QM61 PICK AND PLACE MACHINE

/EASY /RELIABLE /SAFTY /PEACE OF MIND

Yueqing QiHe Electrical Technology Co.,Ltd

_____ www.qhsmt.com _____

1. Preface

Thank you for your purchase and use of a full-automatic vision chip mounter (hereinafter referred to as equipment) produced by Yueqing Qihe Electronics Technology Co., Ltd.. The operating principle of the equipment is acquired from a component supply device (for example material rack), and the equipment is mounted on a circuit board after the coordinate position is calibrated through a vision system.

1.1. Safe Use

The equipment includes a feeding zone, a working zone and a control zone. If related equipment operates incorrectly, personnel and equipment are possibly damaged. Basic skills of operators shall include editing of software and maintenance of basic system hardware and additional devices such as material racks.

 Before use of equipment

·Before use of equipment, an user must read the manual and can operate it after fully understanding contents of the manual.

·After reading the manual, please properly keep it with you to see about doubtful points at any time.

·Irrelevant personnel are prohibited to operate the equipment.

·In order to ensure safe operation and maintenance of the equipment, the operators must understand potential risk occurrence zones of the equipment.

·If the operators reform the equipment without prior agreement of the company or repair it without following methods of the application manual, equipment safety is possible to be damaged seriously.

·The equipment can be absolutely not reformed and repaired by the methods without being admitted by the company.

1.2. Related Guarantee

When the equipment comes about the abnormal phenomena, contents of guarantee are as follows:

Contents of guarantee When the equipment comes about faults due to component materials for constituting the equipment or production, it shall be maintained and repaired for free.

Guarantee period From the delivery date, the whole equipment shall be guaranteed for one year, the suction nozzle shall be guaranteed for one month and the belt shall be guaranteed for

three months.

Items except for guarantee The following conditions aren't guaranteed:

When the storage equipment is damaged, loss of data stored in the equipment cannot be guaranteed; thus the data shall be backed up usually.

Error system actions caused by operating programs irrelevant to equipment application or data loss caused by virus infection.

Aging with time change, or abnormal phenomenon caused by natural wear during equipment use (for example depreciation of oil paint, electroplated layers and consumables).

Change of weak sensibility without affecting equipment quality and performances (for example controller actions and sounds, motor rotation sounds and air pump sounds).

Abnormal phenomenon caused by application environment conditions (for example water, powder and impurities, and dust and oil stains on machinery equipment).

Natural disasters for example earthquake, typhoon, flood, fire and lightning, or accidents.

Imperfect or error maintenance service of equipment.

2. Equipment Introduction

In the fourth generation of QM41, the company's research team is determined to be faster and more accurate, and the product is QM61.

The design highlights of this model are:

1. Six head eight visual design. Six upper vision with each suction nozzle, a high-definition vision detection higher precision chip, a lower visual detection circuit board placement.
2. The structure of slide block and screw rod is adopted, the performance is more stable, and the operation is smoother.
3. Using servo motor, the machine never loses step.
4. The speed increased by 1.2 times on the original basis.
5. dded assembly line segment function, the machine can be in the process of placing, circuit board in advance, mounting efficiency is higher.

3. Equipment Description

3.1. Hardware Properties

The boundary dimension of this equipment is 1350*1365*1330mm. It mainly consists of a work head, top and bottom visual systems, a work table, feeders, etc. Power supply AC220V or AC110V, Power should be 400W.

3.2. Software Features

The software is independently developed by our company, with independent intellectual property rights, have Chinese and English interface, and easy operation.

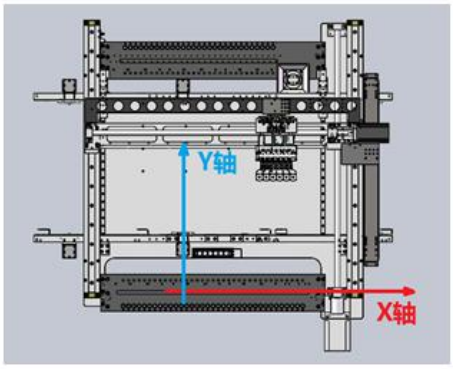
3.3. Specification and Installation of Suction Nozzles

This equipment adopts double-end design, and suction heads are equipped with different types of suction nozzles. There are No. 502, No. 503, No.504 No. 505, and No. 506 suction nozzles available. Under normal condition, No. 502 suction nozzle is the smallest, while the No. 506suction nozzle is the biggest (see video tutorial for installation of suction nozzles for detailed information). Components corresponding to every suction nozzle are shown below.

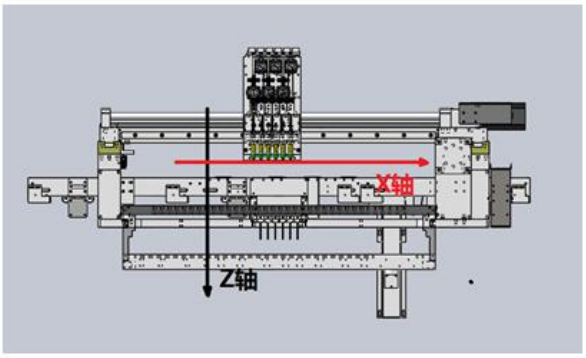
Suction Nozzle Model No.	Legend	Suitable Encapsulation
Suction Nozzle No. 502		Recommended Encapsulation: 0402
Suction Nozzle No. 503		Recommended Encapsulation: 0603
Suction Nozzle No. 504		Recommended Encapsulation: 0805, 1206, 1210, 2512, 3528
Suction Nozzle No.505		Recommended Encapsulation: 3528, 5050, SOP-8
Suction Nozzle No. 506		Recommended Encapsulation: TQFP48、SSOP20, TQFP64、SSOP28,etc.

3.4. Description of Coordinate System

Picture 1-1 and Picture 1-2 show the coordinate system of this equipment. The moving range of X and Y axis is 570*720mm, while the moving range of Z axis is 32mm.



Picture 1-1



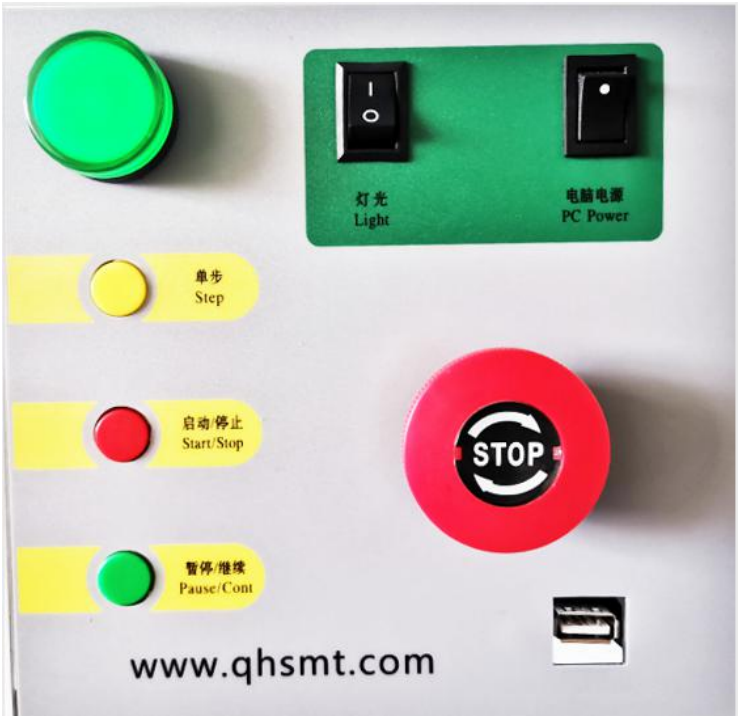
Picture 1-2

3.5. PCB Standards

This equipment applies to PCB size is 400mm*600mm at most, available for jointed board operation.

3.6. Control Panel

3.6.1. Control Panel Introduction



3.6.2. Control Panel Operation

1.Lighting machinery-- lighting

2.computer power-- open the computer

3.Single step button, subdividing the pick and place steps, easy to adjust.

4.Start/stop button, starting or stopping running.

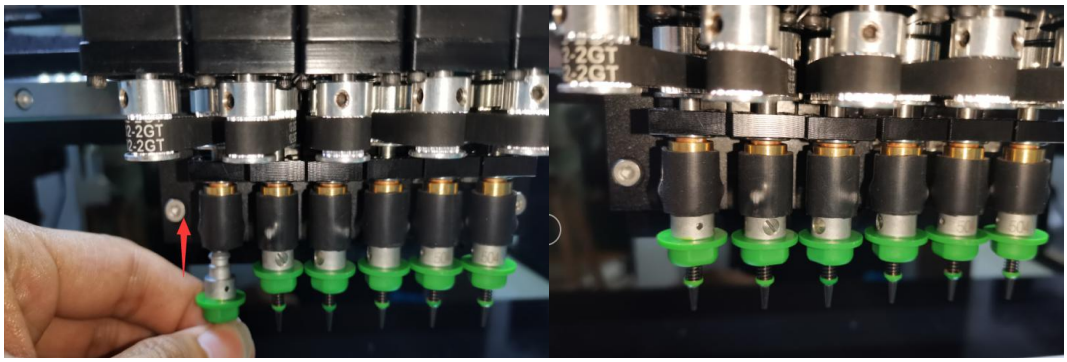
When load a new file, press the button once, the program will start running automatically. In the process of running, press this button, pop-up a dialog box (whether to stop YES/NO). If you are sure to stop, press this button again. If you choose "NO", press "Pause/ Continue" button on the panel. You can operate the program on the computer as well. (If you want to stop the program, press the button twice). **When restarting a mounting program,** press the button once and there will appear a dialog. You can choose according to the actual situation. If you want to continue the last action, press this button again. If you want to remount all, press "Pause/ Continue" button on the right. You can operate the program on the computer as well.

5.Pause/ Continue button. During the process of mounting, this button is used to pause and continue the mounting program.

6.Scram Stop button. In an emergency moment, press the button to cut the power supply. If continue working, twist this button.

4. Preparation Before Equipment Use

4.1. Install the nozzle



Prepare a suction nozzle, then push up and complete the installation.
When you need to replace the suction nozzle, hold the motor with your hand and then pull down to complete the dis-assembly.

4.2. Export coordinate file(CSV file)

At present, we support coordinate files derived by protel, Altium Designer (DXP), pads, Candes, and proteus and adopt the format of .CSV; because protel and Altium Designer (DXP) are generally used, we only explain their deriving ways.

4.2.1. origin orientation

Because the coordinates of the circuit board required for mounting the chips must be consistent to the ones of the equipment, the circuit board is required for origin orientation. Protel 99 SE and Altium Designer (DXP) have the same orientation way, thus we explain the origin orientation of DXP, as the reference of Protel 99 SE. As shown in Figure 3.2.1, selecting Origin in the following menu of Edit and clicking set; selecting the left bottom of the circuit board as the origin (as shown in Figure 3.2.2) and then deriving the coordinates.

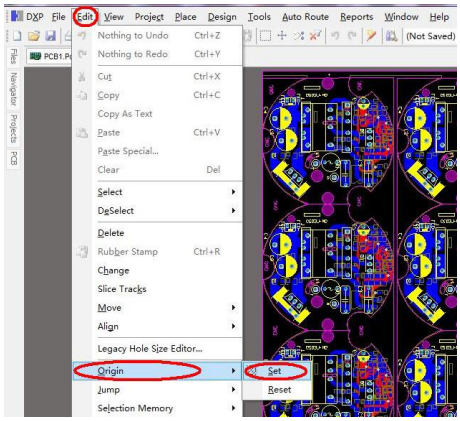


Figure 3.2.1

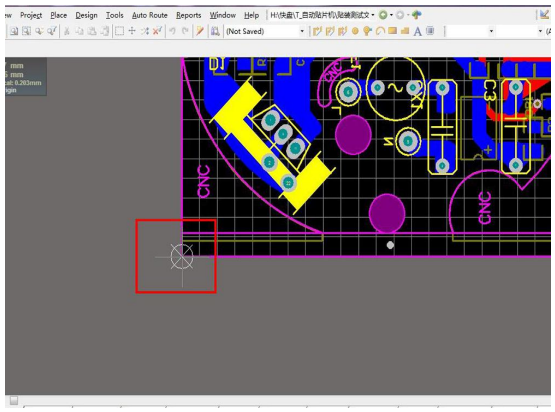


Figure 3.2.2

4.2.2. Derivation of Altium Designer (DXP) Coordinates

Step 1: origin orientation.

Step 2: as shown in Figure 3.2.3, firstly left clicking File, selecting Assembly Outputs and Generates pick and place files, popping up Picture 2.12, selecting the format of .CSV and the unit of metric system, and finally deriving the coordinates by left clicking OK. The file has the name suffix of .csv and is placed in the same directory together with the PCB file.

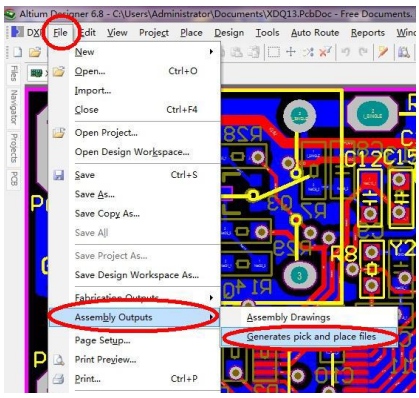


Figure3.2.3

Figure 3.2.4

4.2.3. Coordinate Files Derived from Protel99

Step 1: opening Protel99 software with double click, loading the files of the circuit board required for mounting the chips, and executing origin orientation.

Step 2: as shown in Figure 3.2.5, firstly selecting CAM Manager with left click, deriving the coordinates according to steps of Figure 3.2.8, and finding the file according to Figure 3.2.6 and Figure3.2.7; the file has the name suffix of .csv.

