



ER Series Industrial Robots



CONTENTS

| | |
|------------------------------|----|
| Product introduction | 04 |
| Auxiliary equipment | 08 |
| Control system | 09 |
| Application software | 10 |
| Industrial application | 14 |



ER Series Industrial Robots

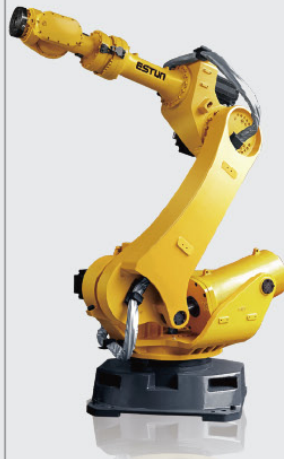
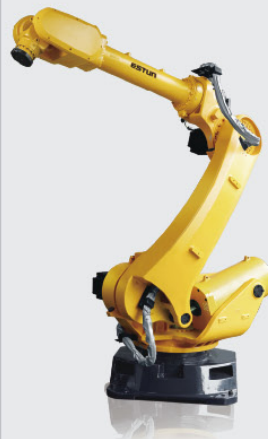
ESTUN Automation was founded in 1993 in Nanjing, China, the ancient capital of Six Dynasties. Being committed to business philosophy of focus and integrity, the company has been growing and expanding fastly during the last two decades. On March 20, 2015, ESTUN Automation became a publicly-traded company in Shenzhen stock exchange. Today, ESTUN automation has become one of the leading companies providing core control technologies for manufacturing industry in China and over the world.

Based on the experiences and advantages in control and AC servo technologies, ESTUN Robotics Co. Ltd. was established as a subsidiary of ESTUN automation in 2011. Its goal is to develop high performance industrial robots and improve the competitiveness of Chinese manufacturing industry. The company has developed a series of industrial robot products, including 6-axis articulated robots, 4-axis palletizing robots, Delta robots, SCARA robots, and linear robots for press lines. The payload of the robots varies from 4kg to 450kg. Besides supplying standard robots, the company has also provided robot stations for applications such as spot welding, arc welding, handling, palletizing, polishing, spraying and assembling. Meanwhile, the company also possesses a strong industrial robot engineering team offering robot-based applications and turnkey solutions of factory automation to our customers.

With the access to the stock market and rapidly growing demand in robot industry, ESTUN has developed a new strategy for growth, called“Dual-core and Dual-wheel”strategy. Under this strategy, ESTUN will expand in two directions: 1) Motion control electrical solutions, and 2) Industrial robots and smart manufacturing, and through two paths: 1) Internal R&D and 2) Merger and acquisition. Through ESTUN people’s continuous hard working, we are confident to becoming a world leading robot supplier and “Industry 4.0”pioneer for the global automation market.



