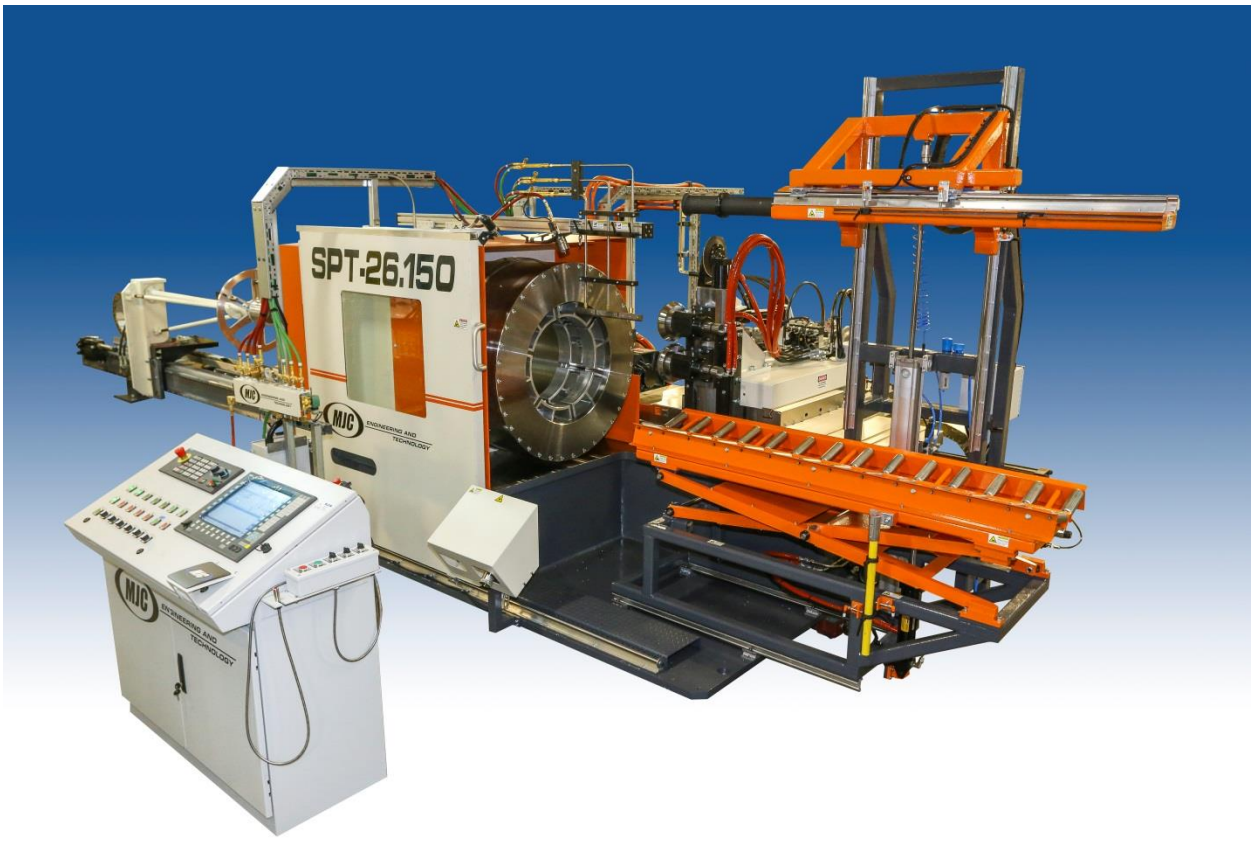
ENGINEERING AND TECHNOLOGY, INC.

SPT-26.150

User Manual



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1. Foreword

The MJC SPT-26.150 metal spinner is a 2 axis, 2 AC vector drive, computer numerical control (CNC) machine used for the spinning and shaping of metal material. The included machine software package is the best and latest MJC has to offer.

The machine is equipped with a “Siemens Sinumerik 840D sl” system. This is the latest Siemens digital control for multi-axes controls. Siemens makes all electrical components, including the spindle and hydraulic pump AC vector drives. All components used are recognized worldwide to ensure that servicing and support are ensured for years to come.

2. Safety

This manual is an instruction and reference book for the machine operators of the subject equipment and should always be available for reference. Follow this manual to ensure the proper operation of this machine. If difficulties do occur, do not hesitate to contact MJC Engineering and Technology directly.

Use in conjunction with OSHA or local regulations.

MJC does not assume any liability for machine damage, malfunctioning, or personal injury resulting from failure to adhere to this manual.

This manual is subject to technical changes at the machine contrary to the descriptions and data in this manual.

2.1 Intended Use

- The machine was designed with the latest technology and according to accepted safety regulations. Despite this, however, hazards to the life of the user or third parties and/or malfunctions of the machine and other property may not be excluded.
- Use the machine only in technically perfect condition and for its intended use while being aware of the safety regulations and hazards involved and strictly following the instructions contained in this manual.
- The machine is exclusively designed for the production of high quality spun parts.
- Any other use or any use exceeding its purpose shall be considered as not intended. The manufacturer or supplier shall not be liable for any damages resulting from use in an unintended way.
- The user bears all risk.
- The intended use also includes adherence to the manual and observance of the service and maintenance conditions. Preventive or routine maintenance can prevent emergency or reactive maintenance, and extend the life of the equipment.
- The intended use includes operating the machine only if protective systems and safety related devices such as: releasing protection devices, emergency shut-off units, sound insulation, and suction units are all available and fully operational.

2.2 Organizational Measures

- Always store this manual in a dry and easily accessible place within the machine's work area.
- Always follow and apply any local regulations and laws applicable for the prevention of accidents and environmental protection.
- User should include in the operating instructions any regulations including supervisory duties and duties of notification concerning company policies, such as work organization, operating sequences, staff assigned, etc.
- It is mandatory that staff who use or maintain the machine have read the manual, specifically the safety instructions before getting near the machine. This especially applies to personnel working near the machine only occasionally during set-up, maintenance works, etc.
- Frequently check the safety and hazard consciousness of the staff while following the operating instructions!
- Machine operators should operate the machine with long hair tied up, and loose clothing or jewelry secured, to decrease the risk of the operator of being caught in the machinery.
- Use personal protective gear at all times, i.e., safety glasses, hearing protection, steel-toe boots, gloves and anything else required by local regulation.

- Observe all safety and hazard notes and signs on the machine.
- Any irregularities with the operation of the machine are to be reported immediately to the proper level of supervision dictated.
- Do not carry out any modification or retrofits to the machine involving its safety without prior consultation with the manufacturer.
- Manufacturer recommends a safety fence around the perimeter of the workstation to ensure there is no unauthorized use or tampering with the machine.
- Manufacturer recommends that only assigned and trained personnel operate the machine.
- Do not make any program changes (software) on the PLC control system without prior consultation with the manufacturer.
- Observe periods for repeating checks/inspections as regulated or indicated in the operating manual.
- For the proper execution of maintenance works, the proper workshop equipment is essential.

2.3 Staff Assignment and Qualification

- Only reliable personnel may carry out work with the machine. Please observe the minimum age as regulated by law.
- Only assign trained staff! Clearly determine responsibilities of the staff as to operation, set-up, maintenance, service, and supervise.
- Manufacturer recommends staff to be trained under the constant supervision of an experienced personnel.

2.4 Maintenance

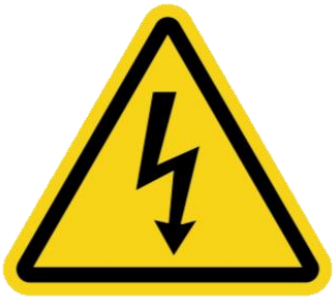
- Refrain from any working methods that jeopardize safety of the operator or those around!
- Check the machine at least once per shift for external damage and defects. Immediately notify the responsible department or staff about any changes that have occurred, including the operational behavior. If the responsible department or staff determine that the machine needs to be stopped or fixed, then stop the machine, and follow lockout/tagout procedures.
- In the case of a malfunction, immediately stop the machine and follow lockout/tagout procedures.

- Before switching on/start-up of the machine, make sure that no personnel are exposed to hazards by the starting of the machine!
- Observe and document the adjustment, maintenance, and inspection. Also include the details on the replacement of parts or assemblies.
- Inform operators before start of maintenance works!
- For any work involving: operation, production change-over, adjustment of the machine or its safety related systems, inspection, maintenance or repair, then please observe switch-on and switch-off operating instructions and the service specific details of the work order.
- In the aforementioned work orders, fence off the service area as far as possible, and follow all safety regulations to raise visibility of operators, maintenance personnel, equipment, and fencing.
- If the machine has been switched-off completely or partially for service and repair work, then the machine must be protected against accidental start-up. Follow lockout/tagout procedures.

- Carefully attach single components and larger assemblies to the proper lifting gear during replacement and protect them against hazards. Only use suitable and appropriately rated lifting gear and load suspension equipment with sufficient load carrying capacity.
- For maintenance where components are lifted above head height, use proper ascent equipment and working platforms.
- For maintenance on high levels and above head height, proper man-baskets, wire/rope slings are required to be implemented.

- Clean the machine, specifically all connections and fittings, from oil, fuel, debris or cleaning agents before starting any maintenance/repair work. Do not use aggressive cleaning agents!
- Always retighten down any screw connection or fasteners that were loosened during maintenance or repair work.
- If dismantling of safety equipment is required during setup, maintenance and repair, mounting and verification of the safety equipment has to be re-implemented immediately after termination of maintenance and repair works.
- Make sure that operating material, as well as replacement parts are disposed of in a manner not harmful to the environment.

2.5 Hazard Symbols



Electrocution Hazard

Death by electric shock can occur.

Lock Out, Tag Out before servicing.

May have more than one live circuit. High voltage risk.

Rotating Parts Hazard

Rotating parts can entangle and trap.

Always secure loose articles of clothing and long hair.

Projectile Hazard

Inadequately clamped or improperly heated parts can be thrown with deadly force.

Projectile Hazard

The safety door may not stop all projectiles.

Always double check job set-ups and never operate the machine with the door open or guards removed.

Eye and Ear Hazard

Flying debris into unprotected eyes can damage one’s eye sight.

Noise levels can also exceed 50 dBA.

Always wear safety glasses and ear plugs when operating the machine.

Lock Out, Tag Out

Always Lock Out, Tag Out before performing maintenance on the machine.

Electrical

- Work on electrical equipment is inherently dangerous and should only be carried out by a qualified electrical technician or by staff under the supervision of a qualified electrical technician.

- Machine components, which are to be subjected to inspection, maintenance or repair, are to be switched to voltage-free state – if required. Components are to be checked of their voltage-free state first, then ground and short them and insulate adjacent components under voltage.

- Use only original fuses with the appropriate current ratings. In the event of a malfunction in the energy supply, switch the machine off immediately!
- Defects such as loose connections and/or scorched cables have to be removed immediately.
- If work on live components is required, a second person should be present who may activate the emergency shut-off and/or the main switch in an emergency.

Hydraulics & Pneumatics

- Check all hydraulic tubes, hoses, and fittings in regular intervals for leakages. Remove any damaged lines immediately. Spraying oil may lead to injuries and fires.
- Depressurize machine sections to be opened and pressure lines (hydraulics, compressed air) before beginning any repair work.
- Only persons with specific knowledge and experience in said fields may carry out work on hydraulic and pneumatic equipment.

Gas, Vapors and Smoke

- High risk of fire or explosion due to use of highly volatile and combustible gases. (i.e. propylene, propane and oxygen)
- Customer to ensure that adequate ventilation is provided due to the high level of combustible gas that is used during machine operation.
- Carry out welding, grinding and torch work on machine only when permitted.
- For work in tight spaces, please observe national and local regulations.

3. Technical Specifications

Machine Data

- Spindle chuck type: Spring-Loaded
- Feed slide stroke “Z” axis: 700mm
- Feed slide force: 70kN
- Feed slide speed: 0-125mm/sec.
- Top slide stroke “X” axis: 375mm
- Top slide force: 70kN
- Top slide speed: 0-125mm/sec.
- “Green Hydraulic Power Unit”: 20 HP
- Spindle AC vector drive motor: 150 HP
- Spindle speed range: 50 – 400 RPM
- Machine weight: 42,084lbs (19,088kgs)
- Machine sound level (In-Use) 80db

Utilities

- Min. fuel pressure: 25psi (1.7bar)
- Min. oxygen pressure: 120psi (8.25bar)
- Amperage requirement @ 460V: 300 A

Machine Consumption and Connections

- Oil Volume Hydraulic Tank 150 gallon
- Cooling Water Consumption, Hydraulic 10 gpm
- Cooling Water Connection, Hydraulic ¾”, min 2 bar
- Cooling Water Temperature max 23°C
- Amperage Requirement @ 460V-50Hz 300 A

Control System

- CNC control system: Siemens 840D sl
- PLC system: Siemens Step 7
- Max. voltage fluctuations: ±10%

In order to prevent system failure, good grounding according to DIN standards must be provided inside the plant to ground all machines, electrical cabinets, etc.

Operating Conditions

- Min. Ambient temperature: 10 ° C
- Max. Ambient temperature: 30 ° C
- Max. Air humidity: 80%

4. Equipment Movement and Installation

4.1 Machine Packaging

This section on packaging applies at all times during shipping, storing and staging, up until the point when the machine is ready to be assembled in it's final position.

The machine must be protected against impact, vibration and outside forces.
The machine must be protected against water at all times to prevent corrosion. This includes direct sources like rain or spills, and also condensation that may appear by temperature variations. MJC recommends using sealed shipping methods and corrosion prevention such as paint or grease on corrosion risk areas.

All the points of suspension and the points of the machine coming into contact with strap/chains have been protected against putting defects into the machines paint.

If the machine is not in it's final position on top of foundational fixtures (i.e. Unisorb RK Fixators), then it must be resting on top of wooden foundation to easily get forklifts under the machine.

4.2 Lifting and Transporting

Use only suitable cranes, elevators, forklifts and other means of transport with sufficient lifting and carrying force for lifting and transport the machine parts. Common sense safety rules should be followed at all times.

When installing or maintaining machine, and lifting gear is required, ensure only suitable and technically flawless lifting gear and load suspension equipment is used!

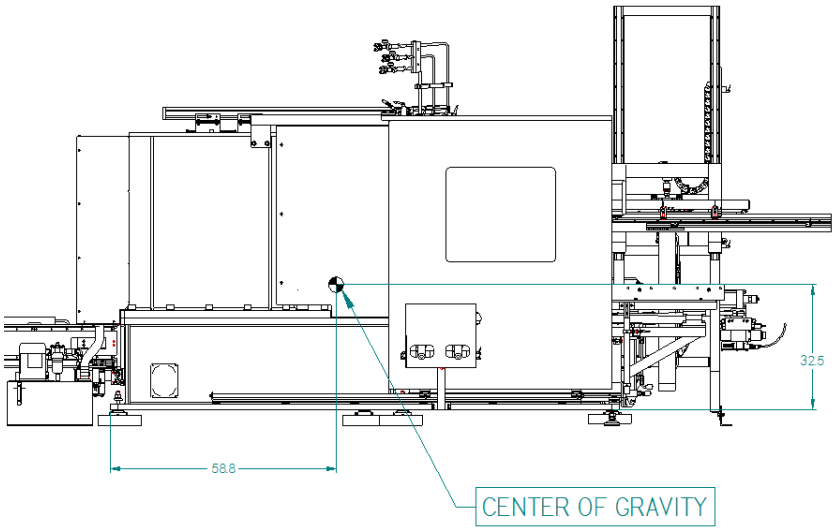
DO NOT STAY OR WORK UNDERNEATH LIFTED LOADS!

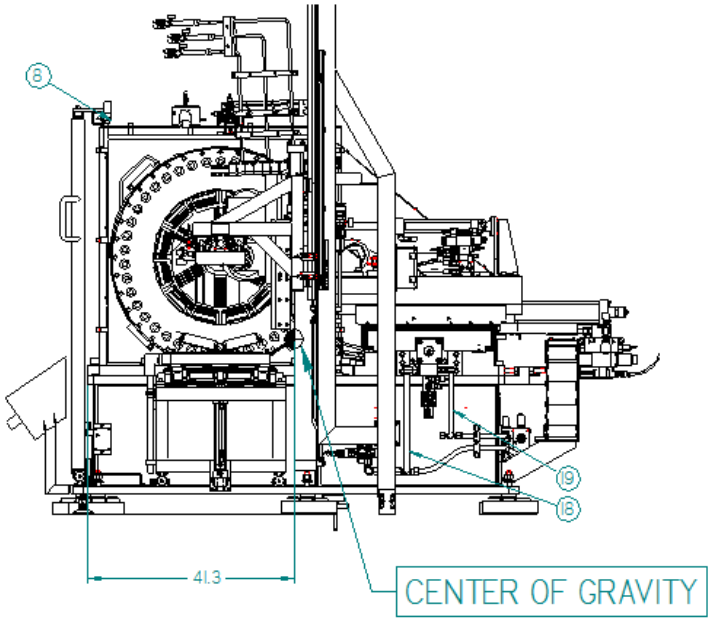
For mounting components/maintenance above body height, use suitable and proper ascent equipment and working platforms. Do not use machine components as a means for climbing.

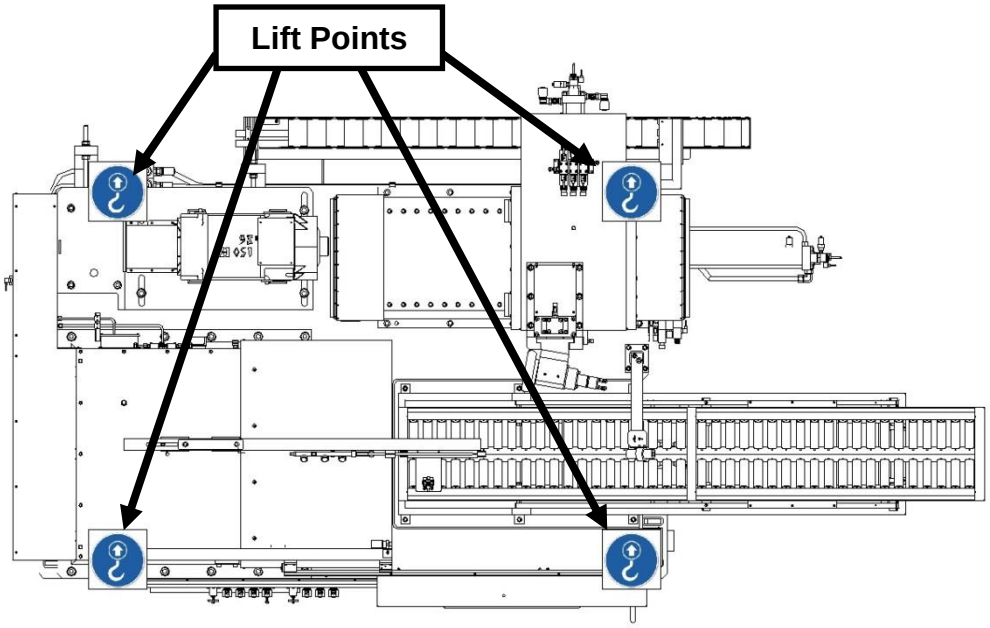
The machine should only be lifted the at marked lift points. Look for the lift sign.

Use machine diagrams on for reference as to where the proper lifting points and the center of gravity of the machine will be. These points are to be used for reference only and should not be relied upon to ensure proper load lifting safety. Please consult with a rigging consultant/contractor.

4.4 Lift Points and Center of Gravity



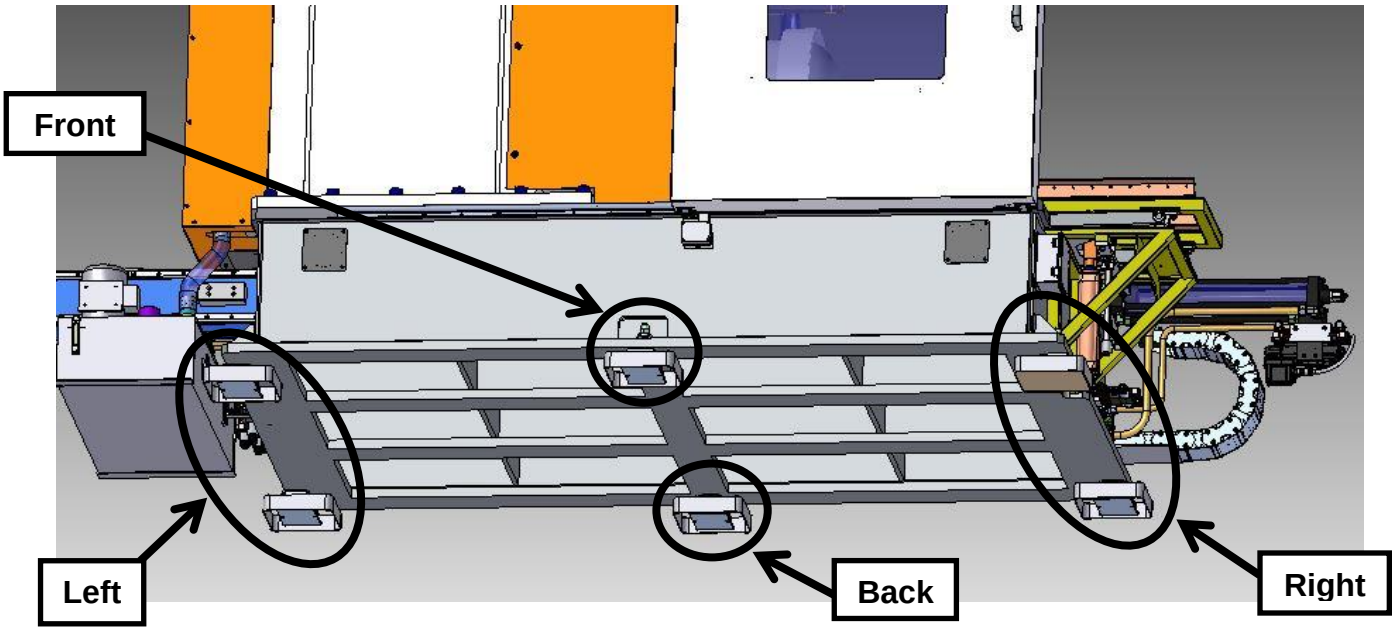




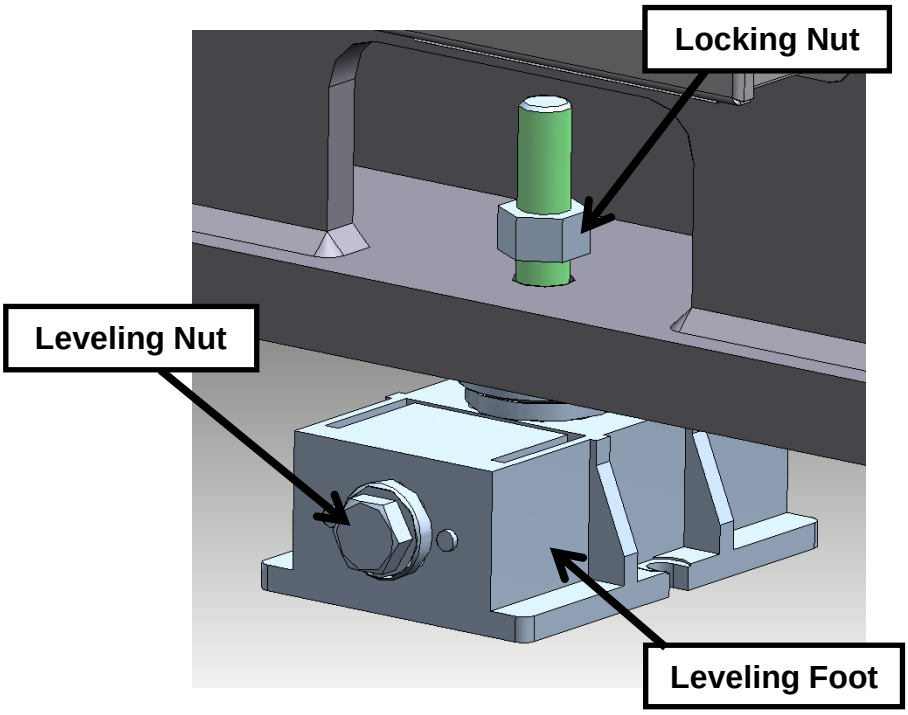
4.5 Installation

Area and Work Space - Prior to final placement of the machine, allow for sufficient space around the machine for assembly, maintenance and production work.
The machine should be placed on a solid, level and reinforced concrete floor.

