Operating instruction of TVM802 desktop type visual chip mounted machine

Start heart and force Create glorious

Start force to be one Win future together

Convenient Reliable Safety Feel ease

Yueqing Qihe Electrical Technology Co., Ltd

www. qhsmt. com

CONTENTS

1 FOREWORD..... 1

1.1 Safety use..... 1

1.2 Notices..... 1

1.3 The relate guarantee..... 2

2 KNOW WELL ABOUT EQUIPMENT..... 4

2.1 Brief introduce of equipment..... 4

2.2 Hardware characteristics..... 4

2.3 Software characteristics..... 4

2.4 Stipulates of coordinate system..... 5

2.5 Suction nozzle specification..... 5

2.6 PCB specifications..... 5

3 MECHANICAL STRUCTURE INTRODUCE..... 6

4 HOST COMPUTER SOFTWARE INTRODUCE..... 8

4.1 Manual running..... 9

4.1.1 Software operating..... 9

4.1.2 Panel operating..... 10

4.2 Visual window..... 10

4.3 PCB Array....11

4.4 Auto....11

4.5 Home....12

4.6 PCB Configuration....12

4.7 System setting....13

4.7.1 Left stack....13

4.7.2 Back Stack....14

4.7.3 IC Stack....15

4.7.4 Nozzle....16

4.7.5 Camera....17

4.7.6 Vacuum....18

4.7.7 Other....19

5 MUST READING BEFORE USE....20

5.1 Test mechanical structure....20

5.2 Connecting machine....21

5.3 Connect the camera....22

5.4 Check each function....22

6 NECESSARY SKILLS BEFORE MOUNTED....23

6.1 Material tray installation....23

6.2 PCB board installation....23

6.3 front stack coordinate setting....24

6.4 Renewal suction nozzle....25

6.5 Adjust the air blow volume..... 25

6.6 Coordinate lead out.....25

6.6.1 Original point fix position..... 26

6.6.2 ALTIUM DESIGNER（DXP）coordinate derived..... 26

6.6.3 Protel99 derived coordinate document.....27

6.7 Load file and Programming.....28

6.7.1 Manually write coordinate.....30

6.8 Mark point setting.....32

6.8.1 One PCB board mounted.....32

6.8.2 PCB.....34

6.8.3 Array.....35

6.8.4 Mark point discriminate mode.....38

6.8.5 Mark point discriminate operation..... 39

7 TEST THE PCB BOARD..... 41

8 COMMON FAILURE..... 41

8.1 Camera can't discriminate.....41

8.2 Incorrect discrimination of chips.....42

8.3 Calibration of stack coordinate calibration.....42

8.4 Push needle blocked**.....43**

8.5 Not accuracy mounted of chips pass through vision.....44

8.6 Tooth jump.....45

8.7 Nylon band can't be separated in time..... 45

8.8 Suction nozzle.....46

8.9 Derived the back coordinate of circuit board.....47

8.10 Vision detect material lack.....48

9 PREVENTIVE MAINTENANCE.....49

9.1 Daily maintenance.....49

9.2 Periodic maintenance.....49

1 Foreword

Thanks for purchase and use the operating specification of TVM802 desktop type visual chip mounted machine (hereinafter called “Equipment”) which produced by Yueqing Qihe Electrical Technology Co., Ltd. The working principle of this equipment pick the elements from the part supply device(example material racks) , calibrate the coordinate position through the visual system, then mounted on the supplied circuit board.

1.1 Safety use

This equipment include material feeding area, working area and control area. If the relate equipment operating incorrectly, this maybe caused staffs and equipment damaged. The operating staffs should have the basic skills include software edit, basic system hardware and additional device(example: material feeding racks) maintenance.

Before use equipment

• Must read the specification before use this equipment, and completely under the content of specification first then operating.

• Please safety keep this specification after finish reading, convenient for inquiry doubts any time.

• Forbid the people without relations operating this equipment.

• To guarantee the equipment safety operating and maintenance, the operators must clear the potential dangerous happen area of equipment.

• If operators rebuild the equipment without Yueqing Qihe Electrical Technology Co., Ltd prior agreement, or maintain the equipment not according to the method of this operating specification, this maybe seriously damaged equipment safety.

• Absolutely can’t rebuild and maintain the equipment without the admitted method of Yueqing Qihe Electrical Technology Co., Ltd.

1.2 Notices

1、Please shut off the power supply of this machine and plug off the power supply

plug from the socket when happen abnormal, failure or power off, avoid unexpected start.

2、Please hold the plug and push out when plug out the power supply plug, don't draw the wire and push out.

3、Please adopt the necessary safety policies, prevent convert place and fallen accidents when push up and moving.

4、Please safety stored the wood box and foams which used in transporting.

5、Please place the machine on the level place.

6、Please keep the ground clean and dry, prevent electric shock and leak, must connect the grounding wire.

7、Please don't put hand in the machine working area to prevent human body accident.

8、To prevent the accident and electric shock accident which caused by unskilled operating, please authorized the people with electric professional knowledge or the relate technical staffs of our company which relate the repair and maintain electrical.

9、Please don't use in the environment where affected by the noise source(Electromagnetic wave) from high frequency welding machine.

10、Please don't use in the situation that power supply voltage exceed ±10% of rated power supply.

11、Please stop use and plug off the power supply when thundering.

1.3 The relate guarantee

When this equipment happen abnormal appearance, the guarantee contents as below:

The guarantee content: provide freely maintain service when happen failure

because the part materials formed equipment or problems from the manufacture.

Guarantee period: the complete machine guarantee one year from the day of receive goods.

Not provide guarantee for the below situation:

1、damage when stored the equipment, not guarantee the loss of data which stored in it, so need prepare backup in normal time.。

2、The system error actions which caused by operating the equipment unconcerned procedure or the data damaged caused by the virus infection and other reasons.

3、Aging along with the change of time, or the abnormal appearance(example: painting, electroplate layer and depreciation of consumables, etc)

4、which caused by natural abrasion of equipment use. The micro weak changes(example: the action voice of controller, motor rotating voice and air pump voice, etc) which not affect the equipment quality and performance.

5、The abnormal appearance caused by the use environment condition(example: water, powder and impurity matters, dust on the machine, oil stain, etc) .

6、The natural damages or accident like earthquake, typhoon, flood, fire and flashing, etc. The imperfection or error during the equipment maintain works.

2 Know well about equipment

2.1 Brief introduce of equipment

In fact, this equipment is one small size industry robot, it's the synthesis of machine-electric- photo electricity and computer control technology. It depend on the absorb - displacement - fix position - place and other functions, realize that fast and correctly mounted the electric elements on the appointed welding tray position of PCB board under the situation that not damage the elements and printing electric circuit board.

2.2 Hardware characteristics

TVM802 desktop type visual chip mounted machine total has five models, respectively are:802A, 802AH, 802AX, 802B and 802BX, the main difference as below:

	802A	802AH	802AX	802B	802BX
Common motor High voltage driver	√	×	×	×	×
Close-loop motor Close-loop ring driver	×	√	√	√	√
Inner placed industry control computer	×	×	√	×	√
Left 29 material stack	√	√	√	×	×
Left 24 material stack	×	×	×	√	√
Back 22 material stack	×	×	×	√	√

The machine size of TVM802A is 875mm*640mm*310mm。

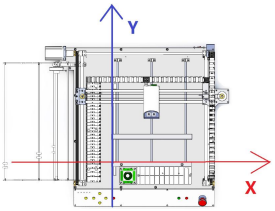
The machine size of TVM802B is 875mm*940mm*310mm。

Mainly formed with mounted head , up and down visual system, working platform, etc.

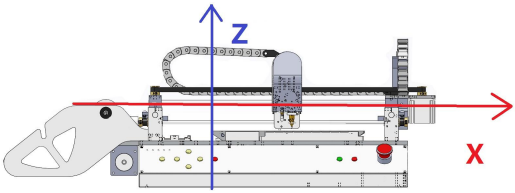
2.3 Software characteristics

The software is independent researched by our company with self intellectual property right, Chinese/English interface, simple operating and easy to grasp it.

2.4 Stipulates of coordinate system



picture2.5.1



picture2.5.2

the moveable range of axis X and Y :395*445mm(this data is not absolute), the moveable scope of axis Z :15mm.

2.5 Suction nozzle specification

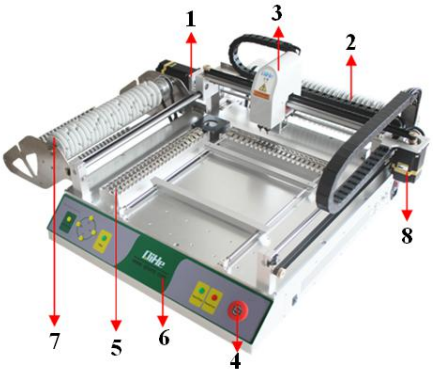
Suction nozzle model	Sample picture	Suitable package
502		0402
503		0603,0805
504		0805，1206，1210，2512
505		3528，5050，SOP-8
506		TQFP、SSOP

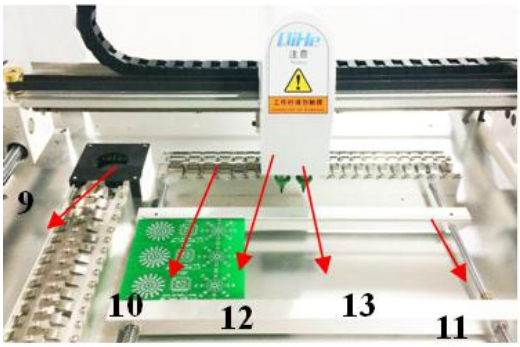
2.6 PCB specifications

802A mounted range 20mm*20mm~330mm*330mm。

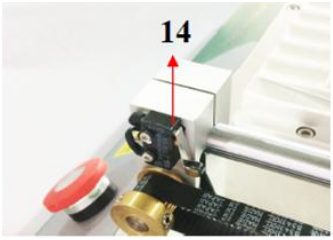
802B mounted range 20mm*20mm~330mm*260mm。

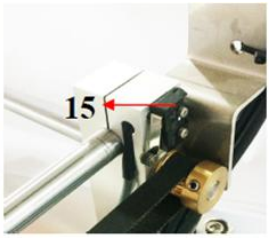
3 Mechanical structure introduce

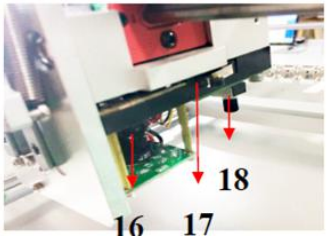




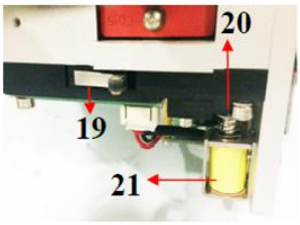
1. Y axis motor	9. 802B up visual
2. 802B back stack	10. back side material feeding racks
3. Mounted head	11. 802B PCB clips
4. Emergency stop key	12. nozzle A
5. Left side material feeding racks	13. nozzle B
6. Control panel	
7. Left stack	
8. X axis motor	

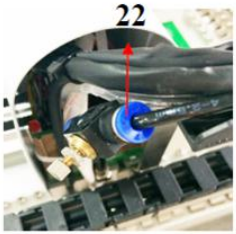


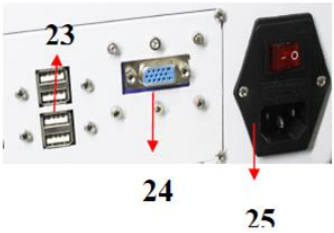




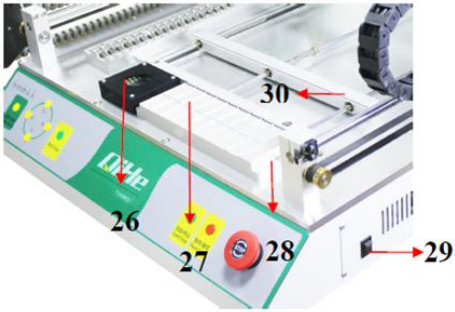
14. Y negative limit position sensor
15. Y positive limit position sensor
16. Down visual camera
17. X positive limit position sensor
18. Down visual light luminance adjust button





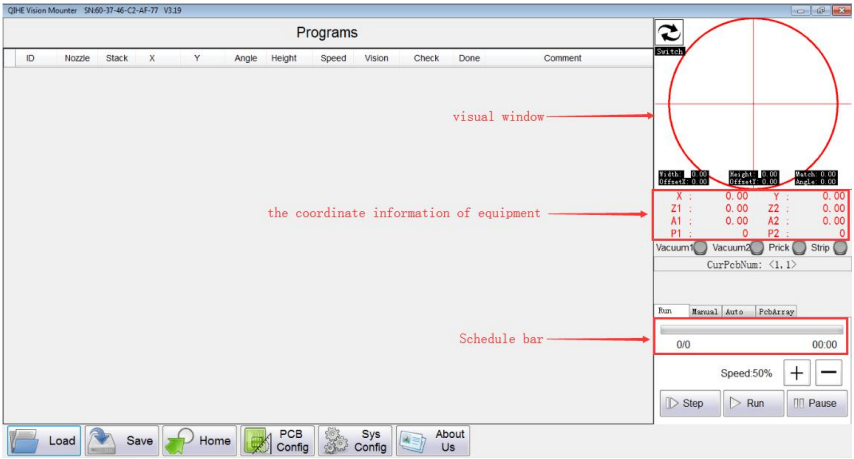


19. X negative limit position sensor
20. Push needle limit position sensor
21. Electromagnetic push needle
22. Air blowing adjust valve
23. USB interface
24.VGA interface
25. equipment stop key



26. 802A up visual camera
27.802A front placed material shed
28. Wastage material groove
29. Computer switch key
30.802A PCB clip

4 Host computer software introduce



Picture4.0.1

Main interface of software

The upper left corner V3.19: Version number of host computer software.

