7th Generation
High-Speed Pick and Place Machine
User Manual

Manufacturer: Hangzhou NeoDen Technology Co.,Ltd.

Applicable Model: NeoDen7 High-Speed Pick and Place Machine

Version: V1.01

Content

NeoDen7 User Manual

(High-Speed Fully Automatic Pick and Place machine)

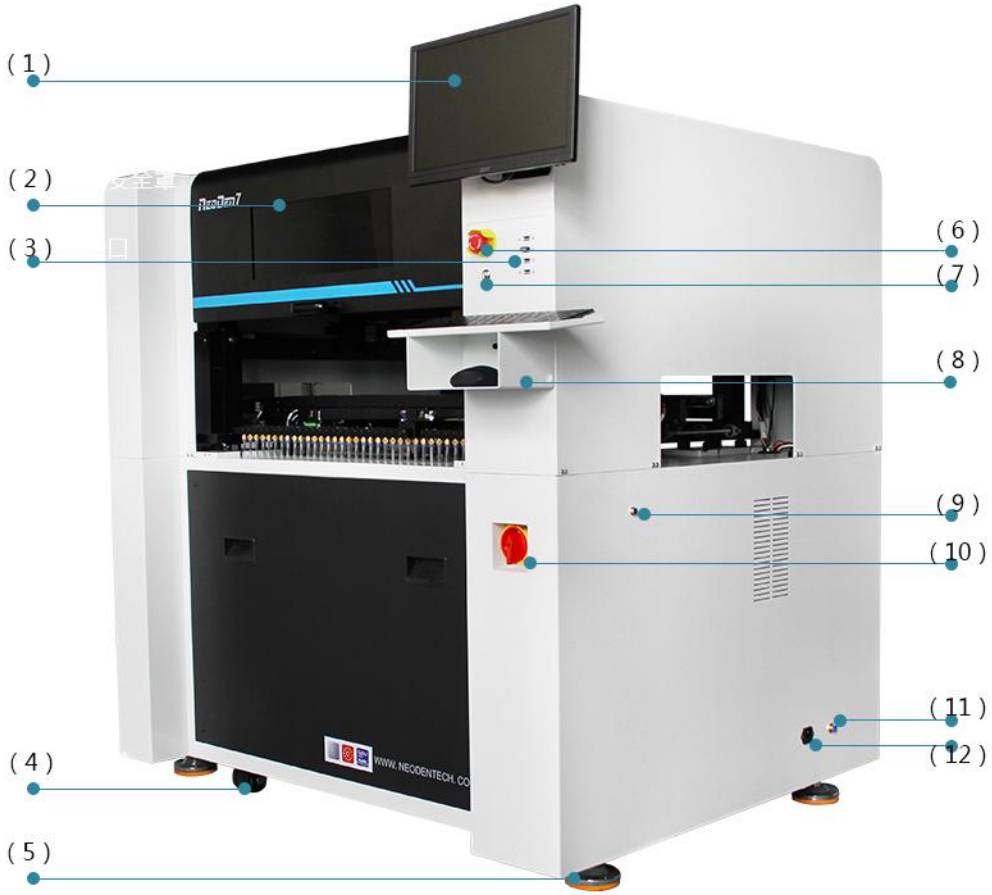
1. Brief Introduction

1.1 Product Introduction

The seventh-generation model NeoDen7(Automatic universal visual pick and place machine) is NeoDen Tech's independent product, with completely independent intellectual property. NeoDen7 has the advantages of fast speed, high accuracy, convenient operation, multiple feeders, high efficiency, stable performance, convenient and simple operation. NeoDen7 features six independent flying HD cameras, one IC alignment camera and one independent fiducial camera, perfectly implements standard mounting of components such as micro-miniature components and fine-pitch IC under the premise of ensuring efficient mounting; NeoDen7 adopts the most stable pneumatic feeder on the market, the advantages are stability, easy replacement, easy installation, quick and convenient tape reel installation, it matching with vision correction system and rail feeding system.

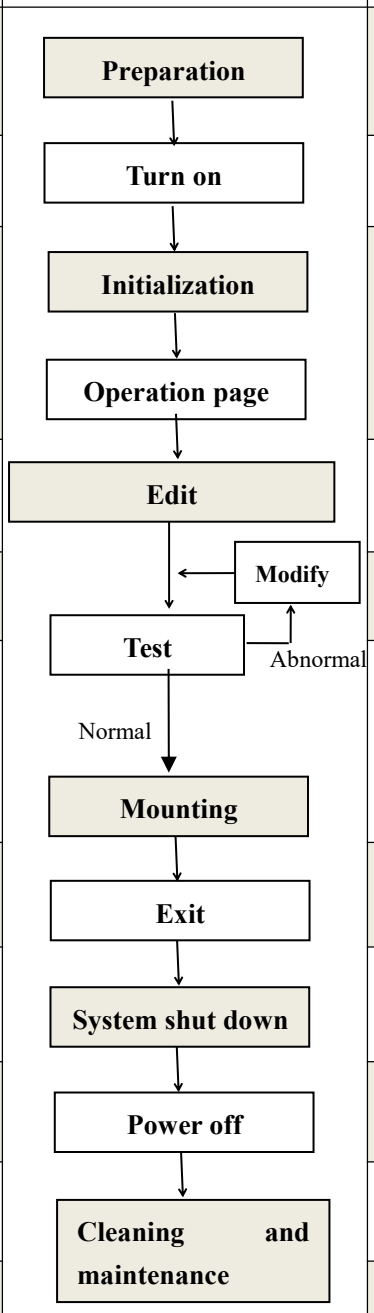
Maximum Board Dimension	630*300mm（1200mm optional)
Number of Heads	Placement head:1 Nozzle:6
Max Tape Feeder Capacity	64(8mm or 12mm feeder)
Applicable tape reel feeder size	8mm,12mm,16mm,24mm,32mm,44mm,56mm
Average Placement Speed	13,500CPH
Vision Number	8(1 fiducial camera, 6 flying cameras, 1 IC camera)
Component range	Smallest components:0402, TQFP, QFN, BGA and other conventional components
Feeder Number	Tape feeder:64
Resolution	X/Y axis:0.01mm, Z axis:0.1mm
Rotation	±180°（360°）
Placement Accuracy	0.01mm
Power Supply	AC220V/110V
Power	500W
Machine Size	1420*1220*1665mm
Air Source	Above 0.6MP

1.2 Structure of NeoDen7

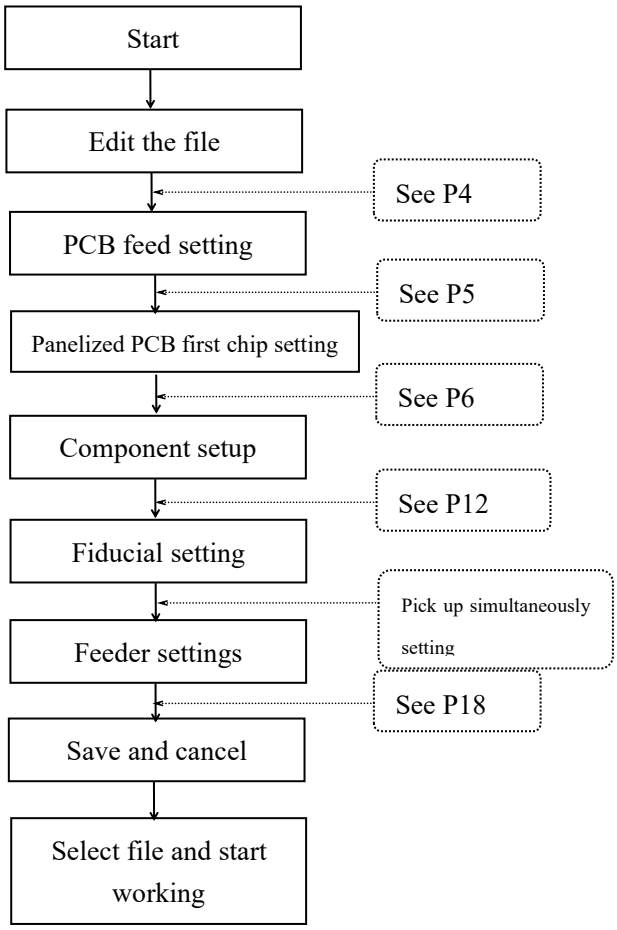


（1） 12 inch high-definition display
（2）Safety cover
（3）USB port
（4）Universal wheel
（5）Heavy load pedestal
（6）Emergency Button
（7）Pause button
（8）Mouse keyboard bracket
（9）Conveyor Port
（10）Power Switch
（11）Air source input
（12）Power port

1.3 Operation flow chart

NO.	Flow chart	Note
1		Checking the working area whether it is safe or not, whether the air source is normally connected and reaches the calibrated pressure value.
2		
3		Click the launcher icons, machine will start self-checking process, you can see the flash board of the up-looking camera is flashing, nozzle start initializing, and XY initializing. After the initialization, machine will go into the software interface.
4		After power on complete, machine will enter the file list interface
5		Please refer to the detailed information on page 4—machine operation introduction
6		After making a programming file, it may exist several programming issues, such as rotation issues of components, so a production testing is necessary for solving issues.
7		Start to pick and place.
8		Production finish, exit.
9		Shut down the system via computer, then power off the machine.
10		Disconnect the electricity supply after the system being powered off.
11		Keep the machine clean, daily maintenance of the nozzles assures high utility.

1.4 Flow chart of making a programming file



Note: The basic procedure of making a programming file by manual programming or import coordinate file is similar, but there are two different parts: component list and fiducial setting. Please find the detailed operation steps of the differences on relative page.

2.Edit on the Operation Interface

2.1 Edit on the Interface

See figure (2.1): On the file list interface, add a file and input the file name, select the file and edit. Or edit the existed file.
Figure (2.1) is the edit interface

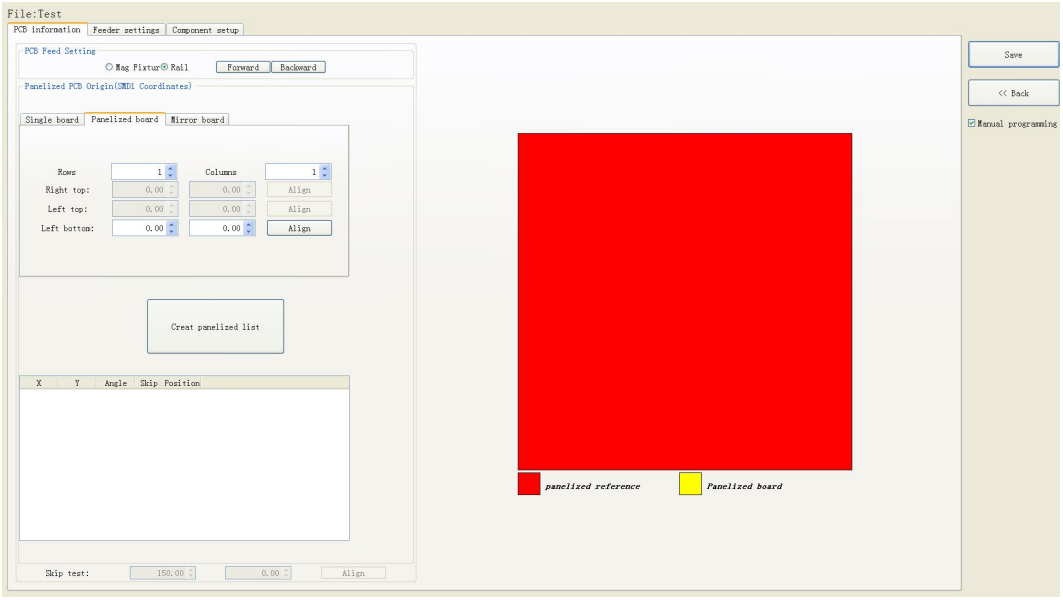


Figure (2.1)

2.1.1 PCB feed settings

Figure (2.1.1)

Function: determine the PCB feed position. On the manual programming mode, it's the primary edit item, see figure (2.1.1)

2.1.1.1 Mag Fixture

When you select "Mag Fixture", the function key of PCB feed setting and setting operation part will be banned. We only need use positioning pins to fix the PCB.

2.1.1.2 Rail

First select the "rail", the setting operation part will be available.
Operation steps: first adjust the rail width to let the PCB can move smoothly on the rail. Click "feed", PCB will move through the sensor to the cylinder thimble position, cylinder will raise the PCB, then thimble will go down, PCB feeding complete. (If need adjust the PCB feeding position, need adjust the thimble and rail sensor position)

2.1.2 Panelized PCB origin (SMD1 coordinate)

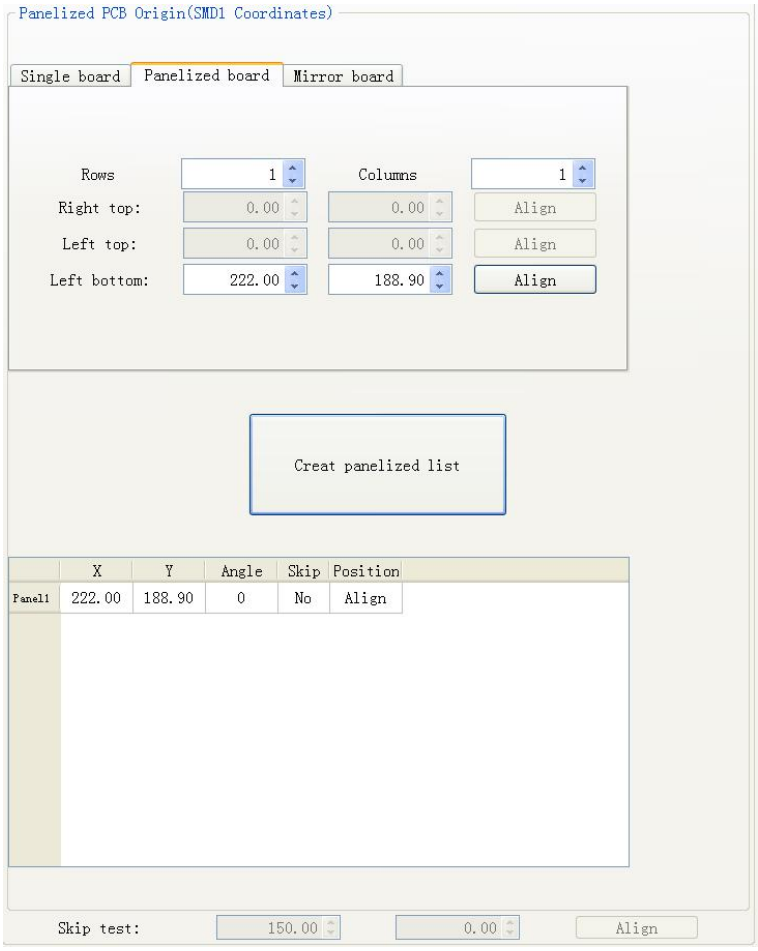


Figure (2.1.2)

Function: This is mainly to determine the first component on single or panelized PCB of manual program or imported file. The principle is to collect and calculate the data of each board's relative spacing, in order to achieve the calculation of the real coordinate.

