

GE FANUC 0i MC

MAINTENANCE MANUAL



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1.0

MACHINE MAINTENANCE

1.1 WAYS LUBRICATION

Lubrication is essential for the free motion of the balls, saddle, and head, as well as for the nut on each ballscrew. Each way and ballscrew must be lubricated to minimize both the wear on the machine and the excess heat generated by friction. The lubrication system must be inspected and serviced regularly. Inspect all of the ways to confirm that each way is getting lubricated. The lubrication system may need to be flushed by a qualified service person to remove any contaminants on the inside of the tubes and joints.

Waylube System

USE WAYLUBE TYPE Castrol Magna BD68, Shell Tonna 68V or Mobil Vactra Oil #2.

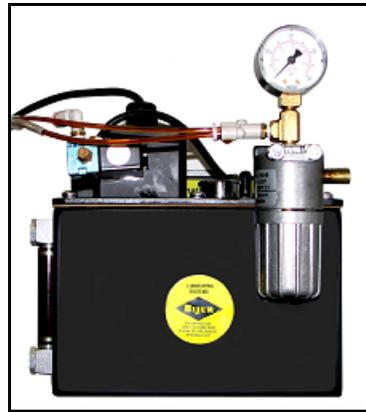


Figure 1-1: Waylube system

The Positive Displacement Injection (PDI) lube system is a solenoid-controlled pneumatic system. When the solenoid is activated, the pump sends oil to the junction block assemblies, which may contain several different size valves, at a pressure ratio of 5:1. The pump is activated for 10 seconds, within a 4 minute cycle, during which oil is distributed to all of the valves on the junction block assemblies. When the solenoid is deactivated the oil flow stops and creates back pressure which escapes through a relief valve. When the pressure on the valve drops below 50 psi, a spring inside the valve is then able to inject oil into the lines.

The CNC has direct control of the automatic lube system. The cycle is activated by executing an axis motion in a CNC program, commanding an axis move in MDI mode or pressing the JOG key. Once activated it monitors the oil level to be sure the reservoir is above the minimum level. In addition, it shuts the oil system down if the machine sits idle longer than one cycle of the lube system.

Frequently clogging filters indicate that the wrong waylube is being used. Replace the External filter on the BIJUR PDI way lube pump.

1.2 COOLANT TRAY

Remove all the chips from the coolant tray (located on the back side of the x-axis) regularly.



Figure 1-2: Coolant Tray

1.3 SPINDLE

It is the recommendation of the Engineering Department in conjunction with the bearing manufacturers that the following procedure be followed to increase spindle life under extreme operating conditions.

Spindles operating under 8,000 RPMs need no cool down period regardless of on time or load to the tool.

1.3.1 8K (10K OPT) GREASE PACKED SPINDLES

Fadal recommends that Spindles operating at over 8,000 RPMs for extended periods of time should be shut down for a period of at least 20 minutes after every 5 hours of continuous operation. This will allow cooling of the races and re-lubrication of the grease lubricated bearings. The actual load to the spindle is not a factor at higher RPMs. The time period should be monitored as closely as possible to increase spindle life.

The 8K and 10K grease packed spindles are self contained units.

These spindles are belt driven and require no maintenance. There is air supplied to the spindle on the top and bottom for positive pressure.

These spindles are self-contained, therefore they should be replaced when bad. The 8K spindle has a locking drawbar and the 10K has a locking drawbar.

1.3.2 AIR OIL SPINDLE (OPT)

Fadal Air/Oil Lubricating System delivers high-efficiency lubrication and cooling for high-speed spindles and other surfaces requiring accurate oil deliveries. The advanced design delivers precise amounts of lubricant and eliminates residual drift of "oil fog" or mist during operation. The 16K air/oil system consists of a spindle, a spindle lubricating oil supply pump, a vacuum pump, a positive displacement injector (PDI) block, a coalescent filter, four pressure switches (2-15psi, 1-80psi, 1-265psi) mounted on a pressure switch manifold,

an electronic control board with wire harness, and various standard plumbing parts. This spindle is also belt driven. The electronic control board controls the ON time of solenoids for oil and air while monitoring:

- Supply oil pressure
- Oil reservoir level
- Air filter
- Supply air pressure
- Air/oil pressure to the upper and lower bearings of the spindle

The pump pressurizes oil to the PDI block. Oil pressure is monitored by an oil pressure switch. Air is supplied to the PDI block through a coalescing filter from a solenoid valve. Air pressure to the machine is monitored by an air pressure switch. The PDI block mixes air and oil. The two lines carry the air/oil mixture to the upper and lower bearings. The pressure of each line is monitored by a pressure switch. A vacuum pump is used to remove any oil that blows by the upper or lower bearings, to reduce oil leakage.



Figure 1-3: Air Oil System

1.4 AUTOMATIC TOOL CHANGER (ATC)

The maintenance schedule is based on machine usage of eight hours a day, five days a week:

Daily

1. Clean the tool changing mechanism off all debris before any operation.
2. Tool in spindle blow chips from around A.T.C. and slide. NEVER blow chips from around these areas during automatic tool change or without a tool in the spindle. (Do not use regular water to clean inside mechanism of A.T.C.)
3. Wash A.T.C. area.

