KAYO-A8L
Automatic SMT P&P Machine

Operating Manual

KAYO Automation Technology Co., Ltd.

en.kayosmt.com

Statement

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Standards

This product implements product standard number: Q/KAYO. 012-2018.

Preface

Release Notes

This material corresponds to product model KAYO-A8L. This material is only applied to the standard configuration of corresponding product model, for special customized products, please carefully read the attached instructions. This material explains product principle, installation method, operation, troubleshooting, transportation, storage, maintenance, etc. If you use this product for the first time, please read this information carefully before installing and using it.

Please keep this information for future reference.

Symbol Description

In order to prevent the possible damage to the human body or equipment, the manual use the following safety signs to indicate how to use the equipment, please note the contents of the signs to ensure that you and the surrounding staff's safety.

Note

General note. Failure to follow this operation, may result in equipment damage and malfunction!

Danger

Electrical safety attention content. May cause risk of electric shock, resulting in personal injury!

Warning

Fire safety attention content. May cause a fire, pay attention to fire!

Explanation

Supplement and explain the description of operation content.

Contents

Chapter 1 Preface

1.1 Greeting

Thanks for purchasing KAYO-A8L Automatic SMT Pick and Place Machine. If you use this product for the first time, please read this information carefully before installing and using it.

1.2 Company Introduction

Beijing KAYO Automation Technology Co., Ltd. is a professional manufacturer focusing in pick and place machine, reflow oven, screen printer, automatic feeder and other SMT equipment. Right now, we have integrated R&D, production and sales together.

We have 20-year experience in SMT machine, with unique understanding of SMT technology, we provide long-term professional services to domestic and foreign electronic company. It always lead SMT equipment technologies and trends in domestic market.

With good quality, competitive price, easy to operate and energy saving, our products are very popular in domestic and oversea market. And all of our machines are wildly used in electronic circuit, photovoltaic, LED industry, instruments and apparatuses.

Up to now, our products are already sold in many countries such as USA, Canada, Australia, Mexico, India, Japan and Southeast Asian area. We will continue to make great efforts to satisfy the customers' requirement.

SMT Pick and Place Machine: It is our primate product, the working teams have always been dedicated to the research and development of SMT machine, which has become a widely recognized brand by customers.

Reflow Oven: Now our reflow oven has eight series, and more than 20 models. We also accept customization for our customers to meet different customers’ diverse needs.

Screen Printer: It is an indispensable equipment in the whole welding process. We provide a high-precision manual screen printers, semi-automatic screen printers and other equipment for your choice.

Chapter 2 Safety Guidelines and Precautions

2.1 Summary

Safety Guidelines is the safeguard of completing high quality products. During operating, main working mechanism of this product is among movement, may cause personal danger and goods damage. In order to prevent the possible damage to the human body or goods, please arrange qualified professionals for equipment operation and processing. Before operating, we recommend all the operators must read and understand this operating manual.

2.2 Safety Warnings and Instructions

Machine body safety warning labels explanation are shown in table 2-1 below

Table 2-1 Machine body safety warning labels explanation

Warning Label	Explanation
	Touch the machine in operation may cause serious personal injury and property damage.
	Internal high pressure, danger! All installation, use and maintenance, in principle, should be completed by qualified professionals only!

2.3 Electrical Safety

a) Do not touch the high voltage terminals while the equipment is electrical working. Otherwise, it may cause personal injury, equipment damage or does not work properly.
b) The emergency stop switch is located at the bottom of the front and rear monitors, two large red buttons, press the switch to start an emergency power off, making all the AC power in the device cut off (except industrial computer host).
c) The machine power outlet must have a bottom wire and the grounding resistance is less than 10 ohms.
d) After the machine is power off, please wait for 2 minutes before powering on to avoid continuous switching of the machine causing the impact current is too large.

2.4 General Precautions

The following general safety precautions should be observed at any time during operation, commissioning and maintenance of the equipment:

a) All motors must be closed before approaching the mounting head, X axis, Y axis, transfer rails and other general electrical appliances;

b) When the equipment is running, it is forbidden to touch any moving parts by hand;

c) Hood must be installed at any time operating the equipment;

d） Unless an electrical maintenance task is performed, the electrical equipment must be disconnected before removing the side cover or opening the rear cover;

e) When handling and using chemical substances, observe the safety precautions recommended by the manufacturer. Do not place flammable or explosive materials near the equipment;

f) Make sure fixation when using;

g） Do not hit this device;

h） Do not remold or dismount this device.

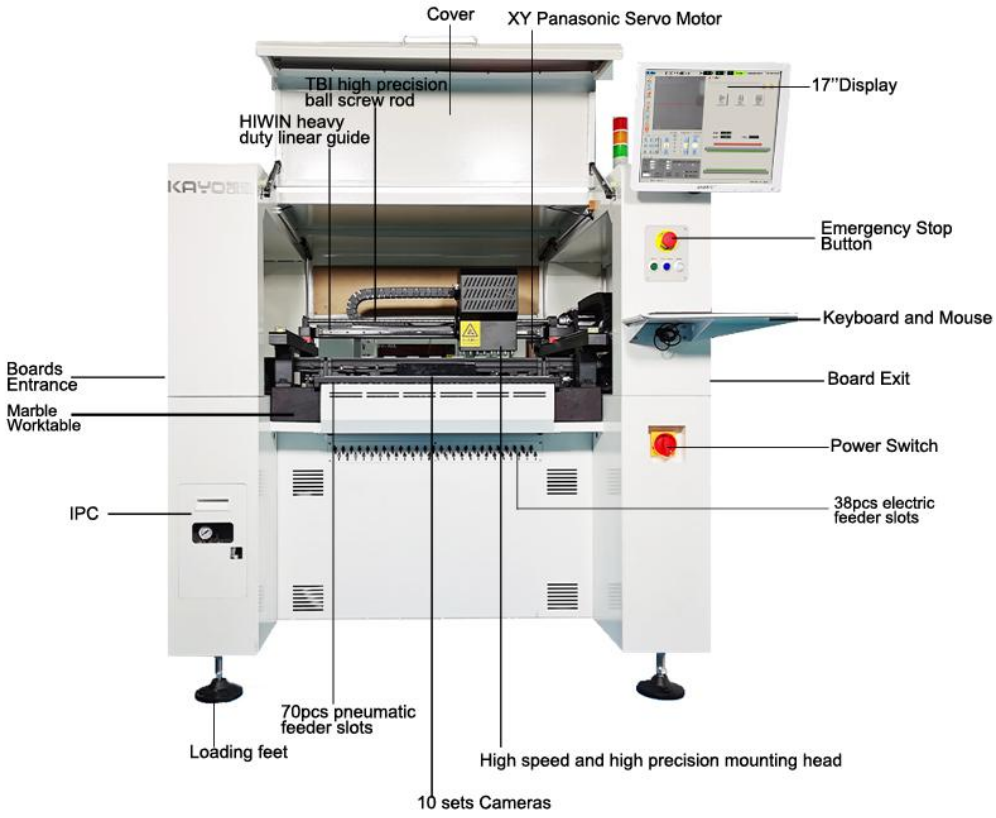
Chapter 3 Product Overview

3.1 Summary

KAYO-A8L automatic SMT pick and place machine is researched and developed by Beijing KAYO automation Technology Co., Ltd.， used to SMD components placement.Users could conveniently set up and complete SMT operation via Software operation interface menu, operating tips, import PCB coordinates or mechanical adjustment.

3.2 Product Appearance

KAYO-A8L product appearance and the main module description:



3.3 Main Components and Functional Units

This device contains the following main components:

a) Mechanical System

Consist of X-Y working platform, Z axis, K axis, placement head, automatic feeder, automatic conveyor belt, etc.

b）Electronic Control System

Consist of Power module, IPC module, control system, motor, solenoid valve drive module, drive module, etc.

c）Image Recognition System

Consist of Lighting source, CCD optical system, image recognition processing software, etc. Mainly used to complete the component image recognition, correction and PCB board programming positioning

d）KAYO-A8L System Software

Special system software, provides the operating interface, to realize the user operating the machine.

Chapter 4 Installation and Commissioning

4.1 Delivery and Check

4.1.1 Unpacking Precautions

After opening the package, please confirm whether the goods are complete, if missing or damaged please contact us.

4.1.2 Check Content

a) Whether the device is the same as the model you ordered;
b) Whether the device is damaged during the transportation;
c) Whether the manual is in the package;
d) Whether the connecting wires are complete.

4.2 Installation Environment Requirements

Please install the device in a place that meets the following criteria:
a) Indoor;
b) Horizontal installation;
c) There is no explosive gas, harmful gases and liquids;
d) No radioactive material, strong electric, magnetic field interference;
e) No continuous vibration and excessive impact;
f) Avoid direct sunlight and air conditioning blowing up.

4.3 Installation Method and Precautions

Each functional parts have been assembled before delivery, don’t need clients self-assembly. Please install the device in a place that meet 4.2 criteria.

Note

Do not disassemble or modify inside parts and cables of the device, otherwise result in personal injury or equipment damage and failure to work properly.

4.4 Debugging Methods and Precautions

This device has been strictly debugged, in the best condition. If some parts need to adjust due to transportation or other reasons, please contact the after-sales technical support.

4.5 Electrical Connection and Inspection Items

After finishing installation, SMT machine's inspection items and technical parameters are shown in table 4-1 below:

Table 4-1 Inspection Items and Technical Parameters

Inspection Items	Inspection Content	Technical Requirements
Power Inspection	Total Power Supply	AC220x（1±10%） Frequency 47Hz~53Hz Supply Current≥10A
Air Inspection	Compressed Air Pressure and Storage Volume	①Air Pressure 0.55MPa~0.65MPa ②Air supply≥120L/min ③Air Tank≥100L
Machine Installation Test	Test of Stability of Installation of Machine Feet	①Whether the feet rise and support on the ground ②feet are locked and screws are locked

Chapter 5 Usage and Operation

5.1 Summary

This chapter will introduce you how to operate the machine, please read carefully before using.

5.2 Prepare and Check before Starting

Please check the following before starting:
a) Please check whether the power supply is connected;
b) Please check whether the air supply is connected;
c) Please check whether the mechanical modules are connected properly.

5.3 Machine Switch Operation Guide

5.3.1 Button Operation

a) Power On/ Off Knob: Turn on and off the power supply to make the device run or turn off;
b) Emergency Stop Button: In case of emergency, press this button to cut off the power to the device;
c) Servo Button: Re-power the machine after offline;
d) Start/Pause Button: Start/ pause;
e) Reset Button: Clear up alarm/ error.

5.3.2 Equipment Start

Please follow these steps to start the device:
a) Connect the power cable (Before connecting, make sure whether the voltage matches the specified voltage of the device.);
b) Connect the pressed air tube and confirm the air pressure value (Please set the pressure value between 0.55Mpa and 0.65Mpa);
c) Turn on the total power supply, IPC into the Windows system;
d) Double-check  SMT1808.exe on the desktop, into SMT machine running procedure;
e) Mouse click 

→ 

, machine is initializing;
f) Equipment initialization is complete, the device complete starting.

5.3.3 Equipment Stop

Please follow these steps to stop the device:

a) Click 

, exit the running program;
b) Close IPC Windows system;
c) Close SMT machine power supply;
d) Close SMT machine air supply.

5.4 Software Operation Introduction

5.4.1 Software Main Interface

When you open the software, you will see the screen shown in Figure 5-1:

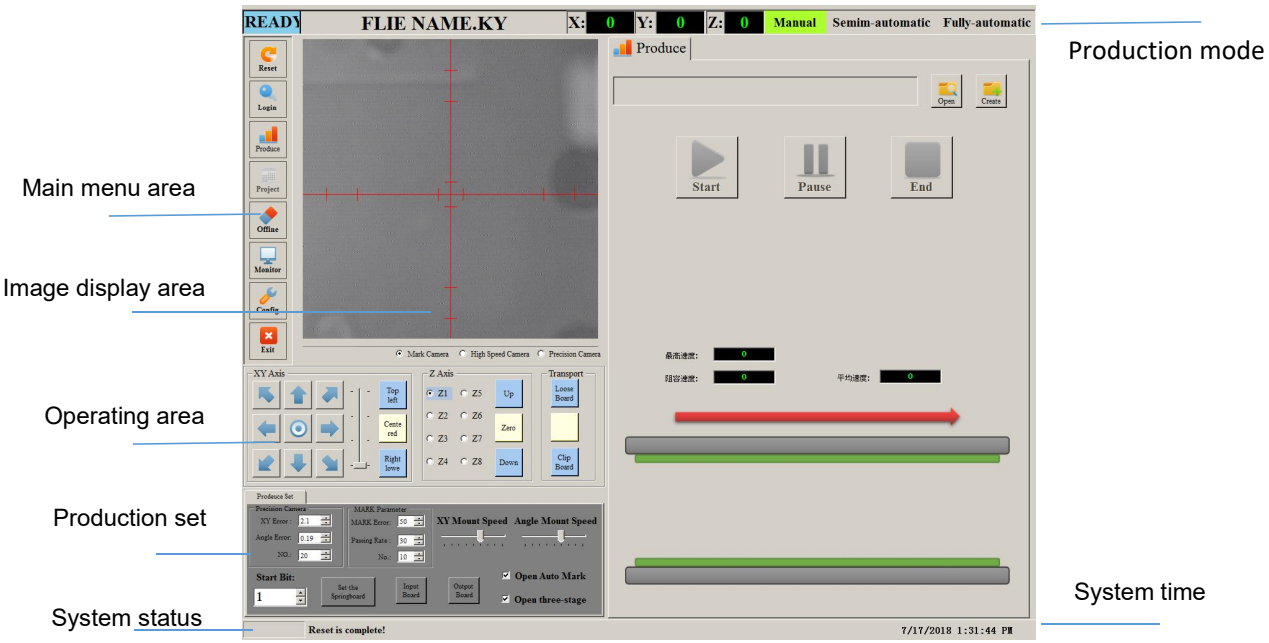


Figure 5-1 KAYO-A8L SMT Machine Software Main Interface

The software main interface includes the following elements:

a) Main Menu Area

Software system menu, for set the basic parameters, machine parameters, editing procedures.

b) Image Display Area

Real-time display images of MARK camera, high-speed camera, precision camera.

c) Production setting

Set each camera's tolerance value, SMT speed, the starting and ending position, the action after opening the safety door, etc.

d) System Status

Used to display the normal operation or fault status of the SMT machine.

e) Production Mode

SMT machine's running mode under normal operation.

5.4.2 Produce Menu

a) "Open": Open the PCB program;

b) "Create": Re-create a PCB program;

5.4.3 Project Menu

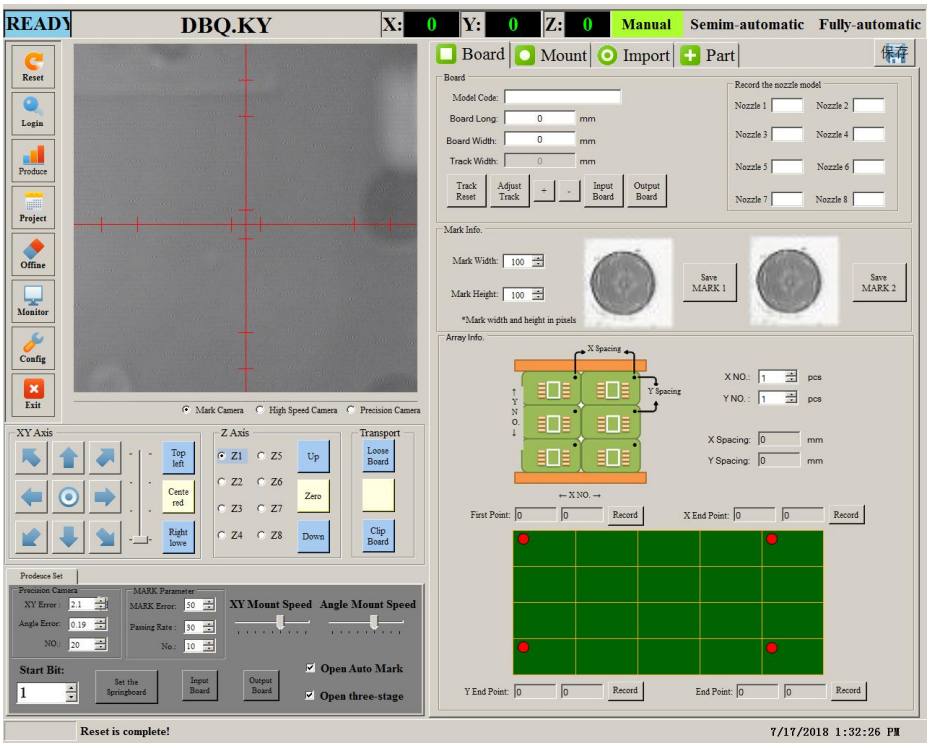


Figure 5-2 Project Menu

a）"Board": Includes the length, width, and make-up PCB information;

b) :Mount": The placement coordinate information on each PCB board;

c）:Import": Generates pick and place files, import coordinate files;

d）"Part": Basic information of Material stand components.

5.4.4 Offline Menu

"Offline": Power off X-axis and Y-axis, to make sure the security of manual operation.

5.4.5 Monitor Menu

"Monitor": During normal operation, could view the recognition of high-speed and precision cameras.

5.4.6 Configuration Menu

"Configuration": Set up and debug the factory parameters of the machine.