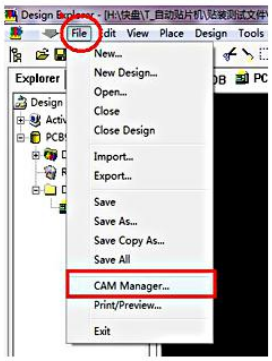


Figure 3.2.5

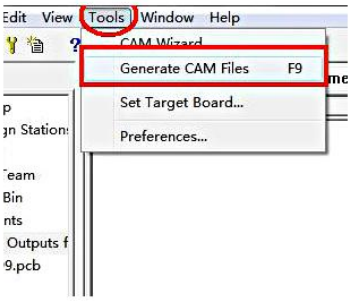


Figure 3.2.6

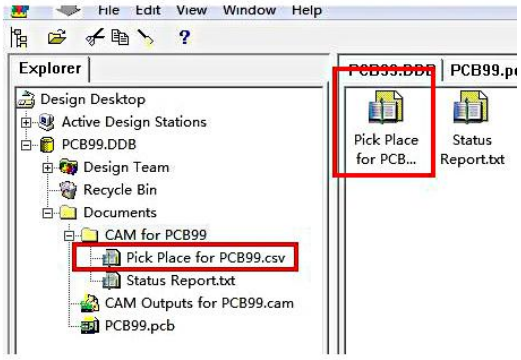


Figure 3.2.7

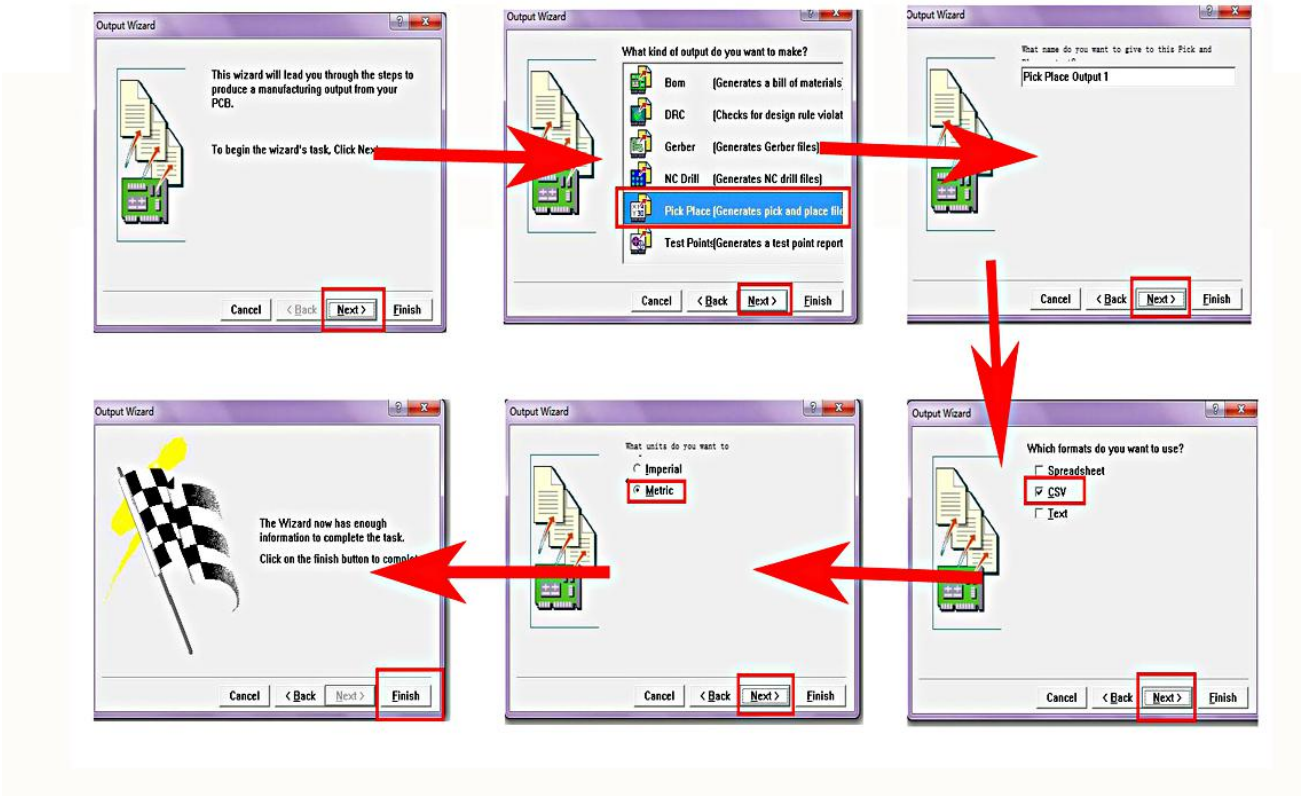
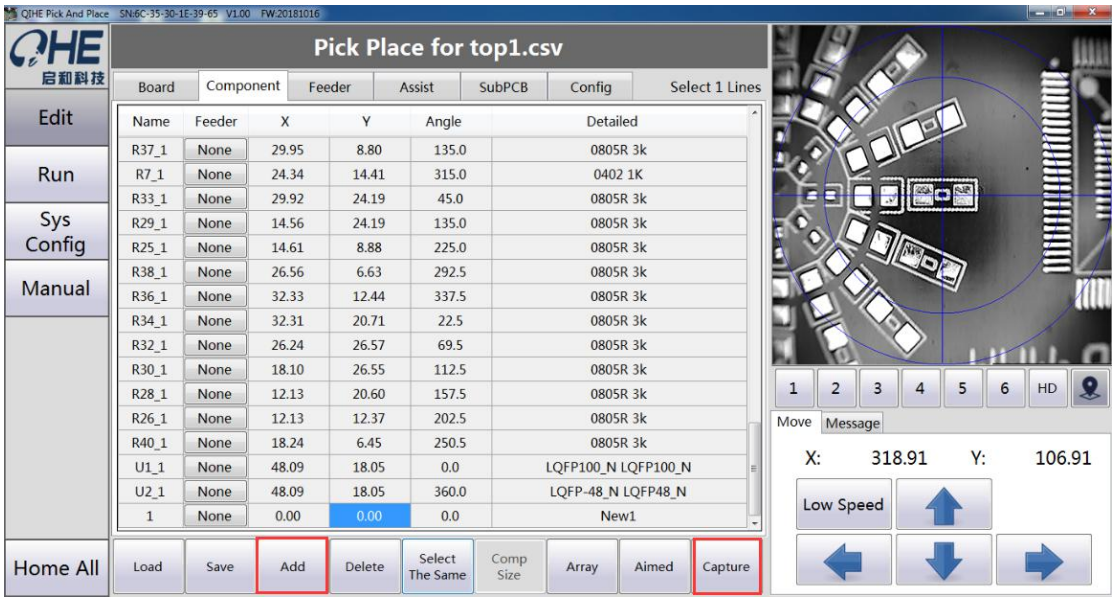


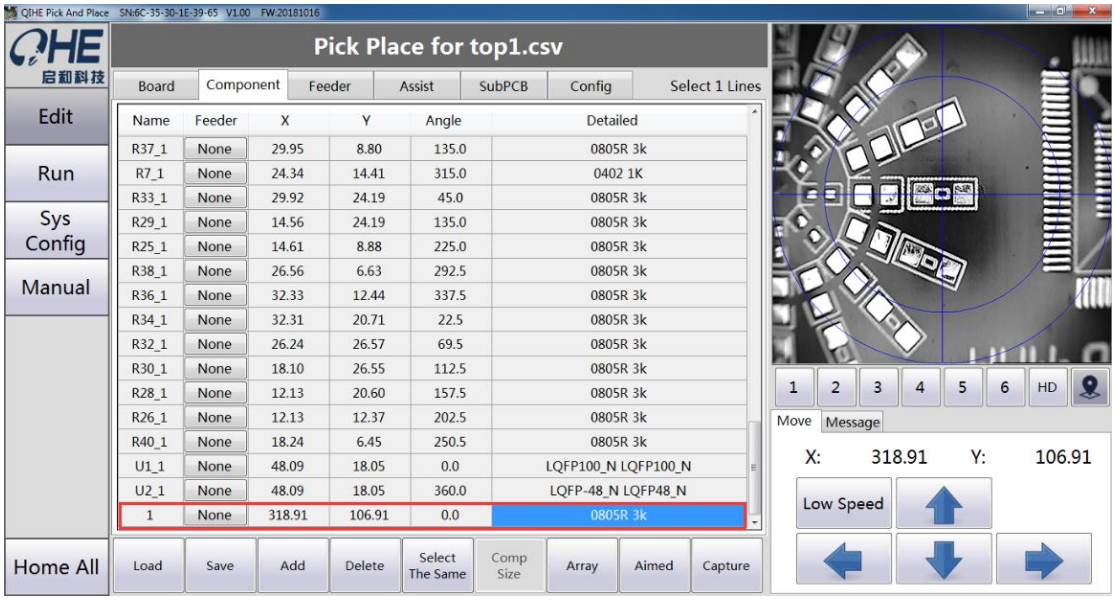
Figure 3.2.8

4.2.4. if there is no coordinate file.

1. Manually add a coordinate, then move the visual camera to the corresponding position and grab the coordinates.



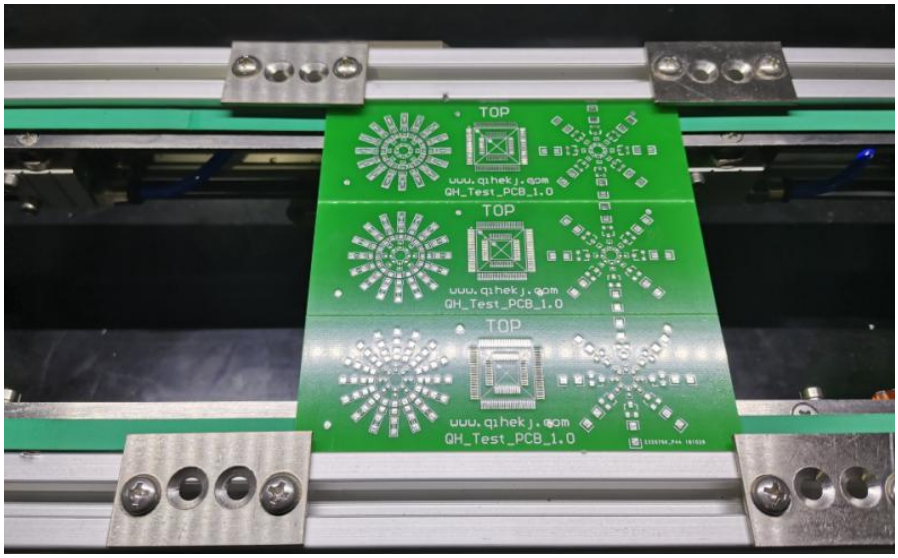
2.Then edit the angle and description

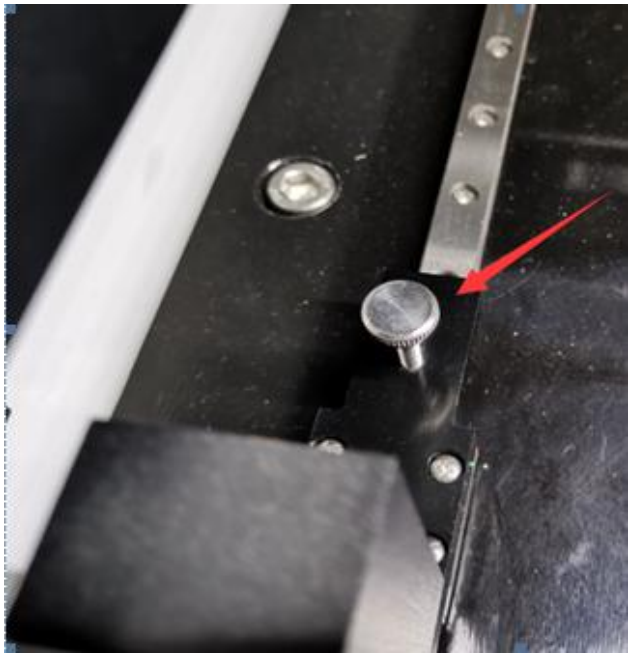


Note: the exported coordinate file should not be modified with EXCEL, otherwise the software will not be recognized.

4.3. PCB installation operation.

Place the PCB on top of the platform and then clamp it.

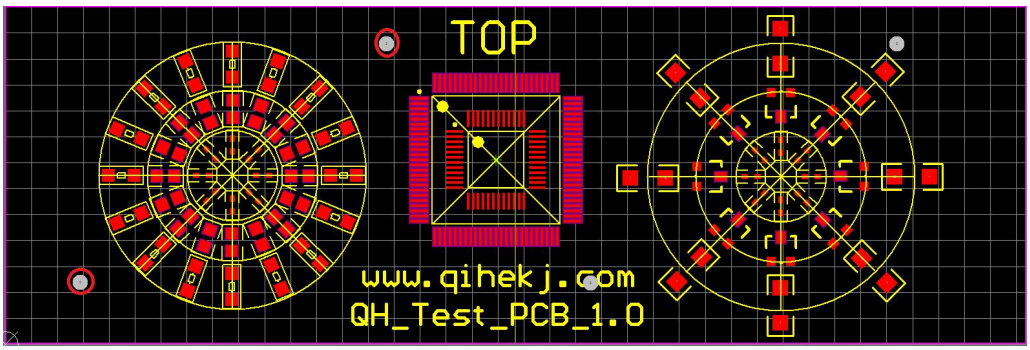


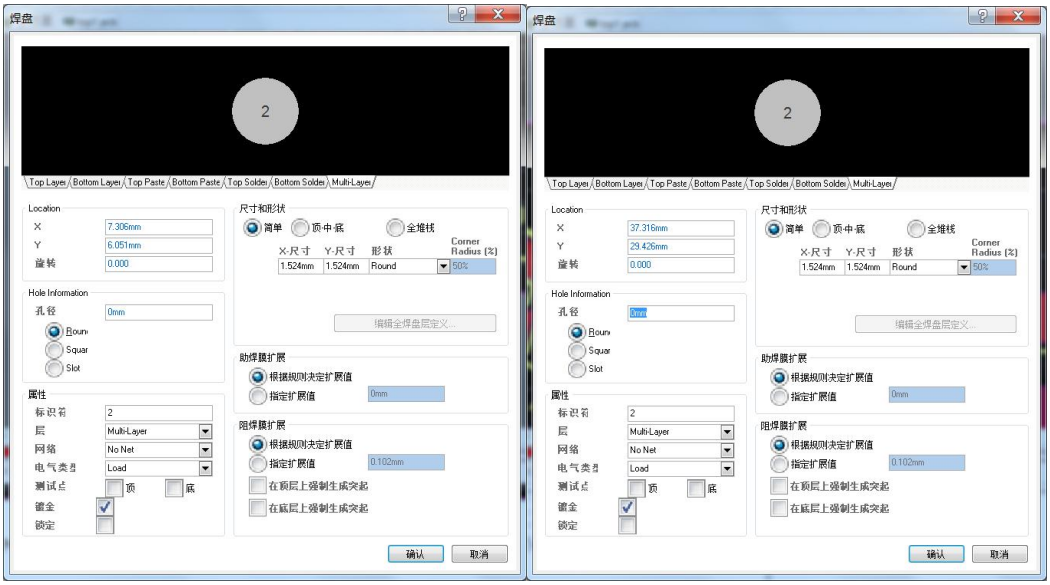


4.4. Mark point set

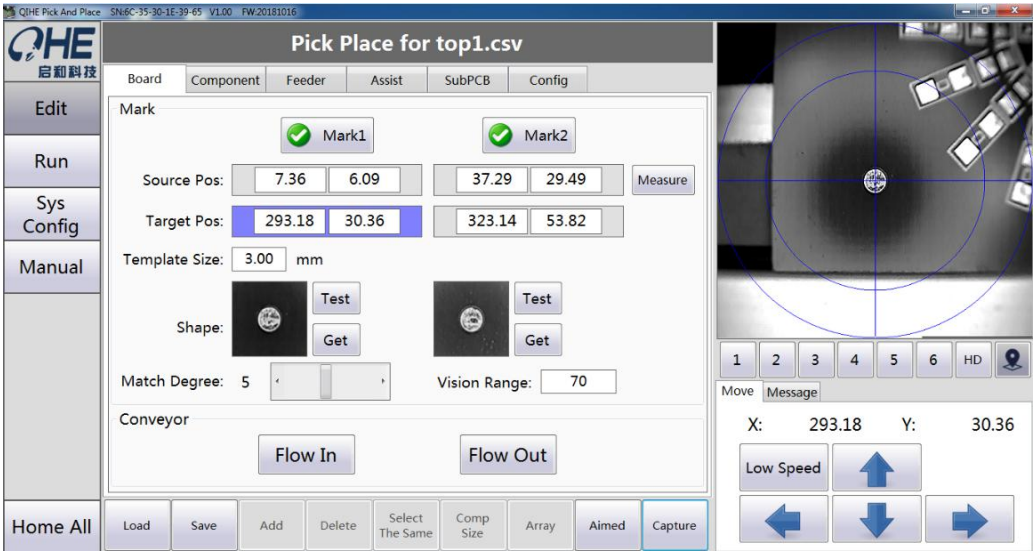
4.4.1. The PCB drawings have mark points:

1. Select the corner point of the circuit board as mark point (if there is no standard mark point, we can use the soldering pan instead)Double click mark position and record the coordinates. （mark1：7.306，6.051　　mark2：37.316，　29.426）



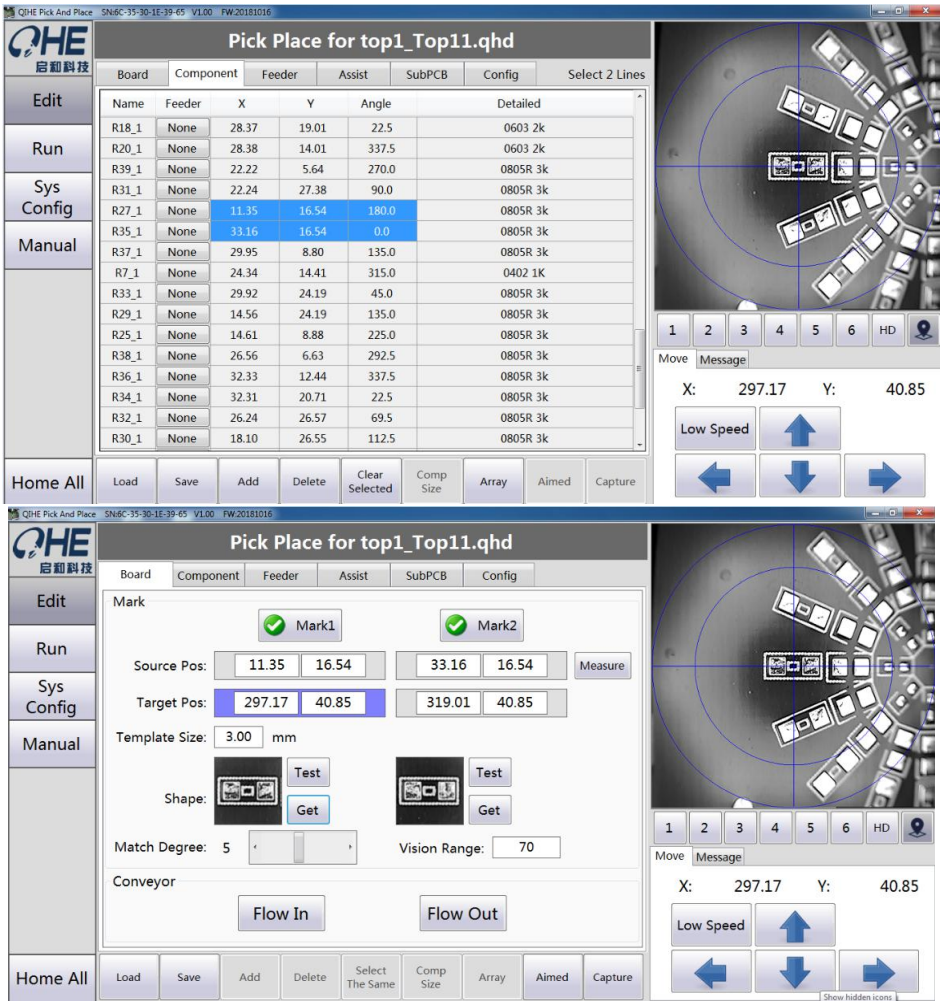


2. Input the PCB coordinates in the drawing coordinates, and then use the visual camera to find the corresponding mark coordinates and grab.