Load: loading the required CSV document.

Save: if has modify at the leading-in coordinate information documents, need be saved.

Home: The first step in opening the machine is to determine the origin.

PCB Configuration: Sets the reference point for the circuit board。

System Configuration: Set each parameter.

About Us，Company introduction.

Have three function keys like the step , automatic, pause function keys, and corresponding to panel operating

For the totality running speed of machine, the quickest speed is 120%.

Schedule bar，can display the total required mounted quantity of elements, the finish mounted quantity of elements, how long of the consumed time.

The coordinate information of equipment：need back to the original points and font color change to be black then can be OK.

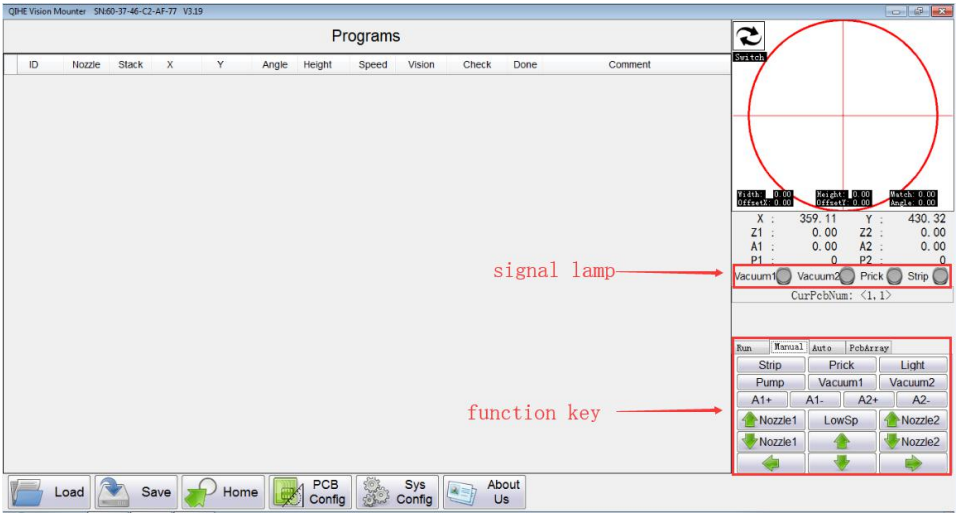
Visual window，Identify circuit boards and chips.

Manual，Test each function.

Auto，Moves to the specified location.

4.1 Manual running

4. 1. 1 Software operating



Picture 4.1.1

Click Manual, the tableau will shift to show as the picture 4.1.1

【Vacuum pump】： open or close the vacuum inhale pump.

【Vacuum 1】【Vacuum 2】： Confirm suction nozzle A, B has pressure.

【Strip】： one time clicked, the roll up wheel rotate the distance of one signal。

【Prick】： Control the up and down movement of the prick.

【Light】： Control light source on and off.

【A+】【A-】【B+】【B-】： nozzle A and B rotate 360°.

【Nozzle A ↑ 】【Nozzle A ↓ 】【Nozzle B ↑ 】【Nozzle B ↓ 】： Control suction nozzle A, B up and down.

【↑】【↓】【←】【→】： Mounted head before and after the left and right sides move.

【LOWSP 】： one time click, shift between the crawl mode and continuous mode, control the mounted head running speed under the manual mode.

4. 1. 2 Panel operating

Picture 4.1.2

Crawl/continuous button：when at manual operation, adjust the speed at direction at axis X and Y, divided into crawl mode and continuous mode

Direction control button： control the working head motion along the positive and negative direction at axis X and Y.

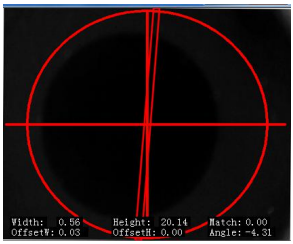
Single step button：subdivision each one mounting action, one time press then work one procedure

Start/stop button：it means start mounting or stop mounting.

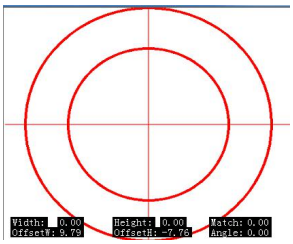
Pause/continue key：pause or continue mounting procedure.

Emergency stop button：if happen emergency situation during running, one time press this button then can cut off the power supply. Need open this button when running this equipment.

4.2 Visual window



Picture 4.2.1



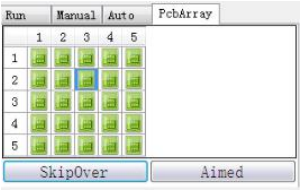
Picture 4.2.2

The picture 4.2.1 is the normal status of up visual, used to discriminate chips

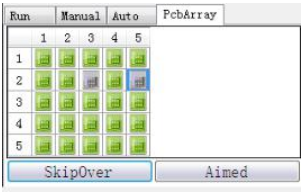
The picture 4.2.2 is the down visual tableau, used to fix position mark point and manual draw the coordinate.

4.3 PCB Array

Picture 4.3.1



Picture 4.3.2



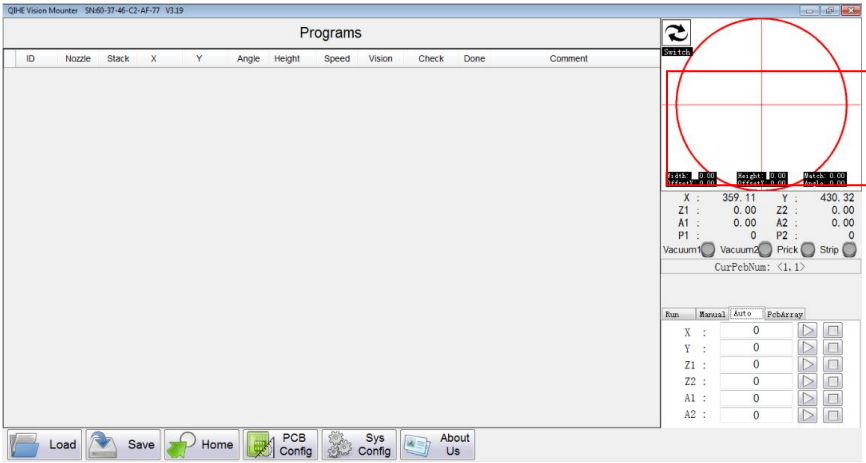
Picture 4.3.3

This function used in the situation that array board mounted

Picture 4.3.1: this situation means no board mounted.

Picture 4.3.2: this situation means has array board mounted, now in the picture means 5 column 5 rows, total 25 pieces board mounted. Under some situation, need jump up one board mounted, we only need select that board mounted, click jump board, the color change from green to gray, example the picture 4.3.3 means will jump that board mounted when next time chips mounted, not chips mounted that board mounted.

4.4 Auto



Picture 4.3.1

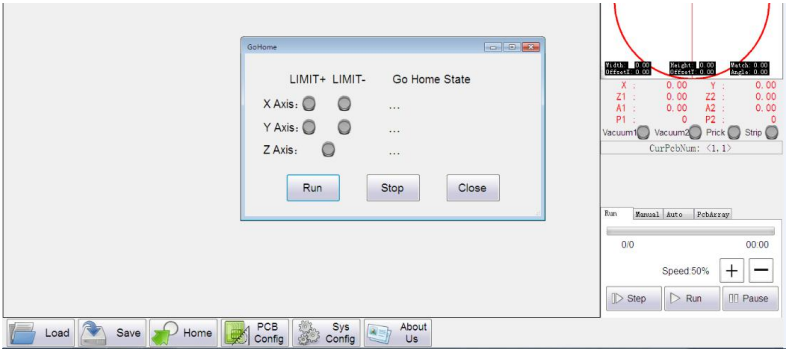
Click auto, the tableau shift to shown as picture 4.3.1，the square frame is the function area under the fix position mode.

Input the appointed coordinate in the frame where back of “X:” “Y:”, the cross center will move the corresponding position.

Input the appointed coordinate in the frame where back of “Z1:” “Z2:”, the suction nozzle A ,B will fallen to the corresponding height

Input the appointed coordinate in the frame where back of “A:” “B:”, the suction nozzle A，B will rotate to the corresponding angle.

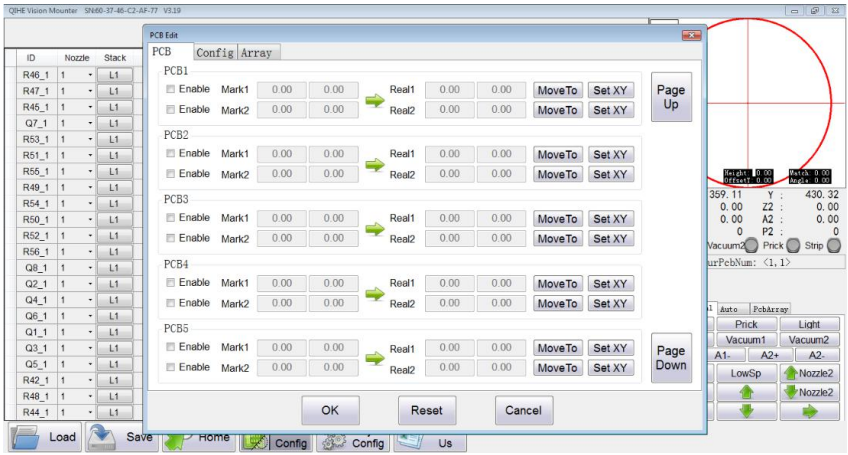
4.5 Home



picture4.5.1

Click Home, the tableau will shift to shown as the picture 4.5.1.Click Run, Machine will automatically back to original point.

4.6 PCB Configuration



picture4.6.1

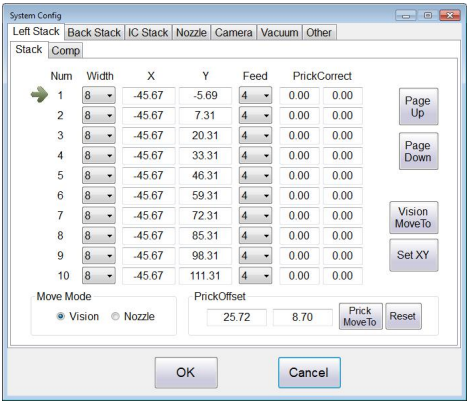
Click PCB configuration, the tableau will shift to shown as picture 4.6.1, the software

automatically shift to manually running mode.