Weekly

1. Clean A.T.C. slide.
2. Inspect the parts of the tool pockets and tool retention rings for damage and tightness.

Monthly

1. Clean carriage plate bearing track from the chips.
2. Lubricate carriage plate with grease.



Figure 1-4: Carriage Plate Bearing Track

1.5 FUSES

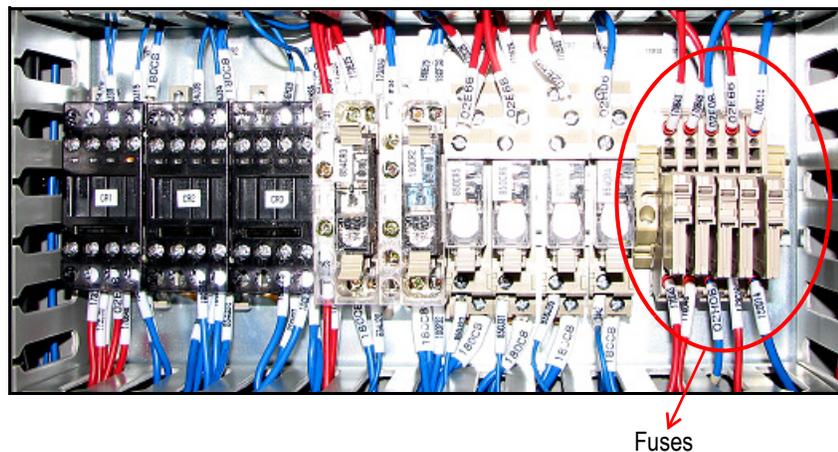


Figure 1-5: Fuses

There are only 5 (five) fuses located in the electrical cabinet. Check them regularly.

1.6 CE DOOR

To ensure the proper function of Safety Circuits, perform the following tests on a regular bases:

Daily

1. Close the front doors. Make sure VMC is not in emergency stop.
2. Start spindle at slow speed.
3. Open front door; the spindle should stop immediately (fully stopped from any speed in less than 5 seconds). Five to ten seconds after the door is

opened, the spindle contactor will open. (Five to ten seconds delay allows the spindle to come to a controlled stop.)

4. Close the front doors. The spindle contactor should immediately re-energize.

Weekly

1. Close the front doors. Make sure VMC is not in emergency stop.
2. Open the electrical cabinet containing Door Interlock Board and examine LEDs and relays on the board.
 - Heart LED should be blinking.
 - Red door LEDs should be off.
 - Yellow door LEDs should be off.
 - Green "Doors Closed" LED should be on.
 - Red Slidehold LEDs should be off.
 - Estop relay (K7) should be on (LED lit).
 - Green "Spindle Enable" LED should be on.
 - "Spindle" relay for spindle contactor (K5) should be on (LED lit).
3. Press the Emergency Stop switch.
 - Heart LED should stop blinking.
 - E-stop relay should go off immediately.
 - Spindle Enable LED and Spindle relay should go off after 5 to 10 seconds. Spindle contactor should then release.
4. Release the Emergency Stop switch and clear the emergency stop condition by pressing Jog.
5. Open the front door.
 - Heart LED should stop blinking.
 - Front door red LEDs should be on.
 - Green "Doors Closed" LED should be off.
 - The yellow LED for the front door should flash at the instant the door is opened.
 - Spindle Enable LED and Spindle relay should go off and Spindle contactor should release after 5 to 10 seconds.
6. Close the front door and open left side door.
 - Heart LED should stop blinking.
 - Left door red LED's should be on.
 - Green "Doors Closed" LED should be off.
 - Yellow door LED should flash at the instant the one door is closed and when the other door is opened.

- Spindle Enable LED and Spindle relay should go off and Spindle contactor should release after 5 to 10 seconds.
7. Close the left side door and open right side door.
- Heart LED should stop blinking.
 - Right door red LED's should be on.
 - Green "Doors Closed" LED should be off.
 - Yellow door LED should flash at the instant the one door is closed and when the other door is opened.
 - Spindle Enable LED and Spindle relay should go off and Spindle contactor should release after 5 to 10 seconds

1.7 SPINDLE COOLING SYSTEM (OPT)

The spindle cooling system is made up of a motor pump assembly, ambient-liquid temperature sensor assembly and a DP5P chiller. As long as there is power to the machine the chiller pump is circulating Dowfrost through the system. The ambient sensor is used to measure casting/air temperature and the liquid sensor to measure Dowfrost temperature in the return line. When there is a one degree temperature differential between the two sensors the chiller is then powered on. A refrigeration unit, coupled to a thermostat, is used to control the temperature of the fluid, which consequently conditions the temperature of spindle as the fluid flows through.



Figure 1-6: Spindle Cooling System

1.7.1 PUMP FILTER

There is a small filter and pressure gauge located on the pump head assembly. Normal pressure is 3-5 pounds. If the pressure gauge shows a pressure above normal the filter should be inspected and cleaned.



Figure 1-7: Pump Filter

1.7.2 TANK RESERVOIR

The tank reservoir is located next to the motor pump assembly in the chiller cabinet. The tank has a 2 1/2 gallon capacity. Visually check the fluid level with the machine powered on. If the fluid level is less than 1/2 of the tank, mix the Dowfrost to a 50:50 solution, with deionized water, or sodium free distilled water and fill to fill level indicator.