6-axis
articulated
robot



| Model | | ER4-1450 | ER6-1600 | ER10-1600 | ER16-1600 | ER30-1900 | ER50-2100 | ER100-3200 | ER170-2605 | ER220-2605 |
|-----------------------------------|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Maximum load (kg) | | 4 | 6 | 10 | 16 | 30 | 50 | 100 | 170 | 220 |
| Reach of arm (mm) | | 1450 | 1600 | 1600 | 1600 | 1900 | 2100 | 3125 | 2600 | 2600 |
| Repeatability accuracy (mm) | | ±0.1 | ±0.08 | ±0.1 | ±0.1 | ±0.1 | ±0.15 | ±0.2 | ±0.2 | ±0.2 |
| Potection grade | | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 |
| Working range | axis 1 | ±180° | ±180° | ±180° | ±180° | ±180° | ±180° | ±180° | ±180° | ±180° |
| | axis 2 | -70°~+160° | -60°~+140° | -60°~+140° | -60°~+140° | -60°~+140° | -80°~+160° | -55°~+80° | -53°~+78° | -53°~+78° |
| | axis 3 | -200°~+80° | -155°~+80° | -170°~+80° | -170°~+80° | -165°~+80° | -170°~+80° | -195°~+80° | -193°~+78° | -193°~+78° |
| | axis 4 | ±170° | ±170° | ±360° | ±360° | ±360° | ±360° | ±170° | ±360° | ±360° |
| | axis 5 | ±135° | ±180° | -130°~+120° | -130°~+120° | ±130° | ±135° | ±120° | ±123° | ±118° |
| | axis 6 | ±360° | ±360° | ±360° | ±360° | ±360° | ±360° | ±360° | ±360° | ±360° |
| Maximum speed | axis 1 | 156°/s | 148°/s | 148°/s | 148°/s | 143°/s | 93°/s | 85°/s | 114°/s | 114°/s |
| | axis 2 | 156°/s | 109°/s | 109°/s | 109°/s | 131°/s | 89°/s | 80°/s | 105°/s | 105°/s |
| | axis 3 | 234°/s | 214°/s | 214°/s | 214°/s | 144°/s | 115°/s | 89°/s | 119°/s | 109°/s |
| | axis 4 | 360°/s | 440°/s | 368°/s | 368°/s | 247°/s | 149°/s | 120°/s | 190°/s | 190°/s |
| | axis 5 | 520°/s | 435°/s | 385°/s | 385°/s | 316°/s | 130°/s | 120°/s | 183°/s | 125°/s |
| | axis 6 | 540°/s | 520°/s | 462°/s | 462°/s | 287°/s | 170°/s | 200°/s | 255°/s | 273°/s |
| Weight (kg) | | 145 | 164 | 170 | 170 | 290 | 600 | 1500 | 1375 | 1400 |
| Operation power of the robot (kW) | | 2 | 2.2 | 2.6 | 2.6 | 4 | 5.5 | 7 | 9 | 9 |
| Mounting position | | floor/ceiling | floor/ceiling | floor/ceiling | floor/ceiling | floor/ceiling | floor/ceiling | floor/ceiling | floor/ceiling | floor/ceiling |

| 4-axis palletizing robot | | | | | |
|-----------------------------------|--------|---------------|---------------|---------------|---------------|
| Model | | ER120-4-2400 | ER180-4-3200 | ER300-4-3300 | ER450-4-3200 |
| Maximum load (kg) | | 120 | 180 | 300 | 450 |
| Reach of arm (mm) | | 2400 | 3200 | 3300 | 3200 |
| Repeatability accuracy (mm) | | ±0.2 | ±0.4 | ±0.5 | ±0.5 |
| Potecton grade | | IP65 | IP65 | IP65 | IP65 |
| Working range | axis 1 | ±180° | ±180° | ±180° | ±180° |
| | axis 2 | -40°~+85° | -40°~+90° | -40°~+90° | -40°~+85° |
| | axis 3 | -17°~+110° | -80°~+68° | -30°~+68° | -80°~+70° |
| | axis 4 | ±360° | ±360° | ±360° | ±360° |
| Maximum speed | axis 1 | 103°/s | 114°/s | 115°/s | 67°/s |
| | axis 2 | 108°/s | 108°/s | 105°/s | 67°/s |
| | axis 3 | 107°/s | 119°/s | 105°/s | 71°/s |
| | axis 4 | 309°/s | 290°/s | 270°/s | 148°/s |
| Weight (kg) | | 1200 | 1400 | 2300 | 2100 |
| Operation power of the robot (kW) | | 8 | 8 | 10 | 11 |
| Mounting position | | floor/ceiling | floor/ceiling | floor/ceiling | floor/ceiling |

