X-MILL 300

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300

User Manual

X-MILL 300 Four-axis Engraving & Milling Machine

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FOREWORD

Dear customers,

Thank you for choosing the products of Xiangtong. Xiangtong X-mill 300 series four-axis engraving & milling machine is a precise device created by the company. To make a better use of this device, please read carefully the user manual delivered together with the device before operating it. This manual is designed for the reference of the users in the installation, commissioning, and processing, troubleshooting and daily maintenance of the machine. Please pay close attention to the relevant precautions, in order to avoid any equipment damage or personal injury due to mis-operation.

Xiangtong X-mill 300 series four-axis engraving & milling machine is manufactured with high-quality components and materials, employing the latest movement control technologies and integrated design, adopting wet or dry process and is compatible with porcelain/wax/PMMA. The machine features double dust prevention, easy and smart operation, and multi-sensor monitoring and maintenance free design.

The engraving & milling machine is a precise processing device. To ensure the safety of the operator and the machine, it should be operated by professionals. If you have any question, please do not hesitate to contact us. Our professional engineers will try their best to help you.

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ICHAPTER 1 INTRODUCTION TO X-MILL 300 FOUR-AXIS ENGRAVING & MILLING MACHINE

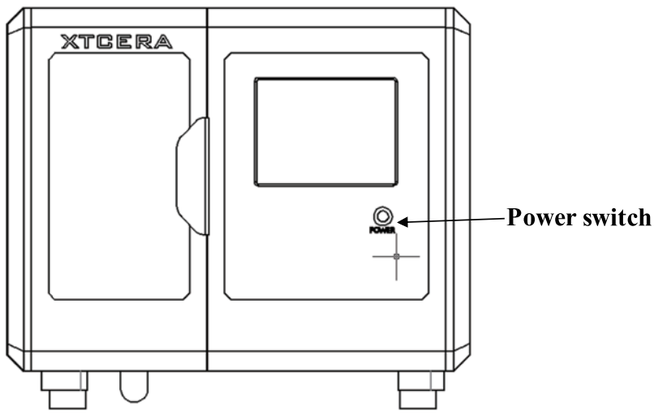
1-1 PRODUCT OVERVIEW

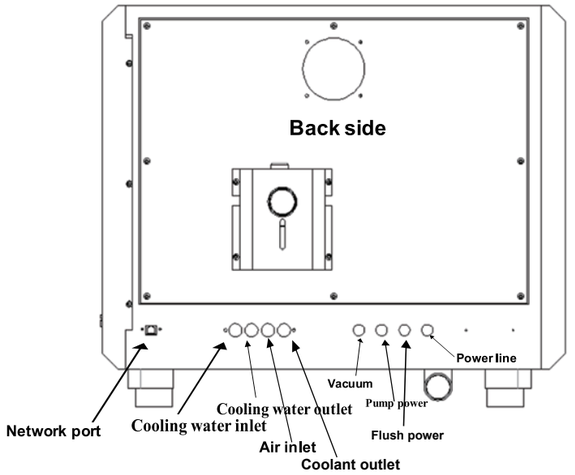
X-mill 300 Four-axis Engraving & Milling Machine is an integrated engraving and milling machine featuring high precision, high efficiency and high integration, and it can be used for processing Zirconium oxide/wax/PMMA/Premilled abutment base/glass ceramic. The machine adopts horizontal structure. The low gravity center movement mechanism can effectively reduce vibration during the processing. The movement components are made of imported lightweight aviation materials which feature high strength and excellent rigidity. The mechanical parts adopt imported high-precision lead screw and linear guide rail, while the electric parts adopt the latest servo drive system of Panasonic to ensure operation stability and precision.

This machine is highly flexible. Different processing strategies can be selected according to different materials, so as to meet the diversified demands of different users and different products.

(For selection of processing strategies, please make careful selection strictly according to the training instructions. Different materials have different processing strategies. Please consult our technicians before replacing the materials.)

1-2 OUTLINE STRUCTURE





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1-3 MAIN STRUCTURE

X-mill 300 4-axis engraving and milling machine is mainly composed of engine base, linear motion mechanism, motor drive system, motion control system, circuit-pneumatic-water control system, man-machine operating interface and shell body.

