

# My WISE-PaaS

An Advantech Magazine - Industry 4.0 2020-2021

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# WISE-Marketplace Industrial IoT App Store – Offering Integrable Apps for Domain-Focused Solutions

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Enabling an Intelligent Planet

## WISE-Marketplace | Industrial IoT App Store

Advantech's WISE-Marketplace is the destination for all your industrial IoT software needs. You can find integration-ready industrial apps (I.Apps), end-to-end solutions, and consulting services for a wide range of industries. Enter WISE-Marketplace to buy, deploy, list, and customize I.Apps to improve your AIoT solutions and business!

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Effectiveness



Factory Energy  
Management



Andon  
Monitoring



Work Order  
Management



WISE-PaaS/EnSaaS  
K8s Service



I.App Starter  
Package



# Advantech Uses AIoT to Accelerate Global Industries Toward Smart Manufacturing

The COVID-19 pandemic and the US-China trade war have had a dramatic impact on the global economy and industrial development. To get ahead of these two major events, manufacturing industries across the world are progressively heading towards Industry 4.0 and launching smart manufacturing strategies, which requires digital transformation. Advantech leverages more than 35-years of experience in industrial computing to launch the WISE-PaaS cloud platform to assist businesses in taking their first steps toward this transformation.

The theme of this issue of MyWISE-PaaS Industry 4.0 focuses on the evolution of technologies and the trending smart applications in Industry 4.0. Several industry professionals have shared their opinions and analysis covering the practical aspects of application development.

In Advantech's view, Allan Yang, CTO of Advantech said that cloud service providers not only utilized big data, the cloud, and AI technologies to acquire data on human behavior to achieve accurate marketing and service innovation, but also to acquire and analyze factory equipment data to implement intelligent automation for factories.

In the Power Insight section, Dr. Deepu Talla, VP and GM of Embedded and Edge Computing of NVIDIA, pointed out that there are two critical factors required to bring AI to the network edge. First, we need intelligence at the network edge such

as AI-enabled edge equipment like security cameras, self-driving cars, and delivery robots. Second, we need near-edge devices or on-premises servers working as gateway devices and aggregation points; these are not part of the cloud but reside close to the edge devices.

In the Customer Partnership section, Aviva Wang, Foxconn Industrial Internet's Vice President describes the ecosystem collaboration that broadens the future of Industry 4.0.

This issue also features seven insightful articles concerning Industry 4.0 applications from around the world. System integrators (SIs) and manufacturers including Eforel, BitLogic, Brazil's ECO Automação Industrial, Ceway Software, Avex-SG, Taiwan Glass, and Taiwan's Yuen Foong Yu, are all ambitiously promoting digital transformation in manufacturing. Their successful case studies from across global industries show us the Industry 4.0 ecosystem, which Advantech has encouraged and nurtured.

Without a doubt, the macro strategy of gearing up smart manufacturing with AI, IoT, 5G, and sensor technologies is key to the breakthrough and reconstruction of manufacturing industries. While journeying to Industry 4.0, it is Advantech's vision to partner with system integrators from various industries to achieve sustainable success in the new global competition era. ■

# Advantech Builds an Industry 4.0 Co-Creation Ecosystem Through I.Apps and WISE-Marketplace

Industrial IoT (IIoT) involves integrating big data, cloud, and AI applications. To embrace this trend, Advantech is collaborating with domain-focused system integrators (DFSIs) to develop industrial apps (I.Apps). These I.Apps are organized and listed on the WISE-Marketplace, an online IoT cloud marketplace for industrial apps. Using this marketplace enables the rapid development of solutions and significantly accelerates the implementation of smart factory applications in various sectors, significantly promoting the realization of Industry 4.0.

**Photos provided by Advantech**

**Interview with Allan Yang, CTO, Advantech; Willie Lin, Senior Manager of iFactory Solution BU, Advantech**

The integration of big data, cloud computing, AI, and other cutting-edge technologies has changed how industries compete. A shift from “supply chain versus supply chain” to “ecosystem versus ecosystem” has occurred and driven a new wave of digital transformation in manufacturing. However, information systems embraced by enterprises for 40 years, such as enterprise resource planning (ERP) systems and manufacturing execution systems (MES), are proving insufficient. Enterprises seeking competitive advantages and the realization of Industry 4.0 must adopt AI, IoT, and big data-integrated cloud architecture as a basis for building an intelligent application system that incorporates information technology (IT) and operation technology (OT).

## **New wave of data-driven digital transformation**

Advantech CTO Allan Yang posits that the new wave of digital transformation can be explained by three phenomena. First, after the emergence of e-commerce and social networking services (i.e., Amazon and Facebook), external users of IT services increased exponentially. Therefore, internal employees are no longer the sole clients of an enterprise’s IT services. As traditional client-server corporate IT became insufficient, cloud-based corporate IT emerged. Second, the technology used for storing and processing big data collected by e-commerce/

social networking services has matured. Third, cloud service providers have begun analyzing users’ behavior data, leading to the implementation of artificial neural networks aimed at achieving marketing and service innovations.

The popularity of cloud, big data, and AI technologies is not confined to business-to-consumer markets. Vertical industries such as healthcare, manufacturing, and retail are also actively leveraging these technologies to promote a new digital transformation. Using smart manufacturing as an example, Dr. Yang elaborated, “These technologies can be leveraged to acquire data on human behavior. The same technology can be utilized to acquire and analyze factory equipment data while implementing intelligent automation for factories.” In the past few decades, IT and OT have significantly improved manufacturing production efficiency. Despite high levels of informatization and automation, human operators remain necessary to the manufacturing process. The present operation of factories has shifted from a function-driven model to a data-driven model. This transformation was driven by a combination of factors—the integration of IT and OT with the aforementioned technologies, data-based intelligent decision making that emulates human cognition, and judgments formed via deep learning models that exceed human intelligence.

## **I.Apps and the WISE-Marketplace accelerate the implementation of IIoT**

Since 2014, Advantech has promoted innovative products and solutions in response to the trend for data-driven manufacturing models. Dr. Yang stated, “Although we endured many trials and errors, making improvements and adjustments has yielded new headway, accelerating the implementation of smart applications.” He further confessed that in 2014, Advantech did not fully realize that data was the key. At that time, Advantech used a function-driven model for promoting smart retailing, manufacturing, and healthcare. Moreover, many smart application implementations used a project-based model, and replicating their deployment from project to project was extremely challenging. These issues made accelerating the promotion of IIoT applications virtually impossible.

Upon recognizing the central role of data, Advantech’s R&D team swiftly developed a data-driven application platform—the WISE-PaaS platform. In the following years, the company began to actively promote co-creation, using decoupling and refactoring concepts to collaborate with global partners in developing industrial applications (I.Apps). Dr. Yang explained that through decoupling and refactoring, I.Apps can be restructured and reused modularly. This ensures rapid and flexible development while making it easier for partners to co-create with Advantech. In 2020, Advantech adopted a concept similar to the Apple App Store and rebuilt its WISE-Marketplace to accelerate the implementation of IIoT applications.

### **Building ecosystems to actively promote smart manufacturing**

Using I.Apps and the WISE-Marketplace, Advantech is accelerating the implementation of smart manufacturing in various regions around the world. Willie Lin, Advantech’s iFactory Solution BU Senior Manager, pointed out that the company has more than 30 years of experience developing industrial PCs and data acquisition equipment. He added that Advantech remains a pioneering leader of industrial intelligence innovation. With the development of I.Apps that enable swift restructuring, Advantech can provide factories with comprehensive and flexible solutions. These apps facilitate the development and implementation of data acquisition systems, management visualization and cloud



services, intelligent manufacturing analytics, and smart factory operations.

Mr. Lin elaborated that 80% of I.Apps on the WISE-Marketplace are mainstream apps, and the remaining 20% are domain-specific apps. This gives Advantech’s DFSI co-creation partners flexibility to choose mainstream or domain-specific apps according to their existing IT infrastructure and intelligent development goals.

Partners benefit from fast implementation, while significantly reducing implementation costs and minimizing the failure rates associated with introducing smart applications.

Using the comprehensive I.Apps and WISE-Marketplace resources, Advantech has deepened its co-creation relationships with its partners. This has included investing in system integrators (SIs) such as Information Technology Total Services (ITTS) and Impelex Data Transfer Co., Ltd. Dr. Yang emphasized that with the formation of upstream and downstream co-creation partner relationships, SIs can utilize any software and hardware resources within Advantech’s WISE-PaaS platform. Leveraging its extensive experience of implementing I.Apps in smart factories to accelerate intelligent production, Advantech provides manufacturing industries with the necessary building blocks for implementing the data-driven models required to realize Industry 4.0. ■

# Bringing AI from the Cloud to Industries, Machines, and Devices

AI is flourishing at the edge. Every second, in urgent care facilities, city streets, retail stores, and factory floors, billions of IoT sensors are uploading terabytes of data that contain valuable information to drive critical decisions in real time. To carry out this type of work safely, securely and efficiently, we need scalable and accelerated AI platforms at the point of action.

