

YP Dental D510 Milling Machine

User Manual

Please read the user manual carefully before using it for the first time



2024-12

Zhengzhou Yp Dental Co., Ltd.

Preface

Dear user:

Thanks for choosing YP Dental's products. The company's products adopt modern design concepts, advanced manufacturing processes, high standard quality systems, and professional after-sales services, and strive to provide you with high-quality products and the best services.

This manual introduces the device parameters, installation and commissioning, operation, maintenance and troubleshooting. Please read the manual carefully before using the device to ensure that the user uses and maintains this device correctly.

YP Dental D510 is a dry and wet milling five-axis dental milling machine that can process various dental materials, such as Glass ceramic, Pre-mill abutment, Zirconia, PMMA, PEEK, and help laboratories or clinics complete the production of various restorations such as Crowns, Bridge, Veneer, Inlay, Abutment and more.

The company reserves the right to change the content of the manual without assuming any responsibility.

If you have any device related issues or parts ordering services, please call YP Dental after-sales service department. We warmly welcome your call and guarantee to provide you with service within 24 hours. To ensure efficient communication, please prepare the following information in advance:

device model:	device ID:
device use time:	Parts to order:
Description of after-sales issues:	

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Chapter 1 Device Introduction

1.1 D510 milling machine introduction

YP Dental D510 is a dry and wet milling five-axis simultaneous dental milling machine with a compact body and easy operation. It is equipped with a servo motor system to achieve high-precision and high-efficiency processing operations. D510 is equipped with a 45mm diameter spindle which uses an water-cooled device, 12 burs for milling various dental materials. Specific parameters are shown in the table below:

Device Name	YP Dental D510 Milling Machine
Device Size	630mm*540mm*700mm
Device Weight	120kg
Power Input	Single Phase AC 220V 50/60Hz 3kW
Air-pressure Input	Above 0.6Mpa
Spindle Speed	0~60000rpm
Spindle Power	1000W
Spindle Diameter	45mm
Spindle Cooling Method	Water Cooling
Five-Axis Control	Servo Motors
Processing Accuracy	Positioning accuracy: 0.01mm Repeated accuracy: 0.005mm
Rotation Axis Angle	A axis: -130°~+30°, B axis: 360°
Clamp	C-clamp, Block holder, Abutment holder
Tool Diameter	4mm
Number of Tools	12
Tool Changing Method	Automatic tool change
Processing Method	Dry or Wet Milling
Processing Materials	Glass ceramic, Pre-mill abutment, Zirconia, PMMA, PEEK, Wax
Processing Time	Pre-mill abutment: 15min, Glass ceramic: 20min

1.2 Device diagram



98mm C-clamp



**7 positions
glass ceramic holder**



**7 positions
pre-mill abutment holder**

Chapter 2 Device Installation

2.1 Preparation before installation

(1) Site requirements:

- The milling machine size is 630mm*540mm*700mm and the weight is 120kg.
- The workbench where the device is placed can bear 200kg and there must be enough space to operate the machine.
- The area where the device is placed must be flat, clean and stable.

(2) Environmental requirements:

- Flammable and explosive items are not allowed to be placed around the milling machine.

(3) Power requirements:

- The milling machine uses a single-phase AC 220V 50/60Hz 10A three-plug power supply.
- The power supply voltage must be stable and must have a grounding wire (it is recommended to be equipped with a voltage stabilizer).
- The rated power of the power supply must be $\geq 3\text{kW}$.

(4) Air requirements:

- This machine requires compressed air. User need to prepare a compressor separately.
- The total air source interface of the milling machine requires an 8mm diameter air hose, and the air pressure must be maintained above 0.6Mpa and remain stable.
- The air needs to pass through an air filter to ensure that the air is clean and dry, otherwise it will reduce the life of the device components (It is recommended that users equip a separate air drying filter).

