

Food & Beverage Processing Solutions

Using Information and Communications Technology to build smart factories and traceable products

Computer-assisted manufacturing system to streamline the food & beverage manufacturing process and establish a track and trace system from logistics management to production control



ADVANTECH

Enabling an Intelligent Planet

WebAccess⁺
Alliance

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Intelligent Food & Beverage Manufacturing Overview

ICT (Information and Communications Technology) realizes smart factories and synchronize sales and production

In the new era of globalization, food and beverage producers operate manufacturing facilities located in different countries with a global supply chain. Therefore, building up a standardized and scalable production system is imperative for today's corporate competitiveness. Smart factories are an industrial trend that use networking and intelligent technologies to integrate all the process, from sourcing and manufacturing to distribution.

Material Weighing & Mixing

Operators scan the barcode, measure weight of materials, divide them into smaller parcels and put tags on the parcels.

Material Requisition

Operators pick materials from the storeroom according to their production order, and read the barcode on the material parcels they pick.

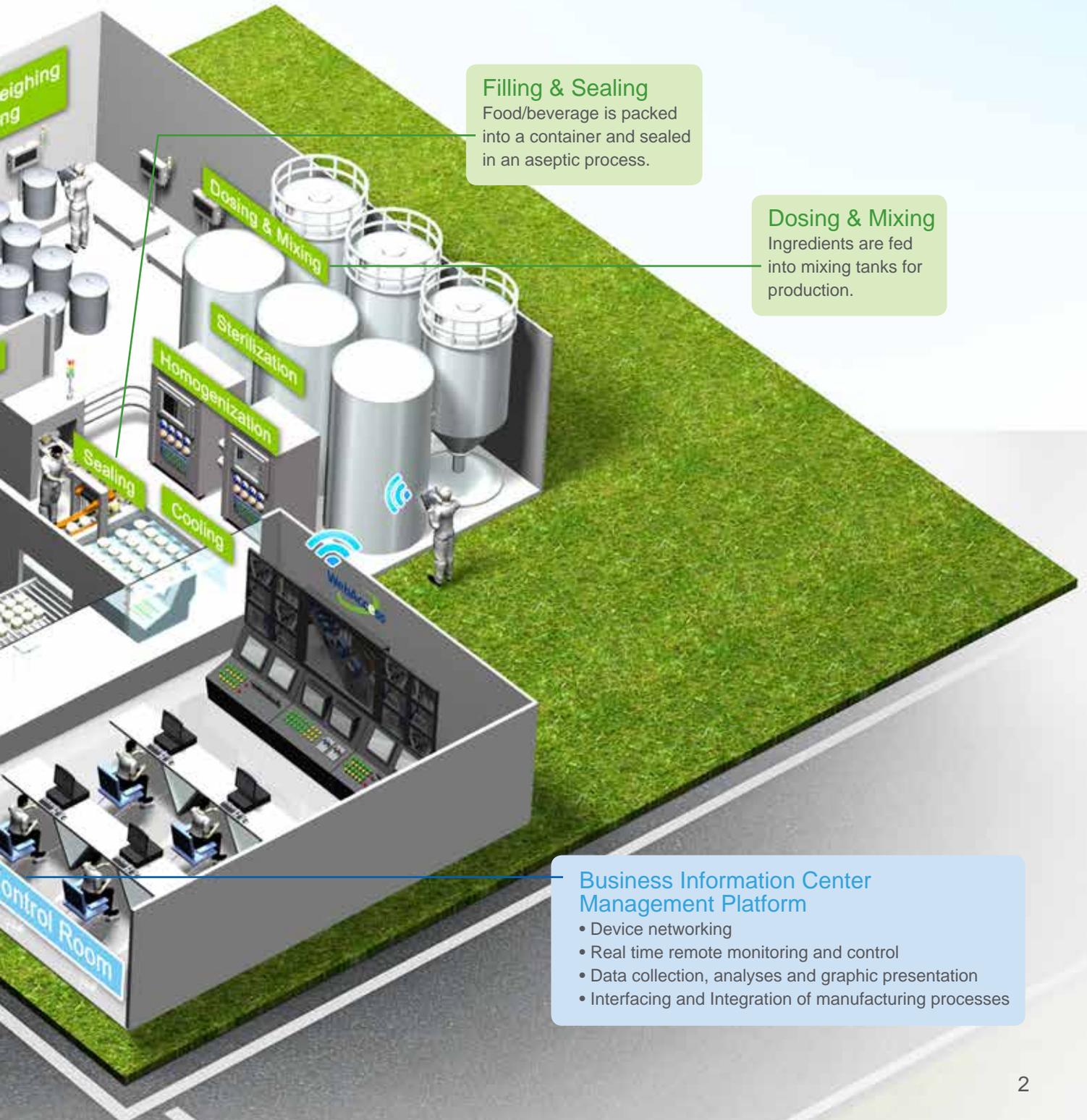
Product Inspection

Packages and labels are examined and quality of food/beverage is tested.

