Intelligent Factory

Smart Manufacturing Ecosystem

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Strengthen the Digital Transformation of Smart Manufacturing

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• Production Efficiency Monitoring
• Event Reporting

Dashboard & Situation Center
• Real-time Situation Awareness
• Data Driven Decisions

EMS & EHS
• Effective Energy Saving
• Work Safety and Sustainability

MachineUnite & PHM
• Failure Prediction and Detection
• Machine Near-zero Downtime

InspectionAI
• AI-based Inspection System
• Full Model Life Cycle Management

Public Cloud

Private Cloud

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WISE-IoT
Core Services

VisualSuite
Dashboard & Visualization

InsightAPM
Asset Management

Edge365
Device Management

DataInsight
Data Enablement

Edge Data Acquisition & Connectivity

Sensing Devices   Gateway   Embedded Boards   Edge Computers   IPC/ Servers   Intelligent Service and Logistics

Edge-to-Cloud Integration Accelerates Digital Transformation for Manufacturers

Interview with Ning Kang, WISE-PaaS Product Director of Advantech; Willie Lin, Director of WISE-AII (Advantech Industrial Intelligence) of Advantech

According to the latest research by IDC, the premier global market intelligence firm, industrial deployment expenditure related to digital transformation will reach US$1.8 trillion globally in 2022. Of this expenditure, manufacturing industries account for nearly 30%, demonstrating the strong momentum of their digital transformation trend. To accelerate the promotion of smart manufacturing and Industry 4.0, Advantech developed its WISE-iFactory platform as a one-stop solution for edge-to-cloud integration. This platform enables the collaborative development of IoT applications that help manufacturers solve digital transformation challenges.

Challenges in the manufacturing industry's digital transformation

Despite the maturation of smart manufacturing technologies, most manufacturers still face challenges in terms of system architecture and data applications. Ning Kang, WISE-PaaS Product Director at Advantech, highlighted how advancing digital transformation across various sectors is increasing the need to integrate different devices and data types.

Although traditional system architectures support many industrial protocols, they have limited data analysis capabilities, insufficient support for open application management frameworks, and are generally inflexible when it comes to expansion. Therefore, they are not only unable to meet current demands for data diversity, but also cannot integrate IT and OT data.

The extent of the challenges largely centers on data analysis and its actual application effectiveness. According to Willie Lin, Director of WISE-AII (Advantech Industrial Intelligence) at Advantech, many manufacturers have vast amounts of data from various OT equipment, but the data cannot be effectively analyzed

> *"WISE-iFactory can integrate Advantech's IoT Edge smart factory edge computing solution to help enterprises build an edge-to-cloud system architecture with unified management."*
>
> *— Ning Kang, WISE-PaaS Product Director at Advantech*

or visualized. Coupled with the fact that most manufacturers are unable to integrate data from heterogeneous systems, these factors prevent most companies from effectively utilizing data.

WISE-iFactory solves digital transformation pain points

Advantech's WISE-iFactory was designed specifically as a one-stop solution to all the pain points manufacturers experience when implementing IoT, from system architecture to data application. Ms. Kang stated that in terms of system architecture, WISE-iFactory is based on WISE-IoTSuite, a low-code industrial IoT platform that allows manufacturers to flexibly expand computing capabilities and implement new IoT applications as required. Furthermore, WISE-iFactory can integrate Advantech's IoT Edge smart factory edge computing solution and help enterprises build an edge-to-cloud system architecture with unified management. This not only facilitates top-to-bottom data channels, but also enhances their data analysis and application capabilities.

Regarding data applications, Mr. Lin asserted that Advantech's WISE-iFactory/DataInsight solution can help enterprises eliminate data silos, establish a multi-dimensional data integration platform, and achieve data analysis for quantitative decision-making within an data-driven management model. DataInsight can also be used as a business intelligence tool to mine and analyze specific data sources from data lakes, ensuring the effective utilization of data while also boosting its value. For example, the ability to analyze data from various devices allows users to assess the energy consumption of an

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>
> *— Willie Lin, Director of WISE-AII (Advantech Industrial Intelligence) at Advantech*

entire factory and optimize energy management.

I.Apps accelerate the implementation of IoT applications

WISE-iFactory has two critical software utility solutions, iFactory Total Productive Maintenance (TPM) and iFactory Environmental Health and Safety (EHS), both of which have their own range of I.Apps.

According to Mr. Lin, the iFactory TPM solution is a platform that breaks down information silos by shifting factories from production-driven manufacturing to market-driven manufacturing, while realizing the competitive advantage of quick response times. The iFactory TPM solution currently offers a wide range of I.Apps, such as Overall Equipment Effectiveness (OEE), Andon (an abnormal event management solution), and Shop Floor (a production schedule management system).

By combining OEE, Andon, and Shop Floor with iFactory TPM and then connecting a manufacturing execution system (MES) using a data fabric to form a data lake, IT personnel can more easily and efficiently utilize data. Engineers and managers can also check the status of production lines and follow a lean process using the Six Sigma strategies to improve yield and efficiency. iFactory EHS also features a variety of complementary I.Apps, including Facility Management and Sustainability, Direct GHG, Indirect GHG – Purchased Energy, and Indirect GHG – Up and Down Stream. Moreover, iFactory EHS provides factory management, energy conservation management, and carbon emission monitoring to assist enterprises with environmental health and safety and building sustainable operations, helping to promote sustainable manufacturing environments.

WISE-iFactory is widely applicable for various manufacturing industries

Advantech expects that by the end of 2022, more than 25 I.Apps developed by Advantech and its co-creation partners will be available. These I.Apps will support rapid implementation in diverse factories to help accelerate the digital transformation of various manufacturing sectors.

In fact, because of the flexibility of these I.Apps, many manufacturers of food, automobiles, and consumer electronics in Southeast Asia and the Greater China region are already using WISE-iFactory to integrate data and maximize the benefits of their digital transformation. In terms of future development, Advantech plans to continue working closely with its DFSI and DFSP partners worldwide to assist manufacturers in the Greater China region and Southeast Asia achieve digital transformation. ∎

WISE-iFactory Industry Application

Digital Twin

Situation Center

Business Intelligence

Low-Code **Easy Use** **Faster Delivery**

iFactory TPM Solutions Enable the Digital Transformation of Electronics Manufacturing

Drive market value with Advantech's iFactory TPM Solutions

- Digitalized management of manual operations
- Out of the box, low-code solution
- ISA 95 compliant
- Composable functionality for step-by-step digital transformation

Challenges in Electronics Manufacturing

1. Availability of process data

Although automated machines are prevalent in the manufacturing industry, many processes are still performed manually. To extract process data from manual processes, paper records must be organized into reports or PowerPoint presentations because digitalized process data cannot support analysis.

2. Data-driven decision-making

Responding to ongoing global challenges, such as the COVID-19 pandemic and ever-evolving consumer demands, necessitates on-demand decision-making based on current production capabilities. But this depends on you having an accurate understanding of shop floor operations.

What is iFactory TPM?

Advantech's iFactory Total Productive Maintenance (TPM) Solutions are a suite of industrial applications (I.Apps) that are available on-premises or hosted on Microsoft Azure and enable the digital transformation of manual processes in electronics manufacturing. WISE-iFactory I.Apps allow manufacturing data to be leveraged for increased production flexibility and maximum capabilities without investing in new assets.
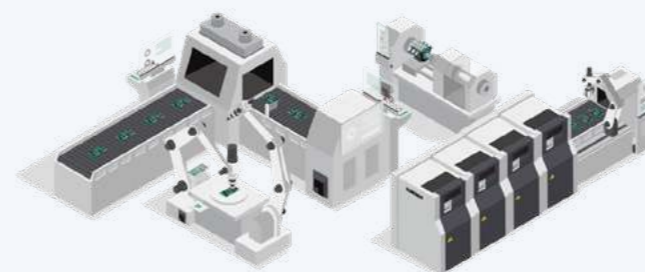
Industry App

1. iFactory/Andon

Report and track any event from the shop floor with a single touch. Important events, such as material requests, changeovers, or first-pass QC, can be pre-configured for easy reporting. Reported events are tracked, and the responsible person is notified via SMS to ensure timely resolution.

