

# P55D

## SERVICE MANUAL

- ✓ All diagrammatize
- ✓ Error code Identification keys
- ✓ Operation Video in QR code
- ✓ Professional Class

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**IN MEMORY OF 2025 UP3D  
TECHNOLOGY TRAINING SUBMIT IN BRAZIL**

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# 01

## Preparation for P55D

## I. Installation

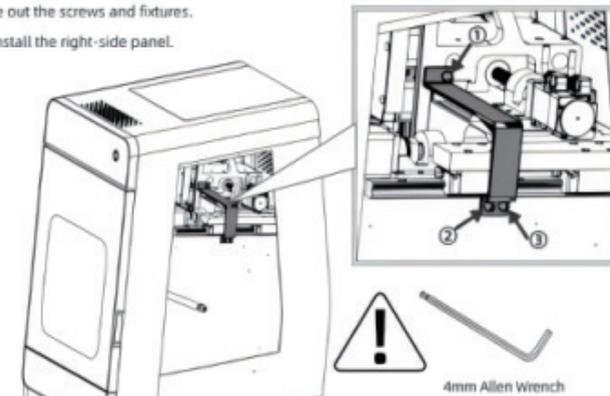
When get the NEW P55D smart milling machine,we need Removing Transport Fixtures.

### Guidelines: Removal Steps

Refer to the diagram below for where to find and how to remove the transport fixtures. Remember to store them safely after removal to avoid losing them.

Tools Needed: Use a 4mm Allen Wrench

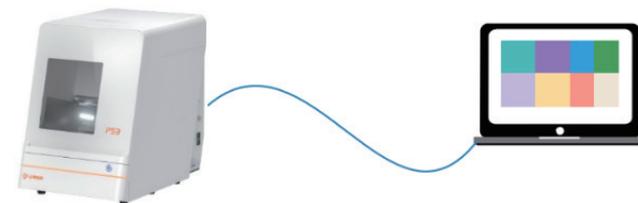
1. Remove the right-side panel.
2. Use a 4mm Allen wrench to unscrew the three bolts holding the fixtures, one by one.
3. Take out the screws and fixtures.
4. Reinstall the right-side panel.



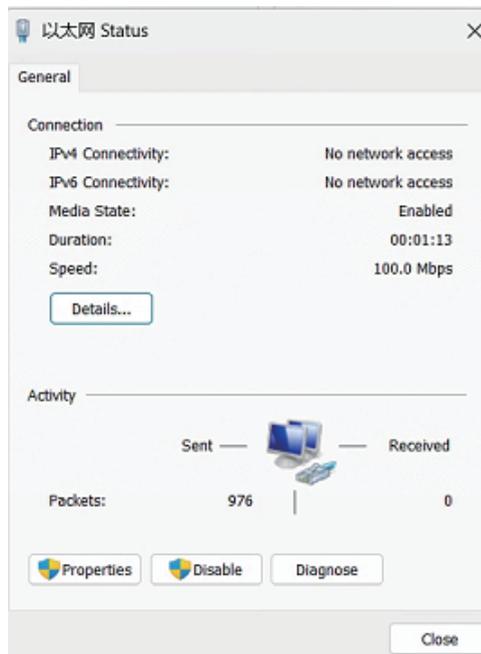
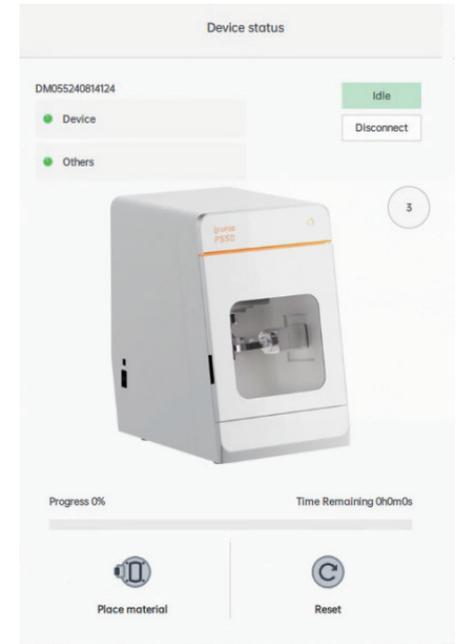
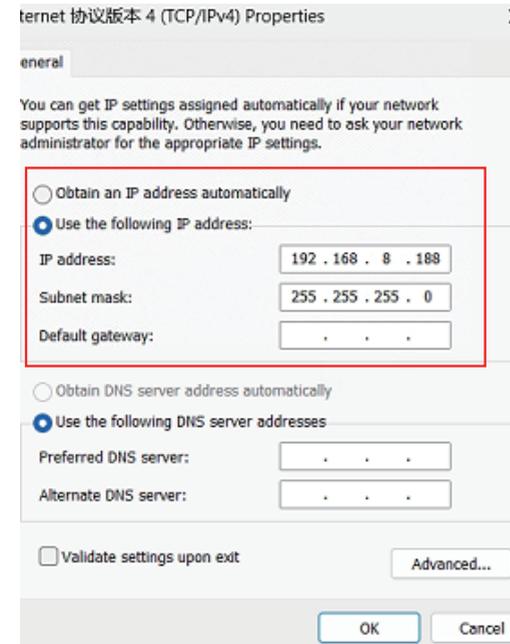
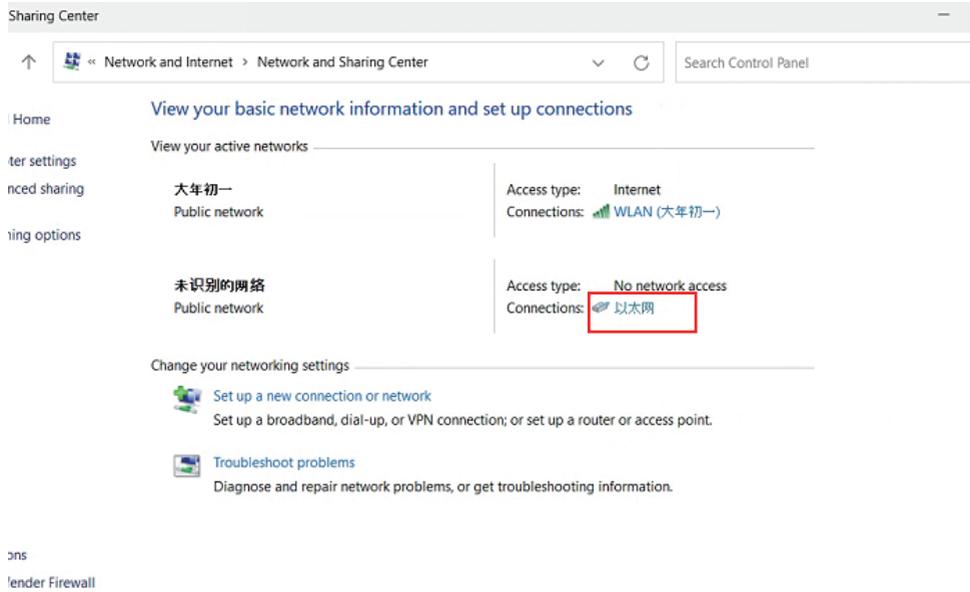
⚠ Caution: While performing the procedure, make sure that the screws and fixtures do not fall into the equipment, as this could damage the device or cause malfunctions.

Connecting the power supply.

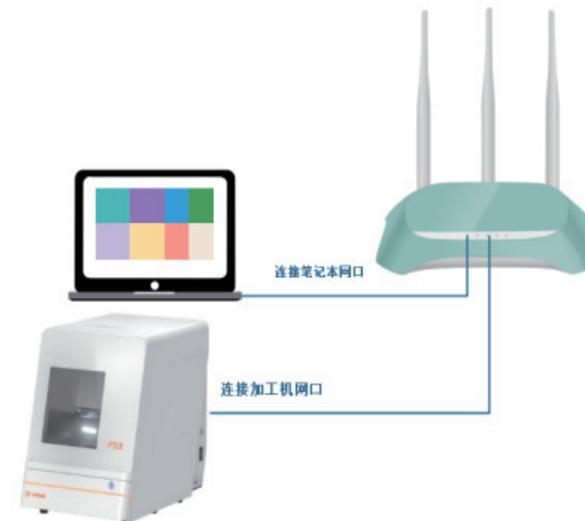
Use a network cable (accessory box) to connect the machine to the computer, then turn on machine power.



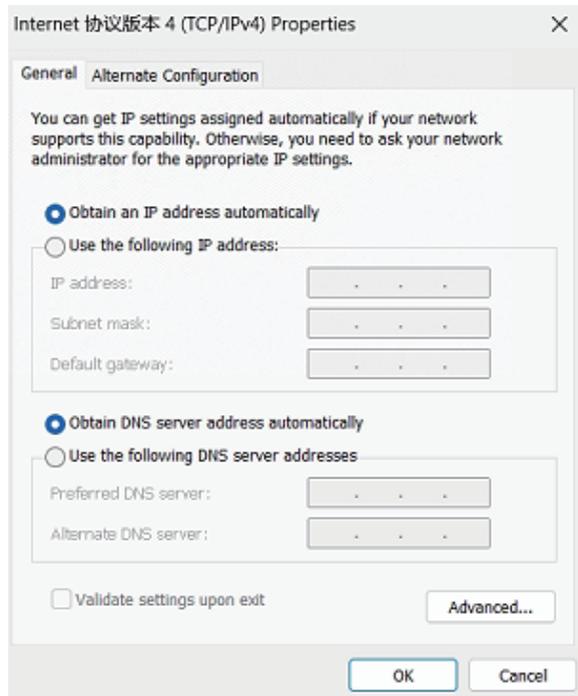
Change the machine IP in computer.



If use router to connect machine.



The IP need as shown below.

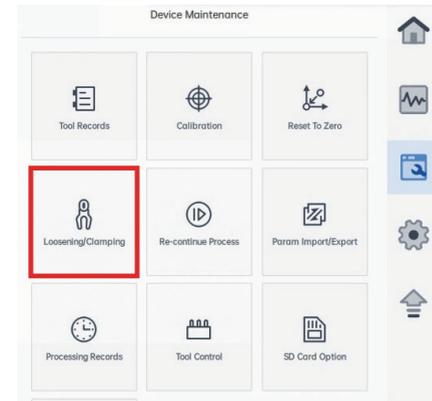


Install CNC3 software.



The silver flash drive contains the cnc3 installation package, use it to install CNC3. After finish install, open CNC3, Automatic connecting machine

On CNC3, Click 'Reset' then click "loosening/clamping", spindle chuck will open. The spindle guard rod will fall off.



Click on the "place materia" to install the calibration disc, calibration bar (position 13), and fixture plate.



**Calibration-Old version:**

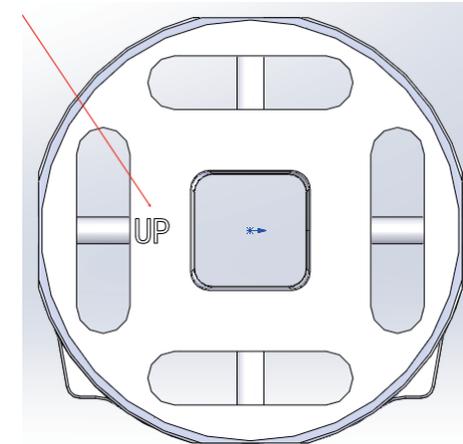


**Calibration-New version:**

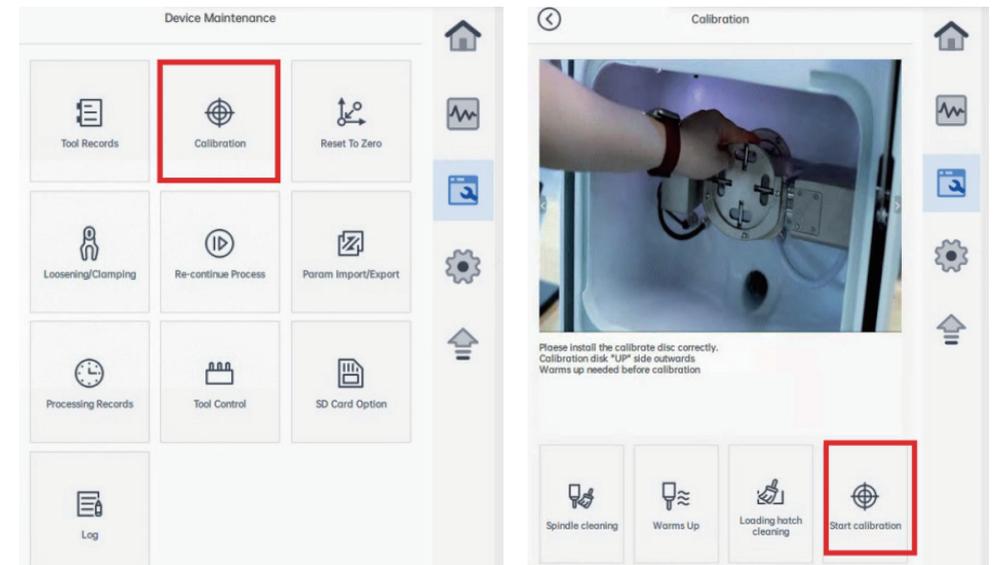
The new version of the 55D calibration disk has some changes on the original basis. There is no UP mark before version 250430. Please pay attention to its placement direction:



**The latest version:**



Click 'Calibration'



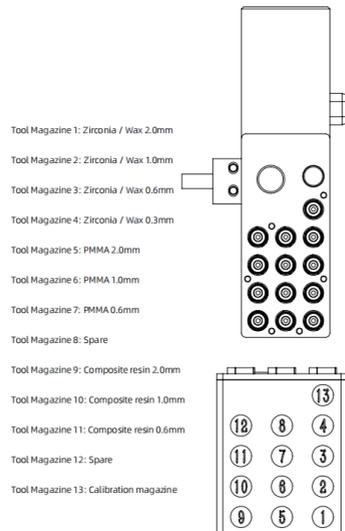
When finish calibration, can try milling a crown, check the milling result.

**If the result not good, please contact us.**

## II. Milling Tools

P55D milling burs introduction

P55D milling burs location:

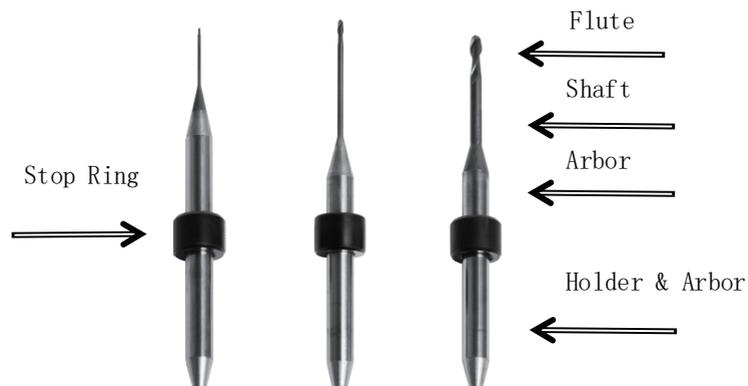


Location N8: Flat milling burs

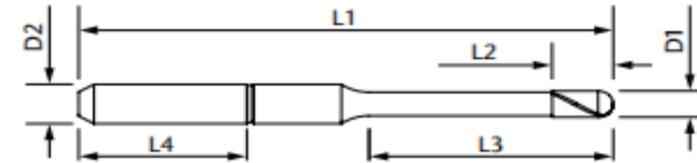
Location N13: Calibration burs & T type milling burs

Location N9-N12: Composite resin milling burs & Spare burs

Components of the milling burs:

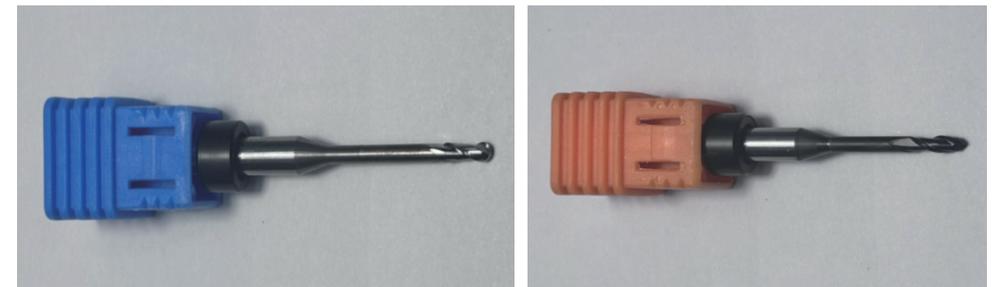


Examples of detailed dimensions of the Zirconia 2 mm Milling burr:



D1 (mm)	D2 (mm)	L3 (mm)	L4 (mm)	L1 (mm)
2.0	4.0	16.0	18.0	50.0

Analysis of milling burs coating:



NO Coating

DC / DLC Coating

No coating burs: use it in PMMA/PEEK/Wax material

Coating burs: use it in Zirconia/Composite Resin

DC&DLC milling burs different:



DC means Diamond Coated, It has excellent hardness and wear resistance, and can provide longer tool life and higher cutting efficiency.



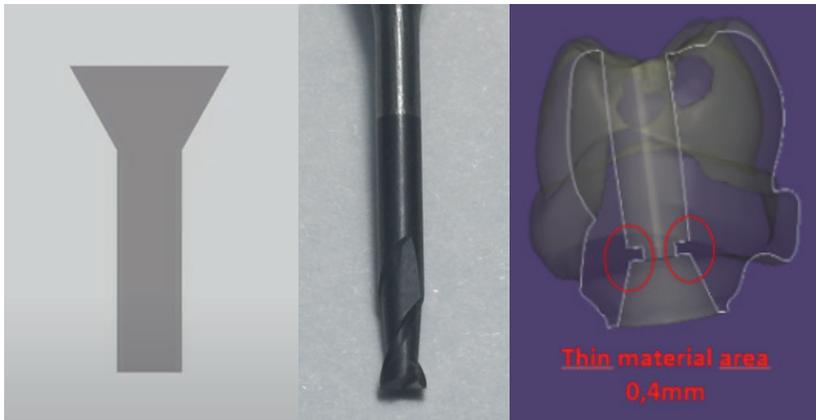
DLC means Diamond-Like Coated, It has a relatively low cost but weak durability. Milling burs shape type



Spherical burs (conventional)      Flat burs (planting)      T-shaped burs (planting)

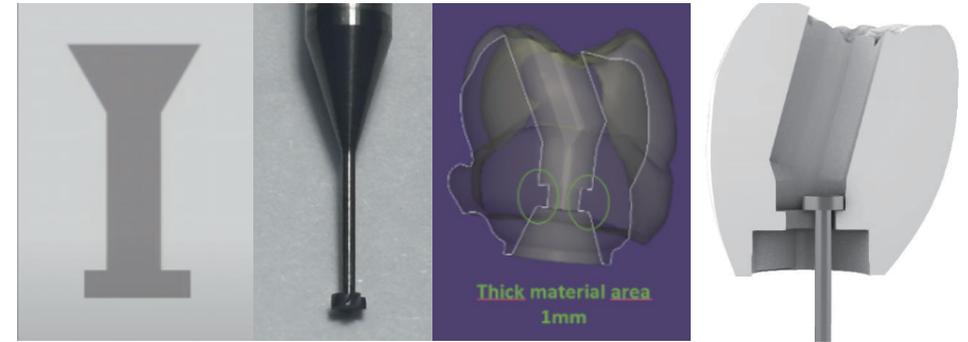
**Flat burs:**

It is applied in the processing flow of conventional implant restorations.