Packaging & Labeling

Products are packaged and labeled with information including expiration date.





Filling & Sealing
Food/beverage is packed into a container and sealed in an aseptic process.

Dosing & Mixing
Ingredients are fed into mixing tanks for production.

Business Information Center Management Platform

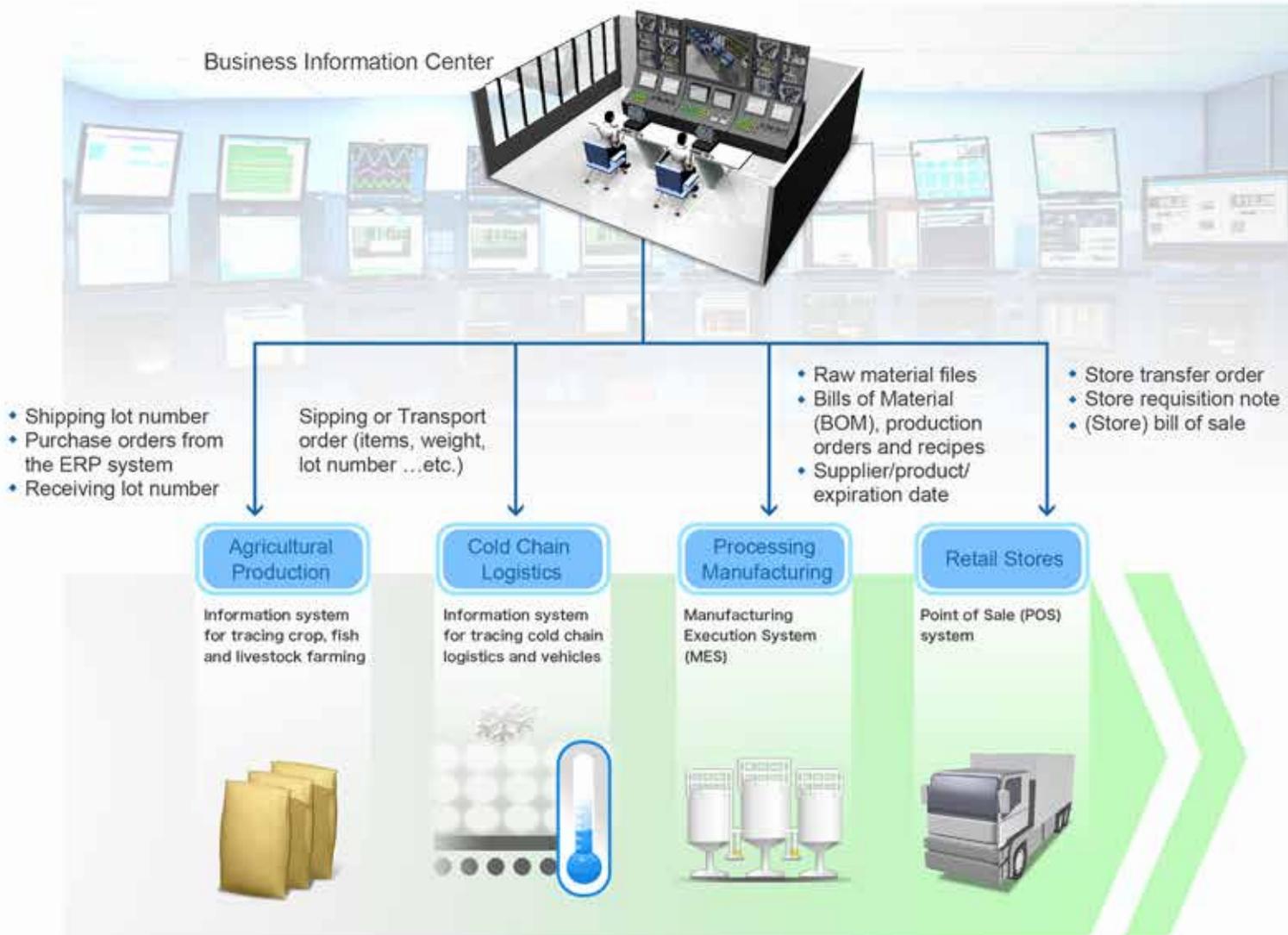
- Device networking
- Real time remote monitoring and control
- Data collection, analyses and graphic presentation
- Interfacing and Integration of manufacturing processes