5.5 Illustrating PCB Programming

5.5.1 PCB Illustration

make-up is three rows and four columns, shown as Figure 5-3-1:

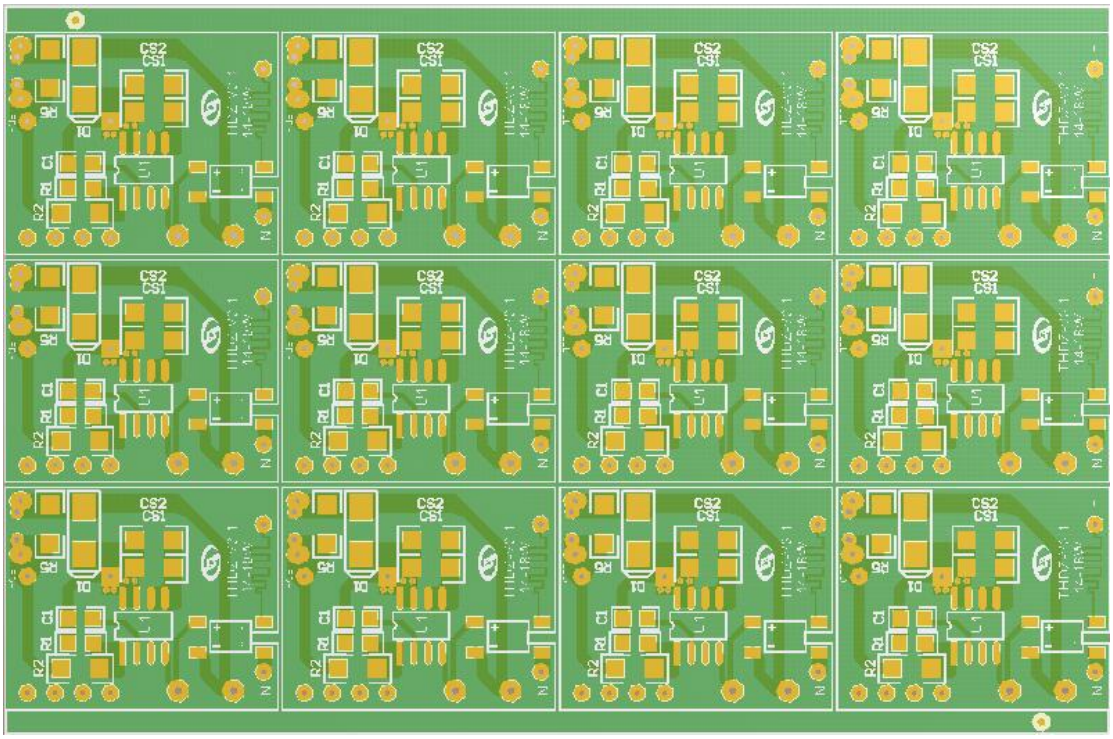


Figure 5-3-1 Imposition

Each small board has 9 points and 8 kinds of components, shown as Figure 5-3-2：

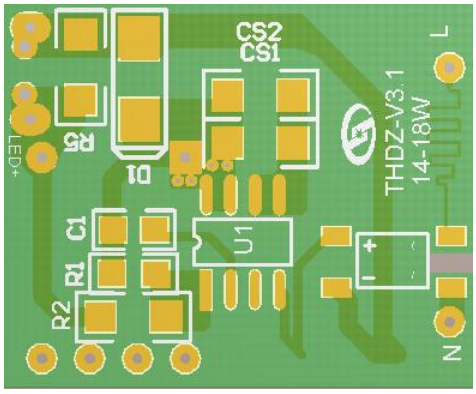


Figure 5-3-2 single board

The programming steps are as following:

5.5.2 Create a New Project

I) Produce→Create→name Show as Figure 5-4

This name can be PCB's name, also can be a date.

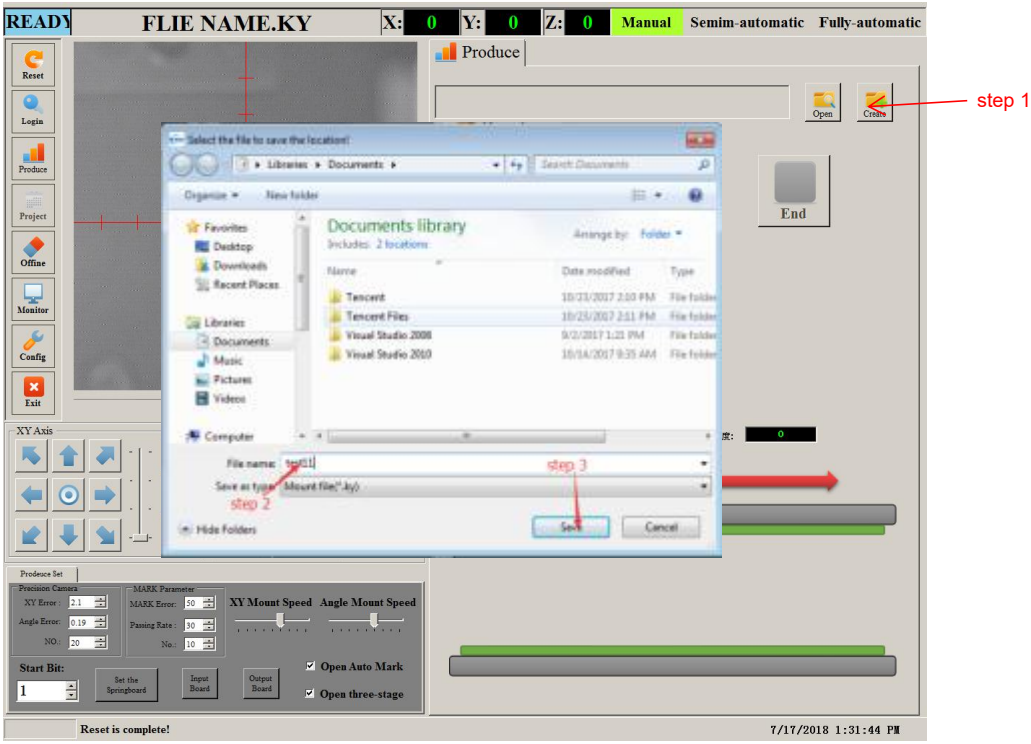


Figure 5-4

II) Click “save”, interface will automatically jump to the "project" interface, shown as Figure 5-5:

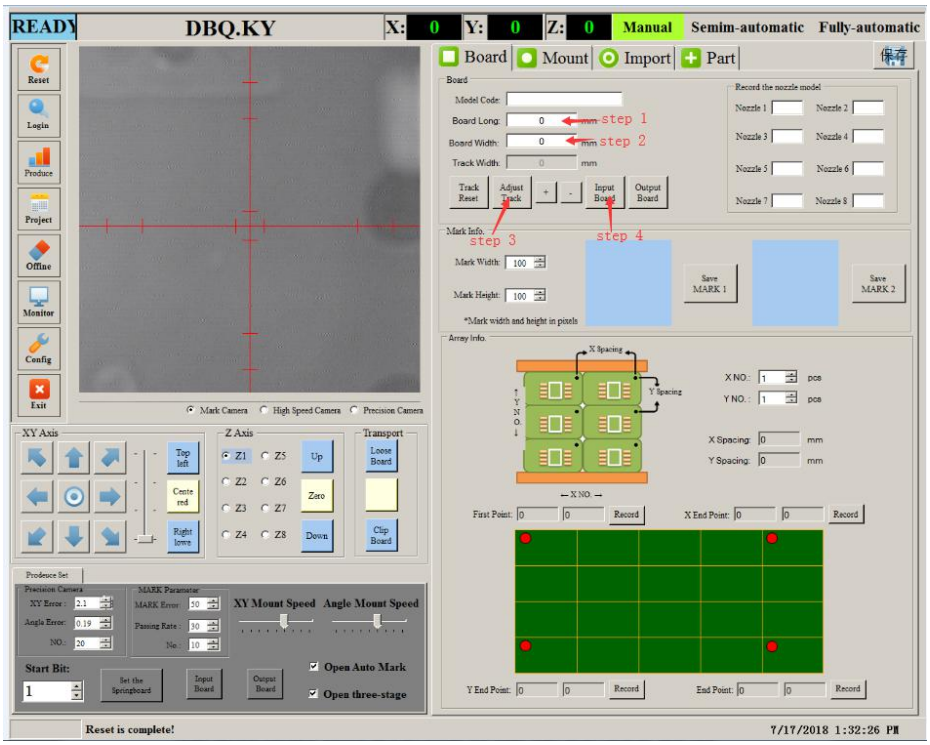


Figure 5-5

5.5.3 Fill Board Information

In the "Board" interface, need to fill in the length and width of the PCB substrate, then click “adjust track”. Put a PCB on the board importing place, and then click “Input board”,

making the PCB into SMT machine and top board fixed.

5.5.4 Create New Part Information

Click “Part” button into the edit, add components interface, shown as Figure 5-6-1:

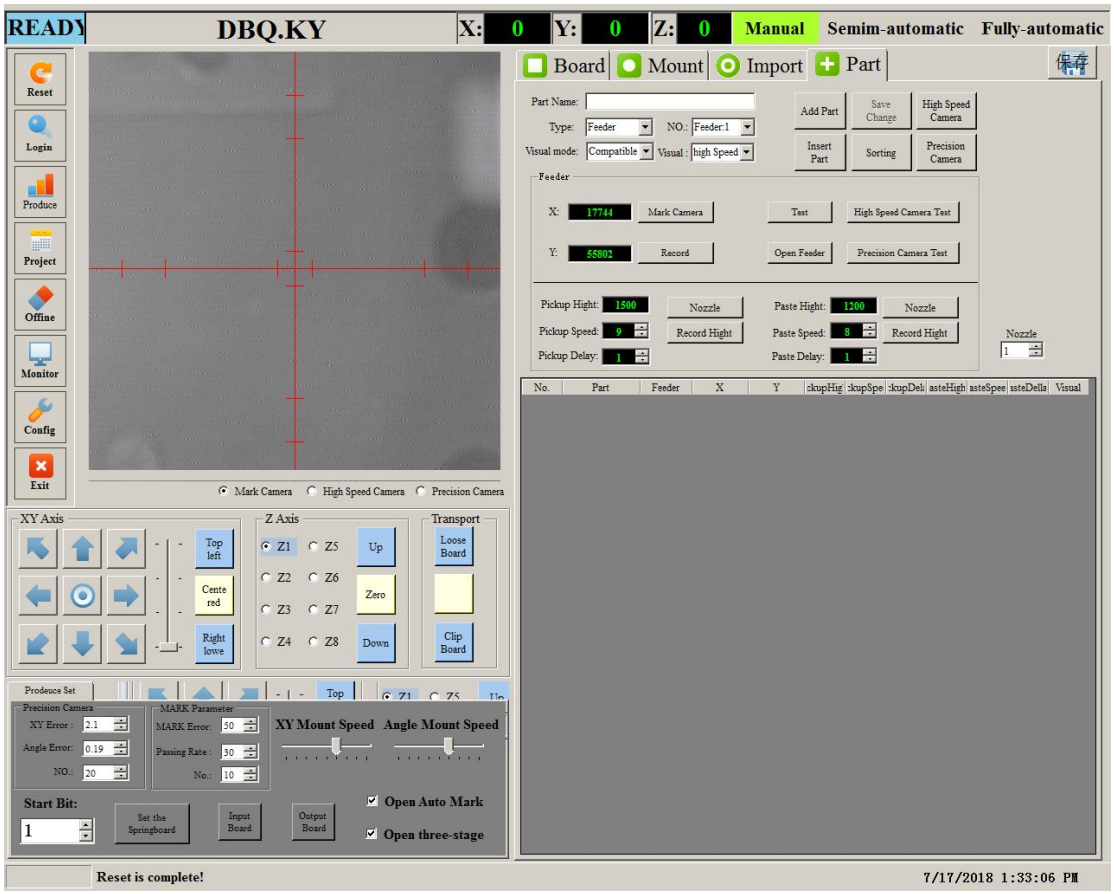


Figure 5-6-1

① Click “New Part”button, then into components setting interface, shown as Figure 5-6-2:
Items need to set:
Part Name: Need to set the name of the components;
Type: Total 3 kinds (Tape, pipe, tray);
NO: Feeder Station No. (This material corresponds to the feeder’s station number);
Visual Algorithm: Component Recognition Method (Resistor-tolerance Algorithm, Compatible Algorithm)
Visual: Recognition Camera’s recognizing method after picking the materials (High speed camera, precision camera, fast precision, no);
Pick Office: Synchronous pickup tolerance. KAYO-A8L has the function of 4 nozzles synchronous pickup, that time needs choose it.
The size of the value is the synchronous pickup deviation value. It judges whether can be synchronous pickup.
If 0, this feeder station does not perform the synchronous pickup operation.
The larger the value, the more they will be picked up together. Normally 0603 sets to 20, 0805 sets to 40, 1206 sets to 60, components above 3528 set to 100.
Feeder’s XY coordinates: This material’s picking position.

1#-8# Suction nozzle's pickup/ paste height, pickup/ paste speed, pickup/ paste delay;

② After inputting the part's name, choosing material's type, NO and visual, click "MARK camera", Mark camera will move close to selected material, shown as Figure 5-6-2:

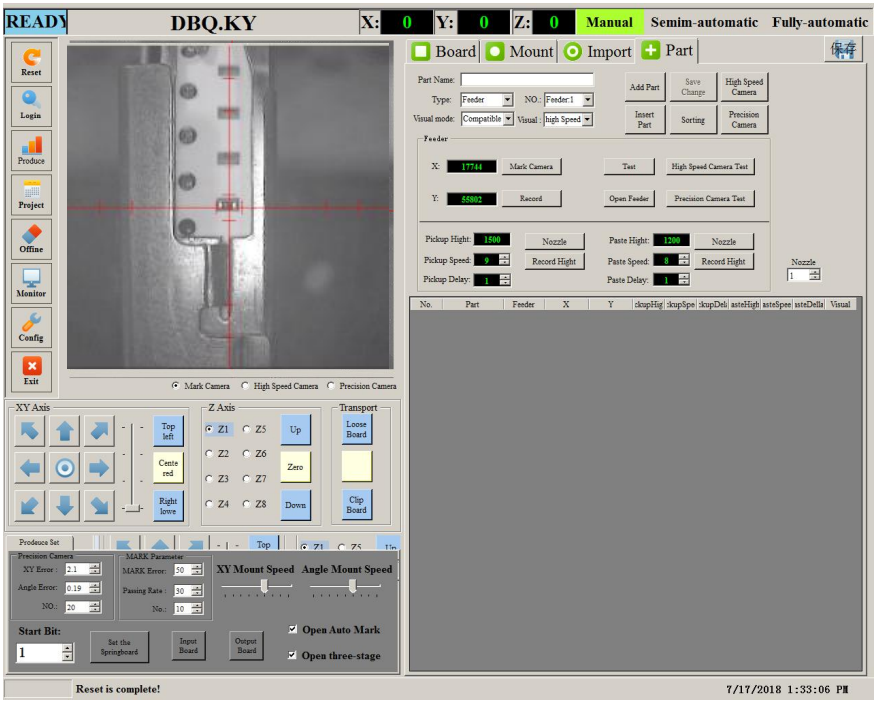


Figure 5-6-2

③ Click the "Open Feeder", move XY coordinates, make the red cross scale aiming to the first material from feeder, click "record coordinate". At this point, all the coordinates record of 1#-8# suction nozzle corresponding to this feeder has been saved. Shown as Figure 5-6-3:

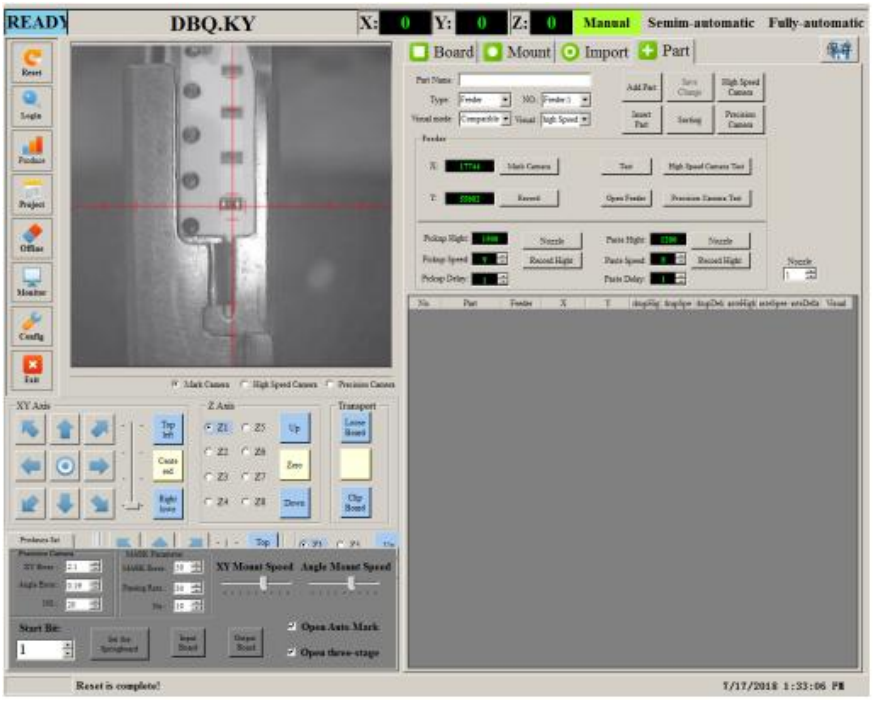


Figure 5-6-3

④ Click “Nozzle”, at this time, 1# suction nozzle could move right above to the red cross scale, click “DOWN” 

button to make 1# suction nozzle down to just touch the material, shown as Figure 5-6-4:

Figure 5-6-4

Click “Record Height” in the pickup material column, after height saved, 1# suction automatically rising back to zero.

⑤ Move 1# suction nozzle on the top of PCB board, click 

button, make 1# suction nozzle just touch the PCB board. Shown as Figure 5-6-5:

Figure 5-6-5

⑥ Click “Record Height” in the paste column, after pick and placement height saved, 1# suction automatically rising back to zero.

⑦ Pickup/ paste speed set:

Tape: 7~9

Tube: 5~8

Tray: 1~4

⑧ Pickup/ paste delay set:

Tape: 1~5

Tube: 5~10

Tray: ≥20

Now the feeder’s (corresponding to 1# suction nozzle) parameter have been set, click 

to check whether it could pick material normally.

⑨ Continue to set the feeder’s parameter corresponding to 2# suction nozzle (XY coordinates need not to set again), click 

, the tooltip will appear, then click “Yes (Y)”, the setting way is the same as 1# suction nozzle’s.

⑩ After setting all of the suction nozzles which need to pick the feeder’s materials, click  . Then create next new component, the operating method is the same as ①-⑨.