Machine Leveling - The machine has been provided with Unisorb RK Fixators (leveling mounts). Make sure that a level surface is ready for final placement of the machine. Before setting the machine down for the final time, ***the Unisorb leveling mounts need to be installed. The Unisorb leveling mounts are shipped loose and require installation before the machine is finally lowered. See installation sheet below for mount preparation and set-up.***



For proper machine balance the bed must first be leveled. There are (6) Unisorb leveling mounts positioned underneath the bed.



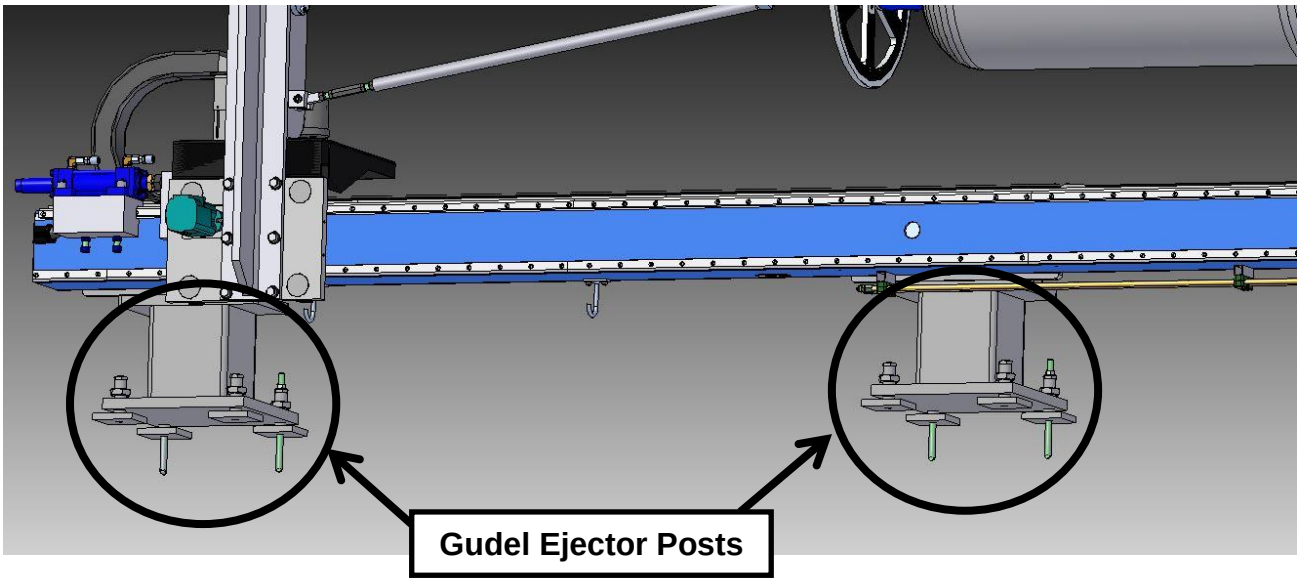
To level the bed:

1. Loosen the locking nut by rotating it counter clockwise.
2. Rotate the leveling nut clockwise to raise the bed and counter clockwise to lower it.
3. Retighten the locking nut to lock the foot in its leveling position.

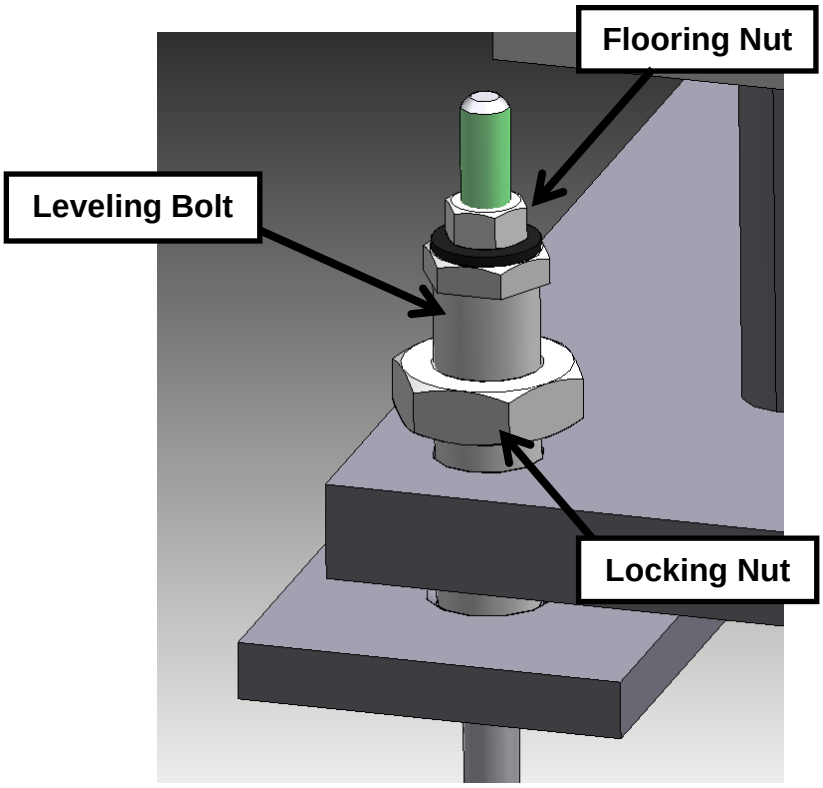
When leveling the bed:

- First evenly level the bed from left to right.
- Then level the bed from front to back.
- Recheck left to right levelness.
- Make small ¼ turn adjustments throughout. Never let one leveling foot take the whole weight!

After the bed has been leveled the, Gudel Ejector must also be leveled.



There are (4) leveling bolts on each post that must be leveled. Four of these (8) feet have tie down bolts to anchor the machine to the floor.



To level the Gudel ejector:

- Loosen the locking nut and flooring nut by rotating both counterclockwise.
- Rotate the leveling bolt clockwise to raise the post and counterclockwise to lower it.
- Retighten the locking nut to lock it in its leveling position.
- Retighten the flooring nut to keep the leveling bolt from lifting off of the floor.

Machine Lighting –
Spinning machines come with *no built-in lighting.* Customer to ensure there is adequate lighting as per local regulation and laws.

Ventilating the Machine –
Customer is to ensure their facility can be adequately ventilated as per local regulations and laws.

Field Assembly –
Once the machine is level; perform any field assembly work that needs to be completed.

4.6 Commissioning the Machine

Step 1: Mechanics

Central Oil Lubrication System –
Fill oil lubrication tank with proper oil type and quantity.

Headstock Lubricating Oil –
Fill headstock with bearing spindle oil using the proper oil type and quantity.
If machine is shipped with oil in the headstock, confirm oil level in sight glass on lower side of headstock.

Slide Bearing Units –
Grease the slide bearings units with the proper grease type and quantity (refer to the Lubrication Section).

Step 2: Electrical

To be performed by qualified personnel only

Main Electrical Power –
Connect main electrical power from customer's switching cabinet to the machine.

Electrical Components Check –
Open the main electrical cabinet and remove any shipping, packing, or bracing that may have been installed for shipping.

Pay attention to machine operating voltage and connected load of the machine!

Step 3: Hydraulics

Initial Oil Fill –
Fill the hydraulic reservoir with hydraulic oil to the top of the hydraulic oil level sight-glass located on the side of the headstock. Use only the recommended hydraulic oil viscosity as described in this manual! If equipped with water-cooling, open the water supply and drain pipe.

The Hydraulic Accumulator should be turned full CCW so that the system pressure is near zero upon initial start-up

Step 4: Compressed Air

If necessary for machine operation, connect compressed air supply to the machine. Compressed air supply should be of sufficient pressure and volume for proper machine component function. Compressed air supply should be filtered and lubricated.

Step 5: Machine Cleaning
All exposed metal areas are coated at the factory prior to shipment. Machine should be wiped down if sprayed with rust inhibitor for shipping. To prevent oxidation to these areas, a light viscosity rust inhibitor similar to WD-40 can be used.

Step 6: Connect CNC System to Mains
Connect the CNC cabinet to mains power; only personnel qualified to handle mains power may attempt this.

To be performed by qualified personnel only

Step 7: Turn Main Electric Power On at Electrical Cabinet
When main power is turned on, the CNC system will boot up. Ensure that all E-stop buttons are unlocked.

Refer to the ***Machine Operation*** section of this manual.

With the appropriate HMI screens displayed and the E-Stops in the correct position, press the **POWER ON** button which is GREEN. It is located below the E-STOP.

Step 8: Electrical Motor(s) Operation and Rotation
Inspect the following:

- Spindle blower motor rotation - forced air should be exiting the motor vents.
- Spindle motor rotation (spindle runs counterclockwise).
- Hydraulic pump system - motor rotation.
- Check coolant system motor rotation. Fan should turn the same direction as the arrow on the fan cover.
- Blower motors for CNC infeed and Spindle modules located in the electrical cabinet.

Observe rotation for each of these. The direction arrows are on the sides of each

Under no circumstances should the machine operate if any of the steps are not performed.

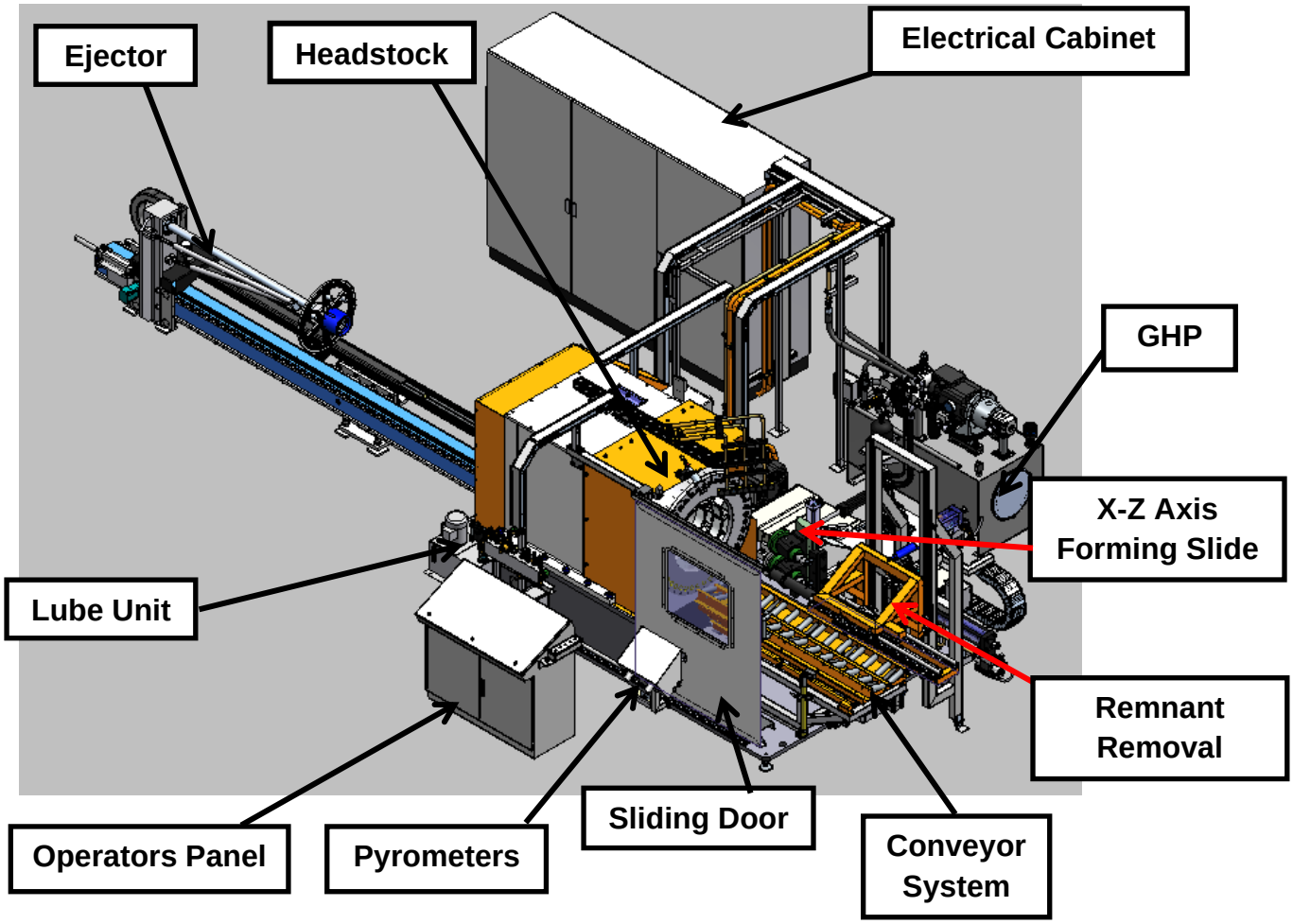
System Check
Once Steps 1-8 have been complete, verify the proper operation of:

- Chuck
- Slides
- Accessory Devices *(if installed)*

5. Machine Description

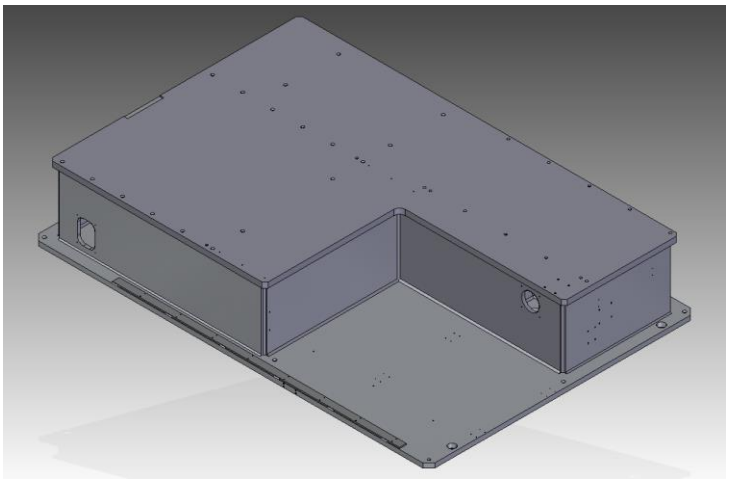
5.1 Structure of the Machine

- Machine Bed
- Headstock
- X-Z Axis Forming Slide
- Loading and Unloading Conveyor System
- Ejector
- Green Hydraulic Power Unit (GHP)
- Lube Unit
- Operators Panel – Human Machine Interface (H.M.I.)
- Remnant Removal



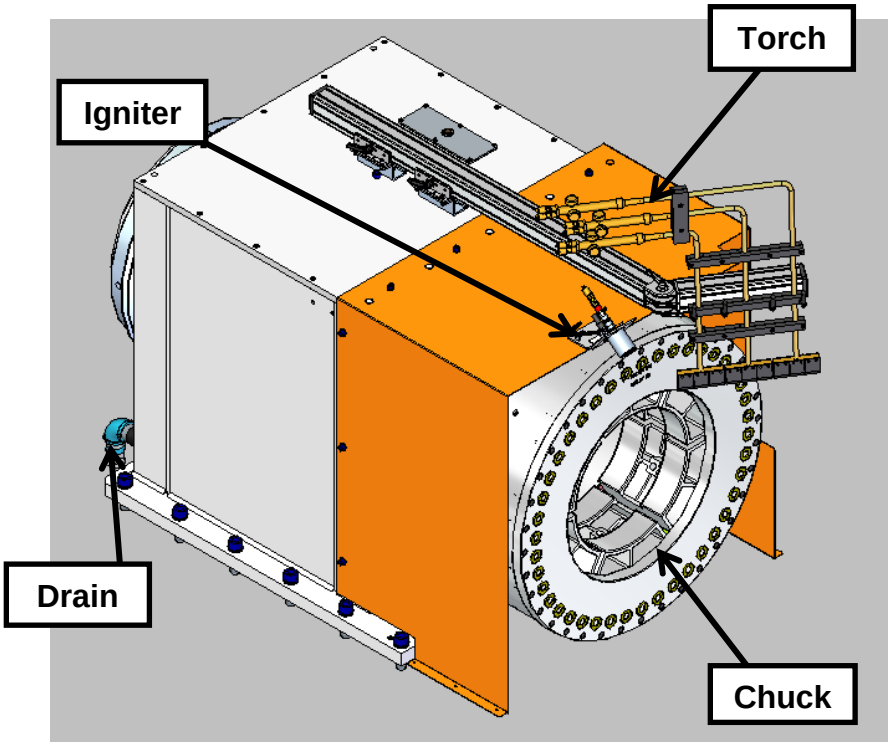
5.2 Machine Bed

The machine bed is made of high strength, heat treated steel with exceptional rigidity. It is the foundation of the machine and is designed to withstand the forces which occur during a part's formation.



5.3 Headstock

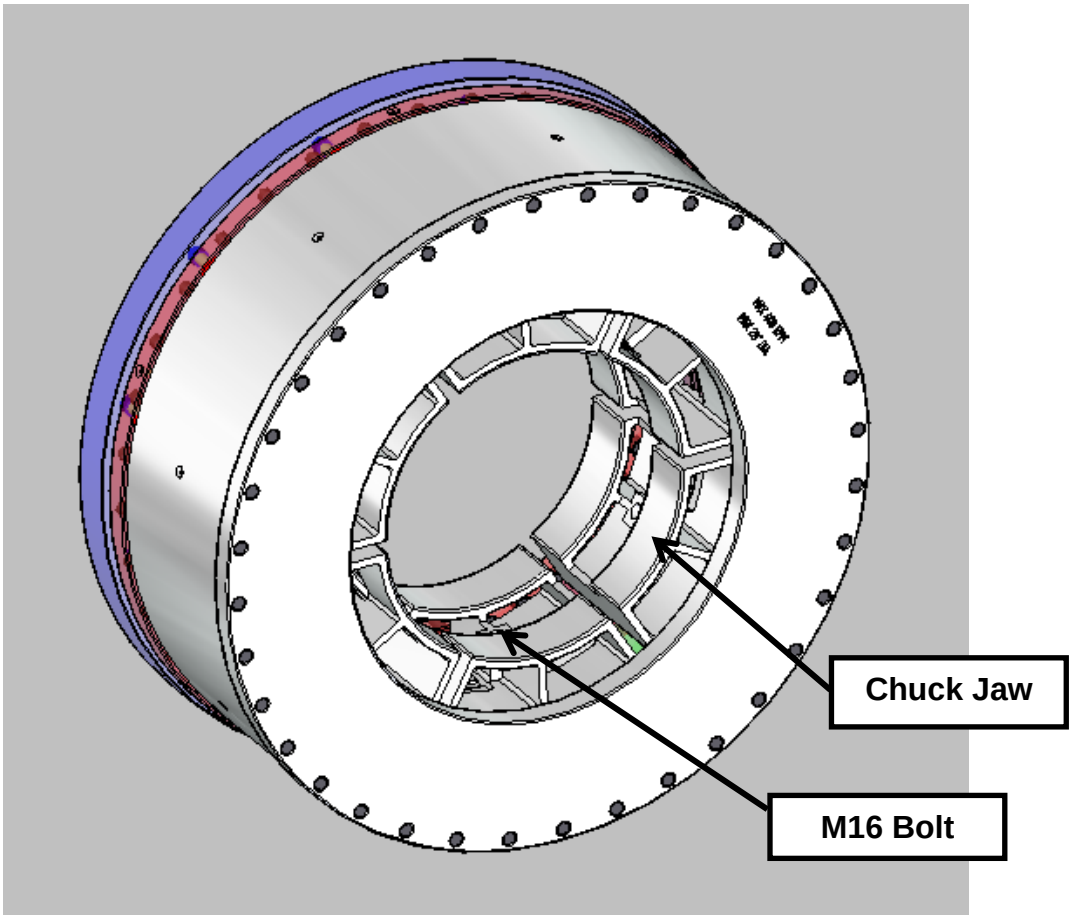
The headstock is a belt driven rotary assembly. The material to be spun is mounted into the chuck and is spun at high speeds. It is then trimmed to start with a consistent part length before being formed by the X-Z axis forming slide. Upon completion, the chuck releases the formed part and is ejected to the loading/unloading conveyor system.

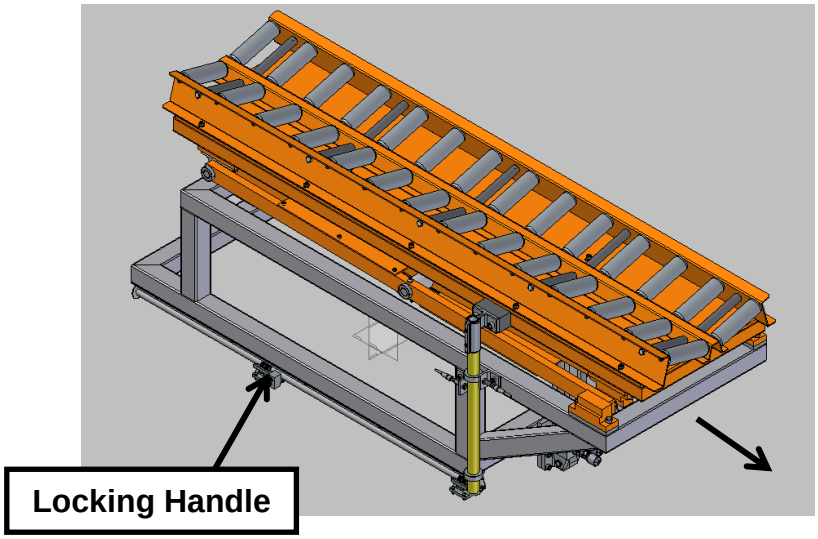


5.4 Chuck

To form different bottle sizes the chuck's inner diameter must be adjusted accordingly. To swap chuck jaw sizes:

- Loosen the conveyor locking handle and slide the conveyor away from the headstock
- Remove the (1) M16 bolts and remove/add the new jaws.
- Tighten the jaws in place with the same M16 bolt.





5.5 Torch and Igniter

A torch applies heat to the part being formed. Through the addition of heat, the material becomes more malleable and is easier to shape to the desired geometry.