Note: the panelized PCB origin (SMD1 coordinates) and panelized list setting of the manual program mode is the same as file import mode.

2.1.2.1 Single board

Click "single board setting", you will see the "align" button of the SMD1 position that means the first component on the component setup. Click "align" to enter the vision align interface, we need find the first component that on the component list, normally we choose the center of the component, see figure (2.1.2.1)

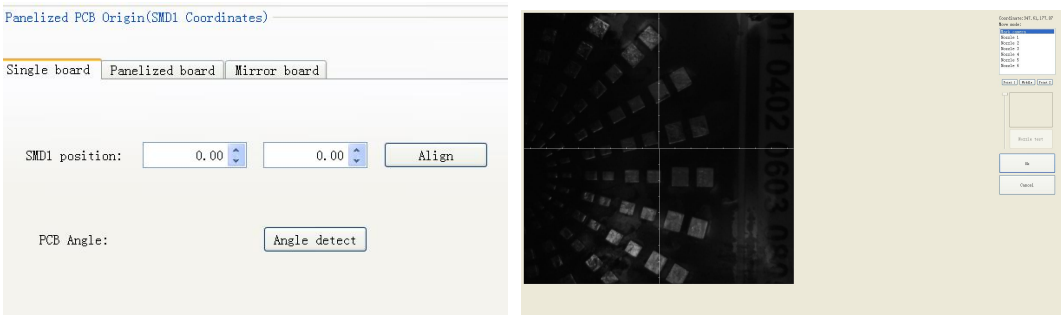


Figure (2.1.2.1)

Click “ok”, it will back to the previous interface, click “create panelized list” button”, the data which on the panelized list will change.

2.1.2.2 Panelized board

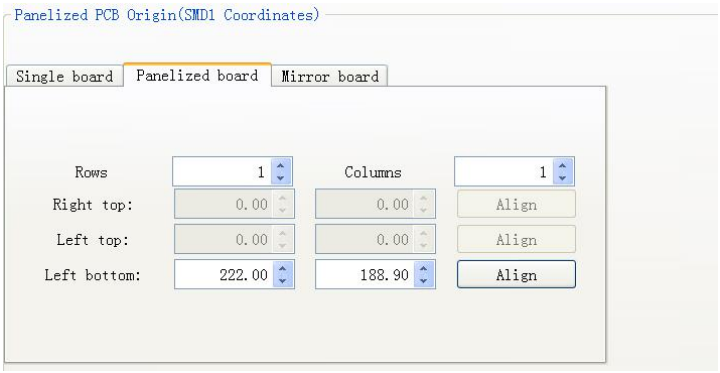


Figure (2.1.2.2)

The steps of the panelized board programming are similar with the single board, but need pay some attention to several points below

●The row and column are determined by the positioning of PCB on working area. The direction along the rails is the column, the direction perpendicular to the rail is row, then please enter data in the row and column.

●About the data collection of “left bottom”, “left top” and “right top”, we should take the “left bottom” as the basic, and then go to set “left top” and “right top”. Once all the data are collected, the machine can calculate and process the information of panelized board.

Please refer to the data collecting method of each position information as following:

●The data of “left bottom” is collected according to first component in the component list of programming file. Press “align” of left bottom, find the left bottom panel that is nearest to the left side and nearest to the feeding position, then find the first component which on the chip list of this panel, align the center of this component. After saving the data, it will return to the “PCB information” automatically.

●The data of “left top”: on the alignment interface, find the left top panel that is nearest to the left side but farthest to the feeding position, then find the component same as the component that aligned on the “left bottom”, align the center of this component. Click save and cancel, it will return to the “PCB information” automatically.

●The data of “right top”: on the alignment interface, find the right top panel that is nearest to the right side but farthest to the feeding position, then find the same component as the

component that aligned on the “left bottom”, align the center of this component, click save and cancel, it will return to the “PCB information” automatically.

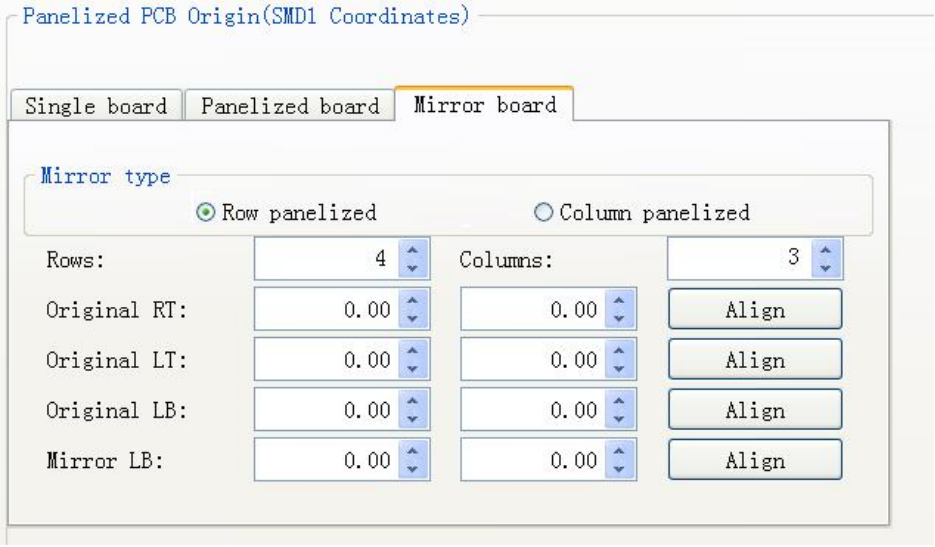
After setup, click “create panelized list”, the panelized list will be generated accordingly in the blank. You can also double-confirm each position by clicking “Align”.

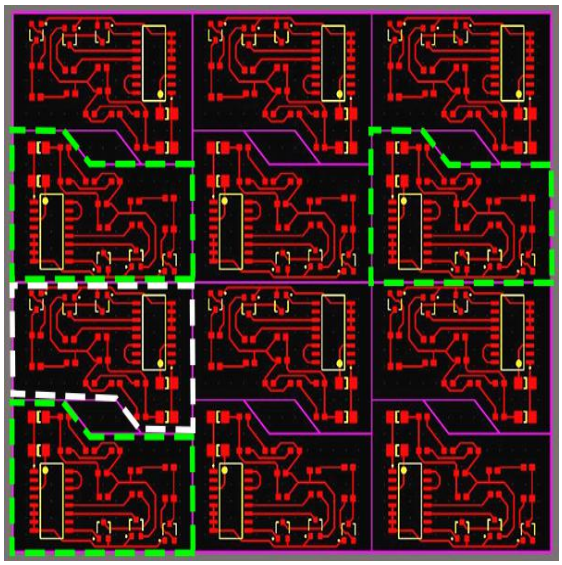
2.1.2.3 Mirror board

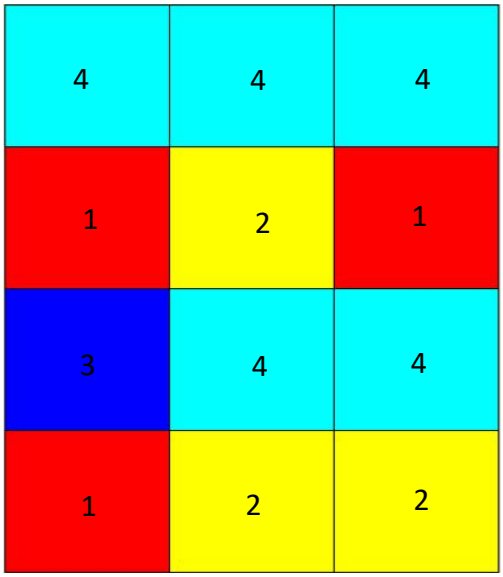
Mirror board includes row panelized and column panelized

Row panelized: several same PCBs are arranged in horizontal direction, and the nearby rows are mirrored

Column panelized: several same PCBs are arranged in vertical direction, and the nearby columns are mirrored





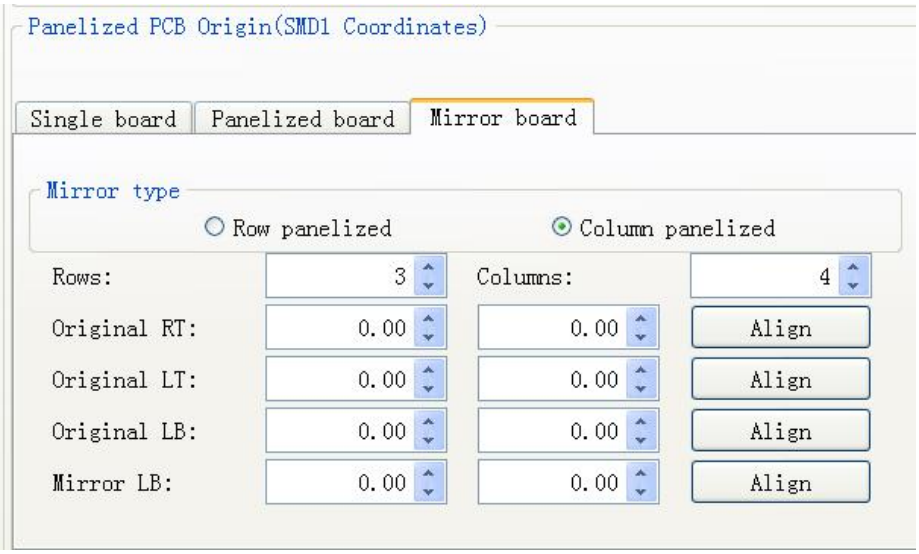


No.1 red areas are original ref

No.2 yellow areas are original boards

No.3 blue area is mirror ref

No.4 light blue areas are mirror boards



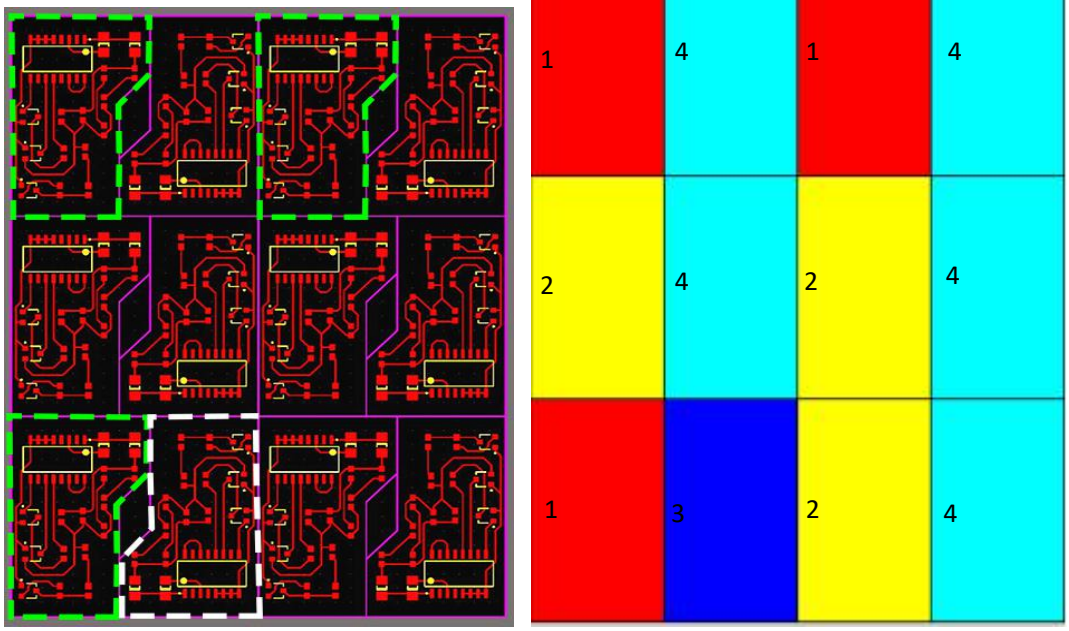


Figure (2.1.2.3)

No.1 red areas are original ref

No.2 yellow areas are original boards

No.3 blue area is mirror ref

No.4 light blue areas are mirror boards

Based on actual board to choose an applicable model of panelized mode. Figure (2.1.2.3) left side is the arrangement way of mirror board and right side is the mirror board showing on computer.

2.1.2.4 PCB angle correction

PCB angle will influence the accuracy of mounting. The angle closer to 0 degree the better, and the angel deviation need to be within 1 degree. The angle of PCB is generated according to panelized PCB coordinates, but we can also adjust the angle by manual. Click “PCB angle” button, according to the index of machine to choose two points, then a new PCB angle will be

generated. (Note, the two points need to be paralleled)
Under panelized PCB model, “PCB angle” is locked. You need to correct from panelized PCB to single PCB (1*1), after confirm the PCB angle, you can change back to panelized PCB model.