⑪ Until all the components types which PCB required have been finished, click 

button on the upper right corner of the interface. Shown as Figure 5-6-6:

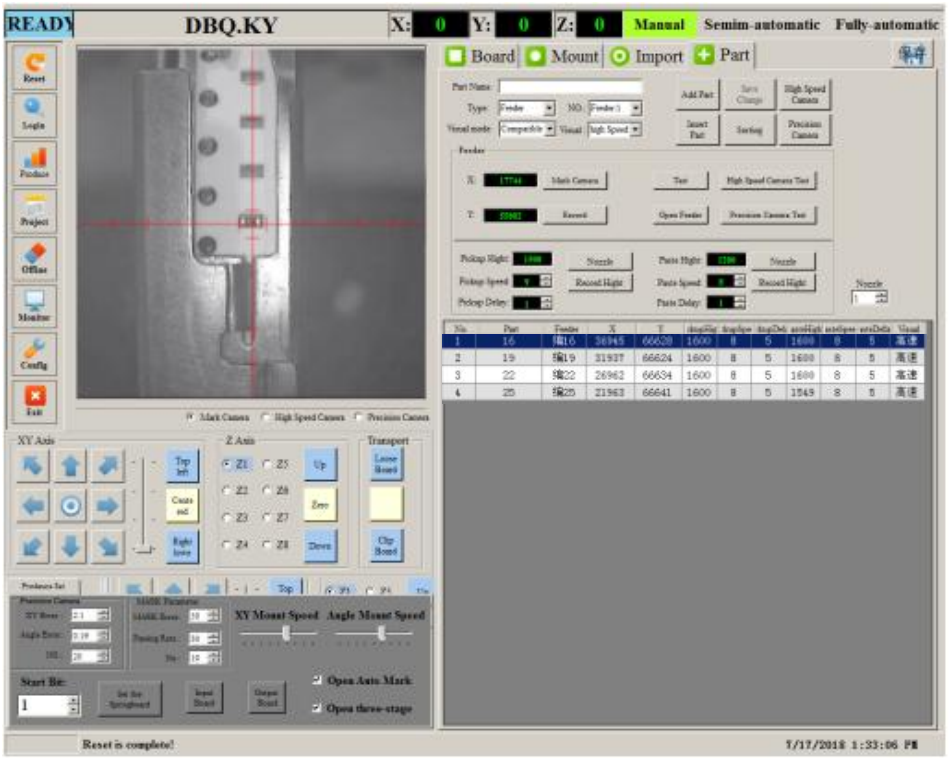


Figure 5-6-6

⑫ As different materials have different packages, so the ranges of vision recognition are

different, which need to set. Click 

and will appear high speed vision recognition setting interface, shown as 5-6-7:

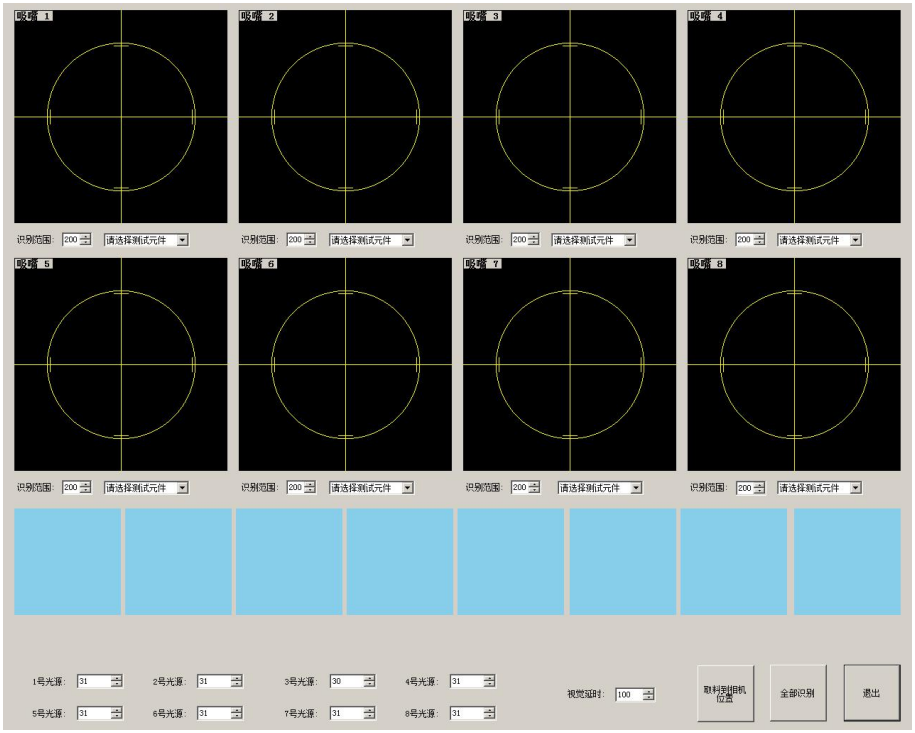


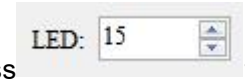
Figure 5-6-7

Eight frames separately present 8 suction nozzles.

Firstly choose components each nozzle need to pick and recognize 

,

then select“visual range” to 201, after all selected, click 

. This time nozzles will pick selected components to recognize in the high speed camera. It is best to adjust the light source brightness 

to components and background contrast significantly.

Note: For the components have larger package, make sure the components within the recognition range (yellow circle), and with much margin, otherwise it will cause error recognition!

After setting 

, then click 

.

⑬ For the components have larger volume, precise pin, need to use precise vision to inspect, the setting method is the same as above, interface shown as 5-6-8:

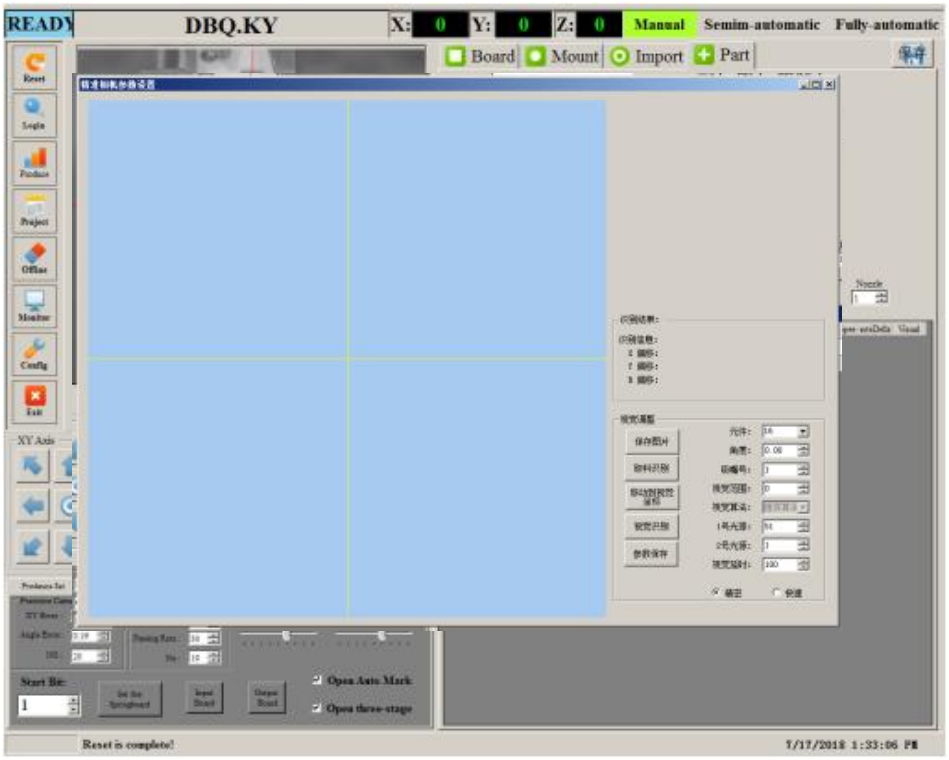


Figure 5-6-8

Normally, only need to choose the part that you want to test, set the angle, nozzle, visual range, LED1 and delay.

PART: choose the component that you want to test.
Angle: Refer to component angle, can be understood as the placement angle. Rotate according to this angle after picking.
Nozzle: choose the correct nozzle to pick up the component.
Visual Range: Diameter of the detection area, be sure to include the entire component.
If the visual range is 0, it is the maximum visual range. If it is greater than 0, it is considered to be the set visual range.
LED: Light source brightness, only set LED1, no need to set LED2.
Delay: Refers to recognition time, cannot be lower than 100.
Area: Pixel area of each component. The default value is 0. When the area is greater than 800, it is considered that something has been recognized.
If it is not 0, it is the currently set value, plus the set tolerance range.
Tolerance: The difference between the actual area and the saved area. The default value is 0. If there is value in Area, normally set Tolerance 10~20%. If Area is 0, the Tolerance setting does not work.
Example: If the area of 0805 resistor sets to 32145, the tolerance is 20%, then the area of this resistor will change if stands up when picked up. If it exceeds 20%, it will be considered unqualified and thrown.

Area and Tolerance are used to make sure that there is no wrong component is picked up.
Step 1:

Choose the component that you want to test, set the parameters and choose the correct camera mode.

Step 2:

Click "Pickup Recognition", the nozzle will pickup the component and move above the camera.

Step 3:

Click "Recognition", the camera will recognize the component.

Step 4:

Adjust the parameters according to the Recognition Result.

Step 5:

Click "Save Para" to save parameters.

Step 6:

Click "Recognition", if recognize successfully, click "throw", then exit the settings interface.

At this point, all of the items in “Part” have been set up.

◎ **Extension:** The function of mouse right click of“Part”include, shown as Figure 5-6-9:

Change: Enter the selected component settings interface (Figure 5-6-2), can modify all of the parameters.

MARK Camera Positioning: Position to the XY coordinate of the selected component.

Delete: Delete selected components.

Uniform Parameters: In the single or multiple selecting case, rapidly set the nozzle (corresponding to the component) pickup height, paste height, pickup/ paste speed, pickup / paste delay, visual mode.

Figure 5-6-9

"Uniform Parameters" shown as Figure 5-6-10：

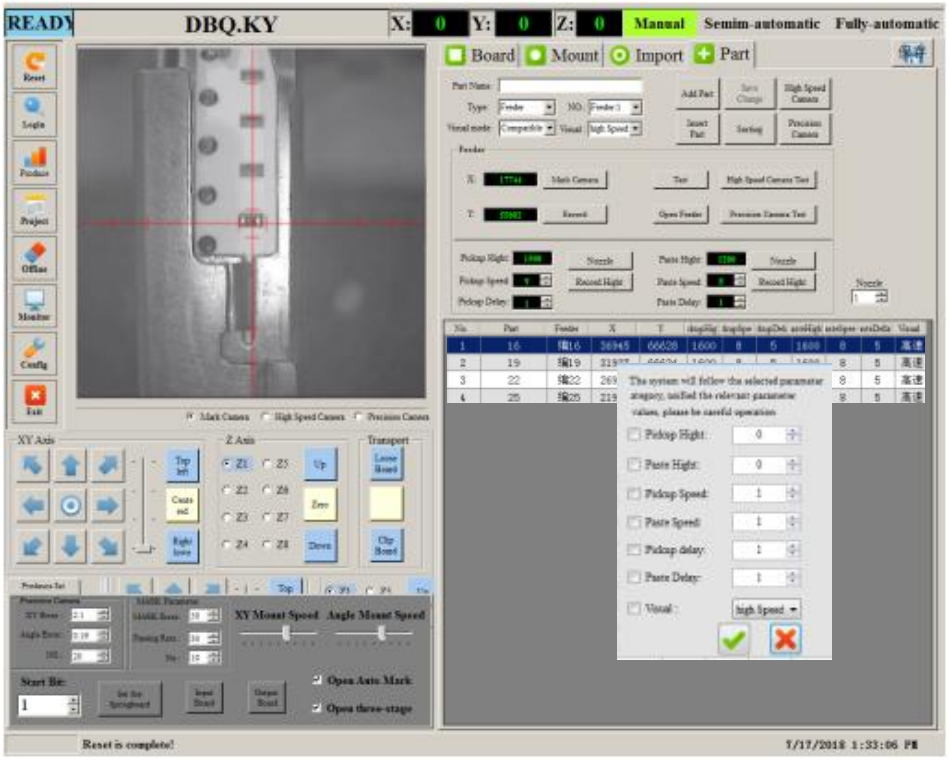


Figure 5-6-10

Ticking ☑ before the modified items presents modifying this item, if not ☐, presents do not modify this item even there is value.

Note: When using "Uniform Parameters", please note suction nozzles switch 

, to ensure nozzles' corresponding relation.

5.5.5 Create Mount Information

Click “Board”, and enter board setting interface, show as Figure 5-7-1:

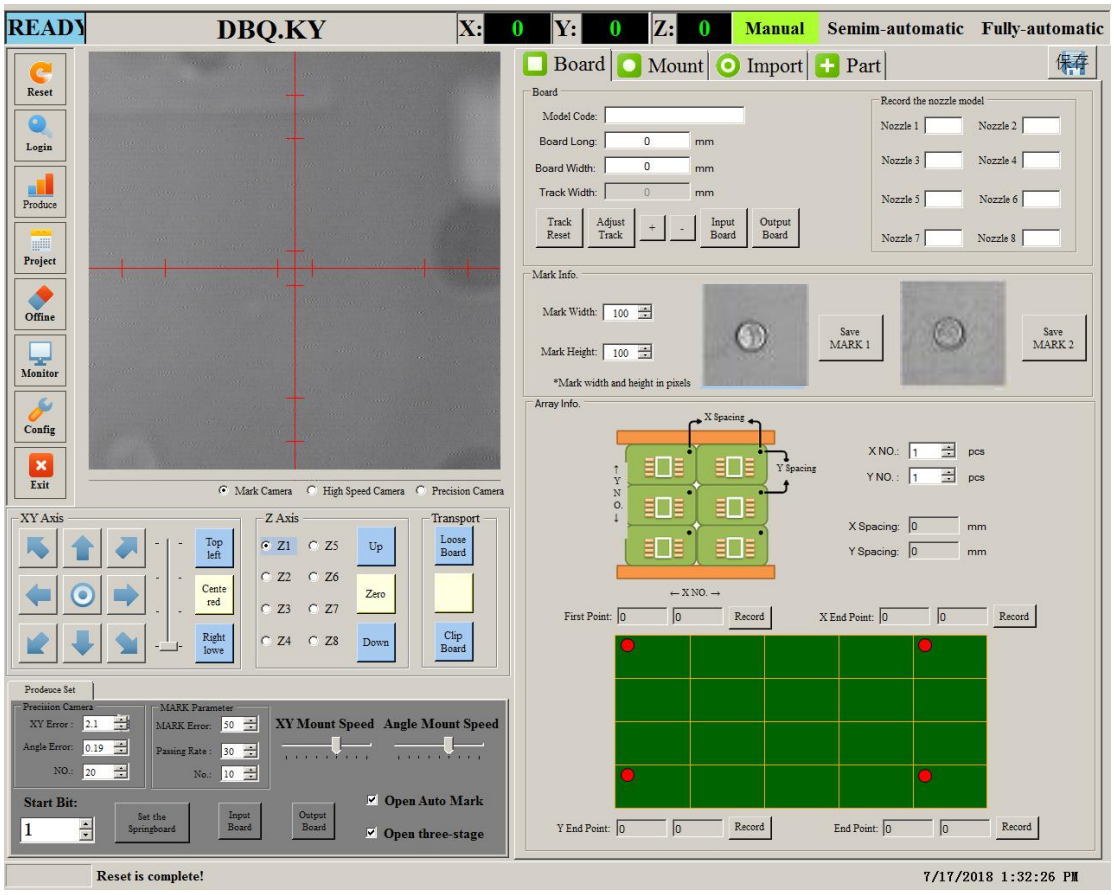


Figure 5-7-1

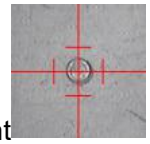
① Move the red cross line to the middle of the MARK point  via moving XY coordinates, then click Mark 1 or Mark 2 to set the two MARK points on the PCB board (the distance between these two Mark points are the largest). Mark points can be adjusted to avoid screen printing. Shown as 5-7-2:

Figure 5-7-2

Click “Mount”, and enter mount setting interface, show as Figure 5-7-3:

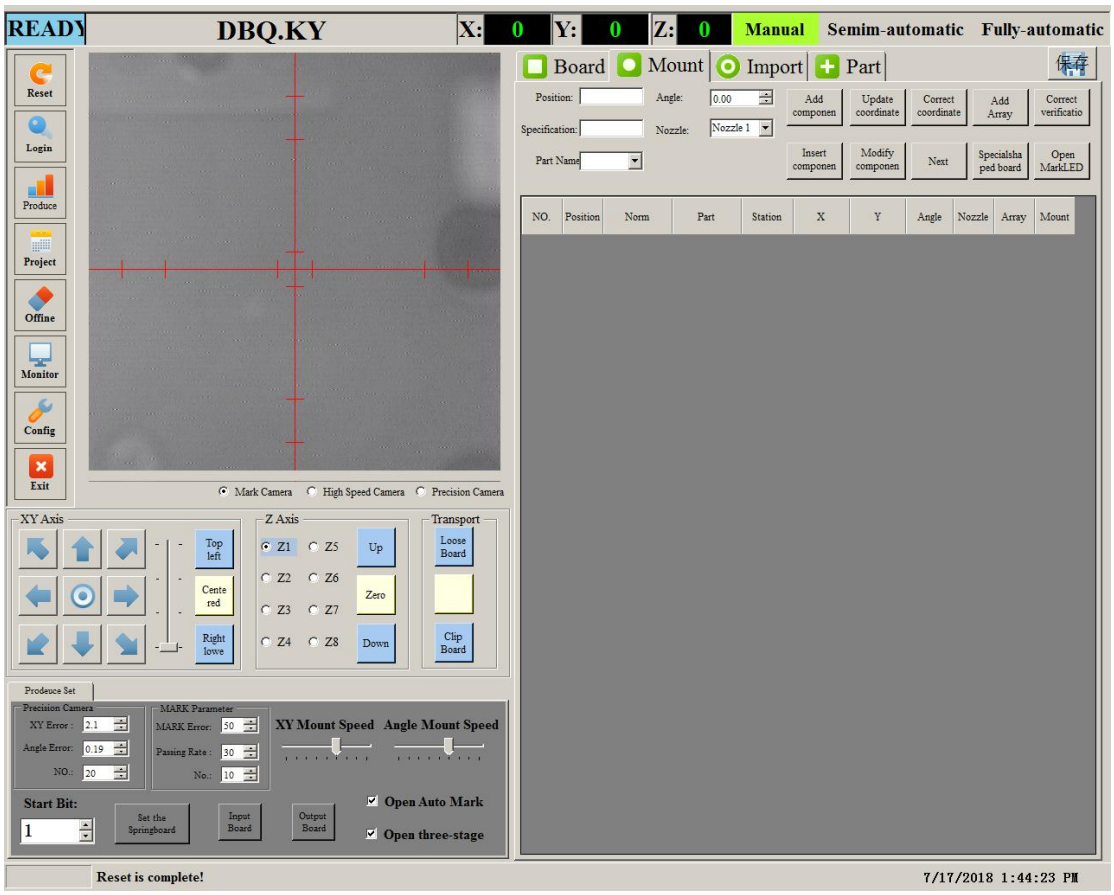


Figure 5-7-3

① Move XY coordinate to the first component (R1) of the single board in the upper left corner, the middle of this component pad.