(5) Software requirements:

- Users need to purchase CAM software. The CAM software supported by the D510 milling machine includes Work NC, Hyperdent (WorkNC is recommended).
- User need to prepare a computer to install CAM software. The configuration requirements are:

Operating system	Win10 or Win11 (64-bit version)
Memory	16G or more
CPU	i5 10th or i7 or above

Graphics card	GTX1660 or above
Processor	quad-core or above
Hard drive	500G or more solid-state drive

2.2 Device unpacking inspection

- (1) The device should not be dumped during transportation. After the device arrives at the site, check whether the outer packaging of the device is in good condition and take photos for record;
- (2) Use tools to disassemble the wooden box. Pay attention to safety when disassembling the wooden boards to avoid hitting people and milling machines;
- (3) After unpacking, check whether the appearance of the device is damaged, collided, or has paint peeling;
- (4) Check whether the device model meets the purchase requirements;
- (5) Check the device, accessories, tools, manuals and other documents to see if they are complete and without any damage according to the device packing list;
- (6) If there are any problems with the device unpacking and acceptance, please contact YP Dental in time and we will solve them for you as soon as possible;
- (7) After the device is unpacked and accepted, contact YP Dental in time for device installation guidance. The company has technical personnel responsible for the installation and commissioning of the device.

2.3 Device installation

2.3.1 Place the device

(1) Place the milling machine on the workbench. Unloading and placement are operations that must be performed by 4 persons or more. It is strictly forbidden to move the device shell and movable door. Instead, the device base should be moved to prevent the device from falling or bumping during the transportation process;

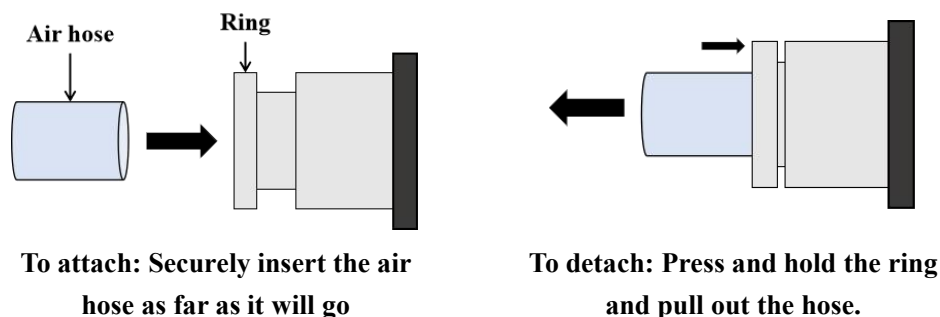
(2) After the device is placed, check that the device and the workbench are not in a shaking state;

2.3.2 Connect the air hose

(1) Install the air filter: The 8mm diameter air hose of the external air source is connected to the filter inlet;

(2) Connect the air inlet hose: Use a 6mm diameter air hose to connect the filter outlet and the device air inlet. The air pressure must be maintained above 0.6Mpa;

(3) Securely insert the air hose as far as it will go. Lightly tug on the hose to make sure it does not come loose.



2.3.3 Connect the spindle water cooler

(1) The water pipe (red) connecting the spindle water cooler has been connected in advance, please do not disconnect it;

(2) Connect the “INLET” pipe (red, 8mm) and “OUTLET” pipe (red, 8mm) on the back of the spindle water cooler;

(3) Connect the “Water inlet” pipe (red, 6mm) and “Water outlet” pipe (red, 6mm) on the back of the milling machine;

(4) Connect the power plug of the spindle water cooler to the “Cooling Line” socket at the back of

the milling machine;

- (5) Inject the vehicle engine coolant or deionized water into the spindle water cooler, and do not directly use tap water which contain impurity and are easy to solidify as coolant;
- (6) After filling the coolant, turn on the power button of the spindle water cooler, and the temperature display will light up, which proves that it is turned on successfully.



2.3.4 Connect the vacuum cleaner (dry milling mode)

- (1) Connect the vacuum cleaner pipe to the port on vacuum cleaner, and the other end of the pipe connected to the milling machine.
- (2) Connect the power plug of the vacuum cleaner into the “Dust Collection Line” socket at the back of the milling machine;
- (3) In dry milling mode, when the milling machine is working, ensure that the vacuum cleaner is in normal working condition to form negative pressure in the processing chamber.
- (4) Clean the dust bucket of the vacuum cleaner in time to avoid dust accumulation that affects the suction power.