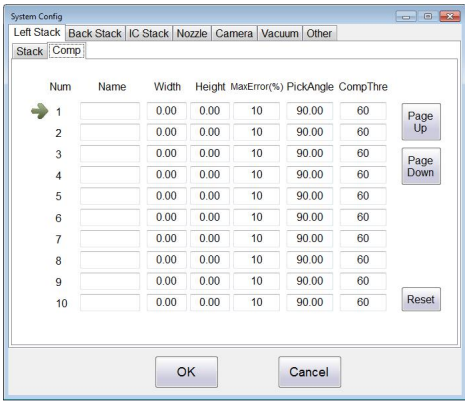
Circuit board 1, circuit board 2, circuit board 3...circuit board 50 means quantity of board mounted, the max can set 50 blocks board mounted. If only mount one block PCB board, needn't board mounted, only need write the content in the circuit board 1 then OK.

4.7 System setting

4. 7. 1 Left stack



picture4.7.1.1



picture4.7.1.2

number 1, number 2.....material groove position of corresponding left stack

【Width】,means the width of material band.

【X】【Y】, means the coordinate position at X ,Y direction when suction nozzle suction materials.

【Feed】, means the distance between two pieces material on the roll up materials.

【Prick Correct】【Prick Offset】【Prick Move to】: the details check the content of push needle blocked in 8.4。

【Move Mode】default it is select visual, But because the reason of structure, vision can't see it at some position, then can select the suction nozzle, the position of suction nozzle A faced is the position of coordinate.

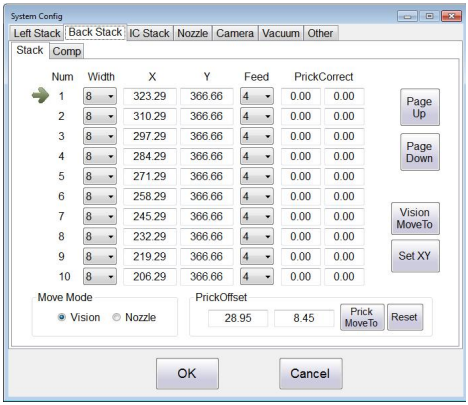
【 COMP 】, This function used under the function that start "Vision lack materials measure"(the details check the 9.13 vision measure the content of lack materials), contrast table 4.7, filled the length and width of elements into the corresponding stack's length and width position, the back "Error" modified according to the actual situation, the general situation is 20; if

cannot know the size of elements, can manual running interface, use suction nozzle absorb the elements, then move to the top camera, fill the detail size of Width and Height in the camera interface into the length and width of corresponding stack.

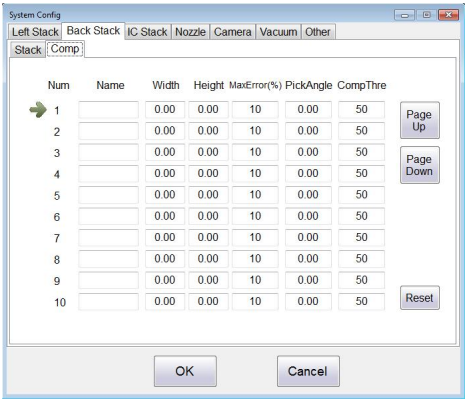
Size contrast table of elements		
Model（British system inch）	Length（mm）	Width（mm）
0201	0.6±0.05	0.3±0.05
0402	1±0.1	0.5±0.1
0603	1.6±0.15	0.8±0.15
0805	2±0.2	1.25±0.15
1206	3.2±0.2	1.6±0.15
1210	3.2±0.2	2.5±0.2
1812	4.5±0.2	3.2±0.2
2010	5±0.2	2.5±0.2
2512	6.4±0.2	3.2±0.2

Table 4.7

4. 7. 2 Back Stack



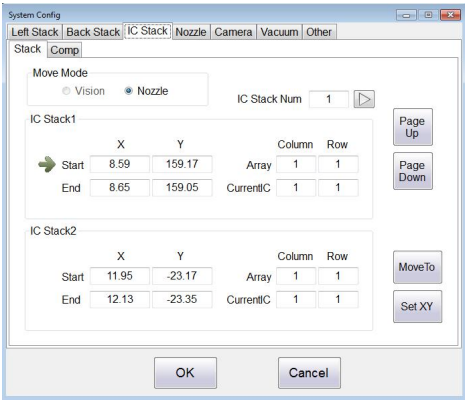
picture4.7.2.1



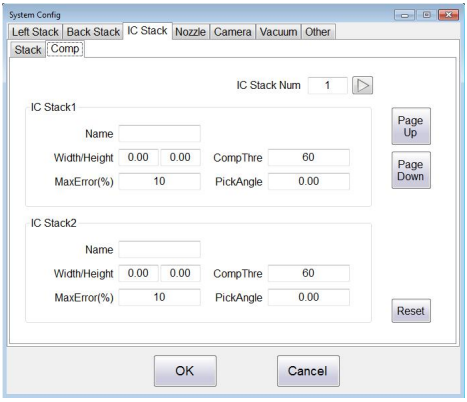
picture4.7.2.2

Same as the "left stack" setting.

4. 7. 3 IC Stack



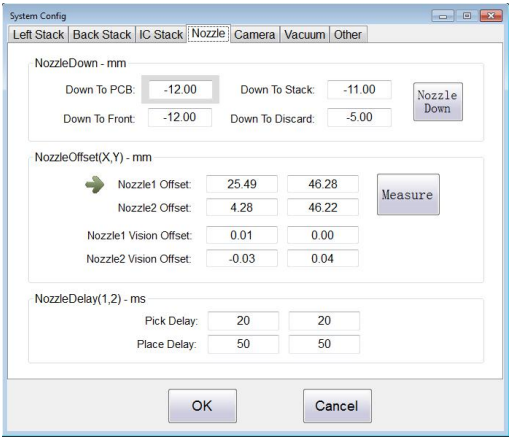
picture4.7.3.1



picture4.7.3.2

it shown as picture 4.7.3.1, picture 4.7.3.2 used in setting bulk material coordinate。

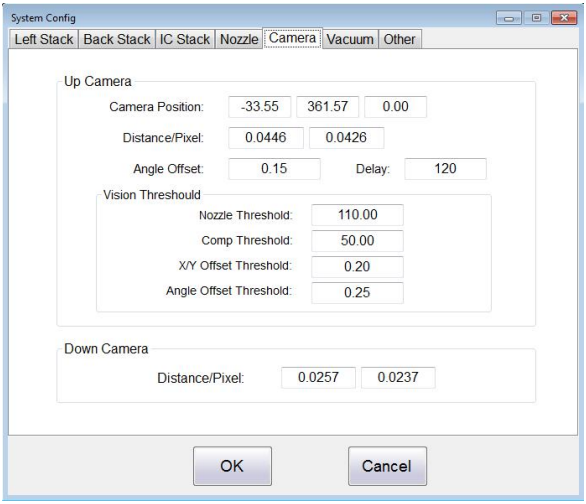
4. 7. 4 Nozzle



picture4.7.4

Name	When to adjust
Down to PCB	Drop too little, increase the numerical, drop too much, decrease the numerical
Down to Front	Drop too little, increase the numerical, drop too much, decrease the numerical
Down to Stack	Drop too little, increase the numerical, drop too much, decrease the numerical
Down to Discard	Drop to the set height and process one throw materials action, needn't adjust this data under the general situation.
Nozzle 1 Offset	No. 1 nozzle take material position is not accurate need modified
Nozzle 2 Offset	No. 2 nozzle take material position is not accurate need modified
Nozzle 1 Vision Offset	the suction nozzle A suction elements incorrect mounted when over visual mounted, then need modify this parameter.
Nozzle 2Vision Offset	the suction nozzle B suction elements incorrect mounted when over visual mounted, then need modify this parameter.
Pick Delay	can't suction the materials up, need increase this value
Place Delay	still happen the situation that material been bring up, need increase this value

4.7.5 Camera



picture4.7.5

"Camera" on above menu column(generally not modify the parameters here), shown as picture 4.7.5, up visual camera:

【Camera position】:means the position of up visual camera, the users needn't modify when this parameter under the normal situation.

【Distance/Pixel】:means the ratio between the actual moved distance of machine and the camera discriminated distance

【Angle Offset】:has angle deviation when the chips mounted well, need adjust this parameter

【Delay】:under the situation that over visual mounted, the shooting tableau occur image pull appearance, need increase this value when the shooting tableau occur image pull appearance

【Nozzle Threshold】:this debugging parameter when leave factory

【Nozzle Threshold】， this debugging parameter when leave factory

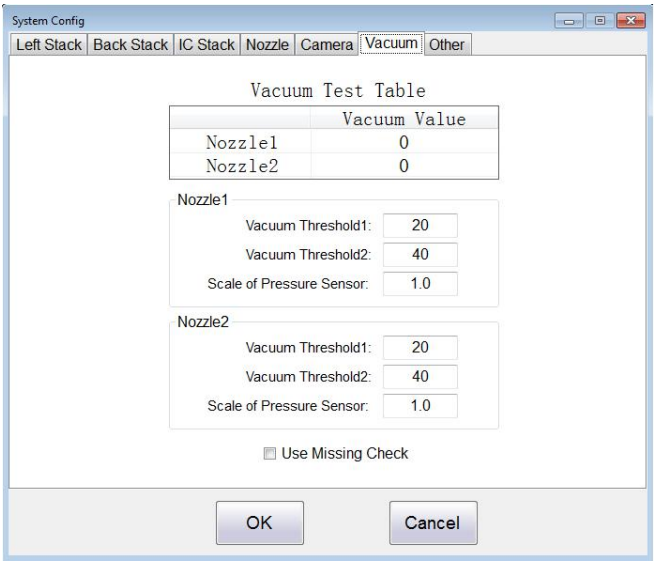
【Comp Threshold】： when over vision but identify poor need modification

【X/Y Offset Threshold】，means the vision calculated value difference of the distance at direction X and Y when over vision

【Angle Offset Threshold】"，means the vision calculated value difference of the angle at direction X and Y when over vision

【Distance/pixel】means the ratio between the actual moved distance of machine and the camera discriminated distance

4. 7. 6 Vacuum



picture4.7.6

Vacuum parameters: picture 4.7.6, under the suction nozzle 1 and nozzle 2

【Vacuum threshold 1】equal to 200, 【Vacuum threshold 2】 equal to 400,

means that, the value smaller than 200 when suction nozzle A finish the material suction process, this means not suction material, needn't process the throw material action, directly suction one time,

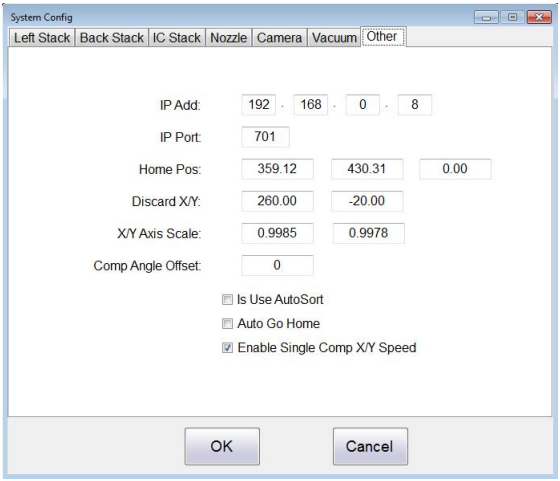
If the value among 200 and 400 then means bad material suction, nee suction material again after process the throw material action again.

If value bigger than 400 then means material suction correctly and process the mounted action.

【Scale of Pressure Sensor】this debugging parameter when leave factory, the clients needn't attention it.

【User Missing Check】if not making tick then means that closed the pressure measure function, so all will process the mounted action no matter whether suction material.

4.7.7 Other



picture4.7.7

"Other", shown as the picture 4.7.7.

【IP Add】and【IP Port】: this is the communication address, strictly forbid users modify it.

【Home Pos】: modify this parameter then will modify the whole coordinate system, the user needn't modify under the common situation.

【Discard X/Y】: the user can select the suitable wastage coordinate according to the actual situation.

【X/Y Axis Scale】: it means the scale between system display the walked distance and actually running distance.

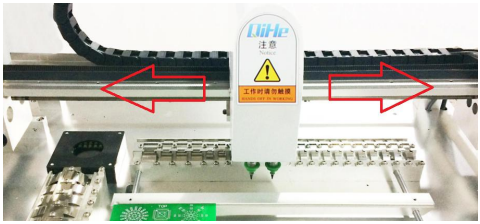
【Is Use AutoSort】improve the working efficiency. System default ticking. The users can select not ticking according his own operating habit.

【Auto Go Home】: the system will automatically back to original and recheck the coordinate after finish 5 times mounted.

