

SINSEGYE



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Industry application

PC based iComputer comes SINSEGYE



SINSEGYE

— A Our advantages

— B Industry application

3C electronics industry

- 01 Watch assembly equipment
- 02 E-cigarette assembly line
- 03 Vehicle-mounted connector assembly line

Semi-conductor industry

- 01 Eutectic placement machine
- 02 Wafer wet cleaning equipment

Laser industry

- 01 Laser master
- 02 3D 5-axis laser cutting equipment

Photovoltaic industry

- 01 Silicon wafer testing and sorting machine
- 02 Series welding machine
- 03 Multi-wire cutting machine

— C Software application

- 01 Control + intelligent guard and diagnosis system for equipment
- 02 Control + decision-making assistance system for production
- 03 Control + robot sensing and control system

PC based **iComputer** comes SINSEGYE

SP7000 series Industrial Intelligent Computer



SX5 series compact intelligent computer



SP6000 series Industrial Intelligent Computer



SP7000s series Industrial Intelligent Computer



SX2 series Standard Intelligent Computer



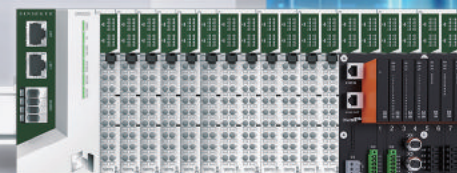
SX58 series Standard Intelligent Computer



