XINJE

Textile industry solution

Starting from multiple aspects to gradually improve textile efficiency

Automation Trusted Partner

Company Introduction

XINJE Electric Co., Ltd. is a prestigious company in China Mainland who dedicates to design, develop and manufacture the automation products and application systems.

Since its set up, the company insists the purpose of innovation, quick response and complete solutions to improve the enterprise competitiveness. Years of efforts get us numbers of patented technologies, which also help us to win many honors from government. They are High-Tech Enterprise Certificate, Leader of Innovation Enterprise Certificate and so on. We are also authorized to be Industrial Key Project Enterprise, Engineering Technology Research Center.

The company offers complete products line which covers PLC Programmable Logic Controllers, HMI Touch Panel Monitors, Servo Control Systems, Frequency Inverters, Vision Machine System, Robot Arms, Network products, etc. We make total automation solutions for customers. In this way, we help customers to improve their productivity, reduce production costs, maximize their profits, and promote their company's value. We XINJE Electric always grow together with our customers.

Up to now, XINJE Electric has more than 32 branches in China and more than 300 agents in China. We also have 1 branch in Germany and more than 20 distributors overseas. We sell our products all over the world, such as Europe, America, Asia, the Middle East and Africa etc. XINJE Electric has more than 2100 employees. The office building covers an area of 20000m² and multiple factory buildings cover an area of 71000m². We also have one R&D center, 4 laboratories, 42 training base. Our company cooperates with a number of universities in China, we established the University - XINJE Laboratory to train the technical engineers.

XINJE was also successfully listed at the Shanghai stock exchange in December, 2016. Our stock code is 603416. With the business philosophy of Innovation, Quality, Service, the company keeps developing and designing much qualified and reliable products, we aim to be a global automation solutions provider. We are committed to build a golden brand reputation in the industrial automation field.

32	300	2100+	20000+	71000+
BRANCHES	DOMESTIC DEALERS	STAFF	FLOOR AREA OF OFFICE BUILDING	FLOOR AREA OF MULTIPLE INDEPENDENT FACTORY BUILDINGS

Introduction

The essentials of food, clothing, housing, and transportation are integral to daily life, with the textile industry—rooted in agriculture—holding vast market potential. As a traditional industry, textiles face challenges such as low production efficiency, high energy consumption, and labor shortages. With the expanding market demand and the influence of modern environments, automation in the textile industry is an inevitable trend.

In response to the industry's supply-demand imbalance and to boost production efficiency, XINJE has launched multiple solutions such as doubling machines, spinning frames, weaving, printing machines, warping machine vision yarn break self-stop systems, and warp knitting machine vision photo self-stop systems. These initiatives aim to enhance automation across various stages of textile production from multiple perspectives, while also integrating information systems to meet the needs for data processing and remote control.

Catalog

Starting from multiple stages

Faster and more stable

Satisfy data processing and remote control

Textile industry solution

Double twisting machine solution

The doubling machine is a twisting device that can achieve two twists with one turn. It combines two or more single yarns by twisting them into a plied yarn, enhancing the original yarn's performance to meet customer demands. Compared to traditional twisting equipment, the doubling machine significantly increases twisting efficiency, expands package capacity, achieves seamless lengths of up to 10,000 meters, and greatly improves twisting quality. Its low height makes it particularly suitable for operation. The electronic form of the doubling machine system is simpler in structure than the traditional mechanical version, offering environmental benefits and energy savings. It reduces production and maintenance costs, as well as environmental costs, while improving production efficiency. Additionally, it allows for easy process changes, automatic stopping, and automatic metering, saving labor, reducing personnel costs, and lessening labor intensity.
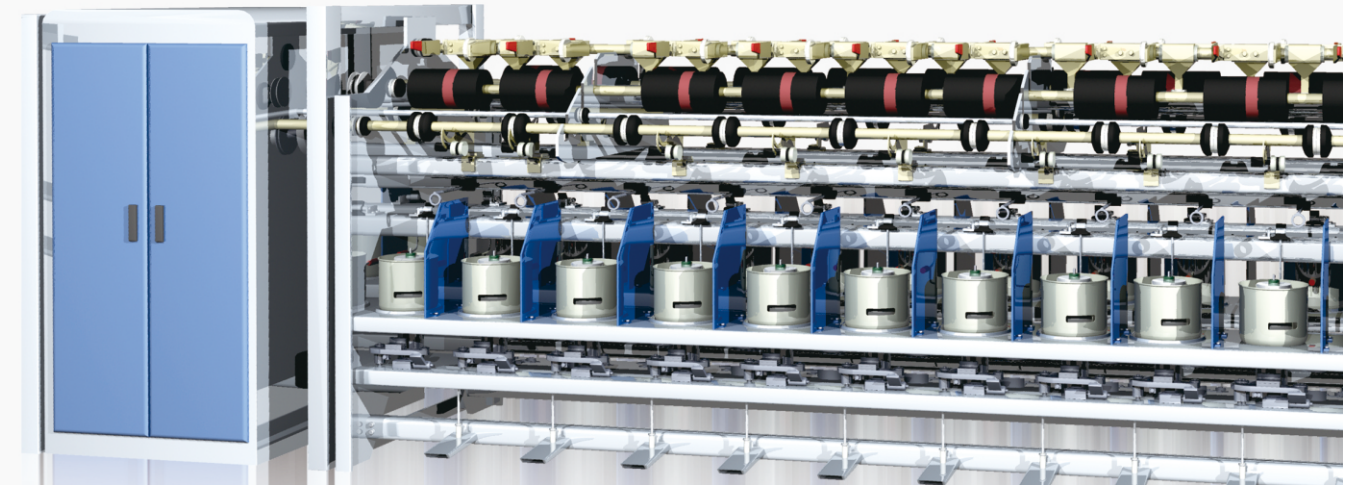
Industry demand and pain points

- The equipment runs stably and the product molding effect is good.
- Compatible with the production of various product categories, the process parameters have strong applicability to different raw materials.
- Easy debugging and quick troubleshooting.
- The production information is clear and concise.

Solution

- The synthetic fiber twisting machine can choose between two in one or three in one solutions. Meet different customer needs and adapt to various installation spaces.
- The short fiber doubling machine adopts EtherCAT bus scheme, which ensures stable and reliable communication, and simple and convenient wiring.
- Common busbar design, power-off synchronization algorithm. Realize synchronous stopping during power outage, without stopping due to shaking electricity.
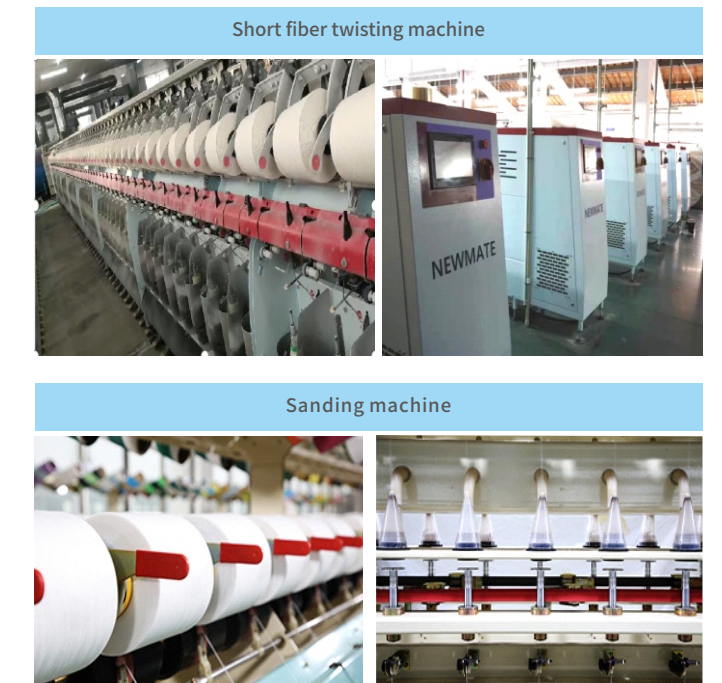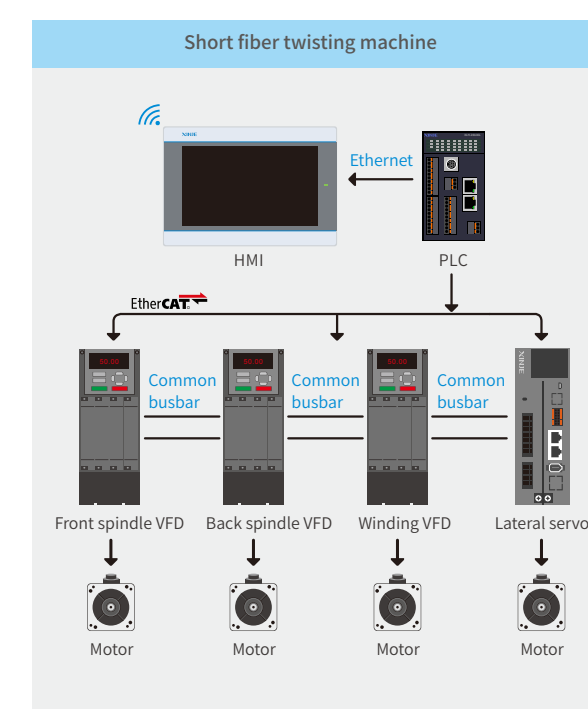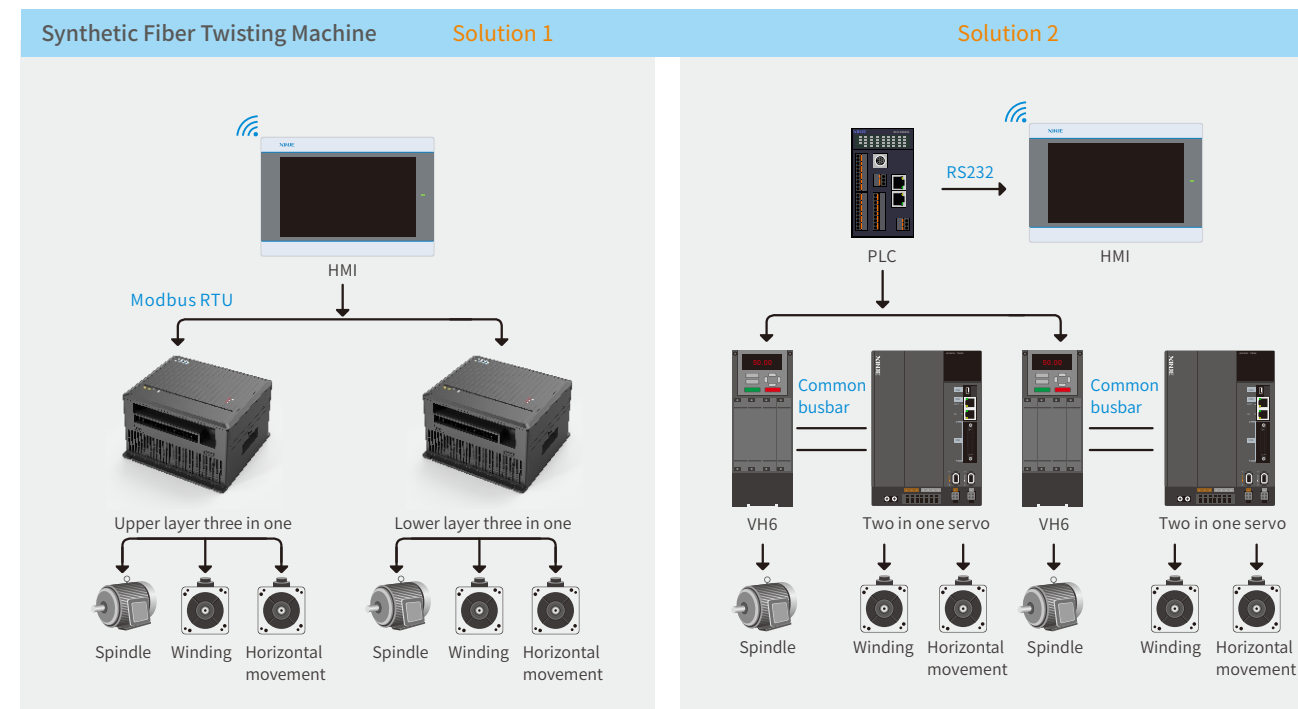- Multiple molding parameters to meet customers' different molding requirements.

Solution Advantages

- Integrated control, simple wiring, saving installation time and reducing wiring failures.
- Power off synchronous stopping, normal operation with shaking electricity, reducing raw material loss, ensuring product quality.
- Short fiber double twisting machine bus control, effectively reducing the weak twisting when start and stop machine.
- Expandable yarn, variable twist yarn and other fancy yarns. Quickly adapt to different models such as wrapping yarn machines and false twisting machines.
- Free access to Xinje Cloud, supporting single spindle detection, operation monitoring, and remote troubleshooting. Improve workshop management level and reduce management costs by 5%.

Field application

Synthetic fiber twisting machine

Special VFD for edge machine

System topology

Synthetic Fiber Twisting Machine

Solution 1

HMI
Modbus RTU

Upper layer three in one
- Spindle
- Winding
- Horizontal movement

Lower layer three in one
- Spindle
- Winding
- Horizontal movement

Solution 2

PLC — RS232 — HMI

Common busbar — VH6 — Spindle
Two in one servo — Winding / Horizontal movement
Common busbar — VH6 — Spindle
Two in one servo — Winding / Horizontal movement

Short fiber twisting machine

HMI — Ethernet — PLC

EtherCAT

Common busbar — Front spindle VFD — Motor
Common busbar — Back spindle VFD — Motor
Common busbar — Winding VFD — Motor
Lateral servo — Motor

Short fiber twisting machine

NEWMATE

Sanding machine

Cotton spinning solution —
Spinning frame

The spinning frame is a machine used in the spinning process to draw, twist, and wind roving or sliver into fine yarn bobbins. As a key machine in the spinning process, the spinning frame's instructions and precision largely determine the output and quality of the fine yarn.