Position: Input position name, normally is screen position No.-(R1).

Specification: The components' package.

Part Name: Choose the component corresponding to this point-(1K).

Shelf NO.: will automatically update-(1).

Angle: Input the component angle-(0).

Nozzle: Select the suction nozzle which the component required-(1).

Click "Add coordinate  ", shown as 5-7-4:

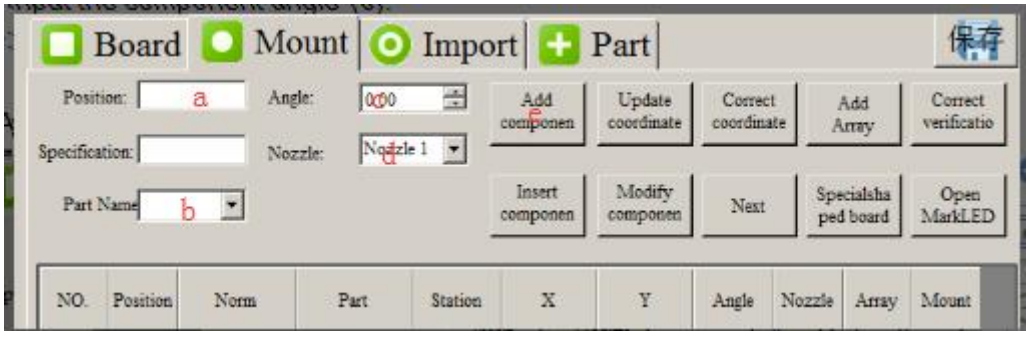


Figure 5-7-4

② Move XY axis to look for the next component, the method is the same as ①, successively find the remaining components of this small board, the order is not unique,

as long as no more or no less.

③ Then click “Correct verification 

” to check whether there is errors, if there is, it need to change.

For example, 5# nozzle cannot pickup the 1# feeder’s materials, shown as Figure 5-7-5:

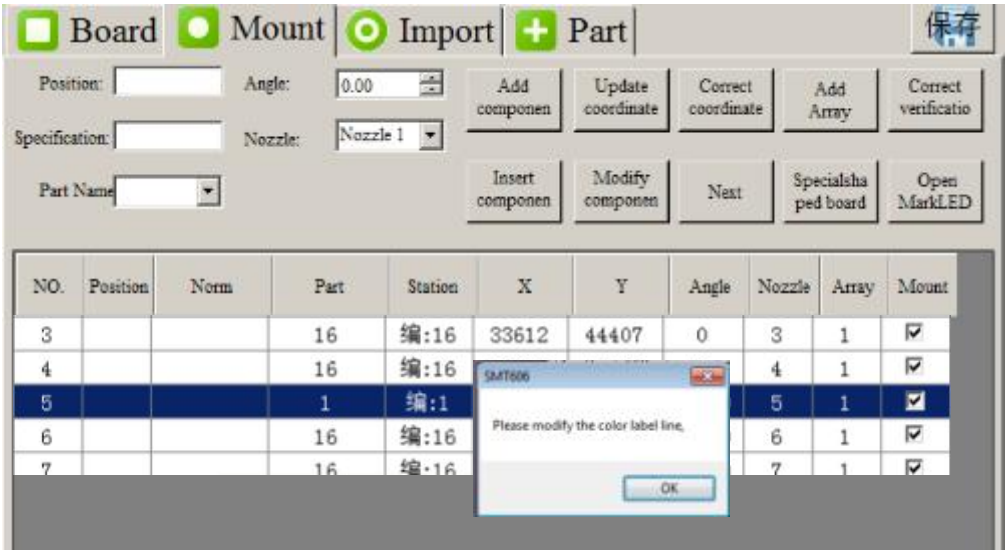


Figure 5-7-5

④ After correct verification, select all of the components, mouse right click to select "Sorting", shown as 5-7-6:

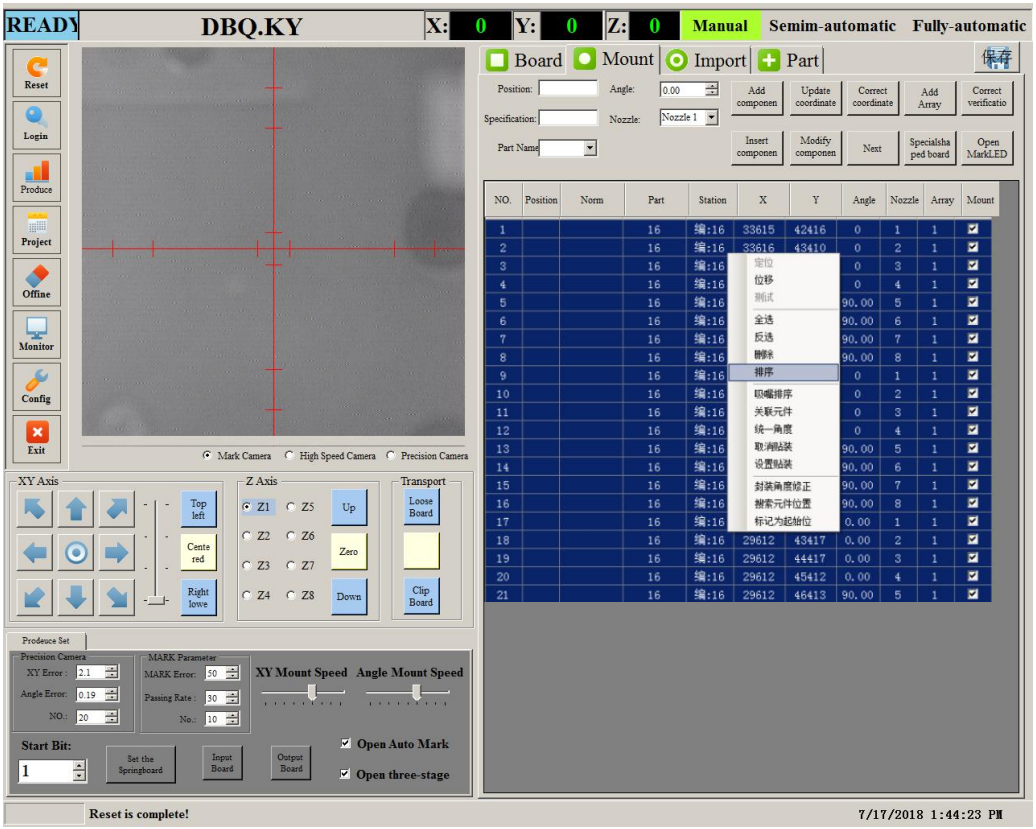


Figure 5-7-6

⑤ Enter sorting interface, click “Nozzle order”, then “Bomlist” shown as Figure 5-7-7, will

pop up a dialog box, click “Yes (Y)”, After sorted, click  to close nozzle sorting interface.

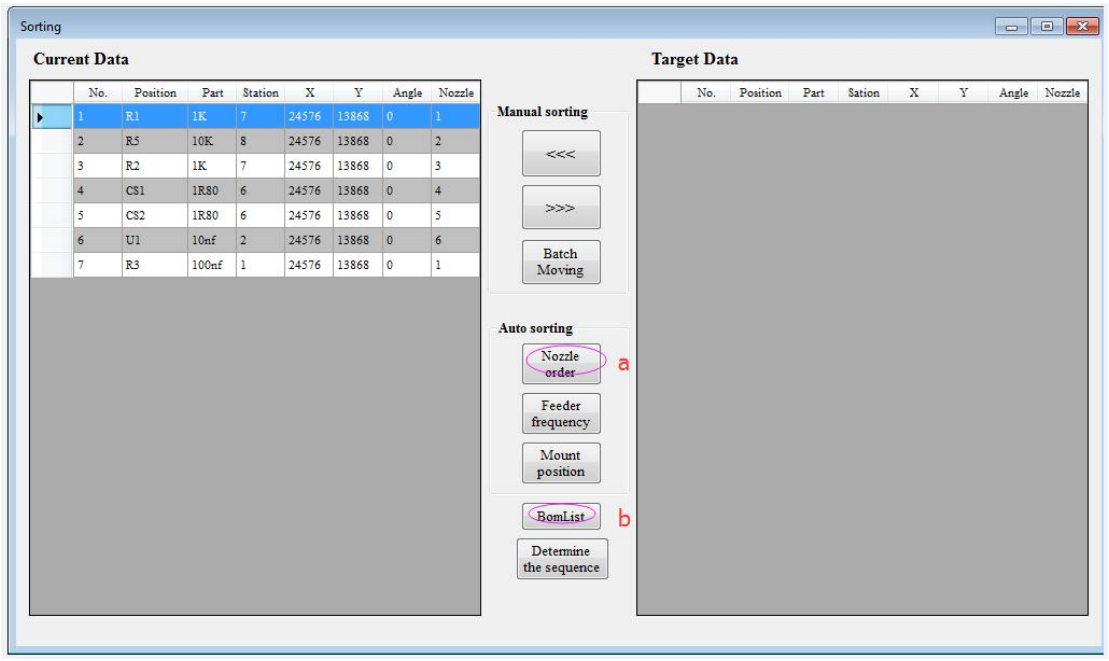


Figure 5-7-7

⑥ Due to make-up, after nozzle sorting, still need to array the rest boards, array set in the “Board: interface. Firstly input XY quantity of make-up, shown as Figure 5-7-8:

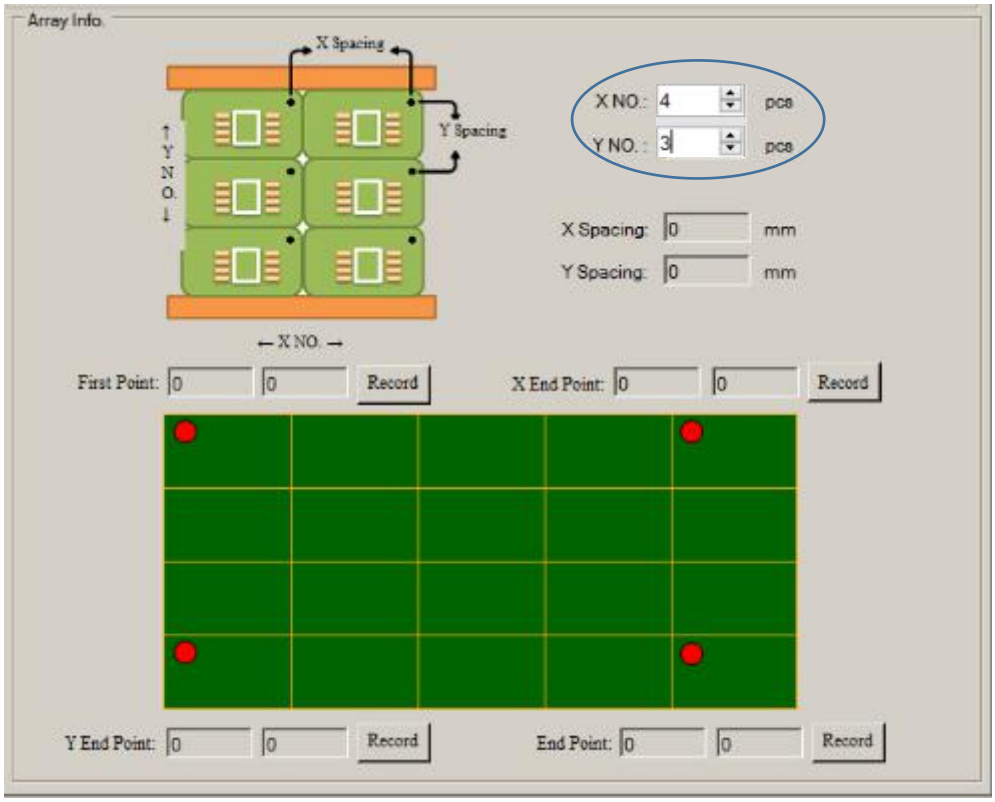


Figure 5-7-8

⑦ Then set array mark points. Please note corresponding relationship, shown as 5-7-9:

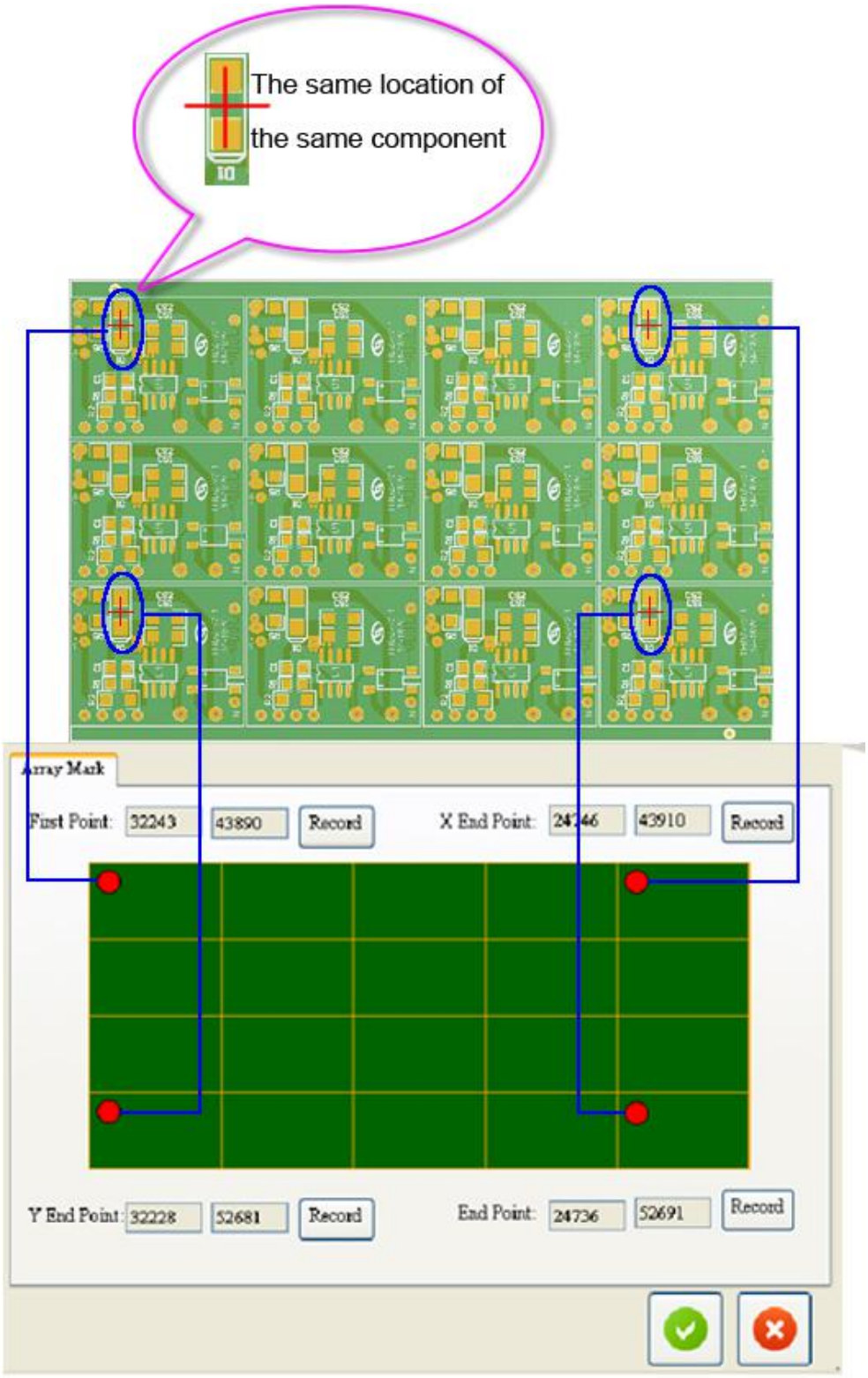
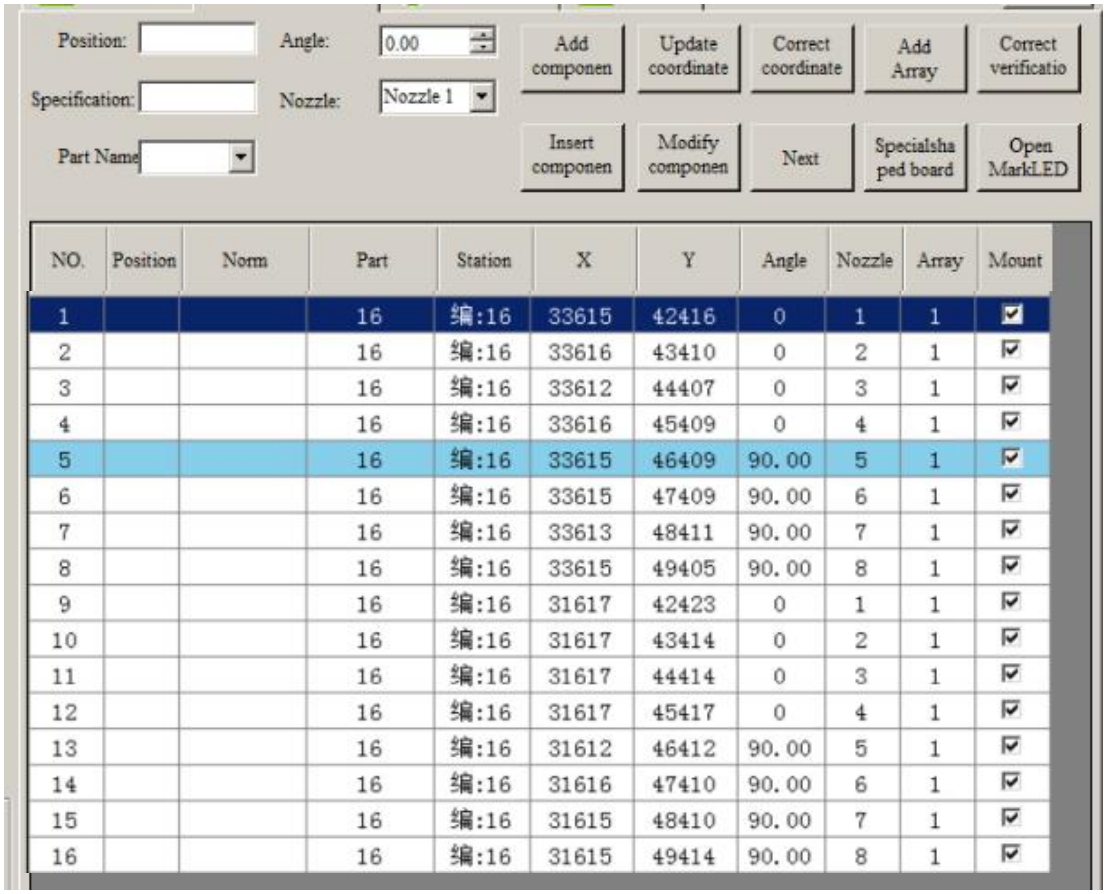


Figure 5-7-9

Through moving XY coordinates to find 4 corresponding points and separately “record”, click ,could check recorded coordinates.