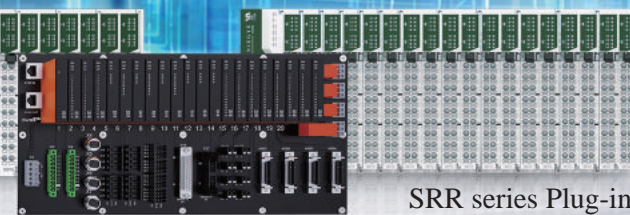
SV Rotating Servo driver and motor



SRE series Plug-in IO products



SRR series Plug-in IO products



SC series Ultra Compact IO products



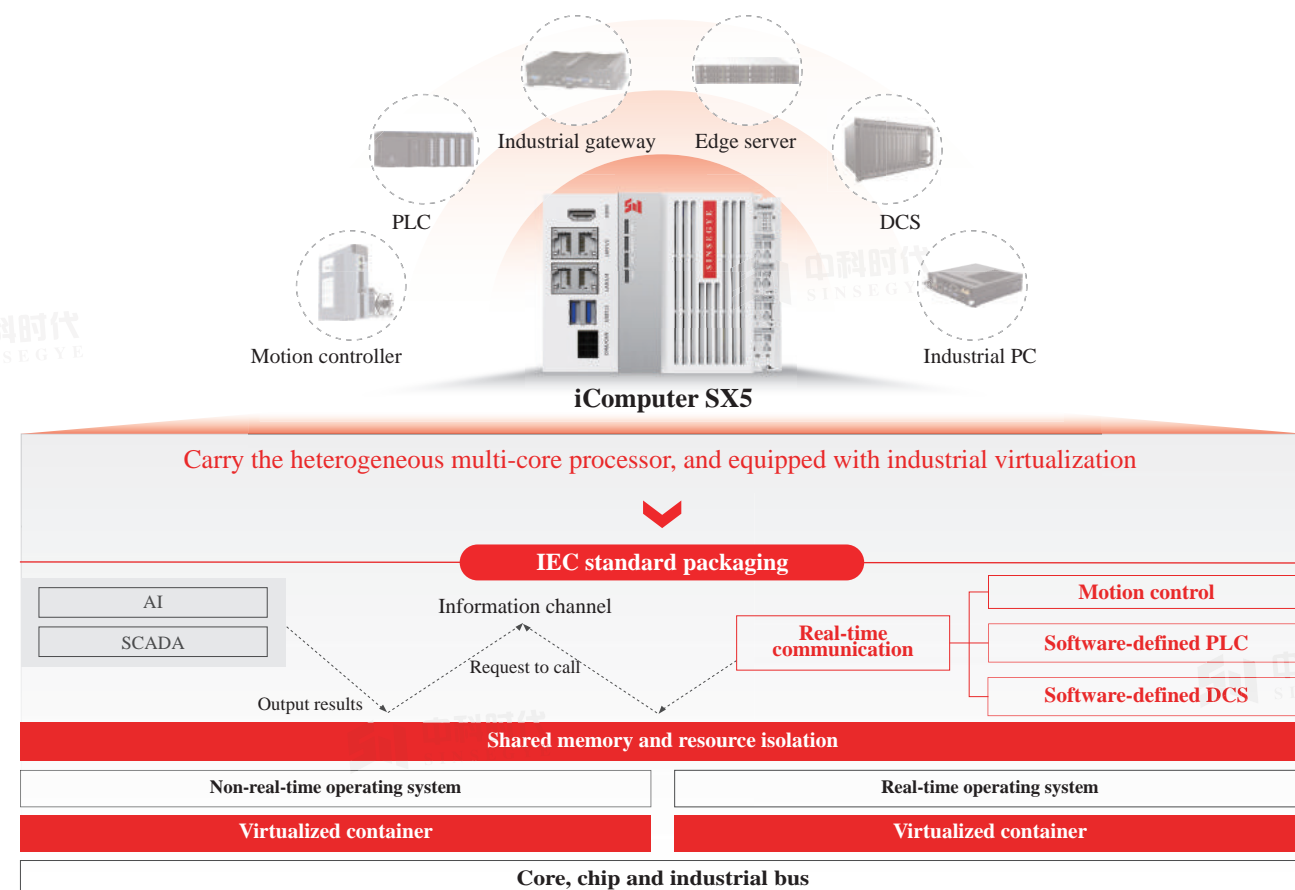
Automation- **MetaOS**
MetaFactory

The very beginning of the new world

Our advantages

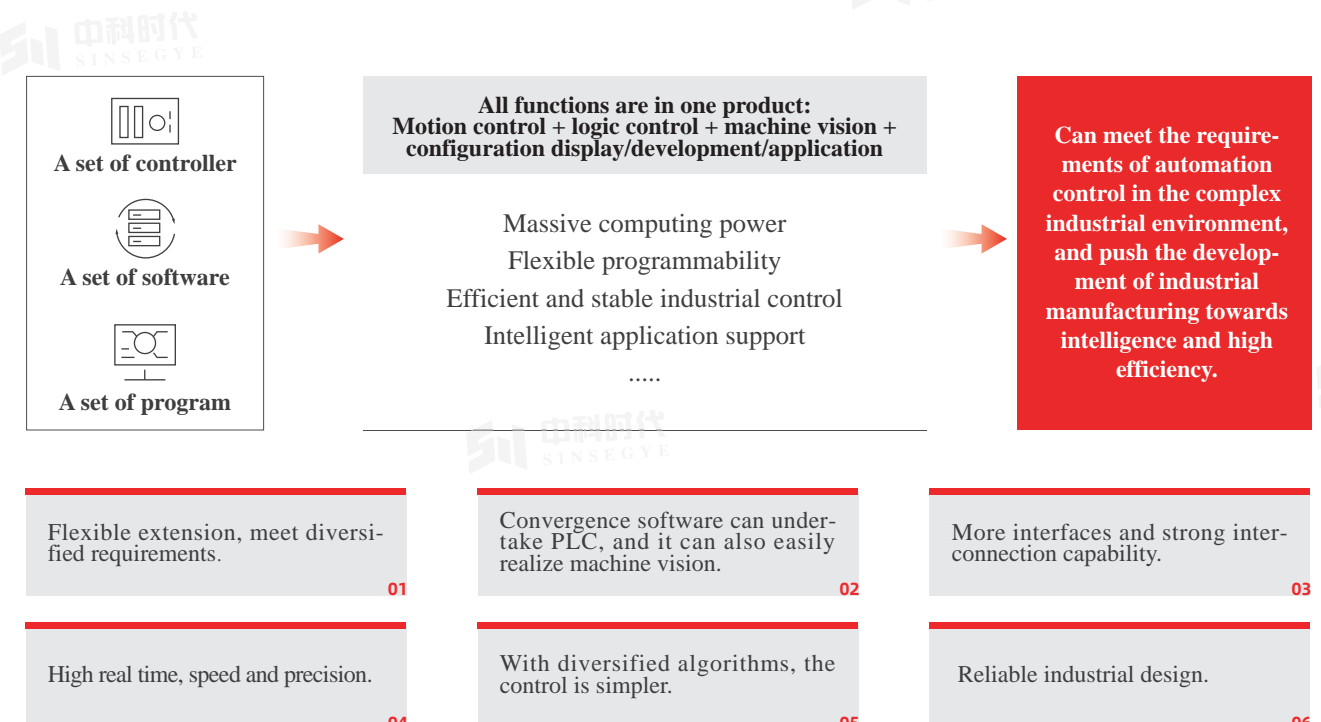
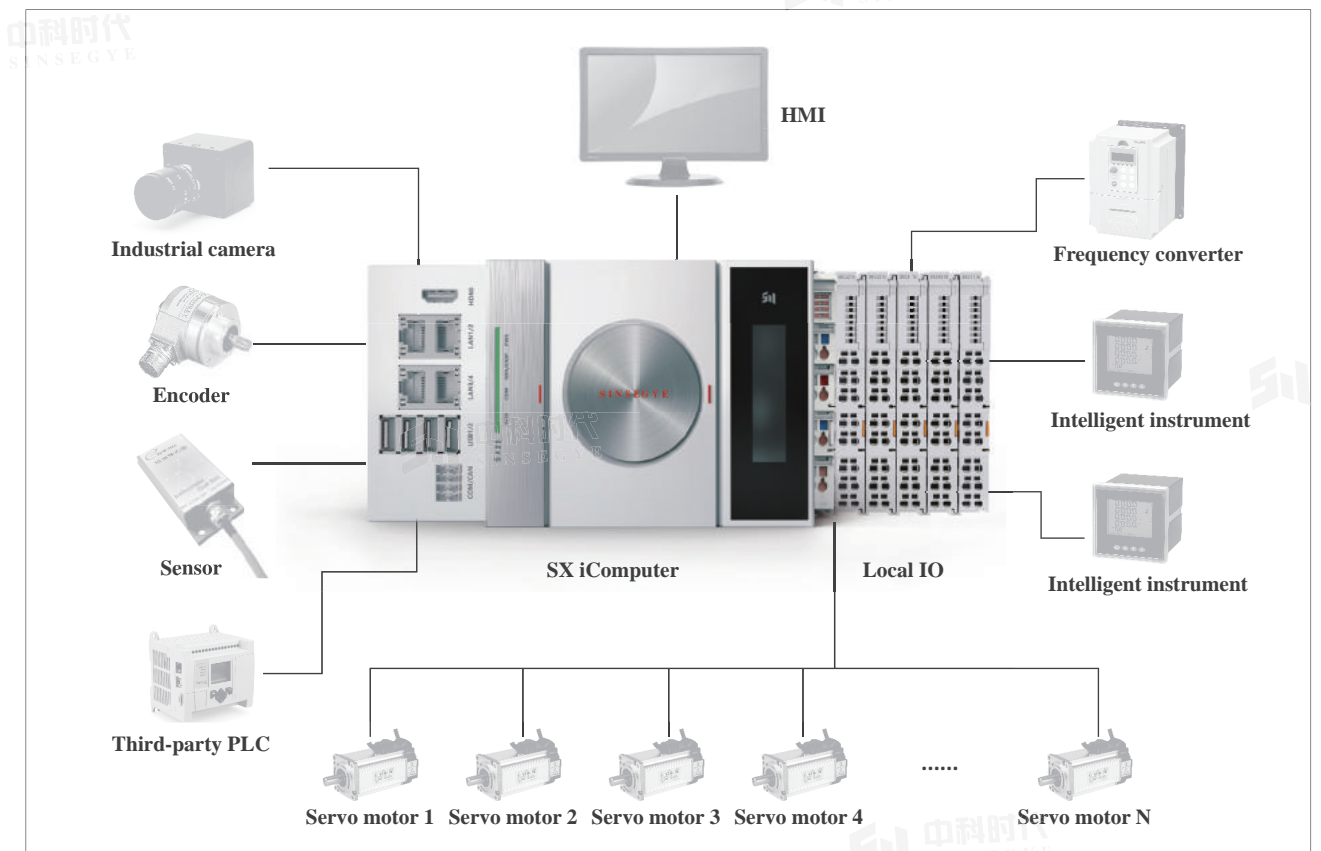
Era transformation of industrial iComputer

iPhone of the industrial control: Integrated with edge AI acceleration, real-time control acceleration and virtualization acceleration.



Meeting different control requirements in complex industrial environment by one set of iComputer

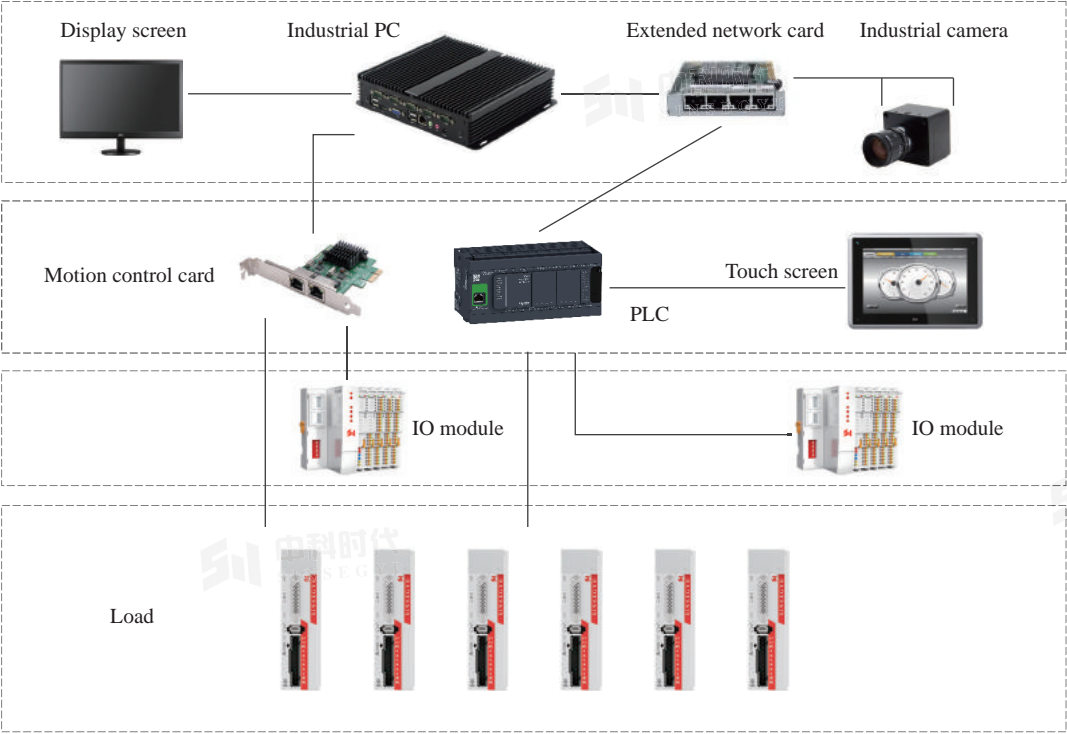
Push the development of industrial manufacturing towards intelligence and high efficiency.