Compared to traditional spinning frames, which use a single main motor to drive other parts through gears and transmission devices, Xinje's comprehensive spinning frame solution includes two options: a four-in-one VFD system and a full servo system. These solutions employ multiple motors to control each part independently, effectively reducing energy consumption and machine wear, while also facilitating equipment maintenance and process adjustments.

All-Electric Spinning Frame System

Industry demand and pain points

- Easy to operate, quickly change process parameters.
- Reduce manual labor and lower the labor intensity of workers.
- Ensure electrical stability and reduce various faults.
- Improve production efficiency, reduce yarn breakage during startup. Reduce ballooning during winding and ensure product quality.

Solution

- Drafting uses variable frequency control with no encoder interference. Each roller is independently controlled, allowing for the spinning of slub yarn, color segment yarn, etc.
- Integrated doffing control system compatible with various spinning frame models.
- Uses EtherCAT bus system for stable and reliable communication, with simple and convenient wiring.
- The TS5 series IoT HMI connects to the Xinje cloud for real-time monitoring of operational data, reporting production, and analyzing production conditions.
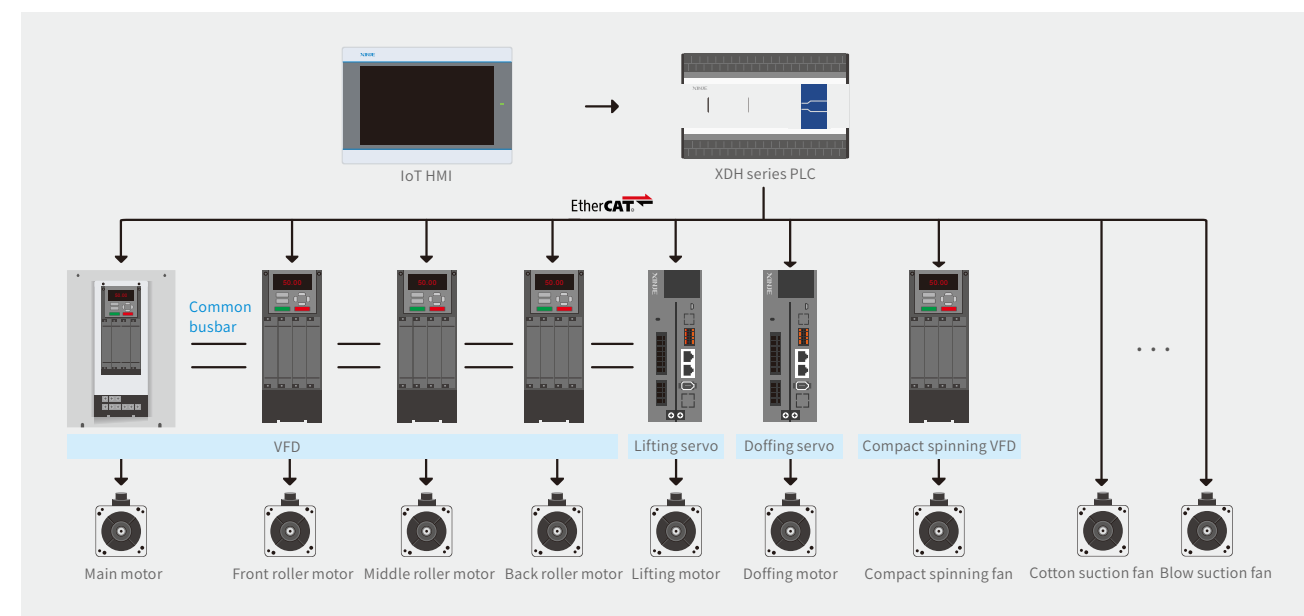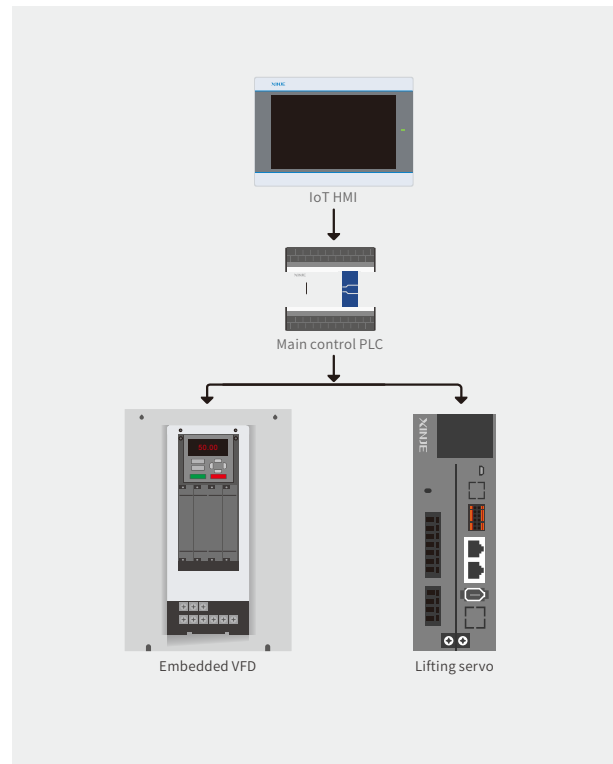
Solution advantages

- Various doffing actions minimize yarn breakage during start/stop operations, maintaining a yarn breakage rate of 0.5%.
- High synchronization keeps speed fluctuations within 1%, with consistent twist during start/stop. The shared bus control ensures no yarn breakage during power failures, and operations continue smoothly during power fluctuations.
- A new forming algorithm increases capacity by 5% to 10% compared to traditional models, reducing issues during winding.
- Quick gauge changes reduce process change time by 50%, allowing technicians to complete adjustments easily.
- Online maintenance of product metrics ensures traceability of quality and automatic production reporting, lowering production management costs by 5%.
- The efficient and stable integrated doffing system significantly enhances overall spinning efficiency, reducing labor and maintenance costs.

System topology

IoT HMI → XDH series PLC

EtherCAT

Common busbar

VFD | Lifting servo | Doffing servo | Compact spinning VFD

Main motor | Front roller motor | Middle roller motor | Back roller motor | Lifting motor | Doffing motor | Compact spinning fan | Cotton suction fan | Blow suction fan

Field application

Spinning Frame Retrofit System Solution

Control solution

IoT HMI

Main control PLC

Embedded VFD   Lifting servo
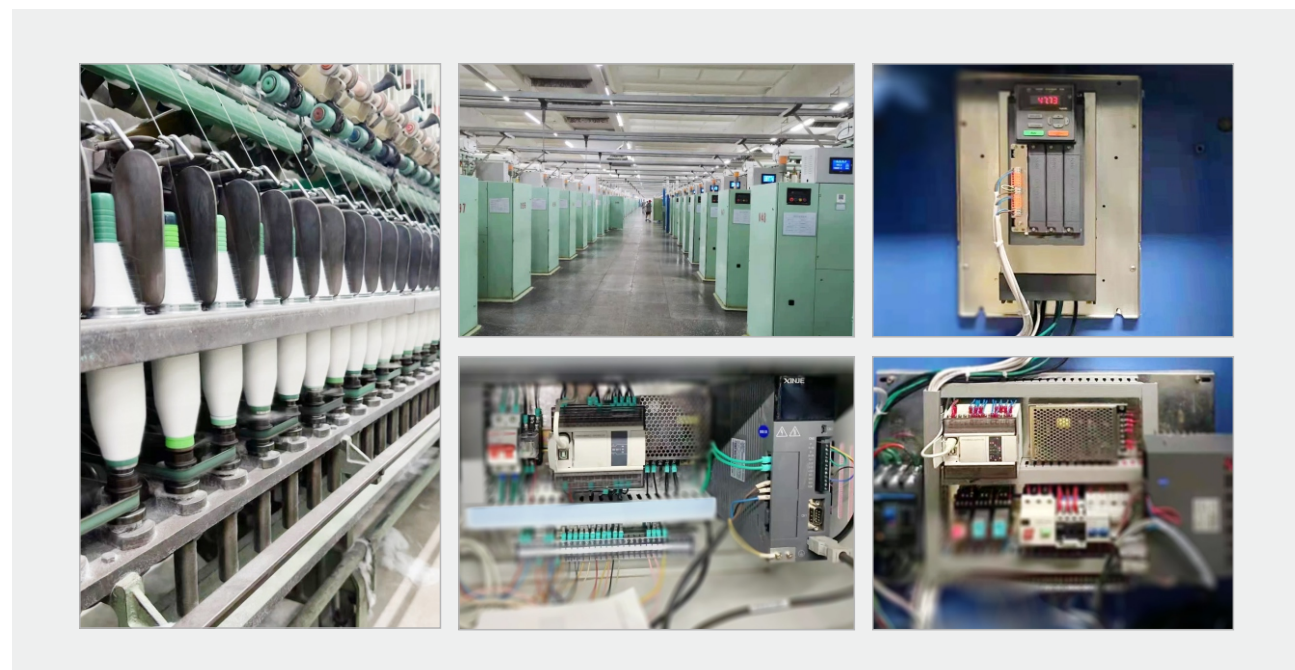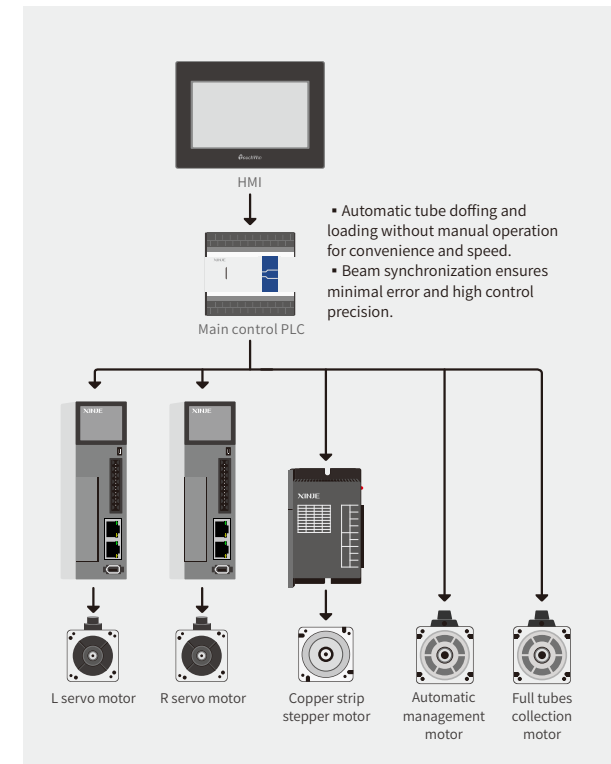
Solution advantages

- Suitable for multiple working conditions, it can be used for retrofitting various equipment and is compatible with multiple brands of inverters.
- Designed specifically for textiles, the compact inverter is installed in a through-hole manner, suitable for high-temperature, high-humidity environments with a lot of lint. The DC common bus design enables synchronized shutdown during power outages, eliminating overlapping yarn problems.
- The second-generation tube bottom forming algorithm provides a more rational bottom formation, significantly reducing the risk of ballooning. This improves winding efficiency and reduces labor intensity.
  Supports cloud connectivity and remote monitoring.
- Depending on the application scenario, pulse or bus solutions can be selected.
- Rich application features include operation monitoring, spindle speed curves, shift production statistics, operation records, recipe processes, and flash driver import/export.

Field application

Collective Doffing System Solution

Control solution

HMI

Main control PLC

- Automatic tube doffing and loading without manual operation for convenience and speed.
- Beam synchronization ensures minimal error and high control precision.

L servo motor   R servo motor   Copper strip stepper motor   Automatic management motor   Full tubes collection motor

Solution advantages

- Choose between single-servo and dual-servo control solutions based on working conditions.
- Spinning frames and doffing can be controlled separately or together, with pulse and bus options available, offering wide applicability.
- The entire doffing cycle can start automatically. Workers only need to replenish empty tubes and handle alarms, eliminating the need for manual start-up and tube changes, saving labor costs.
- Complete records of equipment production are available, including production efficiency, run time, doffing duration, and doffing frequency.

Field application

# Cheese Packing Line + Palletizer Solution

The textile industry is one of the largest manufacturing sectors globally, with Asia, particularly China, being the largest producer and exporter of textiles. With technological advancements and the growing importance of sustainable development, the industry currently faces significant challenges such as labor shortages and low production efficiency.

Process flow

The cheese packing line consists of loading area, weighing area, balancing area, film covering area, bagging area, sealing area, and palletizing area.

Yarn first passes through the loading area to the weighing belt for weighing. In the balancing area, yarn is calibrated to ensure the package meets weight standards, with yarn that doesn't meet the criteria being removed. Once balanced, the selected yarn undergoes sequential flipping and is quickly covered with packaging film and sealed to maintain temperature and humidity. The yarn is then bagged, sealed, and bundled with ties. Finally, the palletizer neatly stacks the packages onto pallets.