⑧ Return to “Mount” interface, select all of components, and click “Add array”,

shown as Figure 5-7-10:



NO.	Position	Norm	Part	Station	X	Y	Angle	Nozzle	Array	Mount
1			16	编:16	33615	42416	0	1	1	☑
2			16	编:16	33616	43410	0	2	1	☑
3			16	编:16	33612	44407	0	3	1	☑
4			16	编:16	33616	45409	0	4	1	☑
5			16	编:16	33615	46409	90.00	5	1	☑
6			16	编:16	33615	47409	90.00	6	1	☑
7			16	编:16	33613	48411	90.00	7	1	☑
8			16	编:16	33615	49405	90.00	8	1	☑
9			16	编:16	31617	42423	0	1	1	☑
10			16	编:16	31617	43414	0	2	1	☑
11			16	编:16	31617	44414	0	3	1	☑
12			16	编:16	31617	45417	0	4	1	☑
13			16	编:16	31612	46412	90.00	5	1	☑
14			16	编:16	31616	47410	90.00	6	1	☑
15			16	编:16	31615	48410	90.00	7	1	☑
16			16	编:16	31615	49414	90.00	8	1	☑

Figure 5-7-10

After adding, click “save 

”button. At this point, one complete program has been compiled.

◎ **Extension**: The function of “Mount” mouse right click includes:

Locate: Mark camera positions to the currently selected component.

Move: Modify X, Y coordinate (can be single, multiple choice).

Test: Test picked material to the current coordinate point.

Select All: Select All.

Anti-election: reverse selection.

Delete: Deletes the selected component.

Nozzle Sorting: Specify or change the nozzle for the selected component.

Specify the Components: Specify or change parts for selected components.

Unified Angle: Specifies or changes the angle of the selected component.

Cancel the Placement: Cancel selected component mount status

Set the Placement: set selected component mounted state

Package Angle Change: Change the angle of the selected component in the component station.

Search for Component Location: Fill in the component "mount location" name, can overall change the filled components.

Sorting: Sort the mount method.

Marked as the start bit: Place the first point of the mount from the selected component.

: Manually enter the board, click "verify mount coordinates", could modify the program again.

5.5.6 Running

In the “Produce” interface, click “output board”→”Fully Automatic”→”Start”, shown as 5-8:

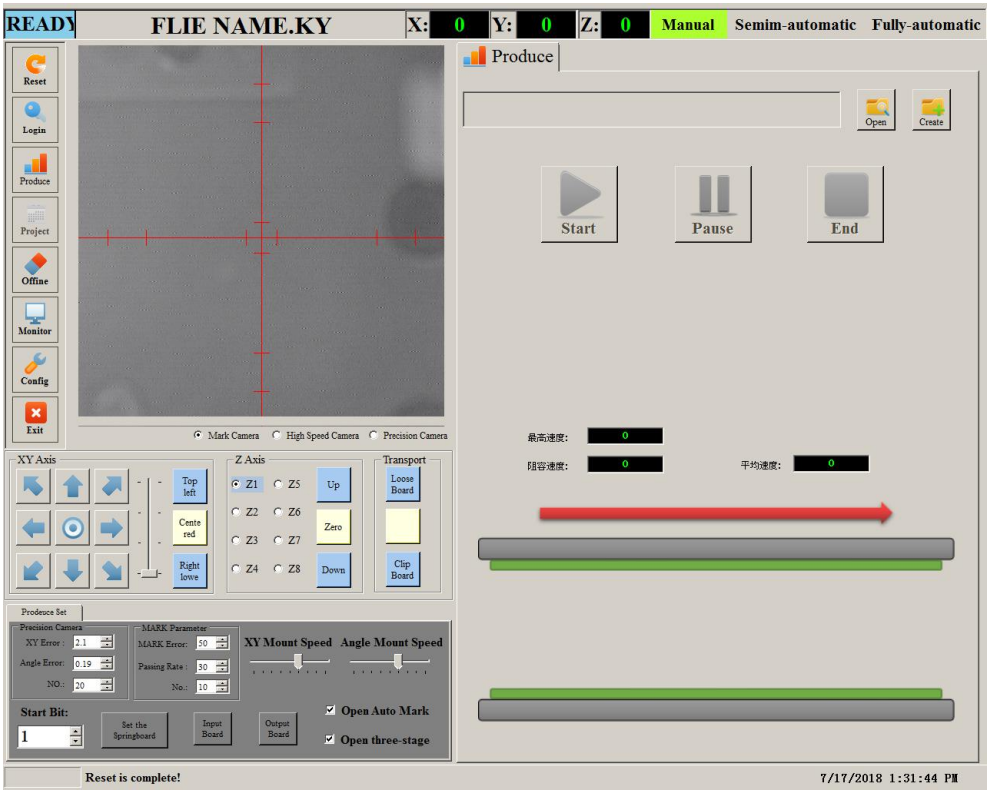
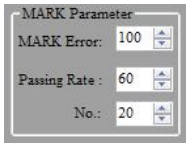


Figure 5-8

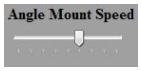
: If there is bad boards in the make-up, could click “set the springboard”to jump this bad board.

: Set to start mount from which order.

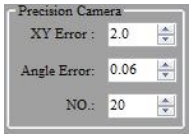


: “MARK Error” general is 20-60; “Passing rate” general is 60-80. "No." Mark recognizes times.

： X,Y coordinates’ moving speed during mount.



:The speed of the angle during placement



: "XY Error" placement allows the error unit of XY to be pulse; "Angle Error" Placement Allowed Error; "No." Precision Camera Repeated Corrections number.

5.6 Programming Method with "Import" Function

① Firstly export the Generates pick and place files from PCB drawing software, and copy it into the machine's IPC, (The imported file must be in .csv format)

② Click "Import 

"→click "Open import file 

", click the file which has been copied into the IPC, and click "Open". (shown as Figure 5-9-1)

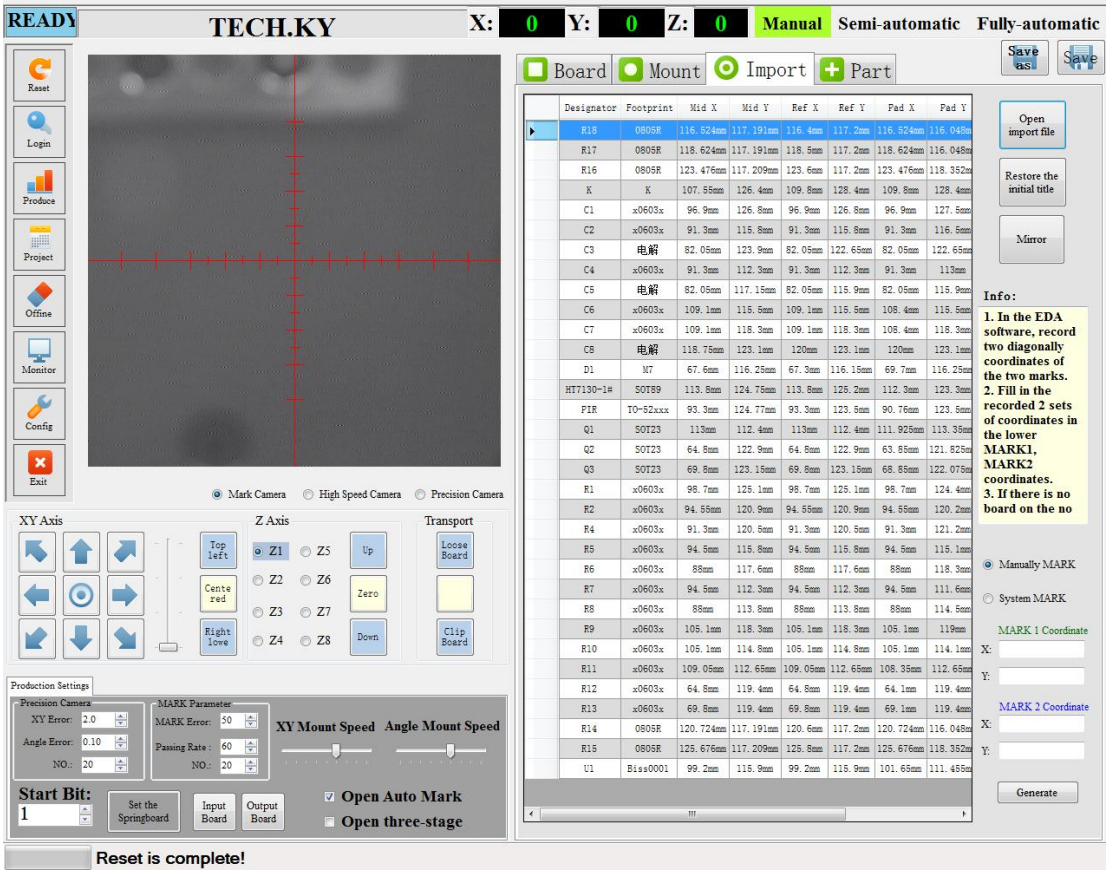


Figure 5-9-1

③ Set the column: Click the right mouse button at the top name of each column to associate and match different names.

Designator→Position;

Footprint→Footprint;

Mid X→X Coordinate;

Mid Y→Y Coordinate;

Rotation→Angle;

TB→Top/Bottom;

Comment→Comment Name;

shown as Figure 5-9-2

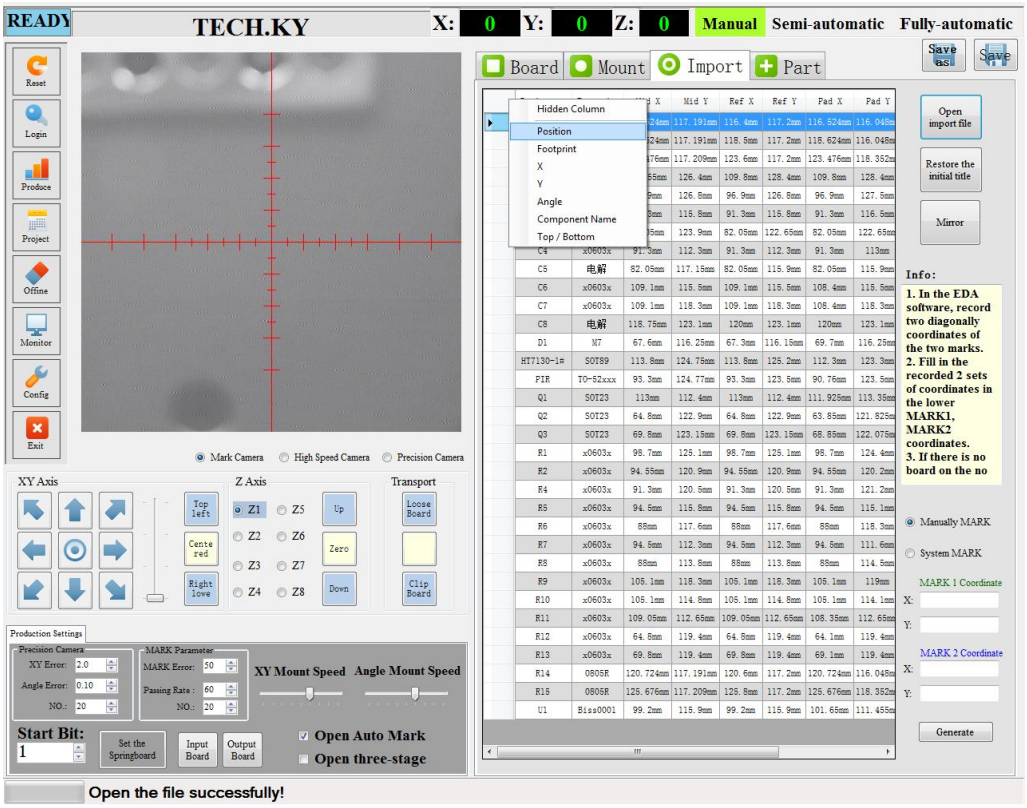


Figure 5-9-2

④ Delete the bottom layer and the rows that do not need to be mounted.

The right mouse button can quickly select the top/bottom layer. Shown as Figure 5-9-3

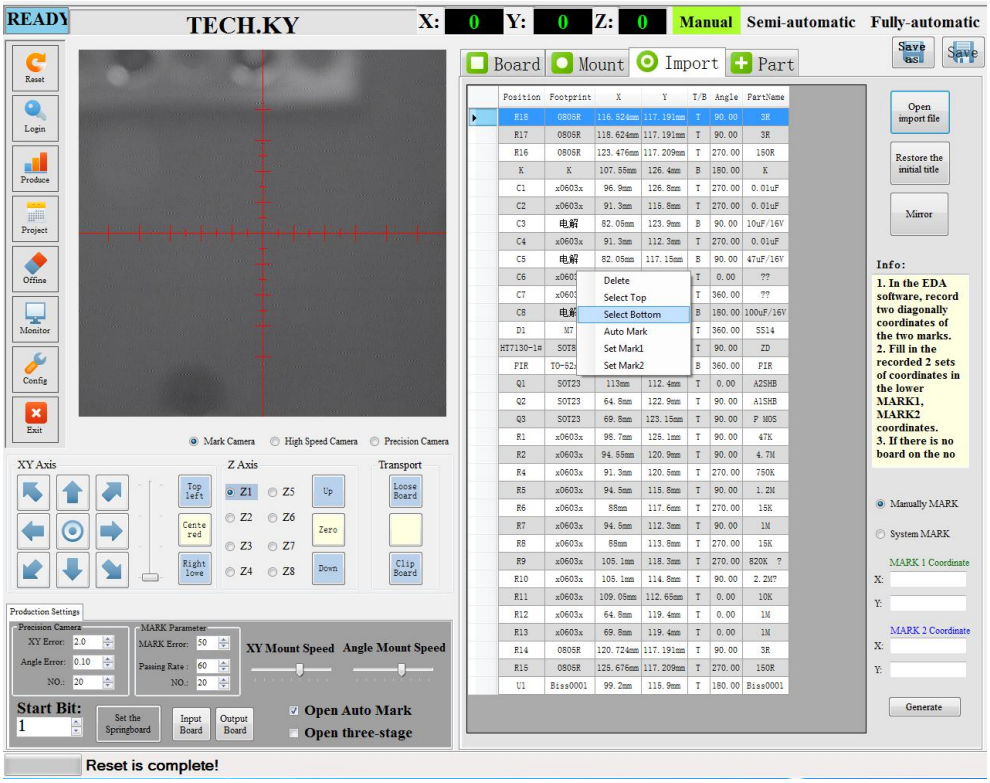


Figure 5-9-3

⑤ Appoint MARK1, MARK2 with two type: ‘manually appoint MARK’,’ systematically appoint MARK’. (Generally, "System MARK" will be used)

A) **Manually appoint MARK**: According to the PCB layout, find the two coordinate lines with the longest distance, click the right mouse button, and select "Set Mark1" and "Set Mark2" respectively (At this time, the coordinate value will be filled in the box on the right) , then click "Generate"

Move the MARK camera, find the mounting position of the MARK1 component just selected on the PCB, align the center of the component mounting position with the center of the crosshair, and then click "Set Mark1"

Move the MARK camera again, find the mounting position of the MARK2 component just selected on the PCB, align the center of the component mounting position with the center of the crosshair, and then click "Set Mark2", after clicking "Set Mark2", it will automatically jump to the "Mount" interface.

B) **System appoint MARK**: After selecting "System MARK", the software will automatically generate the coordinate values of MARK1 and MARK2, and the data on the left will also be marked with different colors for MARK1 and MARK2 (the green is MARK1, the blue is MARK2) Then click "Generate"

Move the MARK camera, find the mounting position of the MARK1 component on the PCB board, align the center of the component mounting position with the center of the crosshair, and then click "Set Mark1";

Move the MARK camera again, find the placement position of the MARK2 component on the PCB board, align the center of the component placement position with the center of the crosshair, and then click "Set Mark2", After clicking "Set Mark2", it will automatically jump to the "Mount" interface. As shown Figure 5-9-4

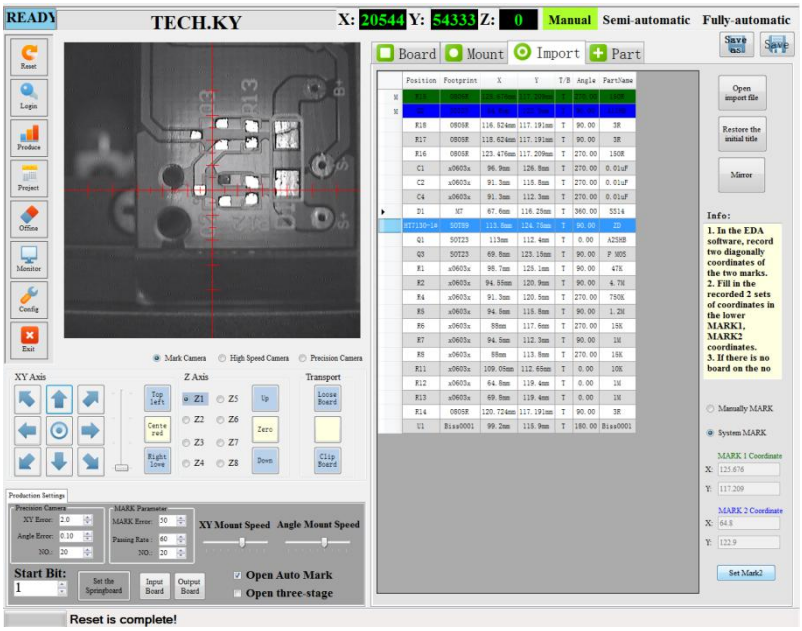


Figure 5-9-4

⑥ In "Mounting", first check whether the mounting position and angle are correct or not.

