



W E C O N T E C H N O L O G Y

WECON TECHNOLOGY · 维控科技

INDUSTRY APPLICATION MANUAL

(1ST Phase)



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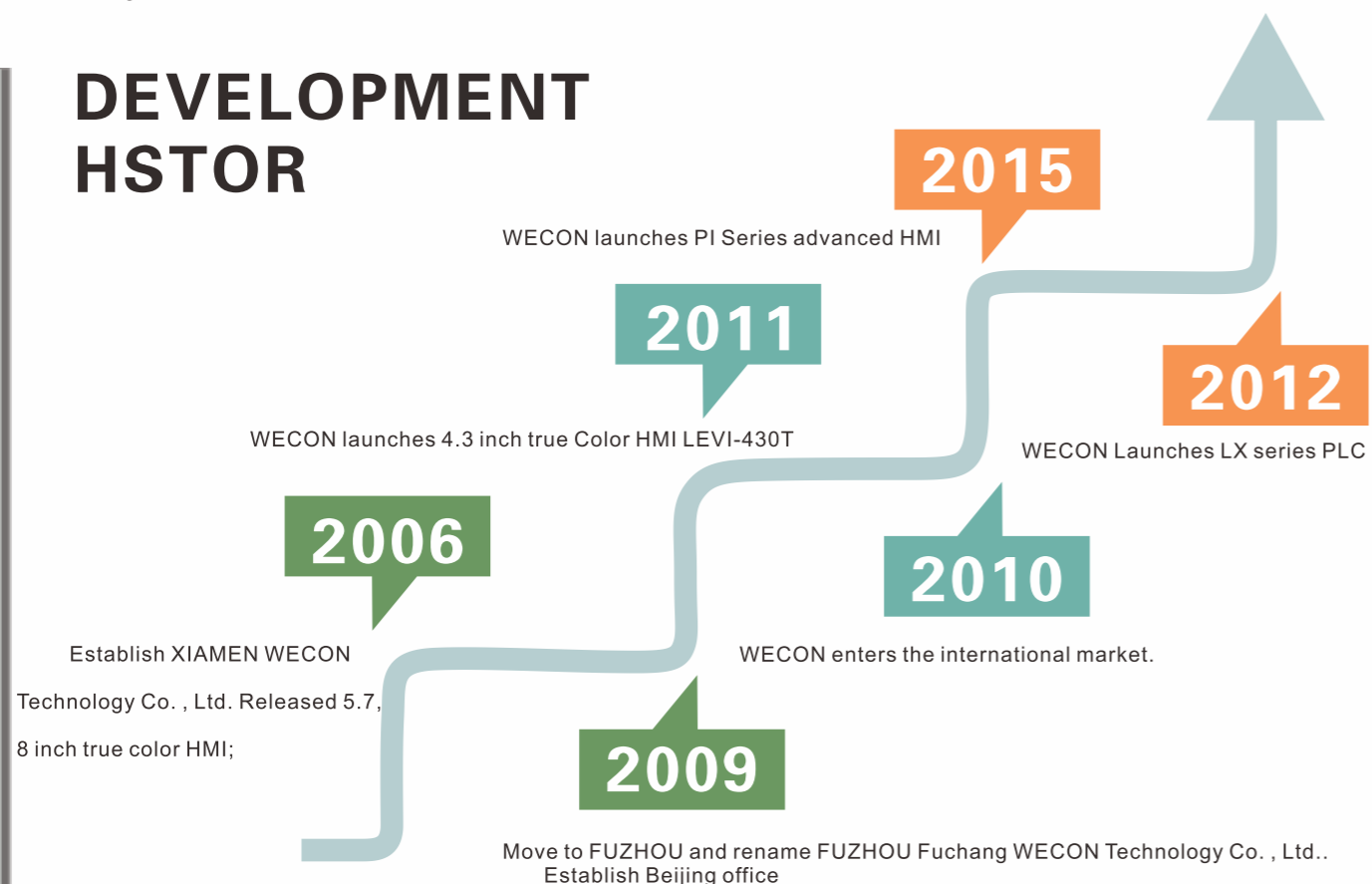




>> Brief introductions of company

WECON Technology Co., Ltd. (commonly referred to as WECON) is a Chinese high technology company, headquartered in Fuzhou, Fujian. That independently develops, manufactures, supports and sells human machine interface, programmable logic controller. WECON products are widely used in machinery and equipment, metallurgy, chemical, oil and other industries. They are favored by many foreign customers.