2.1.2.5 Skip marked panels

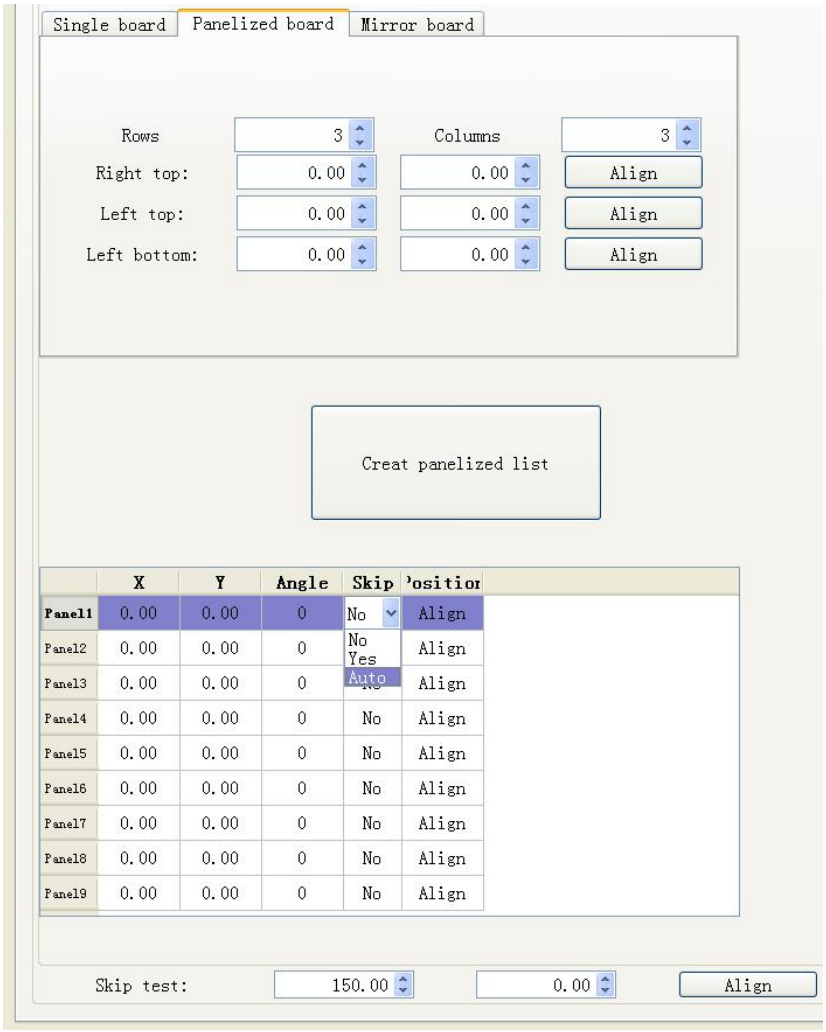


Figure (2.1.2.4)

Function: detect marked panels in multiple boards and skip marked panels
Steps:
(1) According to actual panelized PCB to generate panelized list
(2) Choose “Auto” from “Skip” option of panelized list
(3) Click “Align” button of skip test to choose one fixed position and mark it, thus every time when machine scan this mark, it will skip this bad board.
The conventional practice is to stick a black label to the fixed position (the position that you aligned on the skip test) on the board. If the label is attached on one panel, this panel will be automatically skipped. And if the label is not attached on one panel, this panel will be normally placed.

2.1.3 PCB fiducial setting

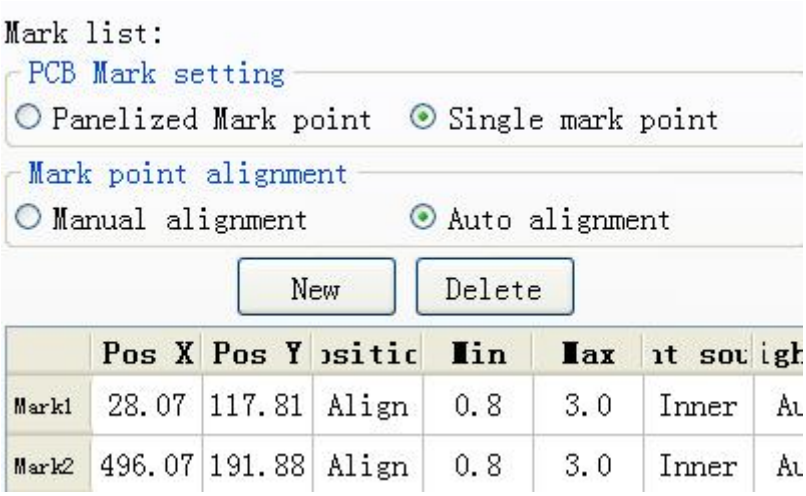


Figure (2.1.3)

Function: After finishing fiducial setting, when the machine is working, the specific position and direction of PCB can confirm via setting fiducial. Only in this way the next step of mounting work can carry out.

2.1.3.1 Single fiducial

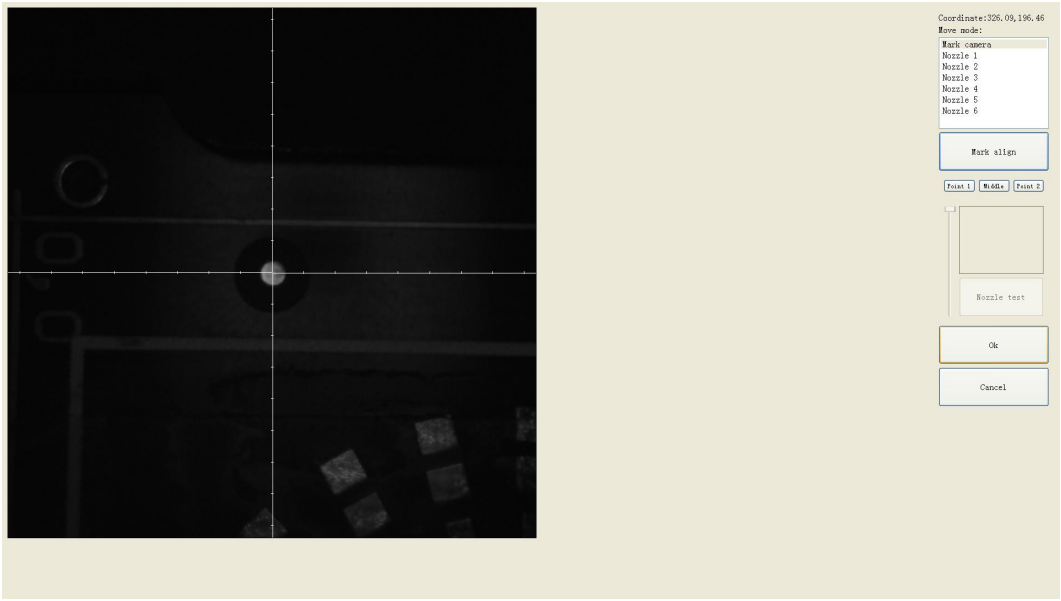
It is mainly used for a single PCB board and multiple identical PCB boards consistent of the whole board (Notice: coordinate programming is done as a single board)
Generally, need to select 2 or 3 fiducials.

2.1.3.2 Panelized fiducial

It is mainly used for multiple identical PCB boards consistent of the whole board, when place every panel board, the machine will rescan small panel board's fiducial.

2.1.3.3 Manual alignment

If there is no fiducial on the PCB, which can through some location holes and set up some special reference point manually to replace and confirm reference position.



Figure（2.1.3.3）

●Import the coordinate automatically status: the data collection of fiducial, which through PCB circuit board to find fiducial coordinate information directly, and input directly. Moreover, there are some information about min, max, light source and brightness in the fiducial list.

◆Min, max value: means the size of fiducial, it has a floated value, which can prevent recognizing fiducial wrongly.

◆Light source: Dividing into inner and external, if select the hole as fiducial which need to choose the inner of light source; If select bright spot as fiducial which need to choose the external of light source.

◆Brightness: The default automatic is generally used, only in special cases need to change the value

●Manual programming situation: the data collection of fiducial, on the manual programming status, select the fiducial in the list and click “align”, see figure (2.1.3.3), enter image capture page, and find the fiducial center via movement, click “fiducial align”, see figure (2.1.3.3), then click “save”, go back to main page. Another Items (min, mix, light source, brightness) setting is the same as the above (import automatically) operation. (if need long distance movement, select visual field to move)

●Manual alignment situation: if there is no available information to set fiducial, we will choose manual recognition. Notice: Generally, select the first component of mounting component, select fiducial which is far away with first component and is easy to find, when setting up like this, the relative mounting result will be better, after reloading process, it needs to confirm manually.

2.1.3.4 Add or delete fiducial

●Add the quantity of fiducial

●Delete fiducial: when meet fiducial setting wrongly or reset up, tick it and delete directly.

2.1.4 Component list setting

Function: display the information of mounting component, the mounting order of component, which can via manual programming or import process file to add component quantity and mounting information, see below figure (2.1.4), operation method:

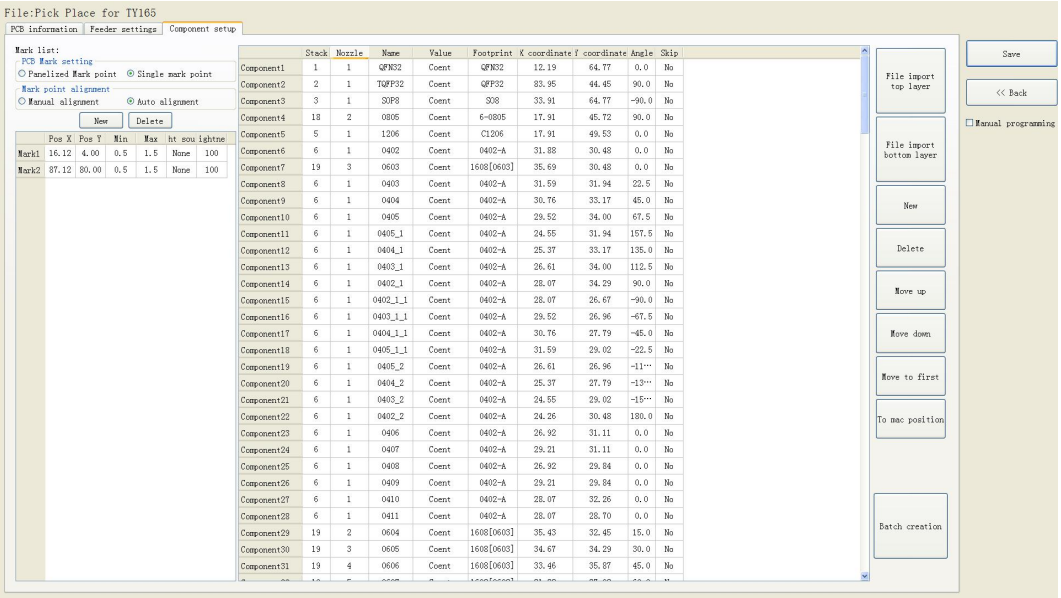


Figure (2.1.4)

2.1.4.1 Manual programming

●Component edit firstly

Firstly, select manual programming, there will be a row of example components in the component information, modify the sample component and click position “align”, the page will switch to the vision of up-looking camera automatically, see figure (2.1.4.1)

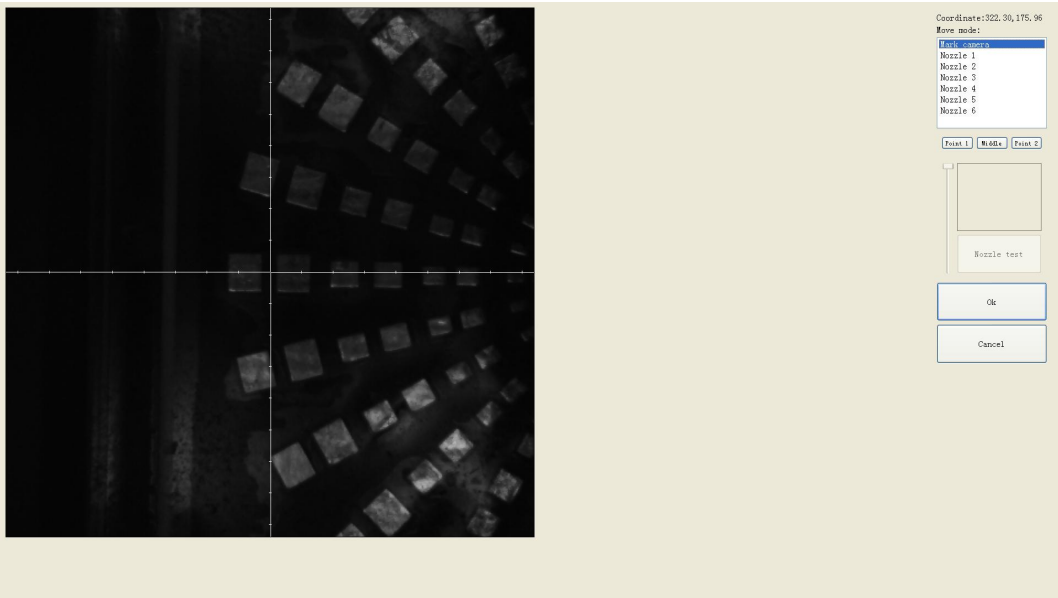


Figure (2.1.4.1) note: a component diagram has been found

We can move down-looking camera or nozzle 1 and nozzle 6, find corresponding component and confirm the component center coordinate, after clicking “save”, go back to main page, then input related component information (Notice: name refer to component bit number, specification refer to component value, footprint refer to common footprint name. Like 0603,0805,1206 etc. The angle is based on the placement direction of component on the circuit board to confirm, transverse is 0 degree or 180 degree, vertical is 90 degree or negative 90 degree, which is mainly based on the polarity of component, degree must be integer degree;) after all parameter setting, the first component information has been finished; click the “new” in next step, the component list will add a row, coordinate information will entirely copy adjacent up row, then click “align” to find the next component center, ensure to modify, reedit name, specification, footprint, angle and etc., after finish it, continue to reedit until all edit finish.

●Component movement

During the process of edit, sometimes, need to do a slightly adjustment for the edited file, we have three types

(1) move up: The main thing is to move the selected components upward

(2) move down: The main thing is to move the selected components downward

(3) move to head position: The main thing is to move the selected components to the head position to place.