2.3.5 Connect the milling fluid pipe (wet milling mode)

- (1) Install the cutting fluid filter on the back of the machine and connect the filter outlet to the cutting fluid port on the milling machine with a pipe;
- (2) Place the water pump in the water tank below the drain pipe at the bottom of the milling machine and connect the water pump to the cutting fluid filter inlet with a pipe;
- (3) Insert the aviation plug of the water pump part into the “Water Pump Line” port;
- (4) After cleaning the cutting fluid tank, pour the milling fluid and water into the tank in a certain

proportion.

(5) It is recommended to use low-viscosity milling fluid or synthetic milling fluid, and avoid open flames and high temperatures in the usage environment.

(6) When the equipment is used frequently, it is necessary to regularly check the depth and temperature of the milling fluid every morning and evening. When the milling fluid level is low, it is necessary to add fresh fluid to the tank in time to avoid safety accidents caused by excessive milling fluid temperature.

2.3.6 Connect the power cord

(1) Connect the power cord: The power supply is single-phase AC 220V 50/60Hz. The power supply must have a ground wire, otherwise the internal components of the device may be damaged.

(2) Press the "ON/OFF" button on the side of the machine to start the device.

(3) If the power supply voltage is unstable, a voltage stabilizer needs to be added in front of the device to prevent the device from being damaged due to voltage fluctuations.

2.3.7 Confirm the air pressure

(1) Check the digital pressure display, the air pressure should be more than 0.6Mpa and remain stable.



2.3.8 Install tools

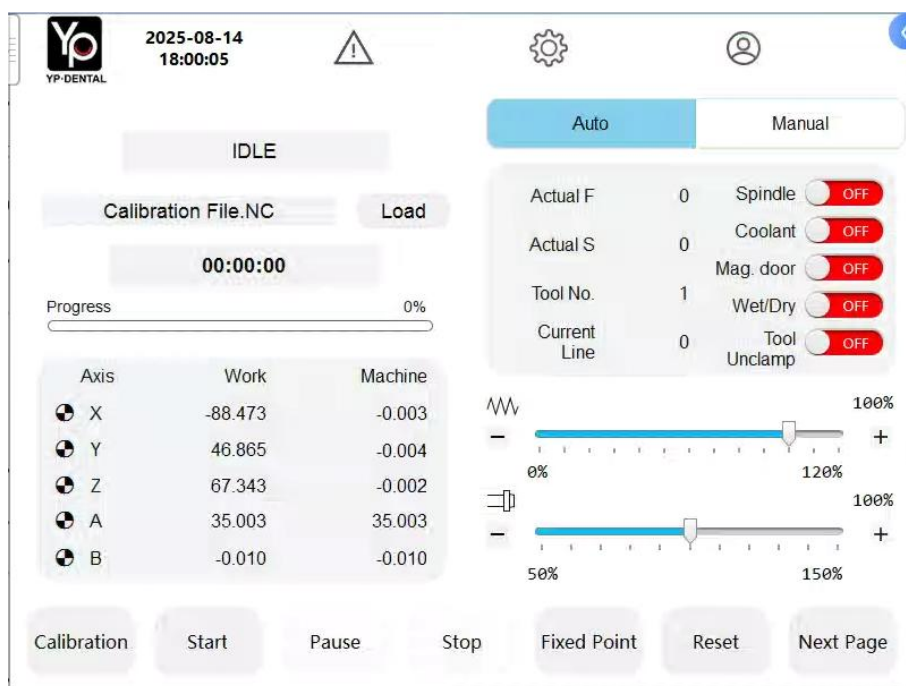
(1) Install the tools to the corresponding positions of the tool library according to the tool number. Make sure that the number of each tool is consistent with the tool library number. If the tool is placed in the wrong position, it will break during processing;

(2) T1~T5 are the tool positions used for Zirconia, T6~T8 are the tool positions used for Glass Ceramic, T9~T12 are the tool positions used for Pre-mill Abutment.

(3) The following tool information will be fine-tuned with the relevant tool numbers and parameters as the process changes, and finally the process of the device manufacturer shall prevail.

