CNC Lock hole & Hinge Slot Machine Manual

This manual has been revised for use with the MachMotion control and is effective January 2025.

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1 INTRODUCTORY INFORMATION

1.1 SCOPE OF THE INSTRUCTION MANUAL

This manual has been compiled to provide the user with a general knowledge of the machine and how to use it safely.

This Instruction Manual aimed at providing all the necessary information for:

- Safe and correct handling of the machine in all conditions
- Technical specifications
- Detailed knowledge of its operation
- Carrying out maintenance and repair work, properly and safely
- Technical assistance and arranging replacements.
- Disposal of waste produced by the machine.

1.2 PRESERVATION OF THE INSTRUCTION MANUAL

Always keep the manual with the machine and handle it carefully. Store it in clean, dry place, and protect it from damage.

1.3 PICTOGRAMS

The pictograms must be applied in areas where they are easily seen and visible by whoever approaches. Its position should be suitable so that the person reading can react timely to take any necessary actions to avoid the risk. When possible, they must be applied to areas protected from the risk of damage, abrasion, chemical attack, dust, or other substance that might affect its visibility and reading of it.

The surfaces where the pictograms are applied must be clean, smooth, and free from grease, oil and chemical products that reduce their adhesion. The regulation intends the safety pictograms to be regularly checked and cleaned to ensure good legibility at a safe distance. When products are subjected to extreme environmental conditions or nevertheless when the safety pictograms no longer respect the conditions of visibility required, they must be replaced.

There are two types of safety notices:

Warning- severe injury or death may result if there are any errors in installation, operation, or maintenance.

Caution- an injury may occur if there are any errors in installation, operation, maintenance. The possibility of damaging the machine or parts may occur in installation, operation, or maintenance.

PICTOGRAMS RELATED TO THE AUTHORIZATION OF OPERATORS

SYMBOL	DESCRIPTION
	Machine Operator
	Mechanical Maintenance Technician
	Electrical Maintenance Technician

PICTOGRAMS RELATED TO HAZARDS

SYMBOL	DESCRIPTION
	Electrical current
	Machine starts automatically
	Moving machinery
	Do not Operate
	Pinch point

PICTOGRAMS RELATED TO PPE

SYMBOL	DESCRIPTION
	PPE Required
	Mask Protection
	Earcup Protection
	Anti slip Shoes
	Eyepiece Protection
	Glove Protection

2 SAFETY

2.1 GENERAL SAFETY WARNINGS

The machine has been fitted with all means of protection and safety devices deemed necessary and equipped with sufficient information to be able to be used safely and properly. To this end, for every machine interaction, when necessary, the following information is indicated:

- Minimum qualification required of the operator.
- Number of necessary operators.
- Status of the machine.
- Residual risks.
- Personal protection equipment required or recommended.
- Prevention of human errors.
- Prohibited actions/obligations related to foreseeable incorrect conduct.

It is also essential to carefully follow the following instructions:

- It is prohibited to allow the machine to work in automatic mode with the fixed and/or mobile safety guards removed.
- It is prohibited to restrict the safety features installed on the machine.
- Operations with a reduced safety level must be done by following the instructions in the related sections.
- After an operation with reduced safety levels, the status of the machine must be restored as soon as possible with the safety devices activated.
- Avoid wearing clothes with hooks/loops that could get attached to parts of the machine.
- Avoid use of ties or other items of clothing that hang loosely.
- Avoid wearing large rings or bracelets that may cause hands to get caught in machine parts.

2.2 CONTROLS AND CHECK

Checks must be done by a qualified technician, both visual and operational, with the aim of assuring the machine's safety.
They include:

- checking all mechanical parts.
- checking all safety features installed on the machine.
- checking all connections with pins and screws.
- operational check of the machine.
- checking the status of the machine.
- checking the seal and efficiency of the pneumatic and/or hydraulic system.

2.2.1 SAFETY INSTRUCTION

Operators and people working on or around the machine should acquire complete familiarity with the machine before operations begin. This includes the method of shutting down the machine in a normal situation or in case of emergency. The person(s) within the movable boundary must wear clothes appropriate to the work and operators must operate all safety devices before the machine's operation.

The machine should not be operated by a person unable to perform normal operating tasks due to sickness or injury. Do not operate the machine alone during working hours. To prevent injury, it is forbidden to restart the machine after any problems, troubles, or accidents. It is also recommended to have a fire extinguisher in proximity in case of a fire or catastrophic failure.

2.3 CONTRADICATIONS OF USE

The machine must not be used:

- For uses other than those established by the manufacturer
- In explosive atmospheres
- In atmospheres at risk of fire.
- Exposed to severe weather.
- With the safety devices removed or not working.
- With electrical bridges and/or mechanical means that exclude users/parts of the machine itself.

2.4 HAZARDOUS AREAS

The electrical maintenance technician must pay attention when working on electrical components, making sure to have isolated the supply.
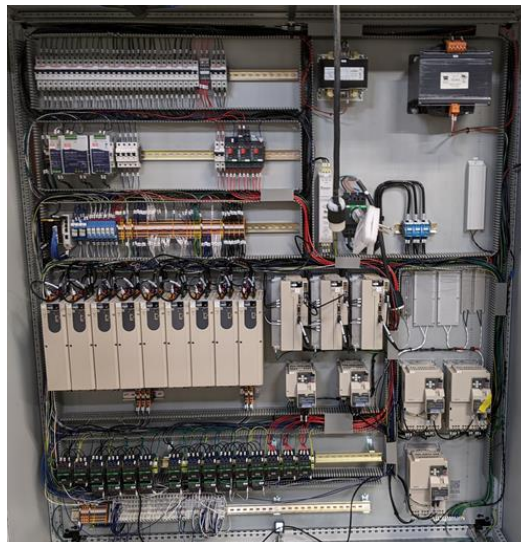
2.5 SAFETY DEVICES

On the machine the following safety devices are installed:

a) **An Emergency stop button** is installed in all three Control Panels. By pressing on this red button, the control and machine are disabled immediately.

b) **A Safety Switch Disconnect** is installed on the main enclosure.

c) **Hard limits for overtravel** mounted on all Roller guide
rails.

d) **Alarm lamps** mounted on the Guide rails on both the loader and unloader gantry.

Green – Blinking	The machine is ready to run
Green – Solid	The machine is running
Yellow	Warning, it will try to complete this cycle but will not start a new cycle.
Red	Alarm – the machine will stop

2.6 SIGNAGE AND SIGNALS
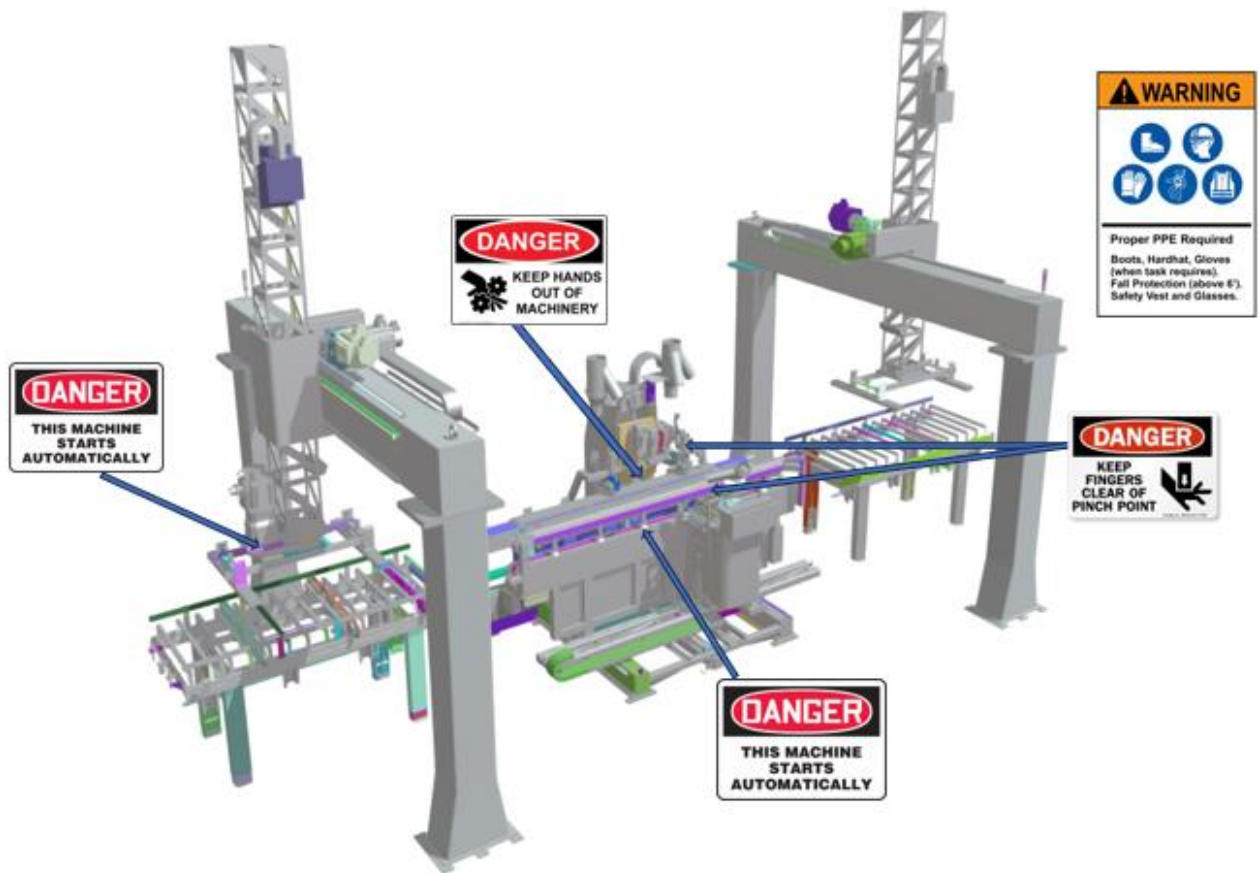
The signage and signals which must be installed near to the machine and the work area of the machine are as follows:

3 DESCRIPTION OF THE MACHINE

3.1 SPECIFICATIONS OF COMPONENTS

MachMotion

Newburg, Missouri, USA
573-368-7399
machmotion.com

SALES ORDER No.: xxxxx

DRAWING No.: S30006

SUPPLY VOLTAGE: 480 VOLTS 60 Hz

PHASE:	-	3 PH (480V)
FULL LOAD AMPS:	-	76.3 AMPS
LARGEST LOAD:	-	12.6 AMPS
MAX SPINDLE MOTOR SIZE:	-	6 KW
MIN SUPPLY CIRCUIT CONDUCTOR:	-	125 AMPS
MAX SUPPLY CIRCUIT OCPD:	-	150 AMPS

SHORT CIRCUIT CURRENT RATING: 5 kA @ 480 VOLTS MAX

AMBIENT TEMPERATURE RATING: 41° TO 104° F (5° TO 40° C)

THIS EQUIPMENT DOES PROVIDE SUPPLY CIRCUIT OVERCURRENT PROTECTION.

Machine model	YUTON HIGH SPEED DOOR CNC
Machine Workpiece Limits	
Max. Workpiece Length	3050 mm (120 Inches)
Max. Workpiece Width	1100 mm (43.30 Inches)
Max. Workpiece Thickness	60 mm (2.36 Inches)
Barcode Sticker Machine Specifications	
Air Pressure	0.5 to 0.7 MPa
Voltage	220 V
Machine size	
Length	4100 mm (161.41 Inches)
Width	3100 mm (122.04 Inches)
Height	2150 mm (84.65 Inches)
Weight	4500 KG (9920 lbs)

Pneumatic supply	
Pressure	0.6 Mpa

Electric supply	
Type	Three Phase
Voltage	480 V (± 5%)
Frequency	60 Hz (± 1Hz)

3.2 PARTS DESCRIPTION
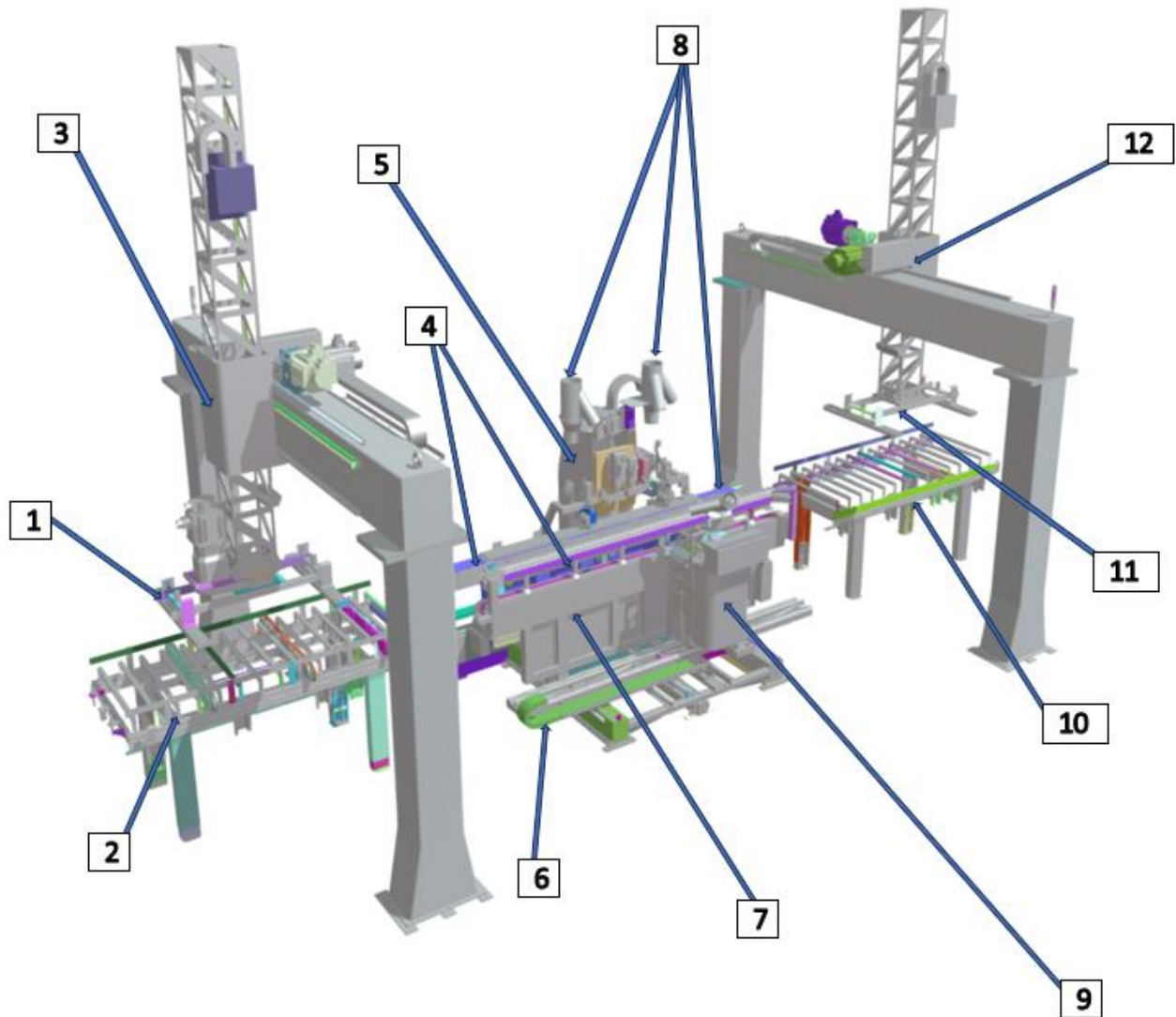
PARTS OF MACHINE		
POS.	NAME	DESCRIPTION
01	Door Feeder	Raw Door Pickup from Stack and Dropoff on Roller Table
02	Loading Gantry Roller Table	Feeds the Doors to Main Machine Table
03	Loading Gantry X-Z axis carriage Assembly	Controls X and Z axis movements of Loading Gantry Door feeder
04	Conveyor	Controls the forward/backward movements of door
05	Lockside Module	Controls the Lockside Tool Assembly Operations
06	Cable Chain	Protects, Supports, and guides cables in moving machine operations
07	Main Machine Table	Holds and Supports the Doors during Operations
08	Exhaust to Dust Collector	Directs the produced Dust to Collector
09	Hingeside Module	Controls the Hingeside Tool Assembly Operations
10	Unloading gantry Roller Table	Collects the Doors after the Operations
11	Door Stacker	Door Pickup from table and Dropoff on Final Stack
12	Unloading gantry X-Z axis carriage Assembly	Controls X and Z axis movements of Unloading gantry Door Stacker

3.3 ENVIRONMENTAL CONDITIONS

The machine is installed inside a lit industrial building, with ventilation and fitted with a solid and even floor.