Facts & Trends in the Food & Beverage Processing Industry

|| The difficulty in realizing complete tracing records

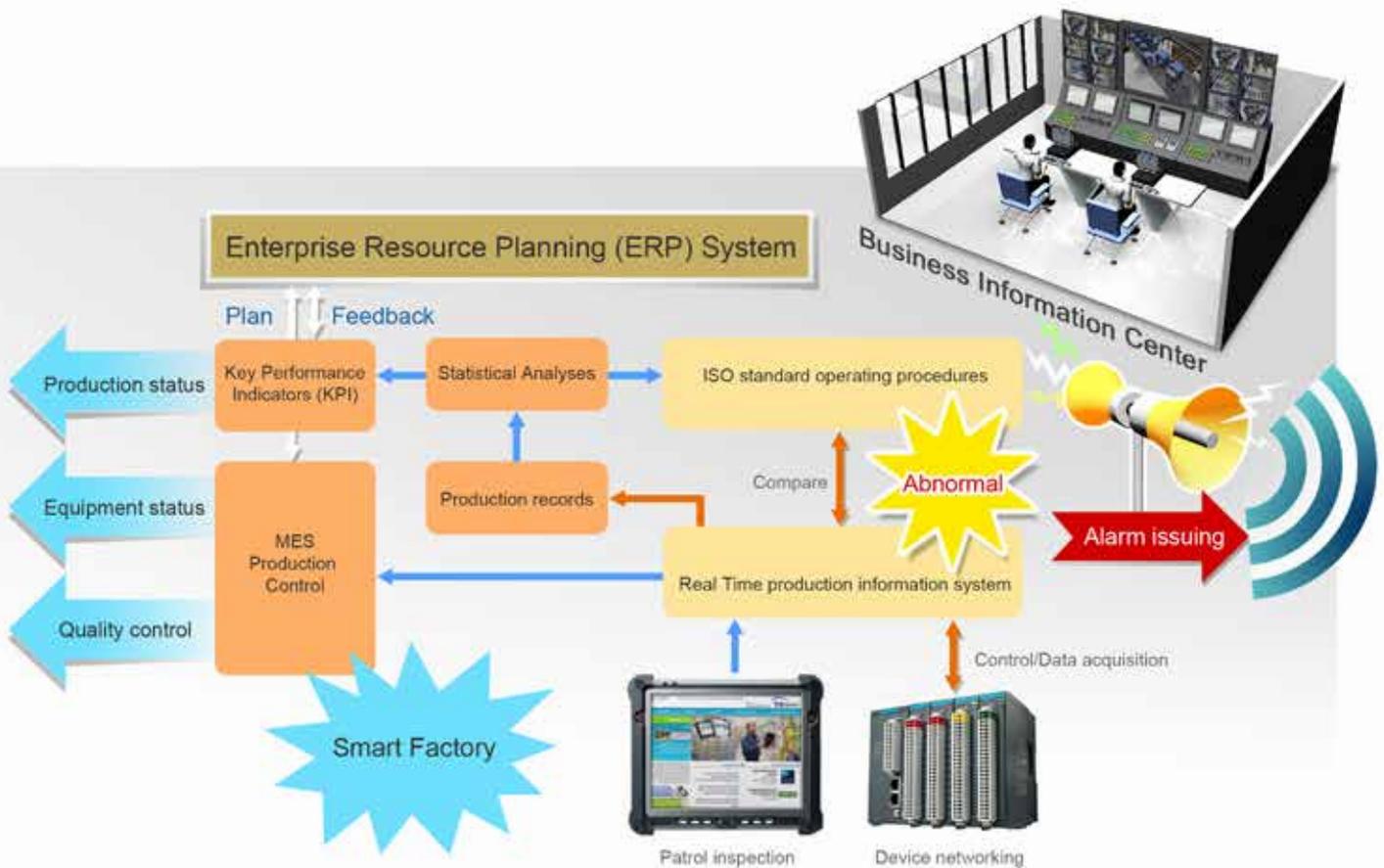
A complete food record tracing back to the very beginning of its ingredient supply, through manufacturing procedures, to logistics, transportation and finally to the retail site is de facto difficult. There are many links or interfaces of systems, many receipts and paperwork involved. A loophole or break could happen in any stage and affect data authenticity, making real time monitoring and preventive actions difficult.