1-4 OPERATING PRINCIPLE

X-mill 300 4-axis engraving and milling machine can read processing files through an external USB or network interface. The motion control system is responsible for interpreting processing file information, transforming it into computer digital signal and sending it to the motor driver, which controls the start-stop and speed of the motor according to the received signal. The motor realizes all kinds of motions by connecting mechanism driven linear mechanism and processing course through contact between high-speed rotating burs and materials.

1-5 TECHNICAL PARAMETERS

Name:X-MILL300milling machine

Weight:150kg

Max power:2.2KW

Number of axis:4axis

Processing mode:double-use of dry and wet

Max feed rate:6000mm/min

Tool changing mode:automatic

Processing materials: Premill abutment,glass ceramic,Resin, PMMA,Zirconia

Dimension (L*W*H):730*720*620(mm)

Input voltage:AC220V

Spindle power:1.8KW

Travel range: XYZ:125/130/80mm A:360° (±20° .positioning processing)

Max speed:60,000rpm

Tool magazine capacity:6

Spindle cooling:water cooling

Processing time: Glass Ceramic:17mins,PMMA:12mins, Premill abutment:25mins,Resin:15mins,

1-6 Operating Environment and Requirements

1.Power supply ground wire must be well grounded to prevent electric shock or fire accident, and moreover, to reduce noise interference.

2.The engraving and milling machine should be placed on a smooth and solid working table.

3.Distance from the machine's four sides to walls should be more than 40 cm to ensure good heat dissipation.

4.The vacuum cleaner vent must be installed in outdoor, and operators need to wear a dust mask.

5.Using environment temperature: - 10 ℃ to 40 ℃. It needs to ensure that equipment can be used in this temperature range, preventing dysfunction of electrical components caused by insufficient heat dissipation.

6.Using environment humidity: < 80%, frost-free.

7.Away from the source of vibration and high frequency launching devices (such as ultrasonic wave).

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CHAPTER 2 INSTALLATION AND COMMISSION

2-1 NOTES FOR EQUIPMENT INSTALLATION

1. Open the packing case and check if the equipment appearance is damaged.

2. Counting the accessories according to the packing list.

3. Install the main body on a horizontal and stable workbench and remove the fixed transport accessories.

4. Connect power line, gas supply system, spindle cooling system, processing cooling system and vacuum system as required.

5. It is forbidden to transport the shell and the movable door when transporting the complete machine; the baseboard of the complete machine should be transported.

6. It is forbidden to move the equipment by pushing or pulling its shell.

PAY ATTENTION TO SAFETY! BEWARE OF BEING BRUISED!

2-2 EQUIPMENT DEBUGGING

1.Turn on the equipment power switch，then the lights in the processing areas will be lighted up and the system will start.