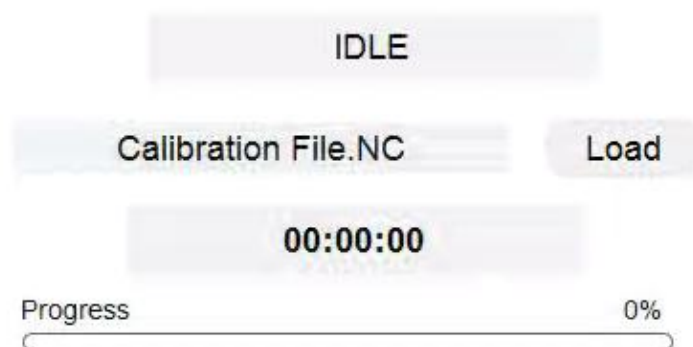
Tool No.	Processing materials	Tool Type	Head diameter	Tool specifications
T1	Zirconia	Ball end	2.0mm	R1.0*D4*50L
T2	Zirconia	Ball end	1.0mm	R0.5*D4*50L
T3	Zirconia	Ball end	0.6mm	R0.3*D4*50L
T4	Zirconia	Ball end	0.3mm	R0.15*D4*50L
T5	Zirconia	Flat end	1.5mm	R0.75*D4*50L
T6	Glass Ceramic	Ball end	2.5mm	R1.25*D4*50L
T7	Glass Ceramic	Ball end	1.0mm	R0.5*D4*50L
T8	Glass Ceramic	Ball end	0.6mm	R0.3*D4*50L
T9	Metal/PEEK	Ball end	3.0mm	R1.5*D4*50L
T10	Metal/PEEK	Ball end	2.0mm	R1.0*D4*50L
T11	Metal/PEEK	Ball end	1.5mm	R0.75*D4*50L
T12	Metal/PEEK	Ball end	1.0mm	R0.5*D4*50L

Chapter 3 Function interface introduction

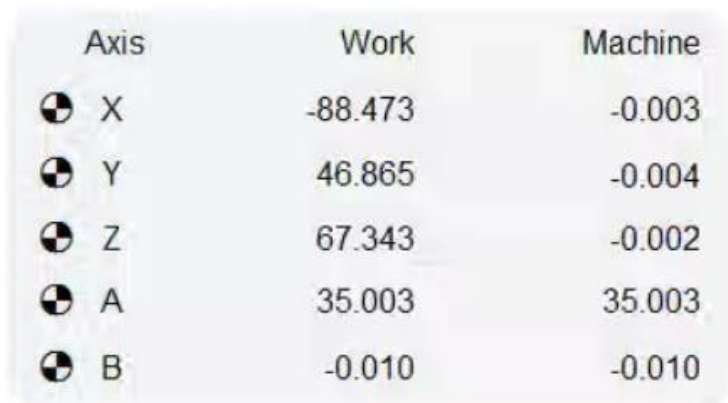


	Press the logo, input the password “1” to enter higher permission.
	Alarm prompt, click to view detailed alarm information.
	System maintenance.
	Register.
Auto Mode	
Calibration	Calibration is required after manual tool change.
Start	Start the program in the list
Pause	Pause the machine processing
Stop	Stop the machining program
Fixed Point	The clamp and spindle return to the safe position for easy loading and unloading of the material disk.

Reset	Reset abnormal alarm information and reset running program files
Next Page	Go to the next page
Resume	When the processing program stops or is interrupted unexpectedly, click Resume to continue processing
Line Selection	Select the processing line for processing
Work Zero	Return to the machine origin coordinates
Night Mode	Turn on the night mode, the machine will automatically shut down after the processing task is completed
NC CLOUD Assistant	Used to provide data interface and communication protocol
Shut Down	Shut down the cutting machine's system
Last Page	Go to the last page
Manual Mode	
Calibration	Calibration is required after manual tool change.
Change Tool	Manually change the milling burs.
Tool Life	Set and view the tool's lifespan.
Jiggle	Manual Jiggle is used for precision calibration of milling machines.
Datum Setting	Datum settings for five axes (customers are not allowed to change them without authorization).
Stop	Stop the machining program
Reset	Reset abnormal alarm information and reset running program files



IDLE	Display the status of the machine
File Name	Display the NC file that the device is ready to run or currently running.
Load	Upload the NC file for processing work.
Time	Indicate the time already processed.
Progress bar	Display the completed processing progress in percentage form.