To slide the torch towards/away from the chuck:

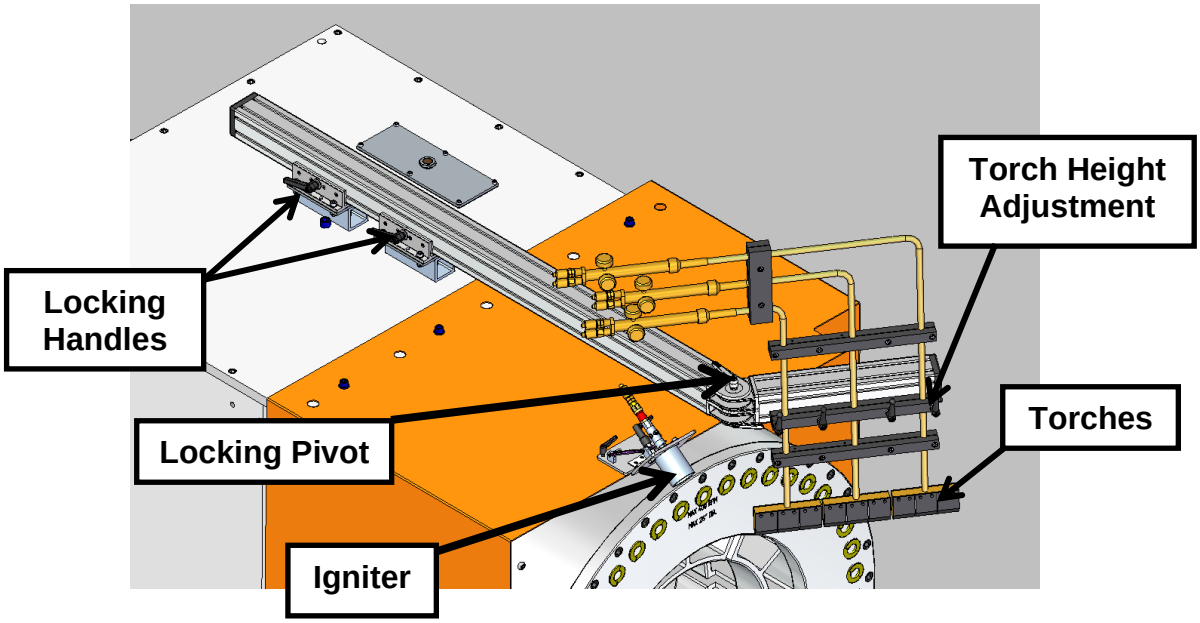
- Loosen the (2) locking handles.
- Slide the torch assembly to the desired position.
- Retighten the (2) locking handles.

To raise/lower the torch towards/away from the part:

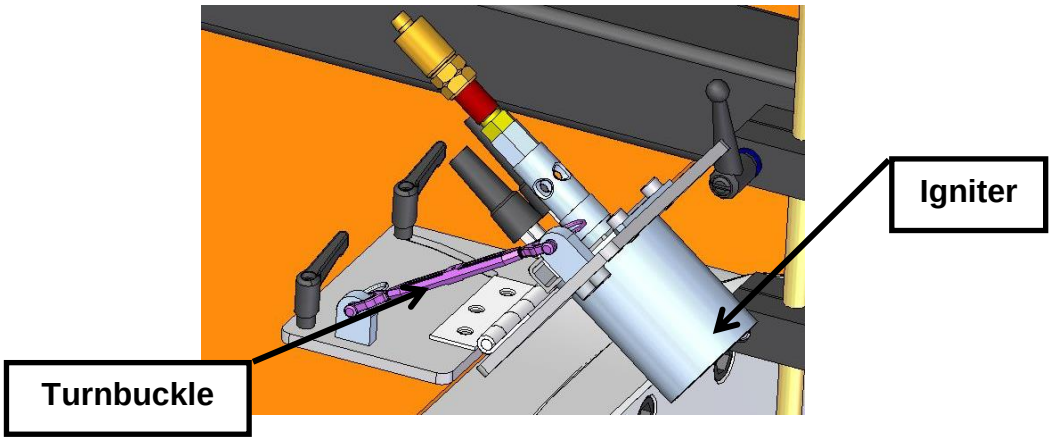
- Loosen the (4) torch height adjustment handles.
- Raise/lower the torches to the desired position.
- Retighten the (4) torch height adjustment handles.

To pivot the torches inline/away from the spindle axis:

- Loosen the locking pivot handle.
- Pivot the torches.
- Retighten the locking pivot handle.

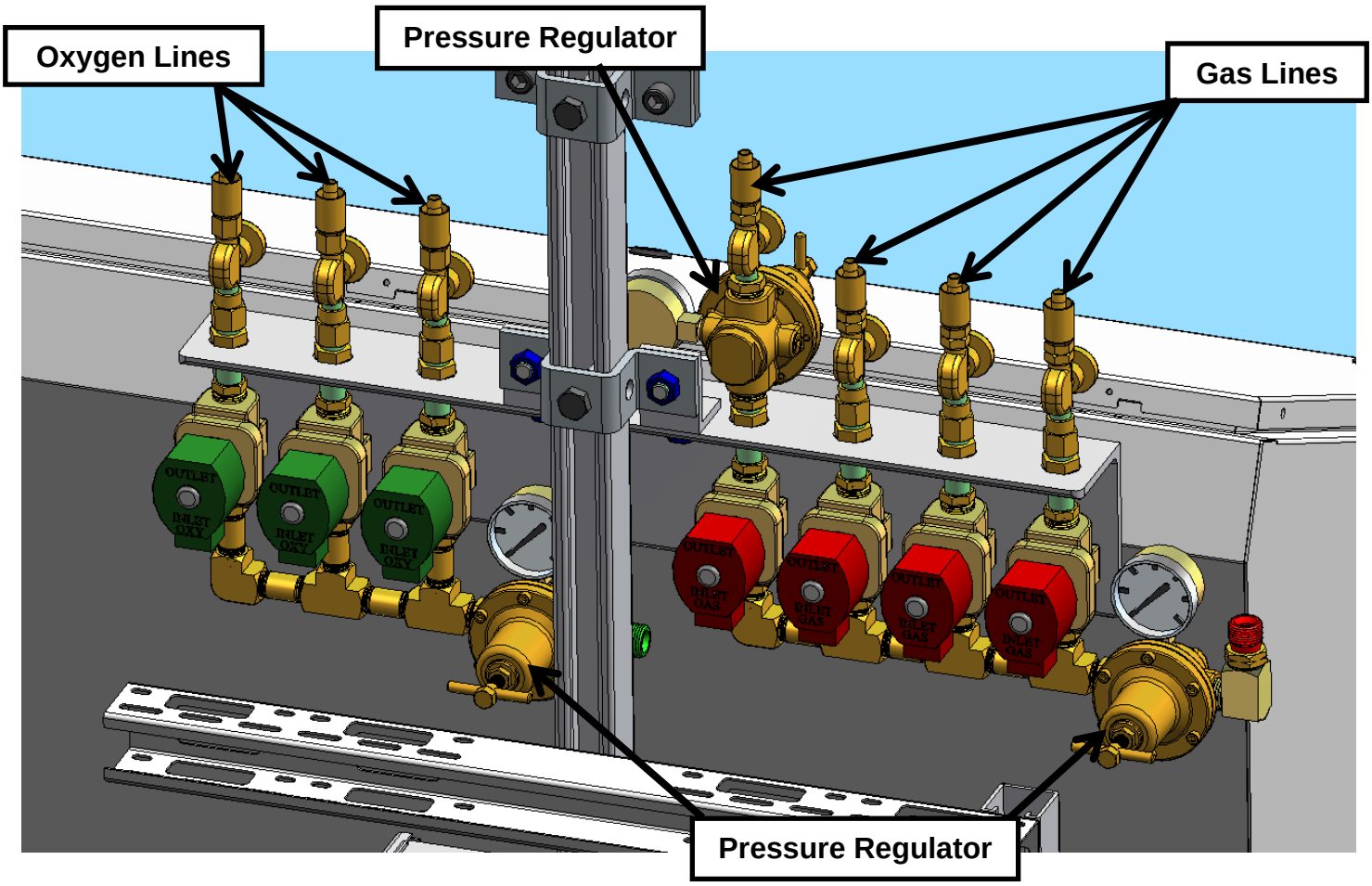


To adjust the tilt of the Igniter then rotate the turnbuckle to adjust the angle of tilt. Counterclockwise to tilt towards the chuck. Clockwise to tilt towards the chuck.



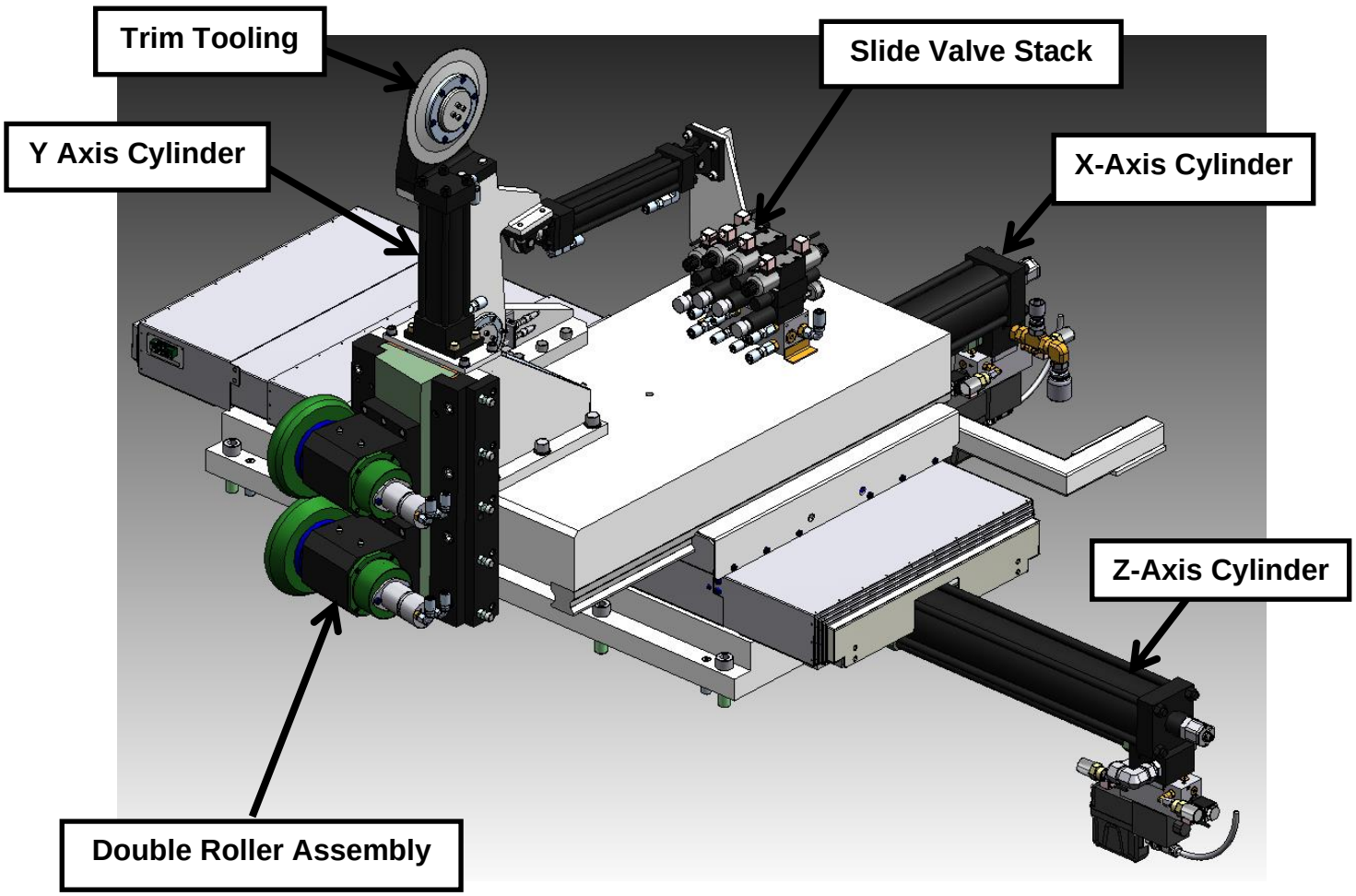
5.6 Torch and Igniter Manifold

The torch assembly is supplied by the torch solenoid assembly. There are (3) oxygen lines on the left and (4) gas lines on the right. Three of the four gas lines supply the torch assembly and the fourth gas line supplies the Igniter.



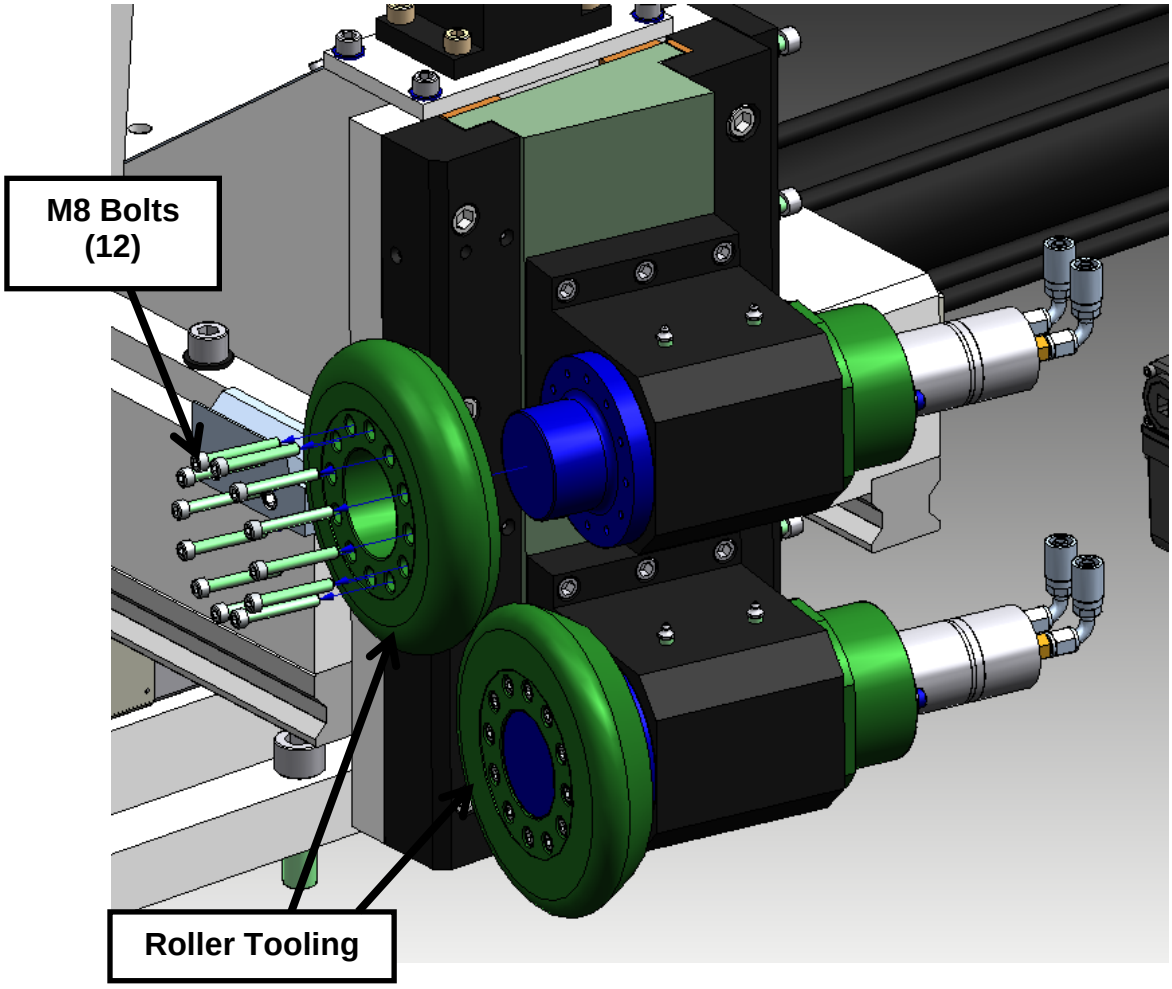
5.7 X-Z Axis Forming Slide

The X-Z axis forming slide is responsible for the formation and machining of the part being made. It consists of four hydraulic cylinders, two of which move the slide along both the X and Z axes. It also has a trimming blade which cuts the part to a consistent initial length.



Double Roller Assembly

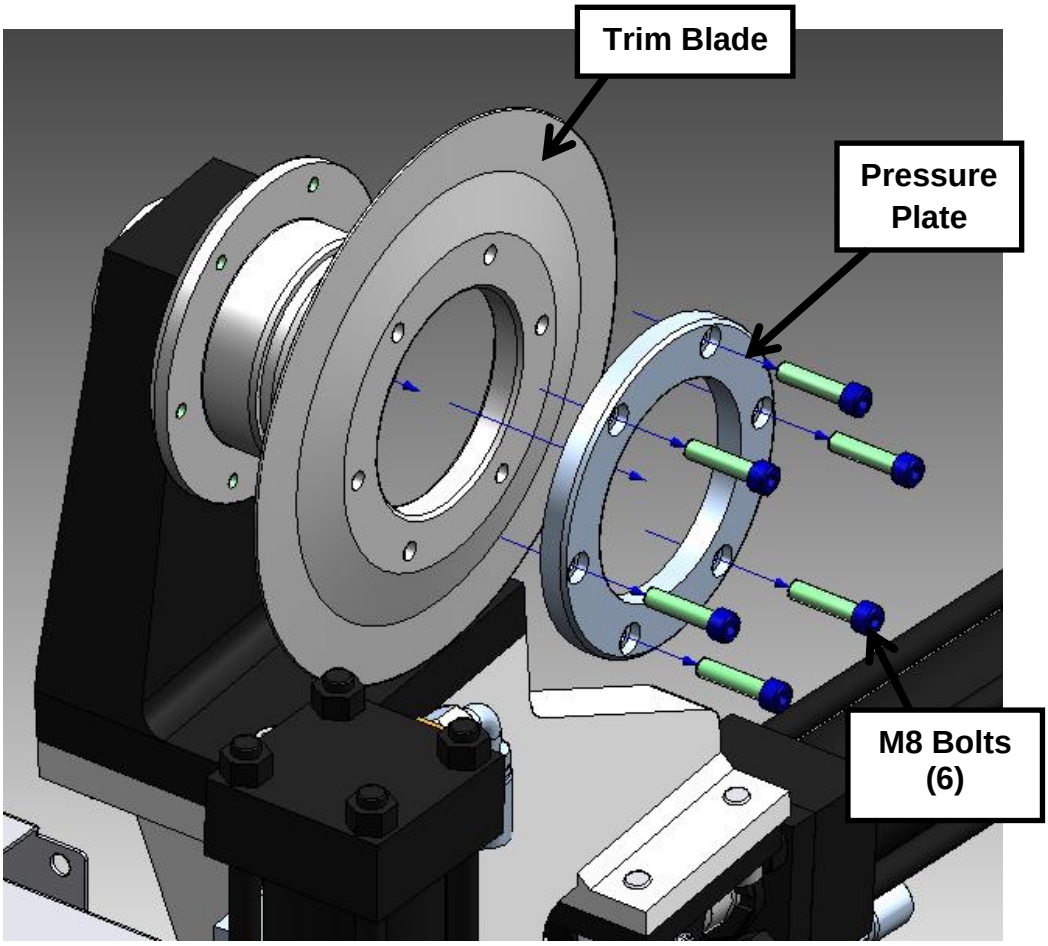
The roller tooling comes into contact with the material being spun to shape it to a desired geometry. The roller itself is made of hardened steel. The bearings within the roller must be lubricated regularly (see the lubrication section). The roller tooling can be taken on and off of the double roller assembly by removing the (12) M8 bolts.



Trim Tooling

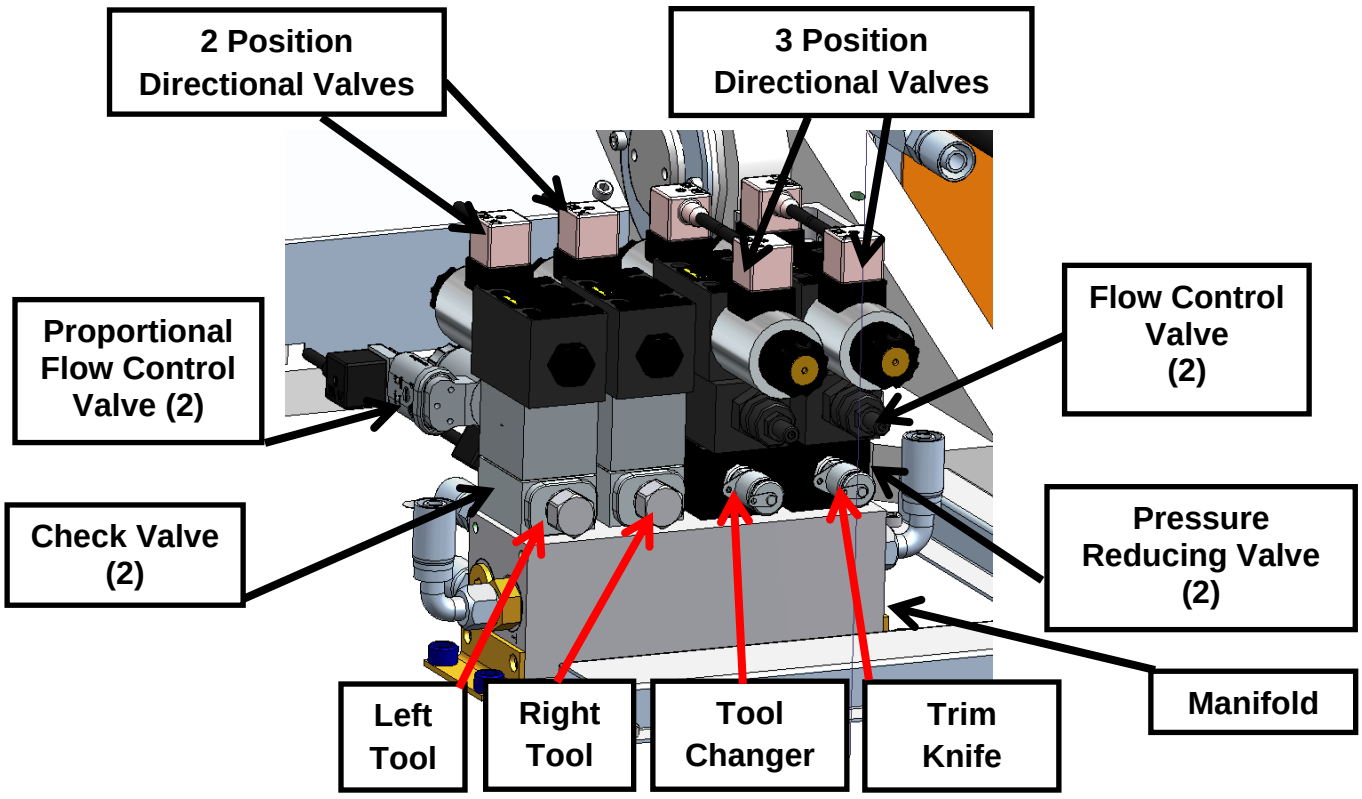
The Trim Tooling trims the part prior to forming in order to start with a consistent initial length. If the blade wears and needs replacement:

- Remove the (6) M8 bolts.
- Slide the pressure plate and blade off of the shaft.
- Replace with a new blade and original pressure plate and retighten bolts.



Slide Valve Stack

The slide valve stack controls the hydraulic flow to the trimming assembly, Y axis cylinder, and the two roller drive motors.