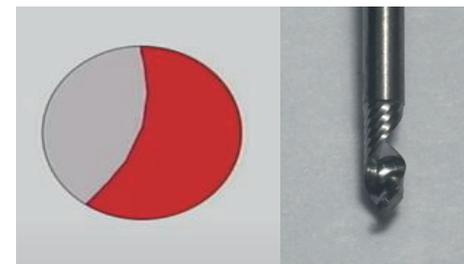


**T-shaped burs:**

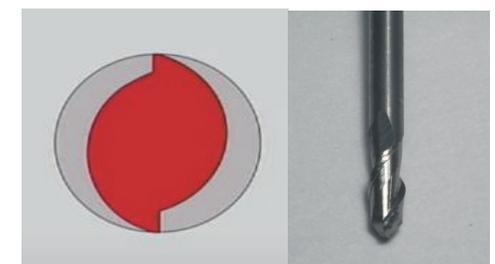
For some implant restorations with angular deviations, traditional flat cutters cannot effectively remove residual material from chamfered areas due to the lack of cutting space, resulting in processing limitations. By adopting a cutting path that starts from the bottom of the crown and using a rotating cutting method, this approach can efficiently complete chamfering in angular areas, significantly improving processing adaptability for complex implant structures.



**Milling burs edge design:**



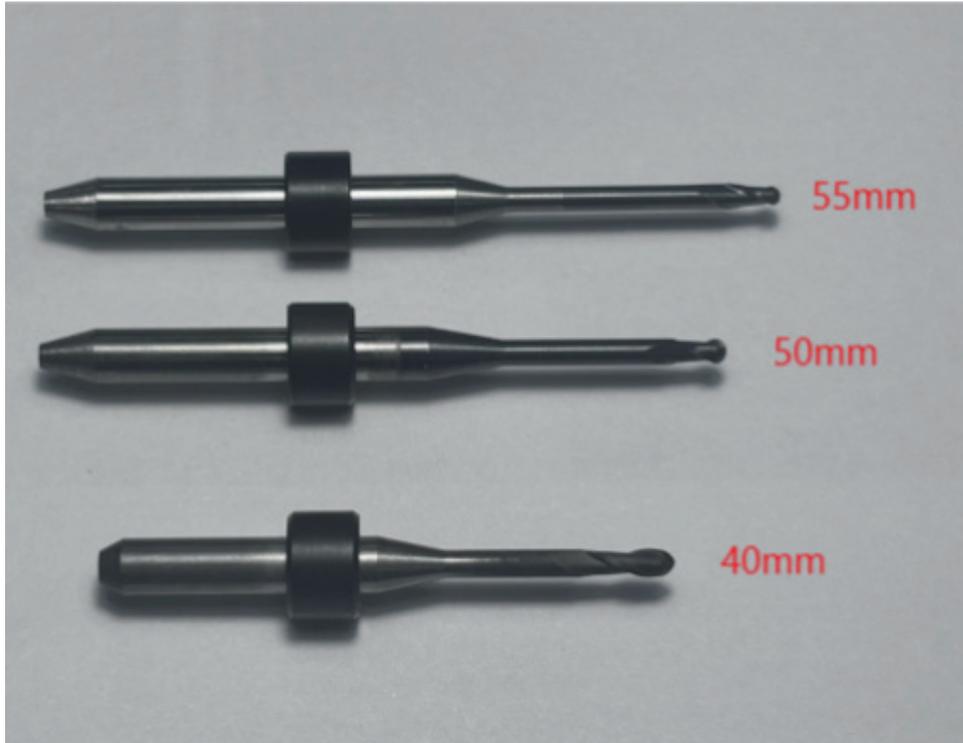
Single-edged type: High precision machining, optimised cooling and chip removal



Double-edged type: High-load cutting, stronger rigidity

### Special milling burs configuration - long and short burs solutions

Three standard milling burs lengths are available to accommodate different material thicknesses and cutting scenarios, 55mm/50mm/40mm, As shown in the figure below:



### 55mm Milling burs:

Application Scenario: Cutting materials with a thickness of  $\geq 25\text{mm}$  to ensure processing integrity.

### 50mm Milling burs:

Application Scenario: Standard tool length design for processing materials of conventional thickness, suitable for most conventional materials and restorative structures;

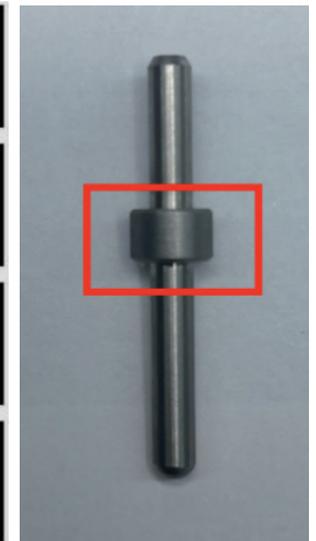
### 40mm Milling burs:

Application Scenario: Cutting high-hardness materials, such as composite resin tools. The overall length is shortened, significantly enhancing tool rigidity and vibration resistance;

### Magnetic burs:

P55D - Equipment produced after May 2025 and some upgraded magnetic equipment

	<b>Zirconia DC Burs Mag</b> Diameter: 2.0 mm      Size: R1.0*16*4*50
	<b>Zirconia DC Burs Mag</b> Diameter: 1.0 mm      Size: R0.5*16*4*50
	<b>Zirconia DC Burs Mag</b> Diameter: 0.6 mm      Size: R0.3*14*4*50
	<b>Zirconia DC Burs Mag</b> Diameter: 0.3 mm      Size: R0.15*4*4*50



Note: All subsequent magnetic equipment will use a magnetic tools' kit.

## 02

## Homing Issue

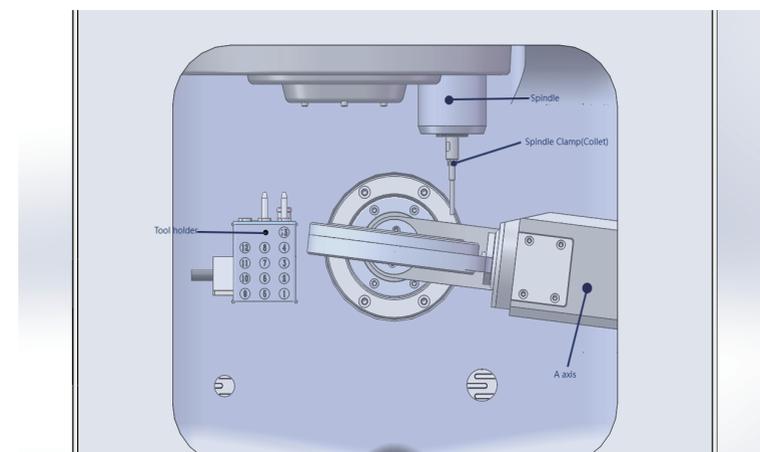
### I. Homing Failure

After clicking 'return to zero', the X/Y/Z/A/B axis fails to return to zero, which is divided into three cases:

Just one times homing failure, click reset button, than click homing button and successful; Click homing button, axis does not move, Coordinate change; The axis hard limit error.

Tools needed:

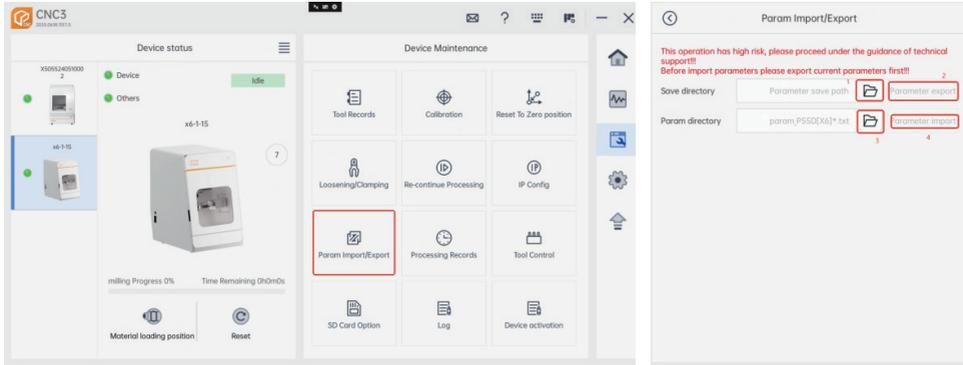
A set of hexagon wrenches, a Phillips screwdriver, a multimeter.



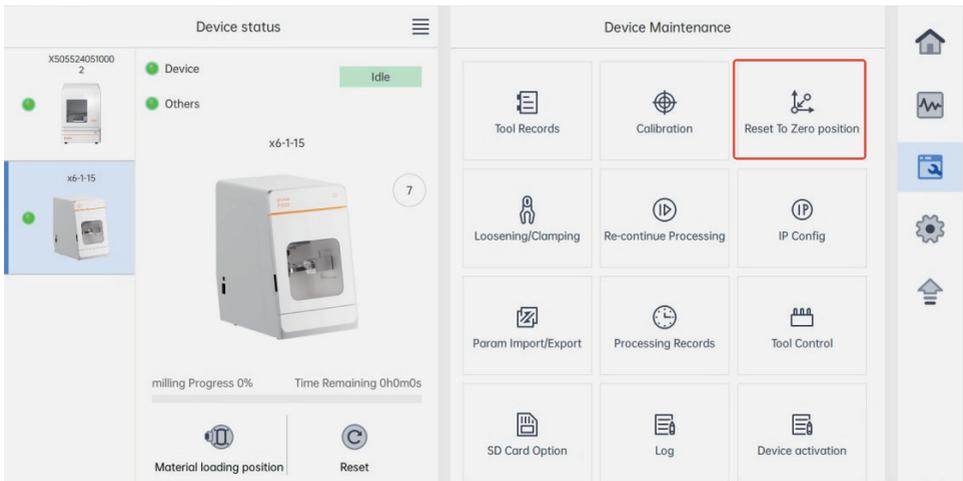
Just one times homing failure, click reset button, than click homing button and successful

Machine parameters not correct

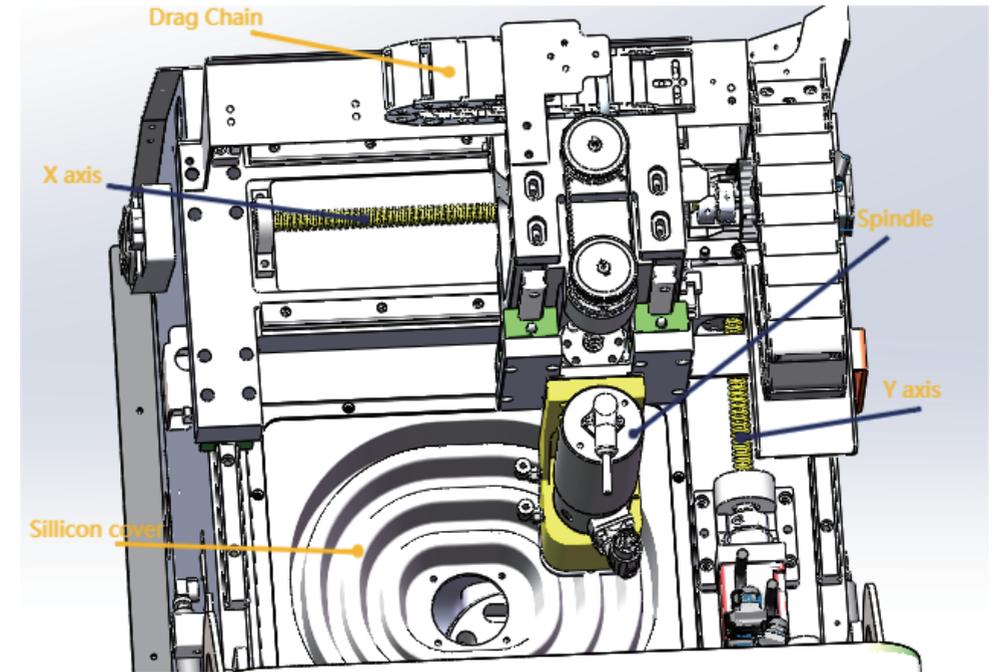
Need to check the original parameter from the flash driver. Then find the Param import/-Export to save and rewrite the parameter.



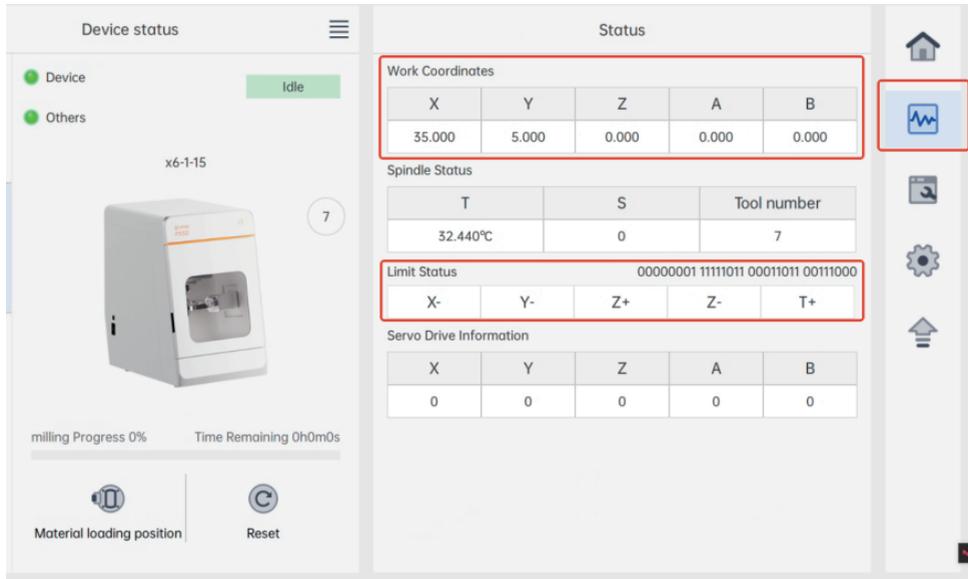
There is a short pause in the return to homing process  
Try to auto homing all axis, and check axis situation.



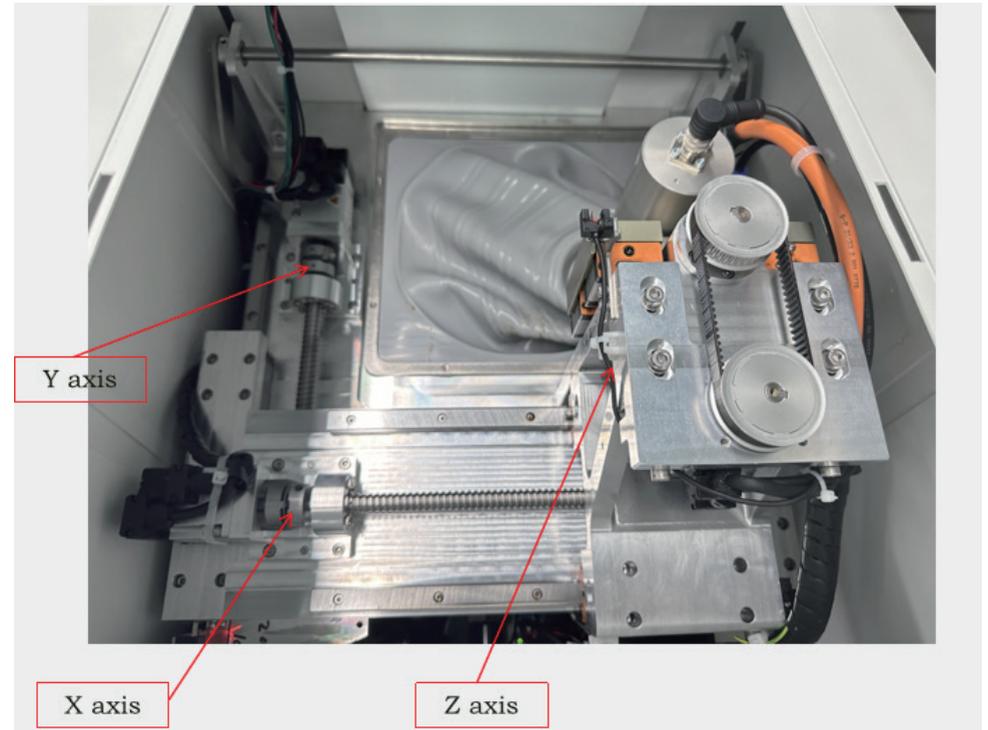
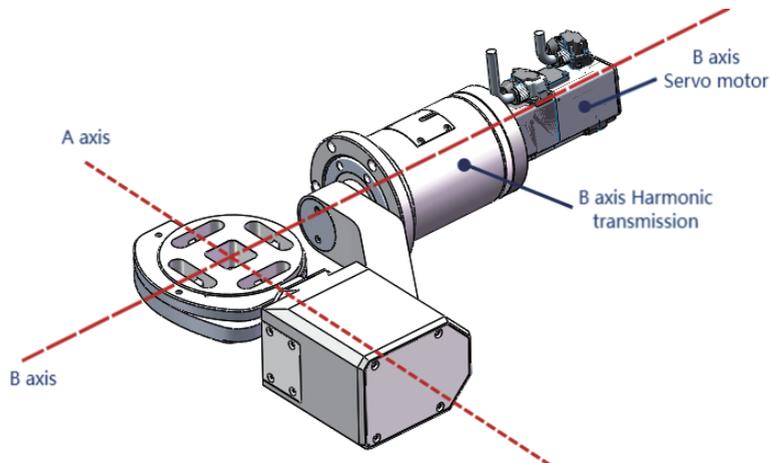
Check coupling, if axis coupling loss, need to tight and confirm the homing normal.



Click homing button, axis does not move, Coordinate change

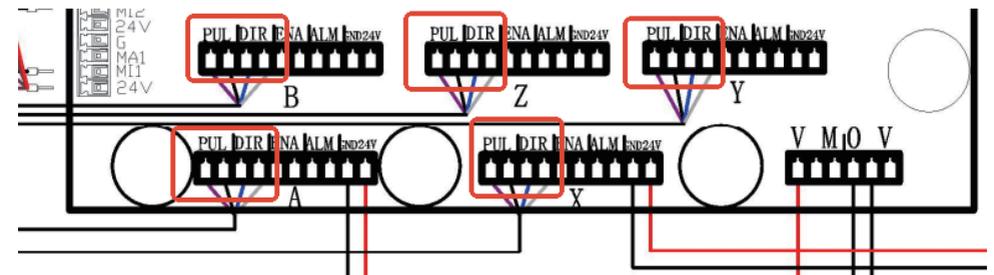


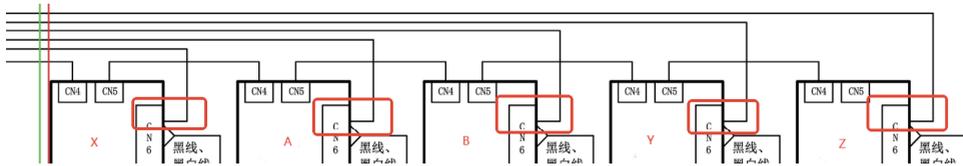
Motor is working and can hear the abnormal voice, need to open the back cover and top cover for the machine and check the axis coupling, if loose need to tight the coupling.



