Chroma

Advancing Excellence

Intelligent Manufacturing System Solutions

Manufacturing Execution System

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iOS

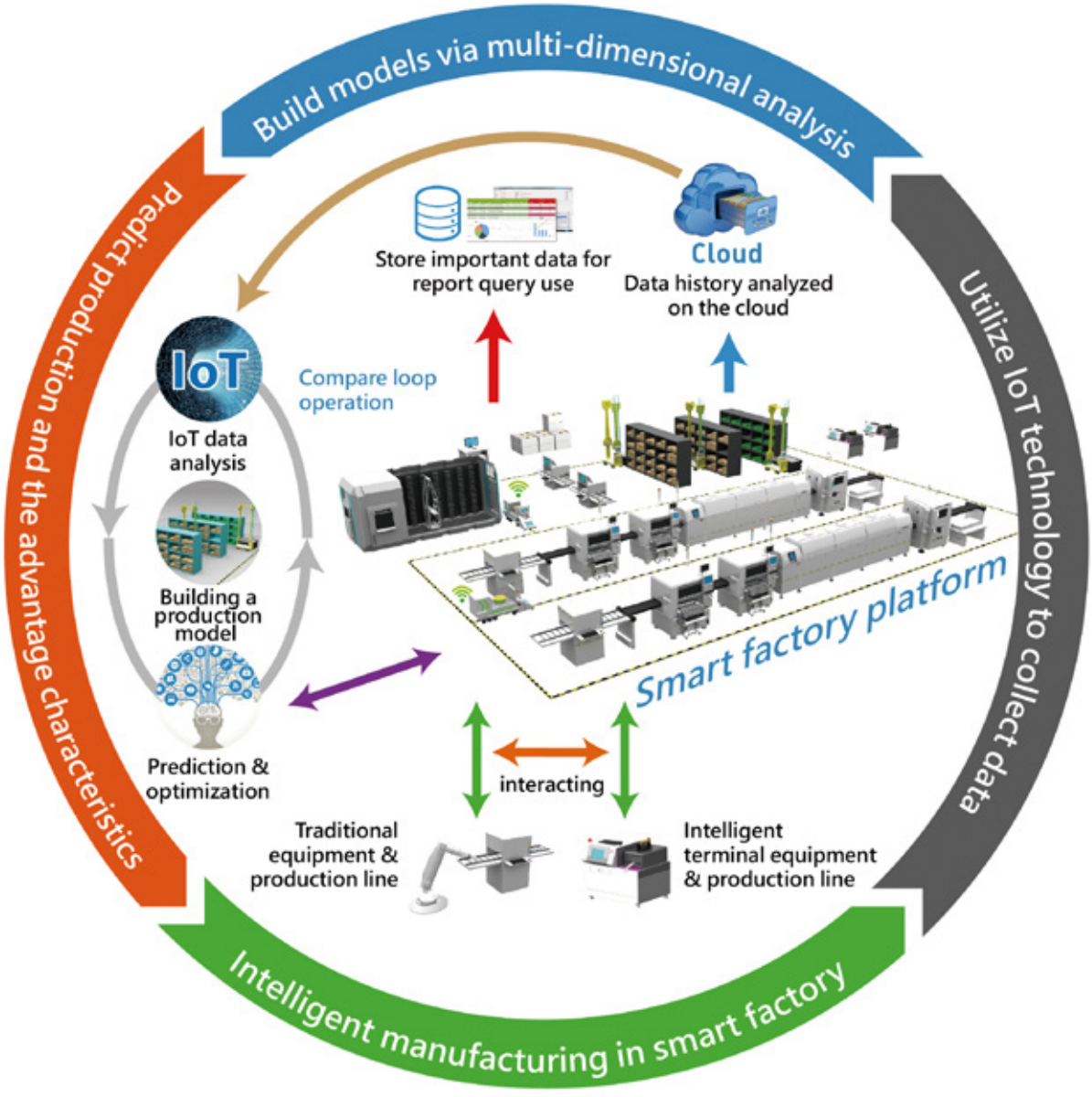
Android

Intelligent Manufacturing System Solutions: Chroma Sajet MES

Sajet MES is the Manufacturing Execution System (MES) from Chroma Group's IMS business unit. Chroma leverages Industry 4.0 practices to achieve intelligent manufacturing, with the MES playing a core role in automation integration.

As modern factories are increasingly oriented toward automated production, traditional MES that focus only on data collection and report analysis are becoming inadequate in an era of rapid change.

The Chroma Sajet MES not only covers traditional MES functions but also incorporates CIM, EAP, machine connectivity, and robotic arm integration to achieve full-factory automation control. It enables real-time, large-scale data analysis, improving product quality and customer satisfaction, reducing production costs, and further enhancing capacity while ensuring end-to-end traceability.



MES System Interface

CHROMA SAJET MES

KEY FEATURES

- Fast Dashboard Player: FDP
  - Intelligent alarm system
  - Customizable kanban style
- Intelligent Equipment Management System (iEMS)
  - Real-time control over equipment efficiency
  - Automatic notification for maintenance and calibration
- Full Production Information Monitoring (WIP Control)
  - Equipment effectiveness improvement
  - Manufacturing performance improvement
- Equipment /PLC Automatic Connectivity
  - Computer Integrated Manufacturing (CIM)
  - Equipment Automation Program (EAP)
- Expert Quality Control System
  - Statistical Process Control (SPC)
  - Corrective Action Report (CAR)
  - Out of Control Action Plan (OCAP)
- Manufacturing Equipment Management
  - Equipment Management System (EMS)
  - Overall Equipment Effectiveness (OEE)
- Real-Time Report
  - Yield Rate Report
  - WIP Report
- Mobile App Real-Time Queries and Notifications
  - Smartwatch
  - Smartphone
  - Tablet Computer
- Chroma i-Learning
  - Online training and calibration at any time
  - Automatic certification system
  - Binding MES operation permission
- AI Data Analytics System
  - EDA data analysis
  - Production material data analysis

Chroma Sajet MES Advantages:
Combining Automation and Integration Technologies

The Power of Software and Automation Integration

Backed by Chroma's 40+ years of industry experience, the Sajet MES has been deployed across factories of varying scales worldwide, cementing its position as the premier choice for full-factory automation.

Starting from the manufacturing end with the MES as the core, we integrate various Chroma testing equipment and measurement and automation solutions. These include inductance testing and packaging machines, flat panel display testers, complete battery formation solutions, solar cell automated inspection and sorting systems, intelligent transport systems, and more, advancing beyond basic automation to create a fully integrated, intelligent manufacturing environment.

Rich Experience

- Over 400 medium and large-sized manufacturers adopted our products.
- Our seasoned MES consultants with abundant consulting and engineering experience ensure a correct assessment and successful implementation.

Mature Product Technology

- Capable of processing data for super large factories, we support with the stable operation of enterprise systems.
- Meets the needs of various industries, including semiconductor, electronics assembly, battery, LED and solar energy, precision hardware, passive components, and other industries.

Global Service

- Chroma ATE is a public Taiwanese company with branches in America, Europe, and East and Southeast Asia, providing the best support to customers who seek factory initiation or expansion.

Integrated Solutions

- Providing complete automated test systems and integrated solutions, we merge R&D resources of the Chroma Group with myriad automated test and measurement products.