DEVELOPMENT HISTOR



Automatic Injection Molding Machine

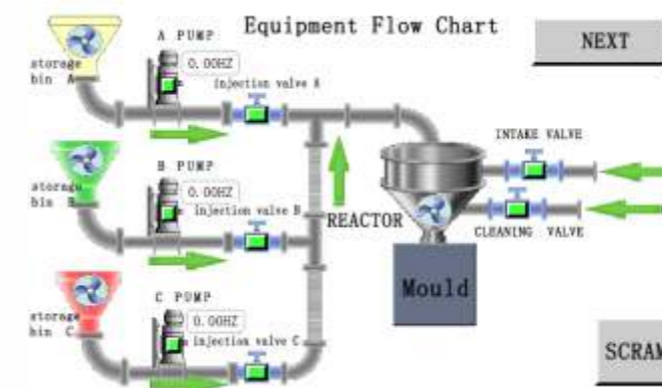
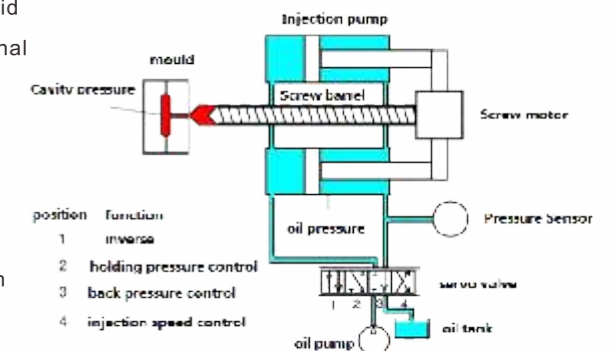
Introduction

Injection molding machine is also known as injection machine. It is the main forming equipment for plastic products which are made of thermoplastic or thermosetting material by plastic molding.

The equipment mixes three kinds of chemical liquid in accordance with the proportion of ingredients in the reactor, and then the mixed liquid is injected into the mold (such as filling material in the car seat). When the mixed liquid meets the air, it begins to harden, which has strict requirements on the sealing performance of the equipment.

Process Requirements

- By controlling the opening time of feeding motor, so that three kinds of liquid get into the reactor according to the logic of program, which replaces the traditional manual operations(valve opening and closing, control the liquid ratio);
- The injection time of each station is executed in sequence;
- Change the frequency of inverter through MODBUS-RTU communication;
- Display the current speed of the three feed pumps respectively;
- Some operation buttons are operated on the HMI, reducing external button costs;
- Need to design automatic cleaning process to facilitate manual operation;



Solution

Injection device mainly consists of PLCLX3v-1616mt ,WECON HMI LEVI700LK, inverter, feeding motor, cylinder, solenoid valves, proximity switches, sealed pipes and other components. Through the HMI parameter settingand the PLC stable output to accurately control the motor and open/close of electronic valve.

Advantages

- Communicating with three frequency inverter by MODBUS-RTU, which reduces the cost of using analog hardware;
- The device is highly automatic and can permanently save the parameters which ensure product quality and consistency when compared to manual operation;
- Using WECON LEVI 700LK HMI makes it easier to set parameterswhich are convenient for operator to operate and quickly put into production;
- By monitoring the screen of HMI to be aware of the states of various electrical components;

Extruder Application Program

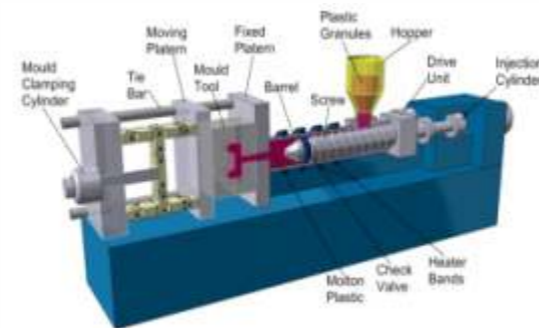
Introduction

Extruder is a machine used to make plastic products by extrusion molding process. It consists of two main components, an injection unit and a clamping unit. For extrusion molding such as electric reels, packaging, bottle cap, auto parts, game machine, pocket comb, some musical instruments (or parts of them), unibody chairs and small tables, storage containers, mechanical parts (including gear), and most other plastic products. Nowadays, extrusion molding is the most common method for manufacturing modern plastic parts.