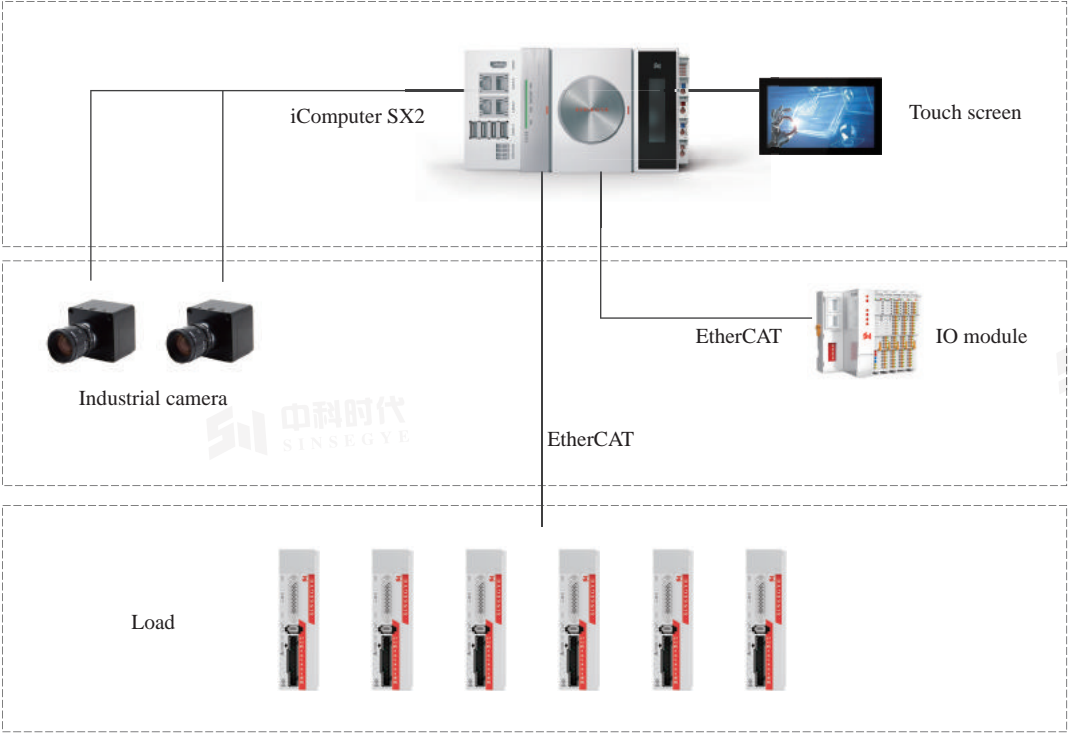
Comparison of control schemes

Production requirements: The control requirements for one set of equipment or a production line generally cover PLC control, NC axis control + HMI + vision.

Control Architecture Diagram for Conventional Scheme



Control Architecture Diagram of SINSEGYE Computable Manufacturing Scheme



VS

Conventional solutions	
The conventional system is of an architecture composed of the industrial PC + PLC and other controllers, it has 2 to 3 layers, and it has a large size	Hardware integration
Distributed architecture, low real-time performance of the system	Real-time performance
The conventional automation equipment requires several engineers for upper/lower computer development, and the software shall be deployed in each controller separately	Software integration
Traditionally, the upper computer shall be installed with expansion boards and extension slots are required, resulting in limited extension and rising cost	Flexible extension
Conventional controllers only brands are domestic	Domestication
Single interface protocol and limited flexibility of protocol docking	Multiple interfaces
The adaptation of the upper and lower computer requires a lot of transfer and adaptation work	Information interaction
Due to limited computing power, the conventional architecture control layer cannot efficiently process large amounts of data	Performance
Digital transformation and intelligent scenario adaptation are not friendly	Scenario adaptation
Due to multiple devices, the purchasing cost, equipment, debugging/labor costs go up	Cost

PC based iComputer comes SINSEGYE	
One set of controller has the functions of motion control, logic control, machine vision and configuration display at the same time, and it is compact in size	Hardware integration
The dual-domain operating system of real-time domain and non-real-time domain share the memory interaction mechanism, and the transmission and control has low delay, ensuring real-time performance	Real-time performance
A set of software is compatible with the development of motion control, logic control and machine vision configuration display, improving programming efficiency and allowing everyone to program	Software integration
Support local and remote I/O extension modules to carry out data acquisition and control for users, transmit and offer a variety of I/O and process modules, simultaneously support the extension modules of graphic cards, network interfaces, serial ports, 4/5GWIFI, and meet on-site functional requirements of customers	Flexible extension
All key components like: CPU, GPU card, Chips are made-in-China. Customers could select different configurations according their needs	Domestication
Flexible configuration of interface protocols, support most mainstream control protocols	Multiple interfaces
Through shared memory between operation domains, transmit large amounts of data efficiently and stably	Information interaction
PC-based controller excels in high computing power and can allocate computing power in real-time domain and non-real time domain in accordance with needs	Performance
Adapt to the digital and intelligent scenarios	Scenario adaptation
Integration facilitates deployment, reduces equipment costs, and improves development and debugging efficiency	Cost

>>>>> Industry application

01 Watch Assembly Equipment



Introduction to models

Key equipment assembling of iWatch

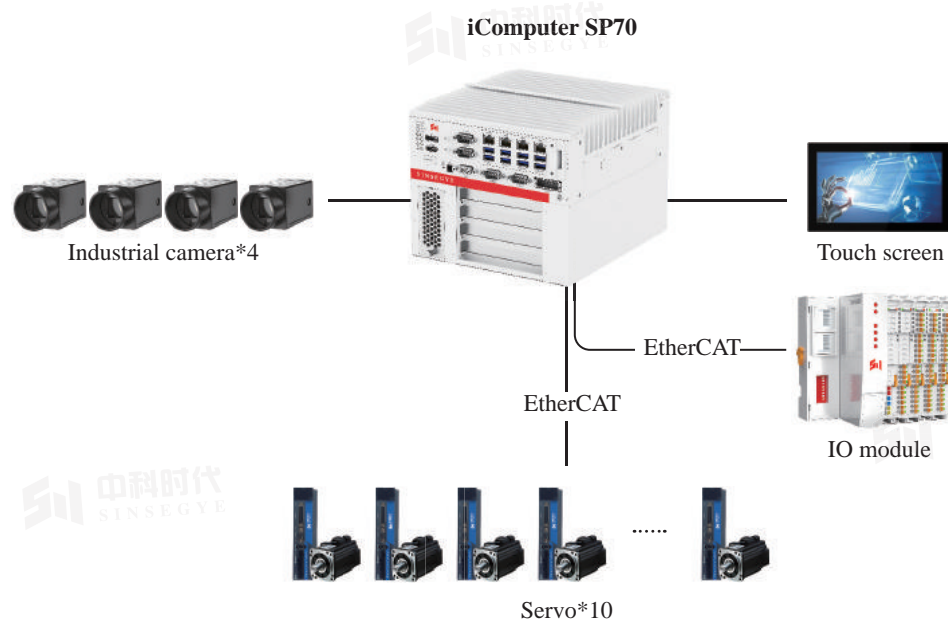
Operating principles

Complete the PCB screw locking function of Watch, the attaching function of StickTape, and perform the testing after the assembling and attaching mainly through precise visual positioning guidance. During the assembling process, save the pictures of locked screws and attached StickTape in real time.

Features of scheme

System architecture: The hardware is upgraded from the multi-system complex state of "IPC+H-MI+PLC motion control card" to the single-system stable state.
Low cost: The hardware cost is reduced by 20%.
High-speed communication: Upper computer software - PLC real-time control interaction is "high-speed" and "stable" (shared memory mechanism, and local network communication).
Strong scalability: Particularly for third-party electronic products, support more than 8 circuits of serial ports or network interfaces.
Labor saving: R&D personnel can be reduced from 3 persons to 1 person.
Flexible: The software can develop a logger, so problem tracing is no longer difficult.
Stable: Based on Hypervisor technology, non-real-time environment can be restarted without affecting the running of program on the real-time side.

Control architecture diagram



02 Electronic Cigarette Assembly Line



Introduction to models

The automatic E-cigarette assembly line is used for the fully automatic assembly of E-cigarettes (small cigarette) atomizers. The assembly accessories include atomizer connectors (connectors with battery rods), silicone insulation sleeves, center electrodes, wire link terminals, heating coils, fiber-glass cotton, oil storage cotton, and outer casing (stainless steel casing). You can choose to add the automatic oil filling function to automatically assemble the the nozzle cover at the same time.