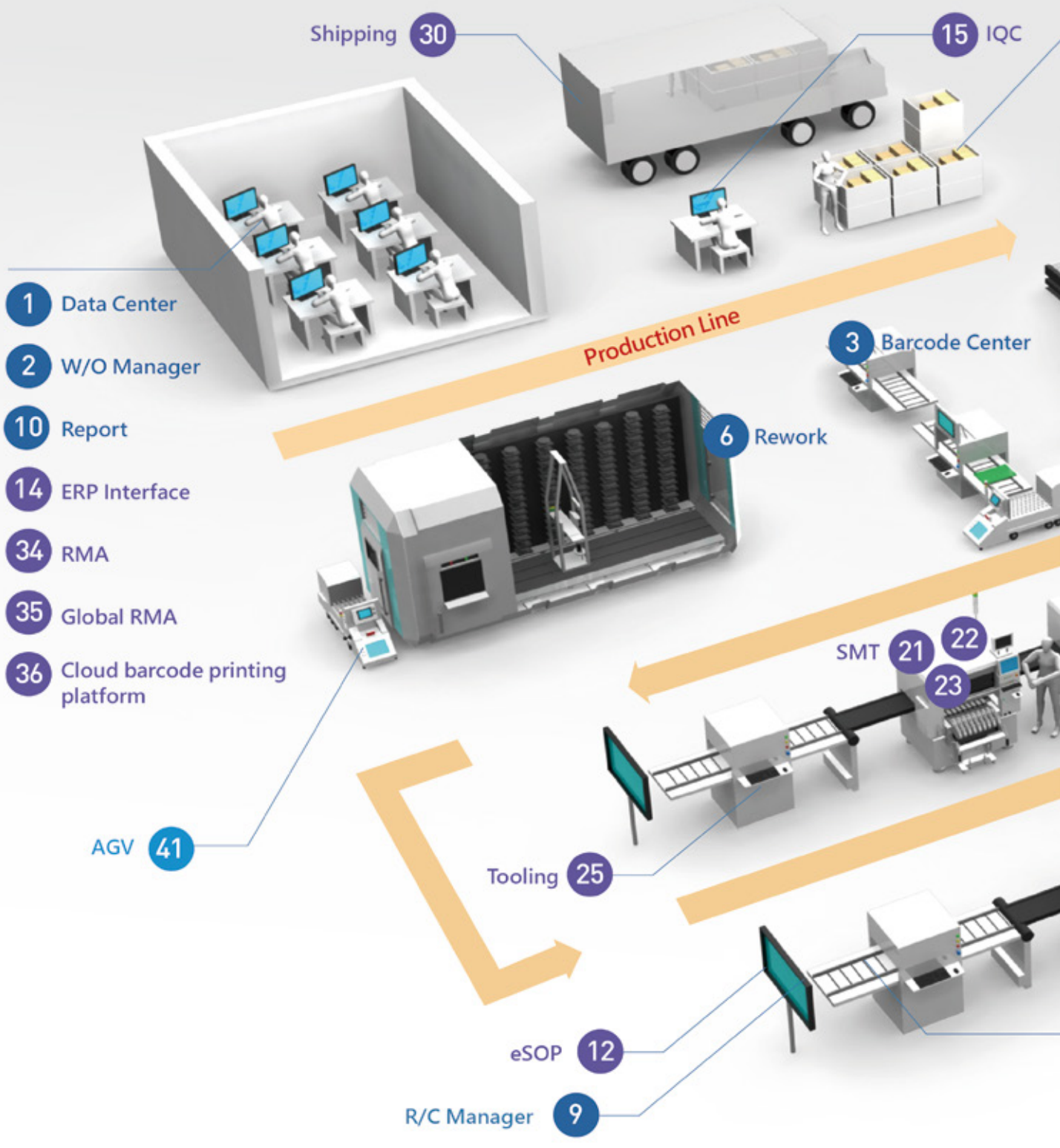
Flexible Modular Expansion

- Modular application enables easy integrating of new modules and maintenance, with user-defined online actions and processes.
- Our systems use various data collection methods, such as wireless PDAs and barcode readers, and can integrate many test instruments and programs.

Convenient System Management

- Applications provide the latest three-tier structure as well as easy version upgrade and database.
- Software supports multiple languages, multi-factory management, permission control, and shared schemes for batch and item management.

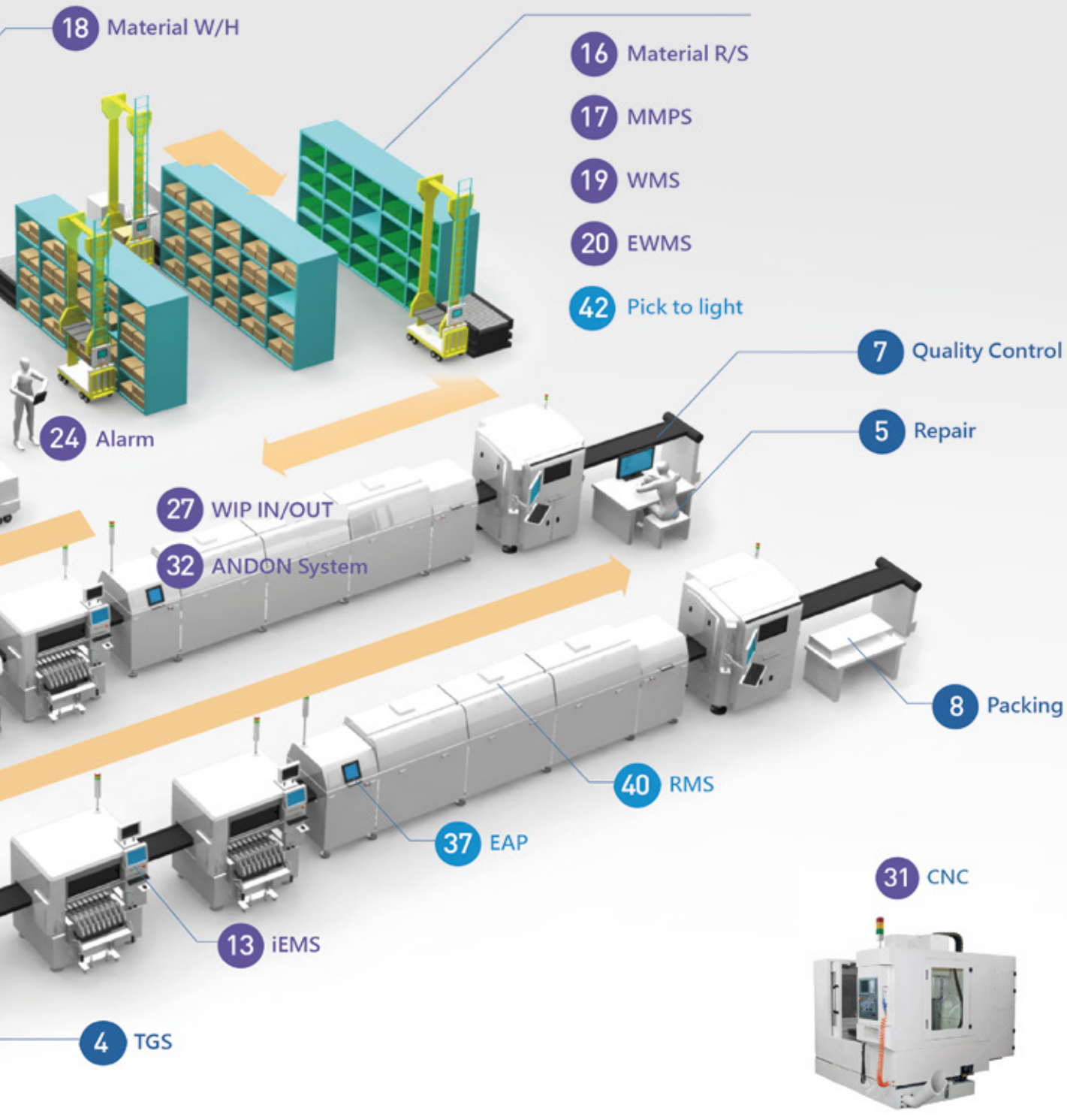
SMART FACTORY APPLICATIONS



26 Aging Test

28 Work Hour

29 SPC



33 App Report

38 OEE 11 FDP

39 FMS

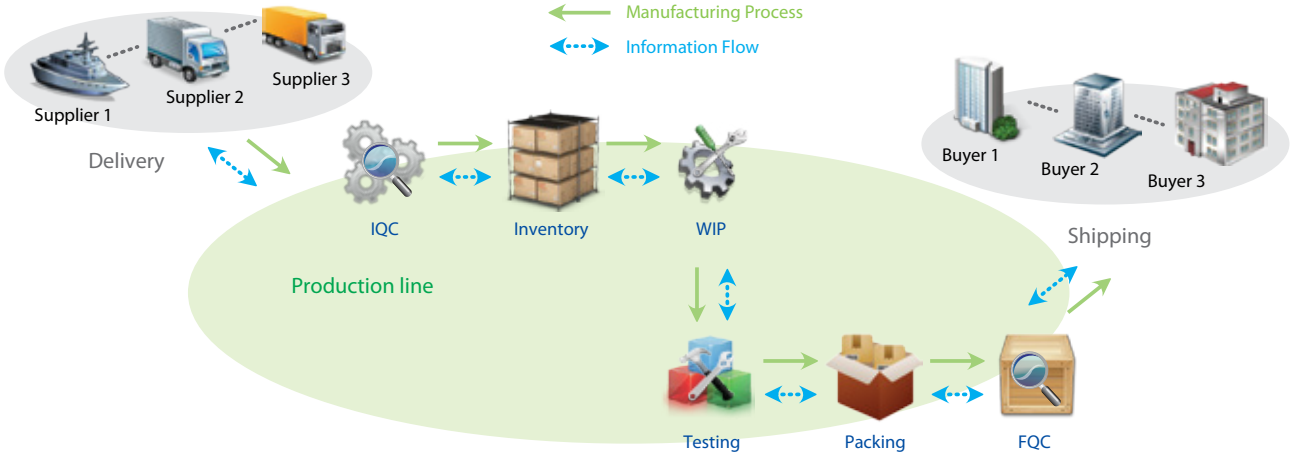
SMART FACTORY FUNCTIONAL MODULES

Modularized Applications and Flexible Expansion of New Modules Solve Production Bottlenecks in Each Industry

