Rev 2.0

Pick and Place Machine

User Manual

ZB3545TP



WenZhou ZhengBang Electronic Equipment Co., Ltd

Preface

Thank you for choosing our product. This operation manual covers the specifications, operating instructions and other relevant information of the ZB3545TP pick and place machine.

Notice

1. No part of this manual (including software and programs) may be copied or reproduced without prior authorization.

2. The contents herein are subject to change without notice.

3. We have endeavored to ensure the accuracy of this manual. Should you find any errors, omissions or discrepancies, please contact our distributor or our company.

4.We shall not be liable for any consequences resulting from improper operation, regardless of the issues stated in Clause 3. Thank you for your understanding.

Notice

For Safe Operation

All operators and maintenance personnel responsible for the operation, maintenance and repair of the mounter (hereinafter referred to as the Machine) must carefully read the following safety precautions before use to avoid personal injury.

1. Basic Guidelines

1. Operation of this machine is restricted to trained and certified operators only.

2. Do not use this machine for any purpose other than its intended use. Our company shall not be liable for any consequences arising from improper use.

3. Do not modify this machine in any way. Our company shall not be liable for any accidents caused by unauthorized modifications.

4. To prevent accidents due to accidental startup, always disconnect the power supply before performing inspection, maintenance, cleaning or repair work.

5. When unplugging the power cord, grasp the plug directly; do not pull the cord itself.

2.Notes on Operation

1. Take necessary safety measures during handling to prevent the unit from tipping over or falling while being lifted or moved.

2. Keep all packaging materials properly after unpacking.

3. Place the machine on a level surface during installation.

4. To avoid personal injury, inspect the power cable for damage, disconnection or looseness before connecting the power supply.

5. To avoid personal injury, ensure the power supply is properly grounded before powering on the unit.

6. All maintenance and commissioning work shall be performed by skilled technicians to prevent accidents caused by improper operation. Only use genuine spare parts supplied by our company for replacement. We shall not be held liable for any accidents resulting from the use of non-genuine parts.

7. All electrical repairs must be carried out by qualified electricians to prevent electric shock accidents due to unskilled operation.

8. After maintenance, commissioning or parts replacement, check that all screws and nuts are fully tightened to prevent personal injury.

3.Working Environment Precautions

To prevent accidents caused by improper operation, do not use the equipment under the following conditions:

1. Do not operate it in environments affected by electromagnetic interference from high-frequency welders and other noise sources.

2. Do not use the equipment when the power voltage exceeds the rated voltage by ±10%.

3. Stop using the equipment and cut off the power supply during thunderstorms.

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Chapter 1 Pre-operation Preparation

1. Unpack the wooden crate and take out the main unit and accessories. Check against the equipment list and inspect all components for integrity. Please contact us promptly if any issues are found.

After-sales Service Hotline: 86-0577-86701181

No.	Name	Specifications	Unit	Quantity
1	SMT Pick-and-Place Machine Main Unit	ZB3545TP	Unit	1
2	Monitor	18.5 "	Unit	1
3	Monitor VGA Cable	1.5m	Piece	1
4	Keyboard and Mouse Set	-	Set	1
5	Nozzles	502×1、503×2、504×2、505×1、506×1	Set	1
6	Nozzle Correction Substrate	Stainless Steel Substrate	Set	1
7	Magnets	Round	Piece	4
8	Calibration Nozzles	Solid Calibration Nozzle	Piece	4
9	Ink pad	Red	Piece	1
10	Power Cord	3×1.5 mm^2	Piece	1
11	Tool box	12.5 "	Set	1
12	Grease	Kunlun No.2 White Grease	Bottle	1
13	Hex Key Wrench Set	8-Piece Set	Set	1
14	Brush	1.5 "	Piece	1
15	Stainless Steel Tweezers	VETUS- Anti-static Precision Stainless Steel Tweezers	Piece	1
16	Sealing Ring	φ10×φ6×2.5	Piece	5
17	0-Ring	φ5×1	Piece	10
18	Certificate of Conformity		Sheet	1

2. The equipment must be placed on a flat and sturdy worktable, and ensure the four feet are adjusted to level.

3. Take out the monitor, mouse, and keyboard and place them on the right side of the main unit.

4. Connect the monitor, mouse, and keyboard to the industrial control computer: Connect the monitor VGA cable and USB mouse/keyboard to the industrial control computer as shown in the figure below.

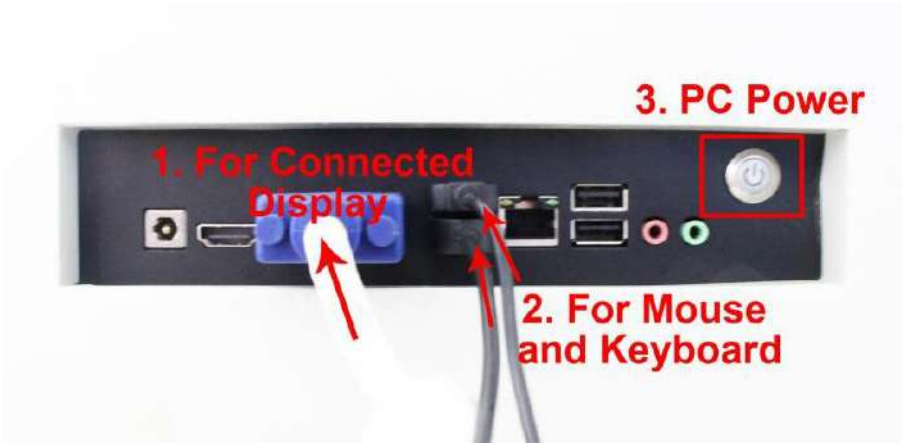


Figure 1-1



Figure 1-2 Monitor Connection Diagram

5 .Connect the main power supply and the monitor power supply: Connect one end of the power cord to the equipment's power input port, and the other end to the mains socket. Then plug the monitor's power plug into the built-in power socket on the equipment, as shown in the figure below.



Figure 1-3 Power socket

6.Connect the air supply: Insert the external air hose into the air inlet on the rear of the equipment, as shown in the figure below.

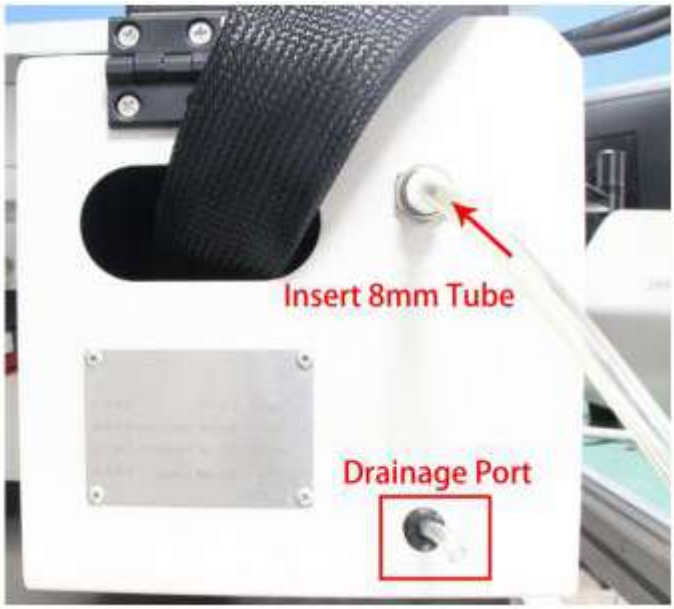


Figure 1-4 Pipe connector

7.Adjust the air pressure: Pull up the knob of the air source processor and adjust the air pressure to 0.6MPa, as shown in the figure below.

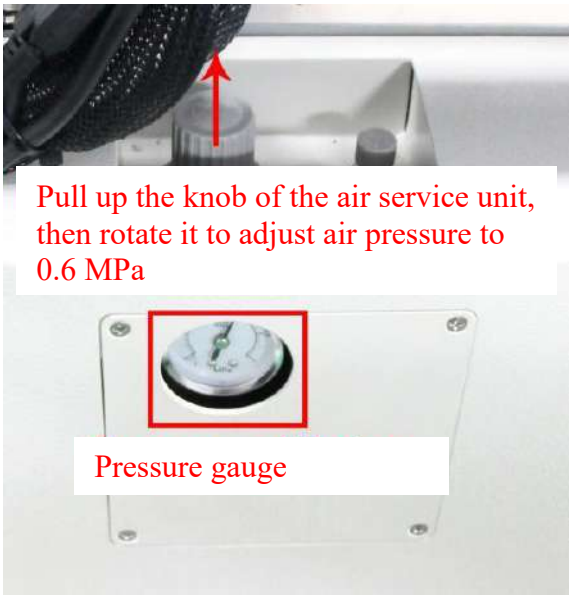


Figure 1-5

8.Turn on the main power switch: Rotate it 90 degrees clockwise to power on the unit.



Figure 1-6

9. Start-up Test: Double-click the shortcut icon on the desktop to launch the pick-and-place machine control system, then check if the monitor, mouse, keyboard and other components work properly.



10.Prepare production materials and supporting equipment.

	Materials	Remarks
1	PCB Design Software	Design software such as PROTEL, DXP, used for converting PCB source files
2	PCB Source File	Convert PCB source files into CSV format coordinate files that can be directly imported into the pick-and-place machine, eliminating the need for additional coordinate editing
3	PCB	PCB to be assembled
4	Components	Electronic components to be assembled (resistors, capacitors, ICs, etc.)
5	Double-sided Tape	Used as a substitute for solder paste during machine testing to avoid unnecessary material waste
6	Solder Paste Mixer	For mixing solder paste (fully mixed solder paste enhances activity, eliminates air bubbles, and improves soldering quality)
7	Solder Paste Printer	Essential equipment for applying solder paste in the SMT production process
8	Squeegee & Mixing Blade	Used with the mixer and printer
9	Reflow Oven	Solders components to the PCB by subjecting assembled PCBs to heating, soaking, soldering, and cooling stages
10	Air Compressor	Air pressure ≥ 0.6MPa

Chapter 2 Equipment Overview

2-1 Equipment Composition

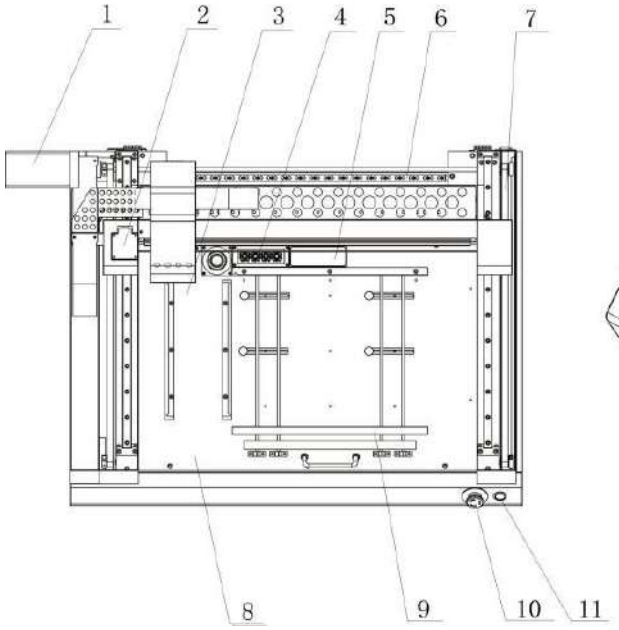


Figure 2-1 Top View of the Main Unit

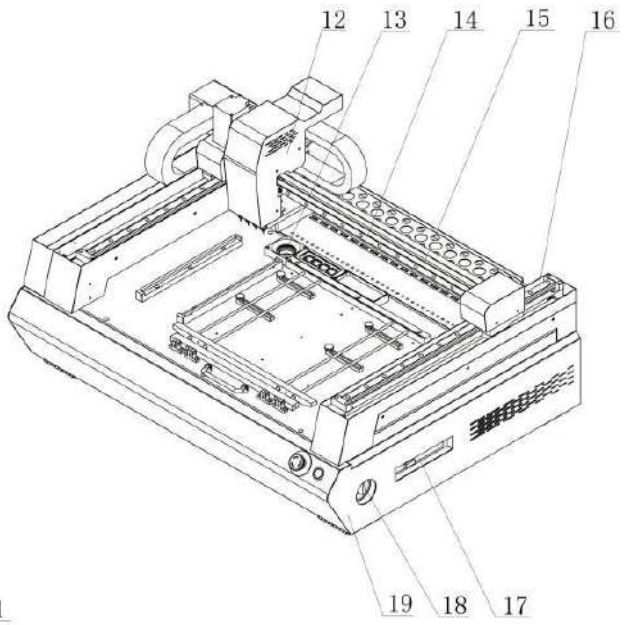


Figure 2-2 Side View of the Main Unit

1---Y-axis Stepper Servo Motor	2---X-axis Stepper Servo Motor	3---IC Tray Placement Area	4---Four-lens High-speed Camera
5---Component Rejection Box	6---Feeder Mounting Plate	7---Y-axis Drive Timing Belt	8---Worktable Plate
9---PCB Clamping Mechanism	10---Emergency Stop Switch	11---One-touch Start Button	12---Placement Head Assembly
13---Large Component Camera	14---X-axis Linear Guide Rail	15---X-axis Drive Timing Belt	16---Y-axis Linear Guide Rail
17---Industrial Control Computer (IPC)	18---Power Switch	19---Enclosure	

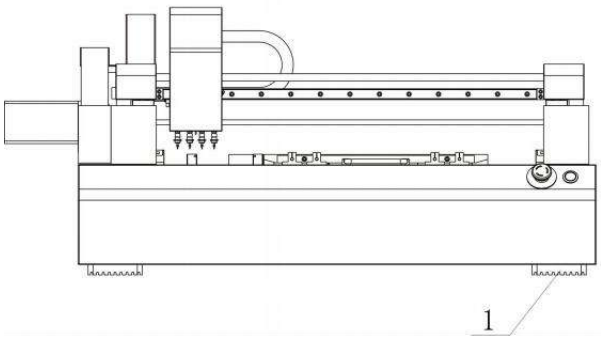


Figure 2-3 Front View of the Main Unit

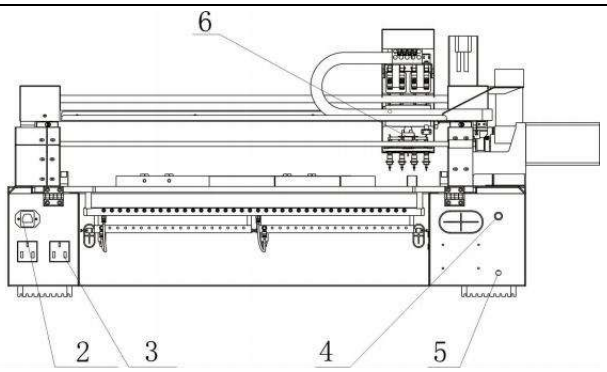


Figure 2-4 Rear View of the Main Unit

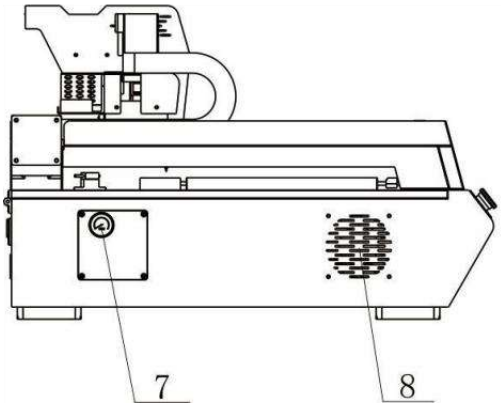


Figure 2-5 Left Side of the Main Unit

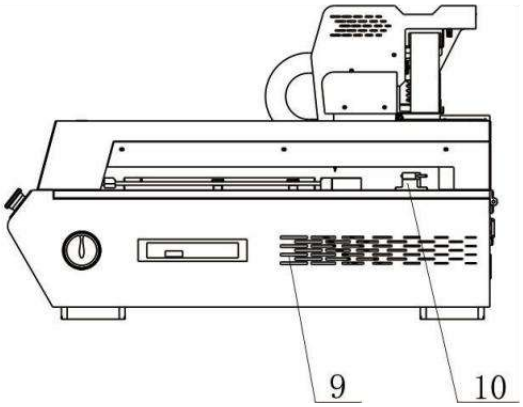


Figure 2-6 Right Side of the Main Unit

1---Rubber Foot Pad	2---Power Cord Socket	3---Power Outlet	4---Air Inlet
5---Air Processor Drain Port	6---Mark Point Camera	7---Air Processor	8---Heat Dissipation Vent
9---Air Inlet Hole	10---Feeder Anti-lift Photoelectric Switch		

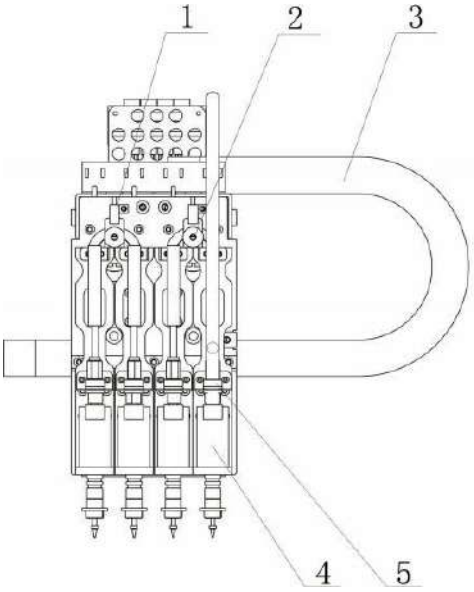


Figure 2-7 Front View of the Placement Head

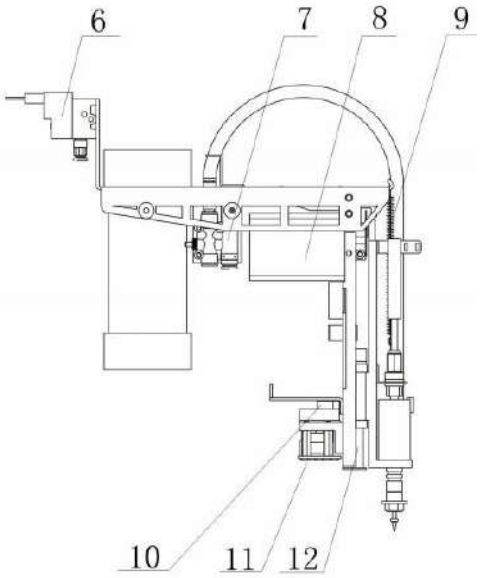


Figure 2-8 Left Side View of the Placement Head

1---Z-axis Detection Photoelectric Sensor	2---Swing Lever Assembly	3---Cable Drag Chain (Energy Chain)
4---Rotary Stepper Motor	5---Rotary Sealing Copper Bushing	6---Vacuum Switching Solenoid Valve
7---Vacuum Generator	8---Z-axis Up/Down Motor	9---Return Spring
10---Mark Camera	11---Mark Camera LED Light Source	12---Z-axis Linear Guide Rail

2-2 Description of X, Y, Z, and A Axes

The machine has four numerically controlled axes (X, Y, Z, A):

1. **X and Y Axes**: The horizontal direction of the equipment is defined as the X-axis, and the vertical direction as the Y-axis. The unit is 0.01 mm, displayed as X=000.00mm, Y=000.00mm.
2. **Z Axis**: Represents height. The unit is 0.01 mm, displayed as Z=00.0mm.
3. **A Axis**: Displays the rotation angle of the placement head. The unit is 0.1°, displayed as A=00.0. Counterclockwise rotation is defined as the positive direction.

2-3 File Types

1. CSV Format Coordinate File

A CSV coordinate file is a file converted and exported from a PCB source file using software such as DXP. It can also be created and edited directly in the FlyerSMT+ pick-and-place system.The file contains data including reference designator, component name, package, placement coordinates, placement angle, and component value. CSV files are fully compatible with Microsoft Excel for editing and saving.

2. OPT Format Production File

The .OPT production file is an official production program file edited and configured within the FlyerSMT+ pick-and-place system.It includes information from the CSV coordinate file, PCB specifications, feeder settings, and other related parameters.The .OPT file can only be modified and used within the FlyerSMT+ pick-and-place system.

2-4 Equipment Specifications

System	Item	Content
Placement System	Number of Placement Heads	4 units
	Placement Accuracy	0.025 mm
	Placement Angle	0~360°
	Theoretical Speed	7500 pcs/H
	Normal Placement Speed	6000 pcs/H
	Vision-Assisted Placement Speed	5000 pcs/H
	Nozzle Type	Juki
	Applicable Components	Resistors/Capacitors (0402, 0603, 0805, 1206, etc.)
		LED Beads (0603, 0805, 3014, 5050, etc.)
		ICs (SOT, SOP, QFN, BGA, etc.)
	Allowed Component Thickness	< 5.5 mm
PCB Board	Minimum PCB Size	10 × 10 mm
	Maximum PCB Size	350 × 450 mm
	PCB Thickness	≤ 2 mm
	Allowed PCB Warpage	< 1 mm
X/Y Motion Structure	Drive Type	Single-arm Direct Coupling
	Drive Mechanism	Belt + Linear Guide Rail
	Drive Motor	Stepper Servo Motor
Feeders	Type	Yamaha CL Feeders
	Supported Sizes	8 mm, 12 mm, 16 mm, 24 mm, 32 mm
	Total Feeder Count	38 pcs
	Electric Feeders	3 pcs
	Tube Feeders	3-tube or 5-tube compatible
	IC Tray Feeders	1 pcs
X/Y/Z Axes	X/Y Axis Travel Range	655 × 575 mm
	Z Axis Travel Range	20 mm
	Z Axis Effective Stroke	12 mm
	Z Axis Rotation Angle	0~360°
Vision System	Vision Camera Type	High-Definition CCD Camera
	Vision Camera Configuration	1 × PCB Camera, 1 × High-Definition Camera, 4 × High-Speed Cameras
	Component Recognition Range	MAX. 22 × 22 mm
Control System	PC Operating System	Microsoft Windows 7
	Control Software	FlyerSMT+
	Compatible File Formats	.CSV, .TXT
	Programming Methods	Online Programming
	External Air Supply Requirement	0.8 MPa
Vacuum System	Vacuum Generation Method	Vacuum Generator
	Vacuum Pressure	-80 kPa
Overall Machine	Power Consumption	500 W
	Power Supply Requirements	AC220V ±10%, 50 Hz

	Machine Dimensions (L × W × H)	L 1185 × W 840 × H 560 mm
	Net Weight	123kg

2-5 Nozzles

NO.	Outer Diameter	Inner Diameter	Appearance	Applicable Components
502	Φ0.7mm	Φ0.4mm		0402 package components
503	Φ1.0mm	Φ0.6mm		0402, 0603 and other same-size package components
504	Φ1.5mm	Φ1.0mm		0805, 1206, 1210, SOT23 and other same-size package components
505	Φ3.5mm	Φ1.7mm		SOP8, SOP14, 1812, 2220, QFN and other same-size package components
506	Φ5.0mm	Φ3.2mm		QFN, TQFP, BGA, or components within 22 mm package size