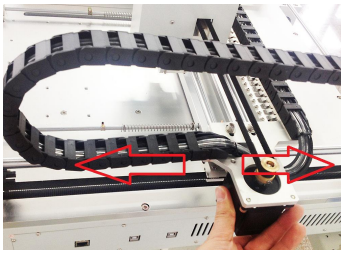
【Enable Single Comp X/Y Speed】: elements speed affect the speed of axis X/Y/Z of this element after ticked. elements speed only affect the speed of axis Z of this element if not ticked.

5 Must reading before use

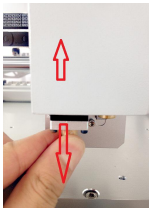
5.1 Test mechanical structure



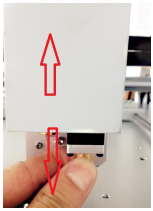
picture5.1.1



picture5.1.2



picture5.1.3



picture5.1.4

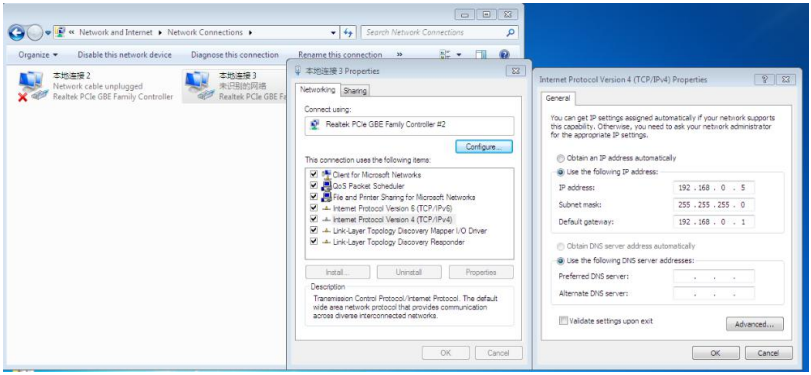
picture5.1.5

Shown as picture picture5.1.1，picture5.1.2，front, back, left and right slowly move, check whether shaft X and Y are smoothly.

Shown as picture picture5.1.3、picture5.1.4， up and down move the suction nozzle A and suction nozzle B, check whether they are smoothly.

Place the machine according to the picture 5.1.5, check whether the gap in the two circles in the picture are in accordance with the picture in the disk. If not uniformity, the details check content in 8.6.

5.2 Connecting machine



First step: use the internet wire which provided by us to make this equipment connect with the computer.

Second step: modify the IP address of computer, the detail operating method as below, find the internet icon on the desktop then right click the attribute and open one window, find the “Modify the adaptor setting” at the left tree type catalog, confirm enter into and find “Local connect”, then right click attribute, select “Internet agreement version 4(TCP/Ipv4)” after confirm enter in, then click attribute and enter into one new dialog window. Select “Use the below IP address”, IP address (I):192.168.0.9; subnet mask(U):255.255.255.0; default gateway(D):192.168.0.1. Then select the “Use the below DNS server address”, click confirm finally, and close all windows.

Third step: open power supply key.

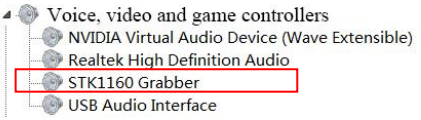
Fourth step: open Emergency switch.

Fifth step: double click the provided software of our company then can control this equipment.

5.3 Connect the camera

As shown on the left, connect one end of the video cable to the device and the other end to the USB port. Then on the basis of 5.2, to install the video driver.

The first step: in the USB disk to find the folder as "USB DVR Capture", and then follow the path "USB DVR Capture> Drivers> Setup", double-click Setup to complete the installation. The second step，test whether the driver is installed，open ”My Computer”、“ Device Manager”。See if it's shown 【 STK1160 Grabber 】 in the red box on the right。



5.4 Check each function

Need to open this equipment to be manual running mode.

The required test function has, suction nozzle A air pipeline, suction nozzle B air pipeline, suction nozzle A rotating, suction nozzle B rotating, suction nozzle A up and down running, suction nozzle B up and down running, mounted head front, back, left and right running, push needle up and down running, push needle signal, roll up wheel motion

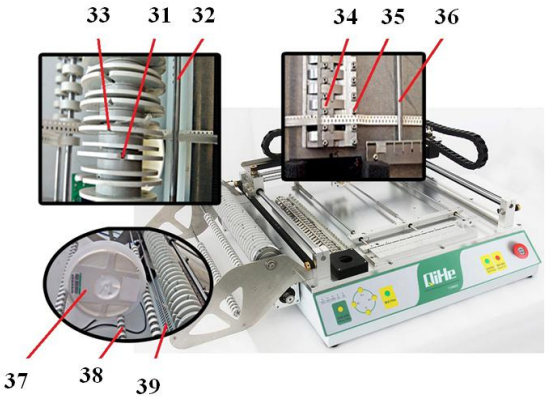
X+X- limit position signal, Y+Y- limit position signal: press the limit position sensor 14, Y+ limit position; 15, Y-limit position; 17, X+ limit position; 19, X-limit position), host computer software will send out impact limit position alarm, close the alarm then OK.

Vision tableau shifting, two tableau can normally shifting then OK.

this equipment check finished, each function completely well and can normally operating and running.

6 Necessary skills before mounted

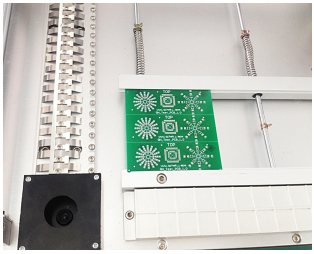
6.1 Material tray installation



picture6.1

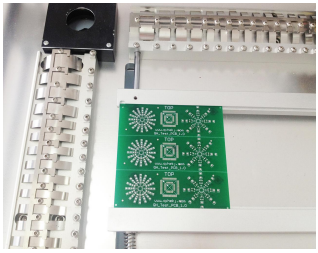
Shown as picture 6.1, place the material tray 37 among three fix position shaft 38, draw the material belt through under the shaft 39, pass through material shed 34successively, fix position the down of screw 35 and pass through shaft 36, negative direction draw the Nylon on the material belt, pass through shaft 33 then fixed in the roll up wheel's V-type groove 31, adjust the damp of roll up wheel through adjust the tension screw which in the U-type groove32, the above are material feeding process.

6.2 PCB board installation



picture6.2.1

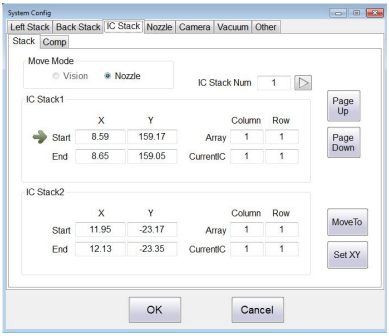
The installation method of 802A PCB board。



picture6.2.2

The installation method of 802B PCB board。

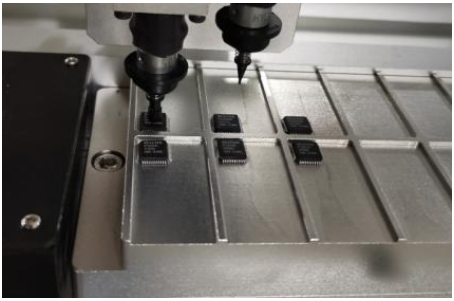
6.3 front stack coordinate setting



In the actual mounted process, some materials are bulked, now need use the function of front stack. The picture 6.3.1 is the setting interface of front stack's coordinate, from tray 1, tray 2....to tray 30, this means can set 30 types different bulk materials.。

All coordinate need be checked by suction nozzle A.

picture6.3.1



picture6.3.2

picture6.3.3

We need set the coordinate of 6 pieces chips in the picture 6.3.2:

First step, manually running, move the suction nozzle to the face up of first IC(Shown as picture 6.3.2), in the computer, move the cursor to the picture 6.3.1, tray1 is the original position, then click set the current then automatically generate the original point coordinate.

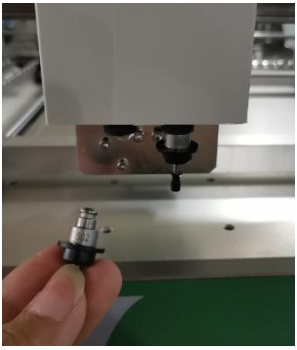
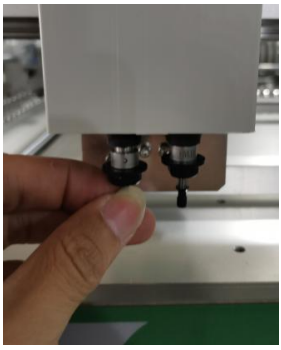
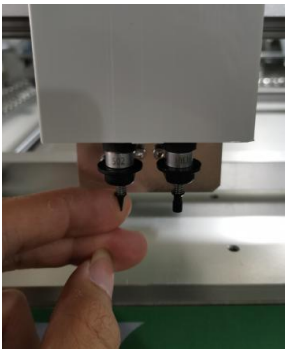
Second step, move the suction nozzle to the face up of the final IC(Shown as picture 6.3.3), in the computer, move the cursor to the picture 6.3.1, tray1 is the original position, then click set the current then automatically generate the final point coordinate.

At the row of array, input "3" and "2", means has three chips at X direction, two chips at Y direction.

finally click confirm then finish the coordinate setting of this chips.

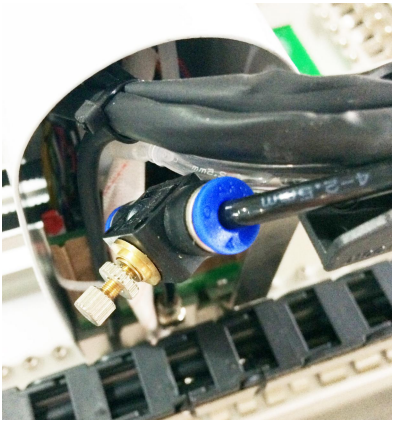
"Current position" means the next will suction position of suction nozzle.

6.4 Renewal suction nozzle

Shown as the above three pictures, plug out directly or plug in then finish renewal suction nozzle.

6.5 Adjust the air blow volume



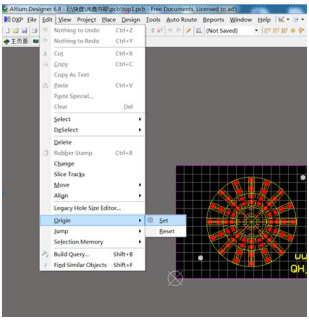
Shown as left picture, 22 is the air blow adjust valve, it locate at back of mounted head. The air blow adjust valve formed with adjust button, lock nuts and cave body. When adjusting, first loosen the lock nut then twist the adjust knob, clockwise rotating is reduce the air blow volume, anticlockwise rotating change to increase air blow volume, the users adjust the air blow volume according to actual situation.

6.6 Coordinate lead out

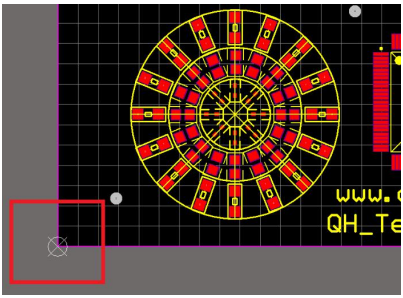
Currently we only support the derived coordinate documents by protel, Altium Designer（DXP）, Pands, Candes and proteus, the format is ".CSV",。

6.6.1 Original point fix position

Shown as picture 6.6.1, “Edit” select “Origin” in the drop down menu then click “Set”; then select the down left corner of circuit board as original point(shown as picture 6.6.2), then can process the derived coordinate step.



picture6.6.1

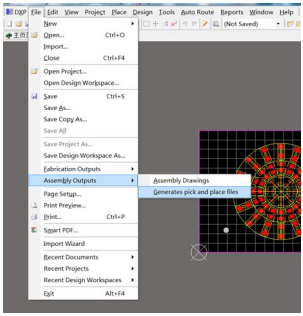


picture6.6.2

6.6.2 ALTIUM DESIGNER（DXP）coordinate derived

First step: original point fix position.

Second step: shown as picture 6.5.3, left click File-Assembly Outputs-Generates pick and place files, jump out tableau picture 6.6.4, the format select “.CSV”, the unit select “Metric system”, finally left click confirm then finish derived document coordinate. The suffix name of document is “.CSV”, put down the same catalog with the PCB document.