2. Double click the icon on the desktop to run XMill300.exe, as shown in the figure.

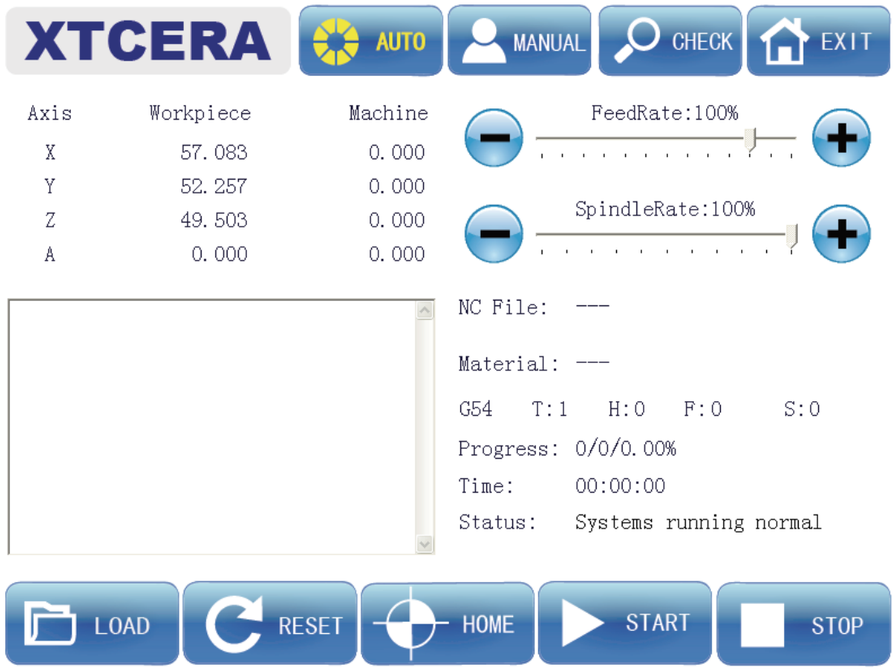

Figure 2-1

3. Click the “HOME” button to make all the axes mechanically back to the origin. When the step is done, the button will display“origin”and being highlighted, which indicates the “HOME” function is normal.

4. Switch to manual operation interface, as shown in the figure below.

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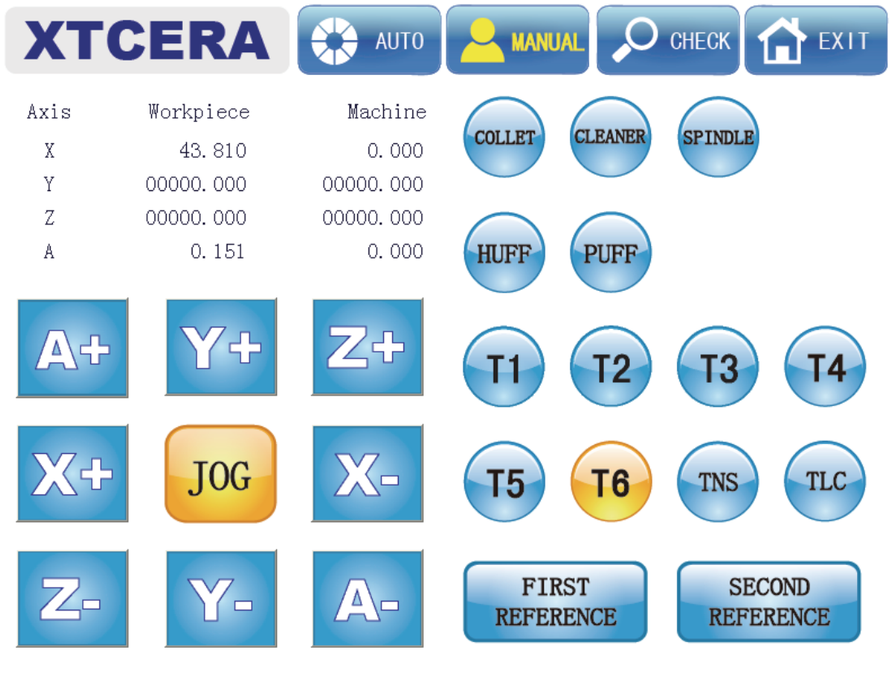

Figure 2-2

5. Check spindle and see if there is protection bar in it, use left hand to hold the protection bar and click the "COLLET" button to loosen the spindle collet, take out the protection bar and put milling bur into the collet one by one with your left hand, and meanwhile click the “COLLET” with your right hand to tighten the bur.

6. Click the "CLEANER" button and observe if the vacuum cleaner starts and runs normally. If there is no abnormality, then click the button again to shut off the vacuum cleaner.

7. Click the "SPINDLE" button and observe if the spindle starts and runs normally. If there is no abnormality, then click the button again to stop the spindle.

8. Click the “FIRST REFERENCE” button and the “SECOND REFERENCE” button successively and observe if the equipment movement is normal and if the equipment stop position is correct.

7. T1~T6 buttons highlight indicates current system bur number. Observe if the bur number on the spindle collet is the same as that displays in the system; if they are different, then click the “TNS” button. The “TNS” button highlight indicates that the bur number setting function starts. Click T1~T6 to set the system bur number as the current bur; when the step is done, click the button again to cancel the bur number setting function.