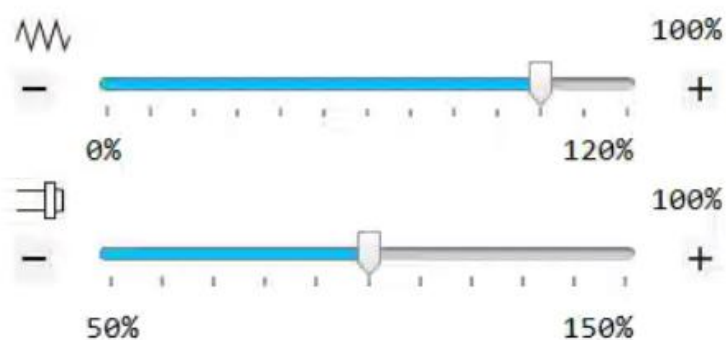


Axis	Work	Machine
X	-88.473	-0.003
Y	46.865	-0.004
Z	67.343	-0.002
A	35.003	35.003
B	-0.010	-0.010

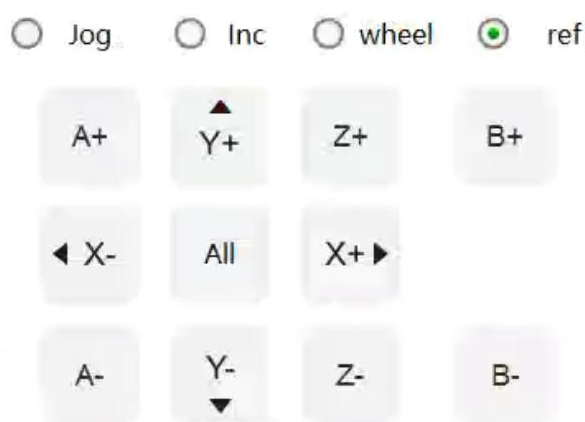
- Display of coordinate information of each axis.



Auto	Auto mode interface.
Manual	Manual mode interface.
Actual F	Feed rate
Actual S	Spindle speed
Tool No.	Current tool number
Current Line	Current processing line
Spindle	Spindle status
Coolant	Coolant status
Mag. door	Tool magazine door status
Wet/Dry	Working mode, ON: Dry mode, OFF: Wet mode
Tool Unclamp	Spindle chuck control



- Adjust feed rate: 0~120%;
- Adjust the spindle speed: 50~150%



Jog	Continuous motion
Inc	Step motion
Wheel	Handwheel controlled movement
ref	Reference Point
X+/X-	Control the spindle to move in the X-axis direction
Y+/Y-	Control the spindle to move in the Y-axis direction
Z+/Z-	Control the spindle to move in the Z-axis direction
A+/A-	Control the fixture to rotate in the A-axis direction
B+/B-	Control the fixture to rotate in the B-axis direction

Chapter 4 Milling Process

4.1 Turn on the device and chiller

- (1) After the device commissioning is completed, click the power button (On/Off) to enter the startup process. Wait for 1-2 minutes during the startup process;
- (2) Rotate the E-stop button to release the stop state;
- (3) Check the air pressure display on the back of the device, and the gas pressure should be maintained above 0.6Mpa;
- (4) During operation of the D510 milling machine, it is necessary to ensure that the chiller is in normal working condition, and the temperature of the chiller must not exceed 35°C.;
- (5) Clean the inside of the processing chamber to ensure it is clean and dry.

4.2 Check the tool

- (1) Check whether the milling burs number is consistent with the tool number. The milling burs specifications and corresponding tool numbers are shown in the following table.
- (2) When installing milling burs, ensure that milling burs is parallel to the tool holder and the black positioning ring is flush with the edge of the tool holder.
- (3) Press the tool release button to remove the metal bar from the spindle. Then take the T1 tool out of the tool magazine and manually install it on the spindle.
- (4) Click the **【calibration】** button on the screen to complete the preparation work before using the machine.



4.3 Install material tray

- (1) D510 clamp supports the installation of circular trays with a diameter of 98mm or 98.5mm;
- (2) Click **【Fixed Point】** and wait for the clamp and spindle to return to the safe position;
- (3) When installing the material tray, the edge of the fixing ring should be flush. Tighten the three bolts using an hex key in a crisscross pattern to ensure even force distribution and prevent the tray from tilting due to uneven force.
- (4) Close the processing chamber door.

