# CLN of South Florida, Inc.

High Performance | Tight Tolerances | Clean Cuts

# CLN Graphics Finisher
# Manual

MADE IN THE USA

# CLN Graphics Finisher Manual

**of South Florida, Inc.**

**Manufacturers of CNC Equipment**

www.CLNofSouthFlorida.com

Made in USA

2336 Cypress Lane, Belle Glade, FL 33430
Toll- Free: (877) 256- 1043  Local: (561) 996-5900
www.clnofsfl.com

# ⚠ Important

Make sure you read and fully understand this manual before operating your automated machine. Failure to do so will put yourself and others in harm and will void the warranty of this equipment.

# Intended Use of Machine

✔ • Machines are designed to automatically cut nonferrous materials:

- Aluminum
- Plastic
- Brass
- Lead
- Wood
- Foam

✘ • Machines are not intended for:

- Steel
- Stone

# Introduction

Everyone at CLN of South Florida, Inc. would like to thank you for purchasing the CLN Brand CNC Router machine. We understand that you had a choice and you picked ours. Before you get started, there are a few things that we need to go over.

## Purpose of this publication

- To help guide you through the learning curve of setting up and operating a new piece of automated equipment.

- As a training aid.

## Contents

This manual will take on average about an hour to read and doing so will help you to better understand the machine functions and operations.

## Disclaimer

CLN of South Florida, Inc. makes every effort to provide their valued customers with current and accurate information about their equipment. However due to constant research and development and an unsurpassed passion to provide our customers with the latest in cutting edge technologies, we cannot guarantee that the contents of this manual are current and complete.

## Copyright

This manual contains information that is copyright protected. All rights are reserved. No part of this manual may be repurposed or reused without consent from CLN of South Florida, Inc.

# Table of Contents

Safety

Machine Overview and Assembly

Machine Maintenance

Machine Operation

Machine Software

Router Bit Height

Trouble Shooting

# Safety

Your Responsibilities:

- As an operator of the CLN machine, you are responsible to follow all safety procedures. Any person who operates or does any maintenance on this machine must be aware of all safety procedures.

Safety Precautions:

- Do not wear any loose-fitting clothing such as scarves or hanging jewelry.
- Do not put hands in or on any moving parts at any time.
- Do not operate machinery while under the influence of alcohol, drugs or any other substance that may impair or alter your judgment.
- Always wear gloves when handling sharp materials.
- Always wear eye and hearing protection when operating equipment.
- Do not operate the machine without all the covers in place.
- Keep hands, head and body out of the way of moving parts.
- When performing maintenance work on the machine always unplug the incoming electric power and disconnect the compressed air supply. Make sure the air is completely drained out of the system.
- Be sure to stay clear of moving parts when turning on the air supply, the tools may unexpectedly move during the initial connection.
- Never leave the machine unattended.
- Completely power down when not in use.

## Opening the Side Covers:

- When servicing the machine, you must first disconnect the electricity, disconnect the compressed air line and completely drain the air out of the system. **If you do not disconnect the electric power and the compressed air line and drain the system, you will put yourself at serious risk of causing permanent damage to yourself or death.**

## Guidelines:

- Always follow the safety rules. Under no circumstance should equipment be used for anything other than what it is designed for. Any person who operates or does maintenance on this equipment should be aware of all safety and operating procedures. It is extremely important that this equipment is handled with care! Distractions such as horseplay, carelessness, loud noises and sudden movements can result in unsafe conditions, therefore, should be always avoided when operating equipment.

## Environmental Considerations:

- Climate Control
  - The machine should be in a climate-controlled area and NOT exposed to extreme temperatures and or weather.
  - There are components on the machine that are susceptible to corrosion and should NOT be exposed to any water based lubricant fluid or humidity.

- Clean Working Conditions
  - Your machine should be located in a clean environment.
  - Keep your machine and work area free of dirt and debris.

- Lighting
  - Your machine should be operated in a well lighted area.

# Caution Labels:



**Danger Stay clear sticker:** Means that the machine moves automatically and will move without warning and cause serious damage to anyone that puts any of there body parts in the area.
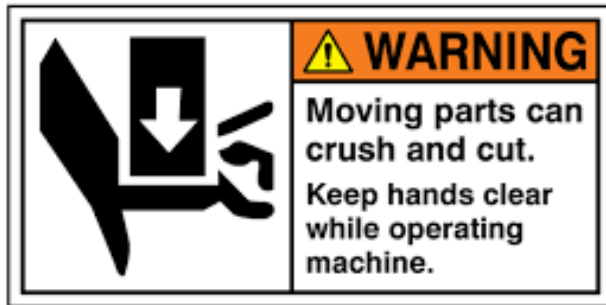


**Warning sticker:** Means that the area around the sticker moves automatically and will move without warning and cause serious damage to anyone that puts any of there body parts in the area.



**Danger Hazardous Voltage sticker:** Means that the area around the sticker can cause an electrical shock to anyone that puts any of there body parts in the area.



Emergency Stop:
This machine is equipped with 3 emergency stops, one on each side of the gantry and the other located next to the monitor. Pressing it will halt all motion on the machine as well as bleeding all the compressed air from the machine's pneumatic cylinders. The machines computer and monitor are the only two components that will remain on with the emergency stop pressed.

# Machine Overview and Assembly

Components Overview

Electronic Components Overview
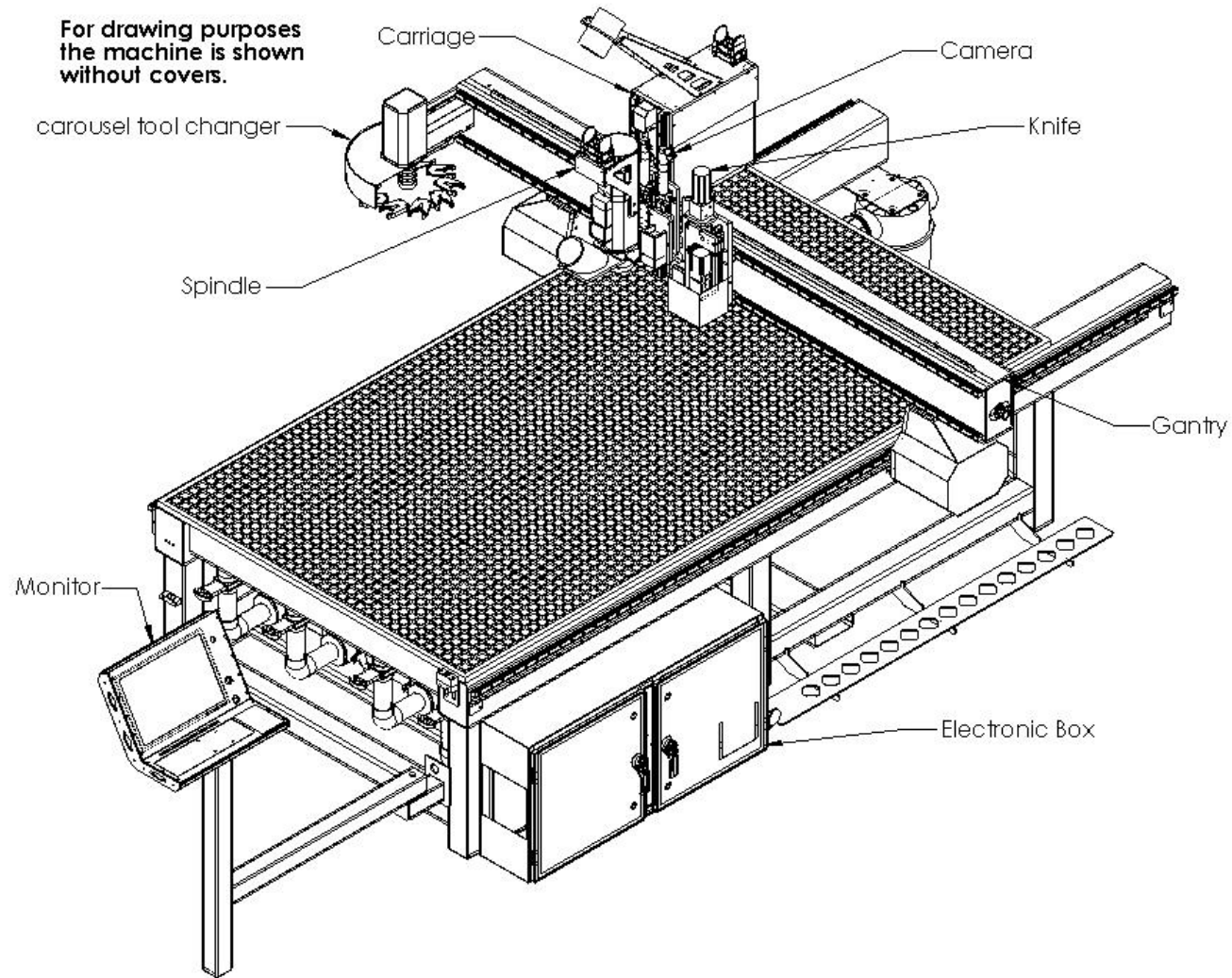
All Machines Footprint

Fusion Plus Footprint

Assembly

Electrical Connection

Compressed Air Connection

Internet Connection
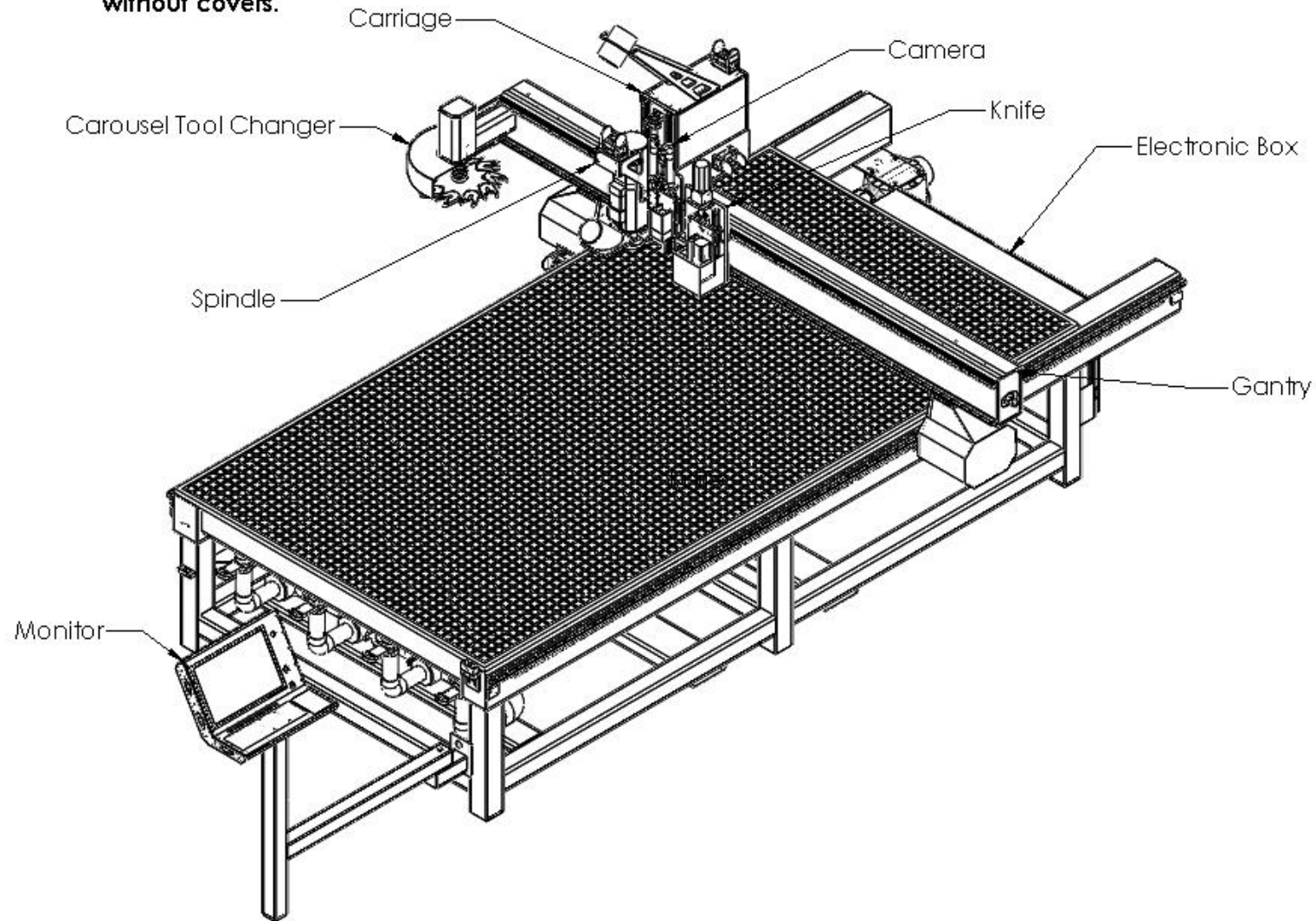
# Components Overview:

**Table Size
4 X 8 and 5 X 10**



For drawing purposes the machine is shown without covers.

- Carriage
- Camera
- carousel tool changer
- Knife
- Spindle
- Gantry
- Monitor
- Electronic Box

# Components Overview:



**Table Size 6 X 12**

For drawing purposes the machine is shown without covers.

Carriage

Camera

Carousel Tool Changer

Knife

Electronic Box

Spindle

Gantry

Monitor

# Components Overview Continued:

**Spindle**

- The (ATC) Automatic Tool Changing Spindle, spins the router bits at a high RPM. The ATC Spindle is equipped with an electric cooling fan. CLN can also add a dust boot that automatically drops down when the spindle is turned on as shown here.
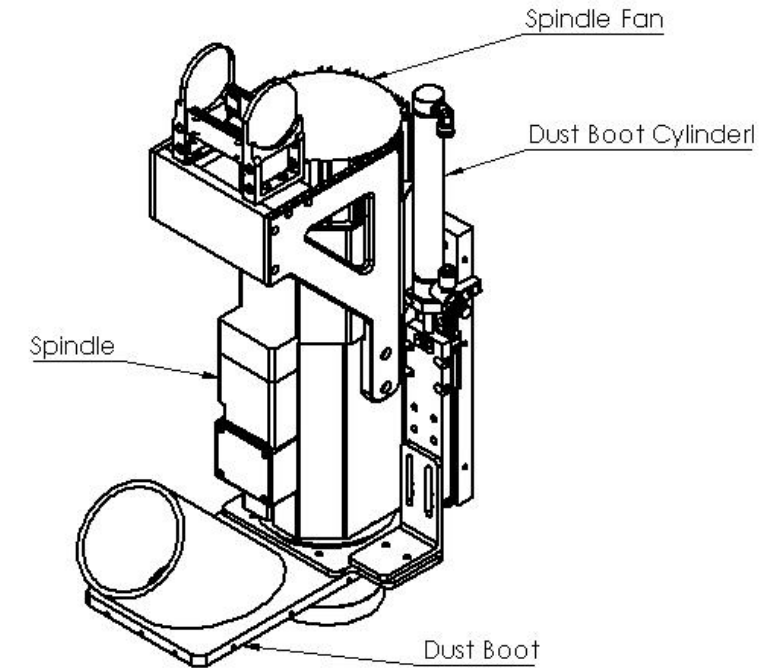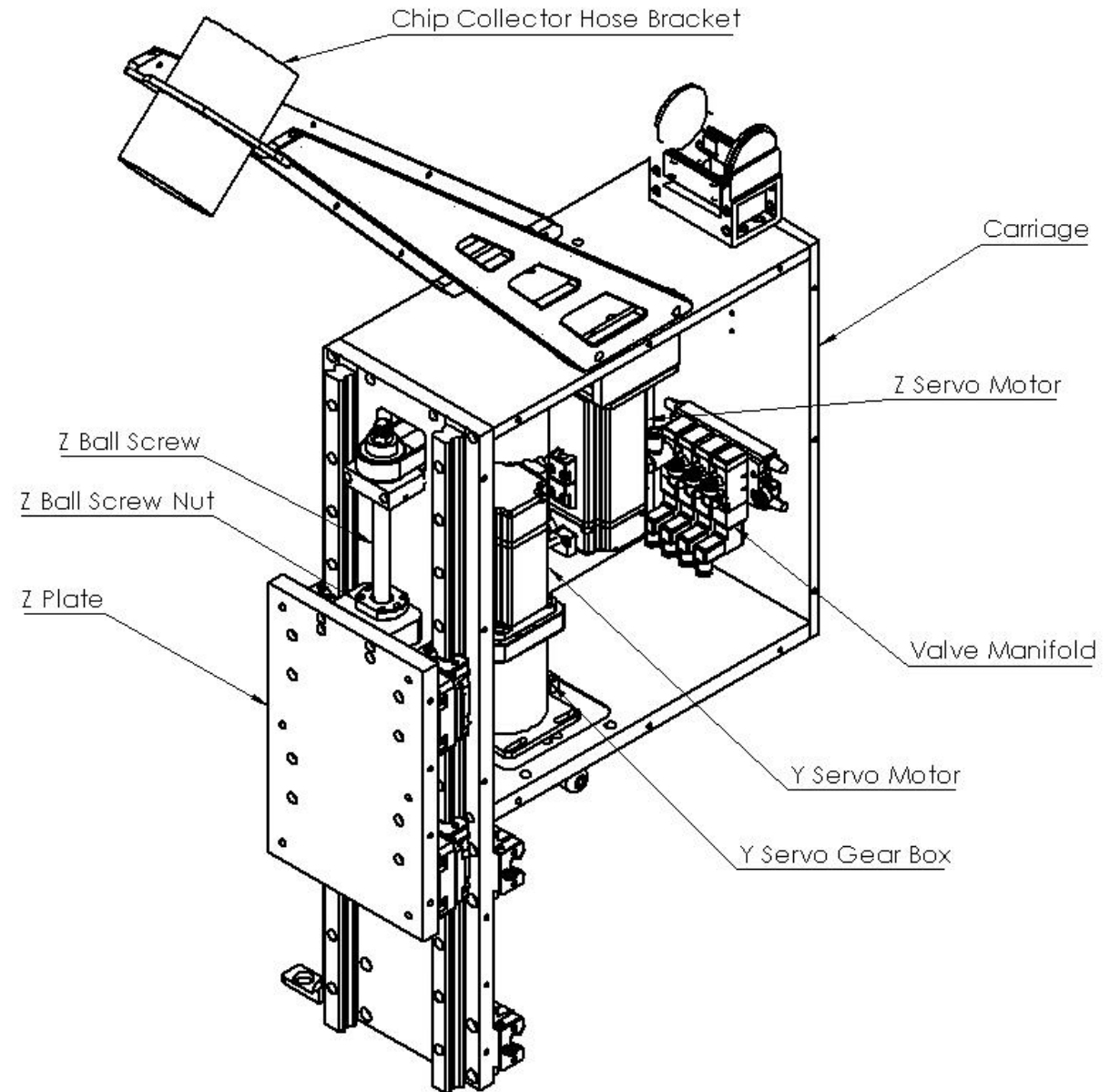
**Camera**