|| The supply chain of food & beverage products



|| New Ideas for the Food & Beverage Industry

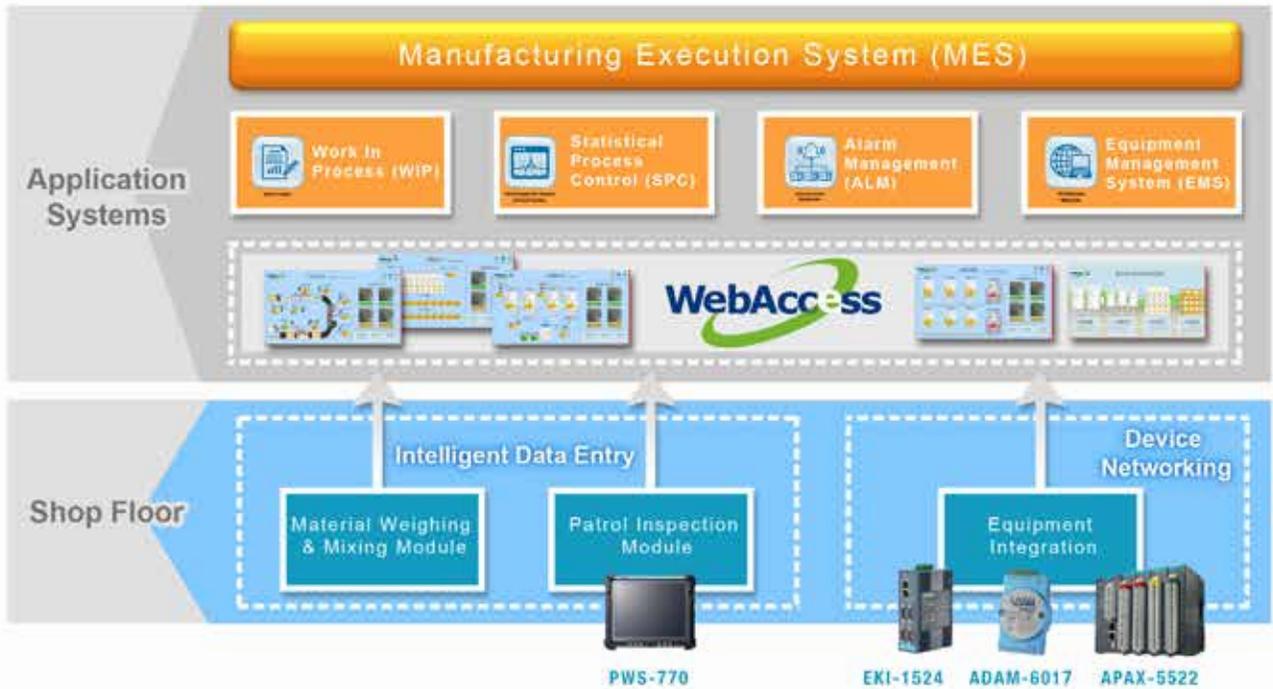
To fulfill complete and correct track and trace food records, smart technologies and new management tools are available. In the smart food factory, Patrol Inspection System is used in connection with the company's Enterprise Resource Planning (ERP) system and Manufacturing Execution System (MES) to allow operators at each processing stage to report production status, equipment status, material usage and quality control. Operators usually use intelligent tools such as barcode readers or industrial tablets to enter data, and all devices in the factory are connected in a network. These are typical practices of a smart factory.



The collected production data will be compared against production plans and Standard Operating Procedures (SOP), and if any abnormality is detected, an alert or alarm will be issued to prompt actions. Production records are also used to produce Key Performance Indicators (KPI) assessment to assist in the company's policy making.

Intelligent Food & Beverage Processing Solution

Intelligent food & beverage processing solution based upon advanced ICT technologies, which is a seamless combination of shop floor data collection--including weighing and mixing , patrol inspection and equipment integration-- and higher level MES modules including WIP control, SPC, equipment management, and alarm management, expected to fulfill the manufacturer's Computer-Integrated Manufacturing (CIM) objectives.



Seven Major Function Modules

Work In Process (WIP)	Including basic information settings, production management, exception management, label management, carrier management, data query administration settings
Statistical Process Control (SPC)	Including sign in/out management, privilege settings, master file settings, system settings, analysis charts and tables
Alarm Management (ALM)	Including privilege settings, alarm management settings, alarm management jobs, query and reporting, system administration and network services
Equipment Management System (EMS)	Including master file settings, task scheduling settings, equipment repair and maintenance, equipment parts management and data query
Material Weighing & Mixing	Including material weight measurement, dosing and mixing jobs, and job records
Patrol Inspection	Overseeing the operations of sterilization, filling & packing, packaging, and quality assessment
Equipment Integration	Fetching digital data and integrating with SPC module into a quality management system; with ALM module into an alarm system; with EMS module into an equipment system

Work In Process (WIP) Module

Work In Process (WIP) module is the core module of Manufacturing Execution Systems (MES), which provides diverse functions and intuitive interface to allow users to receive information such as production records, quality reports, material usage and an equipment status, so that the users can perform real time control and management tasks over the shop floor to prevent processing errors.

Basic Information Settings

- Provides equipment management, production/process control, alerts management, label management, system management, etc.

Production Management

- Provides information of production orders and status of jobs; issues important production notes; setting time intervals for data display.

Equipment Management

- Designates cables, ports, processing modes and grouping of specific machines; defines status rules for "Run", "Down" and "Idle".

Carrier Management

- Provides functions of carrier establishment, management, renaming, and search queries.

Exception Management

- Changes of equipment and port status.