**Photos provided by NVIDIA**  
**Interview with Deepu Talla, Vice President and General Manager of Embedded and Edge Computing, NVIDIA**

We now live in a world where everything is increasingly data driven. Diverse streams of data generated around the clock from multiple locations, and the inherent latency of the cloud, exacerbates the challenge when it comes to deploying machine intelligence and obtaining real-time results.

Edge computing acts as a high-performance bridge from local computers to the cloud. And since all data created by IoT devices will be stored, processed, analyzed, and acted upon close to or at the edge of a network, it is inevitable that edge computing will continue to play a prominent role.

## At the intersection of Graphics, HPC, and AI

Tech giants around the world are acting swiftly to bring AI to the edge, and [NVIDIA](#) has a head start on many of them. The company started out focusing primarily on gaming, specifically in designing and manufacturing graphics processing units (GPUs). Since 2014, however, NVIDIA technology has expanded into sectors such as data centers, professional visualization, and autonomous machines. More recently, NVIDIA's success in high-performance computing (HPC) and AI is emphasized by the fact that most of the world's top 500 supercomputers are accelerated using NVIDIA GPUs, which now



power critical use cases in managing big data, creating recommender systems, building real-time conversational AI, and more.

In his keynote speech at Advantech's 2020 Industrial IoT World Partner Conference, Deepu Talla, vice president and general manager of edge computing at NVIDIA, commented: "At the moment, NVIDIA is working at the intersection of graphics, HPC and AI, all at the same time." Indeed, for at least

the past five years, consumers have been relying more and more on AI. All smart consumer devices are AI-enabled. Apple Siri, Google Assistant, and the recommendation engines driving Netflix and Spotify are just a few well-known examples. However, AI has been operating almost exclusively on the cloud until recently.

This is not enough. We need to bring AI to the edge in order to satisfy the massive compute power needed to implement AIoT and other emerging applications worldwide. Companies like Samsung are manufacturing automated optical inspection (AOI) machine vision using AI on-premises rather than in the cloud, while BMW Group is reinventing its factory logistics using AI-enabled robots with NVIDIA Isaac robotics software. Others such as Walmart have adopted AI edge computing to create smart stores for the future and Microsoft has partnered with NVIDIA to expand the Azure Edge platform with NVIDIA GPUs.

### **Building an ecosystem to accelerate AI at the Edge**

According to Dr. Talla, there are two critical factors required to bring AI to the edge. First, AI at the edge means bringing AI to end machines, which refer to AI-enabled end devices such as security cameras, self-driving cars, and delivery robots. Second, there are near-edge devices or on-premises servers working as gateway devices and aggregation points; these are not part of the cloud but reside close to the end devices.

NVIDIA has designed innovative platforms and built an [ecosystem](#) supported by AI-optimized, cloud-native, secure software to accelerate the process of bringing AI from the cloud to the edge. For example, at its GPU Technology Conference in May, NVIDIA announced two powerful products for its EGX Edge AI platform—the EGX A100 for larger commercial off-the-shelf servers and the tiny EGX Jetson Xavier NX for micro-edge servers—delivering high-performance, secure AI processing at the edge to power a new wave of 5G and robotics applications.

NVIDIA has also built diverse vertical frameworks, working with various partners, software and application providers, as well as system integrators, to develop end products specific to individual industries.

Examples include NVIDIA Metropolis for intelligent video analytics, NVIDIA Clara Imaging for medical imaging, NVIDIA DRIVE for autonomous driving, NVIDIA Aerial for 5G virtual radio access networks, NVIDIA Omniverse for 3D content creation, and NVIDIA Isaac SDK for robotics.

At GTC 2020, NVIDIA also announced comprehensive support for cloud-native technologies across its full Jetson lineup, the industry-leading AI-at-the-edge computing platform with nearly half a million developers. Cloud-native capabilities help manufacturers and developers to implement frequent improvements, improve accuracy, and use the latest features with Jetson-based AI edge devices. Manufacturers of intelligent machines and developers of AI applications can now build, deploy and update in real time high-quality, software-defined features on embedded and edge devices targeting robotics, smart cities, healthcare, industrial IoT and more.

As a preferred partner, Advantech has collaborated with NVIDIA in AI software and services, as well as in hardware and design services. For example, the Advantech AI Edge Solutions MIC [Jetson series](#), powered by the full NVIDIA Jetson platform lineup, benefits from the high performance of a GPU workstation in an embedded module with cloud-native capabilities. The MIC Jetson series is the ideal hardware platform for smart city, transportation, and manufacturing applications.

Dr. Talla points out there is much more to be done. We have only just scratched the surface, opening infinite possibilities to an AI-enabled future in collaboration with partners worldwide. NVIDIA's leadership in edge computing with the fusion of IoT and AI has launched the “smart everything” revolution, where industries can now offer intelligent connected products and real-time upgrades and services just like the telecom industry does with the smartphone. NVIDIA continues to strive to build the ecosystem that we envision, in which our technology plays a key role in everything from the chip and system architecture through the software stack to the simulation software, driving edge AI innovation in healthcare, robotics, data centers, smart cities, logistics, factories, and more. ■

Note: Product names are copyrighted trademarks of their respective companies.



# Canned Tuna Factory Takes the First Steps into Industry 4.0

Eforel, an Indonesian system integrator, built a production line monitoring system for a Japanese owned tuna cannery using Advantech's hardware and software products. The system helped their client capture real-time operational data to increase production efficiency.

**Photos provided by Shutterstock**  
**Interview with Hanggar Cahya Kusuma, Managing Director, Eforel**

An on-site factory production line monitor visualizes numbers and graphs from real-time operations. A separate monitor in the administration center displays data captured from all the factory facilities, including the status and capacity of individual production line machines. The system stores and analyzes data while simultaneously generating production reports. Comprehensive monitoring optimizes the cannery's utilization rates, improves delivery times, increases profit, and augments production capacity. Advantech's approach to the localization of smart manufacturing applications has yielded comparable results in many different factories. Boosting production capacity by deploying the Eforel and Advantech designed real-time control and data analysis solution was this cannery's first step towards Industry 4.0.

## **Real-time monitoring addresses production line issues**

The food and beverage industry has often adopted

automated production equipment earlier than many other industries. Eforel's client originally introduced systems aimed solely at automating the production of canned tuna. Management responsibilities, including generating reports, calculating downtimes, and production capacity, were conducted manually, resulting in inefficiency issues. Manually producing reports led to inaccurate equipment logs subject to human error. Conversely, accurate production records were outdated, hindering their ability to fix problems while limiting potential improvements in efficiency.

Hoping to address these issues by deploying smart manufacturing solutions, this Japanese business approached Eforel.

Eforel, a seasoned industrial automation solutions supplier specializing in applications for transportation, energy, mining, and automated production, is one of Advantech's domain focused system integrators (DFSI). This made Eforel the best candidate for creating solutions tailored to the cannery's needs.

Eforel Managing Director Mr. Hanggar Cahya Kusuma pointed out, “Advantech had the industrial automation products we needed for the four vertical markets we focused on. This allowed us to deliver solutions quickly while consistently fulfilling our clients’ requirements.”

To build a real-time equipment monitoring system, Eforel integrated their production line monitoring system (PLM) with several of Advantech’s solutions—the MIC-7700 compact fanless modularized system, WebAccess/SCADA browser-based software, and the ADAM-6051 industrial Ethernet remote I/O module. Advantech’s ADAM-6051 was connected to production machines and serves as a data acquisition module. ADAM-6051 uses a 3KHz pulse count rate input to collect real-time production line data. This data is then transferred to MIC-7700 and WebAccess/SCADA.

MIC-7700 processes data in real-time and connects to high resolution displays. WebAccess/SCADA provides an intuitive management dashboard facilitating comprehensive analysis and visualization of production data.

This system gives management a comprehensive real-time view of factory operations. Furthermore, WebAccess/SCADA’s on-line accessibility enables supervisors to monitor production lines remotely by logging into the management dashboard from any browser-enabled device.

Mr. Kusuma added, “Advantech has always been dedicated to R&D. The performance and reliability of their software and hardware are well known. Food production uses continuous-flow manufacturing; thus, when there is unexpected downtime, semi-finished products on the production line have to be scrapped. Therefore, system stability is highly important in food factories. Advantech’s outstanding performance meets the stability requirements for food manufacturing clients. It also provides the best support for Eforel’s PLM.”

### **Intelligent platforms increase ROI**

Eforel’s client praised the real-time monitoring system implemented in their tuna cannery. Advantech’s products and technical support played key roles in this project. The client improved their production quality and quantity by deploying this smart manufacturing solution.