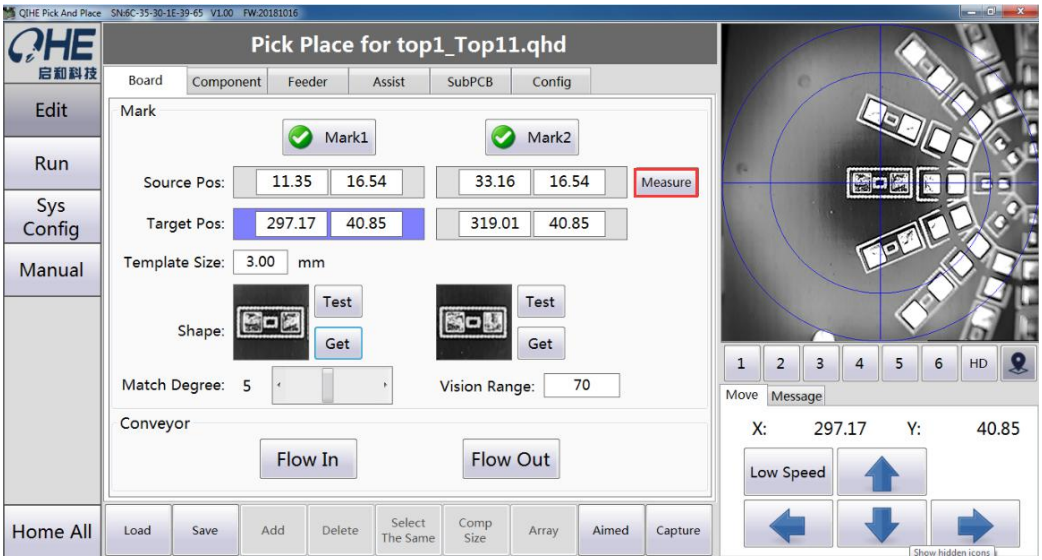


4.4.2. The PCB drawings not have mark points:

We can take the coordinates of two welding plate as mark points for positioning.



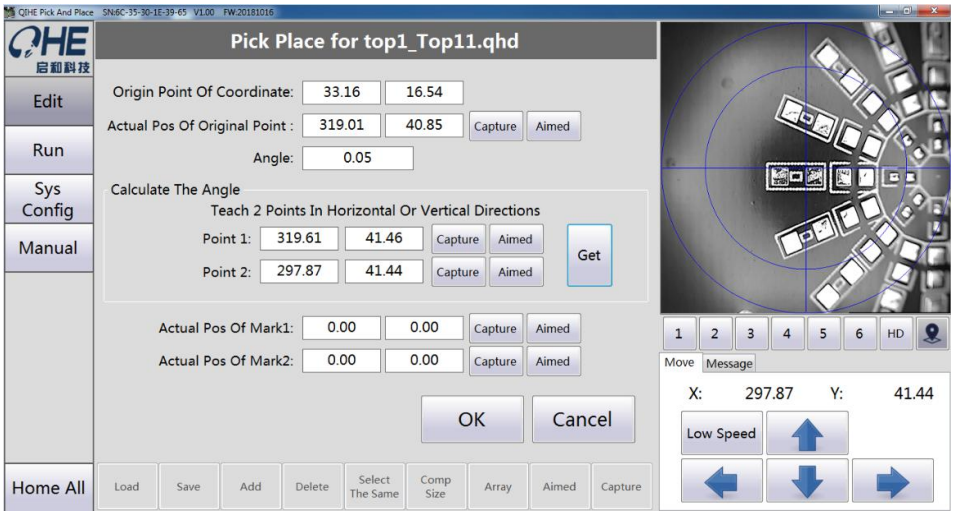
4.4.3. The PCB drawing has no mark point, but the PCB production has added the process edge to you and wants to use the mark point of the craft.



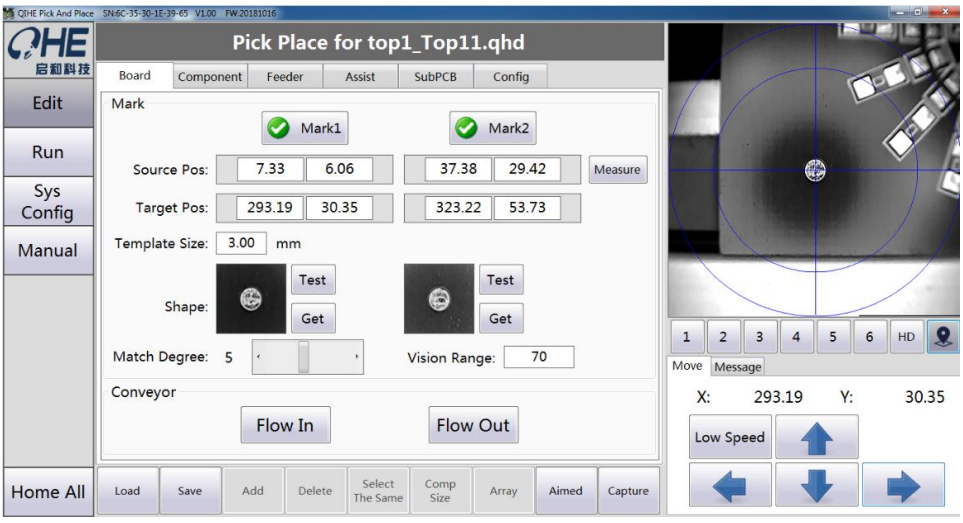
click measure to editor

1. Select a coordinate on the drawing, then move the camera to the top and grab it.

2. Angle measurement, select two horizontal or vertical points, grab, calculate is ok.

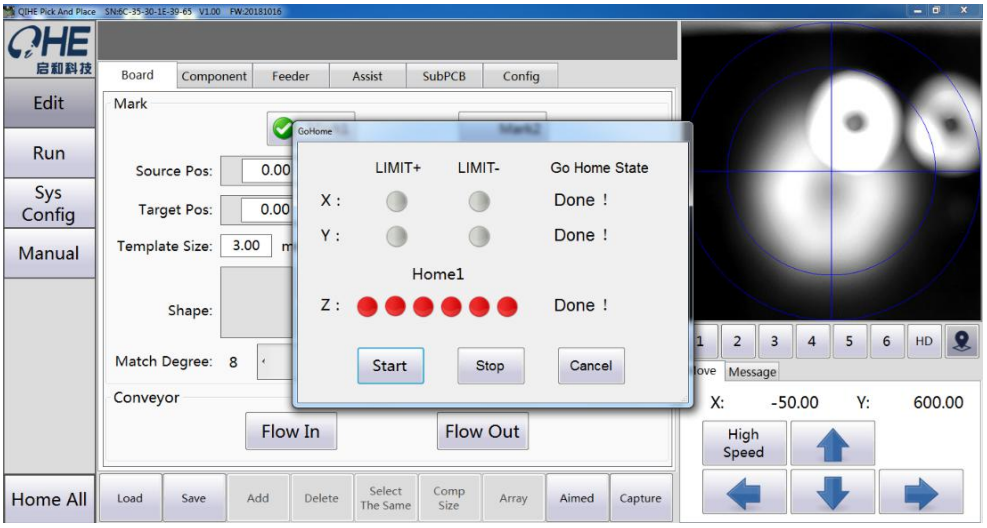


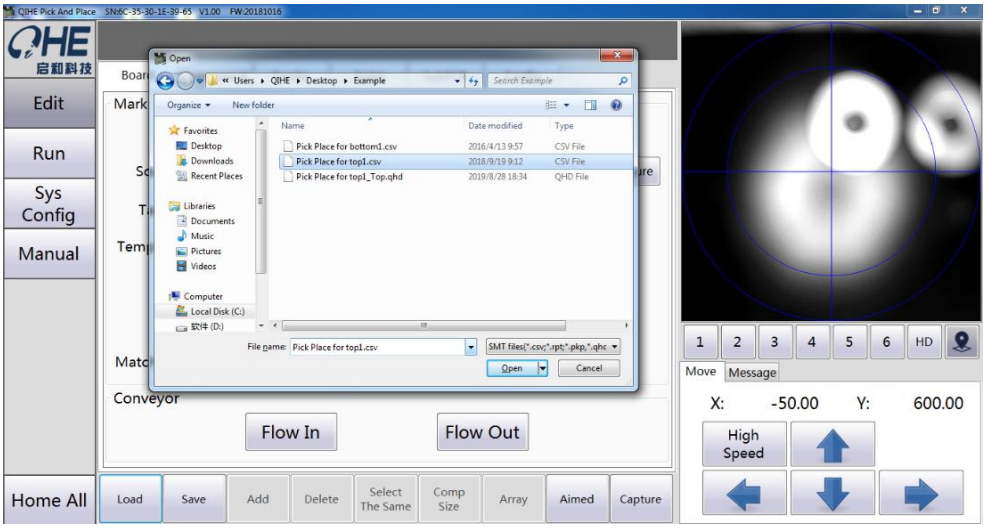
3. Select the two diagonal mark points above the process point, grab and determine, and the exact calculation can be done.



4.5. operation steps

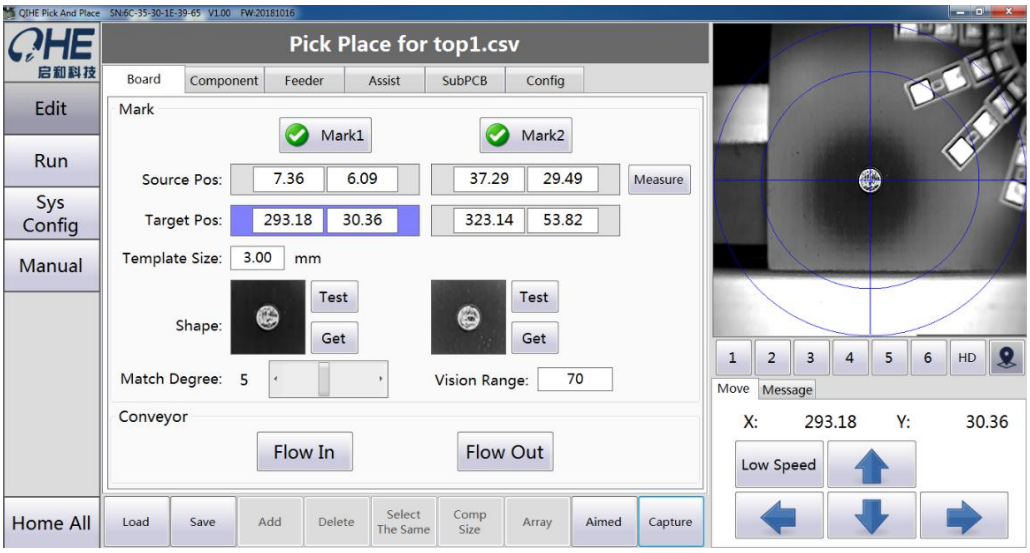
1. Install suction nozzle according to the size of components.
2. Open the software, locate the origin and load the file coordinates.

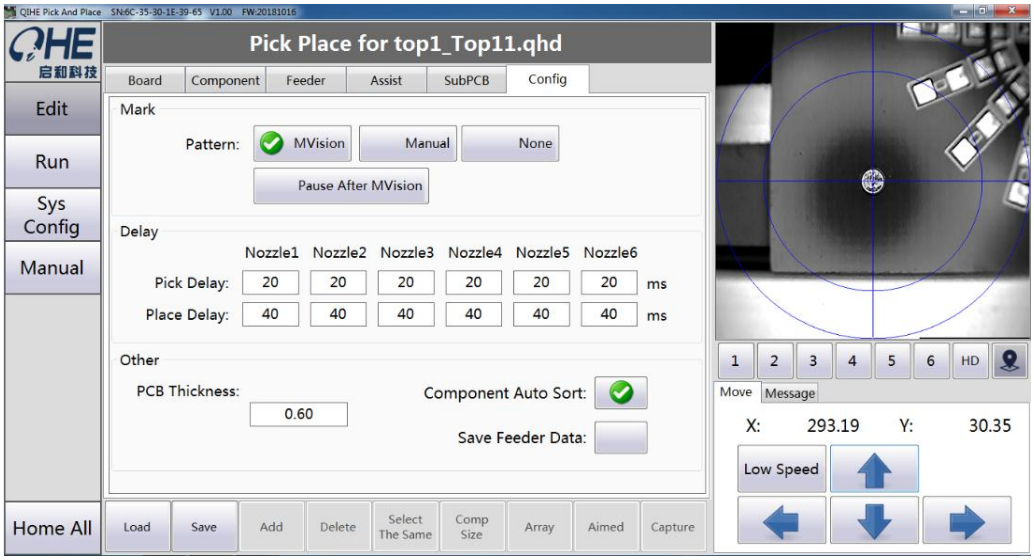




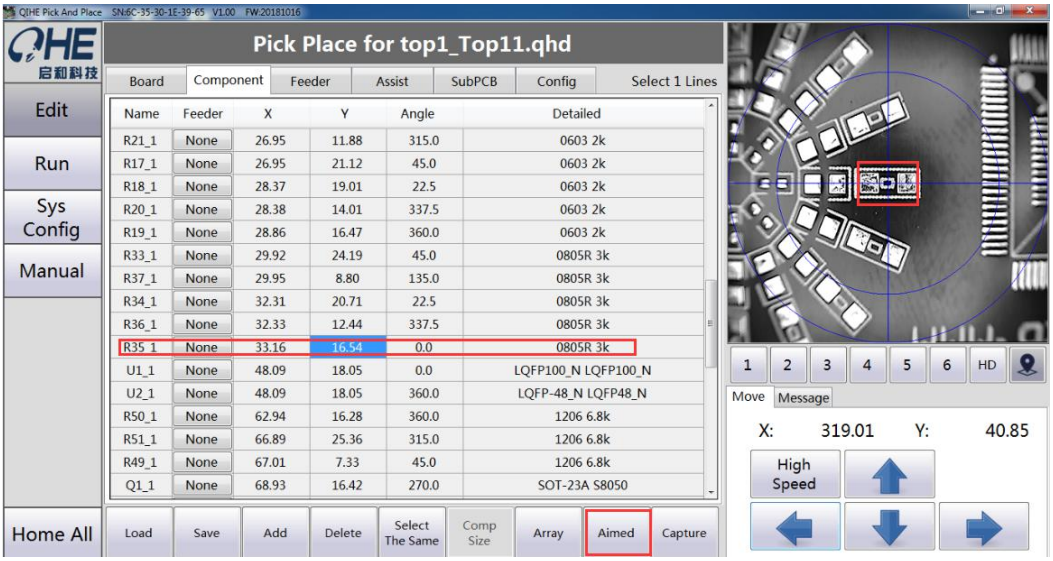
3. Set mark point coordinates and delay parameters (typically 20-100 ms)

Reference point identification parameters can be selected according to their own situation.