System topology
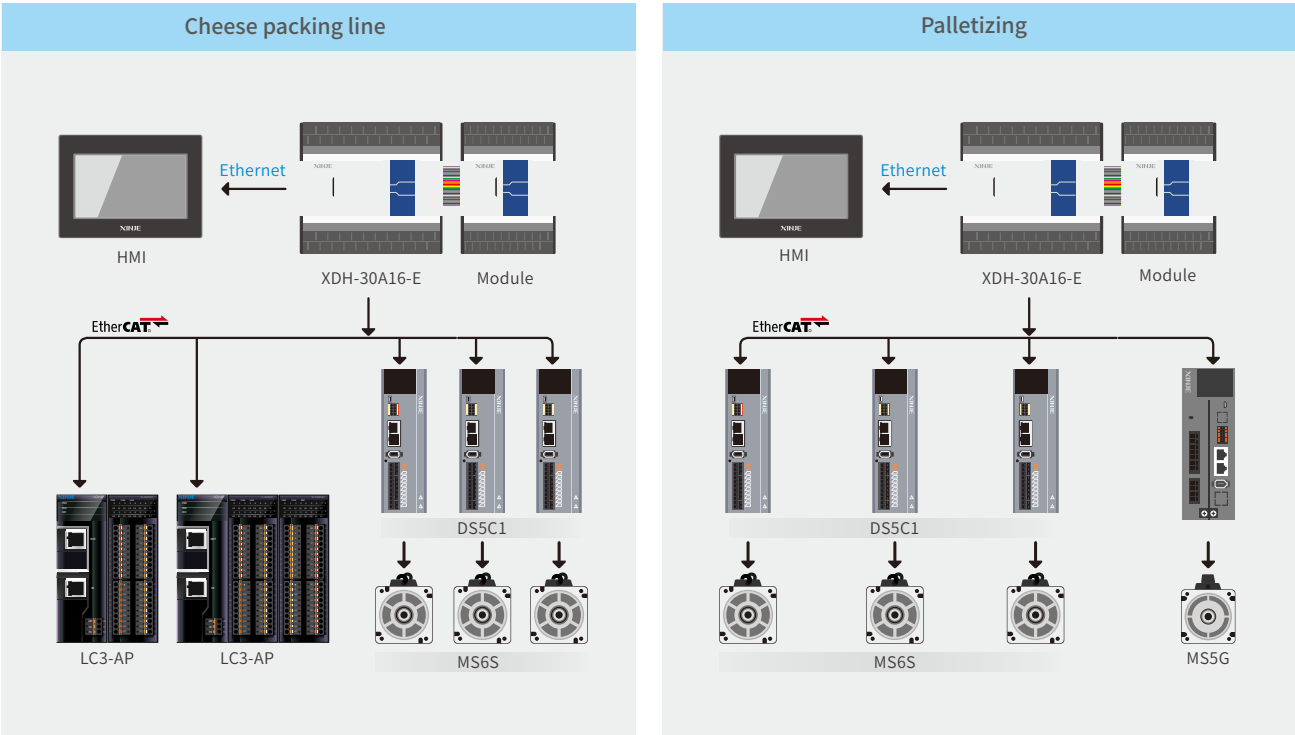
Solution advantages

- Easy debugging and operation: parameters are simplified and organized by area, with default soft component values. Only a few parameter adjustments are needed to commence production.
- Efficiency improvement: high packing efficiency, processing 1.8 to 2 tons of yarn per hour. Combined with a palletizer, it significantly boosts production efficiency.
- High precision: single yarn error of ±1g. The weighting algorithm calculates progressively according to set upper limits and priorities, ensuring high efficiency and greater precision.

Field application

Cotton spinning solution —

Carding machine capacity expansion

The carding machine is primarily used for combing cotton fibers, disentangling and dispersing fiber clusters produced by the lap forming machine. It also removes impurities, cotton seeds, and short fibers. This not only enhances the purity and uniformity of the fibers but also improves the quality and production efficiency of textile products. It is an indispensable piece of equipment in the textile manufacturing industry.

Industry demand and pain points

- High capacity expansion ratio and good quality of cotton strips.
- Debugging is simple and convenient.

Solution

- By adjusting the translational and rotational movements of the platform, the diameter of the cotton web is changed and distributed evenly in the can, ensuring uniform density distribution of the cotton layer. This reduces the density at the center and edges of the can while increasing the density in the central area of the coiled sliver, achieving can capacity expansion.
- Through algorithm-controlled lateral movement of the platform motor, the bottom sliver is kept within the can.
- Optimizing the sliver bundling structure improves sliver quality, reduces surface fuzz, and maintains consistent weight.

System topology

IoT HMI → Capacity expansion special controller → EtherCAT → Rotation driver → Lateral movement driver

Rotation motor → Lateral movement motor

Solution advantages

- The capacity expansion ratio is adjustable, allowing over 100% capacity increase in a 1-meter can, reducing the frequency of can change by 50%. This lowers the workload of workers transporting cans and decreases the number of sliver joints, reducing quality issues caused by poor joints.
- Optimizing the can bottom formation solves sliver overflow, enabling immediate high-speed operation and improving production efficiency.
- The reduced can demand decreases space usage by 30% for customers and cuts can usage and labor costs by 20%.
- The sliver surface is smooth, with less fuzz, uniform distribution, minimal weight variation, and high-speed unwinding without sticking or fuzzy slivers.
- Real-time monitoring of sliver quality reduces manual inspection work by 50%. The capacity expansion device uploads operation data and quality status of carding, combing, and drawing equipment to the network, where it is analyzed by an expert system to optimize production configuration and improve production conditions.
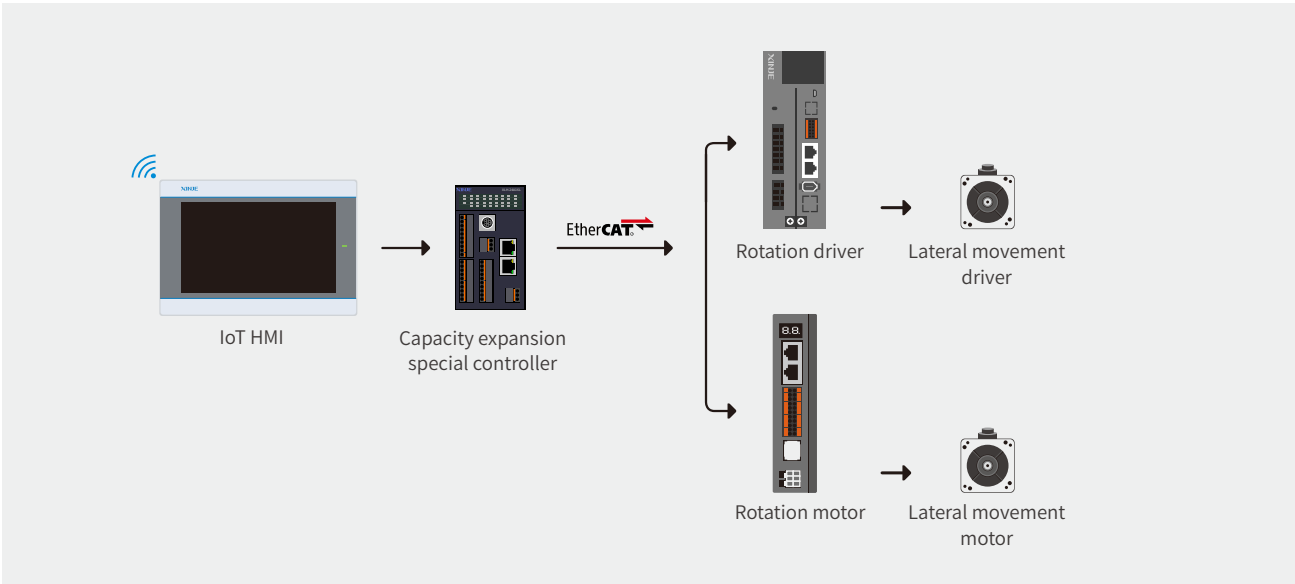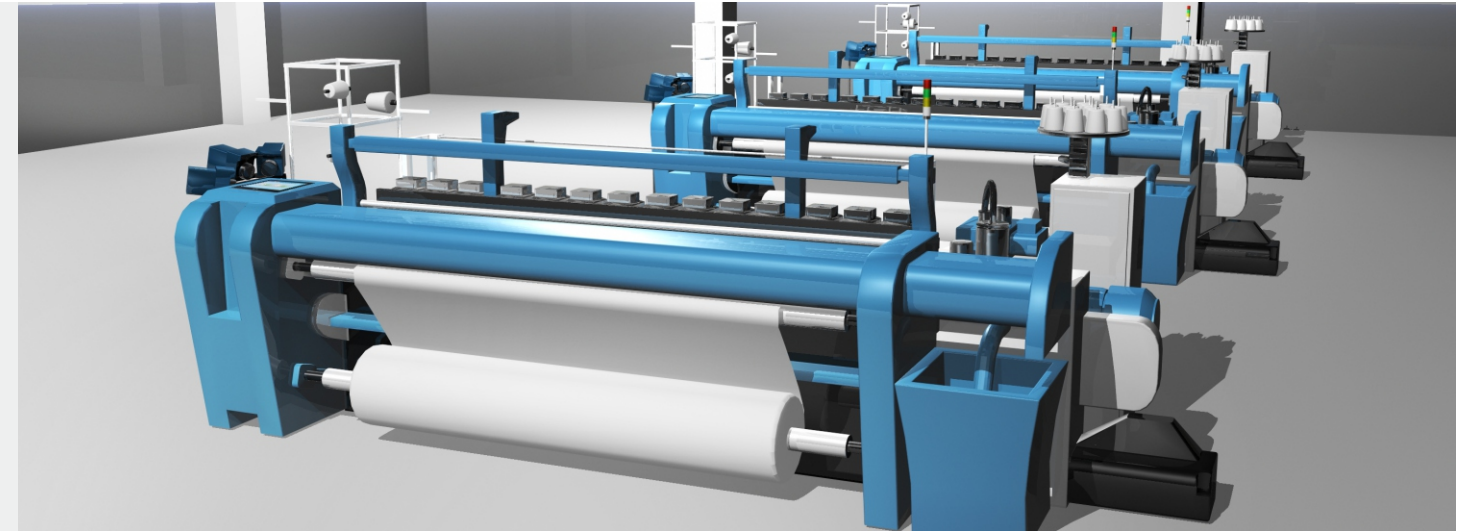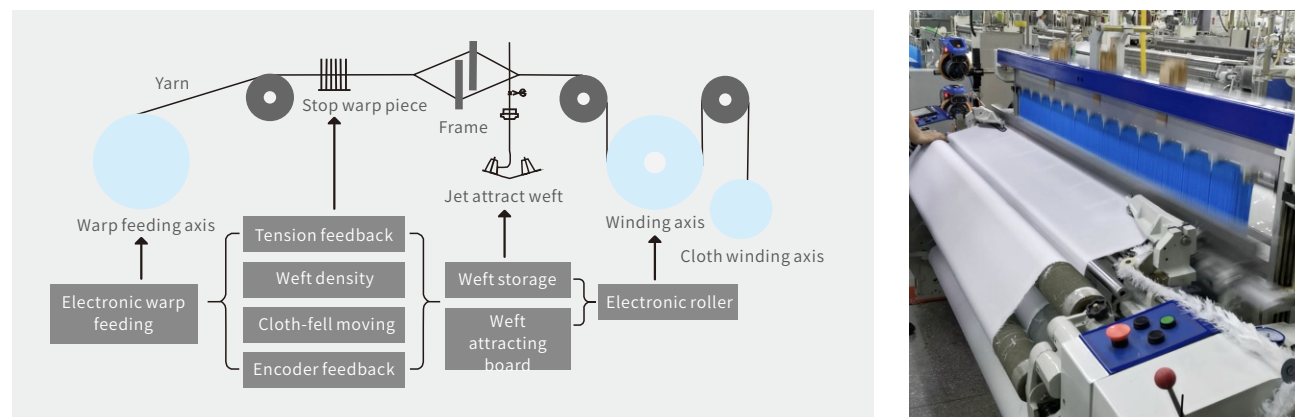
Field application
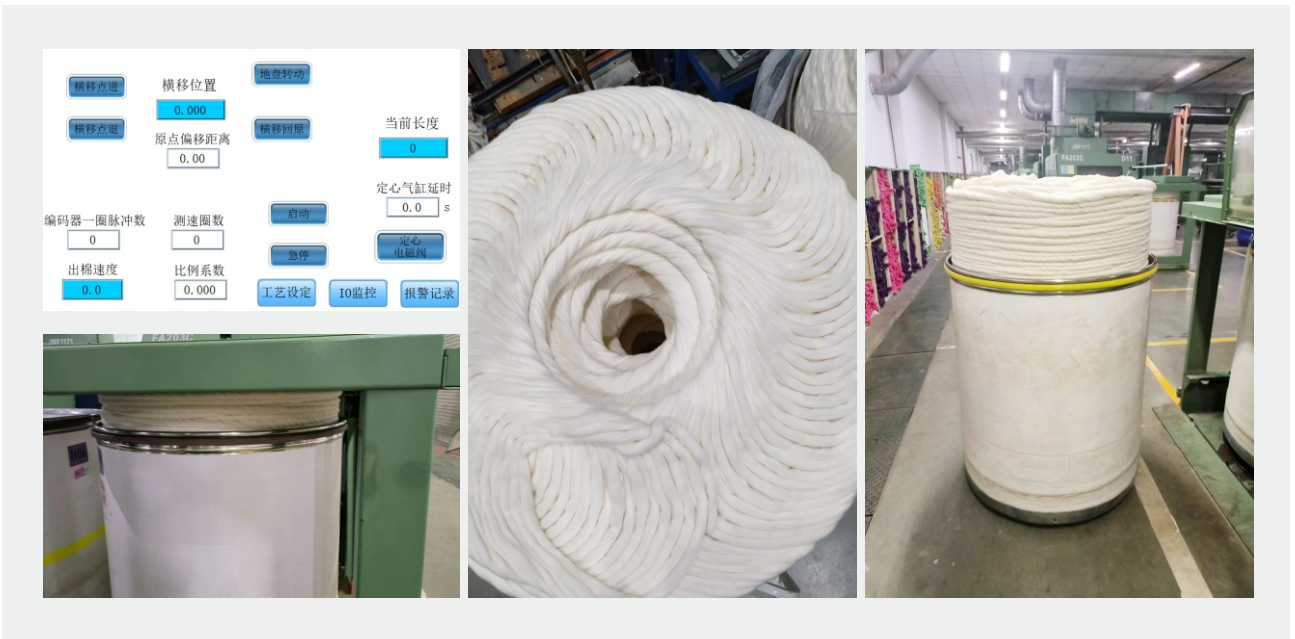
Weaving Solution

The BAJ high-speed air-jet loom electronic control system is a high-end integrated solution independently developed and produced by Xinje Electric, suitable for mainstream air-jet looms both domestically and internationally.