Checking Method: Right click on each line， select ”Locate”, or click “ Next ” to check and verify

⑦ If everything is correct after checking, click” Create Part ”, the software will automatically generate "Part", and the page will automatically jump to“ Part ”as shown Figure 5-9-5

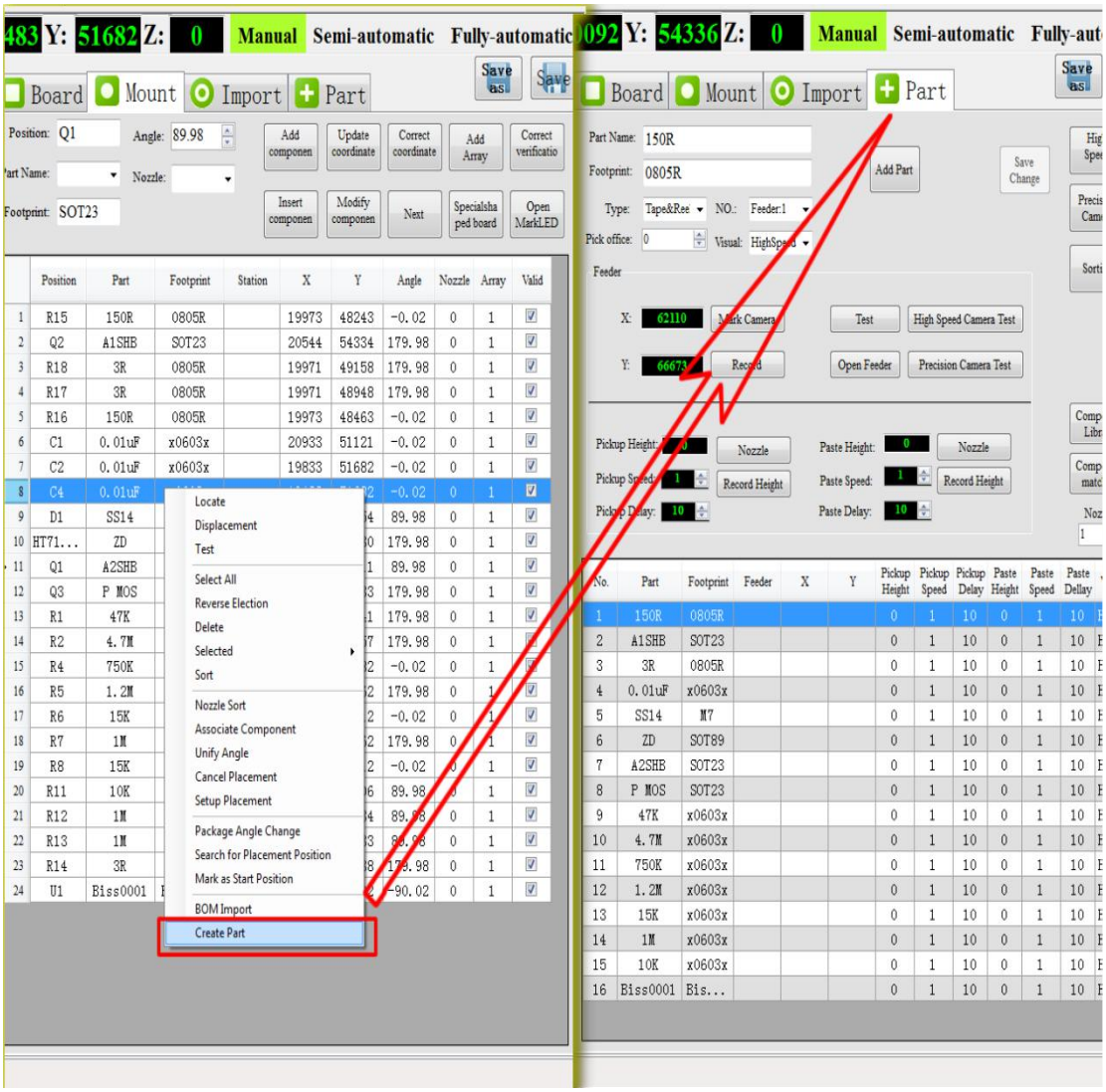


Figure 5-9-5

⑧ In the "Part" interface, set the parameters of each Part (including: "Type", "NO.", coordinates, speed, delay) The setting method is the same as 5.5.4.

⑨ After all parameters setting well of “Part” interface, click“ Sync to mount ”, synchronize the data to “ Mount ”As shown Figure 5-9-6

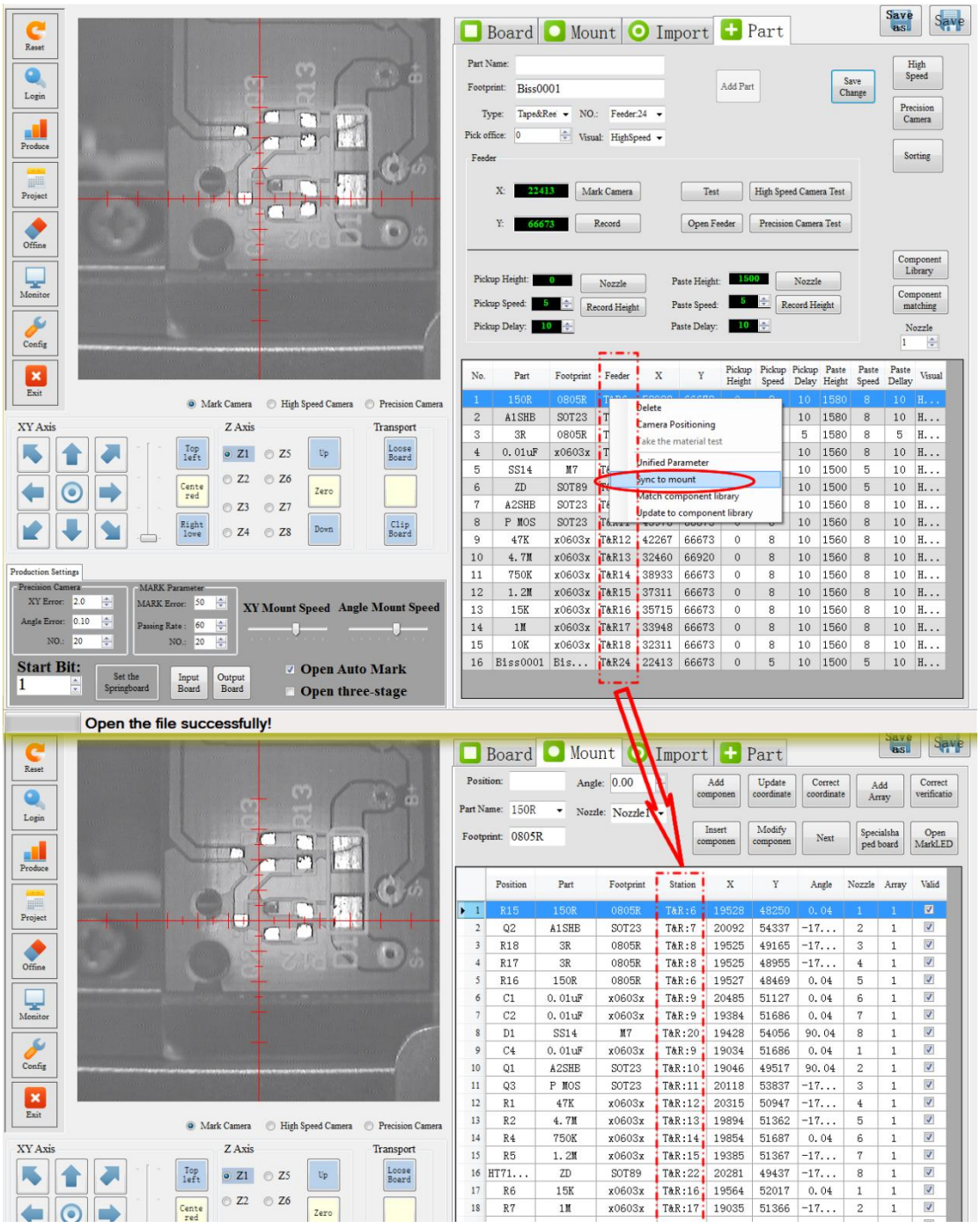


Figure 5-9-6

⑩ Appoint the nozzle number for different position associations.

Method: Click the right mouse button on the row to be associated, select "Nozzle Sorting", and specify the nozzle number for the placement position. (The placement position and nozzle number can be selected multiple times) as shown Figure 5-9-7

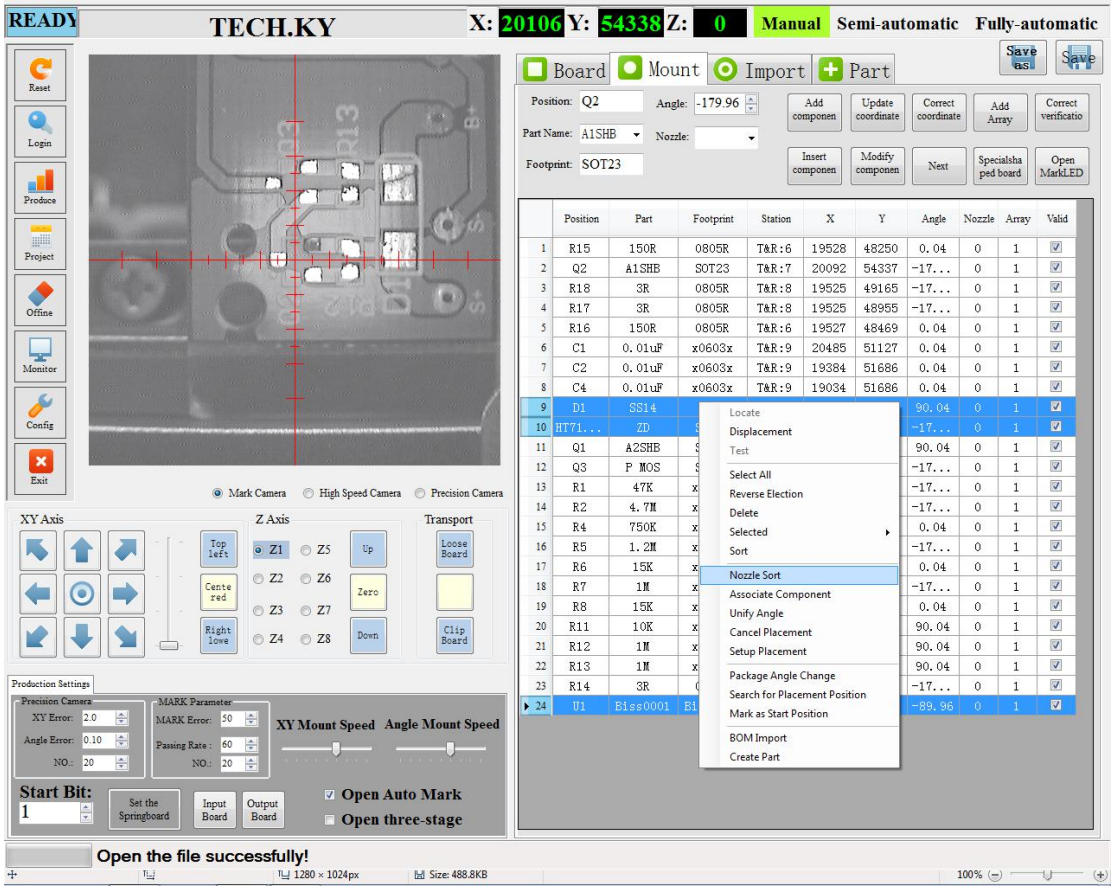


Figure 5-9-7

⑪ After setting the nozzle number, click the right mouse button and select "Sorting" to sort the placement position again. Generally only use the "Nozzle Order" function, click and select "Determine the sequence", a system dialog box pops up, select "Yes". As shown Figure 5-9-8

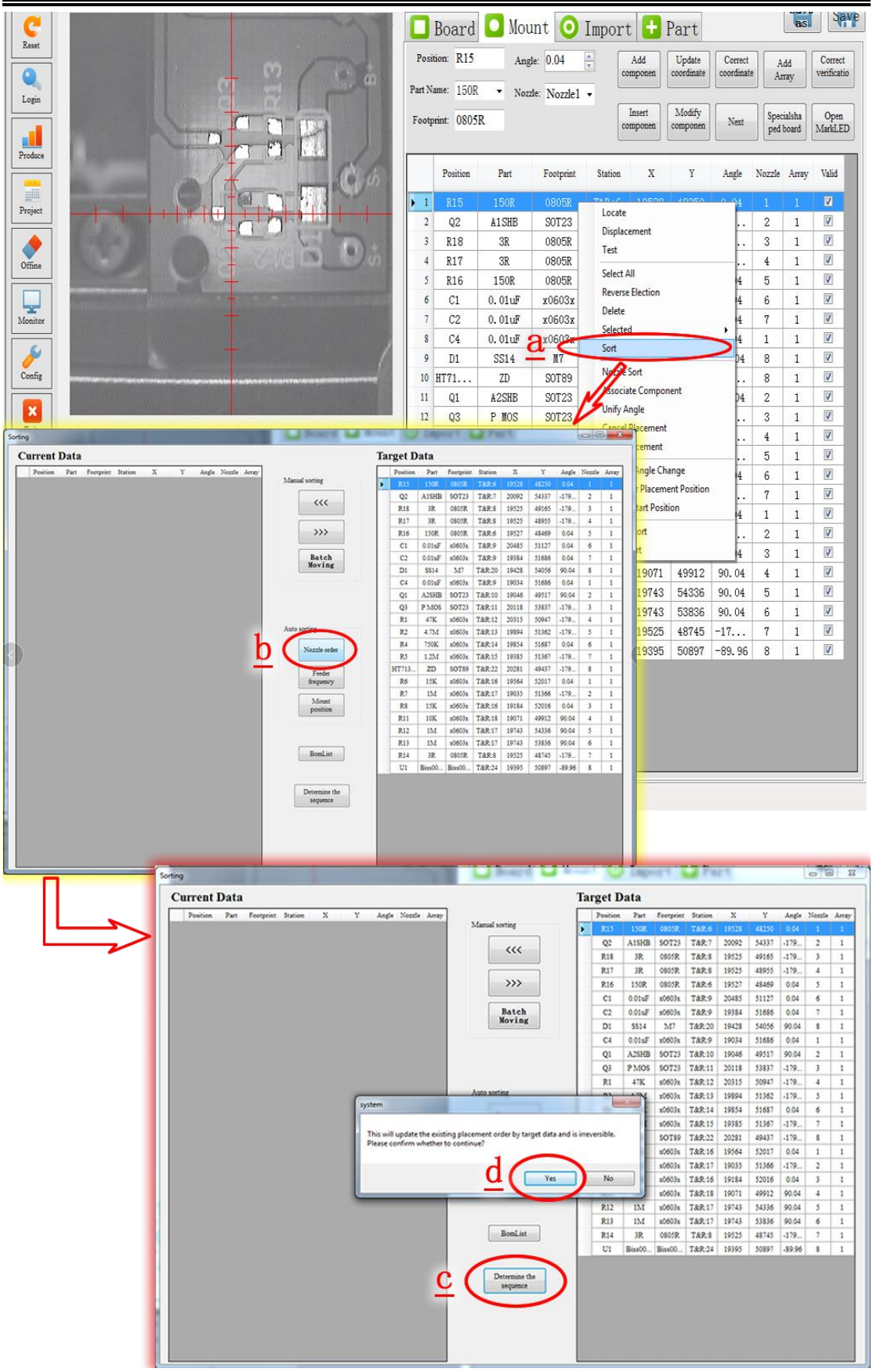

Board
Mount
Import
Part
Position: R15
Angle: 0.04
Part Name: 150R
Nozzle: Nozzle1
Footprint: 0805R
Add componen
Update coordinate
Correct coordinate
Add Array
Correct verificatio
Insert componen
Modify componen
Next
Specialsha ped board
Open MarkLED
Position Part Footprint Station X Y Angle Nozzle Array Valid
Locate
Displacement
Test
Select All
Reverse Election
Delete
Selected
Sort
Unify Angle
Current Data
Target Data
Manual sorting
Batch Moving
Auto sorting
Nozzle order
Feeder frequency
Mount position
BomList
Determine the sequence
a
b
c
d
system
This will update the existing placement order by target data and is irreversible.
Please confirm whether to continue?
Yes
No

Figure 5-9-8

⑫ Click" 

"

If you need array, the method is same as ⑧, ⑨ in 5.5.5

⑬ Running：like 5.5.6

◎ Extension: If the "Comment Name" is missing from the imported file data, that is, the "Part Name" is missing, you can use the "BOM Import" function. As shown Figure 5-9-9