- CLN offers the Opti Scout Camera system. The camera is mounted on a rail and is lowered down in position when it is needed. When the camera functions are not needed it is raised up in a safe position. If you were to use a printer to print a design on a sheet of material, you would also print registration marks around the design. The camera is designed to detect the registration marks applied by a printer. Once the camera finds the marks the software automatically aligns the print to the router and either the knife or spindle can cut around the printed shape.

Spindle Fan

Dust Boot Cylinderl

Spindle

Dust Boot

Speed / Flow Controler Up

Camers Cylinder

Speed / Flow Controler Down

Camera
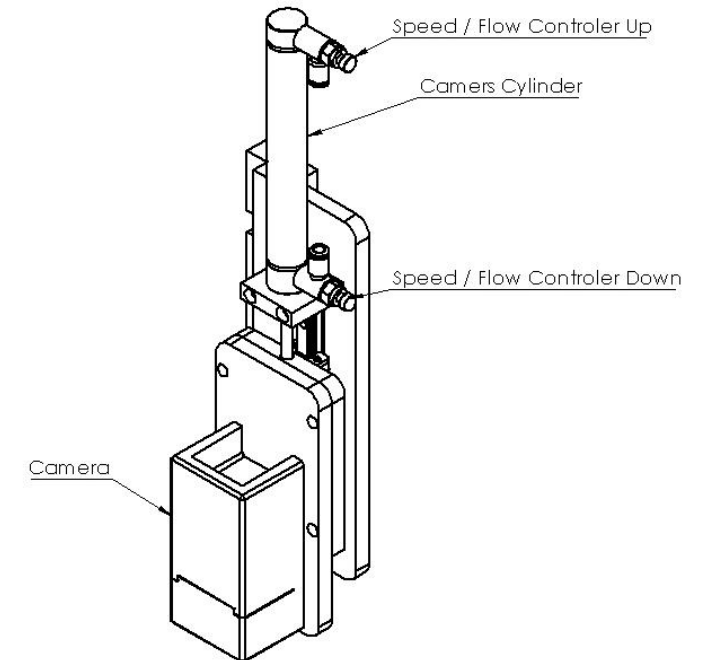
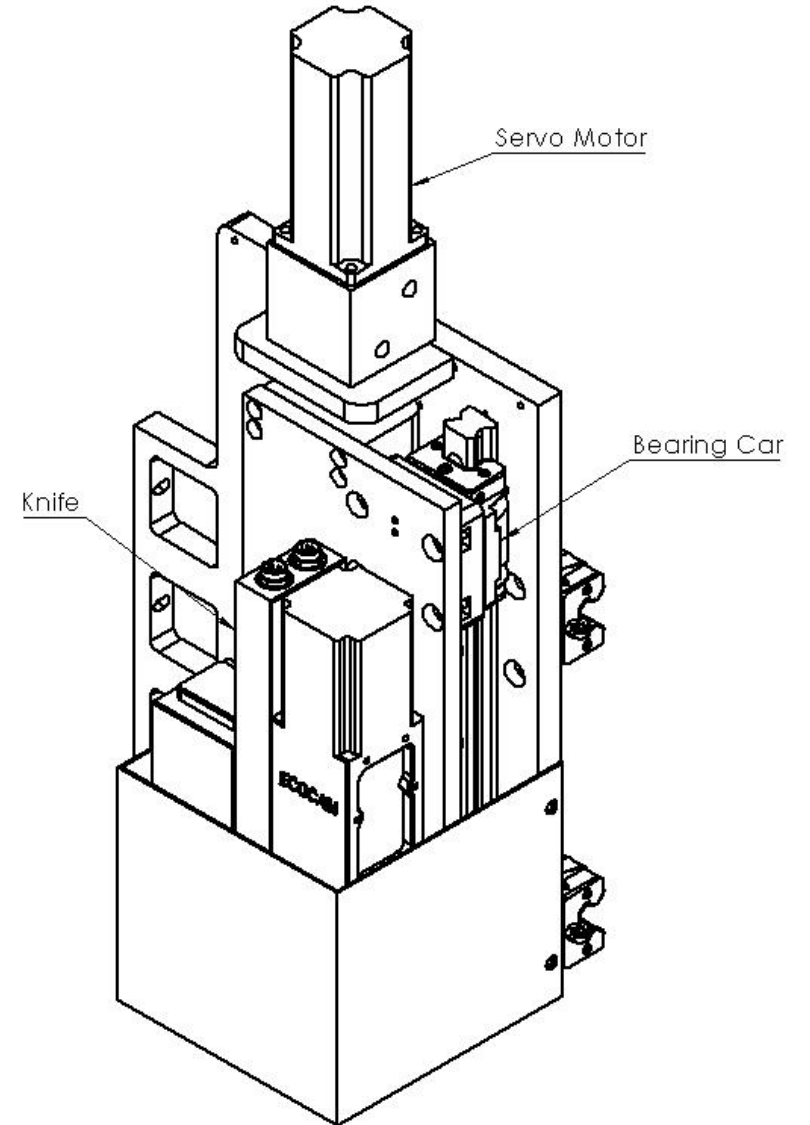# Components Overview Continued:

**Carriage Assembly**

- The Carriage is designed to move the spindle in the Y and Z direction on the machine. This is where the motors for Y and Z are located. The air valves are also located inside. The Spindle mounts to the Z plate that is mounted to the front of the carriage.

Chip Collector Hose Bracket

Carriage

Z Servo Motor

Z Ball Screw

Z Ball Screw Nut

Z Plate

Valve Manifold

Y Servo Motor

Y Servo Gear Box

# Components Overview Continued:

**Knife**

- CLN offers an Eco Cam oscillating knife. The knife is mounted on a rail and is lowered down into the material to cut out your design. The knife uses a carbide blade that rotates around to follow your design. The oscillation feature helps the blade saw through the material. When the knife functions are not needed it is raised up in a safe position.
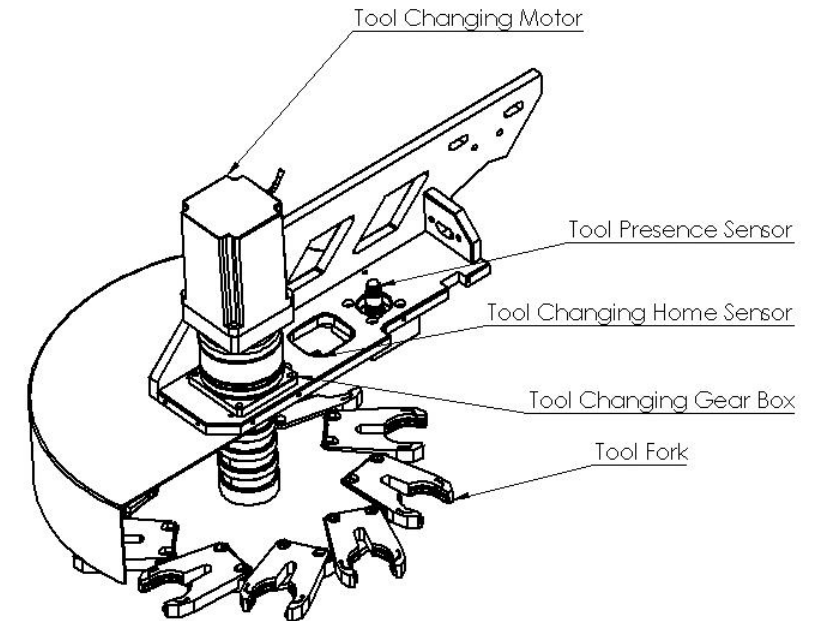
# Components Overview Continued:

**Homing Cell**

- This is a Proximity Sensor located in serval places on the machine. It senses the steel or aluminum as it moves past the sensor. When the material is in front of the sensor a red LED light will illuminate.



M18x1

4

Body Length (mm)
75

4LED

M12x1
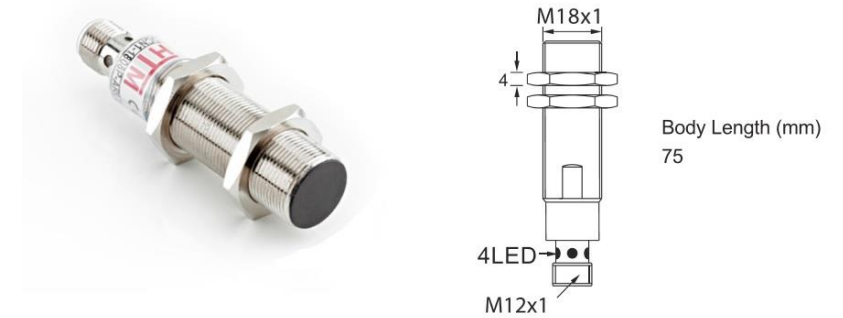
**Tool Changing Carousel**

- The tool changing carousel has 10 tool forks that will hold 10 tool holders. This unit mounts to the left side of the gantry. The when the machine performs a tool change the tool forks rotate around to for the spindle, to either load or unload a tool holder. An added feature of the carousel tool changer is that a tool presents sensor prevents the operator from putting a tool in the wrong spot causing a crash or loading a tool on top of an existing tool.



Tool Changing Motor

Tool Presence Sensor

Tool Changing Home Sensor

Tool Changing Gear Box

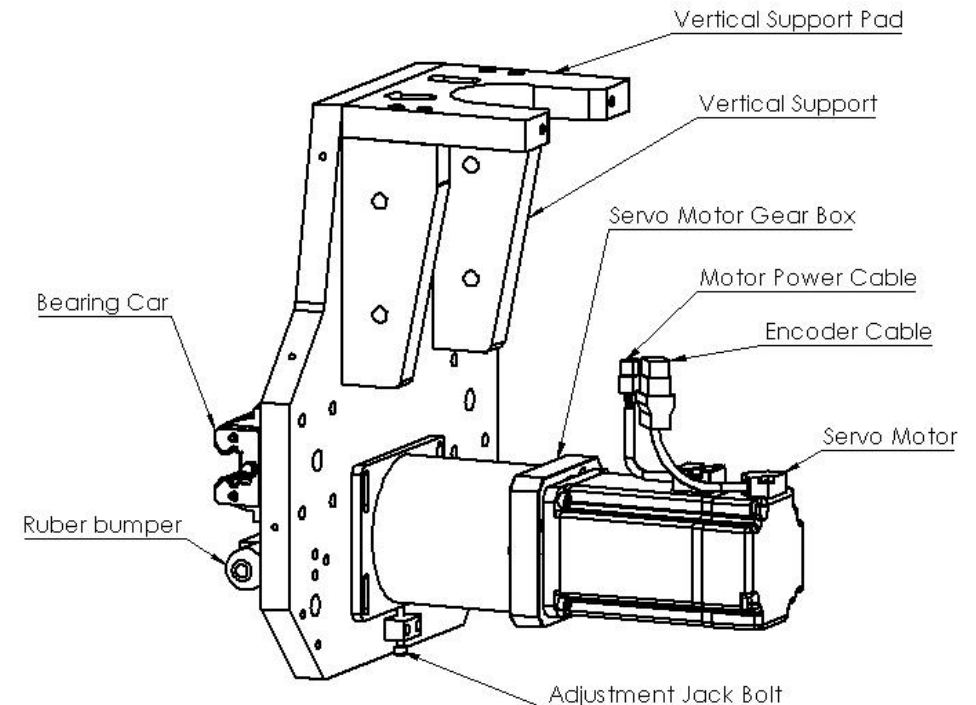Tool Fork

# Components Overview Continued:

**Tool Calibration Switch**

- This unit is usually mounted on the front right side of the machine. The tool calibration switch is used to calibrate your tools that are either stored in the tool changer for a (ATC) machine or for a (MTC) machine the current tool that is in the spindle. When installing a new tool in the machine you will have to calibrate the tool only once. The machine will bring the tool over to the button then slowly lower the tool down until it touches the top of the button.
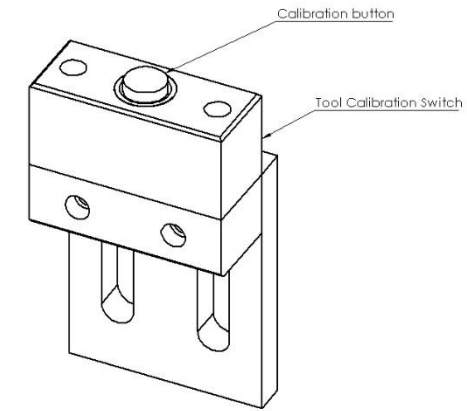
**Vertical Support**

- The vertical support bolts to the gantry. This is what moves the spindle in the X direction. There will be 2 on the machine. The one on the right side is called X1, the one on the left side is called X2. A servo motor is attached to a planetary gear box that has a pinion gear attached to the gear box shaft. The adjustment jack bolt is used to adjust the pinion gear into the rack that is mounted on the machine.