The system adopts a modular design, supporting custom needs such as electronic let-off, electronic take-up, electronic jacquard, double warp beam, and electronic cloth winding. Paired with Xinje cloud, it provides intelligent textile solutions for customers.
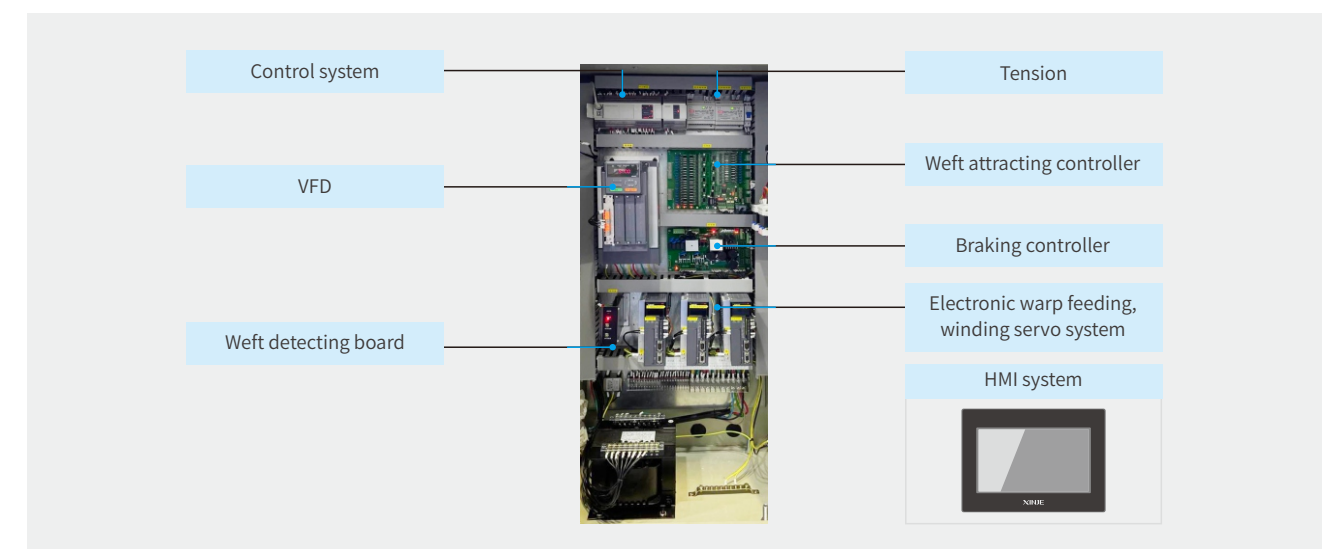
BAJ high-speed air-jet loom system

Process flow

Field application

System topology

### Solution advantages

- Equipped with a high-performance dedicated main controller, suitable for speeds up to 1500rpm.

- Supports various compensation methods such as fell translation compensation, ten-weft compensation, let-off compensation, and take-up compensation, adapting to different fabrics with flexible control.

- Supports control of up to 40 solenoid valves for 6 main jetting, 6 cutters, and 6 boosters.

- Supports intelligent automatic air valve control, dual warp beam control, independent inverter control, and XNET bus electronic jacquard.

- Supports variable weft density, electronic dobby, empty weft insertion, variable speed control, and stable tension control to ensure fabric quality.

- Enables access to Xinje cloud information platform for device configuration, data collection and analysis, remote control, and remote fault alerts and troubleshooting.

Industrial informatization

Equipment malfunction alarm reminder

Support fault alarm reminder
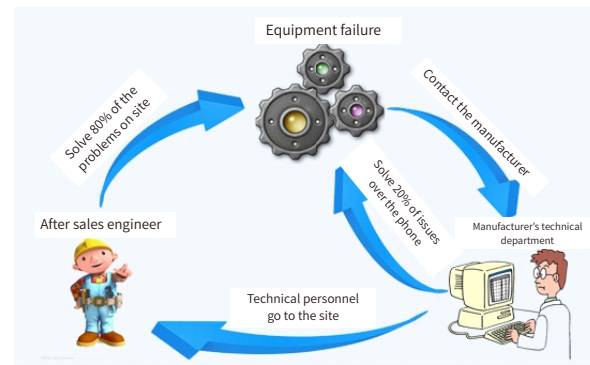
Support alarm record query

Support mobile app push notifications

After-sales Maintenance Reminder

The equipment manufacturer obtains timely information on the lifespan of wear parts and abnormal operations to generate a business information system. This provides a solution to replace traditional manual management for customers, enhancing service levels while offering an accurate information system for after-sales, thereby improving profitability.
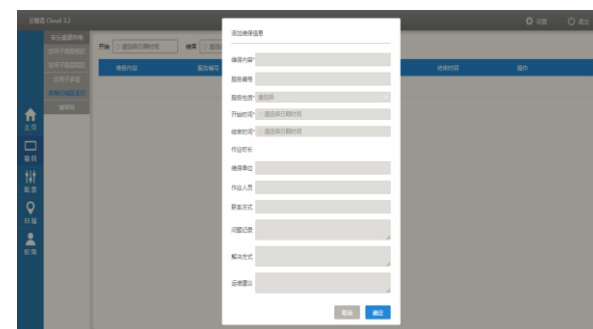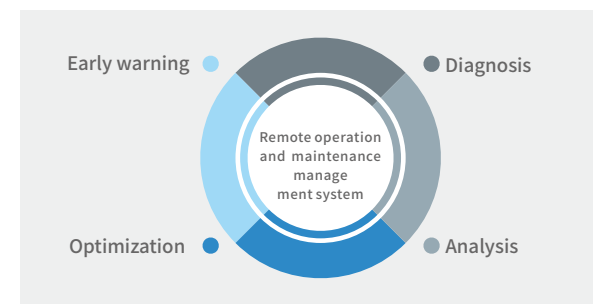

Operation log

During system operation, certain statuses and activities are recorded to generate user operation logs. This ensures the security and integrity of the logs. The system provides functionality to query logs by operator, operation time, and operation content.
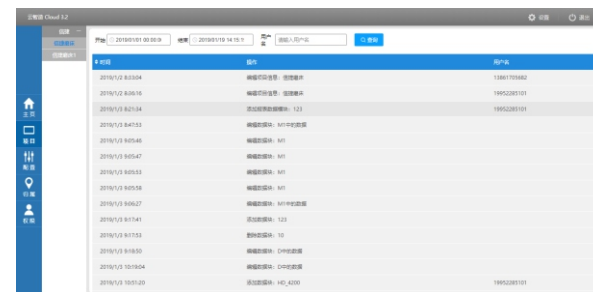
Historical data query

Supports querying by time interval and selectable data options, and offers three display formats: table, curve, and bar chart. Tables can be exported in Excel format.
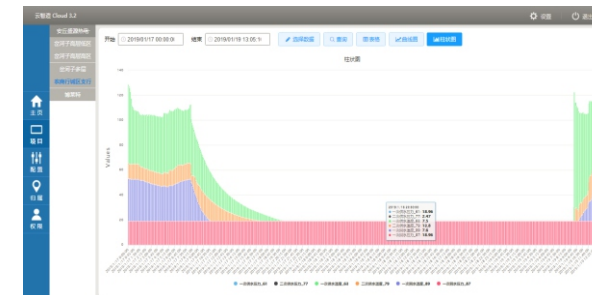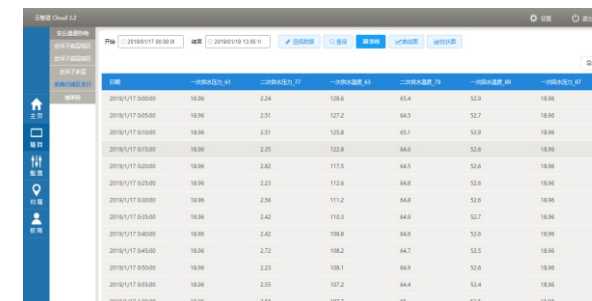
Multivariable Reports

Supports querying by time interval and selectable data options. The report data allows for daily, monthly, and yearly production comparison of different products, updated every 2 minutes. It offers three display formats: table, curve, and bar chart. Tables can be exported in Excel format.
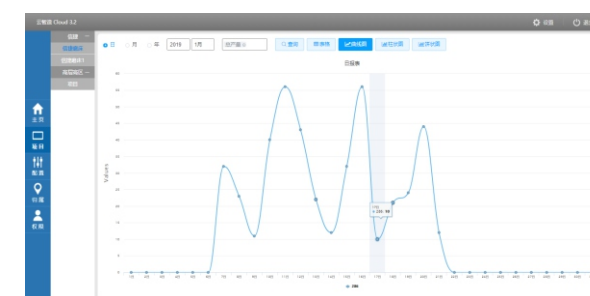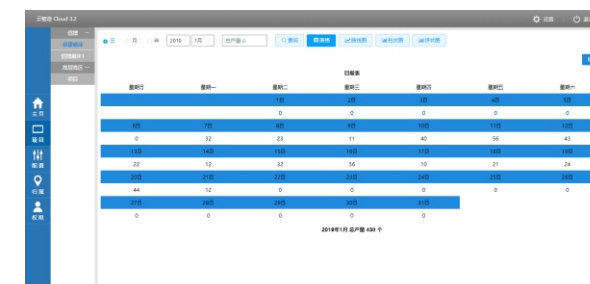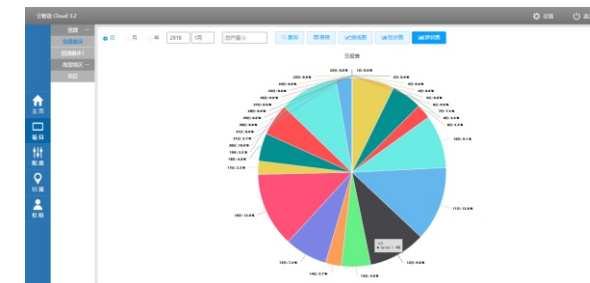
Existing case

Metal wire mesh weaving machine

Process flow

Electronic warp feeding

↓

Tension feedback | Encoder feedback | Break warp detection

↓

Rapier belt attracting weft | Weft detection

↓

Weft density | Electronic net winding

Control solution

Parameter read write

HMI | XDH | Module

Follow up spindle | Electronic cam | Given frequency

Encoder feedback

Warp feeding | Net winding | Rapier band

Solution advantages
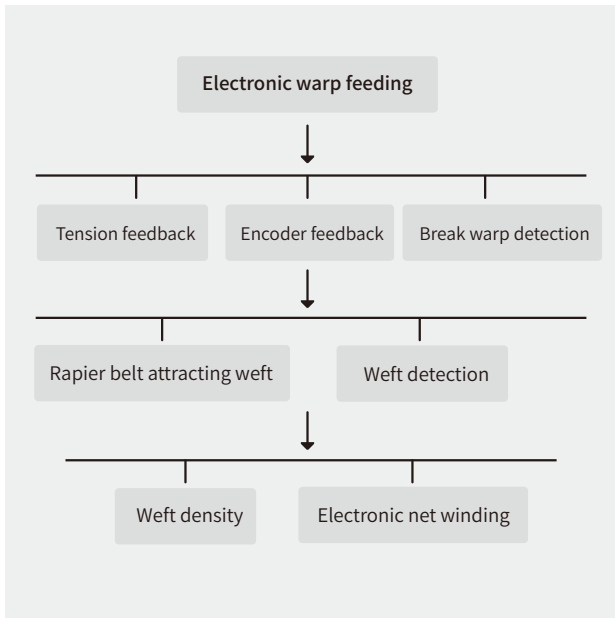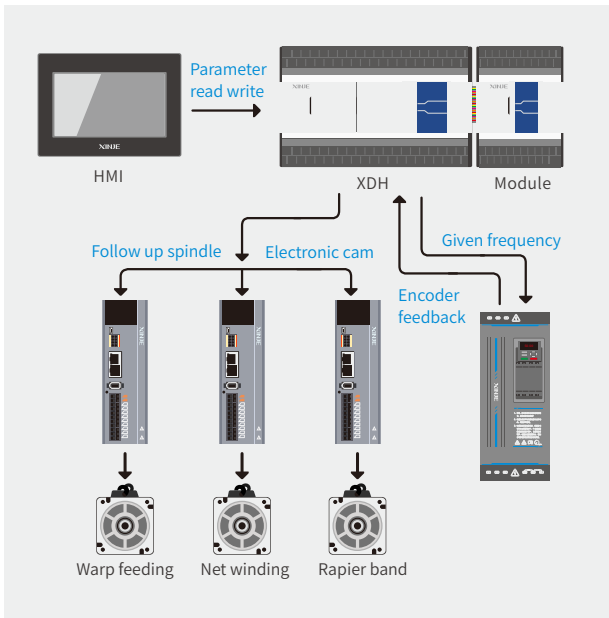
- The system allows for reset and weft search operations at any spindle position, after handling most alarms, high-speed operation can resume directly.
- The tension module monitors tension in real-time and offers an optional PID control algorithm to adjust for tension stability.
- During production, the weft density can be modified in real-time. The weft density percentage can be manually corrected based on the set weft density and actual weft density ratio, and it features a start-up weft density compensation function.
- Both the main shaft encoder position and rapier belt position are monitored. The machine will stop promptly if there is an abnormal encoder signal or a deviation in the rapier belt cam position.

## Field application

Jacquard loom solution

The textile industry involves numerous processes, machines, and high labor intensity. Achieving automation in manual operations and product inspection, implementing automatic detection and adjustment of various process parameters for optimal control, and establishing an automated production management system are hallmarks of modern textile production. Textile automation plays a crucial role in ensuring product quality, improving labor productivity, reducing labor intensity, preventing environmental pollution, and increasing product variety.

With the increasing demands of modern production for more complex fabric patterns and weaving speed, along with the continuous development of science and technology, the textile industry has seen the emergence of mechanical jacquard machines followed by the rise of electronic jacquard machines. The development of jacquard technology is advancing rapidly. The automation level of electronic jacquard machines has significantly improved, allowing for high-speed, multi-variety, and large-pattern weaving with excellent reliability, safety, and ease of pattern changes, making them increasingly favored by the weaving industry.

Technical principle

An electronic jacquard machine is a type of textile equipment used to create patterns on fabrics, similar to computer embroidery. It refers to jacquard machines where the needle selection mechanism is controlled by a computer. Generally, electronic jacquard machines can create more patterns than mechanical jacquard machines.

