

# Instruction manual

## Maintenance and Service Manual

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# 1. Repair and Maintenance

The operators of the machine tool must understand the structure and performance of the machine tool and get good command of various using functions and operation methods of various operation parts and components.

Repair and maintenance are critical factors with significant importance to the machining precision and service life of the machine. Besides various checks and confirmations before the startup of the machine tool on each day, a sound maintenance of machine tool should also attach high importance on “Periodical Maintenance and Cleaning”.

Tidy, neat and clean working environment is the primary condition for the repair and maintenance work because dirt and mess (like dust, oil containments and humidity) would accelerate the deterioration of the machine components and electrical contacting points of the machine, which would affect the original functions of the machine and the machining precision and service life of the machine and components.

Before the implementation of maintenance and services, it is necessary to prepare detailed plan in advance. During the maintenance process, various records should be maintained for the reference of application period of components and inventory keeping of spare parts (Under normal using status, components may reach their corresponding durability period due to long time use. The components exceeding durability may result in the over tolerance of the work piece machined by the machine tool or result in shutdown of the machine tool. Therefore, the warehouse should have such components available for replacing ones exceeding the durability period).

(I) For safety consideration, the doors of all electrical cabinets and operation boxes and protective shields should not be opened unless in the periodical maintenance process.

(II) Please do not use compressed air to clear the machine to other electrical devices because the dirt and mess (like dust, oil containments and scrap iron) would have the

tendency to entering into the bearing, ball screws and so forth, which would shortened the service life of components.

(III) When the repair and maintenance personnel have entered into the moving range of the working bench of the machine tool, please shut down the power switches of all operation panels and electrical boxes. Please prepare some wasted paper board or wooden boards and cover them onto slippery ground to prevent the maintenance personnel from falling off.

## **1.1 Maintaining for Machining Precision**

(1) Before operation, warm up the machine first and the check the necessity of adding oil in various oil filling positions.

(2) Check and guarantee the unblocking of oil line.

(3) Under shutdown status, working sleeves and saddle seat should be located at the central position of the machine (move three spindles to the central positions of their corresponding strokes).

(4) Upon the completion of each day's work, it is necessary to clean and sort tools and appliances. Periodical checking and maintenance should be arranged for the machine tool at certain intervals (weekly and monthly).

(5) Please keep the machine clean.

(6) The machine should be kept away from the vibrating zone and the foundation should be stable.

## **1.2 Maintenance and Service Cycle**

### **1.2.1 Daily Maintenance and Service**

(1) Clear off the iron scraps and oil dirt on the working bench, within the machine and extendable protective shields of the three spindles.

(2) Wipe off the machining oil and tiny iron scraps on the working bench, within the machine and extendable protective shields. Moreover, rust preventing oil should be applied.

(3) Please keep the main spindle taper hole clean and use taper hole of main spindle to wipe the hole upon the completion of the machining process.

- (4) Clean the tool storeroom, storeroom chassis and connection rod group, and spray some lubricating oil.
- (5) Clean the rail for the tool holding finger on the main spindle head and apply some lubricating oil.
- (6) Check the sufficient status of the oil level in the three-point combined oil cup and release the moisture in the dim spot combined air filter water and oil cup.
- (7) Check whether the three-spindle automatic lubricating pump could start working after the connection of power supply (the interval should be 15 minutes and the oil feeding volume is about 3cc to 6cc).
- (8) Check the oil level of three-spindle automatic lubricating oil and add some oil if necessary.
- (9) Check the existence of leakage in the oil hose of the hydraulic oil unit.
- (10) Remove the iron scraps on the supporting filter mesh for iron scraps.
- (11) Check the oil level of the machining liquid and add some if necessary. Check the existence of leakage in the chip flushing pipe of machining liquid.
- (12) Check all signal lamps and check whether alarming lamps for abnormalities could work normally.

### **1.2.2 Weekly Maintenance and Service**

- (1) Check whether the pulling plug of the tool is loose and whether the tool holder is clean.
- (2) Check and clean the inner hole of the main spindle, and check whether the taper grinding surface has any scratches (like scuff marks that may be resulted from the dirt on the tool and inner hole of the main spindle).
- (3) Check the oil level in the oil tank.
- (4) Check the status of circulated oil feeding and the working bench of the feeding pumps for oil.
- (5) Inspect the offset of three-spindle mechanical original point.
- (6) Clean the filter screen of the machining oil tank.
- (7) Check the working status of all cooling fans.

- (8) Check whether the tool changing arm would act smoothly.
- (9) Check whether the cutter head of the tool storeroom could revolved smoothly.

### **1.2.3 Monthly Maintenance and Service**

- (1) Clean the operation panel, electrical box and thermal exchanger net.
- (2) Inspect the levelness of the machine, confirm the horizontal adjustment screws and check the loosening status of the fixing screw cap.
- (3) Inspect the perpendicularity between the center of the main spindle and the working surface.
- (4) Inspect the limits of the three spindles and check whether the micro switch could act normally.
- (5) Rinse the machining water tank and clean the machining liquid and flushing pump.
- (6) Check whether there is any oil dirt and dust in the electrical cabinet. If necessary, clean them and find out the reasons for such dirt.

### **1.2.4 Maintenance and Service in Each Half Year**

- (1) Clean the CNC control unit and the operation panel.
- (2) Dismount the protective shield of the three spindles, and clean the oil pipe connectors of the three spindles, ball screws, three-spindle limits and micro switch for the original points. Meanwhile, check and guarantee their proper functionality.
- (3) Clean all motors.
- (4) Replace the oil in the oil pressure units and oil in the ATC reducing mechanism.
- (5) Test whether motors would have any abnormal noises during the startup process.
- (6) Test all electrical components, units, relays and high voltage distributors.
- (7) Clean lubricating pump and oil tank, and inspect the connection points of all internal circuits.
- (8) Test the back clearance of various spindles and adjust the correction value if necessary and adjust the gap of wedge of various spindles.