| SCARA and DELTA robot | |  |  |  | |
|-----------------------------------|---------|---|---|---|------------------------|
| Model | | Scara robot ER5-4B-400 | Scara robot ER5-4B-600 | Delta robot ER3-4C | |
| Maximum load (kg) | | 5 | 5 | 3 | |
| Reach of arm (mm) | | 400 | 600 | - | |
| Repeatability accuracy (mm) | X+Y(mm) | ±0.01 | ±0.01 | ±0.1 | |
| | Z(mm) | ±0.01 | ±0.01 | | |
| | R(°) | ±0.005 | ±0.005 | | |
| Potection grade | | IP54 | IP54 | IP65~IP69 | |
| Working range | axis 1 | ±130° | ±130° | -50°~+90° | |
| | axis 2 | ±130° | ±140° | -50°~+90° | |
| | axis 3 | 0~150mm | 0~200mm | -50°~+90° | |
| | axis 4 | ±360° | ±360° | ±360° | |
| Maximum speed | axis 1 | 535°/s | 5m/s | 675°/s | Max Linear Speed 10m/s |
| | axis 2 | 535°/s | | 675°/s | |
| | axis 3 | 1200mm/s | 1200mm/s | 675°/s | |
| | axis 4 | 1000°/s | 720°/s | 1350°/s | |
| Weight (kg) | | 25 | 28 | 130 | |
| Operation power of the robot (kW) | | 1 | 1 | 1.8 | |
| Mounting position | | floor/ceiling | floor/ceiling | ceiling | |

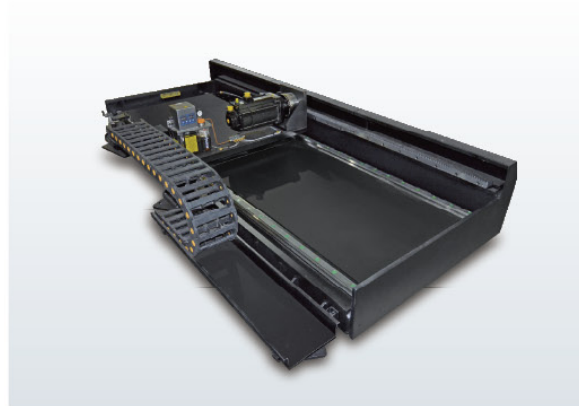
Auxiliary equipment ►

Depending on actual application requirements, external axis is available to realize customization, using ESTUN AC servo system.

The seventh axis of the robot

Linear slide and arc slide with idler wheel can significantly expand working space of 6-axis industrial robot. A robot can finish the work at multiple stations using the seventh axis. ESTUN is able to customize linear, arc, linear and arc combination slide based on application demands.

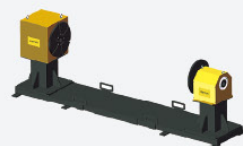
Two pieces of accurately grinded slide are arranged in parallel, which can reach up to 20 meters or even longer through joint the stroke.



Servo positioner



ESP-1D-Uniaxial positioner



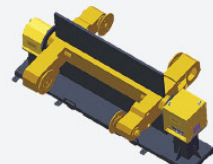
ESP-1H-Uniaxial head and tail bracket positioner



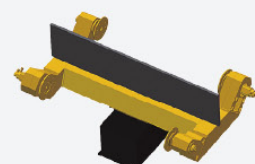
ESP-2U/U type biaxial positioner



ESP-2L/L type biaxial positioner



ESP-3W/W type triaxial vertical turnable positioner



ESP-3C/C type triaxial horizontal rotary positioner

Control system ►

Teaching pendant

- Ergonomic design for better user experience
- User-friendly interface with multiple language options
- Different sizes of screens per request
- Dual-circuit safety switch to protect operator
- Data input and export through USB



Electrical cabinet

- New cabinet with smaller size and more compact structure
- Support synchronous control up to 16-axis
- Available for customization per application
- Support fieldbus of EtherCAT, CanOpen, ProfiBus, ModBus and TCP/IP

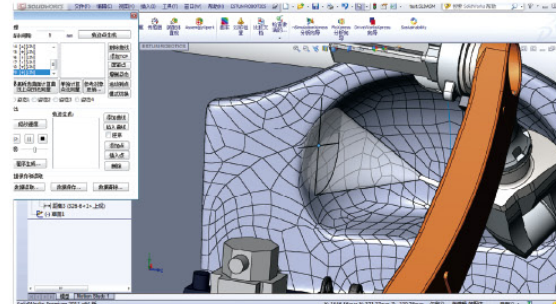


Application software ►

According to application characteristics of different industries, ESTUN provides our customer with tailored robot application software.