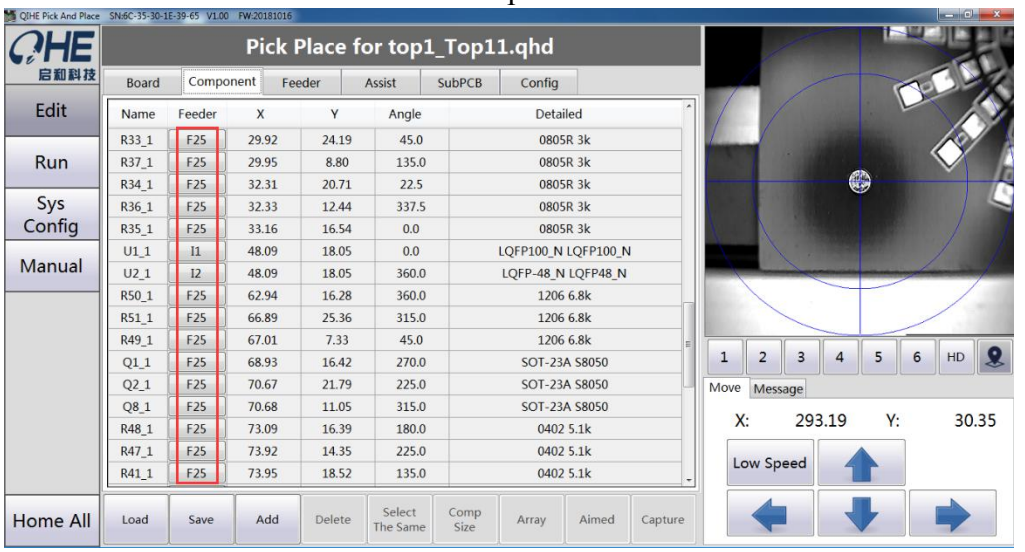


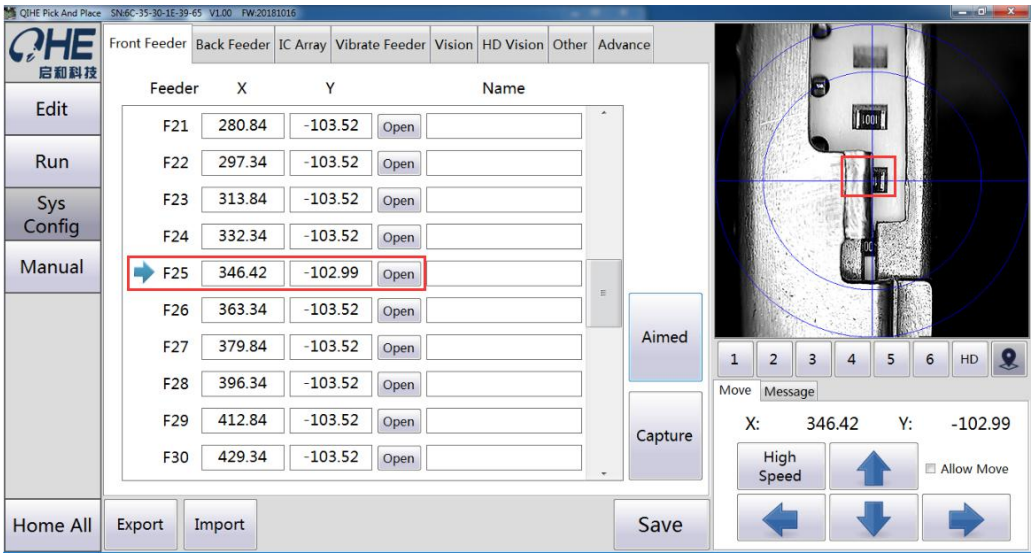


4. Select the position of the device and position the camera. If the position is not correct, we need to check it.The PCB file or the mark point is set incorrectly.

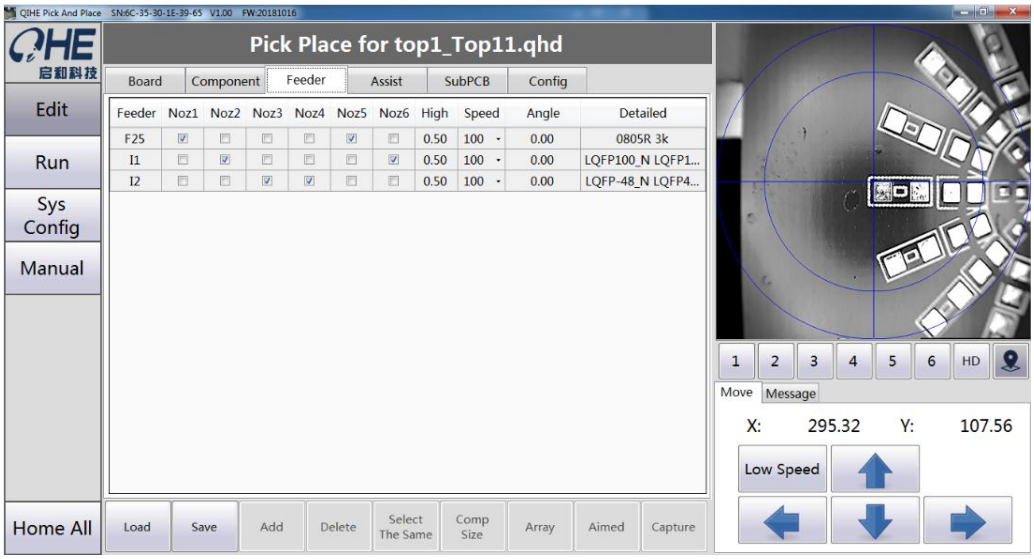


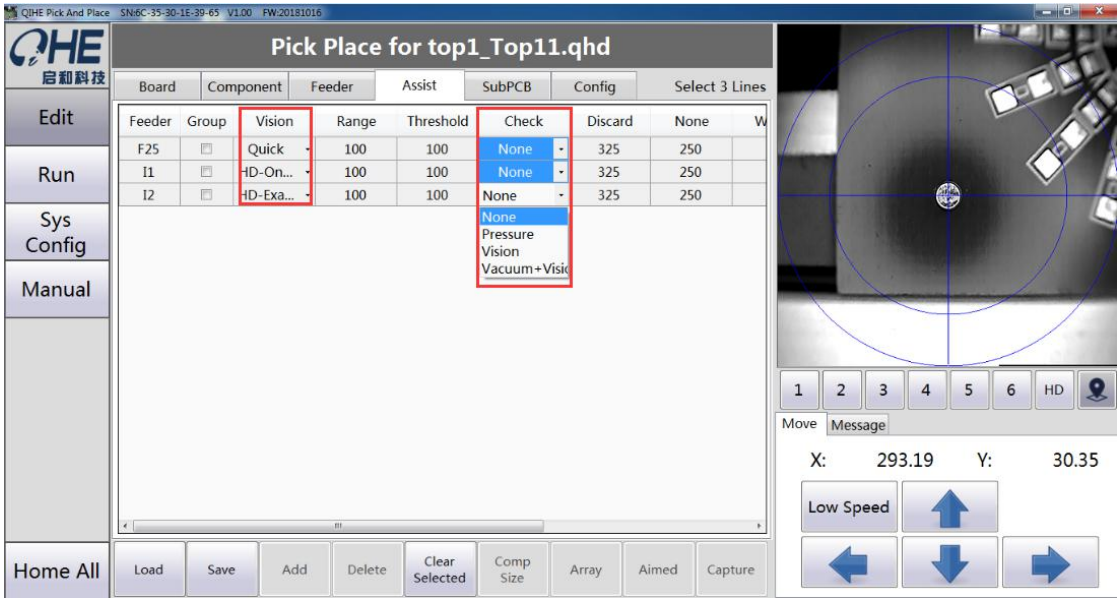
5. Select the feeder number (after selection, need to calibrate the feeder position)
The lower visual center is in the center of the component.



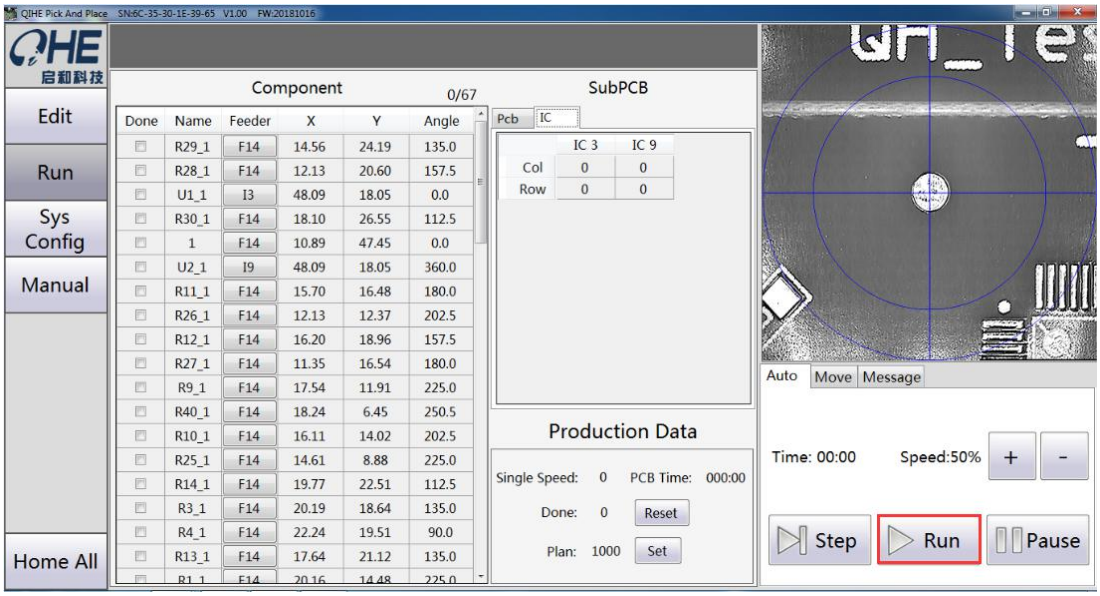


6. Select different types of suction nozzle to install different components. Some devices need to set high, speed and vision and pressure.

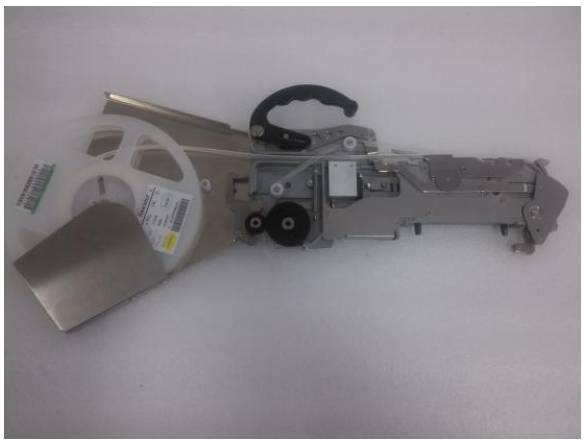


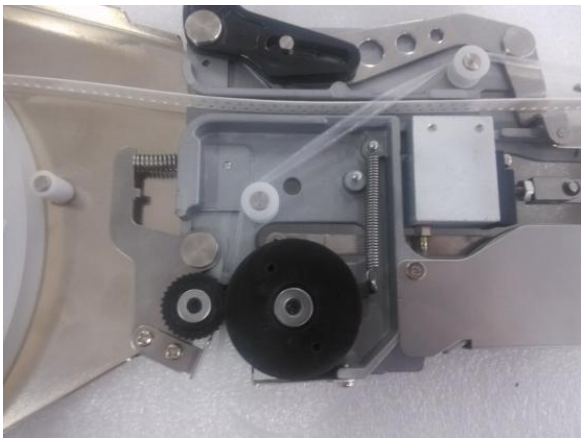


7，choose run



4.6. Feeder mechanism



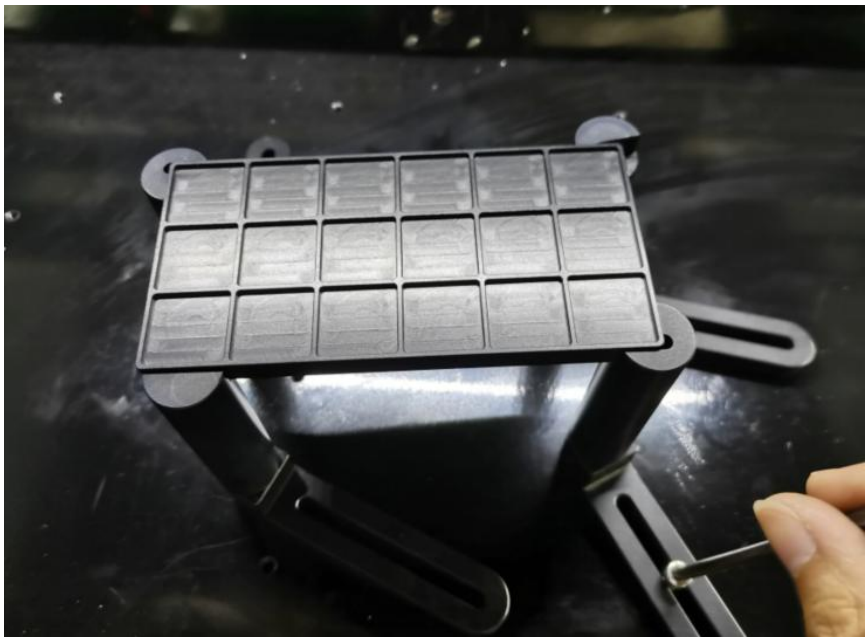


If the spacing of components is different from that of feeder, you can adjust the spacing of the feeder according to the above instructions.

4.7. The IC array

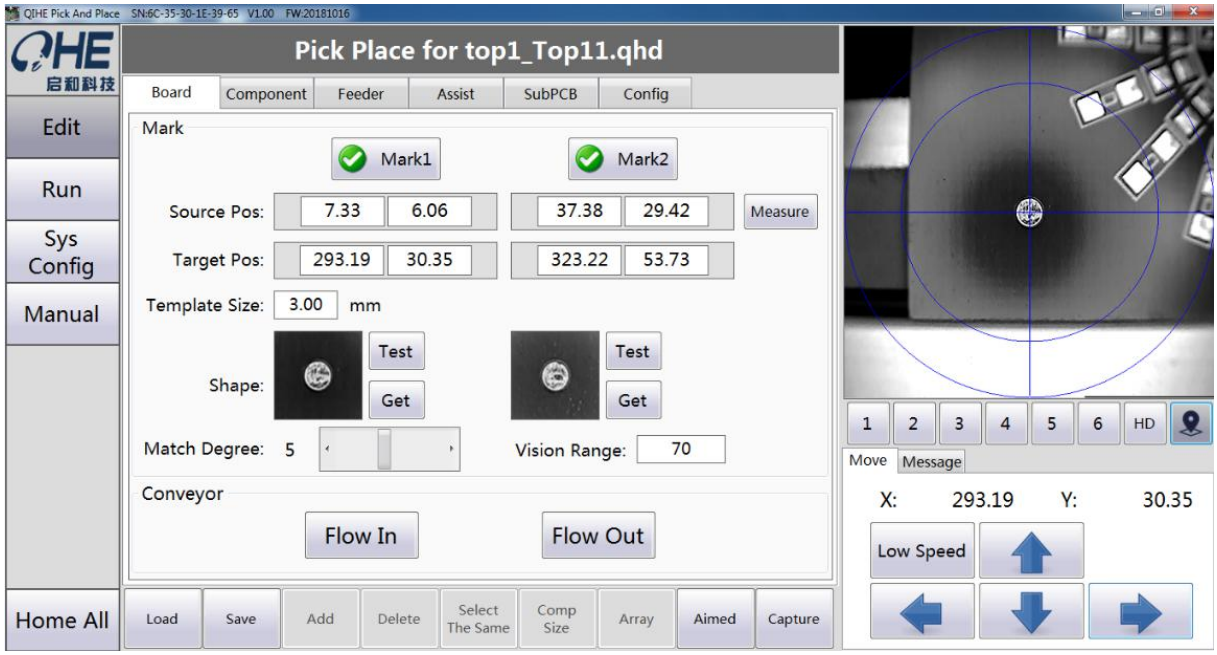
Install the fixed block ,you could adjust the fixed block according to the size of PCB.

While install the fixed block,we suggest use one right-angled block and one straight fixed block,that will make full use of space.(see image below)



Note: Before plugging into power cord, ensure the safety.

5. Interface of Introduction



5.1. Home all

The first step - to locate the origin after turn on the computer.
Particular attention！ You can't choose the feeder (NO.35, NO.34, NO.33) when you're using the No.1 of the nozzle; You can't choose the feeder (NO.35, NO.34,) when you're using the No.2 of the nozzle; You can't choose the feeder (NO.33) when you're using the No.3 of the nozzle;The same, You can't choose the feeder (NO.1, NO.2, NO.3) when you're using the No.6 of the nozzle. You can't choose the feeder (NO.1, NO.2) when you're using the No.5 of the nozzle.You can't choose the feeder (NO.1) when you're using the No.4 of the nozzle.