●Batch generate component

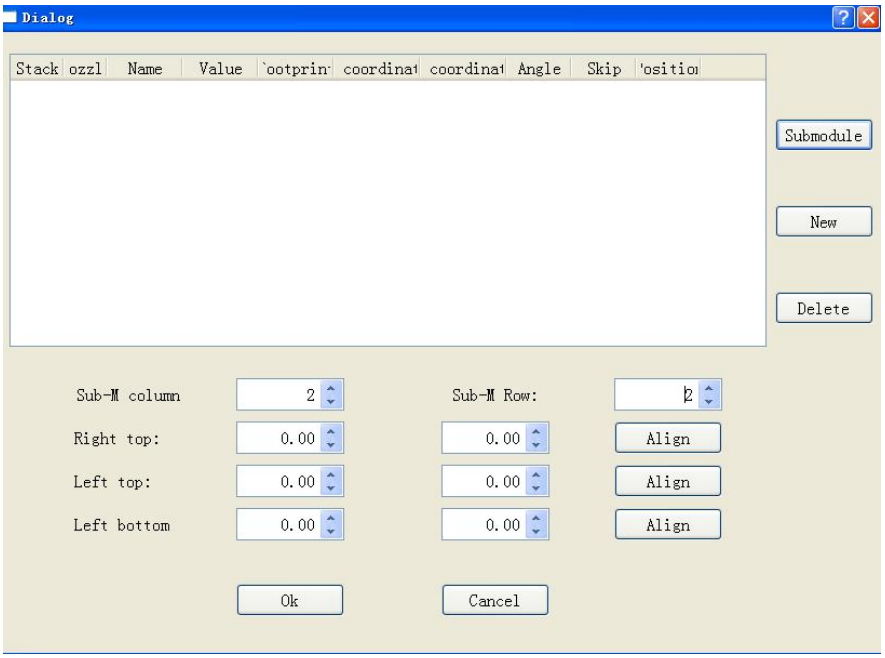


Figure (2.1.3.2-3)

Some circuit board is relatively regular and easy in actual edit, as for this type circuit board, we can through mass production to generate coordinate file, the PCB as shown in figure (2.1.3.2-3), we can see that it has a rectangular region and a circular region together to form a small panel. We call this compositive panel as submodule. We can generate this small imposition through submodule generation. We find it is consisting of 2 rows and 2 column,

input 2 rows and 2 columns, find 3 head components, after finishing generating it, the submodule is shown in the figure: we also can select stack, nozzle, name, specification and etc. to adjust in this page.

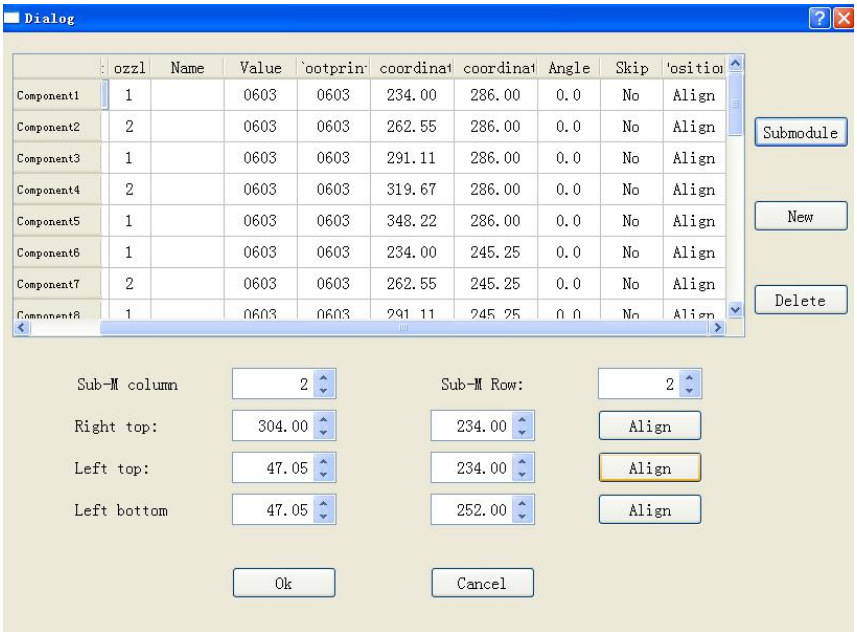


Figure (2.1.3.2-4)

There are two ways to submodules can be produced in batches, one is a rectangle, the other is a circle

① The way to generate rectangle panel: an example is shown as figure (2.1.3.2-5), click: "producing component in batches", which will appear a project is shown as figure (2.1.3.2-5), component specification and component footprint need to input the specification and footprint what you need. If you look at this lamp panel figure, we can see that it's uniformly symmetric in four rows and five columns. We can add 4 rows and 5 columns in the row, column of the machine, follow the tips to find the 3 points orderly to align. The component degree will be based on actual situation to choose. (Notice: this angle here is the angle in the stack setting, the default value is 0, follow the actual situation to modify. Click generate, the machine will automatically generate all components' coordinate in the figure (2.1.3.2-5)

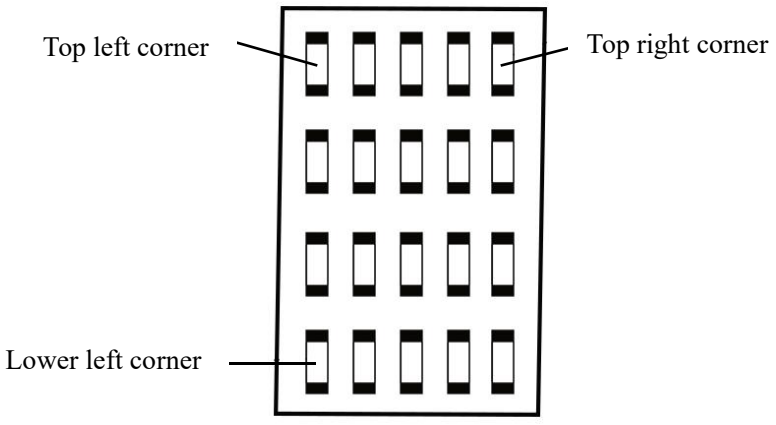


Figure (2.1.3.2-5)

② The way about how to generate the circle panel when the component number is double number: the project and rectangle of the “component type “are the same, we know it has 24 components by observation, the default angle is 0 here, input this value on your own. Because if the total component is double number, we only need to find two symmetry to align. Click to generate the 24 components coordinate in the circle panel.

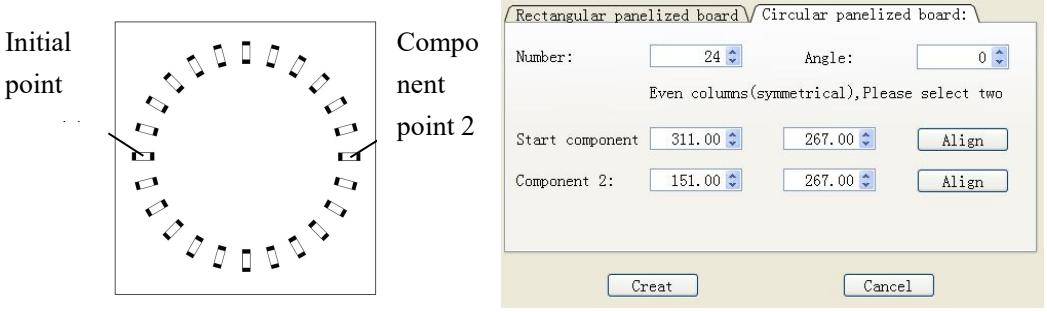
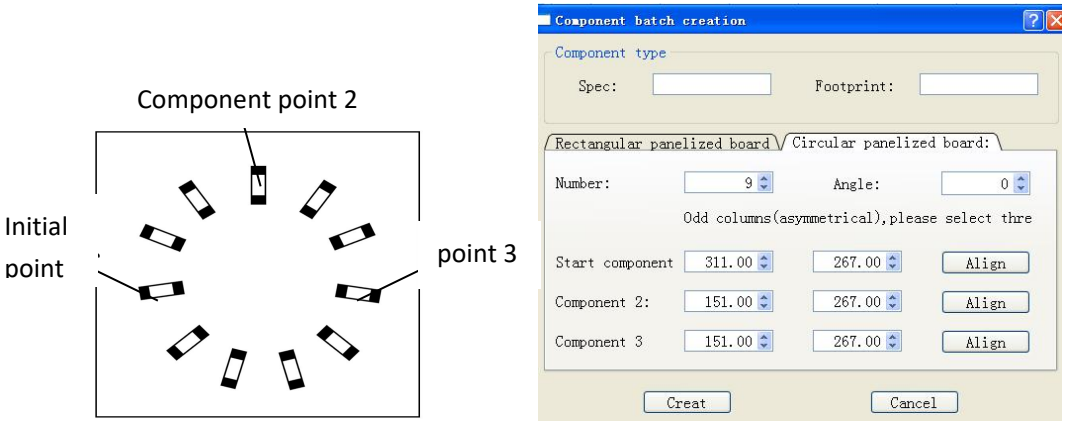


Figure (2.1.3.2-6)

③The way about how to mass generate the circle panel when the component number is single number: item in the type of components is the same as mentioned above, the circle panel is shown as figure(2.1.3.2-6), after observing the panel, we know it has 9 components , because the final number of components is single, it is better to find 3 components that are isosceles triangle, and then align the coordinates of those three points in turn. Click to generate 9 components’ coordinate in circle panel.



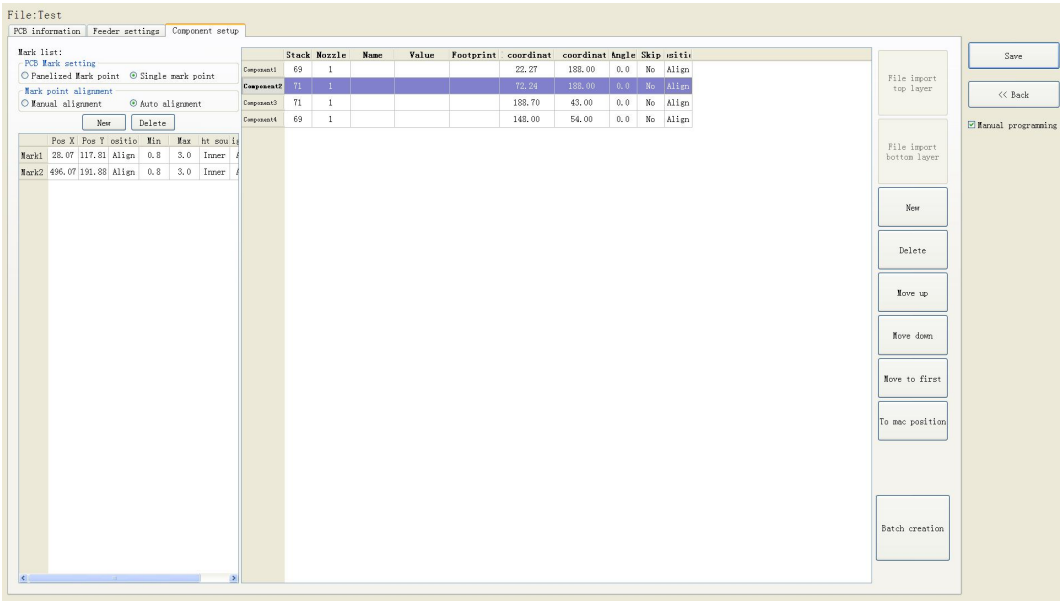
2.1.4.2 Secondary editing of components

Function: add or alter for the information of components based on exist programming

Procedure: firstly, enter into the program edit page, see figure (2.1.4.2):

Put the PCB board into rail which is corresponding with programming, click the “feed” in the access setting area, confirm the PCB at the designated place, then click “transform into machine’s current coordinate” and confirm it, at this time, the machine will automatically scan the fiducial and transform all existing components’ information into current coordinate

information, then we can edit and alter the list of components



Figure（2.1.4.2）

2.1.4.3 Import the mounting file

● Preparing work: Firstly, importing the component information of the PCB which need to process in the computer, when importing it, select metric system, select CSV format, save it on USB flash disk, then plug it in the machine

●Do not choose the manual programming, click “file import top layer”, see figure (2.1.4.3), it will pop up a selecting window, tick the processing files and click save, the information will be imported to the list. Next, go to the stack setting page to set it up.

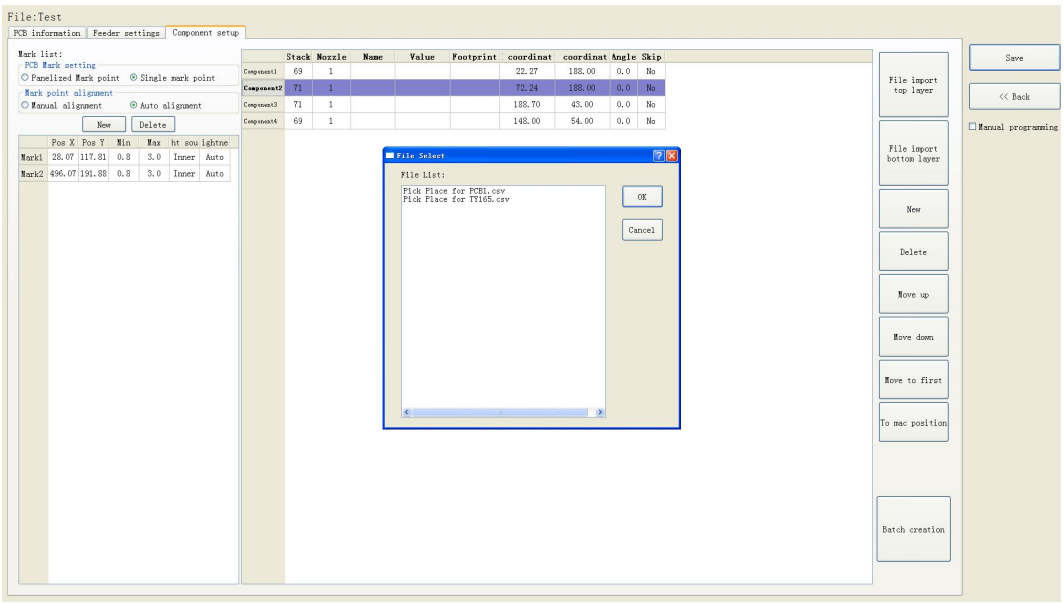


Figure (2.1.4.3)

2.1.5 Feeders setting page

See figure (2.1.5) feeders setting page

Function: all components' setting on this files list, like: nozzle selecting, stack setting, the location of pick components, adjustment setting, and others components' setting all need be finished here.