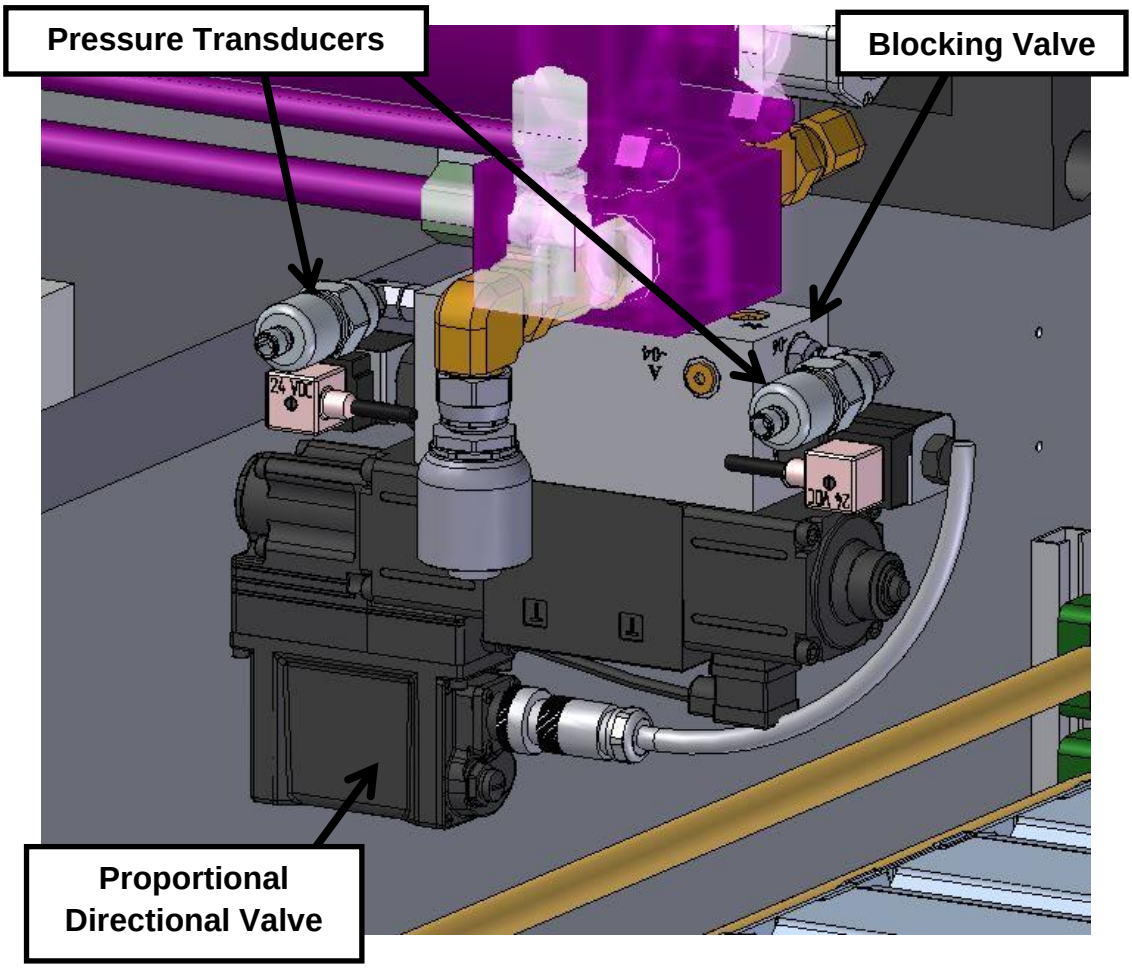


To be done by qualified personnel and intended for set-up only. Check for personnel and object path prior to procedure.

- To adjust the roller's rotational speed:
- Loosen the small set screw
- Turn the center screw at the flow control knob until you have reached the desired RPM/speed
- Re-tighten the small set screw

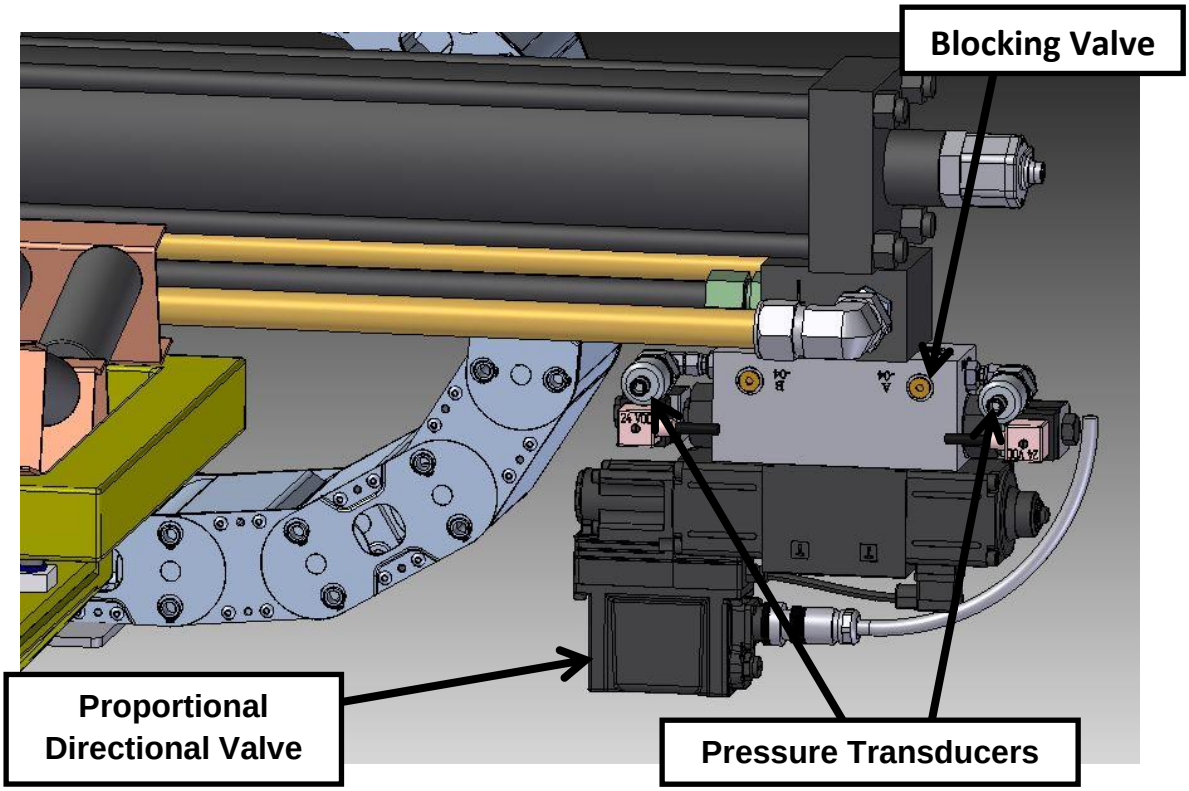
X Axis Cylinder

The X axis cylinder is responsible for maneuvering the tooling perpendicular to the chuck.



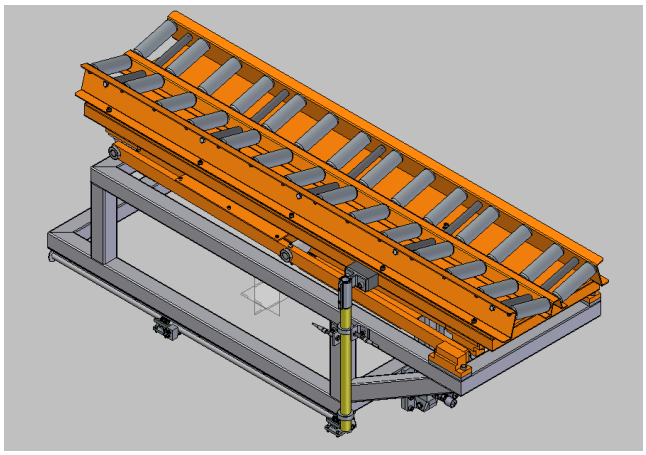
Z Axis Cylinder

The Z axis cylinder is responsible for moving the tooling forwards and backwards parallel to the chuck.



5.8 Loading/Unloading Conveyor System

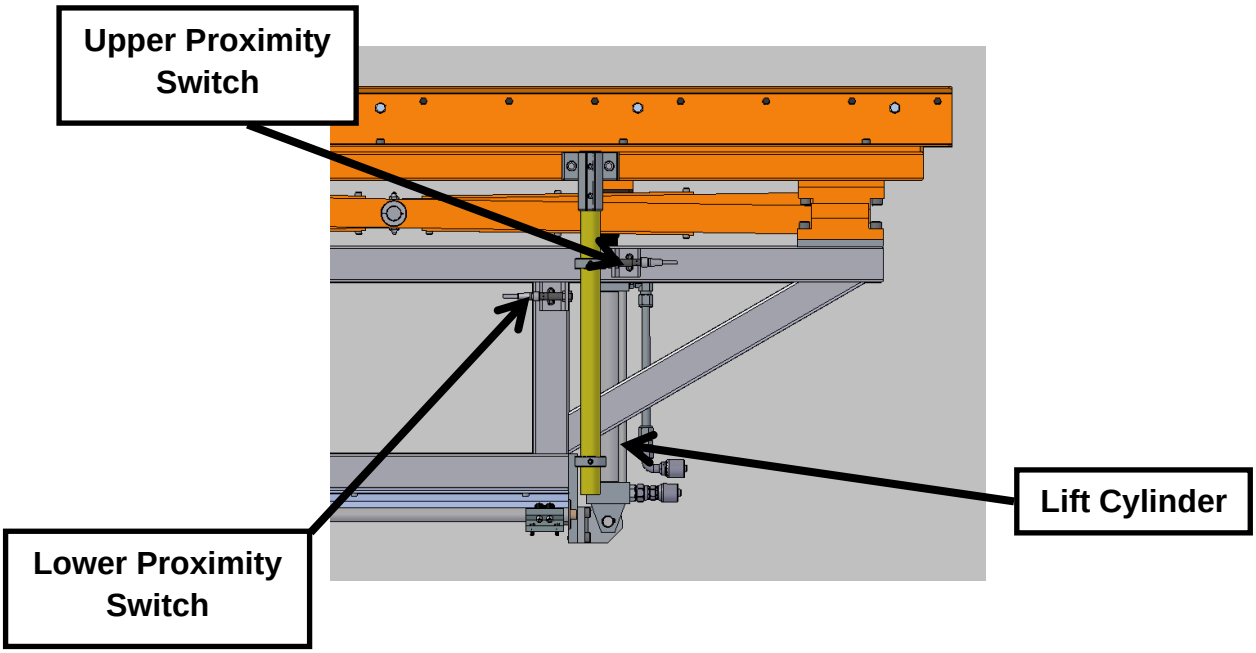
The conveyor system is responsible for loading and unloading each part on and off of the machine. The part can be slid on to the conveyor assembly and into the chuck. When the part's formation is complete it is slid back across the conveyor assembly where it is unloaded to a designated area.



The conveyor system operates similarly to a scissor lift. The conveyor assembly can be raised and lowered to maintain the correct center height of various part diameters. This is done by raising/lowering the lower proximity switch's register so that the conveyor automatically stops at the desired height.

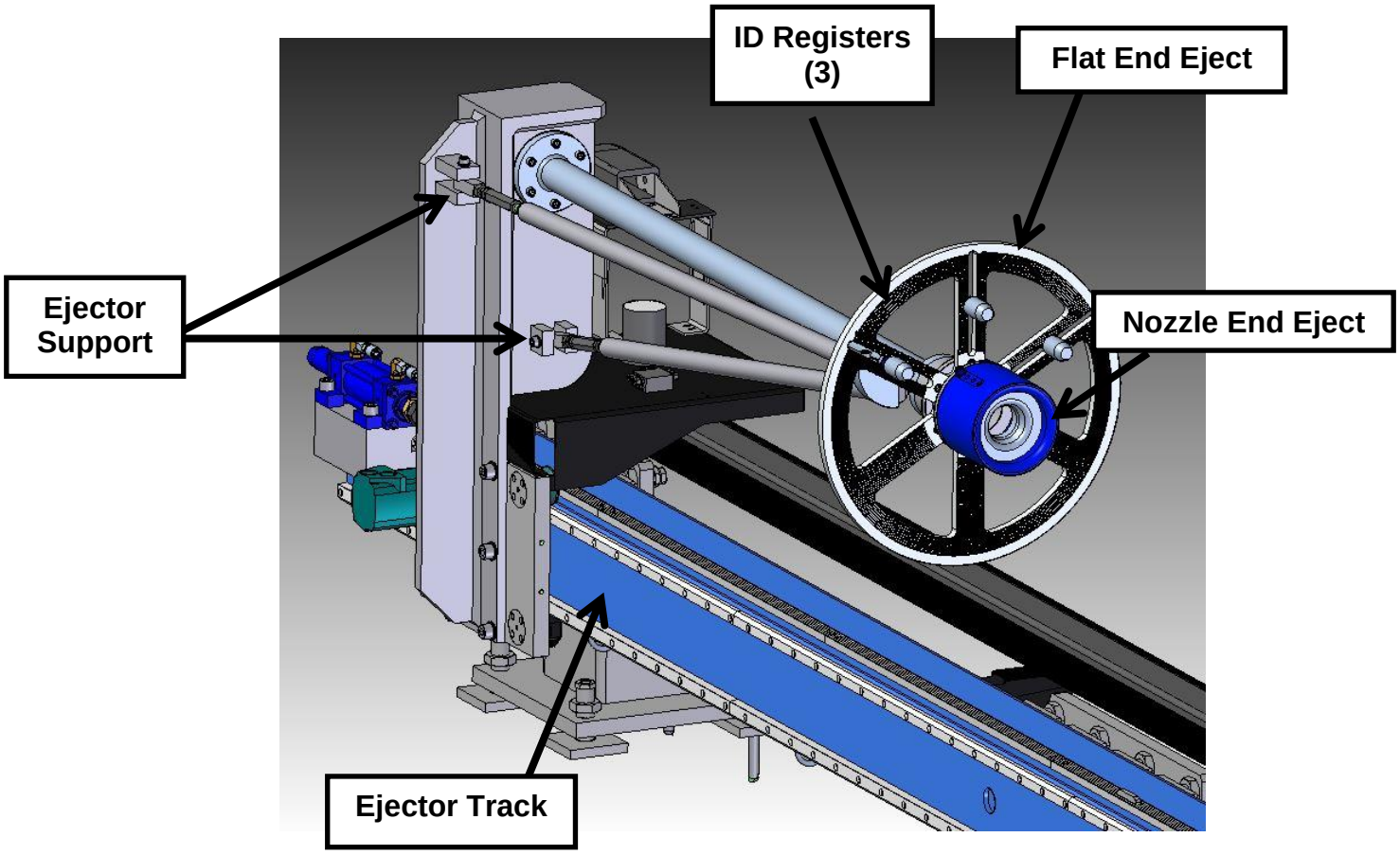
When changing part diameters:

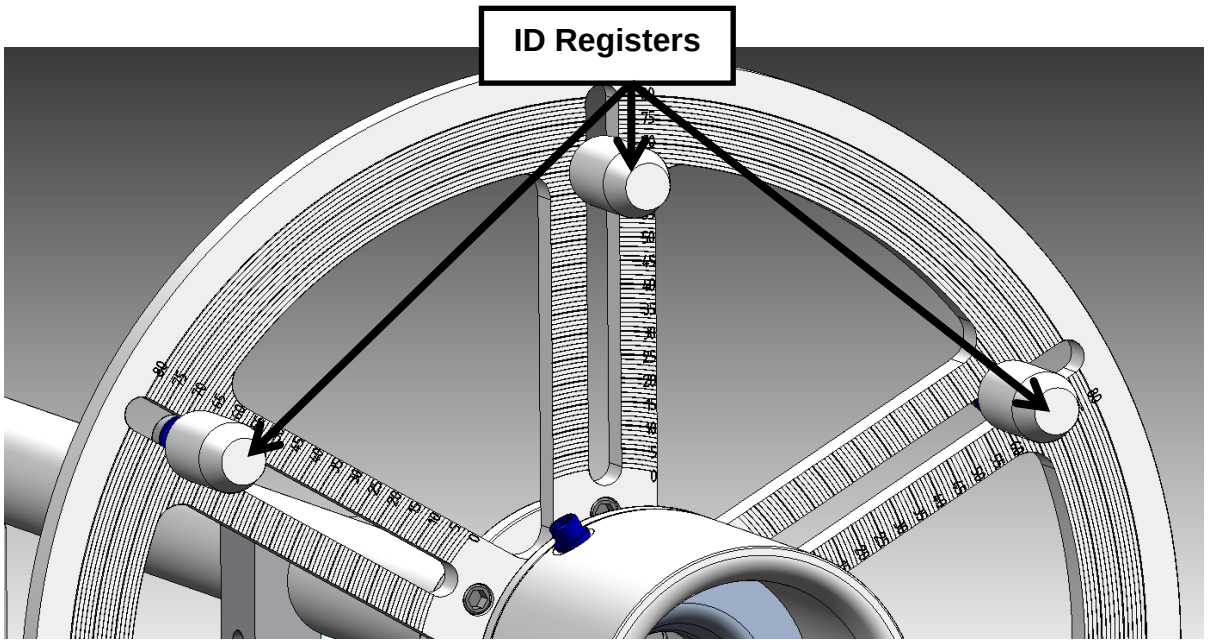
- Loosen the lower register handle by rotating it counterclockwise.
- Slide the lower register to the desired position.
- Retighten the lower register handle.



5.9 Ejector

The ejector is responsible for pushing the part out of the chuck after its formation is completed. There are two different ejects to compensate for the part's various geometry. When using the flat end eject, there are (3) ID registers which slide into the part to keep the plate centered.

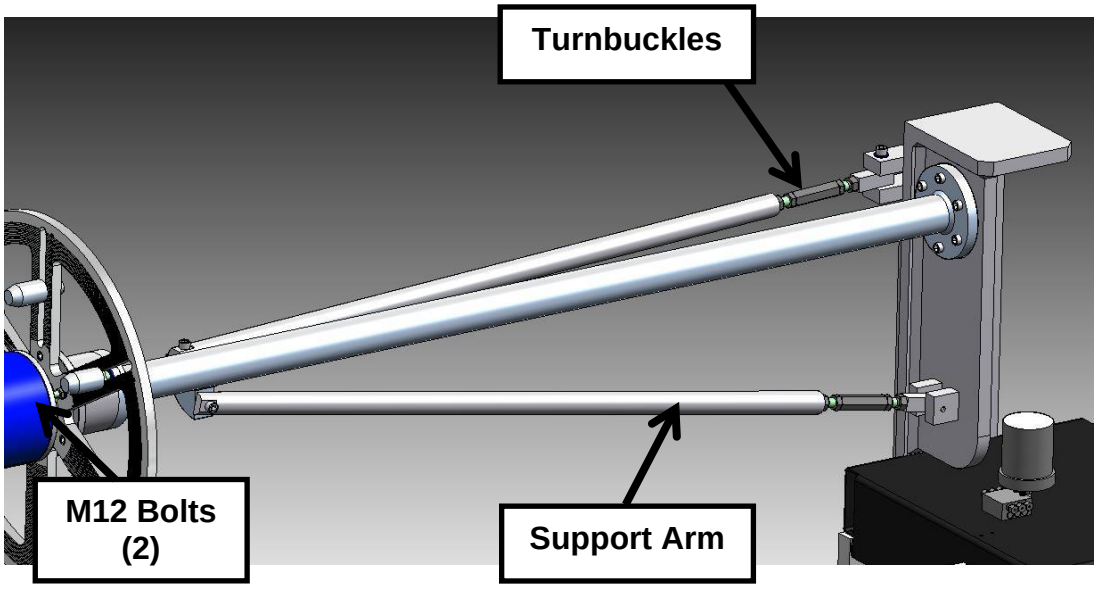




To adjust the ID registers for varying inner diameter parts:

- Loosen the M16 bolt behind each ID register.
- Reposition the ID register. (The scribed numbers are at ½" radial intervals).
- Retighten the M16 bolts.

Due to the weight of the ejector, there is an adjustable ejector support to keep the ejector parallel with the chuck.

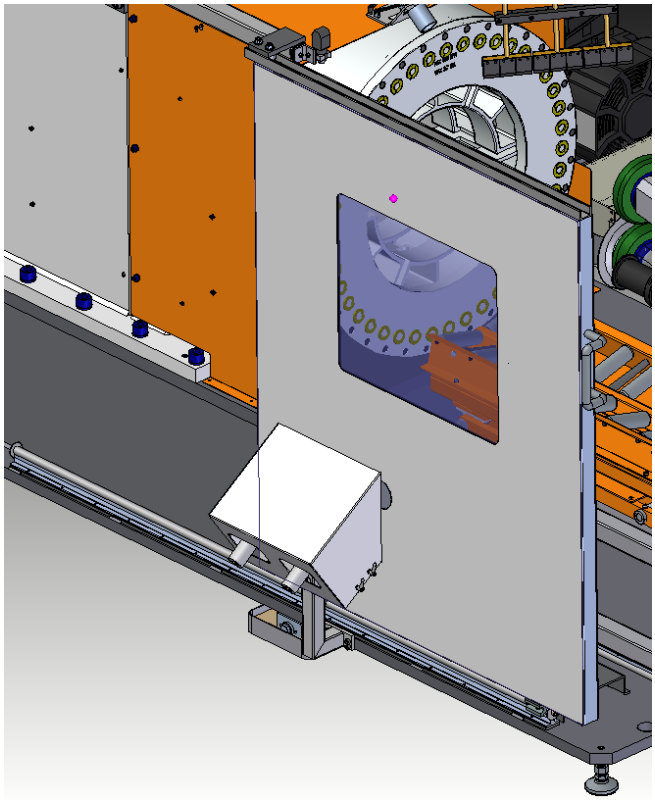


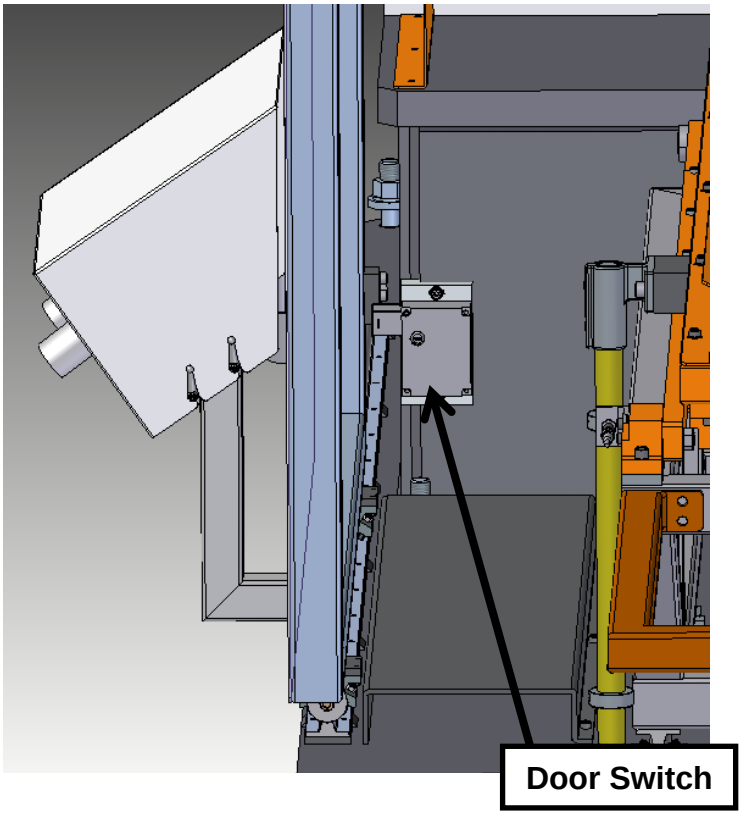
To adjust the ejector support:

- loosen the (2) M12 bolts and (2) turn buckles.
- adjust the turn buckles so the ejector is centered and parallel with the chuck.
- Retighten the (2) locking nuts against the end of the support arm.

5.10 Door

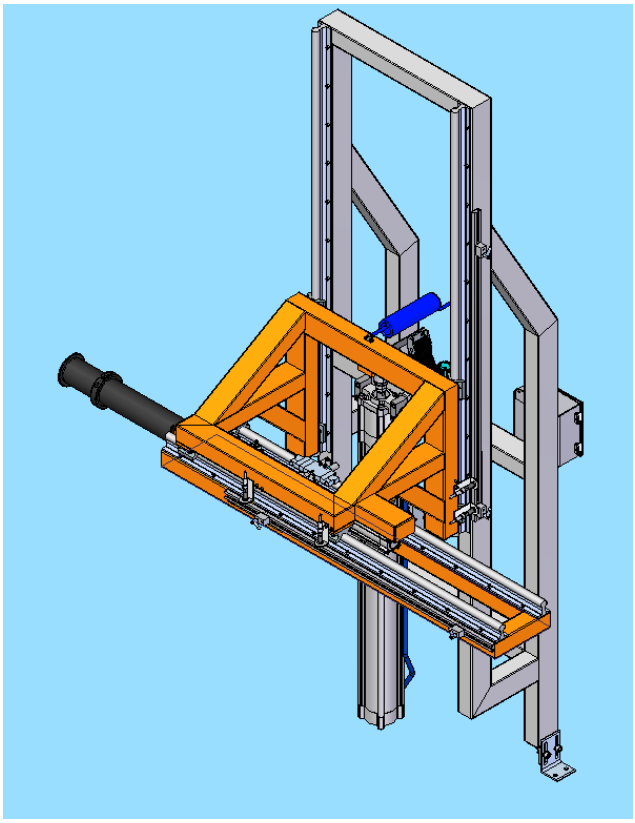
This machine has a single door to protect the user during operation. It is locked into the closed position by an electronic door switch. The door switch can be manually unlocked using the key provided.