2. iFactory/Maintenance

A considerable amount of precision machinery is employed to produce surface mount technology (SMT), while automation equipment is deployed for assembly operations. With iFactory TPM solutions, manufacturers can easily establish maintenance schedules and process repair requests, eliminating the hassle of checking event logs while minimizing machine downtime.

3. iFactory/eManual

Despite the increasing trend towards replacing human workers with robots, humans remain significantly more dexterous and capable of handling small and complex components. Advantech's iFactory eManual utility allows manufacturers to provide digital SOPs to employee workstations. This not only reduces errors due to employee unfamiliarity, but also improves overall production quality.

Benefits

Rapidly resolve anomaly events

Augment employee capabilities

Reduce production time wastage

Increase production capacity and quality

Scenarios

Digital Transformation for Electronics Manufacturing: Drive Decisions with Your Data

Accessible on mobile

Mobile Management

Productivity

Quality

Performance

Operation Costs

iFactory Electronics Manufacturing Solution

KPI

Operations Data

Data Fabric

iFactory Andon

iFactory eManual

iFactory Maintenance

iFactory OEE

OT Data

MES

On-site managers, employees

Process updates from shop floor

Machine Data

SMT Production

Assembly Work

Solution Page

iFactory EHS Provides a Sustainable Intelligent Solution for Managing EHS

Drive market value with Advantech's iFactory EHS

- ISO 14064/45001/50001 compliant
- Low-code operational interface
- User-defined KPIs
- Active supply-chain decarbonization
- Automated data consolidation

Challenges for Energy-Intensive Industries

1. Difficulty establishing programs for systematic energy and GHG emissions management

The complexity of the materials and energy types used throughout production operations increase the difficulty of calculating energy and GHG emissions.

2. Lack of automated data visualization management tools

Approximately 86% of companies still use paper-based spreadsheets and manual record-keeping for maintaining GHG inventories.

3. Inefficient/ineffective patrol route design and evaluation approach

Lack of visibility and transparency regarding environmental and human-related incidents.

What is iFactory EHS?

Advantech's iFactory EHS (Environment, Health and Safety) offerings provide tools for managing facility management systems (FMS), direct/indirect GHG emissions, workplace environment monitoring (WPEM), and patrol inspections. These solutions assist manufacturers with enhancing resource utilization, complying with GHG regulations, and ensuring workplace safety.

Benefits

Optimize corporate sustainability

Conduct extensive environmental monitoring

Enable efficient patrolling/incident handling

Ensure easy scalable deployment

I.Apps for Industrial Applications

iFactory/GHG & FMS

iFactory/GHG collects data to calculate GHG emissions for the organization and its value chains in accordance with ISO 14064-1. This utility recognizes various emission factors to help users easily identify applicable parameters.

iFactory/FMS enables the accurate evaluation of energy consumption. When thresholds are reached, relevant notifications are triggered. This allows energy savings of up to 20 ~ 30% to be achieved while reducing carbon emissions.

Solution Page
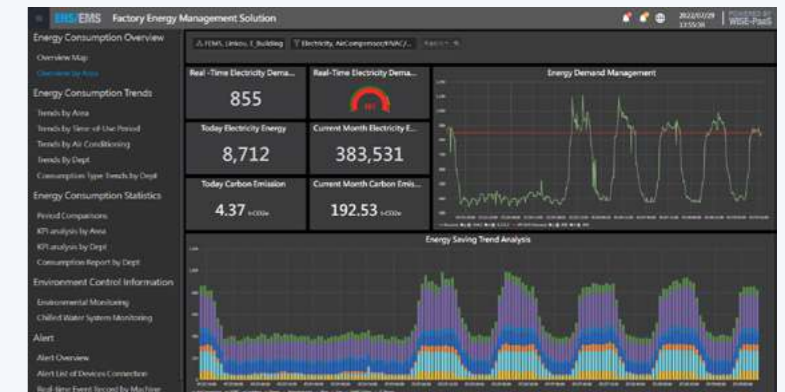
Factory Energy Consumption Overview

iFactory/Patrol Inspection

iFactory/Patrol Inspection enables users to safeguard, view, and conduct patrol tasks assigned via the corresponding app. This utility reports anomaly events in real time and identifies the source/cause of the issue. Supervisors are thus able to quickly understand the situation and assign relevant personnel to handle incidents.
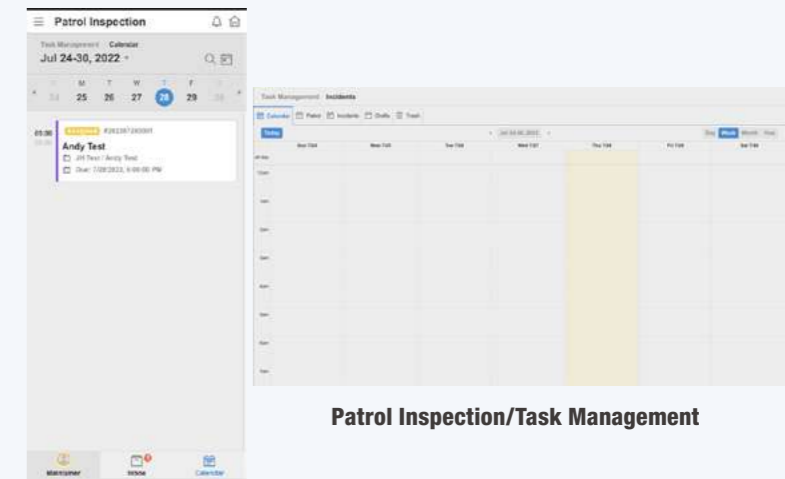
Patrol Inspection/Task Management

iFactory Solution Suite Drives the Digital Transformation of Footwear and Textile Industries

Driving market value with iFactory solution suite

- Out-of-the-box usability
- Low-code design
- Visualized data for intelligent decision-making
- Web-based user environment
- ISA95 compliant

Solution Page

Industry Challenges

1. Labor-intensive industries
Footwear and textile industries are labor intensive, which increases the difficulty of collecting production data.

2. Rapid market changes
To satisfy current fast fashion demands, vendors are trending towards more high-mix, low-volume manufacturing. This means production lines must be flexible in order to respond to rapid market changes.

3. Worldwide demand for environmental protection
Factories are facing increasing demands from brands and consumers worldwide to protect the environment and reduce paper consumption

What is the iFactory Solution Suite?

Advantech's iFactory Solution Suite helps footwear and textile factories collect data of manual production processes to minimize information silos between systems.