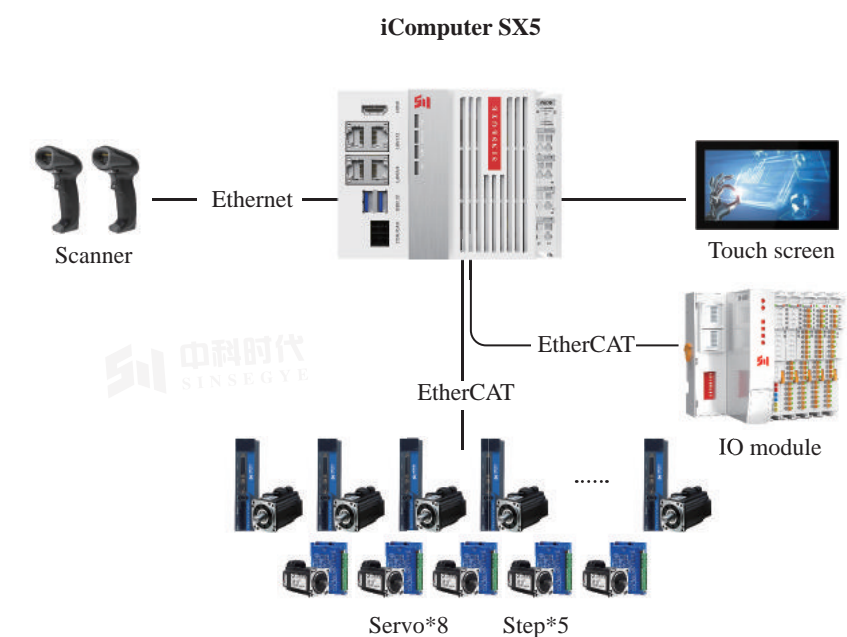
Operating principles

The E-cigarette assembly line includes a conveying device as well as a loading device, a correction device, an oil filling device, a rubber stopper installation device, a resistance testing device, a cigarette holder installation device, an air tightness detection device and an unloading device set along the conveying device.

Features of scheme

System architecture: The hardware is upgraded from the multi-system complex state of "IPC+H-MI+PLC motion control card" to the single-system stable state.
Low cost: The hardware cost is reduced by 20%.
High-speed communication: Upper computer software - PLC real-time control interaction is "high-speed" and "stable" (shared memory mechanism, and local network communication).
Strong scalability: Particularly for third-party electronic products, support more than 8 circuits of serial ports or network interfaces.
Labor saving: R&D personnel can be reduced from 3 persons to 1 person (theoretically).
Flexible: The software can develop a logger, so problem tracing is no longer difficult.
Stable: Based on Hypervisor technology, non-real-time environment can be restarted without affecting the running of program on the real-time side.

Control architecture diagram

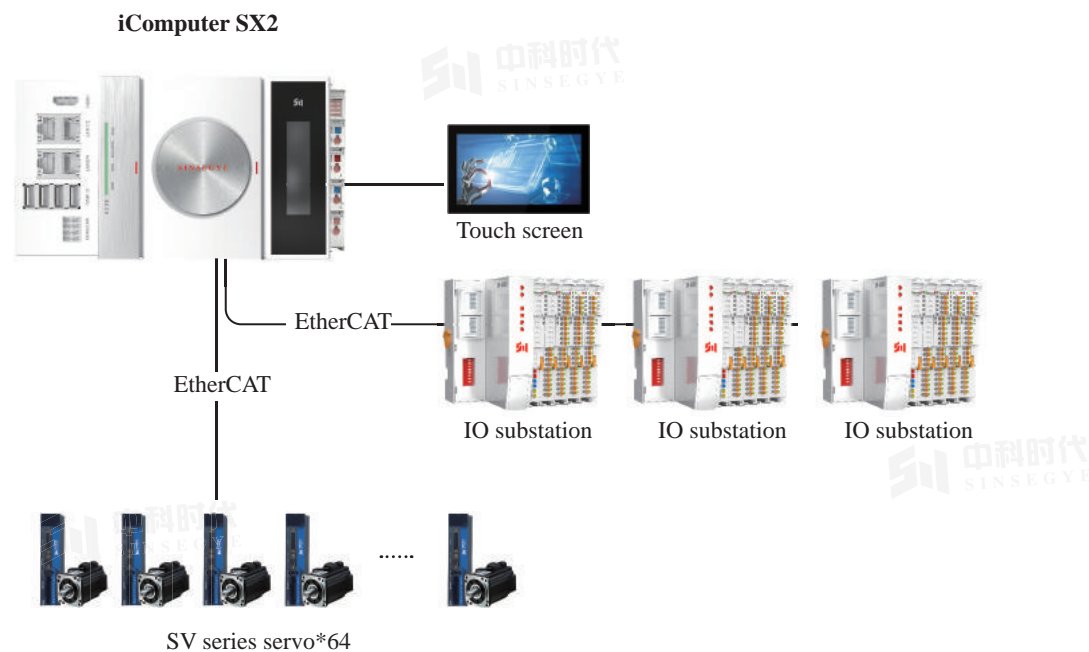


03 Car Connector Assembly Line



Introduction to models	Vehicle-mounted connector assembly line, complex logic and more servo axis motion control.
Operating principles	Use the iComputer real-time system to replace the PLC for the existing production line control, realizing the 64-axis motion control and other IO control. At the same time, the C# human-machine interface is deployed in the non-real-time system to realize the integrated deployment and development of human-machine interface and automation control.
Features of scheme	<p>System architecture: Real-time testing completion logic + operation control; deployment of C# human-machine interface and database on the desktop to facilitate human-machine interaction and data storage.</p> <p>High-speed communication: : Upper computer software - PLC real-time control interaction is "high-speed" and "stable" (shared memory mechanism, and local network communication).</p> <p>Strong scalability: Particularly for third-party electronic products, support more than 8 circuits of serial ports or network interfaces.</p> <p>Stable and reliable: Based on Hypervisor technology, non-real-time environment can be restarted without affecting the running of program on the real-time side.</p> <p>Bus: EtherCAT bus simplifies the control harness and hardware, reducing the integration cost and development cost of the overall production line.</p>

Control architecture diagram

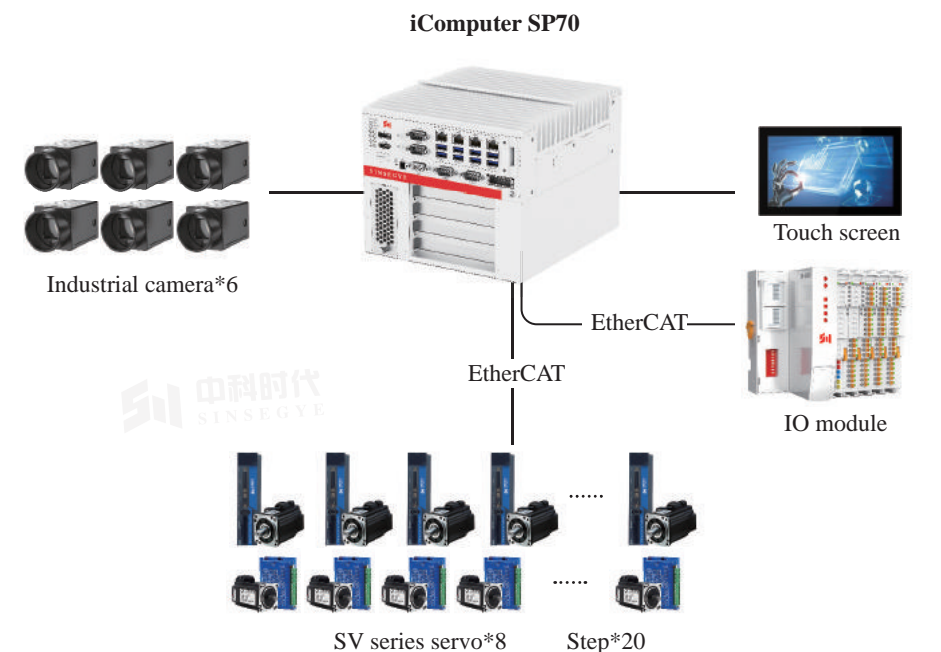


01 Eutectic Mount Machine



Introduction to models	As a key semi-conductor manufacturing tool, it is very important in the micro-electronic component assembling area. Its advantages can improve the manufacturing efficiency, reduce the cost and improve the product quality.
Operating principles	The eutectic placement machine mainly performs a series of operations such as preheating, positioning, suction, alignment, dispensing, etc. for solder joints on chips and carriers to achieve high-precision assembling of micro-electronic components. In a specific operation, multiple conveyor belts and automation technologies can be used to move the chips from their initial location to their final assembling location.
Features of scheme	<p>System architecture: One set of IComputer SP70 replaces IPC*1 + axis card*4+1 temperature controller * 8 in the original scheme.</p> <p>Programming: The IDE programming platform of the iComputer supports C/C++ programming; and the built-in soft board replaces the original motion control board, so that the customer's programming habits are continued without adding engineers.</p> <p>High-speed communication: The upper software integrates vision and interacts with the PLC real-time side through shared memory, effectively improving the processing speed of equipment.</p> <p>Scalability: The network interface can be extended through the PCIE slot, and motors and cameras can be added without increasing the cost of the control system.</p> <p>Stable: Based on Hypervisor technology, non-real-time environment can be restarted without affecting the running of program on the real-time side.</p> <p>Cost: One set of iComputer completes IPC+HMI + motion control card + temperature controller, and the cost is reduced by over 30%.</p>

Control architecture diagram



02 Wafer Wet Cleaning Equipment



Introduction to models

It is mainly used in the front and back cleaning process of wafers to reduce small particles and metal particles on the wafer surface. It can be used for cleaning 6-inch, 8-inch or 12-inch wafers, and it can be configured with 1/2/3/4/8 sets of cleaning chambers and 5 kinds of chemical liquid cleaning processes. During the production, command records, process parameters, process data and equipment operation videos are saved in real time, and the semi-conductor-specific SEMI communication standard is used for upper communicate with the factory.