BASIC MODULES

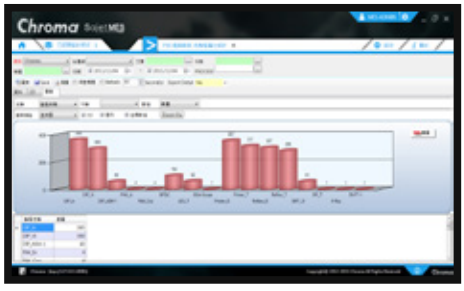
Complete Production Process - Traceability

The manufacturing process information contained in Chroma Sajet MES can assist the factory to process work orders, monitor workstations, track and manage inventory as well as to conduct quality inspection and exception conditions management. The details provided allow users to find the lot number, delivery date, and quantity of passive components used in a supplied product. It can also use the lot number to trace back the shipped products, locations, and quantities so as to efficiently reduce the loss caused by defect components. The traceability features can rapidly find material or process problems, a necessary tool for factory management.



Full Production Infomation Monitoring - WIP Control

Sajet MES provides a variety of WIP reports, which can manage and route all production activities in real time. It controls the quantity of yield and defective goods, manages processed products, calculates the pass-through rate, and gathers the complete production records. Chroma Sajet MES fully steers the product line information to increase production efficiency and reduce production costs.



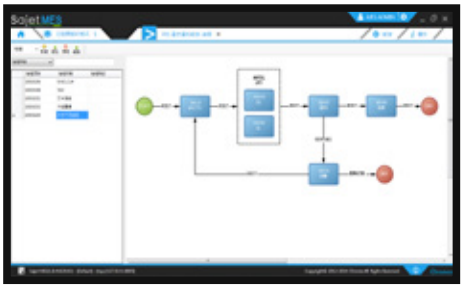
WIP Monitoring Interface

Production Routing

Flexible Routing Management - Lot Control

Sajet MES also offers a flexible process management. Users can plan different routes for different products, and at the same time support different demands of control targets, including products, work orders, lots, and components. Easily construct the production patterns used in different industries through the multi-level combination of equipment, workstations, processes, products, etc. The diverse tracking interfaces meet the needs of various industries and provide early warning and exception handling mechanisms for efficient exception control.

Tracking Interface



Process Management Interface

OPTIONAL MODULES/PERIPHERAL SYSTEMS

Fast Dashboard Player: FDP

The Fast Dashboard Player is a powerful tool for factory visualization. It quickly and intuitively integrates a wealth of operational data such as finance, sales, production, quality, and personnel. Moreover, FDP works with mobile devices to provide a new human-machine interaction interface that assists high-level managers in swiftly making correct decisions.

User Interface

Features display functions including dashboards, marquee text, bulletin boards, image files, slideshows, date, time, weather, and embedded webpages. Layout can be customized according to actual needs, with multiple templates that can be deployed across different displays.

Setting Up & Installment

Connects to display equipment via HDMI, with a wireless connector running on the built-in Android platform. The Wi-Fi environment allows for fast completion of the hardware configuration and quick connection with the background database.

Picture Files Maintenance

Users can easily upload pictures by dragging, create a group based on existing folders, and set the rotation sequence and interval of pictures on display. Picture Files Maintenance supports a variety of picture formats.

KEY FEATURES

- Low cost, fast import
- Broadcast through the easily set-up Wi-Fi
- Simple log in through the web browser
- Modular interface settings and flexibly adjustable layout
- Various connection methods to integrate external databases
- Customizable presentation of charts and diagrams
- Labor-saving platform control of each area and screen setting

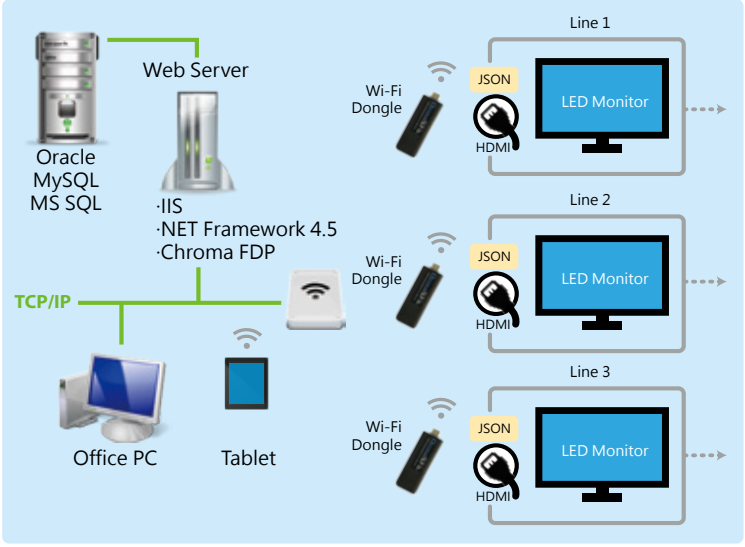
APPLICATIONS

Real-time information broadcast through Wi-Fi:

- In hospitals, retail stores, public environments, etc.
- Factory production efficiency kanban
- Factory eSOP
- Display on mobile phones and tablets

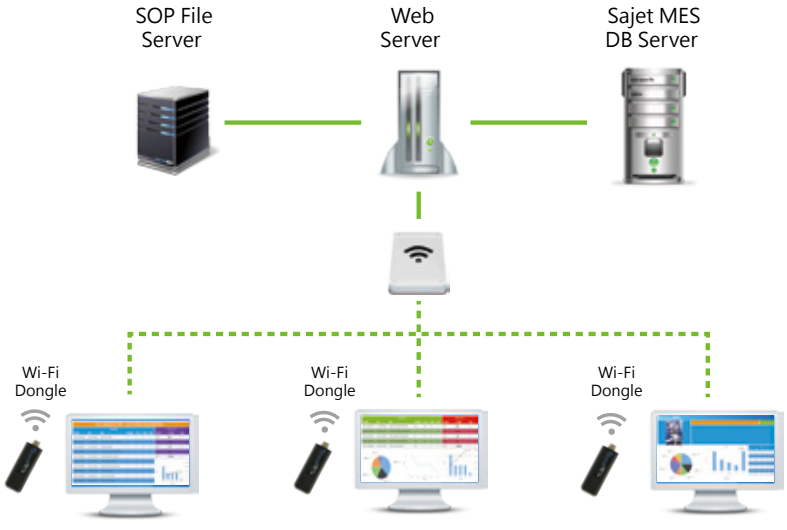
System Architecture - Establish eKanban through Wi-Fi

The new generation of Chroma eKanban solutions integrate an HDMI interface and different kinds of digital display monitors under an Android platform. It uses Wi-Fi to deliver data to factory monitors in real time. Moreover, it is easy to set up the layout configuration through the Web interface. Users can regulate and broadcast real-time kanban information to factories, hospitals, retail stores, and public environments. Chroma's eKanban is the best solution for on-site visual management.



Factory Layout - Manage all Kanbans on One Platform

Chroma FDP can establish new kanbans according to requirements of different areas and set up templates through a single managing platform. Each functional module can be configured by dragging and then distributed to each area's eKanban to present on-site managers with a variety of integrated information. The configurable functions include picture files, weather information, clock, scrolling text, dashboard, chart and diagram, bulletin board, tables, and embedded web pages.