Figure 1-8: Tank Reservoir

Source for Dowfrost:

GOLDENWEST LUBRICANTS

1816 POTRERO AVE., SOUTH EL MONTE, CA 91733

(626) 443 - 3441; (800) 540 - 5823

Do not accept any substitutes for DOWFROST!

Pressure

The cooling system should maintain a constant pressure of 3 to 5 psi.

If the pressure rises, the following conditions may exist:

- clogged pump filter;
- pinched coolant lines.

If the machine is losing pressure and the Dowfrost level keeps dropping, the following conditions may exist:

- there is a hole in one of the lines;
- loose fitting.

1.8 CONVEYOR (OPT)

Please carry out daily, monthly, and yearly inspection according to the following directions.

1. Check motor for abnormal operation, i.e. noise, heat, excessive current, etc.
2. Discard chips on the surface of the belt and inside of frame (place a rag on the belt and reverse until the rag is discarded).

1.9 CHILLER COOLANT (OPT)

The configuration, the coolant and the amount of coolant will affect the cooling process. If the tank is full the tem

perature swings are larger then if the tank is low because more fluid is required to cool and larger temperatures range from top to bottom of the tank.

1.9.1 CUTTING FLUIDS

Some types of coolant have a tendency to swell the motor cover gasket and attack the sealing compound. If this occurs, we recommend switching coolants. Wynns 941 has shown to be a satisfactory coolant.

Using soluble and synthetic coolants that are mixed with water is the single most effective factor in removing the heat generated during cutting. Coolant is formulated specifically to absorb a great deal of heat within its molecular structure without having to radiate that heat onto the next material it contacts. Cutting oils are formulated for cutting, and lack the cooling quality of soluble and synthetic coolants mixed with water. Flood coolant is a better choice than either mist coolant or cutting oils because it benefits the cutting process in addition to providing heat removal.

The temperature of the coolant can be conditioned further through any of a few simple actions. Bags of ice floating in the coolant tank can be used to maintain the temperature. Pumping the coolant through a radiator, or through a copper coil in the coolant tank, or through a copper coil placed in a small refrigerator can all be used to condition the temperature of the coolant.

One side benefit of coolant is its cooling effect on the table as well as the part. As it is splashed around, the coolant's direct contact and its evaporation tends to keep the table at or near the temperature of the coolant, directly compensating for the effect of hot chips falling on the table. If the coolant temperature is being conditioned through some of the steps just mentioned, the thermal stability of the table benefits even more.

NOTE

Some types of coolant have tendency to swell the motor cover gasket and attack the sealing compound. If this occurs, we recommend switching coolants. WYNNS 941 has shown to be satisfactory coolant.

1.10 ROTARY TABLE (OPT)

Face Plate

The rotary table face plate and any tooling must be free from chips and dings. Stone both surfaces and wipe clean.

Serialized Matched Sets

Rotary tables heads are serialized. FADAL maintains a record of the center line height of all serialized heads and tail stocks. If a customer desires at a later date to purchase a matching component, this may be easily accomplished.

1.10.1 SCHEDULE

Daily

Clear away chips and debris from face plate.

Weekly

Check oil level.

6-12 Months (depending on usage).l

Check oil and change if necessary.

As a replacement oil use:

MOBILGEAR 626
LUBRICATION OIL
ISO VG 68

WARNING!

Do not attempt to perform maintenance until you have read and completely understood the contents of the following instructions. Maintenance depends on the rotary table model. Disassemble and remove rotary table for the maintenance purposes.

The gear oil is the primary concern in rotary table maintenance. A small amount of oil can be trapped in bottom of sight gage making it appear that the appropriate oil level is in the unit when actually the oil level may be dangerously low.

To change the gear oil , follow these steps:

VH 175, VH 225

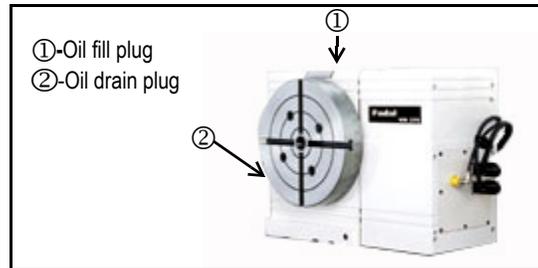


Figure 1-9: Rotary table

1. Remove the pipe plug located on the back side of the rotary table.
2. Drain oil completely.
3. Install drain plug.
4. Remove the pipe plug located on the top of the rotary table.
5. Add oil to the indexer.
6. Re-install the pipe plug.
7. Check the oil level.

The oil level is checked by viewing the oil level sight gage on side of the unit.

VH 165

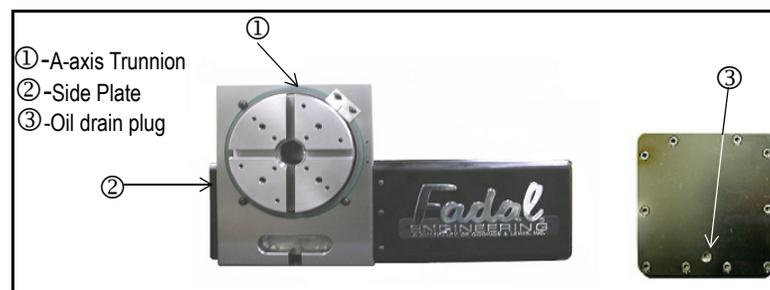


Figure 1-10: Rotary Table

1. Remove the pipe plug located on the side plate of the rotary table.
2. Drain oil completely.
3. Use teflon tape to tape the pipe plug 2.5 turns.
4. Re-install the pipe plug back to it's appropriate position.