Benefits

Supports agile manufacturing management

Promotes information transparency

Minimizes information silos

Enables paperless manufacturing

I.App of iFactory Solution Suite

iFactory/Shop Floor
With the iFactory/Shop Floor utility, real-time production information can be collected and visualized on a dashboard, allowing administrators to quickly understand the status of production operations. This ultimately helps to reduce production bottlenecks and increase overall production efficiency.
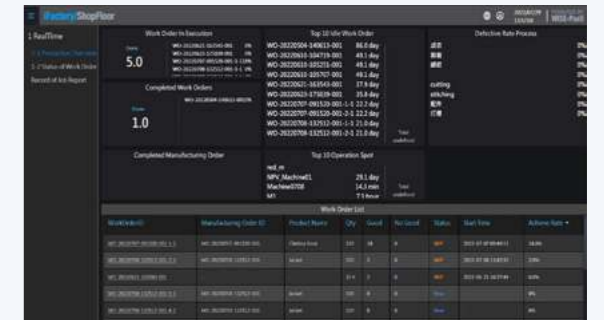
Work Order Status

iFactory/eManual
The iFactory/eManual utility facilitates the creation and use of digital SOPs for easy document management and version control in accordance with the ISO 9001 Document Control standards. This assists footwear and textile factories with eliminating paper-based operations.
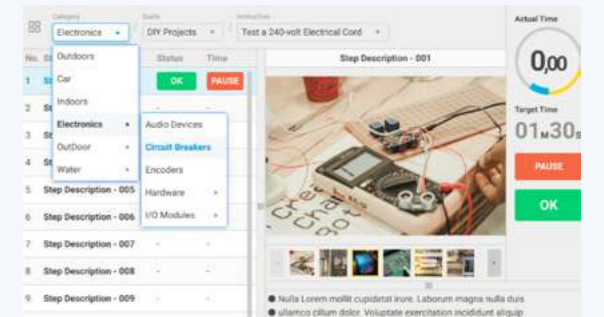
Instruction Details

Architecture Diagram

Operation Manager/ Senior Executive

Mobile Management 24/7 check production status

Workshop Dashboard Visualization

Unified distribution of digital SOPs

iFactory eManual

iFactory Shopfloor

Factory floor data report

Production Manager/ Employee

Outsole Pressure Machine | Moulding Machine | Needle Stitching | Polishing Machine | Assembling line
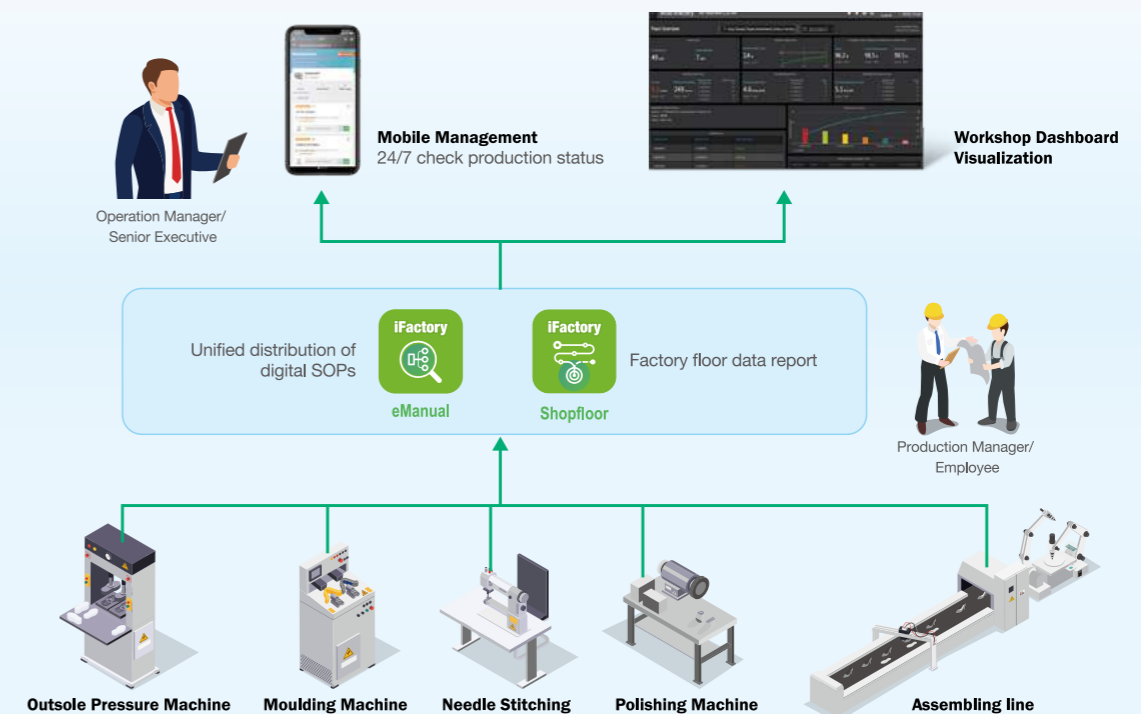
WISE-DataInsight Provides the Ideal Platform for Big Data Analysis and Business Intelligence

Driving market value with Advantech's WISE-Datainsight

- Eliminates data silos
- Facilitates IT and OT data integration
- Serves as a data sharing platform
- Provides data security management and control
- Enables data-driven management

Digital Transformation Challenges

1. Closed systems result in data silos, hindering the integration of applications

Factory production and operation data is collected from different systems. Enterprises must be able to integrate this data to realize the complete integration of company systems. However, traditional data integration tools cannot perform data analysis while processing complex data structures.

2. Complex data acquisition processes prevent real-time data transmissions and applications

Collecting and utilizing enterprise data necessitates significant support and development effort from IT departments. Moreover, because the process is considered labor-intensive and time-consuming, enterprises are discouraged from leveraging real-time data and digital solutions for production management.

What is WISE-DataInsight?

WISE-DataInsight provides one-stop industrial utility for handling big data services. Aimed at manufacturing enterprises, WISE-DataInsight facilitates OT and IT data integration and unified data management. This allows manufacturers to capitalize on data insights for data-driven decision-making that optimizes production operations.

WISE-DataInsight Features

1. Establishes a unified data management system by allowing multiple systems to be integrated in three easy steps.
2. Uses big data engine to perform data operations, improving data development efficiency.
3. Creates various databases and establishes a data sharing platform.
4. Facilitates multi-level permission management and control to realize secure data sharing.
5. Provides a variety of data access methods for gaining rapid insight into data value.

Solution Page

Architecture Diagram

Advantech Industrial Data Integration & Analysis - WISE-IoTSuite / DataInsight
Break down data silos, empower data-driven management

BI Analysis   Data Visualization   AI & Machine Learning   Innovative Application

Data Consumption

Employee   Research & Development   Production   Expense   Supply Chain

Centralized Data Management

Data Integration

Industrial Data

Data Sharing

Data Security

WISE-IoTSuite/IoT Edge

Big Data Computing

WISE-IoTSuite / DataInsight
Industrial Data Integration & Analysis

Data Storage

Sensors and Equipment   Data Source   JDBC \ SOAP \ Rest API

OT Data   Production Operation   ERP MES SCM OA CRM   IT Data

Benefits

Complete integration of complex systems

Improves data development efficiency

Enables increased productivity

Builds centralized database and adds data usage

Scenarios

Using Advantech's WISE-DataInsight solutions, factory administrators can quickly understand production operations, including the equipment status, production progress, product quality, inventory, cost, output value, personnel resources, and other relevant performance indicators.

This enables administrators to observe real-time data trends, identify key management issues, and implement effective improvement measures. Most importantly, however, it allows manufacturers to optimize overall performance and thus improve product quality, reduce costs, accelerate delivery, and increase customer satisfaction.