Calibration button
Tool Calibration Switch



Vertical Support Pad
Vertical Support
Servo Motor Gear Box
Motor Power Cable
Encoder Cable
Bearing Car
Servo Motor
Ruber bumper
Adjustment Jack Bolt

# Electronic Components Overview:
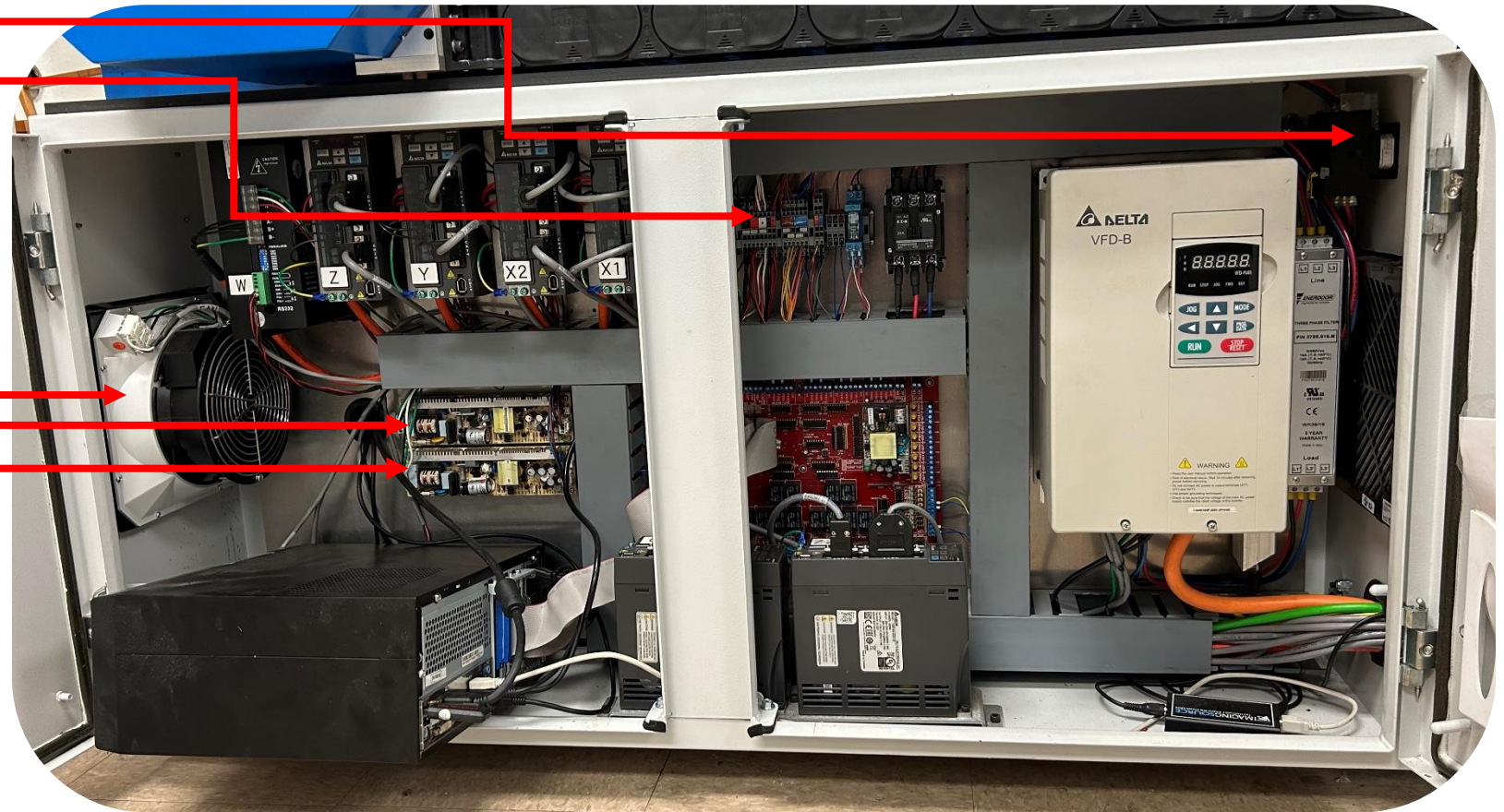
**Electrical Panel**

- Servo Drives
- Relays
- Contactor
- Main I/O Breakout Board
- Servo Drives
- Computer
- VFD
- Line Filter
- CN1 and CN2 Cables
- Video Graber
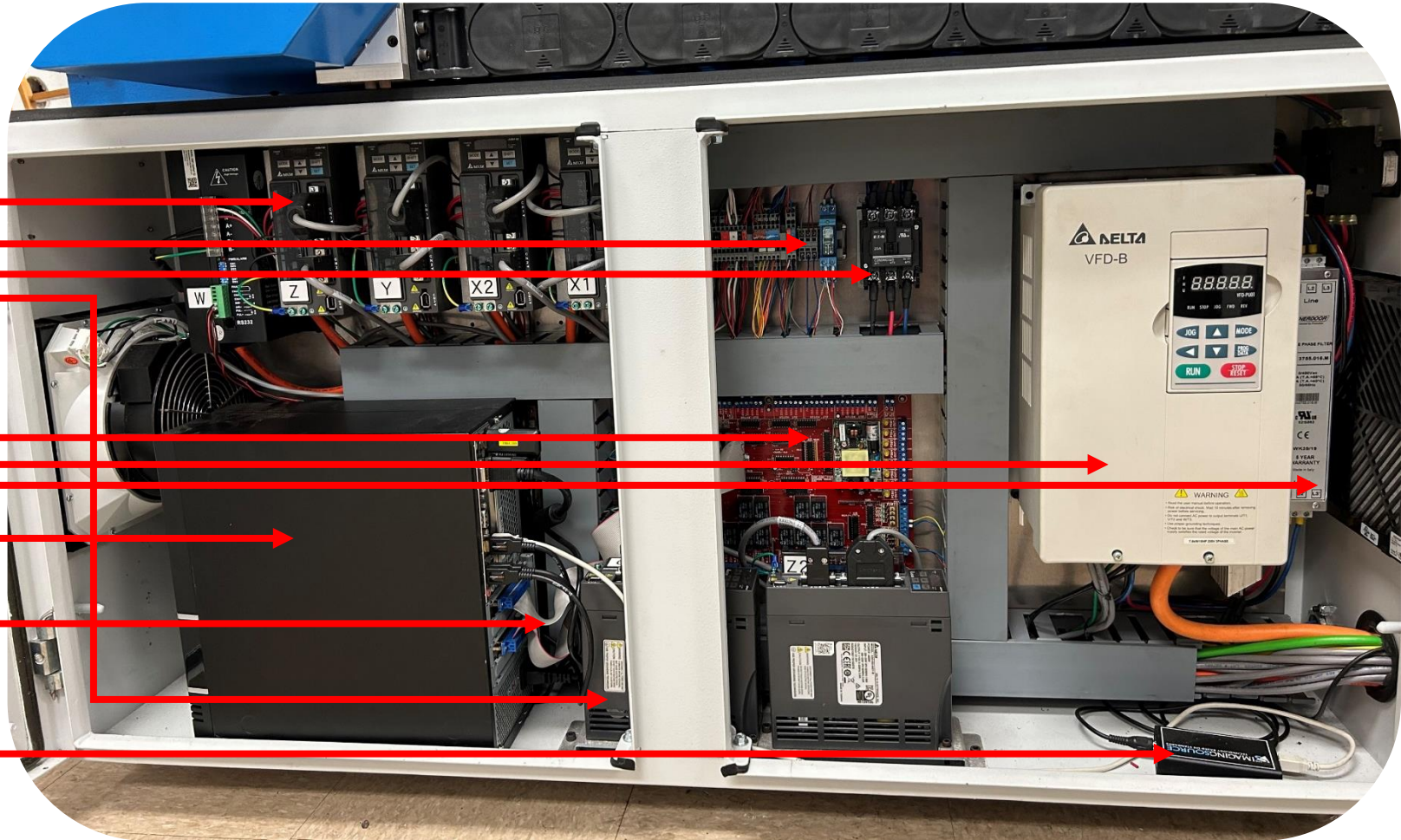
# Electronic Components Overview:

**Electrical Panel**

- Main Power Switch
- AC and DC Distribution
- Fan
- 24 Volt DC Supply
- 12 Volt DC Supply

**Shown with the computer laying down on its side.**

# Electronic Components Overview Continued:

**Servo Drives**

- The servo drives power the servo motors. Its normal for them to have random numbers on them. The numbers are only positions of the motors. However, they also can tell us if something went wrong with the motor or the drive. If you receive a servo fault message from the CLN software program the drive will most likely display an error code. For example, AL.011 is an encoder issue. See Delta Servo Fault codes go to page 288 for a complete list.

**Servo Drive identification :**
From left to right
W Tool Changing Carousel Motor
Z Motor
Y Motor
X2 Left side motor
X1 Right side motor
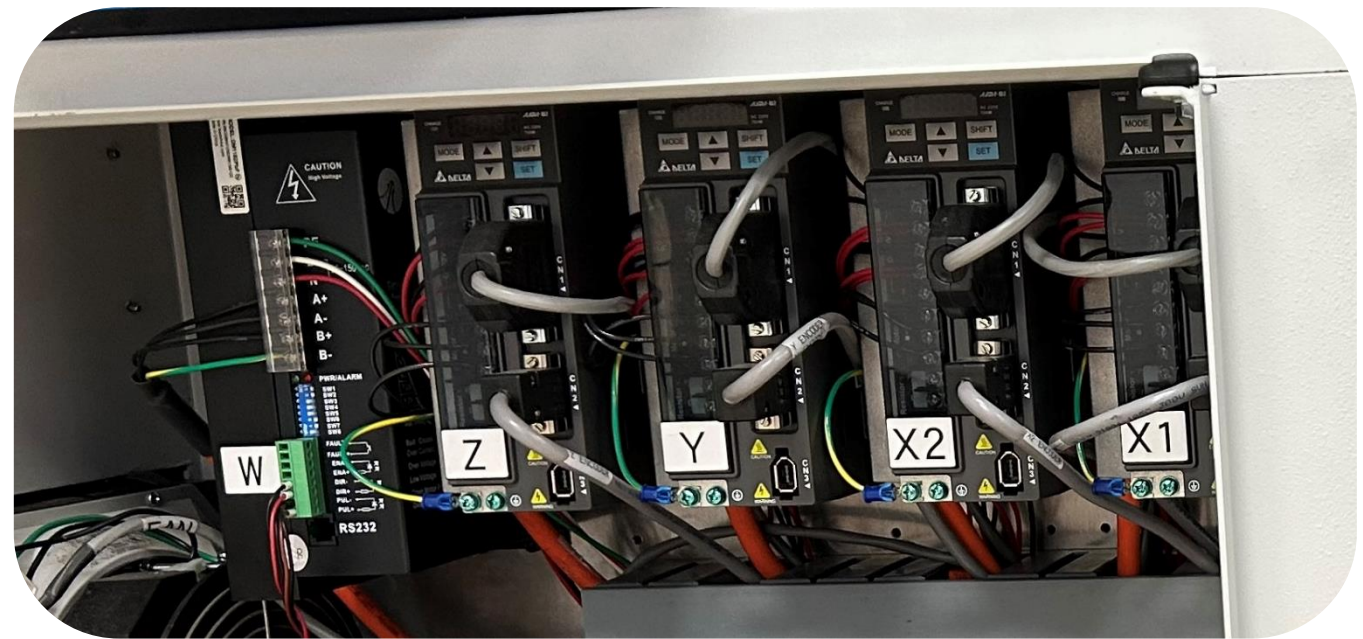
# Electronic Components Overview Continued:

**Servo Drives Continued**

- The servo drives power the servo motors. Its normal for them to have random numbers on them. The numbers are only positions of the motors. However, they also can tell us if something went wrong with the motor or the drive. If you receive a servo fault message from the CLN software program the drive will most likely display an error code. For example, AL.011 is an encoder issue. See  Delta Servo Fault codes  go to page 288 for a complete list.

**Servo Drive identification :**
From left to right
C Knife rotate Motor
Z2 Knife up and down

# Footprint 4 X 8:

**Machine Footprint:**

- Make sure you have at least 48" of clear workspace around the perimeter of the entire machine to ensure a safe working area for the machine operator.
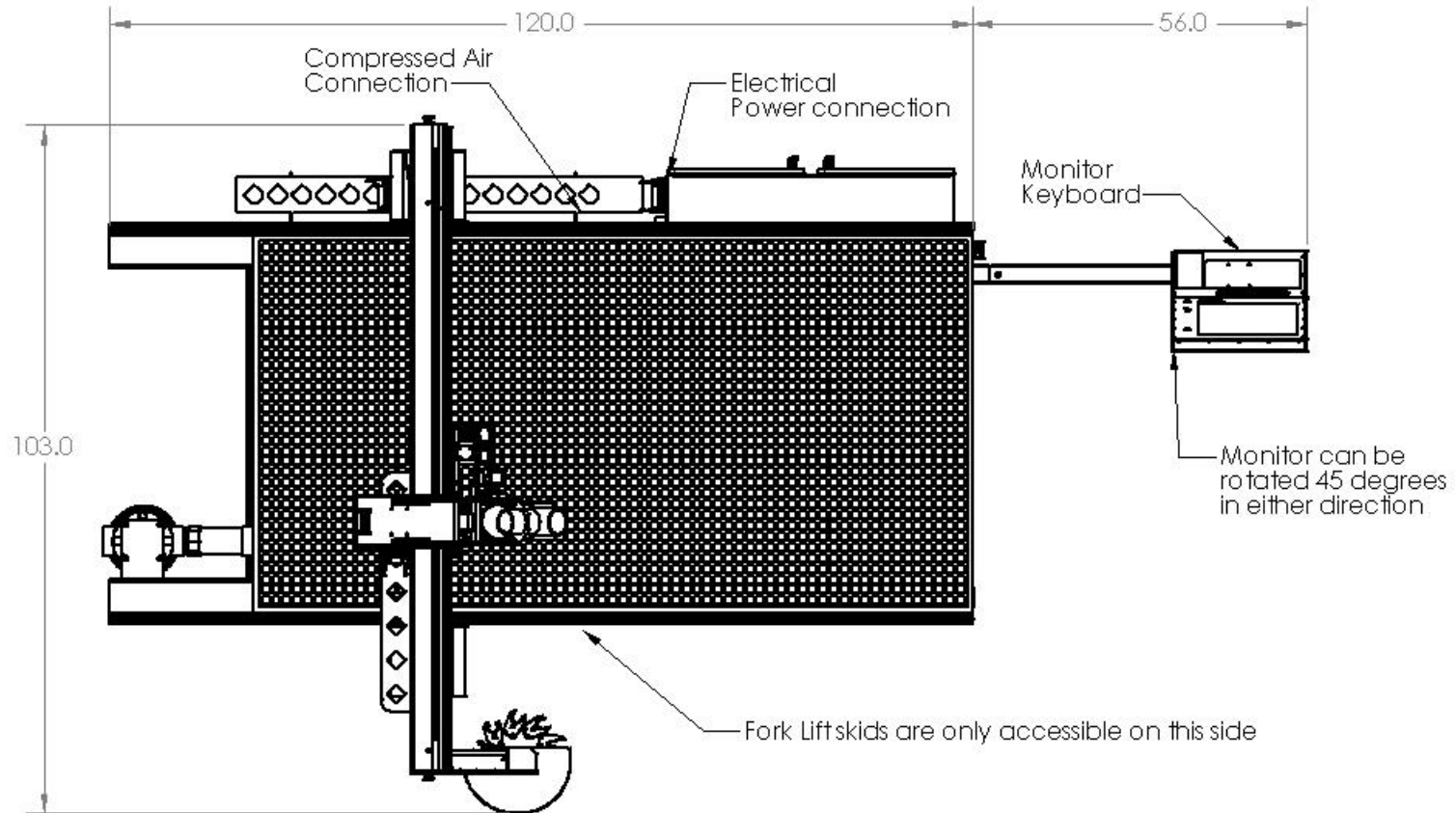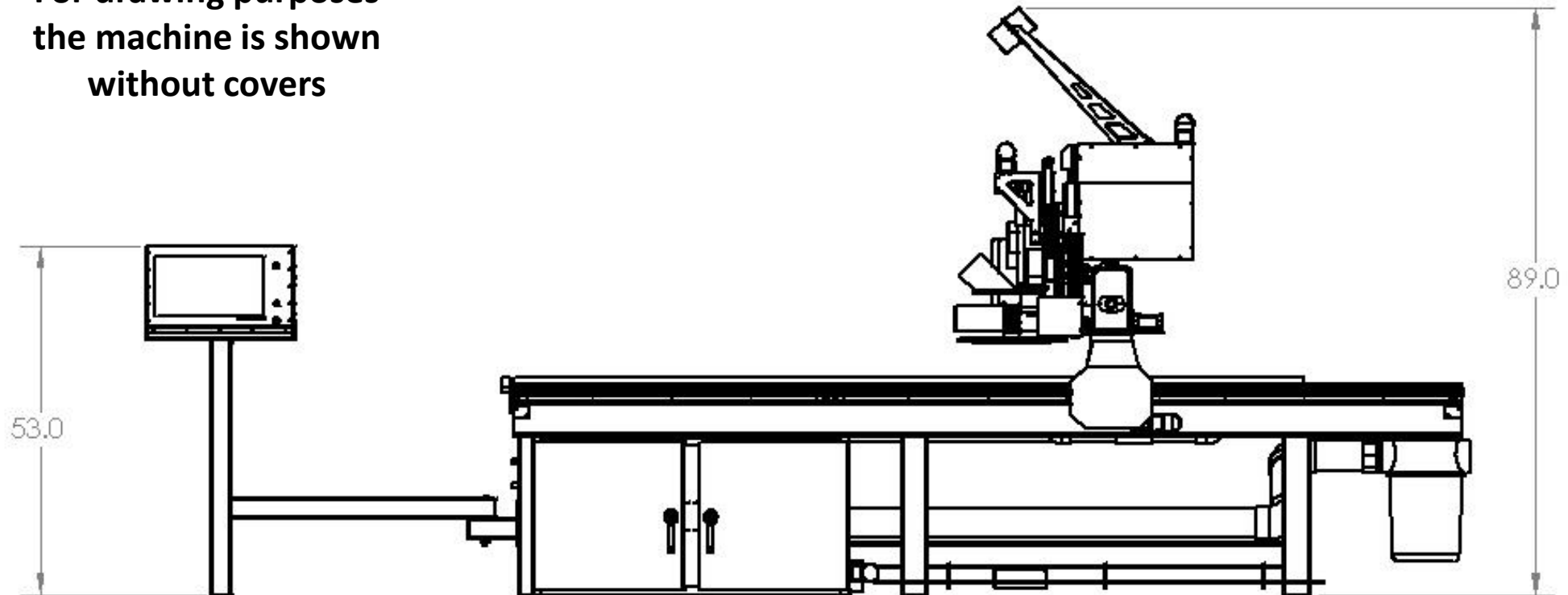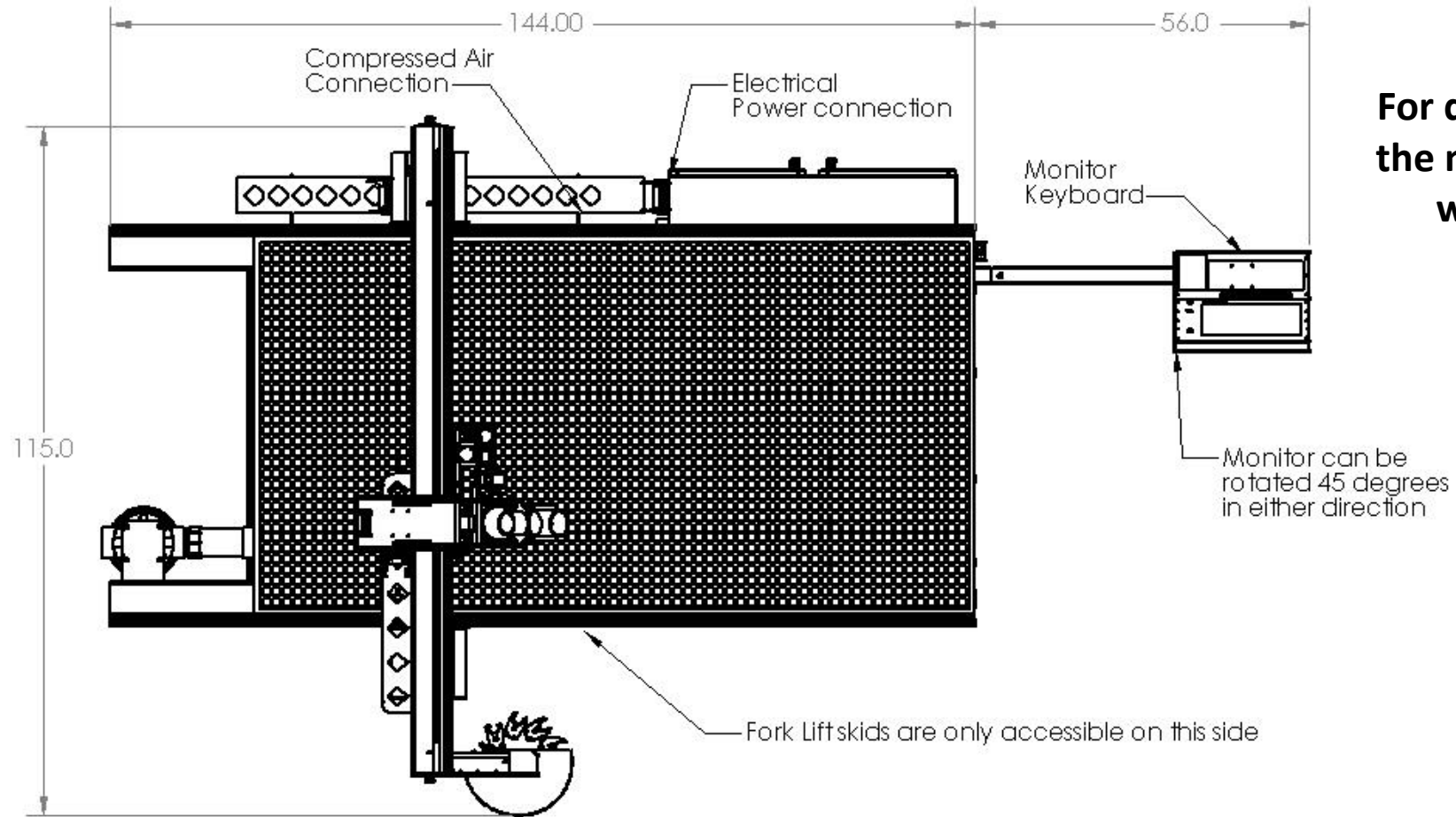
**For drawing purposes the machine is shown without covers**