ADAM-6051’s real-time data acquisition function accurately recorded the production line uptime and downtime, as well as other parameters including

production quantity and machine errors. This data was transferred via reliable industrial Modbus communication protocols to the WebAccess/SCADA platform. The tuna cannery utilizes European and Japanese made automated production machines to execute various protocols. Multiple protocol integration remains a major challenge in factory upgrade and digitalization projects. Advantech’s solution seamlessly connects diverse machines, integrates various protocols, digitizes information, and transfers production data to monitoring platforms.

After receiving real-time data, management can immediately execute any SOPs required by the situation and this helps decrease the damage caused by machine errors. Also, the analysis of recorded production data helps on-site supervisors shorten maintenance times and improve utilization rates. Factory management further benefitted from the improved use of information by identifying bottlenecks in production, planning proactive preventative strategies, and maximizing their return on investment (ROI).

### **Co-creation hastens the localization of smart manufacturing applications**

Eforel benefited from Advantech’s hardware and software products, and in-depth knowledge of vertical markets. Mr. Kusuma commented, “IoT is a global trend, but different industrial and commercial practices require different professional solutions. In order to fulfill the needs of different projects, Advantech shares their IoT platforms, and carries out its co-creation strategy in collaboration with global partners and this results in an extensive IoT ecosystem.” In sum, connecting partners from different specialized areas strengthens the promotion of IIoT.

After seeing promising results at the tuna cannery, Eforel and Advantech strengthened their cooperation by signing a DFSI agreement. Both parties will provide further IoT solutions to clients from different Indonesian industrial and commercial areas in the future.

To this end, Eforel’s ensuing projects for power and energy applications will source specialized suppliers through Advantech’s IoT ecosystem to build solutions that meet clients’ specific needs.

To accelerate the localization of smart applications, Eforel will continue using Advantech’s platform and resources in developing more Industrial apps (I.Apps). ■



## BitLogic Assists Greek Company in Quality Control to Ensure Fresh and Safe Dairy Products

A renowned dairy producer in Greece implemented BitLogic's food management solution to automatically transfer refrigerator temperature data from different regions to a central management system using Advantech's WebAccess/SCADA software in the factory's quality control division. The system satisfies ISO 22000 Food Safety Management System regulations, ensuring the freshness and safety of dairy products for consumers.

**Photos provided by Shutterstock**  
**Interview with Manolis Kartsiotis, Industrial Automation Systems Consultant, BitLogic**

Dairy producers need to have total control over the quality of their milk. Due to high nutrient content, bacteria can multiply rapidly in dairy products not kept at low temperatures during transportation and storage. This can severely impact product quality. Therefore, under ISO 22000 food management standard, manufacturers are required to monitor and record temperature changes in dairy products at every stage—from production and storage, through to delivery and retail. This requirement

helps ensure the freshness and safety of dairy products upon purchase.

While trying to comply with ISO 22000, a Greek dairy product manufacturer found that it lacked a comprehensive system for recording and managing temperature data throughout its supply chain process. This made it difficult for the central office quality control division to meet food safety requirements. To address the issue, the company sought assistance from BitLogic, an



industrial system integrator specialized in automation, who implemented Advantech's industrial-grade network solution with SCADA software. This helped the dairy company obtain stable and accurate refrigerator temperature measurements from different sites to ensure product quality and food safety management regulation compliance.

### **Advantech's industrial-grade gateway bridges PLC and SCADA**

This overall project was managed by Manolis Kartsiotis, Industrial Automation Systems Consultant at BitLogic. The dairy company, which produces products including milk, yogurt, cheese, ice cream, and chocolate, distributes daily to markets around the country via 21 storage and distribution centers. They integrated PLCs to monitor cooling chamber temperature measurements and to have control over refrigerator operations. PID algorithms are used to write programs for the PLCs, enabling automatic control of temperature.

However, temperature data measured by these PLCs was stored locally and could not be transferred to other systems without an engineer rewriting the program. Programming PLCs is complex, costly, and necessitates long development periods. Likewise, the process of rewriting, testing, and launching PLC programs can yield frequent changes in temperature. As dairy products are temperature sensitive, this process can severely compromise product quality.

To confront this challenge, BitLogic chose to convert the Modbus TCP protocol on the PLC to MQTT, a protocol for SCADA, by using Advantech's WISE-710 industrial protocol gateway. The company's VPN network was then used to transfer the temperature data using WebAccess/SCADA, eliminating the complexity and time required for reprogramming the PLCs. The direct transparent transfer between each PLC point and the central SCADA system made the process simple and manageable.

### **Advantech's solution provided major advantages and reduced costs**

Manolis Kartsiotis believed that, "Advantech's solution would ensure the dairy company's management and control processes complied with ISO 22000 food safety regulations at a lower cost. The system, which records and integrates temperature data automatically, saves time and improves production efficiency. Furthermore, it facilitates the traceability needed to identify any problems and their solutions."

According to Mr Kartsiotis, "WISE-710 has three major advantages which contributed to their decision to choose Advantech as a collaboration partner. First, the compact size of WISE-710 made it perfect for the limited space in the refrigerators. Second, it was easy to install, minimizing BitLogic's downtime in solving the customer's problems. Third, it supports various common industrial communication protocols. Even if customers were to replace or upgrade their PLCs, they would still be able to use WISE-710 with WebAccess/SCADA to transfer data, thereby future-proofing the customer's investment."

Ultimately, Mr Kartsiotis emphasized, "WebAccess/SCADA software and WISE-PaaS platform were essential to enabling seamless integration for IoT and automation. WebAccess/SCADA provides a unique environment for development and remote maintenance, enabling the access and manipulation of data stored on a central server.

Its Real-Time Database (RTDB) is designed to meet industrial high speed and large quantity data access requirements. They provide innovative application models, and facilitate the upgrading of existing systems. BitLogic is planning to further collaborate with Advantech to help more manufacturing industry customers realize the benefits of this IIoT platform. They believe this will help them become an ideal IoT partner for assisting manufacturers in digital transformation." ■



# ECO Automação Adopts Advantech's WISE-PaaS Platform to Optimize Foundry Processing Performance

To achieve real-time monitoring and energy-efficient holding, fuser, and DISA furnace processing, ECO Automação Industrial, a Brazilian systems integrator, introduced Advantech's WISE-PaaS cloud platform and edge intelligence solutions to an ISO 9001-certified foundry factory. The results were extremely promising and led to an Industry 4.0 collaboration between the two companies.

**Photos provided by Shutterstock**  
**Interview with Eduardo Kühn, Engineering Manager, ECO Automação**

At the ISO 9001:2015-certified foundry factory located in Brazil, production is conducted with a quality management system that guarantees the development, standardization, monitoring, verification, and traceability of all processes. Quality is verified with the achievement of superior thermal insulation, excellent heating time and heat distribution, and more efficient energy consumption. However, the factory lacked suitable tools for managing productivity and energy costs in real time.

Faced with IIoT investment concerns, limited technical knowledge, and a lack of trained engineers, the factory approached ECO Automação for a “simple, agile, and economical”, a solution that would enable real-time machine monitoring. ECO Automação collaborated

with Advantech to help the factory improve their furnace line productivity and reduce unnecessary waste by minimizing operational downtime.

## **Condition monitoring is the cornerstone of production line optimization**

Although the foundry factory machines were all equipped with programmable logic controllers (PLCs), the main purpose of this project was to provide a mechanism for automatically notifying technicians of furnace abnormalities.

Management at the foundry were unaware of when, why, and how many times production lines were interrupted or stopped. ECO Automação determined

that improving the visualization of day-to-day machine operations was key to not only identifying bottlenecks, but also optimizing utilization rates.

The first stage of the project involved implementing Advantech edge solutions for data collection. Integrated with EKI-5526I unmanaged Ethernet switches, Advantech's ESRP-PCS-ECU1051 edge data gateways were connected to PLCs via WISE-EdgeLink software for real-time data collection. WISE-M501 smart power meters were also deployed for collecting energy data, such as from furnaces. The data collected by both the smart meters and edge data gateways was then transmitted to the ESRP-CSS-UNO2484 cloud-ready secured Azure IoT edge gateway pre-installed with WISE-EdgeLink software. High volumes of edge data can be transmitted to the WISE-PaaS cloud platform via the PostgreSQL or MongoDB database systems to facilitate further deployment of WISE-PaaS/EnSaaS services, as well as the development of visualization management tools using WISE-PaaS/Dashboard.

Using Advantech's hardware, software, and cloud platform, ECO Automação developed an online monitoring and management system that enable the factory to record production uptimes, downtimes, and energy consumption in order to improve production traceability and reduce costs.

Mr. Eduardo Kühn, Engineering Manager at ECO Automação, stated "Because the WISE-PaaS/Dashboard offers simple data integration functions and easy-to-customize graphics, ECO Automação were able to create a custom online visualization dashboard to meet the factory's specific usage needs. This dashboard allows factory managers to access the management dashboard from any browser-enabled device and monitor production lines remotely."