Operating in environments which are:

- at a temperature between + 5°C e + 40°C.
- of a relative humidity between 30 and 95%, not above 50% at 40° C, not above 90% at 20° C

It is prohibited to use the machine in environments that are:

- in a corrosive atmosphere.
- at risk of fire.
- in explosive atmospheres.

3.4 LIGHTING

Lighting in the environment of installation must comply with the laws in force in the US in which the machine is installed and must nonetheless guarantee good visibility at all points, must not create dangerous reflections, and must allow control panels to be clearly read as well as identifying emergency stop buttons.

3.5 VIBRATIONS

In conditions of use that comply with the indications for correct usage, vibrations are not big enough to allow hazardous situations to arise.

3.6 WORKING SPACE

To operate the machine the operator needs sufficient space to move without danger.

3.7 OPERATOR POSITION

It is dangerous to contact the machine during automatic or manual operations. Therefore, it is prohibited to stand within machine movement areas during automatic or manual operations. The operator must work only in front of the Control Panels until the operation is finished. The operator is prohibited from stepping inside the areas reached by machine movement. This position allows the control of all active functions during the working process in automatic cycle.

3.8 DANGER ZONE

Operators should not move into this area while the machine is performing the operation. This machine includes Safety switches, but it may not be possible to avoid Injury If hit. If it is necessary to enter this area, use the emergency stop button to cease all movement before entering the danger zone.

3.9 TOOLS (DRILL BITS)

No.	Tool Name	Handle Diameter (mm)	Handle Length (mm)	Head Diameter (mm)	Head Length (mm)	Total Length (mm)
1	Lock Vertical Left tool (LV1)	12.7	50	8	70	120
2	Lock Vertical Right tool (LV2)	12.7	50	12	70	120
3	Lock Horizontal Levo tool (LH3)	12.7	40	12	50	90
4	Lock Horizontal Dextro tool (LH2)	16.0	60	18	105	165
5	Lock Horizontal Pilot tool (LH1)	12.7	55	3	15	70
6	Lock Bevel Plate tool (LB1)	12.7	40	12	50	90
7	Lock Bevel Corner square tool (LB2)	12.7	55	3	15	70
8	Hinge Horizontal Levo tool (HH1)	12.7	40	12	50	90
9	Hinge Horizontal Dextro tool (HH2)	12.7	40	12	50	90
10	Hinge Horizontal Pilot tool (HH3)	12.7	55	3	15	70

3.10 WASTE MATERIAL DISPOSAL

Waste produced by the machine is collected and treated in accordance with the regulations.

3.11 DUST EXTRACTION SYSTEM

Dust Collectors are directly connected to the machine so that all dust produced has a proper disposal.

4 MACHINE USE

4.1 SAFETY INSTRUCTION

This machine was designed and built to operate in the best safety conditions to protect the maintenance and operative personnel. It is essential that no personnel working in or around the machine do not fully rely on its protection. All precautionary measures should be taken to reduce any risk of injury.

Operators and people working on or around the machine should acquire complete familiarity with the machine before operation begins. This includes the method of shutting down the machine in a normal situation or in case of emergency. The person(s) within the movable boundary must wear clothes appropriate to the work, (no baggy clothing or garments that hang down) and operators must be able to operate all safety devices before the operation.

The machine should never be operated by the person unable to perform the normal task due to sickness or injury. Do not operate the machine alone during working hours. To prevent injury, it is forbidden to restart the machine after any problems, troubles, or accidents. It is also recommended to have a fire extinguisher in proximity in case of a fire or catastrophic failure.

4.1.1 SAFETY PRIOR TO STARTUP

Before starting to operate the machine perform the following checks and confirmation:

- Repair any problems and restore working condition before turning ON the power.
- Clean up any unneeded objects (scrap wood, wood chips and tools, etc.) around the machine and units if there are any.
- Check if there is any scrap or Objects near or on the machine/rails to avoid damage of the machine.
- Check that the Gantries are in range and not touching any parts of the machine.
- Check that the maintenance operators are not within the area of moving parts.
- Make sure that there is oil in the automatic lubricator.
- The operator is prohibited from wearing loose clothes, wearing ties, jewelry, etc. to affect the safety of operation.
- Check compressed air is set to the right pressure with no leakage of air from airline.
- Chips or dust on linear guides and other moving parts is harmful to the machine. It causes excess wear to the machine and decreases service life. Chips or dust on the linear guides will affect the positioning of the parts, and the cuts made into them. Clean up waste chips and dust every shift.

- All photoelectric switches need to be cleaned at the beginning of each shift to ensure accurate operation.
- Unauthorized personnel are forbidden to touch the switch to avoid accidents. When the machine is used, the staff should be outside the dangerous area of the machine tool, and it is forbidden to approach the machine tool.
- This machine uses a high-frequency motor, which may generate a small amount of static magnetic field, and personnel who install/use pacemakers, metal implants and hearing aids shall not operate this equipment or approach the equipment at work.

4.1.2 SAFETY DURING OPERATION

Upon or after turning on the power to the machine, confirm and inspect the following items listed below:

- Machine operators should communicate fully with co-workers in the area and operate the machine by always verifying the location of the co-worker.
- Perform installation and removal of drill bits after confirming that they are not in motion.
- Do not remove wood chips and scrap wood during the machine operation.
- Do not touch the working objects with bare hands or with some other objects.
- If the operator needs to leave the machine, they must stop the automatic operations.
- In case of danger, press the EMERGENCY STOP button to stop operations immediately.
- The operator must always verify that the working pieces are correctly positioned and clamped.
- The workpiece can only be changed after the machine is completely stopped.
- In the automatic cycle, do not modify the processing parameters, do not carry out manual operation, to prevent the program from accidental action.
- Pay attention to avoid metal material in the tool processing position to avoid sparks from tool cutting.
- Do not move the stroke switch or limit switch on the machine tool at will, otherwise it will affect the processing effect, and even reduce the safety factor of the machine tool, causing unnecessary personnel or equipment damage.
- The machine tool must be equipped with a vacuum suction device with sufficient dust suction capacity before it can be started, and the waste chips will be manually cleaned up after cutting off the power supply and air source at the end of each shift.
- Never reach hands beyond safety cage. Servo motors can unexpectedly move quickly.
- Never clear screws or hinges out of the machine while it is running.
- Never reach into the router area to retrieve a door. The router may still be running down after shutting down.

4.1.3 SAFETY AFTER COMPLETION

- After the completion of Operations, all three control panels should be turned off.

- Daily detailed machine cleaning is required to avoid dirt accumulation on the guides.

- Clean up any unneeded objects (scrap wood, wood chips and tools, etc.) around the machine and units if there are any.

4.2 MAIN COMPONENTS

The machine is divided into three major components and their control panels.

4.2.1 LOADING GANTRY

This component is responsible for starting the production cycle. It is a door feeder. It automatically lifts individual doors from a stack and places the door onto a powered roll table where the door can be fed to the main machine automatically when it is ready to receive a door.

The loading gantry is designed to lift flush doors. The door is clamped on the top and is lifted by vacuum grippers. Then the door is positioned on the roll table and fed into the main machinery line.
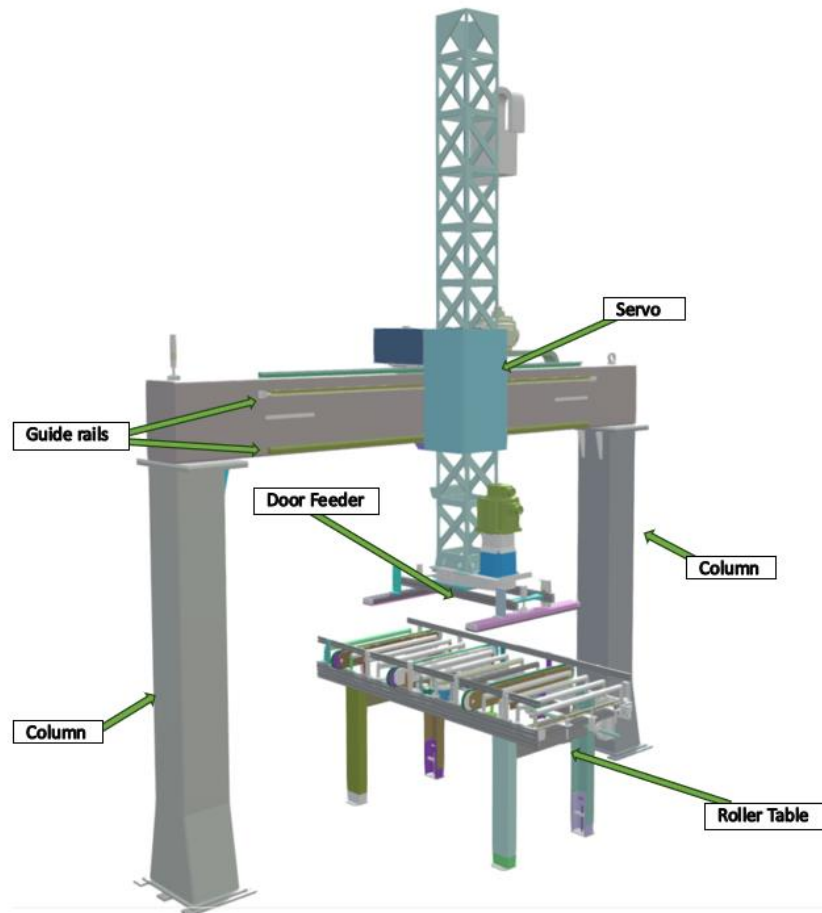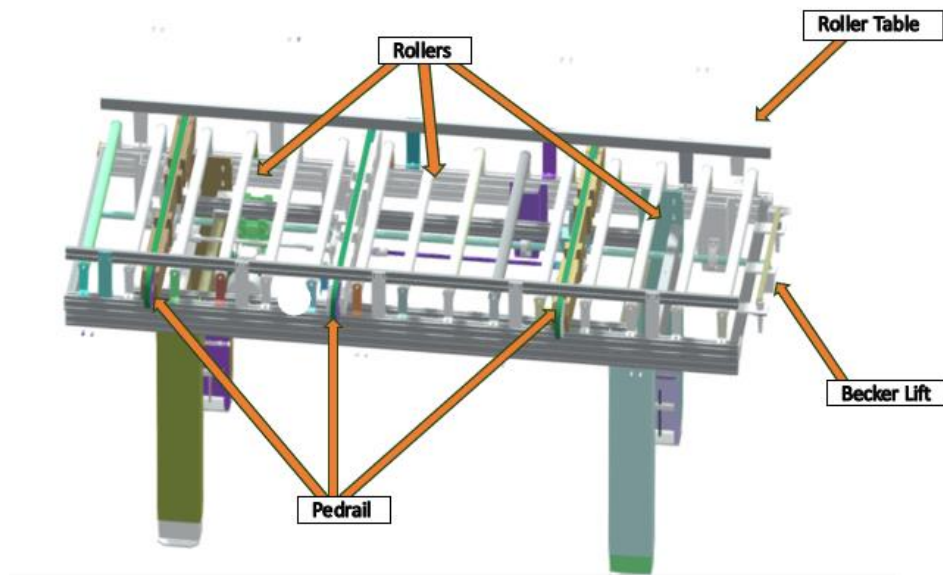
4.2.2 LOADING GANTRY CONTROL PANEL

This section is an overview of the electrical components in the Loading Gantry Electrical Panel. Refer to the MachMotion electrical prints for in-depth information.

The Loading Gantry Electrical Panel contains:

- 24VDC Supply voltage from the main machine control panel
- Motion control I/O terminals
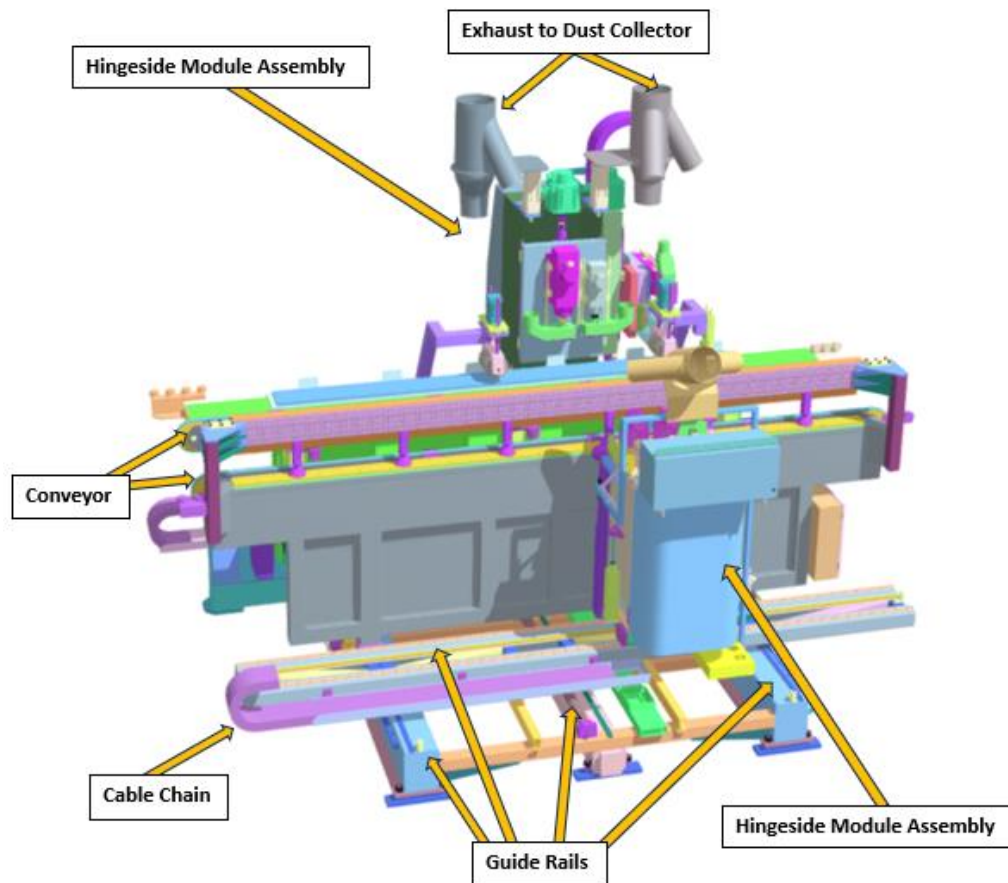- *There are no high voltage connections in this panel*