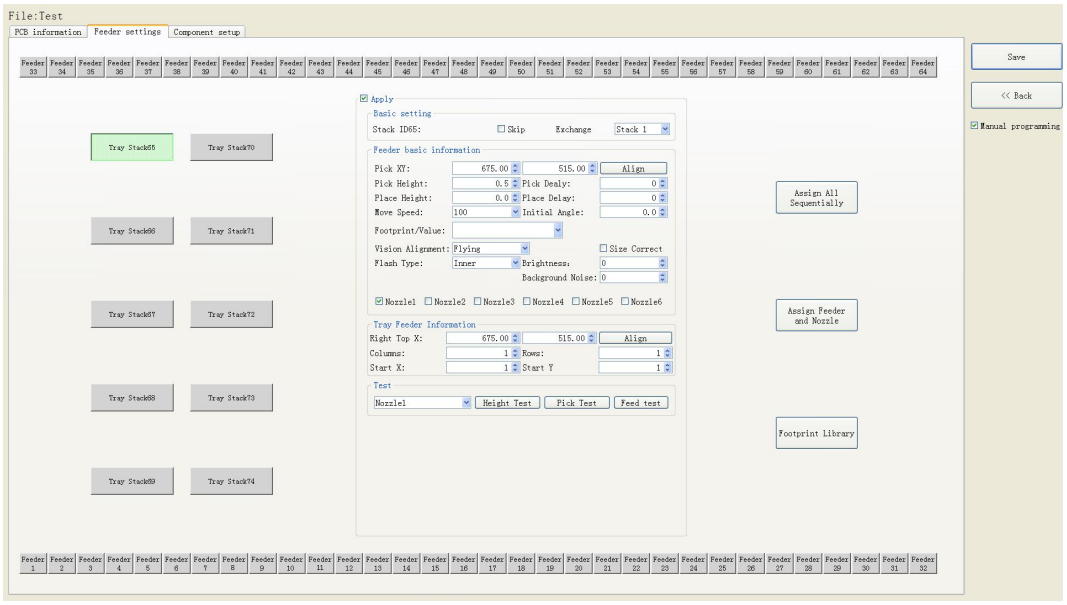


Figure (2.1.5)

2.1.5.1 Feeder arrangement

The first thing you see on the top and bottom of the page and on the left is the stack number, on the top page is 33-64 stacks, on the down page is 1-39 stacks and 65-74 stacks is IC tray, this is the idea configuration, the number of stacks will be decreased based on actual feeders' width which you choose, For instance, there have many components' information on the components list, choose a stack at will, there is a pull down menu, click it , it will appear all components' information and specification on the stack list, Selecting a drop-down list will result in one less item, every stack can be operated like this.

2.1.5.2Feeder information configuration

Choose a stack, click the "apply" in the top left corner, this stack's configuration function is to unlocked , then the information can be modified, there are 5 contents on this page ,respectively are: the information of nozzles, the information of feeders , the basic information of stack, the information of IC tray and the stack exchange, one of IC tray and feeders' options will at closing state according to the different of stack. The operation order of these setting is: the information of feeders (IC tray) → the basic information of stack → the information of nozzles, exchange stack need to base on the actual situation, if find installing the tape reel wrongly, use exchange stack.

- the information of IC tray

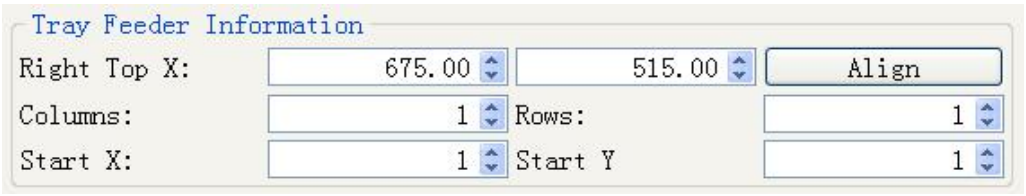


Figure (2.1.5.2-1)

Function: mainly used to set up the picking up information of IC tray and vibration feeders, through change parameter information to finish the picking components' work on the special stacks.

◆horizontal numbers: mainly means how many components on X direction (A row has several columns of components)

◆ vertical numbers: mainly means how many components on Y direction (A column has several rows of components)

◆X Y location on top right corner: finding the component which is the most closed to top right corner in this area by location (generally, this component would be the last one in this IC matrix, of course the first beginning component is located on the most closed to down left corner)

◆the first beginning location X Y: after all above projects are confirmed, the complete default setting is X 1 Y 1 in IC tray (means the first column and the first row), if meet this situation, a part of components on the IC tray are already used , X Y can be set up directly ,through XY information, X means column Y means row , which can confirm a new picking location in this way.

● the basic information of stack: see figure (2.1.5.2-2)

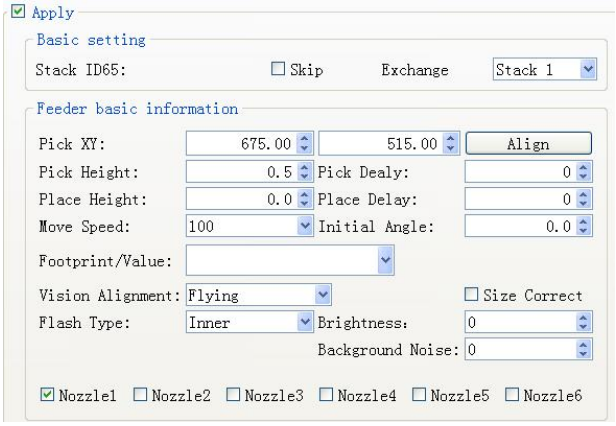


Figure (2.1.5.2-2)

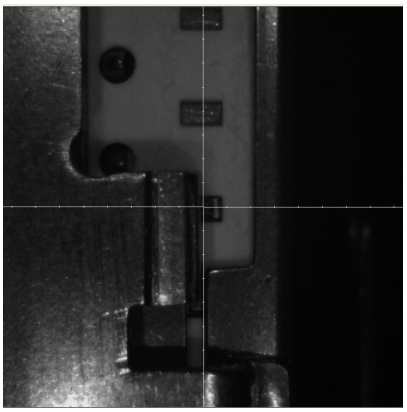


Figure (2.1.5.2-3)

◆skip place option: if tick this option, all components will be skipped on this stack, according to actual situation to choose, and Also can be exchanged via exchange stack

◆firstly, align the location of components on this stack, see figure (2.1.5.2-3) after alignment, click "save", then the XY picking will collect data automatically and display aligned value.

◆pick height: the down and up height can be controlled by the alongside height testing bar to collect nozzle height data. The place height can be adjusted slightly based on the thickness of tape reel.

◆move speed: this value can control the mounting speed directly

◆initial angle: The default angle is 90 degree, which can change the angle here in special

situation to change the whole stack place angle.

◆ component footprint: through select some footprint information, during the vision adjustment process, the data here is which directly refer to the data in the library

◆ image adjustment: can choose flying adjustment, up-looking camera also cannot choose adjustment, which confirm by yourself.

◆flying adjustment can based on demands to select recognition brightness, it may appear the component cannot be recognized, we need to adjust the brightness to help recognize (in generally, resistance and capacitance needn't increase luminance)

◆background noise: Use it to eliminate noisy point when taking photos, as usual, adjust it to 1 or 2 will be fine

●nozzle information setting

Figure (2.1.5.2-4)

◆Function: choose nozzles according to the situation of installation nozzles and components, can choose single or multistep machine will automatically allocate them to corresponding stack in order to satisfy single or multi nozzles working demands. Also, there is detecting function inside: see figure (2.1.5.2-4)

◆ the height downgoing test: after clicking the option, the nozzles will go down, check to ensure whether the nozzle pick height is suitable, if it's not suitable, reset the pick height in stack information.

◆ pick test: the single nozzle will pick a component when click corresponding picking test, after finish this test, check the actual situation of picking components, if there are questions, need to reset picking location in the basic stack information's option

◆feed test: feeder feeding, which used to test the feeders work normal or not.

After finishing the above stack's information setting, click the option to assign the component type to the stack automatically, the components list will do corresponding variation, then click save and back. In this way, the whole program is finished.

2.2 File Mounting

Method to mount one file, see figure (2.2):

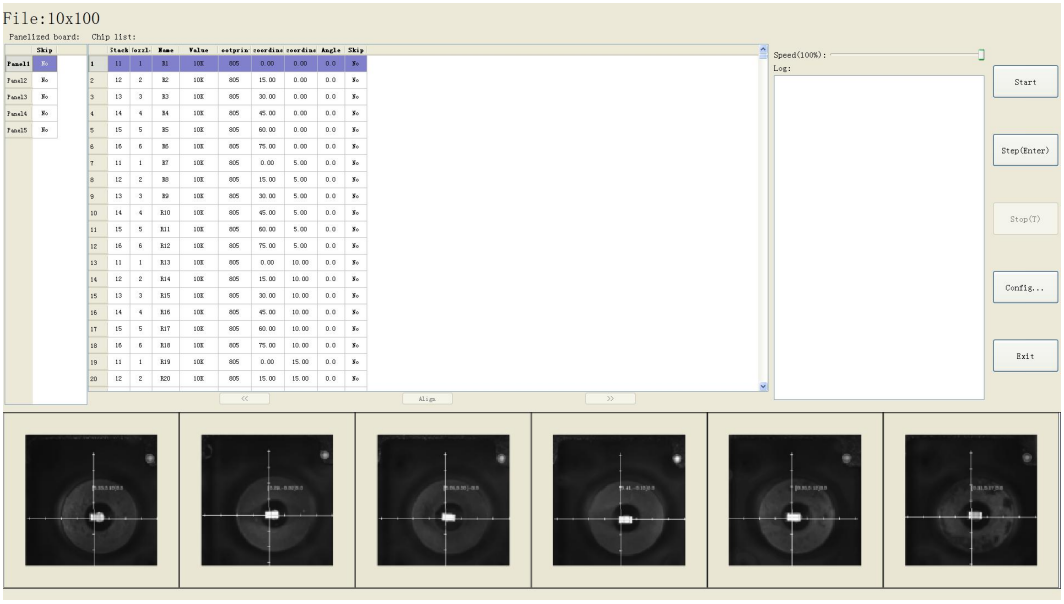


Figure (2.2)

First, select one file, click ‘mount’. You will enter into the mounting page, shown as figure 2.2.

● On the top-left corner shows process of mounting. You can track the process constantly by the blue line.

On the top-right corner, there is a ‘log’ column, which shows the variation information of mounting and issues feedback.

The placement speed can be manually changed by moving the speed button during mounting (maximum 100%).

● The six photographs show the pick alignment in real time. You can check every component for each nozzle.

● The function of five buttons on the right:

Continuous, the machine will executive the program automatically.

Step, the machine will executive one single step by click once.

Stop, the machine will stop the current process.

Configuration, the configuration interface will popup by clicking this button.

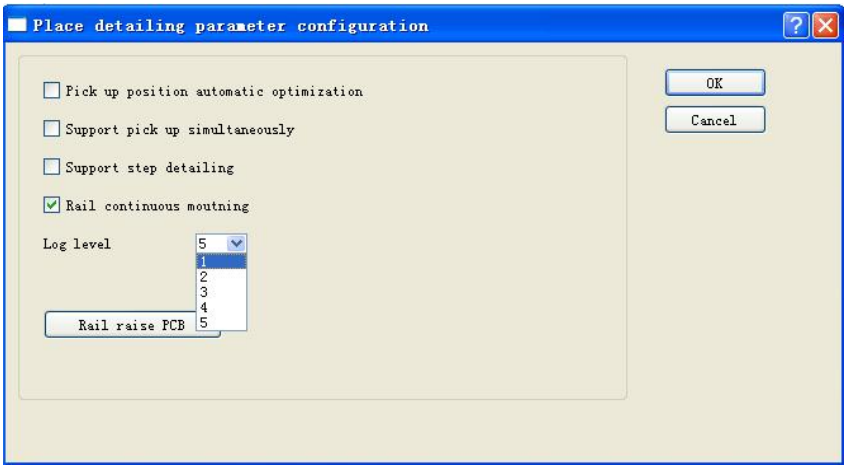


Figure (2.2-1)

Pick up position automatic optimization: Adjust the pick up position automatically

(1) Support pick up simultaneously: Check this to make the nozzles with the same pick height picking the components simultaneously. This will raise the mounting speed much more.
(2) Support step subdivide: Check this to subdivide steps to nozzles
(3) Rail continuous mounting: Check this to make the rail feeding boards automatically, which will make the whole process continuously.
(4) Log level：The higher the log level, the more information will be collected
(5) Rail raise PCB: Click this after finish mounting, the rail roof cylinder will jack-up or drop-down.
Exit, click 'stop' then click 'exit' to finish mounting, exit the mounting interface.

2.3 Factory settings

Function: this part arm at machine' global parameter settings, any modified parameter will influence all mounting files, when modify this part please consider seriously. Especially the last page system settings, we suggest after using a period of time or under the guidance of our engineers then change its parameter. (Notice, before our machines leave factory, all parameter already be set and no need to change). This user manual just introduces all setting functions briefly, more details about parameter modification please refer to comments from our engineers.