8. Click T1 ~ T6 successively, if the bur holder has not filled up with burs, then skip operating on corresponding burs and observe if the process of replacing burs is normal; please stop operating immediately in case of abnormal situation.

9. When the bur changing process is done, click the “TLC” button to perform automatic bur length checking and observe if this process is normal. At this point, the installation and debugging work is completed.

CHAPTER 3 COMMISSIONING AND PROCESSING

3-1 COMMISSIONING

1. Select auto mode. If the system does not mechanically HOME, then click “HOME”.

2. Click the “LOAD” button, and find the nc. file to be milled on local computer folder or on shared LAN folder. When the loading process is done, nc. file information, such as files name, types of materials, etc. will display on the screen.

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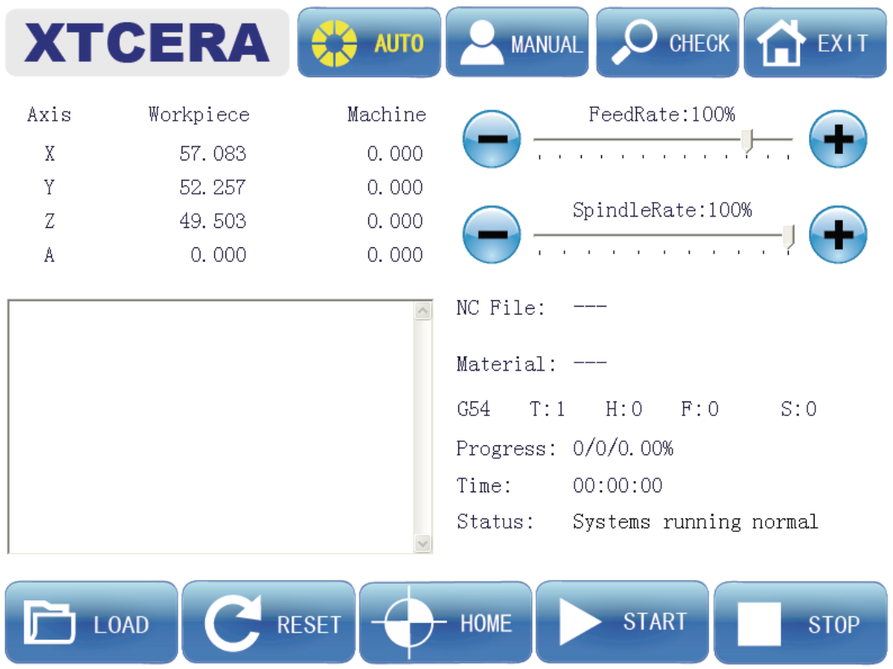

Figure 3-1

3. Click the “START” button, which will then become “PAUSE”. Start commissioning of automatic processing; observe equipment action and interface instructions until the processing is completed without abnormality.

4. Check if size and appearance parameters of the processed test work pieces are within the qualified range. If there is no problem, then commissioning is completed and normal processing can be started; if there is any problem, then make parameter adjustments based on the actual condition.

3-2 PROCESSING AND RUNNING

1. After completing the commissioning operation, formal production can be started. The operation steps of formal production are basically same as the commissioning operation steps.

2. In manual mode, click the "FIRST REFERENCE" button and the axes will automatically return to a position suitable for loading and unloading material plate. Then load the workpiece into the holder and tighten the screw evenly.

3. Switch to auto mode and load correct processing files, then the system will automatically select corresponding processing strategies according to the file information. Adjust the system parameters and related auxiliary functions and click the "START" button after confirmation to perform automatic processing.

4. If there is a need to suspend processing during the processing period, then click the "PAUSE" button. If there is a need to stop processing, then click the "STOP" button. If there is any abnormality in the processing process, the system will automatically interrupt the current processing and retain the current line information; users can click the “START” button to continue the interrupted processing after eliminating abnormalities.(Do not click the “STOP” button; otherwise the processing will start from the beginning again)

5. If power cut happens during the processing period, restart the software when the system is powered on again, and the system will automatically load the previous processing files and recover the interrupted line information that being saved. Users can click the "START" button when the system loading is completed, then the processing before power failure can be restored. (Do not click the “STOP” button; otherwise the processing will start from the beginning again)

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3-3 MILLING BUR SELECTION AND REPLACEMENT

3-3 BUR SELECTION AND REPLACEMENT

Bur replacement, which is very important in daily processing, will directly affect equipment safety and quality and thus needs careful operation. Therefore, when burs have been used for a period of time or they will affect processing quality, bur replacement operation should be executed complying with the following steps:

1.Firstly, execute the "HOME" operation to ensure that the system has been back to the origin.