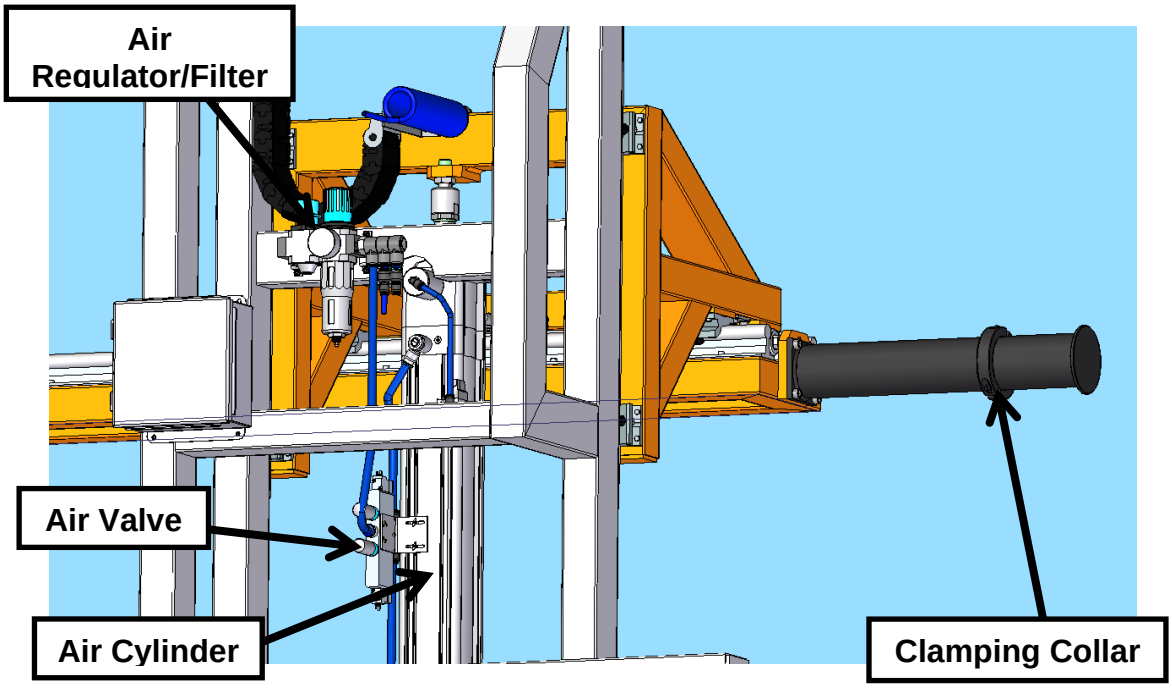


5.11 Part Catcher

The part catcher is used to catch the trimmed rings which are cutoff before spinning.



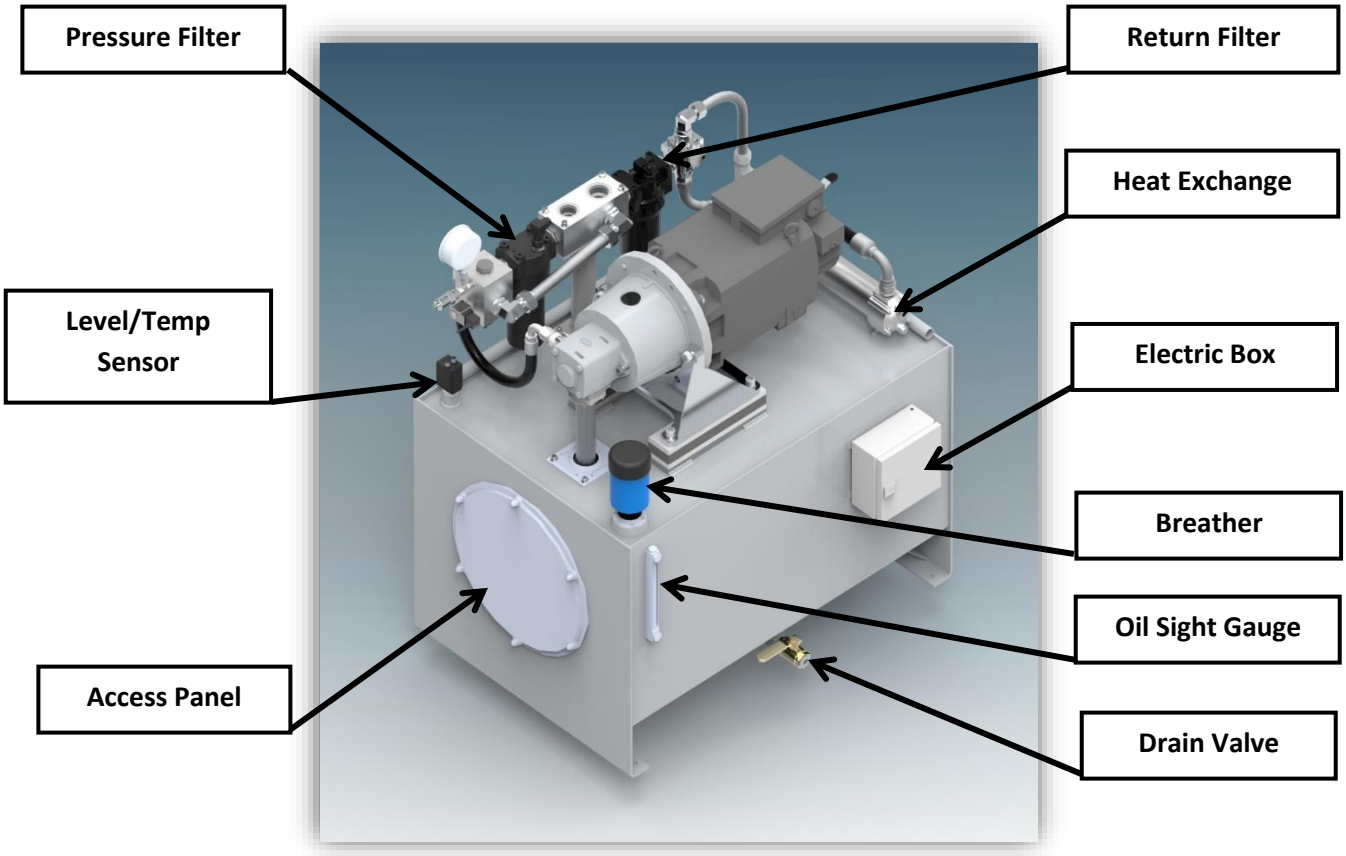
The clamping collar's location can be adjusted for catching various trim sizes.

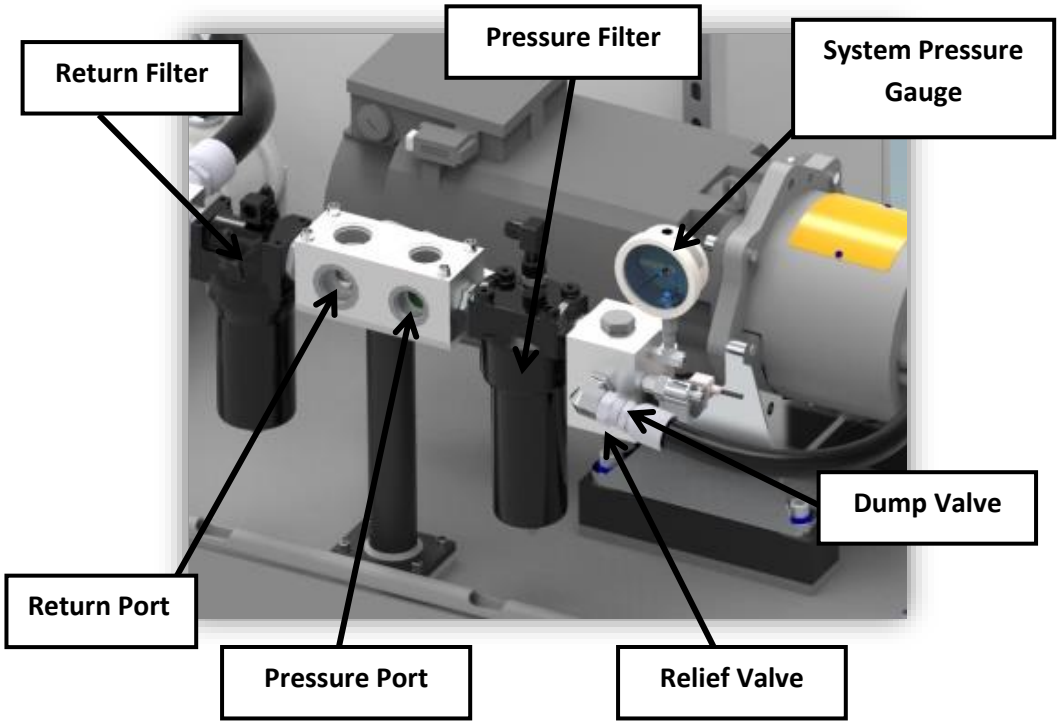


The Air Cylinder has a built-in safety catch. If the machine loses power and/or air, the Cylinder's Rod will remain in place.

5.12 Green Hydraulic Power Unit (GHP)

The GHP provides energy efficient hydraulic power to the machine.
See the spare parts list for replacement filters.

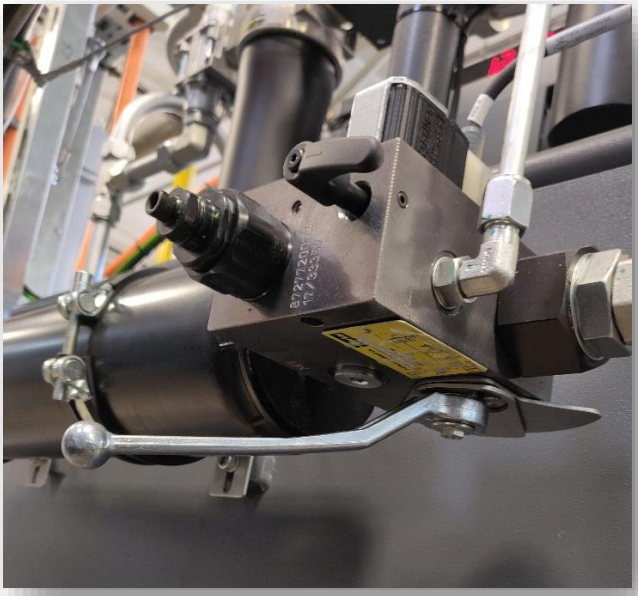




The GHP has an accumulator to help build and maintain hydraulic pressure. See the external document “Parker Accumulator Safety Block Manual.pdf” for more information, the basics of the safety block will be listed below

Key Features

1 Block
2 Accumulator port A
3 Shut-off valve
4 Manually-operated discharge valve
5 Electrically-operated discharge valve (optional)
6 Pressure port P
7 Maintenance port M1
8 Pressure relief valve



 Valve is closed, 90 degree position, the accumulator is NOT connected to the hydraulic system.

 Valve is open, in line position, the accumulator is connected to the hydraulic system.

Normal operation:

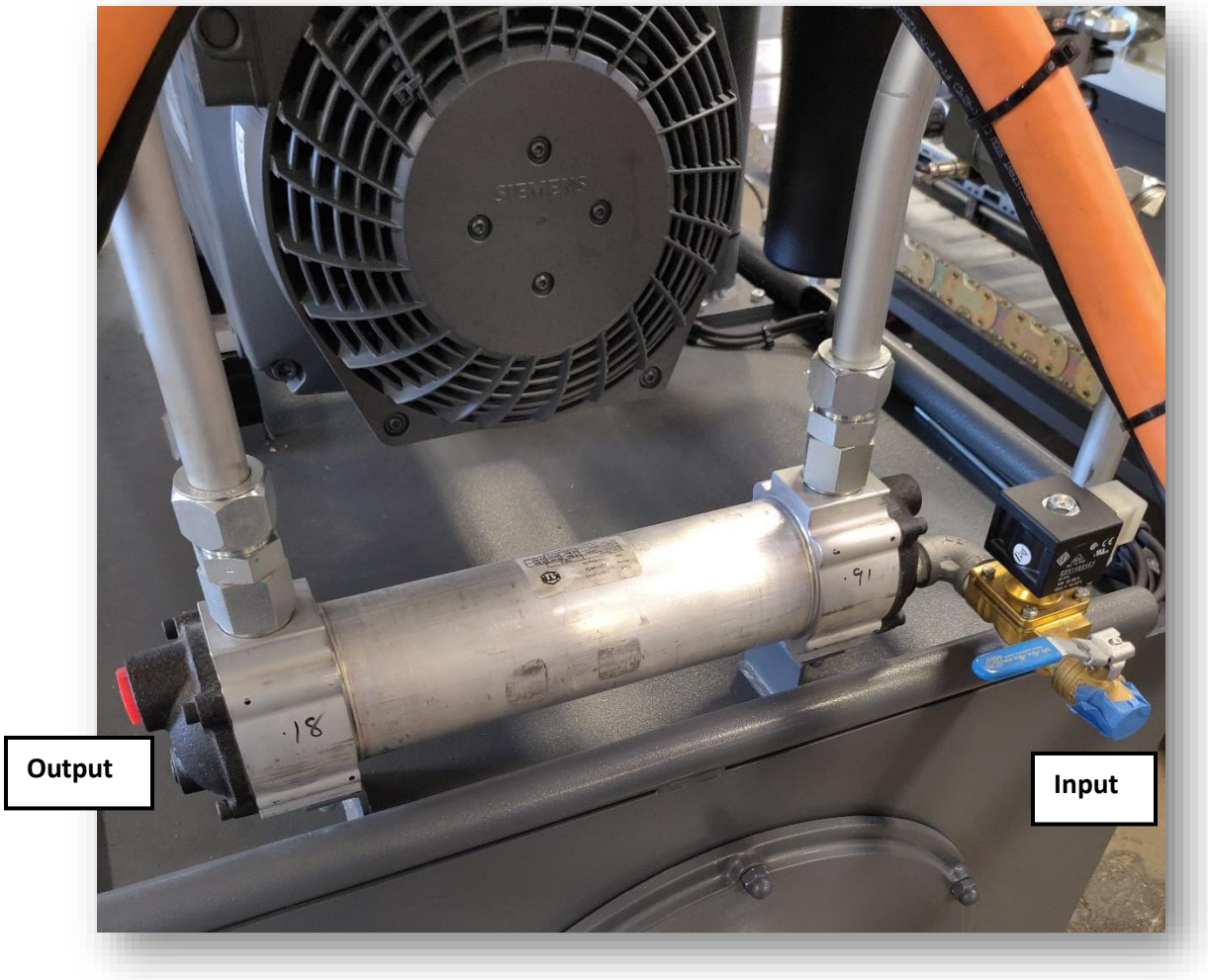
Shutoff valve (3) can be lock-out-tag-out shut into either position.

Manually operated discharge valve (4) is shut. Meaning fully clockwise.

Electrically operated discharge valve (5) is energized, which blocks venting/discharge, allowing system to build pressure.

When hydraulics is turned off or an Emergency Stop occurs, valve (5) de-energizes, venting pressure.

The GHP also has a heat exchanger that must be used when the machine is in operation. The input port is on the right and output port is on the left, and both are 1” NPT thread connectors. Connect the input with continuous city water supply, and connect the output to a drainage ditch, or receptacle, or recycle water solution while abiding to city codes/law. There is a shutoff valve on the input that turns on the flow when the temperature is high, and turns off the flow on low temperature and E-Stop.

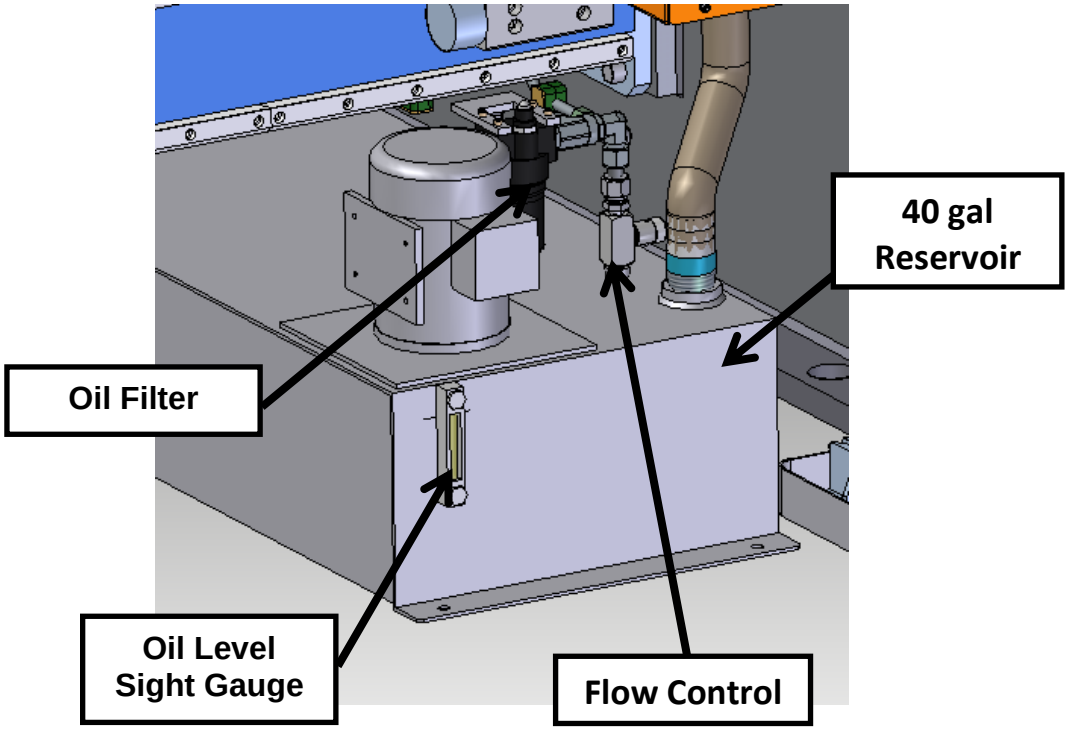


5.13 Headstock Lube Unit

The lube unit is responsible for lubricating the headstock.

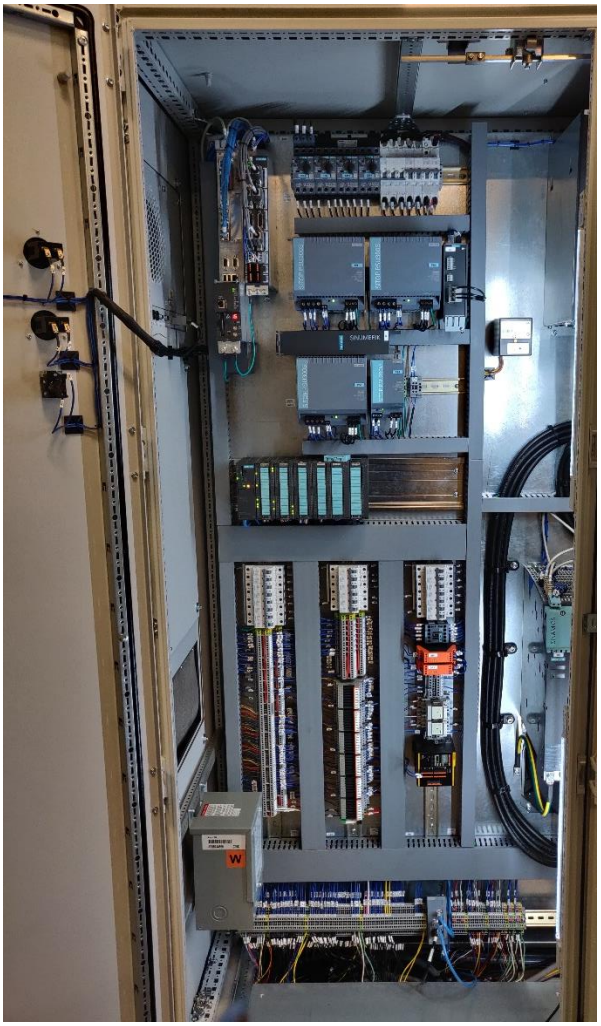
The lube unit consists of:

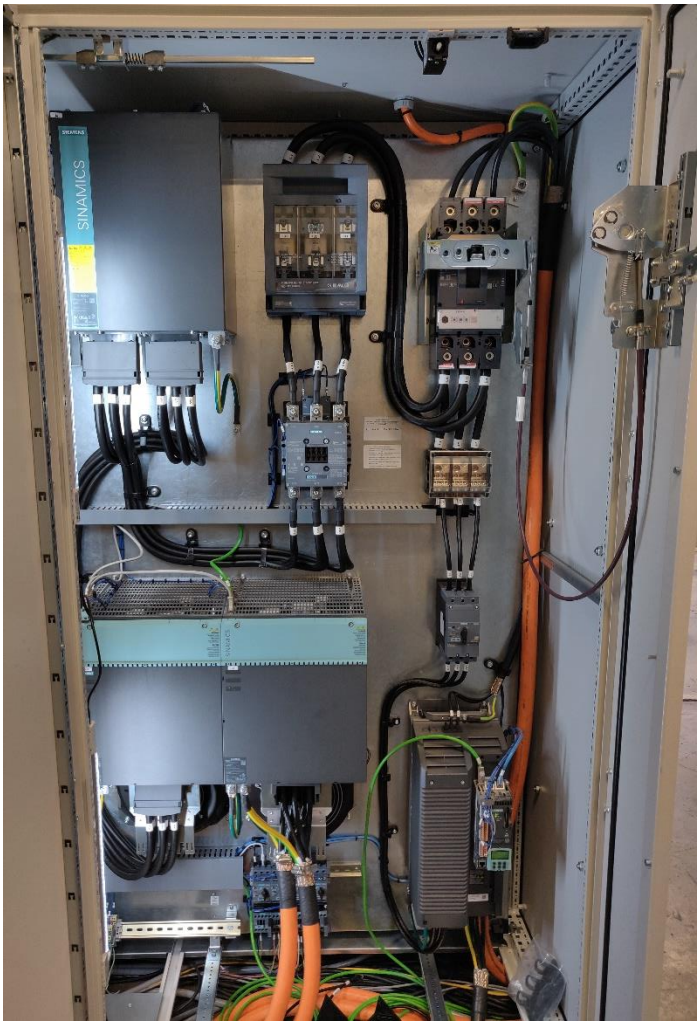
- 0.75hp hydrualic pump
- Reservoir
- Oil filter
- Oil level sight gauge
- Flow control valve
- Breather



5.14 Electrical Cabinet

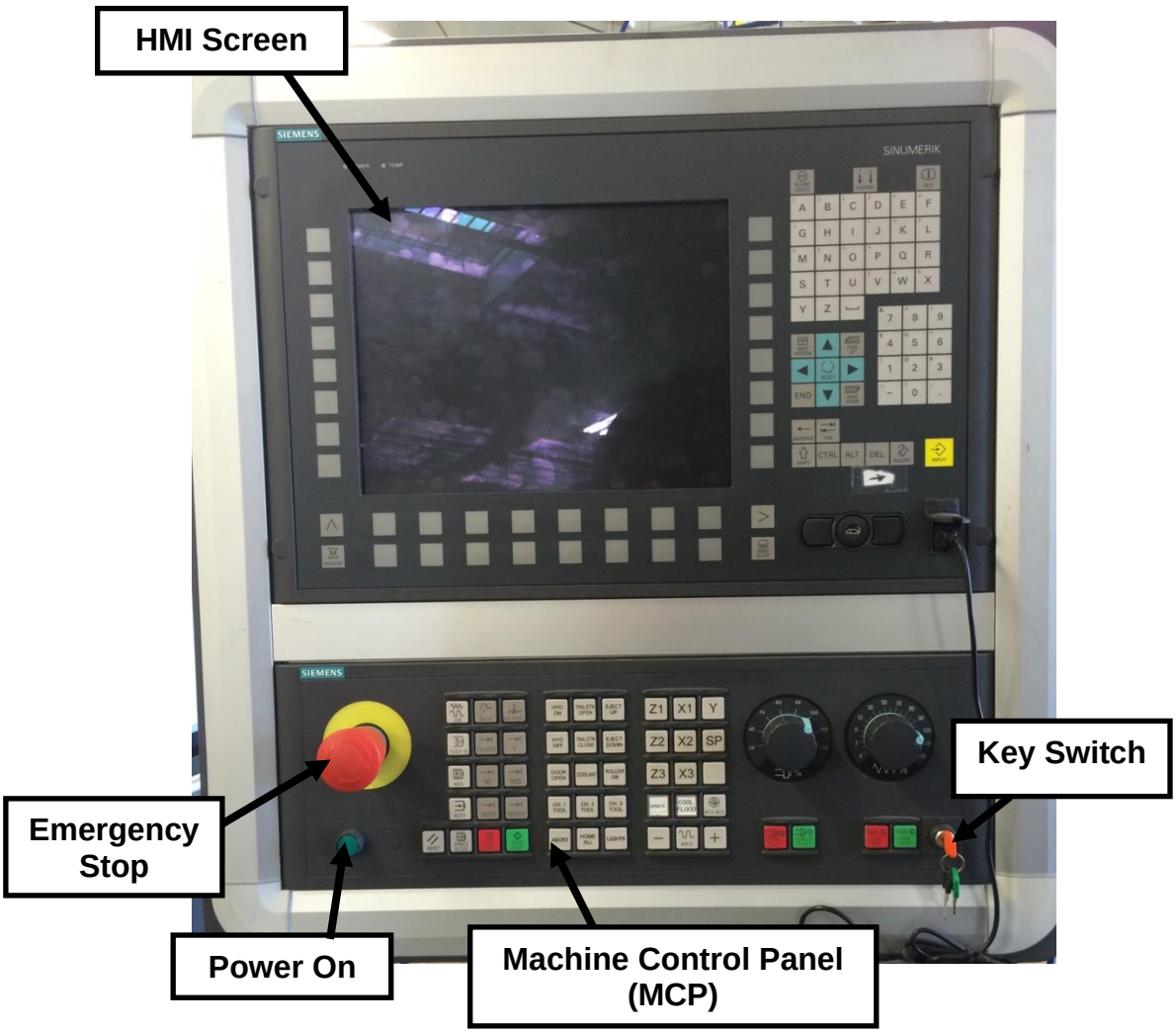
The electrical cabinet is the headquarters for all of the electrical components used on the machine (servo motors, proximity switches, pumps, etc.).