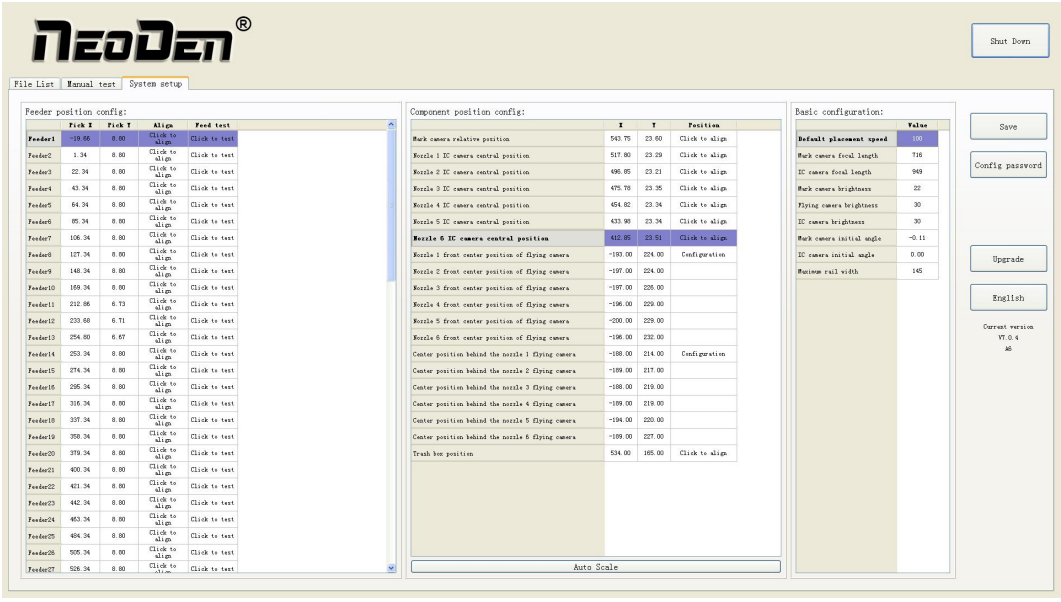
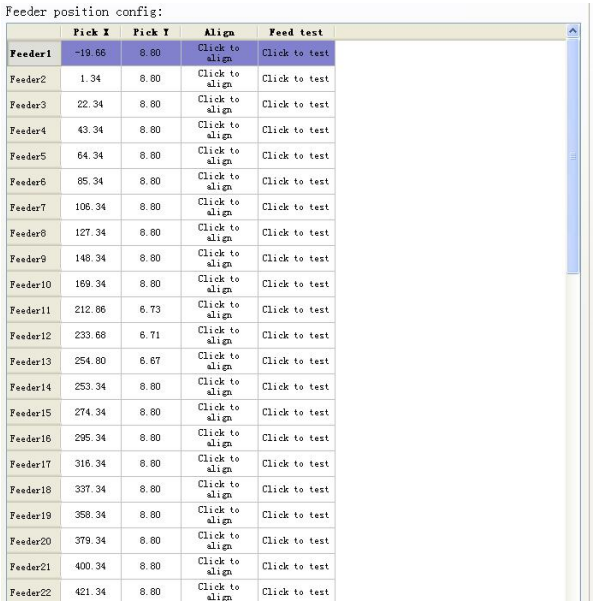


Figure (2.4)

●Shown as figure 2.4 , function description of button on right side
●Save configuration: click it for saving after modify the parameters
●Modify password: click it, put into the password, then finish change the fourth page which is also the system interface.
● Version upgrade: Our software version is upgrading constantly. After receiving our new version file, you can upload it with clicking 'version upgrade' to finish.
●English：NeoDen7 support English and Chinese, click this button can change the language

2.3.1 Feeder configuration

NeoDen7 adopt pneumatic feeders, you can setup the pick position and test in advance.


Feeder position config:

	Pick X	Pick Y	Align	Feed test
Feeder1	-19.66	8.80	Click to align	Click to test
Feeder2	1.34	8.80	Click to align	Click to test
Feeder3	22.34	8.80	Click to align	Click to test
Feeder4	43.34	8.80	Click to align	Click to test
Feeder5	64.34	8.80	Click to align	Click to test
Feeder6	85.34	8.80	Click to align	Click to test
Feeder7	106.34	8.80	Click to align	Click to test
Feeder8	127.34	8.80	Click to align	Click to test
Feeder9	148.34	8.80	Click to align	Click to test
Feeder10	169.34	8.80	Click to align	Click to test
Feeder11	212.86	6.73	Click to align	Click to test
Feeder12	233.68	6.71	Click to align	Click to test
Feeder13	254.80	6.67	Click to align	Click to test
Feeder14	253.34	8.80	Click to align	Click to test
Feeder15	274.34	8.80	Click to align	Click to test
Feeder16	295.34	8.80	Click to align	Click to test
Feeder17	316.34	8.80	Click to align	Click to test
Feeder18	337.34	8.80	Click to align	Click to test
Feeder19	358.34	8.80	Click to align	Click to test
Feeder20	379.34	8.80	Click to align	Click to test
Feeder21	400.34	8.80	Click to align	Click to test
Feeder22	421.34	8.80	Click to align	Click to test

Figure (2.4.1-1)

shown as figure (2.4.1-1): parameters setting for all feeders.

First list on left side is feeder No.

X, Y parameters can set feeders' pick position.

Click button 'click of align' in the list to align the pick position, shown as picture (2.4.1-2). Align the position to center of component (edge of tablet), then save.

Figure (2.4.1-2)

Picture (2.4.1-2) Nozzle testing: Drag the nozzle down by the slider to the aligned position (to check if the nozzle locates in the center of the component)

Adjust the nozzle height: Drag the sideward slider to control the nozzle height (height values

will show in the frame).

Feeding test: click ‘feed’ button, the feeder will feed one component to check if it works.

2.3.2 Nozzles’ Positions Setup

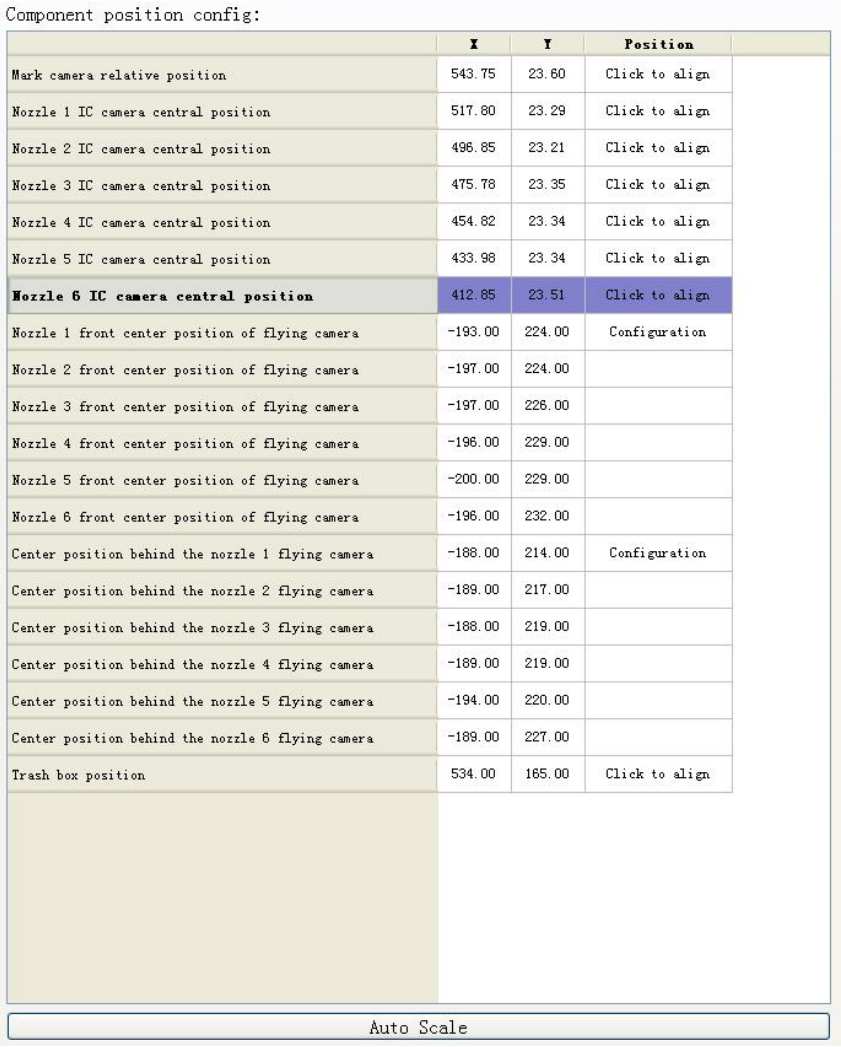


Figure (2.4.2)

Function: this screen is mainly to correct nozzles’ position.

P.S. Password is required to activate the items to avoid maloperation, please contact support team before making a change.

2.3.2.1 Fiducial Camera Position

Steps:

●Put a cooling pad on PCB, click “Rails 2” and fix the PCB on rails.

●Go to the Manual Test screen, move the head make sure the nozzles stay above the cooling pad, then click “Nozzle #1” and “Back”.

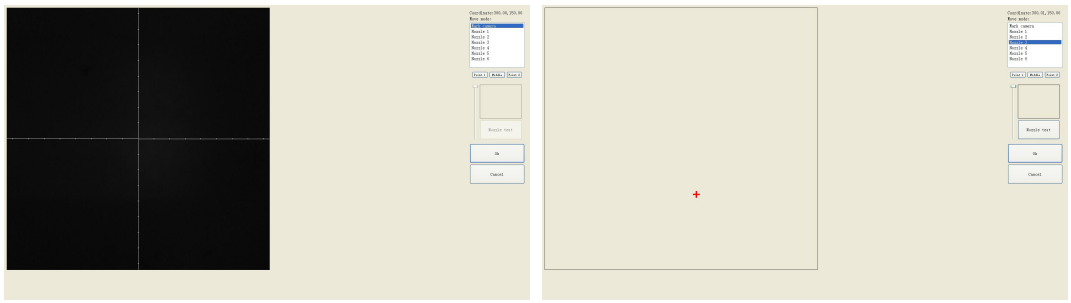
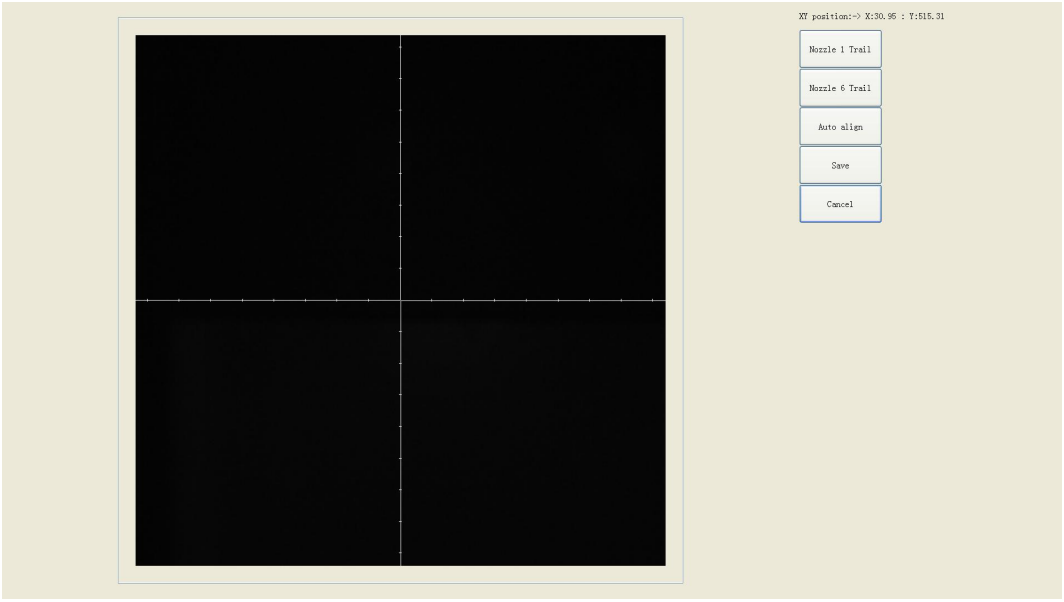


Figure (2.4.2.1)



Figure（2.4.2.2）

●Go to the System Configuration screen, click to align on Fiducial Camera Position (see Figure 2.4.2.2). After click “Nozzle #1 Trail”, the nozzle will move down and rotate until get a round mark. Click “Nozzle #1” again to align the center of round mark, then save the setting. Follow the same steps to get the trail of Nozzle #6, then check the offset between the round mark and the white crosshair, if it’s within 10mm, the trail is done.

P.S. If the offset is overly beyond 10mm, please kindly contact NeoDen support team.

2.3.2.2 IC Camera Position

Click to align on IC Camera Position, you will see this screen (see Figure 2.4.2.2-1).

Figure（2.4.2.2-1）

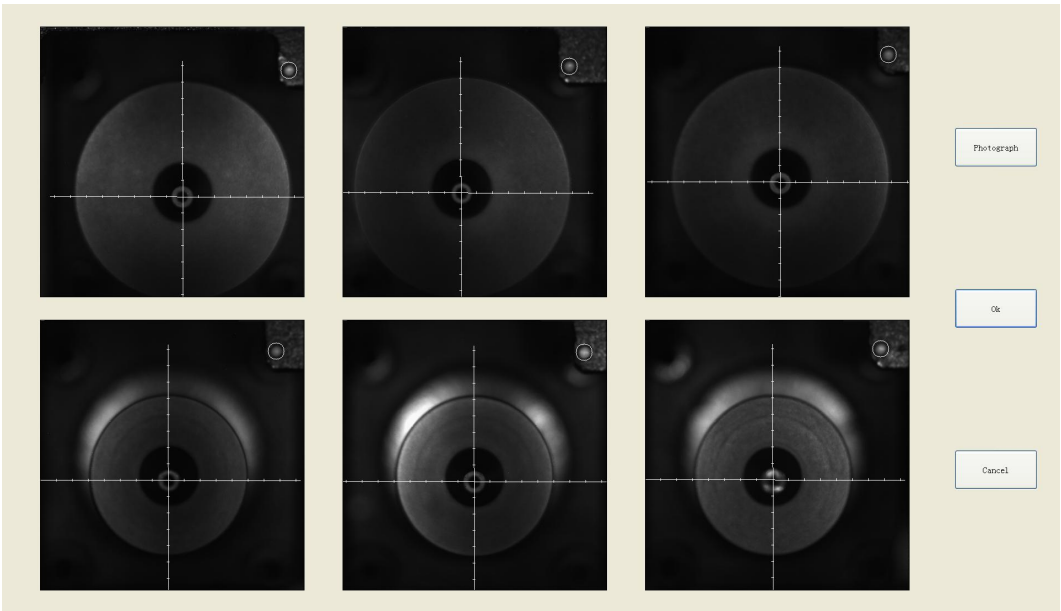
Steps

●Click “Lens Rotation”, seconds later, you will get an overlapped photo of 360-degree rotated nozzle.

●Use the crosshair to align the centers of nozzle #1 to nozzle #6 (You can zoom in to see it clearly)

●Click “Save” to save the changes.

2.3.2.3 Flying Camera Position



Figure（2.4.2-3）

●Nozzle flying camera center position: flying camera take a picture for the 6 nozzles at the same time.

●Click the “configuration” to enter photograph page in front of the nozzle 1 flying camera center position, click “photograph” and will appear 6 nozzle pictures.
●Align the cross to the nozzle center
●Waste box: set up the nozzle fling component position, which can according to demands to set up.