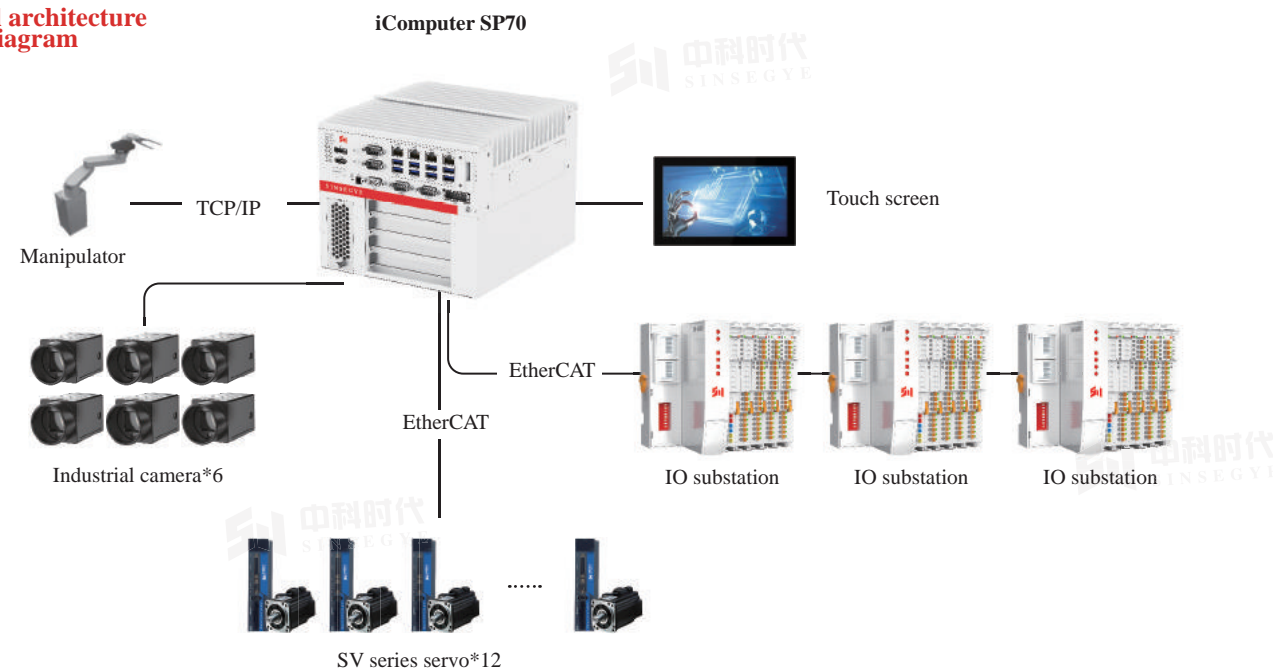
Operating principles

Wafer wet cleaning equipment generally consists of three mechanisms. The wafer loading unit (LoadPort) automatically loads uncleaned and cleaned wafers. The wafer transport unit transports the wafers to each cleaning chamber. The cleaning chamber performs water washing, chemical washing and drying on the wafers. After the cleaning is completed, the wafers are transported to the loading unit.

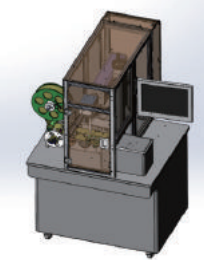
Features of scheme

The RTE on the real-time side integrates EtherCAT and safety control. The hardware cost is greatly reduced, and one set of IPC integrates with IPC, HMI, PLC, recorder and motion control. The separation of the real-time side (i.e. PLC) from the non-real-time side effectively ensures stability of equipment. SECS/GEM communication is implemented at low cost. Strong scalability, particularly for third-party electronic products, support more than 8 circuits of serial ports or network interfaces. It reduces labor, shortens the debugging time of software engineers, and lowers the skill requirements of hardware engineers. Hardware and software engineers can debug at the same time to improve the work efficiency. Efficient real-time communication, high-speed control applications can be completed in the upper system.

Control architecture diagram



01 Laser Label Machine



Introduction to models

The label master mainly uses a laser conversion system and roller rolling packaging to work. It is a highly professional processing and combination system after label printing.

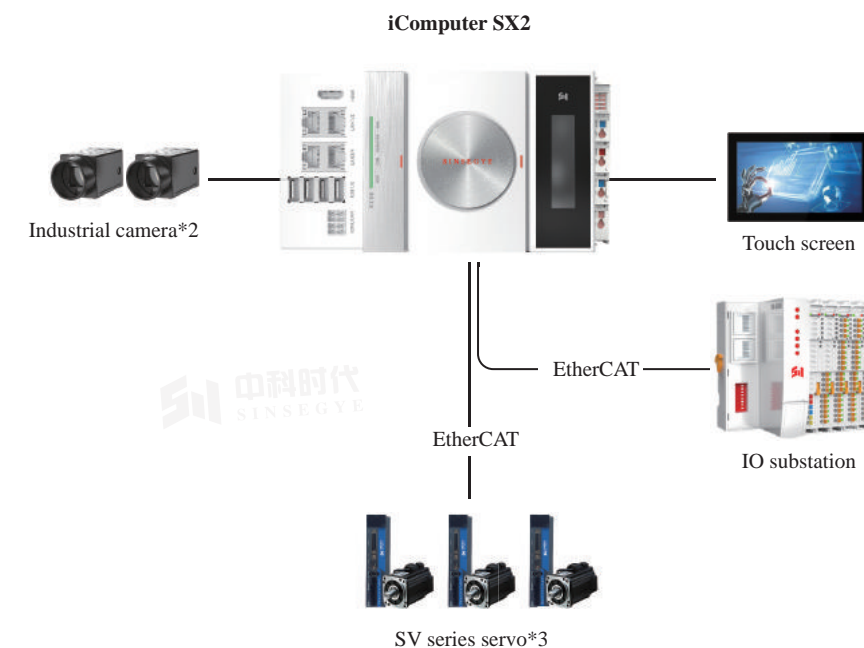
Operating principles

Loading mechanism: According to the set speed, the motor drives the paper pressure roller to automatically unfold the label paper roll, transports it to the marking station, and transfers a certain length of label paper in a step manner; (the scanner can be selected to input). The driving wheel of the transmission mechanism exerts a certain torque to pull the paper roll forward. Adjust the limit block to accommodate label paper of different widths. After the marking is completed, the label automatically peels off and falls into the label box.

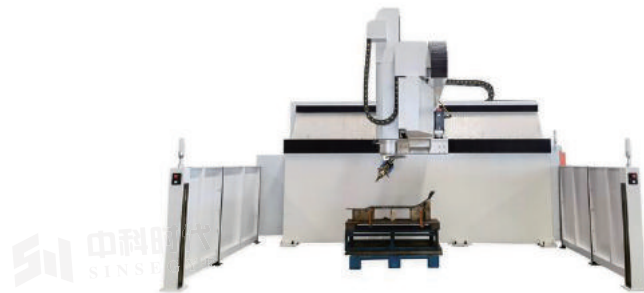
Features of scheme

System architecture: One set of iComputer SP70 replaces the scheme of IPC + axis card + PLC in the original scheme, so that the system architecture is greatly simplified.
Programming: The IDE programming platform of the iComputer supports C/C++ programming; and the built-in soft board replaces the original motion control board, so that the customer's programming habits are continued.
High-speed communication: The upper software integrates vision and interacts with the PLC real-time side through shared memory, effectively improving the processing speed of equipment.
Stable: Based on Hypervisor technology, non-real-time environment can be restarted without affecting the running of program on the real-time side.
Scalability: Strong scalability, particularly for third-party electronic products, support more than 8 circuits of serial ports or network interfaces.