# Footprint 4 X 8:

**Machine Footprint:**

- Make sure you have at least 48" of clear workspace around the perimeter of the entire machine to ensure a safe working area for the machine operator.

**For drawing purposes the machine is shown without covers**

53.0

89.0

# Footprint 5 X 10:

**Machine Footprint:**

- Make sure you have at least 48" of clear workspace around the perimeter of the entire machine to ensure a safe working area for the machine operator.
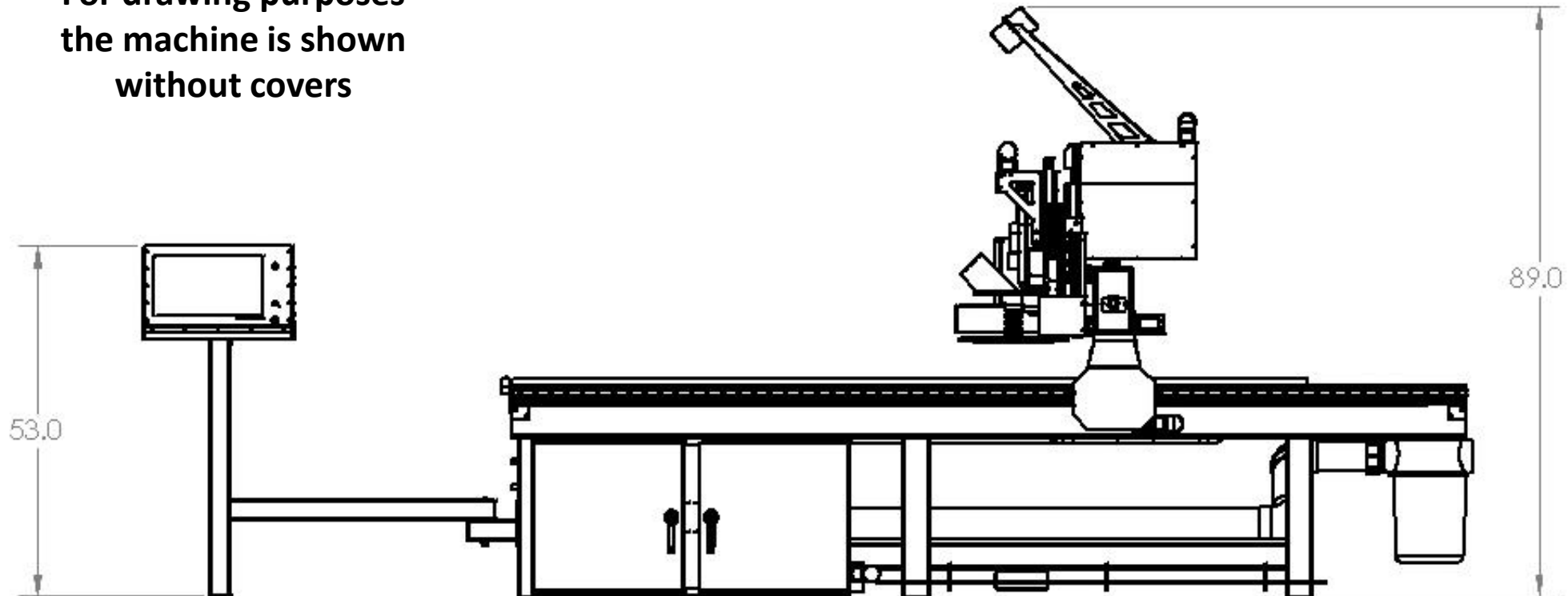


**For drawing purposes the machine is shown without covers**

# Footprint 5 X 10:

**Machine Footprint:**

- Make sure you have at least 48" of clear workspace around the perimeter of the entire machine to ensure a safe working area for the machine operator.
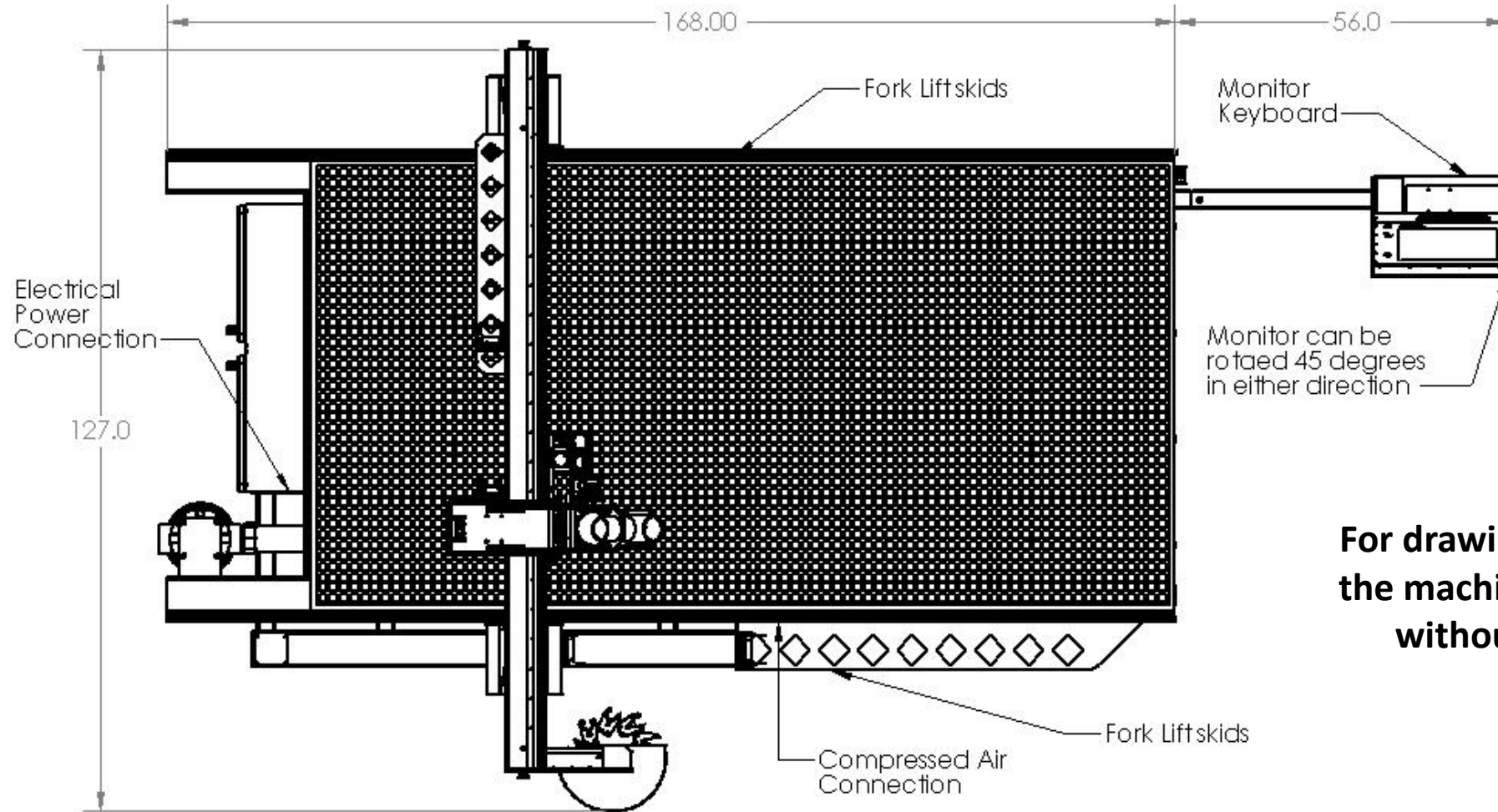
**For drawing purposes the machine is shown without covers**

# Footprint 6 X 12:

**Machine Footprint:**

- Make sure you have at least 48" of clear workspace around the perimeter of the entire machine to ensure a safe working area for the machine operator.
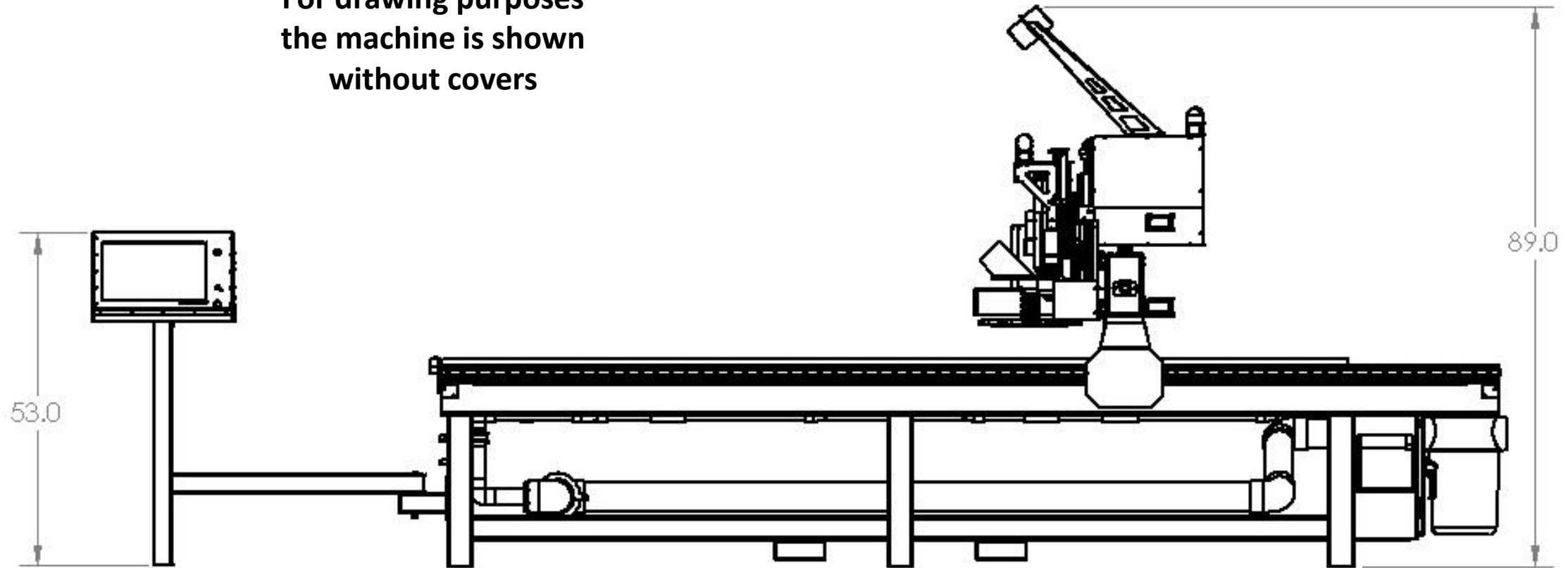


**For drawing purposes the machine is shown without covers**

# Footprint 6 X 12:

**Machine Footprint:**

- Make sure you have at least 48" of clear workspace around the perimeter of the entire machine to ensure a safe working area for the machine operator.