Data Query

- Provides search queries for reports on work-in-process, materials, CIP info, production orders, operator working hours, etc.

Reporting Services

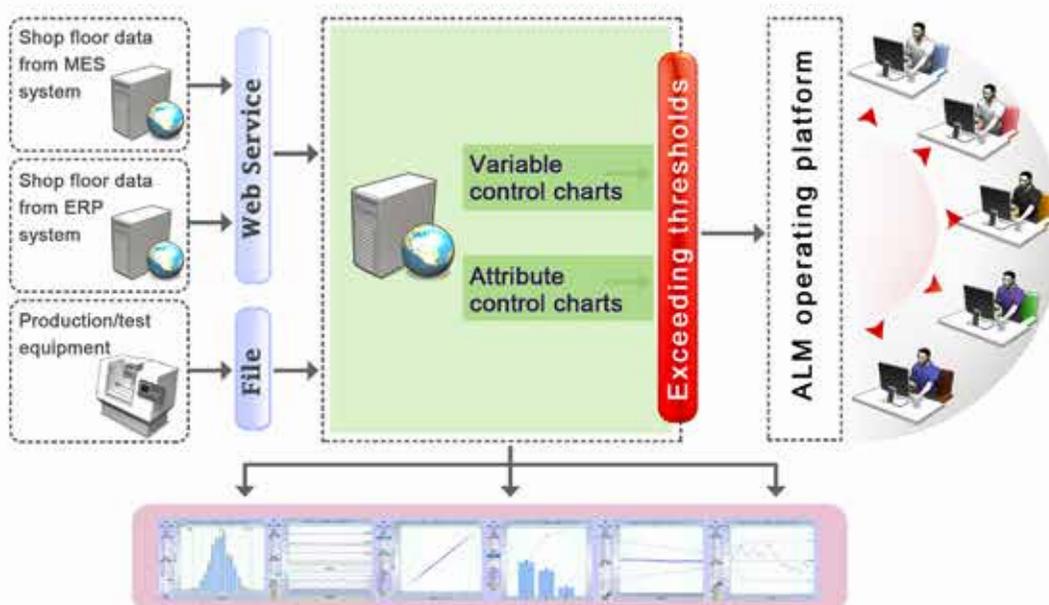
- Provides 6 standard forms for recording equipment efficiency, like : material usage, packaging, and equipment failure statistics , etc.

System Management

- Provides external data columns, institutional management, languages and cultures, naming variables and filtering rules.

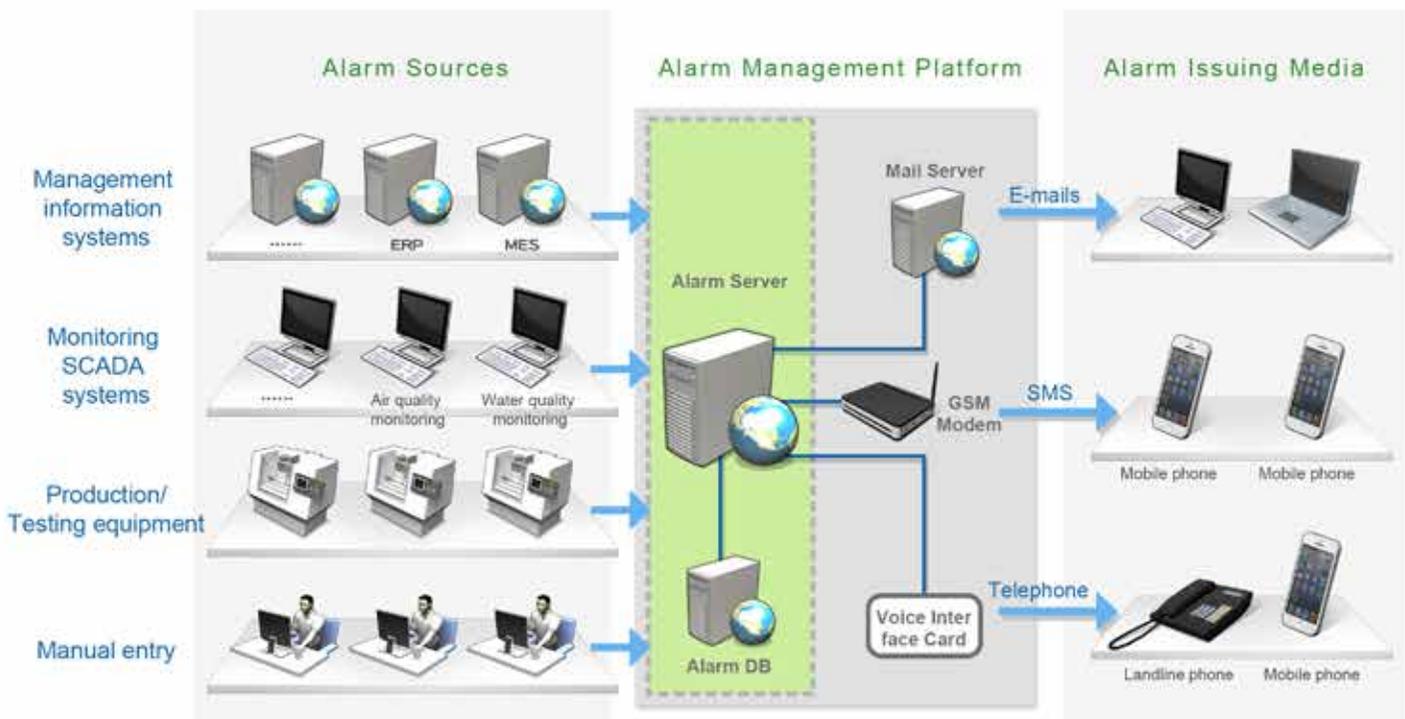
Statistical Process Control (SPC) Module