In a jacquard machine, pattern cards are wrapped around a cylinder. For each weft insertion, a pattern card rotates, and the cylinder presses against the horizontal needles. When there is a hole in the pattern card, the tip of the horizontal needle enters both the pattern card and cylinder holes, allowing the hook end of the vertical needle to remain attached to the lifting knife. As the lifting knife rises, it pulls the vertical needle up, which in turn pulls the heald and warp threads through the heddle eyes to form the upper layer of the shed. A heald weight suspended in the lower heald ring, when the shed closed, rely on the weight of the heald weight to return the heald to its position.When there is no hole in the pattern card, the horizontal needle retracts via a lug, pushing the corresponding vertical needle, causing its hook to disengage from the lifting knife. Consequently, the heald and warp threads connected to the vertical needle do not rise, forming the lower layer of the shed. Thus, the movement of each warp thread is determined by the presence or absence of holes in the pattern card. The holes are punched based on the design and structural requirements of the pattern, ensuring that the warp thread movement aligns with these requirements.
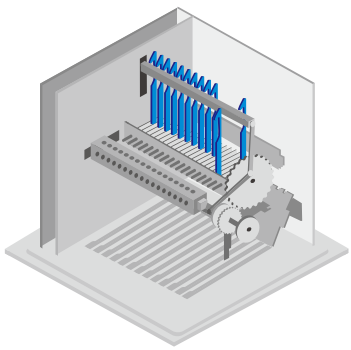
Control solution

After the loom's main motor rotates and emits a differential encoder signal, it is received by the inverter, which synchronizes the rotation to achieve consistent speed. This ensures that the jacquard process can be performed during loom operation, reducing labor intensity and making the operation simpler and more precise.
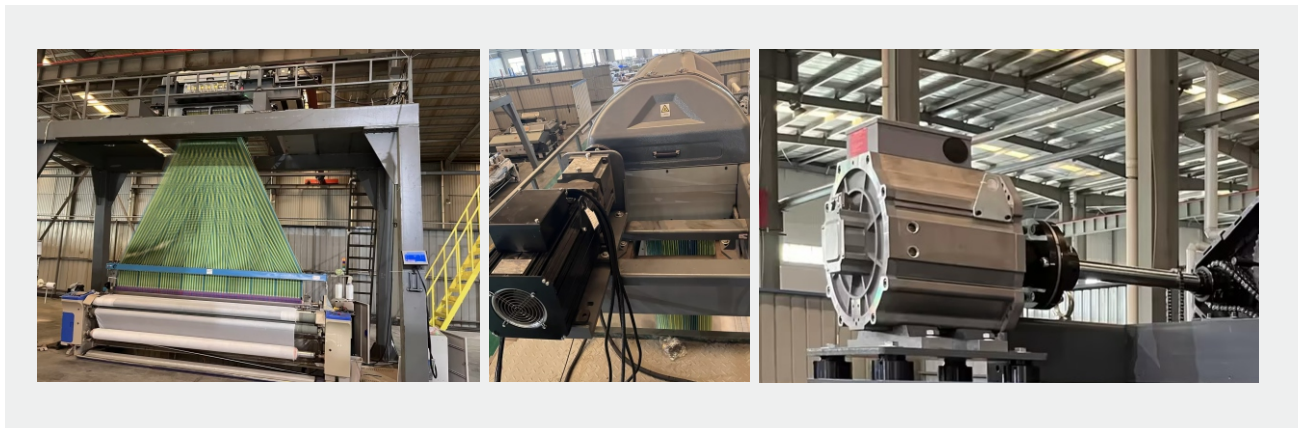
System topology

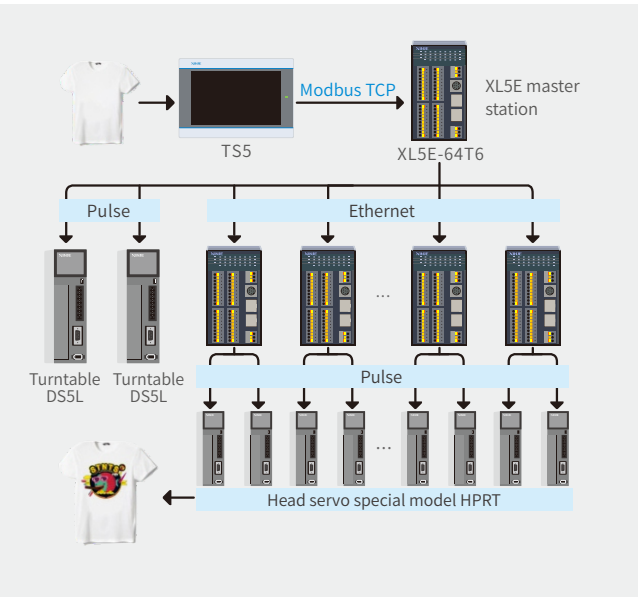
Host encode → Jacquard VFD → Jacquard motor
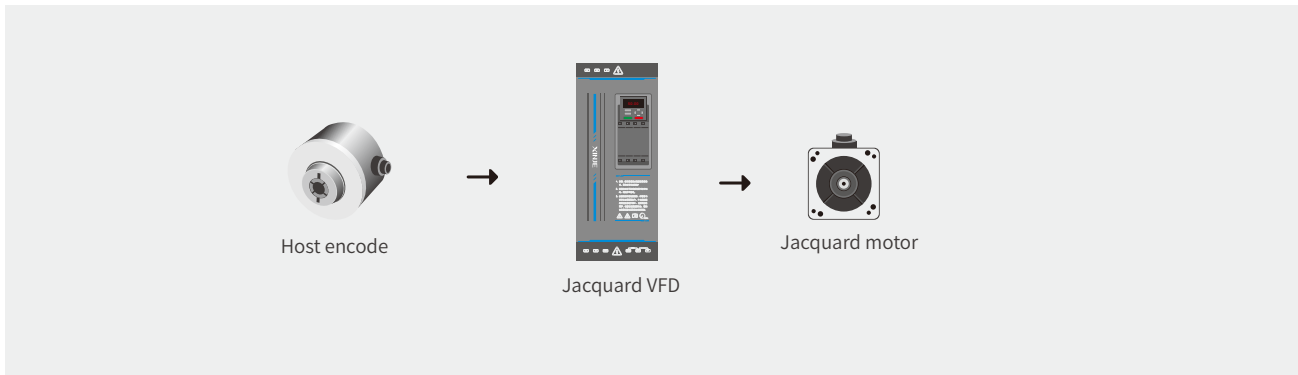
Solution advantages

- Direct-drive motor, easy to install, with high transmission efficiency.
- No need for a gearbox, resulting in low cost.
- Strong start-stop responsiveness and high synchronization accuracy.
- Simple adjustment operations reduce machine setup difficulty.
- Optimal sealing and ventilation prevent lint from entering the system, ensuring maximum longevity.

Field application

Printing machine system solution

Control solution

TS5 — Modbus TCP — XL5E master station
XL5E-64T6

Pulse   Ethernet

Turntable DS5L   Turntable DS5L

Pulse

Head servo special model HPRT

Solution advantages

- This solution is suitable for equipment with 2 to 32 heads and can be connected to various machines like digital printers, heat presses, and flocking machines. It offers high versatility and flexibility in resizing equipment.
- The print head panel controller uses communication control, reducing PLC points significantly, thereby lowering machine costs and simplifying wiring.
- The turntable starts and stops smoothly with no cumulative errors, addressing positioning inaccuracies.
- An optimized speed curve algorithm resolves the issue of splattering.
- It features comprehensive functions, covering modes such as standard printing, reciprocating printing, multi-round printing, and forward/reverse production.

Field application
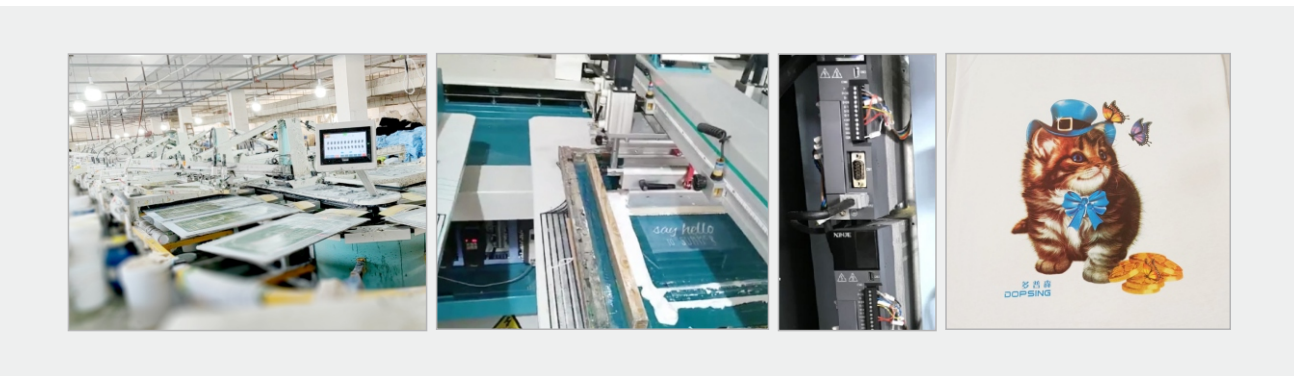
Warping machine vision yarn breakage auto-stop system solution

Real-time monitoring of multiple yarn breaks and immediate alarm

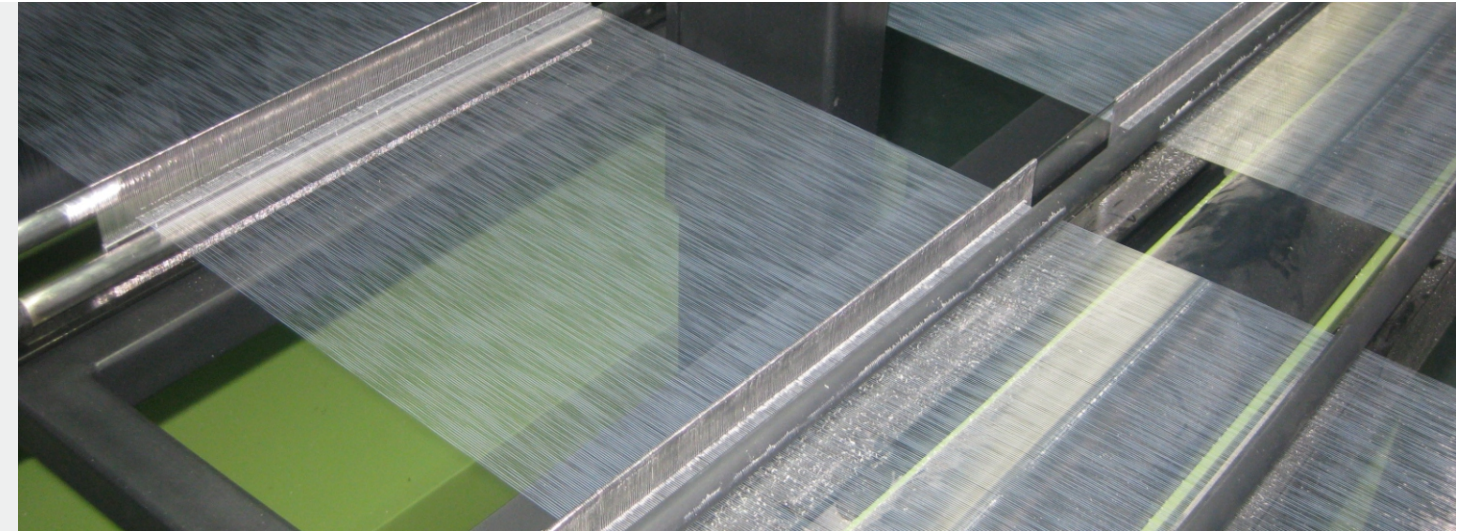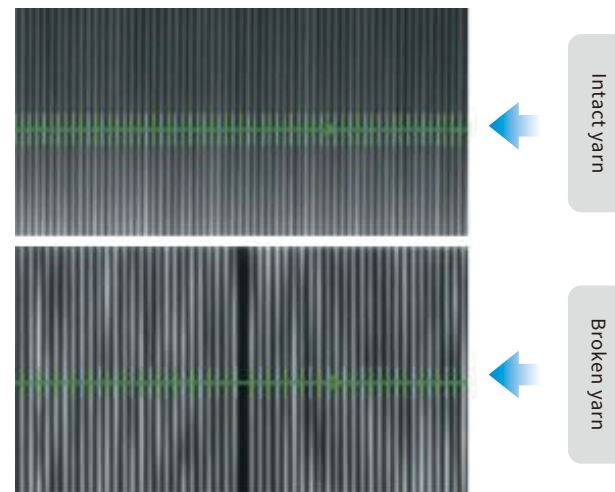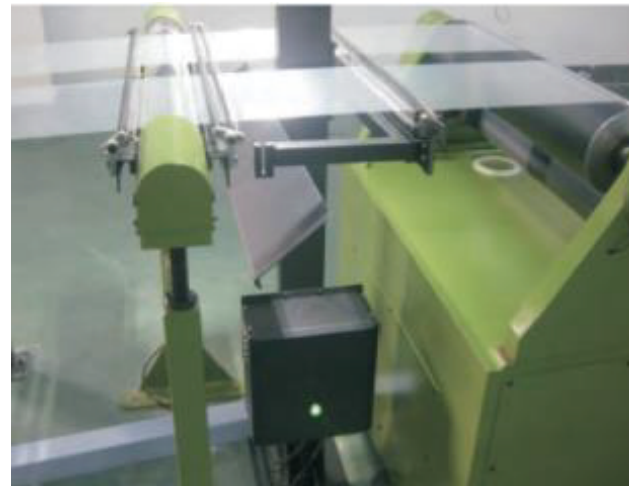Warping, as a weaving preparation process, involves drawing several yarns from the bobbins to form a warp sheet with uniform tension and parallel arrangement. This sheet is then wound onto a warp beam or weaving beam with specified length and width for convenience in warp knitting. The quality of warping directly affects the final fabric quality.

Project overview

Currently, yarn break detection in the textile industry's warping machines relies on manual inspection, which is low in reliability and sensitivity. To address this, XINJE has developed a machine vision-based yarn break auto-stop system.