1.11 COOLANT THROUGH SPINDLE (OPT)

5. Remove 1/2-14 NPT pipe plug located on the top of the A-axis.
6. Fill it with recommended oil.
7. Use teflon tape to tape the pipe plug 2.5 turns.
8. Re-install the pipe plug.
9. Check the oil level. The oil level is checked by viewing the oil level sight gage.

FADAL's Coolant Through Spindle option is designed to work in conjunction with specific tooling (with a hole in the center) to allow coolant to be pumped deep into the part, where normally coolant does not reach. This significantly improves the rate at which heat is removed from the area of the cut, reducing the expansion of the part material. In addition, there is less heat to be transferred through the tool to the spindle and the head, so expansion of the spindle and the head is also significantly reduced, improving Z axis positioning and accuracy.

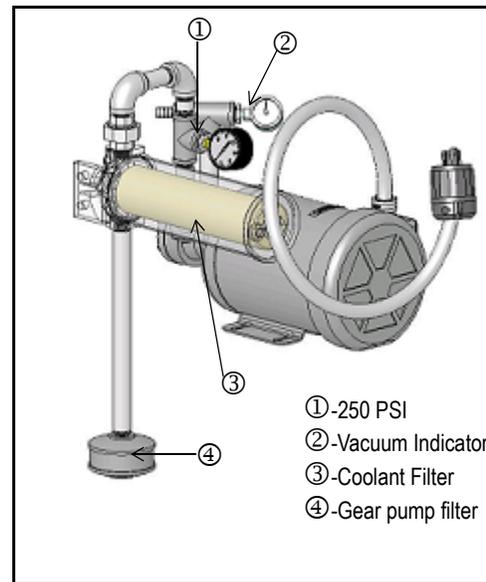


Figure 1-11: Coolant through pump

Coolant through spindle requires the following maintenance:

1. If vacuum indicator shows above 20Hg, change the coolant filter.
2. Check and make sure the coolant tank is at least 3/4 full; if coolant is low, this can damage the pump.
3. If Machining ceramic or Material with a very small and abrasive chips, it is recommended to use 10μ (micron) filter instead of 100μ, which is Factory installed.
4. Pump comes with Factory sitting and 250PSI, changing it might cause the damage of the seal system.
5. Clean gear pump filter strainer weekly. (Lift the pump and rinse it.)

2.0

GENERAL

2.1 MAINTENANCE LABEL

Refer to maintenance and lubrication label for proper maintenance.

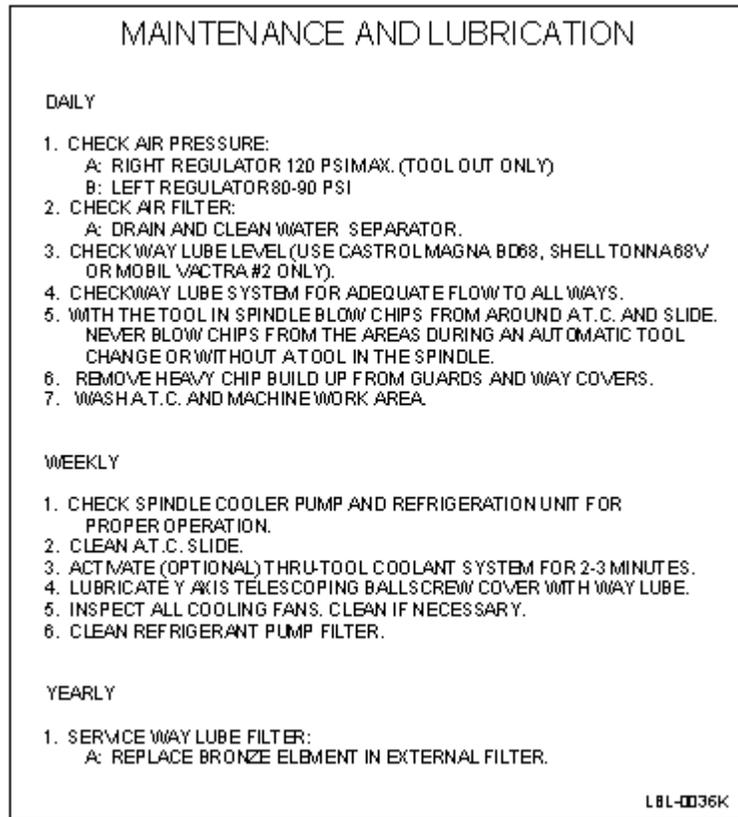


Figure 2-1: Maintenance Label

2.2 WARM UP

The first step in combating thermal expansion effects is also the simplest. Run the machine through a series of moves, at feeds and speeds equivalent to what will be encountered in the production run, long enough to reach an equilibrium; that is, where the amount of heat being generated is balanced by the amount of heat being removed (via convection, evaporation, or absorption through expansion of material). After that point is reached, the effect of thermal expansion in the VMC stabilizes.