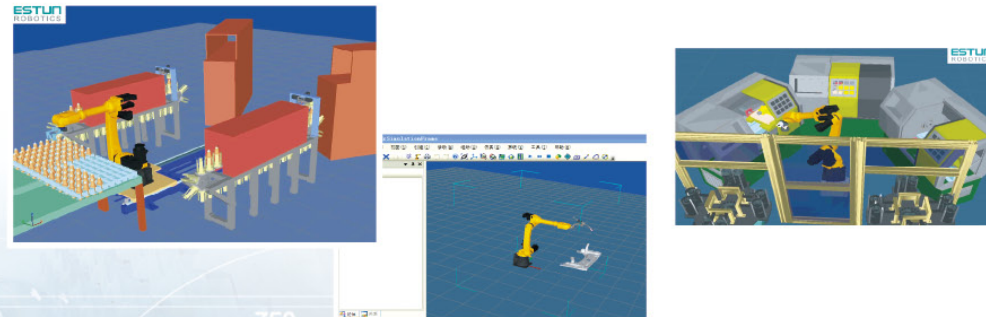
Off-line programming software(ER-Virtual)

Off-line programming software provides three-dimensional environment, which allows our users to draw motion trail of the robot with space curve conveniently. The software can convert the trail to actual operational procedures of the robot, which also can be used in applications where it is difficult to do teaching programming, such as glaze spraying and polishing, etc.



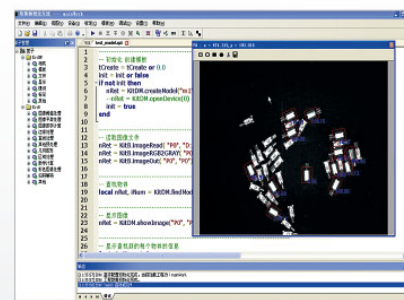
Simulation software(ER-Simulation)

The ER-Simulation provides a 3D simulation environment for ESTUN robots. It allows users to rapidly simulate the application scene in the software in order to observe the ultimate effect as well as inspect the feasibility of the system design, and optimize the solution. In the software, user can use toolbox to add robots, equipments, and auxiliary systems into the interface, and give motion orders to run all robots and equipments for simulation testing.



Vision software package(ER Vision Support)

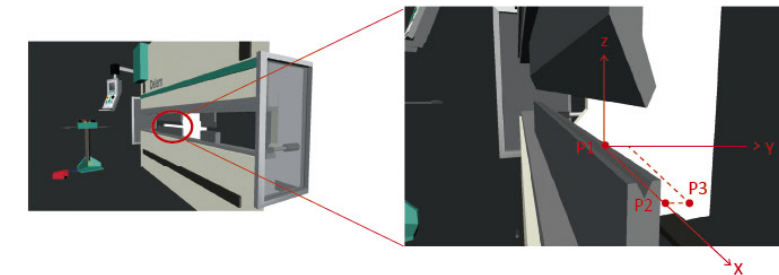
ER Vision software is based on robot-controlled system, which collaborates with the camera to achieve visualization and the control of robot movements. It supports many functions such as TCP/IP communication, IO interaction, instruction interaction, and character string analysis.