2.If the current burs in the spindle do not need to be replaced, click the corresponding bur buttons in manual mode to let the equipment automatically take out the target burs;

3.Click the “FIRST REFERENCE” button to move the axes to the reference position.

4.Loosen the spindle collet by click the collet button in the manual interface and take out the burs need to be replaced. Note that the spindle collet is flexible, so hold the burs with your hands before loosening the collet in order to avoid damage when the burs pop up. Keep in mind: collaboration is prohibited when operating; every step must also be carefully confirmed when operating by a single person. Mal-operation on the spindle should be avoided so as not to cause personal injury.

5. Insert the new bur into the spindle collet, make sure the lantern ring reached to the collet and then tighten the collet by click the collet button agian in the manual interface. Using lantern ring is to make sure that bur installation depth conforms to the equipment processing requirements. So please do not directly put the burs without lantern rings into the collet or bur pouch in the bur repository. At this point, bur replacement is completed.

6.The length of bur handle out of the lantern ring is about 20mm. If the ring of bur moves, please replace the burs timely; otherwise, there may be risk of crashing and burs fracture.

7. Normally a bur can mill around 180units of crown, when the milling job reach this limits, we suggest you to replace the burs timely to avoid any bur breakage and collapse,and bad-ness caused by this .

8. Bur body uses a kind of high-hardness and low-toughness material; when suffered from external force, it is easy to fracture. So when operating the workpiece loading and cleaning the processing chamber, be careful not to touch the cutting edge, so as not to cause frac-ture and personal injury.

3-4 KEY POINTS FOR CIRCULAR MATERIALS CLAMPING

Any kind of material must be clamped strictly complying with the clamping require-ments, in order to avoid badness.

1. No processing residue should be left in the holder and cleaning after eachclamping must be done.

2. Clamps with badness such as bump caused by collision should not be in continual use.

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3. There should be no residue on edge of the re-clamped material, which must be cleaned to prevent fracture caused by uneven force when clamping.

4. When the holder gland is locked tightly, each screw must be tightened up evenly. Do not tighten up one screw first, and then tighten up the rest ones. This operation will easily cause uneven application of force and make the workpices fractured and collapsed, or produce internal stress, leading to fracture during processing.

3-5 Key Points for Glass Ceramic Processing

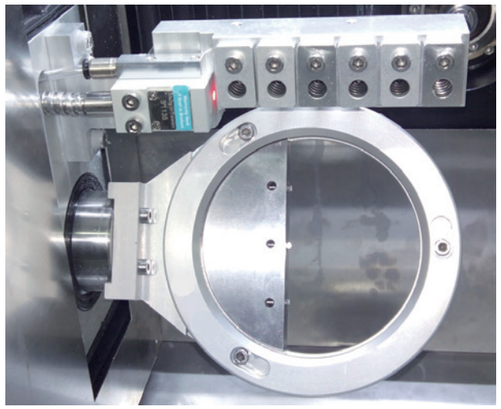
1. Material plate must be cleaned comprehensively before clamping the fixture of glass ceramics to prevent badness.

2.Glass ceramic is strictly required to be clamped in special fixtrure and locked with fastening screws.

3.There should be no foreign impurities and matters in the three clamping holes of the fixture. They must be cleaned before clamping to avoid causing clamping badness.

4.To ensure that in corresponding position of the bur repository, there are special bur for glass ceramic processing and check if the bur specification is correct.

5.To ensure that processing cooling system operates smoothly, and effective.



3-6 Abnormity Elimination

There are system information tips on the automatic interface. Under normal circumstances, it will display "normal"; if abnormality happens, system will prompt abnormal information. For security reasons, most operations can only be accepted by the system under non-abnormal situation; and when performing related operations under abnormal circumstances, the system will prompt corresponding information.