Warning: When you are working in this panel, follow the disconnect protocol for the main machine control panel.
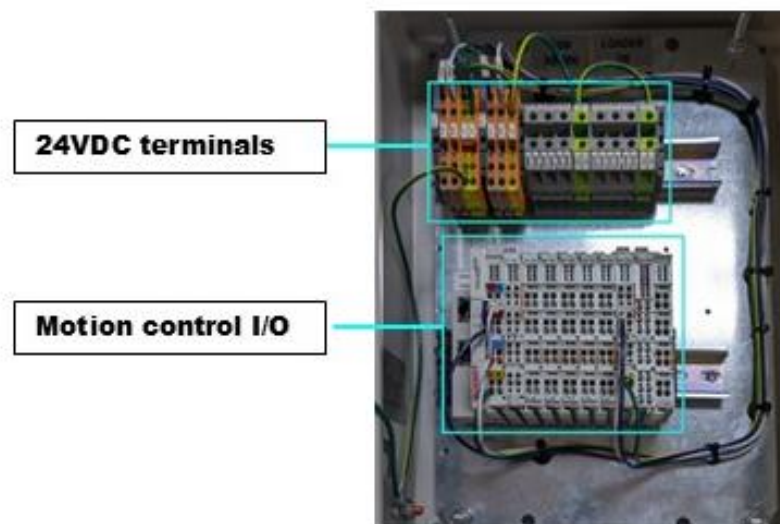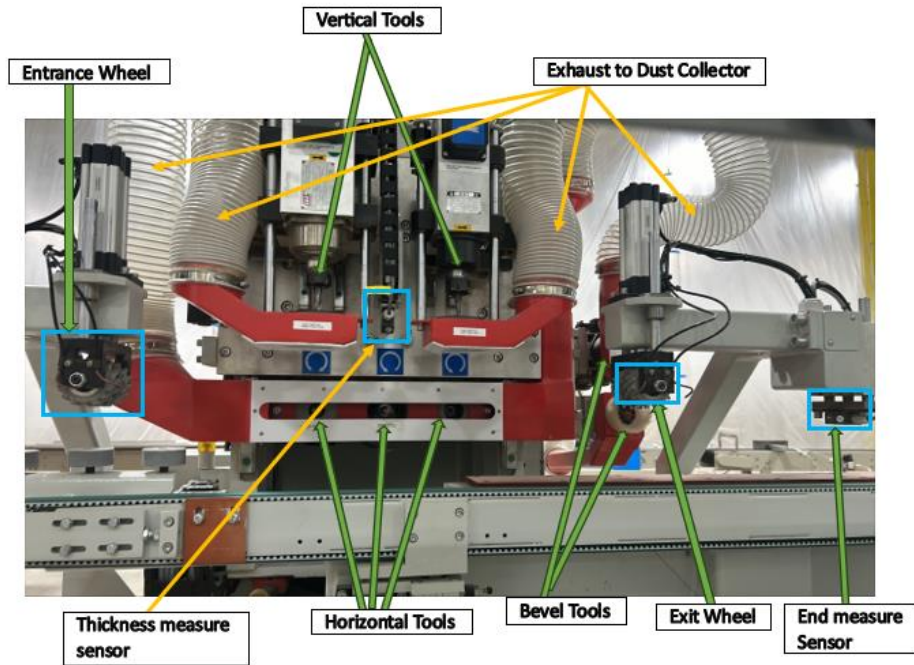
4.2.3 MAIN MACHINE

This is the main component of the machine where the machining operations are carried out. It receives the raw doors from Loading gantry and sends them to the Unloading gantry after the required operations are completed. It has a Lock side and Hinge side. Lock side operations are performed on the left and hinge side operations are performed on the right side.
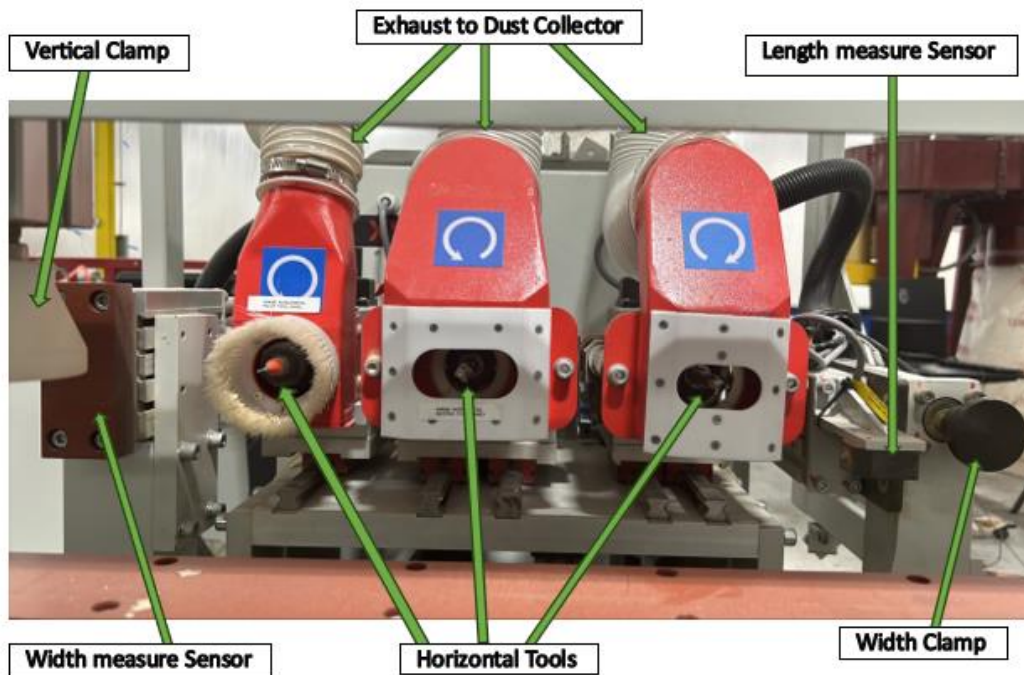
The Lock and Hinge sides have different tool assemblies to perform their operations and are controlled by the MachMotion controller.

4.2.4 LOCKSIDE MODULE ASSEMBLY:

Entrance Wheel — Vertical Tools — Exhaust to Dust Collector — Thickness measure sensor — Horizontal Tools — Bevel Tools — Exit Wheel — End measure Sensor

4.2.5 HINGESIDE MODULE ASSEMBLY:

Vertical Clamp — Exhaust to Dust Collector — Length measure Sensor — Width measure Sensor — Horizontal Tools — Width Clamp

4.2.6 MAIN MACHINE CONTROL PANEL

This section is an overview of the electrical components in the Main Machine Electrical Panel. Refer to the MachMotion electrical prints for in-depth information.

The Main machine Electrical Panel contains:

- Transformers
- Supply voltages to the machine
- 24VDC power supplies
- Fuses
- Safety relay
- Contactors
- Motor Switch Protectors
- Relays
- Motion control I/O terminals
- VFD's (Variable Frequency Drives)
- Servo drives

Warning: High Voltage is present in this panel even with the disconnect off. If you work on the panel, follow the disconnect protocol.
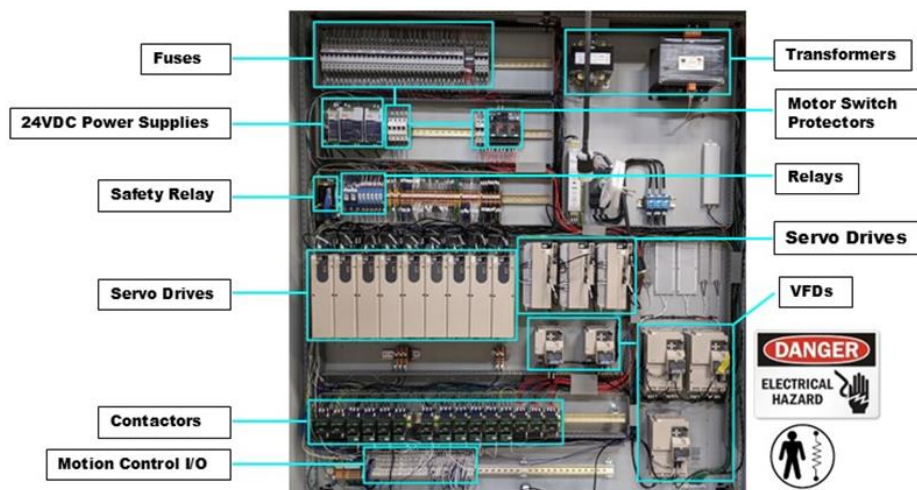

This main control panel manages the loading gantry, unloading gantry, and all the machining operations. The sole purpose of the loading gantry sub-panel is to provide closer I/O terminals for the motion control system.

4.2.7 UNLOADING GANTRY

This works as a Door Stacker/receiver. It is designed to lift flush doors off a roll table and place them on a final door stack.
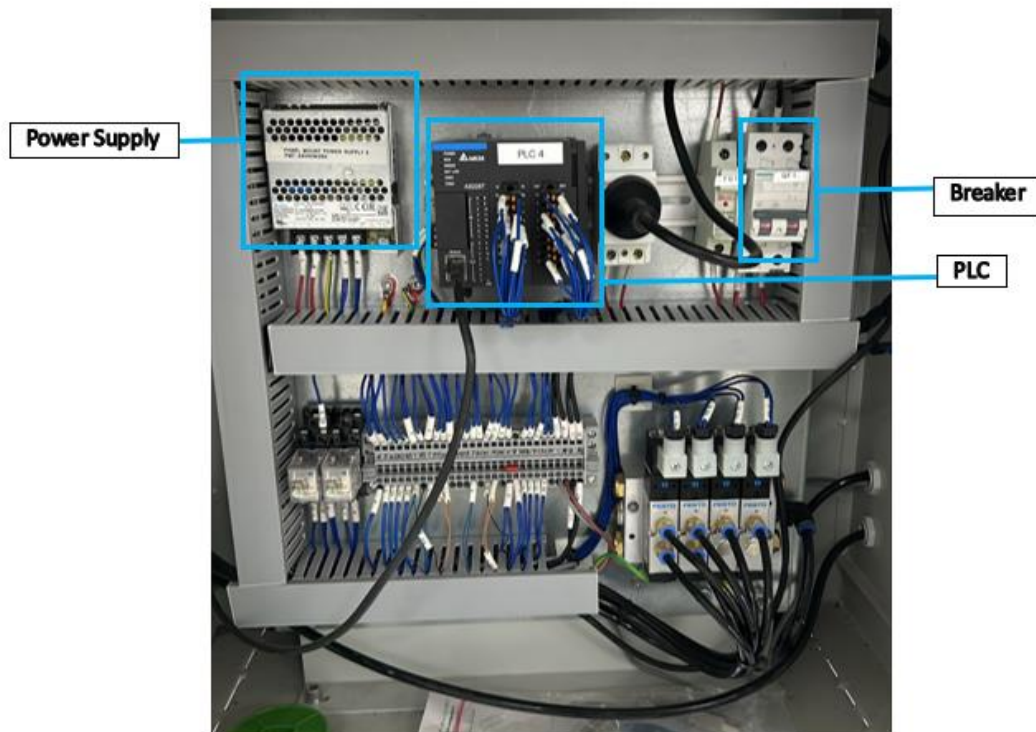
The door is received from the main machinery line and is then lifted and held by vacuum grippers. The door is automatically on an overhead track system to be lowered onto a stack of doors. It automatically finds the level of stack during the off-feed operation. This component ends the production cycle.
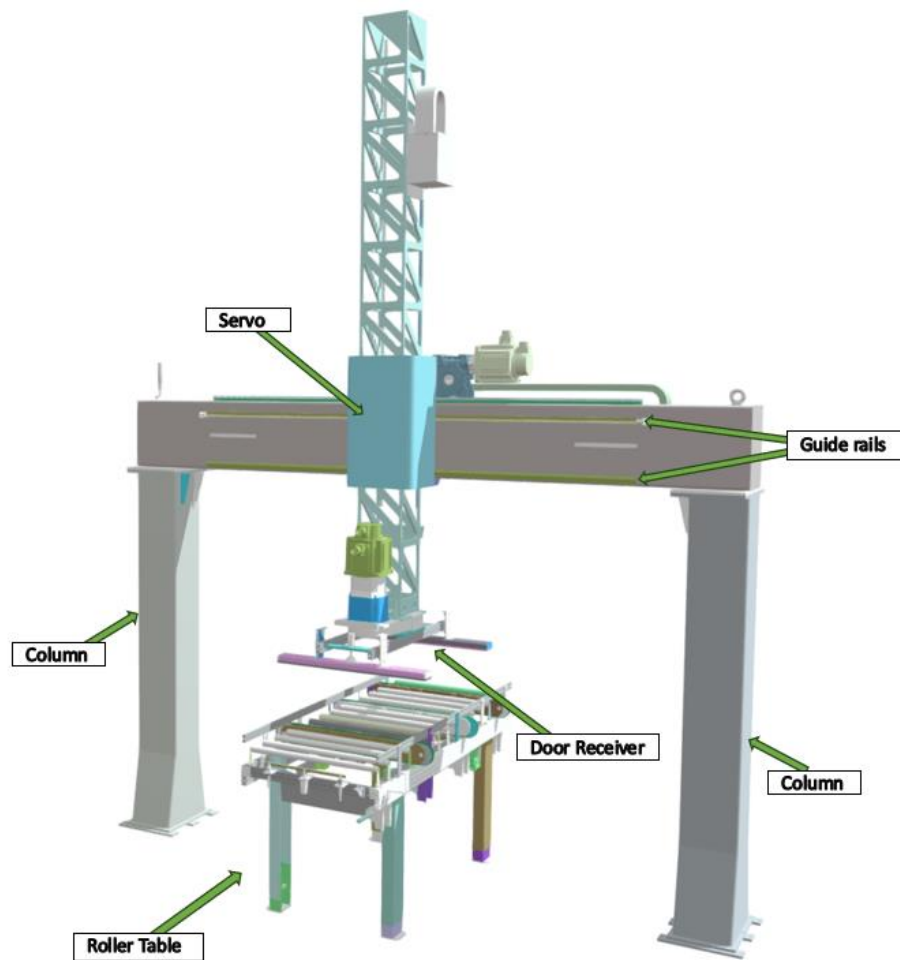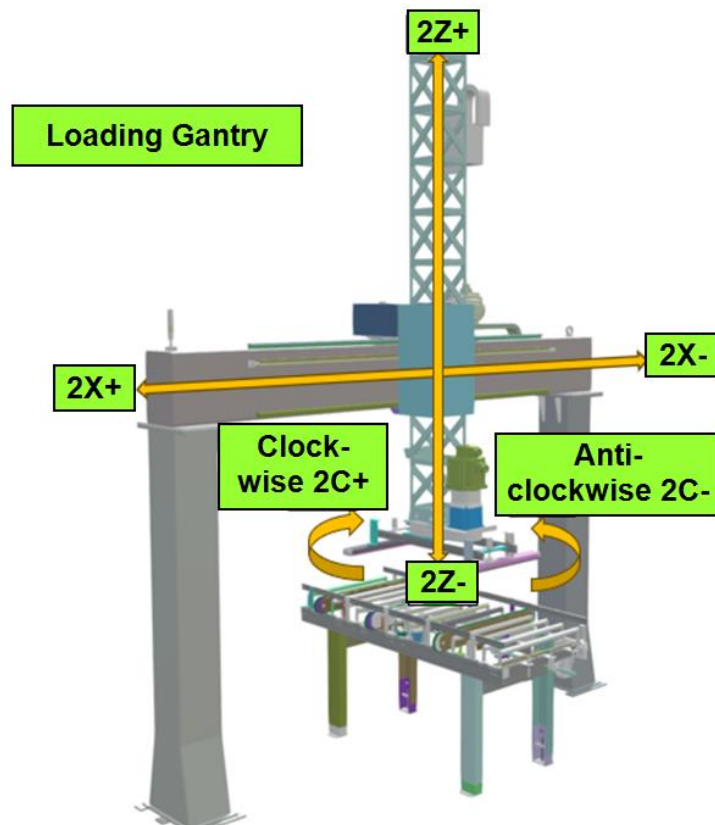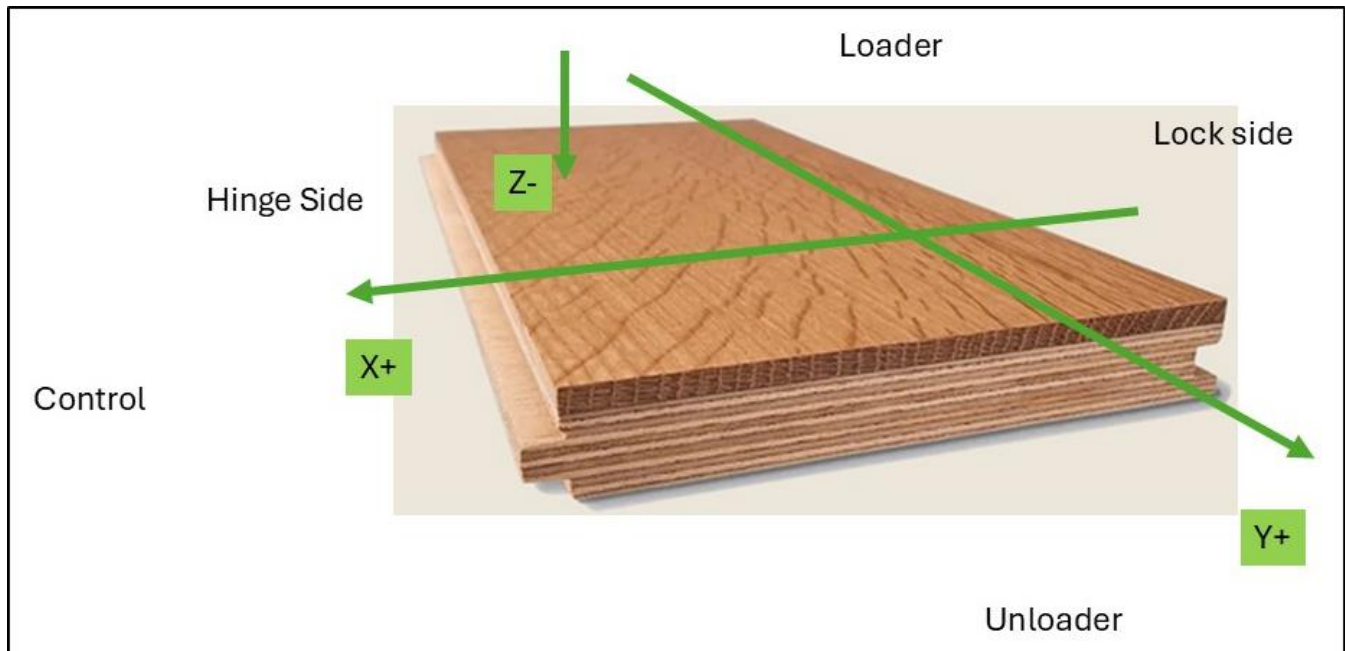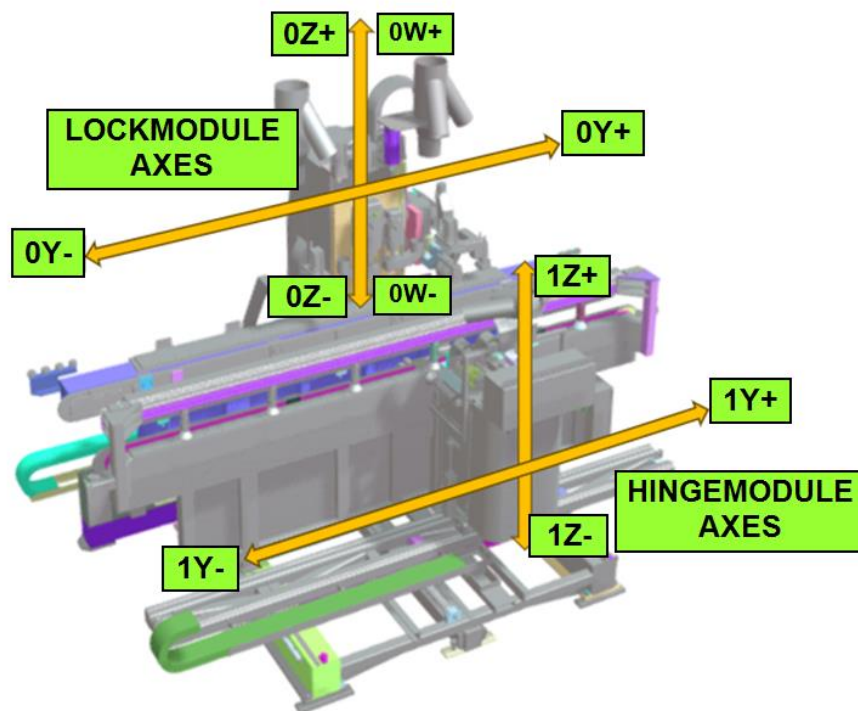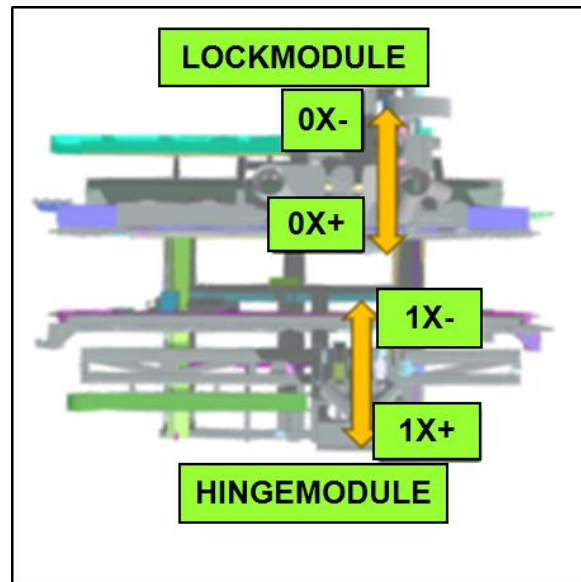
4.2.8 BARCODE PRINTER

