industries.

Customer-oriented Support
Advantech’s complete technical and repair support provides a variety of customizable after-sales services, including extended warranty, advance replacement, upgrade, fast repair and so on. With hotline AE 24/7 technical support, we keep you investment at peak performance and within your budget.
WebAccess/SCADA
Smart HMI/SCADA Software
- 100% browser-based HMI/SCADA software
- Easy to connect and control a variety of IoT Devices
- Supports a variety of mobile devices and browsers

WebAccess+IVS
Intelligent Video Software
- Intelligent Video Platform
- Intelligent Video Analytics Modules
- Modular SDK ready for software integration

WebAccess+IMM
Interactive Multimedia Software
- Digital Signage Management Platform
- Intelligent Programming Platform
- Supports Industries and Application Scenarios

WebAccess/NMS
Network Management Software
- Network Equipment Management and Monitor
- Integration of Network Topology
- Location Identification for Wide Area Deployment

Advantech invites system integrator partners to join the WebAccess+ Alliance to jointly develop the Internet of Things (IoT) and create business opportunities

Worldwide Offices

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