4.4 Load NC program using USB flash drive

- (1) Copy the NC program generated by CAM software to the USB flash drive (The file name cannot contain special symbols, and the file name should not exceed 20 characters). Insert the USB flash drive into the USB port of the device;
- (2) Click the **【Load】** to enter the program loading interface, select **【USB】**, the interface will display the NC files stored in the USB flash drive (It is recommended that the number of NC files stored in the USB flash drive should not exceed 10, and the total memory should not exceed 200MB).
- (3) Select the NC program to be processed, click **【Load】**, click **【OK】** in the pop-up window, return to the main interface, and the program loading is complete;

4.5 Start the processing program

- (1) Check the NC program name on the main interface to ensure that the program name is the same as the device loading name;
- (2) Click **【Start】**, the program starts running, and the device starts working;
- (3) The processing time and processing progress of the program can be observed on the main interface.

4.6 Disassemble material tray

- (1) When the processing is completed, the spindle will return to the safe position and stop rotating. Confirm that the processing progress on the main interface shows 100%.
- (2) Click **【Point】**, wait for the clamp to return to the safe position, use a hex key to loosen the three retaining screws and then remove the material tray.

4.7 Pause Processing

- (1) When the device is running, click **【Pause】**, the device will pause processing, and the spindle will continue to rotate;
- (2) Click **【Start】**, the program will continue processing from the pause line;

4.8 Stop Processing

- (1) When the device is running, click **【Stop】**, the program will stop processing and the spindle will stop rotating;
- (2) Click **【Start】**, the program will continue processing from the pause line.

4.9 Precautions for use

- (1) Use materials allowed by the device for CAM and processing.
- (2) Use the burs that have been tested and qualified by the manufacturer, and place them in the corresponding tool library.
- (3) Do not use materials that do not match the size of the fixture (Fixture size: 98.5mm diameter disk).
- (4) Utilize software or strategies that have been tested for stability by the manufacturer for CAM and processing.
- (5) Avoid using USB flash drives with viruses for file transfer; regularly disinfect USB drives.
- (6) Do not reach into the processing chamber during equipment operation for any reason.
- (7) In case of an emergency during equipment operation, press the "Stop" button on the main interface immediately.

Chapter 5 Maintenance

5.1 Device Maintenance

- (1) After completing work every day, use a brush to clean the dust in the processing chamber of the device to ensure that there is no accumulation of dust on the surface of the spindle and tool setting probe;
- (2) The equipment processing chamber should be cleaned before switching milling materials;
- (3) Based on the usage of the equipment, the dust inside the vacuum cleaner should be cleaned promptly to ensure its suction power;
- (4) It is recommended to clean the inside of the device every 3 months. Power off the device and use a dry and clean cloth to manually clean the inside of the device to ensure that the inside of the device is clean and free of debris.
- (5) The machine requires internal mechanical component maintenance every 3 months. Use the provided grease spray to coat the positions of the lead screw and guide rail.

5.2 Calibration

Long-term use of the device or changes in the surrounding environment of the device may affect the processing accuracy of the device. The YP Dental D510 milling machine can manually calibrate the processing axis to ensure the accuracy of the device's processing workpieces. The specific operation steps are as follows:

- (1) Prepare a test disc (wax disc), disc size: diameter 98mm, thickness 10mm;
- (2) Prepare a digital display vernier caliper (accuracy 0.01mm);
- (3) Turn on the device, install the test disc;
- (4) Use a USB flash drive to upload the "calibration file" and start the processing program;
- (5) Wait for the program processing to be completed, take out the test disc and remove the calibration block;
- (6) Click **【Manual】** → **【Jiggle】** → **【Manual Jiggle】** to enter the device calibration interface;
- (7) Measure the four wall thicknesses X1, X2, Y1, and Y2, as well as the calibration block thickness Z, as shown. (Be careful not to get caught in the protruding numbers on the back of the calibration