Motor Drive not show with ERROR

Need to open the drawer for the P55D and check the motor cable from Control board to the back motor drive parts connection, Whether any place loose or cable bad connection, and try to fix and check again.

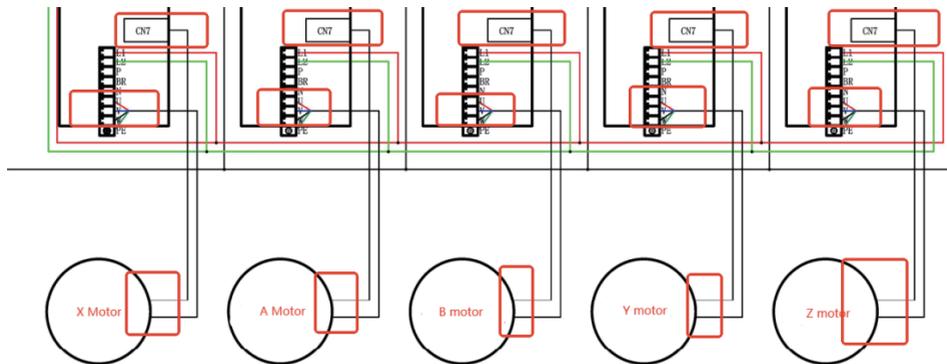




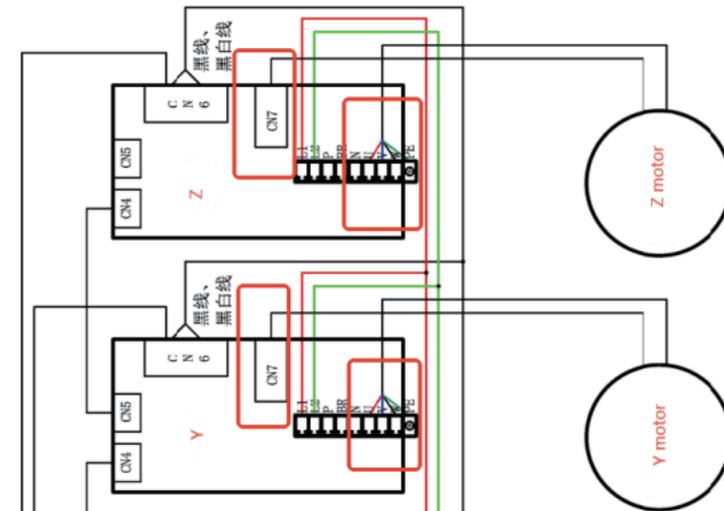
Confirm all connection good and cable continue well but not solve, need to replace the control board.

Motor Drive show ERROR

Need to check cable from Drive to motor parts cable connection, and control the value, try with other work normal parts.



For example, if the Z-axis motor cannot rotate, swap the wiring of the Z/Y axis motors on their motor drive, and operate the Z and Y axis respectively on the CNC to rotate. If after swapping, the Y-axis can rotate but the Z-axis still cannot, it is a motor problem. If the Y-axis cannot rotate but the Z-axis can, it is a motor drive problem (motor wire inspection must be completed before testing).



The axis hard limit error

The limit status always give signal, and axis not moving.

The screenshot shows the CNC3 control interface. The 'Device status' section shows the device is 'Idle'. The 'Status' section displays the following data:

Work Coordinates				
X	Y	Z	A	B
0.000	0.000	1.161	0.000	0.000

Spindle Status		
T	S	Tool number
26.740°C	0	7

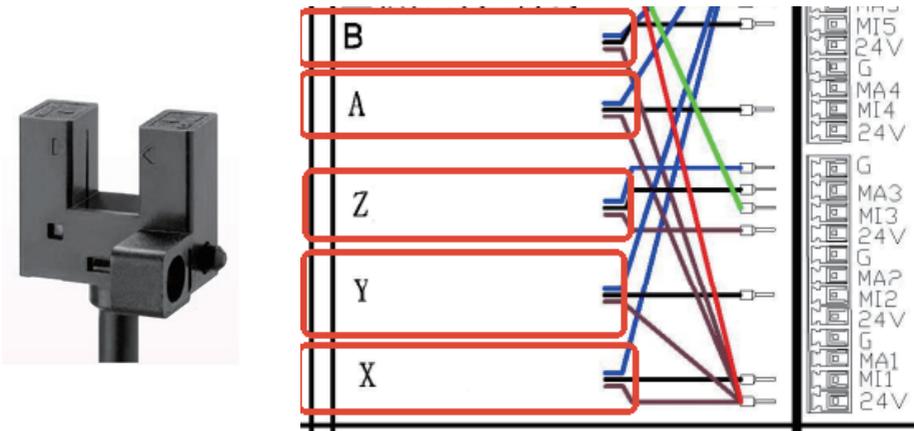
Limit Status: 00000001 11110111 00011111 00111000

X-	Y-	Z+	Z-	T+

Servo Drive Information:

X	Y	Z	A	B
0	0	0	0	0

Need to remove top cover of the machine, and check the photoelectric switch Whether have light, if no light and need to check cable connection.



Check the sensor whether can not be trigger, Sensor or sensor piece position error cause the sensor cannot correct detect the sensor detection piece.

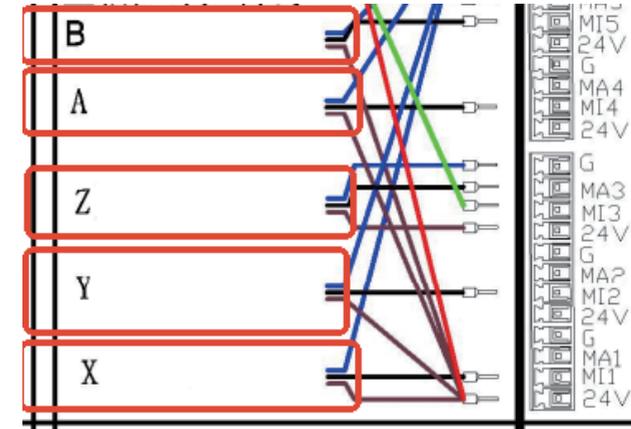
Cable well and position correct, that may the switch issue, If there is a problem with the photoelectric switch, a multimeter can be used for troubleshooting in accordance with the "Photoelectric Switch Inspection" document.

The axis always moving and not stop.

The limit status always do not give signal, and axis moving not stop.

Fault occurrence points: photoelectric limit switch itself, wires, control card. If the customer has replaced the control card recently, it is necessary to check the firmware and parameters.

Same remove top cover of the machine, and check the status of the photoelectric switch light and status CNC3.



It is necessary to check whether the line to the control card is normal. If not, the line needs to be replaced.

It is necessary to check whether the signal feedback is normal when the photoelectric switch is triggered.

The wiring of the normal and faulty photoelectric switches on the control card can be swapped for testing.

If there is a problem with the photoelectric switch, a multimeter can be used for troubleshooting in accordance with the "Photoelectric Switch Inspection" document.

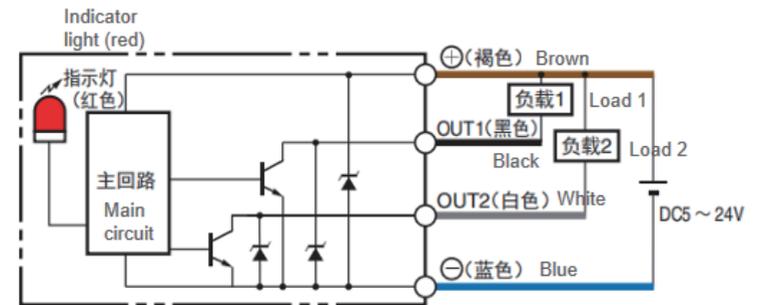
# 03

## Photoelectric switch inspection & replacement

photoelectric switch:



NPN Output | EE-SX953-W 1M 1



Output circuit diagram

The photoelectric switch has four wires, of which the white circuit is not used, so it is a normally open type:  
 Normally open signal wire (black OUT1): Contacts that are open when not energized;  
 Power supply positive wire (brown): Connect to the positive terminal of the power supply  
 Power supply negative wire (blue): Connect to the negative terminal of the power supply

## Measurement method:



Multimeter DC 200V Model,

Use the Multimeter probe to touch the black and Blue wires of the photoelectric switch, when not triggered, the voltage reading is 0V, after manually triggering the photoelectric switch, the voltage reading is 24V.

Touch the brown and black wires of the photoelectric switch with the Multimeter probes, When not triggered, the voltage reading is 24V. After manually triggering the voltage reading is 0V.

The replacement method is to cut off the original limit switch wiring, and connect the new photoelectric switch wiring to the old wiring to complete the replacement.

## 04

## Lines and Stages on the Surface

### I. Common Lines on the Surface

Appearance:

Equipment emerges broken margins and lines abruptly in the processing. Commonly it's caused by dust& the defective limited switch.



**Causes:**

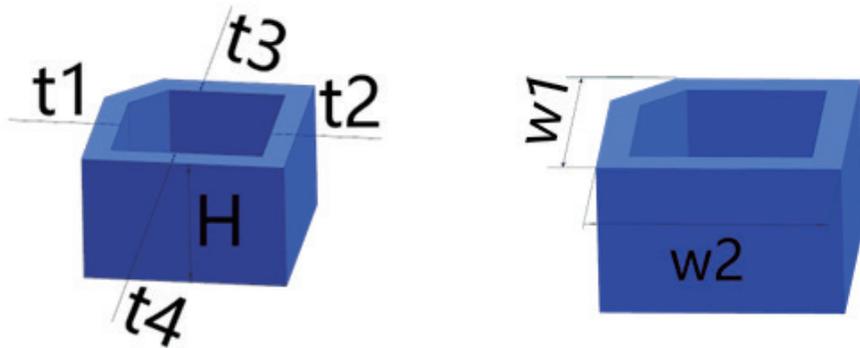
Commonly dental lines problems result from the accumulation of the dust in the equipment and calibration gap for long time

**address methods:**

Confirm whether cleaned inside of equipment and calibration recently firstly. Notice the cleaning about screw rods and the cover of axis particularly for P53

The processing steps please refer to the chapter How to do the cleaning. And then, please calibrate after the cleaning. Additionally, Change a new kit of tool for processing test after calibration.

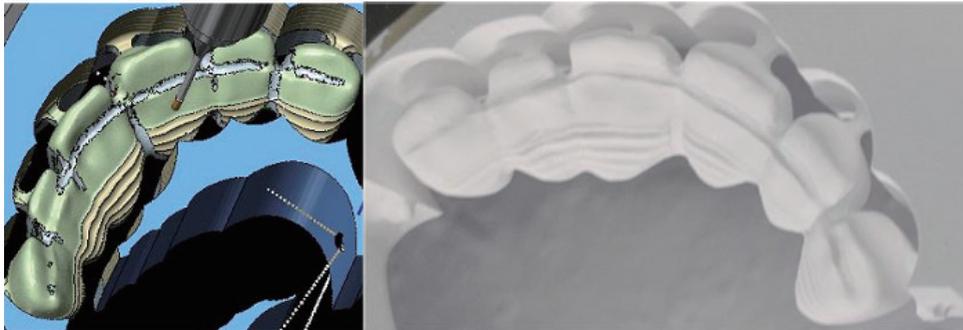
Then please process and measure the standard cubes too see if there still are some problems about the procession outcome



Finally, find the cause according to the measurement value, such as the problem of screw rods, limited switch, tool sensor.

### Lines from CAM Strategy

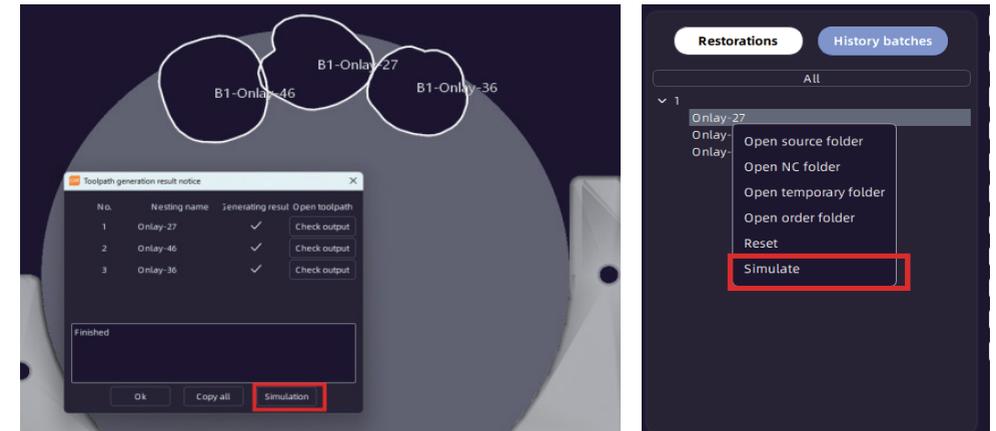
The restoration surface lines after machining are the same as those shown in the CAM simulation, as shown in the following figure.



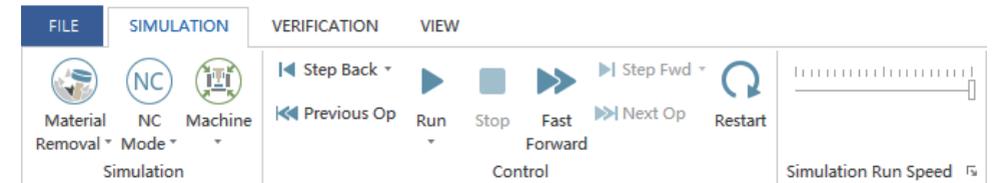
### Cause of failure:

The CAM strategy issue operation methods:

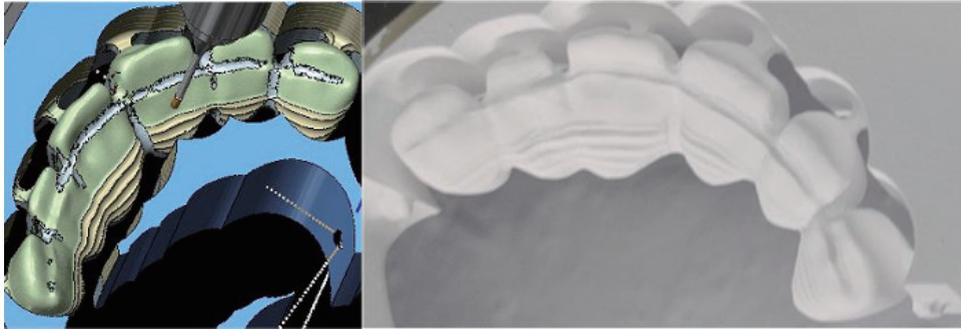
Open the CAM software, find the corresponding order, and enter the simulation.



Click "Start", adjust the speed, and wait for the simulation result to finish.



Compare whether the software simulation results are consistent with the measured processing results.



Once the CAM problems is confirmed, please go to UP3D website, [www.up3dtech.com](http://www.up3dtech.com), to download the latest UPCAM and install.

Analysis and handling of dental lines issues - Multi-layer deep dental lines

Phenomenon: Poor machining results caused by problems with the accuracy or quality of the tool aligner have very obvious characteristics.

During daily machining tool changes, errors such as 'tool broken' and 'tool too long' frequently occur.



The machining results have very deep multi-layered dental lines.  
The machining results are unformed, as shown in the following figure.

**Processing methods:**

Turn off the equipment, use compressed air to clean the dust accumulated around the tool aligner, and press it quickly 15 times (refer to tool aligner cleaning).

Process a single crown for testing.

If the machining effect has improved but there are still dental lines

Clean the interior of the equipment, calibrate it, and process the standard block.

Check the values of the standard block, adjust parameter or replace the corresponding axis limit switch.

If the machining effect does not improve significantly, check the tool length in the log or use the CNC3 tool setter for detection to determine whether the tool aligner needs to be replaced.

Analysis and handling of dental lines issues - layered and banded patterns

Issue: There is a linear/striated pattern on the processed result, and usually, a zero-return error occurs, as shown in the following figure.



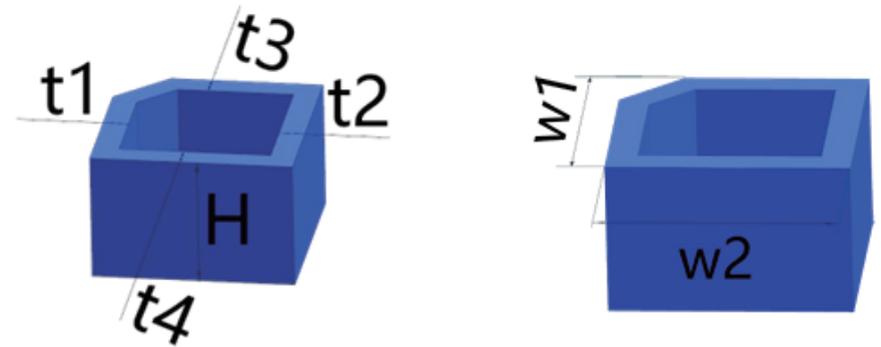
The position of the linear striation corresponds to the external high-point line shown in the CAM layout, meaning the processed result is layered vertically. When the equipment finishes processing the upper half, the position of the machining center shifts after the A-axis rotates 180°. This phenomenon is generally caused by abnormal accuracy of the limit switch or incorrect previous calibration results. It can be addressed by re-calibrating and adjusting the supplementary parameters through processing a standard block.

**Processing methods:**

Clean the interior of the equipment (refer to the cleaning document), calibration.

Process the standard block.

Measure the standard block.



标准块尺寸 t1、2、3、4=1±0.05mm, H=5±0.05mm, w1、2=8±0.04mm

After adjustment, re-calibration is required.

After re-calibration, process the standard block and measure it to ensure the values are correct.

If the deviation of the value in step 4 is too large (greater than 0.15mm), the corresponding limit switch needs to be replaced.

If the problems of frequent axis zero-return failure and dental lines occur in daily use (and the interior of the equipment has been cleaned), please directly replace the axis limit switch.

# 05

## Tool Sensor Issue

### I. Tool broken error

The CNC page displays error messages:

ERROR21: CNC\_SYS\_ERR\_TOOL\_BROKED Tool broken (Cutting Tool broken)

Or ERROR22: CNC\_SYS\_ERR\_TOOL\_LONG Tool too long (Cutting Tool too long), but the Cutting Tool is actually intact.