This system can count the number of yarns in real-time, detect missing and broken yarns, and accurately display the break location. It is resistant to interference from yarn vibrations and reflections, making it ideal for use in warping, winding, sizing, and doubling equipment.

Intact yarn

Broken yarn

System topology

- The XINJE warping machine vision-based yarn break auto-stop system consists of an industrial controller, industrial camera, PLC, and alarm indicator light.
- Users can choose between touch control integrated machine (with touch display) or motion control integrated machine (replacing PLC) according to their needs.
- The industrial camera dynamically captures images of the parallel-aligned yarns after separation, and the vision control unit performs multi-yarn break detection. It monitors the number of yarns, detects yarn breaks, and identifies the break location in real time.
- Upon detecting a yarn break, it quickly executes a stop operation. The robust yarn break alarm database system promptly alerts users to yarn breaks or shortages, helping to eliminate the root causes of frequent breaks.

Dual camera

Light source

Touch control integrated machine

Signal transmission

PLC
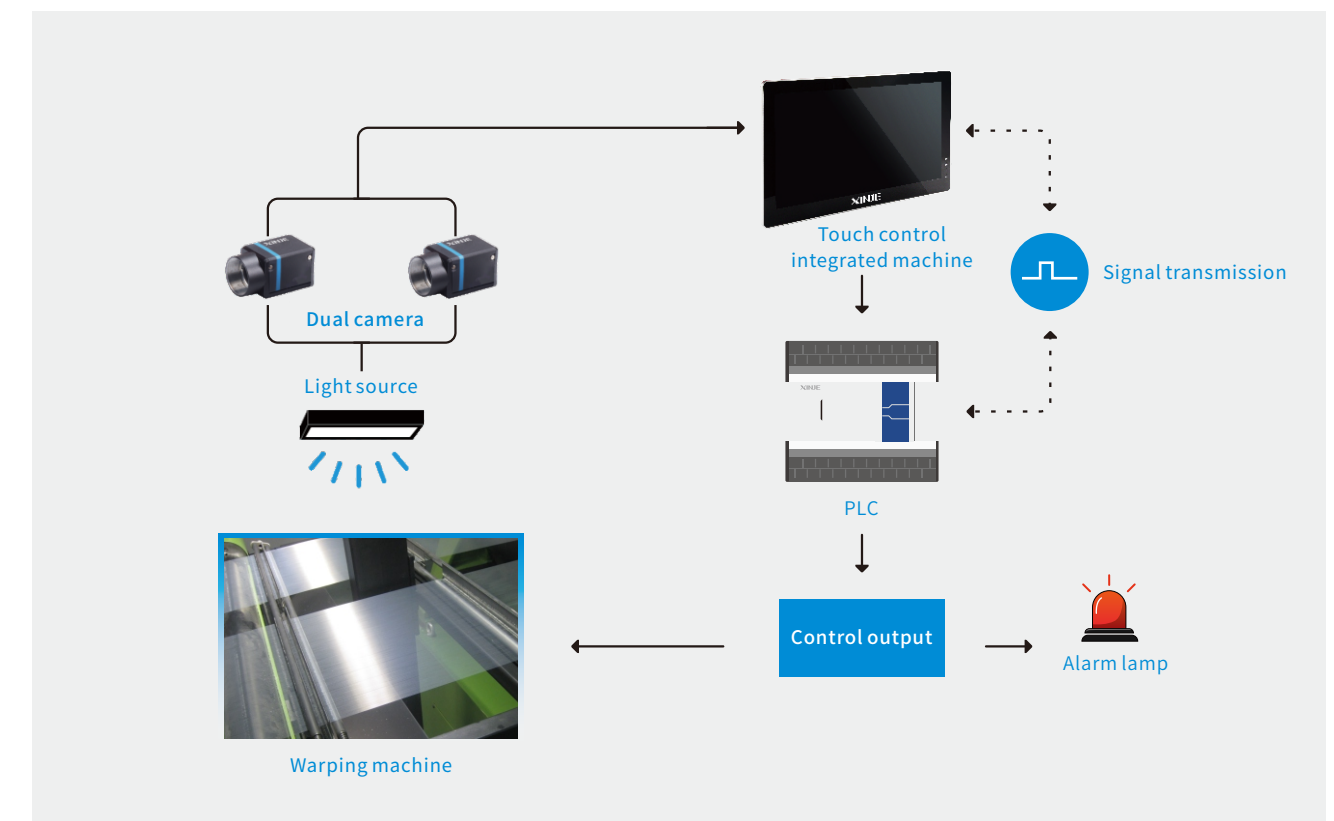
Control output

Alarm lamp

Warping machine

Solution advantages

- Ten million pixel dual-camera operation, with a single camera capable of capturing up to 500 yarns and a shooting width of up to 0.8 meters.
- Dynamic real-time shooting with a reaction speed of less than 0.2 seconds.
- Strong adaptability to various yarns (elastic yarn, filament, monofilament, bright yarn, etc.), with no need to reset parameters when changing yarns, and equipped with self-learning capability.
- Standard LED lighting is sufficient, with no need for additional industrial light sources.
- Highly resistant to interference, suitable for different on-site environments.

Warp knitting machine vision-based photo auto-stop system solution

AI solutions combined with informational platform for more timely and reliable data

As a type of textile machinery, warp knitting machines are crucial for various fabrics and significantly impact essential aspects of daily life such as clothing, food, housing, and transportation. However, due to equipment malfunctions or operational issues during the knitting process, the fabric produced may have defects. Current detection equipment cannot fully ensure the quality of the fabric at the warp knitting machine's output. Therefore, there is a need to develop an accurate and rapid detection method.

Project overview

Based on this, XINJE has launched a warp knitting machine vision-based photo auto-stop system that precisely samples small fabric defects. It extensively monitors for defects such as missing or broken warp, missing or broken weft, holes, foreign objects, knots, wrinkles, indentations, scratches, and oil stains.

Production data is uploaded to the cloud in real-time, enabling production monitoring, report analysis, and data control through an informational platform, thus maximizing management efficiency.
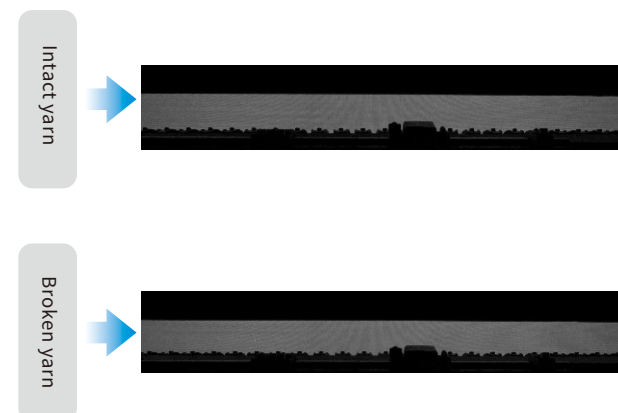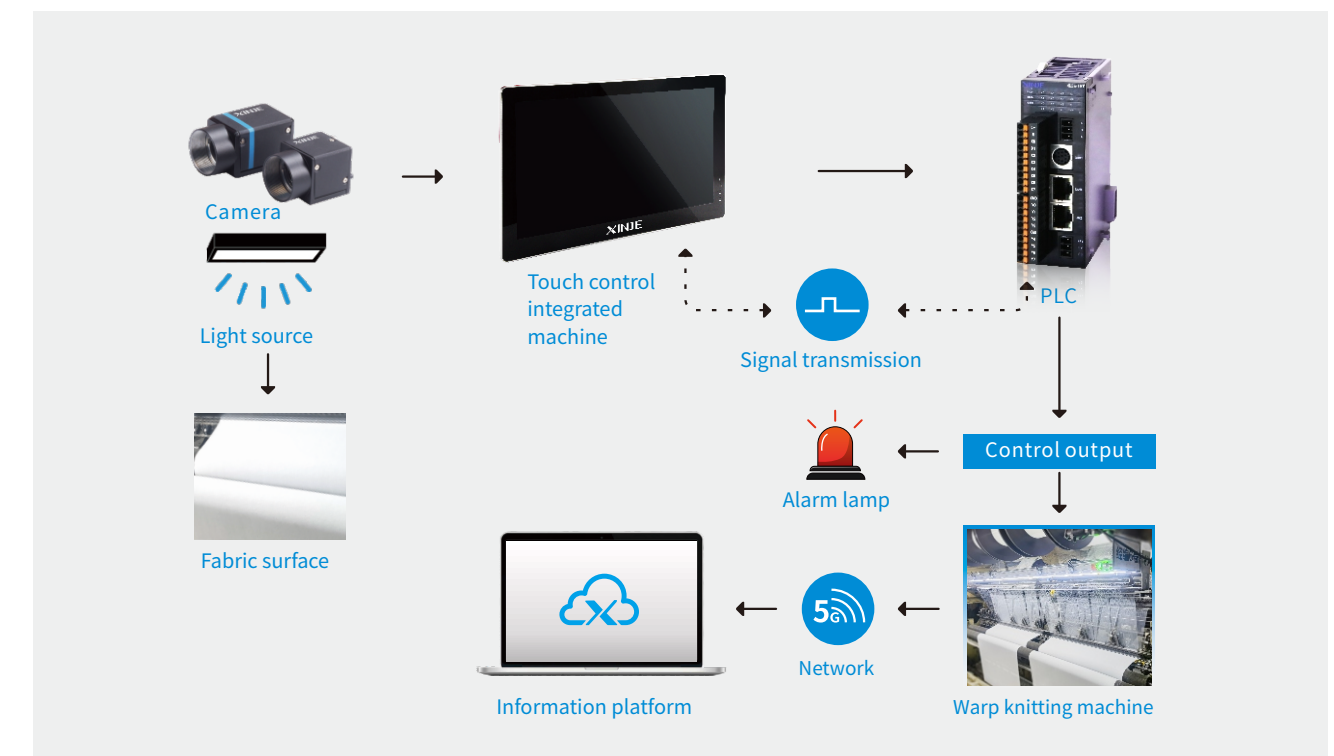

Principle

The warp knitting machine vision-based photo auto-stop system consists of a vision detection system, electrical control system, and informational management platform.

Cameras positioned above the warp knitting machine capture real-time dynamic images of the fabric. The industrial controller processes these images using algorithms such as image filtering, line detection, and the Hough transform, automatically detecting defects and sending a stop signal to the electrical system via the PLC.

Data from the warp knitting equipment, image processing, and PLC are uploaded to the informational platform via a wireless terminal. Computers, smartphones, and other monitoring devices can then monitor the data in real-time for production management.

Intact yarn

Broken yarn

Diagram

Camera

Light source

Fabric surface

Touch control integrated machine

Signal transmission

PLC

Control output

Alarm lamp

Information platform

Network

Warp knitting machine

Solution advantages

- High speed, with a single camera capturing up to 30 frames per second.

- Timely and reliable data, with an intelligent information platform for real-time data monitoring and production alarm notifications.

- Large-area monitoring supports camera groups in 4, 6, or 8 configurations, with a single camera covering a width of up to 1 meter.

- Stable performance with anti-shock protection to prevent vibration.

- Wide adaptability, with proprietary algorithms using multiple tools and angles to detect various fabric defects.

Information platform

The information platform includes modules for equipment management, data storage, graphical configuration, data analysis, and user management. It features production monitoring, data monitoring, report analysis, and alarm notifications. It supports simultaneous monitoring via web and mobile app.
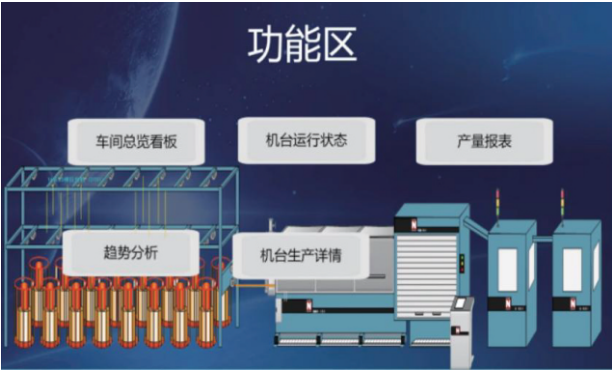
The knitting machine vision-based photo auto-stop system combines the informational platform with AI solutions, significantly improving detection efficiency while reducing labor costs. It addresses the issue of data delays, ensuring data is more timely, reliable, and traceable.

Functional area

Data monitoring panel

Solution advantages

Robust data acquisition capabilities

- Collects comprehensive data, including start and end times, running speed, fabric type, operating status, product quality, and output.
- Capable of simultaneously monitoring hundreds of warping and warp knitting machines, compatible with multi-zone machinery.
- Utilizes host computer input and various methods to ensure safe data acquisition.

Diversified Data Applications

- The existing platform offers data monitoring and reporting features, centralized monitoring on large screens, and big data trend analysis.
- The platform provides standardized HTTP API interfaces for integration with existing MES, ERP systems, and PLC flows. It supports the universal Modbus TCP protocol.
-

Intelligent Detection System for Circular Knitting Machines Solution

System function

Defect Detection

Defect detection is a core function of the circular knitting machine vision inspection system. The system captures real-time images of the fabric surface and uses algorithms to identify defects such as holes, oil stains, broken needles, missing needles, and yarn breaks, accurately locating defect positions.

It operates continuously for 24 hours, automatically stopping when defects are detected, thus preventing further production of flawed products and improving product quality.

Intelligence and Integration

The circular knitting machine intelligent detection system features advanced self-learning and adaptability, allowing it to automatically adjust detection parameters and algorithms based on production needs, enhancing accuracy and efficiency. Additionally, the system supports integration with ERP systems, ensuring seamless data connection and resource sharing, with real-time uploading of production data.

Technical features

Real-time: The system can perform real-time inspections during the textile process, promptly identifying and addressing defects, thus preventing waste of defective fabric.

High Accuracy: Using advanced image processing algorithms, it can detect even the smallest defects, achieving a detection accuracy of over 95% with a false detection rate below 5%.

User-friendly: The interface is intuitive and easy to understand, allowing workers to quickly learn and operate it, reducing operational difficulty and training costs.