**For drawing purposes the machine is shown without covers**



89.0

53.0

# Assembly:

**Inspect the Package:**
- Prior to opening the package, check for any damages that may have occurred during shipping.
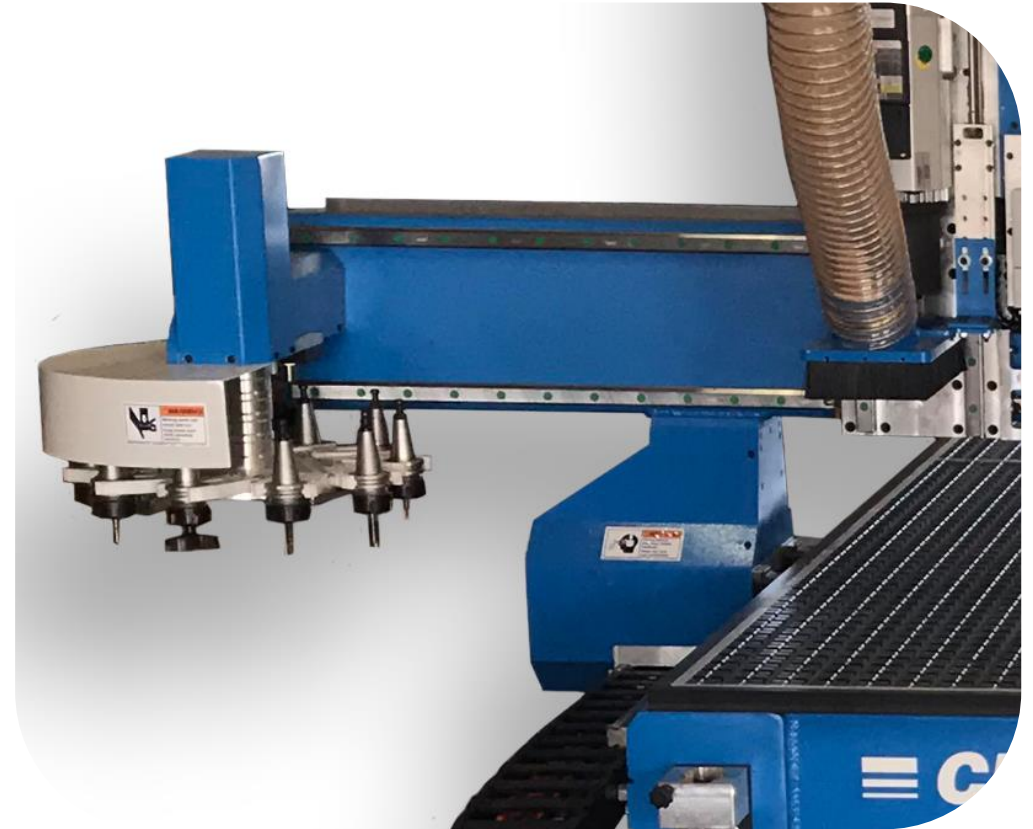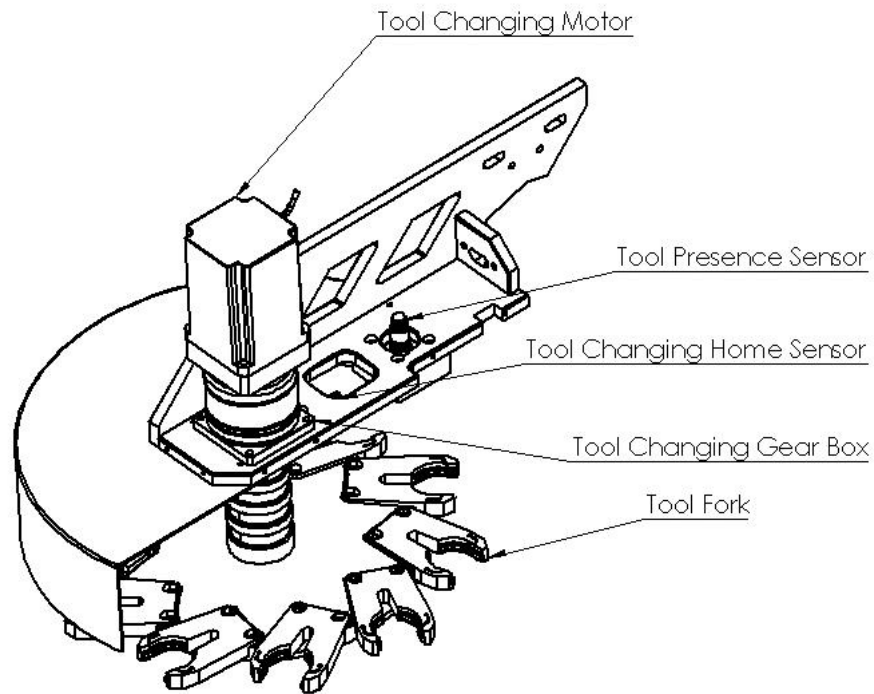
**Unwrap the Machine**
- Remove the shrink wrap.

- Unload all boxes off the bed of the machine.

- Remove the shipping plates.

- Install the leveling feet.

- Set the machine in place.

- Level the machine by adjusting the corners of the machine. Then bring the center leveling feet down to make solid contact with the floor.

# Assembly Continued:

**Machine Set Up:**
- If you purchased a Carousel ATC Tool Changer and its not already installed. Bolt it to the left side of the machine. Use the locating pins to align it in position.

Tool Changing Motor

Tool Presence Sensor

Tool Changing Home Sensor

Tool Changing Gear Box

Tool Fork

# Assembly Continued:



- **Machine Set Up:**

- Don't misplace the small parts. Don't throw anything away until your sure that you know that you have everything.

# Electrical Connection:

**Electric Power Connection:**

- This machine can be wired a few different ways. Look at the tag that's riveted to the machine for the electrical specs.

- Have your electrician connect the power to the terminal box located on the electrical enclosure.

- Most shops that have 3 phase and some have high leg. If you have a high leg, it must be connected to L2.

- Three phase tables require 3 hot lines, (Black Red & Blue) 1 neutral (White) and 1 ground (Green). The amperage draw is 30 amps and requires 10 - gauge wire.

- Single phase tables require 2 hot lines, (Black & Red) 1 neutral (White) and 1 ground (Green) The amperage draw is 30 amps and requires 10 - gauge wire.

# Compressed Air Connection:

**Connecting the Compressed Air Line:**

- An air compressor with a minimum capacity of 5 CFM at 80 PSI is required for the machine to function.

- Connect your air supply to the side of the regulator marked in. The picture shows fittings that CLN uses. You can use any suitable hose connection.

- When the air line is connected to the machine, the gauge on the air regulator should read 80 psi. While the machine is running the gage should not drop more than 10 PSI.
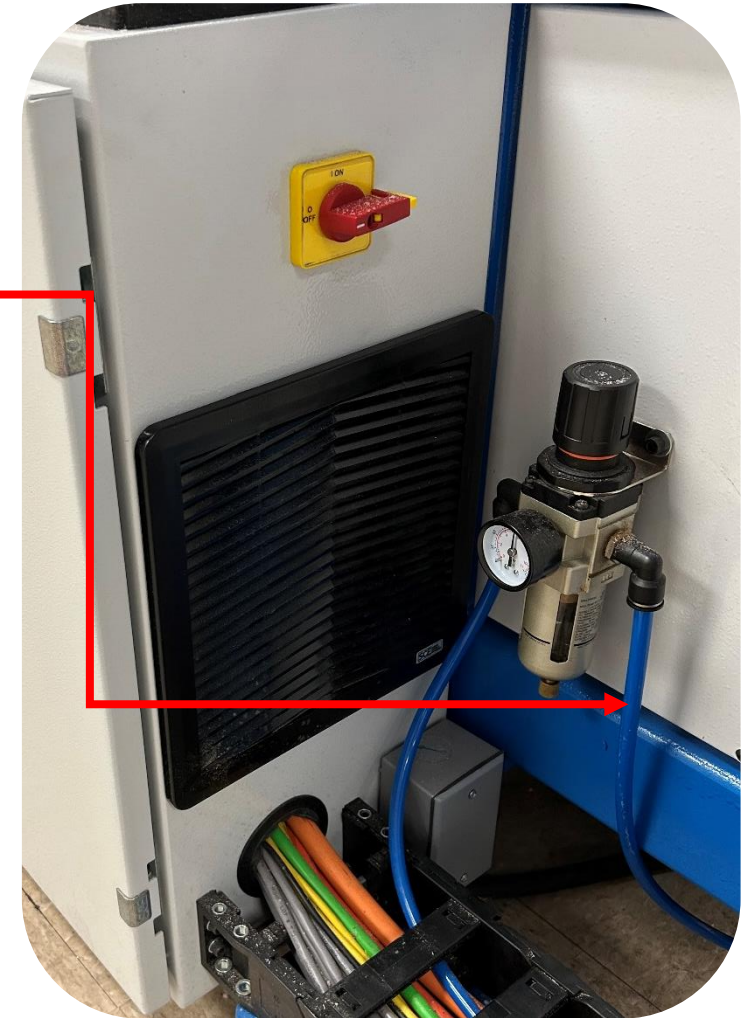
# Internet Connection:

**Internet Installation:**
- It is the user's responsibility to connect the PC to the Internet.
- There is a Network Adapter on the rear of the computer that you can connect an Ethernet cable to.
- You can also install a Wireless Network Adapter to the computer if you wish to connect wirelessly.
- To receive the most efficient technical support for one of our highly skilled technicians it is imperative to have internet connectivity for them to assist you.
- Our customer support team can log onto your machine through a software call Team Viewer if you need assistance. For this software to work properly you must be connected to the Internet.
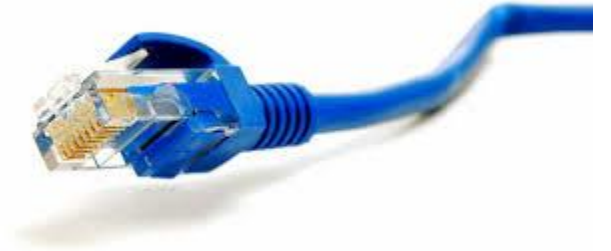
*Cable not included
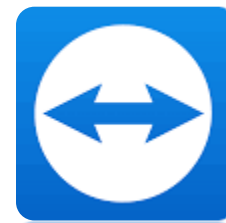
# Vacuum Pump:

**Vacuum Pumps:** CLN offers several different vacuum pumps to accommodate a wide variedly of user applications.

- **2 stage pump:**

- Brand: Black Box

- Part Number: Hurricane Pump

- Commonly used for Single Phase applications.


- **20 HP Regenerative Blower:**

- Brand: FPZ

- Part Number: K10-MS-20-3

- Commonly used on the 4 X 8 or  the 5 X 10 Table.


- **25 HP Regenerative Blower:**

- Brand: FPZ

- Part Number: K10-TD-25-3

- Commonly used on the 5 X 10 or  the 6 X 12 Table.

# Vacuum Pump Continued:
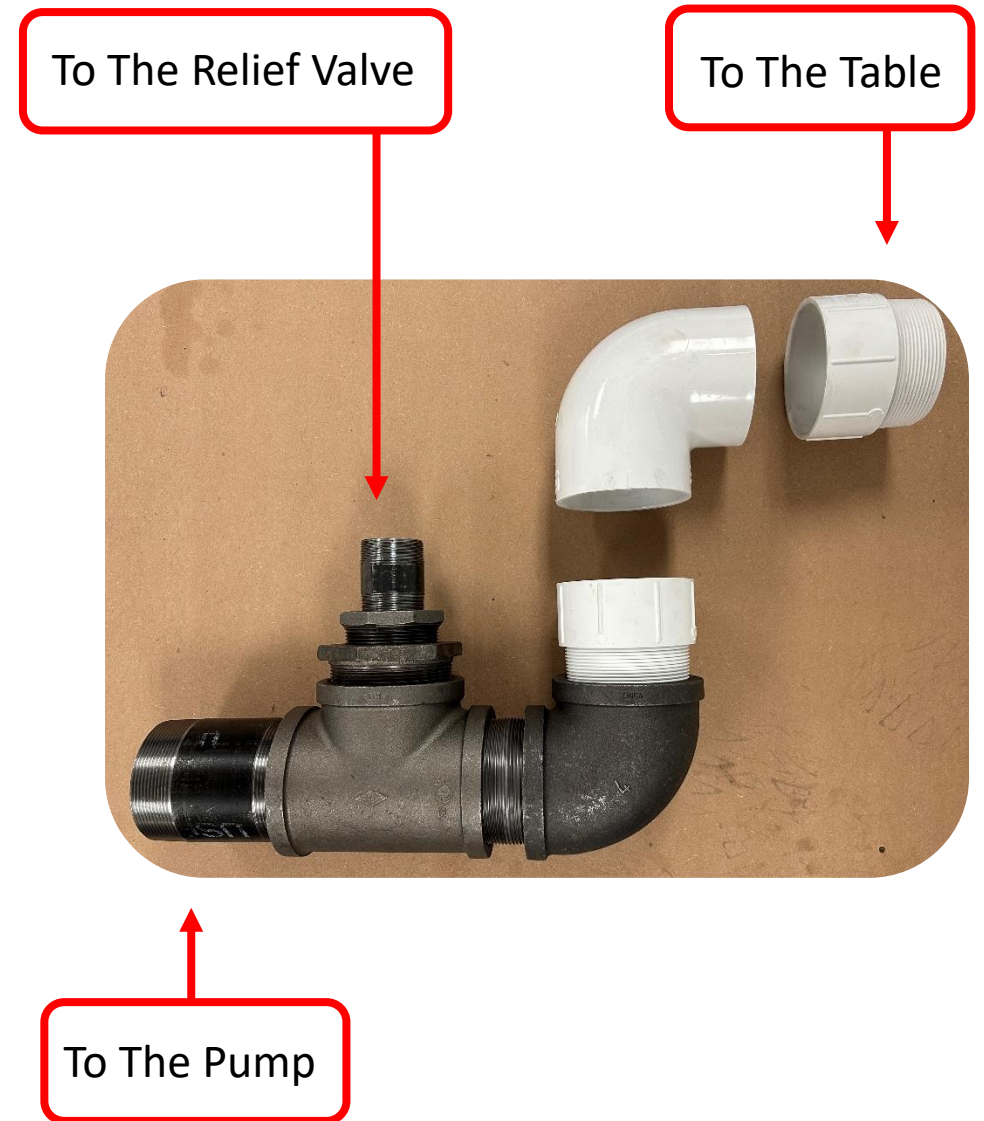
## Connecting the Pump to the Table:

**Vacuum Pump Connection Kit:** For <u>FPZ pump K10-MS-20-3 and K10-TD-25-3</u> require a connection kit to connect the Vacuum pump to the CLN Router Table. The kit allow you to install the pump in any favorable location. However, it is recommended that you keep the pump within 20 feet of the table, the closer the pump is to the table the better the vacuum will work. You can run PVC pipe from the pump to the table. <span style="color:red">Never use PVC pipe for the exhaust of the pump, the exhaust is to hot for the PVC and it will catch on fire.</span> You must use steel for the exhaust.

**Hurricane Black Box:**

- The Huracan pump does not require a connection kit. Just run PVC pipe from the intake of the pump to the Router Table. Install the inline filter so that the filter cover is on top.

**FPZ  K10-MS-20-3 and K10-TD-25-3**

- The Blower pumps require the (vacuum connection kit.) The parts are shown in the picture. Use Teflon tape when threading the pipe connectors together. The PVC pipe is not included.
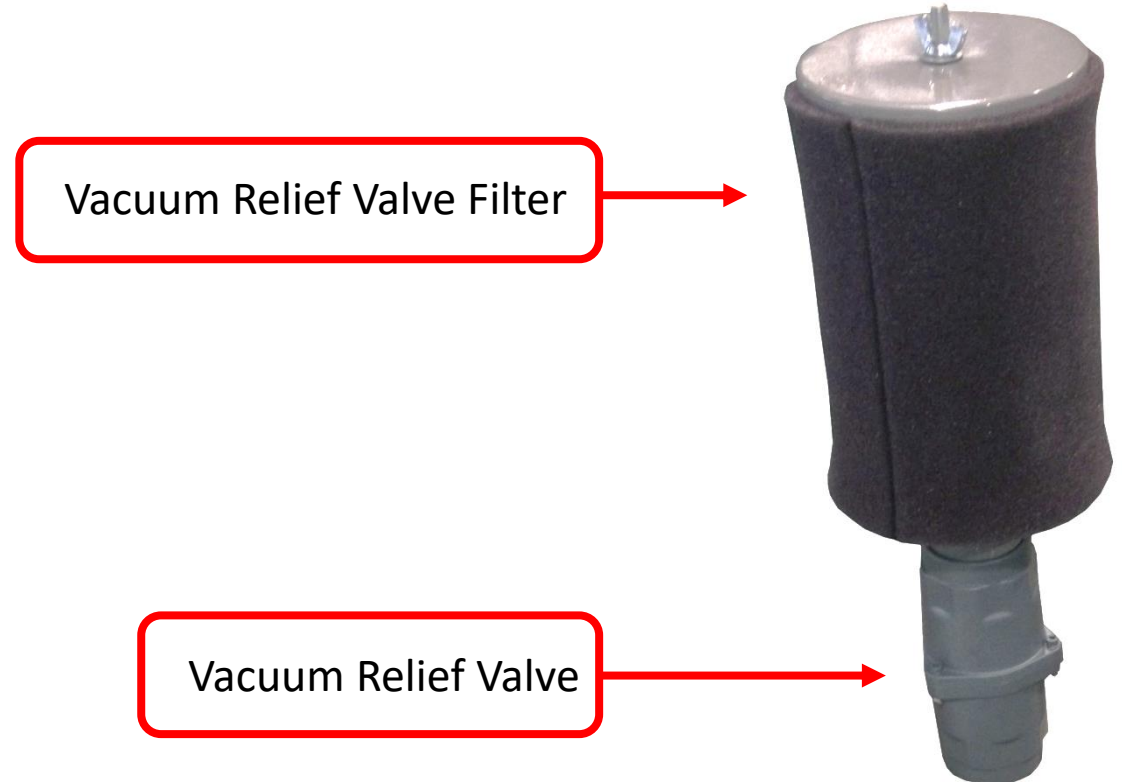
To The Relief Valve

To The Table

To The Pump

# Vacuum Pump Continued:

## Connecting the Pump to the Table Continued:

**Vacuum Relief Valve:**

- This valve opens up when all of the manual zone valves are shut off. This valve prevents the pump from starving for air, which will damage the pump. This valve must be adjusted at the time of installation of the vacuum system.