The Statistical Process Control (SPC) module traces and records information pertinent to quality issues in manufacturing process. It simplifies and digitalizes complicate data into easy-to-understand charts and tables through statistics and computing algorithm based on process quality control theory. The results will help authority to establish a mechanism to identify reasons and deal with quality fluctuations, allowing for continuous improvement.



Alarm Management (ALM) Module

Aims to meet shop floor management requirements, the alarm management system sets frequency for alarm issuing, message-forwarding vehicles and receivers to create an effective alarm system. The ALM module is an open platform able to integrate various information systems in the company and instantly forward alarm messages on equipment abnormalities to personnel in charge to allow for fastest handling and reduce loss.



Equipment Management System (EMS) Module

Equipment Management System (EMS) is a preventive maintenance platform that integrates maintenance and repair jobs, spare parts management and alarm functions to allow users optimize their important asset/ equipment utilization and reduce loss resulted from unexpected equipment failure.

- **Preventive maintenance:** The computer will automatically produce a recommended maintenance schedule for factory equipment, Engineers can discuss on the feasibility of this schedule and make adjustments if there is any difficulty in practice.
- **Repairs:** By logging in the system and filling necessary forms, the system will automatically generate a code number and submitted to the engineering department for handling.
- **Components management:** The system will based on repairs applications., to check the amount... of parts issued, issuing date and the recipients shall be clearly recorded during and after a repair job.
- **Maintenance notices issuing:** The system will automatically send e-mails of a scheduled maintenance order to people in charge.

Material Weighing and Mixing Module

The module helps to standardize and computerize the operations in material storeroom, weighing area, and dosing and mixing area. All inbound materials are labeled with 1D/2D barcodes to facilitate measurement. The picking, request for and issuing of materials are implemented according to ERP procedures. In the weighing area, operators acquire materials according to production orders and recipes; inventory shortage and overage should be adjusted regularly.