Locate fixture offsets and establish tool length offsets after the machine has attained the optimum operating temperature. Avoid using moves or spindle speeds that exceed those used in the part program.

In addition to running a warm up routine at the beginning of the production shift, the same kind of routine can be run during breaks. This will maintain the VMC at operating temperature, especially the two subsystems that heat up or cool down the most (the spindle and the ball screws).

**2.3 ROUGH CUT/
COOL DOWN/
FINISH CUT**

A complement to the warm up of the VMC is the use of a rough cut to remove most of the material from the part. Although the part material heats up, the material can then be cooled to a stable temperature. Then, a series of finish cuts can complete the part in a short time, so that the material doesn't have time to expand beyond acceptable tolerance.

This process is also effective for inspecting parts. By cooling the part prior to the finish cuts, the temperatures at final cut and at inspection can be brought closer. In this situation, the target temperature should also be close to the temperature at which the gauge is calibrated.

**2.4 MONITORING
POSITION
CHANGES**

The home position of the part will change as the temperature of the ballscrews change. The operator can follow the home position changes throughout the production run and change the fixture home position and offsets accordingly.

2.5 FLUIDS

Recommended fluids

SECTION	USE
Waylube	CASTROL MAGNA BD68 SHELL TONNA 68V or MOBIL VACTRA #2
Spindle Cooling System	DOWFROST CLEAR (Mixed 50/50 with de-ionized water or sodium free distilled water)
Rotary Tables	MOBIL GEAR 626
Hydraulic Hi/Low	MOBIL DTE HEAVY MEDIUM
Hydraulic Brake	HYDRAULIC OIL 32
Dual Tool Changer	SAE 90-140, (approximately 1.3 gallons, (5 liters))

**2.6 MAINTENANCE
CHART**

WARNING!

Before carrying out any maintenance operations, ensure that the machine is safe to work on and electrical power is switched OFF.

Maintenance Chart

SCHEDULE	2216 & 3016
DAILY	<ul style="list-style-type: none"> • Check way lube system for adequate oil flow to all way surfaces. • Check way lube level. Use Castrol Magna BD68, Shell Tonna 68V or Mobil Vactra #2 or equivalent. • Check coolant level. • Clean coolant screen. • With tool in spindle blow chips from around A.T.C. and slide. NEVER blow chips from around these areas during automatic tool change or without a tool in the spindle. • Wash A.T.C. and machine work area. • Clear the tool changing mechanism of all debris before any operation. • Inspect the parts of the tool pockets, tool carrier, and tool retention rings for damage and tightness. • Remove heavy chip build up from guards and way covers. • Check air pressure (air pressure depends on VMC model) • Clean the area around the machine. • Immediately clean any spills in the area. • Remove the chips and debris surrounding the proximity switch inducing box. • Remove the chips and debris that have accumulated on the inverted moving body of the tool pot.

Maintenance Chart

SCHEDULE	2216 & 3016
WEEKLY	<ul style="list-style-type: none"> • Check spindle cooler pump and refrigeration unit for proper operation. • Check fluid level of chiller tank and refill, if needed, with a 50/50 mix of Dowfrost clear and de-ionized water. If de-ionized water is not available, sodium-free distilled water can be substituted. <i>Do not accept any substitutes for DOWFROST CLEAR!</i> • Activate Thru-Tool coolant system for 2-3 minutes (if machine has this option). • For high torque and high speed machines, check fluid level in the hydraulic actuator reservoir. Refill, if needed, with Mobil DTE Heavy Medium. • Clean A.T.C. slide. • Grease axis way cover using molygraph. • Grease retention rings using molygraph. • Grease Geneva wheel and gear using Copr-Kote. • Check air regulator. • Drain and clean water separator. • Inspect all cooling fans, clean screens if necessary.

Maintenance Chart

SCHEDULE	2216 & 3016
MONTHLY	<ul style="list-style-type: none"> • Keep correct tension of conveyor chain by adjusting take-up bearing. • Check roller chain between motor and conveyor for proper alignment and correct tension. • The greatest care should be exercised to keep friction surface of torque limiter free from oil when lubricating roller chain. • Change conveyor oil at 100 hours initially, every 1,500 to 2,000 hours thereafter. • Check motor for abnormal operation, i.e. noise, heat excessive current, etc. • EVERY 4 MONTHS. Replace service way lube filter. Machines with an external filter require less frequent replacement; however, do not exceed 4 months. When replacing the external filter, fill the new filter with way lube prior to installation.
YEARLY	<ul style="list-style-type: none"> • Carry out all monthly inspection items. • Check bolts for looseness. • Check electrical connections for looseness. • Check friction disk for abrasion, and replace if necessary.

3.0

OPTIONS

3.1 CONVEYOR

Please carry out daily, monthly, and yearly inspection according to the following directions.

1. Check motor for abnormal operation, i.e. noise, heat, excessive current, etc.
2. Discard chips on the surface of the belt and inside of frame (place a rag on the belt and reverse until the rag is discarded).

3.2 CHILLER COOLANT

Different models of the VMC have different coolant configurations.