The barcode printer automatically labels each door before main operations begin. It functions in both manual and automatic modes and is connected only to the loading gantry. The system generates barcodes based on order requirements. A moving assembly on top of the printer slides to apply the barcode. The door moves to the roller table's left corner, where the printer applies the barcode on the edge just before the door enters the main machine for processing.

4.2.9 BARCODE PRINTER CONTROL PANEL
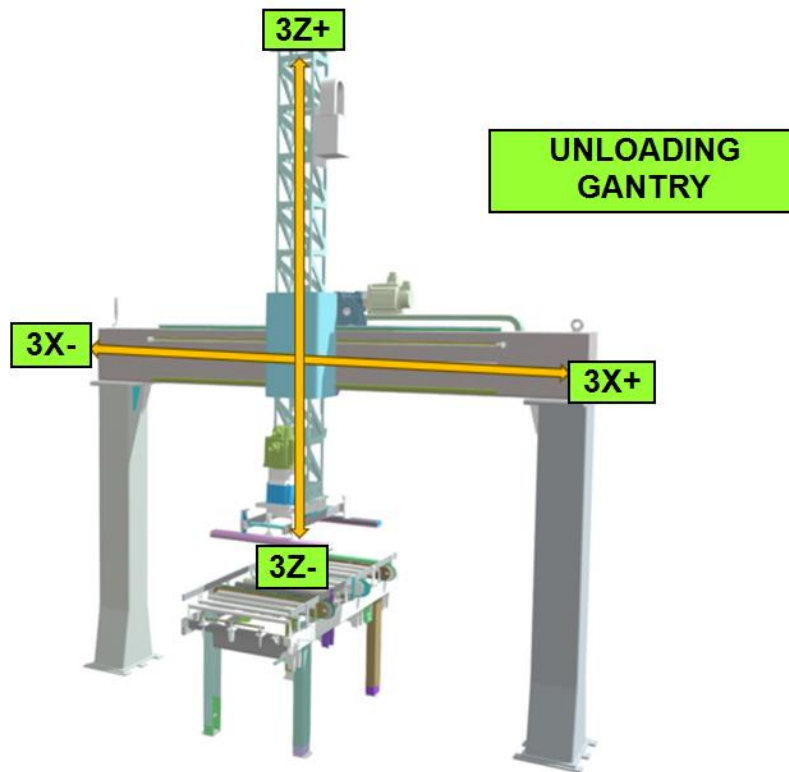
4.3 NAME AND DIRECTION OF AXES

LOCKMODULE

0X-

0X+

1X-

1X+

HINGEMODULE

0Z+   0W+

LOCKMODULE
AXES

0Y+

0Y-

0Z-   0W-

1Z+

1Y+

1Y-   1Z-

HINGEMODULE
AXES

3Z+

**UNLOADING GANTRY**

3X-

3X+

3Z-

4.4 DESCRIPTION OF USER INTERFACE SCREENS

4.4.1 Alarms (Global Monitoring System)

The Global Monitoring System icon will indicate if there is currently an alarm or warning active. If there are no alarms or warnings active, then the icon will be a green checkmark. If there is an alarm or warning active, it will flash a red and yellow error triangle. Clicking on the icon will open the diagnostics window.
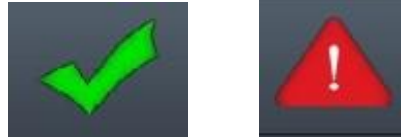
These are the possible alarms.
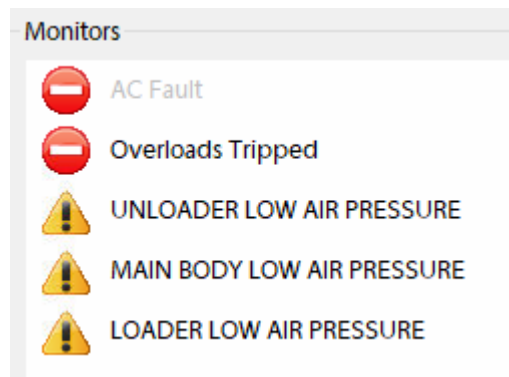
The physical conditions need to be corrected before the system will run again. Once the conditions have been corrected, press the reset button on the face of the control to clear the alarms. If the alarm comes back, the physical conditions have not yet been fully corrected.
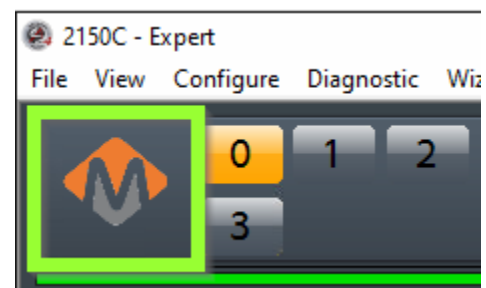
4.4.2 Dashboard

This screen is available from any instance and is used to start the tool setter sequence after any changes to the tools.

Click the M icon in the upper left corner.

Click the Service tab at the bottom of the screen

Click the Dashboard tab at the top of the screen

4.4.3 Machine I/O

The Machine I/O is used for detailed diagnostic work when there is a problem with the machine. It shows which limits are currently active, and which outputs are currently active.

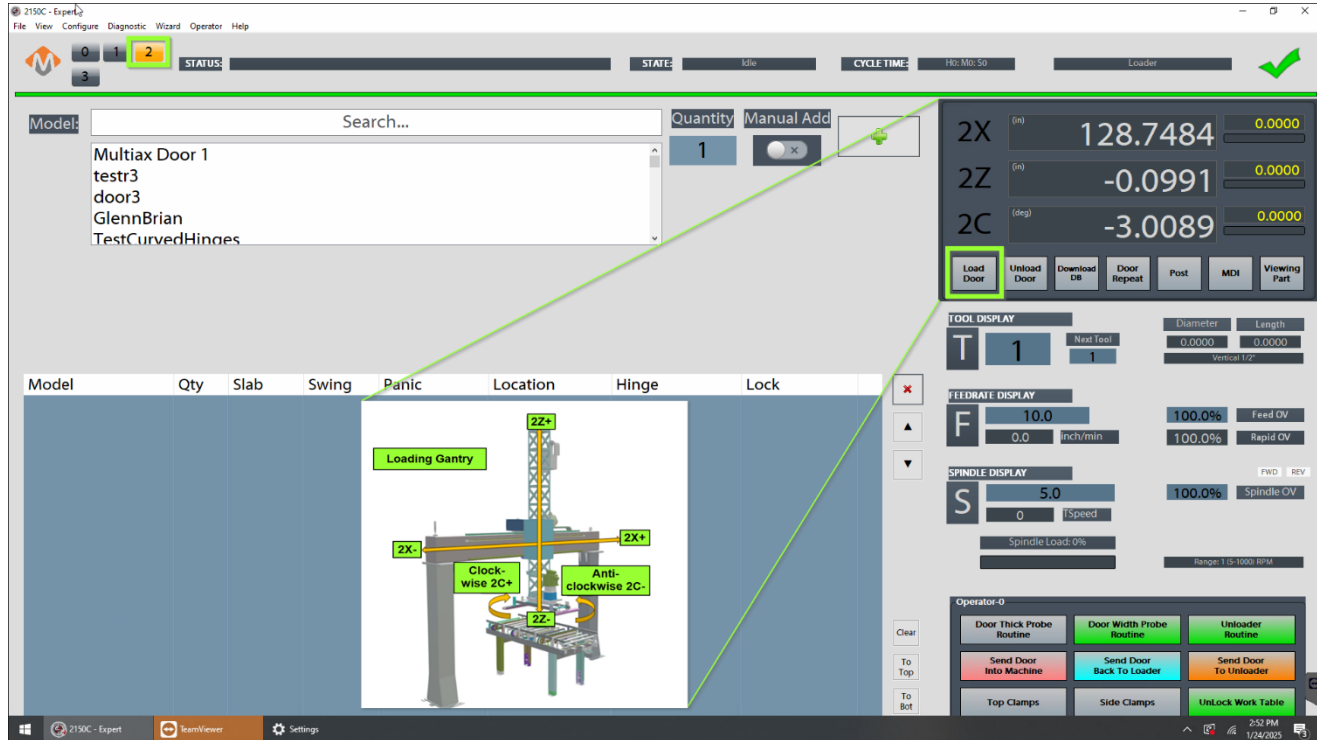Click the M icon in the upper left corner of the screen