At the second stage of the project, ECO Automação's data scientists assisted the factory managers with understanding the analysis reports and identifying previously undiscovered operational issues. After implementing corrective action, furnace productivity was increased from 58% to 85%. Subsequently, foundry supervisors began managing production lines in real time, which improved their resource allocation and overall capacity management.

For the final stage of the project, due to the success of the previous stages and the fact Advantech's WISE-PaaS cloud platform supports 24/7 operation, the factory

decided to introduce a third work shift to realize 24-hour production.

### **Co-creation with Advantech: a growing IIoT market awaits**

ECO Automação has partnered with Advantech since 2010. Inspired by the Advantech IoT Co-Creation Summit in 2018, ECO Automação established a new business unit called Eco+ that is focused on promoting IIoT applications. This project to digitalize the foundry factory was their first smart factory implementation.

Because of Advantech's extensive experience of assisting system integrators with implementing intelligent factory solutions as well as its innovative cloud platform and edge solutions, ECO Automação was able to impress the client, despite having no previous related experience.

Mr. Kühn commented, "Advantech has spent many years developing industrial and IoT solutions, which is a sector we are also focused on. We really appreciate Advantech's co-creation business model because it allowed ECO Automação and Advantech to expand their market shares and cultivate business in LatAm countries together. In fact, having Advantech's reputable brand behind every project is the best warranty for our clients."

Additionally, because ECO Automação's Eco+ business unit has only been in operation for approximately one year, a lack of trained engineers and limited technical knowledge were the two main concerns for each project. Mr. Kühn asserted, "Advantech offered us a one-stop shopping solution that allowed us to meet client requirements and complete projects very quickly by eliminating the need to develop solutions from scratch."

ECO Automação praised the Advantech Brazil and Advantech Headquarters support teams for providing its Eco+ business unit with industry knowledge and constructive suggestions during every project. Their suggestions have greatly improved the overall solution performance and sustainability.

In terms of future plans, the ECO Automação Eco+ team will continue promoting Advantech's WISE-PaaS cloud platform and edge solutions to Brazilian companies. They also aim to invest more effort into realizing Advantech's co-creation business model. With the assistance and collaboration of Advantech, ECO Automação hopes to become a leading IIoT solution provider in the Brazilian and LatAm IIoT markets. ■



## Digital Transformation Helps Taiwan's Yuen Foong Yu Enter the Industry 4.0 Era

Yuen Foong Yu, a century-old traditional paper-making company founded in Taiwan, has digitally transformed itself to adapt to and thrive in the era of industry 4.0. The company has implemented an Advantech overall equipment effectiveness (OEE) solution in its Yangmei plant to automatically acquire data from equipment on its production lines. The solution has helped identify problems and blind spots that previously affected production efficiency. Moreover, it has improved the speed and accuracy of the data acquisition process, paving the way for AI applications.

**Photos provided by Yuen Foong Yu Consumer Products Co., Ltd**  
**Interview with Mingfa Tang, Vice President of Production Dept; Carl Chang, Vice President of Tissue R&D Center; Anchor Hung, Factory Manager of Yangmei Plant; Rex Chiang, Manager of Yangmei Plant; Daniel Hung, Engineer of IT Department; Sam Peng, Manager of CEO Office.**

Entering Yuen Foong Yu's toilet paper manufacturing plant in Yangmei, one immediately notices not only the background sound of machinery but also the dedicated employees working on carefully designed production processes.

The plant covers several hectares and hosts a dozen

production lines for tissue paper products sold through general retail and commercial channels. At most of the production lines, employees manually record the equipment's operational status with pen and paper. However, at one line, there are no employees observing production. Instead, a computer screen in a nearby office

displays relevant production line equipment and data in an easily digestible visual format.

The dashboard is part of Advantech's OEE solution that Yuen Foong Yu implemented to visualize production data from their 17 different types of equipment. It identifies critical issues affecting production efficiency, and devises plans to resolve issues.

### **New Industry 4.0 OEE solution**

In almost a century history, Yuen Foong Yu is a company committed to innovation. While most traditional manufacturers are still debating whether to adopt industry 4.0 applications, Yuen Foong Yu has embraced smart technology in order to resolve a problem that has long affected the traditional manufacturing sector—labor shortages.

According to Carl Chang, Vice President of the Tissue R&D Center, management started planning for industry 4.0 applications as early as 2017, carefully deliberating on how to integrate IoT and automated technologies with existing production processes, connect channel needs with production plans, and build an automated warehouse system. Management even defined directions and processes with an eye toward industry 5.0.

Yuen Foong Yu defines industry 4.0 as cyber-physical systems (CPS) that connect various types of equipment through networks, smart sensors, and wireless technologies, allowing the virtual and physical world to be seamlessly integrated. Industry 5.0, meanwhile, integrates AI technology to process big data, realize cost reductions, improve efficiency and quality, and optimize production processes.

The first step Yuen Foong Yu took was implementing Advantech's OEE solution, which features comprehensive software and hardware integration, in its Yangmei plant. On the production line, intelligent edge devices are used to connect with the production equipment's control interfaces to acquire production-related data such as restocking times, equipment operation times, and stock inventory. Data is transferred to the OEE database via a gateway to process production volume (per shift, day, week, and month), production efficiency, downtime, and other indicators, which are then integrated on a dashboard for visualization and presentation on a large screen in the smart factory. Administrators can also remotely monitor production statuses in real time through their smartphone or tablet.



Sam Peng, Manager of the CEO Office explained that the company had built its own internal production management system called YES (YFY Excellence System)—before implementing Advantech's OEE solution. This system was an overall management tool that covered aspects such as regulations, work safety, production efficiency, quality, and logistics management. Production management-related data such as availability rates and production efficiency were recorded and calculated manually by front-end staff before YES could do any further analysis. However, the system had its limitations, data was recorded manually and not processed in real time; there was a risk of human error; and there were only limited data types. So, Yuen Foong Yu decided it was time to implement Advantech's OEE solution to improve the speed and accuracy of data acquisition and to gain access to, and learn more about the analytic applications on offer.

### **Transparent production data improves efficiency**

Yuen Foong Yu discovered many blind spots in the production process. "The devil is in the details," said Anchor Hung, Factory Manager of the Yangmei plant. He pointed out that major problems on the production line are often the result of an accumulation of minor issues. These minor issues are key factors that stand in the way of efficiency improvements. However, with traditional methods of manual data acquisition, it wasn't possible to identify these issues, let alone solve them.

Rex Chiang, General Manager at the Yangmei plant, concurred with Mr. Hung and said that, "In the past, certain types of data could only be acquired after a production shift had ended. Advantech's OEE solution, however, allows us to monitor status in real time, find



defective equipment, compare the status of different shifts and products, and pinpoint areas for improvement.”

Yuen Foong Yu’s household and commercial tissue paper products include many brands, such as Mayflower, Tender, and Delight. When changing sku’s on the production line, onsite staff must adjust the base paper, packaging, and machinery. Traditionally, staff came up with a rough estimate for the time needed for such tasks. Now, the OEE solution precisely calculates the time required for preparation down to every single item in a production process. This allows Yuen Foong Yu to set production plans in a timely adjustment and find opportunities for improvement based on analyses of different processes and brands.

### **Intelligent transformation of traditional manufacturing**

A wide range of industry 4.0 solutions are available on the market today. Yuen Foong Yu decided to collaborate with Advantech because of a common corporate philosophy. Both companies sought to bolster industry 4.0 development and promote upgrades and transformation in Taiwanese manufacturing as a whole. Yuen Foong Yu’s many factories offer an ideal environment to realize industry 4.0, allowing Advantech’s high-quality solutions to showcase their full potential. Yuen Foong Yu has experienced the benefits of working with an experienced enterprise such as Advantech, taking major steps forward in reducing costs and enhancing time efficiency.

According to Daniel Hung, IT department engineer, in the initial implementation of the OEE solution, the communication interfaces of the production equipment

could not be upgraded. The company evaluated the situation and considered whether to spend more money on purchasing new equipment. With its extensive experience, Advantech advised Yuen Foong Yu to use a human-machine interface (HMI) terminal for data acquisition. This significantly reduced costs for Yuen Foong Yu in the long run. Mr. Hung noted that Advantech offers more than just products. Advantech is dedicated to helping customers upgrade and transform their existing systems. Advantech adopts their customers’ perspective to determine what is best for them. Initially, Yuen Foong Yu did not understand how to leverage data to identify opportunities and improve production efficiency. So, Advantech offered various ideas, took part in brainstorming sessions with Yuen Foong Yu, and interpreted available data. Furthermore, Advantech took the initiative to design an overall availability comparison chart for Yuen Foong Yu, which displays 17 process points simultaneously on the same page, allowing the administrator to have a clear overview of all data without switching windows.