Application software ►

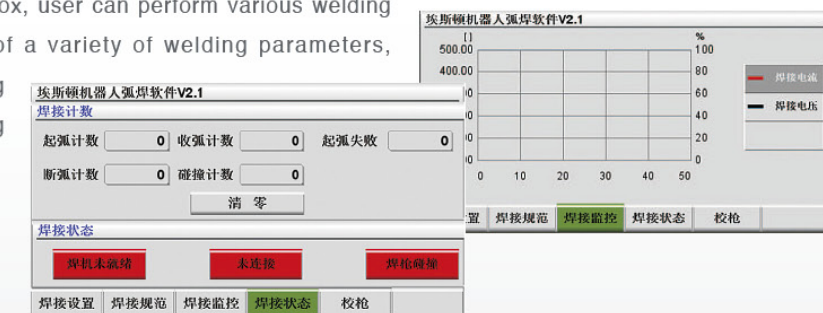
Bending application software

Currently, bending application software and bending machine system can support IO and Ethernet communication modes. Network communication mode only needs one cable for connection, which can read signal, mold parameter, bending speed and other parameters of the bending machine without tedious wiring. Furthermore, it directly uses teaching box to invoke the instruction of bending machine and control its startup. Application software has no strict requirements on robot and bending machine placement, which is convenient for users. Moreover, there's no need for re-calibrating bending machine after the replacement of mold, which reduces workload in operation. The software also offers simple palletizing function, easy-to-use interface, high precision displacement sensor, and automatic feeding function. It substantially saves time for teaching and assure bending accuracy.



Arc welding application software

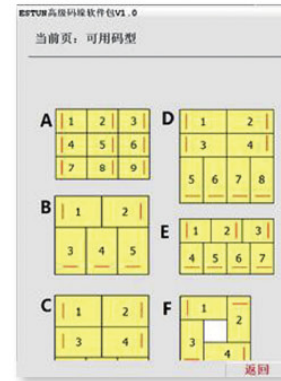
Arc welding software integrates the robot with welding source seamlessly, and supports fieldbus and I/O communication mode. Real-time interaction of mass data between robot and welding source can be achieved. In addition to possessing basic welding functions, the software package also supports registration code activation function with curve chart to monitor current, voltage and wire feed rate, sticky thread detection and self-removal function, robot and welder interlocking function, sequence welding function, intermittent welding function, swing welding and other advanced functions. Through software interface on the teaching box, user can perform various welding setups, obtain feedback of a variety of welding parameters, and use abundant welding instructions to meet welding requirements.



Application software ►

Palletizing application software

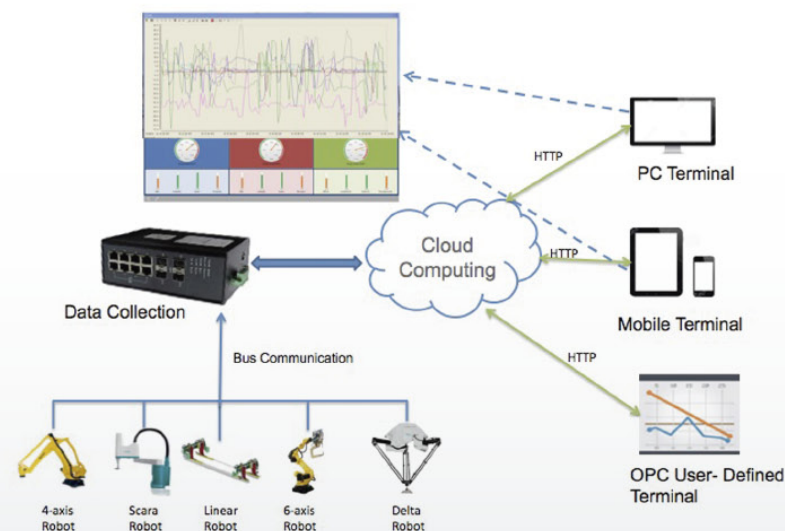
Palletizing application software adopts graphic interface design. All palletizing operations can be easily realized using the interface, including configuration and stacking/unstacking. The software has multiple built-in stacking shapes commonly used by users, which greatly helps the commissioning of simple stacking. Meanwhile, it also supports complicated types of stacking and customized stacking configuration. Using our built-in stacking procedure template, customers can conduct the demonstration of stacking feature points through the interface without writing robot program. After finishing configuration, user can directly click buttons in the interface to start palletizing, and monitor status of the system in status interface, such as target location of current work piece, serial number of currently placed work piece, and whether there's a signal for the feed and pallet, etc..