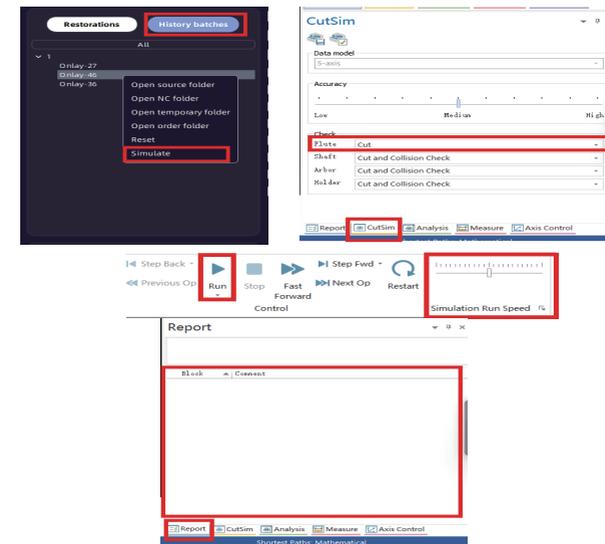
#### Handling Methods:

Tool Breakage ERROR21: CNC\_SYS\_ERR\_TOOL\_BROKED Tool broken

First, confirm whether the Cutting Tool is actually broken.

#### 1. If the Cutting Tool is broken:

- a. Click "Reset," "Home," and "Tool Release" to manually remove the broken Cutting Tool.
- b. Hardware: Clean the 5-axis components and perform calibration.
- c. Software: Open the CAM software, find corresponding order, start simulation. Check for collision error messages. In the simulation page's bottom-right "CutSim" panel, adjust "Check" → "Flute" → "CUT." Then, select "Report," click "Start Simulation," and observe the error messages in the "Report" section. Reposition the model to avoid collisions and resume machining.



## 2. Cutting Tool is normal but error occurs

- Click "Reset", "Home", and "Tool Release" to manually remove the Cutting Tool and return it to the tool magazine
- Power off and clean the tool setting instrument (refer to Tool Setting Instrument Cleaning Documentation)
- Export logs and check tool length values:

If the tool length parameters in the logs show minor variations with low frequency, perform calibration after cleaning.

The screenshot shows the CNC control interface with the 'Log' section highlighted. Below it, a file explorer shows the log file 'cnc\_log\_DM155250526009\_20250808...' selected. The log content is displayed in a text editor, showing the following entries:

```
[Tue Jul 22 13:05:56 2025] [W/cnc tool ] update 555 lenh=index=0,toolnum=13, lenh=33942
```

If the tool length parameters exhibit significant fluctuations (e.g., consistent variations exceeding 700 units during each tool setting), replace the tool setting instrument. Use CNC3 to conduct a tool setting instrument test and verify whether its precision is abnormal.

## II. Tool breaking during processing

During machining operations, burr needle breakage occurs, predominantly with 2mm & 1mm diameter needles.

### Tool Breakage Handling - No.1 Tool:

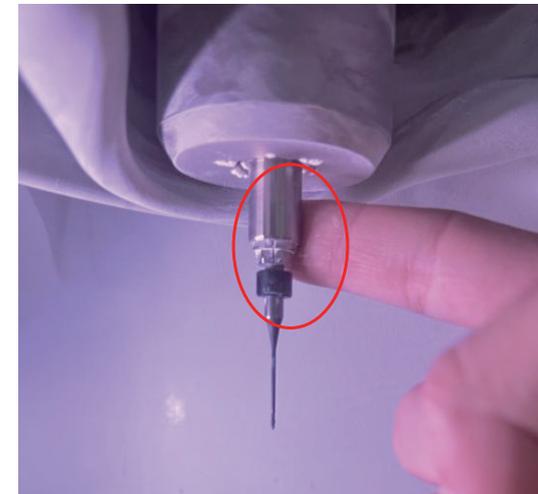
#### Spindle Status Verification:

Confirm spindle operational status

Manually rotate spindle collet (must be in clamped position)

If abnormal noises or resistance or spindle not rotate is detected during rotation:

→ **Immediate Action: Check the spindle situation or replace spindle unit (indicates spindle seizure)**



#### Material & Tool Verification:

Confirm burr needle specifications match CAM design

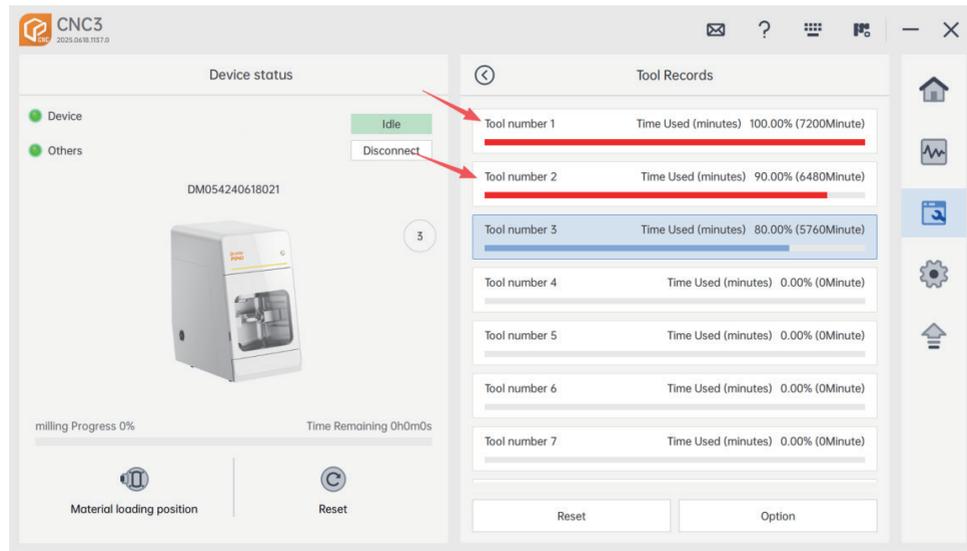
Verify material block compatibility

```
Order name: [20] 2025-07-31-104921
Blank name: Zirconia(ZI-10) With step N
Size: 98.00mm, 10mm, 1.25
Blank colour: W
Residues: 89.1164
Milling machine: WPMillP55D C-Clamp-Y
Version: 3.1.4.2023.07.31.10140
```

- Ensure correct machine type is selected
- Layout Configuration Check
- Validate restoration type settings
- Inspect margin line positioning
- Confirm insertion axis orientation
- Complex Model Simulation
- Run mandatory simulation for complex geometries
- Verify simulation shows minimal/no errors

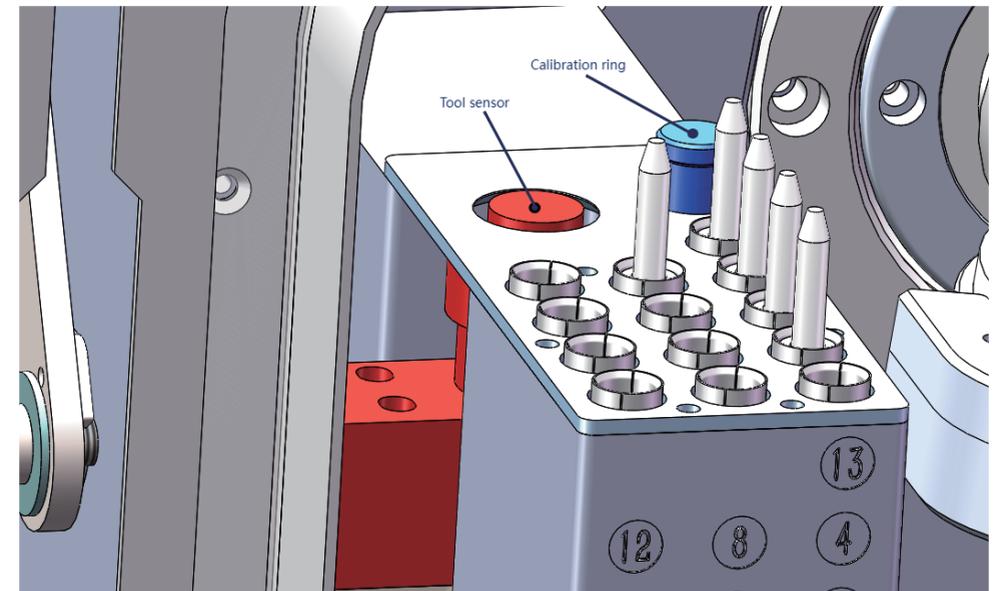
**NC File Integrity Check:**

- Inspect NC program for encoding errors
- Confirm file integrity before processing, hardware Change History, inquire about recent hardware replacements:
  - Spindle control card
  - Spindle power cable
  - Control card
- Rule out firmware/parameter mismatch issues
- Check tool Life Monitoring, check burr needle usage against recommended lifespan



**Tool Length Log Analysis:**

- Review historical tool length measurements
- Tool Setter Maintenance
  - Perform tool setter cleaning (Ref: Tool Setter Cleaning SOP)
  - Machine Internal Cleaning
  - Execute 5-axis system cleaning if overdue (Ref: Equipment Maintenance Manual)
- Causes of No.2 Tool Breakage (refer to No.1 tool breakage troubleshooting):**
  - Tool-bit mismatch
  - CAM design issues
  - Powder accumulation on tool sensor causing wrong milling
  - NC code corruption



### III. Tool clamping failed

During tool retrieval/changing, the collet fails to open/gets stuck, resulting in tool unclamping/changing failure.

#### Troubleshooting Procedure:

Click [Tool Clamp/Release] and listen for collect motor from spindle collect.

#### If collect motor sound is present:

Gently tap tool shaft with small wrench

Slowly rock tool back and forth

Remove tool and clean spindle collect (Ref: Spindle Collect Cleaning Guide)

#### If sound is normal but can not remove the tool from spindle, Loose tool motor working process issue

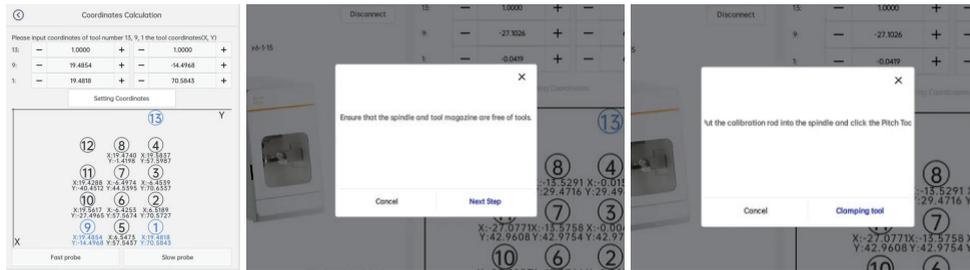
Physical chunk stuck into spindle-Try to remove spindle chuck/ replace spindle

Electrical clamping issue-need to check clamping signal cable and motor voltage, relay signal output, control board signal.

(Ref: Electrical clamping troubleshooting)

#### If Tool holder issue cause the tool not remove from the spindle:

Location parameter issue-Coordinates Calculation



(Calibrate the tool holder coordinates by detecting the tool holder

Fast probe: Only detect positions 1, 9, and 13.

Slow probe: Detect all positions.)

Tool holder issue-Mag tool holder update method(Ref:P55Dtool holder update)

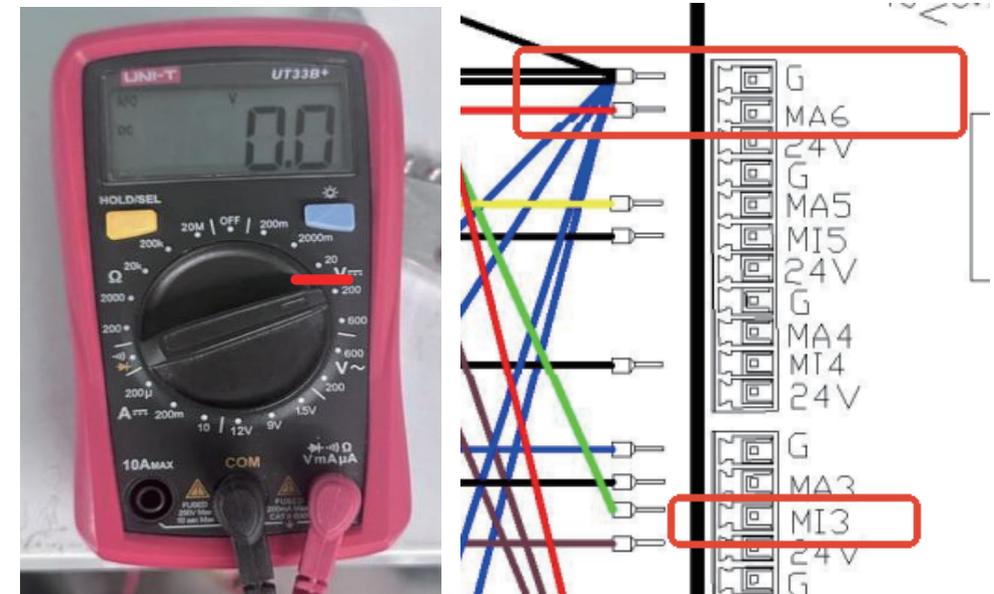
### IV. Tool sensor inspection

Tool Sensor	
Parameters	-21 2
MA6	MA6 (DC5~24V)
24-	Tool setting signal output
MI3	Travel signal input
24-	Travel signal input

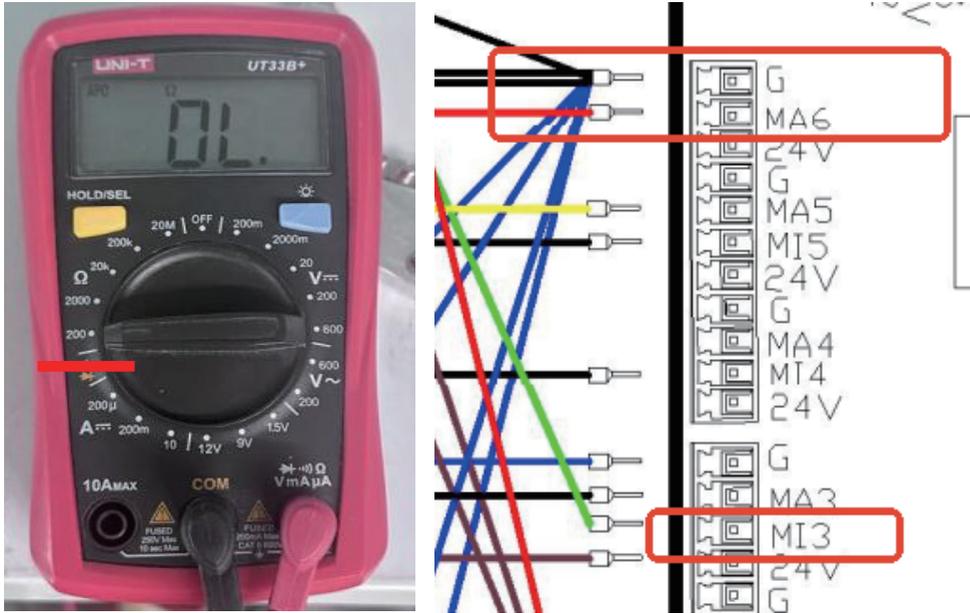
Multimeter DC 200V Model, measure MI3&24-, MA6&24-

MI3 normally measures 0 volts, and 24 volts when pressed down.

MA6 normally measures 0 volts, and 24 volts when pressed down.



Use the continuity setting on the multimeter to test MI3&24-, MA6&24-.  
Normally, there will be a beeping sound, and pressing will cause a short circuit.



## V.Replacing tool sensor

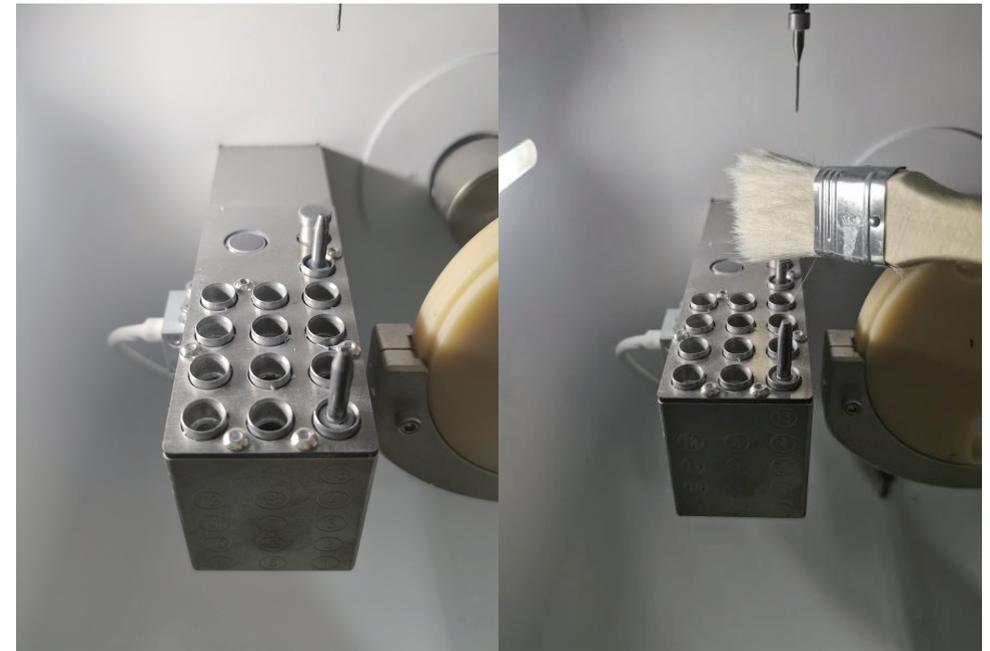
### Replace tool sensor

Tools: Allen wrench (accessory box), Brush.

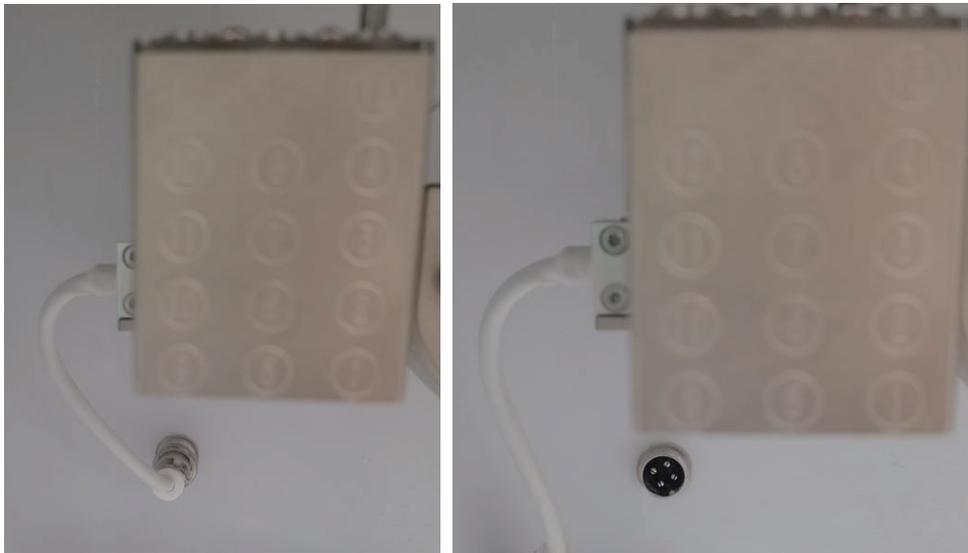
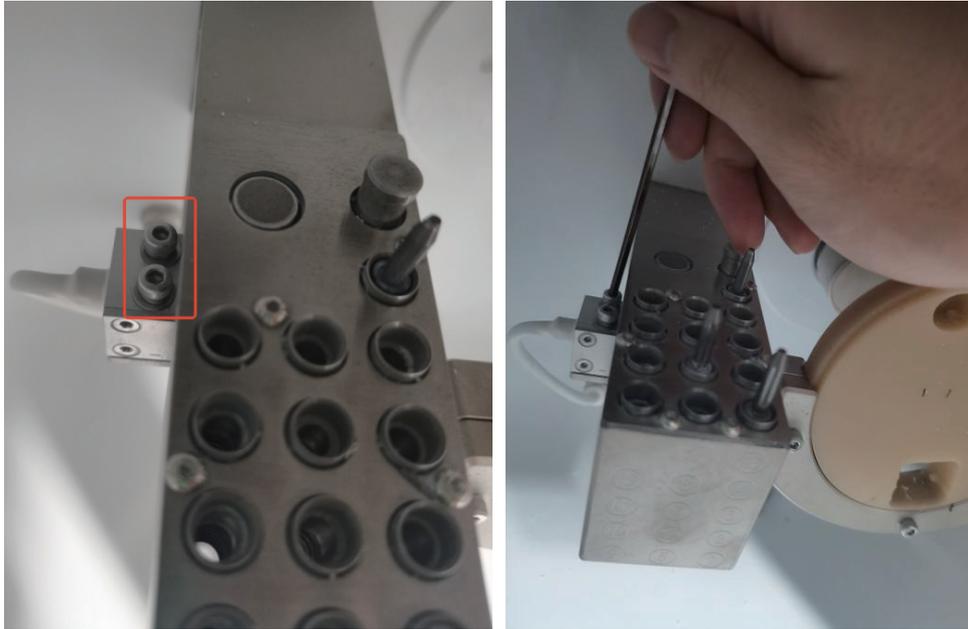
#### Operation:

Click 'homing', after that turn off machine, and take out power cable.