Application value

- **Reduce Defect Loss by 80%**

  24-hour real-time detection minimizes the production of defective products through continuous monitoring and timely shutdowns.

- **Automated detection reduces the need for human intervention**

  Automatically monitors and inspects needles, fabric, and more in real-time, decreasing the reliance on manual inspection.

- **Reduce Labor Costs**

  Automated detection significantly reduces the time and cost of manual inspection, enhancing production efficiency.

- **Reduce Raw Material and Energy Waste**

 Decrease raw material waste by 300 kg per year per machine.

Field application
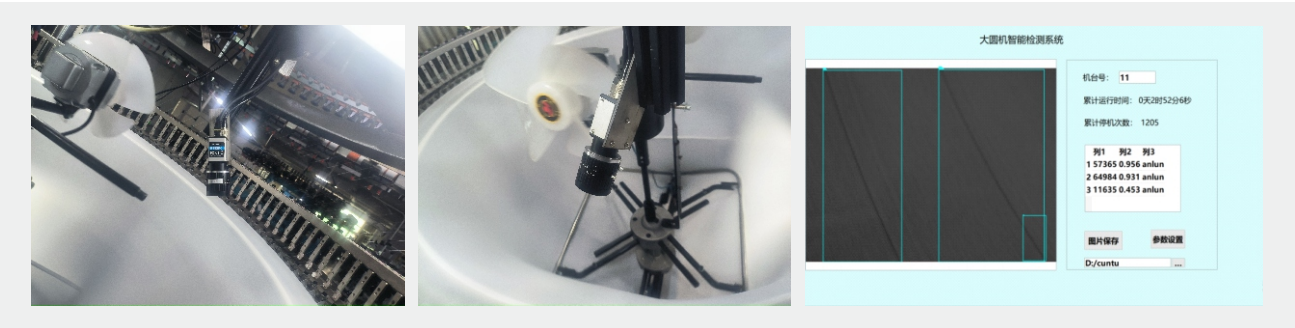
Rapier Loom Solution

The rapier loom vision inspection system is based on advanced machine vision technology. It uses high-precision cameras to capture image information during the weaving process and employs image processing algorithms for real-time analysis and processing. This enables automatic detection and identification of fabric quality, weaving conditions, and potential issues. The system comprises an image acquisition module, an image processing and analysis module, and a motion control module.

Diagram

IPC → HMI → PLC → Alarm lamp

Fabric surface ← Camera ← Light source ← Servo system
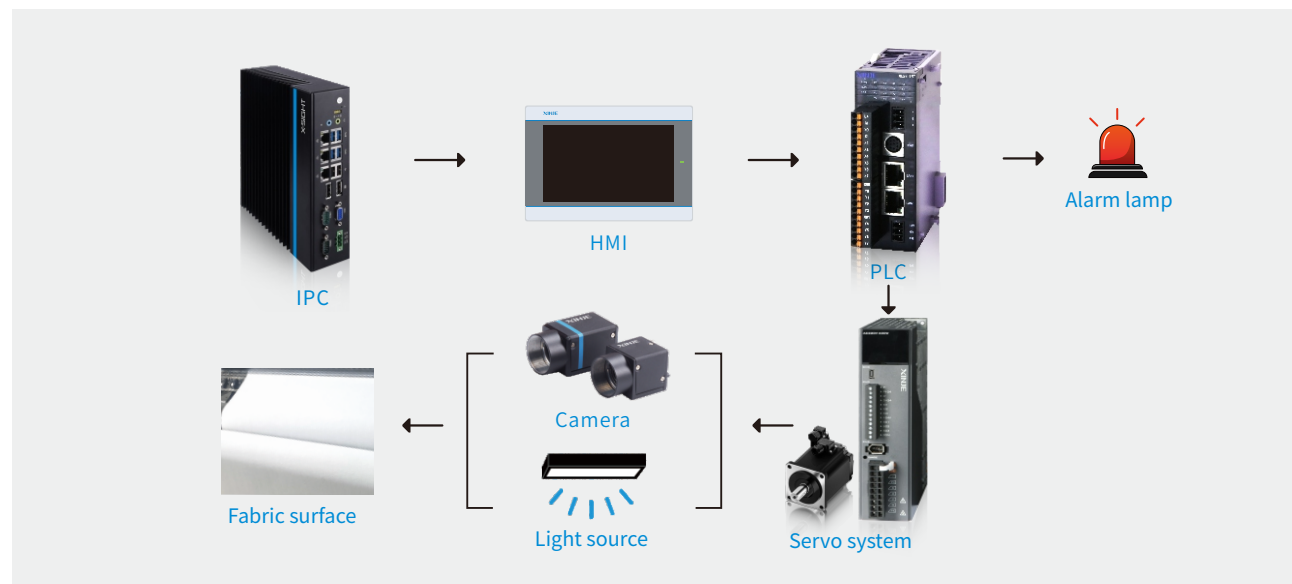
Functional features

- Utilize machine learning, deep learning, and other algorithms to classify and identify extracted features, determining the presence and type of defects. Train and validate algorithms with large sample data to enhance accuracy and robustness in defect recognition. Adjust and optimize algorithms adaptively based on real production conditions and feedback data.
- Monitor the fabric surface in real-time, set different warning thresholds, and employ varying responses based on defect severity.
- Reduce labor costs for enterprises, decreasing reliance on manual inspectors.

Application scenarios

Detectable defects, warp and weft lines, uneven and dirty warp and weft lines
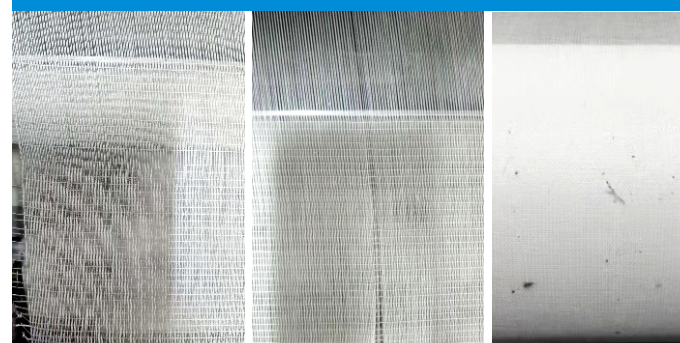
Textile informatization

As a traditional labor-intensive industry in China, the textile industry has seen continuous advancements in technology over recent years. However, management levels have relatively lagged behind. Taking the spinning industry as an example, traditional spinning machines exhibit several challenges: manual meter reading is time-consuming and labor-intensive, production progress is difficult to control, changing specifications and models is inconvenient, and production data integration is challenging. In the rapidly evolving era of information technology, the industrial structure urgently needs adjustment.

Xinje addresses these issues by focusing on electrification transformation, IoT, and cloud platform systems, creating tailored solutions for the spinning industry. This approach quickly reduces factory management costs and helps enterprises achieve intelligence and digitization, ultimately reducing costs and increasing efficiency.

Industry Pain Points

Textile enterprises often have large production sites, lacking real-time, comprehensive, and accurate understanding of on-site production conditions. The vast amount of data generated during production can lead to errors in manual statistics, resulting in inaccurate assessment of workers' performance.
There is an inability to implement strict hierarchical management for different roles such as production workers, maintenance personnel, and workshop managers.

Customer Value

The Xinje IoT solution uses the TS series HMI, featuring built-in gateway functionality, which reduces system construction costs.
The automatic metering function quickly records device data and associates it with personnel information. Through edge computing, it determines personnel and production performance, achieving cost reduction and efficiency enhancement.
The aesthetically appealing and dynamic workstation allows real-time viewing of production progress and capacity efficiency reports. Factory managers can easily coordinate and manage operations, significantly improving overall factory efficiency.

Solution advantages

- **IoT HMI**
  The HMI comes with IoT functionality, no need external gateway.

- **Automatic Meter Reading**
  Scheduled automatic meter reading and manual one-click export, with flexible recording options.

- **Multi-Endpoint Access**
  View production progress and capacity efficiency in real-time on large screens and office computers.

- **Equipment Repair Requests**
  Remotely debug equipment and switch production specifications with one click.

- **System Access**
  Multiple standard API interfaces for seamless access to MES/ERP systems, providing diverse equipment data through MySQL database.

- **Data Security**
  Deployed on a local area network, ensuring isolated data transmission without leakage and no network interference.

Application Cases

Application layer

| Workshop display board | Production management personnel | Third party system |

Service layer

Office network: Ethernet/WiFi

High performance server deployment-Textile specific platform

Execution layer

Equipment network: Ethernet/WiFi

| TS5 | TS5 | TS5 | TS5 | TS5 |

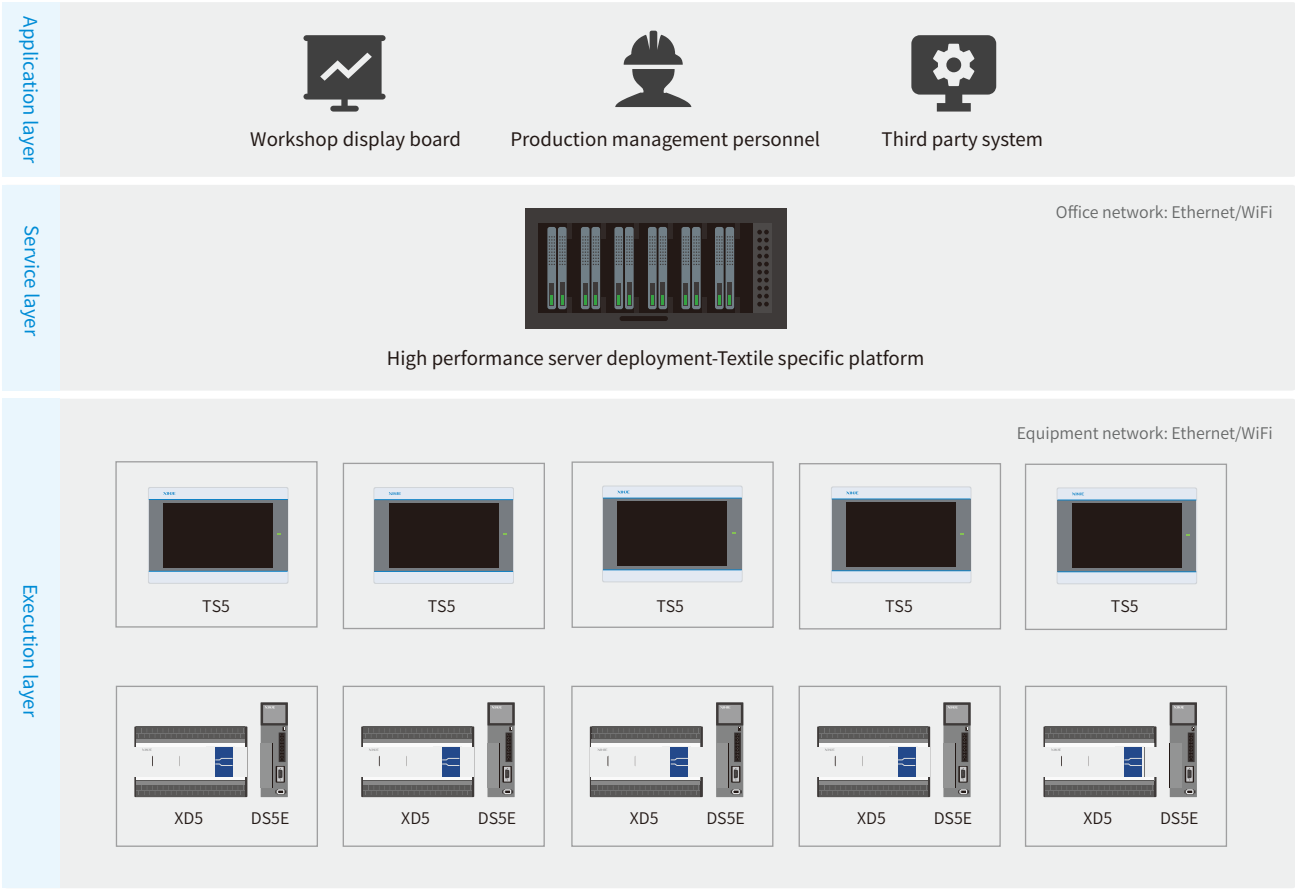| XD5 DS5E | XD5 DS5E | XD5 DS5E | XD5 DS5E | XD5 DS5E |

In a large domestic spinning factory equipped with hundreds of roving machines, the Xinje TS5 series IoT HMI have been implemented. Managers can easily monitor and control the roving equipment, while operators can view equipment status, production data, and key indicators in real-time. The connection between the HMI and the edge server ensures rapid data transmission and real-time updates, allowing production data to be promptly fed back to managers and decision-makers. Through the VNC function, the HMI provides a direct interface for managers to take action when anomalies are detected.

Thus, the advantages of the IoT solution are clear. It ensures real-time data interaction within the factory's local area network, achieving production visualization and controllability. This provides customers with more efficient production management and decision support, helping them improve production efficiency and reduce costs.