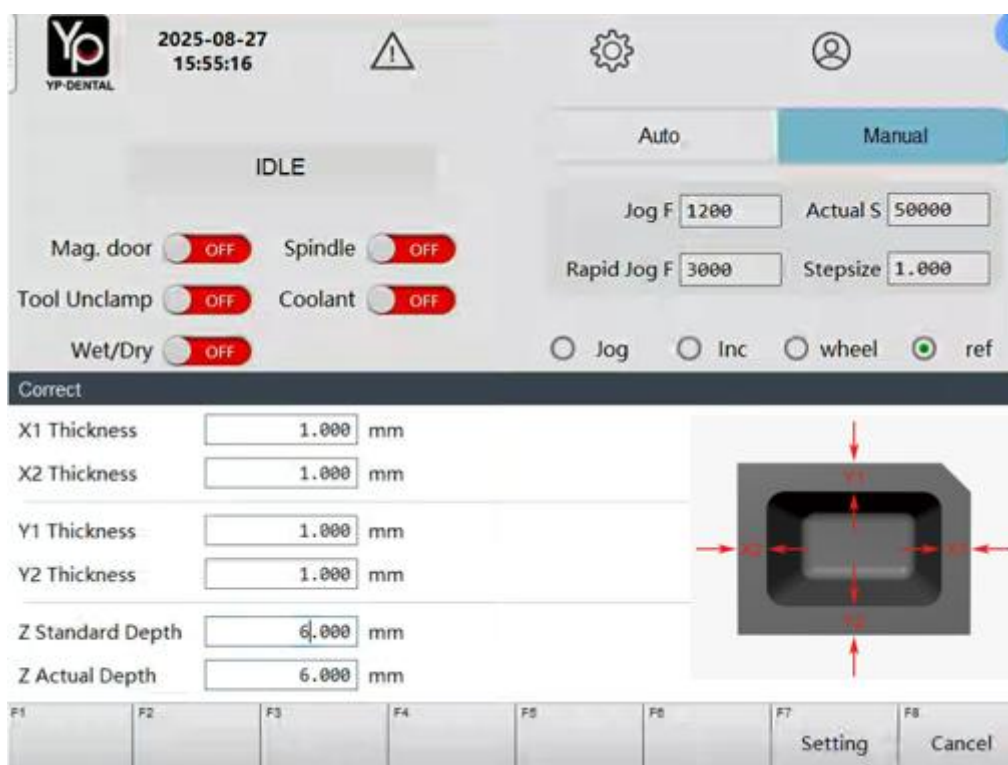
block, as this will cause inaccurate measurements). Enter the Z standard thickness of 6.000mm. Each data must be measured more than 3 times. If the 3 measurement data are the same, it means that the measurement data is valid. Ensure the position and direction of the calibration block

(8) Click **【Setting】** , wait for the device to automatically calibrate.

(9) To confirm that the coordinates of the machine have been calibrated back to the standard value range, it is necessary to cut the calibration block again and measure the wall thickness and thickness of the calibration block. Standard range: Calibration block wall thickness = $1\pm0.03\text{mm}$, calibration block thickness = $6\pm0.03\text{mm}$. If the calibrated value is not within the standard range, it is necessary to perform the calibration procedure again.

(10) Calibration cycle:

- ① When the machine has abnormal phenomena such as positioning or serious joints, the calibration procedure can be performed at any time.
- ② It is recommended to calibrate once every month when the frequency of use is high, and once every three months when the frequency of use is low.



5.3 Precautions when Performing Maintenance

- (1) When cleaning the equipment, do not use solvents such as gasoline, alcohol, and thinners, otherwise it may cause a fire;
- (2) The processing tools and spindle motor will become hot, so be careful of high temperature burns;
- (3) The processing needle is sharp, so be careful to avoid injury;
- (4) Do not turn the rotating shaft by hand, otherwise it may cause equipment failure.

5.4 Special Statement

- (1) If you purchase this device to process other materials besides the above materials, please make an assessment based on the device parameters. The user shall bear all responsibilities for any unexpected situations caused by the user processing products made of other materials;
- (2) Without the consent and permission of our company, users are strictly prohibited from disassembling the external and internal parts and electrical accessories of the device. Our company does not bear the corresponding responsibility for the damage to the device caused by this.