Control architecture diagram



02 3D Five Axis Laser Cutting Equipment



Introduction to models

The 3D 5-axis laser cutting equipment is laser processing equipment for cutting 3D parts with complex curved surfaces. For some high-strength steel structural components with complex contours, 3D laser cutting is a very effective processing method from both the technical and economic perspectives. It has been widely used around the world, and the market demand is growing.

Operating principles

It controls the energy released when the laser beam of the laser head is irradiated onto the surface of the steel plate, making the stainless steel melt and evaporate. It contains five interpolation axes to realize planning and analysis of the spatial trajectory.

Features of scheme

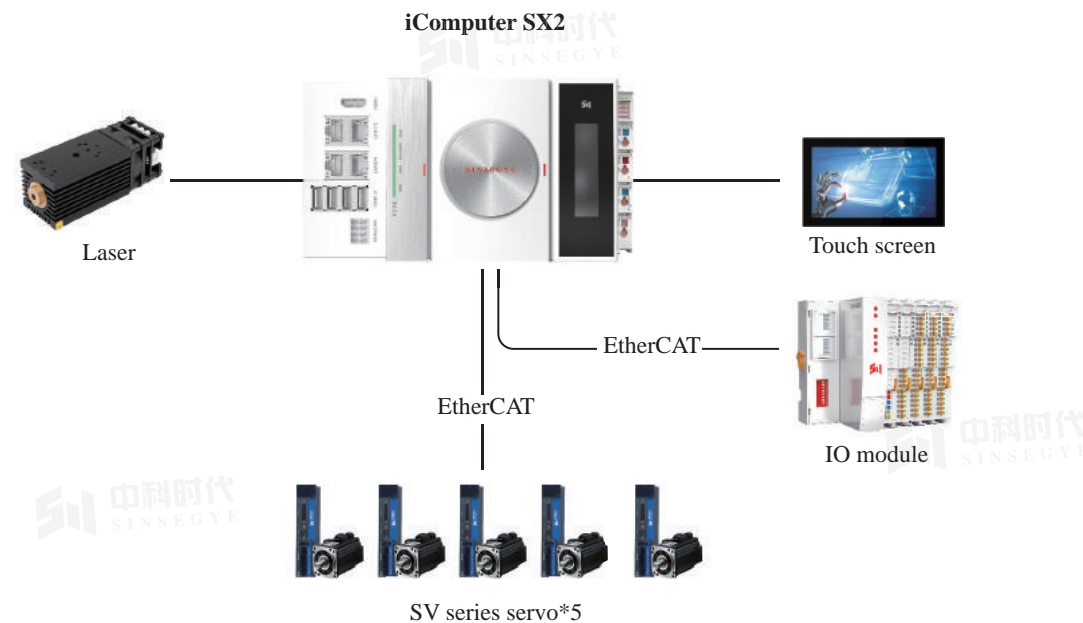
System architecture: The dual system architecture of the industrial PC brings convenience to equipment manufacturers for remote after-sales service, and it greatly reduces the after-sales service cost.

Programming: The self-developed CAM software is highly integrated with the IDE; and the upper software carries out data interaction with the PLC real-time side through shared memory, effectively improving the processing speed of equipment.

Stable: Based on Hypervisor technology, non-real-time environment can be restarted without affecting the running of program on the real-time side.

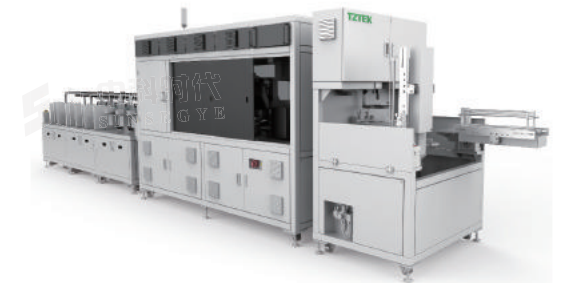
Scalability: Strong scalability, particularly for third-party electronic products, support more than 8 circuits of serial ports or network interfaces.

Control architecture diagram



PC based iComputer comes SINSEGYE

01 Silicon Wafer Detection and Sorting Machine



Introduction to models

It is equipment for sorting silicon wafers. At present, the domestic silicon wafer manufacturers mainly adopt manual sorting methods, which are low-efficiency, high-cost, and harmful to the health of workers. The use of silicon wafer sorting machines can effectively reduce the difficulty and cost of manual sorting and improve production efficiency. This equipment is widely used in semi-conductors, solar panels, etc.

Operating principles

The silicon wafers are inspected and sorted according to appearance, printing and electrical characteristics, and they mainly include the processes of three stages such as loading, inspection and sorting.

Features of scheme

System architecture: One set of iComputer SX2 replaces the original Beckhoff 2030 + 21-inch touch screen, greatly reducing hardware costs.

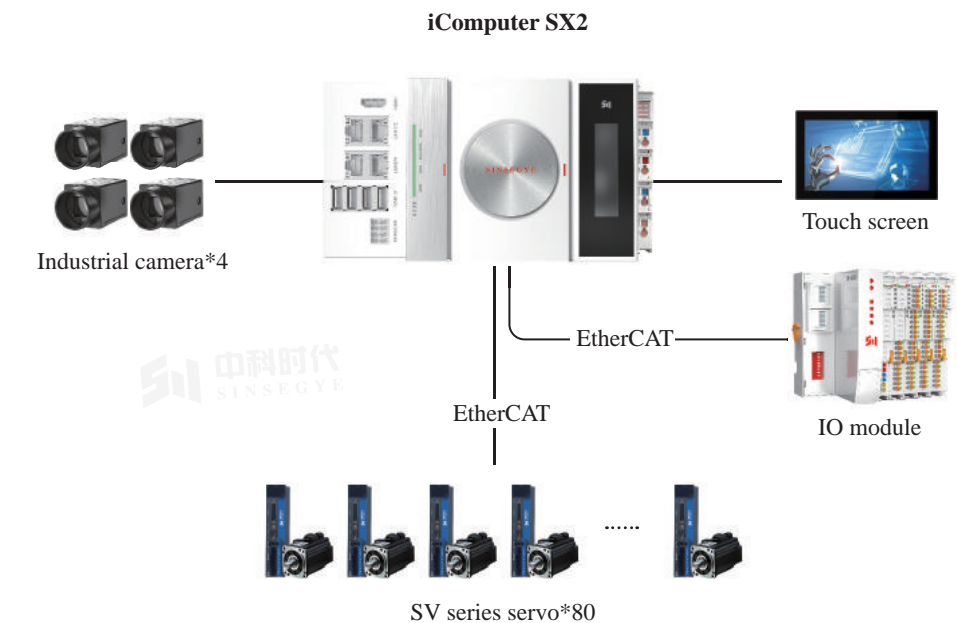
High-speed communication: Based on the customized communication protocol of SINSEGYE, it supports: high-speed communication function (2,000 bytes are completed within 20 ms) and variable subscription function (if the PLC variable changes, actively notify the upper computer), which effectively improves the running speed of equipment.

Scalability: The network interface can be extended through the PCIE slot, and motors and cameras can be added without increasing the cost of the control system.

Stable: Based on Hypervisor technology, non-real-time environment can be restarted without affecting the running of program on the real-time side.

Communication interface: It supports the current mainstream communication protocols and interfaces in the market.

Control architecture diagram



PC based iComputer comes SINSEGYE

02 String Welding Machine



Introduction to models

The series welding machine is equipment that automatically connects solar panels into strings, and it is the core equipment of photovoltaic modules. The single-chip voltage of solar cells is around 0.5 V, which is far lower than the voltage required for actual use. Therefore, they need to be connected in series or parallel and packaged into a photovoltaic assembly.