5.2. Board

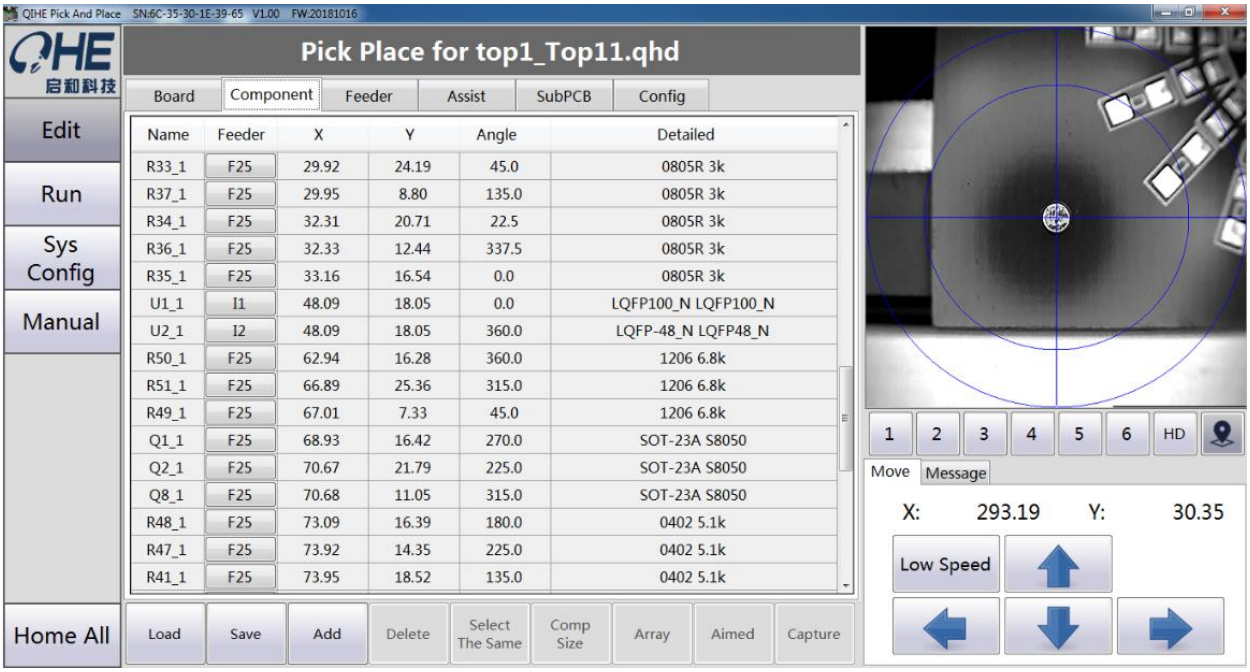
Mark：
Generally, the Mark is the two points on the diagonal of the PCB.
Set the Mark point：
First, find the Mark position in PCB file. The position as the drawing
Coordinate.
Second, Use the Visual system(down) to capture the appropriate Mark point.
Template size and match Degree： modify according to your own needs.
we would have to adjust the "match Degree" when the Mark does not be recognize

When you set the mark point, you need to grab the coordinates.

Match Degree：
If there is a problem, you can make it smaller

Vision Range：
If there are similar mark points around, we can modify here to make the positioning of mark point more accurate

Conveyor：
Flow in： flow in the PCB
Flow out： flow out the PCB
Pls Note: Remember to save.



5.3. Component

Feeder：Pls choose the appropriate feeder
Selected the appropriate position to adjust the coordinates and angles.

Load：Loading the “CSV” file by protel、DXP、Altium Designer、pads、Candes、proteus.

Save：To save the file that are modified in the process of running or debugging.

Add ： T o add the position of device.

Delete：To delete the position of device.

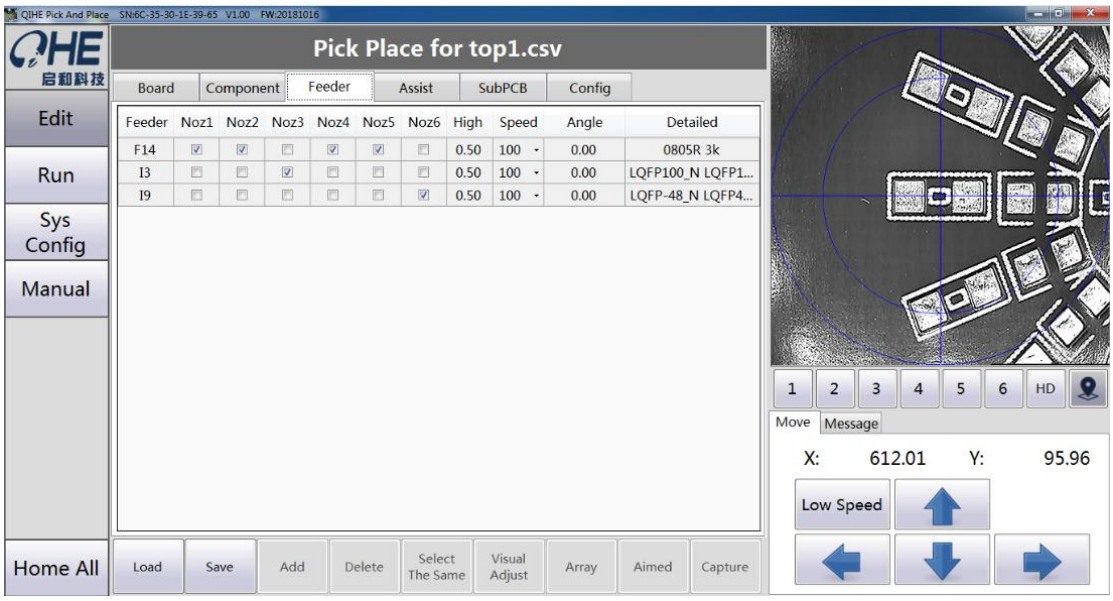
Selected the same：To selected the all devices with the same position, device or the same

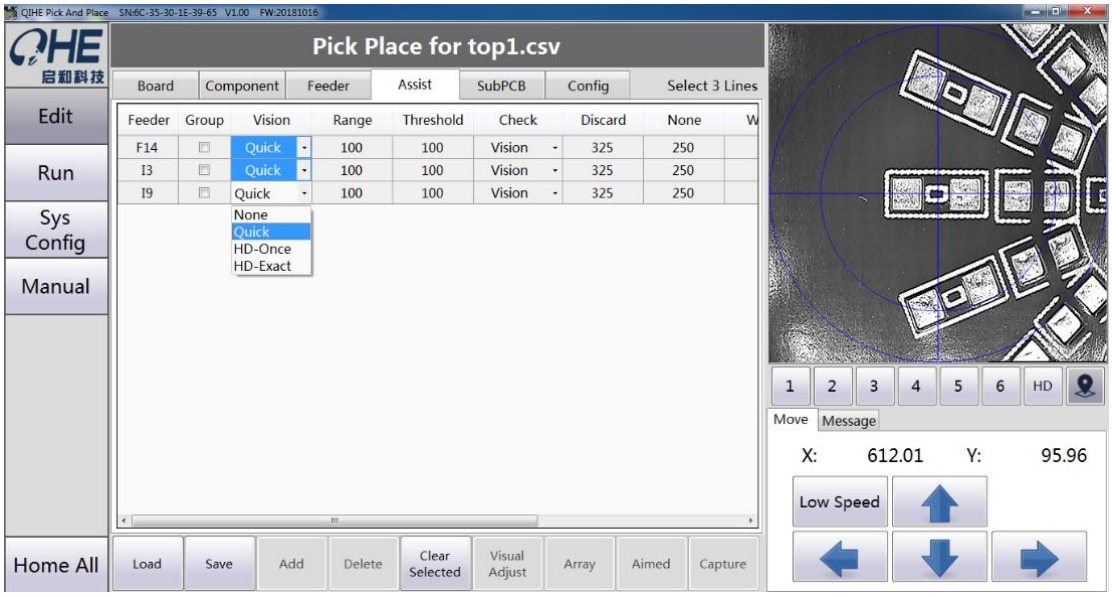
Clear selected：To delete the position of devices by your selection.

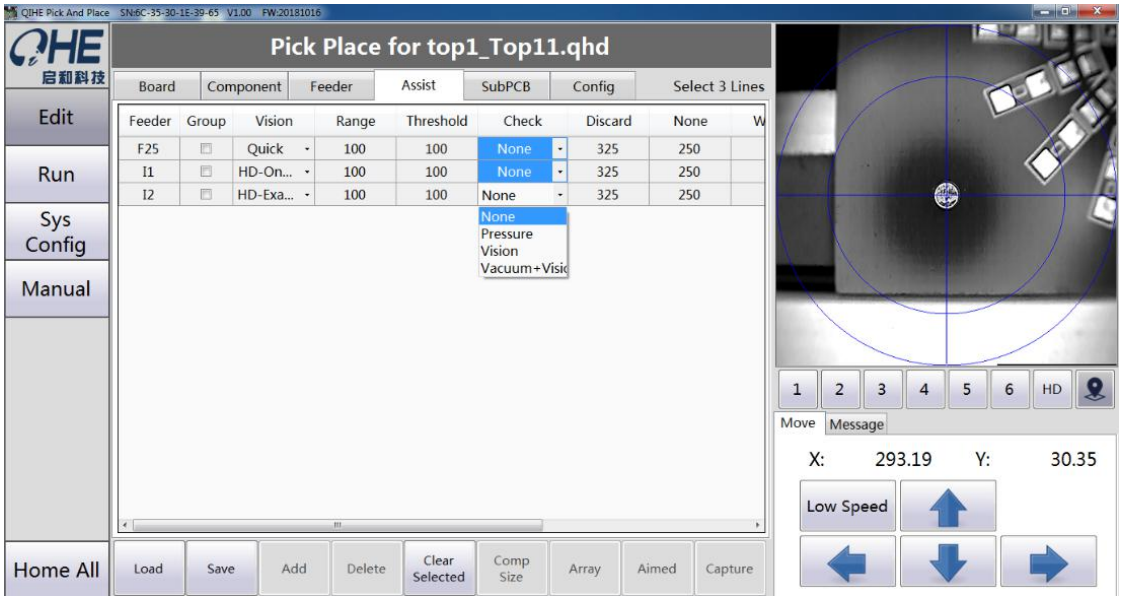
Aimed：Use the visual system(down) to locate the appropriate position of devices.

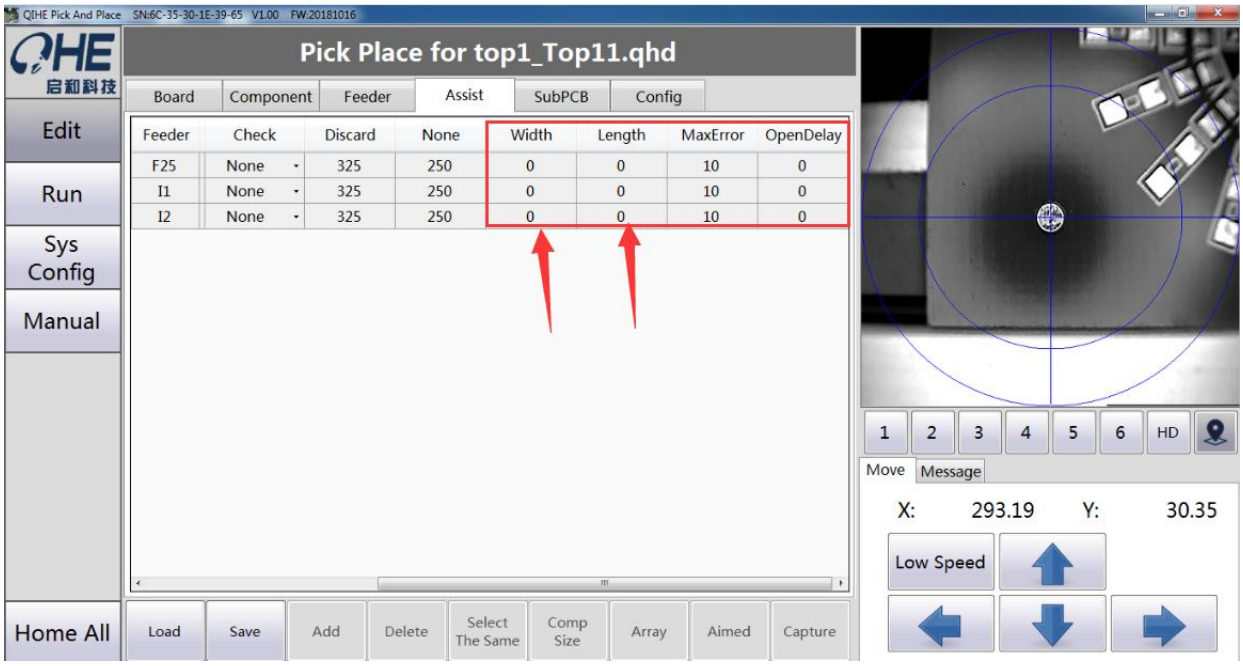
Capture：Set the current coordinate is the position of devices.

Pls Note: Remember to save after changes.


Pick Place for top1.csv
Board
Component
Feeder
Assist
SubPCB
Config
Feeder Noz1 Noz2 Noz3 Noz4 Noz5 Noz6 High Speed Angle Detailed
F14 0.50 100 0.00 0805R 3k
I3 0.50 100 0.00 LQFP100_N LQFP1...
I9 0.50 100 0.00 LQFP-48_N LQFP4...
Edit
Run
Sys Config
Manual
Home All
Load
Save
Add
Delete
Select The Same
Visual Adjust
Array
Aimed
Capture
1 2 3 4 5 6 HD
Move
Message
X: 612.01 Y: 95.96
Low Speed


Pick Place for top1.csv
Board
Component
Feeder
Assist
SubPCB
Config
Select 3 Lines
Feeder Group Vision Range Threshold Check Discard None
F14 Quick 100 100 Vision 325 250
I3 Quick 100 100 Vision 325 250
I9 Quick 100 100 Vision 325 250
None
Quick
HD-Once
HD-Exact
Edit
Run
Sys Config
Manual
Home All
Load
Save
Add
Delete
Clear Selected
Visual Adjust
Array
Aimed
Capture
1 2 3 4 5 6 HD
Move
Message
X: 612.01 Y: 95.96
Low Speed


Pick Place for top1_Top11.qhd
Board
Component
Feeder
Assist
SubPCB
Config
Select 3 Lines
Feeder Group Vision Range Threshold Check Discard None
F25 Quick 100 100 None 325 250
I1 HD-On... 100 100 None 325 250
I2 HD-Exa... 100 100 None 325 250
None
Pressure
Vision
Vacuum+Visi
Edit
Run
Sys Config
Manual
Home All
Load
Save
Add
Delete
Clear Selected
Comp Size
Array
Aimed
Capture
1 2 3 4 5 6 HD
Move
Message
X: 293.19 Y: 30.35
Low Speed



5.4. Feeder and Assist

Nozzle：Selected the appropriate nozzle

High：Generally speaking, the high is the default. But there are a number of higher need to adjust their own.

Speed：To reduce the speed when the machine are operation.(The speed of each device be reduce from 100 to 50 or 60)

Vision：Generally speaking, Resistance capacitance does not require through the visual. The rapid lamp and high precision, please select the “quick”. The chip and the higher precision, please select the “Accurate”

Range：When identifying large devices, you can modify here.

Threshold：If individual feeder components are not well identified, adjust.