Process Requirements

Using 0-24 channels(optional) closed-loop PID thermostat control, particles from the screw plunger slowly move forward into the constant temperature heating chamber, by heating and pressurizing in the extrusion so that the molten material flow into the mold state, then cool and fill directly through the mold.



Advantages

- Controlling the temperature with high precision, customize program control, improve the overall performance fundamentally.
- Using the PID self-tuning function of the PLC, the temperature error can be controlled within ± 0.5 degrees.



Solution

The control system mainly uses the PLC and the expansion module uses LX3V-4TC. PLC is used for controlling heating coil by PID instruction; LX3V-4TC is used for data acquisition

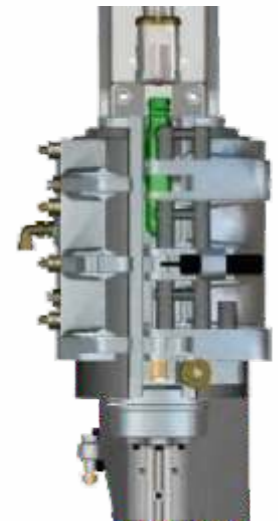
Bottle Blowing Machine

Introduction

Bottle blowing machine is a device for making plastic particles into hollow containers by blow molding process. Currently, the common types include the hollow blow molding machine by PP and PE, the injection molding blow machine using PET, PC or PP by secondary forming, and the new development of a multi-layer hollow blowing and stretchblow molding. At present, most of the blow molding machines are still two-step blowing machine, i.e. plastic raw materials must be made as preforms, and then blowing. Now commonly used material is PET that is environmentally friendly.

Process Requirements

- The preforms were placed in a preform container, and transferred into the preform positioning device via a conveyor.
- The embryo of bottle is automatically transferred to the bottle embryo holder, and then is fed into the baking channel.
- After heating, the preforms are sent to the blow-off platform, and then clamping, and then going through low-pressure blow, high-pressure blow, exhaust, and finally break mold.
- The bottles were removed from the blowing platform by an automatic stripping system.



Solution

The control system mainly uses the HMI LEVI-700LK, the PLC host uses LX3V-1212MT4H, and the expansion module uses LX3V-4LTC.

The brief scheme is as follows: the four high speed outputs of PLC control the four servo motor operation (mode, tension, aluminum row, embryo), the expansion module LX3V-4LTC samples temperature and controls temperature.



Advantages

- Using servo to control, with accurate positioning;
- With the cleaning function, the embryo area automatically removes the residual preform from the conveyor belt;
- The coordination between the parts (On the embryo, aluminum row transmission, the embryo, mold blowing, "bottle out") of the action saves unnecessary waiting time between each other, so as to shorten the cycle time, improves the work efficiency;
- Temperature control module LX3V-4LTC (four temperature acquisition, four transistor output, built-in PID function) keeps the error within ± 0.5 degrees;

Automatic Liquid Filling Machine

Introduction

Filling machine is a kind of packaging machine, from the point of view of packaging materials it can be divided into liquid filling machine, paste filling machine, powder filling machine and particle filling machine. This paper mainly introduces the application of WECON automatic control system in liquid filling machine, summarizes the working principle of filling machine and its demand for WECON automatic control system, and emphasizes on the software design process of the system, and points out whether the system design could meet the basic control functions of equipment with considering the convenience of maintenance and system scalability, etc. This system can greatly save human resources, improve the work efficiency and automation degree, which will directly improve the output and quality of products.



Solution

The control system mainly uses the WECON HMI LEVI-102L, PLC LX3V-1212MR, and the module LX3V-1WT.