Click the Service tab at the bottom of the screen

Click the Machine I/O tab at the top of the screen
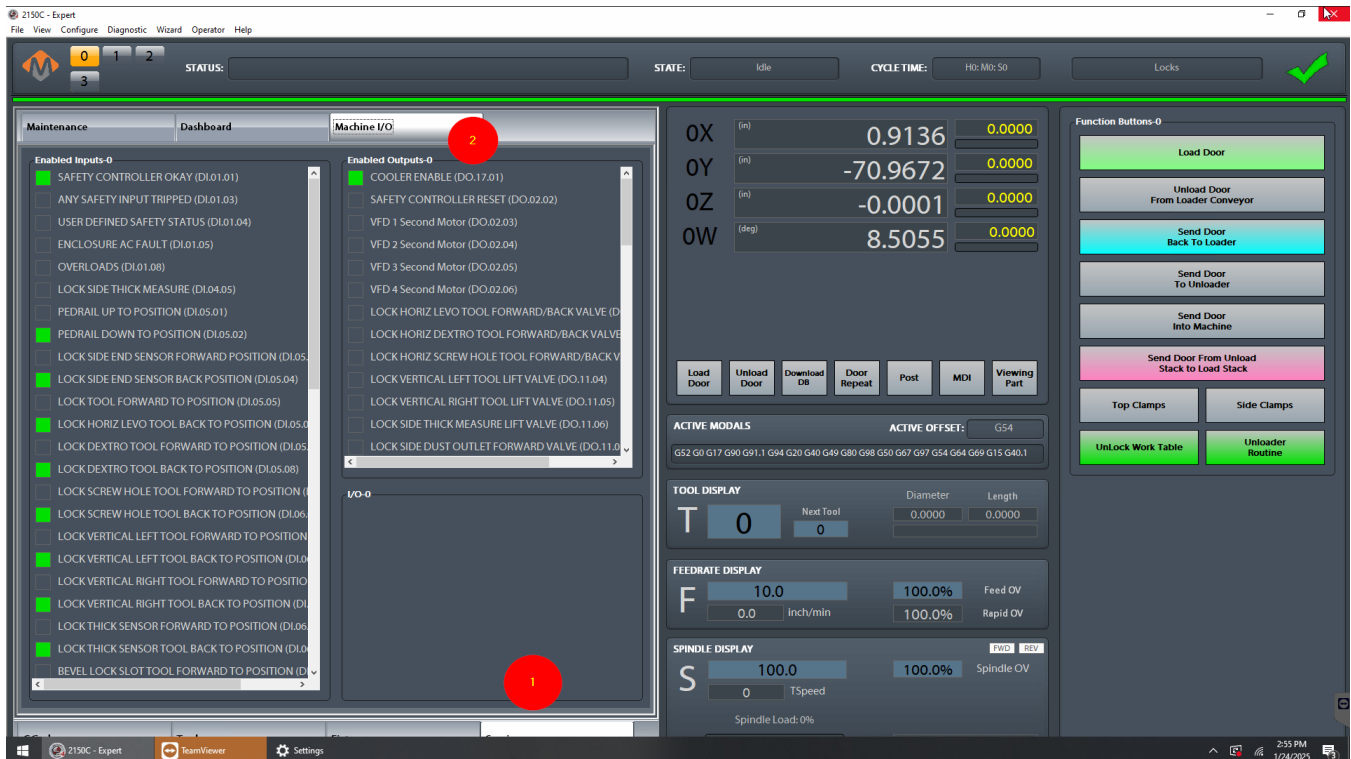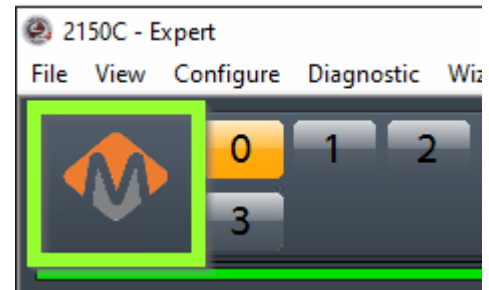
4.4.4 Loading Gantry Instance

Instance 2 manages the loading gantry. In the upper right corner of the screen are the three axes and their current locations. The inset graphic shows the axis mapping.

If the axes labels are black, then they are functioning properly.

You may use the Load Door button, below the axes labels, to manually run a door load cycle.

The complete I/O table for instance 2 is shown below

SignalID	SignalName	Device	Name	Description
7	Input #6	EK1100.2	DI.01.7	FORWARD FEED INTO 4# LOAD GANTRY (DI.01.07)
8	Input #7	EK1100.2	DI.01.8	BACKWARD FEED INTO 4# LOAD GANTRY (DI.01.08)
9	Input #8	EK1100.2	DI.02.1	PIECE REACH 1# CONVEYOR ROLLER (DI.02.01)
10	Input #9	EK1100.2	DI.02.2	PIECE REACH 1# CONVEYOR SCANNER (DI.02.02)
11	Input #10	EK1100.2	DI.02.3	PIECE BACKWARD REACH 1# CONVEYOR (DI.02.03)
12	Input #11	EK1100.2	DI.02.4	1# CONVEYOR UP TO POSITION (DI.02.04)
13	Input #12	EK1100.2	DI.02.5	1# CONVEYOR DOWN TO POSITION (DI.02.05)
14	Input #13	EK1100.2	DI.02.6	1# CONVEYOR BACKER DOWN TO POSITION (DI.02.06)
15	Input #14	EK1100.2	DI.02.7	SUCK OVER PRESSURE LOAD GANTRY (DI.02.07)
16	Input #15	EK1100.2	DI.02.8	PRESSURE PROTECT LOAD GANTRY (DI.02.08)
65	Motor 0 Home	EK1100.2	DI.01.1	LOAD GANTRY X HOME (DI.01.01)
66	Motor 1 Home	EK1100.2	DI.01.4	LOAD GANTRY Z HOME (DI.01.04)
67	Motor 2 Home	EK1100.2	DI.01.6	LOAD GANTRY C HOME (DI.01.06)
97	Motor 0 ++	EK1100.2	DI.01.2	LOAD GANTRY X+ LIMIT (DI.01.02)
98	Motor 1 ++	EK1100.2	DI.01.4	LOAD GANTRY Z+ LIMIT (DI.01.04)
99	Motor 2 ++	EK1100.2	DI.01.5	LOAD GANTRY C+ LIMIT (DI.01.05)
129	Motor 0 --	EK1100.2	DI.01.1	LOAD GANTRY X- LIMIT (DI.01.01)
130	Motor 1 --	EK1100.2	DI.01.3	LOAD GANTRY Z- LIMIT (DI.01.03)
131	Motor 2 --	EK1100.2	DI.01.6	LOAD GANTRY C- LIMIT (DI.01.06)
161	Probe	EK1100.2	DI.02.7	SUCK OVER PRESSURE LOAD GANTRY PROBE (DI.02.07)
1050	Output #0	EK1100.2	DO.03.1	VACCUME ON LOAD GANTRY (DO.03.01)
1051	Output #1	EK1100.2	DO.03.2	VACCUME OFF LOAD GANTRY (DO.03.02)
1052	Output #2	EK1100.2	DO.03.3	1# CONVEYOR PEDRAIL LIFT VALVE (DO.03.03)
1053	Output #3	EK1100.2	DO.03.4	1# CONVEYOR BACKER LIFT VALVE (DO.03.04)

4.4.5 Locks Instance

I/O for the locks instance

SignalID	SignalName	Device	Name	Description
2	Input #1	EK1100.1	DI.01.1	SAFETY CONTROLLER OKAY (DI.01.01)
4	Input #3	EK1100.1	DI.01.3	ANY SAFETY INPUT TRIPPED (DI.01.03)
5	Input #4	EK1100.1	DI.01.4	USER DEFINED SAFETY STATUS (DI.01.04)
6	Input #5	EK1100.1	DI.01.5	ENCLOSURE AC FAULT (DI.01.05)
9	Input #8	EK1100.1	DI.01.8	OVERLOADS (DI.01.08)
22	Input #21	EK1100.1	DI.04.5	LOCK SIDE THICK MEASURE (DI.04.05)
26	Input #25	EK1100.1	DI.05.1	PEDRAIL UP TO POSITION (DI.05.01)
27	Input #26	EK1100.1	DI.05.2	PEDRAIL DOWN TO POSITION (DI.05.02)
28	Input #27	EK1100.1	DI.05.3	LOCK SIDE END SENSOR FORWARD POSITION (DI.05.03)
29	Input #28	EK1100.1	DI.05.4	LOCK SIDE END SENSOR BACK POSITION (DI.05.04)
30	Input #29	EK1100.1	DI.05.5	LOCK TOOL FORWARD TO POSITION (DI.05.05)
31	Input #30	EK1100.1	DI.05.6	LOCK HORIZ LEVO TOOL BACK TO POSITION (DI.05.06)
32	Input #31	EK1100.1	DI.05.7	LOCK DEXTRO TOOL FORWARD TO POSITION (DI.05.07)
33	Input #32	EK1100.1	DI.05.8	LOCK DEXTRO TOOL BACK TO POSITION (DI.05.08)
34	Input #33	EK1100.1	DI.06.1	LOCK SCREW HOLE TOOL FORWARD TO POSITION (DI.06.01)
35	Input #34	EK1100.1	DI.06.2	LOCK SCREW HOLE TOOL BACK TO POSITION (DI.06.02)
36	Input #35	EK1100.1	DI.06.3	LOCK VERTICAL LEFT TOOL FORWARD TO POSITION (DI.06.03)
37	Input #36	EK1100.1	DI.06.4	LOCK VERTICAL LEFT TOOL BACK TO POSITION (DI.06.04)
38	Input #37	EK1100.1	DI.06.5	LOCK VERTICAL RIGHT TOOL FORWARD TO POSITION (DI.06.05)
39	Input #38	EK1100.1	DI.06.6	LOCK VERTICAL RIGHT TOOL BACK TO POSITION (DI.06.06)
40	Input #39	EK1100.1	DI.06.7	LOCK THICK SENSOR FORWARD TO POSITION (DI.06.07)
41	Input #40	EK1100.1	DI.06.8	LOCK THICK SENSOR TOOL BACK TO POSITION (DI.06.08)
61	Input #60	EK1100.1	DI.09.3	BEVEL LOCK SLOT TOOL FORWARD TO POSITION (DI.09.04)
62	Input #61	EK1100.1	DI.09.4	BEVEL LOCK SLOT TOOL BACK TO POSITION (DI.09.05)
63	Input #62	EK1100.1	DI.09.5	BEVEL LOCK SCREW HOLE TOOL FORWARD TO POSITION (DI.09.06)
64	Input #63	EK1100.1	DI.09.6	BEVEL LOCK SCREW HOLE TOOL BACK TO POSITION (DI.09.07)
65	Motor 0 Home	EK1100.1	DI.03.1	LOCK Y HOME (DI.03.01)
66	Motor 1 Home	EK1100.1	DI.03.4	LOCK X HOME (DI.03.04)
67	Motor 2 Home	EK1100.1	DI.03.5	LOCK Z HOME (DI.03.05)
68	Motor 3 Home	EK1100.1	DI.09.2	LOCK W HOME (DI.09.02)
97	Motor 0 ++	EK1100.1	DI.03.1	LOCK Y+ LIMIT (DI.03.01)
98	Motor 1 ++	EK1100.1	DI.03.3	LOCK X+ LIMIT (DI.03.03)
99	Motor 2 ++	EK1100.1	DI.03.5	LOCK Z+ LIMIT (DI.03.05)
100	Motor 3 ++	EK1100.1	DI.09.2	LOCK W+ LIMIT (DI.09.02)
129	Motor 0 --	EK1100.1	DI.03.2	LOCK Y- LIMIT (DI.03.02)
130	Motor 1 --	EK1100.1	DI.03.4	LOCK X- LIMIT (DI.03.04)
131	Motor 2 --	EK1100.1	DI.03.6	LOCK Z- LIMIT (DI.03.06)
132	Motor 3 --	EK1100.1	DI.09.1	LOCK W- LIMIT (DI.09.01)
161	Probe	EK1100.1	DI.04.6	LOCK SIDE END MEASURE (DI.04.06)
164	E-Stop	EK1100.1	DI.01.2	E-STOP BUTTON STATUS (DI.01.02)
181	Spindle At Speed	Yaskawa VFD.3	During Speed Agree	
182	Spindle At Zero	Yaskawa VFD.3	During Zero Speed	
183	Probe1	EK1100.1	DI.04.5	LOCK SIDE THICK MEASURE PROBE (DI.04.05)
213	Probe9	EK1100.1	DI.10.7	Lock Tool TouchOff Probe
216	Input #65	EK1100.1	DI.10.1	PEDRAIL DECELERATE SWITCH (DI.10.01)
217	Input #66	EK1100.1	DI.10.2	PIECE ARRIVE PEDRAIL SWITCH (DI.10.02)
220	Input #69	EK1100.1	DI.10.5	MAIN BODY PRESSURE PROTECT (DI.10.05)
221	Input #70	EK1100.1	DI.10.6	UNLOADER PRESSURE PROTECT (DI.10.06)
231	Input #80	EK1100.2	DI.02.8	LOADER PRESSURE PROTECT (DI.02.08)
236	Input #85	Yaskawa VFD.3	During Speed	Lock VFD At Speed Tools 1-3 and 5-7
237	Input #86	Yaskawa VFD.2	During Speed	Hinge VFD At Speed Tools 1-3
238	Input #87	Yaskawa VFD.5	During Speed	Lock VFD At Speed Tool 4

1018	Enable #0	EK1100.1	DO.17.1	COOLER ENABLE (DO.17.01)
1051	Output #1	EK1100.1	DO.02.2	SAFETY CONTROLLER RESET (DO.02.02)
1052	Output #2	EK1100.1	DO.02.3	VFD 1 Second Motor (DO.02.03)
1053	Output #3	EK1100.1	DO.02.4	VFD 2 Second Motor (DO.02.04)
1054	Output #4	EK1100.1	DO.02.5	VFD 3 Second Motor (DO.02.05)
1055	Output #5	EK1100.1	DO.02.6	VFD 4 Second Motor (DO.02.06)
1058	Output #8	EK1100.1	DO.11.1	LOCK HORIZ LEVO TOOL FORWARD/BACK VALVE (DO.11.01)
1059	Output #9	EK1100.1	DO.11.2	LOCK HORIZ DEXTRO TOOL FORWARD/BACK VALVE (DO.11.02)
1060	Output #10	EK1100.1	DO.11.3	LOCK HORIZ SCREW HOLE TOOL FORWARD/BACK VALVE (DO.11.03)
1061	Output #11	EK1100.1	DO.11.4	LOCK VERTICAL LEFT TOOL LIFT VALVE (DO.11.04)
1062	Output #12	EK1100.1	DO.11.5	LOCK VERTICAL RIGHT TOOL LIFT VALVE (DO.11.05)
1063	Output #13	EK1100.1	DO.11.6	LOCK SIDE THICK MEASURE LIFT VALVE (DO.11.06)
1064	Output #14	EK1100.1	DO.11.7	LOCK SIDE DUST OUTLET FORWARD VALVE (DO.11.07)
1065	Output #15	EK1100.1	DO.11.8	LOCK SIDE DUST OUTLET BACK VALVE (DO.11.08)
1066	Output #16	EK1100.1	DO.12.1	LOCK SIDE ENTRANCE FOLLOW CLAMP VALVE (DO.12.01)
1067	Output #17	EK1100.1	DO.12.2	LOCK SIDE EXIT FOLLOW CLAMP VALVE (DO.12.02)
1079	Output #29	EK1100.1	DO.13.6	LOCK SIDE END MEASURE VALVE (DO.13.06)
1080	Output #30	EK1100.1	DO.13.7	BEVEL LOCK SLOT MOTOR (DO.13.07)
1081	Output #31	EK1100.1	DO.13.8	BEVEL LOCK PLATE SLOT MOTOR (DO.13.08)
1082	Output #32	EK1100.1	DO.14.1	BEVEL LOCK SLOT VALVE (DO.14.01)
1083	Output #33	EK1100.1	DO.14.2	BEVEL LOCK PLATE SLOT VALVE (DO.14.02)
1090	Output #40	EK1100.1	DO.15.1	UNLOADER RED LIGHT (DO.15.01)
1091	Output #41	EK1100.1	DO.15.2	UNLOADER GREEN LIGHT (DO.15.02)
1092	Output #42	EK1100.1	DO.15.3	UNLOADER YELLOW LIGHT (DO.15.03)
1093	Output #43	EK1100.1	DO.15.4	1# Conveyor roller motor (DO.15.04)
1094	Output #44	EK1100.1	DO.15.5	1# Conveyor pedrail motor (DO.15.05)
1095	Output #45	EK1100.1	DO.15.6	Hinge Levo Motor (DO.15.06)
1096	Output #46	EK1100.1	DO.15.7	Piece feed Pedrail motor (DO.15.07)
1097	Output #47	EK1100.1	DO.15.8	Hinge Dextro Motor (DO.15.08)
1098	Output #48	EK1100.1	DO.16.1	Hinge Screw Hole Motor (DO.16.01)
1099	Output #49	EK1100.1	DO.16.2	Levo Lock slot motor (DO.16.02)
1100	Output #50	EK1100.1	DO.16.3	Dextro Lock Slot motor (DO.16.03)
1101	Output #51	EK1100.1	DO.16.4	Left lock hole motor (DO.16.04)
1102	Output #52	EK1100.1	DO.16.5	Right lock hole motor (DO.16.05)
1103	Output #53	EK1100.1	DO.16.6	lock screw hole motor (DO.16.06)
1104	Output #54	EK1100.1	DO.16.7	bevel lock slot motor (DO.16.07)
1105	Output #55	EK1100.1	DO.16.8	bevel lock plate motor (DO.16.08)
1106	Output #56			Lock Roller Clamps (SIM)
1142	Spindle Fwd	Yaskawa VFD.3	Forward	
1143	Spindle Rev	Yaskawa VFD.3	Reverse	
1208	Output #64	EK1100.1	DO.18.1	YELLOW LAMP UNLOAD GANTRY (DO.18.01)
1209	Output #65	EK1100.1	DO.18.2	GREEN LAMP UNLOAD GANTRY (DO.18.02)
1210	Output #66	EK1100.1	DO.18.3	UNUSED OUTPUT (DO.18.03)
1211	Output #67	EK1100.1	DO.18.4	UNUSED OUTPUT (DO.18.04)
1212	Output #68	EK1100.1	DO.18.5	UNUSED OUTPUT (DO.18.05)
1213	Output #69	EK1100.1	DO.18.6	MAIN BODY OIL PUMP (DO.18.06)
1214	Output #70	EK1100.1	DO.18.7	LOAD GANTRY OIL PUMP (DO.18.07)
1215	Output #71	EK1100.1	DO.18.8	UNLOAD GANTRY OIL PUMP (DO.18.08)
1224	Output #80	EK1100.2	DO.03.5	LOADER RED LIGHT (DO.03.05)
1225	Output #81	EK1100.2	DO.03.6	LOADER GREEN LIGHT (DO.03.06)
1226	Output #82	EK1100.2	DO.03.7	LOADER YELLOW LIGHT (DO.03.07)