Therefore, when the system prompts abnormal information, users can click the "RESET" button to reset related abnormality. If the abnormality still exists after reset, then corresponding elimination measures should be taken according to abnormality information and corresponding prompt information.

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CHAPTER 4 MAINTENANCE AND MATTERS NEED ATTENTION

4-1 MAINTENANCE INSTRUCTIONS:

1. Clean the dust in the processing cavity of the equipment every day to make surethere is no dust accumulation in it; for the moving parts in particular, make sure there is no dust accumulation in the groove of the spindle sleeve and on the presetting bur surface of the presetting bur gauge.

2. Clean up the equipment processing cavity before switching processing materials.

3. Clean the dust inside the vacuum cleaner once a week to maintain its suction. (If thedust in vacuum cleaner is not cleaned in time, then the filter will be clogged easily, which will reduce the negative pressure and the suction power. Finally, part of the dust will enter into cavity of the equipment, causing internal electronic component damage,and abnormal alarm and thus reduce the service life of the equipment).

4. Check the water level of the cooling water tank every week and test the water yield of the pump every day. When the water level is low, make timely supplement or replacement. Right amount of antirust agent must be added into the cooling water.

5. The equipment with a computer built in it is “a special computer for special use”. Please do not modify system related settings, install or uninstall software. To ensure normal operation of system, please regularly search and kill computer virus.

6. For glass ceramic processing, it is suggested to replace cooling water and clean water tank every day to prevent precipitation, so as not to affect processing quality and reduce the lifetime of burs and cooling water pumps.

4-2 SPECIAL ANNOUNCEMENT:

1. If you purchase equipment of our company, using for processing other products than specified materials in this manual, please make good evaluation according to the above equipment parameters. For any unexpected circumstance caused by customer processing products of other materials, users should take full responsibility.

2. Without the consent and licensing of the company, users are forbidden to dismantle external and internal spare parts and electrical accessories of the equipment. The company does not assume corresponding responsibility of equipment damage caused by this.

3. This equipment adopts precision electronic components for assembly. Thus higher requirements on clean degree of air source are demanded. Equipment of our company is installed with triple air filter before shipping and installation. In order to increase the stability and service life of equipment, please ensure the clean degree of air source and install air filter as required.

4-2 SPECIAL ANNOUNCEMENT:

1.Power socket must be effectively grounded, or the equipment grounding protection will fail, internal components will be burned and more seriously, personal electric shock risk may be caused.

2.The vacuum cleaner should be cleaned in time on a regular basis; otherwise it will seriously affect dust collection effect, cause environmental pollution, damage human health, and at the same time reduce the service life of the equipment.

3.The cooling water system, air supply system and dust collection system must be properly connected, or dislocation will seriously damage important parts; if water leakage phenomenon appears, please stop using and contact with us.

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4.Spindle cooling water must be added with anti-rust agent to prevent rust congestion; and regularly check of water yield must be made according to the requirements of regulations. Contact us for anti-rust agent specifications.

5.System gas supply must be clean air and must be passed through the air filter; otherwise it will affect surface quality of processed products and reduce service life of equipment components. Pressure must be sufficient to prevent abnormal alarm.

6.Equipment operation must be strictly in accordance with Equipment Overall Operation Flow Chart in Appendix Ⅰ. Operate in accordance with normal computer switch mode to avoid system file missing, boot failure, system response speed reduce and even system crash.

7.When equipment installation is completed; it is not allowed to be moved in principle. If you have any special need, please contact us firstly. And force can only be applied on the baseboard in the process of moving; it can't be applied on any part of the shell, or it may lead to shell deformation or equipment drop, causing serious accident.

8.If abnormal sound or movement happens in use, please record the abnormal information and contact us.

9.Multi-task operation on this equipment is prohibited in order to avoid unnecessary damage.