Patrol Inspection Module

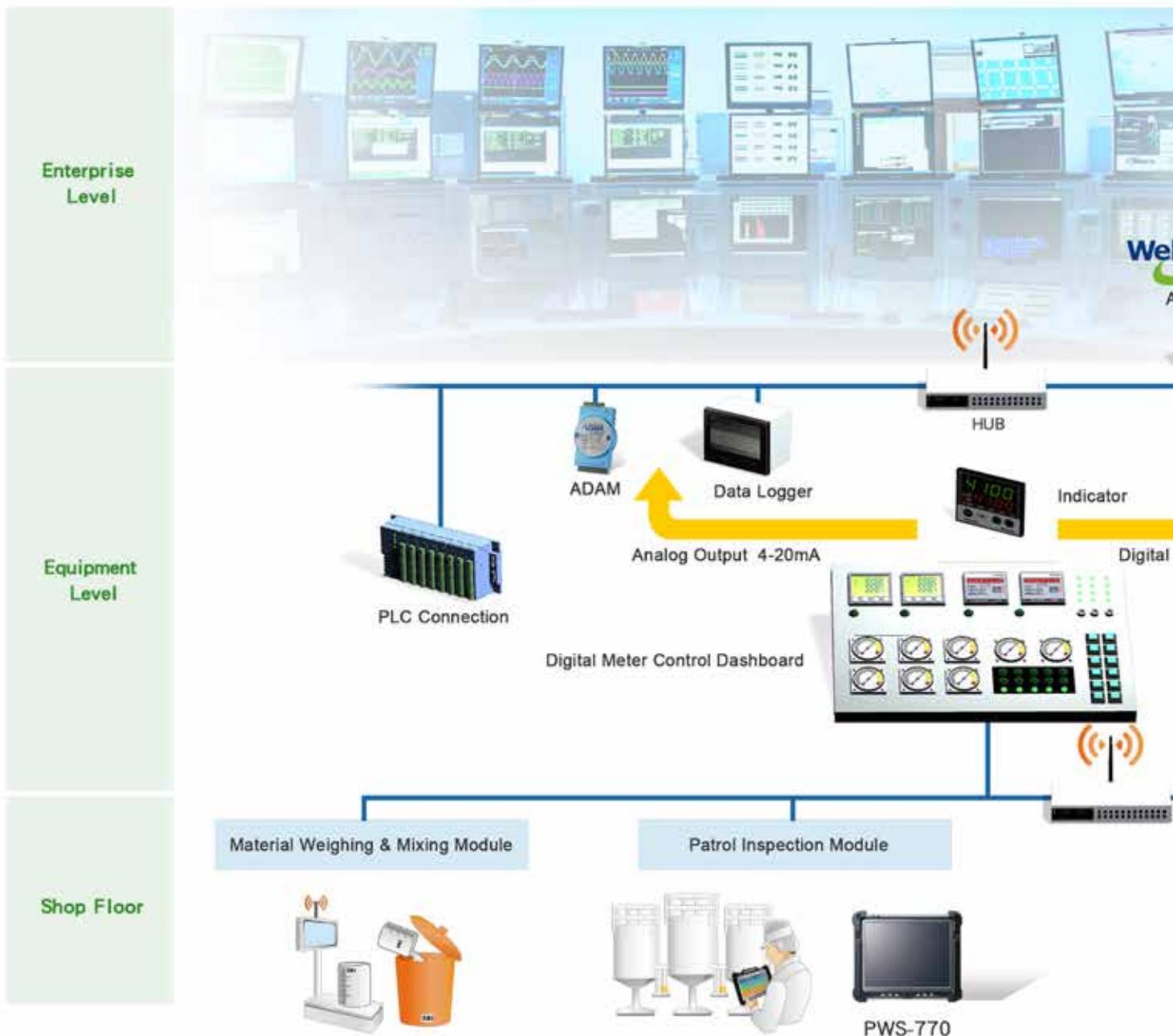
This module allowing operators to enter data with a handheld touch panel while they are patrolling around the shop floor. The entered data is then transmitted to server host via Wi-Fi wireless connection and is compare against standard samples stored in the database to determine if there is an abnormality. In this way, the traditional handwritten forms are replaced by digital files which can be used for further purposes.

Industrial panels, Wi-Fi wireless connection, Bluetooth transmission, RFID positioning.



Equipment Integration Module

The equipment can be integrated in a network by either using Advantech's monitoring control software WebAccess to connect with shop floor PLCs to acquire equipment data; or use ADAM or other data loggers to connect with modified devices to acquire analog data or use T50 networking hub to acquire digital data. This helps to realize real time consecutive monitoring control instead of the traditional scattering checkpoints. The data acquired automatically can be used to compare with manual records to determine if there is an abnormality. The connection of devices is shown below:



Case Studies

MES for Food & Beverage

Project Introduction

Taiwan's biggest food and beverage manufacturer initiated a MES to establish more efficient and accountable tracking records for their products so that they can quickly identify problematic ingredients and responsible suppliers.



System Requirements

Five units of the Advantech industrial panel PWS-770 with WebAccess 7.1 are deployed in the field to collect real time production data at major control points, including ingredient measurement and proportioning, sterilization, filling and packaging.

Some devices and meters are installed with wireless modules and can transmit data immediately; however, some still need workers to input data on-site. With a portable panel workers can walk around and input data immediately. They can also conveniently use a barcode reader to scan batch numbers or simply click on the touch screen with fingers to input data. The company also uses networking and intelligent technologies to integrate all the links in production process; including WIP, SPC, ALM, EMS, etc. to realize smart factory from production to distribution.

Conclusion

Before the deployment of the electronic MES system, production records were mostly done by paperwork, it took one or two days for the company to find related production data when problems occurred, and it was difficult for them to identify root causes as a great number of ingredients and suppliers are involved in mass and continual production.

With the new system, all ingredients and their suppliers are encoded at the beginning and linked to a database, so that all production data can be traced throughout the process and problematic ingredients and suppliers can be immediately identified. Sometimes problems can even be prevented in process due to the alarm features of the system.

The mobility provided by Advantech industrial panels helps to realize walk-around management and real-time monitoring. Meanwhile, WebAccess not only allows for instant data input and display but also provides statistical analyses and historical trends in very easy-to-read figures and tables to be reviewed by senior officers at company headquarters.

Intelligent Data Entry and Equipment Integration Solution

Food & Beverage Processing Solution focusing on equipment integration, material weighing and mixing, patrol inspection, WIP, SPC, ALM and EMS, which can be used to organize and build up six major systems for customers to choose to install according to their own needs.