2-6 PCB Limitations

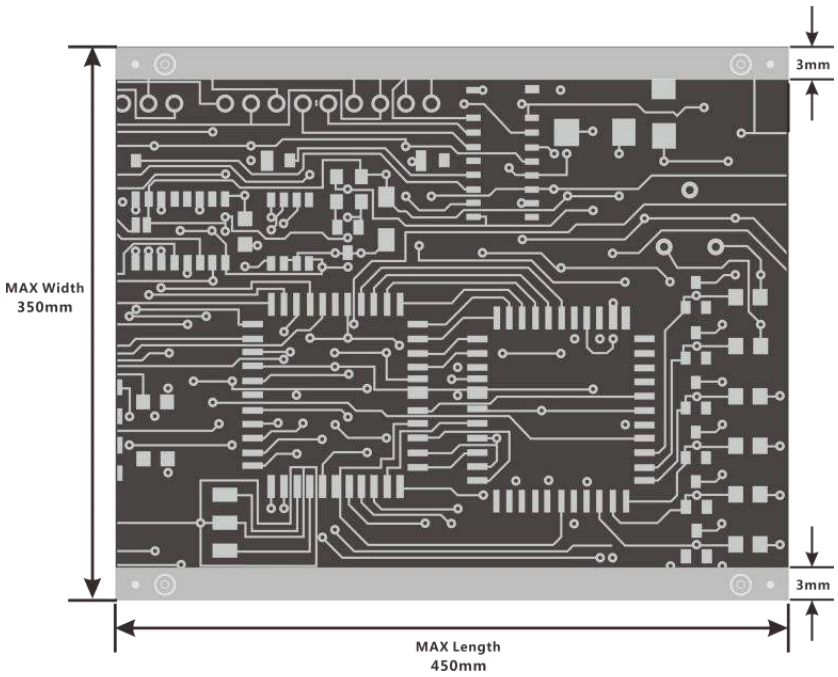


Figure 2-9 PCB Limitations

2-7 Menu Structure

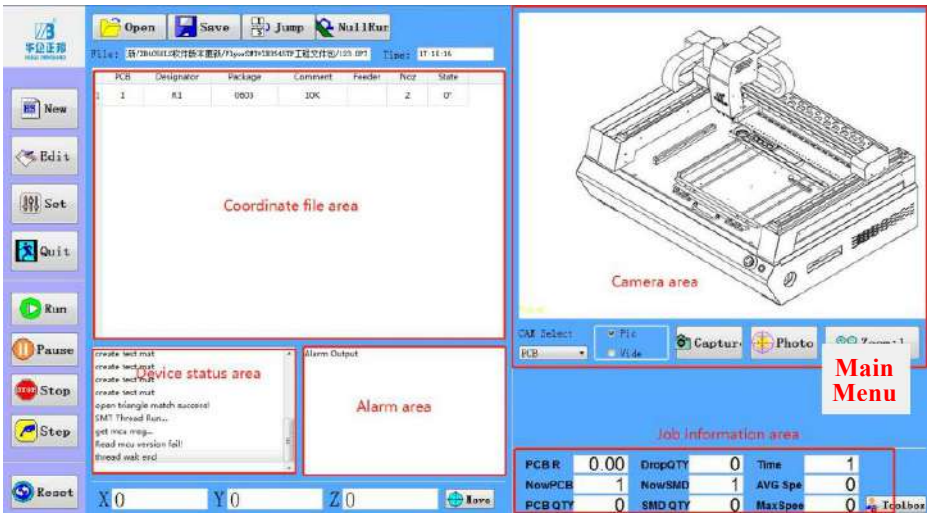


Figure 2-10 Main Menu

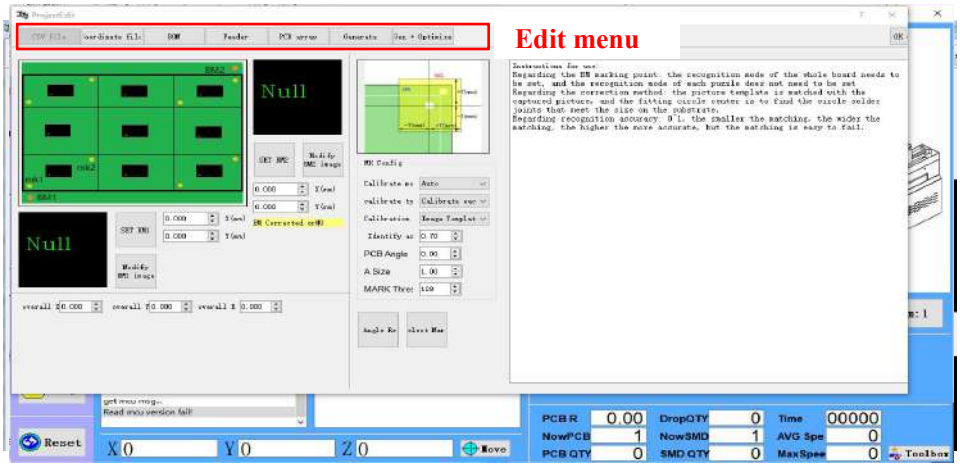


Figure 2- 11 Edit Menu

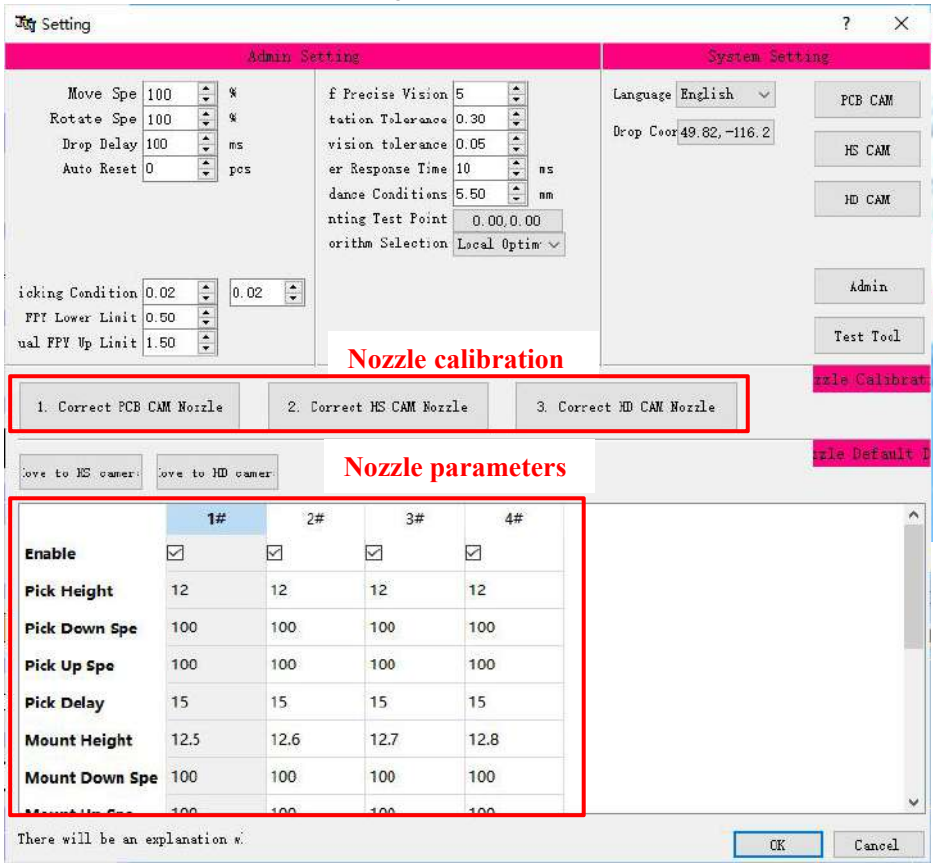


Figure 2- 12 Settings Menu

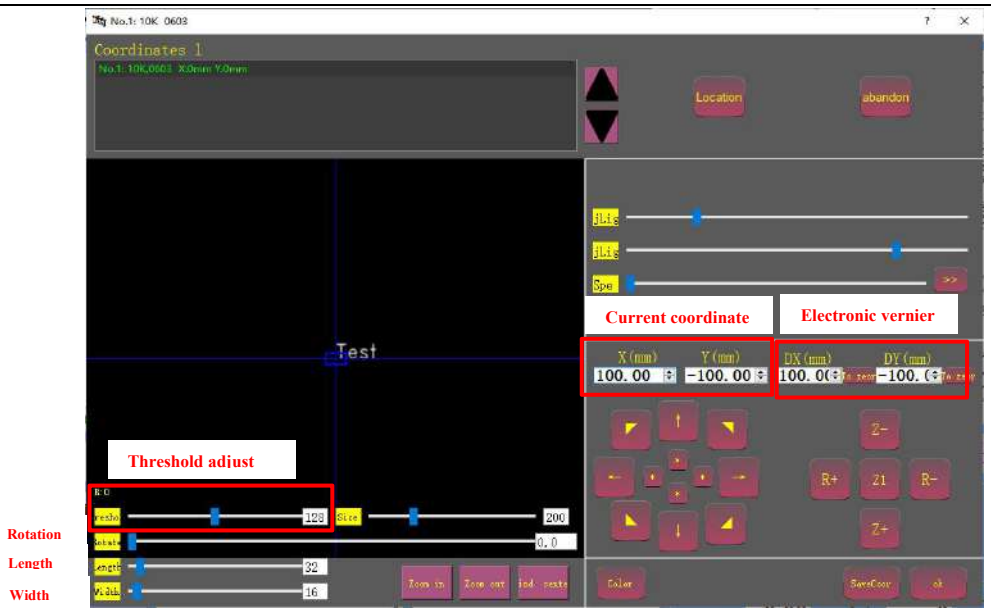


Figure 2-13 Coordinate Editing

Chapter 3 Program Editing

3-1 CSV File Creation

IMPORTANT NOTE:

If you have PCB source files, simply export the CSV coordinate file and import it into the pick-and-place system — no further editing of component placement coordinates is required.

If you do not have PCB source files, you can only add component coordinates directly via the pick-and-place system.

3-1-1 PCB Source File to CSV Coordinate File Conversion

1.**Importing Files**: Launch DXP (Altium Designer), then import the PCB source file required for the pick-and-place process.

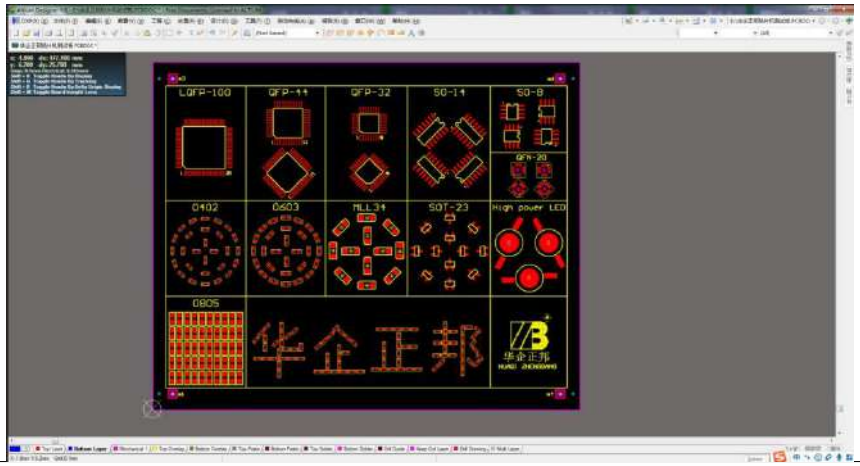


Figure 3-1-1 Importing Files

2.Setting Origin: Click Edit → Origin → Set, then align the cursor to the through-hole via at the bottom-left corner, the Mark point, or the component pad at the bottom-left corner to set it as the origin point.

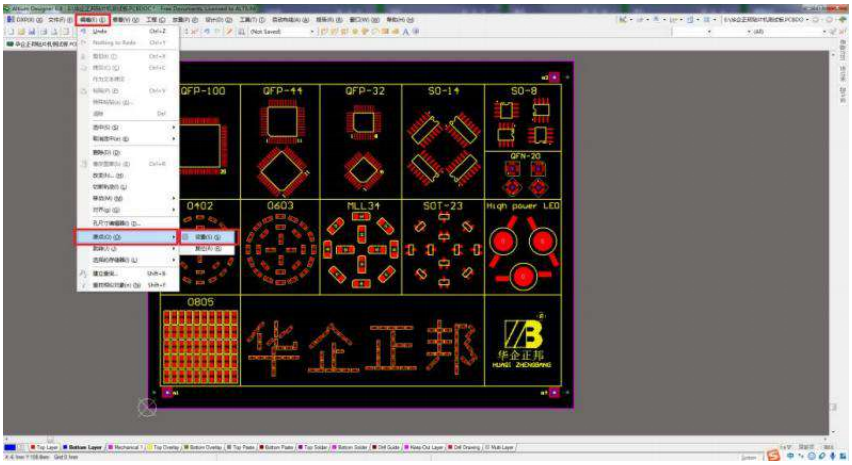


Figure 3-1-2 Selecting Origin Settings

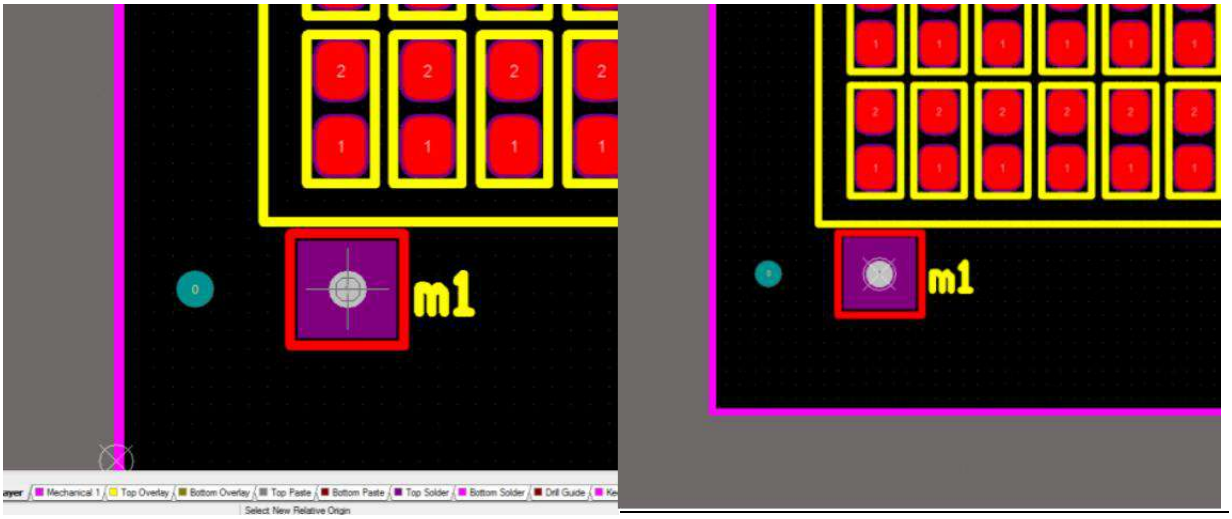


Figure 3-1-3/4 Setting the Origin

IMPORTANT NOTE:

While it is common practice to set the origin at the bottom-left corner edge of the PCB, this is not recommended due to potential inaccuracies in the PCB cutting process. Instead, it is more appropriate to set the origin using a bottom-left through-hole via, Mark point, or component pad at the bottom-left corner.

3.Exporting Files: Click File → Assembly Output → Generates pick and place files to export the coordinate file.

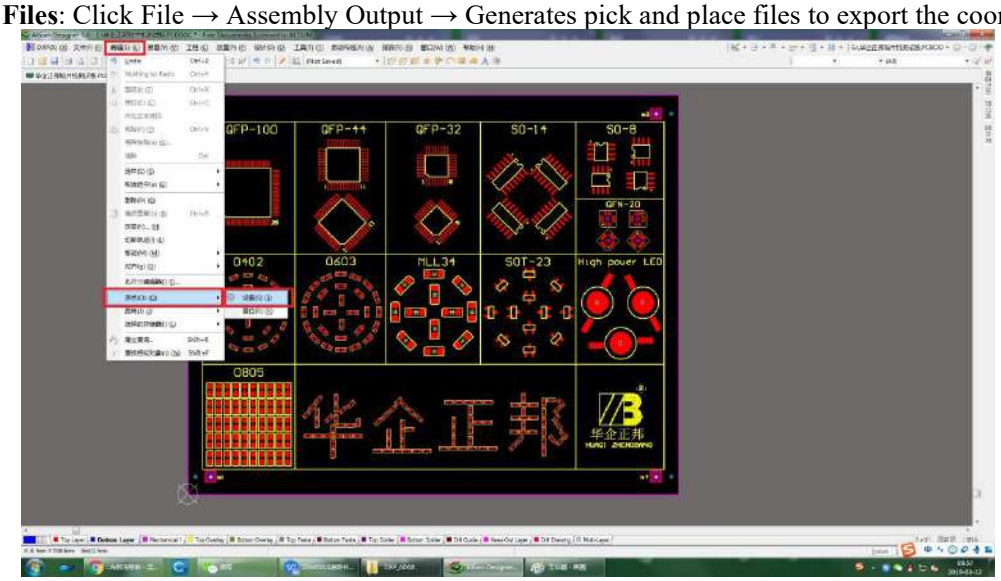


Figure 3-1-5 Exporting the Coordinate File Select Format

Select Format: CSV, Units: Metric, then click "OK"to generate the CSV coordinate file.

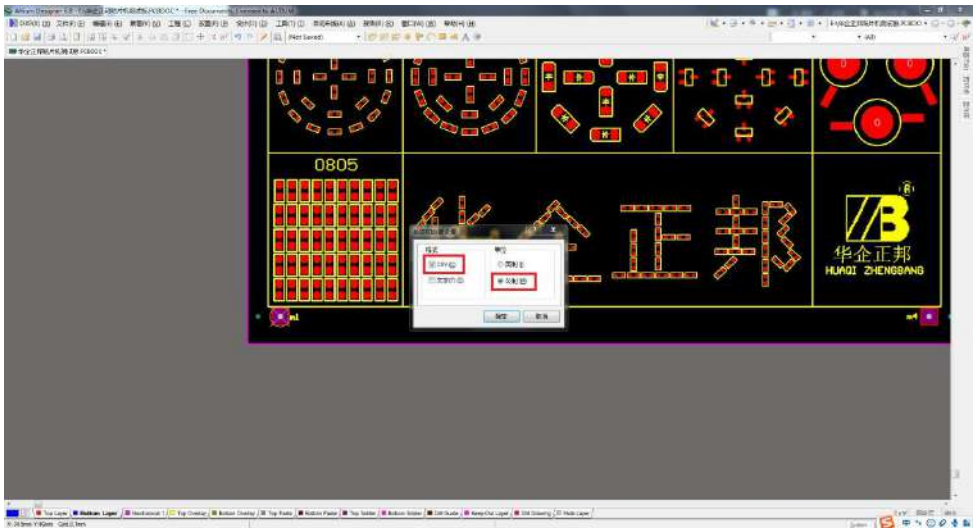


Figure 3-1-6 Selecting Output Format

The exported file is saved by default in the same folder as the PCB source file

3-1 Creating a New Project

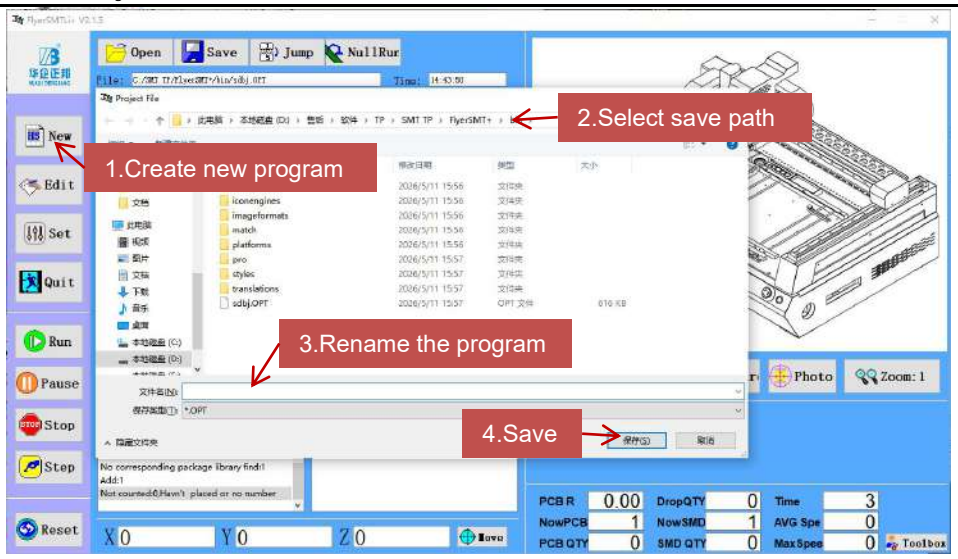


Figure 3-1 Creating a New Project

3-2 PCB

IMPORTANT NOTE:

BM1 and BM2 must be set at diagonally opposite positions on the PCB.