4.4.6 Hinge instance

I/O for the hinge instance

SignalID	SignalName	Device	Name	Description
1	Input #0	EK1100.1	DI.04.7	HINGE SIDE END MEASURE (DI.04.07)
2	Input #1	EK1100.1	DI.07.1	HINGE LEVO TOOL FWD TO POSITION (DI.07.01)
3	Input #2	EK1100.1	DI.07.2	HINGE LEVO TOOL BACK TO POSITION (DI.07.02)
4	Input #3	EK1100.1	DI.07.3	HINGE DEXTRO TOOL FWD TO POSITION (DI.07.03)
5	Input #4	EK1100.1	DI.07.4	HINGE DEXTRO TOOL BACK TO POSITION (DI.07.04)
6	Input #5	EK1100.1	DI.07.5	HINGE SCREW HOLE TOOL FWD TO POSITION (DI.07.05)
7	Input #6	EK1100.1	DI.07.6	HINGE SCREW HOLE TOOL BACK TO POSITION (DI.07.06)
8	Input #7	EK1100.1	DI.07.7	HINGE WIDTH SENSOR FWD TO POSITION (DI.07.07)
9	Input #8	EK1100.1	DI.07.8	HINGE WIDTH SENSOR BACK TO POSITION (DI.07.08)
10	Input #9	EK1100.1	DI.08.1	HINGE SIDE ENTRANCE WIDTH CLAMP BACK TO POSITION (DI.08.01)
11	Input #10	EK1100.1	DI.08.2	HINGE SIDE EXIT WIDTH CLAMP BACK TO POSITION (DI.08.02)
12	Input #11	EK1100.1	DI.08.3	HINGE SIDE CLUTCH Y FWD TO POSITION (DI.08.03)
13	Input #12	EK1100.1	DI.08.4	HINGE SIDE CLUTCH Y BACK TO POSITION (DI.08.04)
14	Input #13	EK1100.1	DI.08.5	WORKTABLE LOCKING FWD TO POSITION (DI.08.05)
15	Input #14	EK1100.1	DI.08.6	WORKTABLE LOCKING BACK TO POSITION (DI.08.06)
16	Input #15	EK1100.1	DI.08.7	HINGE SIDE END FWD TO POSITION (DI.08.07)
17	Input #16	EK1100.1	DI.08.8	HINGE SIDE END BACK TO POSITION (DI.08.08)
18	Input #17	EK1100.1	DI.09.3	HINGE SIDE ASSIST CLAMP TO POSITION (DI.09.03)
19	Input #18	EK1100.1	DI.09.4	BEVEL LOCK SLOT TOOL FWD TO POSITION (DI.09.04)
20	Input #19	EK1100.1	DI.09.5	BEVEL LOCK SLOT TOOL BACK TO POSITION (DI.09.05)
24	Input #23	EK1100.2	DI.02.3	PIECE BACKWARD REACH 1# CONVEYOR (DI.02.03)
26	Input #25	EK1100.1	DI.10.3	BEVEL TOOL DOWN (DI.10.03)
27	Input #26	EK1100.1	DI.10.4	BEVEL TOOL UP (DI.10.04)
28	Input #27	EK1100.1	DI.05.1	PEDRAIL UP TO POSITION (DI.05.01)
29	Input #28	EK1100.1	DI.05.2	PEDRAIL DOWN TO POSITION (DI.05.02)
30	Input #29	EK1100.1	DI.10.1	PEDRAIL DECELERATE SWITCH (DI.10.01)
31	Input #30	EK1100.1	DI.10.2	PIECE ARRIVE PEDRAIL SWITCH (DI.10.02)
32	Input #31	EK1100.1	DI.19.5	FORWARD FEED INTO 4# UNLOAD GANTRY (DI.19.05)
33	Input #32	EK1100.2	DI.02.1	PIECE REACH 1# CONVEYOR ROLLER (DI.02.01)
65	Motor 0 Home	EK1100.1	DI.03.8	HINGE Y HOME (DI.03.08)
66	Motor 1 Home	EK1100.1	DI.04.2	HINGE X HOME (DI.04.02)
67	Motor 2 Home	EK1100.1	DI.04.4	HINGE Z HOME (DI.04.04)
97	Motor 0 ++	EK1100.1	DI.03.8	HINGE Y+ LIMIT (DI.03.08)
98	Motor 1 ++	EK1100.1	DI.04.2	HINGE X+ LIMIT (DI.04.02)
99	Motor 2 ++	EK1100.1	DI.04.4	HINGE Z+ LIMIT (DI.04.04)
129	Motor 0 --	EK1100.1	DI.03.7	HINGE Y- LIMIT (DI.03.07)
130	Motor 1 --	EK1100.1	DI.04.1	HINGE X- LIMIT (DI.04.01)
131	Motor 2 --	EK1100.1	DI.04.3	HINGE Z- LIMIT (DI.04.03)
161	Probe	EK1100.1	DI.09.8	HINGE SIDE WIDTH PRESSURE PROBE (DI.09.08)
212	Probe8	EK1100.1	DI.10.8	Hinge Side Probe For Tool Length
1050	Output #0	EK1100.1	DO.12.3	HINGE LEVO TOOL CYLINDER VALVE (DO.12.03)
1051	Output #1	EK1100.1	DO.12.4	HINGE DEXTRO TOOL CYLINDER VALVE (DO.12.04)
1052	Output #2	EK1100.1	DO.12.5	HINGE SCREW HOLE TOOL CYLINDER VALVE (DO.12.05)
1053	Output #3	EK1100.1	DO.12.6	HINGE SIDE VERTICAL CLAMP VALVE (DO.12.06)
1054	Output #4	EK1100.1	DO.12.7	HINGE SIDE WIDTH CLAMP VALVE (DO.12.07)
1055	Output #5	EK1100.1	DO.12.8	HINGE SIDE MEASURE FLOAT VALVE (DO.12.08)
1056	Output #6	EK1100.1	DO.13.1	HINGE SIDE Y CLUTCH FWD VALVE (DO.13.01)
1057	Output #7	EK1100.1	DO.13.2	HINGE SIDE END MEASURE VALVE (DO.13.02)
1058	Output #8	EK1100.1	DO.13.3	WORKTABLE LOCKING VALVE (DO.13.03)
1059	Output #9	EK1100.1	DO.13.4	WORKTABLE PEDRAIL LIFT VALVE (DO.13.04)
1060	Output #10	EK1100.1	DO.13.5	HINGE SIDE WIDTH MEASURE CYLINDER VALVE (DO.13.05)
1066	Output #16	EK1100.1	DO.14.3	HINGE SIDE ASSIST CLAMP UP VALVE (DO.14.03)
1067	Output #17	EK1100.1	DO.14.4	HINGE SIDE ASSIST CLAMP DOWN VALVE (DO.14.04)
1068	Output #18	EK1100.1	DO.14.5	HINGE SIDE ASSIST CLAMP VALVE (DO.14.05)
1069	Output #19	EK1100.1	DO.14.6	BEVEL HINGE TOOL UP VALVE (DO.14.06)
1070	Output #20	EK1100.1	DO.14.7	BEVEL HINGE TOOL UP VALVE (DO.14.07)
1071	Output #21	EK1100.1	DO.14.8	HINGE CLAMPS DOWN (DO.14.08)
1142	Spindle Fwd	Yaskawa VFD.2	Forward	
1143	Spindle Rev	Yaskawa VFD.2	Reverse	

4.4.7 Unloader Instance
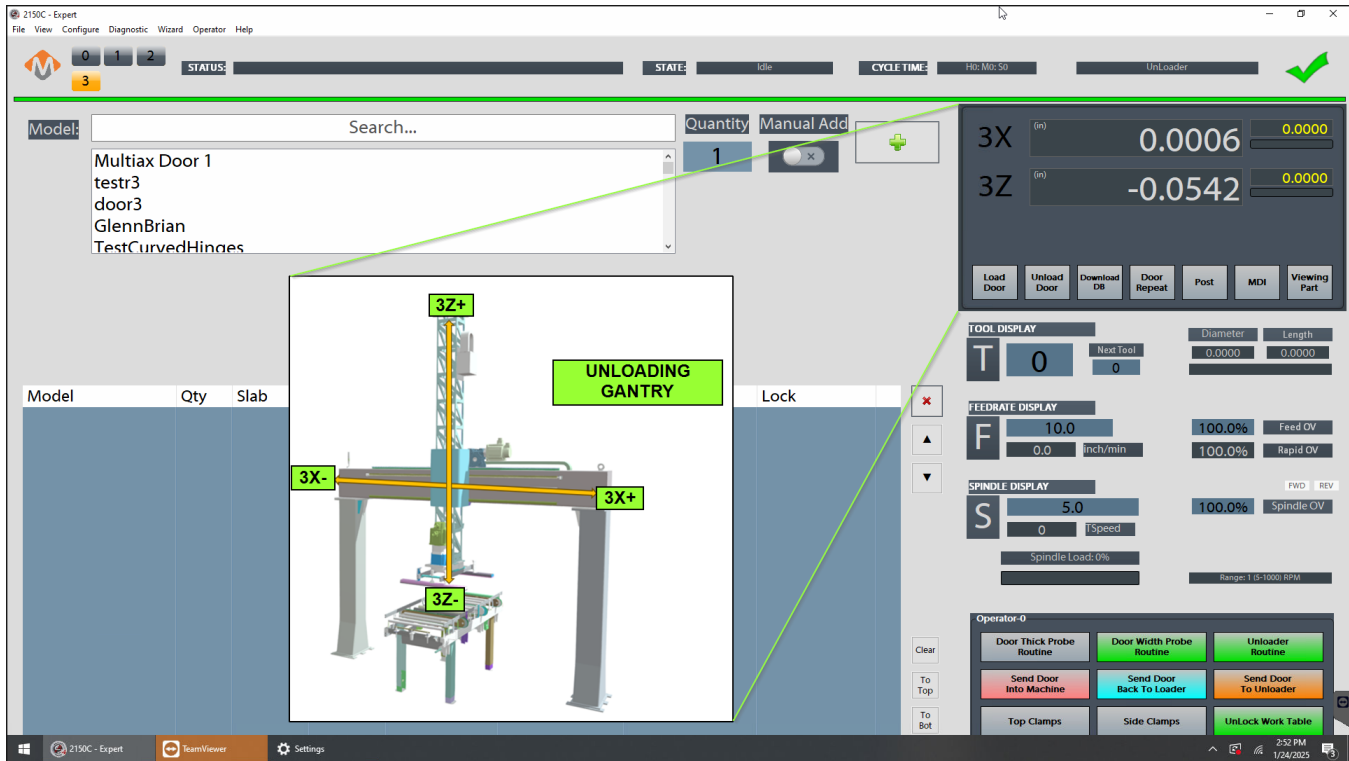
I/O for the unloader

SignalID	SignalName	Device	Name	Description
5	Input #4	EK1100.1	DI.19.5	FORWARD FEED INTO 4# UNLOAD GANTRY (DI.19.05)
6	Input #5	EK1100.1	DI.19.6	BACKWARD FEED INTO 4# UNLOAD GANTRY (DI.19.06)
8	Input #7	EK1100.1	DI.19.8	PRESSURE PROTECT UNLOAD GANTRY (DI.19.08)
65	Motor 0 Home	EK1100.1	DI.19.1	UNLOAD GANTRY X HOME (DI.19.01)
66	Motor 1 Home	EK1100.1	DI.19.4	UNLOAD GANTRY Z HOME (DI.19.04)
97	Motor 0 ++	EK1100.1	DI.19.2	UNLOAD GANTRY X+ LIMIT (DI.19.02)
98	Motor 1 ++	EK1100.1	DI.19.4	UNLOAD GANTRY Z+ LIMIT (DI.19.04)
129	Motor 0 --	EK1100.1	DI.19.1	UNLOAD GANTRY X- LIMIT (DI.19.01)
130	Motor 1 --	EK1100.1	DI.19.3	UNLOAD GANTRY Z- LIMIT (DI.19.03)
161	Probe	EK1100.1	DI.19.7	SUCK OVER PRESSURE UNLOAD GANTRY PROBE (DI.19.07)
1050	Output #0	EK1100.1	DO.14.4	UNLOADER VACUUM ON (DO.14.04)
1051	Output #1	EK1100.1	DO.14.5	UNLOADER VACUUM OFF (DO.14.05)

4.5 MACHINE STARTUP

4.5.1 Notes Before the Operation Starts

- Make sure there are no Objects or tools around/Near the machine.
- Check the list of doors that you need to run and make sure you understand all the details. If any details are unclear, talk with the manager for clarification.
- Before starting the operation, check that all safety devices are operative and in their safety position.

4.5.2 Turn on the power to the control

1. Turn the dust collector on	
2. Turn on all main pneumatic valves	
3. Turn the disconnect knob **clockwise** on the main MachMotion enclosure. That will power up the enclosure and the MachMotion control.	

4.6 OPERATION OF MACHINE

4.6.1 Enter the doors into the job queue:

You use this screen to create a queue of doors to run. You will define the quantity of each door, and any customizations. Customizations will only affect that row – they will not change the underlying model specifications.

You can use the search bar to filter the list to your criteria

For a standard door:

1. Select the model from the list
2. Enter the quantity
3. Click the + button to add this job to the queue

For a custom door:

1. Select the model from the list

2. Enter the quantity

3. Click the Manual Add button

4. Make the required modifications to the hinges, strike and panic fields. Press the keyboard enter or tab key after making each modification.

5. Click the + button to add this job to the queue

How to modify the queue

1. Select the row that you need to modify

2. If any of the details are incorrect, remove the row with the X button on the right side and re-add that door with the correct details

3. Verify that the queue lists the jobs in the correct order. The physical stack of doors at the loading gantry **must** match the order in the queue.