The configuration, the coolant and the amount of coolant will affect the cooling process. If the tank is full the temperature swings are larger than if the tank is low because more fluid is required to cool and larger temperatures range from top to bottom of the tank.

VMC 2216 / 3016 / 4020 Metric balls-crews, 10,000 RPM Spindle Configuration

The coolant flow path is coolant tank to pump to coolant sensor to X axis ballscrew to Z axis ballscrew to spindle to Y axis ballscrew to chiller and back to coolant tank.

VMC 6030 / 8030 10,000 RPM Spindle Configuration

The coolant flow path is coolant tank to pump to spindle to Y axis ballscrew to coolant sensor to chiller and back to coolant tank.

3.2.1 CUTTING FLUID

Some types of coolant have a tendency to swell the motor cover gasket and attack the sealing compound. If this occurs, we recommend switching coolants. Wynns 941 has shown to be a satisfactory coolant.

Using soluble and synthetic coolants that are mixed with water is the single most effective factor in removing the heat generated during cutting. Coolant is formulated specifically to absorb a great deal of heat within its molecular structure without having to radiate that heat onto the next material it contacts. Cutting oils are formulated for cutting, and lack the cooling quality of soluble and synthetic coolants mixed with water. Flood coolant is a better choice than either mist coolant or cutting oils because it benefits the cutting process in addition to providing heat removal.

One side benefit of coolant is its cooling effect on the table as well as the part. As it is splashed around, the coolant's direct contact and its evaporation tends to keep the table at or near the temperature of the coolant, directly compensating for the effect of hot chips falling on the table. If the coolant temperature is being conditioned through some of the steps just mentioned, the thermal stability of the table benefits even more.

NOTE

Some types of coolant have tendency to swell the motor cover gasket and attack the sealing compound. If this occurs, we recommend switching coolants. WYNNNS 941 has shown to be satisfactory coolant.

3.3 TOOL CHANGER**3.3.1 AUTOMATIC
TOOL CHANGER
(A.T.C.)**

The maintenance schedule is based on machine usage of eight hours a day, five days a week:

Daily

1. Clean the tool changing mechanism of all debris before any operation.
2. Tool in spindle blow chips from around A.T.C. and slide. NEVER blow chips from around these areas during automatic tool change or without a tool in the spindle. (Do not use regular water to clean inside mechanism of A.T.C.)
3. Wash A.T.C. area.

Weekly

1. Clean A.T.C. slide.
2. Inspect the parts of the tool pockets and tool retention rings for damage and tightness.

Monthly

1. Clean carriage plate bearing track from the chips.
2. Lubricate carriage plate with grease.

Yearly

1. Check tension on A. T. C. belt.



Figure 2-1: Carriage Plate Bearing Track

3.3.2 DUAL ARM TOOL CHANGER (D.A.T.C)

The lubricant inside the lubricant container of the tool changing mechanism should be changed after working for 2400 hours. When the cam, rollers and the bevel gear are in use without lubricant, abnormal wear and fractures will occur. Appropriate quantity of lubricant should be a little more than half of the lubricant container.

The lubricant should be changed annually or when the lubricant becomes contaminated. Recommended lubricants viscosity: SAE 90-140.



Figure 2-2: DATC Oil Glass Gage

Follow the instructions from the maintenance (yellow) label below the DATC oil glass gage. Amount of lubricant:

- 40 Taper - fill oil to the middle line of oil glass about 6 liters.
- 50 Taper - fill oil to the middle of oil glass about 10 liters.

The maintenance schedule is based on machine usage of eight hours a day, five days a week:

The parts which should be checked and replenished with grease periodically:

Daily

1. Remove the chips around all the proximity switches and reed switches.
2. Remove the chips inside the tool pot.
3. Clean the tool changing mechanism so that the chips can not stick on it.
4. Check the pocket mechanism parts.

Weekly

1. Grease tool arm gripper.
2. Grease tool arm holding rod (head) sliding block of pocket mechanism.
3. Grease positioning block of pocket mechanism.
4. Grease tool magazine.
5. Check the parts of tool pots and tool disc and also check if "C" snap rings are tight

3.4 ROTARY TABLE

Monthly

1. Check tool arm plunger.
2. Check tool arm wear-resistant hold down plate.

Every 6 months

1. Check tool arm plunger.
2. Check too arm tool holding rod.
3. Replenish with grease tool pot roller wheel.
4. Replenish with grease tool magazine driving roller.
5. Replenish with grease index mechanism cylindrical cam.

Face Plate

The rotary table face plate and any tooling must be free from chips and dings. Stone both surfaces and wipe clean.

Serialized Matched Sets

Rotary tables heads are serialized. FADAL maintains a record of the center line height of all serialized heads and tail stocks. If a customer desires at a later date to purchase a matching component, this may be easily accomplished.

3.4.1 GEAR OIL

Daily

Clear away chips and debris from face plate.

Weekly

Check oil level.

6-12 Months (depending on usage).

Check oil and change if necessary.

As a replacement oil use:

MOBILGEAR 626
LUBRICATION OIL
ISO VG 68

WARNING!

Do not attempt to perform maintenance until you have read and completely understood the contents of the following instructions. Maintenance may vary depending on the rotary table model. Disassemble and remove the rotary table for maintenance purposes.