3-2-1 PCB Editing Process

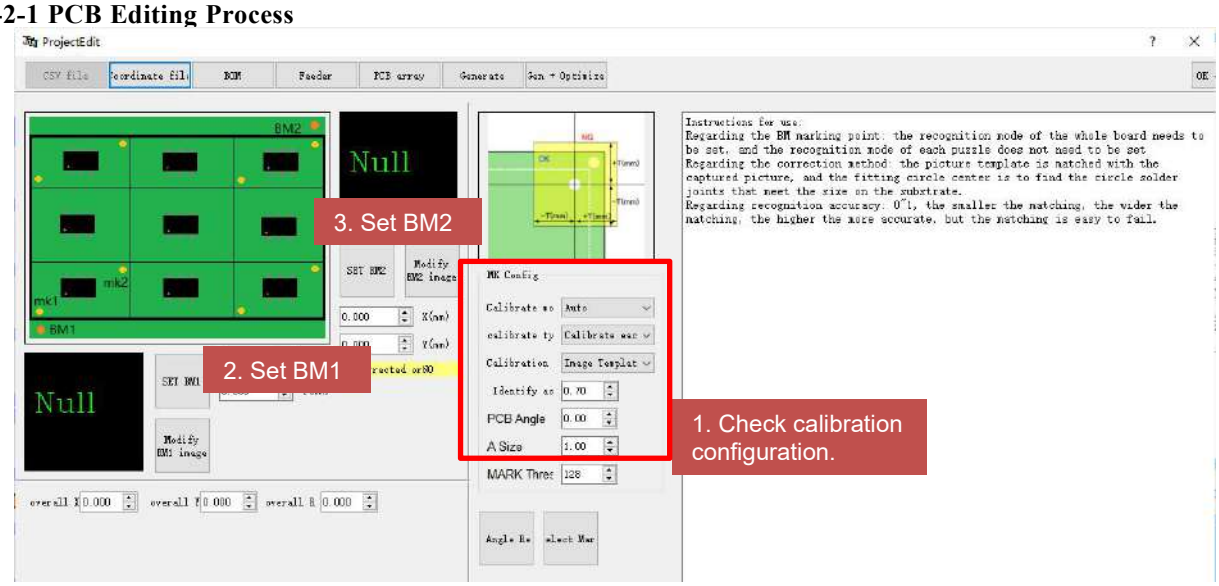


Figure3-2-1 PCB Editing Process

3-2-2 Setting BM1

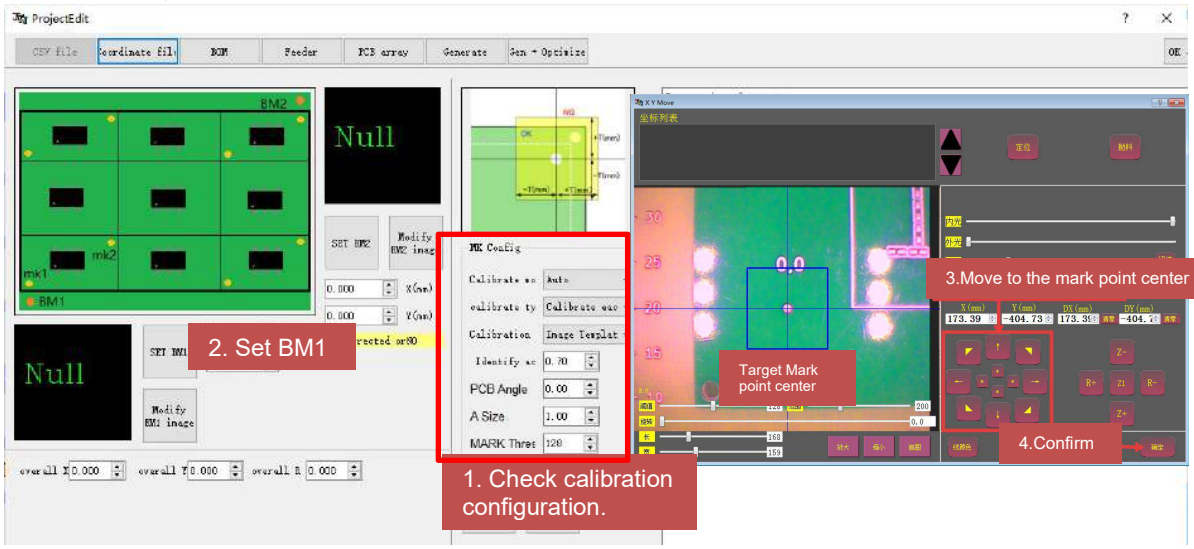


Figure 3-2-2 Setting BM1

3-2-3 Setting BM2

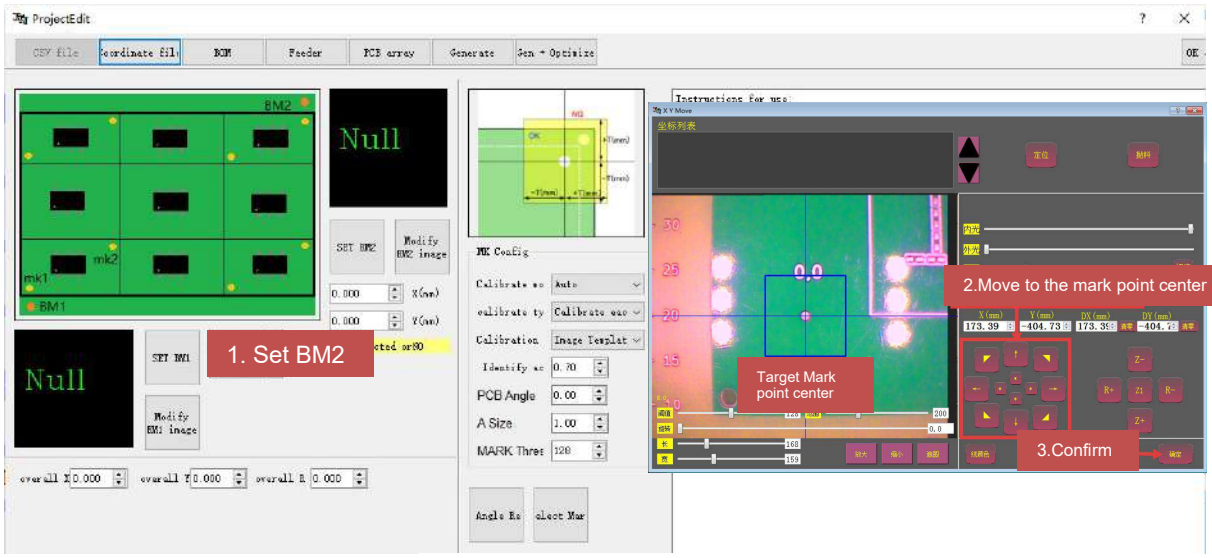


Figure 3-2-3 Setting BM2

3-3 Coordinate File Editing

3-3-1 Coordinate File Editing Process

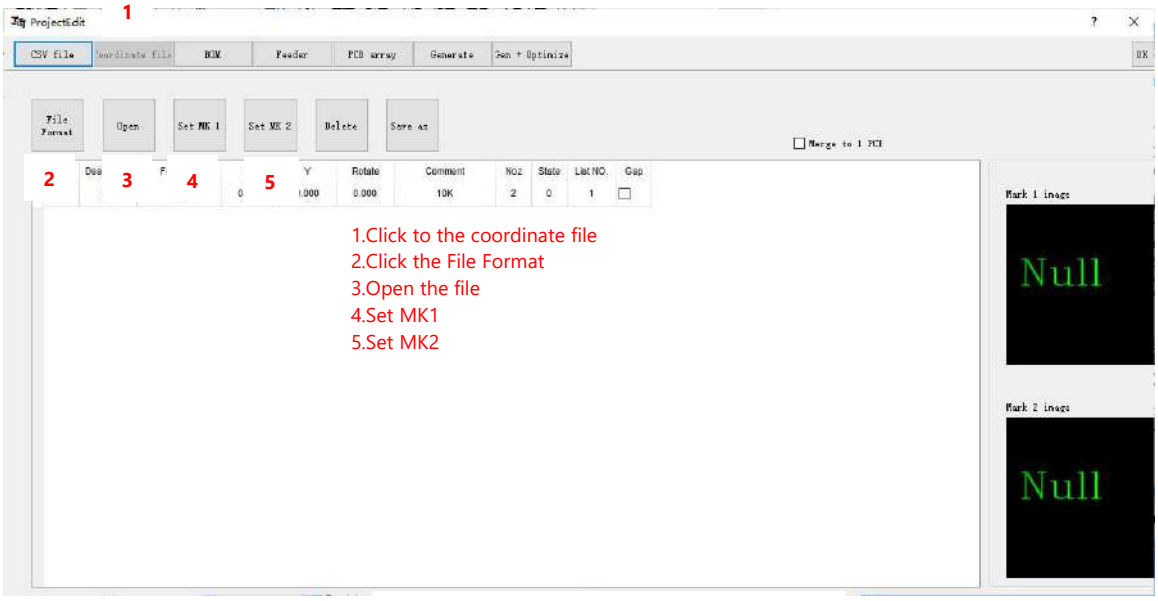


Figure 3-3-1 Coordinate File Editing

3-3-2 File Format Editing

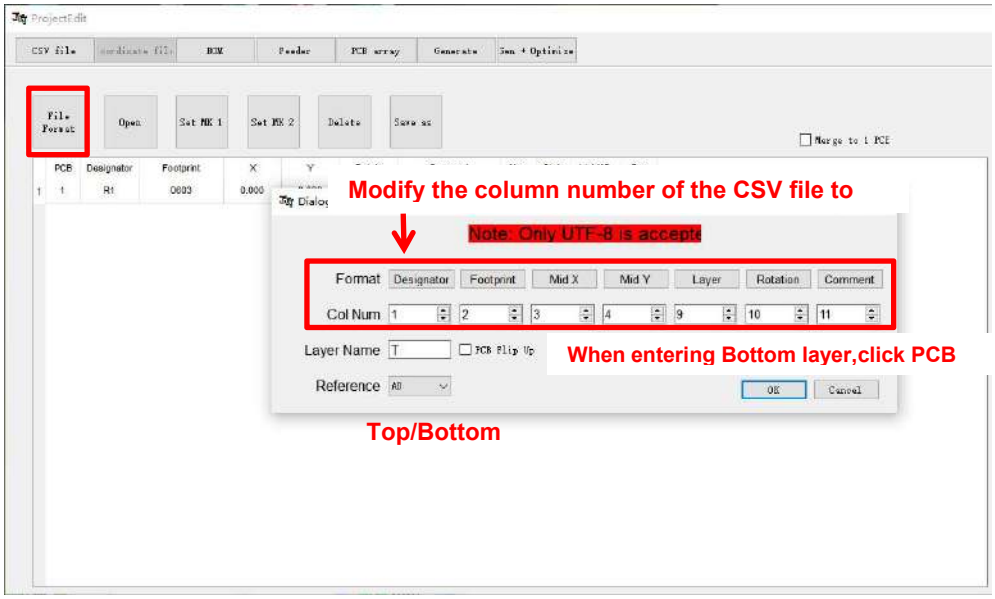


Figure 3-3-2 File Format Editing

3-3-3 Open File

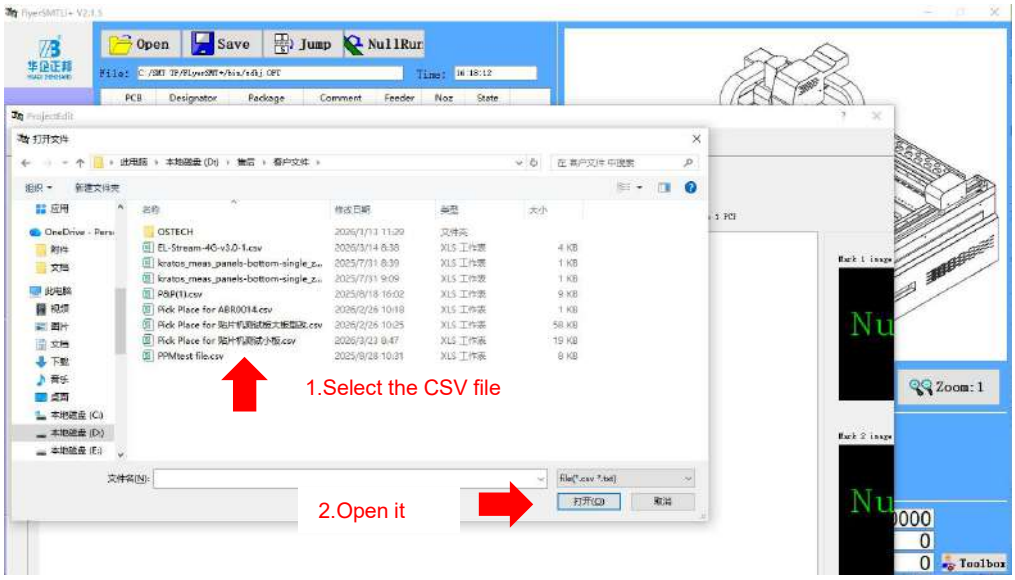
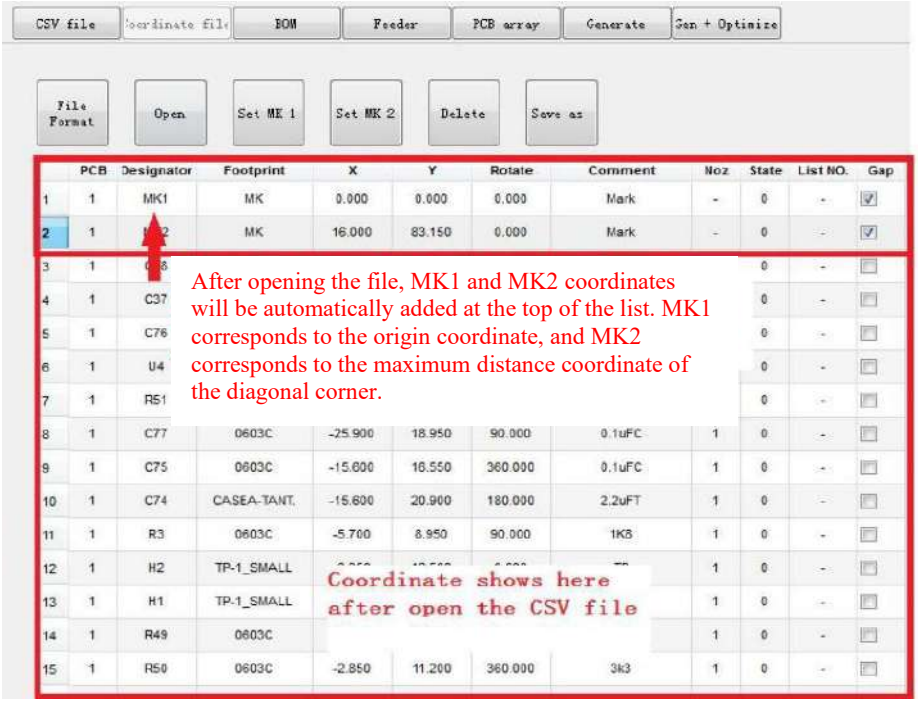


Figure 3-3-3 Open File



	PCB	Designator	Footprint	X	Y	Rotate	Comment	Noz	State	List NO.	Gap
1	1	MK1	MK	0.000	0.000	0.000	Mark	-	0	-	☑
2	1	MK2	MK	16.000	83.150	0.000	Mark	-	0	-	☑
3	1	C36							0	-	☐
4	1	C37							0	-	☐
5	1	C76							0	-	☐
6	1	U4							0	-	☐
7	1	R51							0	-	☐
8	1	C77	0603C	-25.900	18.950	90.000	0.1uFC	1	0	-	☐
9	1	C75	0603C	-15.600	16.550	360.000	0.1uFC	1	0	-	☐
10	1	C74	CASEA-TANT.	-15.600	20.900	180.000	2.2uFT	1	0	-	☐
11	1	R3	0603C	-5.700	8.950	90.000	1K8	1	0	-	☐
12	1	H2	TP-1_SMALL					1	0	-	☐
13	1	H1	TP-1_SMALL					1	0	-	☐
14	1	R49	0603C					1	0	-	☐
15	1	R50	0603C	-2.850	11.200	360.000	3k3	1	0	-	☐

Figure 3-3-3-2 After Opening File

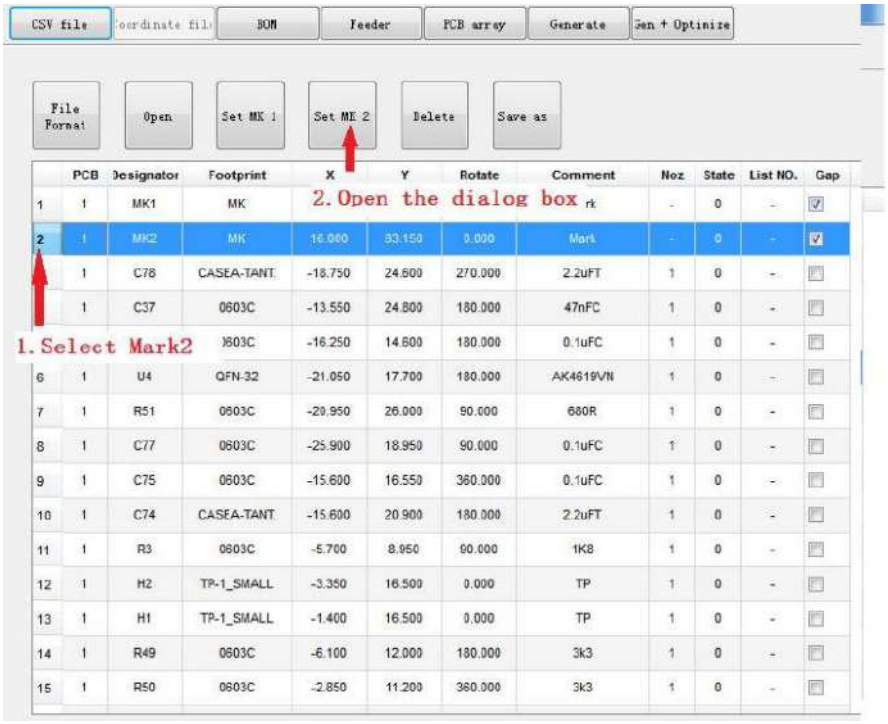
3-3-4 Setting Reference Point 1



Figure 3-3-4 Setting Reference Point 1

3-3-5 Setting Reference Point 2

-



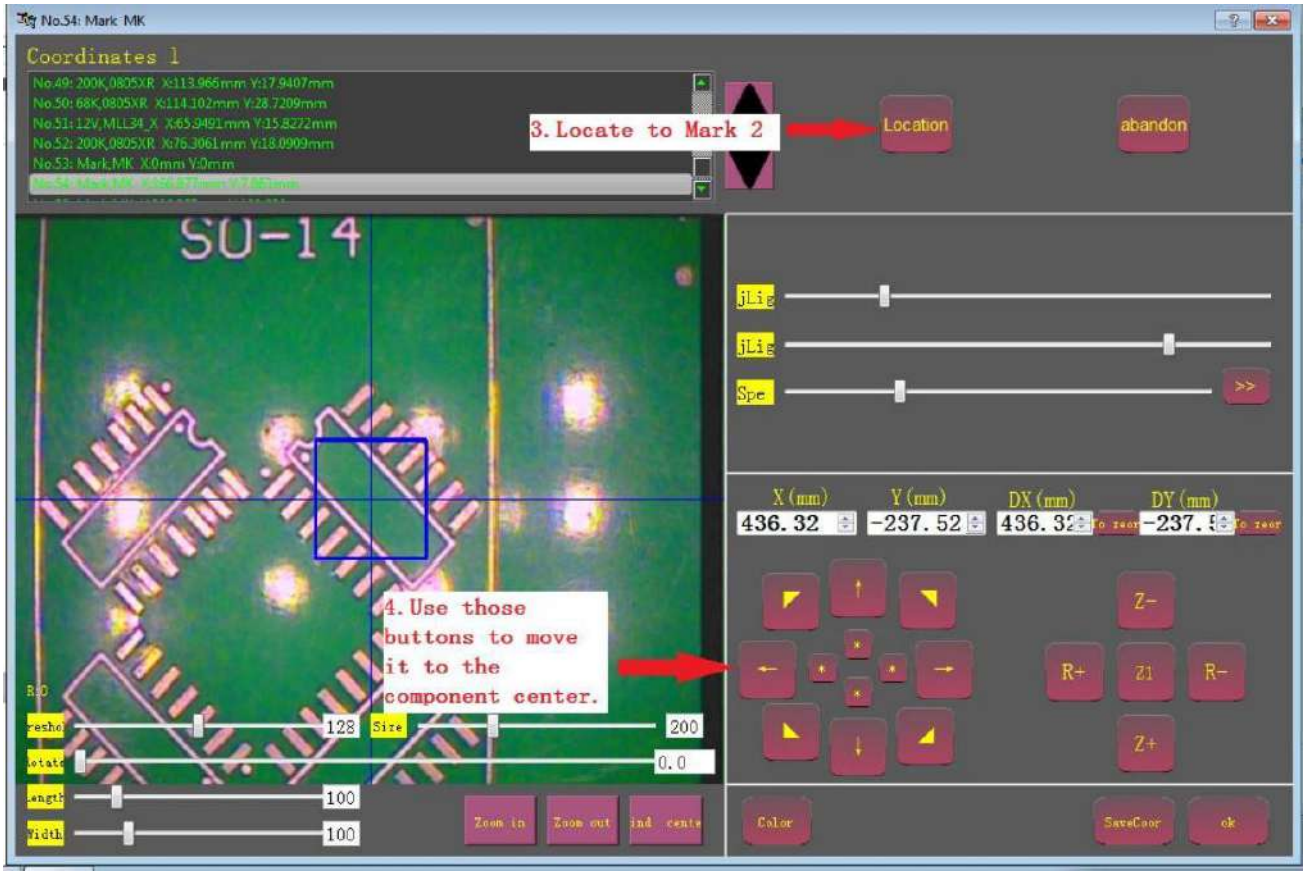


Figure 3-3-5 Setting Reference Point 2

3-3-6 Viewing-Modifying-Coordinates

IMPORTANT NOTE:

When the reference points are correctly set, the crosshair should be aligned to the center of each component when checking the component coordinates one by one. If the crosshair does not align with the component center, this indicates improper reference point configuration, and you must re-set the reference points.

If you need to modify the coordinate position of the current component while viewing the coordinates, you can adjust the position using the direction keys located at the bottom right corner. After completing the position adjustment, click the save key at the bottom right corner to save the modified coordinates of the current component.

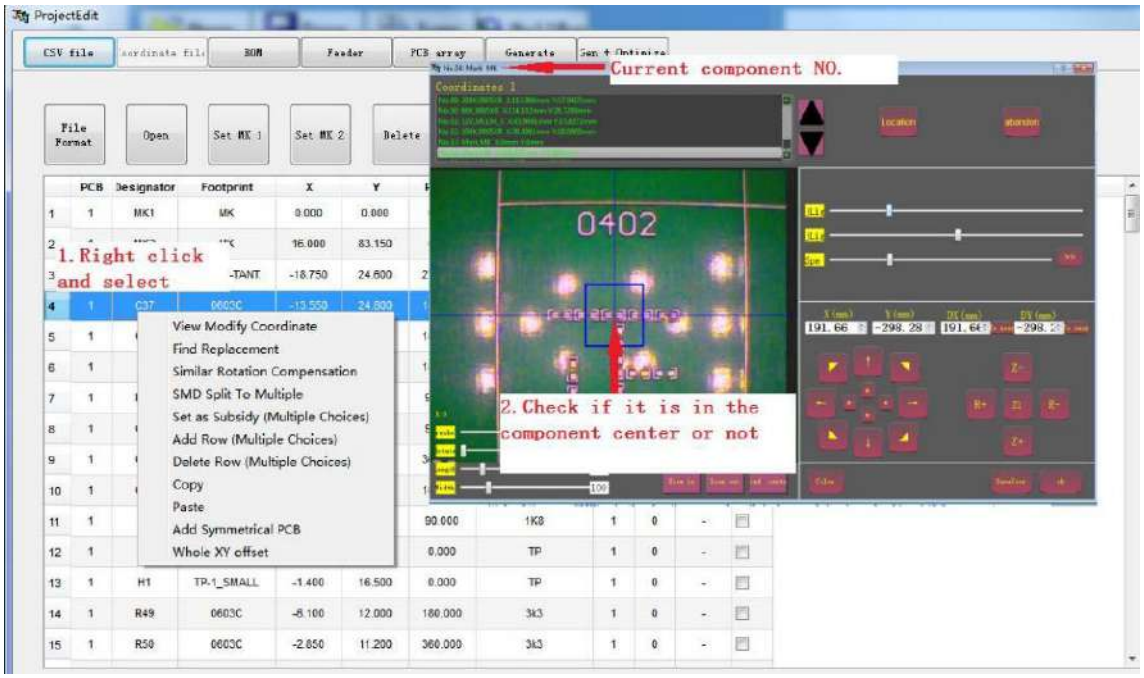


Figure 3-3-6 Viewing-Modifying-Coordinates

IMPORTANT NOTE:

The following descriptions of the right-click menu functions (including Find and Replace, Same-type Rotation Compensation, Same-type Multiple Splitting, etc.) are for reference only when needed, and may be skipped when not required.

3-3-7 Find and Replace

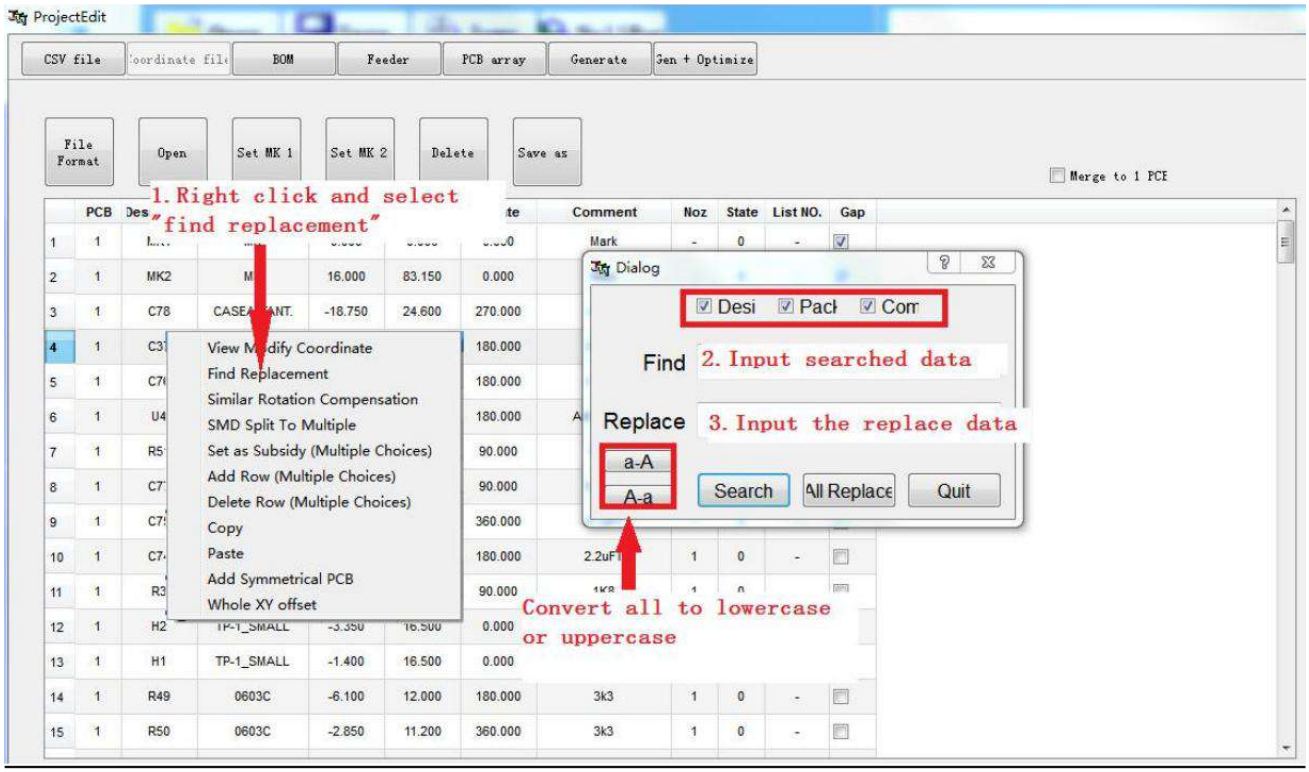


Figure 3-3-7 Find and Replace

3-3-8 Same-type Rotation Compensation

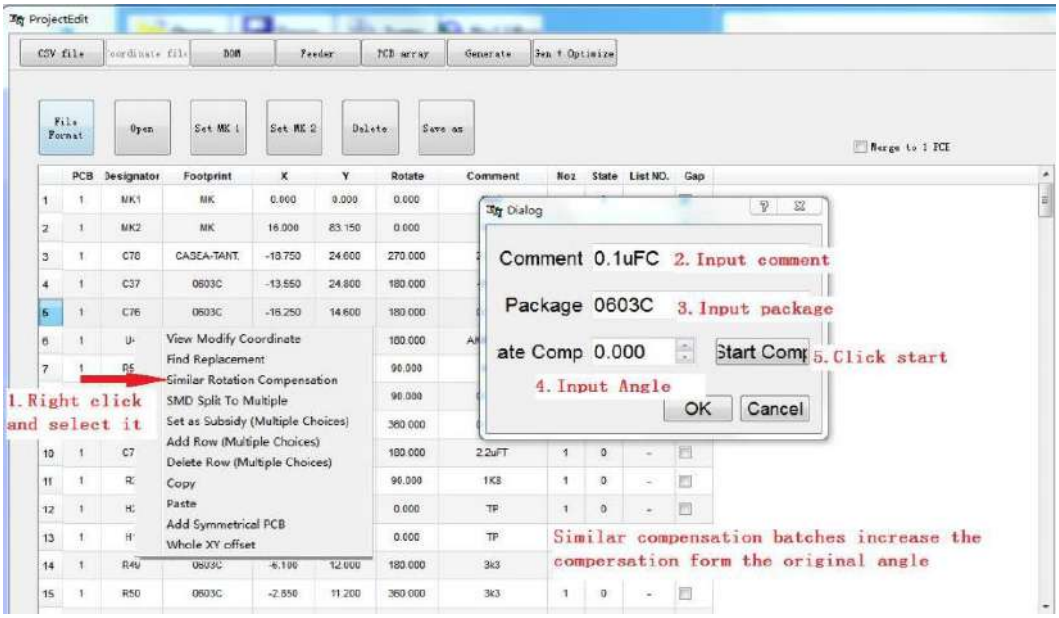


Figure 3-3-8 Same-type Rotation Compensation

3-3-9 Split similar items into multiple groups

This function of splitting identical items into multiple groups applies to scenarios where a single type of component is used in large quantities and feeding efficiency with one single feeder is insufficient. After entering the split quantity, the software will automatically revise the original remarks by appending "-X" to indicate identical quantities. This allows multiple feeders to supply the same material, and it is especially suitable for LED bead mounting operations.