Find the tool sensor, clean the dust on the installation screws of the tool setting instrument, and prevent the screw holes from becoming blocked.



Use the corresponding L-shaped hex wrench to remove the two mounting screws (counterclockwise) while unscrewing the quick connector of the tool sensor.



Take out old tool sensor, replace it.  
 After install new tool sensor, connect machine power cable, turn on machine, do calibration.

## VI. Clean the tool sensor

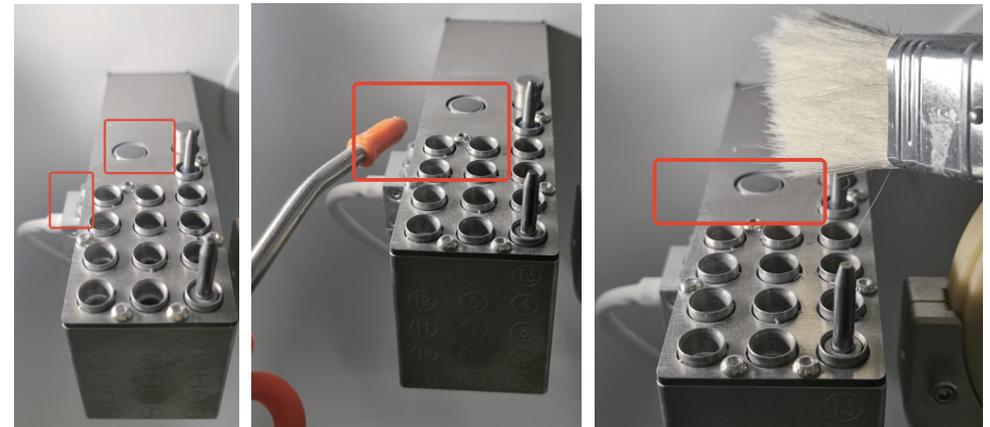
Tools: Brush, Compression air gun



Operation:

Turn off machine, take out power cable.

Use compression air gun to clean the accumulated powder around the tool sensor, then use a brush to remove the surface dust, and finally press quickly 15 times

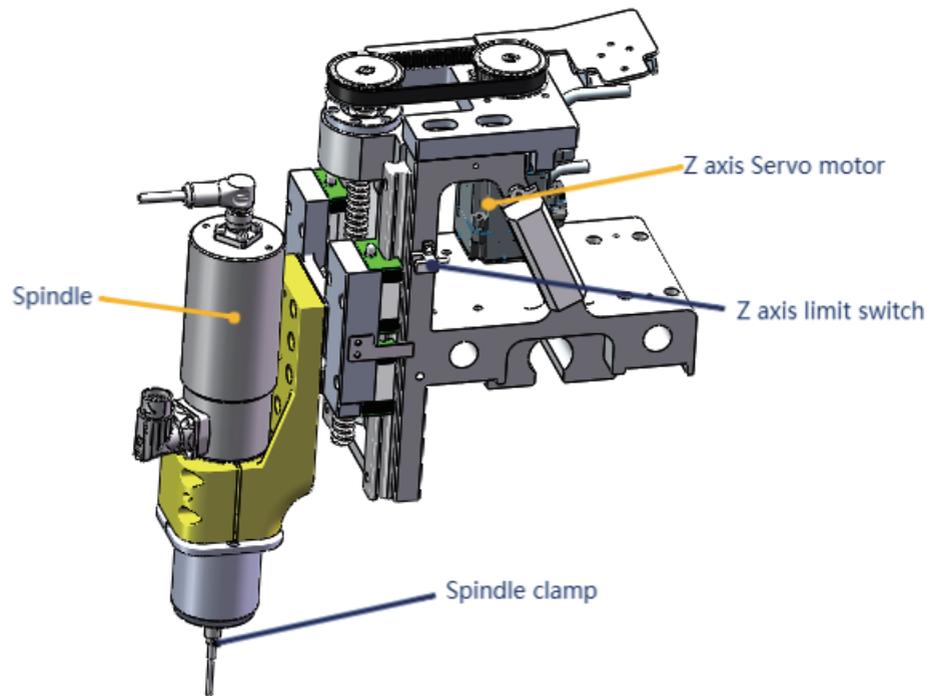


## VII. Clamping issue

After completely power off and reboot machine, the spindle will auto return to zero and clamp ( Note whether have voice about clamping).

No voice mean that have electrical clamping motor not have voltage. (Have voice but can not remove, Relay issue or physical issue)

Then need to check clamping signal cable and motor voltage, relay signal output, control board signal.



### Troubleshooting Procedure:

Use a Phillips screwdriver to disassemble the side panels, back panel, and top maintenance panel of the machine.

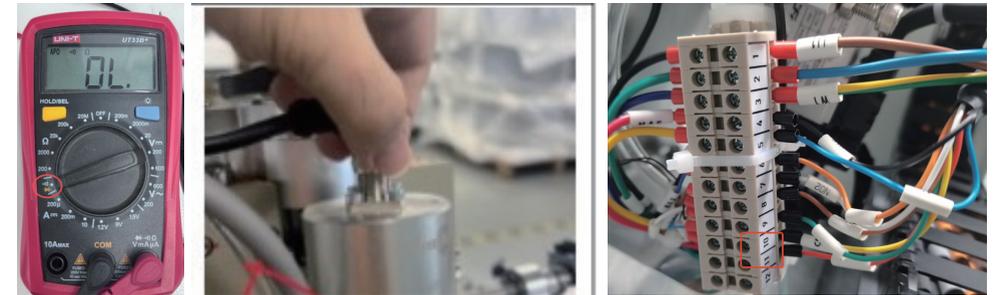
After dismantling we can see the whole electrical system.

Check the Clamping motor voltage whether normal:

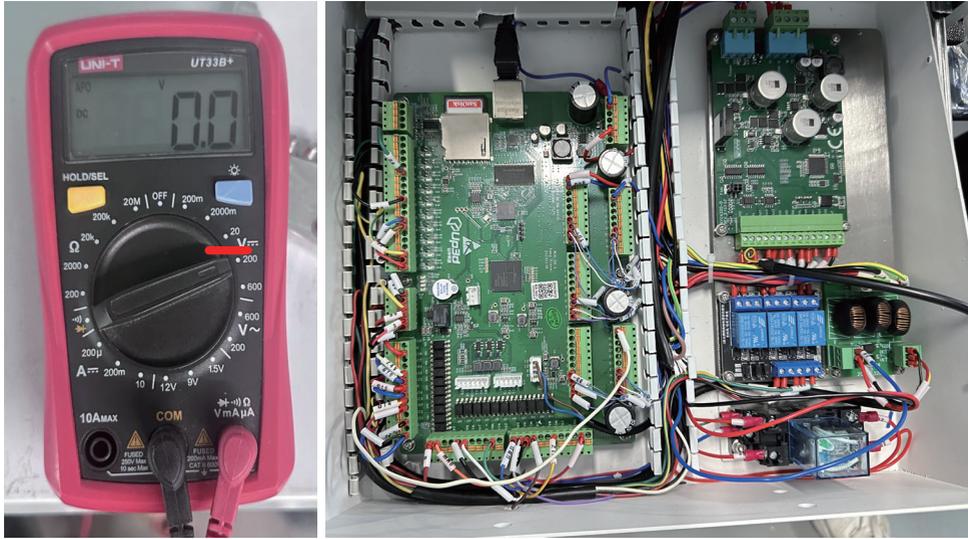


### Clamping cable checking:

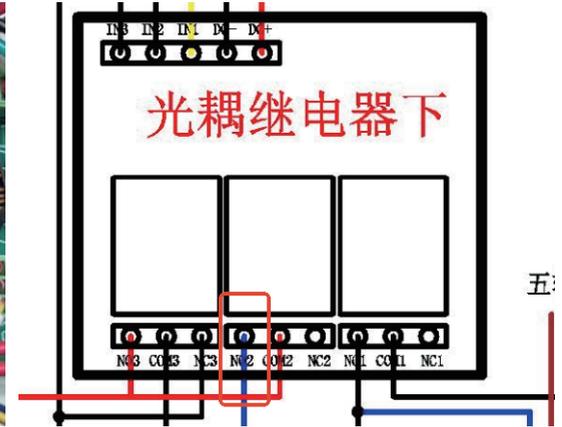
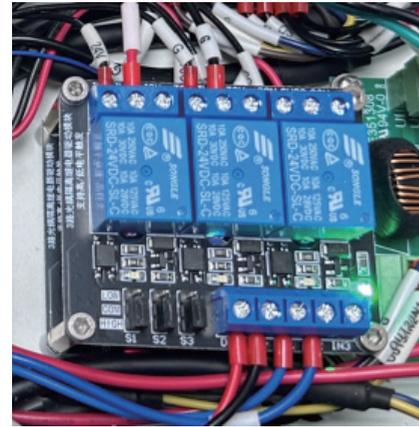
Check cable continue and stable connection. Use multimeter Beep function First check motor power cable to the middle cable ports.



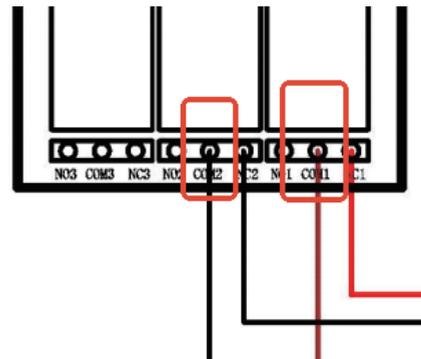
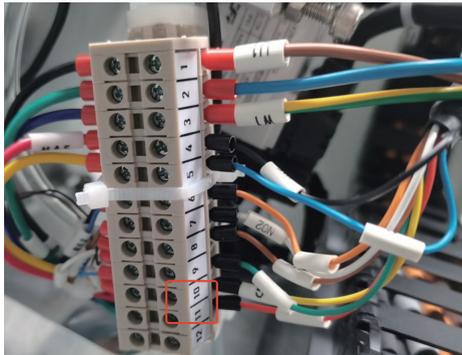
Relay or control card signal issue:  
Use multimeter DC voltage function:



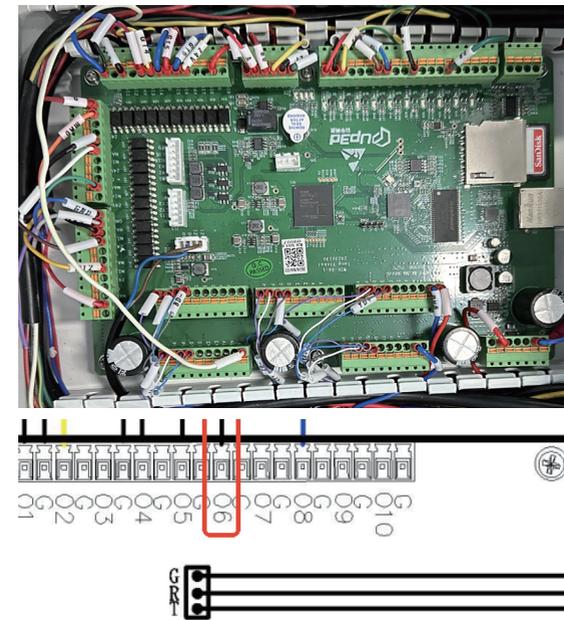
Find drawer Optocoupler relay: Check whether the voltage from relay NO2 to GND is 24V DC voltage. The 24V voltage is normal.



Second check middle cable ports to relays ports.



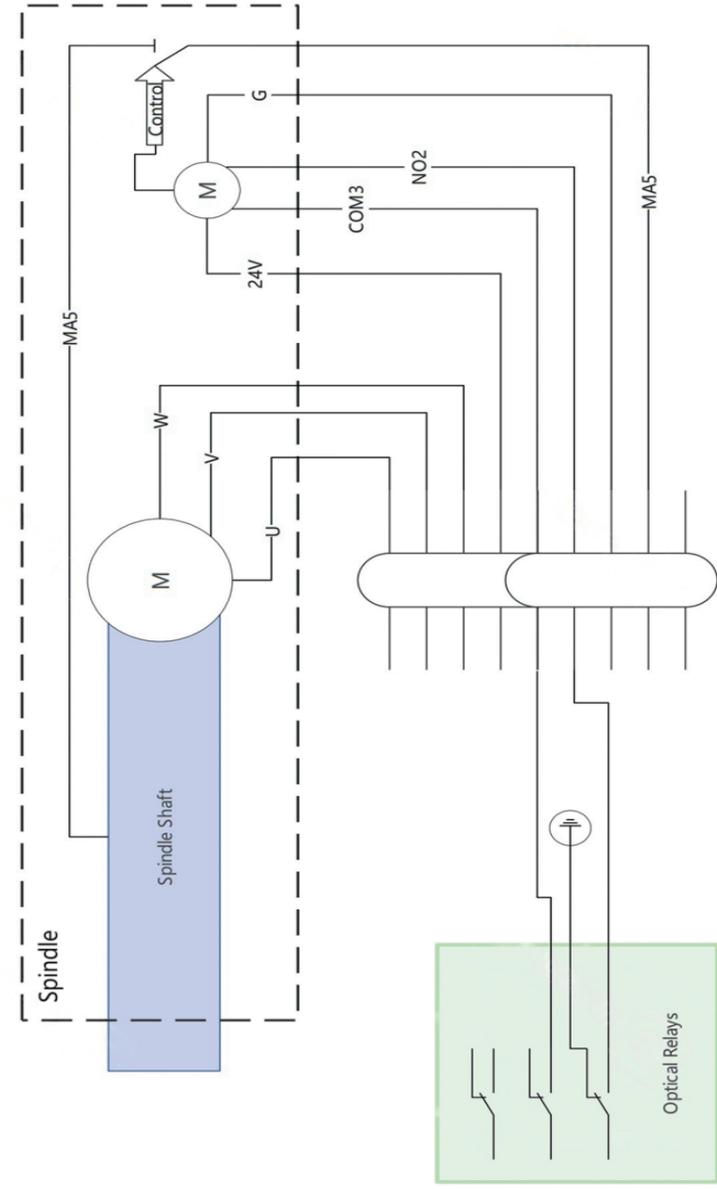
Find drawer control board: The control card need to check for NO6, and same methods with NO2.

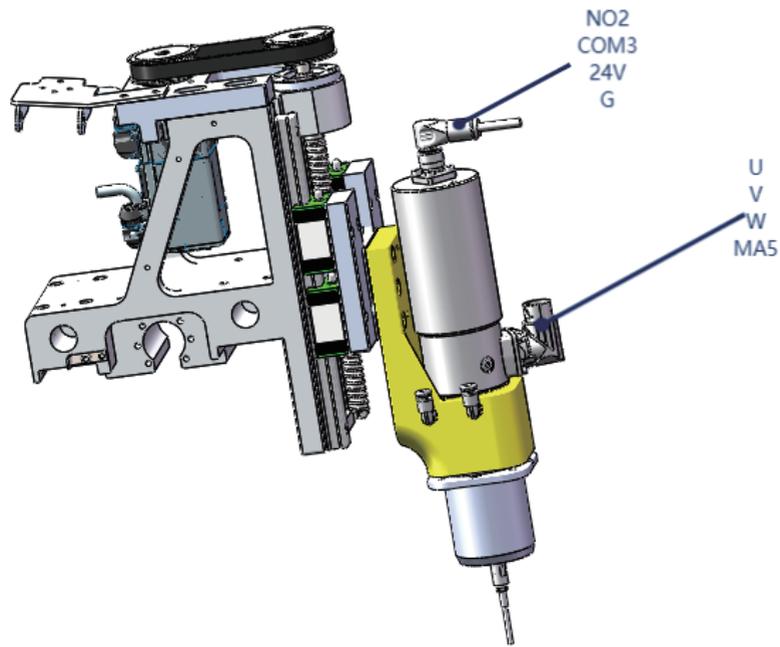


# 06

## Spindle Issue

### I. Analysis of spindle system





From above diagram, we can see that there's 8 wires inside spindle cable, and there's two motors in one spindle. The bigger one powered by U, V, and W is a 3 phases AC motor which controls the rotation of spindle. And a smaller one in addition which powered by 24V and G is a Functional Motor, this motor is used to select different function such as closing or loosing spindle collet.

Additionally, there's a MA5 to provide the signal of calibration. When the spindle is on the Probe mode, the functional motor will control the switch close, so that the shaft inside and MA5 will be conductive, and when spindle touches the ground, the voltage will reduce to 0V.[ Please refer to the electrical potential theory.]

## How to check

In the above diagram and analysis, we can see all the spindle functions is controlled by different wires and their signals. So that we can use a multimeter to measure the voltage of those wires to make sure the function is ON or OFF.

Wires	ON Voltage	Off Voltage	Functions controlled	Start Place
NO2	24V	0	Loosing Collet	Optical Relays
COM3	24V	0	Close MA5	Optical Relays

Please refer to the electrical potential theory.