The brief scheme is as follows: controlling the conveyor belt frequency and start/stop via the communication between PLC 485 port and inverter; the precise timing; support the extension module connection that may satisfy various requests; with 24 high resolution weighing signals, weight for real-time and calibrate the error.

Advantages

- Light and convenient, automatic feeding, a hopper can be added for thick paste feeding ;
- Manual and automatic switching function: when the machine is in the "automatic" mode, the machine fills automatically and continuously according to the set speed, when the machine is in the "manual" mode, the operator need to click on the manual button on the touch screen to achieve step-by-step filling;
- Fully automatic filling, significant savings in human resources, improve work efficiency;
- Can be used alone or with linkage, to achieve the integration of weighing, packaging;
- Weighing module comes with filter function that can avoid vibration caused by the error;

Process Requirements

Filling machine generally consists of transmission mechanism, counting mechanism, filling mechanism and clamping mechanism, the transmission mechanism is generally controlled by a three-phase inverter motor, drive a conveyor belt, conveying the material to the appropriate agencies; The counting mechanism is based on optoelectronic devices; The transmission mechanism transmits the material to the filling mechanism, then clamping mechanism clamp packing bag for filling.

Specific process: open the front door, close the back door, the front door for photoelectric counting, when the count value is equal to the set value, the front door is closed, open the holding device. According to the customer selected mode, choose whether to dive, and then start filling, the back door will open after finishing filling, then "bottle in", the front door will open after a time delay. The "bottle in" and "bottle out" are simultaneous actions, back door will close when photoelectric count value is equal to the set value.



Particle Packing Machine

Introduction

Particle packing machine is used in industrial and agricultural production packaging, such as chemical fertilizer, pesticides, veterinary drugs, premix, additives, washing powder, salt, MSG, sugar, seeds, rice, food, hardware and other granular materials. The whole packing process is controlled by PLC, which is automatically completed with the characteristics of high weighing speed, high weighing precision, labor saving, simple operation and easy formaintenance.



Process Requirements

- Packing speed 5-40 bag / min (depending on the state of materials, and the number of measurement range);
- Measurement accuracy is from $\pm 0.5\%$ to $\pm 2\%$ (depending on the state of the material);
- Packaging weight ranges from 10 to 50000g;
- Multiple buckets work separately and feed alternately;
- Automatic weighing, automatic bagging, automatic sewing package, no manual operation;

Advantages

- Automatically correct vibration;
- Automatically adjust the drop value;
- Automatic multi-speed control, high feeding speed, high precision ($500g \pm 1 \sim 2g$);
- Four-way, packaging speed of 40 bags / minute (500 grams);
- Electronic scales can also be linked with the packaging machine to achieve weighing, packaging integration;
- Auto zero function;

Solution

The system uses a LX3V-4AD analog module to control vibration motor, two LX3V-2WT weighing modules to collect the weight data in real time. CPU uses the LX3V system with 26 point PLC to carry on the logic control.

There are two options to weigh, one is the time method, set the feed time according to the flow of every millisecond, then the weighing module will collect the data and calculate the error, and calibrate the error next time. The speed of this method is fast, but the precision is lower. The other method is real-time weighing that is divided into fast, medium and slow mode, each time the weight is the same, the error is small, with high precision, but packaging speed is decreased.

Rotary Automatic Filling Machine

Introduction

Rotary automatic filling machine is a kind of automatic filling machine with motor, screw feeding, transmission mechanism and bottle feeding mechanism. It has automatic "bottle in" and bottle automatic detection (bottle filling, no bottle filling, secondary less filling), automatic filling (coarse filling, fine filling, automatic adjustment of filling parameter) and other functions. It is suitable for the quantitative packing of powder and powder-like materials in chemical, foodstuff, agricultural and sideline products industries, such as milk powder, starch, pesticide, veterinary medicine, premix, additives, condiment, feed and enzyme.