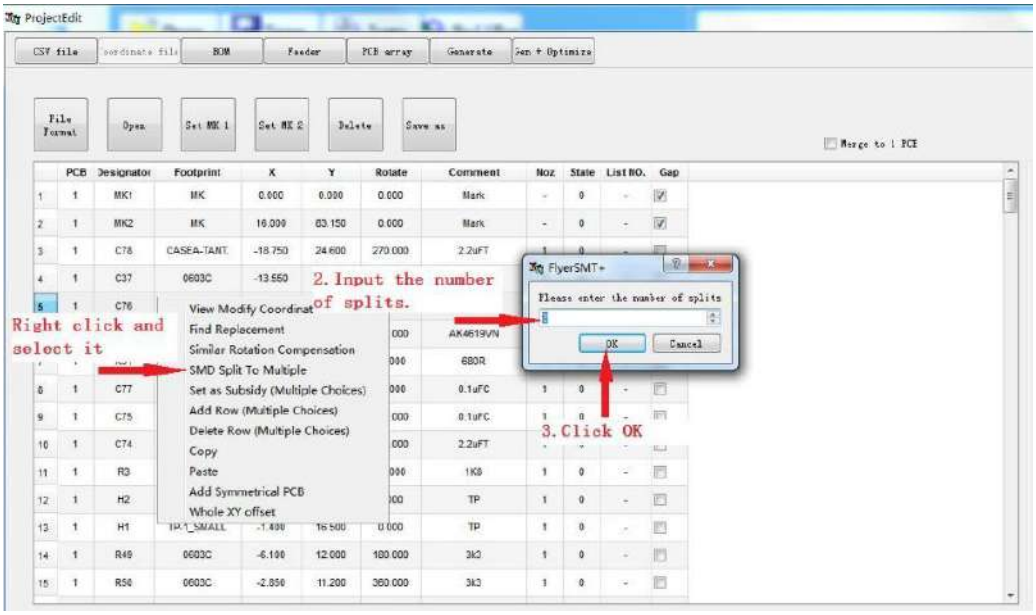
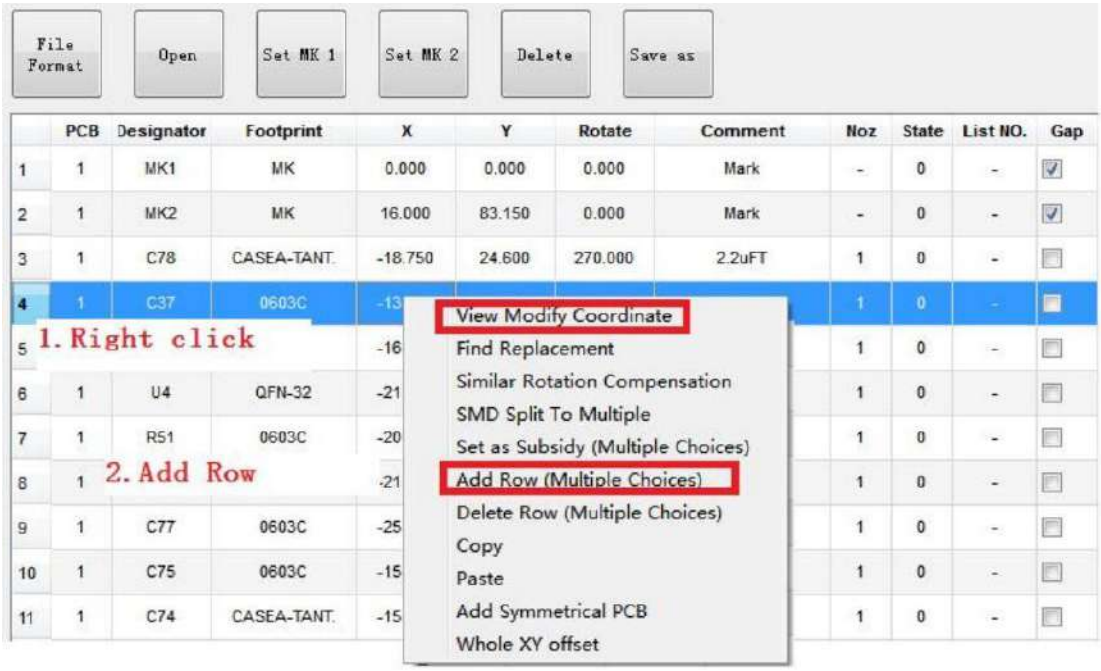


Figure 3-3-9 Split similar items into multiple groups

3-3-10 Manually Edit Component Coordinates (Without Original CSV File)

Step 1: Create a new project. Refer to Section 3-2 for details. Step 2: Manually add and edit coordinates.



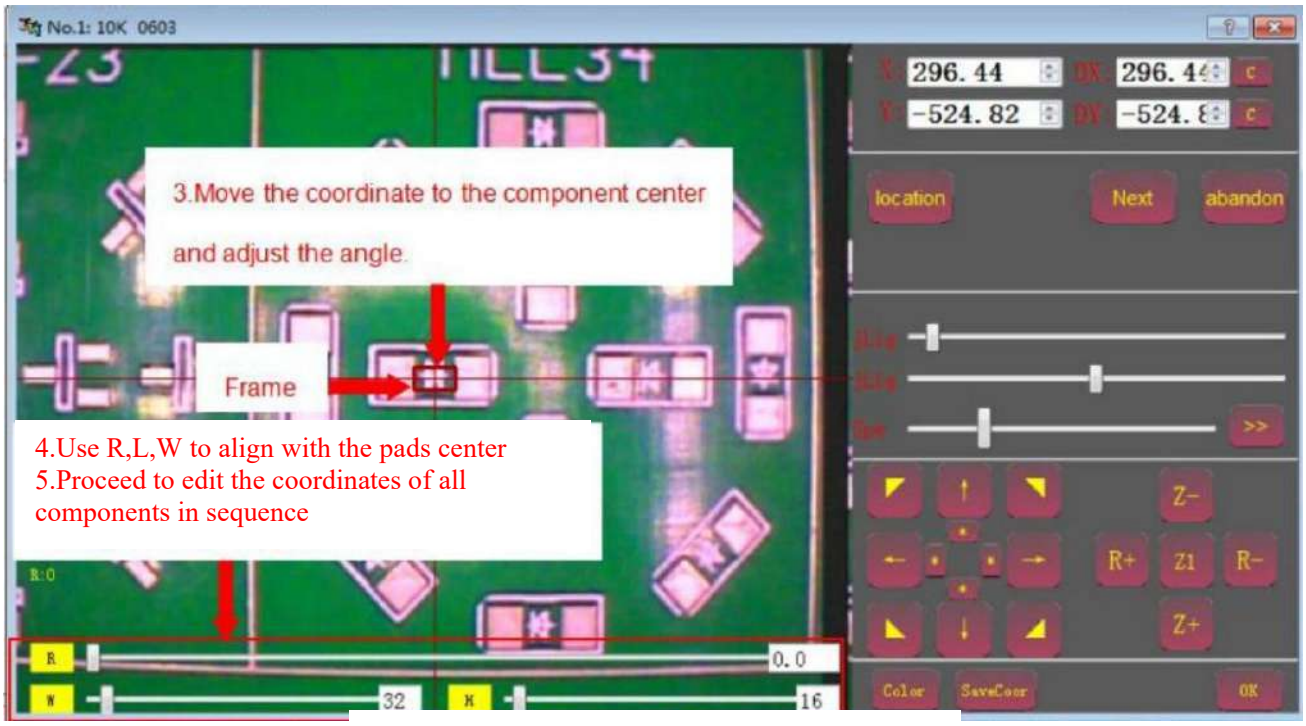


Figure 3-3-10 Manually Add Coordinates

3-4 Edit Component List

3-4-1 Component List Editing Process

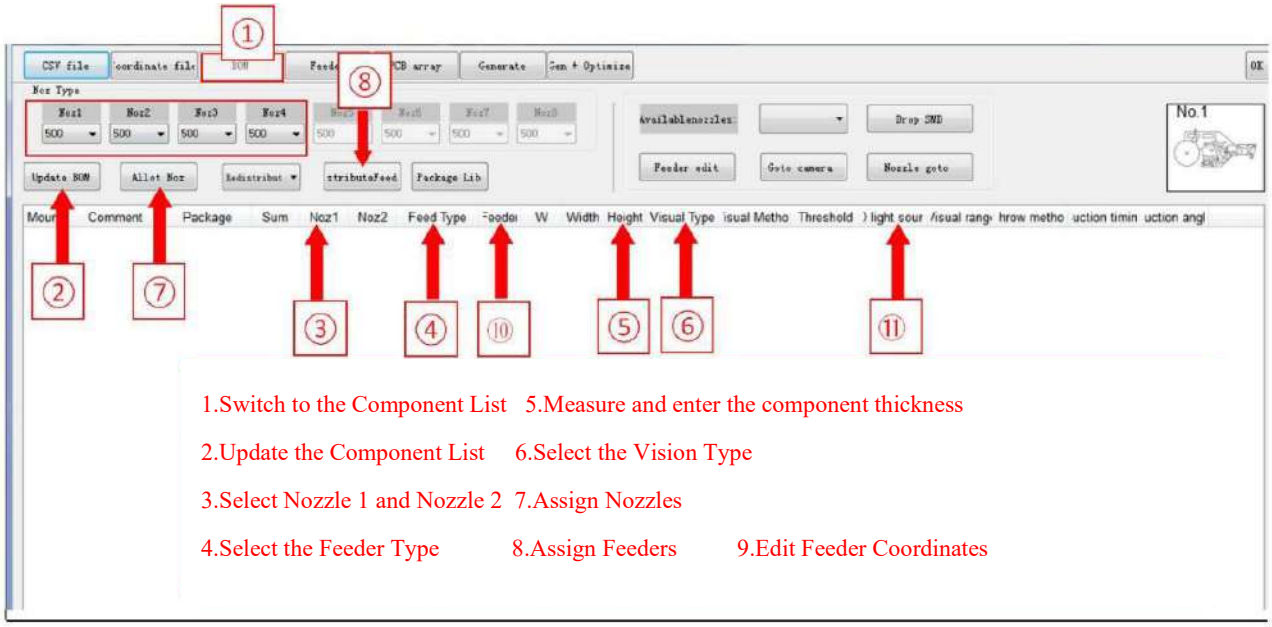


Figure 3-4-1 Component List Editing

3-4-2 Switch to Component List & Update Component List

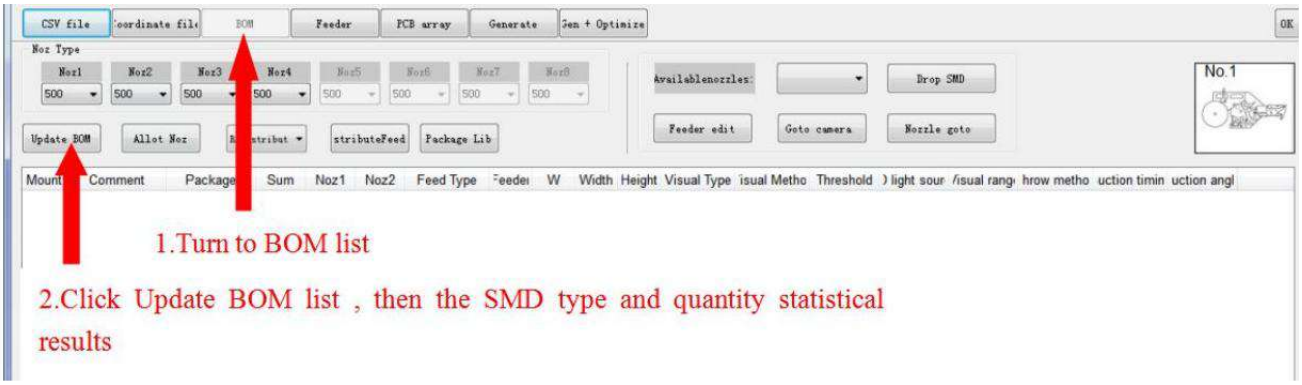


Figure 3-4-2 Update Component List

3-4-3 Select Nozzle Type

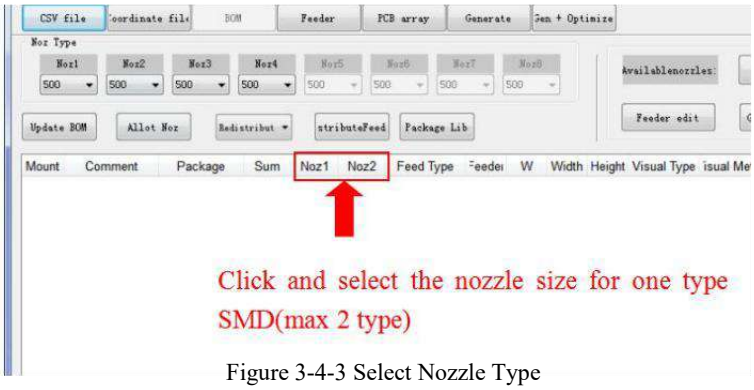


Figure 3-4-3 Select Nozzle Type

3-4-4 Select Feeder Type



Figure 3-4-4 Select Feeder Type

3-4-5 Component Thickness Editing

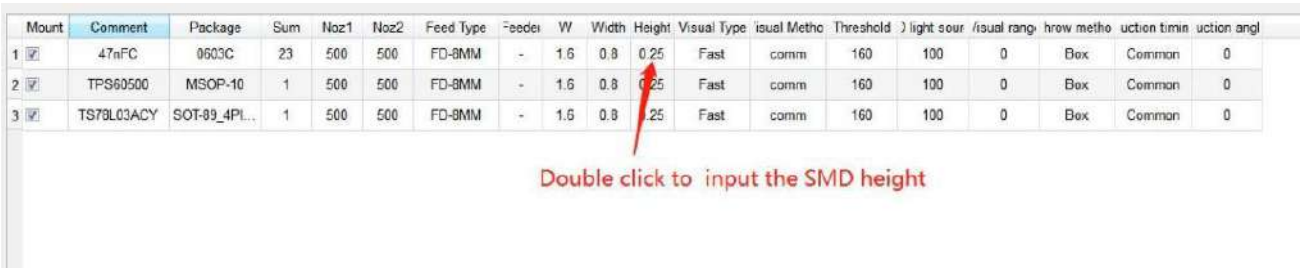


Figure 3-4-5Component Thickness Editing

3-4-6 Select Vision Type



Figure 3-4-6 Select Vision Type

3-4-7 Assign Nozzles & Assign Feeders & Install Nozzles & Install Feeders

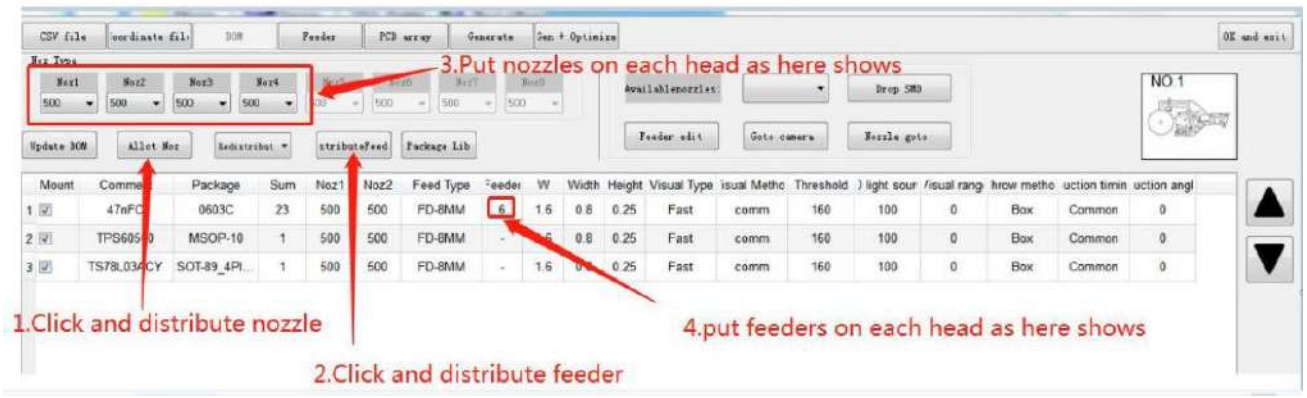


Figure 3-4-7 Assign Nozzles & Assign Feeders & Install Nozzles & Install Feeders

3-4-8 Edit Feeder Coordinates

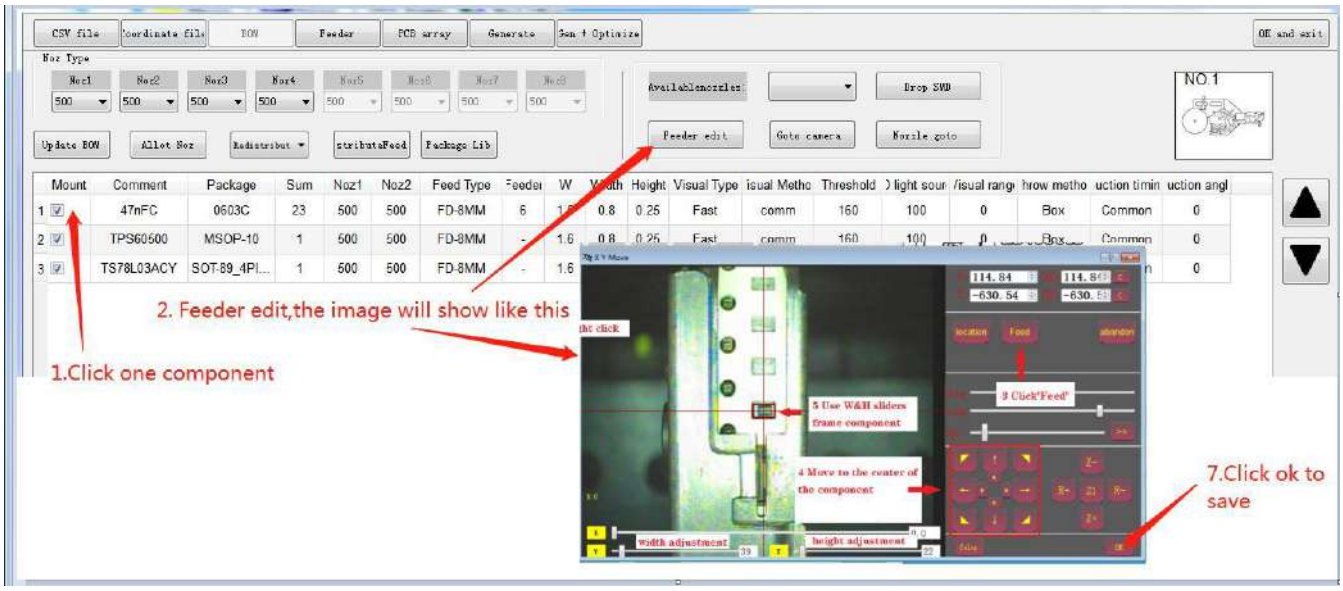


Figure 3-4-8 Edit Feeder Coordinates

3-4-9 Placement Options

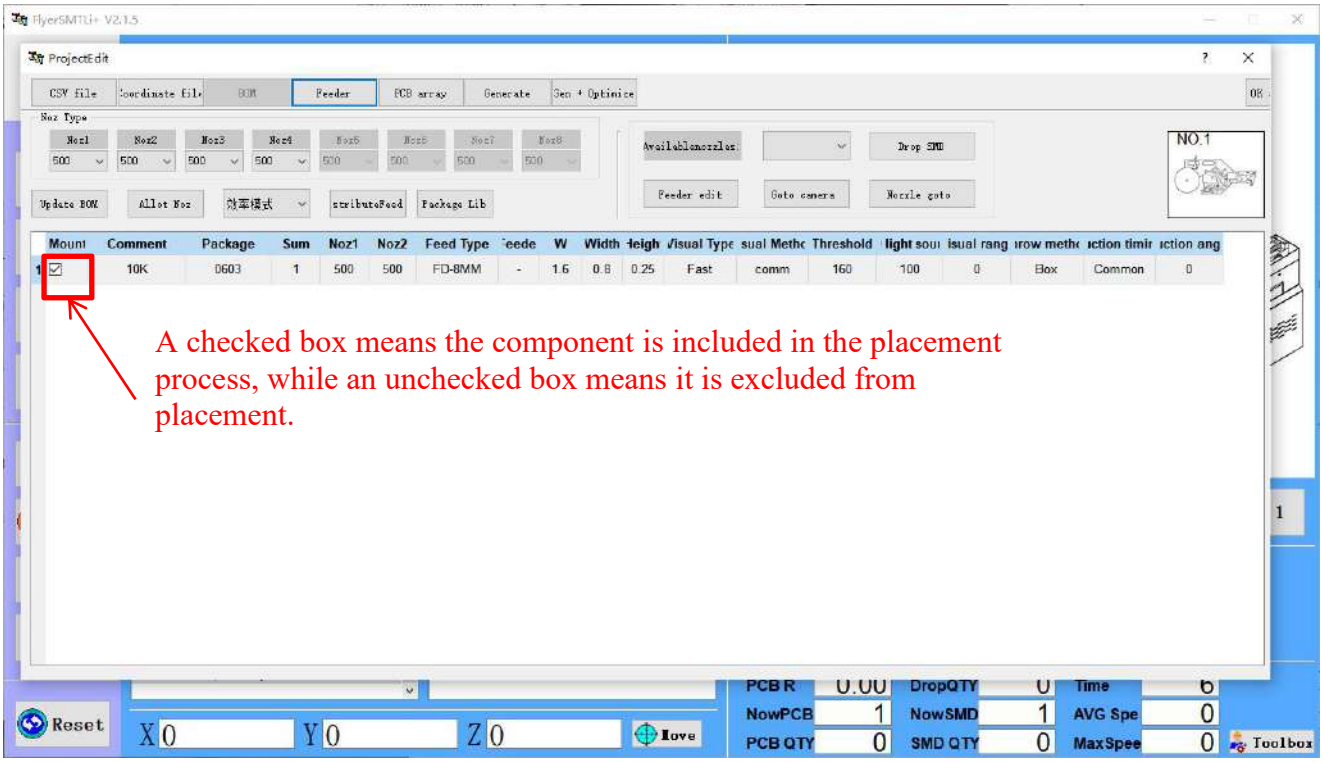


Figure 3-4-9 Placement Options

3-5 Feeder Editing

3-5-1 Introduction to Feeder Editing Contents

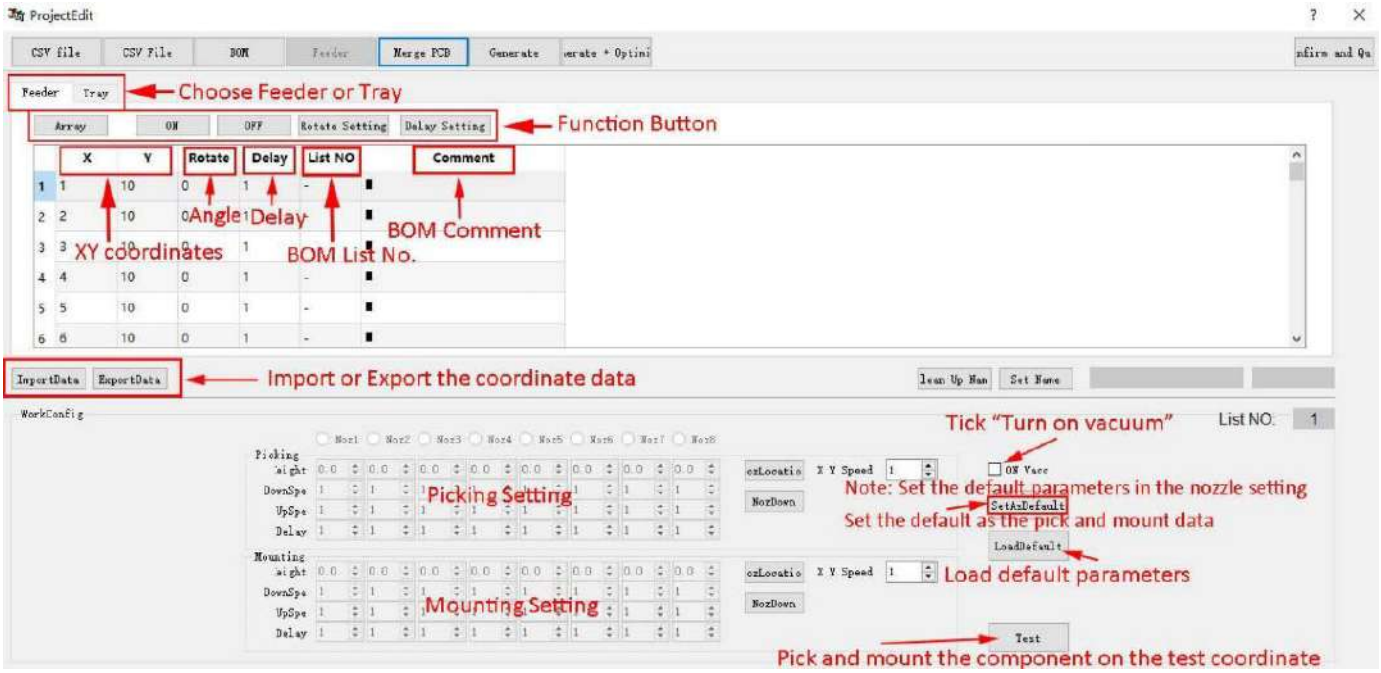


Figure 3-5-1 Introduction to Feeder Editing Contents

3-5-2 Feeder Array

Note: The feeder array function quickly generates corresponding feeder coordinates when their initial positions are undefined. However, the coordinates created by arraying require further fine adjustment for accuracy.