			Close MA5 Switch	
24V Spindle	24V	Always ON	Power	Control Board
G Spindle	0	0	Power Negative	Control Board/G
U	/	0	Rotation	Choke Card
V	/	0	Rotation	Choke Card
W	/	0	Rotation	Choke Card
MA5	24V	Always ON	Probe Signal	Control Board

## II. Spindle replacement

### Tools:

Allen wrench (accessory box), Phillips screwdriver, lint-free cloth/clean cloth, alcohol/WD40 cleaning fluid

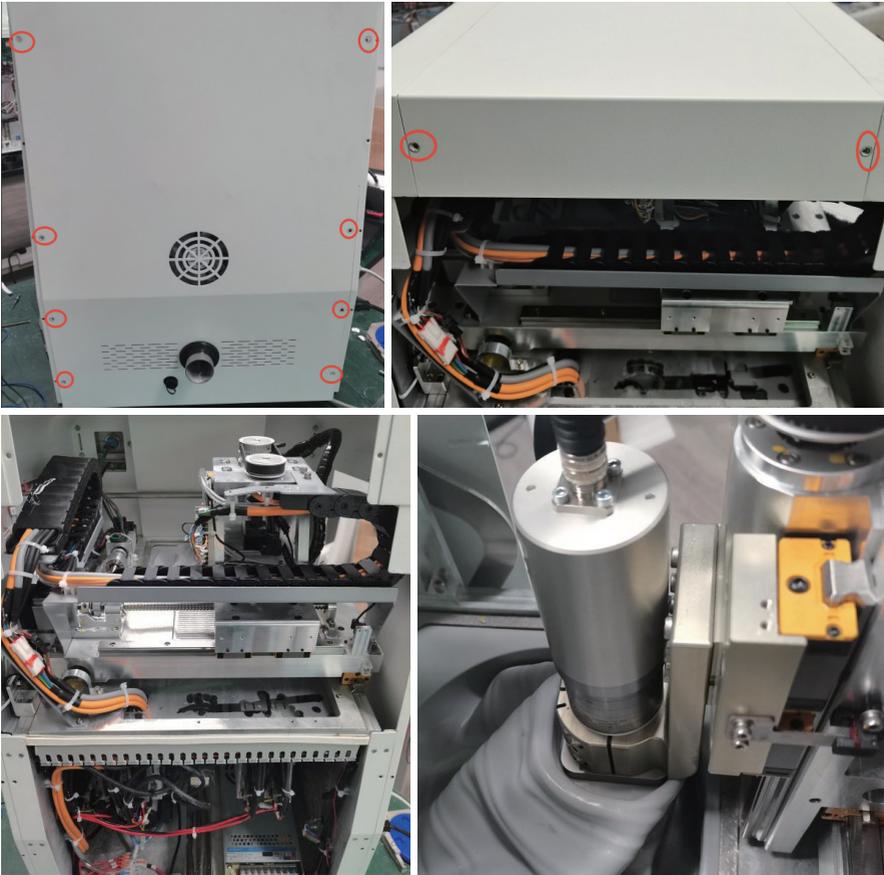
### Parts to be removed:

Back side panel of the processing machine, top maintenance panel.

### Operating steps:

Turn off machine, take out power cable, Remove the back side panel of the processing machine.

Remove top maintenance panel



Remove the spindle clamp screws. Disconnect the clamping motor cable on spindle, tube on the spindle and power cables from the spindle, and then remove the spindle.



Clean the spindle installation location, install the new spindle, connect the wiring, connect the air pipe, and tighten the clamp screws (tightening force 3 N.m).

Do calibration.

Cut the wax for testing.

### III. Spindle calibration problem check

**Purpose:**

Troubleshooting steps for abnormal spindle movement during calibration

**Tools:**

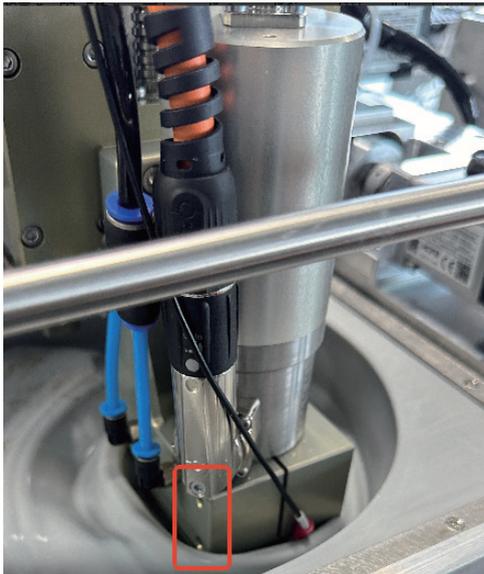
A set of L-shaped hex wrenches, CNC software, multimeter

**Appearance:**

The spindle hovers above the tool post, remains stationary, and error is reported  
 Parameter error, need to adjust - During the spindle calibration process, when moving to the relative height of the tool post to the surface of the tool aligner, if it does not touch the surface of the tool post and there is no MA5 signal, it will only move 3mm in the negative direction of the Z-axis at most. If it still does not touch the surface of the tool post and there is no MA5 (conduction) signal, the spindle will stop still on the surface of the tool post without associated error reporting (with reference to the processing machine position parameters)

85.923439	Tool sensor surface	\$t0pzz1
86.633591	Tool holder surface	\$t0paz1

Spindle displacement, need to recover - readjust the spindle installation position and tighten the screws



The spindle hovers at the zero return position, remains stationary, and there is error report.

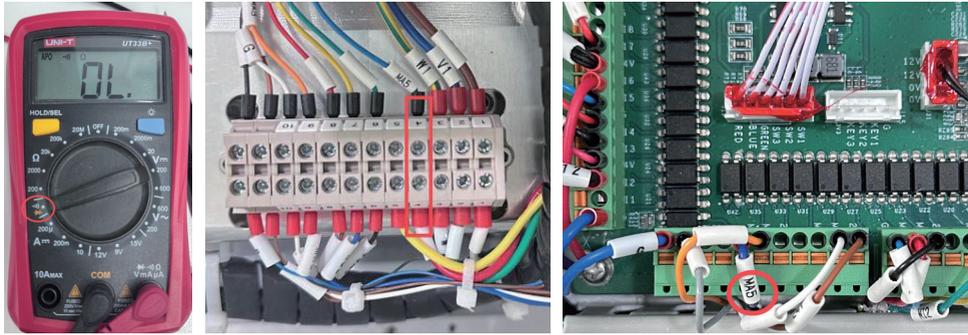
- (1) A short circuit in the spindle ground causes an abnormality in the MA5 signal, resulting in the machine receiving the MA5 (conducting) signal during the downward probing process at the zero return switch position.
- (2) Use a multimeter to check the spindle-related circuits and the ground conduction status, then check whether there is a conductor at the clamp contact position causing the spindle to be connected to the clamp. If the spindle itself is short-circuited, the spindle needs to be replaced.
- (3) Set the multimeter to the conduction mode, and measure whether the spindle U, V, W, and MA5 are conducting to the ground respectively.
- (4) Set the multimeter to the conduction mode, and measure whether the spindle is conducting to the ground under normal conditions.



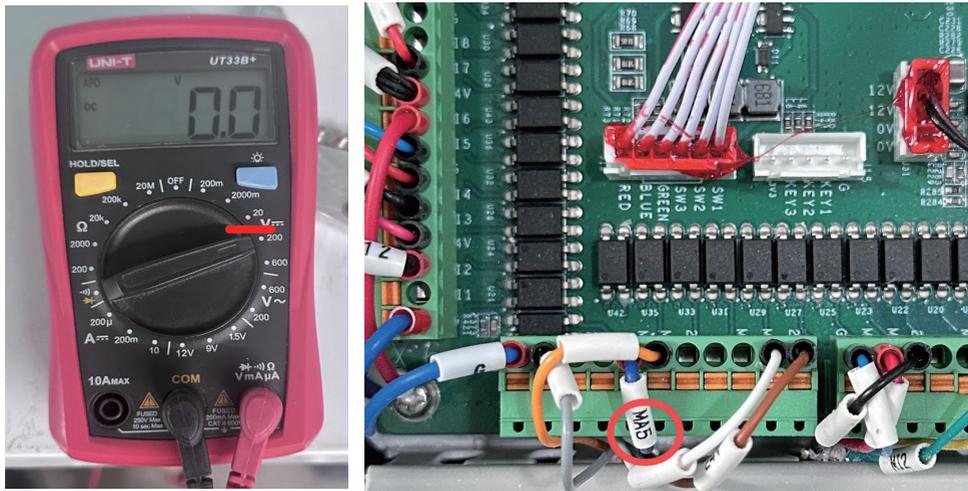
U,V,W

The spindle collides with the surface of the tool post, and automatic calibration is abnormal. During the spindle calibration process, when moving to the height of the tool post relative to the tool aligner surface, if the MA5 (yellow-green wire) signal is received, it will continue to move 3mm in the negative direction of the Z-axis. If there is still no MA5 signal at this time, it will collide with the surface of the tool post.

The spindle is not conducting - set the multimeter to the buzzer mode, Check continue from the spindle MA5 to the middle cable port, and check the continue from middle MA5 to control board MA5.



No signal output from the MA5 port of the control card - Power on the equipment, set the multimeter to DC voltage mode, connect one end to the MA5 pin of the control card and the other end to any G pin, and check the signal output of the control card (around 24V). If the signal output of the control card is abnormal, replace the control card.



## IV. Spindle rotation issue

### Appearance:

During milling spindle working, and give to spindle rotate issue which is divided into two cases:

- A. After starting milling process, the spindle not rotate and CNC3 show with :Spindle error(not spinning) code: 213
- B. After starting milling process, the spindle rotate not stop and CNC3 show with :Spindle error(non-stop) code: 214

### Tools needed:

A set of hexagon socket wrenches, a Phillips screwdriver, a multimeter.

### 213-Spindle no rotating

Abnormal spindle wire connection

The UVW should conduct each other at each terminal position and should beep when measured with a multimeter (beeping mode). Note: Power off machine completely.

Use a Phillips screwdriver to disassemble the side panels, back panel, drawer and top maintenance panel of the machine.

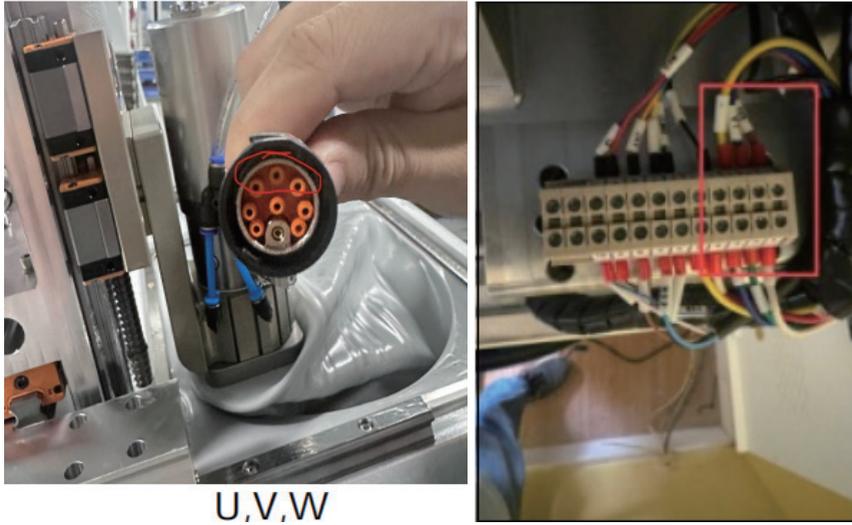
After dismantling we can see the whole electrical system.

Check the spindle wire whether stable connection then check cable continue by multi-meter beeping mode:

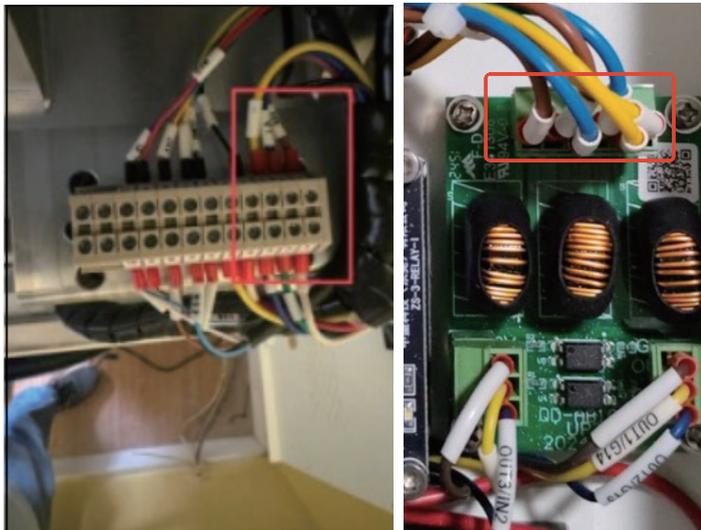
Loose the spindle side power cable



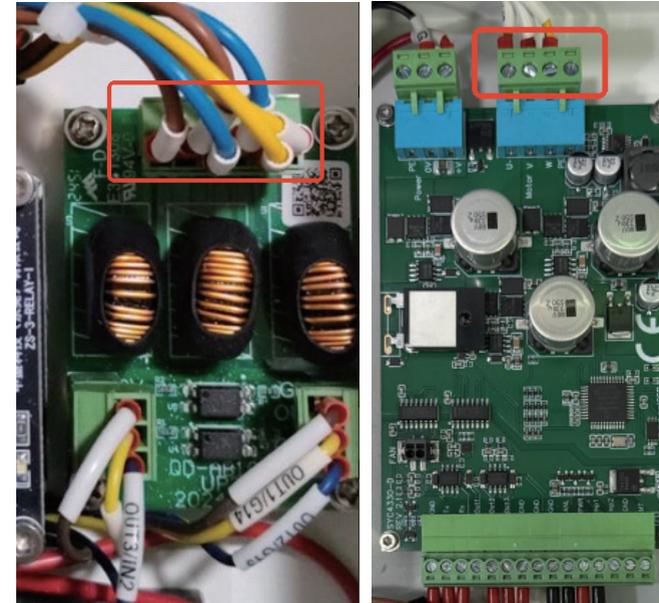
No signal output from the MA5 port of the control card - Power on the equipment, set the multimeter to DC voltage mode, connect one end to the MA5 pin of the control card and the other end to any G pin, and check the signal output of the control card (around 24V). If the signal output of the control card is abnormal, replace the control card.



Check continue with UVW from terminal part to the choke card



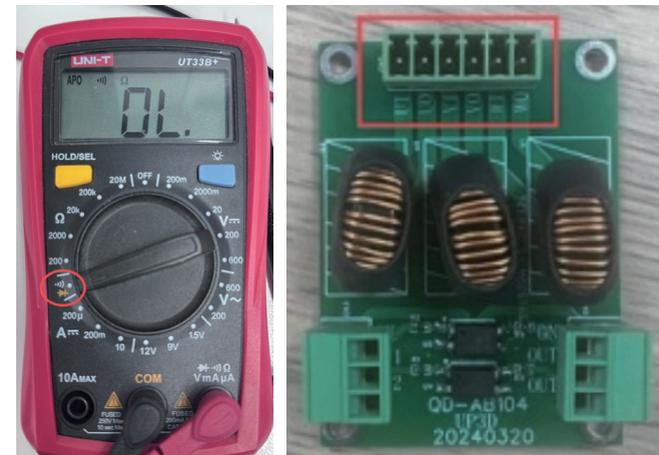
Check continue with UIVIWI from choke card to spindle board UVW



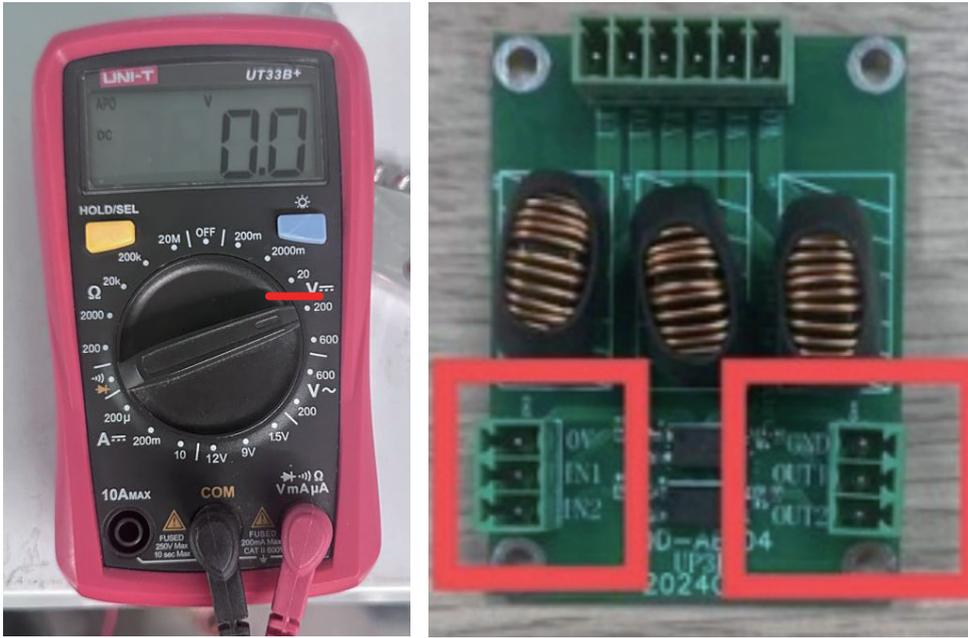
Board abnormal (Choke card)

U,V,W not connect to U1,V1,U2 on choke card.

Open the drawer to find choke card and check by multimeter beeping mode: Measure from U and U1 , V and V1 , W and W1 should with beeping sound.



Choke card failed to receive zero-to speed signal or fails to output signal.  
Check with multimeter DC voltage mode:



The left side of the zero to speed signal position, multimeter DC 200V voltage mode, negative pole connected to G, positive pole connected to IN1 or IN2. spindle did not begin to rotate when IN1 or IN2. 24V voltage, spindle rotation IN1 or IN2. 24V IN1 should be 0V when IN2 should be 0V, IN2 should be 0V when IN1 should be 0V, each other opposites.

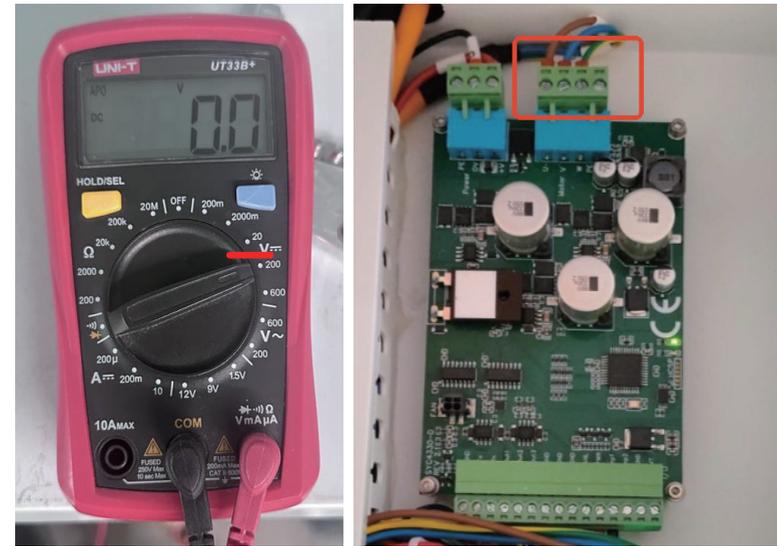
The right side is the position of the output zero to speed signal, and the measurement method is the same on the left side

**Board abnormal ( Spindle Driver Board)**

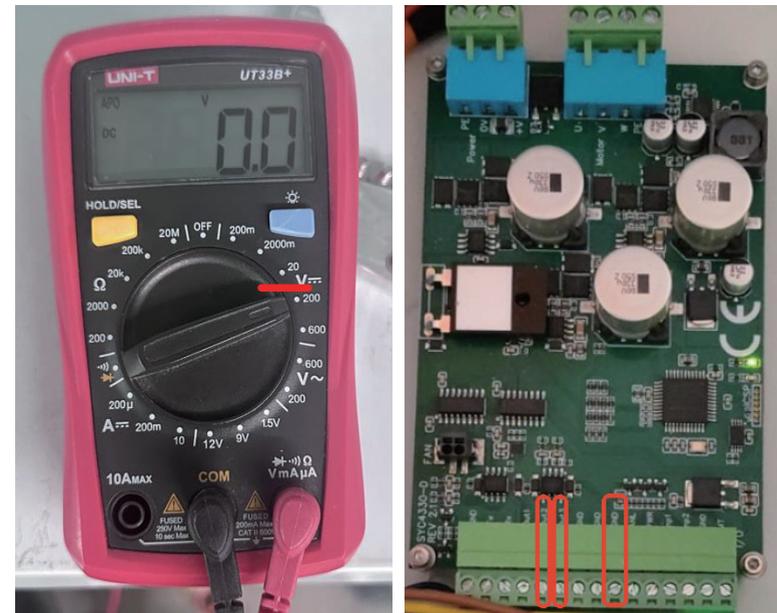
Spindle card UVW has no power output

Use multimeter DC voltage 200V mode:

Measure U V W wires voltage, there should have voltage output.