Gigatek Optimizes Energy Efficiency in Pursuit of ESG

Photos provided by Advantech
Interview with Quan-Wei Wei, Project Manager of Gigatek; Zhao-Geng Tsai, Vice President of S&E Technology

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S&E Technology Co., Ltd.
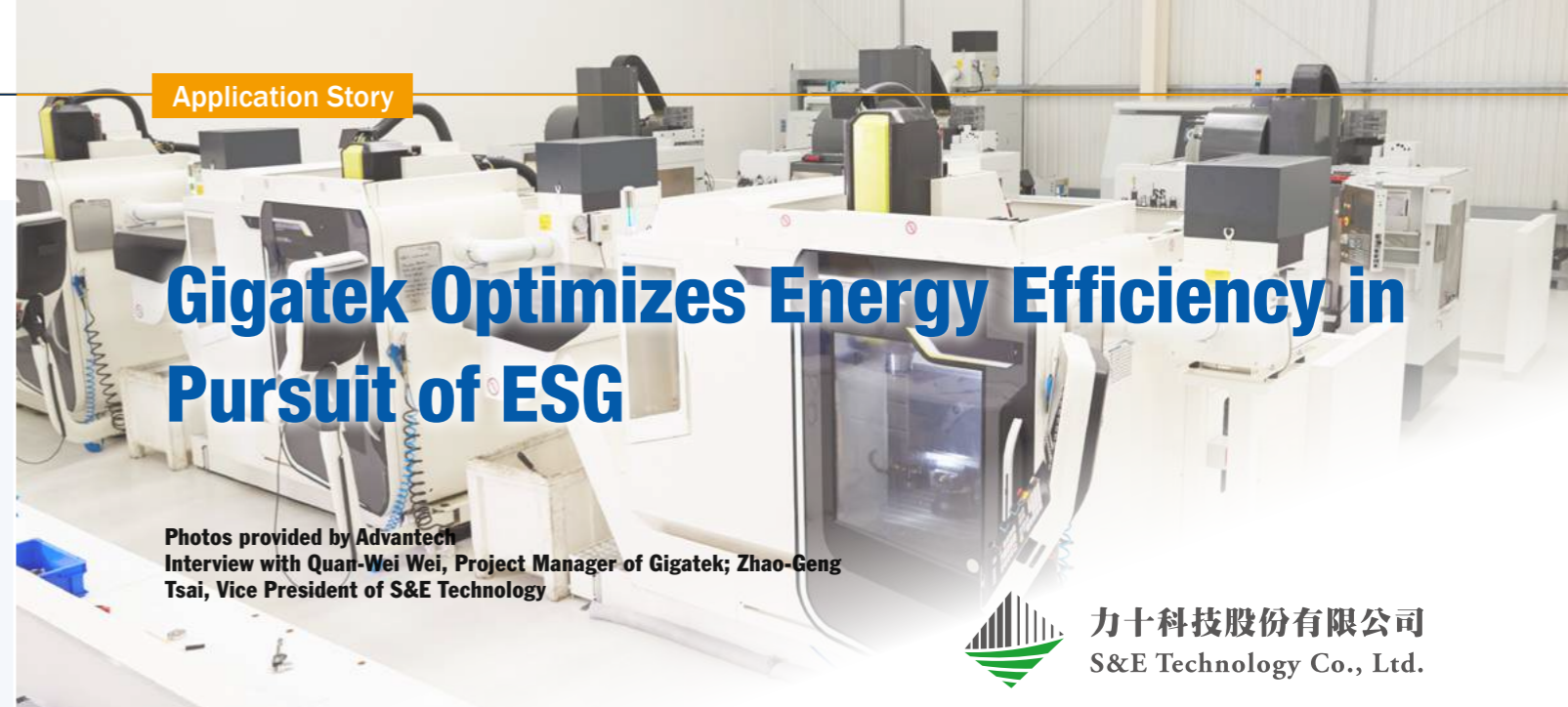
With increasing environmental awareness and energy supply limitations, optimizing energy management has become essential. Established in 1984, Gigatek Inc. has always been optimistic about emerging market demands for energy management. Accordingly, in 2016, Gigatek established S&E Technology Co. Ltd., to provide energy management-related software and hardware integration services.

To promote environmental sustainability, Gigatek integrated Advantech's iFactory EHS (Environmental Health and Safety) solution to construct an energy management system (EMS) that optimizes energy usage at their factory, realizing the company goal of promoting environmental sustainability.

Leveraging Advantech solutions to build an EMS

According to Quan-Wei Wei, Project Manager at Gigatek, the company launched an energy conservation project in 2017 that allowed S&E Technology to assist Gigatek with building an EMS in two phases.

The first phase focused on factory equipment that consumed high amounts of energy; for example, air compressors, air conditioners, and production machinery. The second stage targeted other equipment such as switchboards, water pumps, and pump motors to gradually realize the intelligent control of all point-of-use equipment.

Zhao-Geng Tsai, Vice President of S&E Technology, explained that from a system architecture perspective, during the first phase S&E Technology installed digital meters on all electrical equipment to collect and analyze the data using WebAccess graphical control software. Then they used the dashboard built into the building energy management system (BEMS) to generate reports that provide an overview of energy consumption.

In the second phase, because of the system's evolution, S&E Technology upgraded the original BEMS to the iFactory EHS modular software platform. This allowed S&E Technology to expand the distribution board on each floor and use plug-and-play digital signage to display energy consumption data in real-time. The iFactory EHS system also provided advanced functions such as carbon asset management, factory patrol and inspections, and energy demand forecasting to facilitate future expansion.

At the application level, the system exports equipment energy consumption data and generates reports specific to Gigatek's management requirements. By having regular reports sent to every department, supervisors are aware of the energy consumed in specific zones of the factory without needing to log into the system. This allows supervisors to remind employees to minimize electricity usage and prevent excessive electricity consumption.

Two key benefits in energy conservation and equipment performance

Since implementing the iFactory EMS, Gigatek has reduced its annual electricity costs by approximately US$25,700, while achieving two key energy conservation benefits. The first benefit is that they can more accurately control electricity usage. Mr. Wei explained that by using the EMS to understand their energy consumption, they were able to formulate multiple energy conservation strategies. These strategies include not turning on all electrical equipment simultaneously, which causes a spike in electricity consumption, and determining how many air conditioners should be active based on the internal building temperature. Together, these strategies have helped reduce their overall electricity consumption.

The second benefit is that the EMS safeguards equipment performance. Previously, Gigatek would only replace equipment that was damaged or unusable. Now, the EMS allows them to identify declining equipment performance to facilitate prompt replacement in order to maintain consistent performance.

Collaborating with Advantech to help enterprises implement ESG

"Advantech's complete solution is one of the keys that allows Gigatek to successfully demonstrate its energy conservation efforts," Mr. Tsai explained. The products

Solution and Benefits

Advantech's iFactory EHS solution optimizes energy use and eliminates energy waste through data collection, analysis, and management insights, helping enterprises reduce operating costs and achieve their environmental sustainability goals. In addition to energy management, the modular system provides multi-faceted solutions for sustainable factory management, including advanced functions such as carbon asset management, factory patrol and inspection, and energy demand forecasting.

Case Study Benefits

1. Reduced annual electricity costs by approximately US$25,700
2. Facilitates the continuous reduction of electricity consumption
3. Safeguards consistent equipment performance

"

Advantech's complete solution is one of the keys that allows Gigatek to successfully demonstrate its energy conservation efforts.

"

- Quan-Wei Wei, Project Manager of Gigatek Inc

Advantech provided for this solution included digital meters, digital signage displays, iFactory EHS, servers, and various software and hardware.

Better still, Advantech's solutions can cover a diverse range of application scenarios. From energy data acquisition, aggregation, and management to final data presentations, Advantech's solutions allow S&E Technology to easily manage complex energy consumption data. Furthermore, throughout the project execution process, Advantech was able to provide technical support as soon as problems arose, ensuring the project was completed smoothly.