- The and K10-TD-25-3 pump relief valve needs to be set to **170 H2O**

- The and K10-MS-20-3 pump relief valve needs to be set to **140 H2O**

Vacuum Relief Valve Filter

Vacuum Relief Valve

# Vacuum Pump Continued:

**Vacuum Relief Valve Continued:**

**Spring Selection:** The valve is supplied with 2 different springs; each spring is to be used within a specific pressure-vacuum operating range. The valve is supplied with a silver spring. You will most likely need to use the green spring.

## SPRING REPLACEMENT

- **Wear eye and ear protection**.

- Refer to figure 1.

- Remove the two plastic caps on valve.

- Ensure stop-nut 923 is locked on the upper housing 106.

- Unscrew screw 903 from nut 903.1.

- Remove cover 107 from housing 106.

- Unscrew spring guide disc 433 taking it out from shutter guide 434.

- Remove spring 700 (only in case of replacement).

- Install the appropriate spring into shutter 165.

- Compress spring and screw spring guide disc 433 on shutter guide 434 for at least 20 full thread turns.

- Check that both ends of the spring are properly positioned within their seats.

- Install the cover 107 on the housing 106 inserting the sliding guide on the slot in spring guide disc 433.

- Tighten screw 903 on nut 903.1.
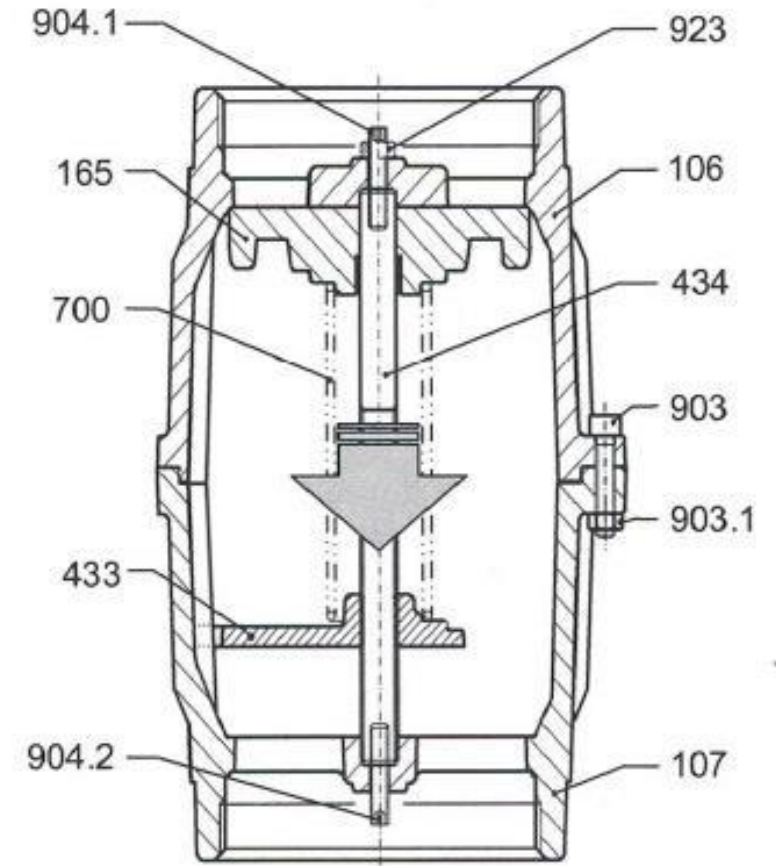
# Vacuum Pump Continued:

**Vacuum Relief Valve Continued:**

**Vacuum Relief Valve Adjustment:**

- The pump needs to be wire for this step. Failure to complete this step will damage the pump.

- Go to to find the safe operating setting.

- Loosen jam nut 923.

- Relieve spring tension by backing off upper grub screw 904.1 with the Allen wrench. <span style="color:red">Make sure that you don't drop the wrench. If the wrench goes into the pump, it will destroy the pump. Use a wrench that is big enough so that it can't fit through the relief valve hole.</span>

- **<span style="color:red">Put on eye and ear protection.</span>**

- Turn on the vacuum pump.

- Close all ball valves.

- Adjust upper grub screw 904.1 until the safe operating setting is reached.

- Tighten nut 923 keeping blocked upper grub screw 904.1.

- Open all of the ball valves wait a minute then close all of the ball valves. Check the vacuum gauge again to make sure that you are at the safe operating setting
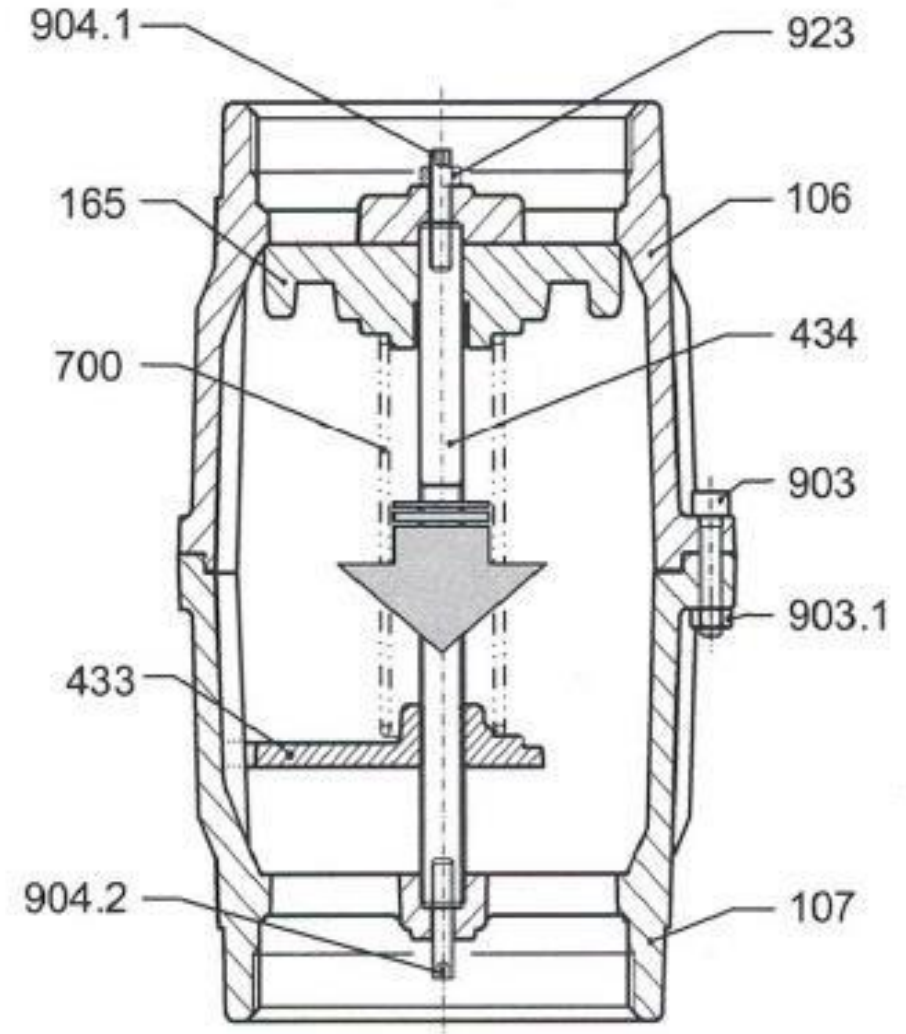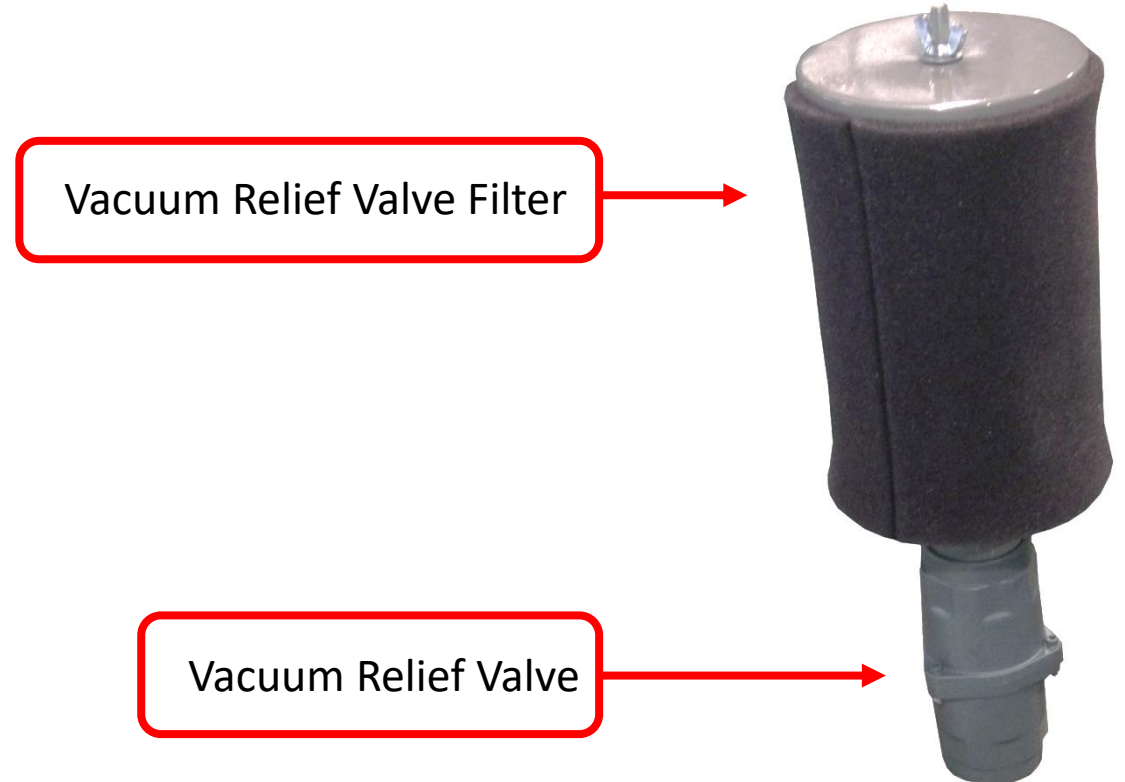
# Vacuum Pump Continued:

**Vacuum Relief Valve Continued:**

**Vacuum Relief Valve Filter:**

- Install the filter to the relief valve. Use Teflon tape on the threads.

Vacuum Relief Valve Filter

Vacuum Relief Valve

# Vacuum Pump Continued:

## Connecting the Pump to the Table Continued:

Here are some examples of pumps, connected to a CLN Router Table.

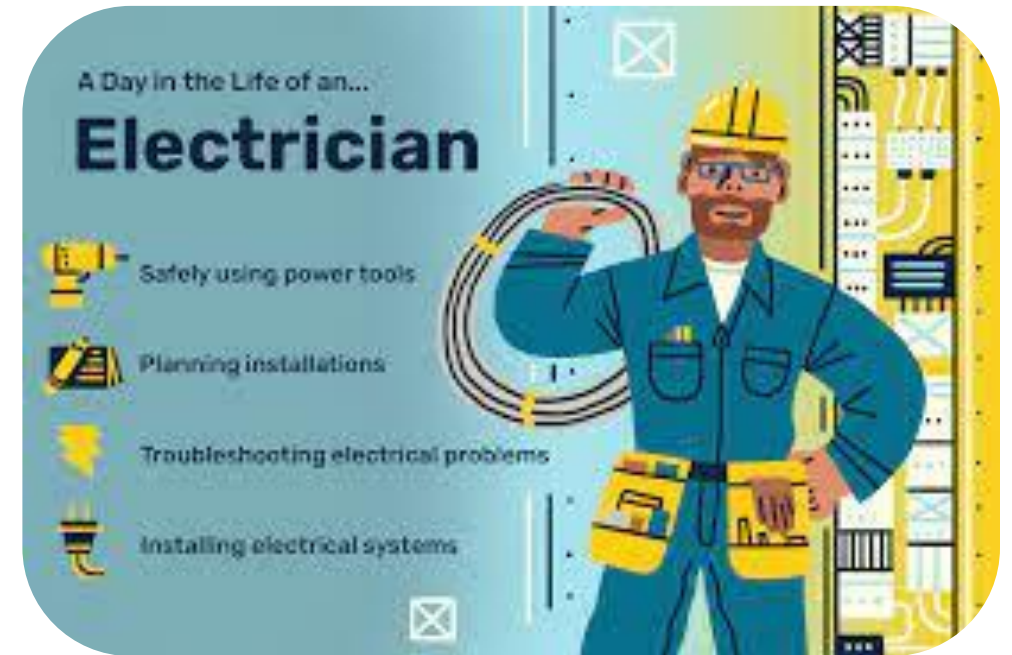**Hurricane Black Box:**



**K10-TD-25-3**



**FPZ  K10-MS-20-3**
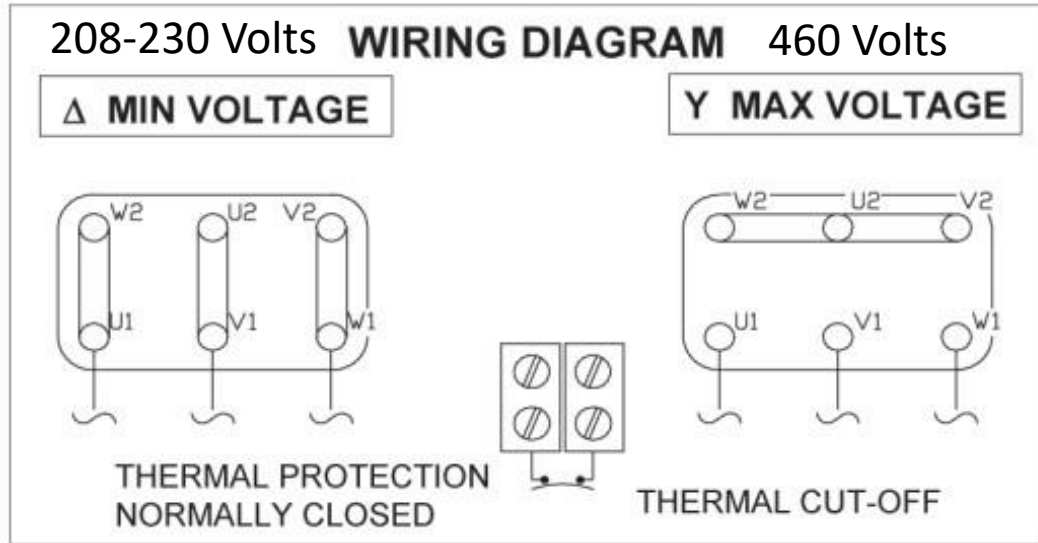
# Vacuum Pump Continued:

**Electrical connection for FPZ  K10-MS-20-3 and K10-TD-25-3:**

- **Please read this !**

- Connecting electricity to the Vacuum pump must be done by a licensed certified electrical contractor. The electrician must have knowledge in your local electrical codes and has experience with high HP motors.

- An incorrectly wired pump cost $5,000.00 to be repaired.

- 9 out of 10 pumps are damaged by inexperienced electricians.

- Size and length of wire need to be carefully calculated.

- Fuses and disconnects need to properly sized.

- The motors will draw an excessive amount of amperage on start up and you could lose power in other areas of the building.

- The jumpers on the motor need to be set to correctly.

- If you damage a new pump, CLN will not be responsible for the work of your electrician.