The six systems are divided into two groups based on their ways of data entry: "Intelligent Data Entry" and "Equipment Integration". The former uses industrial touch panels to report shop floor information, and the later acquires real time production data via equipment integration enabled by Advantech products like WebAccess and ADAM. The acquired data will be further processed for applications. To realize complete and seamless Computer-Integrated Manufacturing (CIM).



Solution		Intelligent Data Entry	Equipment Integration	Total Solution
Function Module		<ul style="list-style-type: none"> • Material Weighing & Mixing Module • Patrol Inspection Module • WIP Control Module 	<ul style="list-style-type: none"> • Equipment Integration Module • SPC Module • ALM Module • EMS Module 	<ul style="list-style-type: none"> • Material Weighing & Mixing Module • Patrol Inspection Module • Equipment Integration Module • WIP Module • SPC Module • ALM Module • EMS Module
 <p>Intelligent HMI/SCADA software</p> <ul style="list-style-type: none"> • 100% Browser-based • Easy to connect and control a variety of IoT devices • Supports all kinds of mobile devices and browsers 		 <p>300 tags</p>	300 tags	600 tags
 <p>Hand-held Panel Computer PWS-770</p>		<p>CPU : Intel Atom N2600 or above / RAM : 2GB / HDD : SSD 32GB OS : Windows 7 Embedded I/O ports : 2 x USB 2.0 / 1 x RS232 / 1 x VGA / 1 x Audio in / 1 x Audio out / 1 x DC-in WI-FI : 802.11b/g/n WLAN Build in, Bluetooth class 2.4.0 Built in Screen size : 10.4" Lithium battery: 1.1V 1900mAh, 1 x embedded</p>		
 <p>Data Acquisition I/O</p>		<p>ADAM-6060 Provides 6 input and 6 output channels ADAM-6050 Provides 12 input and 6 output channels ADAM-6017 Provides 8 analog input and 2 output channels</p>		
Server Equipment		<ul style="list-style-type: none"> • Host server • Back-up server • Networking and cabling engineering 	<ul style="list-style-type: none"> • Host server • Back-up server • Networking and cabling engineering • Equipment modification for networking (Bluetooth) 	
Others		<p>DB Server OS: Windows Server 2008 R2 Standard or above Data Base: (either one) <ul style="list-style-type: none"> • SQL Server 2008 R2 Standard Edition or above • Oracle Database 11g Standard Edition or above AP Server OS: Windows Server 2008 R2 Standard or above</p>		

Choose Advantech as Your Best Partner

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

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



Enabling an Intelligent Planet

Smart city solutions

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

Digital Retail and Hospitality	Intelligent Hospital	Digital Logistics and Fleet Management
		
<ul style="list-style-type: none">• Ustore Manager• iCloud Solution• In-Store Management• Central Control and Cloud Management• Restaurant Management	<ul style="list-style-type: none">• Integrated Operating Room• Quality Nursing Care• Intelligent Outpatient Services	<ul style="list-style-type: none">• Logistics & Warehousing Management System• Fleet Management System

Why Advantech

Designing specific solutions according to industry characteristics

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

Perfect cloud integration solutions

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

Model Corporate Citizen

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

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

After Service

Product Warranty

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

Professional Installation

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

Complete Training

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

Intelligent Building and Urban Space Management



- Intelligent Space Management
- Intelligent Building Energy Management System
- Urban Space Management
- Transportation Control System

Intelligent Agricultural and Environmental Protection



- Intelligent Environmental Protection
- Intelligent Agriculture
- Intelligent Water Affairs
- Intelligent Plant Equipment Monitoring
- Oil and Gas
- Power and Energy

WebAccess
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ADVANTECH
WebAccess/SCADA

ADVANTECH
WebAccess+IVS

ADVANTECH
WebAccess+IMM

ADVANTECH
WebAccess/NMS

Industry-Leading Quality Assurance

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

Customer-oriented Support

Advantech's complete technical and repair support provides a variety of customizable after-sales services, including extended warranty, advance replacement, upgrade, fast repair and so on. With hotline AE 24/7 technical support, we keep you investment at peak performance and within your budget.

WebAccess⁺ Alliance

One for All · All for One

WebAccess/SCADA

Smart HMI/SCADA Software

- 100% browser-based HMI/SCADA software
- Easy to connect and control a variety of IoT Devices
- Supports a variety of mobile devices and browsers

WebAccess+IVS

Intelligent Video Software

- Intelligent Video Platform
- Intelligent Video Analytics Modules
- Modulized SDK ready for software integration

WebAccess+IMM

Interactive Multimedia Software

- Digital Signage Management Platform
- Intelligent Programming Platform
- Supports Industries and Application Scenarios

WebAccess/NMS

Network Management Software

- Network Equipment Management and Monitor
- Integration of Network Topology
- Location Identification for Wide Area Deployment

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

WebAccess⁺ Alliance Partner



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