Process Requirements

Artificial bottle feeding to the conveyor belt → automatic bottle into the turntable station → automatic rotation of the turntable → automatic quantitative filling with empty cans (no cans / fine secondly filling not coarse filling) → automatic rotation of the turntable → detection weight, Fine filling → automatic rotation of the turntable → automatic quantitative fine filling → automatic rotation of the turntable → determine whether qualified or not → qualified finished output (unqualified turntable cycle to the secondary fine filling)

Note: This is a single filling process, actually multi-tank is carried out simultaneously.



Advantages

- Automatically correct the parameters, improve efficiency;
- After 3 times of intelligent adjustment, screw servo feeding can be achieved within the precision of plus or minus 0.5g;
- Device has a turntable memory, secondary memory and other functions. Using WECON PLC which has multi-axis high-speed pulse output as the core controller of the system to control the three servos, it makes the system more reliable and stable.
- Used linkage to achieve the integration of weighing and packaging;

Solution

The control system mainly uses the WECON HMI LEVI-102L and PLC LX3V-3624MT4H and module LX3V-2WT.

The brief scheme is as follows: the main servo controls the rotating station (12 stations), two axis servos control the coarse filling and fine filling respectively, two weighing signals are used to weigh the coarse filling and fine filling respectively.

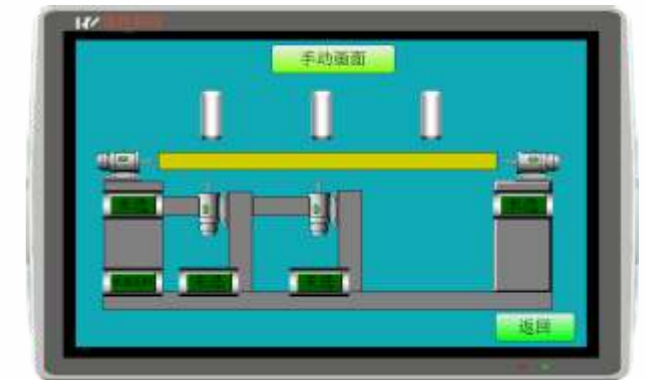
Automatic Drilling Machine

Introduction

With a number of drill bits and can work together in the porous processing equipment, commonly used in three rows of drilling, four rows of drilling, and six rows of drilling. At present, the drilling of the plate type furniture parts is the last production process of the plate type furniture. The design of the drilling tools must be based on the type of drilling and the production process, and the holes of the parts should be arranged in order to achieve the drilling requirements. The purpose of realizing the single datum of the porous bit is to ensure the machining accuracy of the drilling hole.

Process Requirements

- Four row drills has three operating modes: manual mode, automatic mode, the school drill mode.
- The fourth drill can be transformed into a vertical or horizontal drill.
- Automatic mode can choose synchronous operation (horizontal and vertical running at the same time), asynchronous operation (run vertical drill firstly and then run transverse drill)
- In the automatic mode, user can select the "one-body" mode (all the row drills are controlled by the foot switch 1) and the "segments" mode (the left 2 and right 2 rows are controlled by the foot switch 1 and foot switch 2 respectively)



Solution

The control system mainly uses the HMI LEVI700LK and PLC LX3V-1616MR.

The brief scheme is as follows: the PLC-controlled contactor drives the horizontal and vertical motor / cylinder to work in the synchronous operation or asynchronous mode, and then stops working when reaching the position of the limit switch.



Advantages

- Low failure rate: using WECON panel and PLC industrial control system, powerful performance, low failure rate;
- Large drilling range: easy to change the drill bit;
- Durability: Imported original brand drill row, motor and linear track;
- High precision: the aperture tolerance is $\pm 0.5\text{mm}$, the hole depth tolerance is $\pm 1\text{mm}$, the hole position tolerance is $\pm 0.5\text{mm}$;