- You can avoid all of this by hiring a licensed certified electrical contractor. Ask your electrician for his credentials and a reference list.
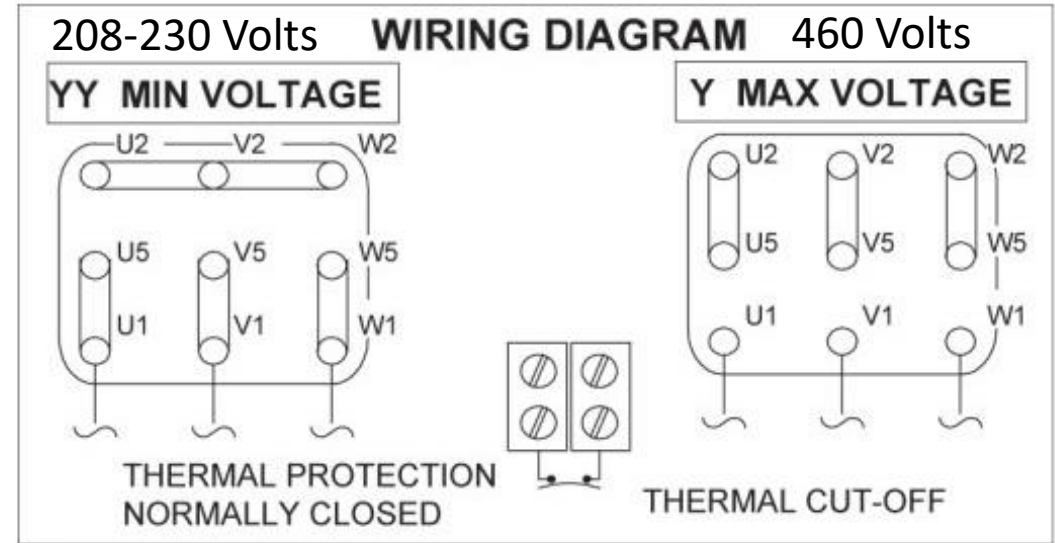
- Vacuum Pump Wiring Diagram



A Day in the Life of an...
Electrician
Safely using power tools
Planning installations
Troubleshooting electrical problems
Installing electrical systems

# Vacuum Pump Continued:

**Electrical connection for FPZ  K10-MS-20-3 and K10-TD-25-3:**



208-230 Volts  WIRING DIAGRAM  460 Volts
Δ MIN VOLTAGE — Y MAX VOLTAGE
THERMAL PROTECTION NORMALLY CLOSED — THERMAL CUT-OFF

**6 LEADS MOTORS.**
208-230/460 V - 60 Hz
230/400 V - 50 Hz



208-230 Volts  WIRING DIAGRAM  460 Volts
YY MIN VOLTAGE — Y MAX VOLTAGE
THERMAL PROTECTION NORMALLY CLOSED — THERMAL CUT-OFF

** **9 LEADS MOTOR.** APPLICABLE TO 20Hp SIZE 132
208-230/460 V - 60 Hz
200/400 V - 50 Hz

| POWER | | | 60 HZ | | | 50 HZ | | | STARTING CURRENT RATIO* | CABLE ENTRY 1*** | CABLE ENTRY 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HP | KW | SIZE | VOLTAGE | FLA 208 / 460 | POWER FACTOR cos φ | VOLTAGE | FLA 230 / 400 (200 V) | POWER FACTOR cos φ | | | |
| 20** | 15.0 | 132** | 208-230/460 | 54.0 / 26.0 | 0.86 | 200/400 | (61.0) / 30.5 | 0.82 | 7.0 | M32 | M32 |
| | | 160 | 208-230/460 | 54.0 / 29.8 | 0.85 | 230/400 | 51.6 / 29.8 | 0.85 | 8.1 | M40 | M40 |
| 25 | 18.5 | 160 | 208-230/460 | 63.0 / 34.8 | 0.87 | 230/400 | 60.0 / 34.8 | 0.87 | 8.5 | M40 | M40 |
| 30 | 22.0 | 160 | 208-230/460 | 72.0 / 41.5 | 0.87 | 230/400 | 72.0 / 41.5 | 0.87 | 8.4 | M40 | M40 |

* FLA x starting current ratio = starting current

** 9 leads motor applicable to 20 hp motors with 132 frame (MS / MD series)

*** Cable entry 1 includes cable gland

**THREE PHASE MOTOR**

**GENERAL SPECIFICATIONS:**
1. Type: 3-phase AC Motor IEC 60034
2. Marks: cURus, CE
3. Poles: 2
4. Insulation class: F
5. Frequency: 60 hz / 50 hz
6. Enclosure: TEFC
7. Protection
8. Thermal protector: Klixon $150^0$ C
9. Service factor: 1.15
10. Max. Ambient $40^0$ C
11. Duty: Continuous
12. Construction: aluminum frame

# Vacuum Pump Continued:

**Electrical connection for FPZ  K10-MS-20-3 and K10-TD-25-3:**

- Motor starters are necessary for the K10-MS-20-3 and K10-T D-25-3 vacuum pumps. The motor starters are specifically sized to the size of the vacuum pump and your buildings electricity.

- Instructions for the motor starter will come with the unit.

# Machine Maintenance
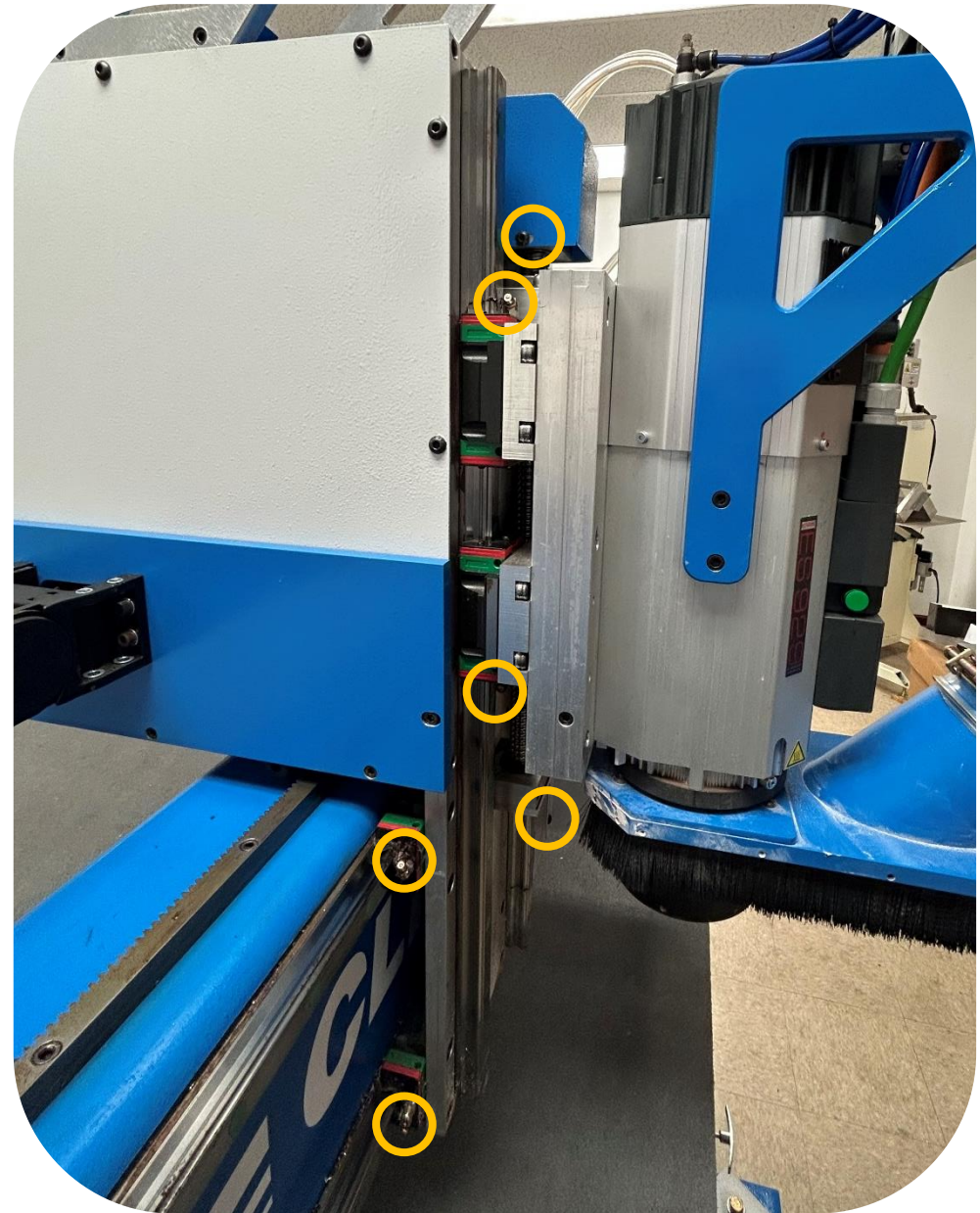
Grease Locations

Water Separator

Filters

General Inspection

# Grease Locations:

**Left Side of the spindle:** Use a general-purpose grease to grease the machine. There are 6 locations shown with a yellow circle. 4 are bearing cars and the other 2 are the ball screw nut and lower bearing.
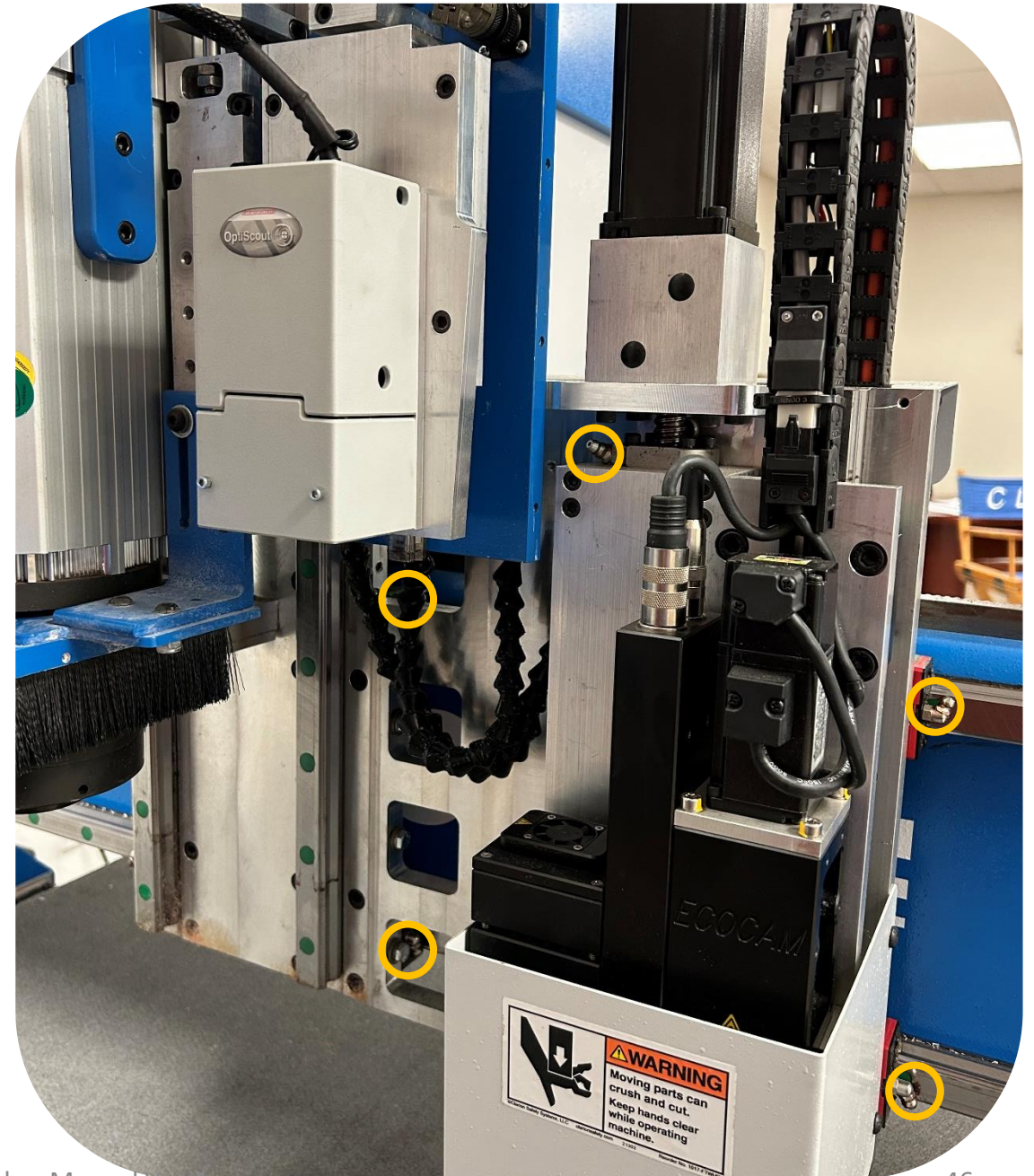
Grease Monthly

## Grease Locations Continued:

**Right side of spindle:** There are 5 locations shown with a yellow circle. 4 are bearing cars and the other 1 is the ball screw nut for the knife.
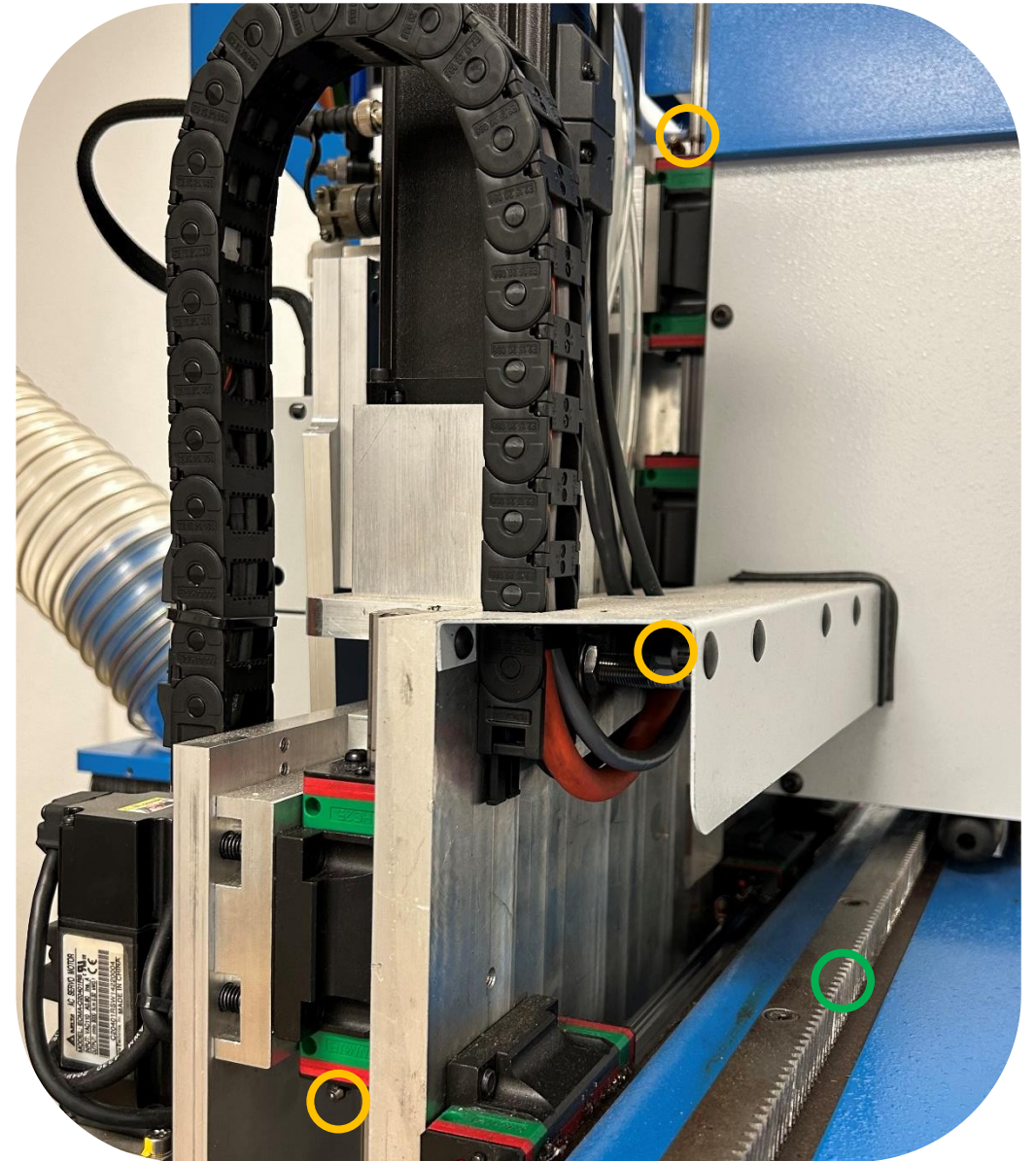
Grease Monthly

# Grease Locations Continued:

**Right side rear of spindle:** There are 3 locations shown with a yellow circle. All 3 are bearing cars.

**Gear Rack:** Use a brush and very lightly brush a thin coat of general-purpose grease on all the gear rack on the machine. The gear rack is shown with a green circle.