The gear oil is the primary concern in rotary table maintenance. A small amount of oil can be trapped in bottom of sight gage making it appear that the appropriate oil level is in the unit when actually the oil level may be dangerously low.

To change gear oil, follow these steps:

V300/V400

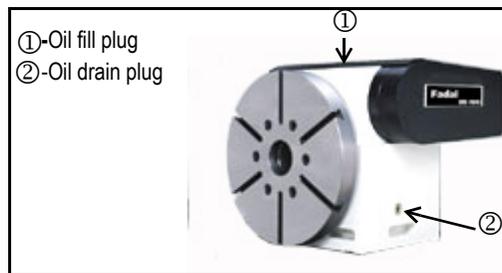


Figure 2-3: V400

1. Remove 7/8-14 UNF pipe plug located on the side of the rotary table.
2. Drain oil completely.
3. Install drain plug.
4. Remove the 7/8-14 UNF pipe plug located on the top of the rotary table.
5. Add oil.
6. Re-install the pipe plug.
7. Check the oil level. The oil level is checked by viewing the oil level sight gage.

V175, V225, and V275

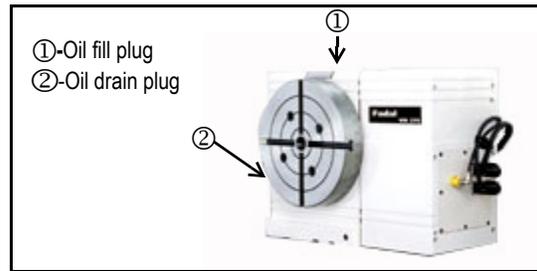


Figure 2-4: V275

1. Remove the pipe plug located on the back side of the rotary table.
2. Drain oil completely.
3. Install drain plug.
4. Remove the pipe plug located on the top of the rotary table.
5. Add oil to the indexer.
6. Re-install the pipe plug.
7. Check the oil level.

The oil level is checked by viewing the oil level sight gage on side of the unit.

VH165

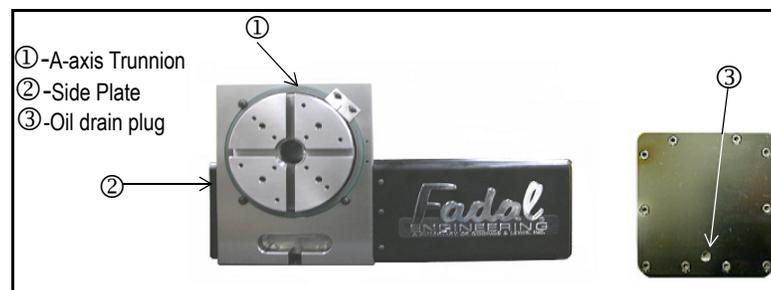


Figure 2-5: V165

1. Remove the pipe plug located on the side plate of the rotary table.
2. Drain oil completely.
3. Use teflon tape to tape the pipe plug 2.5 turns.
4. Re-install the pipe plug back to it's appropriate position.

3.4.2 REMOVAL AND STORAGE

5. Remove 1/2-14 NPT pipe plug located on the top of the A-axis.
 6. Fill it with recommended oil.
 7. Use teflon tape to tape the pipe plug 2.5 turns.
 8. Re-install the pipe plug.
 9. Check the oil level. The oil level is checked by viewing the oil level sight gage.
-
1. Wipe any coolant, chips or dirt from the rotary table, motor cable, connector and any fixtures.
 2. Jog the table for best access to the rotary table.
 3. Turn off the power and lock out the main power box.
 4. Unscrew the motor cable connector from the 4th axis receptacle, place a plastic bag around the connector for protection, and replace the dummy plug in the receptacle (for D.C. servo rotary motors).
 5. Coil up the cable and wire tie it in a loop.
 6. Make sure there are no chips between mating connections.
 7. Remove any fixtures that are attached to the face plate. The fixtures will add extra weight and make the rotary table awkward to lift.
 8. Loosen the 1/2-13 hex bolts that mount the unit to the table.
 9. Carefully slide the unit to the edge of the table.
 10. Screw in the 1/2-13 eyebolts.
 11. Ease the rotary table off of the table using the proper lifting procedure.
 12. Wipe off the bottom of the unit and place it on a clean flat surface.
 13. Lightly coat with a protective oil to keep it from rusting. The unit may be stored in the original container for protection.
 14. Power on the machine.
 15. Type SETP <<ENTER>> to bring up the parameters.
 16. Change the axes selection from X,Y,Z,A to X,Y,Z (from 4 to 3).
 17. Exit the parameter screen.
 18. Power the machine off and then back on. This will reset the parameters.

3.5 PROBE

A probe in the spindle can be used as a part of the program to discover what adjustments are required. The probe can be used to pick up the new home position at the beginning of each program, or even at various times within the program. A probe can quantify the rate of expansion in the Z axis and a change can then be made to the tool table. The probe can also track the Y axis and X axis growth and, by using a macro, the fixture offsets can be altered without operator intervention. Because the amount of expansion differs depending on where the fixture is located on the table, each fixture should be relocated with the probe. A consideration when using a probe is that if a chip is in the spindle or on the probe's holder the probe will indicate an incorrect position.