Remote control of the robot

Remote control function of ESTUN robot connects robot to the Internet through wireless remote connection module. Any computer installed with remote control software can be remotely connected to the robot, to monitor running status and to alarm failure risk of the robot in real-time. It can also download program to the robot remotely, modify the program online, generate status report, analyze robot failure or alarm, as well as remotely solve minor malfunctions. As an important feature for industry 4.0, our remote control solution helps factories improve efficiency and output while reducing the downtime.

Network topological graph of the solution



Monitoring display

| 6号工位信息 | | | | | | | | | |
|--------|------|------|------|------|------|------|------|------|------|
| 工位名称 | 工位编号 | 工位坐标 | 工位速度 | 工位位置 | 工位状态 | 工位报警 | 工位故障 | 工位维护 | 工位备注 |
| 工位1 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 工位2 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 工位3 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 工位4 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 工位5 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 工位6 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 工位7 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 工位8 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 工位9 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 工位10 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

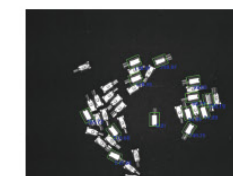
Visual solution of the robot

Machine vision provides robot work station with visual system, which enables the robot to pick or place the object without mechanical positioning. Visual system provides the robot with accurate location information of the object, and can realize static object picking, dynamic movement tracking, object color, character and bar code identification, and detection and measurement functions, etc.

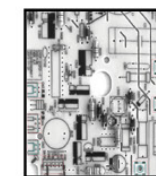
Two-dimensional visual system

Two-dimensional visual system can be used together with Estun robot. The system has high performance/price ratio, with good maintainability.

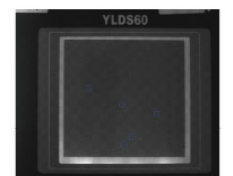
- EVision supports object identification and location, bar code detection, target characteristics extraction, color discrimination, distortion correction, coordinate system calibration and many other functions.
- Support TCP/IP communication and IO communication function; adopt high-speed processor to ensure processing speed;
- Support both grey and color vision; The camera can achieve 500W pixel and reach the level of sub pixel;
- Camera lens have a wide coverage area, and support focal distance ranging from 5mm to 25mm;
- Friendly human-computer interface, convenient for user's engineering and commissioning.



Identification and localization of mobile's vibrator



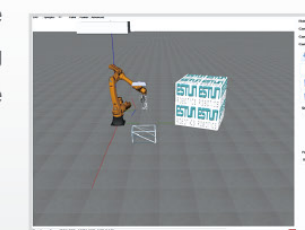
Location of PCB circuit board plug-in



Detection of LCD screen dead pixels

Three-dimensional visual system

It's a set of intelligent and full-automatic three-dimensional random bin picking system with functions of automatic camera calibration, image processing and calculating, robot movement simulation, auto-computation of optimum pose, collision detection, prospective computation and estimation, 3D model importing and visualization function. This three-dimensional visual system is highly integrated with robot system. After importing robot model, work piece and feed box model, the system can realize real-time simulation, calculate optimum picking angle and position, and achieve high machine intelligence for robot.



► Three-dimensional display



► Three-dimensional round tube to realize random picking

Industrial application ▶

Welding

Spot welding

ER170 spot welding robot is equipped with ESTUN high-speed and low-inertia servo motor and drive, which help the robot realize high speed, high responsiveness and accurate control. It has 170kg load capacity and works well with different models of welding gun. Equipped with small-size control cabinet, and IPC and real-time Ethernet control system, it can realize multiple robots cooperation and is suitable for welding production line.



Arc welding

ER6 arc welding robot is equipped with Aotai welding power, Binzel welding torch, and independently developed welding software that supports fieldbus. Setting and adjustment of all the welding tasks can be realized by robot teaching pendant. It is widely used in steel furniture, automobile parts and other metal industries.



Laser welding

ER10 welding robot has high track precision and good repeatability accuracy. Laser welding improves welding efficiency through exchanging workbench, to ensure work piece can be smoothly processed at external workbench while welding in internal workbench. It can be widely used in sheet-metal parts, automobile, kitchen appliance, electronic engineering, medical equipments or mould manufacturing industry.