CHAPTER 5 COMMON ABNORMALITIES AND COUNTERMEASURES

Fault phenomenon	Reason analysis	Countermeasures
Connect power supply and turn on the power switch, but working area lighting is not lit.	Equipment internal switch trips.	Disconnect the power, open the rear cover and close the internal power switch.
Program cannot run, showing specified encryption lock cannot be found.	Encryption lock loos-ened from the USB port Encryption period ends	Open the rear cover and reseat the encryp-tion lock Contact us
System low air pressure warning Processing interrupts	System gas supply pres-sure is not enough, or pipeline leaks	Check the gas supply air and gas pipeline
Inverter alarm: 1	Communication line fault	Open the side cover, reseat the network interface at the bottom of the frequency converter
Inverter alarm: 34 The spindle tempera-ture is too high	Cooling water pump is abnormal,Water level in water tank is low,Cooling circuit blocks	Check the water pump, water level in water tank and cooling circulation loop

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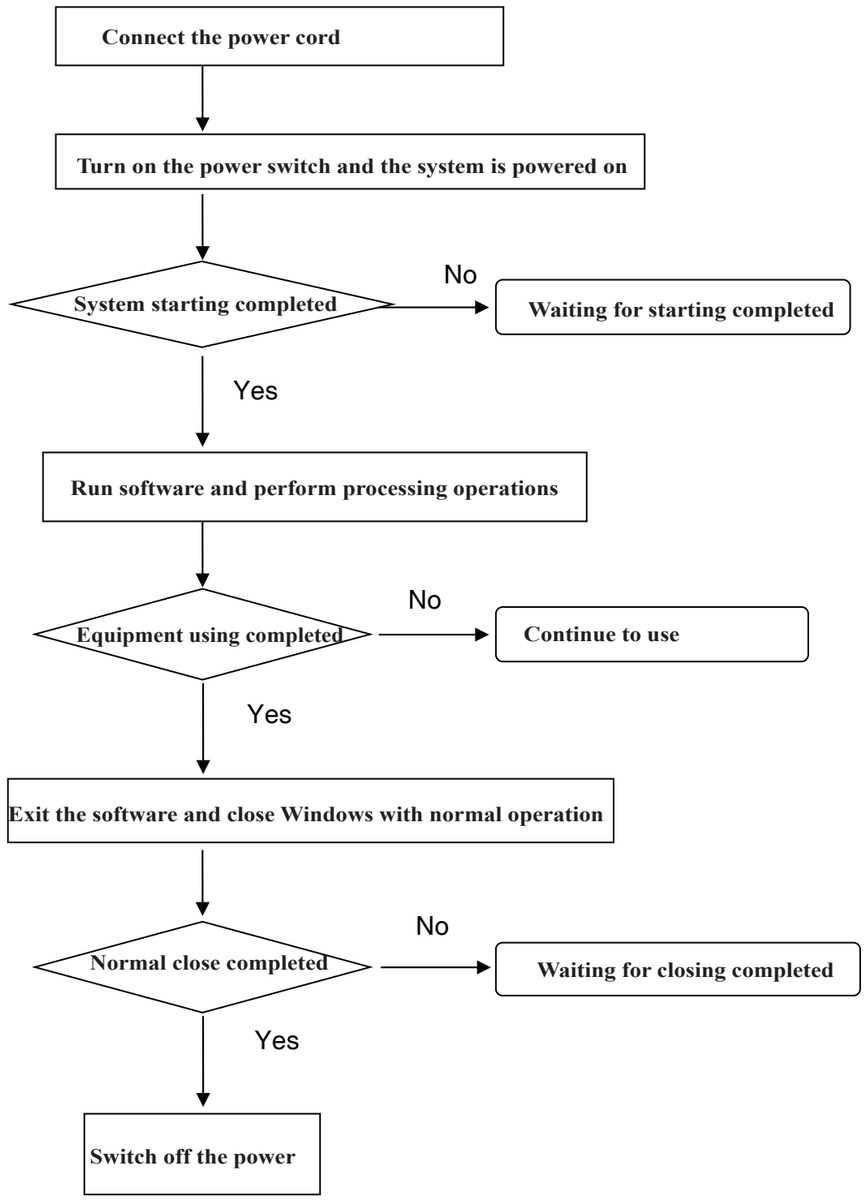
APPENDIX I EQUIPMENT OVERALL OPERATION FLOW CHART



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