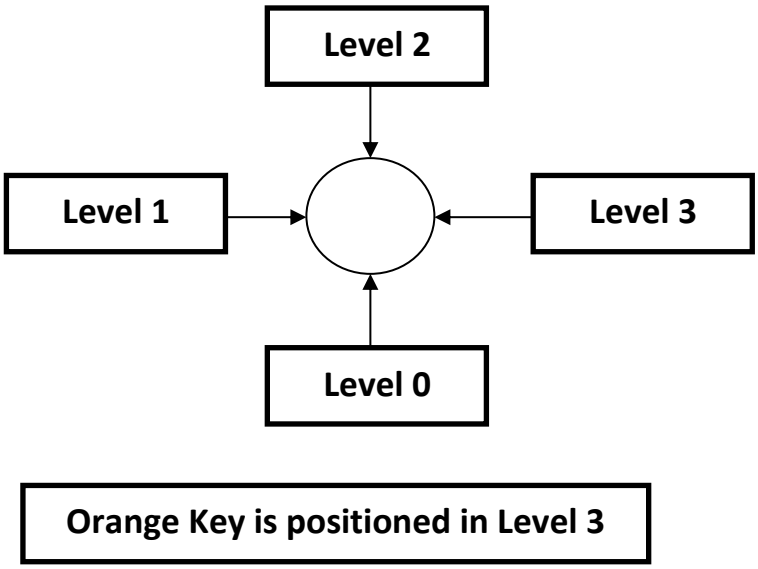
5.15 Operator’s Panel - Human Machine Interface (H.M.I.)

The operator’s panel is a Siemens PCU 50 industrial computer with a model OP12 display screen and HMI advanced software.



Supervisor Level Key Switch

- The key may be removed to prevent unauthorized changes at the supervisor level.
- Factory password must be off for key switch security level to work.



Level 0:
- Prevents viewing G-Code programs.
- Unloading and selecting programs is possible.

Level 1:
- Allows viewing only of G-Code programs.
- Unloading and selecting programs is possible.

Level 2 (access level 5):
- Allows manual edit of G-Code programs in PROGRAM screen.
- Unloading and selecting is possible.

Level 3 Orange/Door Bypass Mode (access level 4):
- Allows manual edit of G-Code programs in PROGRAM screen.
- Unloading and selecting is possible.
- Viewing of Machine Setup Data is possible.

Interlocks

The door and access panels are interlocked to prevent machine operation when they are opened or removed.

Warning: Physical injury may occur if interlocks are tampered with or removed.

6. Maintenance & Inspection

6.1 General Information

Before carrying any maintenance and inspection work:

- Switch off the hydraulic system
- Switch off the key-operated switch
- Disable main power and provide a safeguard against unintentional energizing!
- Trained experts of the respected fields of mechanics, hydraulic, pneumatic and electronics only are allowed to carry out functionality checks and inspection works.

Please follow this manual's "Safety" section when performing maintenance and inspection work.

Failures caused by insufficient or incorrect maintenance may lead to very high repair costs and long downtimes of the machine. Therefore, periodical maintenance is imperative.

Besides various other factors, the operational safety and the overall life of the machine also depend on correct maintenance.

The following "List of Maintenance and Inspection" contains time interval and maintenance instructions for the normal use of the machine.

The time interval is based on an 8-hour operating day. If the operating hours indicated is not reached during the corresponding period, the period may be extended accordingly.

Because of the different operating conditions, it is impossible to determine the frequency of wear and tear checks, inspections, maintenance and repair. A useful inspection routine has to be well documented and scheduled frequently, while noting any changes to operating conditions.

6.2 List of Maintenance and Inspection Intervals

Regularly:

- Check and maintain the machine according to the lubrication plan and list of lube points.
- Check the oil condition and level.
- Check the switching, regulating, control and information devices as to their proper functionality
-  Do not remove dirt, debris, chips, etc. with compressed air. Only use cleaning cloths and vacuums when cleaning the machine.
- The paint finish must be touched up from time to time in order to prevent rust and corrosion.
- If there is a change to product G code, or new product G code created, then back up the files.

Daily:

- Check all hydraulic, grease, and way oil levels.
- Check the GHP and spindle oil for water contamination or emulsion.
- Check that the working pressure of the hydraulic system is at the proper level for operation.

Weekly:

- Clean way covers on the slide and check for any possible damage.

Monthly:

- Inspect way covers for proper operation and lubricate with light oil, if necessary.
- Inspect the oil reservoirs and add oil as needed.
- Check the dust buildup on electrical cabinet vector drive vents (beneath power switch). If buildup exists, open cabinet and wipe vents with clean cloth rag. Apply compressed air as necessary to remove dust accumulation.

Semi-Annual:

- Check hydraulic oil for contamination and ageing.
- Check all hoses and lubrication lines for cracking.
- Check the spindle belt for wear and tear. Follow the recommended belt tension specification in the spindle section, measure the belt tension and adjust to match this specification.

Annual:

- Check the electric motors for wear and tear. Grease bearing of electric motor, if required.
- Check all electrical terminal, plug-in connections and lines for a firm seat.
- Check all electrical contacts for corrosion.
- Replace hydraulic oil and air filters.
- Replace spindle oil and air filter.

6.3 Lubricants

 Please follow the operating manual “Safety” when performing maintenance and inspection work.

Notes for Lubrication

The machine has been provided with corresponding lubricants during assembly at the factory. Careful lubrication is required for a faultless operation of the machine and helps to prevent costly repairs. This particularly applies to the lubrication of the linear bearing, rails, and ball screws. An insufficient lubrication causes excessive wear resulting in a considerable shortening of the service life of the machine.

Alternative Lubricants

MJC recommends following the “Specifications of Oils and lubricants” to fill the machine. Other lubricants may be used at customer’s discretion, but they must match the specifications and features of the lubricants listed. ***However, MJC does not assume any responsibility or liability for damage or malfunction that may occur, if a non-recommended lubricant was used.***

Storage of Lubricants

Lubricants such as oil and greases have to be stored in clean, sealed containers in order to prevent the penetration of dust, humidity and to keep oxidation by the air as low as possible. The storage location should be in a cool, dry place.

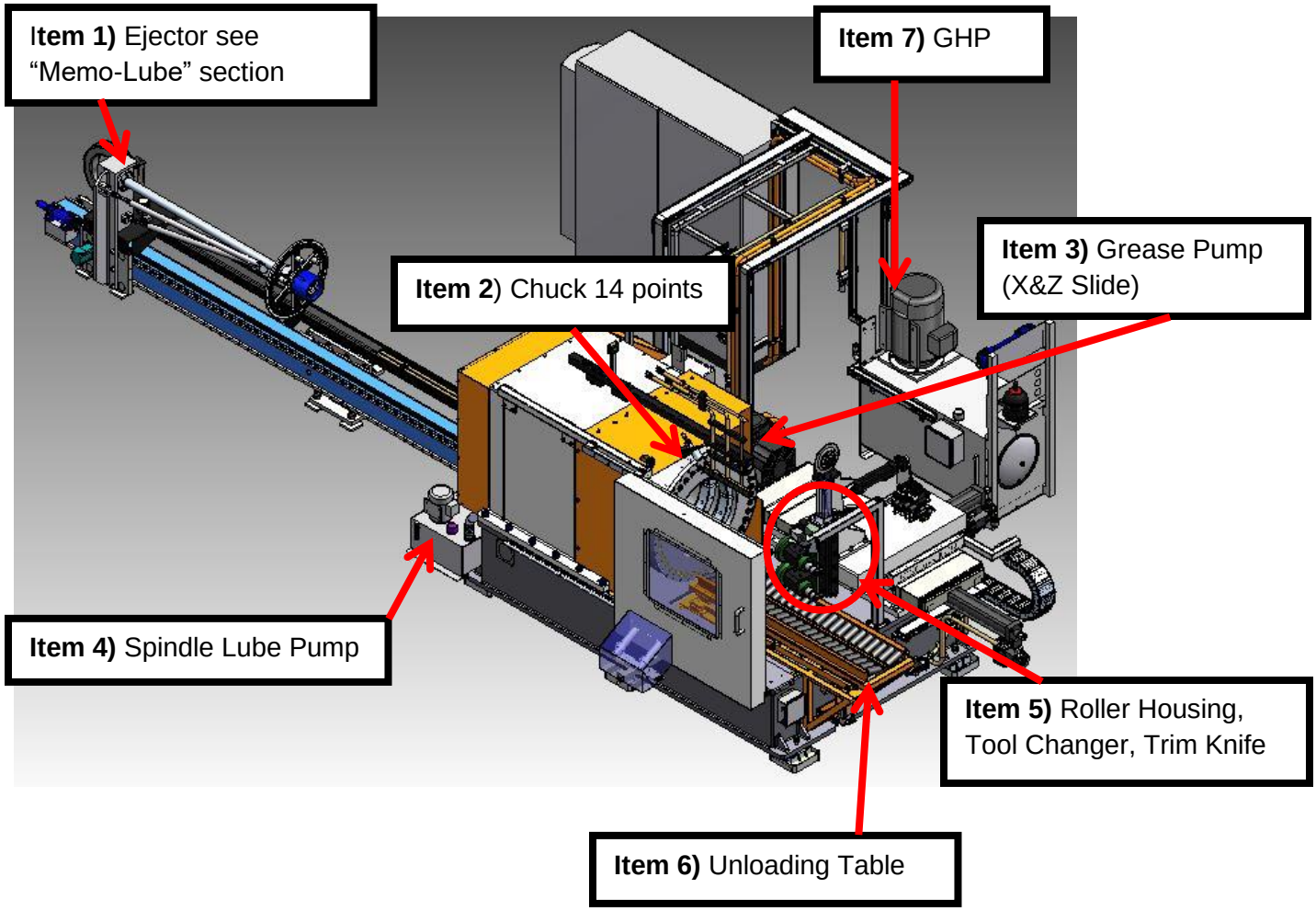
6.3.1 Specifications of Oil and Lubricants

Location	Type	Quantity	Interval
GHP/ Hydraulic Oil	Mobil DTE25 / Premium HY AW Hydraulic 32 oil	100 gal	Annual
Spindle	Mobil DTE25 / Premium HY AW Hydraulic 32 oil	40 gal	Annual
Unloading Table	Timken GR217C	2 hand pumps	Bi-weekly
Grease Pump (X&Z Slide)	Timken GR217C	2 Liter	When low
Chuck**	Ultra High Temp Grease (MMC 1417K48)	2 hand pumps	Bi-weekly
Roller Housing	Ultra High Temp Grease (MMC 1417K48)	2 hand pumps	Bi-weekly
Tool Changer	Ultra High Temp Grease (MMC 1417K48)	2 hand pumps	Bi-weekly
Ejector Lube Unit***	MEMOLUB HPS	To capacity	Bi-weekly
FALK Gearbox	ISO-VG 220	3.2 gal	When low

**Do not over grease - verify grease is getting to locations first
***Refer to MEMOLUB section

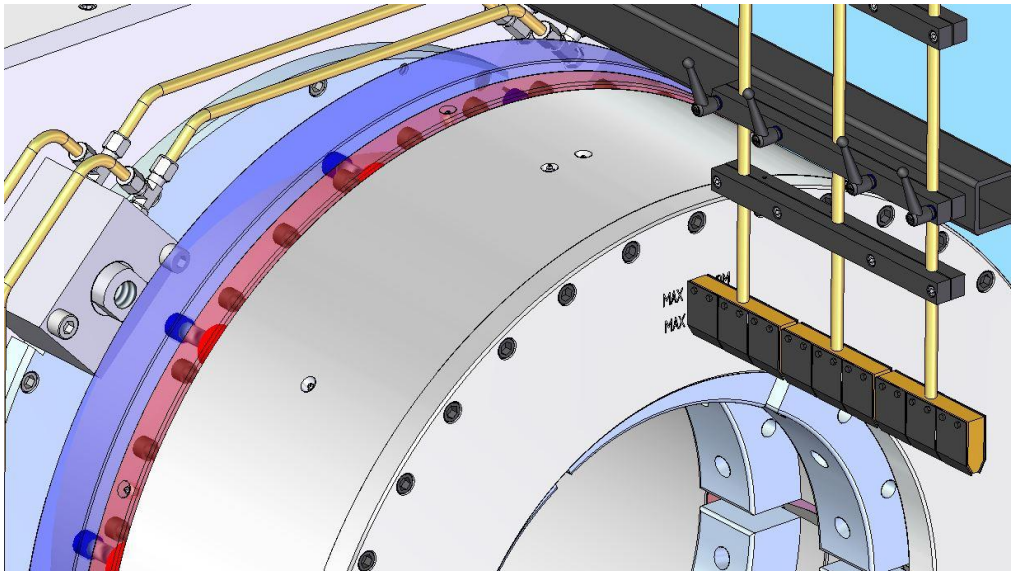
6.4 Lubrication Locations

Overview

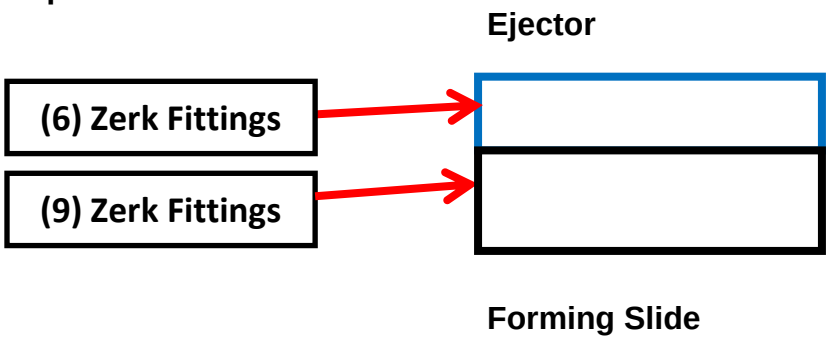


Chuck

- (6) Zerk Fittings on circumference closest to Ejector.
- (9) Zerk Fittings around the circumference closest to the forming slide.

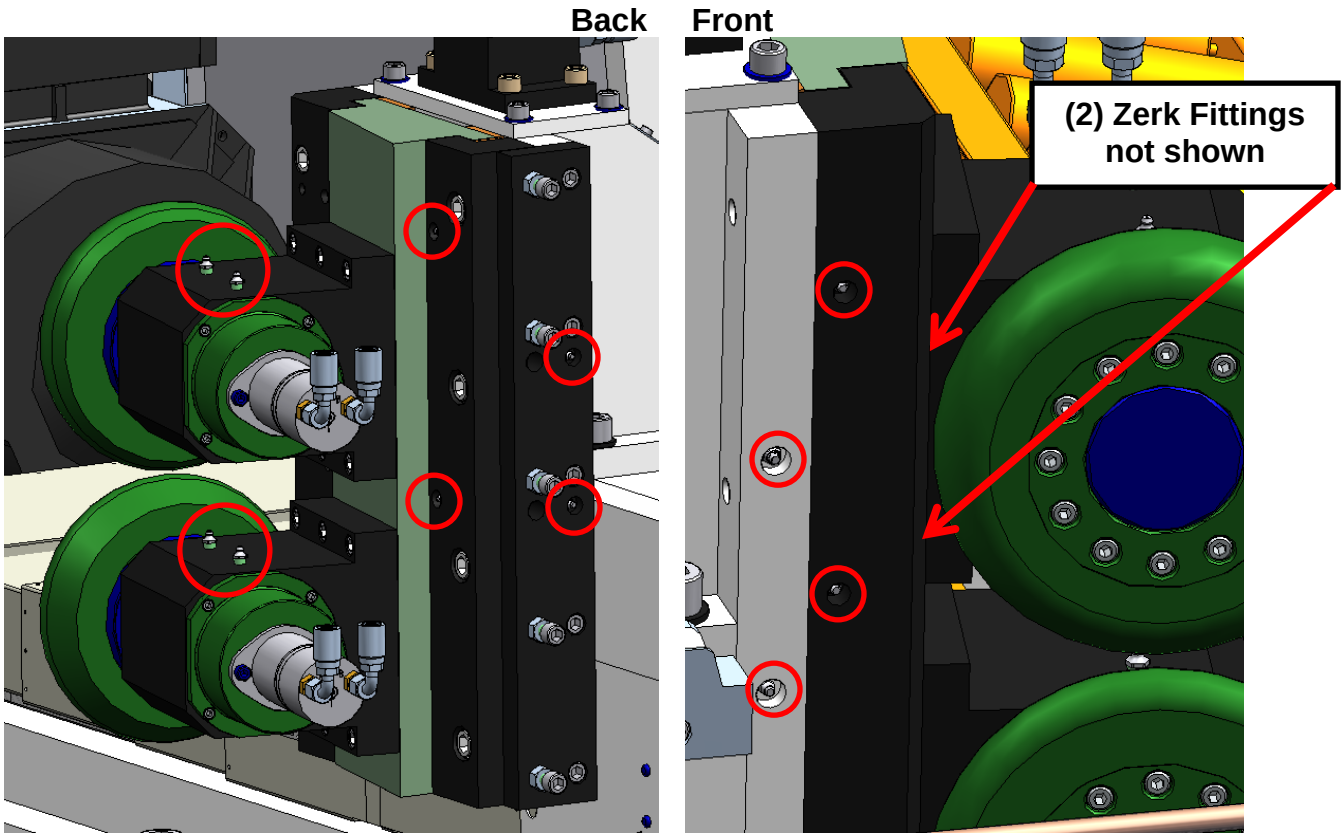


Top View



Tool Housing and Tool Changer

- (2) Zerk Fittings on each tool housing (4 total).
- (4) Zerk Fittings on each black retainer rail that hold the roller housings.
- (2) Zerk Fittings close to the chuck and face of the rollers, on the white painted metal rail.

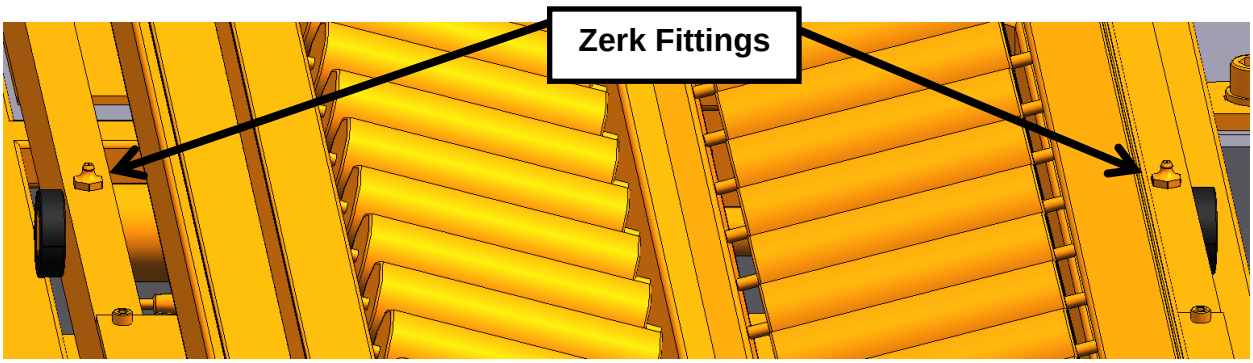


Trim Knife

- Zerk Fittings on the trim knife arm.

Unloading Table

- (8) Zerk Fittings on the pivot points and pillow blocks on the unloading table.



6.5 Hydraulic Power Unit (H.P.U.) Oil Change

Regularly check the hydraulic oil is free of dirt, ageing and water content. If there is high moisture content in the air, then water contamination may occur when the moisture settles in the tank on all surfaces above the hydraulic oil level. This moisture in the tank may also cause surfaces to rust, and rust will further contaminate the oil. If water or rust is present, then:

1. Empty the hydraulic oil immediately.
2. Find the cause of the problem and eliminate.
3. Fill the tank with new hydraulic oil.

Water reduces the viscosity of the hydraulic oil and causes emulsification of the oil. If water gets into hydraulic cylinders, then there is a chance of air bubbles being introduced into the system, this may cause cavitation and damage pump gears and seals.

MJC Engineering and Technology Inc. does not assume any responsibility or liability for damage or malfunction that may occur due to contamination of hydraulic oil.

For oil type and quantity see description “Specifications of Oils and Lubricants”

6.6 Maintenance of the Oil Filters

The service life of the filter element on the GHP and Falk Gearbox is dependent on the degree of dirt accumulation.

Replace each filter element at each oil change with the filters listed in the “spare parts list”, or when an inspection deems the filter too dirty.

6.7 Lube Unit

Regularly check the Lube Unit's oil is free of dirt, ageing and water content. Water reduces the oiliness of the hydraulic oil and causes emulsification of the oil.

- Empty the oil immediately.
- Find the cause of the problem and eliminate.
- Fill with new hydraulic oil.

Daily:

- Check the oil level in the Lube Unit Tank.