2.4 First trial and test

2.4.1Program first dry run

Usually we would suggest you to have a dry run (no components are loaded) before production test. After it
goes smoothly, you can start to produce few boards.

2.4.2 First production test

1 Make a programming file
2 Test the file to pick and place components.

2.4.3 Component Inspection

2.4.3.1 Inspection items

● Check if the specification, direction, polarity of components is aligned with what they should be.
●Whether the components are damaged or the pins are distorted.
●Whether the component is off beyond allowance.

2.4.3.2 Inspection method

The inspection methods vary from the equipment that you have.
Except visual inspection, all of amplifier, microscope, online or offline AOI equipment can be applied if the
pitch of IC is quite small to check.

2.4.3.3 Inspection standard

Please follow SOP to do inspection or any other general standards (IPC Standard and SJ / T10670-1995 SMT
General Technical Requirements). Adjust the programming file according to the placement effect after the first
production test.
If there is any issue of specification, direction and polarity, please follow process file to amend.
If the components are off, please adjust the file by following two methods
① If the placement effects of all components are off in the same direction, it would be the fiducial
issues. Please resolve this issue by adjusting the coordinate of fiducials according to its value of deviation.

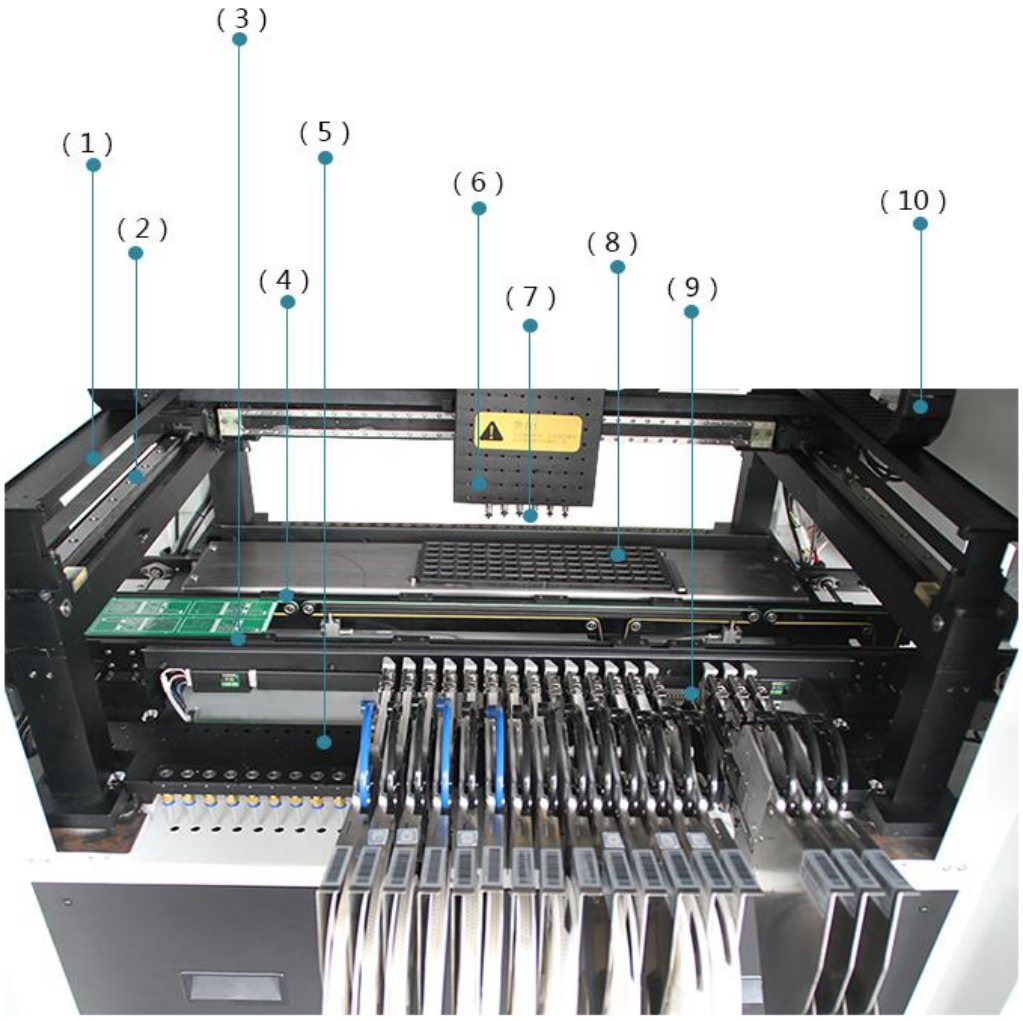
② If there are several components off beyond allowance, you'd better adjust their coordinates on
working file with down-looking camera.
If there are couple of issues occur during test, some other points need to be considered.
●Frequent pickup failure. Some suggestions are listed below,
(1) The pick height is inappropriate, please revise the value after an inspection or a pick-test;
(2) The pick offset needs an adjustment, it should be aligned with the center of component reel slot
rather than that of component.
(3) Due to peel strength or installation issue of wasted film, the film on tape won't be peeled completely
(4)The nozzle was blocked
(5) The nozzle is damaged or has a crack
(6) The size issue of nozzle would cause air leakage or insufficient suction.
(7) The air hose is blocked or has a leakage problem, and even the pump has an issue.
●Frequently throwing components. Some suggestions are listed below,
(1) Up-looking camera can't take a clear picture of component due to brightness issue for example.
(2) The pins are distorted
(3) The size or shape isn't aligned with that in "Footprint library''
(4) The size of nozzle is inappropriate or insufficient suction.
(5) The nozzle has solder paste or rubbish cause air leakage
(6) The nozzle is damaged or cracked cause air leakage

2.5 Continuous SMT production

Follow the SOP to start production
Notes:
(1) Do not touch the surface to board to avoid damaging the printed solder paste.
(2) When the error message occurs, please check out and solve it a.s.a.p.
(3) Once reloading the component during production, pay attention to the model, specification, polarity and
direction of components.
(4) Clear the reject box timely to avoid wasted materials stacked too high to damage the mount head.

3.Structure and maintenance instruction

3.1 Structure chart



(1)Y-axis belt
(2) Linear guide rail
(3) Flying camera reflector
(4)Three-sections auto rail
(5) Feeder fixing shelf
（6）Mounting head
（7）Nozzle
（8）Tray holder
（9）IC camera
(10) Anti-friction tank chain

3.2 Feeder Brief Introduction

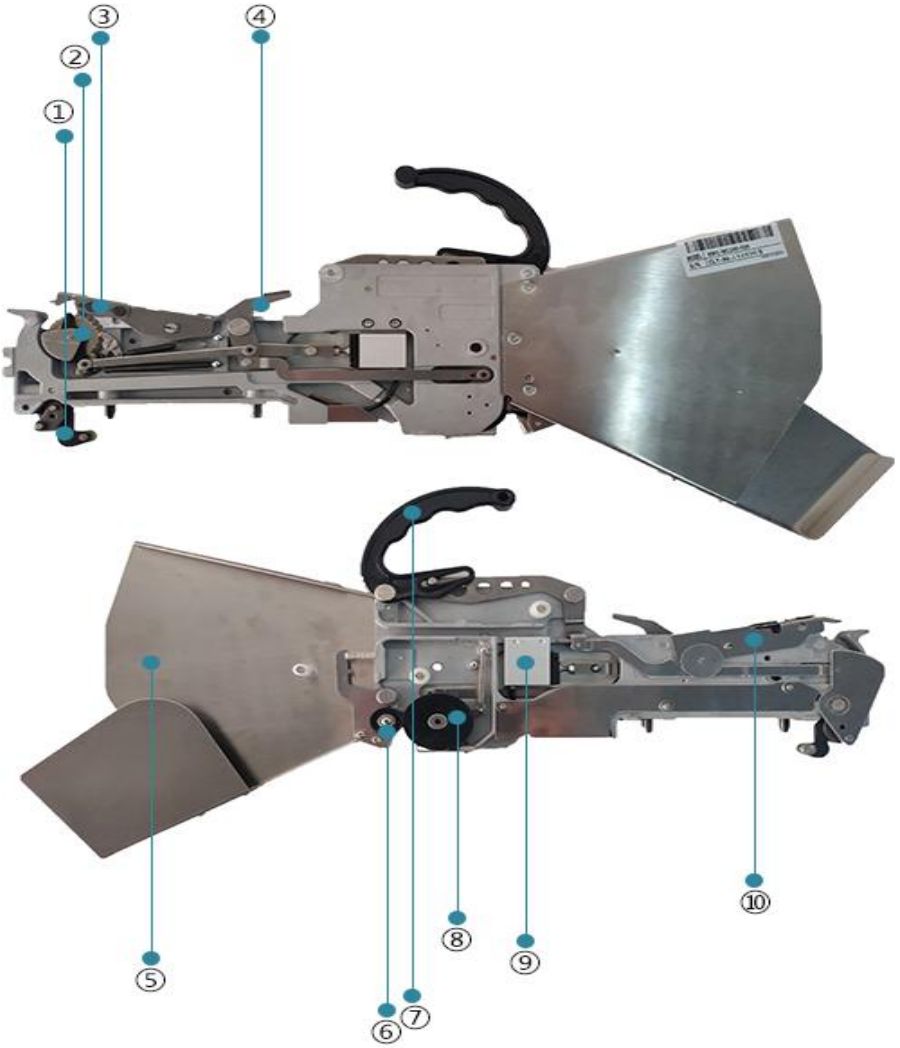


Figure (3.2.1)

①Front fixed buckle ⑥Single-track wheel

②Material-sending wheel gear ⑦Hand Shank

③Press material cover ⑧Tape coiling wheel

④Locking Claw ⑨Cylinder

⑤Tail board ⑩Snap joint cover

3.3 Installing tape and reel components

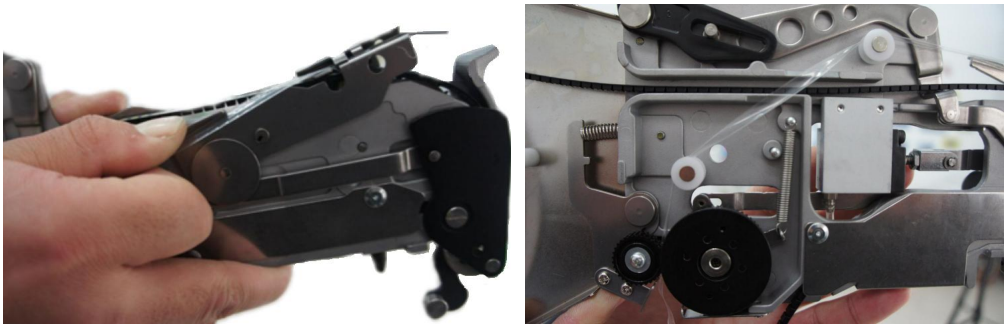


Figure (3.3.1)

1.Making the feeder in open status to wait for installing the tape reel ①Lift up the feeder fixing handle； ②Press the material-sending handle with left hand ③meanwhile press the lamellule at right side of the feeder with your right hand；④loosen the material-sending handle, ensure the proper wrapped (see figure 3.3.1) then loosen the lamellule

2.Installing the tape and reel components: setting the reel on reel storage at the back side of the feeder, pull out approximately 10cm length tape, separate the film and tape, then put into transfer storage (see figure 3.3.1).The tape should be closely matched with the gear, and the film should pass through the upper denomination groove (see figure 3.3.1) through two white guide wheels and then be sandwiched between two gears.

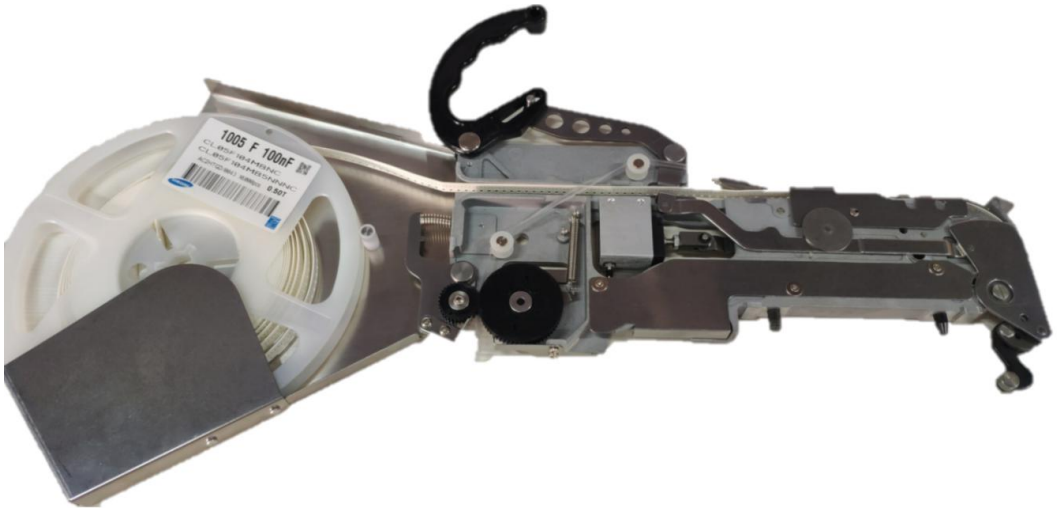


Figure (3.3.2)

3.Finish installing tape and reel components (see figure 3.3.2)

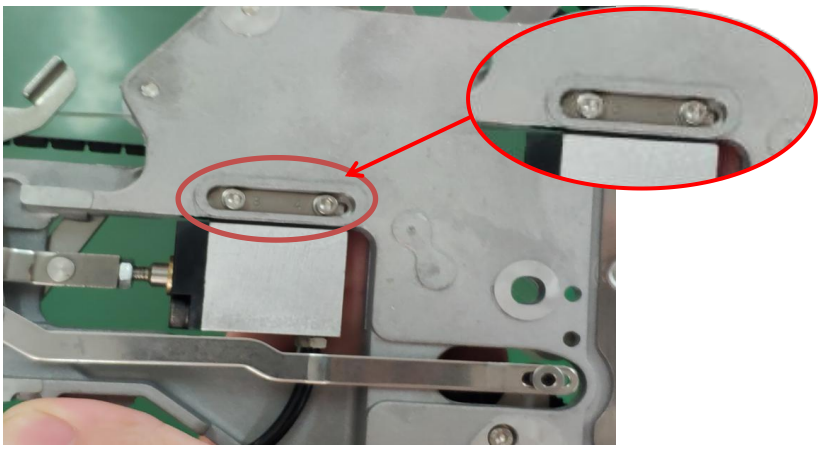


Figure (3.3.3)