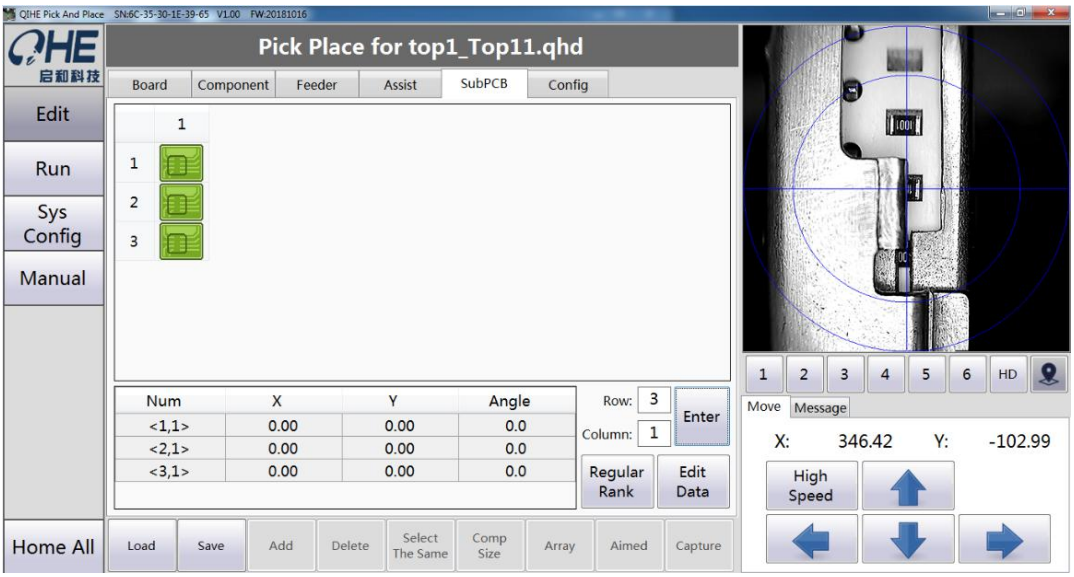
Check：we can not select the pressure test that the electric capacity have rough surface or some round glass tube of device.

Discard and None：If it is lower than that, it will discard the components l and then retake it. If it is lower than None, will be taken components again.

Width and length：Dimensions of components

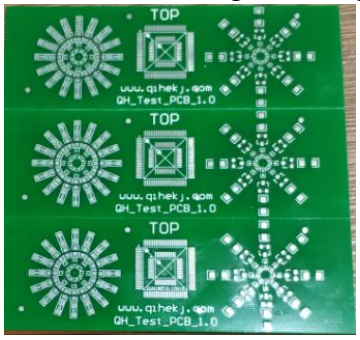
Max error：Allowed to identify the deviation, the general fill 30

Open delay：Feeder delayed start, generally for large components

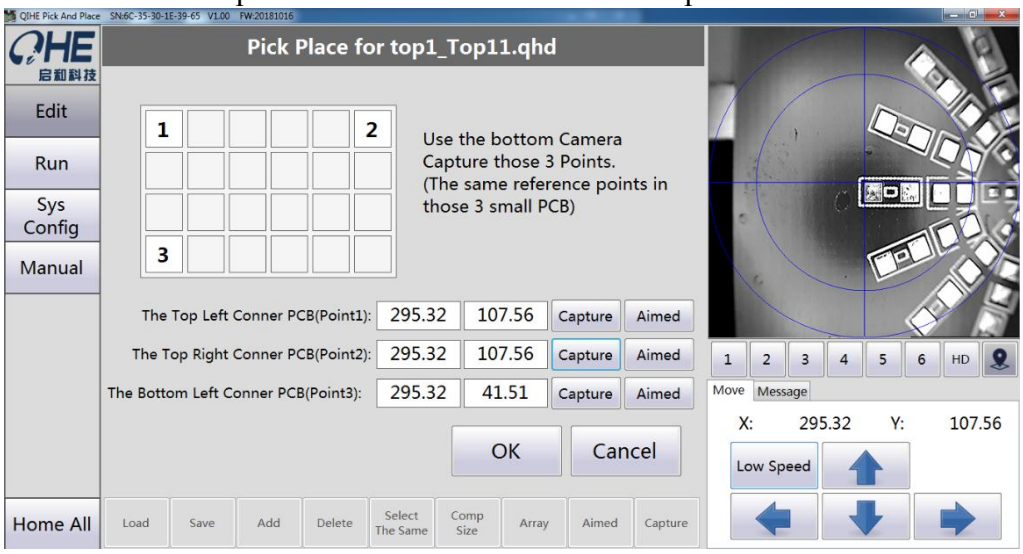


5.5. SUBPCB

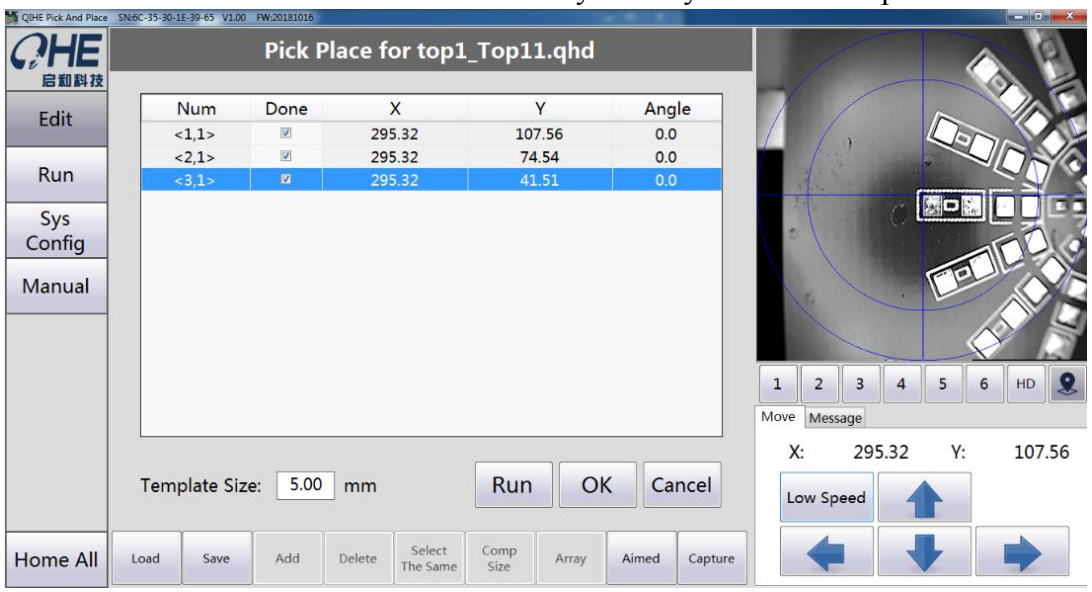
Row：How many block of ROW)，Please just put how many block.
Column: How many block of Column, Please just put how many block
If it is lower than that, it will discard the components l and then retake it. If it is lower than NONE, will be taken components again.then click enter and the click regular rank

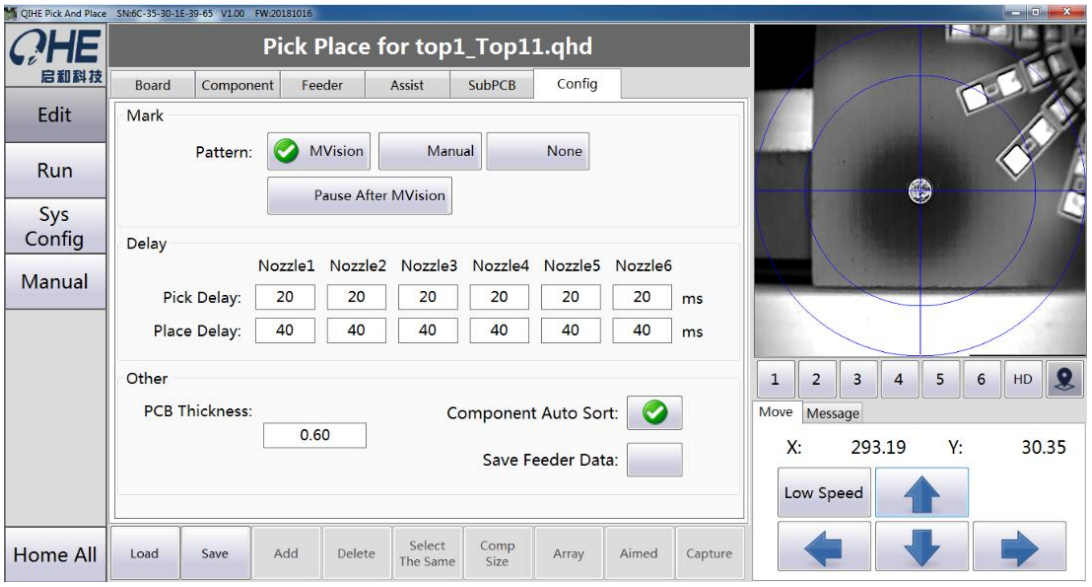


It's important to note that if the X direction is 1, the coordinates of 1 and 2 are the same.
if the Y direction is 1, the coordinates of 1 and 3 are the same.
We take the same points at each board as a reference point. then click ok



the click run，the machine will automatically identify the reference points on the circuit board.





5.6. Config

Mark： If it is the standard Mark, pls use choose automatic identification.

If use the bonding pads or another position as Mark, pls choose the manual Identification.

If there is no requirement for accuracy, we can choose not to distinguish.

Pls Note: Proposed distinguish the Mark so taht the accuracy of the patch will be better.

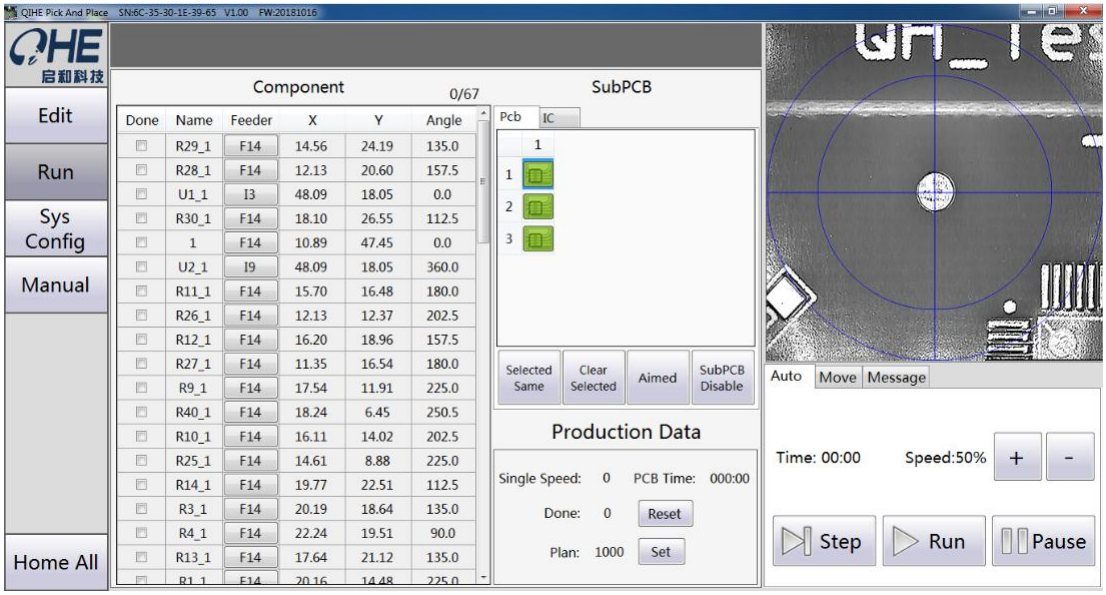
Delay： If the device appears leakage or suck not to live, we need to increase the corresponding suction nozzle of suction “Pick Delay”.

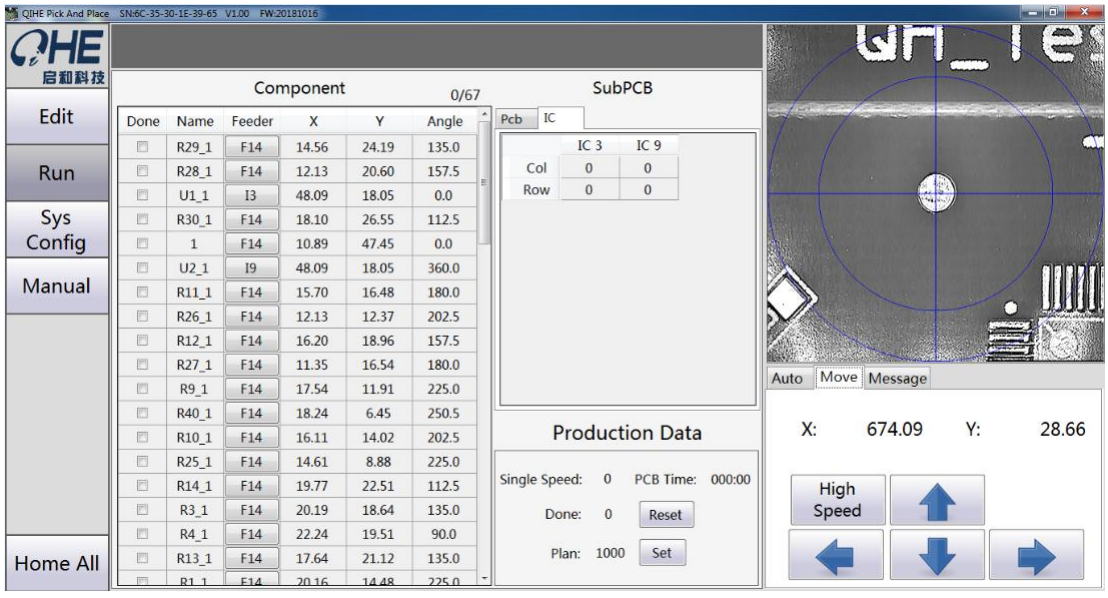
If the device appears leakage, we need to increase the corresponding suction nozzle of the paste “place delay”

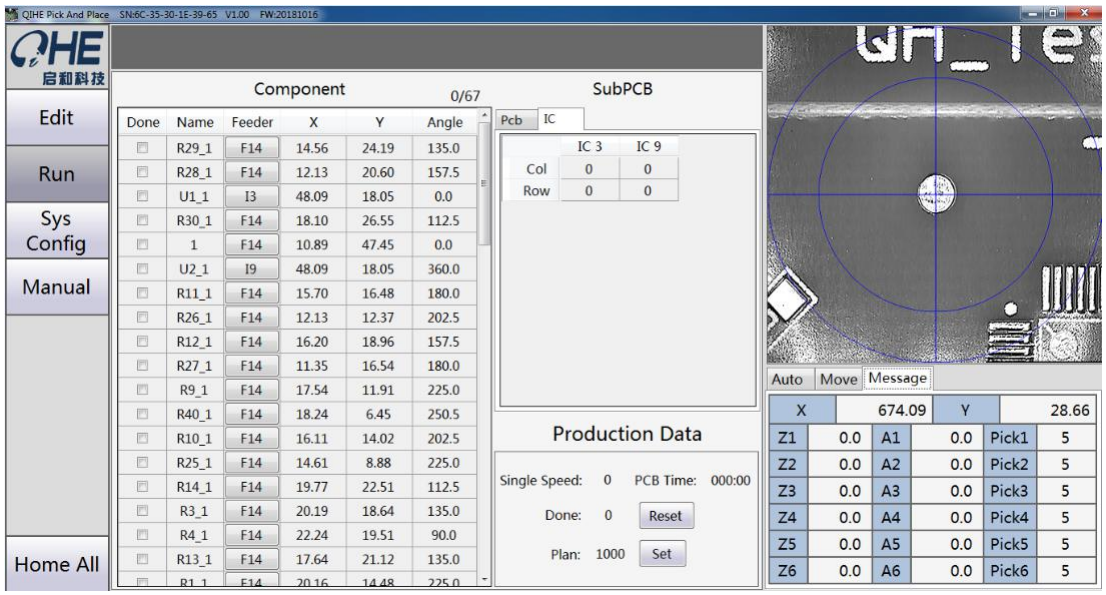
Other： PCB thickness ，Generally do not nee to modify.

save feeder data，it will save data in the file

Component auto sort: The software will be run in whatever order he thinks is best