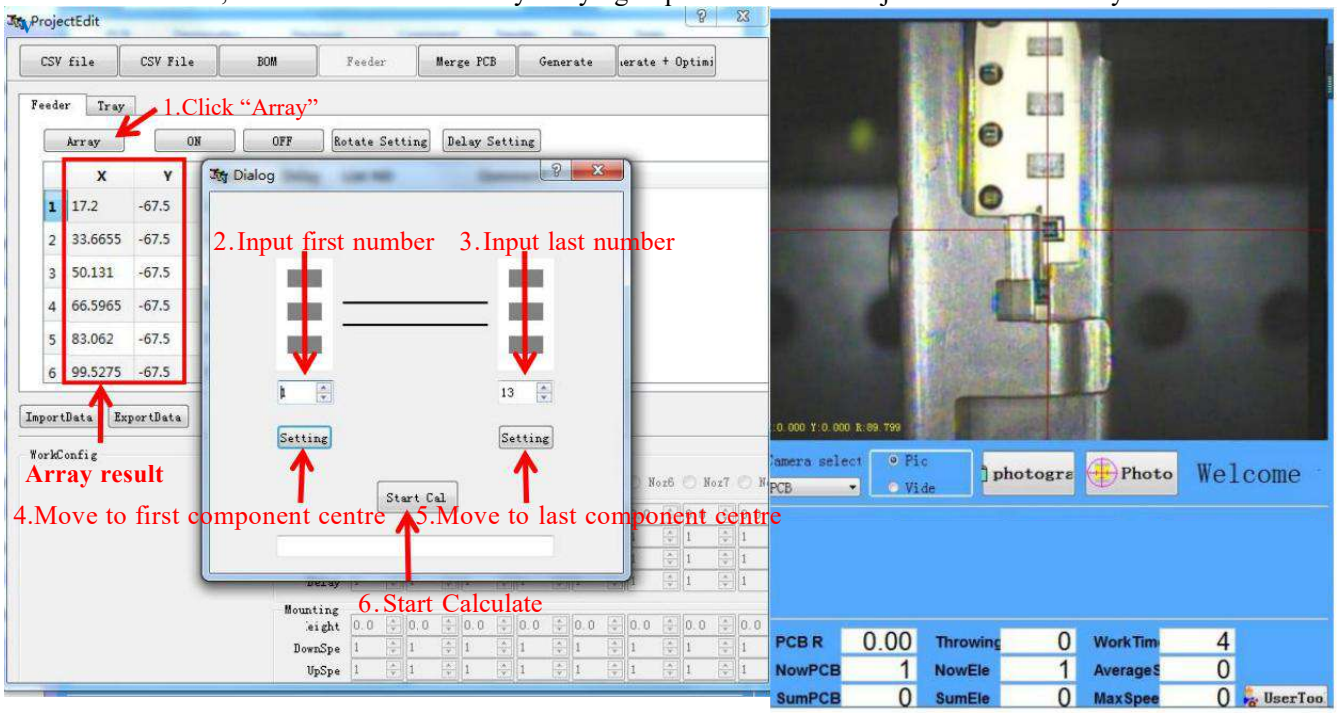


Figure 3-5-2 Feeder Array

3-5-3 Open And Close Feeder

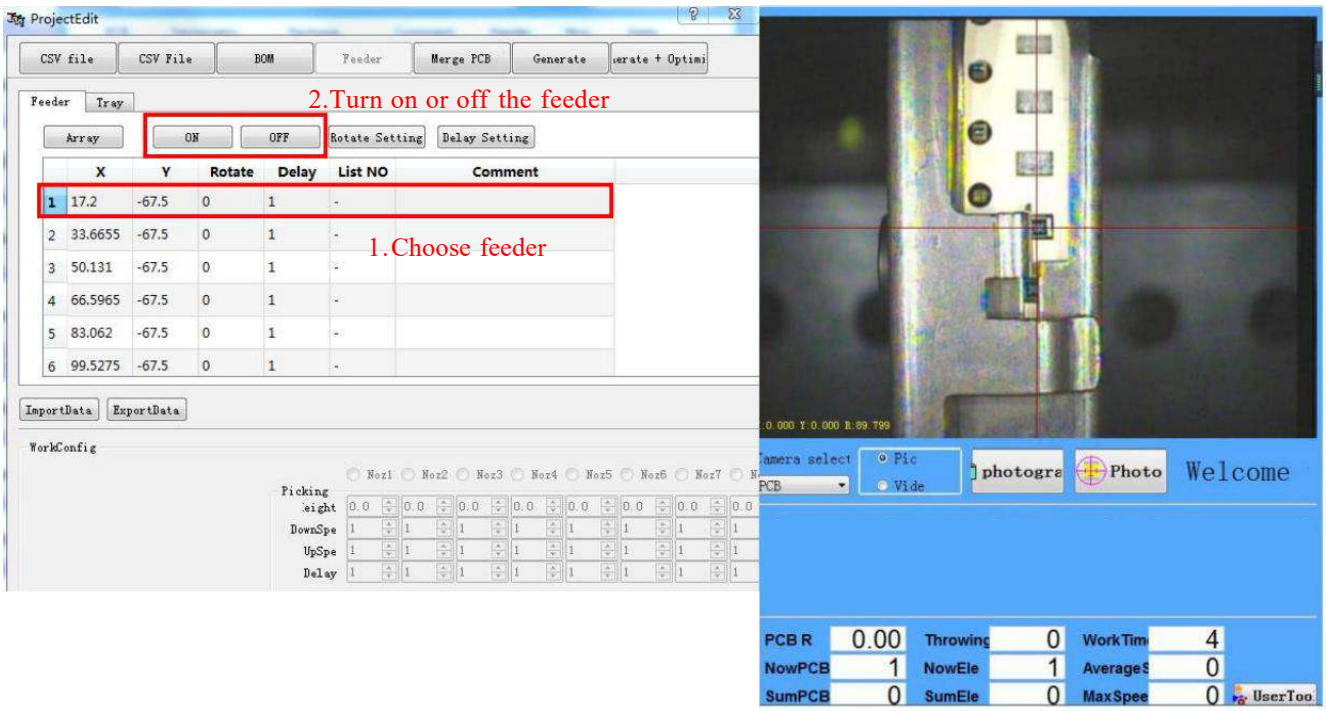


Figure 3-5-3 Open And Close Feeder

3-5-4 Set Multiple Rotation Angles & Multiple Delays

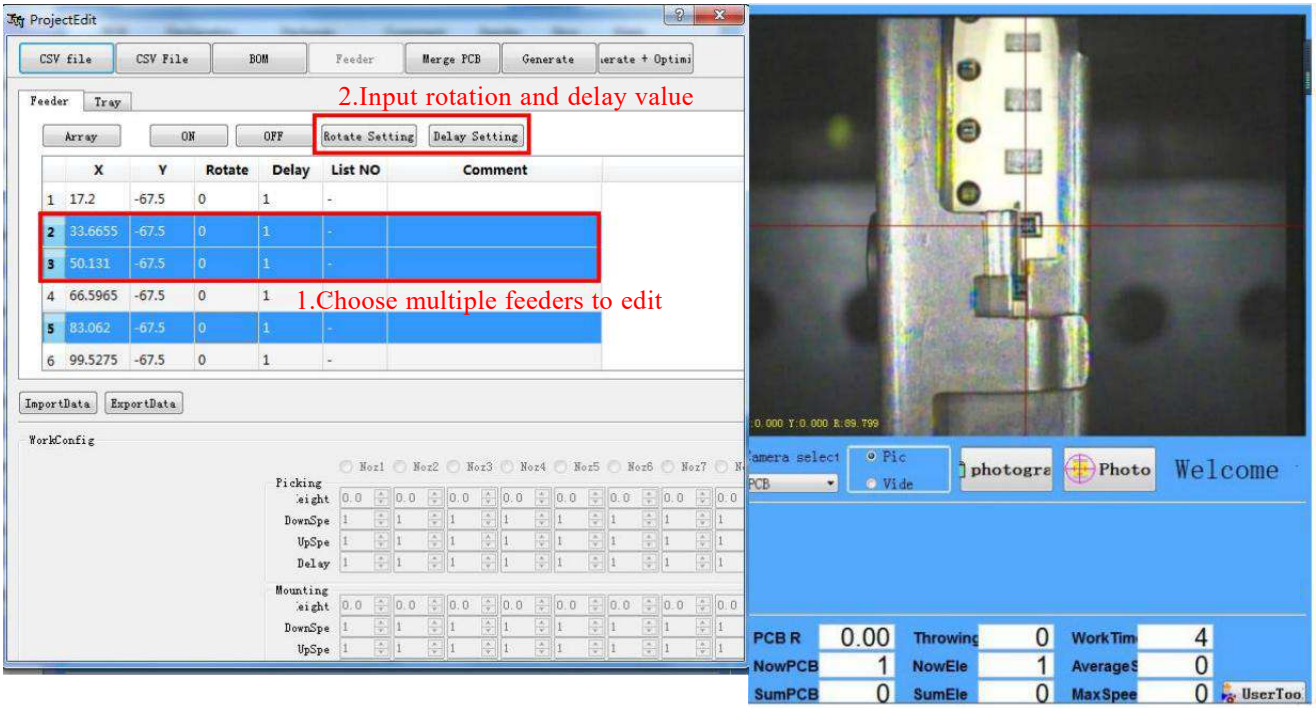


Figure 3-5-4 Set Multiple Rotation Angles&Multiple Delays

3-5-5 Edit X & Y Coordinates

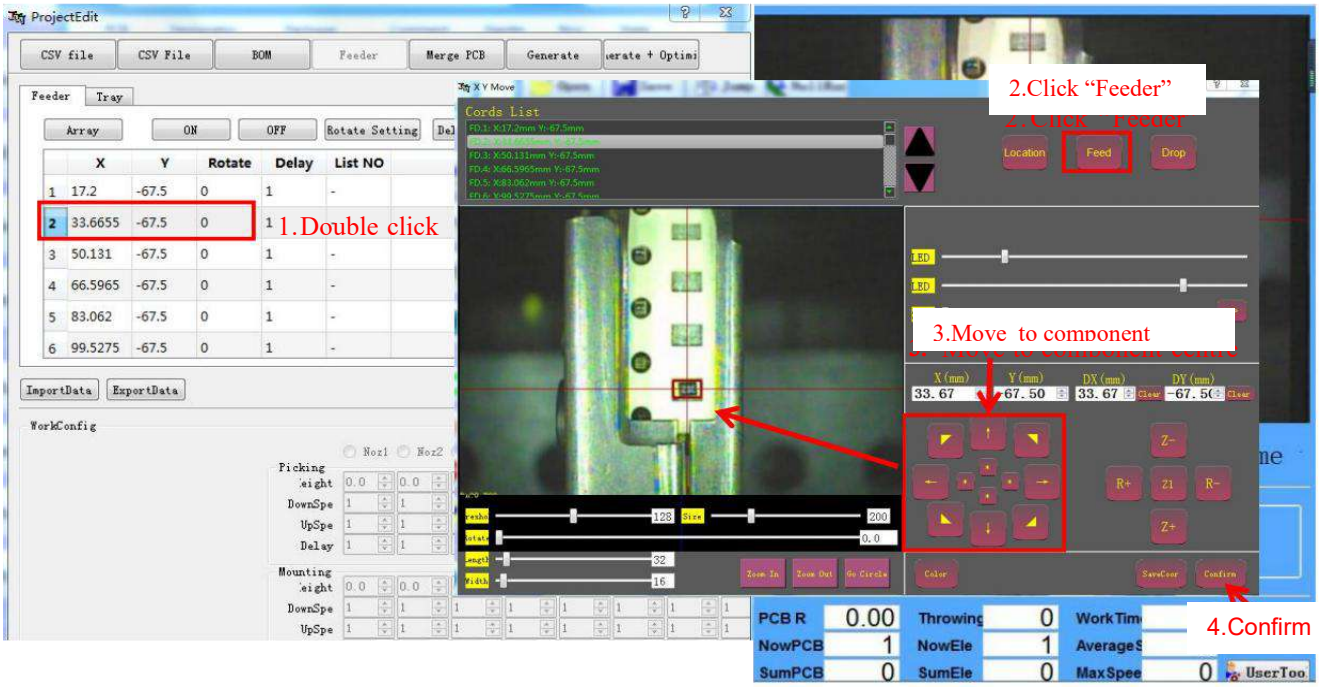


Figure 3-5-5 Edit X & Y Coordinates

3-5-6 Import & Export Feeder Coordinates

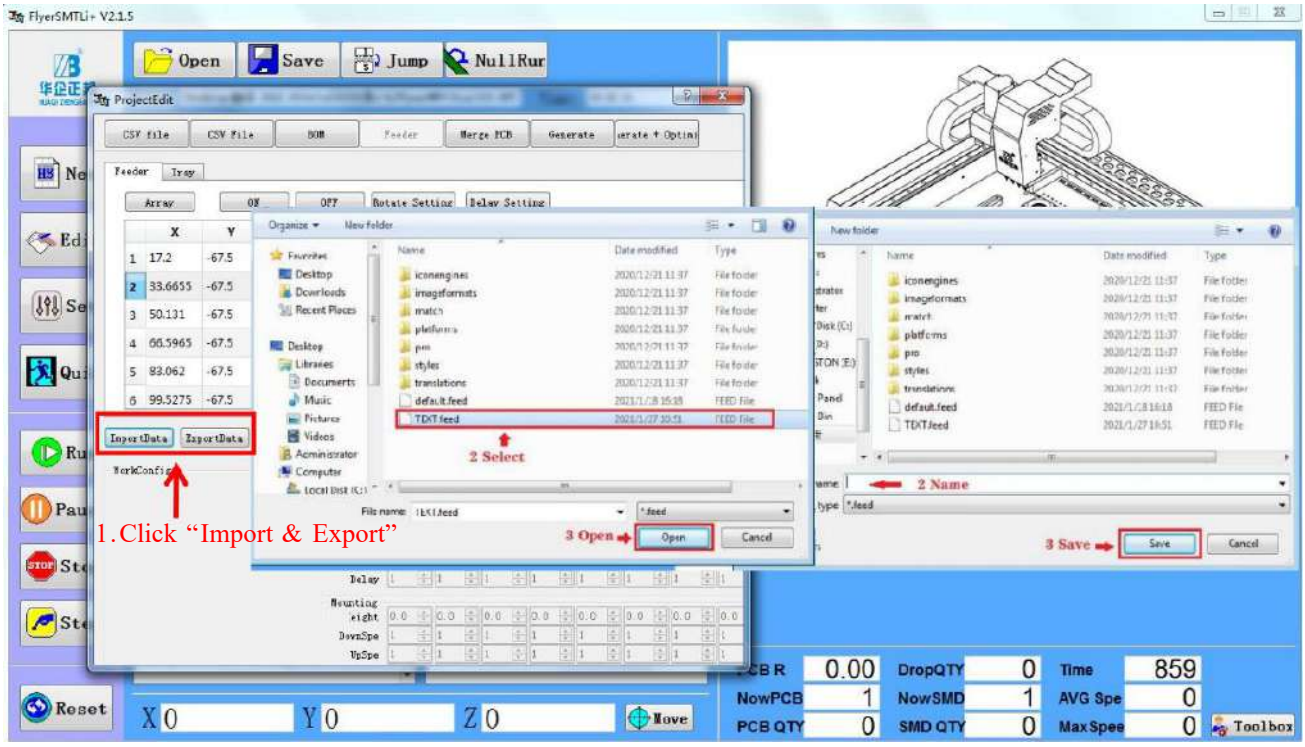


Figure 3-5-6 Import&Export Feeder Coordinates

3-5-7 IC Tray Editing

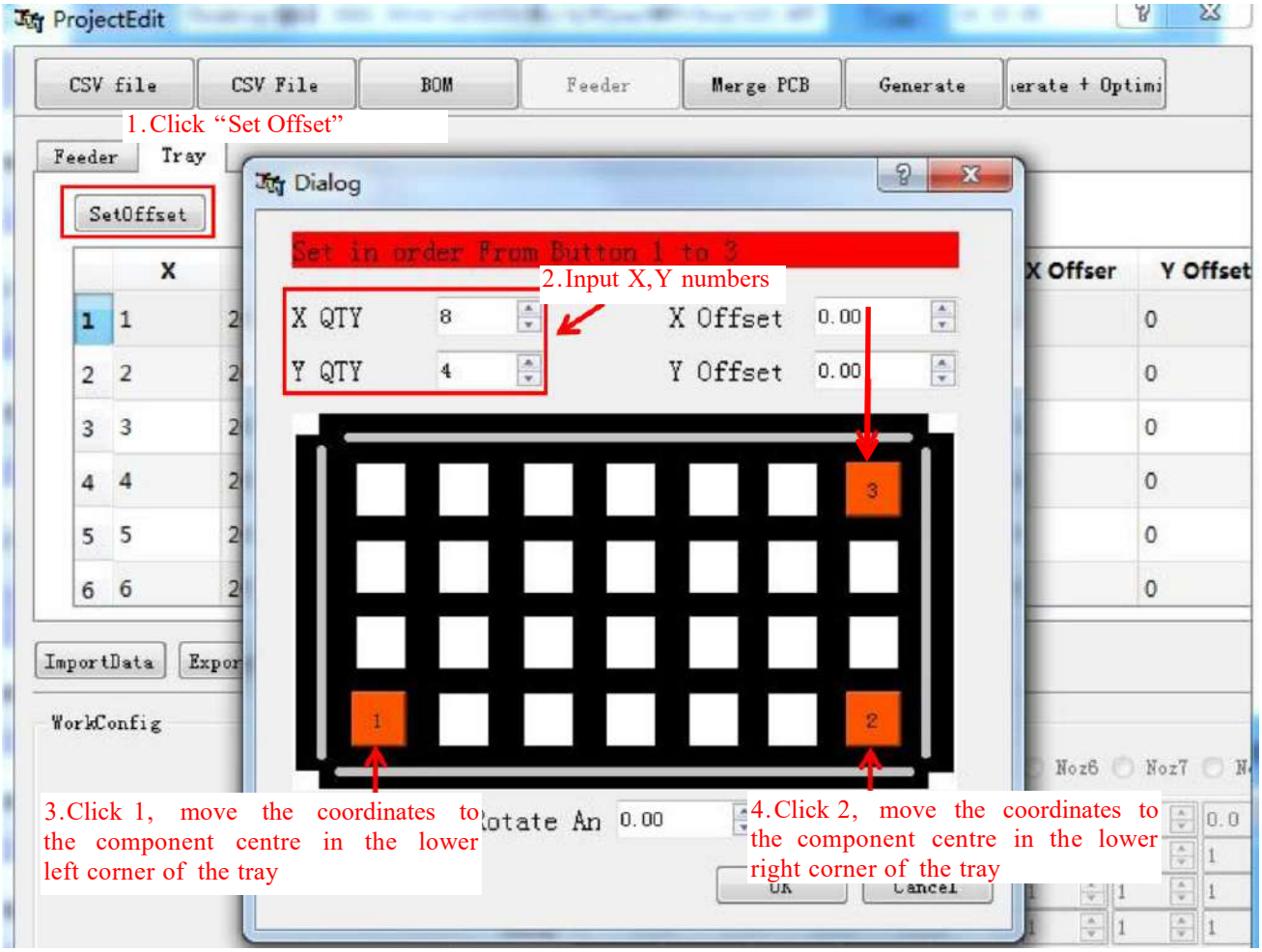


Figure 3-5-7 IC Tray Editing

3-5-8 Pick & Place Configuration

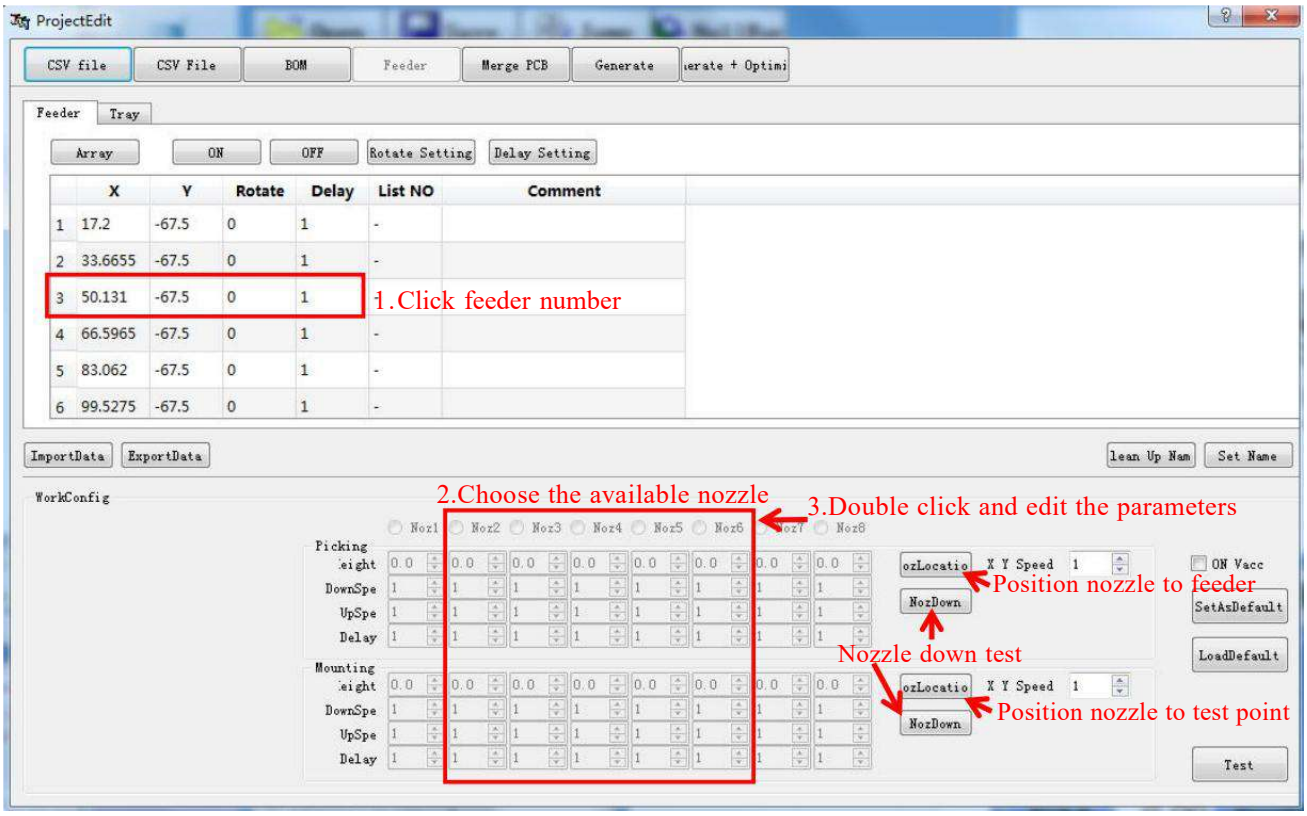


Figure 3-5-8 Pick&Place Configuration

3-5-9 Feeder Type Recognition

Set the corresponding feeder model according to component package. The identification method for feeder models is shown in the figure below.



Figure 3-5-9 Feeder Type Recognition

3-6 Panel Editing

3-6-1 Panel Editing

IMPORTANT NOTE:

The first coordinate is the position of Reference Point 1 and cannot be modified.