Probe requires the following maintenance:

1. Clean all the chips from the probe.
2. Change the batteries every 3 months (MP12), depending on usage.
3. Constantly verify the alignment of the switch face (TS27R).

3.6 COOLANT THROUGH SPINDLE

FADAL's Coolant Through Spindle option is designed to work in conjunction with specific tooling (with a hole in the center) to allow coolant to be pumped deep into the part, where normally coolant does not reach. This significantly improves the rate at which heat is removed from the area of the cut, reducing the expansion of the part material. In addition, there is less heat to be transferred through the tool to the spindle and the head, so expansion of the spindle and the head is also significantly reduced, improving Z axis positioning and accuracy.

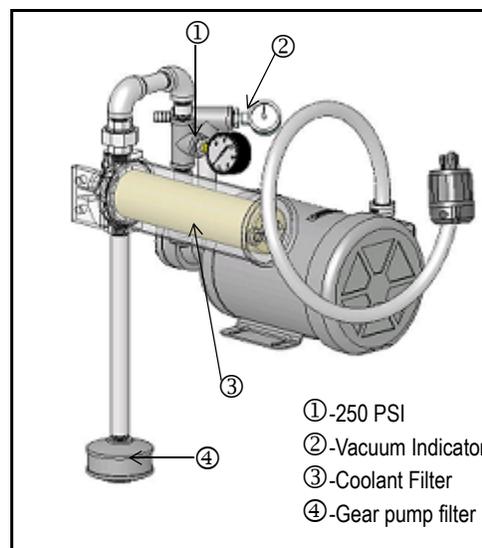
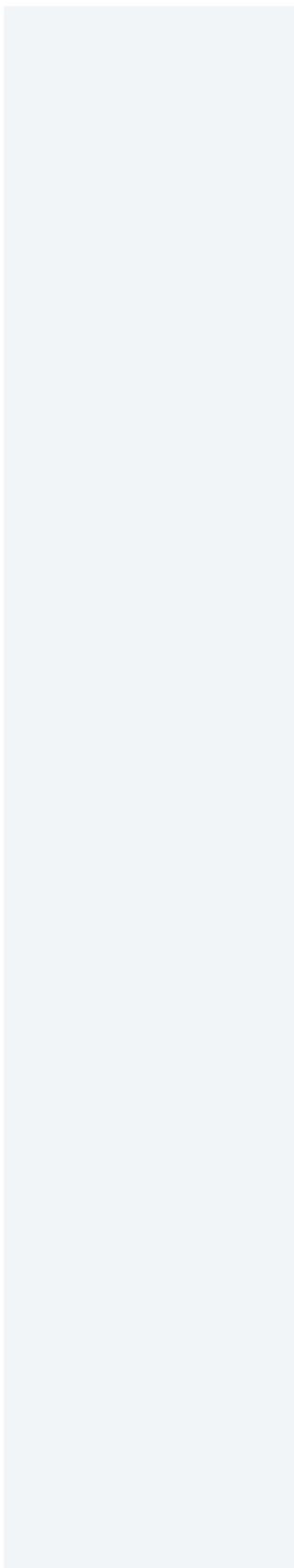
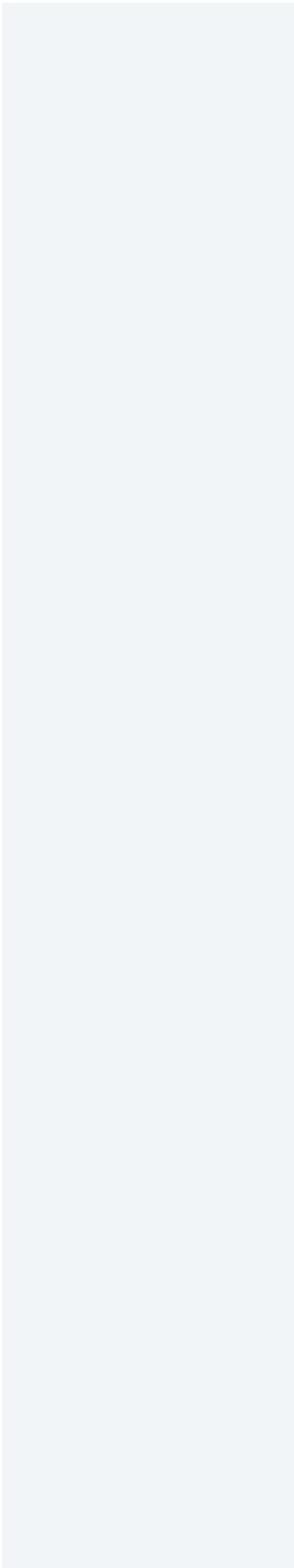


Figure 2-6: Coolant through pump

Coolant through spindle requires the following maintenance:

1. If vacuum indicator shows above 20Hg, change the coolant filter.
2. Check and make sure the coolant tank is at least 3/4 full; if coolant is low, this can damage the pump.
3. If Machining ceramic or Material with a very small and abrasive chips, it is recommended to use 10 μ (micron) filter instead of 100 μ , which is Factory installed.

- 
4. Pump comes with Factory sitting and 250PSI, changing it might cause the damage of the seal system.
 5. Clean gear pump filter strainer weekly. (Lift the pump and rinse it.)



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