Operating principles

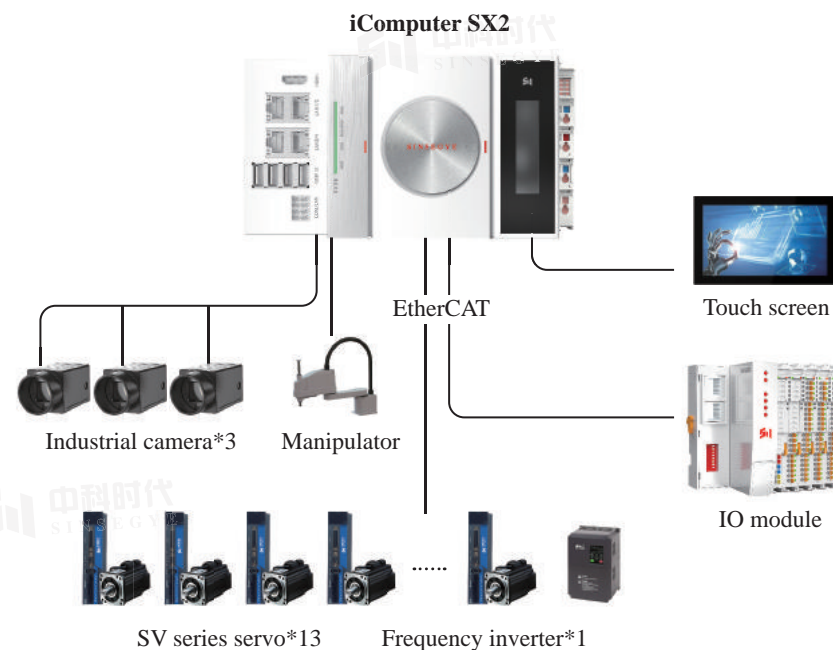
The equipment is driven by multiple servo motors; a visual positioning robot is used to grab and detect the quality of the battery cells; and the cell spacing, the number of cells in a single string, the welding temperature, etc. can be set at will. The equipment as a whole includes:

1. Feeding and discharging boxes of the battery box;
2. Transportation of battery cells;
3. Appearance testing and positioning system of machine vision;
4. Welding strip pulling and transporting mechanism;
5. Welding mechanism;
6. Lower battery cell preheating unit;
7. Belt conveying mechanism.

Features of scheme

System architecture: One set of iComputer SP70 replaces IPC*1 + motion controller * 1 + axis module * 1 + temperature controller * 10 in the original scheme.
Programming: Universal programming platform, continuing the usage habits of customers.
High-speed communication: The upper software integrates vision and interacts with the PLC real-time side through shared memory, effectively improving the processing speed of equipment;
Scalability: The network interface can be extended through the PCIE slot, and motors and cameras can be added without increasing the cost of the control system.
Stable: Based on Hypervisor technology, non-real-time environment can be restarted without affecting the running of program on the real-time side.

Control architecture diagram



PC based iComputer comes SINSEGYE

03 Multi-wire Cutting Machine



Introduction to models

Multi-wire cutting machine is one of the key equipment in semi-conductor processing. Through the high-speed reciprocating movement of the metal wire, the abrasive is brought into the processing area for grinding, and hard and brittle materials such as semi-conductors are cut into hundreds or even thousands of thin slices at a time.

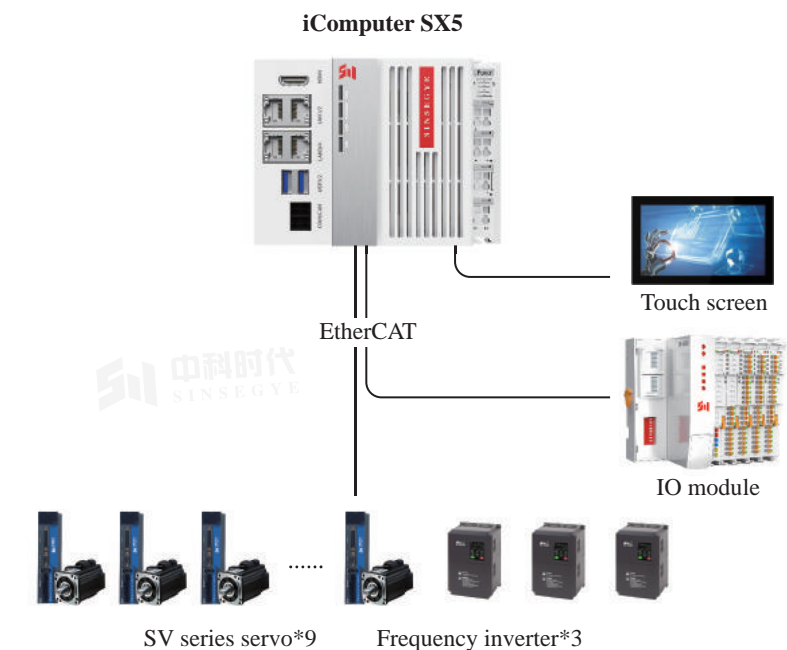
Operating principles

This control plan proposes to build a motion control module with multi-axis synchronous linkage and multi-task synchronous execution. The key to operation of the mechanism is to pass a certain length of diamond steel wire through a mesh processing area formed by multiple routing wheels and reverse wheel structures, and the steel wire makes high-speed reciprocating motion at a set length.

Features of scheme

Unique algorithm: It predicts the roll diameter and calculates the roll diameter in real time, and corrects the PID parameters in real time through the iterative method based on the changes in the roll diameter, effectively reducing tension fluctuations.
Aesthetic appearance: The desktop operating system supports the operation of C# human-machine interface, and completes logic and motion control functions in real time.
Accurate and flexible: The scan cycle of the iComputer is less than 1 ms. Precise roll diameter calculation and tension control improve the speed control accuracy, and the tension, fluctuation, acceleration and deceleration can meet more requirements.
Stable and reliable: Based on Hypervisor technology, the controller can be restarted in the non-real-time environment without affecting the running of program on the real-time side.

Control architecture diagram



PC based iComputer comes SINSEGYE

»»»» Software application

01 Application case of control + intelligent guard and diagnosis system for equipment

Intelligent pump house monitoring system



Introduction to models

In order to timely find and solve problems in the water system of the modern water pump house, a monitoring system shall be installed to monitor and record the water pressure, flow, temperature and other parameters in the pump house in real time; and can monitor the entry and exit of personnel and alarm.

Operating principles

It mainly involves data collection, camera monitoring, PLC logic control, remote access, alarm remote output, etc.

Features of scheme

System architecture: Dual-system architecture, the desktop operating system is deployed with Instaguard, the self-developed software of SINSEGYE to complete the monitoring of the upper computer interface and video and the original PLC functions through real-time testing.
Hardware architecture: One set of iComputer completes the functions of PC + PLC, the structure is compact and the cost is low.
Interface: It supports the access from the mobile client, and it can obtain alarm information set by the system in real time; and it provides the OPC UA data communication interface for connection and communication with the production management system or other systems.

Control architecture diagram



PC based iComputer comes SINSEGYE

02 Application case of control + decision-making assistance system for production

Automatic control of polysilicon reduction furnace



Introduction to models

It is difficult to effectively control the polysilicon reduction process due to the complex process mechanism, and an ideal control solution cannot be provided since the conventional closed-loop control cannot be measured subject to some parameters due to the difficulty in the modeling of production process and energy consumption data.