Moving forward, S&E Technology expects to cooperate with Advantech more closely by leveraging Advantech's software suite to redevelop IoT applications and port them into Advantech's WISE-iFactory industrial cloud. This will accelerate the implementation of IoT applications and assist enterprises with optimizing energy management and implementing effective ESG policies. ■
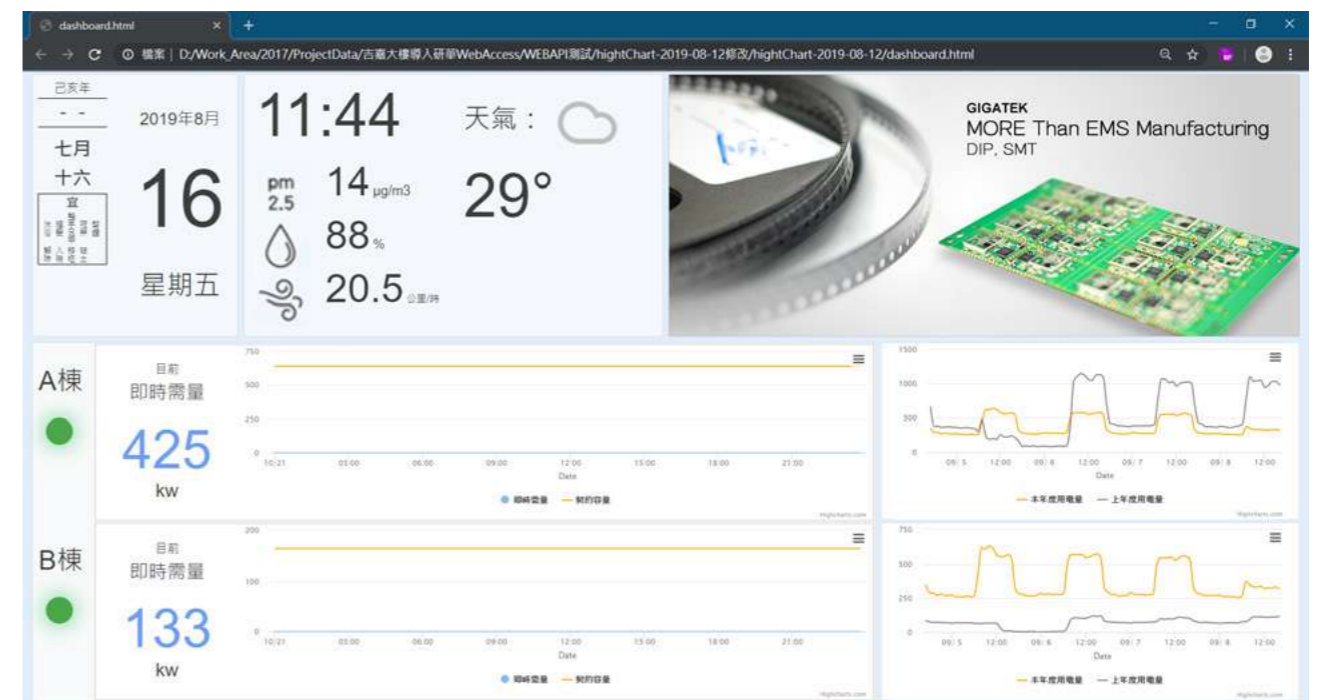
Advantech's iFactory Solution Revolutionizes the Footwear Industry

Photos provided by Shutterstock

Recent years have seen a considerable increase in consumer demand for high-mix low-volume production. In particular, the need for supply chain reorganization and shorter delivery times necessitates that shoe manufacturers in Taiwan urgently establish agile and precise real-time management strategies. For this project, a renowned Taiwanese shoe manufacturer wanted to actively promote its digital transformation in response to evolving industrial competition.

Three key challenges driving digital transformation

The shoe manufacturer aimed to achieve a 50% increase in production efficiency over the next five years and to implement lean management strategies. However, in the process of promoting operational growth, they encountered three key challenges.

The first challenge was that the networking of their production line equipment was minimal, with many tasks relying on paper-based data collection. In addition to a lack of transparency, this meant that parameter settings and equipment status could not be captured in real time, making it difficult to share and replicate the experience. This resulted in low overall management efficiency and hindered the implementation of lean management. The second challenge was the manufacturer lacked the ability to integrate heterogeneous systems and data collected from diverse devices or systems. For the third key challenge, there were high technical requirements and a steep learning curve for equipment management, as well

as no effective handover strategies to facilitate the organization's rapid expansion.

To overcome these challenges and accelerate the optimization of their operations, the manufacturer had to undergo digital transformation. To achieve this, Advantech proposed its iFactory solution.

Digitally transforming the footwear industry with iFactory

Advantech's iFactory Footwear Industry is a total solution that comprises software (e.g., OEE, Andon, and Shop-Floor), hardware (e.g., gateways and edge computers), and multiple industrial applications (I.Apps) that satisfy the manufacturer's customization needs.

Using Advantech's WISE-iFactory OEE solution for real-time data visualization, the shoe manufacturer was able to immediately improve their responsiveness to problems and quickly resolve the issues identified in their production processes. For example, using the WISE-iFactory OEE solution to obtain data from their IP injection molding machine eliminated the risk of human error when manually copying data. Furthermore, the data could be

Case Study Benefits

1. Real-time management of production lines
2. Complete integration of equipment and systems
3. Comprehensively optimized production operations

WISE-iFactory Solution Advantages

1. Microservice model
2. High flexibility of I.Apps
3. Highly scalable software platform
4. Industry-specific application development

transmitted and reports exported in real time, allowing production personnel to manage operations according to the actual on-site performance.

As part of the solution, Advantech's domain-focused solution partner, HITI, developed several I.Apps for collecting real-time production data and related parameter settings. This enables the system to monitor the internal temperature of the mold and issue an alert if abnormal temperatures are detected. The system also monitors the rotating speed of the roller, the product length, thickness, production temperature, pressure, and vacuum status throughout the IP production process.

All data from the production line is uploaded to Advantech's WISE-IoT platform for centralized monitoring of production status to ensure high product quality through data sharing and real-time data analysis. For the manufacturer, this reduces the risk of production downtime due to equipment abnormalities. Most importantly, however, this allowed equipment parameter data to be easily replicated at other factories as the organization expands, thereby standardizing operations and improving overall competitiveness. ∎

iFactory Simplifies Digital Transformation for a Zipper Brand

Photos provided by Advantech
Interview with Hanggar Cahya Kusuma, CEO of Eforel

eforel
Industrial Internet of Things

Being aware of the latest trends and technologies in data-driven smart manufacturing is key to remaining competitive, reducing costs, improving efficiency, and optimizing production. For this project, a large Japanese zipper brand with many factories around the world commissioned Eforel, an Indonesian systems integrator (SI), to implement a smart factory solution at one of its factories in Indonesia.

In Phase 1 of the project, Eforel deployed Advantech's iFactory/OEE solution-ready package (SRP) to a single production line for automatic data acquisition, real-time monitoring, and cross-system integration. During the six-month trial period, production data was automatically collected for analysis and real-time machine monitoring. This allowed managers to take immediate action in response to any machine errors.

In Phase 2 of the project, the zipper brand decided to extend the deployment and implement Advantech's

Project Outcomes

1. Optimized allocation of production resources
2. Accurate calculations and comparisons production costs
3. Improved production expansion strategies

Solution Benefits

Advantech's iFactory SRPs help managers optimize the allocation of production resources based on real-time production data, including productivity, machine utilization, and energy consumption.

complete iFactory Smart Manufacturing Suite, including iFactory/OEE (Original Equipment Effectiveness), iFactory/EHS (Environmental Health and Safety), and iFactory/EAN (Event, Alarm, and Notification), on all production lines.

Data collection: the cornerstone of smart manufacturing

For insights into day-to-day factory operations, the PLCs of 100 machines were connected to Advantech's ESRP-SCA-UNO2484 Edge SRP/Visualizer solution equipped with WebAccess/SCADA for collecting and transmitting production data. Meanwhile, Advantech's ECU-1051TL RISC-based industrial communication gateway was adopted to collect power consumption data for production-related processes, such as plating and water usage management.

This setup allowed data to be collected by ESRP-SCA-UNO2484 and ECU-1051TL, converted into MQTT format, and transmitted to the iFactory Smart Manufacturing Suite, which was linked to the customer's manufacturing execution system (MES). To integrate the iFactory Suite with MES, Eforel helped the customer set up a database with a GraphQL interface for APIs.