4. If you need to re-order the queue, select a row that needs to move and use the Up and Down arrow buttons on the right side of the queue to move that row.
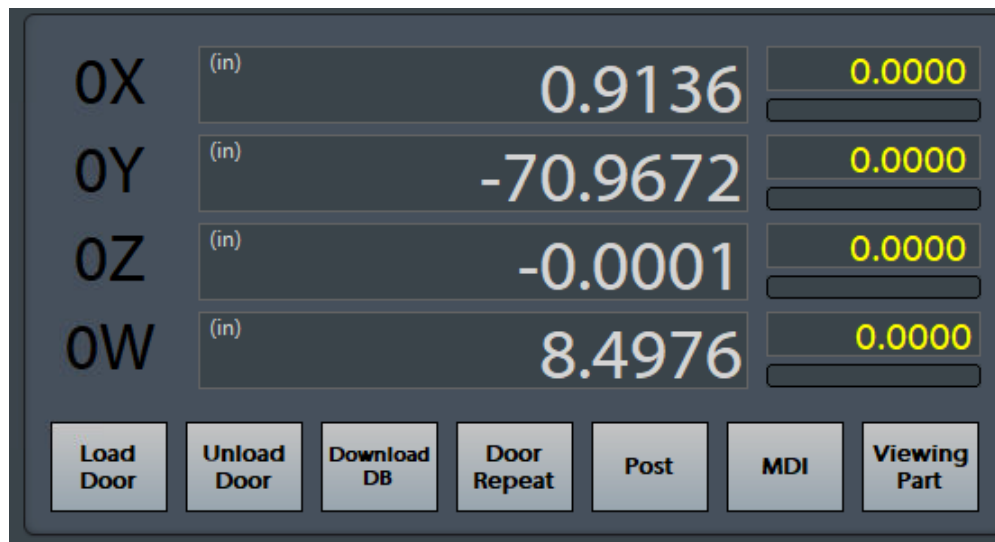
4.6.2 Manual Mode Operation:

The buttons in the lower right corner of the screen provide some manual operation function and can be used for testing and setup. The MachMotion control is not configured for fully manual operation.

Door Thick Probe Routine	Door Width Probe Routine	Unloader Routine
This will enable the thickness probe routine during normal operation. This could potentially be turned off after running the first door of a set.	This will enable the width probe routine during normal operation. We recommend this *always* be enabled.	This is used during testing to leave the door in the machine. It will complete the defined cuts, unclamp and leave the door in-place. This makes it easy to make adjustments.
Send Door Into Machine	**Send Door Back To Loader**	**Send Door To Unloader**
This will run the loader routine completely: pick a door off the stack, load it onto the table, position it, then load it into the machine for cutting operations.	This will send the door back to the loader table, but it will not put it back onto the stack.	This will move the door from the machine, to the unloader, and then to the completed stack
Top Clamps	**Side Clamps**	**Unlock Work Table**
This is a toggle button that will clamp or unclamp the top clamps.	This is a toggle button that will clamp or unclamp the side clamps	This will unclamp the work table

|	
Load Door This will move the door from the stack to the table, but it will not send it into the machine.	**Unload Door** This will pick up a door from the *loader* table and put it back onto the stack.
Download DB This will create a local working copy of the master Baserow database in the cloud	**Door Repeat** When this is turned on, it will run all rows in the queue and the operator will not need to press Cycle Start for each row. When this is turned off, the operator will need to press Cycle Start to run each door in each job. If a row specifies 10 doors, the operator will press Cycle Start 10 times.
POST A POST operation converts the job details into machine instructions. Specifically, it: 1. Takes the specifications for a task in the queue 2. Generates the G-Code (machine language) for that task 3. This G-Code contains all the motion commands needed to complete the job This is useful for testing to review the G-Code before cutting parts.	**MDI** Manual Data Input. This will open a small window where you can enter, and run, G-Code manually.
Viewing Part This shows the axes locations in terms of the fixture zero on that part. This is the view you will normally use.	**Viewing Machine** This shows the axes locations in terms of the machine zero – from which all movements are measured. The button and the coordinates will turn orange when this is enabled.

4.6.3 Normal Production Operation

MachMotion has worked to make normal production as simple as possible.

1. Enter the doors into the queue

2. Stack the doors at the loader station in the correct order

3. Enable or disable thickness probe, width probe, unloader routine

4. Enable or disable Door Repeat
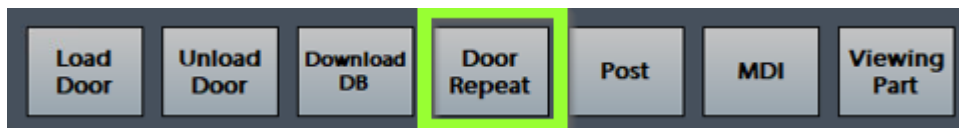
5. Press Cycle Start

4.7 MACHINE SHUTDOWN
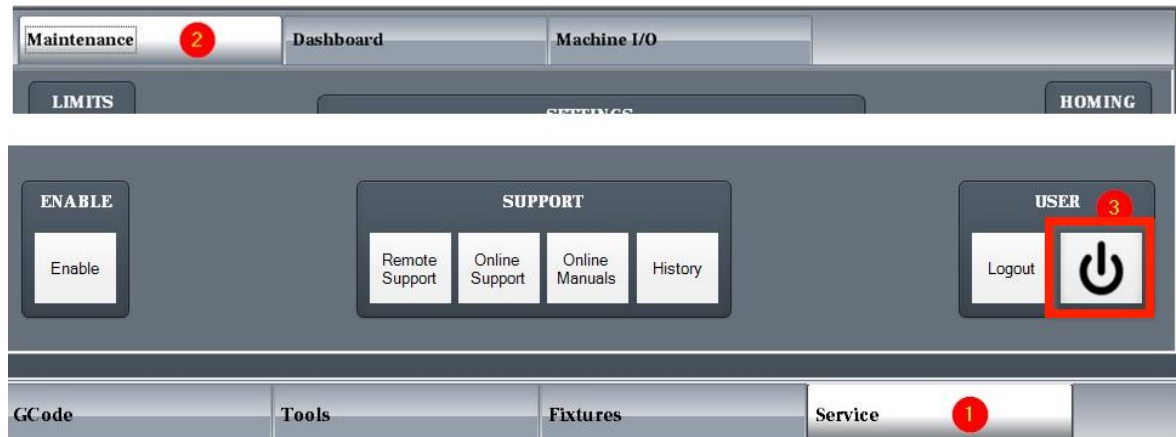
Shutdown the MachMotion software and the computer

1. Click the M icon in the upper left corner of the screen
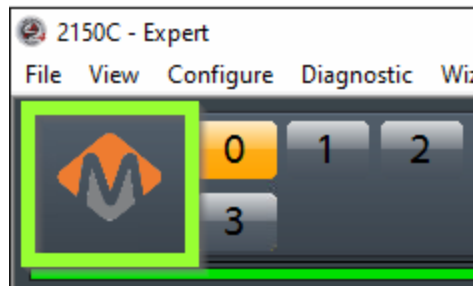
2. Click the Service tab at the bottom of the screen

3. Click the Maintenance tab at the top of the screen

4. Click the power button

Turn this Switch **Anticlockwise** on the main MachMotion enclosure.	
Turn off the main pneumatic valve to this machine	
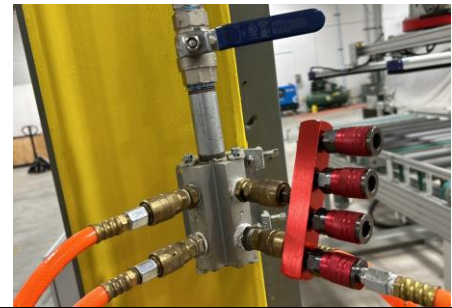
4.8 TOOL CHANGE

4.8.1 Tools Needed

ER25UM WRENCH

ER32UM WRENCH

12.9 HEX CAP SCREW

4MM ALLEN WRENCH

3MM ALLEN WRENCH

Two Hole Tool Setter

One Hole Tool Setter

6 mm Allen Wrench

4MM ALLEN WRENCH

3MM ALLEN WRENCH
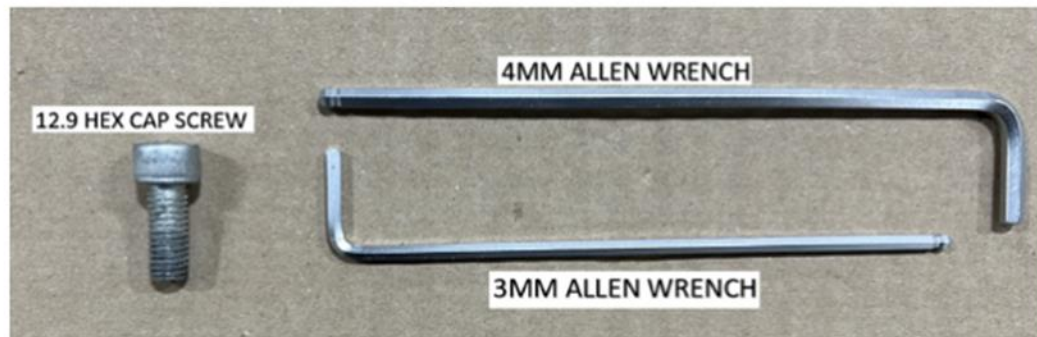
12.9 HEX CAP SCREW

4.8.2 Tools Directory

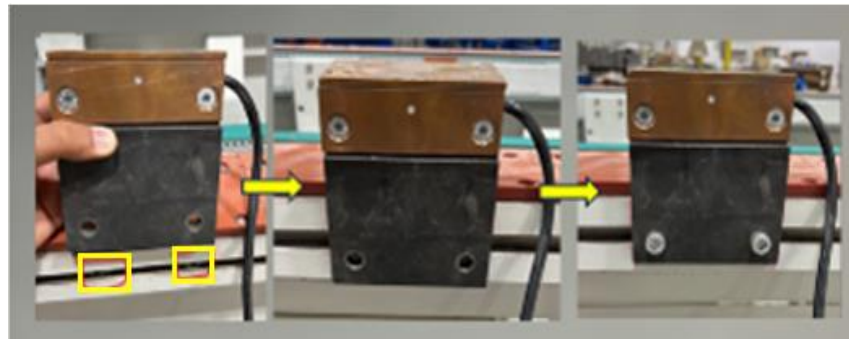| Side	Tool (Drill)	Tools Needed
Lock Side	Horizontal Levo tool	• Two-hole tool setter • 12.9 Hex Cap screw (2) • ER25UM Wrench • Wrench (27)
Lock Side	Horizontal Dextro tool	• Two-hole tool setter • 12.9 Hex Cap screw (2) • ER32UM Wrench • Wrench (32)
Lock Side	Horizontal Pilot tool	• Two-hole tool setter • 12.9 Hex Cap screw (2) • Wrench (30) • Wrench (21)
Lock side	Vertical Left tool	• Two-hole tool setter • 12.9 Hex Cap screw (2) • ER20UM Wrench • Wrench (27)
Lock side	Vertical Right tool	• Two-hole tool setter • 12.9 Hex Cap screw (2) • ER20UM Wrench • Wrench (27)
Lock side	Bevel Lock Plate tool	• Two-hole tool setter • 12.9 Hex Cap screw (2) • ER20UM Wrench • Wrench (27)
Lock side	Bevel Corner square tool	• Two-hole tool setter • 12.9 Hex Cap screw (2) • Wrench (21) • Wrench (30)
Hinge Side	Horizontal Levo tool	• One hole tool setter • 12.9 Hex Cap screw (1) • ER20UM Wrench • Wrench (27)
Hinge Side	Horizontal Dextro tool	• One hole tool setter • 12.9 Hex Cap screw (1) • ER20UM Wrench • Wrench (27)
Hinge Side	Horizontal Pilot tool	• One hole tool setter • 12.9 Hex Cap screw (1) • Wrench (21) • Wrench (30)

4.8.3 Tool Change procedure

- Replace the tool before it becomes dull. A dull tool will increase the load on the machine and reduce its service life.
- The tool becomes dull after long-term use. The cuts with a dull tool will not be clean. There is more resistance, which will increase the heat in the cuts, and could cause a fire.

|	
1. Attach **a tool setter and coil** to the machine. There are defined locations on the machine (both Lock and Hinge sides) where each tool setter needs to be attached. Use **two** Cap screws for the Lockside and **One** for the Hinge side.	Lockside / Hingeside
2. Place the tool setter on top and tight the cap screws using a 6mm Allen Wrench	
3. The **other end** of the Tool setter is the **coil plug** which needs to be connected to the machine. There is a defined location for the coil connection. It is on the front top side of the machine.	LockSide / HingeSide

4. Open the **dots** of coil plug, and connection together as shown in the picture and insert the plug.

After the tool setter is attached and the cable is connected, the tool can be changed.
Now get the required tools from Tool directory for that tool (Drill)

5. Use the metric wrench to hold the backside bolt of the Die (tool holder) and Insert UM wrench in front side.
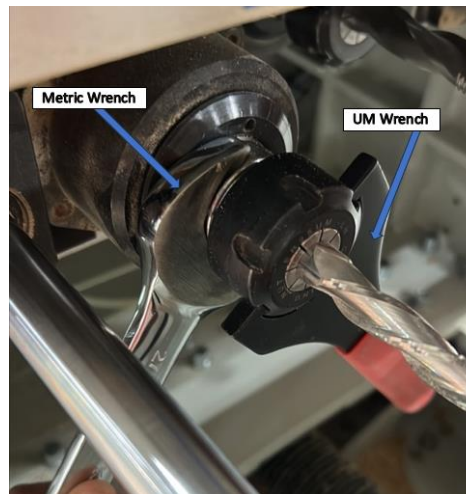

Identify the direction that this tool will be rotating

6. If the tool is rotating **Anticlockwise**, then move both wrenches together **towards** each other. If the tool is rotating **clockwise**, then move both wrenches together **away** from each other.

The die (tool holder) will be tight, so enough force is required to loosen and open it.

7. Once the die (tool holder) is loose, take it out. That die holds the collet and drill bit. Remove the drill and collet from die (tool holder). **Clean** everything with an air gun.	
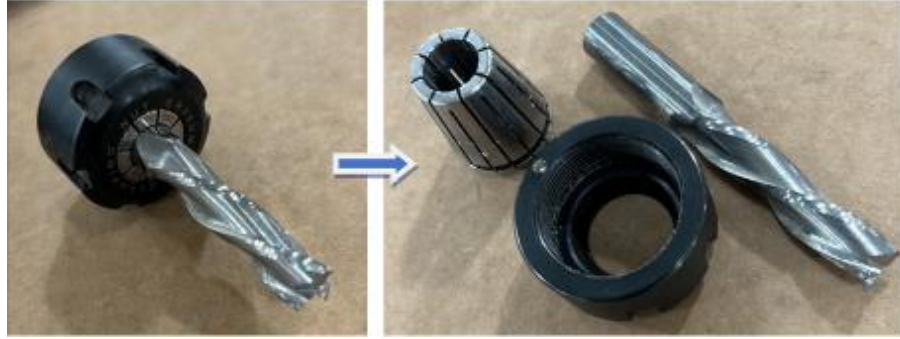
1. Insert the collet into the die (tool holder) and place it back on the threads of the bolt.	

2. Insert the **new drill bit** into the collet	

It is important to know how much of the drill bit should be inserted. It should not be too much inside and not too much outside. When it is inserted correctly, you should be able to see all of the cutting flutes, and there should be 2 to 3 mm between the end of the flutes and the collet. Do not tighten the collet too much. Apply 3 to 4 rotations.