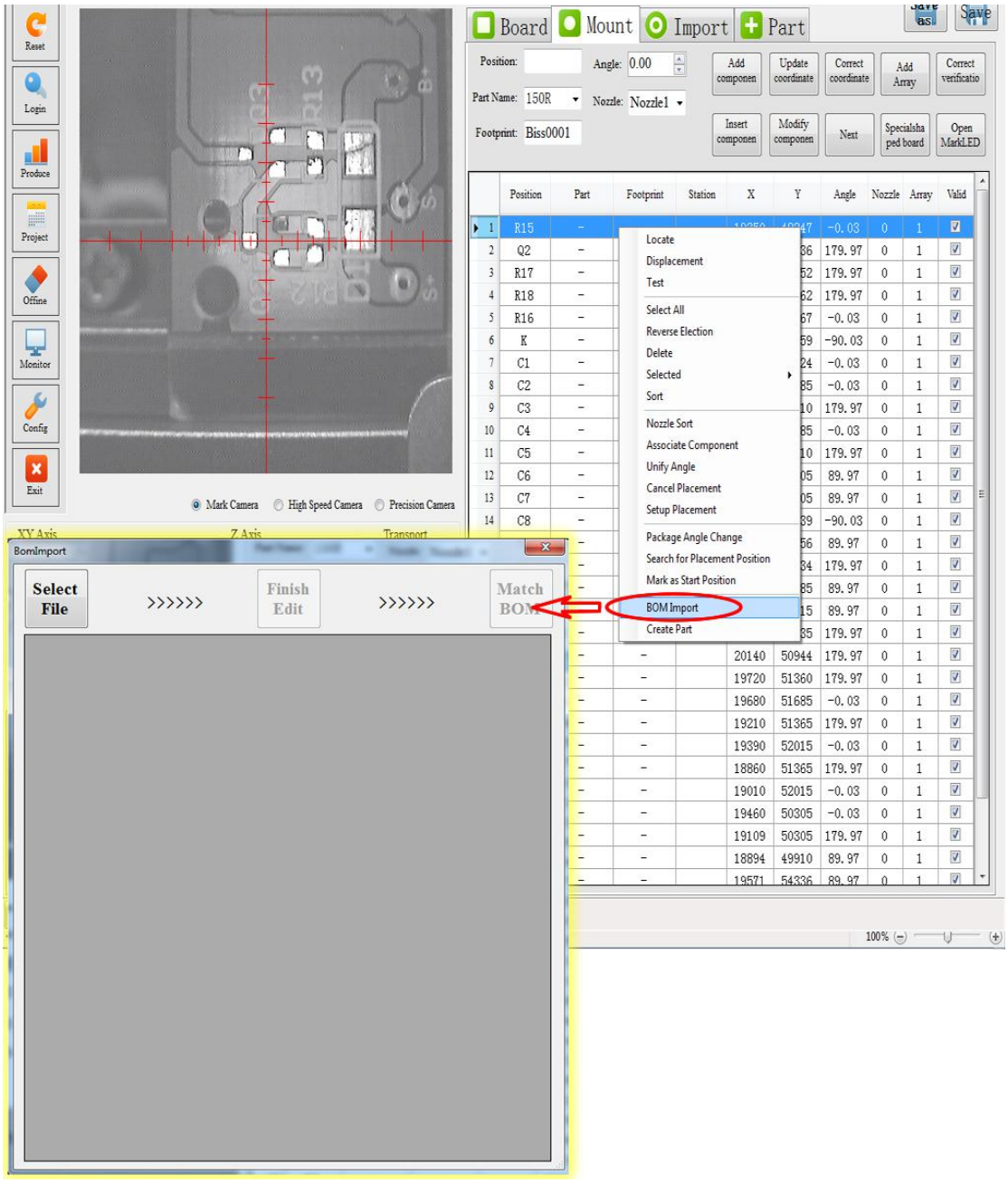


Figure 5-9-9

The steps to import BOM (Bill of Material must be in .CSV format) are as follows:

1. In the pop-up dialog box, click "Select File", after selecting the BOM, click "Open"

2. Edit the column of the table, and appoint the corresponding names according to the types of different columns, "Component name", "Position", "Footprint Type", and hide the other columns (specify with the right mouse button)

3. Click "Finish Edit", after confirming that it is correct, click "Yes"

4. Click "Match BOM", after the prompt is successful, click "OK" to complete the BOM import. As shown Figure 5-9-10

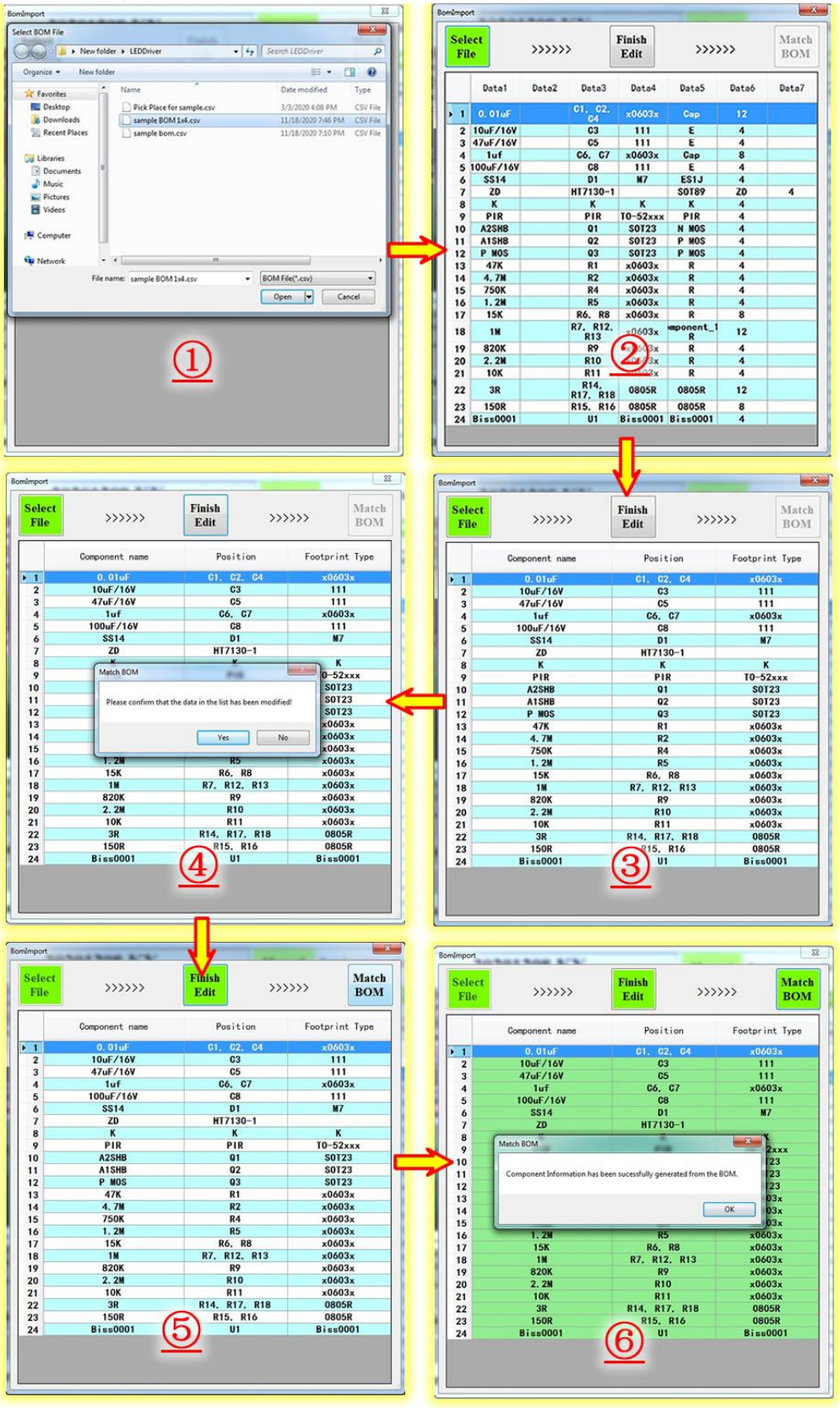


Figure 5-9-10

5.7 Factory Parameter Setting

Note: Non-professionals do not operate.

Factory parameters of this device In the "Configuration" menu, click "Configuration" to enter the factory parameter settings.

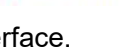
5.7.1 Fling Materials Location Setting

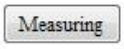
After moving the XY axis to the desired position, click "Record".

5.7.2 High Speed Camera Parameter Setting

① Replace the 8 suction nozzles with a black solid nozzle.
② Move the nozzles above the high-speed camera by moving the XY axis, make sure each nozzle is as close as possible to the vision center crosshair location, then click "record" to save it 

.

③ Choose “High Speed 

”→click “Measuring 

” into high speed camera parameter calculate interface.

④ Click "move to camera 

", adjust the light source brightness to make the white point of the solid nozzle head bright, highlight. And then click "Visual parameters 

".

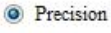
Automatically calculate and click the Exit button.

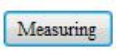
5.7.3 Precision Camera Parameter Setting

① Replace the 8 suction nozzles with a black solid nozzle.
② Move the #1 nozzle to the visual center of precision camera by moving the XY axis, 

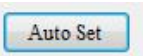
then click "record" to save it. Switch Z axis 

, move to the visual center as well, then "record". In this way save the visual coordinates of the eight nozzles.

③ Choose “Precision 

”→click “Measuring 

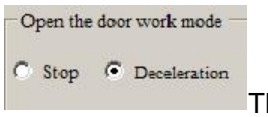
” into precision camera parameter setting interface.

④Click “Automatic Set 

”, at the same time to adjust the light source brightness to make the white point of the solid nozzle head bright, highlight.
⑤ If appearing "Recognition Complete" dialog box, it indicates that the recognition is

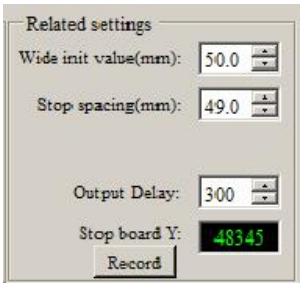
successful and exit after confirming.

5.7.4 Open the Cover Working Mode and Alarm Parameter



There are two working modes after opening the cover, speed deceleration and stop. The alarm parameters are alarming after not taking components for several times.

5.7.5 Corresponding Setting



wide init value: the width of the track after resetting;
Stop spacing: mainly to adjust the stopped boards are centered;
Output delay: adjust the output time according to the size of different board;
Stop board Y: stop PCB board position.

5.7.6 Nozzle Relationship Setting

① Prepare inkpad, 8 small-caliber nozzles (502 best), one PCB board with white paper (size> 200x80mm).

② Click “Nozzle Relationship 

”into nozzle relationship setting interface.

③ Move the XY coordinates so that the nozzle is on the upper edge of PCB board with white paper and the 8 nozzles could within the white paper when decline. Shown as Figure 5-10:

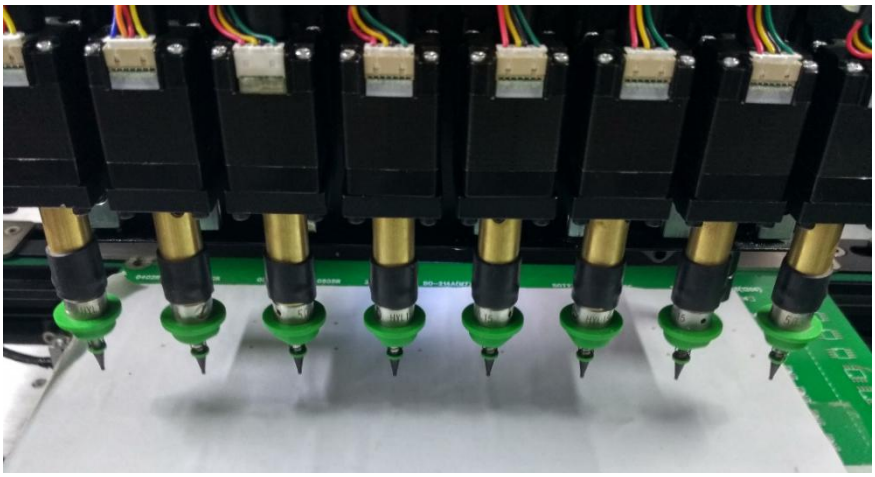


Figure 5-10

④ Select "Z1 Z1 " → click "down Down " , making 1 # nozzle drop to white paper and also with much force,

Then click "record height Record Hight " below the No. 1 nozzle's offset; record the remaining 7 nozzles' height according to the same method separately.

⑤ After setting 8 nozzles' height, click "Start Start ", appearing the prompt box, click "yes (y)" after reading.

⑥ Appearing the prompt box again, after painting the 8 nozzles inkpad, click "Confirming" (Note: Do not click "Confirming" before painting the inkpad), shown as Figure 5-11. 8 nozzles will dot on the white paper successively. Ready to paint the inkpad again, total 4 times, total dot four rows. be careful when operating.

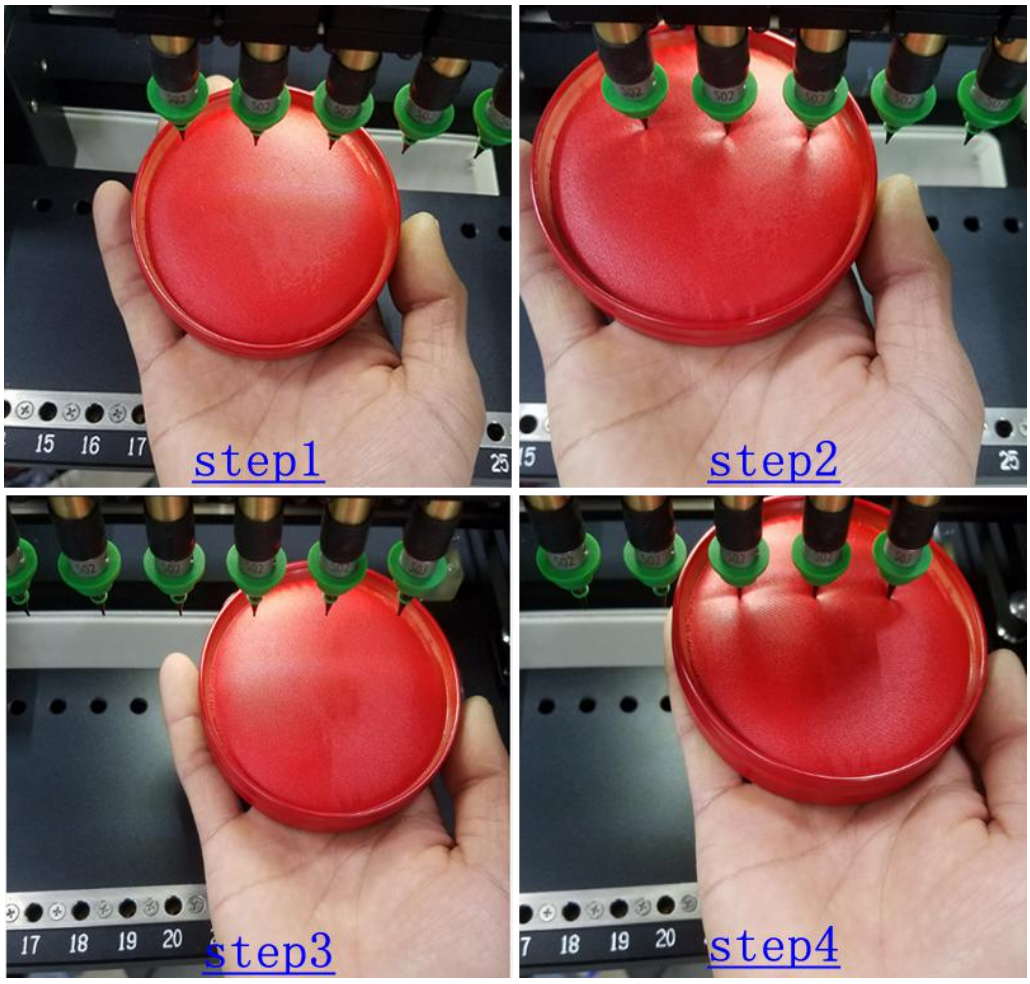


Figure 5-11

⑦ After dotting 4 rows, MARK camera will automatically move close to the first point., Moving the XY axis, red cross line of MARK camera will find the center of the first point, click "Save nozzle No. 1 Save Nozzle No. 1 ", appearing the prompted box, click "Confirming" after verifying the information. Then MARK camera will automatically move close to the

second point location, moving the XY axis, red cross line of MARK camera will find the center of the second point, click "Save nozzle No. 2", appearing the prompted box, click “Confirming” after verifying the information. So do the third point.

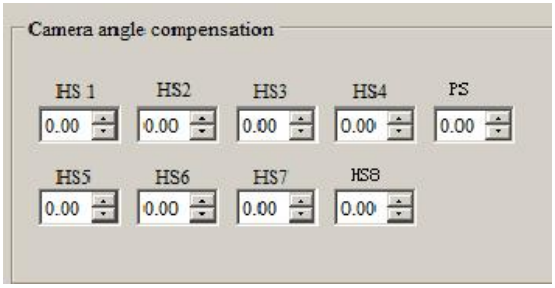
⑧After saving 8 points of the first row, click "ok 

"on the lower right corner, MARK camera will automatically move to the next row, and continue to set the second row, setting method same as above.

⑨ When all points of the four rows saved, click "ok 

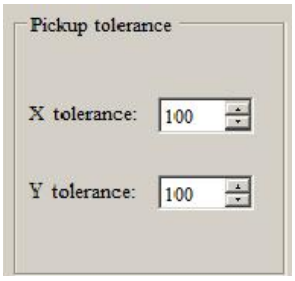
" on the lower right corner, at this point, all of the suction nozzle relationship have been set up, click  to exit.

5.7.7 Camera angle compensation setting



Camera angle compensation is used to correct the angular misalignment due to mechanical installation. This parameter has been adjusted when the device is shipped from the factory.

5.7.8 Synchronous Pickup Tolerance Setting



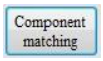
Take tolerance: This parameter is used to calculate whether the components can be picked up at the same time. The parameters are determined according to different packaged components. The greater tolerance, The higher the probability of pickup at the same time. The suction components may not be in the center position, resulting in the components can’t picked up. The smaller the tolerance value, the smaller the probability of pickup at the same time, and the better the stability of the suction components, this parameter needs the user to adjust according to the components used in the actual mounting process.

5.8 Component Library

According to the component name, collect the pick speed, place speed, pick delay, place delay, etc. of the component together, can quickly match and call when editing the program again.