Automatic Edge Sealing Machine

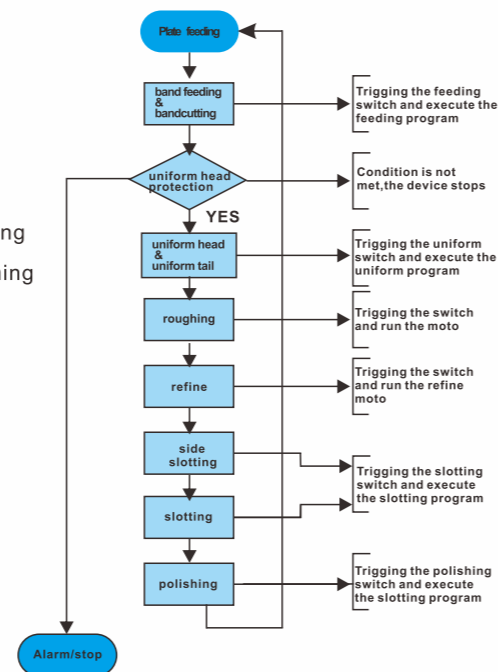
Introduction

Edge sealing operation is an important process in the process of furniture manufacturing, the quality of the edge has a direct impact on product quality, price and grade. The choice of the edge material includes PVC, polyester, melamine and wood, different processes for different material. There are mainly two kinds of edge sealing machine used by the furniture manufacturers, one is manual straight curve edge banding machine and the other one is automatic straight edge machine. The latter one is a more efficient and popular device, which generally have adhesive, sealing, cutting, homogeneous, coarse fine edge repair, scraping, polishing and other functions.



Process Requirements

- Process: Feeding → Transport → Uniform head → Roughening → Refine → Side Slotting → Slotting → Blowing → Polishing → Finishing
- Requirement: The PLC communicates with the four frequency converter over RS485, and controls the feeding, transportation, uniform head, and rough repair respectively.



Solution

The control system is mainly consisted of HMI LEVI700LK, and PLC LX3V-48MR.

The general automatic linear edge banding machine is composed of pasting and pressing device, front and back edge sealing device, upper and lower trimming device, tracking trimming device, scraping device and polishing device, some of which are equipped with edge milling cutter, sand edge of the sanding head and heating devices. Start debugging from the feed side; operate in accordance with the order, until the end side.

Advantages

- PLC can communicate with multiple INVRs at the same time, the communication efficiency is high.
- Instead of manual edge sealing, achieve continuous production, improve work efficiency.
- By using various type continuous sealing machine, the plate side is quickly sealed up. It not only accelerates the edge curing, improve the production efficiency, but also ensure the quality of the edge. The adhesive layer is thin and uniform and the plate can be shipped to the next step without delay.

Automatic Sawing Machine

Introduction

The automatic saw machine is also called the four side saw. It is special equipment for trimming or cutting the plates in the woodworking machinery industry. The device has the advantages of simple operation, high work efficiency, high precision, and can be used for removing dust and the like, it make the board orderly and smooth. The device solves the problems of low efficiency, low accuracy and cumbersome operation.



Process Requirements

The device is composed of two saws in the vertical and horizontal direction, and the transfer section is controlled by two servos. The equipment will automatically return to zero position each time, when the plate is placed in the longitudinal plate area, click to run, clamp the clamp hand, then a series of action start in sequence. When the end of the plate passes through the longitudinal saw at a set speed, then accelerate the feed speed and slow down and stop in the position. After triggering cross-saw to move, cross-saw will complete the corresponding actions and return to zero position respectively and automatically at high speed. Then the single processing is finished, and repeat.

Solution

This control system mainly uses the HMI LEVI-102L, the PLC LX3v-2416MR and the servo system.

The brief scheme is as follows: the function of manual operation, automatic operation monitoring, running time parameter setting and servo parameter setting can be carried out by HMI. The operation of each cylinder valve and the motor can be easily detected by manual operation, which is convenient for maintenance and debugging. Operation monitoring can be convenient to observe the running state and running position in real time. Users adjust the logical sequence of the action by setting time parameters, and adjust the speed and accuracy of operation by setting the frequency and pulse of servo.

Advantages

- Using the servo system and PLC control system instead of the traditional inverter control (absolute coordinates, absolute encoder, maximum yield), reducing the number of sensor and proximity switch;
- With memory function (remember the location of the plate), put an end to the phenomenon of bad plate caused by the error of the sensor and proximity switch, and the tedious replacement of the sensor and proximity switch that is often damaged;
- With servo motor traction, two axis linkage, fast speed, large output, the arbitrarily set of program, only need two people to operate, greatly reducing the labor cost;