According to Eforel CEO, Hanggar Cahya Kusuma, the biggest challenge for this project was the acquisition and integration of all production-related data. This included data for the iFactory SRPs and MES, as well as various facility monitoring/management devices such as PLCs and electricity, water, and gas usage meters. Advantech's SRPs unified collected data with built-in WebAccess/SCADA software, while the flexible and expandable WISE-PaaS platform simplified the systems integration process. Moreover, Advantech leveraged its technical resources to resolve implementation issues and satisfy the customer's unique demands.

Optimizing production performance and reducing costs with iFactory

After the full solution suite was successfully implemented, iFactory/OEE was used to obtain real-time production values, defect rates, and machine status information for improved machine visibility, productivity, and quality control. With iFactory/EAN, the customer was able to quickly detect and address critical events, such as unexpected machine downtime and abnormal power consumption. Meanwhile, iFactory/EHS is employed to continually monitor power consumption, providing an overview of current and historical energy consumption data and KPIs. This provides a systematic approach for identifying abnormal consumption and areas for reducing energy usage, allowing the customer to accurately evaluate energy costs and optimize energy efficiency.

Mr. Kusuma concluded, "the iFactory Smart Manufacturing Suite helps managers optimize the allocation of production resources based on real-time production data, including performance, machine utilization, and energy consumption." Furthermore, the customer can now calculate exactly how much energy is needed to produce 1000 units for more accurate calculation of production costs. Based on meaningful insights into machine utilization, production performance, product quality, and energy consumption, the zipper factory is able to implement more informed, data-based production expansion strategies in Indonesia. ∎

The Revelation of Hsu Fu Chi's Digital Transformation

Photos provided by Hsu Fu Chi
Interview with Ji Xiang Chen, Senior Manager of Hsu Fu Chi; Dong Hui Yi, Manager of
Smart Manufacturing Solutions for the Food Industry of Advantech

Hsu Fu Chi International Limited, a giant of China's confectionery industry, produces more than 1400 categories of snack products. Indeed, the company's four factories house more than 38 workshops and 126 high-precision automated production lines – for a daily production capacity that exceeds 1600 tons. However, to manage factories of such size containing such complex production lines, machine automation and intelligentization is required to streamline processes and improve both production efficiency and performance.

Advantech's comprehensive range of integrated software and hardware IoT solutions enabled Hsu Fu Chi to revolutionize operations management at its production sites by digitalizing and optimizing process workflows.

Hsu Fu Chi embraces IoT to realize intelligentization

Hsu Fu Chi's production and manufacturing operations are extremely complex, involving more than 700 raw material ingredients, 2500 packaging components, and 1400 stock-keeping units. To effectively manage so many moving parts, Hsu Fu Chi adopted automation technology as early as 2004, and then in 2012, introduced digitalization and intelligentization with the implementation of automated robots and IoT applications.

Ji Xiang Chen, Senior Manager at Hsu Fu Chi, asserted that while automation solved issues pertaining to real-time data transmissions and on-site traceability,

Case Study Benefits

- Reduced labor requirements through factory automation
- Seamless data collection and analysis
- Increased production efficiency
- Optimized management and decision-making

Solution and Benefits

The IoTSuite platform's high compatibility and scalability ensures easy integration with existing systems and future expansion according to production growth, while also streamlining process workflows and improving production efficiency.

it also gave rise to new problems. For example, Hsu Fu Chi's many workshops use equipment and PLCs of various brand, leading to data silos that hindered the collection of production data from different sensors. Furthermore, analyzing and converting the vast amount of data into quantitative production indicators was also significantly challenging, presenting an obstacle to their digital transformation.

To address these challenges, Hsu Fu Chi initiated a collaboration with Advantech. Leveraging Advantech's ECU-1051E gateway, WISE-IoTSuite industrial platform, and additional product offerings, Hsu Fu Chi was able to integrate the various production equipment and systems. Their data silos and data acquisition problems were resolved through the realization of machine interconnection and interoperability. Advantech not only supervised the project implementation, but also provided operations and maintenance training, as well as full lifecycle services, to facilitate the company's digital transformation.

Bringing significant benefits and optimizing operations

Mr. Chen emphasized that after data acquisition had been simplified, employees were able to fully utilize production systems and project execution times were reduced. Moreover, establishing effective data reporting allowed administrators to optimize production lines

according to actual equipment usage in the different workshops. Ultimately, this increased the flexibility of the workshop layout and operations, while improving data utilization.

Dong Hui Yi, Manager of Advantech's smart manufacturing solutions for the food industry, highlighted how the IoTSuite platform's high compatibility and scalability ensured easy integration with existing systems and future expansion according production growth. For Hsu Fu Chi, the platform delivered considerable benefits in meeting the needs of both their medium- and long-term development plans.

The WISE-IoTSuite is a low-code platform that simplifies application development by leveraging data insights from actual workflow situations. In addition to operational optimization, IoTSuite provided Hsu Fu Chi with a reliable tool for stable and efficient machine integration, helping them overcome their data collection and analysis issues.

Mr. Chen explained that by configuring preset thresholds, the system was able to detect any equipment abnormalities or process disruptions and automatically notify the relevant personnel. This ensured problems could be addressed as they occurred, which eliminated the need for regular equipment checks and reduced overall labor required, while significantly improving production efficiency.

For Hsu Fu Chi, the benefits of its digital transformation include reduced production costs, increased production efficiency, and the establishment of differentiated competitive advantages that enable them to seize new opportunities in today's highly competitive market. ■

A New Phase of Smart Manufacturing in the Textile Industry

Photos provided by eAI Technology
Interview with WeiWei, Vice President of eAI Technology

eAI Technologies Inc. 漢門科技股份有限公司

In the past decade, the global textile industry has faced multiple challenges including labor shortages, difficulty managing factory equipment, pollution from manufacturing, ESG concerns, and the shift towards low-mix high-volume production. In response to these market trends, eAI Technology collaborated with Advantech to create IoT solutions that enable textile factories to implement IoT applications and quickly achieve intelligentization.

One-stop smart manufacturing solution

For over 20 years, eAI Technology has helped shape the world's textile industry by providing enterprise resource planning (ERP) systems for textile manufacturing processes, from spinning and weaving to dyeing, finishing, and garment production. Their achievements include establishing complete smart manufacturing solutions that enable process management, enterprise intelligence, AI operations, energy management, and IoT applications in textile factories.

Wei Wei, Vice President of eAI Technology, pointed out that, unlike other ERP information service providers that focus on financial accounting when implementing systems for customers, eAI Technology delivers high-quality, domain-specific ERP solutions that go deep into manufacturing sites. These solutions combine front-end financial and accounting information with back-end manufacturing production data to provide a complete one-stop smart solution.

Collaborating to create rapidly replicable IoT applications

Throughout 20 years of close collaboration, eAI Technology has adopted and integrated Advantech hardware, such as industrial computers, into its ERP system solutions for enterprises. Because both companies have pursued the common goal of promoting smart manufacturing in recent years, they plan to collaborate more extensively in 2022.

According to Mr. Wei, "Combining Advantech's IoT software and hardware solutions with WISE-IoT cloud platform resources, we will jointly develop IoT solutions that can be quickly replicated and implemented to realize smart manufacturing." Collaboration between the two companies will first focus on the textile industry. Through redevelopment and potting using Advantech's IoT Suite, eAI Technology plans to launch successive IoT applications on the WISE-IoT platform. They expect to complete three IoT applications aimed at weaving and garment production in the near future.

One such IoT application is the monitoring of weaving machines, where machine production data is collected by sensors for analysis and monitoring. Thus, when a machine issue occurs, operators can be notified immediately in order to resolve the issue and identify the cause promptly. By integrating machine data with fabric inventory ERP systems, factories can optimize production schedules to reduce labor costs, improve efficiency, and enhance product quality based on factors such as labor, machinery, and materials.

eAI Technology's R&D team not only incorporates the advantages of Advantech's energy management solutions, but also expands on them by adding critical management elements for textile factories and an energy management system for weaving and dyeing factories. This is just one of the reasons eAI Technology's services and solutions are such competitive options for many enterprises.