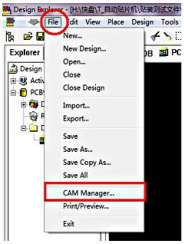
picture6.6.3

picture6.6.4

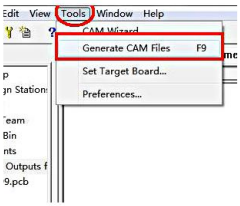
6. 6. 3 Protel99 derived coordinate document

First step: double click Protel99 software, loading the circuit board document which need be mounted, and process original point fix position.

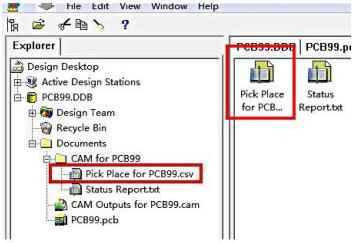
Second step: shown as picture 6.5.6, firstly left click “File”, select “CAM Manager”, then finish derived coordinate according to the steps of picture 6.6.8, then find the documents according to shown in the picture 6.6.6 and picture 6.6.7, one suffix name of document is “.CSV”.



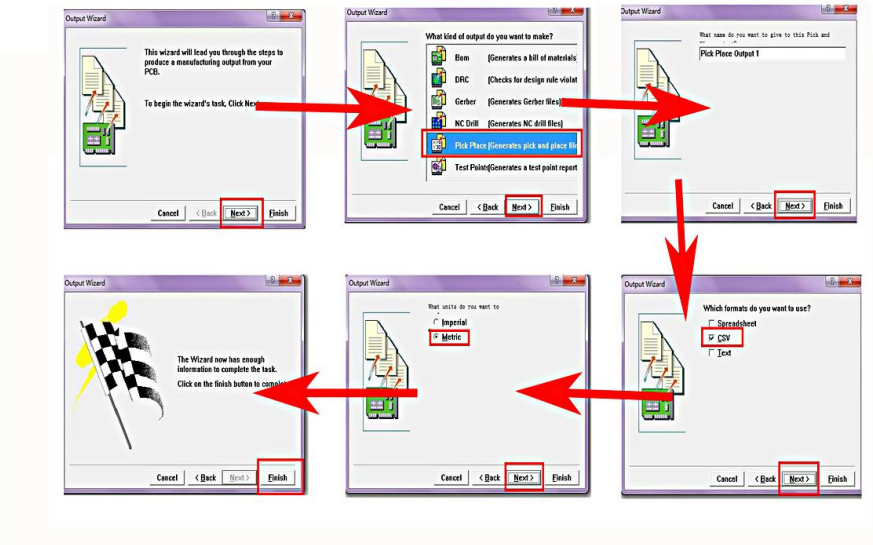
picture6.6.5



picture6.6.6

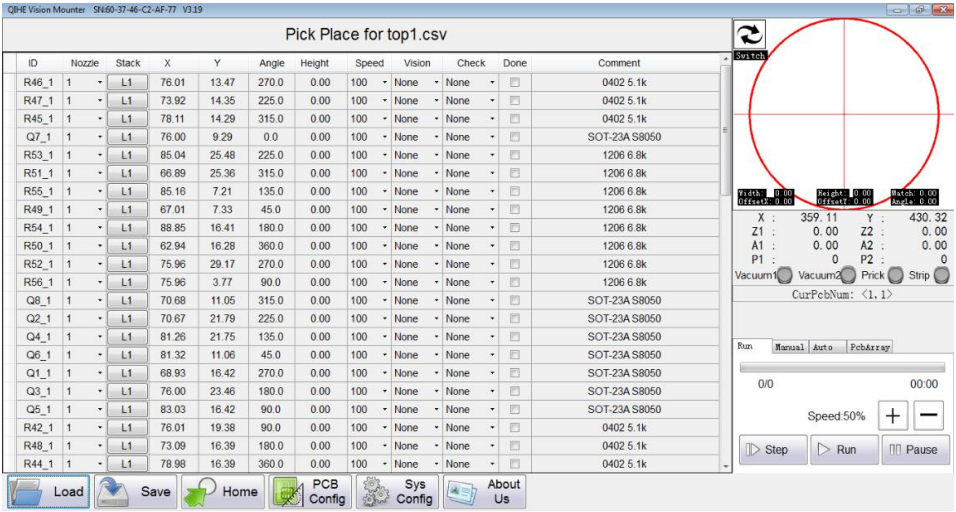


picture6.6.7



picture6.6.8

6.7 Load file and Programming



picture6.7.1

First step：

Shown as picture 6.7.1，load the file。

the operation need operated by users：

delete the directly inserted coordinate and the coordinate which needn't be mounted.

Select the corresponding suction nozzle, all are select 1/2 suction nozzle under the normal situation, it means both suction nozzle working at the same time;

select the corresponding stack number, need manually record what material position corresponding what chips when install user's material tray;

modify the angle, maybe caused angle difference 180° because different package, need check carefully at the chips which have requirements at direction;

Select speed, here's speed means the speed of single element;

Height, fill according to the actual height of chips, the height of electric resistance and capacity default as 0, needn't write it.

Vision, to the chips which no higher requirements at precision, can select the fast。the higher precision requirements and more sparse pins chips. need select accuracy.

Material detect method have four types, none, vision, pressure, pressure+ vision.

"None", not advise customer select under this situation,

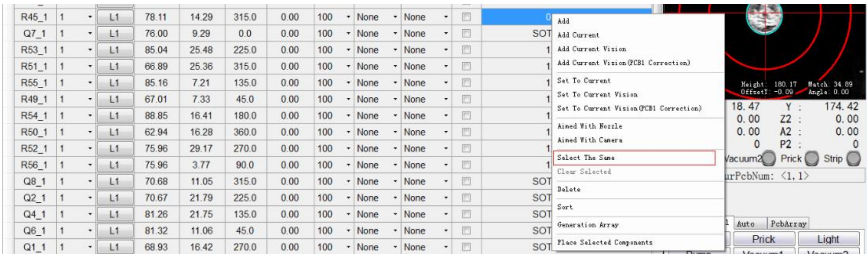
”Vision” , if mounted is pass through vision then use this function.

“Pressure”, if mounted is not pass through vision then use this function.

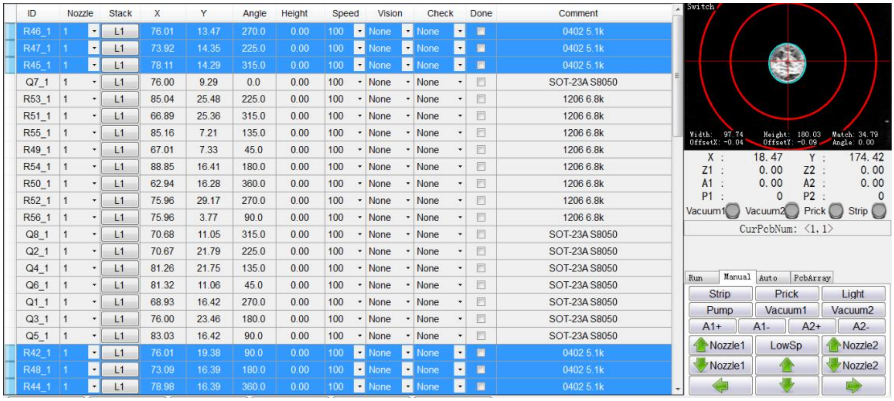
“ pressure+ vision”, means the situation that pressure meet conditions and vision also meet the conditions, judged that material suction correctly then mounted elements.

comment，Describe the components

Note: during the edit, need edit and save at the same to time, avoid happen unexpected.



picture6.7.2

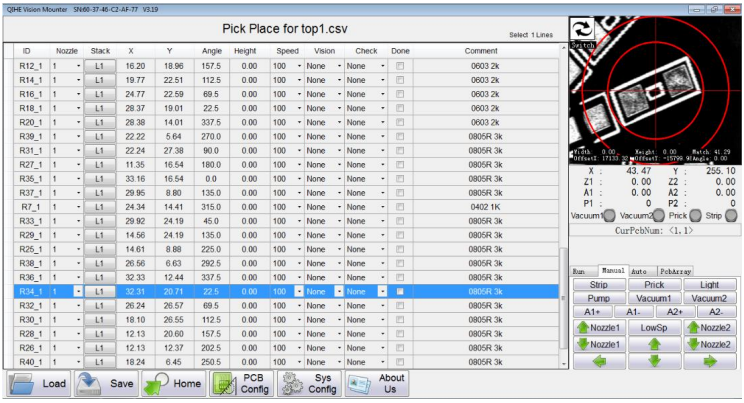


picture6.7.3

Lot edit function, only need select “0402 5.1k” , right click then select “Select the same ”, automatically select the all coordinate information which include in “04025.1k”, we only need edit one coordinate information , the others will automatically edited.

Second step：

Set mark point.

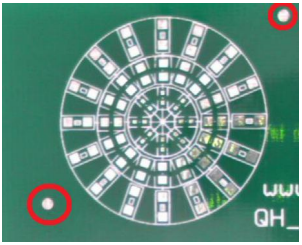


picture6.7.4

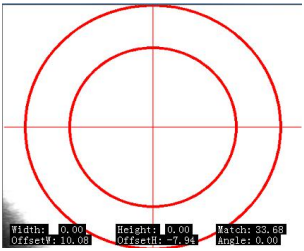
Third step:

Check whether mark point are correct, shown as picture 6.7.4, select the “Coordinate X” or “Coordinate Y” in one elements, right click, “Camera align”, the down vision camera will automatically align the welding tray corresponding to this coordinate information.

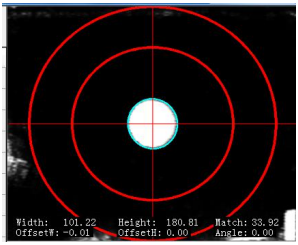
6. 7. 1 Manually write coordinate



picture6.7.5



picture6.7.6



picture6.7.7

No coordinate information：

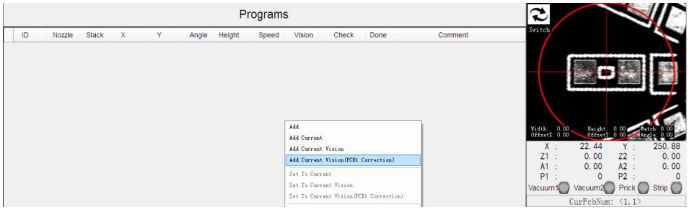
If one PCB board no coordinate document then need manually write the coordinate information.

Sample as the board in picture 6.7.5, the welding tray in two circles means two mark points, the down left corner is mark point 1, the up right corner is mark point 2. The vision window shift to down vision, Click crawl mode, press direction key move to the face top of mark point 1. then open the PCB configuration, tick mark point 1 and click the “Set current” back of actual coordinate 1, then will generate actual coordinate 1, then write the coordinate information of actual coordinate 1 to the picture coordinate 1, shown as picture 6.7.8。Mark 2 is same.

picture6.7.8

picture6.7.9

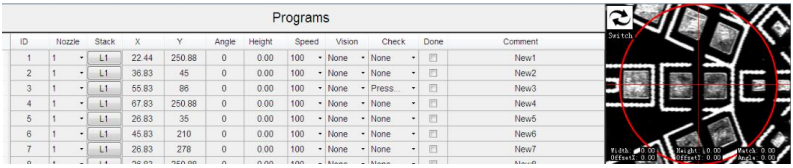
Then press down the confirmation. The mark point set well, then set the coordinate of elements.



picture6.7.10

First step: click crawl mode, then press direction key and move to the face top of mounted position, Note: subject to welding tray.