For 12mm,16mm width feeder, the feed rate can be adjusted by adjusting the parameters of the feed regulator. (see figure.3.3.3)

3.4 Incorrect installation Samples

1. Incorrect setting of reel in reel storage (see figure.3.4.1)

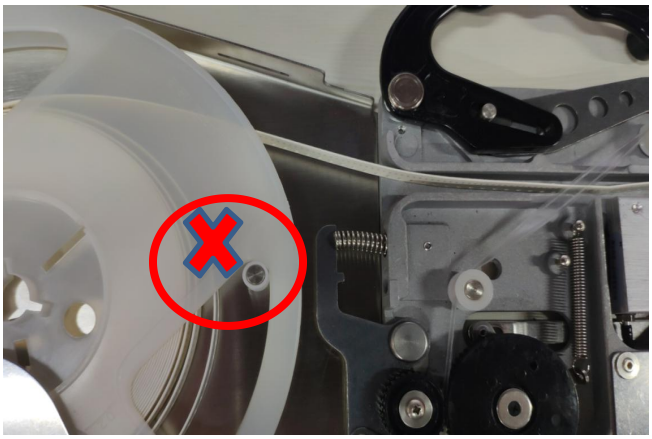


Figure (3.4.1)

2. The film is twisted, not tight enough, or the film is not between the white guide wheel and the black gear (see figure.3.4.2)

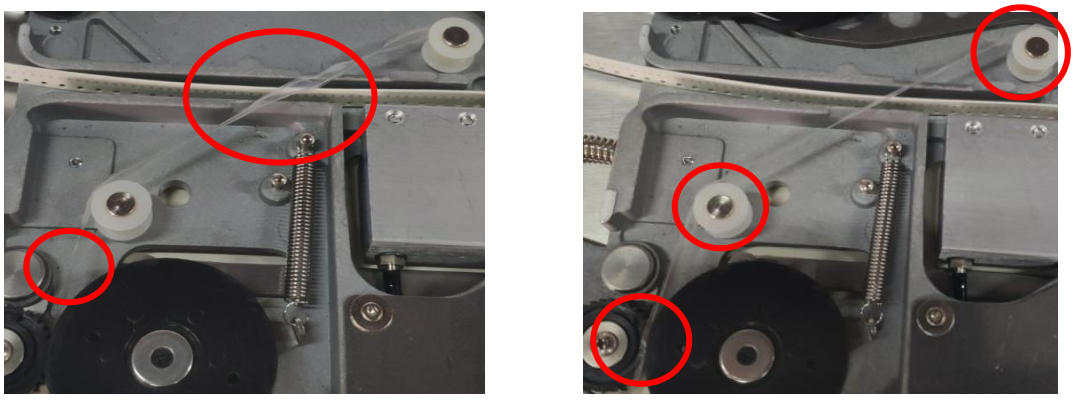
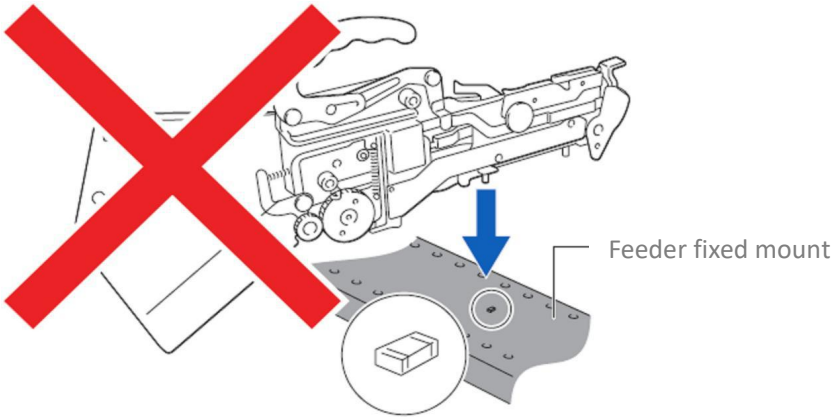


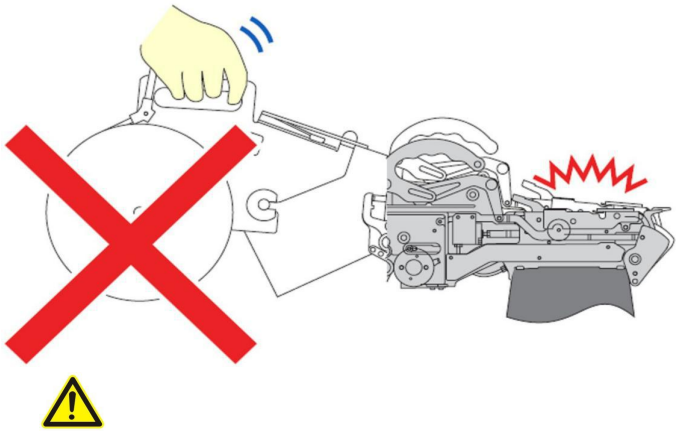
Figure (3.4.2)

3.Cautions: Strictly refer to the instruction manual to use the feeder, and non-standard operation is strictly forbidden.

Warning: when installing the feeder, if feel the hand press is not strong, or loose match in



place, then it is forbidden to operate. Otherwise will cause feeder floating in the operation and collision problem. In case of this situation, please contact the after-sales department of our company.



Warning: when installing the feeder on the equipment, make sure there is no foreign matter on the feeder fixed plate, and make the bottom surface of the feeder fully fit with the fixed plate. The handle is the main way to lock the feeder, so pls pay attention to protect this part. (Note: Don't move the feeder while the equipment is running, or it may cause collision problem.)

3.4.1 Nozzle

The size of the nozzle

Please choose nozzles according to the shape and size of components.

Table1-1 Nozzle

Type	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular
Model	CN030	CN040	CN065	CN100	CN140	CN220	CN400	CN750
Illustration								
External Diameter	0.6mm	0.8mm	1.0mm	1.8MM	2.0mm	3.6mm	5.0mm	9.0mm
Inner Diameter	0.3mm	0.4mm	0.7mm	1.0MM	1.4mm	2.2mm	4mm	7.5mm
Type	Special	Special	Special	Special	Special	Special	Special custom	
Model	YX01	YX02	YX03	YX04	YX05	YX06	-	
Illustration								
Shape								

The reference of nozzles selection

In order to ensure the placement accuracy， please select nozzles according to the shape and size of components

Table 1-2 size comparison of Nozzles

Model	Recommendation（Imperial system）
CN030	0201
CN040	0402（optimal）
CN065	0402、0603 etc.
CN100	0805、diode、1206、1210 etc.
CN140	1206、1210、1812、2010、SOT23、5050, etc.
CN220	SOP series ICs、SOT89、SOT223、SOT252, etc.
CN400	ICs from 5 to 12mm
CN750	ICs bigger than 12mm
YX01	3528serices Soft bead
YX02	High power lamp beads
YX03	Chips and BGA from 11mm to 17mm BGA
YX04	Chips and BGA bigger than 17mm
YX05	4148 circular diode
YX06	3535 ball shape LED(Spherical height 1.4mm,overall height 1.9mm）

3.5 Maintenance

3.5.1 Take effective measures to reduce /avoid malfunction

3.5.1.1 Reinforce daily maintenance

P&P machine is that high-accuracy device which requires a clean working environment with constant temperature and humidity, so it’s necessary to have a routine maintenance.

3.5.1.2 Requirements for operator

● Operator should get a basic operator training, which should cover fully all the skills and knowledge needed to safely operate the type of pick and place machine.

● Operating strictly against equipment's instruction. Don’t use machine with problems. Stop the machine once malfunction appears and contact with the after-sales service staff, restart to work after problem solved.

● Operator should be concentrated，

Observation-- to see whether there is abnormal situation, such as peel-box doesn’t work, plastic tape is broken etc.

Listening-- whether have strange sound, such as noise from placement head, sound of loss component, strange noise of conveyor etc.

Handwork-- solve some small problems in time, such as install feeder, correction placement position etc. If the main machine body or circuit problem, please consult after-sales staff. Formulate measures to reduce/ avoid big problem.

3.5.1.3 Formulate the measures to reduce/avoid big problem

The most easily appeared problem during work are placement wrong components and placement misaligned. Supply below measures for ref.

①It needs to check whether the components package is matched with related feeder. If not, please correct them.

②As to tape reel feeder, when ran out of one reel, operator must check whether newly changed tape reel is correct or not.

③After import the SMD file or edit chip list manually, please recheck each components No., nozzle rotation angle and placement position to make sure correct.

④ Operator must check the first finished PCB of each file. If any problem, please find solutions such as revise program to solve it.

⑤To check the placement position misaligned or not, component loss problem in regular work. Find reason in time and solve it.

⑥Set pre-welding detection station (manual or AOI)

In sum, P&P machine's running speed and placement accuracy still has limit. Peoples work is important to run machine on its proper role. So, it's necessary to comply with effective measures to keep machine normal work, its placement quality and efficiency.

3.5.2 Maintenance

Arrange regular inspection and maintenance system.

3.5.2.1 Daily Inspection

	Items
Items check before power on	①Temperature& Moisture: Temperature 20℃～26℃, humidity 45~70% ②Indoor environment: Air clean without aggregate air. ③No clutters within the placement area and keep rails clean. ④No spots on cameras and keep lens clean. ⑤No obstacles around the head nozzles ⑥Checking if nozzles are dirty, distorted; If so, please clean or change the nozzle. ⑦Checking if feeders are correctly installed in stacks and confirm no clutters on stack. ⑧Checking the connection of air connector and air hose ⑨Checking air pressure.
Items check after power on	①Checking if the monitor display normally after system start up. ②Checking if emergency button can work normally or not. ③Checking if placement head can move back to the origin. ④Checking if there's abnormal noise while placement head move. ⑤Checking all nozzles vacuum pressure. ⑥Checking if PCB moving on rails smoothly or not; Sensor

	workable or not. ⑦Checking if the board has been well fixed by magnetic bar and pins.

3.5.2.2 Monthly Inspection

Items	Detailed Inspection
X/Y axis	Make sure no abnormal noise while placement head moving.
X/Y motor	Make sure X/Y motors no overheating.
Nozzle	Checking if all nozzles are good without bend and nozzle surface is horizontal
Air hose	Checking the connection between air hose and machine, keep sure the hose in good situation without wearing or air leaking.
Step motor	Checking if any dirty on step motor, synchronous belt, Synchronous wheel. Make sure the Z-axis motor can up, down and rotate smoothly.
Z-axis motor	Checking if the placement head can go up and down smoothly. Use your finger to push the nozzle to check if it moves smoothly. Let each nozzle head up and down beyond the normal range.
Vacuum pressure	Checking nozzle vacuum pressure. If abnormal, please clean nozzles.
Positive pressure	Checking if the positive pressure normal.
Optical axis	Checking whether it is covered dusk. Please keep it clean and lubricated
Operation button	Checking each button to make sure they are well-worked
Connector	Checking if well-connected the air hose and air connector.
PCB clamp block	check their wear pattern

3.5.3 Related issues during solder paste printing process

3.5.3.1 Stencil Printing Technology

Screen printing technology refer to using ready-made stencil, directly connect to the printer in a certain way, make the solder paste evenly flow on the stencil and then leak into the mesh through the holes. When getting the stencil away, solder paste had been covered to the printed circuit board solder graphics, then finish the solder paste printing on the PCB.

3.5.3.2 Inspecting of solder paste printing

Printing process is one of the key working procedures to ensure the quality of surface mounting. According to the statistics, under the premise of guaranteed quality about components and PCB, correctly PCB design, 70% of the surface quality problem caused during printing process. In order to ensure the quality of SMT assembly, it is necessary to strictly control the quality of the solder paste printing.

The amount of solder paste printing requirements are as follows:

(1) The using amount of solder paste should be uniform, good consistency. Solder paste graphics should be clear, try to avoid adhesion between adjacent graphics. Solder paste

graphics and solder graphics should be consistent.
(2) In general, keep unit area amount of solder paste about 0.8 mg/mm². For fine pitch components, should be 0.5 mg/mm² (using stencil thickness and hole size to control in the actual operation).
(3) Printed on the substrate of solder paste compared with required value, a certain deviation is permissible, the covering area of the solder paste on each solder pad should be more than 75%.
(4) Should be no seriously collapsing problem and edges neatly after solder paste had been printed, the dislocation shouldn't be larger than 0.2 mm, for solder pad of fine pitch components, dislocation shouldn't be larger than 0.1MM, pollution by solder paste is not permitted to the PCB.
Inspection by 2~5 times magnifier or 3~20 times microscope.

3.5.3.3 The defects of solder paste printing, reasons and solutions

Excellent printing graphics should be uniform in both vertical and horizontal direction, full, clean all round, solder paste fill solder pad. Using above such printing graphics device, after reflow soldering, will get good welding effect then.

Problem	Reason	Issue	Solution
Solder paste graphics dislocation	Holes on the stencil not good match with solder pad; No enough precision of the Printing machine	easily cause bridge connection	Adjust the stencil position; Adjust the printing machine
Solder paste graphics have icicles and dents	Scraper pressure is too large; Rubber scraper hardness is not enough; Holes are too big in the stencil	Solder paste required volume is not enough, easy to appear faulty soldering; solder joint strength not enough.	Adjust the printing pressure; Use metal scraper; Improved holes designing in the stencil.
Too much solder paste	Holes are too big in the stencil; The gap is too big between stencil and PCB	easily cause bridge connection	Check stencil holes size; Adjust the parameters of printing, the gap between PCB and stencil
Graphic uneven (have breakpoints)	Holes' wall is not smoothness enough; not wipe residual solder paste in using for many times;Solder paste's thixotropy is bad	Easy cause no enough solder paste, lead to the problem such as faulty soldering.	Wipe the stencil
Contamination of the graphics	Not wipe residual solder paste in stencil after using for many times; Poor quality of solder paste; Shake problem when getting the stencil way	easily cause bridge connection	Wipe and clean stencil; replace solder paste; adjust the machine