“The Yangmei plant is only the starting point in our quest to realize the vision of smart factories. We want to use the experience gained here and replicate it in other facilities around the world,” commented Mingfa Tang, Vice President of Production Department. Yuen Foong Yu is not only expanding OEE applications to other production lines, but also implementing AI technologies to seek further improvement and innovation. It aims to play a pioneering role in Taiwan’s traditional manufacturing sector to achieve comprehensive intelligent transformation. ■

# Advantech WISE-PaaS Industrial IoT Cloud Platform

## Enabling AIoT Applications via Digital Transformation



**ADVANTECH**  
**WISE-PaaS**  
 AIoT Solutions & Marketplace



**Microservices Architecture**



**Data Acquisition**



**Remote Asset Performance Management**



**Data Visualization**



**Cross-Platform Data Integration**

**ADVANTECH**

*Enabling an Intelligent Planet*

Advantech's WISE-PaaS industrial IoT cloud platform provides edge-to-cloud software and services, including edge data acquisition, data analytics, visualization, and equipment remote management. It helps system integrators and manufacturers by enabling real IoT-powered cloud business models in various vertical markets and quickly develops SaaS and domain-specific IoT solutions.



WISE-Marketplace

### Edge Sensing

#### **WISE-EdgeLink**

Machine-to-Intelligence  
Edge Engine

#### **DAQNavi**

Machine Condition  
Monitoring Software

#### **WebAccess/CNC**

CNC Machine  
Monitoring Software

### Intelligent Connectivity

#### **WebAccess/DMP**

Mass Router  
Deployment System

#### **WebAccess/NMS**

Cloud Network  
Management System

### Edge Computing

#### **WebAccess/SCADA**

IIoT Application  
Software Framework

#### **WebAccess/HMI**

HMI Runtime  
Development Software

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# Ceway Software and Advantech Collaborate to Assist Machine Builders in Boosting Smart Manufacturing

Leveraging decades of experience in industrial services and a thorough understanding of manufacturing challenges, Ceway Software partnered with Advantech to utilize its industrial IoT platform and apps to enhance critical decision-making for manufacturers by integrating all data across the IoT infrastructure.

**Photos provided by Shutterstock**  
**Interview with Teddy Wu, CEO, Ceway Software; Harry Gao, CTO, Ceway Software**



Since its establishment in 2006, Ceway Technology has operated in the industrial services sector. With the development of industrial IoT, Ceway Software—a subsidiary of Ceway Technology—was created in 2017 with the goal of changing the industry status quo and providing valuable and precise industrial solutions. Since then, the team at Ceway Software has gained a thorough understanding of customer needs through detailed research.

After examining the experience of hundreds of large-, medium-, and small-size factories, Ceway Software has identified key problems that urgently require solutions. As Teddy Wu, CEO of Ceway Software, pointed out, “We’ve discovered that many problems can be solved with industrial IoT technologies. By adopting these technologies and implementing smart factory processes, management can communicate effectively and optimize operations intelligently.”

### **The fusion of innovative technologies—an industrial IoT platform and industrial apps**

The advent of Industry 4.0 has generated many challenges for manufacturers. One of Ceway Software's customers is a renowned metal processing equipment company in China that boasts impressive revenue. This company provides factories with equipment installation, maintenance, and repair services. Equipment availability is essential to factories, as any downtime or malfunctions interrupt production and negatively impact productivity. Thus, prompt repair services are required to ensure continuous operation of production lines.

The China-based company explained that the repair services they provide rely mainly on manual inspections and adjustments, and that the status of CNC machines is manually recorded by onsite operators. The lack of real-time system information and smart processes, as well as manual data collection operations, are the main cause of inefficiency in factories. Thus, the company sought to provide smart services. However, because of the wide variety of metal processing equipment and the fact that most machines run independently, various communication protocols are required. The lack of a standardized communication interface made it difficult to integrate onsite production equipment and obtain data regarding operational status, utilization, production progress, and quality inspection results; as well as implementing preventive maintenance services and minimizing the risk of equipment shutdowns.

To overcome these challenges, Ceway Software partnered with Advantech to provide a real-time monitoring service on CNC machines. This enabled the Chinese company to implement remote equipment management at its factories. Ceway Software utilized Advantech's ECU-1051 intelligent edge communication gateway to connect to its device management perception system (DMPS) via Advantech's WISE-EdgeLink software to enable data acquisition and protocol conversion. The gateway supports various protocols and provides connected equipment with precise real-time information, enabling onsite production equipment to connect, communicate, and interact with each other.

Ceway Software uses Advantech's WISE-PaaS platform to upload big data in real time. The data is then analyzed using WISE-PaaS/Datahub and transmitted to the APM.CNC industrial app for dashboard visualization to enable functions such as equipment management, real-



time monitoring, and error/malfunction notifications.

According to customers, this comprehensive solution facilitates real-time machine status monitoring, multi-site machine management, preventive maintenance, error/malfunction notifications, and timely machine inspections and repairs. Moreover, factory managers can use the solution to obtain an overview of machine operations in order to gain business insights for optimizing processes and improving productivity.

### **Ceway software combined with Advantech hardware—a co-creation model for a new age**

The key to the successful collaboration between Advantech and Ceway Software is comprehensive integration from the edge to the cloud. According to Harry Gao, CTO of Ceway Software, equipment is the lifeblood of factories. However, because of the different equipment types, models, interfaces, and communication protocols, establishing equipment networks for convenient management can be challenging. Ceway Software's DMPS achieves this task. By leveraging the WISE-PaaS data platform, as well as the integration of Ceway Software's DMPS and Advantech's APM.CNC remote operation and maintenance management solution, excellent value-added services can be provided to equipment manufacturers and factories.

"Ceway Software's strength is its ability to deliver customized solutions aimed at satisfying customer demands, while Advantech excels in network and industrial services. Co-creation with Advantech offers Ceway Software a new strategy for achieving competitive growth in the future," emphasized Gao. As a prominent VIP member of Advantech's WISE-PaaS Alliance, Ceway Software actively participates in the industrial IoT ecosystem built by Advantech in order to generate exciting new business opportunities. ■



# Visualizing Real-Time Machine Production Information : OEE Management Forms the Cornerstone of Intelligent Manufacturing

Avex-SG has adopted Advantech's OEE solution to build a real-time production and equipment management platform, designed to optimize the manufacture of CNC tools, specialized machines, and PLC-based equipment, while also improving production efficiency.

**Photos provided by Shutterstock**  
**Interview with Jan Kuo Sung, Assistant Manager, Avex-SG's System Engineering Department; Wang Chien Hsiung, Engineer, Avex-SG's System Engineering Department**

At noon, while most employees are on their lunch break, the light of the general manager's office of a metal processing plant in Taichung is still lit, accompanied by the intermittent sound of discussion. The general manager, Willy, and factory director, Gary, are having a

meeting. Both are on their laptops, sharing numbers and charts. "Recent orders have been increasing significantly; the factory needs more equipment to improve productivity," suggested Gary. However, Willy disagreed. "If we take a closer look at the production efficiency

of these few pieces of equipment, it's much lower than that of the others. We should first solve this. Then we can discuss purchasing new equipment." This scenario epitomizes a typical Avex-SG customer. For example, consider a metal hand tool factory in central Taiwan that has more than 20 CNC machine tools. Such companies, which tend to have numerous pieces of old equipment, specialized machines, and PLC-based machines, are facing the challenge of being unable to optimize their production efficiency.

By leveraging Advantech's OEE solution to integrate software and hardware into a new system, Avex-SG helped this manufacturer build a complete OEE platform. The system collects and analyzes production data from various machines on the production line, allowing equipment availability to be monitored closely. Moreover, data can be visualized from a central control room. This gives managers the real-time information they need to assess production at a glance, while also providing access to historical data so that better decisions can be made to improve efficiency.

### **Standardized ready-to-use solution without costly development**

Over the years, Avex-SG has used many Advantech products. The partnership has already seen successful completion of many monitoring projects in industrial, government, and education sectors. Answering why Advantech's solution was adopted, Jan Kuo Sung, assistant manager of Avex-SG's System Engineering Department, pointed out that, "CNC machines are very special machine tools, unlike general PLC machines, so networking them together is difficult." Advantech's solution, however, provides networking functionality for CNC machine tools, and this has led to extensive cooperation. For this project, Advantech's OEE solution comprised of several products. This included an UNO-2483G industrial computer with built-in CNC machine networking WebAccess/CNC software for acquiring machine data. A WISE-4050 digital I/O IoT wireless module was also incorporated to collect data from tri-color lights and counters. Finally, Advantech's OEE solution, which contains a MIC-7700 server, IoT software WebAccess/SCADA, and other OEE applications, served as the OEE computing platform in the central control room. This was responsible for receiving on-site data and dynamically visualizing real-time production status of

the entire production line.

The two most critical products of the project were WebAccess/CNC and the OEE solution management solution. WebAccess/CNC provided a network interface for the network controllers produced by mainstream CNC vendors (such as FANUC, Mitsubishi, HEIDENHAIN, Siemens, and LNC), enabling the acquisition of CNC information. It also forgoes the need to program machine-specific software and install external sensing devices. The OEE solution provides ready-made dashboards (visually presented real-time production, machine availability, day/night shift production, and changeover efficiency management info) commonly used in manufacturing.