Reaching overseas markets with Advantech's global marketing resources

Once the two companies have achieved their goal of developing innovative IoT applications, they plan to cultivate growth opportunities in Taiwan's textile industry. Additionally, they aim to

> *By combining eAI Technology's experience of implementing systems with Advantech's global marketing resources, the two companies plan to accelerate the application of IoT solutions for high-mix low-volume production in manufacturing factories around the world.*
>
> *- Wei Wei, Vice President of eAI Technology*

leverage eAI Technology's experience of implementing systems combined with Advantech's global marketing resources to accelerate market expansion in Southeast Asia.

In terms of R&D, eAI Technology will also develop related IoT applications based on WISE-IoT for manufacturing printed circuit boards, processing hardware, and other components/operations to extend their market reach into other sectors. In the future, the two companies will also focus on increasing their presence in developing nations throughout Central Asia and Africa.

Mr. Wei concluded that in order to best serve the global market, eAI Technology will need to leverage Advantech's resources to establish remote maintenance and service capabilities, and potentially even build a training center, to further accelerate the implementation of IoT. ∎

iMccoy Technology Solutions Help Semiconductor Manufacturers Realize Intelligent Data-Driven Operations

Photos provided by Shutterstock
Interview with Jynn-Yu Wang, Chairman of Hangzhou YinHu iMccoy Intelligent Technology Co., Ltd.,

Over the last decade, China's semiconductor industry has maintained rapid growth despite facing unprecedented challenges due to increasingly complex chip manufacturing processes and expanded chip manufacturing capacity. To sustain and even strengthen competitiveness, optimizing production processes and intelligentizing manufacturing systems has become essential.

Hangzhou YinHu iMccoy Intelligent Technology Co., Ltd., a provider of automation technology solutions, has long focused on developing intelligent manufacturing software systems and services for semiconductor manufacturing. Using Advantech's IoT Edge gateway

and AI Framework Services (AIFS), Hangzhou YinHu iMccoy Intelligent Technology builds a variety of industry-specific equipment automation program (EAP) solutions. These solutions include remote control systems, robotic process automation technology, artificial intelligence, IoT applications, and other equipment that helps semiconductor manufacturers intelligentize production processes.

Data is key to intelligentizing manufacturing

"Although many factors impact semiconductor manufacturing, the most important component is data," stated Jynn-Yu Wang, Chairman of Hangzhou YinHu iMccoy Intelligent Technology. In addition to acquiring appropriate equipment and materials, semiconductor manufacturers must optimize production parameters to improve yield rates and production standards. Such parameters are derived from analyzing the massive data generated throughout the manufacturing process. Thus, a mature set of production parameters generally necessitates decades of accumulated experience-based production knowledge.

The process of manufacturing semiconductors is extremely complex. In fact, fabricating a single chip involves more than 300 inputs, 50 types of high-tech equipment, and anything from 2000 to 5000 processes, generating a colossal amount of data. In addition to data acquisition being both time-consuming and labor-intensive, each data set typically exists independently in different systems, making it challenging to integrate data for subsequent analysis.

Accordingly, Hangzhou YinHu iMccoy Intelligent Technology provides a SECS/GEM-based integrated platform and interface for flexible secondary development. This enables manufacturers to quickly establish communication between semiconductor equipment and the host platform to allow real-time monitoring of production lines and automating of equipment operations.

Leveraging mutual strengths through collaboration

In addition to facilitating the building of technologies for process analysis, Hangzhou YinHu iMccoy Intelligent Technology's collaboration with Advantech assists semiconductor manufacturers with establishing data-driven operational capabilities in two ways.

Firstly, Advantech's WISE-IoTSuite/IoT Edge supports most common industrial protocols, while Hangzhou YinHu iMccoy Intelligent Technology's solutions support relevant SECS/GEM protocols for semiconductor manufacturing. Therefore, combining the equipment capabilities of the two companies offers manufacturers enhanced processing of IoT applications at the edge.

> *Hangzhou YinHu iMccoy Intelligent Technology uses its existing technologies for process analysis and collaborates with Advantech to assist semiconductor manufacturers with establishing data-driven operational capabilities*
>
> *- Jynn-Yu Wang, Chairman of Hangzhou YinHu iMccoy Intelligent Technology Co., Ltd.*

Secondly, integrating the AIFS of Advantech's industrial cloud platform with Hangzhou YinHu iMccoy Intelligent Technology's image recognition algorithm for semiconductor manufacturing provides an AI automated optical inspection (AOI) solution for manufacturers to improve detection efficiency and significantly reduce misinterpretation. This solution has valuable current applications in wafer inspection and downstream sectors.

Mr. Wang concluded by highlighting how Hangzhou YinHu iMccoy Intelligent Technology leverages its industry expertise to integrate solutions with Advantech's platform. This allows them to develop more standardized products for diverse application scenarios and serve a greater number of customers more quickly. Furthermore, customers also benefit from Advantech's comprehensive technical support and customer service, which enables them to establish more reliable, economical, efficient, and intelligent manufacturing processes. ∎

Expetech Aspires to Be a Global Promoter of Smart Manufacturing

Interview with Tzuo-Liang Luo, President of Expetech; Chen-Yu Kai, Manager of the Digital Manufacturing Technology Department of the Intelligent Machinery Technology Center of ITRI; Henry Chen, Business Development Manager for iFactory of Advantech

> Positioned as a large-scale systems service provider, Expetech operates as an Advantech domain-focused solution partner. The aim of this joint venture includes giving full play to the synergy of their complementary advantages and accelerating the global development of smart manufacturing.
>
> - Tzuo-Liang Luo, President of Expetech Co., Ltd.

With the worldwide promotion of Industry 4.0, the machinery industry—also known as "the mother of industry"— must be at the forefront of intelligentizing equipment in order to accelerate the implementation of smart manufacturing in factories. Recognizing the importance of leveraging intelligence in the machinery industry, the Intelligent Machinery Technology Center of the Industrial Technology Research Institute (ITRI) and Advantech have jointly established Expetech Co., Ltd. The goal for this collaboration is to integrate Advantech's competencies in industrial computing and cloud platforms, as well as its global marketing resources, with the center's experience implementing IoT applications in the manufacturing sector and make Expetech a global promoter of Industry 4.0.

A synergistic joint venture that leverages complementary advantages

To assist Taiwan's industries with promoting smart manufacturing, ITRI established the Intelligent Machinery Technology Center in 2016. This center focuses on the machinery and equipment for developing total solutions, from their design and manufacturing to their application. Over the last few years, the center has developed numerous IoT applications. Integrating hardware from Advantech and other manufacturers, the center has implemented IoT applications for metal processing, electronic equipment, metal stamping, plastic injection, and textile equipment manufacturing industries.

Leveraging extensive experience developing and implementing applications across various sectors, in 2020, the Intelligent Machinery Technology Center built the Machinery Cloud and transformed custom-developed applications into SaaS modules. The goal was to help manufacturers overcome deficiencies in system integration and software development capabilities to facilitate the rapid implementation of IoT applications.

Chen-Yu Kai, Manager of the Digital Manufacturing Technology Department of the Intelligent Machinery Technology Center of ITRI, pointed out that by the beginning of 2022, there were more than 100 apps on the Machinery Cloud. To extend these apps into more manufacturing sectors around the world, while maintaining the development of new applications, it was necessary to integrate more IoT software and hardware technologies, project experts, and marketing resources. At that time, Advantech was actively looking for partners to realize its co-creation strategy. Consequently, Advantech and the Intelligent Machinery Technology Center decided to leverage their complementary capabilities and collaboratively establish Expetech Co., Ltd.