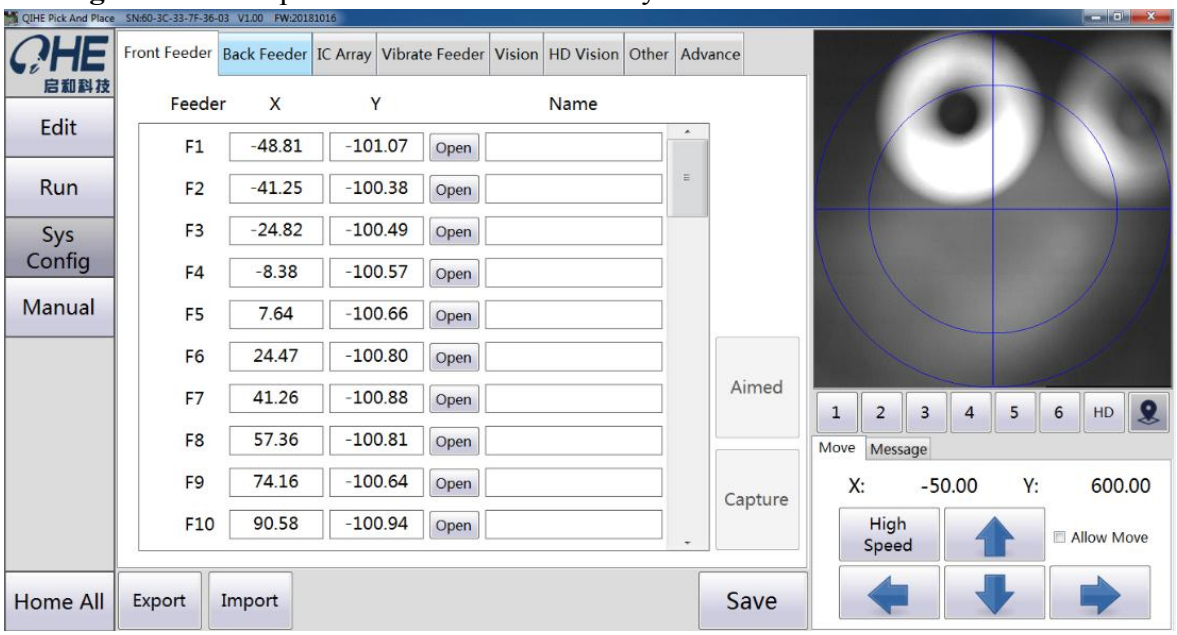

QIHE Pick And Place SN:6C-35-30-1E-39-65 V1.00 FW:20181016
Edit
Run
Sys Config
Manual
Home All
Component
0/67
Done Name Feeder X Y Angle
R29_1 F14 14.56 24.19 135.0
R28_1 F14 12.13 20.60 157.5
U1_1 I3 48.09 18.05 0.0
R30_1 F14 18.10 26.55 112.5
1 F14 10.89 47.45 0.0
U2_1 I9 48.09 18.05 360.0
R11_1 F14 15.70 16.48 180.0
R26_1 F14 12.13 12.37 202.5
R12_1 F14 16.20 18.96 157.5
R27_1 F14 11.35 16.54 180.0
R9_1 F14 17.54 11.91 225.0
R40_1 F14 18.24 6.45 250.5
R10_1 F14 16.11 14.02 202.5
R25_1 F14 14.61 8.88 225.0
R14_1 F14 19.77 22.51 112.5
R3_1 F14 20.19 18.64 135.0
R4_1 F14 22.24 19.51 90.0
R13_1 F14 17.64 21.12 135.0
SubPCB
Pcb IC
Selected Same
Clear Selected
Aimed
SubPCB Disable
Production Data
Single Speed: 0 PCB Time: 000:00
Done: 0 Reset
Plan: 1000 Set
Auto Move Message
Time: 00:00 Speed:50% + -
Step Run Pause


QIHE Pick And Place SN:6C-35-30-1E-39-65 V1.00 FW:20181016
Edit
Run
Sys Config
Manual
Home All
Component
0/67
SubPCB
Pcb IC
IC 3 IC 9
Col 0 0
Row 0 0
Production Data
Single Speed: 0 PCB Time: 000:00
Done: 0 Reset
Plan: 1000 Set
Auto Move Message
X: 674.09 Y: 28.66
High Speed


QIHE Pick And Place SN:6C-35-30-1E-39-65 V1.00 FW:20181016
Edit
Run
Sys Config
Manual
Home All
Component
0/67
SubPCB
Pcb IC
IC 3 IC 9
Col 0 0
Row 0 0
Production Data
Single Speed: 0 PCB Time: 000:00
Done: 0 Reset
Plan: 1000 Set
Auto Move Message
X 674.09 Y 28.66
Z1 0.0 A1 0.0 Pick1 5
Z2 0.0 A2 0.0 Pick2 5
Z3 0.0 A3 0.0 Pick3 5
Z4 0.0 A4 0.0 Pick4 5
Z5 0.0 A5 0.0 Pick5 5
Z6 0.0 A6 0.0 Pick6 5

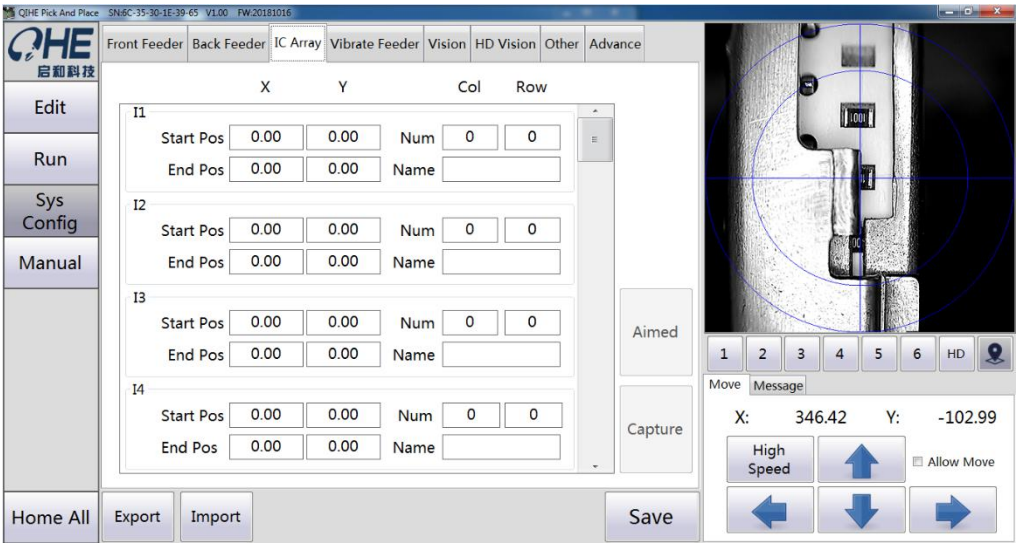
5.7. Run

Aimed：It's can be observed the coordinate of each device
Step：Single step operation
Run：Start stop
Pause：Pause continue
Time：Display the time of Mount
Speed：Adjust the speed of machine
SubPCB Disable： Skip the select pcb, Machine will default that this board has been placed.
IC：Choose where to start picking.
Message：Show the pressure of Z axis and Rotary axis



5.8. Sys Config

Front Feeder:
Feeder: The corresponding feeder
X，Y：The corresponding of X, Y coordinates, pls using the Visual system (down) to catch
Name：The name of the component can be given to each.
Open：Open the solenoid valve of corresponding
Aimed：search to current location
Capture：Set up the current location
Back Feeder：the same as front feeder

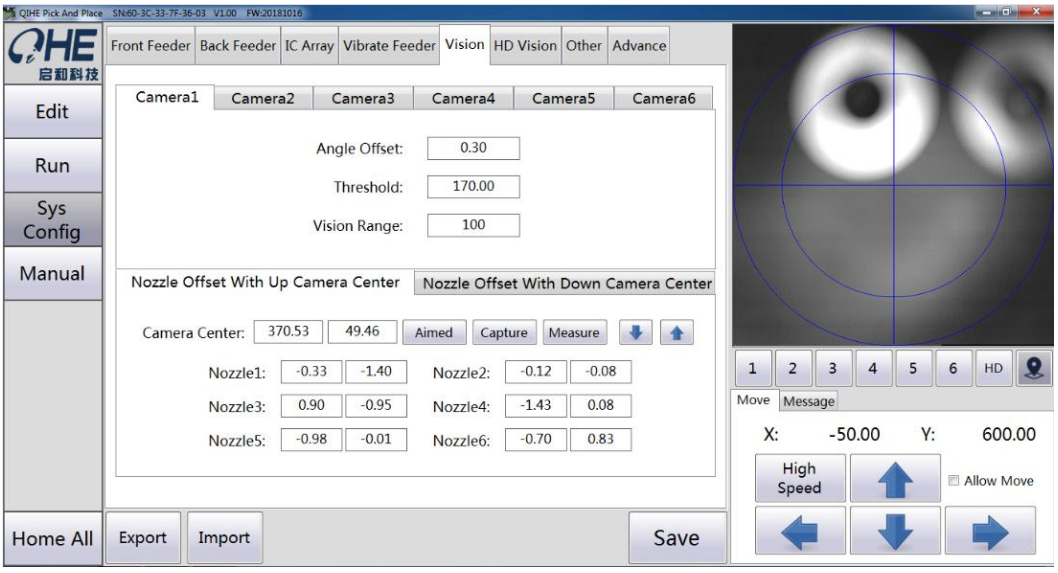


5.9. IC Array

Start Pos：the first chip's position
End Pos：the last chip's position
Num：the number of X direction, the number of Y direction
Name：Name of components

IC stack setting

the software has 30 IC stack,it means the software can set 30 different kinds of IC. As shown on the left, put one kind of IC on the tray,setting steps are as follows：
Move the nozzles to the red circle1,in the upper software computer, click System Config →IC Stack. Setting IC stack1,put the cursor in Start， click Set XY, the same way, put the nozzles to the red circle2, put the cursor in End, click Set XY. Array is “10 , 6”,because the tray has 10 lines and 6 rows.



5.10. Vision:

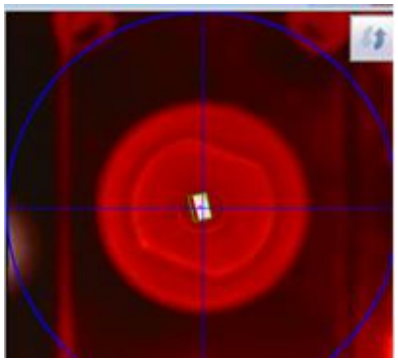
Camera1-Camera6:

Angle Offset:

It's will need to adjust when the angle of the component mounting is offset.

Threshold:

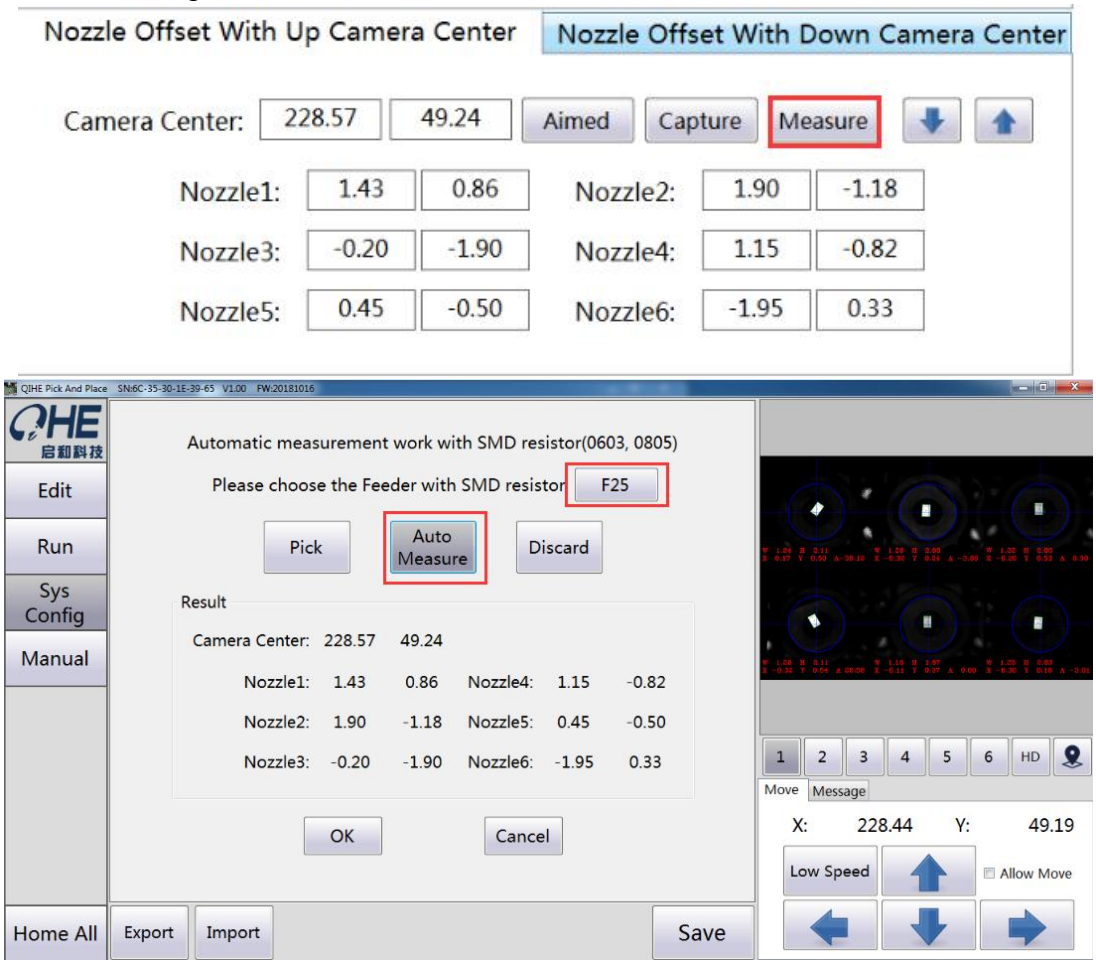
When the components through the vision, the recognition is not good. We need to adjust, Makes the green box just in the periphery of the component.

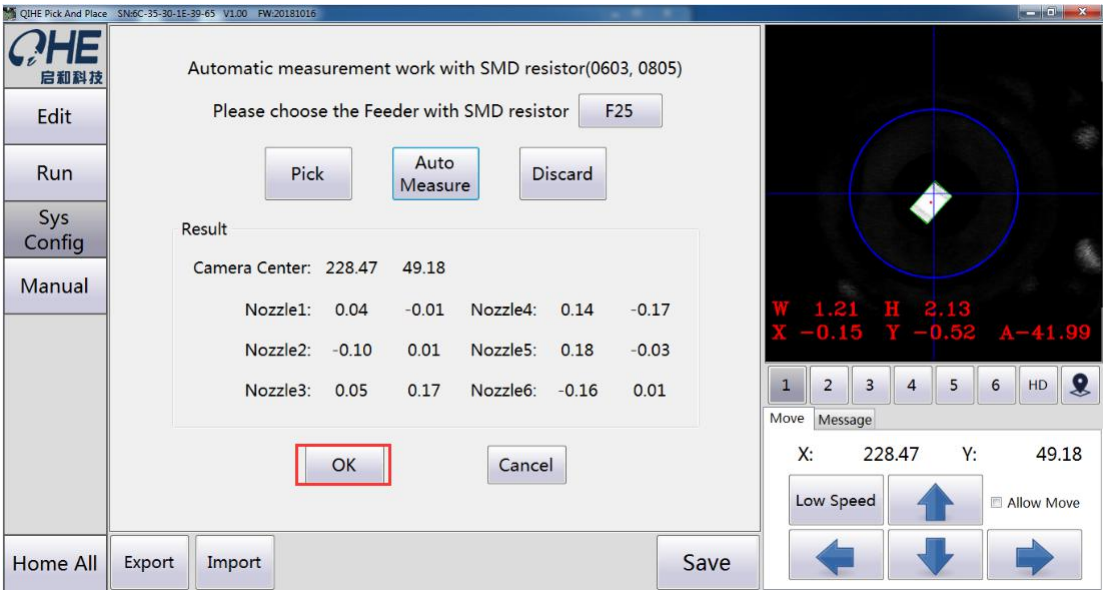


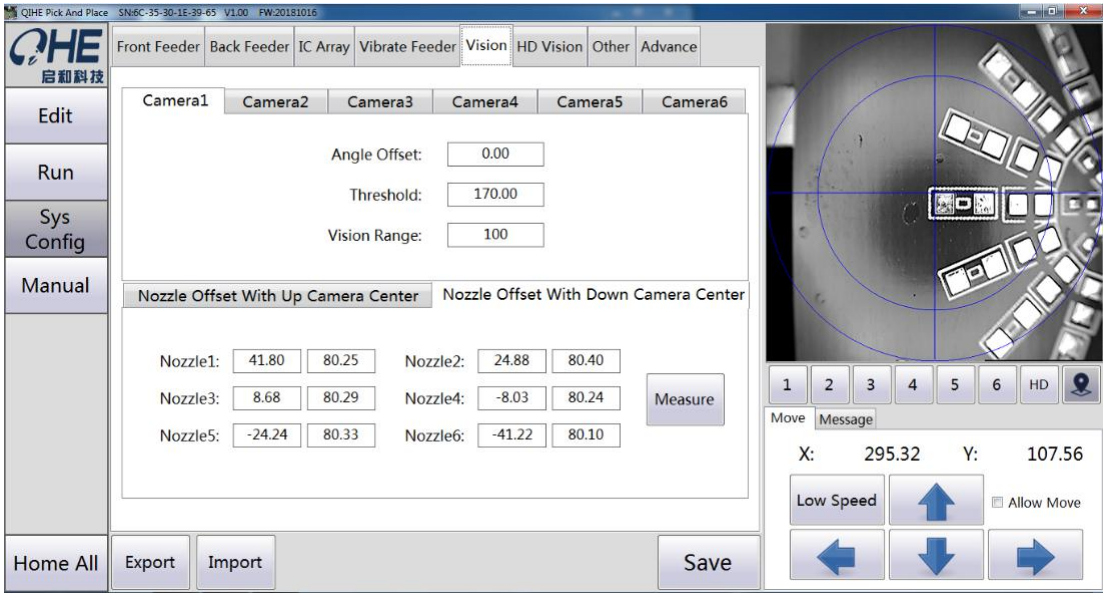
Vision Range:

Nozzle Offset With Up Camera Center:

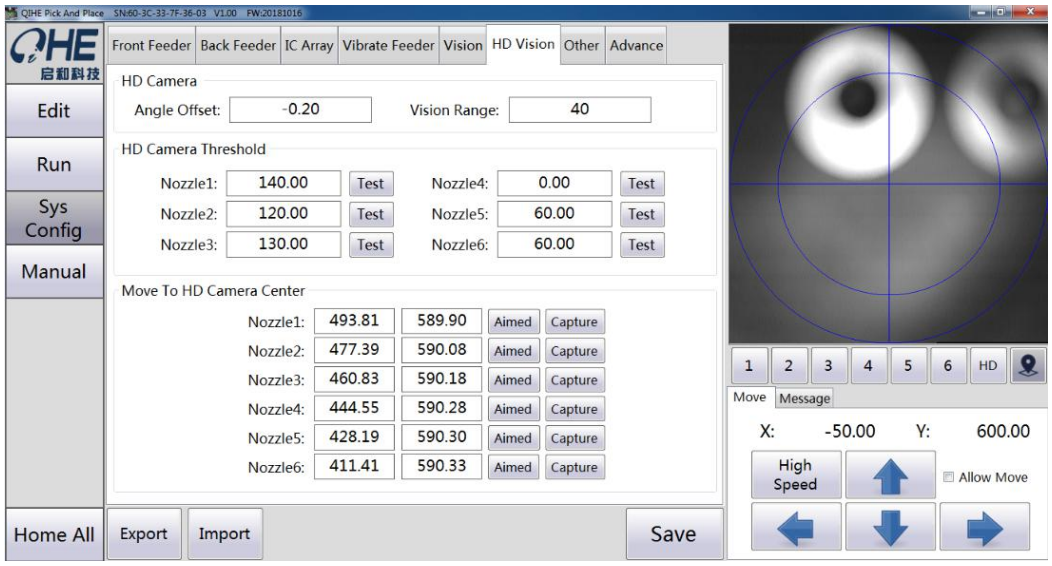
click the measure and choose right feeder and click auto measure， and finished click discard to discarded components ， then click OK





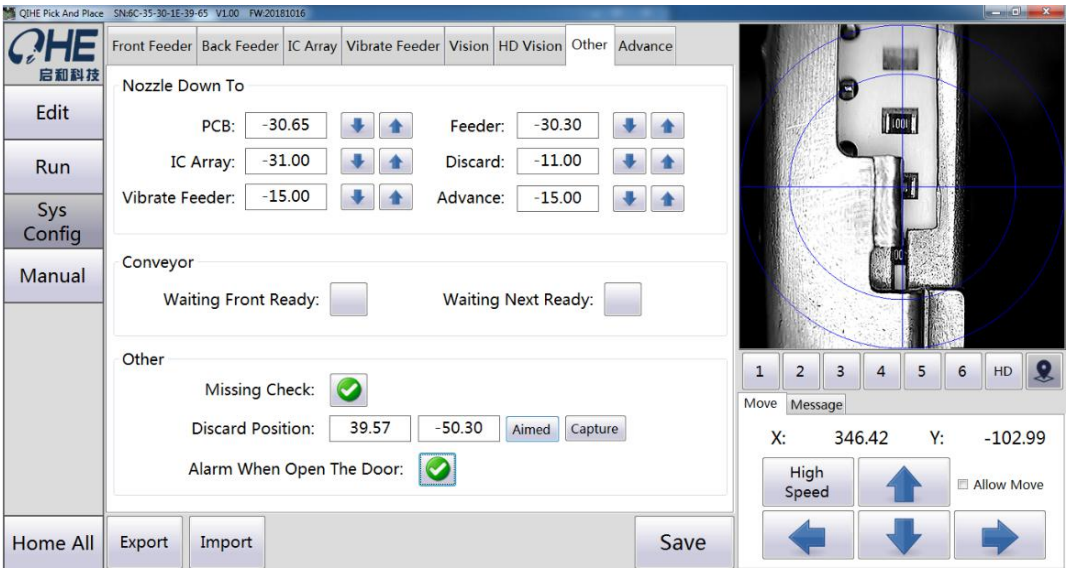


The Offset With Down Camera Center To Nozzle： When the chip is deviation, it needs to be adjusted.



5.11. HD Vision

Move To HD Camera Center： when the nozzle is not in the middle of the vision, need to adjust.



5.12. Other

Nozzle Down To：

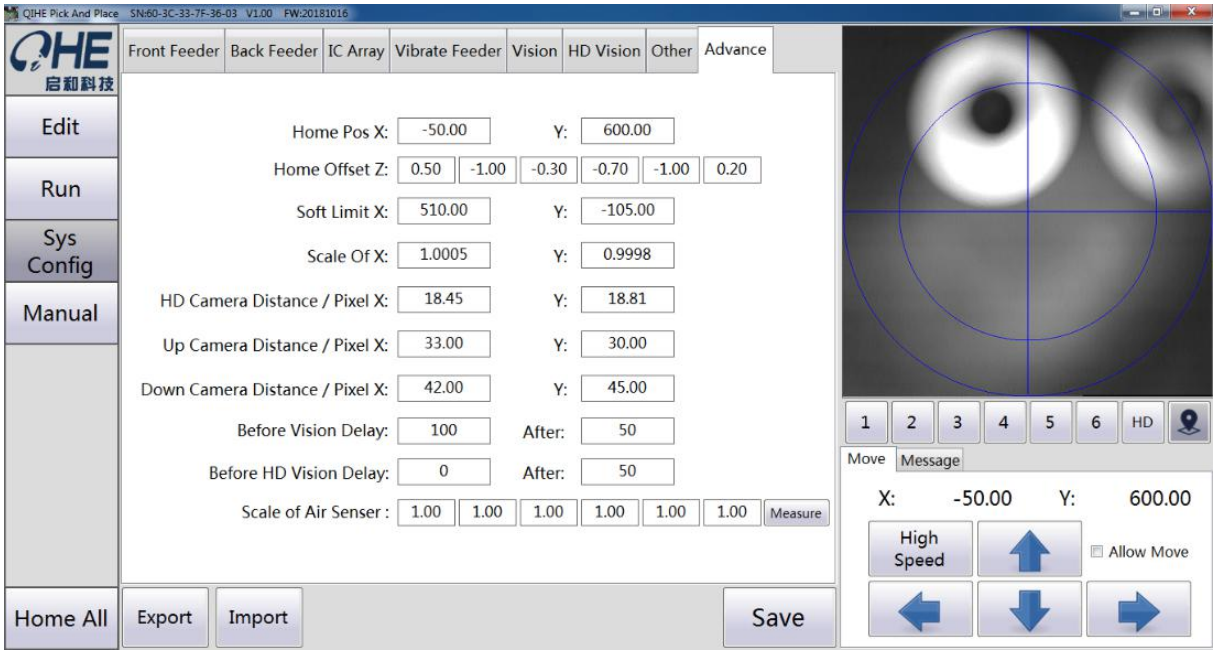
PCB : Drop to the PCB's height
IC stack： Drop to the tray's height
Feed Stack： Drop to the feed's height
Discard： Drop to the height of the waste material position
Vibrate Feeder： Drop to the vibrate feeder's height
Advance： Suction nozzle down ahead of schedule

Conveyor：

waiting front ready： you need choose to open
waiting next ready： you need choose to open

Other：

Missing Check： When the components are not picked up , The machine can be detected and to pick up again when the components are not picked up.
Discard Position： This coordinates we can set their by ourselves
Alarm when open the door： for safety, you need choose to open



Home Pos X：Generally do not need to modify

Home Offset Z：Make sure the suction nozzle drops at the same height

Soft Limit X：Generally do not need to modify

Scale Of X：Generally do not need to modify

HD Camera Distance/Pixel：Generally do not need to modify

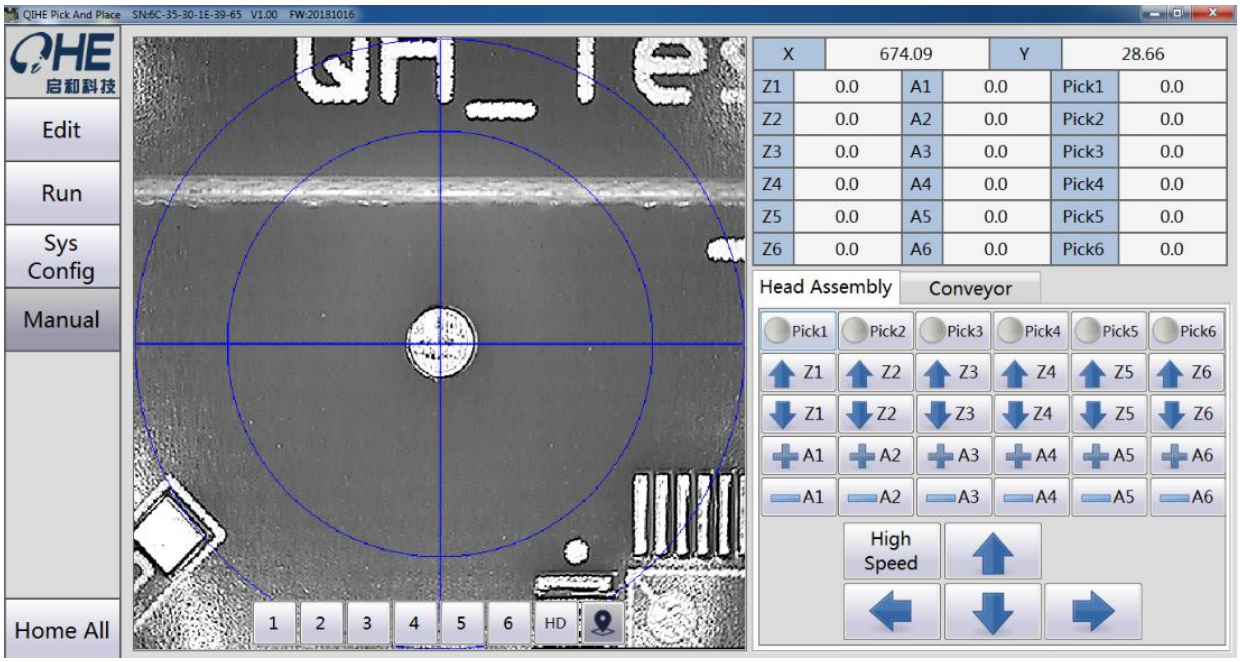
Up Camera Distance/Pixel：Generally do not need to modify

Down Camera Distance/Pixel：Generally do not need to modify

Before Vision Delay：Generally,when it through the visual，it's need to waiting "150"

Before HD Vision Delay：After the waiting for the visual, we need to set data about "100" if there have a nozzle

Scale Of Air Sensor：you need open the pick 1-6.then cover nozzle with your hand ，click the measure，the purpose is to make sure the NP1-NP6 is same.

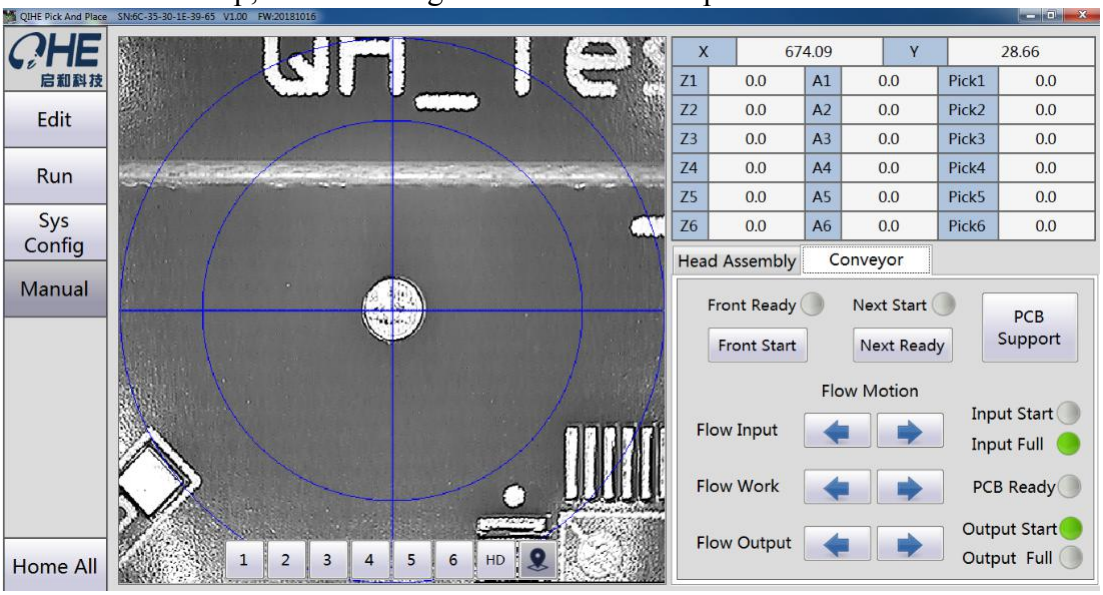


5.13. Manual

Head assembly：

The main test the function of Z axis and A axis.

when stick the chip, we can enlarged it to see if the chip is accurate identification



Conveyor：

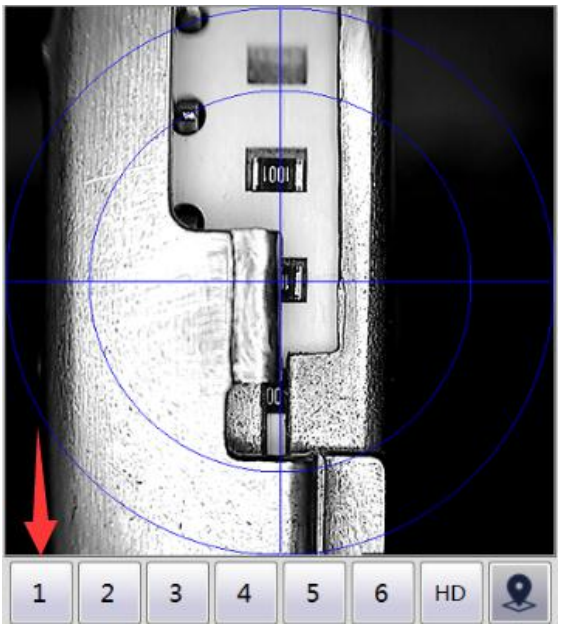
Front start： when you open this ， the PCB will flow in the machine from the front inspection conveyor

Next ready： when you open this ， the PCB will flow out the machine to second inspection conveyor

Input Start.Input Full .PCB Ready . Output Start and Output Full: When the corresponding sensor is keep out.the signal will appear.

PCB support: When you click this the top bar will go up.

Flow Motion: Control the movement of the assembly line.



This have six camera you can click anyone to switch

5.14. Special attention

Because of the visual system, higher requirement to the light source. In the process of using, avoid direct sunlight, lighting source, otherwise it will cause visual system error, affect the normal operation of equipment.

6. Maintenance

6.1. Nozzle maintenance

6.1.1 Check the nozzle whether it is deformative or wear after impacting, and make sure whether there are blockage inside the suction nozzles.

6.1.2 press the suction nozzles to feel the tightness, if too tight,you should use the abluent to clean the inside of nozzle.

6.1.2 if nozzles are under severe wear,you should replace the nozzles.

6.2. Surface cleaning of machine

Look at the machine surface whether there are foreign matter,if so,using the air gun or brush to sweep away.

6.3. Check feeder

Check the reels whether some reels and the fixed shaft is loose.

6.4. Clean the camera

Using swab with alcohol to clean dust on the camera surface,If there are any components falling on camera surface, please take away in time.

6.5. Lubricate the XY-axis guide rail

Using cloth to wipe the old oil first, then add the new grease.

6.6. The computer antivirus

The computer antivirus need on a regular basis so that the software can run steadily.