Wang Chien Hsiung, Engineer of Avex-SG's System Engineering Department emphasized, "Advantech's OEE solution fulfilled many of the necessary functions for this manufacturer. In particular, the ready-made dashboards prevented them from having to perform design and development from scratch." Avex-SG took about one week to design the user interface for all the monitoring, and because there was no need to code any new software, the setup only required data to be retrieved from a database.

### **OEE solution opens the door to intelligent manufacturing**

In the past, manufacturing evaluated production efficiency by focusing on the size of human resources and number of working hours invested in a production line, as well as output quantity. As factories grew, they inevitably added a variety of machinery and equipment. In situations where there was a mixture of old and new equipment, managing it all became another important indicator for measuring production efficiency.

This project, which was jointly accomplished by Avex-SG and Advantech, is a key example of how such applications can improve production efficiency and open the door to intelligent manufacturing. The deployment of equipment networking and real-time data acquisition through the OEE solution allowed factory administrators to review and analyze data clearly so they could better optimize equipment utilization and improve overall factory production efficiency. Avex-SG is continuing to collaborate with Advantech and wishes to cooperate with more IoT companies to understand, learn, and provide more high-quality Industrial 4.0 solutions to the industry as a whole. ■



# Taiwan Glass Implements Advantech's Factory Energy Management Solution to Realize Green Transformation Goals

In an effort to balance the pursuit of intelligent manufacturing with low energy consumption, Taichia Glass Fiber Co., Ltd. (TGF) implemented Advantech's Factory Energy Management Solution (FEMS) to monitor and manage energy use in real time. The solution was deployed for all departments and factory equipment, with the aim of realizing the company's green transformation goals.

**Photos provided by TGF**  
**Interview with Zhang Xiaobo, Supervisor, Information Technology Center, TGF**

Kunshan City (Jiangsu Province, China) is a global hub of product manufacturing. At one of TGF's factories in Kunshan, management noticed that their automated production equipment was consuming high amounts of energy. In spite of this, their total monthly energy consumption was far lower than that of their competitors.

After deploying Advantech's FEMS, the company was able to collect energy consumption data from all departments and equipment in real time. The data was then used to formulate corresponding monitoring and management measures. This helped the glass

manufacturer break away from environmentally unfriendly manufacturing practices by enabling it to pursue operational efficiency and social responsibility in regards to environmental protection.

## **Complete solution for managing energy efficiency**

TGF produces electronic-grade glass fabrics and is a subsidiary of the Taiwan Glass Group (TGG), a glass manufacturing company established in 1964. As a global leader in glass manufacturing, TGF actively promotes the use of automated and intelligent production

lines to ensure higher product quality and enhanced competitiveness.

However, a major problem surfaced with their new factory. Zhang Xiaobo, supervisor of TGF's Information Technology Center recalled, "Because the degree of automation is higher than that in other industries, our production line consumes more electricity. To meet environmental protection standards, we are replacing heavy oil with natural gas, which also substantially increases capital costs." Because the company's energy costs were too high, they were determined to find ways to reduce energy consumption more effectively.

Mr. Zhang emphasized that real-time energy monitoring is essential for efficient management. It enables companies to understand energy usage, utilize big data analysis to identify energy wastage, and devise strategies to reduce energy consumption. Accordingly, in 2018, TGF implemented Advantech's FEMS and established a centralized control room for energy management.

### **Key functions for reducing energy consumption**

Advantech's FEMS has three main functions aimed at making energy consumption data simple to understand through data visualization. The first function uses key performance indicators (KPIs) to track per unit energy costs and monitor the real-time energy consumption of each department. The second function involves analyzing the energy consumption of production units, combining ERP and MES statistics (output value and work order), and capturing energy wastage. The third function is equipment health monitoring. By using energy consumption and equipment startup rates as indicators of equipment operational efficiency, managers were able to determine machine availability and lifespan.

According to Mr. Zhang, "By adopting Advantech's FEMS system, we were able to understand the factory's overall power consumption and resource consumption. This included daily electricity, water, oil and gas demands, as well as cumulative electricity, water, oil, and gas consumption per month.

Using management tools to track changes in demand, and referencing historical usage data, we are now able visualize energy usage using pie charts in order to analyze energy use trends."

### **Collaborating with Advantech to fast track green transformation**

Mr. Zhang stated, "We selected Advantech as our supplier because they have long been committed to developing IoT applications, have extensive field experience, and were quickly able to provide a solution that met our needs."

With Advantech's FEMS, TGF has reduced their energy wastage while increasing production efficiency. The operating costs of the factory are expected to decline by 7% to 10%. However, Mr. Zhang believes the cost reduction potential is even higher. "Our investment in this system is only the first step. The subsequent changes in employee behavior will highlight the true value of the FEMS. When the various department heads and factory managers pay attention to the data and learn to use it proficiently, more applications will almost certainly be developed."

With the support of Advantech, TGF has been able to fast track their factory's green transformation. The management of energy efficiency will always be a key issue for the glass manufacturing industry. By working together to create innovative solutions, we can improve the environment we live in. ■





# WISE-PaaS 4.0: The K8s-based Data Application Platform Accelerating Industry 4.0

Advantech created WISE-PaaS 4.0, a Kubernetes (K8s) based data application platform that encourages digital transformation towards Industrial IoT (IIoT) for enterprises and industry. WISE-PaaS 4.0 accelerates the localization of intelligent applications and advances Industry 4.0 by enabling enterprises, domain-focused system integrators (DFSIs), and equipment manufacturers to quickly develop and use their own industrial apps as well as Advantech's own I.Apps.

**Photos provided by Advantech**

The industrial app economy is driven by big data. For businesses, the industrial app is key to promoting IIoT, implementing Industry 4.0, and undertaking digital transformation. An increasing number of companies are creating new industrial apps to enhance their decision-making processes through data-driven approaches and AI analysis. These companies aim to satisfy evolving demands related to increasing production capacity, improving yield rates, optimizing utilization rates, and deploying predictive maintenance. Unfortunately,

industrial app development is time-consuming and cost-intensive. These processes tend to bottleneck projects and slow digital transformation.

Utilizing IIoT data platforms can subvert conventional frames of development and accelerate deployment. Advantech's WISE-PaaS 4.0 platform facilitates the integration of diverse devices and communication protocols, thereby promoting data exchange between cloud services, support for cloud-native technologies, and several application framework services. These features

make WISE-PaaS 4.0 one of the best data platforms for IIoT application development.

### **Innovative data-driven decision-making**

WISE-PaaS integrates edge computing with an IoT cloud platform and provides a wide range of services including edge intelligence, cloud data collection, data analysis, and dashboard visualization. WISE-PaaS helps DFSIs and equipment manufacturers focus on the specific needs of vertical markets and quickly develop varied AI IoT (AIoT) applications.

WISE-PaaS is structured in several ways. First, it integrates intelligent edge computing application software, sensors, and edge computing devices (e.g., WebAccess and WISE-DeviceOn). It combines heterogeneous data from multiple devices and different communication protocols then uploads it to the WISE-PaaS/EnSaaS, a core cloud computing platform. Second, EnSaaS cross-cloud management bridges mainstream IaaS services such as Azure, AliCloud, AWS, and private clouds (Advantech's WISE-STACK) to satisfy cross-cloud management and target market localization demands. WISE-PaaS links data from the edge to the cloud allowing users to derive insights from edge data and thereby fast-track decision-making and application development processes by accessing statistical data analysis and AI.

K8s-based EnSaaS 4.0 is now a cloud-native platform that allows users to create application elements based on containers and micro-services. Users can improve their coordination with Advantech I.Apps or utilities from Advantech's WISE-Marketplace. Application elements can be decoupled and refactored in to adjust application services quickly and adapt to ever-changing market demands.

WISE-PaaS 4.0's target customers are the three types of user who require I.Apps to implement AIoT transformation. The first type is DFSIs, who utilize WISE-PaaS modularized services, reusable containers, and micro-services to develop solutions that meet their customer's needs. The second type is legacy industries. Businesses implementing WISE-PaaS can utilize real-time visualization of production and equipment data in place of manual production data. This transformation enables remote production monitoring and optimizes production efficiency. The third type is equipment manufacturers. In the past, factories only requested services when encountering equipment problems or

materials shortages. This made it difficult for equipment manufacturers to provide services. Now, with the help of AI, manufacturers can increase equipment efficiency and more effectively perform prognostic tests as well as health management through predictive diagnosis services, and schedule maintenance before failures occur.