Product specification

Item		TS5-700-E	TS5-1000-E
Product features	Size	7"	10.1"
	Type	16.77 million colors	
	Resolution	800*480	1024*600
	Brightness	200 cd/㎡	
	Touch panel	Four-wire resistive touch panel	
	Service life	Over 50,000 hours at an ambient temperature of 25℃, operating 24 hours	
	Processor	Cortex-A7 1GHz	
	Memory	128MB	
Interface	COM1	RS232/RS485	
	COM2	RS232/RS485/RS422	
	Ethernet port	Standard RJ45, 10/100M	
	USB port1	USB-A (compliant with USB2.0), USB flash drive port	
	4G(optional)	4G full netcom LTE-FDD (Mbps): 10 (Downlink)/5 (Uplink)	
	WIFI(optional)	IEEE 802.11 a/b/g/n IEEE 802.11 g: 54Mbps	
Electrical features	Input voltage	DC24V (voltage range: DC22V~DC26V)	
	Power	5W	8W
	Allow instant power outage	Below 10ms (actual power loss is less than 1s)	
	Voltage withstand	AC1000V, 10mA, less than 1 minute (between signal and ground)	
	Insulation resistance	DC500V, above 10MΩ (between signal and ground)	
Environment	Operation temperature	0-50℃	
	Storage temperature	-20-60℃	
	Ambient humidity	10% RH to 90% RH (non-condensing)	
	Vibration resistance	10-25Hz (2G in X, Y, Z directions for 30 minutes each)	
	Interference immunity	Voltage noise: 1500Vp-p, pulse width lus, 1 minute	
	Ambient air	Non-corrosive gas	
	Protection rating	Front panel Ip65	
Structure	Cooling method	Natural air cooling	
	External dimension(mm)	205.8*147.2*35.5	277.0*191.7*37.6
	Cutout dimension(mm)	192.1*138.5（±0.1）	260.2*179.7（±0.1）

Model	A-BOX-4G	A-BOX-W
COU	MT7628	
FLASH	16MB SPIF FLASH	
RAM	128MB	
Operating voltage	DC24V, allowable range is DC21.6V-26.4V	
Installation method	Standard DIN rail mounting	
4G module	EC200N-CN	--
4G operating bands	GSM/GPRS: 900, 1800MHz EDGE: 900, 1800MHz UMTS: CDMA2000(BC0), WCDMA(B1, B8), TD-SCDMA(B34, B39) LTE: FDD(B1, B3, B8)TDD(B38, B39, B40, B41) GNSS: GPS, GLONASS	--
WiFi operating bands	--	2.4GHz
Ethernet	Two 10/100M adaptive ports	
COM port	COM：RS232/RS485/RS422	
Internet access method	4G/Eth	WIFI/Eth
Serial port passthrough	√	√
Network port passthrough	√	√
Data monitoring	√	√

Product appearance dimension drawing

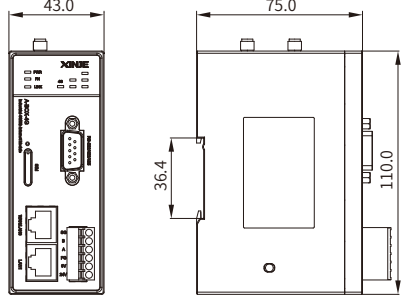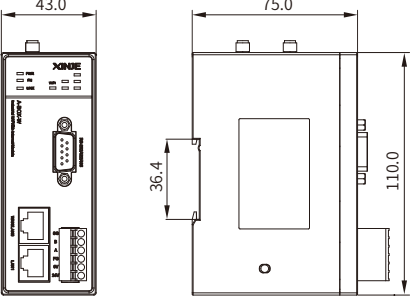(Unit: mm)

TS5-700
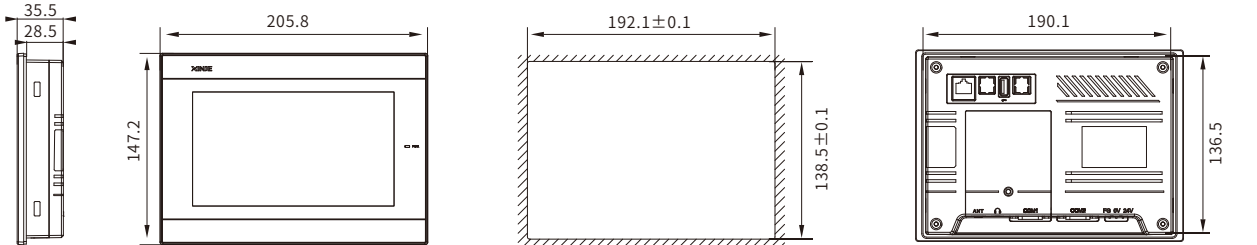
### TS5-1000
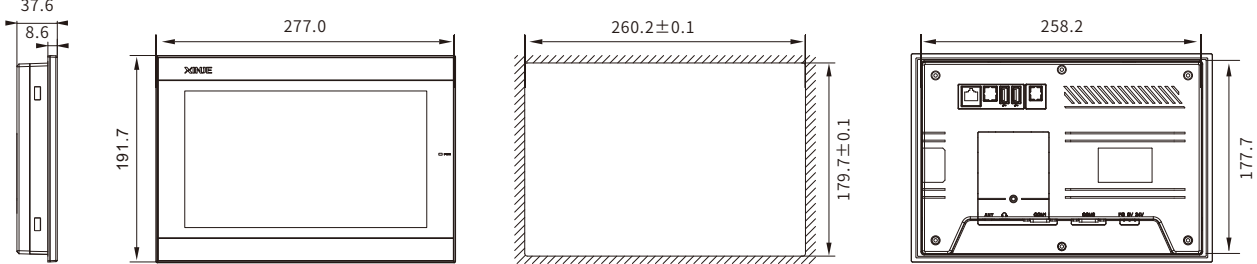
A-BOX-4G

A-BOX-W

Magnetic Stripe Navigation Differential AGV

The Magnetic Stripe Navigation Differential AGV is primarily designed for transporting loads of up to 1 ton. It can automatically interface with goods using lifting or roller transfer mechanisms. It features fixed task paths, high travel precision, and stable operation, significantly enhancing work efficiency. This AGV is widely used in production line transport within the automotive, 3C, and manufacturing industries.
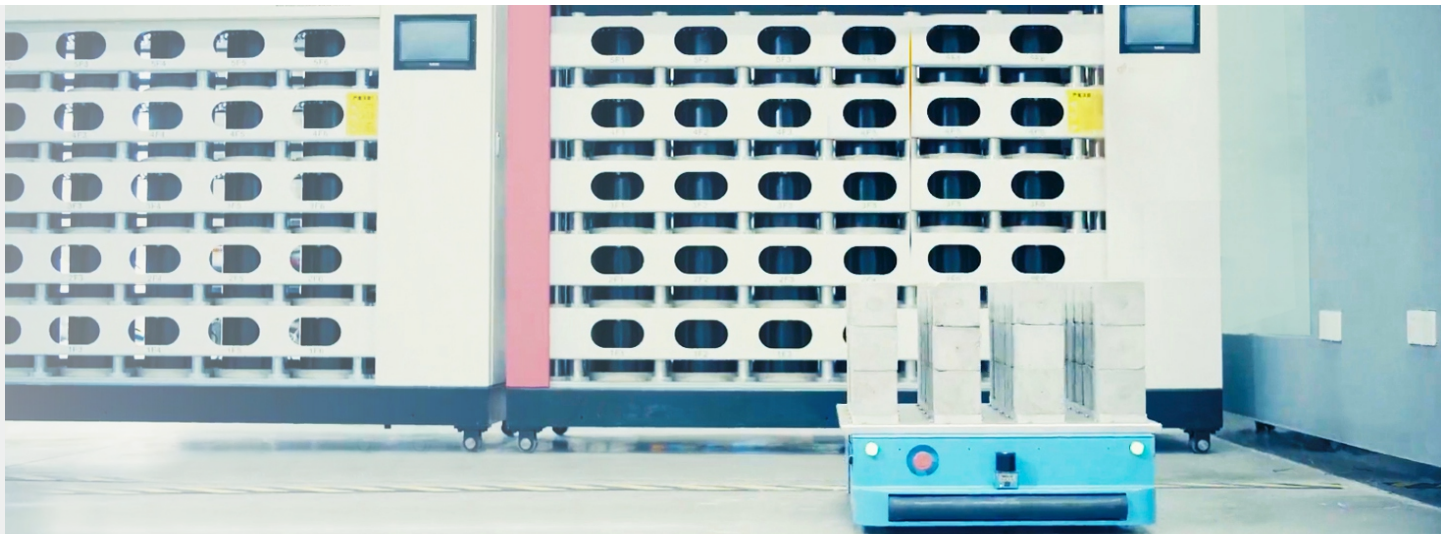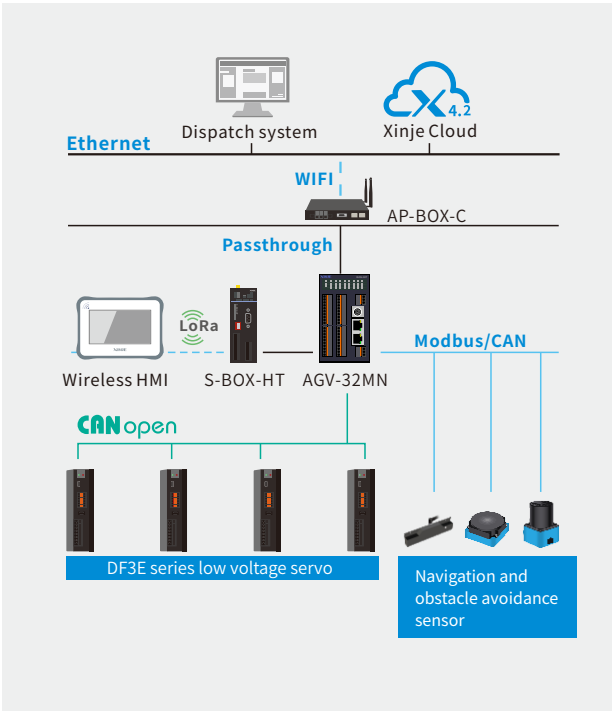
Control solution

The control system collects signals from magnetic navigation sensors, RFID sensors, laser obstacle avoidance, and safety edges. It follows the preset task path trajectory and uses data from the magnetic guidance sensors to differentially control the drive wheels, achieving corrections and steering to ensure the AGV steadily follows the magnetic stripe. When the RFID sensor detects function tags placed along the AGV's path, the AGV begins to execute functions such as path selection, in-place rotation, and stopping, achieving navigation control, function execution, and safety protection.

System topology

Dispatch system
Xinje Cloud
Ethernet
WIFI
AP-BOX-C
Passthrough
LoRa
Modbus/CAN
Wireless HMI
S-BOX-HT
AGV-32MN
CANopen
DF3E series low voltage servo
Navigation and obstacle avoidance sensor

Technical parameters

Item	Parameter
Navigation method	Magnetic stripe navigation
Control method	Differential control
Direction of movement	Bidirectional movement
Walking function	Forward, backward, in-place rotation
Positioning accuracy	±10mm
Travel precision	±10mm

Item	Parameter
Operating speed	0-60m/min
Load capacity	0-1000Kg
Stopping method	Soft stop, emergency stop
Protection method	Laser obstacle avoidance, safety edge
Protection range	Adjustable up to 3 meters
Drive unit	Single drive unit, dual drive unit

Solution advantages

- A standardized vehicle control program ensures quick project implementation.
- It features a standardized low-level motion control interface that supports autonomous secondary development at the logical layer.
- It supports single and dual differential motion model control.
- The system integrates control of various transfer mechanisms like rollers and lifters, offering a wide range of functional options.
- It supports visual path editing, standalone autonomous path planning, and online system scheduling.
- Wireless HMI communication allows for visualization and easy modification of parameters.
- Customization services are available to meet customer needs.

Field application

QR Code Navigation AGV

The QR Code Navigation AGV is primarily designed for transporting light loads, focusing on models with rotation, lifting, and multi-layer bins. It features flexible paths, high positioning accuracy, and fast operating speeds, making it widely used in scenarios such as line-side storage, production line stations, and bin-to-person applications.


Control solution

The control system uses dual-wheel differential drive for movement control. It collects signals from laser obstacle avoidance and safety edges, captures and reads QR codes laid out in the area with a camera, and processes real-time data from inertial navigation sensors. It converts discrete QR codes into a continuous path for correction control, ensuring the AGV can navigate stably. It controls the AGV to perform functions like moving forward, backward, in-place rotation, and stopping, meeting navigation control, functional control, and safety protection needs in practical use.

Solution advantages

- Individual equipment can be commissioned in 2-3 hours, ensuring rapid project deployment.
- It features a standardized program with low-level motion control interfaces for direct function calls.
- The system supports autonomous secondary development at the logical layer, flexibly addressing non-standard needs.
- It integrates algorithm processing for Hikvision and Dahua cameras, offering strong compatibility.
- The system achieves high positioning accuracy of ±3mm and an angular accuracy of <±1°.
- It can operate stably at speeds up to 2.2 m/s, enhancing transport efficiency. Customization services are available to meet different non-standard requirements.

System topology
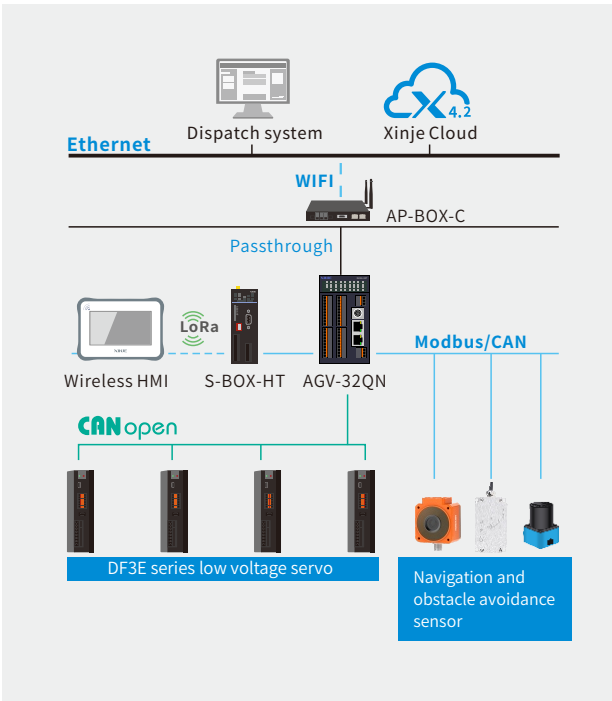
Technical parameters

Item	Parameter
Navigation method	QR code and inertial navigation
Control method	Differential control
Direction of movement	Bidirectional movement
Walking function	Forward, backward, in-place rotation
Positioning accuracy	±3mm
Travel precision	±10mm

Item	Parameter
Operating speed	0-2.2m/s
Load capacity	0-1000Kg
Transfer method	Lifting + rotation, roller
Rotation method	Synchro drive, follow mode
Stopping method	Soft stop, emergency stop
Protection method	Laser obstacle avoidance, safety edge
Protection range	Adjustable up to 3 meters

Field application