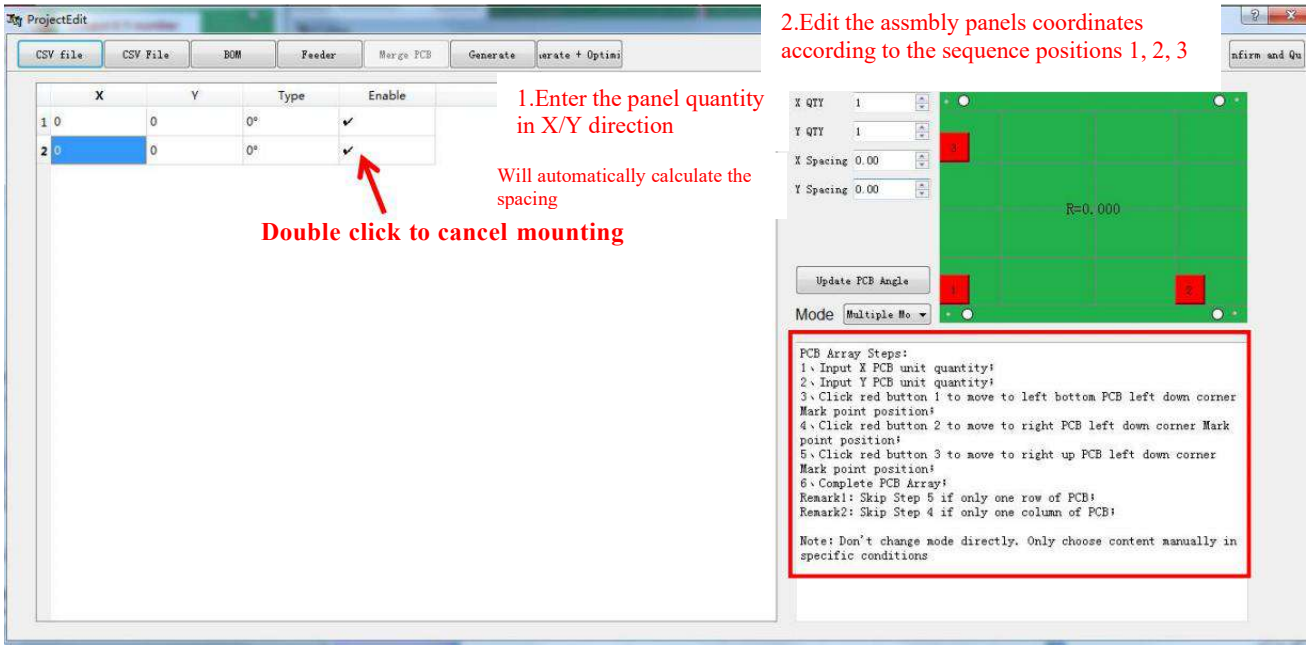


Figure 3-6-1 Panel Editing

3-6-2 View & Edit Panel Coordinates



Figure 3-6-2 View&Edit Panel Coordinates

3-6-3 Combine Panels into Single Board & Split Single Board into Multiple Panels

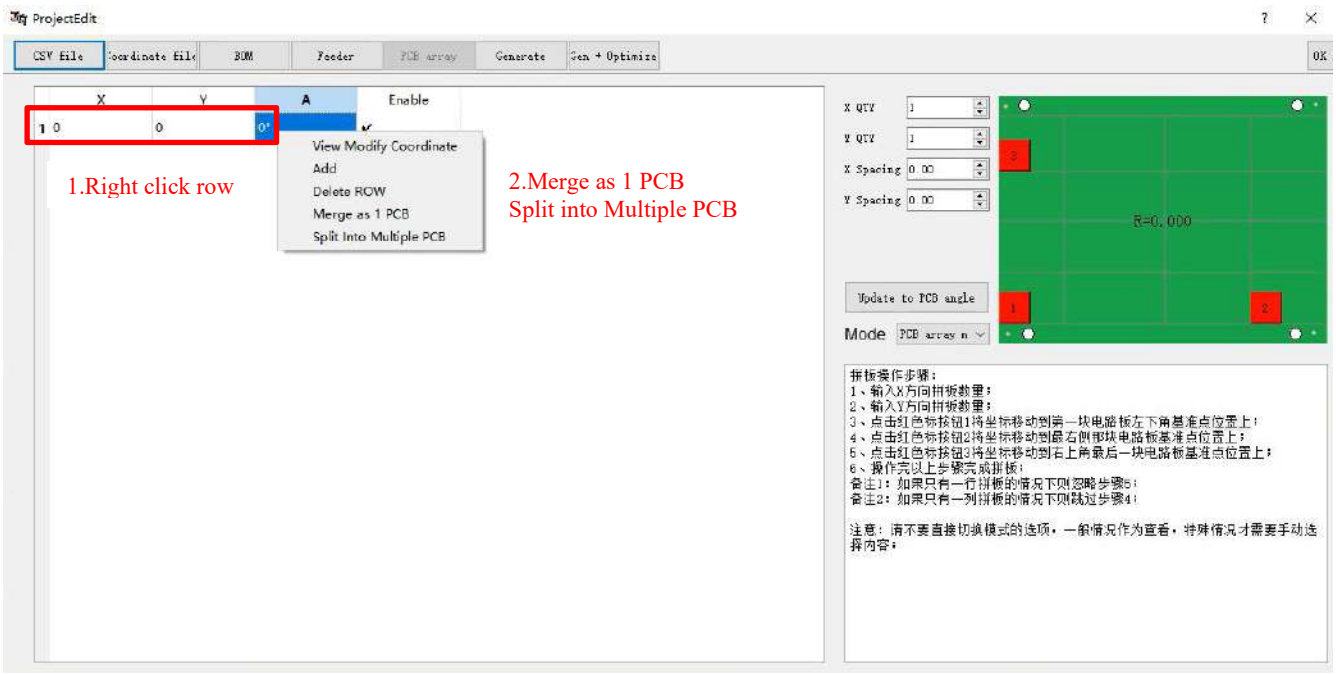


Figure 3-6-3 Panel Merging & Splitting

3-7 Build Project & Build and Optimize

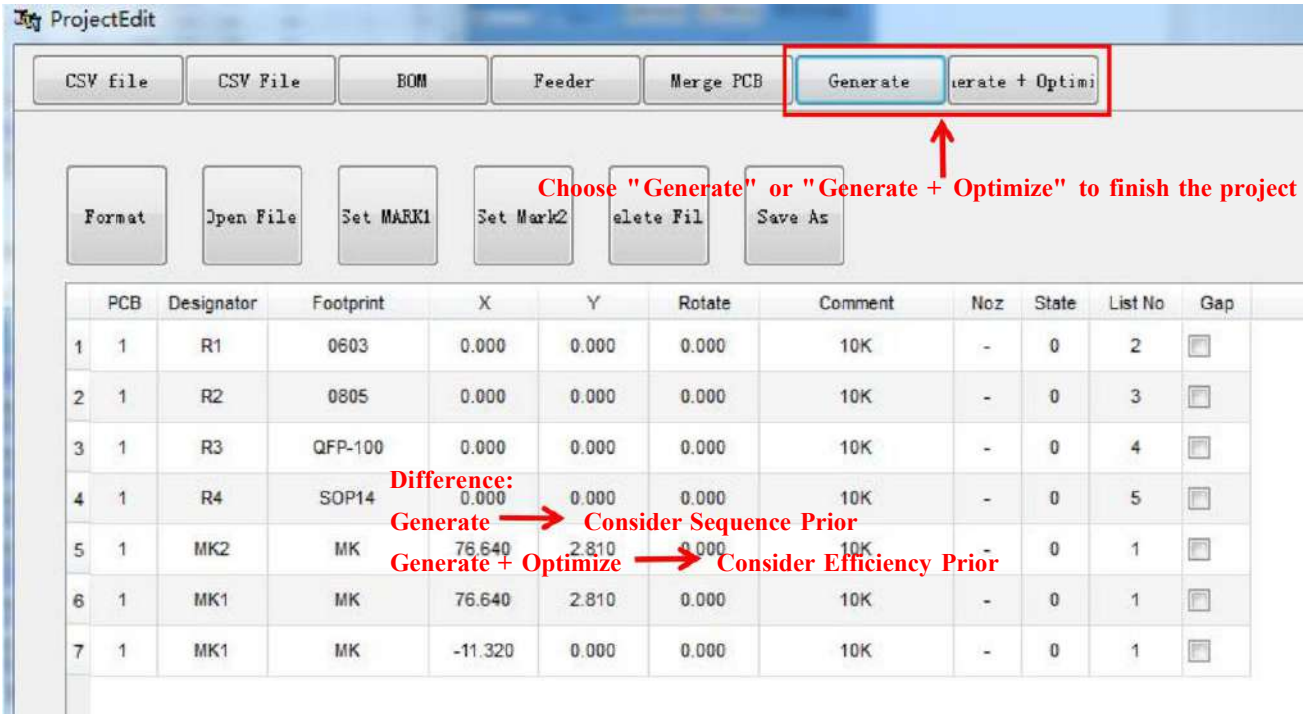


Figure 3-7 Build Project

3-8 Save Project

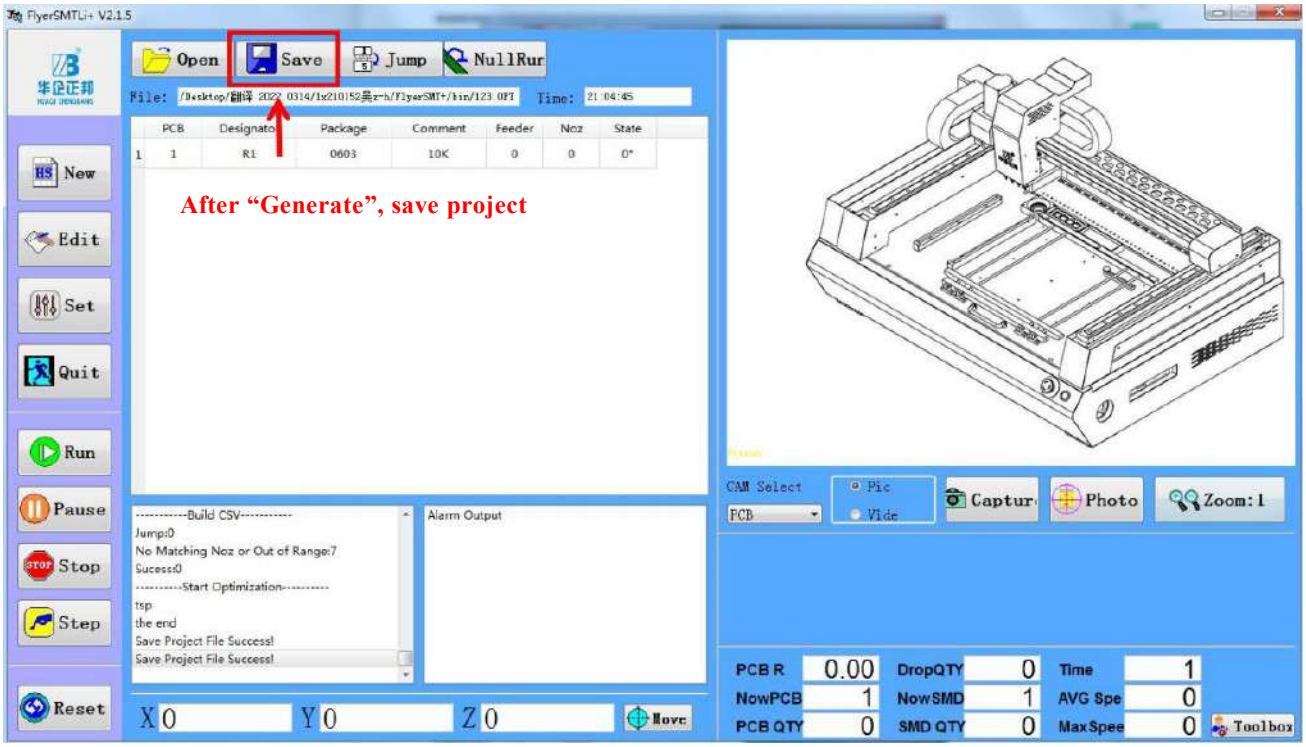


Figure 3-8 Save Project

Chapter 4: Production Placement

4-1 Input Project

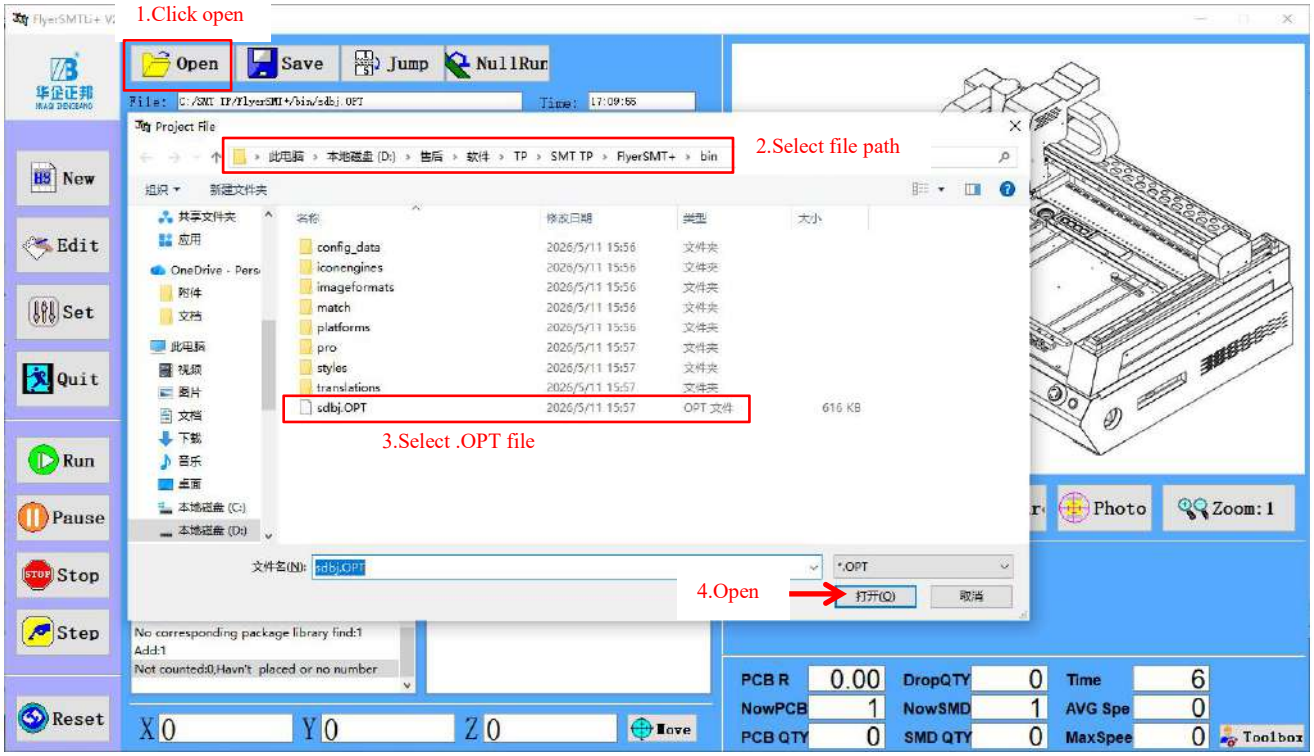


Figure 4-1 Input Project

4-2 Production Placement

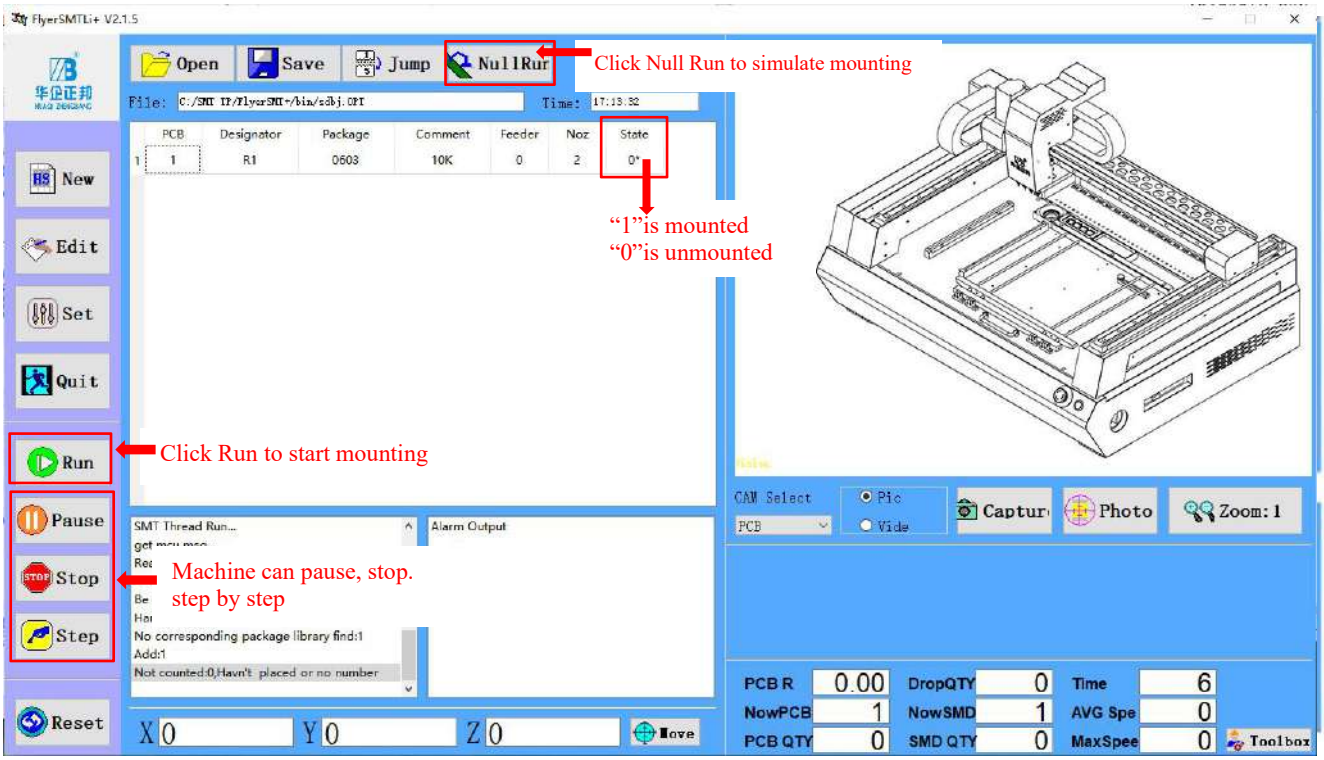


Figure 4-2 Production Placement

4-3 Feeding Production

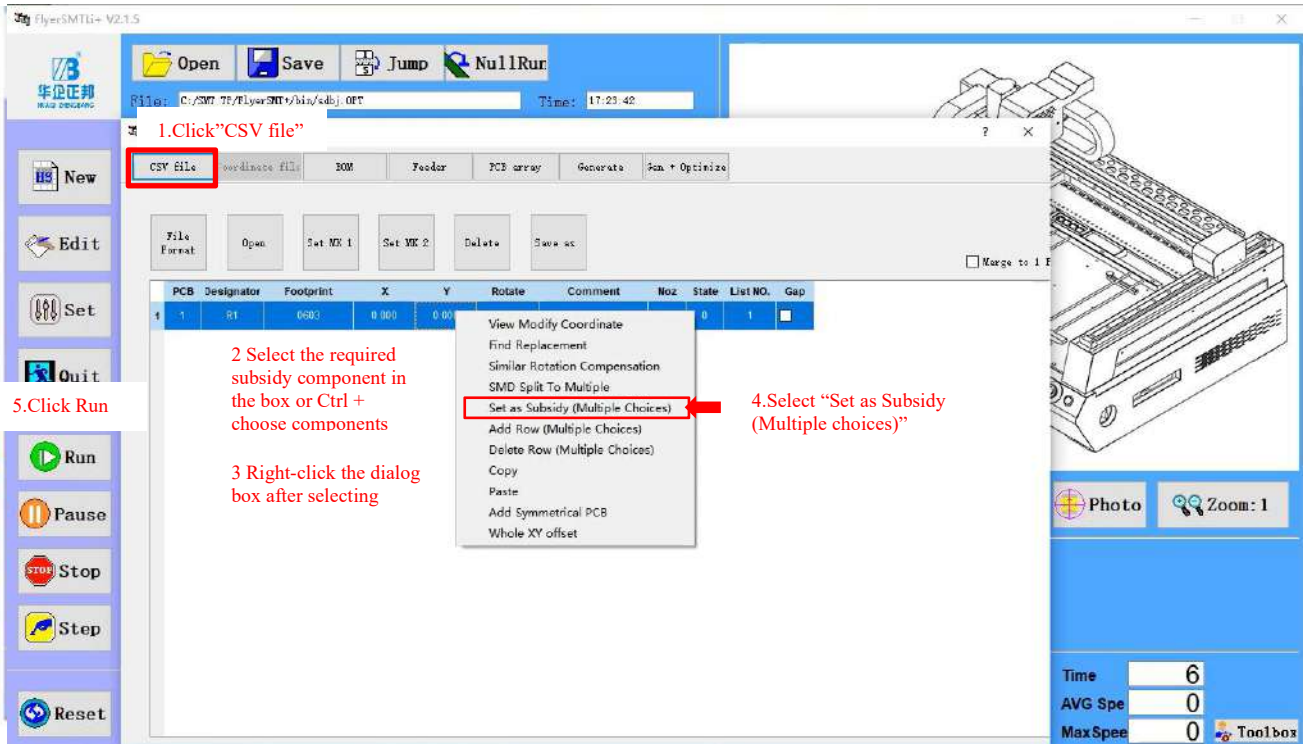


Figure 4-3 Feeding Production

4-4 Jump To Production

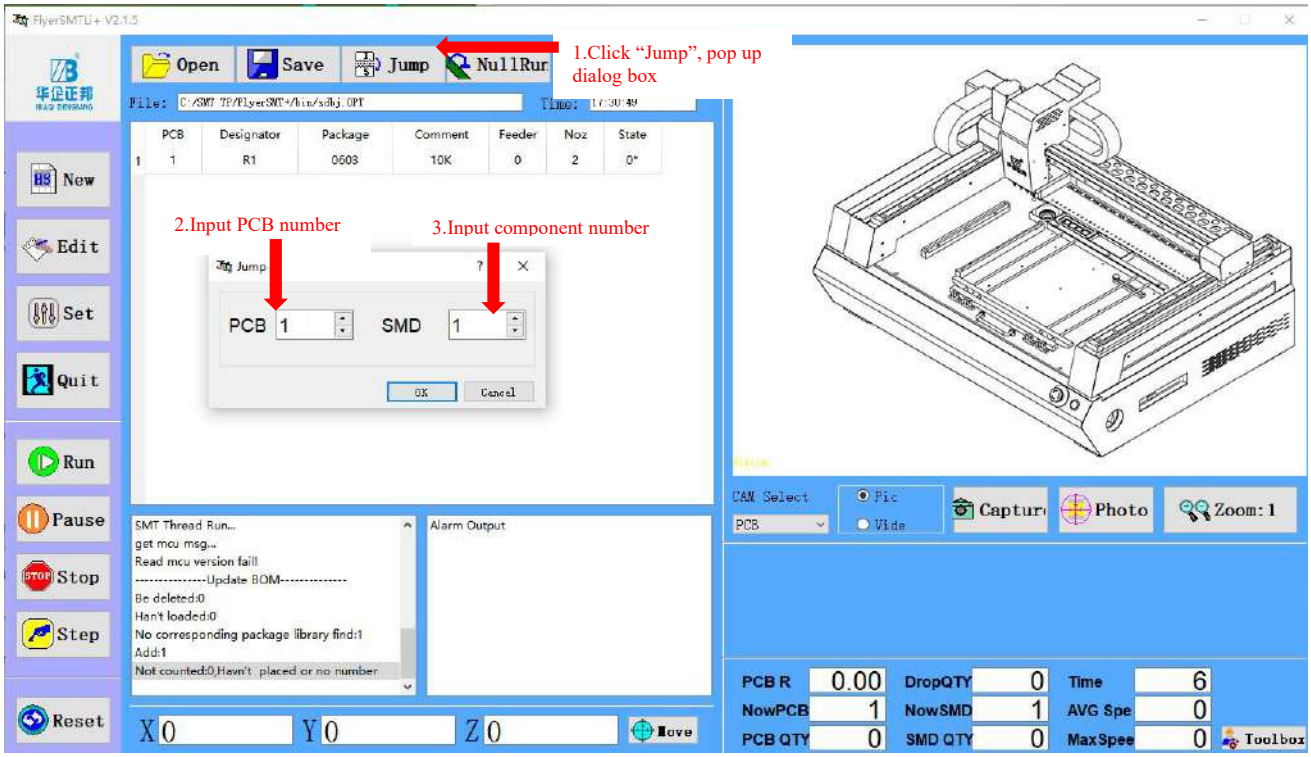


Figure 4-4 Jump To Production

4-5 Power Off

1. Click the **Exit** button to quit the mounter control system.

2. Click the Windows Start menu and select **Shut down** to turn off the computer.

3. Toggle the power switch on the right side of the main unit to cut off the power supply.

IMPORTANT NOTE:

Make sure to shut down the computer before cutting off the power, otherwise it may cause computer malfunctions. Please save all programs before exiting the system to avoid data loss.

DANGER:

The equipment will start running immediately after power-on. To avoid injury, **never** put your hands or head into the working area.

Before starting the machine, confirm no personnel are working inside.

Also ensure no objects (such as adjusting tools) that may interfere with operation are left inside.