Spindle card zero to speed signal no output signal  
Use multimeter DC voltage 200V mode:





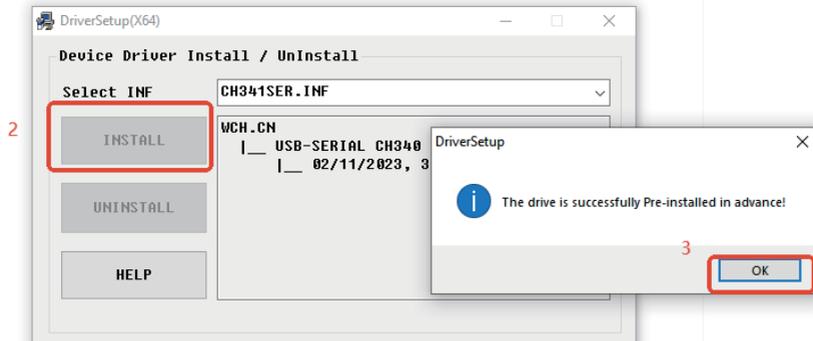
# V. Spindle driver firmware flashing

After all checking after the cable and voltage, but the spindle still not working, and the MA5 command is not change the voltage signal change to let spindle rotate, under this situation we need to update the spindle card firmware. Ready for flashing cable connect to spindle control card and pc/laptop.

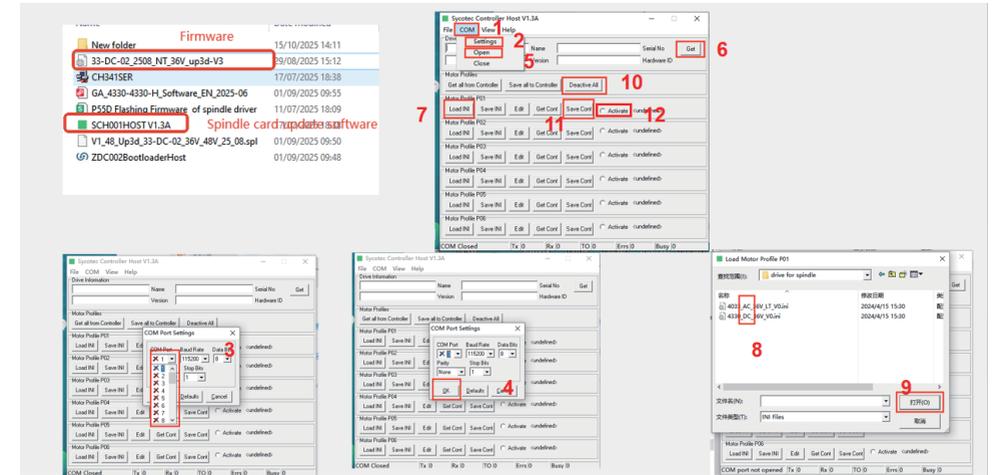


Install the drive so ready for the pc/laptop detect to the correct com port from spindle control port.

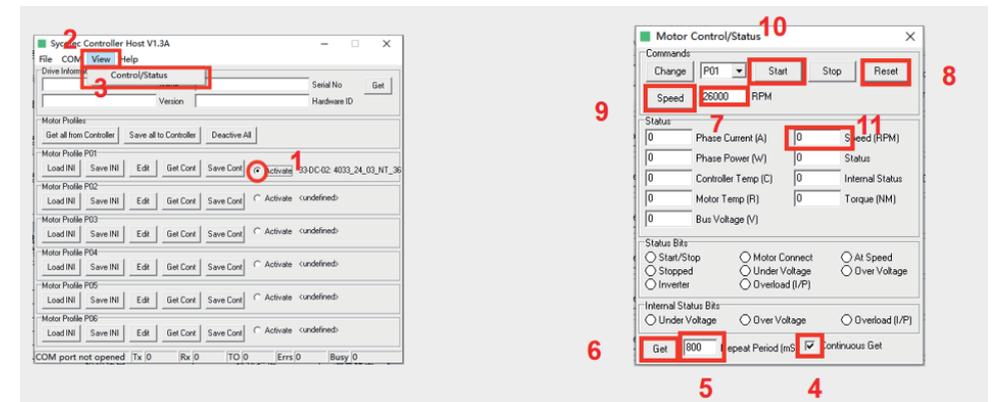
4330_UC_36V_V1	1/10/2025 18:56	Configuration sett...	2 KB
<b>CH341SER</b>	17/07/2025 18:38	Application	643 KB
GA_4330-4330-H_Software_EN_2025-06	01/09/2025 09:55	WPS PDF 文档	787 KB
P55D Flashing Firmware of spindle driver	11/07/2025 18:09	XLSX 工作表	2,381 KB
SCH001HOST V1.3A	17/07/2025 18:38	Application	1,267 KB
V1_48_Up3d_33-DC-02_36V_48V_25_08.spl	01/09/2025 09:50	SPL File	80 KB
ZDC002BootloaderHost	01/09/2025 09:48	Application	1,266 KB



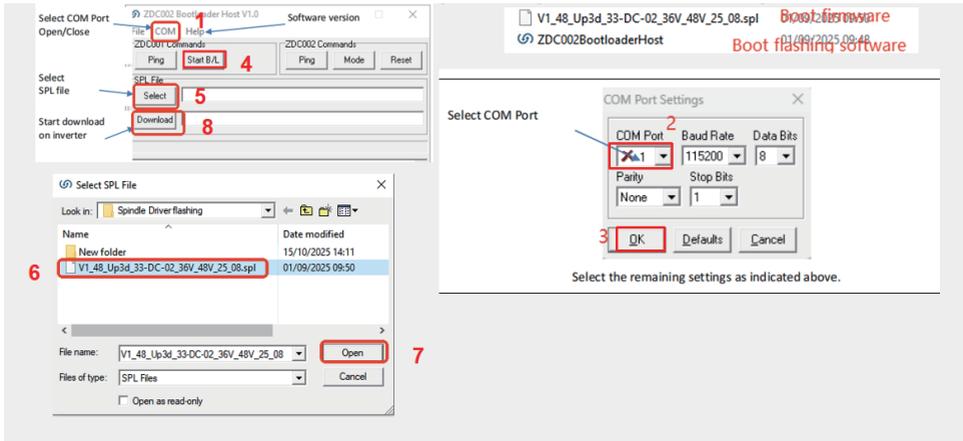
## Sycotec spindle V3 firmware update



Spindle card firmware checking and test. (After last ppt the last process 12, that is this checking's save and test process 1 beginning.)

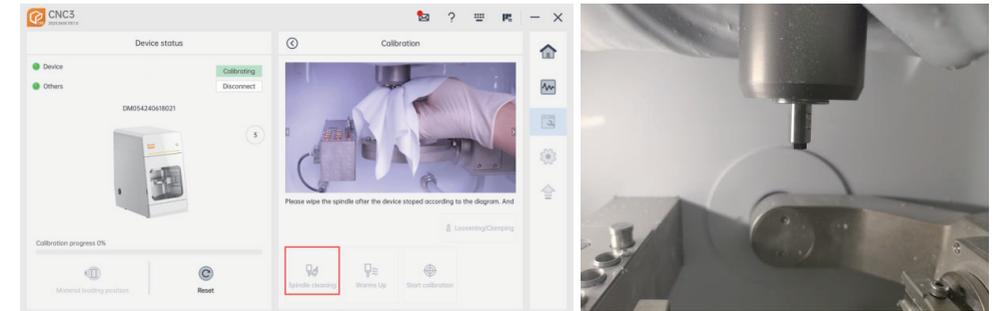


Spindle control card boot flashing. (After last ppt the last process 11, if the spindle still not rotating, we need to reflashing the card boot firmware and update the spindle card firmware again.)

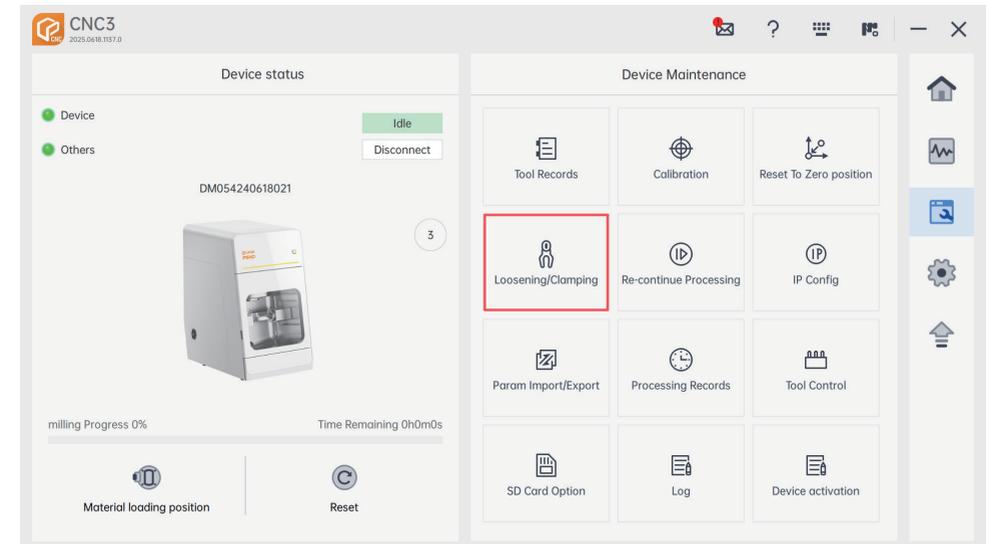


## VI. Spindle clamp clean

Open "UPCNC3" software and click "Calibration" button, you can see a small video, click 'Spindle cleaning', you can see the spindle will move to this position like this picture.

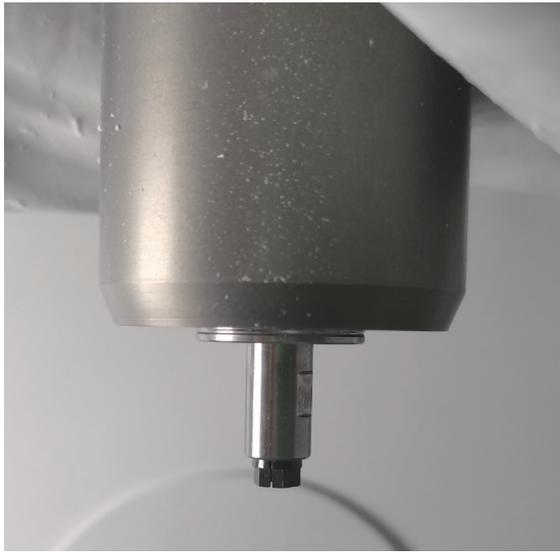


Close the calibration window and click "Open/Close cutter" button, then insert the spindle chunk with the equipped "spindle chunk driver" and turn clockwise until the spindle chunk is completely removed.

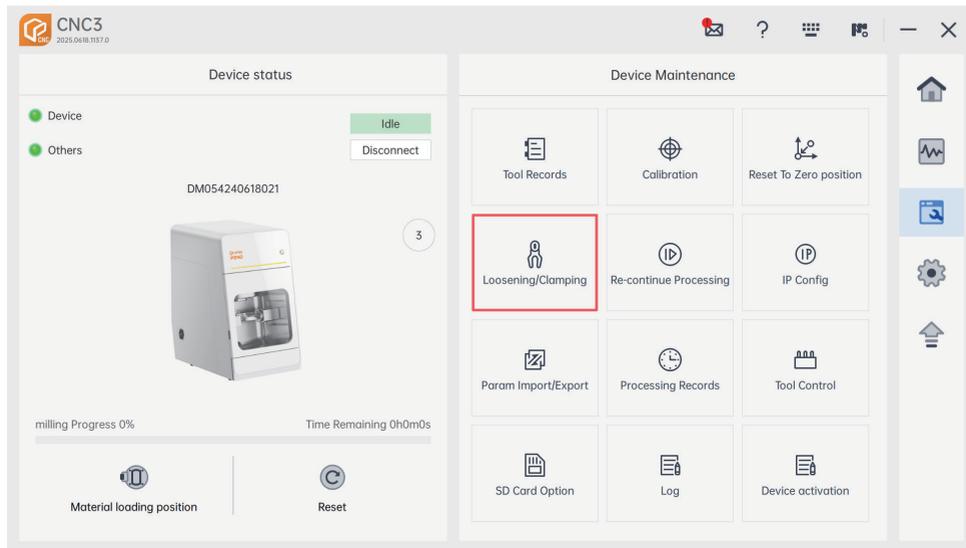




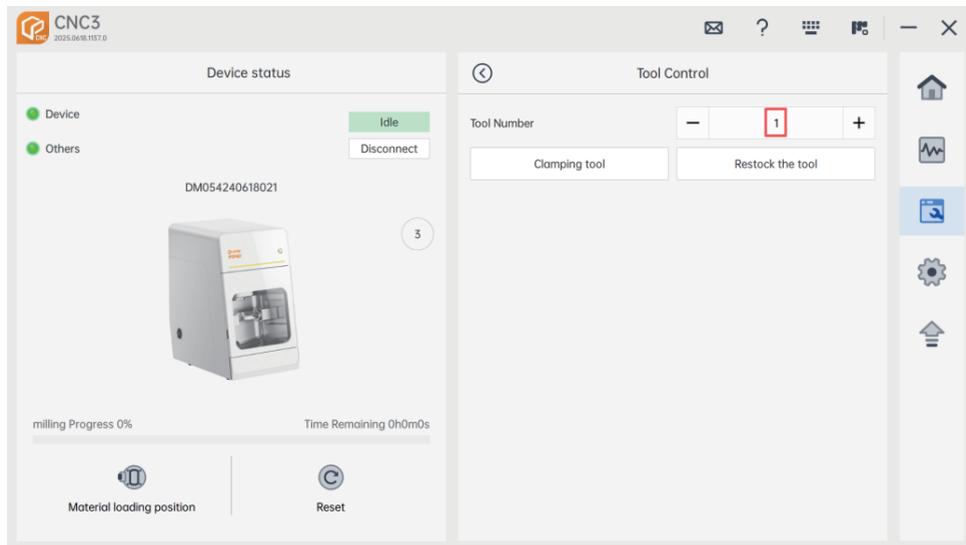
After cleaning the spindle chuck and mounting hole (ensure no dust and moisture residue), use the spindle chuck driver to install the spindle chuck in the original position and Click 'Loosen/Clamping' (Turn the driver counterclockwise during installation, do not use dead force to lock, the locking force does not exceed 1.5N).



Carefully wipe the inner and outer walls of the spindle chuck and the inner holes of the spindle with a dust-free cloth (alcohol can be sprayed on the dust-free cloth to clean the collect quickly and cleanly)



Test whether the spindle chunk holds the bur firmly. Take a bur by UPCNC3 software and hand to pull down the bur, check if the bur does not work or easy to fall.



## 07

## Common Code of Debugging

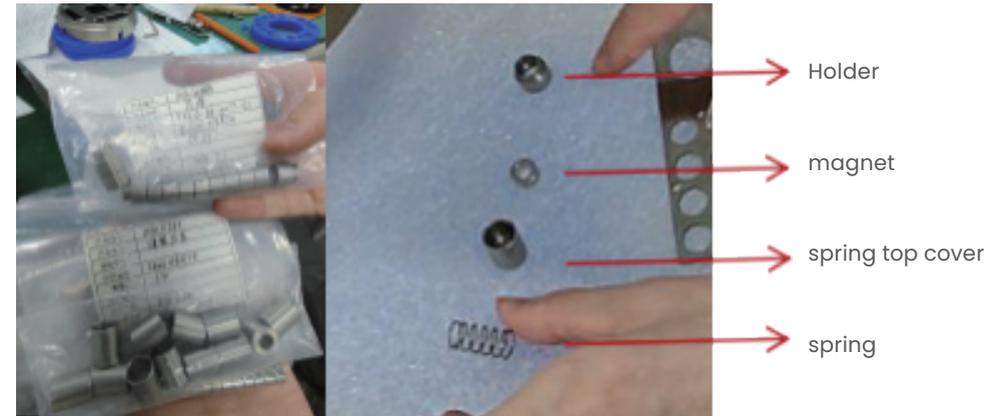
G38.1	Tool aligner command. Example: G38.1 Z-20 F10 (used to judge tool aligner problems)
G38.2	Tool holder command. Example: G38.2 Z-30 F20 (used to judge whether the spindle is conducting)
M03	Spindle forward rotation (speed command should be used together when starting rotation). Example: S20000 M03
M05	Spindle stop (stop rotation) M06 Tool clamping
M07	Cooling air on
M7.1	Open spindle chuck
M7.2	Close spindle chuck
M08	dust collector start-old machine
M8.4	dust collector start
M09	Cooling air off
M30	All outputs off
S	Spindle speed (the rotation speed of the spindle)
F	Axis feed rate (the moving speed of the axis)
DN	Door limit. 0 means closed, 1 means open
M100	Material taking command. Example: M100 P2 Q3 (take material tray 2 to position 3);
M101	Material returning command. Example: M101 (return material tray \$arpad to original position)

## 08

# Replacement of P55D Tool holder

## Material preparation:

tool holder, magnet, spring top cover, spring(the same with the original), hexagon socket wrench



## Replacement operation:

Use an Allen wrench to remove the tool holder top cover (6 screws in total) and take out the original tool holder.

- a. When removing, be careful to hold the top cover to prevent the full elastic force from acting on a small number of screws and damaging the threads.
- b. When loosening the screws, use a wrench to apply downward force and turn slowly to avoid stripping the threads of the screws.