Integrating the WISE-IoT platform to accelerate implementation

Positioned as a large-scale systems service provider, Expetech operates as an Advantech domain-focused solution partner. The aim of this joint venture includes giving full play to the synergy of their complementary advantages and accelerating the global development of smart manufacturing. Tzuo-Liang Luo, President of Expetech stated that Advantech's hardware, such as its industrial computers, support international communication protocols to ensure rapid networking and integration with other factory devices. This allows Expetech to focus on delivering application development and system implementation services.

Henry Chen, Business Development Manager for iFactory at Advantech, added that after Expetech's apps are transferred to Advantech's WISE-IoT cloud platform, the low-code microservice application components of WISE-IoT can be leveraged to quickly develop IoT application interfaces and programs. WISE-IoT can also be connected to Expetech's Machine Control System and other application systems like manufacturing execution systems (MES). This means solutions can be implemented in factories to integrate equipment and production data at the application level, all in one database. This benefits factories by allowing data to be analyzed to generate information that can be used to build IoT applications from a single point in the past. On a larger scale, this facilitates the building of an intelligent command center that supports entire factories, accelerating the realization of smart factories in the manufacturing industry.

Expetech's first task is to port some of its most popular apps onto the WISE-IoT platform. These apps will then be transformed into industrial apps (I.Apps) that can be directly deployed to any industrial sector. Initially, eight I.Apps will be available on the platform. Mr. Kai used one Expetech apps that automatically adjusts mechanical parameters as an example. This app optimizes the parameters of production line equipment in

real time. For the aerospace industry, this app has helped reduce the time required to manufacture turbine blades from 24 hours to 8 hours. After this app is launched on WISE-IoT, it can be swiftly installed in various factories to intelligently optimize equipment parameters and improve production efficiency.

Accelerating market expansion in southbound countries

In terms of business expansion, Expetech will start with southbound countries in Southeast Asia, such as Taiwan, and pursue two critical directions. The first direction is to, in collaboration with Advantech, help various manufacturing sectors intelligentize their factory equipment. The second direction is to utilize Advantech's software, hardware, and cloud platform resources to optimize smart applications for Expetech's manufacturing customers.

According to Mr. Kai, Expetech hopes to guide manufacturing companies on the journey to realizing Industry 4.0 with the provision of a smart manufacturing platform that offers comprehensive software and hardware solutions. ∎

Expetech
Industrial IoT Expedition

Expetech & Advantech Co-Creation Structure
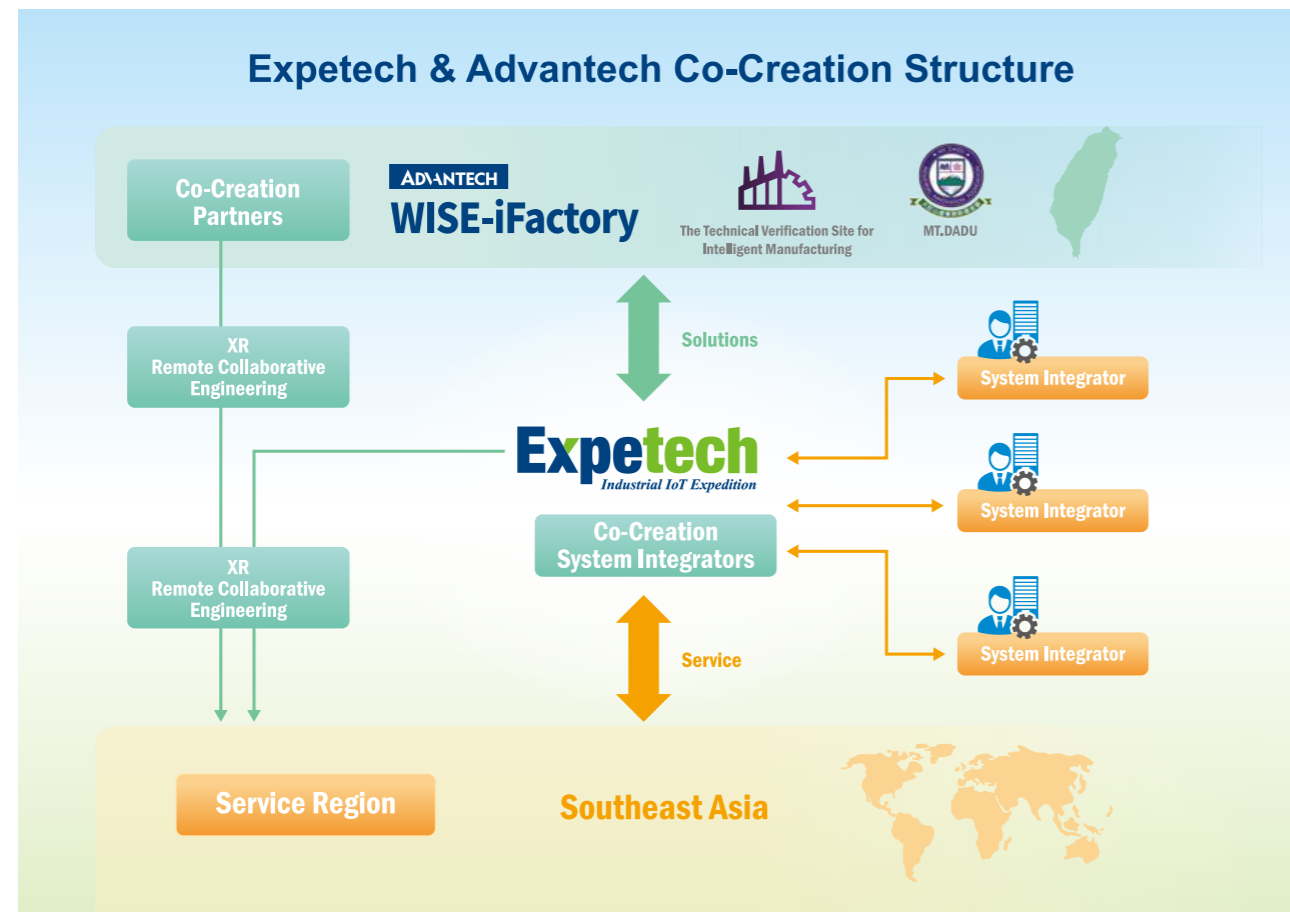
Intelligent Lifecycle Prediction for CNC Machines with Advantech AI-based Monitoring Solution

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Equipment Maintenance I.App
Reduce unplanned downtime and equipment failures

Co-creation CNC I.App
AI-based CNC tool monitoring system

IFS-RTM-M770W5A
iFactory RTM package, MIC-770 V2

PCIE-1802
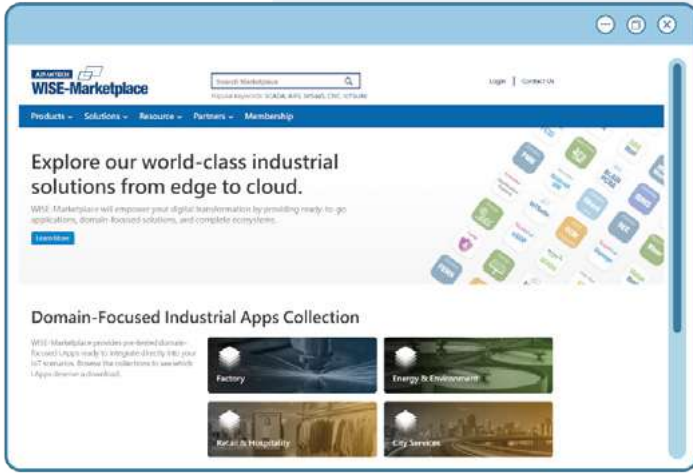216 kS/s, 24-bit, 8/4-ch Dynamic Signal Acquisition PCIE Card

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