After 2,000 hours operating or once a year:

- Change hydraulic oil
- Clean the tank
- For oil type and quantity see description "Specifications of Oils & Greases"

Oil Filter Maintenance

The service life of the filter element on the Lube Unit.) is dependent on the degree of dirt accumulation.

Replace the filter element at each oil change and in case of high level of contamination

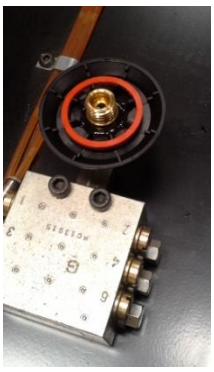
Replacement Filter: Parker 40CN120QEBM2KS164

6.8 Ejector Automatic Lube System

The Ejector bed comes with and Automatic Lubrication System that you can customize the cycle settings to accommodate based on equipment use by use of installing rings. It stores a 240cc volume of lubricant. (See Manufacturer's website for full device details)
http://www.memolub.com/files/Complete%20UserGuide%20%20v4.07%20.pdf

MEMOLUB 240 & Ring demonstration (pictured)

Rings Used	Code	Cycles per day	Frequency
RD WHT BL	RWB	24	1 HOUR
RD & WHT	RW	12	2 HOURS
RD & BLK	RB	4	6 HOURS
RD	R	2	12 HOURS
BLK&WHT	BW	1.5	16 HOURS
WHT	W	1	24
BLK	BW	0.5	48 HOURS



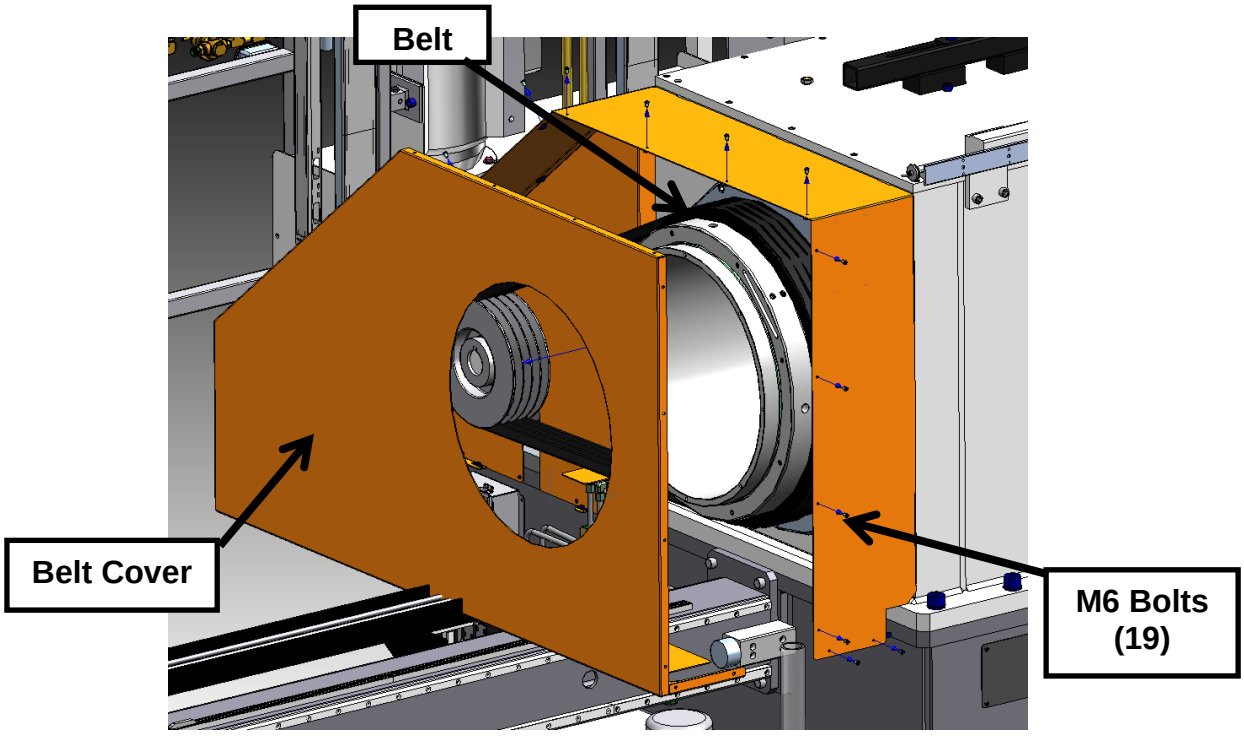
6.9 Spindle Motor Belt Adjustment and Removal/Installation

Do not operate or perform any maintenance without power disabled!

Belt Tension

In order to access the belt:

- Remove the (19) M6 bolts.
- Slide the Belt Cover out and away from its mounted position.



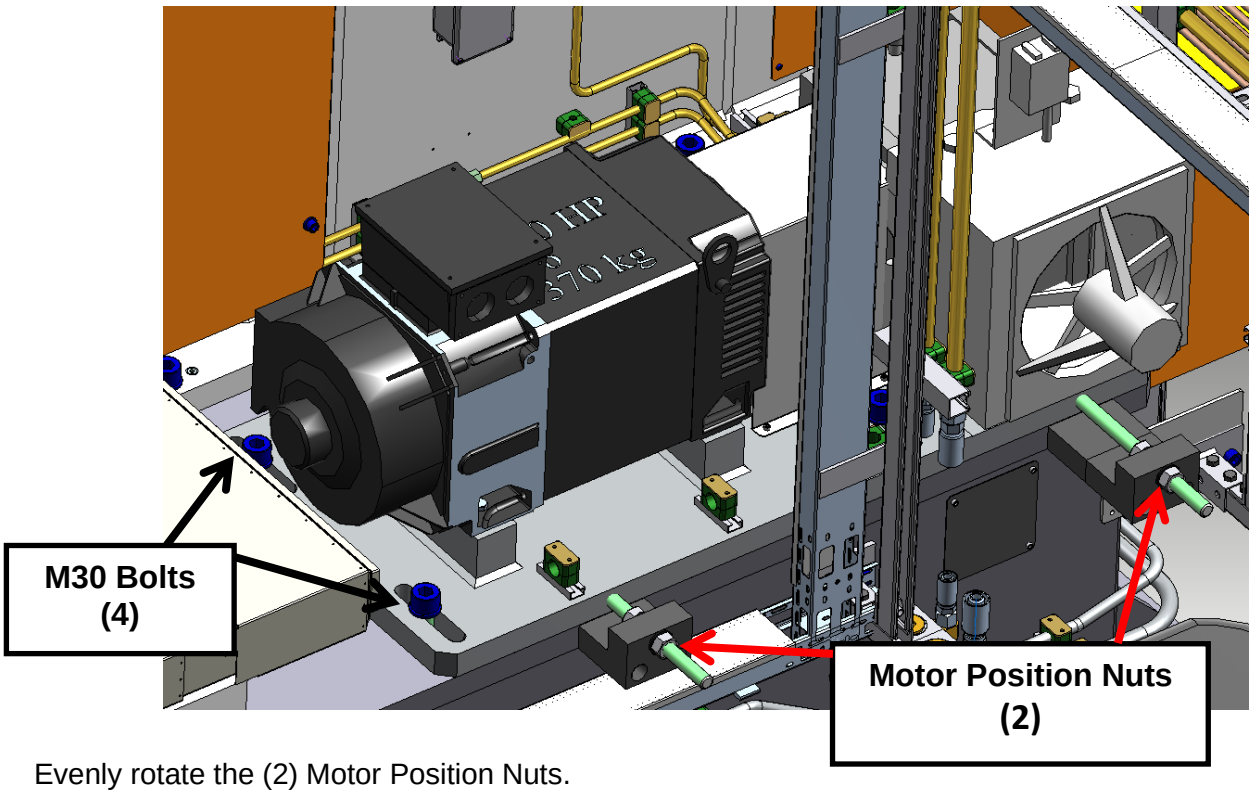
Follow the tension specification for 8V belts, and 14” small sheave diameter.

V-Belt Drives

V Belt Cross Section	Small Sheave Diameter Range (Inches)	Recommended Deflection Force (Lbs.)*		
		Initial Installation	Retensioning	
			Maximum	Minimum
3V	2.65 - 3.35	4.6	4.0	3.1
	3.65 - 4.50	5.5	4.8	3.7
	4.75 - 6.0	6.4	5.6	4.3
	6.5 - 10.6	7.3	6.4	4.9
5V	7.1 - 10.3	16.5	14.3	11.0
	10.9 - 11.8	19.5	16.9	13.0
	12.5 - 16.0	21.0	18.2	14.0
8V	12.5 - 16.0	39.0*	33.8*	26.0*
	17.0 - 20.0	45.0*	39.0*	30.0*
	21.2 - 24.4	51.0*	44.2*	34.0*

When changing belts or setting the belt tension:

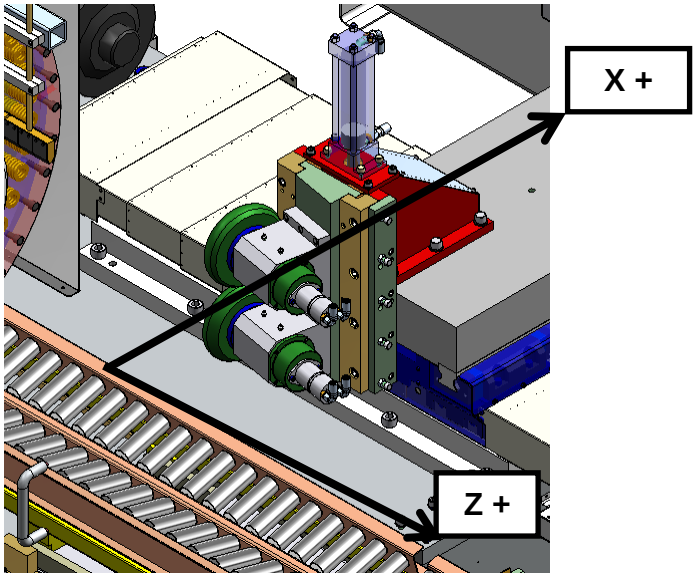
- Loosen the (4) M30 bolts.



- Evenly rotate the (2) Motor Position Nuts.
    - Clockwise for increased tension.
    - Counter-clockwise for decreased tension.

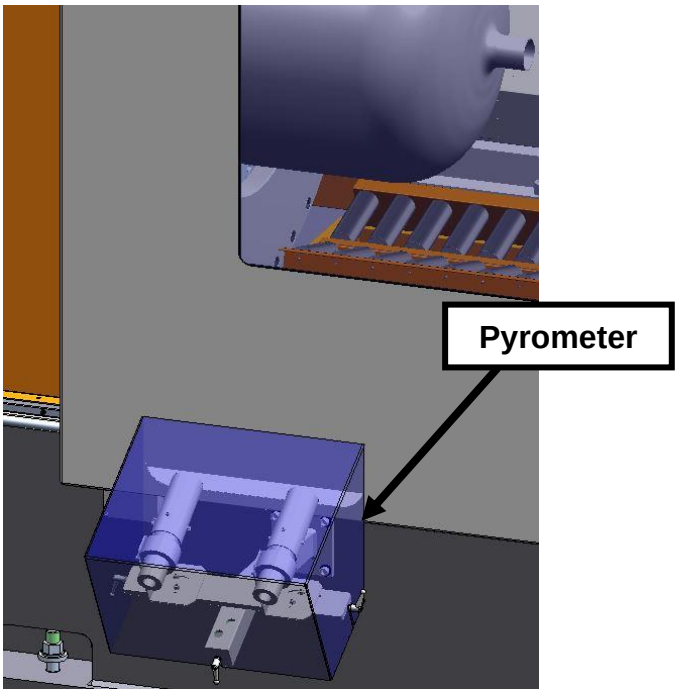
8. Machine Operation

8.1 Axis Orientation



8.6 Pyrometer

The pyrometer is located on the machine bed. It measures the temperature of an unspun bottle.



8.6.1 Setting Emissivity

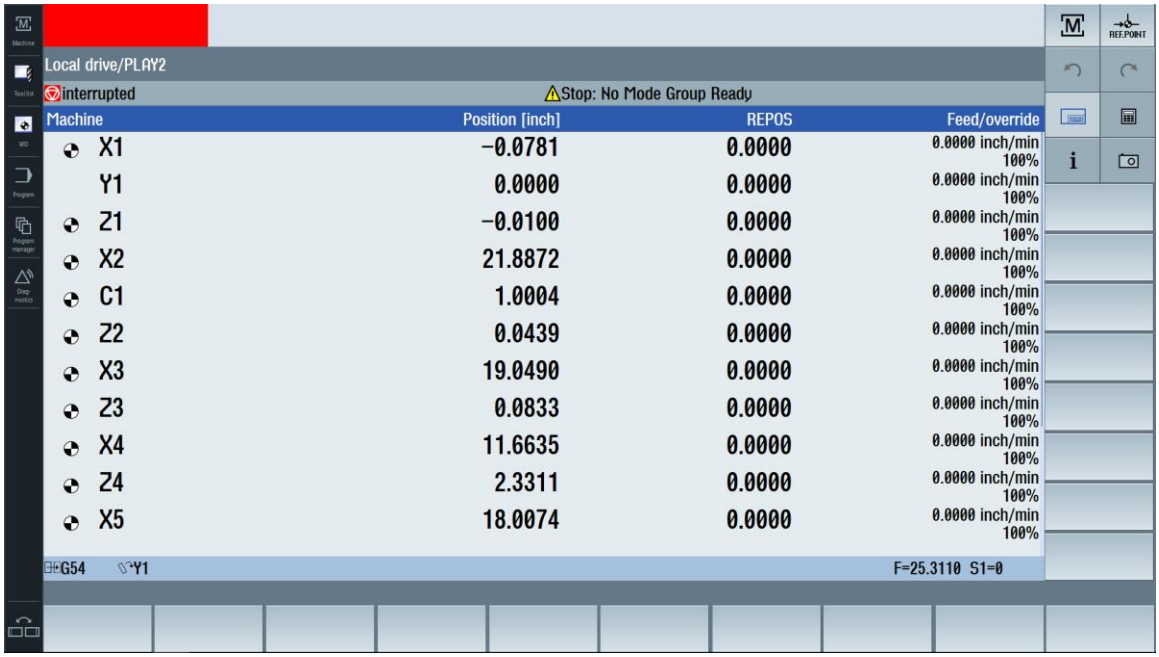
Reference external document: Optris manual.

5. Software Operation

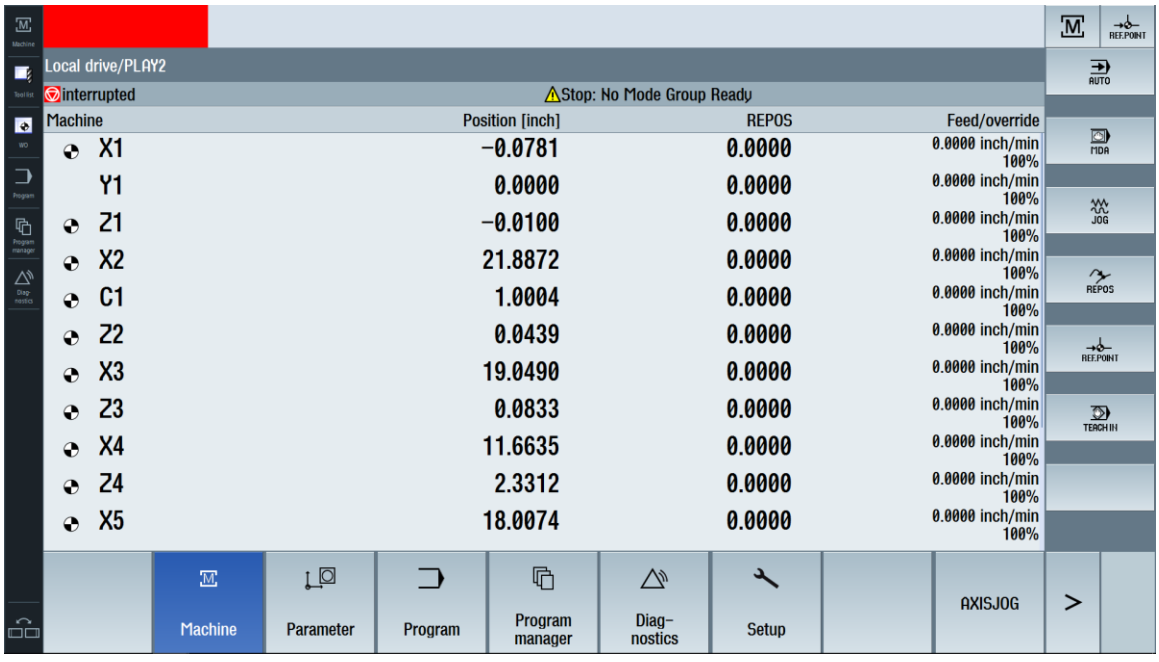
MJC offers a variety of software packages depending on the machine purchased. Separate manuals are attached at the end of this manual.

Basic Navigation

Press “menu select” to begin navigating to all available screens. On MJC custom screens the button is clearly labeled “menu select”. On Siemens menus the button has different logos depending on the current screen, and it is usually at the top and second from the right (where the [M] is below).

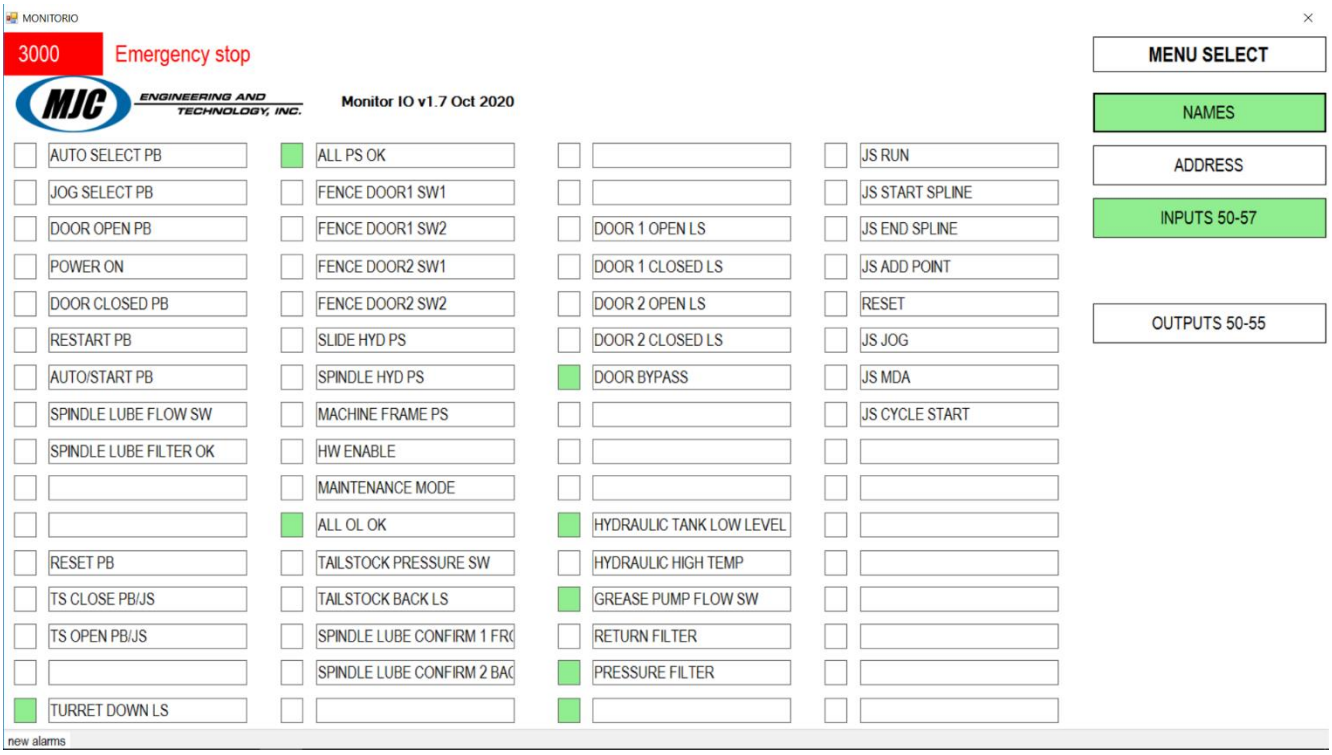


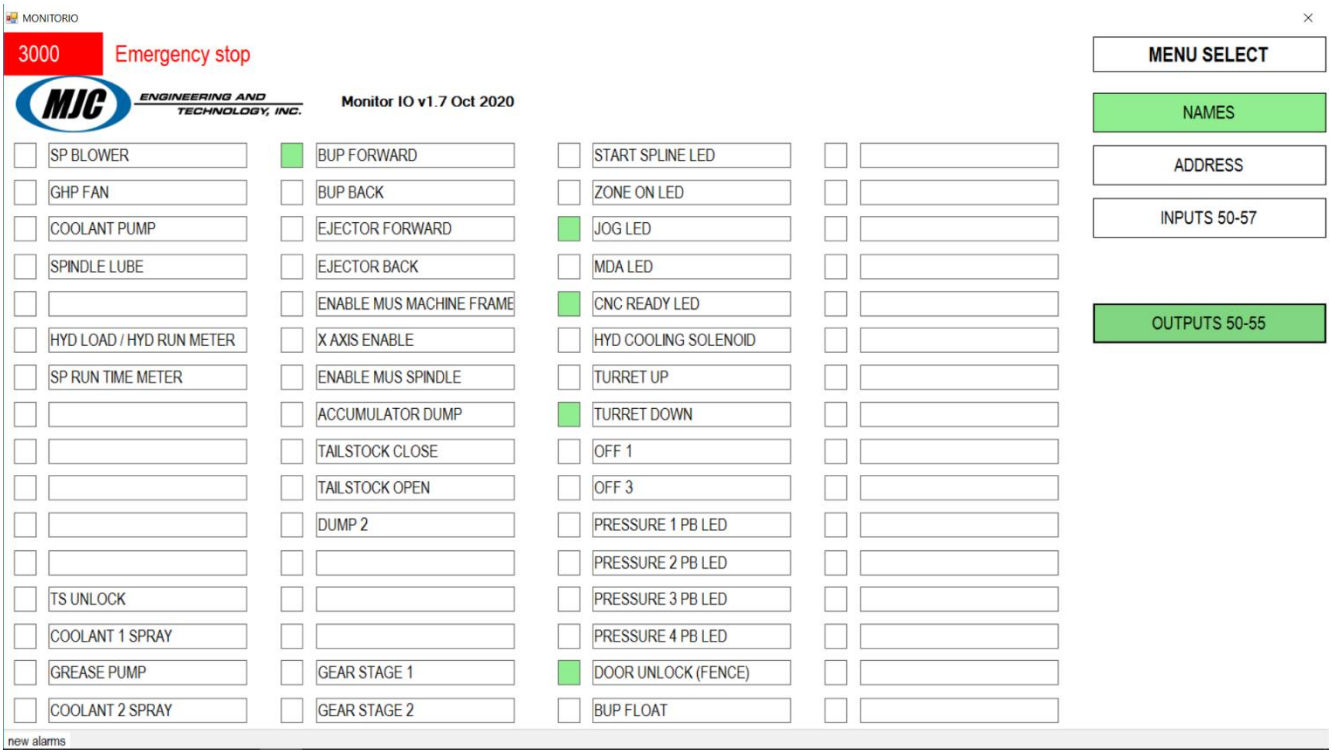
Right arrow (>) to access second set of available screens.