5.8.1 Component matching

In 

interface，click 

, the software will automatically index the names in the component library, and perform parameter matching for components with the same name in the component. As shown Figure 5-8-1

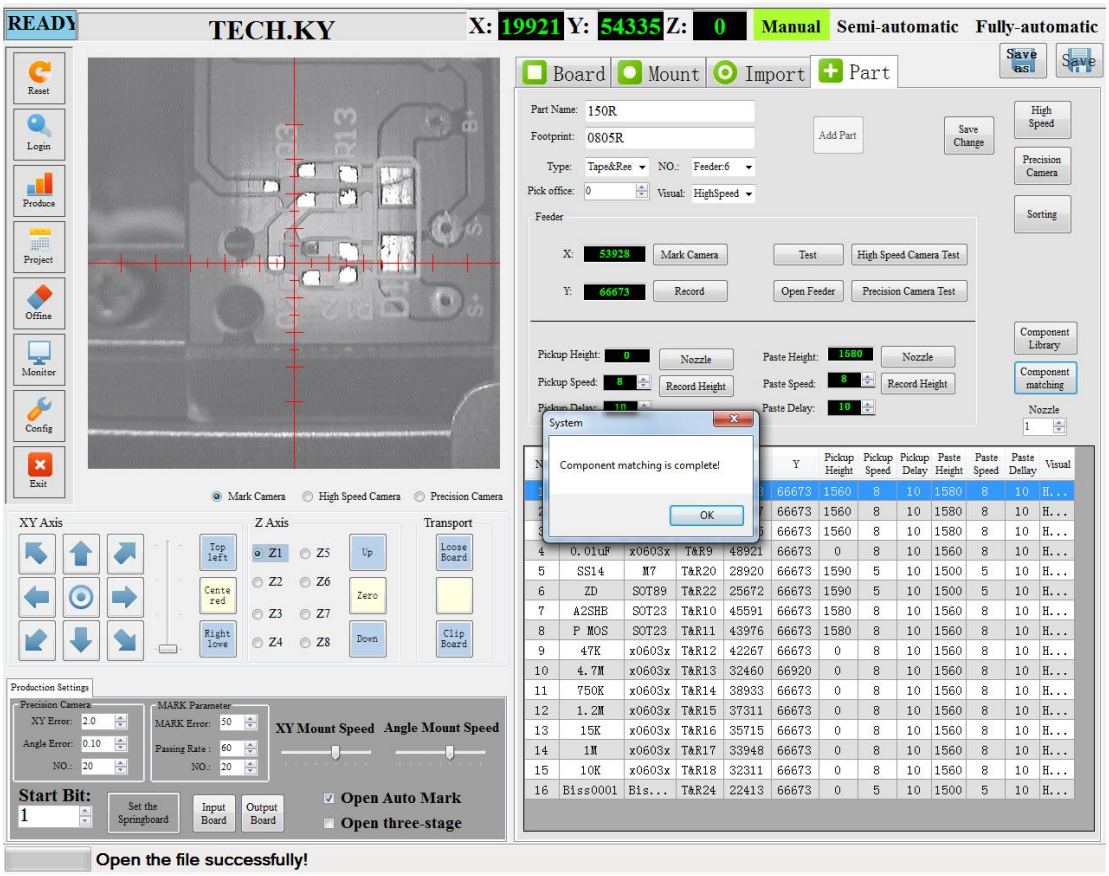


Figure 5-8-1

5.8.2 Update to Component Library

Synchronize the components in 

to the component library.

First select the components to be synchronized (multiple selections are possible), then click the right mouse button and select " Update to Component Library" as shown Figure 5-8-2

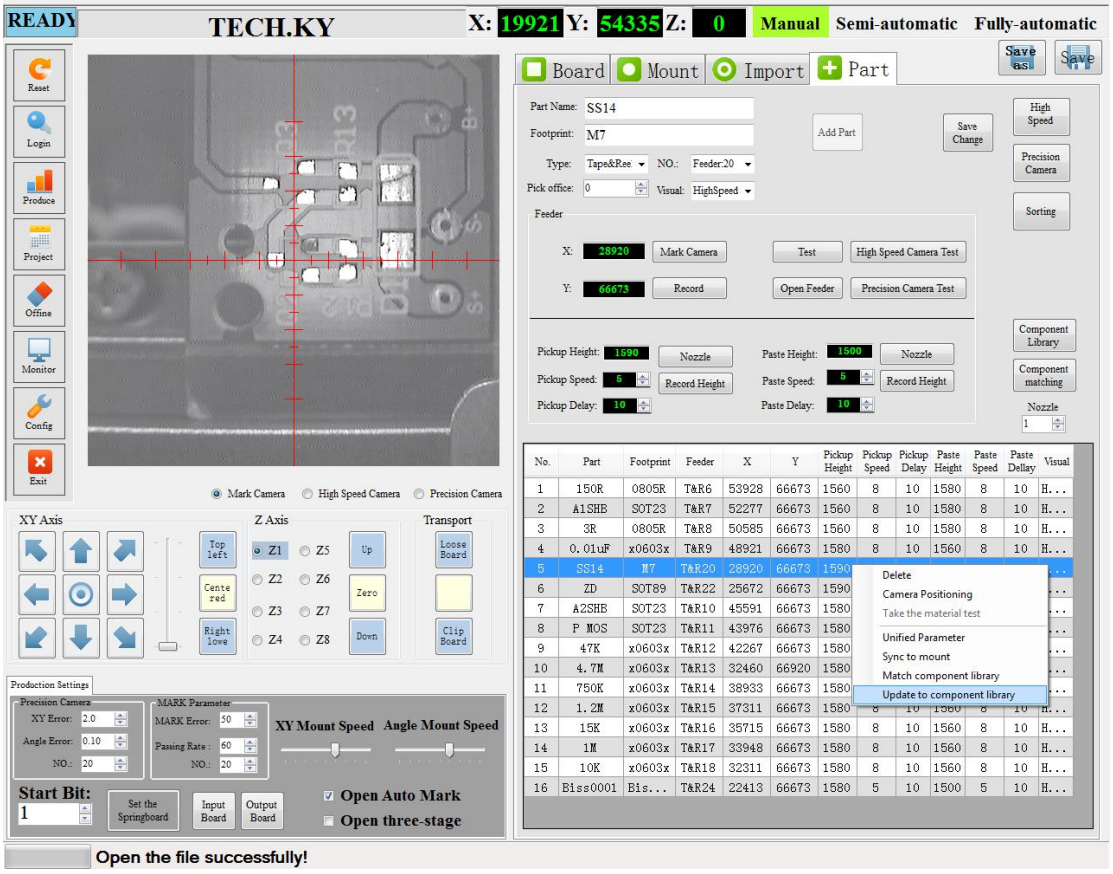


Figure 5-8-2

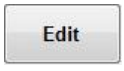
5.8.3 Component Library

In 

interface，click 

pop-up component library interface. as shown Figure 5-8-3

: Create new component



: Modify various parameters of a component. As shown Figure 5-8-4

Move the component to the right operation box to modify it (press 

to move to the right)

: Read component information from other edited projects for using

:Export from component library to 

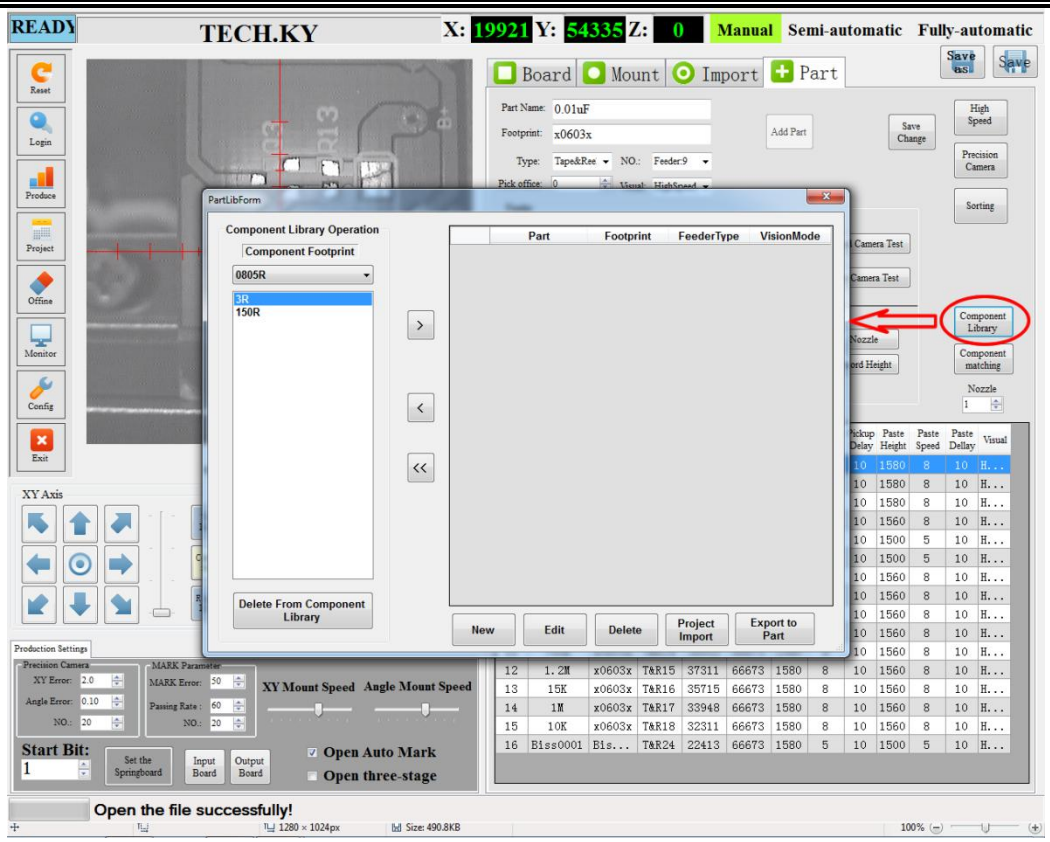


Figure 5-8-3

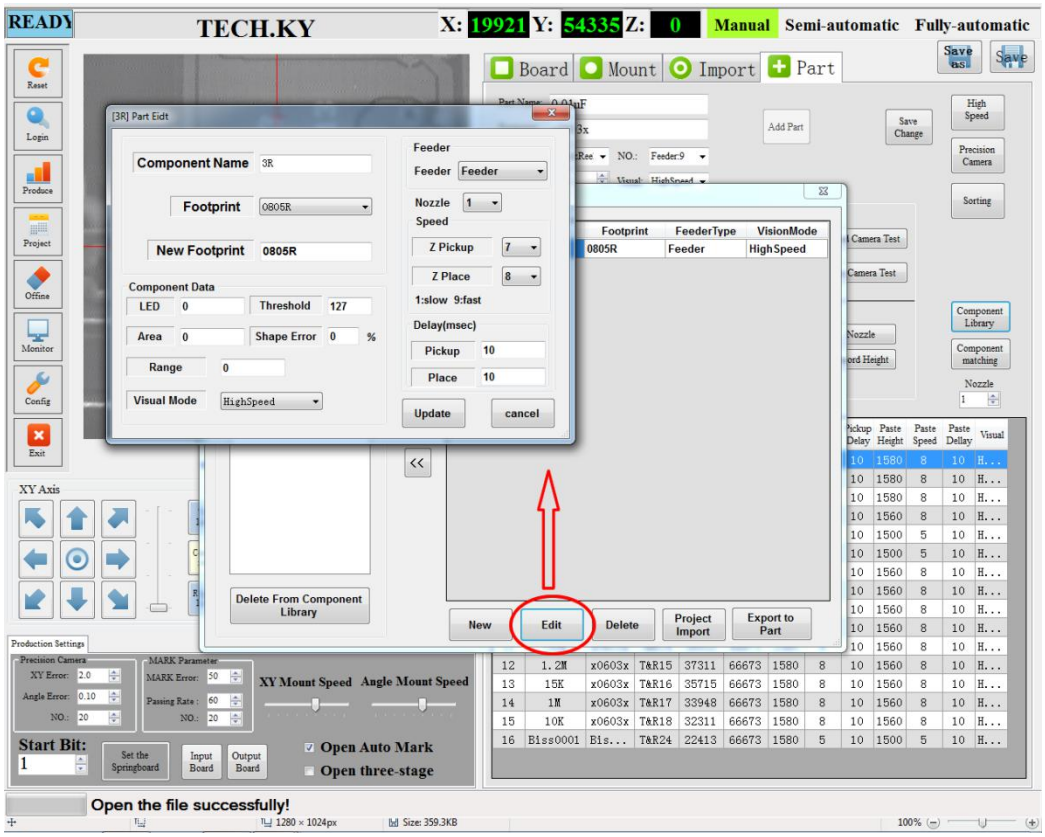


Figure 5-8-4

-LED: Brightness of the LEDs

-Threshold:Visual recognition threshold, the default is 127. Don’t change it casually, it’s prepared for some special components.

-Area: Pixel area of each component. Can be set to 0, during the placement process, the software will automatically calculate according to the software's built-in threshold.

-Shape Error: Area tolerance. Can be set to 0, the software will proceed according to the default setting.

-Range: Diameter of the detection area. Can be set to 0 by default, which is the maximum recognition range.

Chapter 6 Maintenance

6.1 Summary

regular maintenance could make the equipment smoothly run, extend the service life and improve production efficiency.

6.2 Daily Maintenance

6.2.1 Daily Check and Clean

A) Often clean the machine desktop, check whether there is a foreign matter, especially the feeder base, and timely clean up. When cleaning, please make sure not let the foreign matter fall into the pores.
B) Often check high-speed camera cover, precision camera cover. No foreign matter, oil, dust, and when wipe, shall not use corrosive solvent.
C) Often check whether there are debris in the track and synchronous belt, if there is necessary to clear with the air gun, prohibit hard objects scratching the track.
D) Often check whether the screws, tracheal joints are loose.

6.2.2 Electrical Check

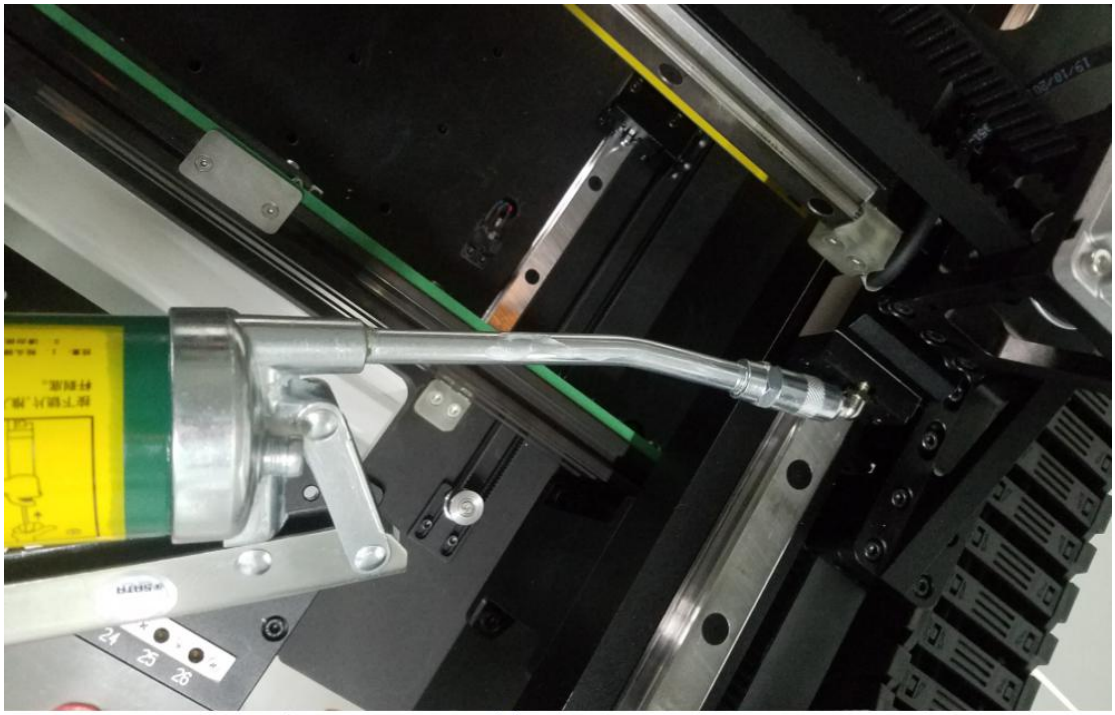
All electrical parts are forbidden to privately disassemble. As the chassis internal has much lines is complex, if foreign matter or dust accesses, completely eradicate using wet cloth to wipe. After power off, can use vacuum cleaner to absorb.

6.3 Rails Maintenance

The rails belong to moving parts, and the movement is frequent, must ensure that monthly replacement of new special lubricants.

Rails Maintenance:

Before all the rails refueled, remove the old grease with a non-dust cloth and insert the oil gun into the grease nipple of rail slide, and then put the lubricant into the slider after fixed, until the oil overflowed from the slider, and then move the slider several times along the rails. Shown as Figure 6-1, 6-2:



The oil gun's nozzle inserts into the slider's nozzle and fully integrate

Figure 6-1

Figure 6-2

Chapter 7 Fault Analysis and Troubleshooting

During production process, due to parameter settings and production material variation and other reasons, the software or related error of SMT machine, need operators to deal with. Common faults and troubleshooting methods are shown in Table 7-1

Fault	Reason Analysis	Solution
Can not recognize Mark point	PCB board revered	Click “Stop”, and adjust the board after exported
	Mark point tolerance is set too small	Increase Mark point tolerance （Range 50-100）
	Mark point oxidation or batch causes on PCB board make the difference of saved Mark point is too large	Re-save Mark point
Feeder cannot normally work	Check whether the air pressure is too low	Make sure the air pressure between 0.55Mp and 0.65Mp
	Check whether feeder blocks material	Clean up the waste material
	Check whether feeder is broken	Replace or repair feeder
Picking materials abnormally	Check whether the air pressure is too low	Make sure the air pressure between 0.55Mp and 0.65Mp
	Check whether the nozzle is clogged or damaged	Clean up or replace nozzle
	Check whether vacuum generator is abnormal	Replace the intake / bleed pipe or vacuum generator
	Parameter setting is wrong	Re-set the coordinate and height of picking material（③-⑫ of 5.5.4）
There is a deviation in the placement position	Whether there is deviation in the placement position of specific points	Import board again, After “Correct placement coordinate”, find this point and modify it.
	Whether there is deviation in the whole placement position	Modify the Mark points again
	The first make-up is normal, there is deviation in the placement position of rest make-up and deviation is regular	Reset the array point （⑧ of 5.5.5）
Can not put the board after adjusting the rail	Whether there is debris on the rail	After cleaning up the debris, click “rail reset” to adjust the rail again

Table 7-1

Thanks for Using Our SMT Machine

Beijing KAYO Automation Technology Co., Ltd.

After-sale Service E-mail：sales@kayosmt.com