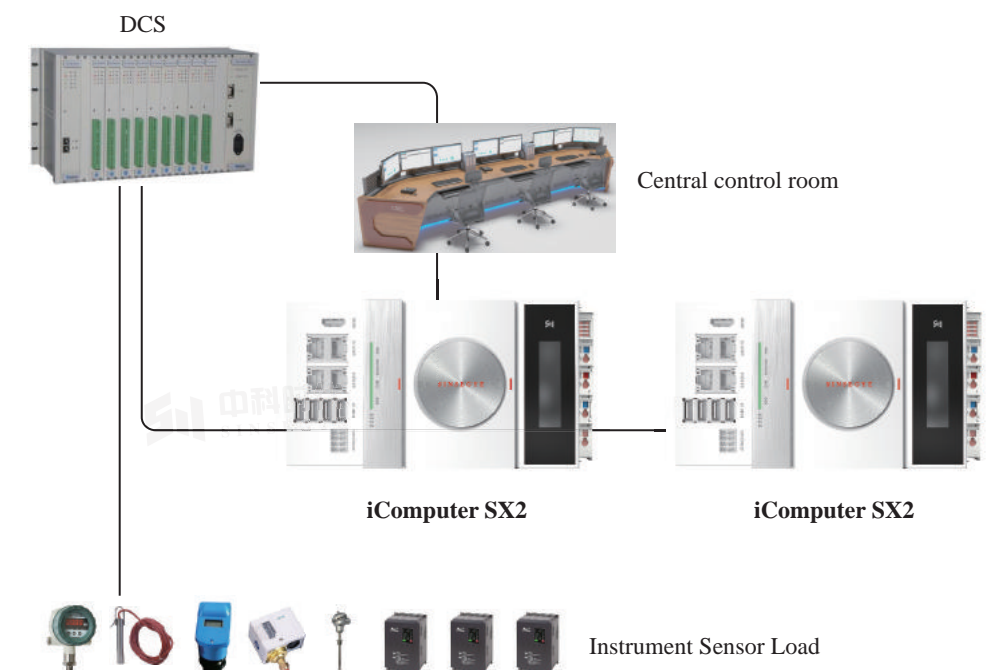
Operating principles

By deploying the polysilicon reduction furnace intelligent control system MesPV on the non-real-time system of the iComputer, a refined control module is implemented in the real-time system, and the intelligent closed-loop control of the polysilicon reduction furnace is implemented in the dual-domain system combination. Based on the functions of reduction furnace management, batch management, curve viewing, parameter control and distribution, etc. provided by the platform, the reaction situation in the furnace can be judged in real time, the atomization state in the furnace is identified, and the SV values such as H₂, TCS, current, voltage, etc. are dynamically adjusted, avoiding severe atomization, lack of phase, etc. At the same time, the electricity consumption of a single set is reduced by 2-4 kWh/kgSi, which saves a lot of costs for the production of polysilicon. Calculated on the basis of a 40-degree rod reduction furnace, each batch can save 26,000-52,000 kilowatt hours of electricity.

Features of scheme

System architecture: Dual-system architecture of the iComputer, the desktop operating system is deployed with the self-developed software of SINSEGYE to complete data acquisition and various control functions.
High speed: The non-real-time system software carries out data interaction with the real-time RTE through shared memory, effectively improving the response speed of control.
Result: This project realizes the integration and integrated deployment of computation and control business such as MesPV, OPCServer and DCS control system, etc. through the iComputer, and it optimizes the production process of the polysilicon reduction furnace, achieving energy saving, quality improvement and efficiency increasing.

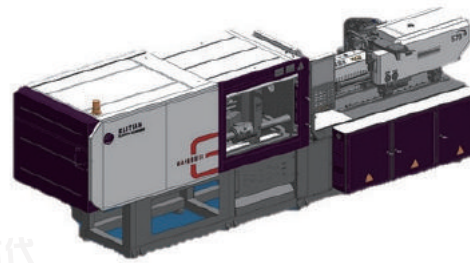
Control architecture diagram



PC based iComputer comes SINSEGYE

02 Application case of control + decision-making assistance system for production

Control of injection molding machine + automatic parameter adjustment of mold



Introduction to models

Injection molding machine is the core equipment for the production of plastic products. The quality of plastic product molding is related to many factors. As a single person cannot fully control the impact of various factors on the finished product, a large amount of equipment adjustment time is needed every time a new product is manufactured, which reduces the production efficiency.

Operating principles

Real-time side: The real-time RTE of the iComputer is used to replace the embedded controller of the existing injection molding machine to complete the control tasks for each mechanism of the injection molding machine. At the same time, the data of the injection molding process is shared with the non-real-time system in real time.

Non-real-time side: It deploys the parameter adjustment algorithm of the injection molding machine on the MESAPPS platform to quickly find the optimum process parameter combination for new products and distribute to the real-time system.

Computing + Control: It realizes self-adaptation of the process parameters, reduces the parameter adjustment time, and improves the production efficiency.

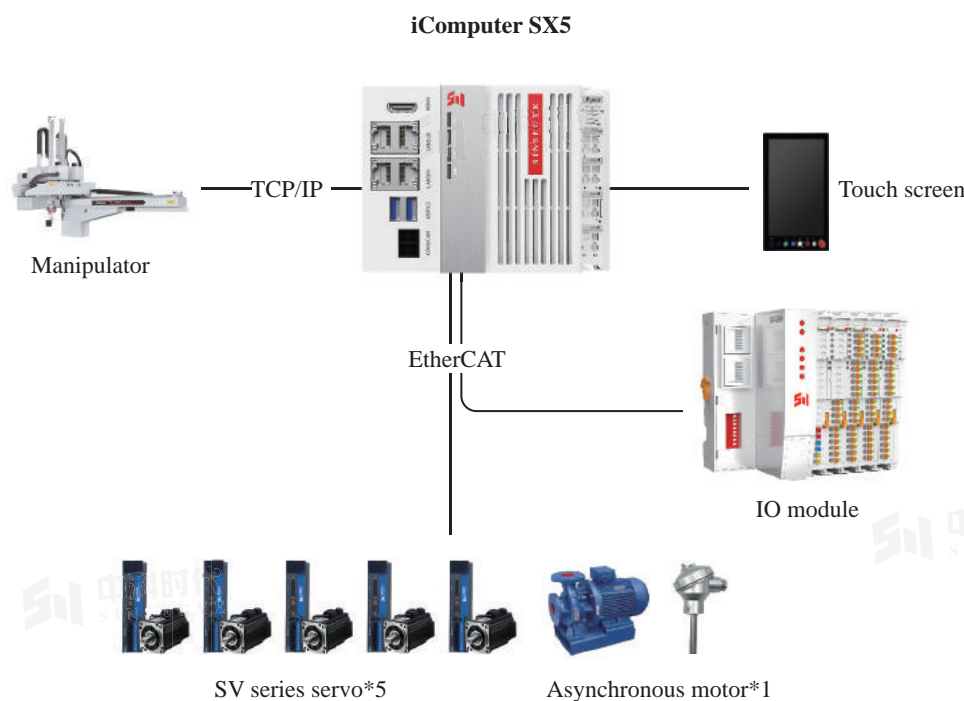
Features of scheme

System architecture: Dual-system architecture, the desktop operating system is deployed with the parameter adjustment algorithm to complete the control for the injection molding machine, achieving computing + control.

High speed: The non-real-time system software carries out data interaction with the real-time RTE through shared memory, effectively improving the response speed of control.

Interface: It provides the OPC UA data communication interface, which can connect and communicate with the production management system to realize collaborative operations of production process planning management, material management, equipment management and quality management, so that the level of factory intelligence is increased.

Control architecture diagram



03 Application case of control + robot sensing and control system

Unattended station of oilfield



Introduction to models

An oil production plant in a certain oilfield focuses on the "unattended intelligent station", uses key equipment as the entry point, and it finishes remote patrol inspections as well as accurate and early troubleshooting through intelligent means.

Operating principles

Real-time side: A soft PLC control system is deployed to replace multiple PLCs and a system server in the site. An integrated vibration and temperature sensor is deployed on the equipment to collect the acceleration, speed and displacement of the equipment, combining with the process data of flow, current, and voltage of the equipment body.

Non-real-time side: Accurately locate equipment faults through automatic learning for fault neural network models. At the same time, it is integrated with PetroChina's A11 system to complete integrated remote guard and reduce the labor intensity of personnel.

Features of scheme

System architecture: Dual-system architecture of the iComputer, the desktop operating system is deployed with the self-developed software of SINSEGYE to complete data acquisition and various control functions.

High speed: The non-real-time system software carries out data interaction with the real-time RTE through shared memory, effectively improving the response speed of control.

Communication interface: It carries rich communication protocols and interfaces, which can easily connect to various independent systems and equipment.

Result: Our services are integrated into the A11 system as a whole. The communications are carried out with the in the station through OPC protocol to complete business data acquisition, and finally integrate the core business of the system into the main system through the rapid integration suite.

Control architecture diagram