5.1 Input/Output

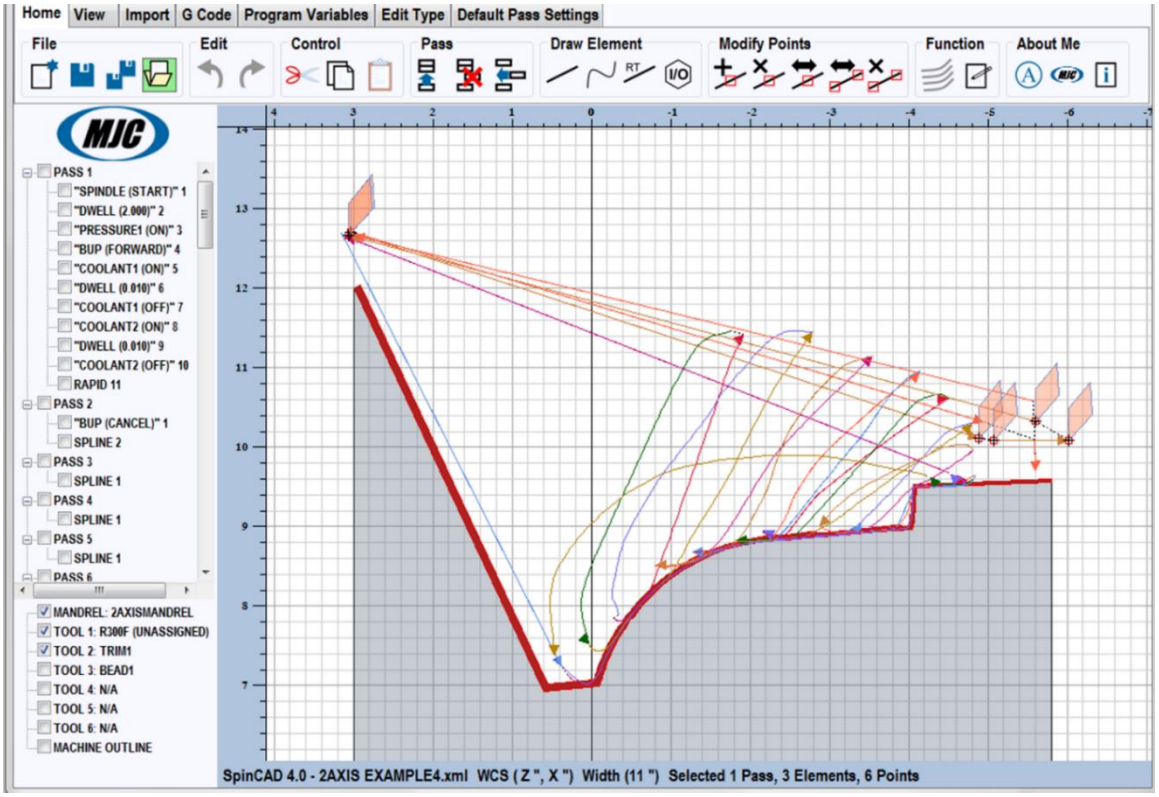
Input/output screen is generally used as a troubleshooting guide if alarms/faults should appear.





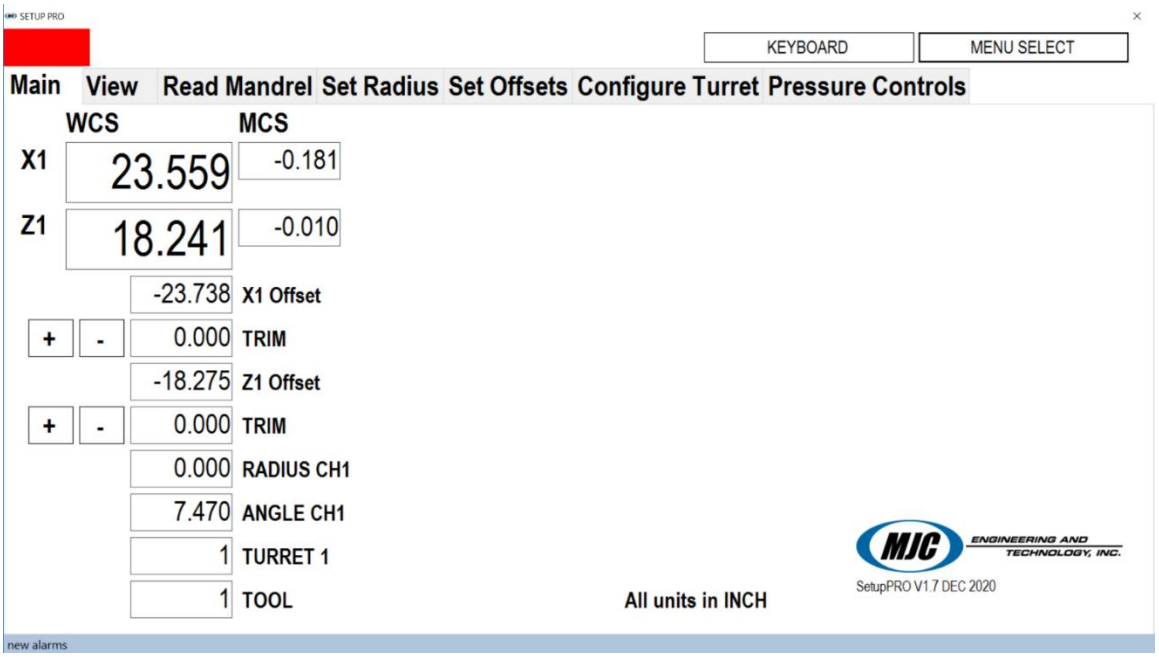
5.2 SpinCAD® 4.0

A CAD program that creates tool paths and the G code to be executed on the machine.



5.3 SetupPro

Work offsets need to be updated if a mandrel has been changed, or if any dimension of a roller has changed due to rework.



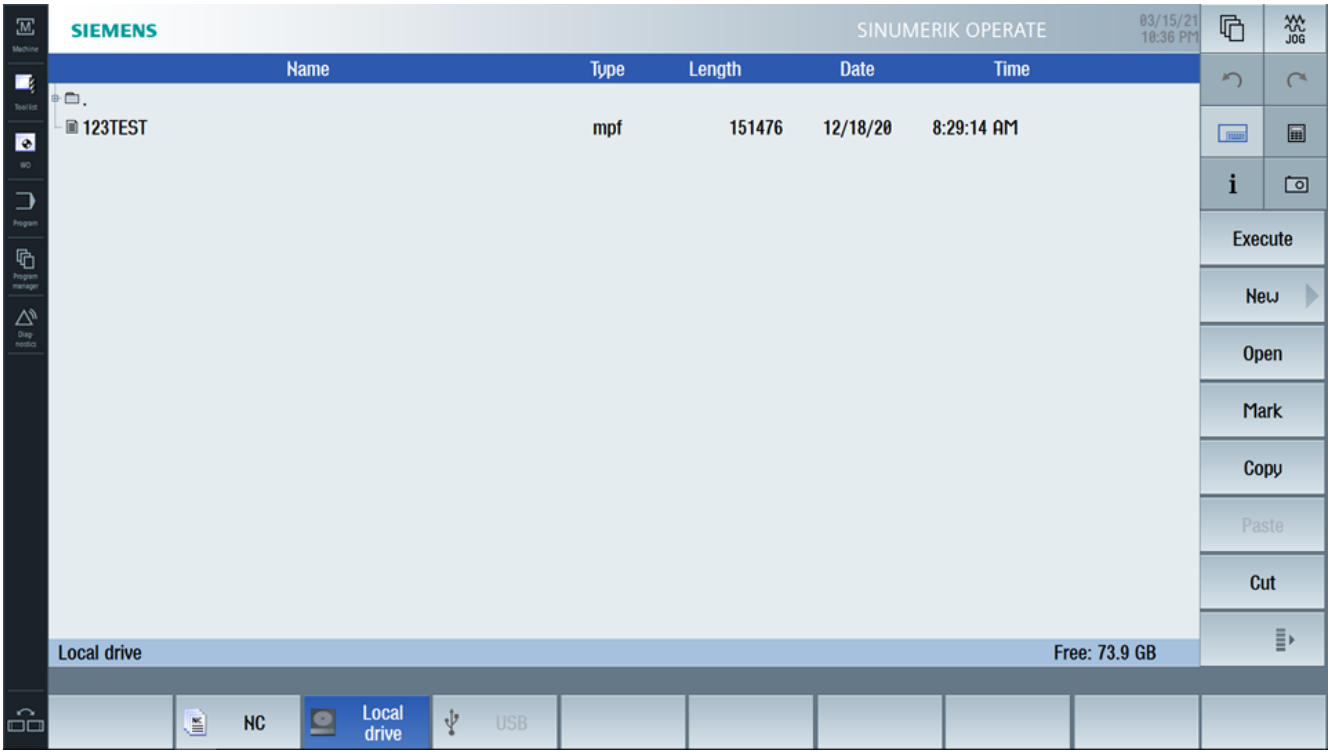
5.4 PROGRAM Screen

Click on “generate G code” button in SpinCAD 4.0 program.

Navigate in Siemens environment: MENU SELECT, PROGRAMS, LOCAL DRIVE.

Copy the desired G code file(s) into NC drive.

Highlight the desired G code file and click EXECUTE.



5.5 M and G Codes

G0 Rapid traverse
G01 Feed rate programmed move
G71 program in MM/Min
G642 Corner rounding/smoothing
G90 Absolute dimension programming
G91 Relative dimension programming
G54, G55, G56, G57, G505, G506 Activate tool 1 - 6 offsets.

M3 SPINDLE START
M5 SPINDLE STOP

M10 TAILSTOCK FORWARD
M11 TAILSTOCK BACK
M35 TAILSTOCK CANCEL

M20 TRIM ON
M21 TRIM OFF

M12 BUP FWD
M13 BUP BACK
M36 BUP CANCEL

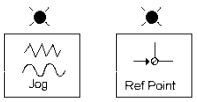
M49 WAIT ZERO SPEED ON
M47 WAIT TS FWD ON

M37 EJECT FWD
M39 EJECT BACK

5.6 Machine Startup

After the user interface computer boots, we will be in reference point approach mode.

This is indicated by the “Jog” and “Ref Point” lights both on



All axes are absolute encoder and do not need to be referenced.

5.6.1 Basic Functions Operator Panel

There are two ways for operating the machine, on screen buttons and the MCP buttons.

On screen buttons select part programs and navigate through machine settings. An on-screen keyboard will appear when an editable field is clicked on. Optionally, MJC custom screens usually have a button “Keyboard” that will bring up the Windows on screen keyboard.

The machine button navigates to the basic machine setting page, such as setting presets when referencing machine axes.

The parameter button navigates to the offsets and other variables for machine operation. This screen also can access R variables on the machine, they can be viewed and changed here.

The program button navigates to the screen where the user can select from stored G code files.

The program manager button similar function to the program button.

Diagnostic button can access NC and PLC variables, R variables, data exchange items between NC and PLC. The axis diagnostic shows all of the run permissions, and there is a second diagnostic screen that shows axis variables, following errors and calculated servo gain. The following error and calculated servo gain are important to determine the quality of servo tuning.

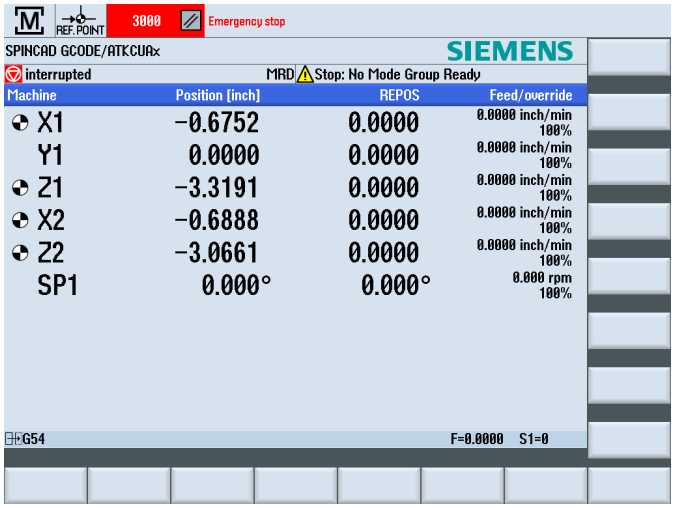
Setup button can access system data similar to a Windows file explorer for files on the machine. The “D:\OEM” folder holds all of the data and executables for MJC screens. MJC recommends regularly backing up either all of the OEM folder, or if desired only the folders necessary for machine operation involving G code which includes: “D:\OEM\Programs” folder, and “D:\OEM\SpinCAD4” folder.

5.6.2 System Start up

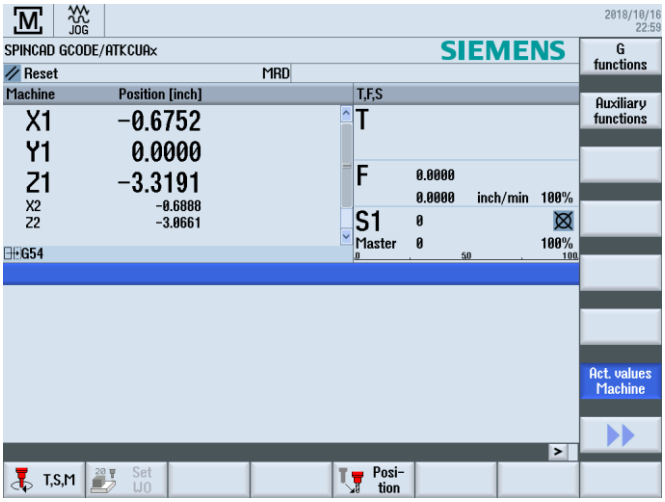
At first the lights on the MCP buttons blink. When the system is ready to run, the lights stop blinking.

The operator panel will boot up to what is called the Human Machine Interface (HMI) main page.

Turn to release the E-Stop if it has been pressed. Press the “RESET” button on the MCP for two seconds to clear alarms and prepare the system to run.



Press jog on the MCP.



Machine is now ready for operation.

5.6.3 Select Part Program

Click on the program button, go to the desired program and press “EXECUTE”.

5.6.4 Running a Part Program

Select “MACHINE”, then “AUTO” on the MCP. Verify the program name you selected shows at the top of the screen.

Pressing “Cycle Start” will begin program at the beginning.

Pressing “Reset” will stop the slides and spindle.

5.6.5 Running a Part Program from Middle

In Auto Mode, and with machine screen displayed. Select “Block Search”. The G codes will be displayed, scroll to where you wish start execution.

Select “Calculate Block End Point”.

Press “Cycle Start”, The spindle will come up to speed and the message “Press Cycle Start to Continue” is displayed.

Press “Cycle Start” again and the program will execute from the selected location.

5.6.6 Hand Wheel Jog Pendant

The pendant can jog the slides with the operator close to the work. This assists in touching off on parts to establish offsets. The “Enable” button must be pressed for any functions to work.

The 0, Z, X, Y selector chooses the axis that will move, “0” is no selection.

The +/- jog the selected axis at the speed set by the override pot on the MCP.

The wheel is used in conjunction with the F1, F2, F3 increment button.

With F1 selected, the slide moves 0.001” per revolution of the wheel, or .001” each time +/- is pressed.

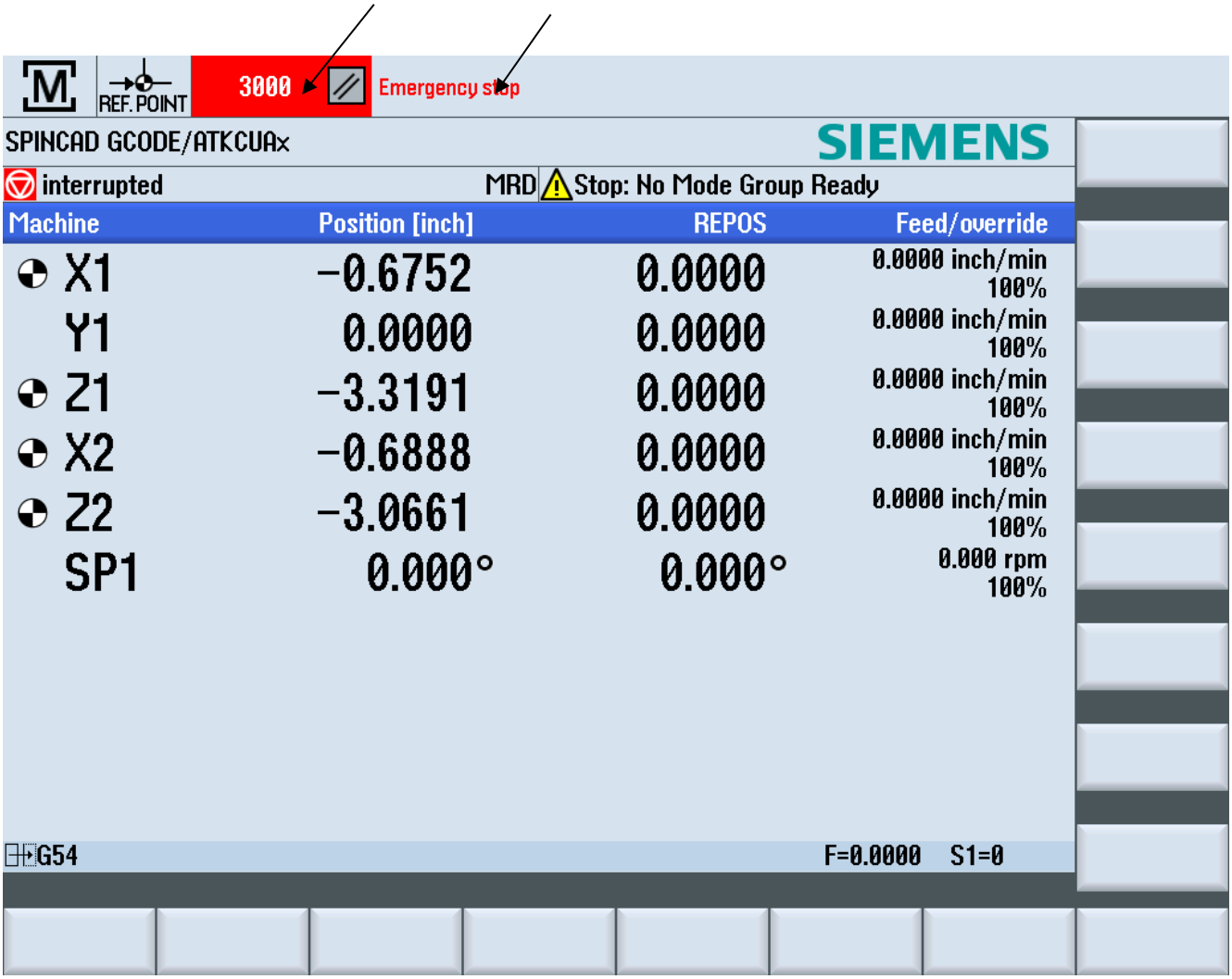
With F2 selected, the slide moves 0.010” per revolution of the wheel, or .01” each time +/- is pressed.

With F3 selected, the slide moves 0.100” per revolution of the wheel, or .10” each time +/- is pressed.

Releasing the “Enable” key clears the increment mode, which allows the +/- keys to jog at the rate selected on the MCP.

6. Alarm Descriptions and Diagnostics

When reporting errors, please give the number and text of the alarm message.



PLC faults are the 700000 series fault codes. These faults are specific to this machine. MJC determines what conditions post what messages.

All other numbers are Siemens CNC system messages. Only a few are mentioned here. A more comprehensive list is in the **Fault Codes and Corrective Actions** document. It is a compilation of all errors reported by all customers. It is updated periodically as new errors or solutions to errors make themselves known.

6.1 CNC Faults

The most common errors:

Moving fast for too long

- “Contour Monitor”, “Axis Drive Limit” or “Axis Drive Error” will display.
- Any cycle in progress will terminate.
- Press “RESET” to recover.
- Typically, there is one rapid in, then material forming at a slower speed for a period allowing the accumulator to charge.

Axis faults during hydraulic turn on

- As the hydraulic system builds up pressure, the CNC control system may not be able to maintain position.
- “Contour monitor”, or some other alarm with an axis drive letter Z or X will display.
- Press “RESET” to recover.

General note about servo valves and axis faults:

- When there is an alarm displayed with a drive letter, *(any axis fault),* all servo signals are turned off.
- Note the axis indication in the alarm message, the axis that caused the error will be displayed.
- A hard failure on an axis can be a loose/broken wire in the servo valve circuit, or a loose connector in the feedback cables.

6.2 Corrective Actions

Press “**RESET”** for more than 2 second to clear PLC alarms. If the condition producing the message is cleared, the message will be removed from the screen.

700000 **HYDRAULIC NOT ON**
Cannot start cycle with hydraulics off.

700001 **CHUCK NOT CLOSED**
Chuck was open when the spindle was commanded to turn.

700003 **DOOR NOT CLOSED**
In AUTO mode operator door is not closed when the spindle is commanded to turn. Inhibited by BYPASS key switch selected to position 3. Door closed condition detected by proximity switches.

700004 **SPINDLE LUBE FLOW FAULT**
Check the flow visual indicator on the Hedland flow switch on the headstock, and the sight gauge on the spindle lube reservoir.

700006 **SPINDLE LUBE OVER TEMP**
Check the cooling for the spindle lube.

700007 **HYDRAULIC OVER TEMP**

Check the cooling for the hydraulic system.

700008 **HYDRAULIC LOW LEVEL**

Check the oil level for the hydraulic system.

700009 **SET SPINDLE START**

See below.

700010 **SET FEED START**

Cycle start is inhibited when this fault is active.
Press the two green buttons SPINDLE START and FEED START on the MCP.

700011 **TRIM KNIFE OUT OF POSITION**

Trim knife did not reach it's commanded position, check the proximity switches.

700012 **LIFT NOT DOWN**

The lift table is not in the down position when the spindle was commanded to turn.

700013 **OVERLOAD OPEN**

A motor overload is open. Vertical as shown is OK, tripped is CCW 45 degrees. Open is CCW 90 degrees. Open and then close by turning CW to vertical. Please inform MJC which overload tripped when calling.

700014 **GREASE LOW LEVEL**

Check the grease sensor I52.2, it has a low level condition.

700016 **FLAME FAULT**

Flame not detected by thermal camera when torch on command was given. Check the flame ignitor and the gas lines.

9. Spare Parts List

Valves

Poppet solenoid valve	Parker GS068000N	Quantity: 6
Direct proportional valve	Parker D3FCE50UB9NB03	Quantity: 3
24VDC coil	Parker CCS024D	Quantity: 6
Din connector 6+PE	Parker 5004072	Quantity: 4

Probes & scales

X1 Axis – Balluff BTL7-S572B-M0375-Z-S32 (14.75” STROKE)

Z1 Axis – Balluff BTL7- S572B-M0700-Z-S32 (27.5” STROKE)

Cables & connectors

Servo cable and connector	Balluff BKSS32M20	Quantity: 4

PLC input / output modules

PLC digital input card 32*	Siemens 6ES7321-1BL00-0AA0	Quantity: 1
PLC digital output card 32*	Siemens 6ES7322-1BL00-0AA0	Quantity: 1
PLC analog input card 8*	Siemens 6ES7331-7KF02-0AB0	Quantity: 1
PLC analog output card 2*	Siemens 6ES7332-5HB01-0AB0	Quantity: 1

Solid state relays

INPUT: 24VDC, OUTPUT: 24VDC 1NO/1NC	Phoenix 2966634	Quantity: 20

Filters

GHP pressure filter	Parker 941037Q	Quantity: 2
GHP return filter	Parker 936712Q	Quantity: 2
GHP air filter	Descase DC-EX-3	Quantity: 1
Falk gearbox air filter	Falk Airmax Filter	Quantity: 1

Motors and mounting accessories

Hydraulic motor 5/8” shaft	CHAR 129-0293-002	Quantity: 3
Bolt and flange kit	CHAR 60552	Quantity: 3

Flame unit

SuperFlash type GG flashback arrester set	SUP 616226-02070	Quantity: 11

Cylinders

Block cylinder 4” bore, 2.5” rod, 2.2” stroke	CAL BLOCK CYLINDER	Quantity: 5
Field repair kit	CAL REPAIR KIT	Quantity: 4