OPTIONAL MODULES/PERIPHERAL SYSTEMS

Intelligent Equipment Management System: iEMS

Instant and Precise OEE Control

The intuitive interface controls equipment reports in real time, such as OEE, utilization, and preventive maintenance reports. Users can instantly review and formulate improvements when necessary.

Early Shutdown Warnings through Big Data Analysis

The system monitors equipment data, integrates and compares production information, thereby finding the data models before equipment abnormalities occur. This prevents the production line from being shut down.

Automatic Maintenance and Calibration Notifications

Pre-program equipment maintenance or calibration schedules, the system will remind users of the itineraries in advance.

Device Status Check in Real Time

Query data on equipment maintenance and repair log at any time, the system will sort out the equipment use and maintenance status in real time.

Easy Integration of Various Devices

Developers can return the machine's real-time status and test data to the iEMS platform system through OPC, MSMQ, or API.

Cloud Library

All repair call, maintenance, and machine status data are automatically uploaded to the database in the cloud, where users can grasp the complete equipment log.

KEY FEATURES

- Real-time and precise OEE control
- Early shutdown warnings through big data analysis
- Auto maintenance and calibration notifications
- Device status check in real time
- Easy integration of various devices
- Cloud Library

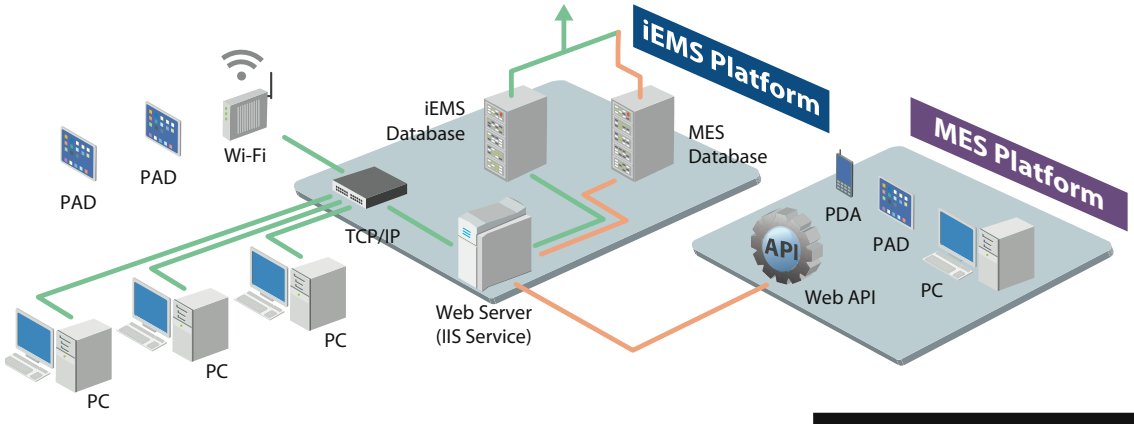
APPLICATIONS

- Equipment information management
- Preventive maintenance and calibration
- Visual equipment status monitoring
- Maintenance calls and repair reports in the cloud
- Real-time management of components usage
- Web operation for mobile devices
- Integrated asset management
- Management reports

Chroma iEMS Advantages

Open System Structure

Most equipment management systems are single module functions in the MES system and are closed systems, unable to integrate with other systems or even with other equipment. Chroma iEMS provides integration methods such as OPC, MSMQ, and Chroma API. The open interface can receive equipment data in real time and the open database can be integrated with the customer's asset management system.



Integrated Equipment Management and Status OEE

The majority of equipment management systems separate the equipment management functions from the equipment status monitoring functions, so users need to work across different interfaces or software programs simultaneously to handle both. Chroma iEMS integrates the management and status monitoring on one platform, making it easier for users to operate.

Join the Training Platform

Chroma iEMS connects to Chroma i-Learning, a training platform where you can watch online training videos for equipment maintenance, repair, calibration, and other operations. This greatly simplifies and shortens the training of your personnel.

iEMS Functions

Equipment Information Management

- Basic equipment information (factory data, manuals)
- Maintenance record
- Maintenance details
- Repair history
- Equipment components replacement record
- Equipment borrow and return record
- Annual survey
- Maintenance schedule
- Equipment capability screening

Preventive Maintenance and Calibration

- Routine inspection
- Maintenance inventory
- Maintenance result
- Maintenance instruction
- Maintenance audit
- Maintenance result figure upload
- Maintenance order scheduling plan
- Equipment maintenance plan
- Equipment maintenance SOP display

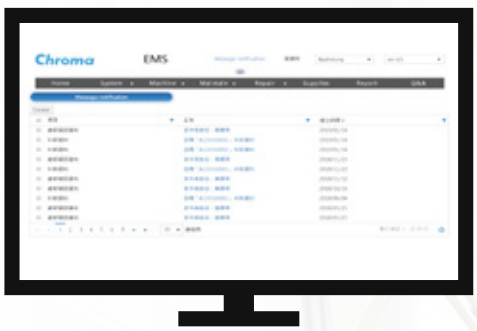
Maintenance Calls and Repair Reports in the Cloud

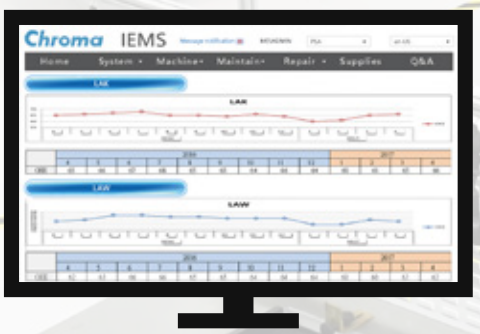
- System auto maintenance call
- Maintenance report
- Cloud Library
- Maintenance manual
- Maintenance record
- Maintenance notices
- Abnormal figure upload
- Equipment abnormalities traceability

Visual Equipment Status Monitoring

- Equipment management report
- Idle equipment report
- Overall Equipment Effectiveness (OEE) *
- Equipment utilization rate *
- Equipment mobility *
- MTBF data trends *
- MTTR data trends *

* Require EAP module





Real-time Management of Consumable Usage

- Equipment components replacement record
- Spare parts list
- Material warehouse entry
- Material inventory display
- Spare parts supply notification
- Spare parts management

Integrated Asset Management

Includes automatic updating of equipment depository, equipment lists according to the internal asset management system of your company, and attribute data synchronization.

Web Operation for Mobile Devices

- Interface message notification
- E-mail instant notification
- Factory management report
- TS management form
- Equipment cause of failure analysis
- Consumables usage
- Present equipment status
- Equipment utilization analysis *
- Maintenance efficiency analysis

* Requires EAP module

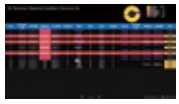
OPTIONAL MODULES/PERIPHERAL SYSTEMS

Warehouse Management System: WMS

Chroma's Warehouse Management System provides a solution for basic warehouse management functions, such as receiving, warehousing, dispatching, first-in-first-out, allocation, storage, return management, and other processes. WMS not only integrates ERP documents for inventory synchronization, but also uses task delivery to automatically notify personnel or equipment in accordance with the system instructions, and integrates data in both ways.