3. Use those two wrenches again and tighten it in the **opposite directions** of that you used to remove it.	

Make sure it is tight enough. **The tighter the better**.

4.8.4 After the tools have been replaced, you need to run the calibration cycle

If you swapped out a new tool you will need to touch off all your tools again. The button for this is located on the service page (found on the bottom of your screen),
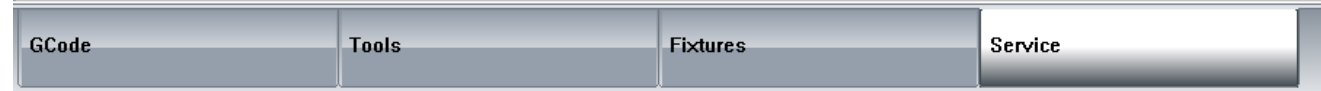
If the service tab is not visible, tap the MachMotion symbol on the top right of your screen. After doing so, the Service Tab should be visible at the bottom of your screen.
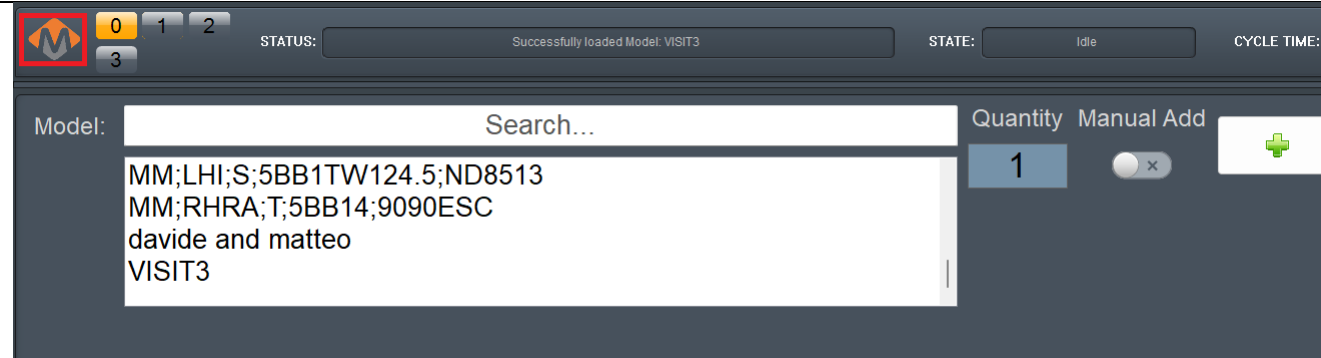
Then under Dashboards (found at the top of your screen).

Maintenance | Dashboard | Machine I/O

Function Buttons-0

Download DB

Part Size-0

#500	1.0000
#501	1.0000
#502	-1.0000
Door Loaded	0.0000
Door Waiting	35.7500
Rotate Door 2	-1.0000

Hinge Functions-0

Hinge Horizontal Tool Touch-Off

Hinge Probe Door Width

Hinge Touch-Off Block Positions-1

| #550 | 0.0000 |

Lock Functions-0

Lock Vert/Hori Tool Touch-Off

Lock Bevel Tool Touch-Off

Lock Touch-Off Block Positions-0

#554	0.0000
#553	0.0000
#555	0.0000

GCode | Tools | Fixtures | Service

Pressing the "Lock: Touch Off Hori/Vert Tools" button will run a routine to automatically touch off all of your tools besides the beveled tools and set the X offset/Length for you. To touch off the beveled tools, press the "Lock: Touch Off Bevel Tools". The screen will prompt you to mount and remove the blocks on start and finish respectively.

After pressing either "Lock: Touch Off Hori/Vert Tools" or "Lock: Touch Off Bevel Tools", follow the Cycle Start dialogs that will appear on the screen.

Mount the touch block inside of the marked out location on the lock side. Look for two black lines. The block should fit right between them. Also, drape the cord in between the worktable to avoid running over it with the head of the machine.

If adjusting the position of the touch block or if using a new one make sure to change the touch block

position, Found in C:\Mach_4\Subroutines\O9054, #550 (touch block position). Adjusting this will cause your tool length offset to move in or out respectively.

4.8.5 Calibrating Hinge Side

If you swapped out a new tool you will need to touch off all your tools again. The button for this is located on the service page (found on the bottom of your screen),

GCode	Tools	Fixtures	Service

If the service tab is not visible, tap the MachMotion symbol on the top right of your screen. After doing so, the Service Tab should be visible at the bottom of your screen.

Then under Dashboards (found at the top of your screen).

Pressing the "Hinge: Touch Off Tools" button will run a routine to automatically touch off all of your tools and set the X offset for you. The screen will prompt you to mount and remove the blocks on start and finish respectively.

After pressing either "Hinge: Touch Off Tools", follow the Cycle Start dialogs that will appear on the screen.

Make sure to mount the normal hinge block and not the bevel hinge block. On the hinge side there is only one spot to mount the block. Look for a hole on the inside of the worktable near the unloader side of the machine.

If adjusting the position of the touch block or if using a new one make sure to change the touch block position, Found in C:\Mach_4\Subroutines\O9050, #550(Hinge Block touch off position) Adjusting this will
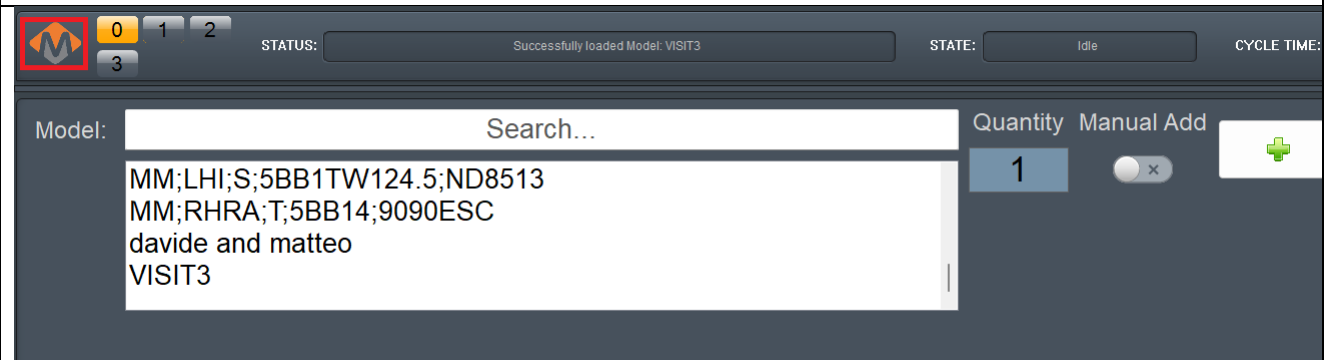
cause your tool length offset to move in or out respectively.

4.8.6 Calibrating Hinge Side Bevel

If the 3° bevel changes, you can change the X and Z Bevel Offset in C:\Mach_4\Subroutines\O9017

#5081 (X Bevel Headshift Offset) and #5083 (Z Bevel Headshift Offset)

4.8.7 Safety Before and during the Tool Change procedure

- Only tools that meet national standards and industry requirements can be used on the machine tool, and tools with defects such as cracks, deformation, and unbalanced will cause danger.
- Clean everything with an air gun before starting the tool change.
- Make sure the machine is in home position.
- Gloves and Safety glasses with side shields must always be worn.
- When replacing knives or maintenance, the power supply and air source must be turned off at the same time, and protective gloves must be worn to replace knives to avoid damage to the human body by the blade, and the tool must be confirmed to be installed reliably after replacing the knives.
- After the tool change is completed, take all the tools, and make sure there are no tools or objects kept.
- Do not perform this procedure alone. Always keep someone on the computer screen.
- Do not perform anything other than the mentioned in the procedure.
- While tightening the bolt and die, watch your hands.

5 MAINTENANCE

5.1 LOCK OUT AND TAG OUT

Before carrying out any kind of maintenance and/or repair work, it is necessary to isolate the machine from the electricity supply and any other sources of energy.

Before working on the machine each operator locks all the isolators of the sources of external power with personal locking devices - for example padlocks - and takes the keys for opening with them; each operator removes the personal locking devices of the isolators only once the intervention work on the machine has been finished and therefore the isolator lock can only be removed after all operators have removed their personal locking devices, that is only after all operators have finished intervention work on the machine.

If the isolators do not have enough space for all the locks, simple locking devices like those shown in the photo can be used:

Follow the P-R-O-P-E-R lockout rule of thumb.

P....... Process shutdown

R....... Recognize energy type (electrical, pneumatic, mechanical, etc.)

O....... OFF! Shut off all power sources and isolating devices!

P....... Place lock and tag

E....... ENERGY: Release stored energy to a zero-energy state

R....... Recheck controls and test to ensure they are in the "OFF" state

This type of procedure prevents an operator from starting the machine without realizing that other operators are in the hazardous areas of the machine; to be effective it is essential that all operators that carry out intervention work on the machine lock the isolators with personal locks. A procedure for isolating energy sources, widely used in industrial sectors, is known as Lockout/Tagout (LOTO); this procedure comes from the USA and has been defined by the Occupational Safety and Health Administration (OSHA) [www.osha.gov]

5.2 ZERO ENERGY TO START UP

Starting the equipment properly is just as important as the lockout/tagout guidelines in terms of safety. The following guidelines below should be followed to start the equipment.

Inspect

The equipment must be inspected for proper adjustment before starting equipment.

Clean Up

All materials and debris must be cleaned up. Any combustible materials or old parts used during repairs must be cleaned up and/or properly disposed of.

Replace Guards

Replace all equipment guards. If part of the equipment cannot be properly adjusted after start-up with guard on check the troubleshooting section in the manual.

Check Controls

Confirm that all switches are in the "OFF" position. Please be advised that some components of the machine may start automatically when energy is restored.

Remove Locks

Each operator must remove his or her own lock and tag. This will ensure that all operators are in a safe place when the equipment is started.

Perform Visual Checks

Checks must be done by a qualified technician, both visual and operational, with the aim of assuring the machine's safety.

Remember, lockout/tagout procedures work because you are the only one with the key to your lock. Proper lockout/tagout can save lives, limbs, and money. Help make your work environment safe for you and your fellow workers. Be sure to follow the P-R-O-P-E-R lockout/tagout procedures, and that those around you do also.

Close the Cage Gate

Verify all cage gates are securely closed. Ensure all safety protocols are in effect.

5.3 SPECIFIC PRECAUTIONS

When carrying out maintenance and/or repair work meticulously follow the instructions below:

- When carrying out all cleaning, repair and maintenance, the power supply and air supply must be cut off. The main switch must be locked during maintenance to strictly prevent accidental starting of the machine.
- Before beginning work, display a sign indicating "MACHINE UNDERGOING MAINTENANCE" in an easily visible position.
- Take care not to allow lubricant-coolant liquids to escape into the environment.
- To access the higher parts of the machine, use suitable means to carry out the operations.
- Do not climb on the machine parts since they are not designed to support the weight of people.
- On completion of operations, restore and properly secure all safety devices and guards removed, open and de-activated.

5.4 SCHEDULED ROUTINE MAINTENANCE

Scheduled routine maintenance includes inspections, checks and interventions to prevent work interruptions and breakdowns, they keep the lubrication status of the machine and the status of parts that are subject to wear under systematic control. These operations, although simple, must be carried out by Qualified Personnel.

The machine has been designed to reduce routine maintenance to a minimum, it is up to the operator to make a judgement regarding the state and suitability for use. It is however recommended to stop and to intervene with maintenance any time that non-optimal operation is noted, to always enable maximum efficiency.

Always use the designated PPE (Personal Protective Equipment) - Personal Protective Equipment:

- Gloves to protect against mechanical and electrical risks

NOTICE

Gloves required in this area

- Safety shoes

- Earcup Protection

- Eyepiece Protection

- Mask Protection

For all maintenance that does not require voltage supply to the machine parts it is necessary to stop the system, isolating the supply from the general panel isolator, locking it with special lock provided at position "O" (OFF).

In the event of a malfunction assign the task of finding the fault only to specialized personnel or call the technical assistance service of the manufacturer of the electrical panel.

5.5 MAINTENANCE CHART

Duty	Daily	Weekly	Monthly	Quarterly
Clean Dust on machine	✓			
Move forward & backward tool cylinder to clean dust on guide rail then wipe with a cloth containing oil	✓			
Check photoelectronic switch and wipe away the dust		✓		
Check Pneumatic Filter and Pressure Gage	✓			
Clean Dust Collector Hoses		✓		
Check All Guide ways for Light Film of Oil	✓			
Clean Filter on Air Conditioner		✓		
Clean All tool Holders & Collets		✓		
Check lubrication oil level in oil reservoir	✓			
Check tools for wear and damage		✓		
Check electric Components in electric cabinet			✓	
Clean dust on filter net of cooling fan		✓		
Check all fastening bolt on machine			✓	
Inspection of all guide rails and wheels		✓		
Clean Vertical Clamps	✓			

5.6 PERIODIC CLEANING, INSPECTION AND MAINTENANCE

Periodic checking and maintenance are essential to maintain machine accuracy and to operate the machine in its best condition. Checking and maintenance of the machine prevents machine troubles and allows early discovery of abnormal conditions, permitting early measures to be taken to minimize damage to the machine. Observe the following instructions for reliable maintenance and check to operate the machine in its best condition.

5.6.1 DAILY CLEANING AND MAINTENANCE

The machine operator should perform daily routine cleaning and maintenance around the machine. Daily cleaning of the linear ways, general removal of wood dust and debris around the machine area, good maintenance allows early discovery of machine troubles, reducing damage to the machine and increasing the productive life of the machine.

- Cleaning of guide rails
- Cleaning of Roller tables
- Cleaning of Lockside Module
- Cleaning of Hingeside Module
- Tool inside area cleaning
- Lubrication Oil Check

5.6.2 WEEKLY INSPECTIONS AND MAINTENANCE

- Weekly inspect and clean all linear ways, tool holder collets, collets, fixture rails for rust or damage as well as a light coat of oil being present, as the appearance of rust or component damage or lack of lubrication may prevent the machine from operating at peak performance and in time may cause severe damage to the machine

- Inspect the In and out rollers for correct operating appearance. All issues found should be reported and repaired as soon as possible to avoid further damage to the machine

- Detailed Cleaning and Inspection of both Modules

- Detailed Cleaning and Inspection of Sensors/Barcode Scanner

- Detailed cleaning and lubrication of guides

PROXIMITY SWITCH 3
TL-Q5MC2-Z
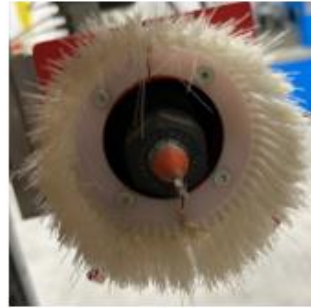
5.7 AIR CONDITIONER

- Air Conditioner plays an important role in keeping the cabinet at normal temperature and so it is an integral part of the machine. It is important to maintain it in a working condition.
- Weekly remove, inspect and clean the air filter on the air conditioner fitted on the main machine electrical cabinet. The filter can be cleaned with compressed air.

5.8 LUBRICATION

- This machine has an automatic oiling device. It is important to be sure that there is enough oil in the reservoir.
- It is also important that the oil lines do not have any air pockets or bubbles in the lines, also check that the ways to make sure that they are all getting oil, you should keep them clean and check them for rust, wear, or damage.
- Lubricate oil when it is lower than the lower limit of the oil level 5.

Lubrication Point	Oil Name	Maker	Lubrication time
Auto Lubricator			

6 TROUBLESHOOTING

If the system is not working correctly, please review and follow the steps in these sections of this manual:

Section 4.1 Safety Instruction

Section 4.4.1 Alarms

Section 4.5 Machine Startup

Section 4.6 Operation of Machine

Contact your maintenance staff