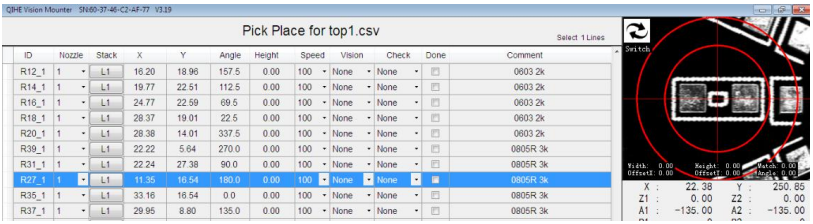
Second step: right click at the blank programming window, select “Add current camera position (Correct circuit board 1), shown as picture 6.7.10. The system will automatically generate the coordinate document shown as picture 6.7.11. and so on, added all coordinate information, then need modify and edit the generated coordinate documents



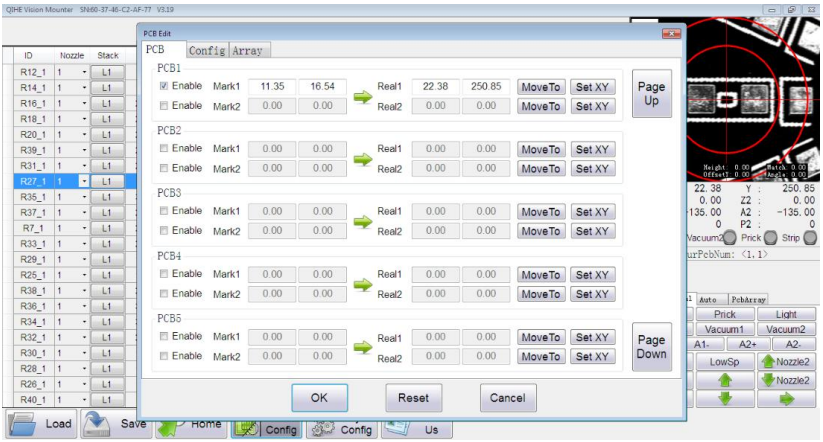
picture6.7.11

Has coordinate information but no mark point information：

First, use the down vision align the center position of one element, observe and record。example, the picture 6.7.12, record the coordinate (11.35，16.54) .



picture6.7.12



picture6.7.13

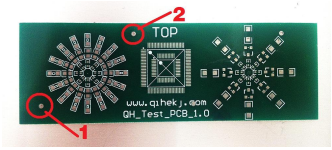
Second step：Fill in the coordinates to mark 1 (11.35，16.54).

Third step：Set X Y in real 1. As picture picture6.7.13

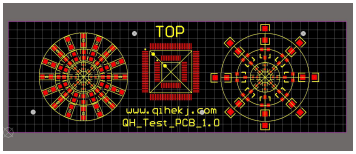
Fourth step: can right click the coordinate of first element to verify whether it is correct, select camera align, check whether it is down vision camera center, whether it align to the center of welding tray.

6.8 Mark point setting

6. 8. 1 One PCB board mounted



picture6.8.1



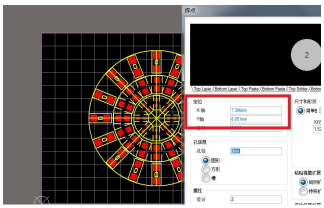
picture6.8.2

Picture 6.8.1 is the trial PCB board which provided by this company

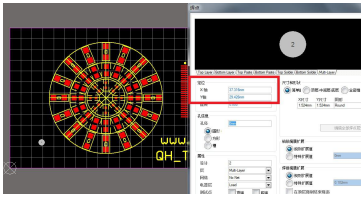
picture 6.8.2 is the PCB document of this type board

The original point of the two circles in picture 6.8.1, also be the mark point 1 and mark point 2.

First step, find and record 2 pieces mark point corresponding coordinate in the PCB document.

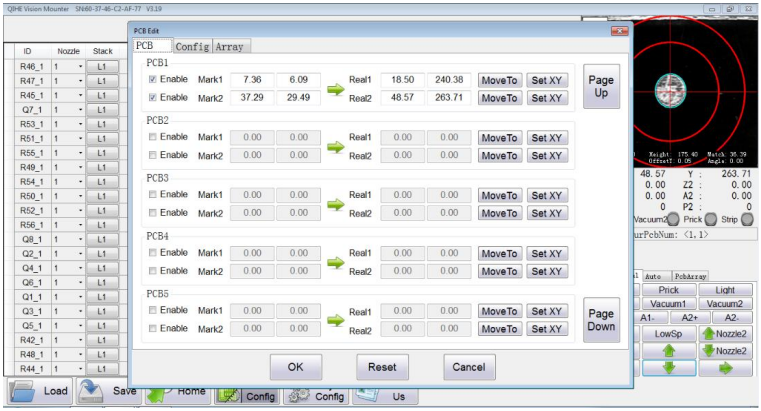


picture6.8.3

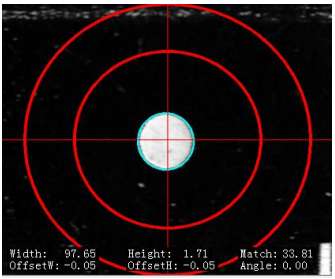


picture6.8.4

Second step、 open the PCB configuration. Input the coordinate of mark point 1 and mark point 2.



picture 6.8.5



Third step, manually move the mounted head, make the down vision camera align to mark point 1, if it is standard mark point and no other element's welding tray disturbed in the camera vision range, roughly aligned , then click the back "Setting current" which back the "Actual coordinate 1", then automatically input the actual coordinate of mark point 1. the same reason, finish input mark point 2

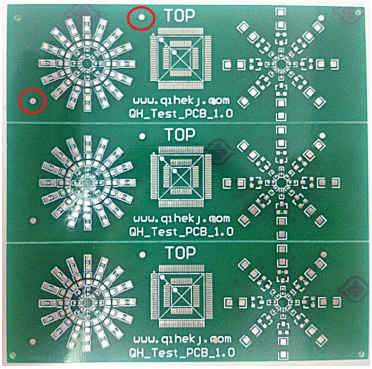
picture6.8.6

Note: after setting well, click confirm first, save the modified content, click save, saved in the CSV document, make ensure that can be used in next time.

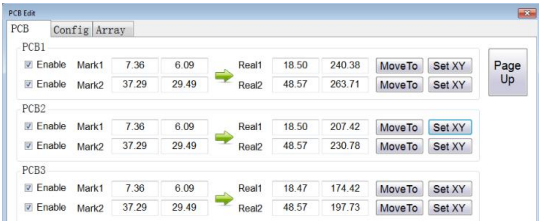
Judge whether mark point input correct or no: the X coordinate of two mark point picture

coordinate subtract approximate the X of actual coordinate subtract. the Y coordinate of two mark point picture coordinate subtract approximate the Y of actual coordinate subtract.

6.8.2 PCB



picture6.8.7



picture6.8.8

We use picture 6.8.7 as sample set three PCB board mounted.

We need tick “Mark1、Mark2、Mark 3”

First step: set PCB1 mark point.

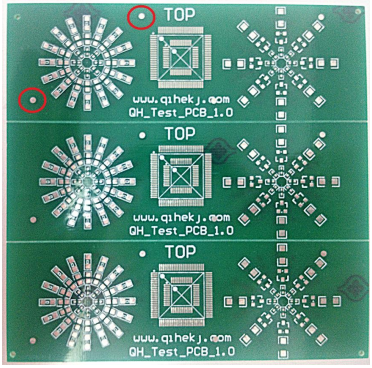
Second, tick the PCB2 and PCB3 mark 1 and mark 2

Third step: manually input the picture coordinate, the picture coordinate of three circuit board are same.

Fourth step: manually move the mounted head to make the down vision camera align the all mark point

Finally click confirm then can finish the mark point setting of three PCB board mounted, save documents.

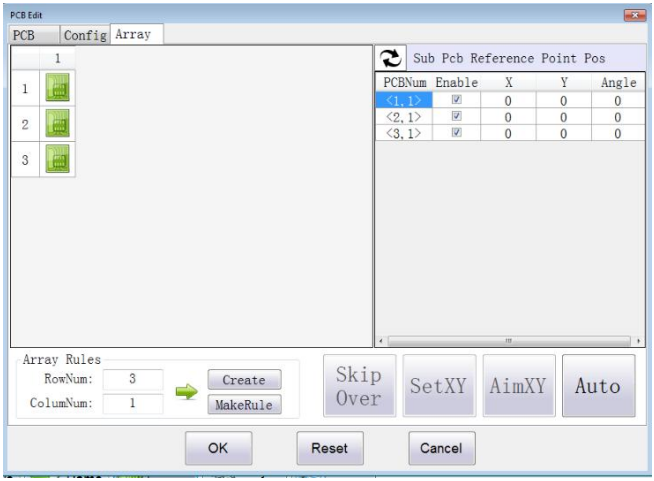
6.8.3 Array



picture6.8.9

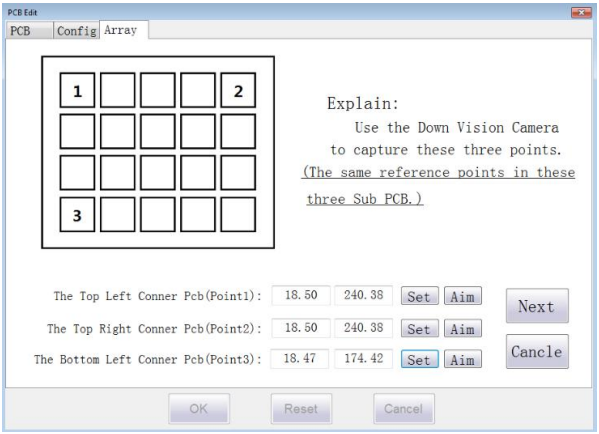
We use the picture 6.8.9 as sample to set three PCB board mounted.

First step: first set mark point.

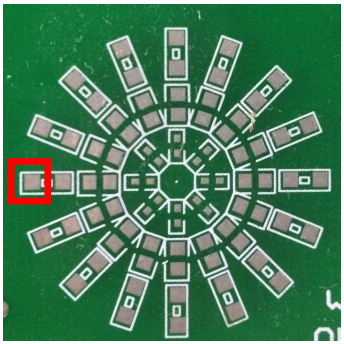


picture6.8.10

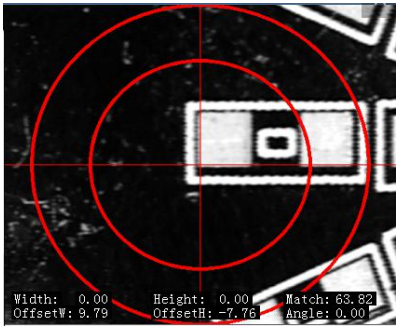
Second step, shown as the picture 6.8.10, click ①PCB board mounted array, edit the PCB board mounted interface. ②input the row number and column number according to the actual situation, according to shown in the sample of 6.8.9, because, here we input row number 3 and column number 2. ③Click to generate the array button then will occur picture 6.8.10 ④ Click interval distance measure, enter into the tableau of picture 6.8.11to set.



picture6.8.11



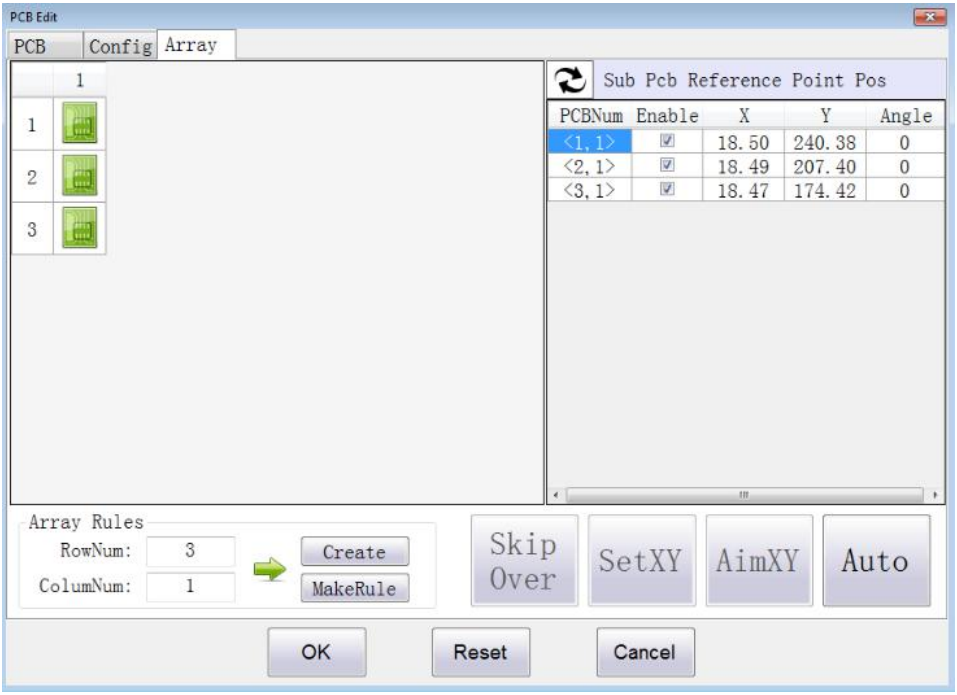
picture6.8.12



picture6.8.13

Third step, need gather the same point of corresponding sub board. We use the picture 6.8.12, left down corner of this welding tray in the red square frame as reference point(note: must use the welding tray as reference point). ①manually move the mounted head, make the down vision camera align this reference point of NO.1 sub board, shown as picture 6.8.13. Click the setting back of [Reference point coordinate of NO.1 sub board], this coordinate automatically generated. ②manually move the mounted head, make the down vision camera align this reference point of NO.2 sub board, click the setting back of [Reference point coordinate of NO.2 sub board at X direction], this coordinate automatically generated. (Note:No.2 sub board at the same row of NO.1 sub board.)③ manually move the mounted head, make the down vision camera align this reference point of NO.3 sub board, click the setting back of [Reference point coordinate of NO.3 sub board at Y direction], this coordinate automatically generated. (Note:No.3 sub board at the same row of