Storage scan


Document scan


Receiving real-time kanban


Reel ID shelving scan


Instant warehousing

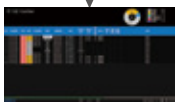

Reel ID retrieval scan

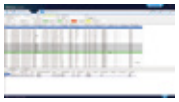

Site ID distribution scan


Reel ID work completion scan


Production real-time kanban

Receiving | IQC | Shelving | Order creation | Retrieval | Zoning | Distribution | Production deduction | Order shipment

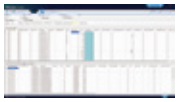

IQC real-time kanban

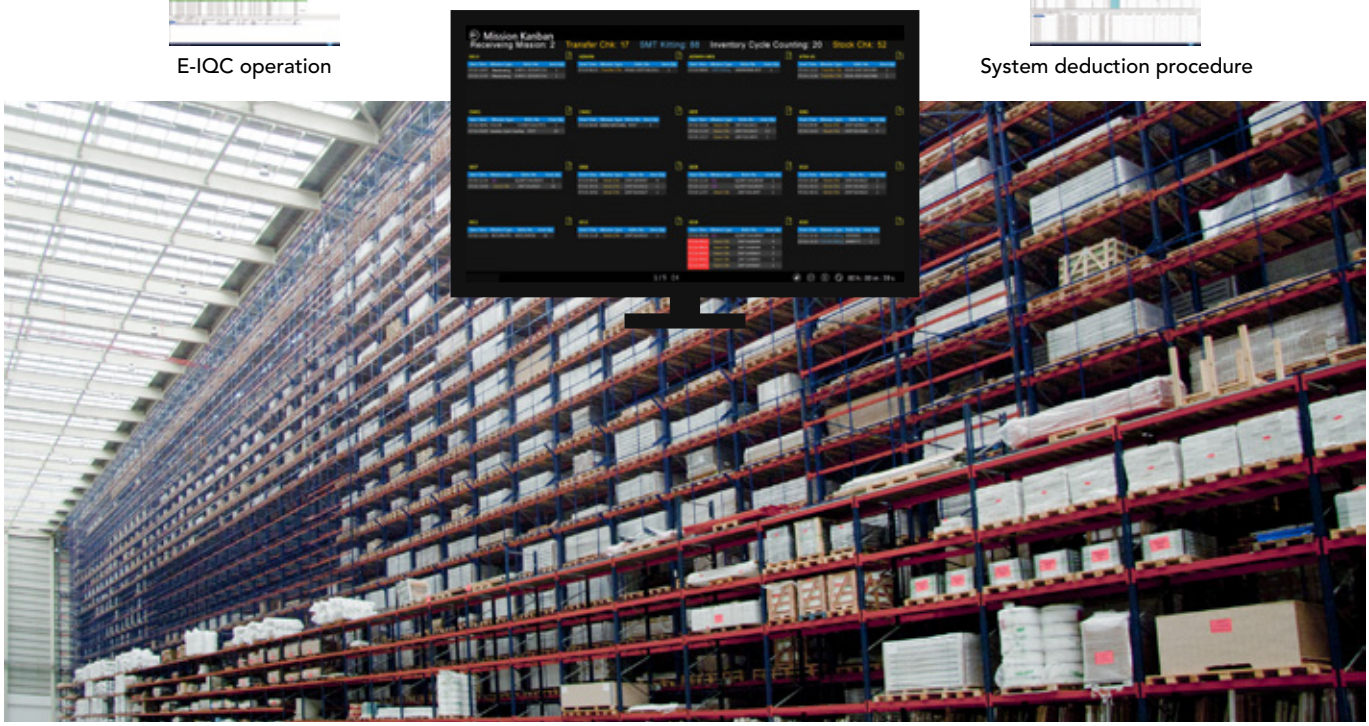

E-IQC operation


Work order real-time kanban


Reel ID retrieval scan


Assembly deduction scan


System deduction procedure

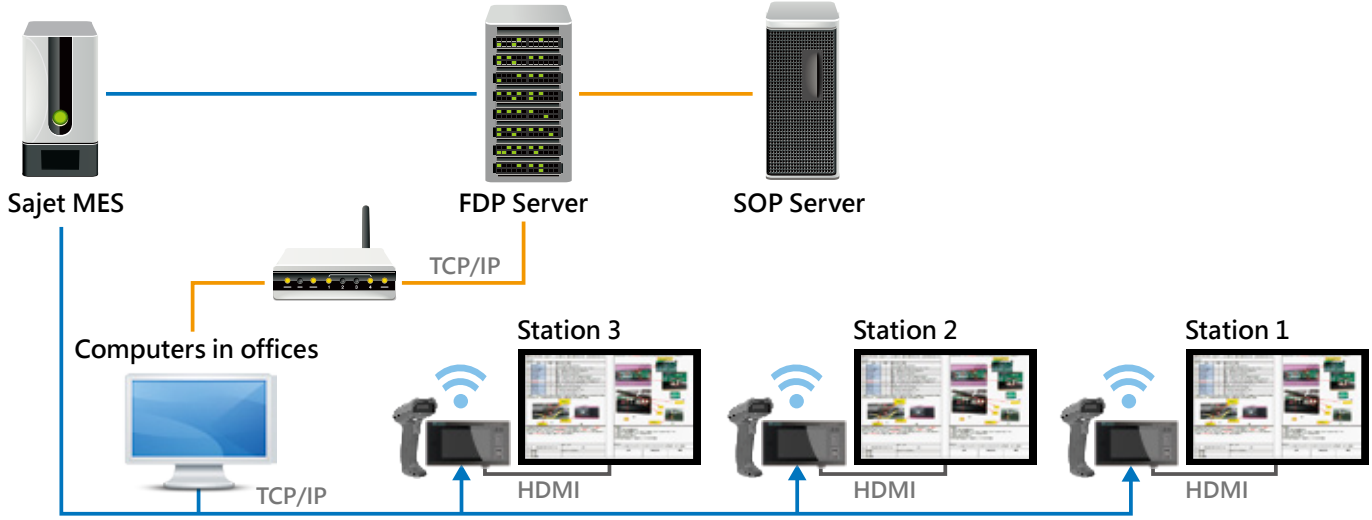


Real-time APP Reports - Yield Rate Report, WIP Report

Chroma Sajet MES incorporates its top-rated powerful MES database technology with real-time data connection to administer every work item precisely. Chroma's unique report generator provides full report query and instant report generation. Various mobile devices like smartphones, PDA and tablets can be used to examine the report and get an immediate snapshot of the factory status. Besides being easy to maintain, Sajet MES can also be integrated into the BI (Business Intelligence) system so that managers can view thorough reports of the production line.

Electronic Standard Operating Process (eSOP)

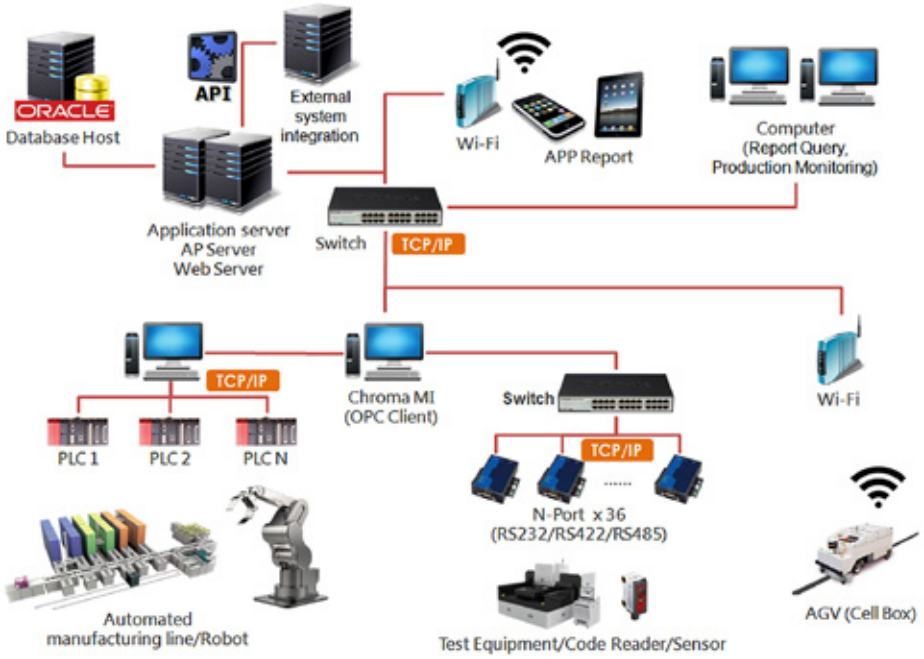
MES automatically sends electronic SOP documents per line and station, and the system instantly guides production line personnel through the operation. The system automatically sends the relevant documents according to the product's serial number, to prevent IE personnel from sending the wrong documents and so wasting paper.