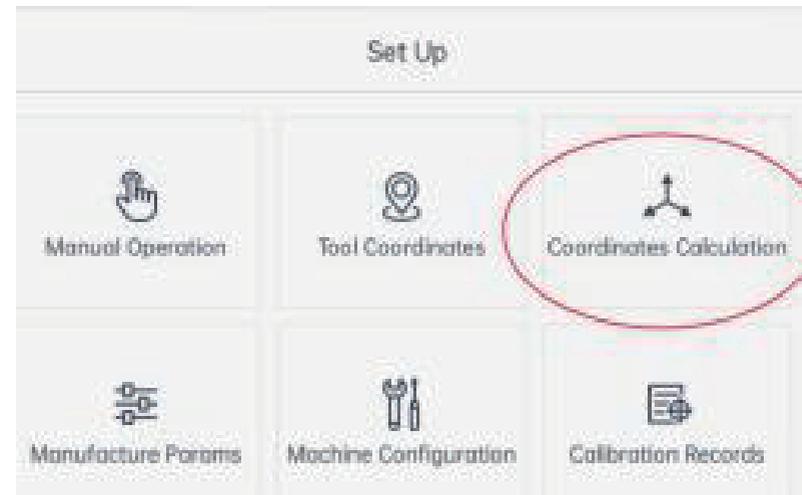
Stack them in order from top to bottom as shown in the above figure and put them into the tool library.



Install the cover plate.  
 Place the cover plate in alignment, hold it down and start installing the screws.  
 First, install the diagonal screws, turn them a little bit at a time for several times until they are tightened, and then install the remaining screws.



Perform calibration on the CNC



# 09

## P55D Tools Position Auto-calibrate

UPCNC3\_2025.0219.1127.0 has added a new function of coordinate calculation, which can automatically calibrate the position of the tool magazine and solve the problem of malfunction caused by position deviation during tool change, the following is the operation guideline of this function:

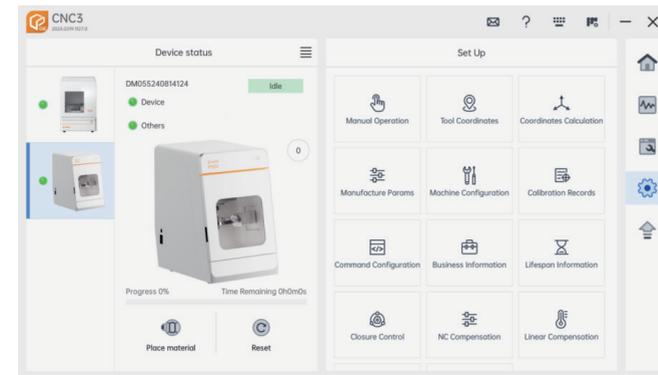
**Preparation:**

- 1, the software will be updated to UPCNC3\_2025.0219.1127.0 above version
- 2, machine firmware update to P55D (X6) O\_V0731\_H0000\_202502191513\_master version above
- 3, remove all tools in the machine (calibration bar should also be removed)

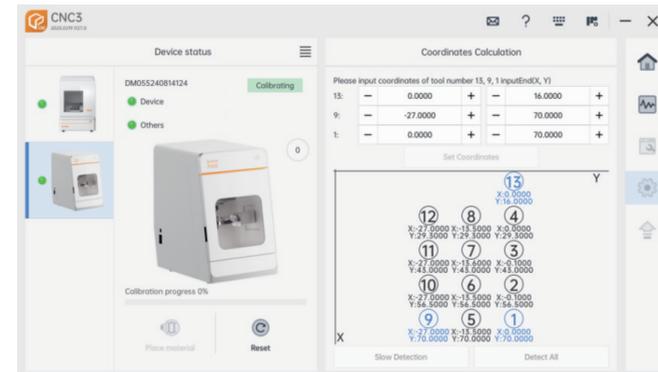
**Operation:**

Open the CNC3 software and perform the tool calibration operation:

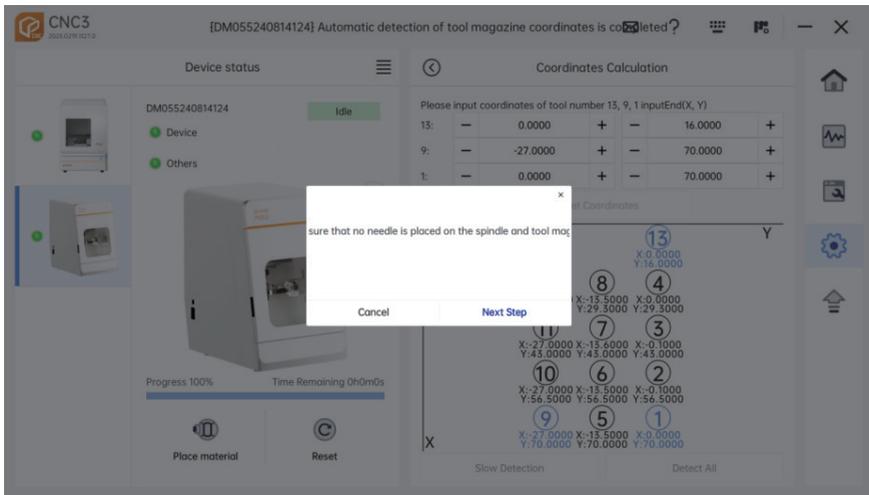
- 1, Enter the password, Enter device settings, click on the coordinate calculation to enter the tool position calibration interface.



- 2, Click on Slow Detection.



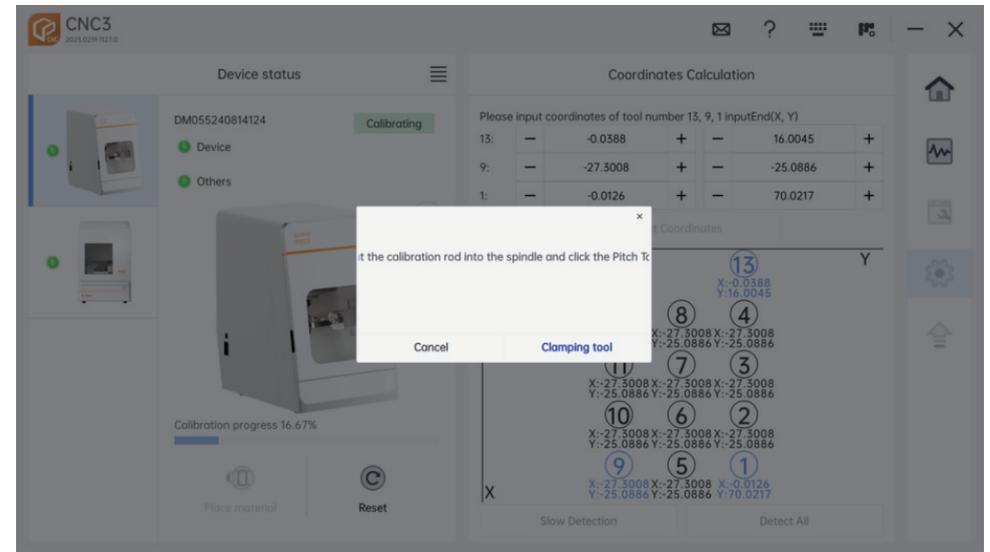
3, Make sure to remove all the knives in the machine (the calibration rods should also be removed), and then click Next.



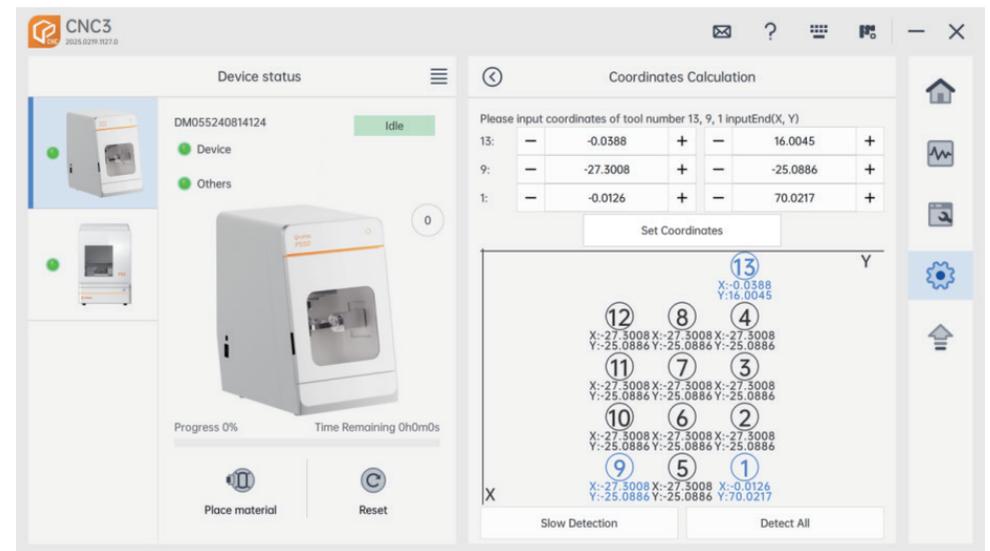
4, Put the calibration rod into the spindle chuck.



5, Click on Clamping tool.



6, Wait for the probe to finish, Click to set coordinates.

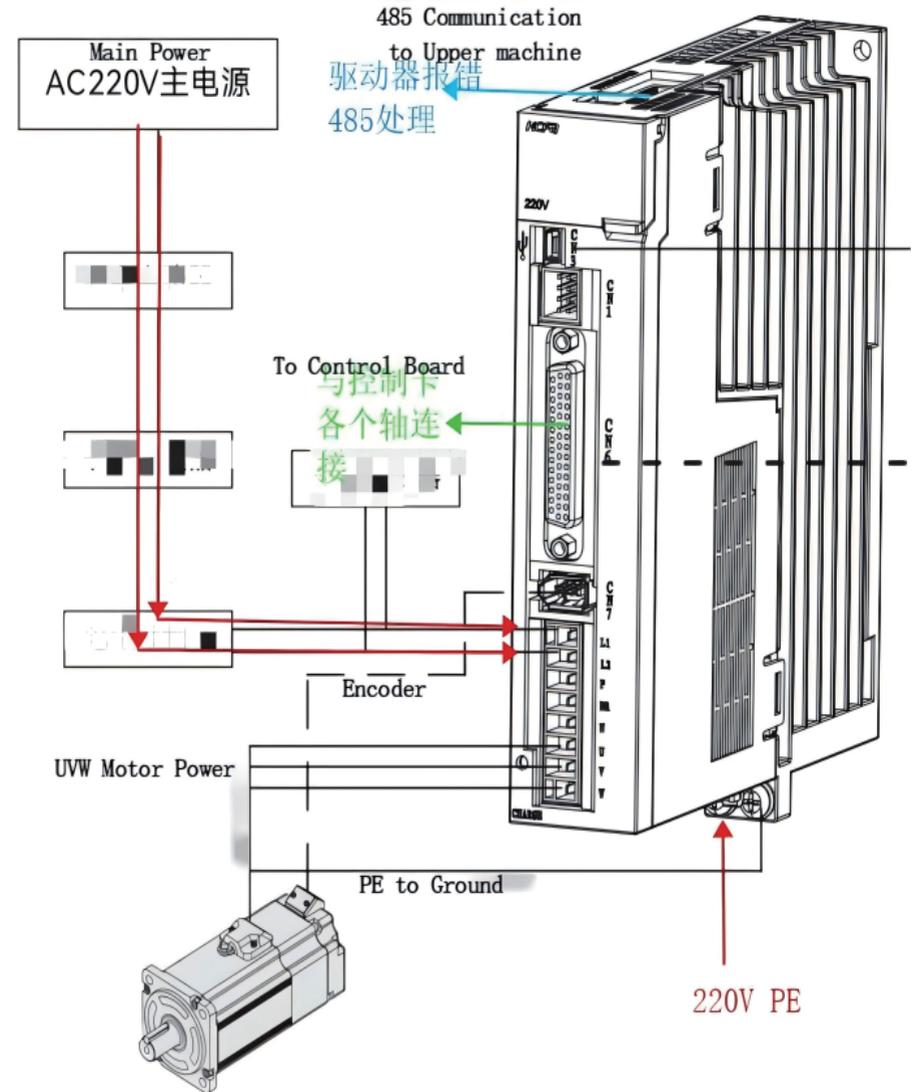


7, Enter the Tools Control function to test the tool change.

# 10

## Servo Motors system

### I. AC Servo system



Each servo motor has one and only corresponding servo driver. And their relationship is showed as above.

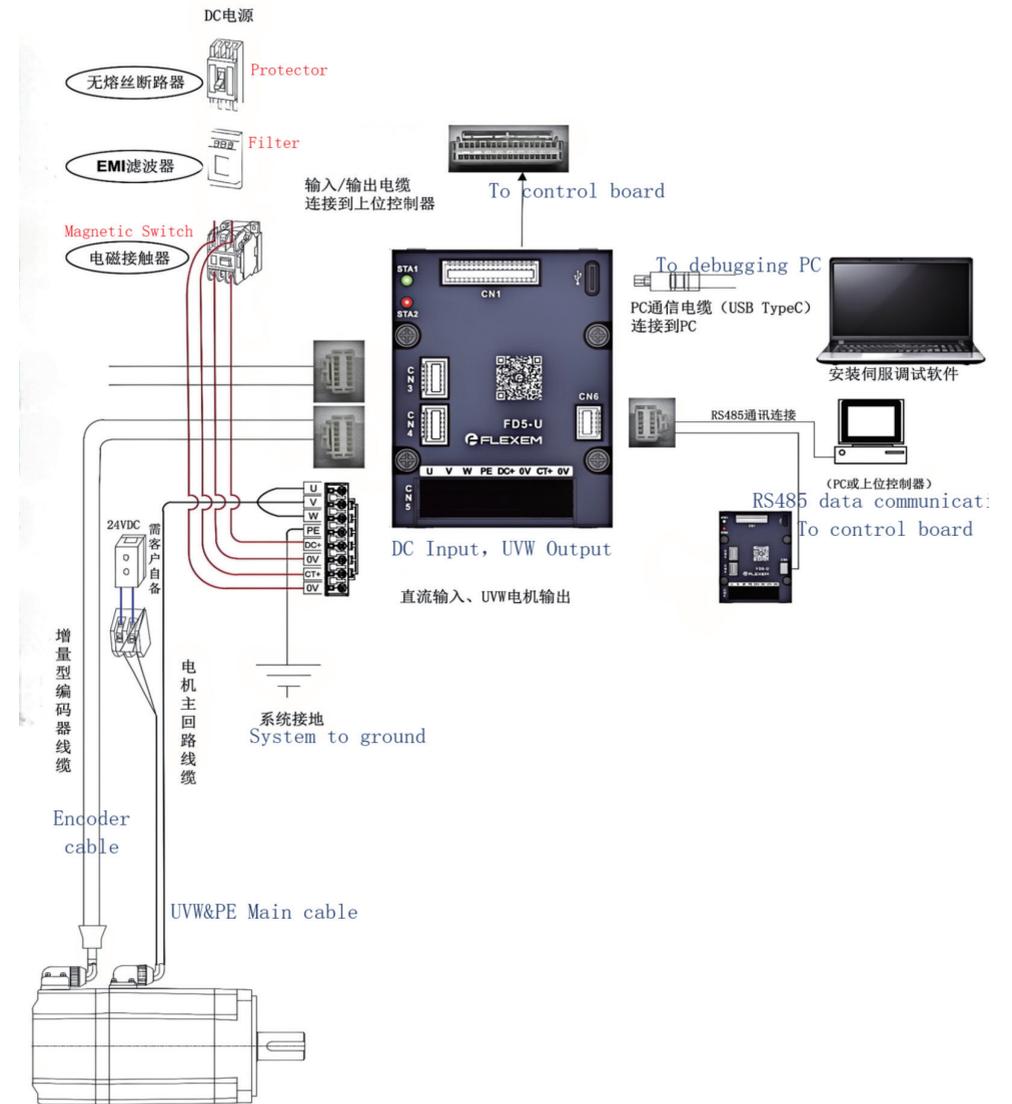
Each motor has 2 ports, one is UVW power, to driving port of servo driver. Another one on the bottom of motor is encoder port, to CN7 port of servo driver.

When moving, CN6 port of servo driver will receive digital signals like 0101... from control board, and output suitable voltage of 3 phases electricity to motor.

There is a LCD screen on each servo driver, we can read any error code and info from that screen, the frequently appeared error code and its indication is showing below:

Error Code	Error Description	General Solution	Note
Er.007	Encoder not detected	1.Check encoder cable 2.Replace motor	
Er.013/014	Encoder signal or data abnormal	Check the encoder cable or replace it	
Er.015	Encoder's power is low	Replace encoder's battery	
Er.008/045	UVW phases missed or short conducted	1.Check UVW cable connection and conductivity, check cable's and port's UVW phases' resistance to PE cable and ground, if not isolated, please replace cable or motor. Check if the PE cable from motor is grounded.	
Er.047/046	Servo motor or servo driver overloaded	Check the motor and transmission, make sure noting is blocking the movements of motor	Usually be stuck from part to part

## II. DC servo system



DC servo system means the power supply to servo driver is DC source, except the power supply to servo driver, other parts connection is exactly same with AC servo system. 2 ports to control board, another 2 ports to motor. Their connection is just like the way showed in above figure.

Error Code	Error Description	General Solution	Note
Er 2.1/2.4	UVW/PE short circuit	Check or replace the main cable and port	
Er2.8/2.9	Servo driver or motor overloaded	Check if there's block of the movements	
Er 4.0~Er 4.3	RS485 communication abnormal	Check the RS485 communication cable	
Er 5.3	Position deviation is too large	1.Check if mechanically blocked. 2.Check the NC file if the move command is too large. 3.Servo driver parameter abnormal	
Er 10.0 ~Er 10.6	Encoder Abnormal	1.Er 10.0 please check encoder cable 2.Er 10.6 please replace the encoder's battery 3.Other error please reinsert encoder cable and cut down the power for 5 min, and switch on again. If remains, please replace motor	
Er 1.0/1.1	Voltage too high or too low.	Check the power source's voltage.	

## Attach 1. Update History

Version code	Updates	Effected Date
V0.1	Origin Version	Dec. 1st, 2025
V0.2	Updated servo system, add DC servo system error debugging	
V0.3	1.Added Attachments. 2.Corrected some contents.	Dec. 15th, 2025
V1.0	Officially Published version	Jan. 1st, 2026
V1.1		May, 2026
V1.2		Oct, 2026

## Attachment 2. Error Code Identification Keys

Error Code	Error Info	Refer to Page	Note
9/10	Clamping/Loosing tool failed	30, 35	
12	Origin Version	Check Accompanying error	Usually occurred with other error
13	Unsupported CNC command	/	Check NC files
21	Tool broken	26, 27	
22	Tool is too long	30~35	
180	Limit_Hit_X_MIN	19	
181	Limit_Hit_Y_MIN		
182	Limit_Hit_Z_MIN		
183	Limit_Hit_A_MIN		
184	Limit_Hit_B_MIN		
213	Spindle can't start to spin	44	

214	Spindle can't stop	44	
233	X axis homing failed	14	
234	Y axis homing failed		
235	Z axis homing failed		
236	A axis homing failed		
237	B axis homing failed		
452~453	Tool sensor error	30~31	
Servo error	Servo driver's error reporting	55~58	