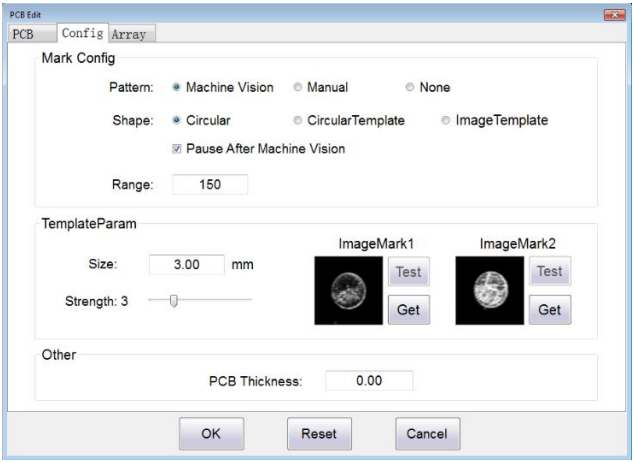
NO.1 sub board.). The result of setting shown as picture 68.12 then click confirm and return. Can find that, the parameters in the right square frame of picture 6.8.10already changed (Shown as picture 6.8.14).



picture6.7.14

The fourth step, check whether all generated coordinate position correct or not. One by one select the mounted number <1,1>, <1,2>....click camera aligned, check whether the center of camera align to the reference points, aligned means that parameters are correct. If not aligned then manually move mounted head till aligned, then click set current. Click confirm then save documents.

6.8.4 Mark point discriminate mode



picture6.8.15

Mark point discriminate mode divided into【Machine Vision】,【Manual】 and【None】, shown as picture 6.8.15.

【Machine Vision】: down vision camera will automatically running up of mark point, automatically calibrate the error and make the centering of camera align to the center position of mark point.

【Circular】: mark point must be the round welding tray.

【Circular Template】: under the mode, the system will automatically generate one green round to mate the mark point

【Size】make the diameter of green round which generated by system same to the diameter of mark point.

【Image Template】: the users need to make the camera move to the center of two mark points respectively, then click overshot, then can obtain the images of two mark points. Discriminate mark point will discriminate according to the overshot images after select this mode

【Size】affect the size of overshot images.

【Strength】are 1-10 respectively. More small value more lower required image mating ratio.

【Pause After Machine Vision】: if ticking, will suspending after finish discriminate one mark point under the automatically discriminate, waiting manually confirm whether correctly

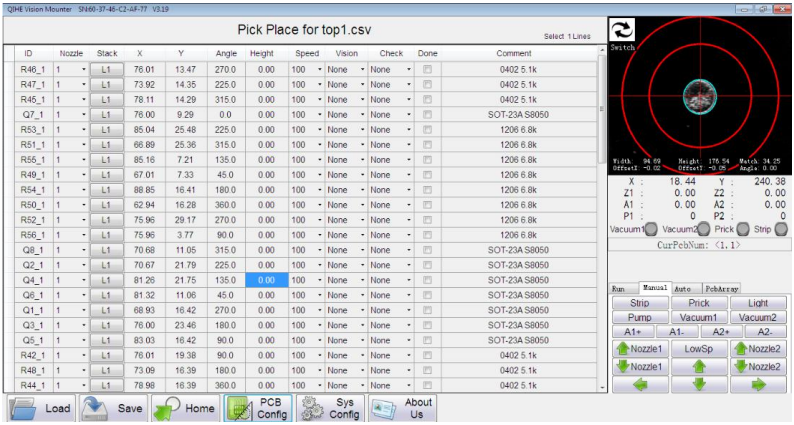
discriminate correct at this mark point, then manually process the next discrimination. if not ticking, will process next mark point discriminate no matter whether this mark point is correct after finish discriminate one mark point under the automatically discriminate.

【Range】： more smaller value means more smaller valid vision range, the range of circuit board allowed placement error.

【Manual】: the camera on the top which down view will running to the up of mark point under the manually operating, manually correct error, make the center of camera para-position and align the center position of mark point.

【None】: no higher mounted precision but higher required efficiency, this situation can select this mode.

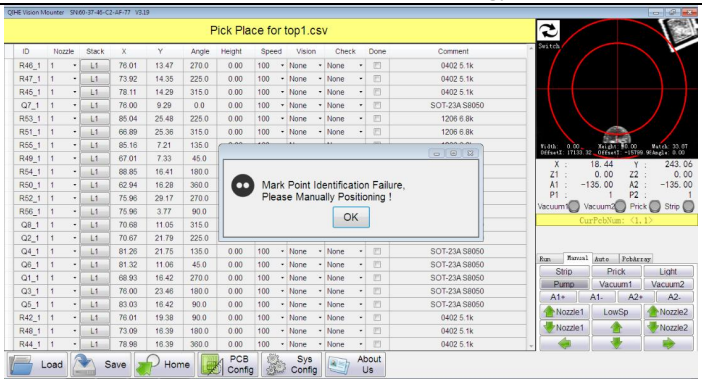
6.8.5 Mark point discriminate operation



picture6.8.16

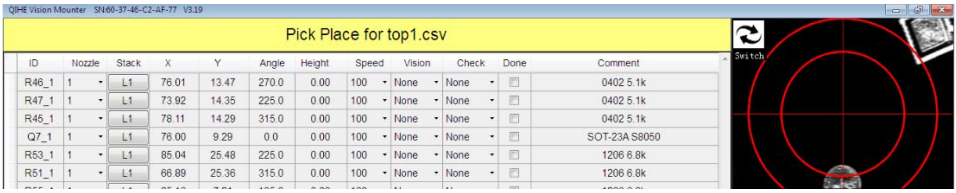
Machine Vision：

One time hand press step key, mounted head will come to discriminate mark point 1, shown as picture 6.8.16, if green at square frame then means still in discriminating, the users needn't operate it, if the square frame change to be yellow, the "Cross center" in down vision image and center position of welding tray's circle dot center position aligned, this means this mark point finish discrimination, then press single step to process mark point 2 discrimination, finish discrimination then can press "Single step" or "Continue" process mounted.



picture6.8.17

During the process of discriminate mark point, alarm voice sounding, indicate that mark point discrimination failed, shown as picture 6.8.17, explain that automatic discrimination this mark point failed, need manually operating, we only need press down the confirm in the picture 6.8.19, close the alarm then press the direction key on 50(direction control key), control the mounted head motion(attention the speed shift to the crawl mode) to make the “Cross center” in down vision image and center position of welding tray’s circle dot center position aligned (note: it’s center of welding tray, not center of expanding hole) press single step then can process next mark point 2 discrimination.



picture6.8.18

Manual：

One time hand press step key, mounted head will come to discriminate mark point 1, shown as picture 6.8.18, if yellow at square frame then means that we need manually adjust it ourselves, press the direction key on control key, control the mounted head motion(attention the speed shift to the crawl mode) to make the “Cross center” in down vision image and center position of welding tray’s circle dot center position aligned, (note: it’s center of welding tray, not center of expanding hole), press single step then can process next mark point 2 discrimination.

None：can select no discriminate if no higher requirements at precision and to

improve the produce efficiency.

7 Test the PCB board

Our company provided one trial mounted PCB board to customers, the PCB board has positive and negative surface.

The user can directly use CSV document to mounted.。

mounted process：

First step, the place of PCB board and installation of material tray.

Second step, open the PCB document of PCB board.

The third step, set original point.

Fourth step, derived the coordinate document.

Fifth step, load the coordinate documents.

Sixth step, set mark point and save.

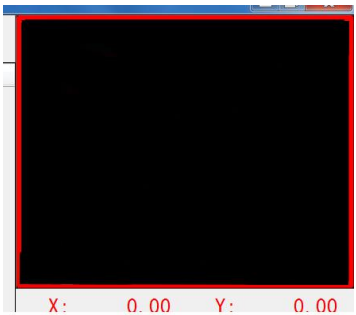
Seventh step, edit the procedure.

Eighth step, single step trial running.

Ninth step, mounted formally.

8 Common failure

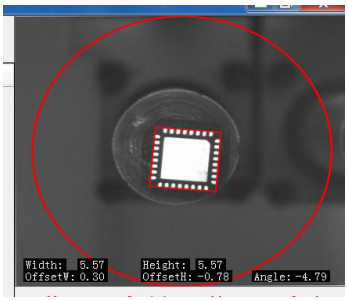
8.1 Camera can’t discriminate



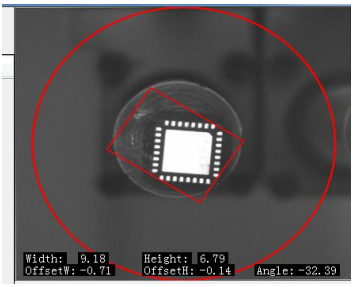
Shown as right picture, the video window are dark, no circle ring and cross, this means video wire not connected well, or drive isn’tinstalled well.。

The file folder named “USB DVR Capture” in U disk, then double click Setup according to path “USB DVR Capture＞ Drivers＞Setup”, unload the software, one time re-install again .

8.2 Incorrect discrimination of chips



picture8.2.1



picture8.2.2

During the mounted process, sometime will find that the effect of pass through the vision will be more bad, and more inclined, this is caused by the error chips discrimination, the picture 8.2.1 is discrimination correct, the picture 8.2.2 is discrimination wrong.

Note, can't has light source above this equipment.

We need adjust "Component threshold" the max of this value is 99.

8.3 Calibration of stack coordinate calibration

Calibration of left stack:

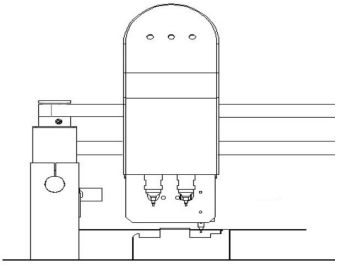
If it is X direction incorrect of all stacks, adjust "System setup", "Other parameters", "Left push needle deviation", the "X" value in the front one square frame.

If it is X direction incorrect of individual stacks, adjust "System setup", "Left stack", select the corresponding stack number, "Push needle revise" the "X" value in the front one square frame.

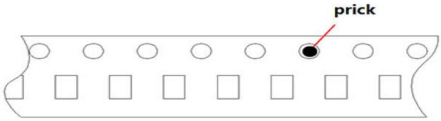
If it is Y direction incorrect of stacks, adjust "System setup", "Left stack", select the corresponding stack number, modify the coordinate value of Y then OK.

Calibration of back stack : is same left stack

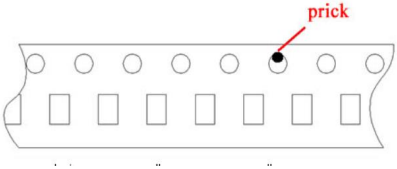
8.4 Push needle blocked



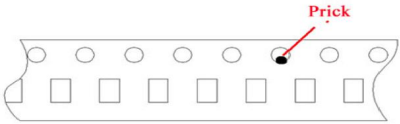
picture8.4.1



picture8.4.2



picture8.4.3



picture8.4.4

Left stack:

Under the premise that material suction position is correct, single step running, running to the position where shown in picture 8.4.1, observe the position of push needle.

The picture 8.4.2 shown the position of push needle insert in the material band holes are correct.