### **Utilizing application framework services and accelerating industrial data mining**

WISE-PaaS benefits DFSIs, businesses, and equipment manufacturers. Effective on-site data mining and information alchemy helps them create their own business transforming industrial apps. Speeding up the development of I.Apps requires utilizing application framework services. Application framework services for visualization include WISE-PaaS/Dashboard and WISE-PaaS/SaaS Composer. These two services are easy-to-use, intuitive, and use low-code development tools that utilize drag-and-drop widgets to forgo the need for traditional coding processes. WISE-PaaS/Dashboard supports dozens of data sources and several visualization plugins, allowing users to display the latest data changes on visualized dashboards. This is achieved by synchronizing variables such as data sources, markings, and time ranges. WISE-PaaS/SaaS Composer is a 3D workflow maker. By utilizing 3D models and flowcharts that reflect actual application sites, users can observe the parameters of facilities while operating dashboards remotely.

The second framework service is called InsightAPM for Asset Performance Management. WISE-PaaS/InsightAPM provides modules including device connection, management logic via topology configuration, alerts and notifications, and equipment performance analysis. These help users quickly access equipment performance data, optimize efficiency, and lower the risk of unexpected production pauses and abnormalities.

The third framework service is designed for training and deploying AI models (WISE-PaaS/AIFS). This service hastens the development of models, accommodates life cycle management services, and activates retraining as necessary to improve model efficiency.

Most importantly, after users launch WISE-PaaS edge-to-cloud services, they can find suitable I.Apps from the WISE-Marketplace and use software microservice consultancy services. By utilizing these tools and services, businesses can construct solutions and further their transition into Industry 4.0. ■

# Advantech WISE-PaaS AI Solutions Redefine Smart Manufacturing

Advantech's WISE-PaaS platform has lowered barriers to AI adoption while opening the door to smart manufacturing applications. To assist manufacturing industry in breaking through bottlenecks, Advantech has created numerous AI solutions for the WISE-PaaS platform.

**Photos provided by Advantech**  
**Interview with Jamie Su, Manager of WISE-PaaS I.App, Advantech**

AI is the key to unlocking the potential of smart manufacturing. But determining how to implement AI solutions in order to solve real industry problems can be a challenge. To help businesses cross the AI threshold and realize Industry 4.0, Advantech has packaged a series of AI solutions that leverage WISE-PaaS AI Framework Service (WISE-PaaS/AIFS) as a core solution, adding further utility with Automated Optical Inspection with AI (AI AOI), Predictive Quality Analytics (PQA), Prognostic and Health Management (PHM), as well as many other apps and solutions.

## AI-Powered AOI, PQA, and PHM accelerate smart manufacturing

According to Jamie Su, Advantech WISE-PaaS product manager, businesses typically conduct several processes when implementing AI: 1) choose valuable targets, 2) collect data, 3) annotate data, 4) store variable data, 5) build AI models, 6) deploy solutions, and 7) maintenance of system/IoT infrastructure (including retraining AI models).

Advantech can provide assistance for all but the first step, which is generally performed by each business. With over 30 years of experience in data acquisition and edge computing, Advantech has suitable solutions for all types of industrial sites. In particular, WISE-PaaS/AIFS satisfies the need for data annotation and fusion, AI modeling, and model management.

Su added, "Advantech has demonstrated its technical strength by offering various solutions for improving work



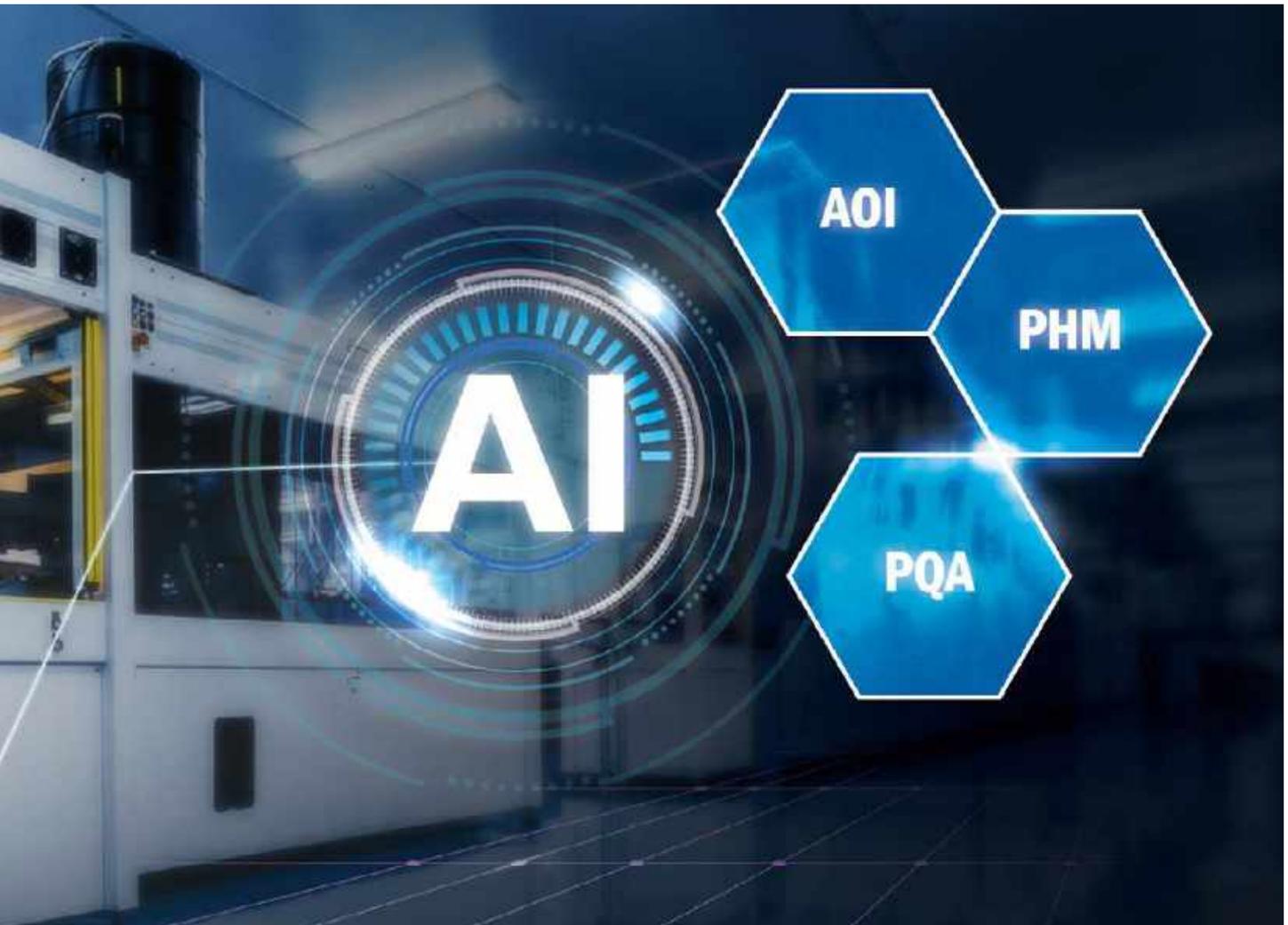
efficiency and reducing dependence on data scientists.” For example, AI AOI can improve inspection efficiency in electronics, electric machinery, and metal processing factories. PQA is ideal for helping tool master craftsmen adjust machine parameters, ensuring product quality in textiles and molding manufacturing. Finally, PHM enables equipment diagnosis during key operations at metal processing and rotating machinery factories; this compensates revenue loss caused by production interruptions.

**Using WISE-PaaS/AIFS as a cornerstone to scale up AI applications**

AI AOI performance has been proven in printed circuit board assembly (PCBA) and passive component production. Advantech’s PCBA Dual In-line Package (DIP) production line at its Linkou campus was used as a trial

application to integrate Advantech’s edge computing technologies and AI models with the system integration partner NEGU TECH AOI equipment. Together, they successfully delivered a DIP AI AOI solution. The solution included pre-trained models that enable on-site staff to improve maintenance efficiency and AI-assisted annotation. By using the AIFS platform’s web interface, on-site staff can select AI training data, execute training sessions, verify training performance, and eventually deploy AI models to edge devices. Staff can even use it to notify relevant parties when model re-training has been completed. With the deployment of the AI-powered AOI solution for DIP PCB solder inspection, fault detection rates rose to 99%, while error rates fell below 10%.

SI partner Smasoft Technology has extensive expertise in fault detection solutions and passive component production line applications, but they lack the



resources and platform for automatic model deployment and scheduled training. Consequently, together with Advantech, they co-created a passive component fault detection AI AOI solution that has been successfully deployed at many production sites and become an industrial app (I.App) product used by many businesses.

A PHM solution was adopted by a large-scale steelworks to conduct predictive maintenance of their large industrial fan motors. This was achieved by collecting vibration data and uploading it to the cloud. The AI model was co-created in collaboration between the company, the SI, and Advantech's data scientist teams using WISE-PaaS/AIFS. During the co-creation process, the WISE-PaaS/AIFS preprocess model (vibration sampling and analysis) and hyperparameter tuning function (accelerates model creation) were fully utilized. After initial verification, the PHM solution began detecting abnormal signals from the equipment and notified technicians to perform preemptive maintenance, thereby preventing motors from suddenly failing and causing production delays.