AUTOMATED EQUIPMENT MODULES

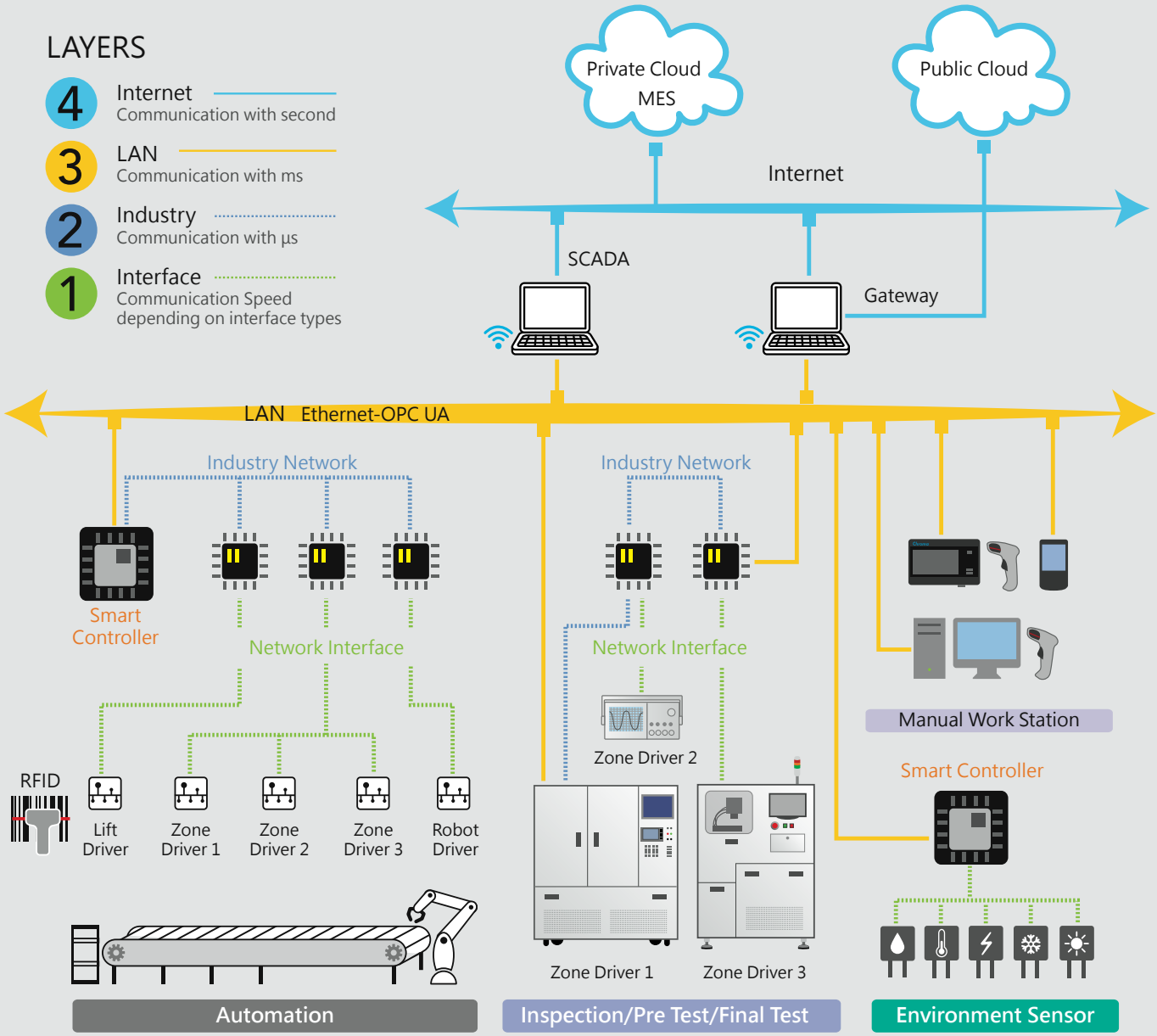
Equipment Automation Program: EAP, Computer-Integrated Manufacturing: CIM, Automatic Test Equipment: ATE

Chroma Sajet MES collects production data, reads RFID to identify product identity and quantity, and connects with EAP through the OPC and equipment PLC, automatic arm, automated production lines, automated guided vehicle, and other automation equipment. Chroma Sajet MES provides an API interface for testing program integration to achieve integration of equipment with a variety of data communication methods, including SECS/MQ/RV/OPC, and so on.



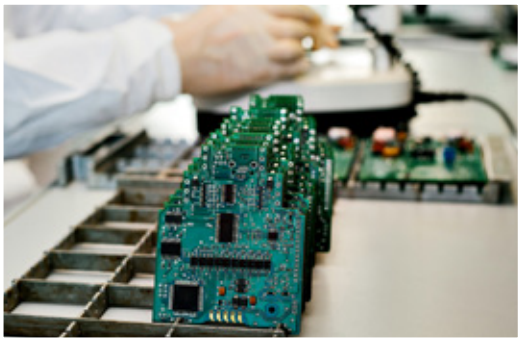
CHROMA SAJET MES – STRUCTURE OF SMART FACTORY

Chroma is not only a supplier of professional MES solutions, but also a global leader in test & measurement instrumentation and system integration. In addition to combining the existing R&D resources in the Chroma Group, Chroma Sajet MES has the ability to connect with various devices, providing a comprehensive automated information integration solution for both hardware and software. As factory manufacturing continues to evolve toward automation, Chroma Sajet MES will upgrade constantly to fulfill customer requirements for sustainable development and service.



DIVERSE INDUSTRIAL APPLICATIONS - COMPLETE SOLUTIONS FOR MYRIAD INDUSTRIES

Electronics Assembly

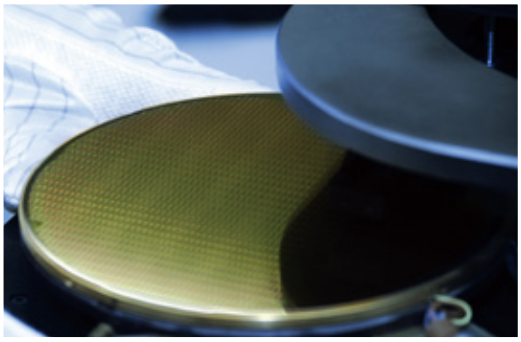


(1) Accurately controls material use, providing batch and serial numbers for material receiving, IQC, delivery, usage, warehousing, and shipping.
(2) Foolproof feeding management has clear prompts and full control, to prevent materials misusage and to control material costs more precisely.
(3) Test operations combine automation with SPC Online Control to benefit quality management.

Battery

(1) The equipment connection platform integrates large amounts of test data to realize real-time production control, status reports, and test data analysis for instant production monitoring and feedback.
(2) Recipe and graded management are based on battery characteristics for accurate control over process quality.
(3) Collects data and connects the whole process, with quality traceability and equipment control as well as production management, thus realizing equipment interconnection and data unification.

Semiconductor



(1) All throughout the long semiconductor process and the wide variety of automated machines, the precise process control sets production parameters, reads WIP quantities, and collects production data.
(2) Detailed recording of the wafer manufacturing process and setting of corresponding prompts allows easier control and reduced abnormalities during the manufacturing process.
(3) Quickly and accurately displays the investment cost situation to effectively save production costs, improve efficiency, and strengthen competitiveness.

LLED & Solar Energy

(1) Accurately controls the inspection process and links the production process and batch operation of the verification figures, to meet different levels of picking and sorting.

(2) Operation procedures, such as bin discrimination, are based on product process characteristics, and make automatic judgments through the system bin settings.

(3) Automatically calculates units for the product batch number, depending on the conversion of product types as well as the operation process and unit control of production lines, for complete recording of material usage in the field.

Precision Hardware

(1) System management is necessary when expanding an enterprise or automation process, to reduce human errors, improve process efficiency, and quickly respond to customer needs.

(2) Collects information through the process trigger sensor and then executes equipment reporting, utilization rate analysis, etc., in order to record the actual machine operations and calculate various production statuses via interface or machine operation.

Passive Components

(1) The systematic platform offers control of flexible changes in the production process as well as bundled control of each station's production data, in order to advance control and production of small and diverse batches amidst the current transformation and automation of production patterns.

(2) Integration of systematic platforms and equipment provides productivity analysis to the real-time records of both personnel and equipment for higher control over production costs.

CHROMA I-LEARNING

Instant Learning, Fast Mastery

During the process of introducing MES into the company, our continuous focus is on the effective use of the software by all personnel.

Chroma i-Learning provides comprehensive training courses for the functions and operation of each software module. This online learning platform creates training plans for all levels of personnel for them to learn effectively, regardless of geographical or other constraints. The complete online test functionality ensures the successful use and implementation of the technology throughout the entire enterprise.