Palletizing and transporting

ER130/ ER180/ ER300/ ER450 palletizing robots can work at fast speed. They are able to stack and transport 1000 bags/hour. The robots are equipped with special gripper and conveyor belt, which can provide complete automatic solutions for packaging and palletizing. They can be used for transportation, stacking or unstacking of fodder, fertilizer, chemical, food, beverage, beer, and grain.



▶ Handling



▶ Stacking

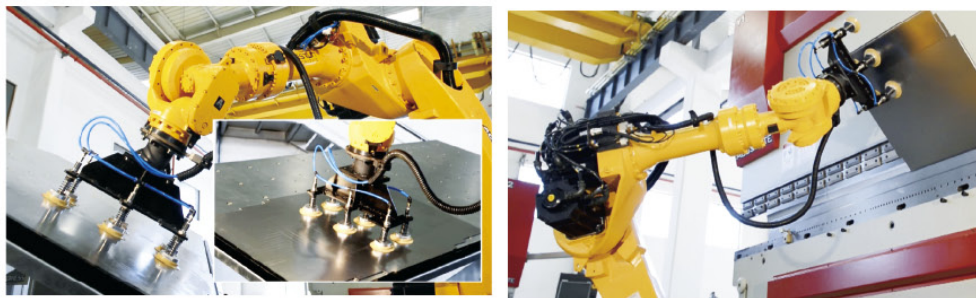


Industrial application ►



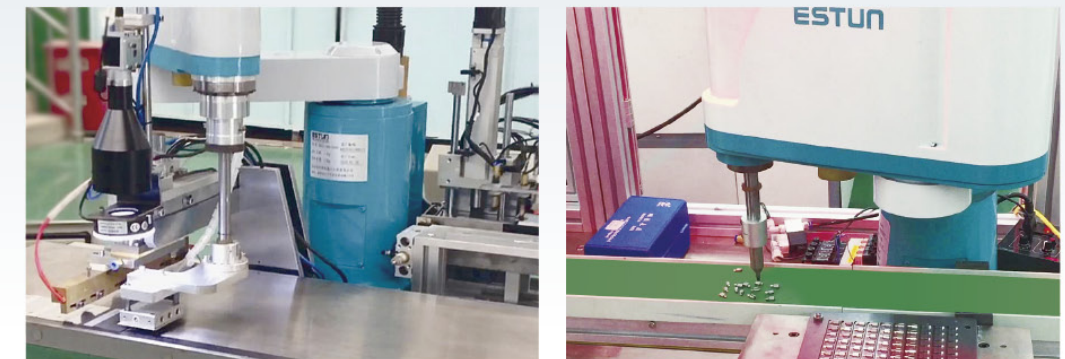
Bending

Based on rich experience accumulated in automation for sheet metal processing and bending technology, ESTUN has developed special bending software “ER-Bending” based on CNC bending system and robot controlled system. The software is able to solve the problem of deviation caused by high acceleration during bending process, as well as the problem of long teaching time.



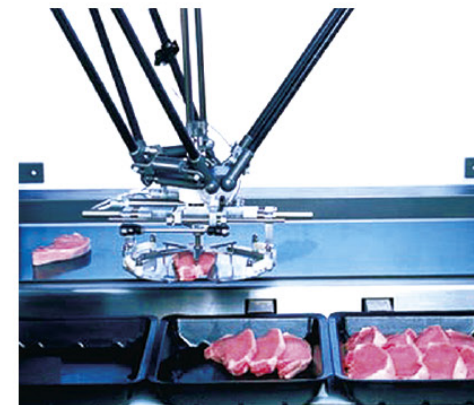
SCARA

Products currently developed: ER5-4B-400, ER5-4B-600 and ER10-4B-800. The main areas for SCARA are material handling and assembling. Equipped with visual system, SCARA can identify the shape and color of work piece at high speed and high precision. Pattern recognition feature is also adopted to detect color difference. SCARA is widely used in 3C electronics and various assembly industry.