The picture 8.4.3 shown the up position of push needle nearby the band holes, if all stack all are at the same position, “System setup”, “Other parameters”, “Left push needle deviation”, “Y” value in the back square frame, this value should be reduced, the range of each time reduce is 0.05. If only individual stack, “System setup”, “Left stack”, “Left push needle revise”, “Y” value in the back square frame, this value should be reduced, the range of each time reduce is 0.05.

The picture 8.4.4shown need to increased

Also has another situation, material blocked obviously when more small materials, or it is paper roll up tray (example M7 package), then need process the next operation, shown as picture 8.4.5.

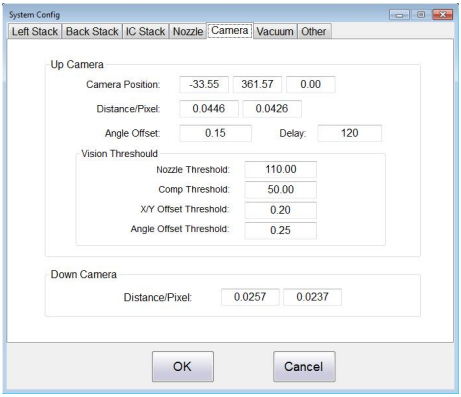
picture8.4.5

8.5 Not accuracy mounted of chips pass through vision

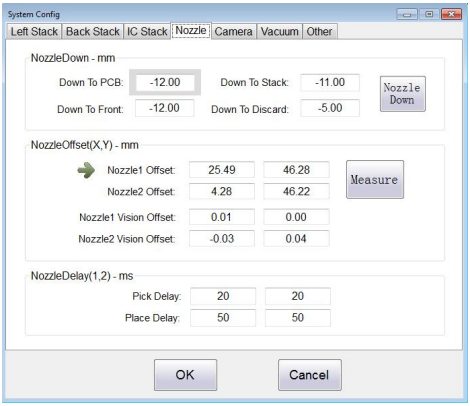
Chips pass through the vision but still not accuracy mounted. Attention to observe the effect of pass through vision, if incorrect discrimination, the details check content in8.2.

Under the premise of correct discrimination, need observe whether the height of chips drop to the PCB board are suitable, the PCB board has obvious deformation when drop to the PCB, this means that too big height of drop to the PCB board, check whether the height of chips in the procedure are correct, also can modify the value in “Drop to the PCB” under the premise of that other electric resistance and capacity and chips all can be mounted.

The user can micro adjust under the premise that last all are correct.



picture**8.5**.1



picture8.5.2

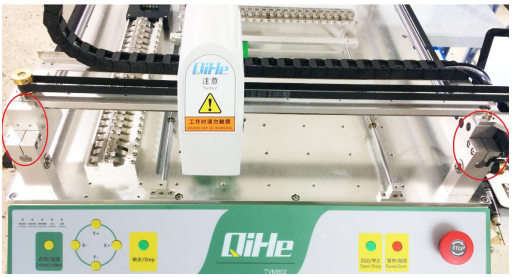
Open “Camera parameters” , shown as picture 8.5.1, if angle has deviation when mounted the chips then adjust “Angle deviation”, if chips need anticlockwise rotating then increase this number, conversely, then reduce this value.

If the mounted X direction of suction nozzle A has deviation when mounted the chips, then adjust the value in front square frame of [Suction nozzle 1 up vision camera deviation] shown as picture 8.5.2, the chips need move to left, then add this number, conversely, then reduce this value.

If the mounted Y direction of suction nozzle A has deviation when mounted the chips, then adjust the value in back square frame of [Suction nozzle 1 up vision camera deviation] shown as picture 8.5.2, the chips need upward move, then add this number, conversely, then increase this value.

Has error when suction nozzle B mounted, then adjust [Suction nozzle 2 up vision camera deviation], the method same as above.

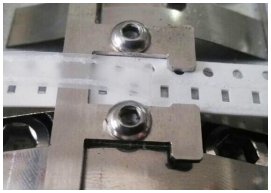
8.6 Tooth jump



Place the machine as the position of left picture, check whether the gap in two circle rings are unanimous with your picture in the disk. If not unanimous then means happen tooth jump appearance.。

The tooth jump caused one side gap more bigger than the gap at another side. What users need to do are that, take a tool like screw driver and put into the seam at smaller gap, tightly clamped, force to back break off to the bigger gap side, then will heard one sound “KA”, this means that adjust the gap well then contrast with the picture then OK.

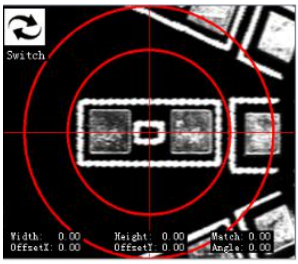
8.7 Nylon band can’t be separated in time

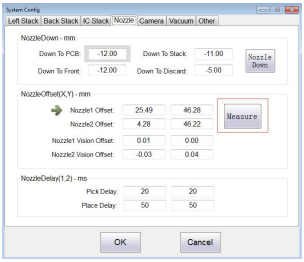


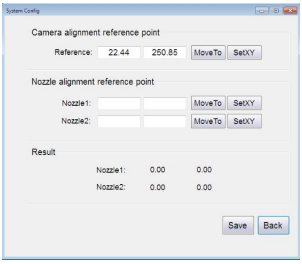
When occur that Nylon band can be separated on time(shown as left picture) then means no enough friction force on the roll up wheel of this stack, we need increase friction force. Note: 1. another reason occur this situation is that nylon material band not roll up on the roll up wheels correctly, but blocked between both roll up wheels, now, only need push the nylon material band to the roll up wheel then OK. Nylon band need the smooth surface face to the polish rod, reduce the friction force. After long time used, the material tray will tension and caused the push needle block material, need use hand loosen the material tray, a little thick plastic parts need use hand to press flat the tablet compressing.。

Shown as left picture, use the 1.5mm hexagon screw driver which provided along the machine, clockwise tighten the needle on the roll up wheel which corresponding to the stack, use hand rotating the roll up wheel when twisting, feeling the friction force, note: the friction force of roll up wheel not better to be more big, more big will affect the working life of roll up wheel. Or broke the nylon band.

8.8 Suction nozzle





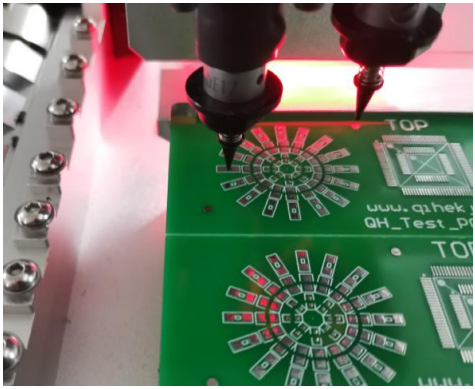


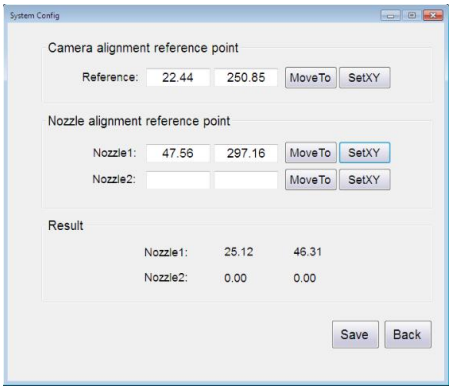
1 2 3

First step, use the down vision camera align to the center position one element coordinate.

Second step, click measure.

Third step, click setcurrent setting, seize the current camera coordinate.





4 5

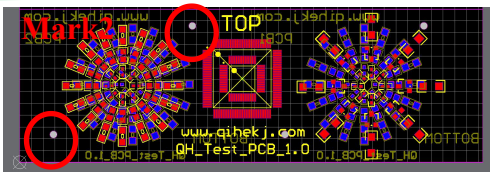
Fourth step, move the nozzle to center position of elements.

Seventh step, make the suction nozzle at the center position of elements. Eighth step, setting current after clicked suction nozzle 1, seize coordinate.

【Nozzle 1 Vision Offset】Parameter automatically revised. One time repeat this process, confirm whether modify are correct. If correct then click save then OK.

【Nozzle 2 Vision Offset】The method same as above.

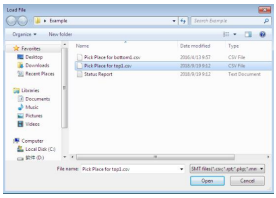
8.9 Derived the back coordinate of circuit board



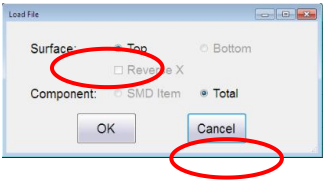
picture8.9.1

Shown as above picture, PCB document include top layer coordinate and bottom layer coordinate. The original point set at the down left corner. Mark1(7.3，6)，Mark2(37.3，29.4).

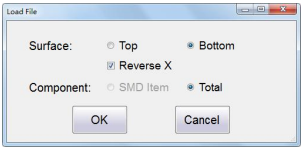
The first step, derive coordinate。



picture8.9.2



picture8.9.3



picture8.9.4

The second step, load documents, shown as picture 8.9.2, click Load, select the derived coordinate documents, click open. If mounted the positive surface, shown as picture 8.9.3, select and click confirmation. If mounted negative surface, shown as picture 8.9.4, select and click confirmation.

Note: shaft X direction select opposite, must select.

Third step, set mark point.

Note: the shaft X coordinate of mark point need select opposite when mounted back surface. Shown as picture 8.9.1, Mark1(7.3， 6), Mark2(37.3， 29.4), but when mounted at the back, Mark1(-7.3，6), Mark2(-37.3，29.4).

The above mounted back surface of coordinate generate method, need strong understanding ability of operators, mainly apply the knowledge at coordinate system, relative coordinate and absolute coordinate.

8.10 Vision detect material lack

picture8.10.1

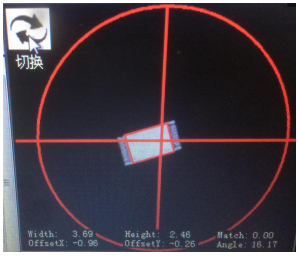
picture8.10.2

Shown as picture 8.10.1, the model of this element is 2010, contrast table 4.7, we know the model of this element is 5mm*2.5mm,

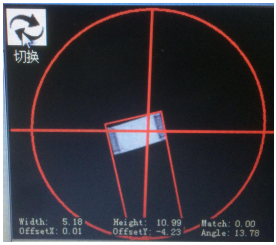
According to the “Error =20” which filled by ourselves(left stack, reference picture 4.7.1.2; the back stack, reference picture 4.7.2.2; front stack, reference picture 4.7.3.2), 2.5*0.2=0.5，5*0.2=1

So, 2.5-0.5≤Width or Height≤2.5+0.5, 5-1≤Width or Height≤5+1

Shown as picture 8.10.2, this is the pattern of pattern of the element pass through, from the picture we can see that, Width=2.49, Height=5.12, if their value in the range then means discrimination correctly, the next step is to mount.



picture8.10.3



picture8.10.4

Picture 8.10.3, Width=3.69, Height=2.46, Width is not in accordance the condition, vision detection, means this material has problem, then will come to throw materials, suction materials again.

Picture 8.10.4, Width=5.18, Height=10.99, Height is not in accordance the condition, vision detection, means this material has problem, then will come to throw materials, suction materials again.

Note: picture 8.10.3 and 8.10.4 vision check the root reason of discrimination, reference the content in 8.2.

9 Preventive maintenance

9.1 Daily maintenance

1、Please check whether the suction nozzle mouth whether happen deformation and abrasion because impacted, and confirm whether inner of suction nozzle has the appearance that blocked.

2、Use the cotton bud add ethyl alcohol clean the dust on the surface of camera, should clean in time if has elements fallen on the surface of camera.

3、Check whether the roll up wheel loosen, whether each fix position shaft loosen.

4、Please keep machine clean. naked eye check whether have foreign matters in machine and material feeding rack, should handle in time if has foreign matters, can use the brush or air gun handle the foreign matters.

9.2 Periodic maintenance

1、Fill oil in rails of shaft X and Y, firstly use the rag remove the old oil grease then add new lubricating grease..

2、Check the XY axis synchronization with no loose, if there is necessary tension.

3、PCB clamping seat optical shaft to remove dust, when necessary coated with Rust-proof oil。

Note：For the industry equipment, please use the socket with grounding protection because the working environment requirements, avoid computer USB has electric leakage or other static electric affect the machine.