Whether it is for personnel on the production line, or for equipment maintenance and calibration, and whether the company already has integrated or plans to introduce Sajet MES, Chroma i-Learning will ensure that teams and entire enterprises are effectively trained in the MES technology.

Core learning audiences:

- Management staff:
  instant checks of individual learning processes
- QA staff:
  modules related to QA (quality assurance)
- Production line staff:
  processes for system operation
- Information staff:
  software development and maintenance training

KEY FEATURES

- Online video learning at any time
- Learning plans for each staff position
- Online test and certification system
- Certification binding to MES operation permission
- Certification binding to HR assessment system
- Complete connection with routine equipment maintenance and calibration

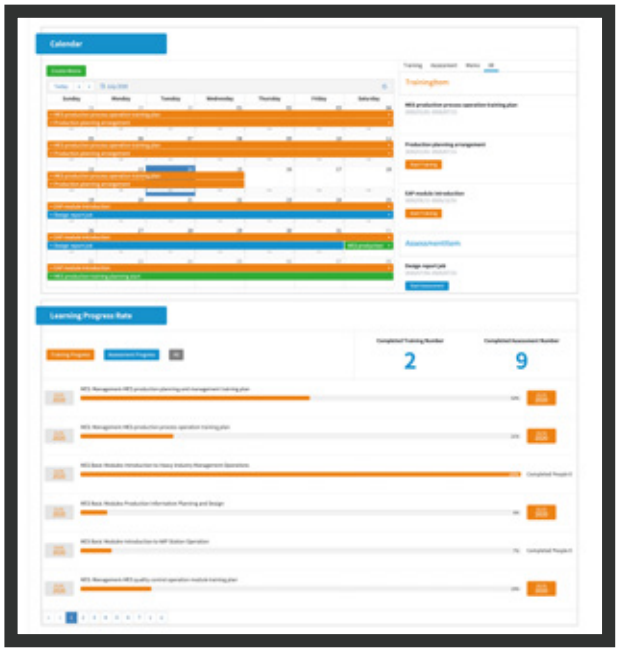
FUNCTIONS

- Personalized training course data
- Individual learning plans development
- Instant annotation to each video node
- Video exam questions
- Online discussion area
- Instant query of individual learning reports
- Organization nodes in learning plans
- Role decentralization management

Digital Learning to Reduce Time and Labor Costs

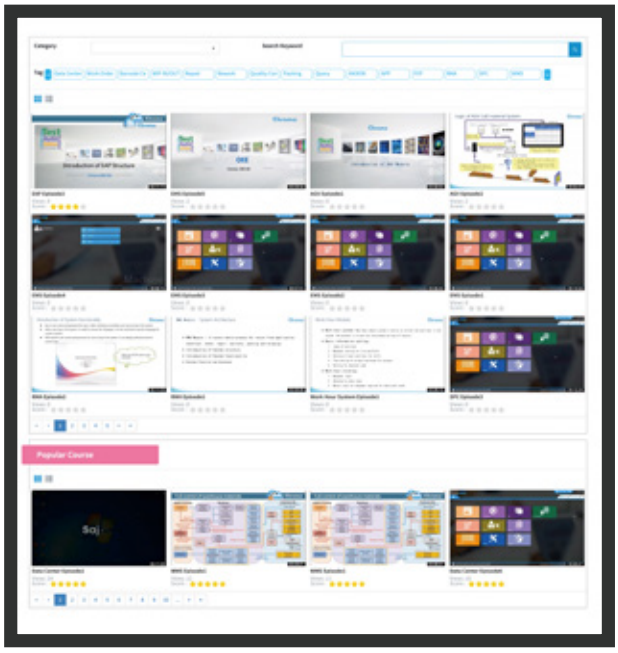
Personal calendar · Control over learning plan

The clear interface automatically imports learning plans for each software module into the personal calendar, enabling clear control over the learning process.



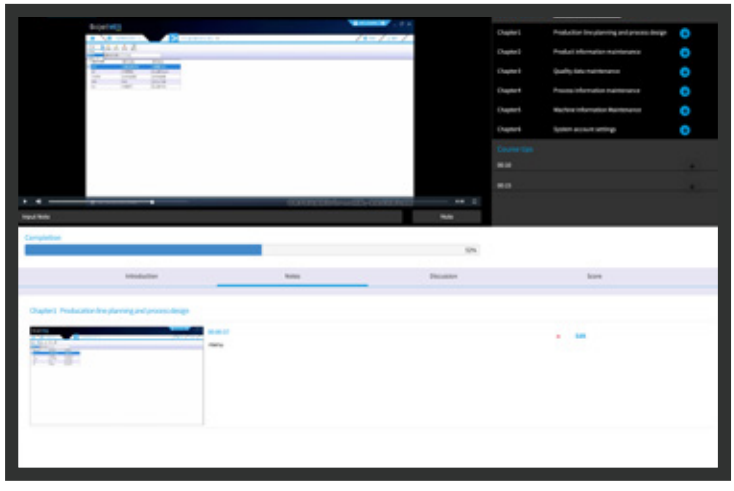
Abundant videos · Flexible independent learning

In addition to course videos, students can also refer to videos on Sajet MES modules and peripheral systems as needed.



Instant annotation · Deepen effective understanding

The built-in course note functionality in the videos make it easy for students to review the course content.



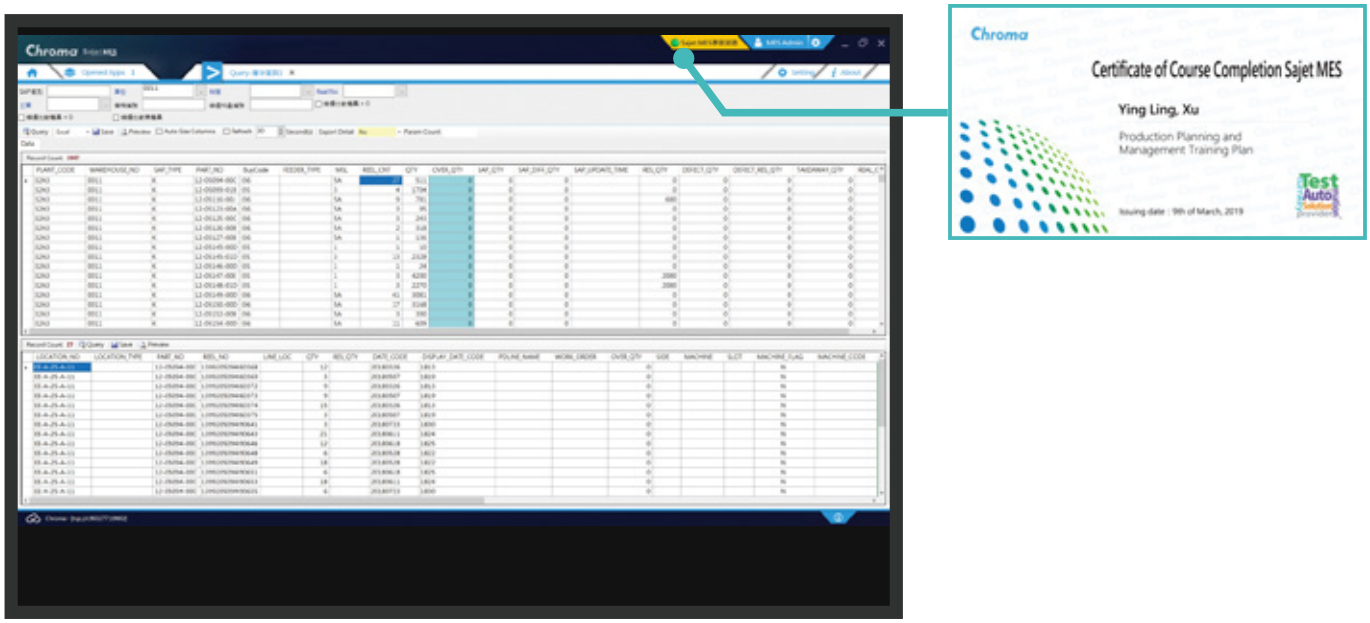
Inspect Learning Results and Integrate into MES & HR Systems

Online testing · Abundance of test questions

The rich test item bank offers a wide variety of online questions and multimedia quizzes (with video), a quick response to learning results, and instant test results.