Chapter 5 System Settings

5-1 User Settings

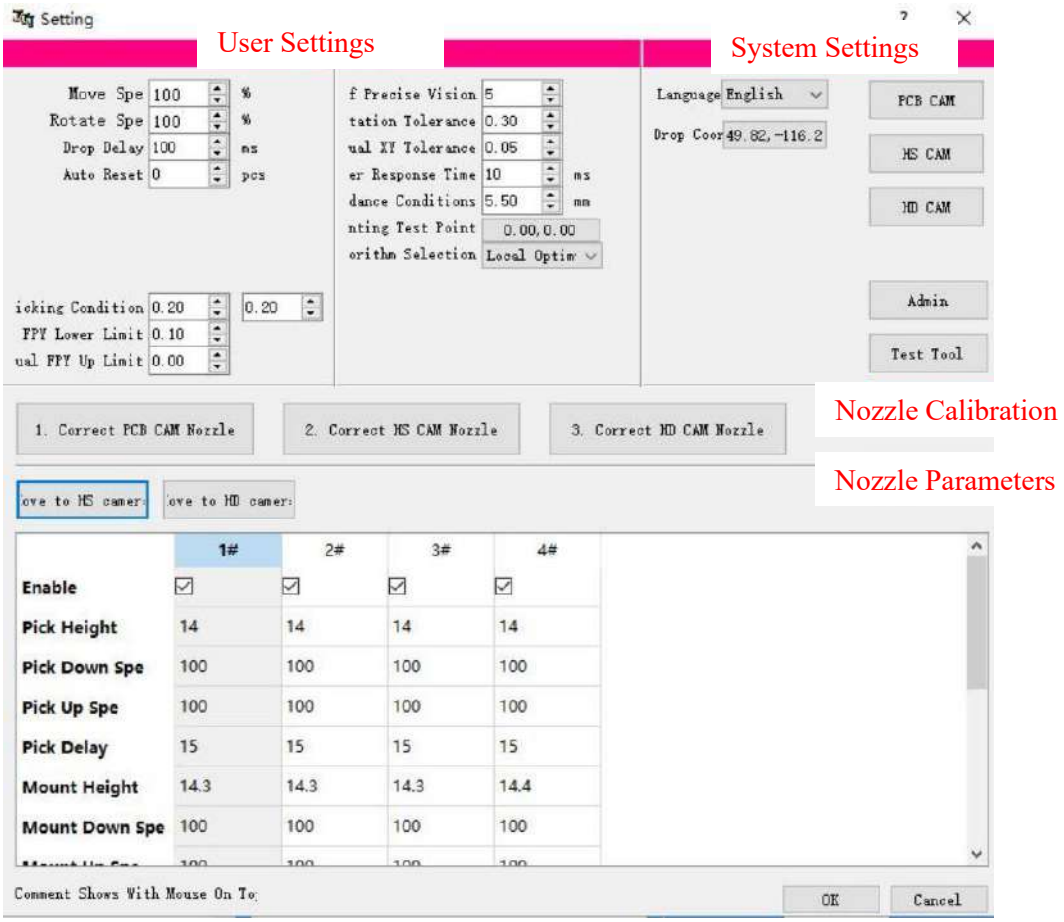


Figure 5-1 System Settings

1. Movement Speed: Setting range of X/Y axis moving speed: 1-100 (Common parameter)
2. Rotation Speed: Setting range of nozzle rotation motor speed: 1-100 (Common parameter)
3. Component Rejection Delay: Hold time for switching from vacuum to air blow during component rejection.
4. Auto Reset: Automatically perform reset based on the set value to guarantee data accuracy.
5. Simultaneous Pick Condition: The nozzle can pick components simultaneously if the position deviation relative to the feeder is within the set range; otherwise, simultaneous picking is disabled.
6. Lower Limit of Visual Acceptance Rate: Components are judged defective if their size is below the set value (calculated by the percentage of component outline dimension).
7. Upper Limit of Visual Acceptance Rate: Components are judged defective if their size exceeds the set value (calculated by the percentage of component outline dimension).

8. Precision Vision Closed-loop Cycles: Maximum cycles for repeated recognition and correction of precision components.
9. Precision Vision Rotation Tolerance: Maximum allowable angle deviation during precision component recognition.
10. Precision Vision XY Tolerance: Maximum allowable XY position deviation for precision component recognition.
11. Feeder Response Time: Time required for the feeder to act after power is supplied.
12. Tall Component Avoidance Rule: Components with height greater than or equal to the set value will be placed separately at last automatically.
13. Placement Test Point: Coordinate position for placement test.
14. Advanced Optimization Algorithm Selection: Path algorithm adopted for project optimization and generation.

5-2 System Settings

1. Language: The system supports Chinese and English, you can switch by selecting the desired language.

2. Rejection Coordinates: The machine allows modification of the rejection box position. First place the rejection box on the workbench behind the guide rail. Click Rejection Coordinates to move the placement head above the box, then save the settings. (Align the nozzle above the box visually.).

3. Other system parameters are factory settings. Do not modify them arbitrarily, otherwise the equipment may malfunction.

5-3 Nozzle Calibration

Tools for Nozzle Calibration

No.	Name	QTY	Mark
1	Calibration substrate (stainless steel)	1	
2	Round Magnet	4	
3	Inkpad	1	Machine come with
4	Nozzle	4	
5	Solid Nozzle	4	
6	A5 Paper	1	Provide by Customer

5-3-1 Calibrate Offset between Nozzle and PCB Camera

1. Fix an A5 white paper on the calibration board with four round magnets.
2. Adjust the PCB clamping device to a width larger than the calibration board, then place the board at the placement position and clamp it securely.
3. Put the ink pad at the corner between the high-definition camera and the IC tray fixture.



Figure5-3-1 Ink pad Position

4.Click to calibrate the offset between PCB camera and nozzles. The four nozzles pick up ink at different angles, then move to the white paper to mark points repeatedly.

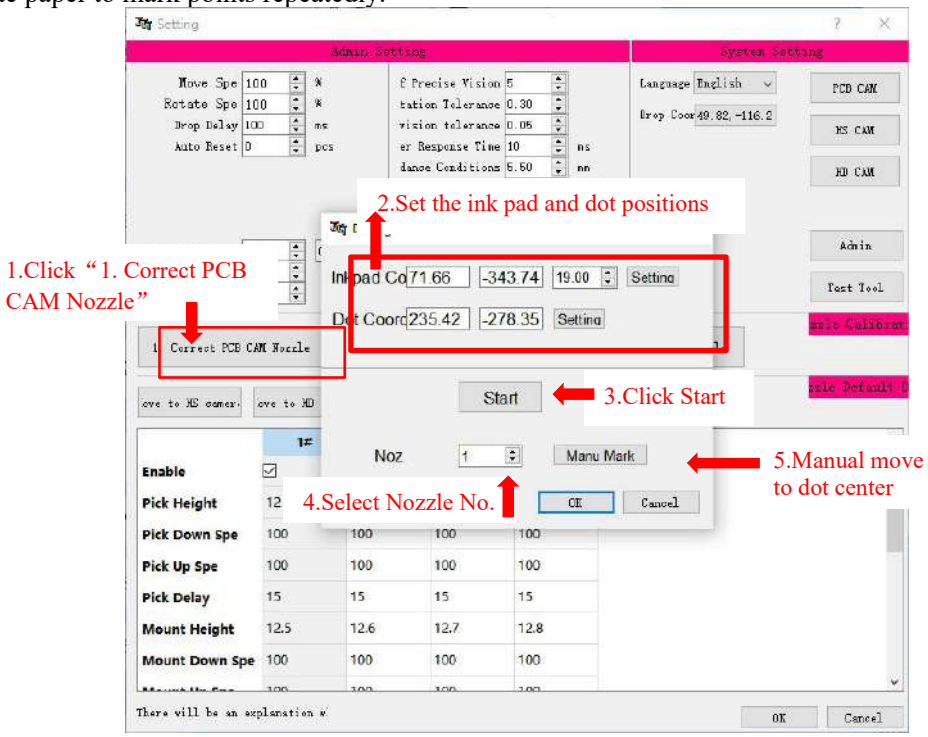


Figure 5-3-2 Nozzle Calibration



Figure 5-3-3 Pick up Ink

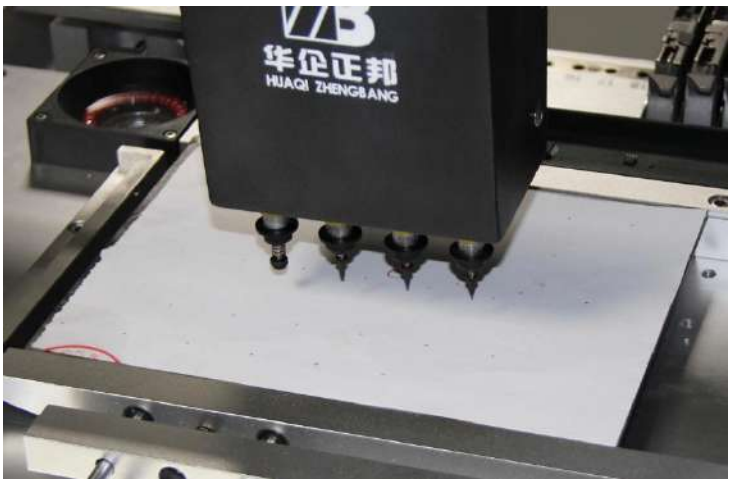


Figure 5-3-4 Make marking points

5. Select the nozzle number and click **Manual Calibration** to open the coordinate editing window. Click **Position** to let the camera align with the marks on the white paper. Adjust the coordinates to center on the marks, then click **Confirm** to save data and finish calibration for this nozzle. Repeat the steps to calibrate all nozzles in sequence.

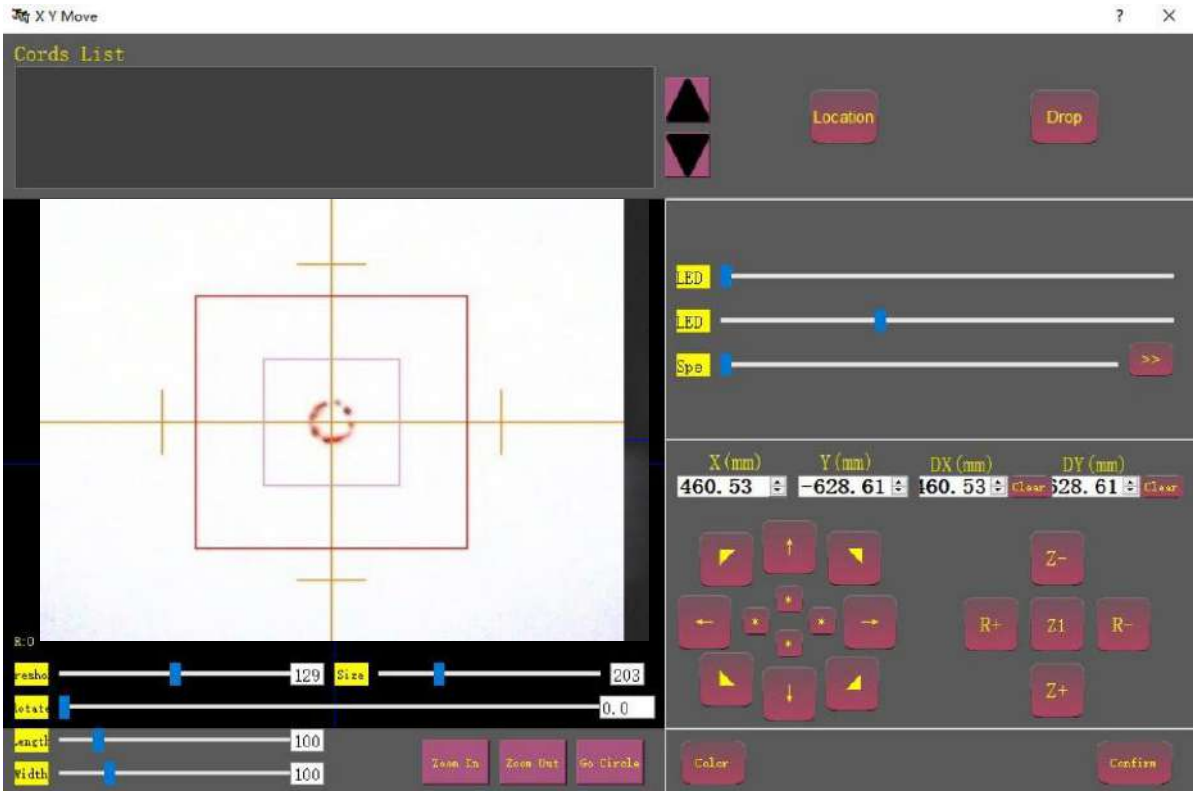


Figure 5-3-5 Coordinates Calibration

5-3-2 Calibrate Offset between High-Speed Camera and Nozzles

1.Install the 4 solid nozzles (included as standard accessories). Select the nozzle to be calibrated, then click **Calibrate High-Speed Camera & Nozzle Offset**. The nozzle will start automatic calibration. Click **OK** to finish once completed. Repeat the above steps if offset still exists.

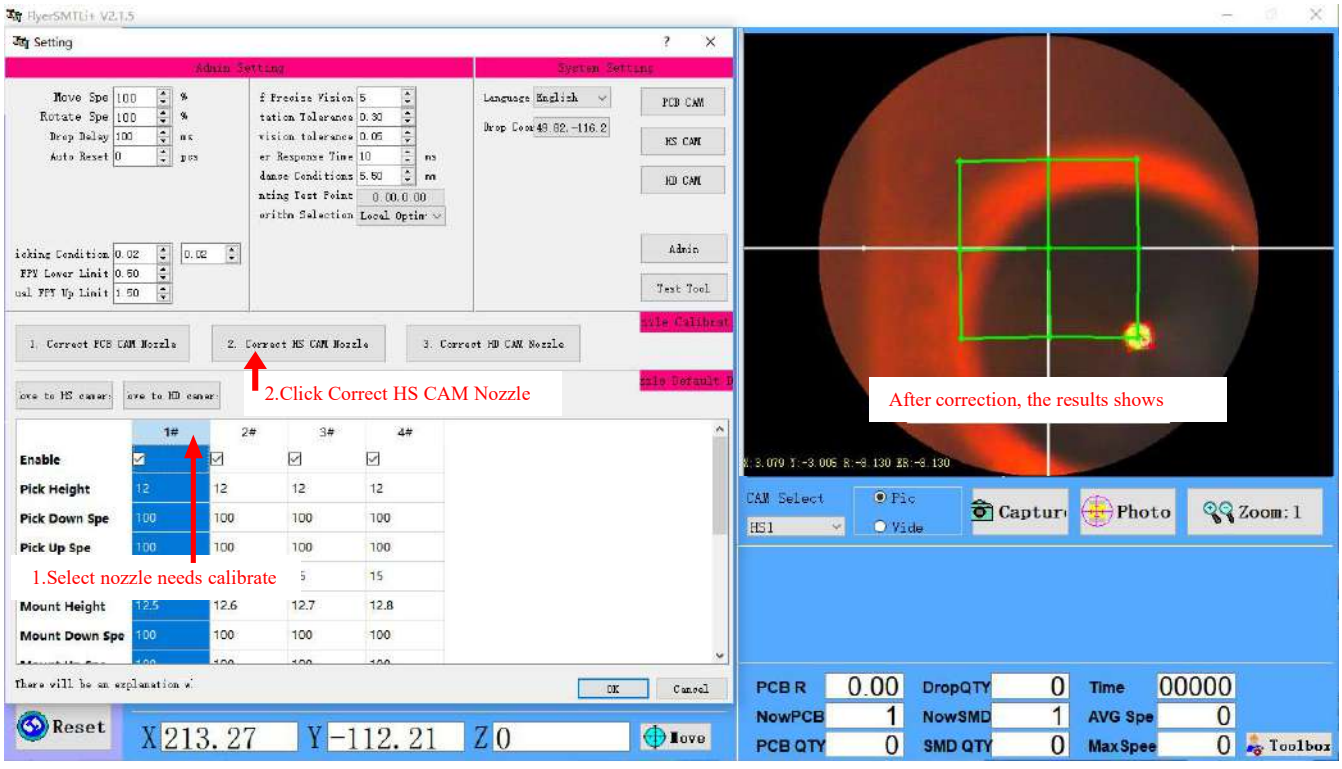
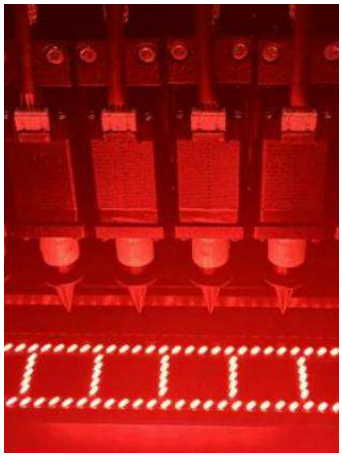


Figure 5-3-2-1 High-speed Camera Calibration Procedure



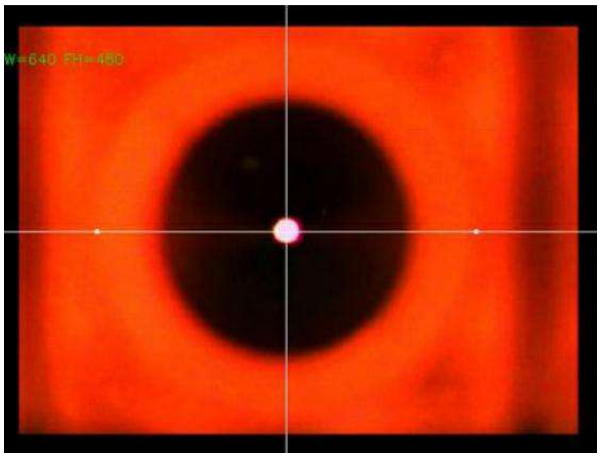


Figure 5-3-2-2 HD Camera Calibration Schematic

Figure.5-3-2-3 Calibration Result Display

2.Follow the steps in Step 1 to calibrate the remaining nozzles one by one.

5-3-3 Calibrate Offset between HD Camera and Nozzles

1. Select the nozzle to be calibrated, then click Calibrate Offset between HD Camera and Nozzles. The unit will start automatic calibration. Click OK to finish when done. Repeat the process if any offset remains.

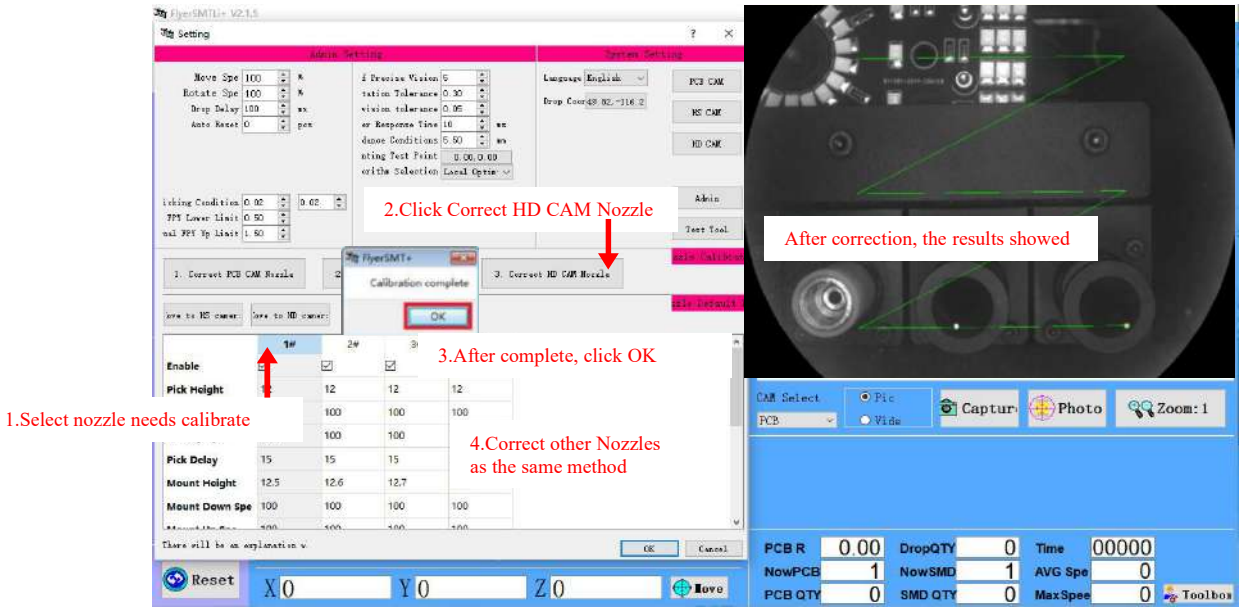


Figure 5-3-3-1 HD Camera Calibration Procedure

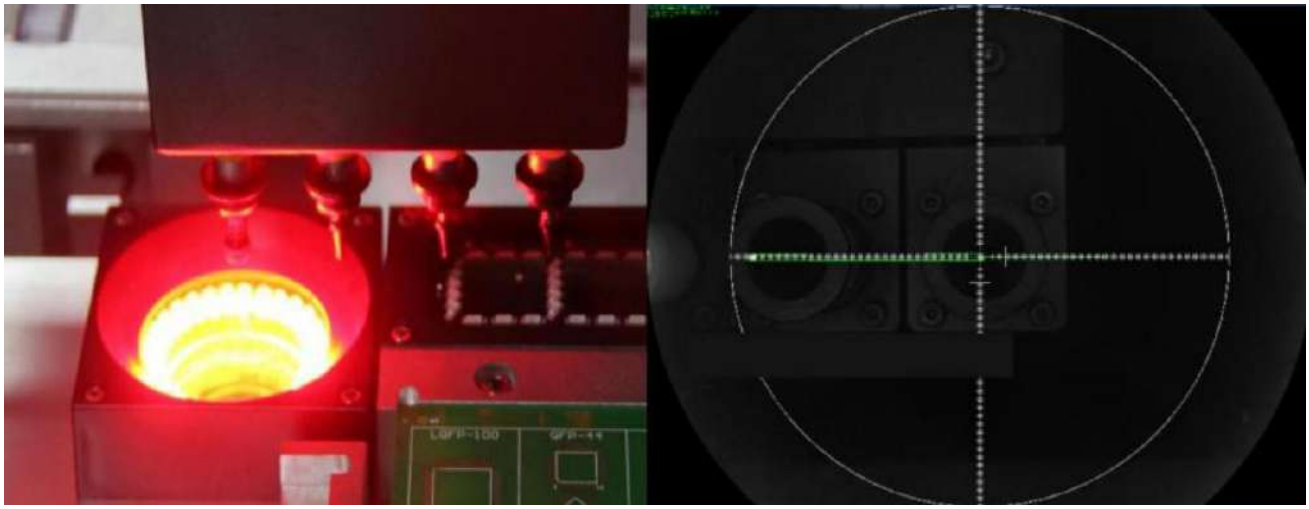


Figure 5-3-3-2 HD Camera Calibration Schematic

Figure 5-3-3-3 Calibration Result Display

2.Follow the steps in Step 1 to calibrate the remaining nozzles one by one.

5-3-4 View High-Speed Camera & Verification Results

1.After calibrating the offset between the high-speed camera and nozzles, check the center of each nozzle one by one to verify the calibration results.

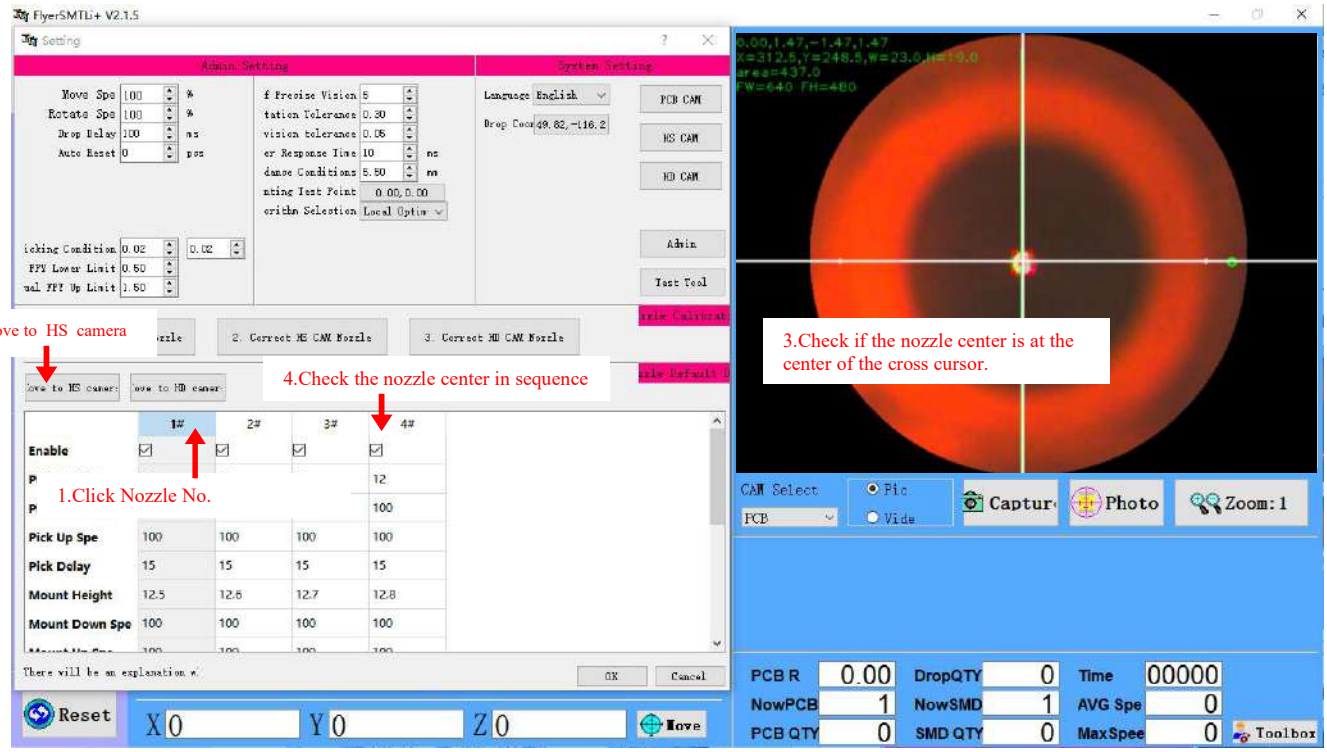


Figure 5-3-4-1 View Nozzle Center (High-Speed Camera)

2.After calibrating the offset between the HD camera and nozzles, inspect each nozzle center one by one to verify the calibration results.