PQA solutions facilitate product quality control at textile or plastics processing factories. In the process of deployment, the PQA solution collects data from IoT devices, analyzes production quality data, and performs analysis to optimize processes and production quality prediction. Using WISE-PaaS/AIFS to deploy PQA solutions accelerates a factory's digital transformation and enables rapid on-site quality verification.

Advantech's AI AOI, PHM, and PQA solutions incorporate several software and hardware packages from the edge to the cloud, as well as corresponding consultancy services. PHM, for example, uses edge devices such as DAQNAVI and WISE-2410 for data acquisition; combined with WISE-PaaS/AIFS, it offers AI models suitable for equipment fault prediction, fault classification, and equipment life expectancy prediction. It can also perform edge computing inferencing.

To realize large-scale AI solutions in any industry, businesses must rely on a manageable, expandable, and self-operating cloud platform. This is precisely what WISE-PaaS/AIFS achieves. Moreover, to enhance economies of scale, AIFS functions have been continuously improved.

Overall, WISE-PaaS/AIFS has aided in AI learning operations through its comprehensive model management functions, which support version control and performance analysis. In the future, incremental learning, reinforcement learning, and federated learning models will be leveraged so that on-site technicians will not require assistance from data scientists to upgrade model retraining performance.

By taking advantage of WISE-PaaS/AIFS, businesses can easily manage low-level computing and data pooling, training data fusion, model development, retraining, and notification handling. WISE-PaaS/AIFS is truly a powerful force for accelerating AI implementation in smart manufacturing. ■



# Keep Your Edge in Machine Vision Analytics

## Advantech All-Series Edge Solution

**VisionNavi**



### Boosting Productivity, Traceability and Yield Rate At Once!

**ADVANTECH**

*Enabling an Intelligent Planet*

Time management, ease of maintenance, and accuracy are always major demands for machine vision solutions at the edge. Advantech provides a comprehensive machine vision edge solution, from intelligent platform to HMI and controller, all combined with graphical and flow-chart based application software, VisionNavi, which is user-friendly and able to deal with multiple tasks. With easy development that saves on time, Advantech's edge solution can fulfill diverse requests in industrial IoT applications; boosting productivity and yield rates on the factory floor.



**VisionNavi**

#### Intelligent Edge Solution

**ESRP-VAI-M770**  
High Computing Expandable System  
**ESRP-VAI-A3410**  
General Fan-Based Vision System  
**ESRP-VAI-UNO2484**  
Rugged Fan-Less System



**VisionNavi**

#### Smart HMI Solution

**ESRP-VAI-TPCB500**  
Modular Fanless HMI  
**ESRP-VAI-PPC6151**  
All-in-one HMI



**VisionNavi**

#### Automation Control Solution

**ESRP-VAI-W5580**  
Softlogic EtherCAT Controller

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# Fii Partners with Advantech to Co-Create an Industry 4.0 Ecosystem

Photos provided by Foxconn Industrial Internet  
Interview with Aviva Wang, Vice President, Foxconn Industrial Internet

Industrial IoT (IIoT) and smart manufacturing are quickly becoming the most critical aspect of any new industrial infrastructure. These two growth engines encourage corporate innovation and the optimization of production, management, and sales, as well as decreasing costs and improving efficiency. Together, these help connect supply chains and value chains while also assisting in the reconstruction of business models. In particular, following the COVID-19 pandemic, businesses have become more aware of the urgency of smart manufacturing and digitalization and are seeking to

accelerate their digital transformation. While upgrading to smart manufacturing, most businesses only implement individual aspects of IIoT here and there, instead of committing to a complete transformation. Large-scale adoption and localization are seldom carried out because of the unique requirements of each industrial site; each project needs careful integration of resources which present difficult and complex challenges.

Embracing the business opportunities brought about by the necessity for developing industrial apps, Foxconn Industrial Internet (Fii) was established in



2018. Leveraging over 40-years of smart manufacturing knowledge from Foxconn meant Fii could develop a brand-new smart manufacturing service dedicated specifically to electronic product production. They have also proactively explored collaboration with ecosystem partners and steered the transformation of smart manufacturing in traditional industries.

### **Complementary advantages speed up the localization of industrial applications**

In the process of localizing industrial applications, Fii has aggressively searched for ecosystem partners for Fii's cloud platform. Having years of experience in both software and hardware, as well as sharing the same vision for ecosystem partners, Advantech naturally became Fii's ecosystem partner for the development of smart manufacturing.

Ms. Aviva Wang, vice president of Fii, commented, "Benefitting from Foxconn's 40 years of manufacturing experience, Fii has manufacturing application modules and sites and has developed industrial apps from them. Combined with Advantech's co-creation' model, the partnership between us really paves the way for brand-new IIoT ecosystem collaboration."

In terms of technical strength in software and hardware, as well as the ability to offer dedicated solutions to fulfill customer needs, Advantech has become a global leader in terms of industrial computing market share and bridging the gap between IoT technologies and cloud platforms. The most important elements in smart manufacturing are interconnection and interworking. There is a shared vision between Advantech and Fii, which has led to successful cooperation between the two parties.

Fii knows about production pain points inside out and has the professional know-how to provide total solutions for them. Fii positions itself to be a service provider, meaning any tool can be applied to Fii's platform. Advantech has the same view with this strategy. Therefore, Fii signed a strategic partnership agreement with Advantech last June and both parties are dedicated to expansion of the IIoT ecosystem and eco circle.

### **Interconnection and interworking: creating a new ecosystem to realize mutual success**

It is not easy to form a firm eco partnership in the IIoT industry. When speaking of the experience working



with Advantech, Ms. Wang further explained, "The reason for the close partnership between us is because both of us are open-minded. We proactively promote the interconnection and interworking of industrial IIoT and smart manufacturing."

In smart manufacturing, businesses of varying scale across different industries are facing unique pain points. Their demands are diverse, fragmented, and specialized, and this often requires the cooperation of several parties to deliver solutions that can satisfy the needs of all these different customers. Advantech's WISE-PaaS platform is designed for different scales of application, and this helps partners reach out to different IIoT vertical markets.

"Interconnection and interworking of Fii and Advantech platforms is a good thing, especially for value chain partners", Ms. Wang pointed out. This means that more partners can develop diverse domain focused solutions for industrial applications to satisfy more business customers, as well as to explore and win more business opportunities.

The cooperation between Fii and Advantech is a great example of interconnection and interworking and the co-creation ecosystem. Looking forward to the future, Fii and Advantech will further cooperate on the localization of IIoT and smart manufacturing applications, leading the transformation of manufacturing industries, and putting more effort into digitalization globally. Let's all embrace the business opportunities brought about by the growth of Industry 4.0. ■

**Advantech Live Seminar**  
 The World After COVID-19 : Market Trends Under Digital Transformation  
 June 4<sup>th</sup>, 2020  
 15:00pm GMT+8 Taipei Time

**Host**  
**Vincent Chang**  
 Senior Director & Sales General Manager of Aintercon Region, Industrial IoT Group

**Special Guest**  
**Linda Tsai**  
 President of IIoT

**Local Guest**  
**Jash Bansidhar**  
 Managing Director of Advantech Europe & AVP of Industrial IoT Sector

**Local Guest**  
**Matrix Choong**  
 General Manager of Advantech Thailand

# Advantech IoT Co-Creation InnoTalks: Realize Your Digital Transformation with AIoT

Photos provided by Advantech

In 2019, Advantech held 49 Co-Creation Partner Conferences in different countries, and shared their insights for IoT digitalization solutions, co-creation models, and the establishment of IIoT ecosystems, with 5,629 partners from around the world across a variety of industries. Such industry focused themed events and conferences took global customers and partners by storm. In 2020, hoping to reach more customers and partners in every region, yet mindful of the current global pandemic, we turned the conference into an online live streaming event called “Advantech IoT Co-Creation InnoTalks”.

InnoTalks takes the form of direct conversations with Advantech’s experts, industry professionals, and opinion leaders who are invited to explore specific in-depth topics, such as digital transformation, Industry 4.0, and AIoT (AI and IoT). Conducted in local languages, as well as streamed and advertised through social media (such as YouTube, Facebook, and local media), Advantech’s InnoTalks and solution forums will be held as much as possible in the form of online webinars and online live streaming events to increase global audience coverage. ■

**Advantech Live Seminar**  
 How Enterprise Responds to the COVID-19 Crisis  
 April 22, 2020  
 15:00pm (GMT +8) Taipei time

**Chaney Ho**  
 Co-founder, Executive Director of Board

**Vincent Chang**  
 Senior Director & Sales General Manager of Aintercon Region, Industrial IoT Group

**Elvin Ng**  
 ASEAN Industrial IoT Sector Head & General Manager of Advantech Malaysia

**Andrey Falileev**  
 Key Account Manager, Industrial IoT Group, Advantech Russia



Check InnoTalks Video

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AIoT Solutions & Marketplace

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