Sorting

The high repeatability accuracy of ER3-4C robot assures high-efficient sorting rate, shorten production cycle and increase capacity. It is used in areas such as work piece assembly, food packaging, objects pick and place. In addition, it can identify the shape and color of work piece with higher precision and speed. It also can inspect defective product, and adopt pattern recognition features to detect color difference. ER3-4C allows customer to easily configure different searching parameters and set various application programs, and is widely used in food, printing, electronics and packaging industries.



Industrial application ▶

Other fields

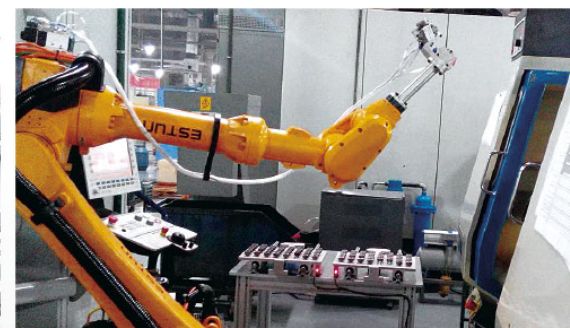
Press automation

6-axis articulated robot of ER series using fieldbus communication, equipped with destacker, rinse and oiling device, terminal controller, and stacking machine can realize full automation of multiple press lines. While improving safety of workers, it also improves production efficiency and product quality.



Machine center

Industrial robot of ER series is equipped with loading platform, gripper and unloading platform. One robot station can realize the loading and unloading application of multiple machines. It is widely used for machine tool, injection molding machine, and die casting machine.



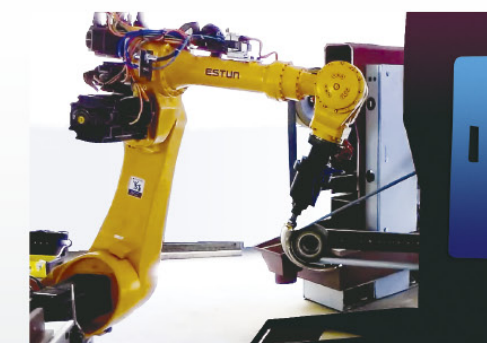
Forging

Industrial robot structure of ER series create the ability to work under high temperature. Being equipped with automatic ink jet device and special grippers, it can replace manual work, and save logistic space and cost as well as improve automation level.



Polishing

ER50 robot adopts off-line programming software to realize complicated demonstration of faucet polishing program. It can finish object polishing of various materials and shapes, and parts de-burring to ensure smooth and stable product quality. Non-conformable polishing will not happen.



Spraying

ESTUN robot can be extensively applied in glaze spraying, gluing and other spraying industries. ESTUN robot gluing system is composed of ER series robot, automatic transportation unit of work piece, work piece positioning device, glue dosing system and safety protection system, and is characterized by stable gluing speed and high gluing quality. This system can be used in coating of front, rear and side windscreen glazing compound of automobile, automobile lamp, water proof screen of vehicle door, underframe, plastic parts, household appliances and other fields. It can completely replace manual work and significantly improves work efficiency.



▶ Spraying

Butchering

ESTUN ER220 robot is equipped with tailor-made double speed chopper. Encoder is installed on butchering line, which is easier for the robot to follow the delivery mechanism in real time during downward chopping. Butchering with the help of robot can reduce difficulties of manual work, and minimize pork loss in slaughtering.



Mission — We are offering Accuracy & Efficiency!

Vision — Enjoy your life from Automation!

Values — Focus, Integrity, Growing together!



Estun Robotics Engineering Co., Ltd.

Address: No. 178, Yanhu Road, Jiangning Economic Development Zone, Nanjing

Tel.: 025-85097068 Fax: 025-85097089

WEB: www.estun.com

E-mail: info@estun.com

Stock abbreviation: ESTUN Stock code: 002747



Official WeChat account



Sina Microblog account

Version: ER-1606A

Contents are subject to change without further notice.