- (9) Inspect and clean all cooling fans and guarantee their proper functionalities.
- (10) Clean the inner side of the electrical cabinet and operation cabinet.
- (11) Write test program and inspect the working status of various relative functions.
- (12) Check whether the amplitude of the main spindle RUN OUT is too large, and whether the gaps among bearings of the main spindle is under normal status.
- (13) Check whether bolts or screw caps become flexible.
- (14) Check the sufficiency status of the lubricating grease in various sliding rails.
- (15) Comprehensively check the working status of various connection points, connectors, sockets and switches.
- (16) Comprehensively check the insulation resistance and make corresponding records.

## **1.2.5 Annual Maintenance and Service**

- (1) Check the sensitivity of the keys on the operation panel.
- (2) Use cleaning cloth with alcohol to wipe off the carbon deposition accumulated on the relay contacts of all relays in the relay cabinet and operation cabinet.
- (3) Check whether the chains of balance weight are under normal status and apply lubricating oil on the chains.
- (4) Clean the machining water tank and replace the old machining oil with new oil with same nature.
- (5) Clean oil pressure unit and replace the oil with new oil. Meanwhile, inspect whether the adjustment pressure in the setting is under normal status.

## **1.3 Cleaning of Electrical Cabinet**

### **1.3.1 Filtering Mesh**

- (1) The filtering screen of the electrical cabinet should be maintained and cleaned in each month. Compressed air could be used to clean the filtering screen. Please dismount the filtering screen before cleaning.
- (2) The filtering screen for iron scraps on the machining liquid tank should be cleaned in each week.

### **1.3.2 Cooling Fan**

(1) The cooling fan of the motor on the main spindle should be cleaned once in each half year. The maintenance personnel should dismount the blades of the cooling fan, wipe them off and then install them back.

### **1.3.3 Maintenance and Cleaning for the Inner Sides of the Electrical Cabinet and Operation Cabinet**

- (1) Check whether air switches are under normal working status.
- (2) Check whether the fixing screws of circuit connectors become flexible.
- (3) Check whether the transformer has resulted in any high temperature.
- (4) Clean the dust periodically and avoid using compressed air to clean them.
- (5) Check whether the contact points of relays have excessive dust.

## **2. Lubricating System**

### **2.1 Lubricating Oil**

(1) Oil for Pneumatic System (Three-point combination)

(A) Check the oil in the pneumatic system and add appropriate amount in case of insufficient oil in the oil cup.

(B) Check the three-point combined filter water cup of the pneumatic system and periodically remove the filtered water in the air of the water cup periodically.

(C) Please use lubricating oil with specified specification or replaced lubricating oil equivalent with the specified specification.

(2) Oil for Automatic Lubrication (Rail Oil)

(A) Check the oil level of the automatic lubrication oil injector periodically  
(check once per each two to three days)

(B) Please use the lubricating oil with specified specification or use lubricating oil with equivalent specification.

(3) Oil for Hydraulic System (Oil pressure unit)

(A) Check the sufficient status of oil level in the oil pressure tank periodically.

(B) In case of insufficient oil volume, please use the hydraulic oil with same

specification.

(C) Please replace all hydraulic oil periodically in each half year.

(4) Oil for the Reducer of Tool Storeroom

(A) Replace the oil for reducing unit periodically in each two years.

(B) Please use the oil with appropriate specification.

(5) Oil for Lubricating System

Oil Adding Position	Oil Feeding Volume	Oil Used	Oil Feeding Time
Rail Oil	20cc	R68	Set at once per 75 minutes
Three-point Combination	3~5cc	R10	Oil injection in case of air blowing
Cooling of Main Spindle	7.2l/min	R 10	Circulated oil feeding
	12l/min	R32	

## 2.2 Lubrication

(1) The three-spindle ball screw rod adopts automatic lubrication method (the interval is 75 minutes and the oil feeding volume is from 3cc to 6cc). The ALARM information (lubricating lacking) would occur when the oil in the lubricating tank is insufficient. The ALARM would be relieved after appropriate amount of lubricating oil has been added.

(2) In case of the generation of above ALARM of lubricating oil during the implementation of program under automatic memory mode, the program would enter into PAUSE status after implementing single section of the program. After the removal of the ALARM, press automatic implementation switch (CYCLE START) and the program would continue implementing the next single section.

(3) Adjust the oil volume according to the needle valve of the three-point combined oil cup, and add spindle oil (oil with low viscosity) periodically mix with water in air and reach the objective of lubrication.

(4) The APC oil tank should use hydraulic circulation oil with specified specification and factory and should be replaced periodically (change once per each half year).

(5) The tool storeroom reducer should use the special oil for reducer with oil with



specified specification and factory and should be replaced periodically (change once per each three years).

(6) The capacity of rail lubricating oil tank is 1.6 liters. Please check once in each three days and add appropriate amount according to the situation.

(7) The capacity of the cooling liquid tank for machining is from 873 to 1048 (gear drive is from 1700 to 2200) liters. Please check the liquid level in each week and make appropriate adding according to the actual situation.

(8) During the maintenance and service in each half year, dismount the protective shield of various spindles, clean the ball screw rods of various spindles, and check the oil feeding status of ball screw under automatic lubrication of various spindles. Users could also clean the lubrication positions of various spindles, implement full stroke of various spindles and rapidly move the spindles to judge the oil supply status of automatic lubrication system.