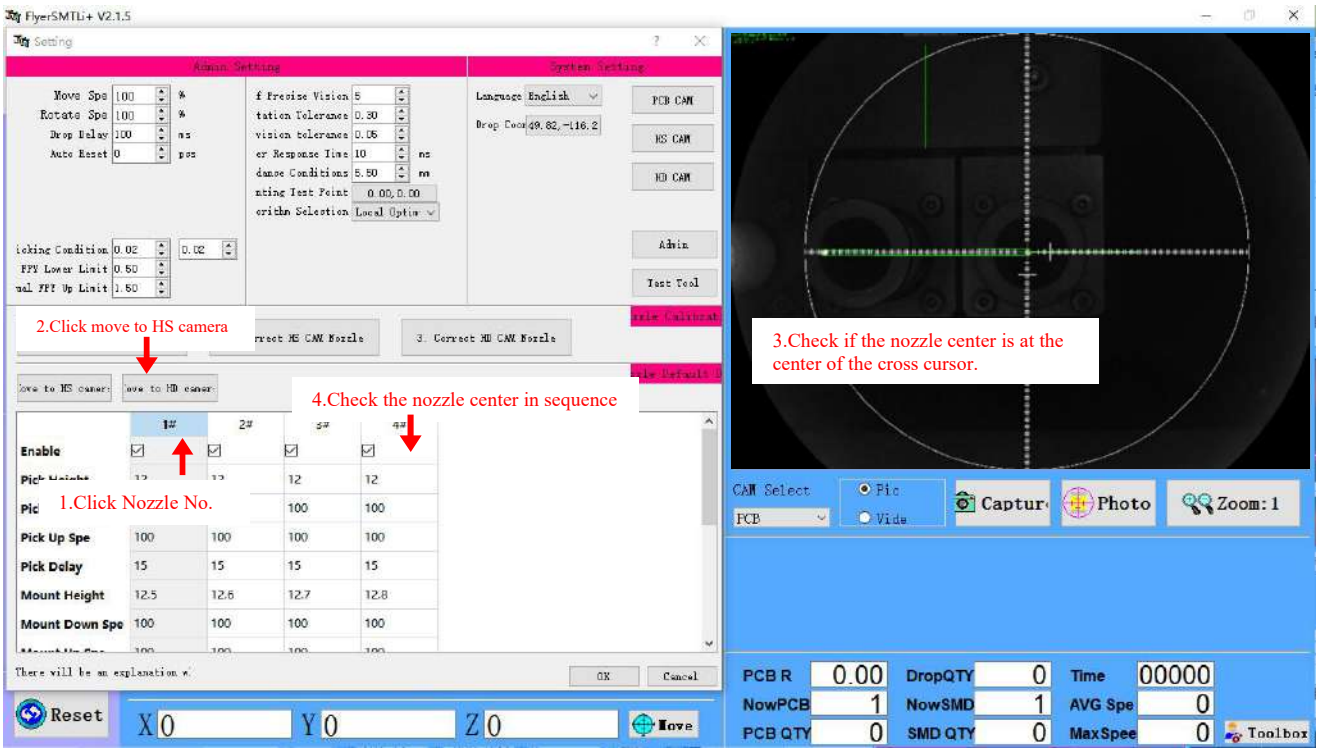


Figure 5-3-4-2 View HD Camera Nozzle Center

5-4 Nozzle Parameters

5-4-1 Nozzle Pick and Place Parameters

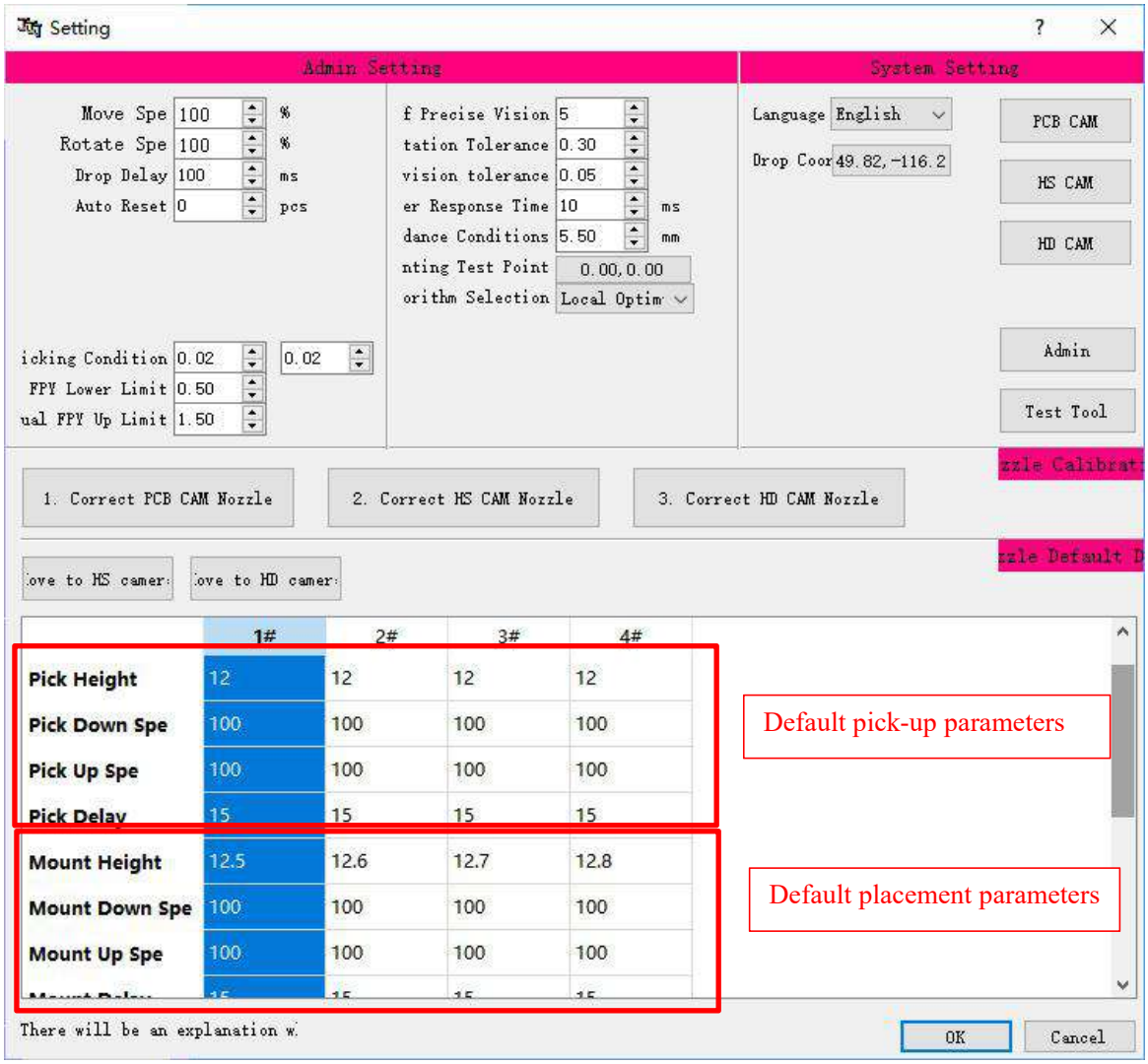


Figure 5-4-1 Nozzle Pick and Place Parameters

5-4-2 Nozzle Coordinate Offset Relative to Camera

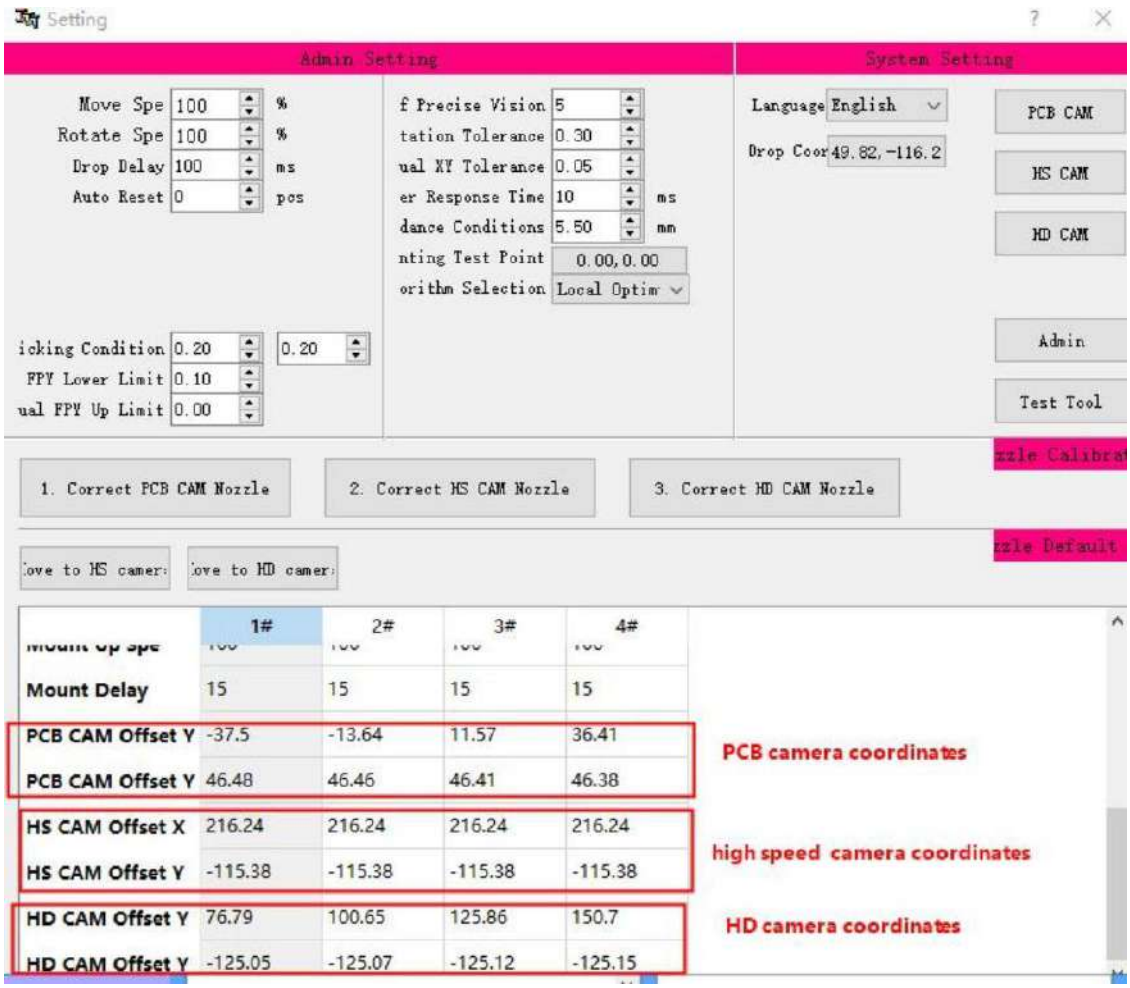


Figure 5-4-2 Nozzle Coordinate Offset Relative to Camera

5-4-3 Acquire Pick Height Value

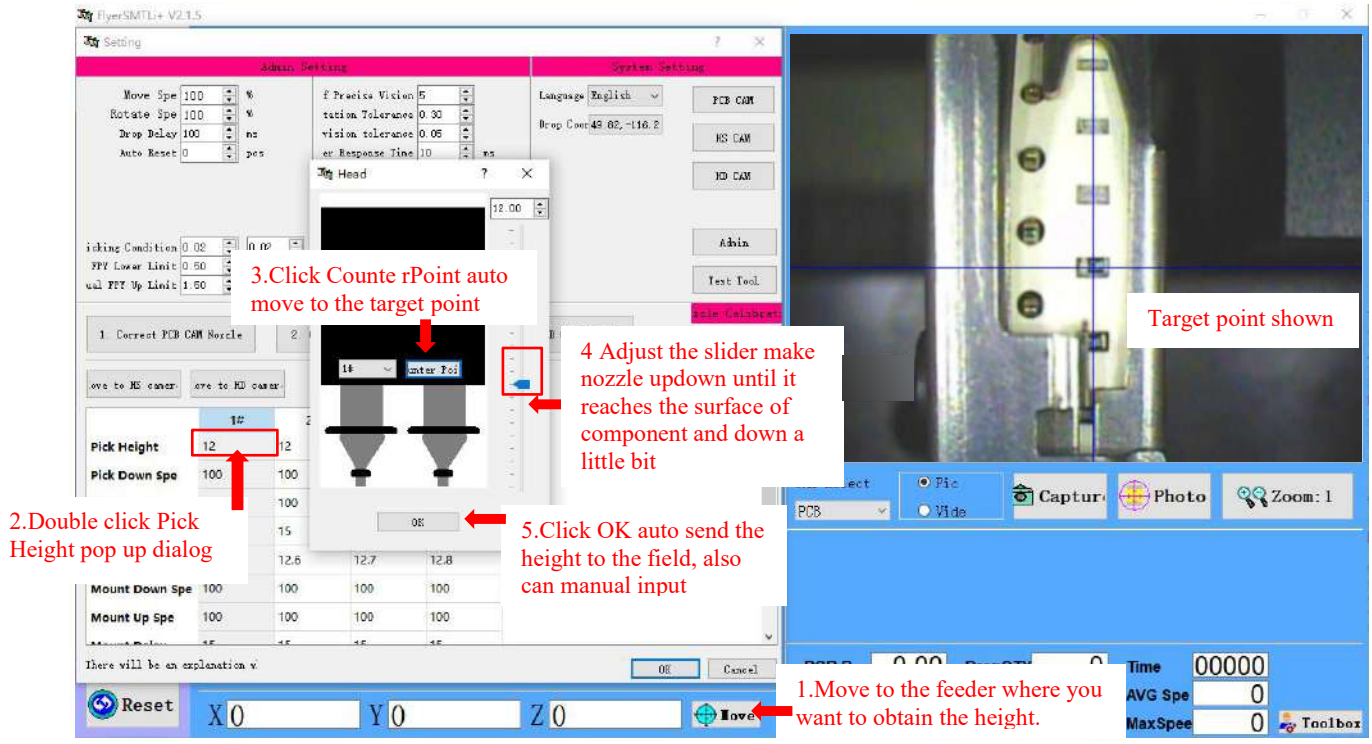


Figure 5-4-3 Acquire Pick Height Value

5-4-4 Acquire Placement Height Value

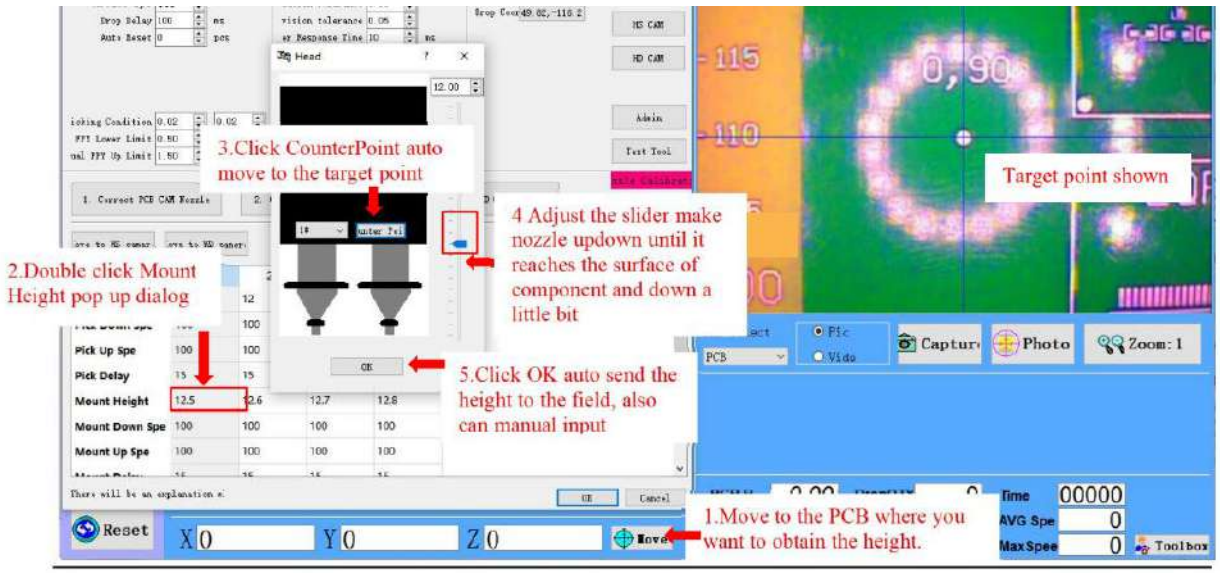


Figure 5-4-4 Acquire Placement Height Value

Chapter 6 Maintenance

6-1 Daily Maintenance

1. Inspect nozzle tips for wear or damage, and check for solder paste adhesion or blockage. Clean or replace nozzles if necessary.
2. Check the PCB camera lens for dust or debris, and wipe it with a soft cloth when needed.
3. Remove residual components and foreign matter from feeders and clean them as required.
4. Inspect the component camera lens for dirt and clean it with a soft cloth if necessary.
5. Clear stray components and debris from the worktable using a brush when needed.
6. Verify the pressure reading on the air pressure gauge is within the normal range (reference: 0.6 MPa).
7. Check the oil cup of the air treatment unit and drain accumulated water.
8. Empty the component rejection box and sort usable materials.
9. Check the V-groove of the PCB clamping assembly for fallen components and clean with a soft cloth if required.

6-2 Weekly Maintenance

1. Inspect the X-axis timing pulley for particles or debris and clean if necessary.
2. Check the lubricant on the X-axis guide rail for hardening and residual buildup.
3. Inspect the Y-axis timing pulley for particles or debris and clean if necessary.
4. Check the lubricant on the Y-axis guide rail for hardening and residual buildup.
5. Examine pneumatic fittings for air leakage and replace them as required.
6. Inspect air hoses for aging or distortion and replace if necessary.
7. Check the vent holes on the feeder board for fallen components or foreign matter and clean thoroughly.

6-3 Monthly Maintenance

1. Check the brightness of each LED. Replace the complete LED assembly if the light is insufficient.
2. Inspect the joint between the Z-axis rotary motor shaft and oil seal for air leakage, then apply a small amount of white grease.
3. Wipe dust and residues off the X-axis linear guide rails and apply new grease.
4. Clean dust and residues from the X-axis timing belt.
5. Wipe dust and residues from the Y-axis linear guide rails and apply new grease.
6. Remove dust and residues from the Y-axis timing belt.
7. Clean dust and residues off the Z-axis linear guide rails and apply new lubricating oil.
8. Check if the outer silicone ring of the nozzle holder becomes loose or slides upward to hinder motor rotation; replace it if necessary.
9. Inspect the filter of the vacuum generator assembly for sucked components, and clean or replace the filter as required.
10. Check the fan impeller for dust buildup, and blow clean with an air gun when needed.

DANGER:

To avoid accidents caused by accidental startup, perform maintenance only after power is cut off.

WARNING:

Do not use an air gun. It will blow dust and debris into the equipment and adhere to guide rails, lead screws and lenses, which will affect normal operation.

IMPORTANT NOTE:

Do not clean the equipment surface with organic solvents, as they will damage the paint finish.

6-4 Nozzle Cleaning

1. Clean the nozzles with an ultrasonic cleaner filled with alcohol, then blow out residual alcohol inside using an air gun.
2. The standard ultrasonic cleaning duration is 5 minutes.
3. Wipe off stubborn dirt that cannot be removed by ultrasonic cleaning with a soft cloth dampened with alcohol.
4. Apply lubricant to the nozzle slider after cleaning to prevent internal rusting.

IMPORTANT NOTE:

Do not use solvents other than alcohol (such as propanol). High-viscosity grease will prevent the nozzle slider from returning smoothly.

Chapter 7 Troubleshooting

7-1 Component Rejection

Symptom	Cause	Corrective Action
Severe Component Rejection	1. Improper light source brightness setting	Check and reconfigure the light source brightness
	2. Incorrect brightness decay setting	Check and reconfigure the brightness decay parameter
	3. Improper visual threshold setting	Check and readjust the visual threshold, then re-register the component image
	4. Insufficient camera anti-shake exposure time	Increase the camera anti-shake exposure time
	5. Poor pick-up quality	Check nozzle concentricity and verify feeder coordinates

7-2 Pick Components

Symptom	Cause	Corrective Action
Component Standing Upright After Pick	1. Insufficient nozzle height	Reconfigure the Z-axis height
	2. Incorrect feeder coordinates	Recheck and calibrate feeder positioning coordinates
	3. Nozzle concentricity error	Inspect and replace the nozzle
	4. Pick hold time is too short	Increase the pick hold time
	5. Insufficient air pressure	Increase the air pressure
Failure to Pick Components	1. Insufficient nozzle height	Reconfigure the Z-axis height
	2. Solenoid valve failure	Inspect and replace the solenoid valve
	3. Vacuum generator failure	Inspect and replace the vacuum generator
	4. Nozzle blockage	Clear the nozzle or replace it
	5. Nozzle mismatch	Replace with a larger nozzle to enhance negative pressure
	6. Air circuit blockage or leakage	Replace the air hose

7-3 X/Y Axis

Symptom	Cause	Corrective Action
X/Y Axis No Movement	1. X-axis or Y-axis triggered the limit switch	Press reset to return to the home position before moving
	2. Z-axis is not at home and in protection mode	Press the reset switch to return to home position, then check if the Z-axis is jammed
	3. Stepper/servo motor failure	Replace the stepper/servo motor
	4. Stepper/servo motor wire breakage	Replace the motor lead wire
	5. Stepper/servo drive failure	Replace the stepper/servo driver

7-4 Placement

Symptom	Cause	Corrective Action
Component Tombstoning After Placement	1. Insufficient solder paste viscosity or paste dried out	Replace solder paste and re-print the PCB
	2. Excessive Z-axis speed	Reduce the Z-axis placement speed
	3. Solder paste print offset	Re-adjust and calibrate the printer alignment
	4. Insufficient Z-axis distance to PCB surface	Re-configure the Z-axis distance to the PCB
	5. Insufficient placement hold time	Increase the placement hold time
Overall Placement Offset	1. Incorrect fiducial mark positioning	Re-calibrate the fiducial mark
	2. Placement head offset	Re-align the placement head
	3. Uneven PCB clamping	Re-calibrate and re-install the PCB position
	4. Excessive placement speed	Reduce the placement speed
Inaccurate Placement of Specific Components	1. Nozzle concentricity error	Inspect and replace the nozzle
	2. Incorrect feeder coordinates	Re-check and calibrate the feeder coordinates
Placement Angle Not Reached	1. Failed rotary motor	Replace the rotary motor
	2. Nozzle mismatch	Turn on the placement head switch
Placement Head Not Placing Components	1. Placement head switch is off	Turn on the placement head switch
	2. Panel placement set to skip mode	Change panel placement mode from skip to place

7-5 MARK Point

Symptom	Cause	Corrective Action
MARK Point Not Detected	1. Detection range is too small	Increase the detection range
	2. MARK point image not updated	Update the MARK point image
	3. Insufficient light source brightness	Adjust the MARK point light source brightness
	4. MARK point features are not distinct	Re-select two points and define them as MARK points
	5. Excessive MARK point deviation	Reduce the width of the conveyor guide rails if they are too wide

7-6 Power Supply

Symptom	Cause	Corrective Action
No Power	1. Blown fuse	Inspect and replace the fuse
	2. Poor contact at the power plug	Check and secure the plug; verify the power supply is working properly

Chapter 8 After-sales Service

The warranty period for this machine is **twelve (12) months from the date of purchase**. During the warranty period, we will provide **free repair** for failures that are not caused by human error. For failures caused by human factors or after the warranty period has expired, we will charge a reasonable service fee at our discretion. **Lifetime maintenance support** is available.

◆ **Revision History**

Rev	Date	Revised Pages	Revision Content
1.0	2019.4		Initial release
2.0	2026.5		Updated software operation procedures

Specifications and appearance are subject to change without prior notice.

All rights of final interpretation of this operation manual are reserved by the company.