Certificate issuance · Binding MES review

Based on the test results, the system automatically reviews and connects with the MES system, to ensure that the staff can actually operate on the production line.



COMPLETE HARDWARE INTEGRATED SOLUTION SATISFIES VARIOUS NEEDS

Integration of Various Devices

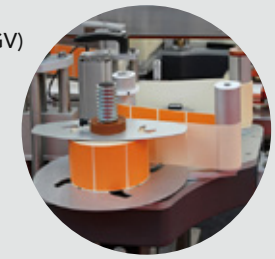
- ☑ Various test equipment from Chroma
- ☑ Manufacturing database online control program development and implementation

Automatic Equipment

- ☑ Automatic labeling machine, laser engraving machine, etc.
- ☑ Fully automatic test equipment solution

Smart Logistic Equipment

- ☑ Labeling Machine
- ☑ Automated Guided Vehicle (AGV)



Industrial Network Peripherals

- ☑ Data collector, IPC
- ☑ TCP/IP, RS232, USB signal converter, etc.

Barcode Printing Device and Sensor Switch

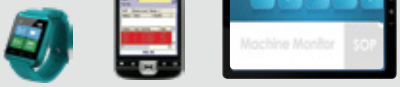
- ☑ Long/short range optical switching system
- ☑ Various industrial barcode printer

Optical Scanning

- ☑ Various handheld 1 & 2 dimension gun type barcode scanner
- ☑ RFID Reader, fixed barcode scanner system, etc.

Mobile Application Management Devices

- ☑ PDA, Tablet Computer, smart watch (iOS/Windows/Android)
- ☑ Wireless Scanner, wireless Terminal, etc.



Display Device Management

- ☑ Various production efficiency dashboards
- ☑ Factory notice dashboard, Pick To Light, etc.

Other Electro mechanics and Factory Device

- ☑ Temperature controller, electronic scale
- ☑ PLC, connectable device (Scanner), etc.

SYSTEMS & FUNCTIONAL MODULES

Chroma Sajet MES version .NET 2019 supports Oracle Database 11gR2/Oracle Linux 6.5/Oracle Linux 7

The MES basic modules mainly contain basic modeling, product setting, permission control, management and traceability of production stations, and report display.

	Basic Modules	Description
1	Data Center	Sets up basic information including factory ID, production line ID, process, workstation, test item, and device.
2	W/O Manager	Establishes the work order; changes statuses; and assigns the production schedule.
3	Barcode Center	Sets up serial number coding rules; automatically extends number sequence; and integrates with label editing software to print labels.
4	Terminal Gateway Service (TGS)	Collects data; controls devices; edits production behavior; and monitors workstation statuses.
5	Repair	Records the causes of abnormalities; reports responsibilities; ranks defects; and lists details of parts replacement.
6	Rework	Defines the rework schedule based on production conditions; controls skip station, parts disassembly and repackaging.
7	Quality Control	Defines the batch, inspection item, and AQL parameters; and records the measured values by the inputted serial number.
8	Packing	Sets the package specification and automatically generates the box number; prints the labels by production line; and connects with the weighing machine.
9	R/C Manager	Sets out the batch R/C number, the layout design, and batch separation/ combination based on the work order.
10	Report	Customizes the report development tools as desired; provides standard report formats per industry.

The optional modules and peripheral systems must be imported with the basic modules and include ERP integration, shipping operation, fixture management, as well as SMT error material prevention and raw material control in the electronic assembly line. Moreover, they can perform system control of warehouse management, execute pull management of materials, and integrate production lines and warehouse information without ready connections.

	Optional Modules/Peripheral Systems	Description
11	Fast Dashboard Player (FDP)	Provides a web-based management interface with customizable kanban style; and plays its contents using a wireless receiver.
12	Electronic Standard Operating Process (eSOP)	Supplies electronic SOP for production line operators, connective with the MES system; and displays the current model SOP immediately when the user scans the barcode.
13	Intelligent Equipment Management System (iEMS) incl. calibration, verification and repair management	Provides equipment maintenance planning and calibration management; monitors the equipment's status; and calculates the utilization rate through a factory layout diagram.
14	ERP/MES Interface	Integrates with multiple ERPs by providing an intermediate layer to define the exchange data fields, frequencies, and conditions.
15	Incoming Quality Control (IQC)	Records the raw material quantity and quantitative statistics; and defines the inspection rules.
16	Material Requirement System	Personnel can notify the warehouse through a mobile device to distribute materials, based on the material consumption status.
17	Material Movement and Pull System (MMPS)	Automatically reminds the warehouse to distribute material through the AGV, based on the material consumption status.
18	Material Warehouse	Generates labels for raw material; prompts for first-in-first-out; and manages expiration dates.
19	Warehouse Management System (WMS)	Provides basic warehouse management functions including receiving, warehousing, dispatching, FIFO, allocation, storage, return management; and integrates ERP documents for inventory synchronization.

Continued on next page

20	SMT Auxiliary Material (Solder Paste, Red Glue, Moisture Sensitive Devices) Management	Tracks and manages the use of SMT auxiliary materials to avoid abnormalities in product quality caused by the use of unqualified materials on the production line.
21	SMT Equipment Data Analysis System	Connects to the SMT equipment in the automated production line including ICT, REFLOW, and AOI; and obtains equipment data for analysis.
22	SMT Error-proof Material Control System	Implements the workstation material tables into the system for SMT error-proof material control and tracing.
23	Alarm System	Defines alert conditions; and sends alerts via warning devices, emails, and text message.
24	Tooling Manager	Sets the serial and sequence numbers of fixtures and tools; and forms usage time and count control mechanisms.
25	Aging test System	Integrates a variety of different aging test equipment; and analyzes the retrieved data.
26	WIP IN/OUT	Collects incoming and outgoing batch data; defines conditions for process, parameters, and workstation pass through.
27	Work Hour System	Calculates labor productivity and efficiency, working hours, abnormal working hours, actual production hours, etc.
28	Real-time SPC	Integrates MES test results from each workstation into SPC charts, with instant SPC monitoring.
29	Shipping	Integrates ERP shipping orders; and records shipment details via wireless devices.
30	App Report	Provides iOS and Android versions of the report app with customizable report access permissions, conditions, and fields.
31	Return Materials Authorization (RMA)	Single sites provide application, acceptance, inspection, maintenance, warranty period, packaging and shipping procedure for product repair services.
32	Global RMA System	Supports multiple sites for repair services and spare parts inventory; and assists in constructing a product after-sales service and maintenance record system.
33	Cloud barcode printing platform	Instantly dispenses material barcodes from the supplier to the customer, based on their material requirements, through the cloud-printing platform; and immediately pastes the barcode labels during shipping.
34	Energy/Carbon footprint platform	Real-time display of energy consumption and carbon footprint data, real-time monitoring dashboard, along with the ability to access historical data for analysis and response strategies.

Automated equipment models can be imported both independently of or combined with basic modules. They contain comprehensive management and control of automation equipment on the production line, including data collection, recipe management, and kanban display.

	Automated Equipment Modules	Description
35	Equipment Automation Program (EAP), Computer-Integrated Manufacturing (CIM), Automatic Test Equipment (ATE)	Integrates all kinds of automation equipment in the production line; and supports multiple communication protocols, such as OPC UA, SECS/GEM, Modbus, RS-232, RS-485, RS-422, MQTT etc.
36	IoT Gateway	Industrial communication platform supporting OPC UA and SECS/GEM standards for real-time data integration. Features unlimited connection capacity and high-frequency data transfer, with a low-code Web interface for easy configuration.
37	Overall Equipment Effectiveness (OEE)	Obtains the OEE status in real time, to help the supervisor solve problems instantly and to improve the efficiency of the factory equipment.
38	Formation Management System (FMS)	Provides a battery cell measurement equipment integration platform, including recipe management, real-time monitoring, and grading rules setup.
39	Recipe Management System (RMS)	Manages the recipes, parameters, and versions for products and equipment.
40	Automatic Guided Vehicle (AGV) Manager	The unmanned handling system integrates an auto delivery system to control the recipe versions of automated production devices, programs, or parameters.
41	Pick to light	Prompts a light signal to automatically notify the storage location of the material to be picked, based on the stock preparation request from the electronic rack.

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202411-MES-brochure-EN-PDF