**Grease Monthly**

# Grease Locations Continued:

**Vertical supports:** There are 4 locations shown with a yellow circle. All 4 are bearing cars.

Right Side

Left Side

# Water Separator:

**Draining the Water Separator:**

- Check the Air Filter Regulator for moisture every four hours and drain by pressing up on the bottom fitting as needed.

Drain Daily

# Filters:

**Cleaning the Electrical Cabinet Filters:**

- There are 2 filters on the machine that need to be cleaned. Remove the filter by lifting the filter cover, up and away from the cabinet. Use a compressed air hose and blow out the filters, then reinstall them. If the filters look like you can't get them clean, then replace them with new ones.



Clean Monthly

# Filters Continued:

**Cleaning the Vacuum Pump Filters:**

- There are 2 filters on the machine that need to be cleaned. The main pump filter and the relief valve filter. Remove the filters and use a compressed air hose and blow out the filters, then reinstall them. If the filters look like you can't get them clean, then replace them with new ones.

Main Vacuum pump filter

Clean Monthly

Vacuum relief valve filter
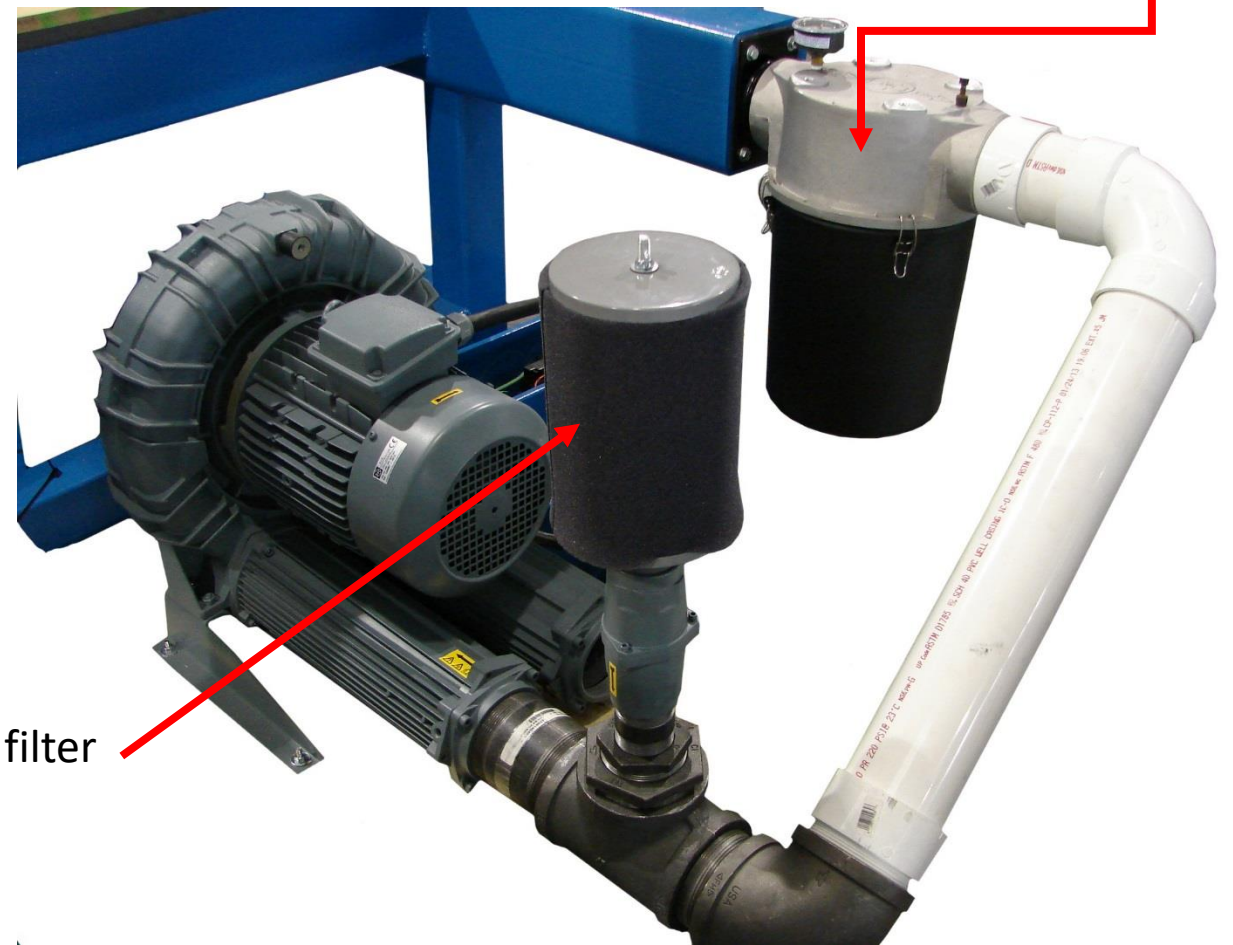
# General Inspection:

**Inspect the Machine:**

- Preventing a real issue before it happens. Pay attention to what's going on with the machine. Listen for any strange noises, like air leaking or the camera moving up and down to fast. A simple adjustment can prevent a big problem.

- Look for any potential mechanical issue like tools not going in and out of the tool changer correctly. Again, a small adjustment to the software can prevent a big problem in the future.

- Clean the machine after every use.

## Inspect Daily
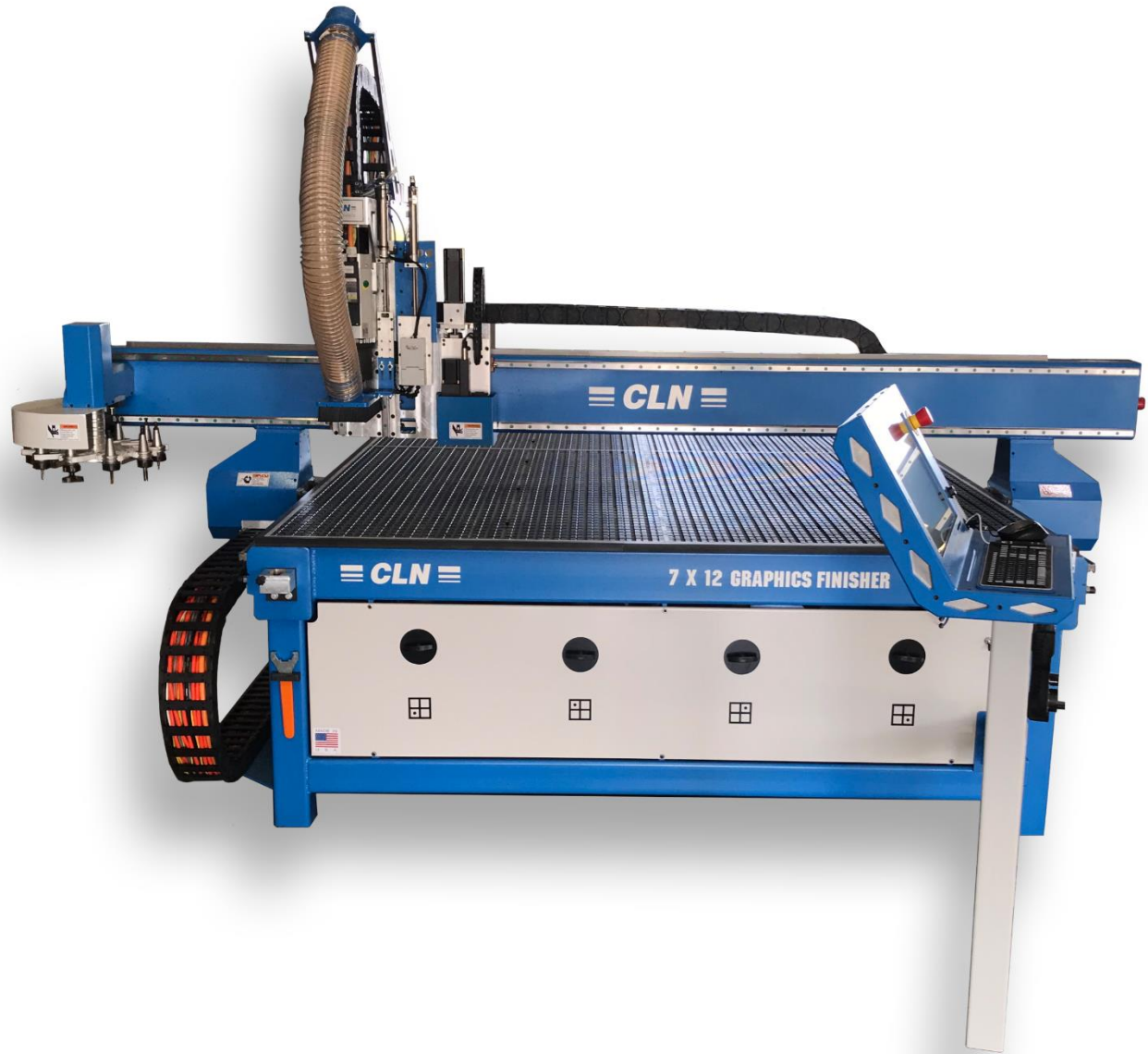
# Machine Operation

Turning the Machine on and off

Compressed Air

Loading Material

Mist Coolant

Loading Tools

Calibrating the ATC

Installing the Knife Blade

Mechanical Adjustments
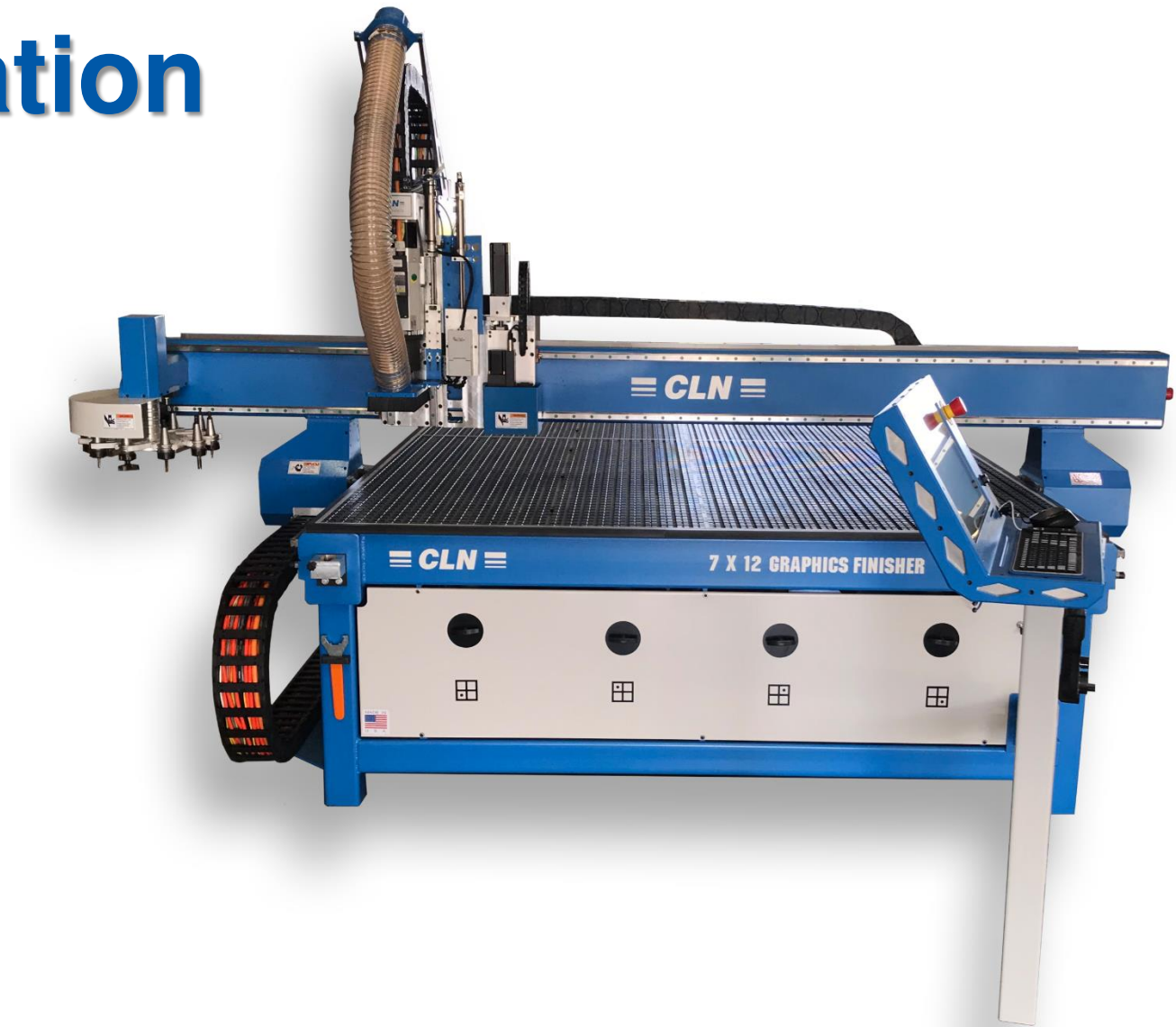
# Turning the Machine On and Off:

**Power Up Sequence:**

- Turn the main power on using the power switch located on the electrical box of the machine.

- The computer should come on when the main power switch is turned on. It's set to do this via the BIOS settings. If the computer doesn't start, then turn the computer power on by pressing the power button on the front of the computer. You will have to open one of the door closest to the operator in order to gain access to the power switch.

- Wait for the computer to completely boot up.

**Power Down sequence:**

- Shut the computer down through windows operating system. Wait 30 seconds for the computer to completely power down or until you hear a knock sound coming from the electrical box. That sound is the contactor switching to the off position.

- Turn off the main power switch located on the rear of the machine.

# Compressed Air:



**Check the Air pressure:**

- Before you proceed any further, make sure your air compressor is turned on and connected to the machine. The gauge on the machine should read 80 psi.

- For the machine to function properly your air compressor should have a minimum capacity of 5 cfm at 80 psi.

- While the machine is running the gauge shouldn't drop more than 10 PSI.
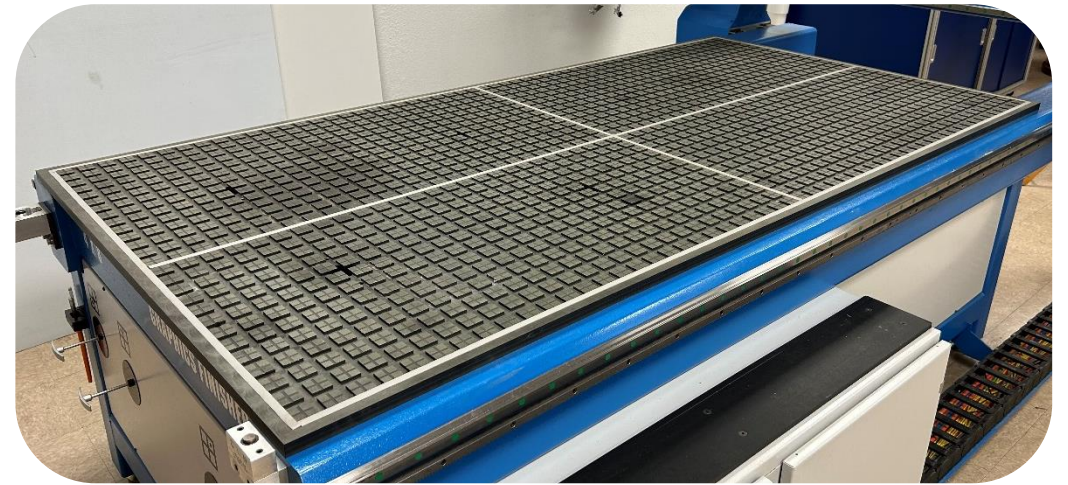
# Loading Material:

## Vacuum Table:

- Park the spindle by pressing park on the monitor. This will move the spindle out of the way.

## Establishing the zones on the table:

- The most common way to configure the zones is to divided the table into 4 zones. However, you can use any configuration that fits your needs the best. Use ¼ X ½ inch weather striping around the entire table then divide the table up into zones.

- Don't use a weather strip that is too dense, it wont flatted out when the vacuum is turned on. We recommend Foam Window Seal. This brand can be purchase at any popular hardware store.
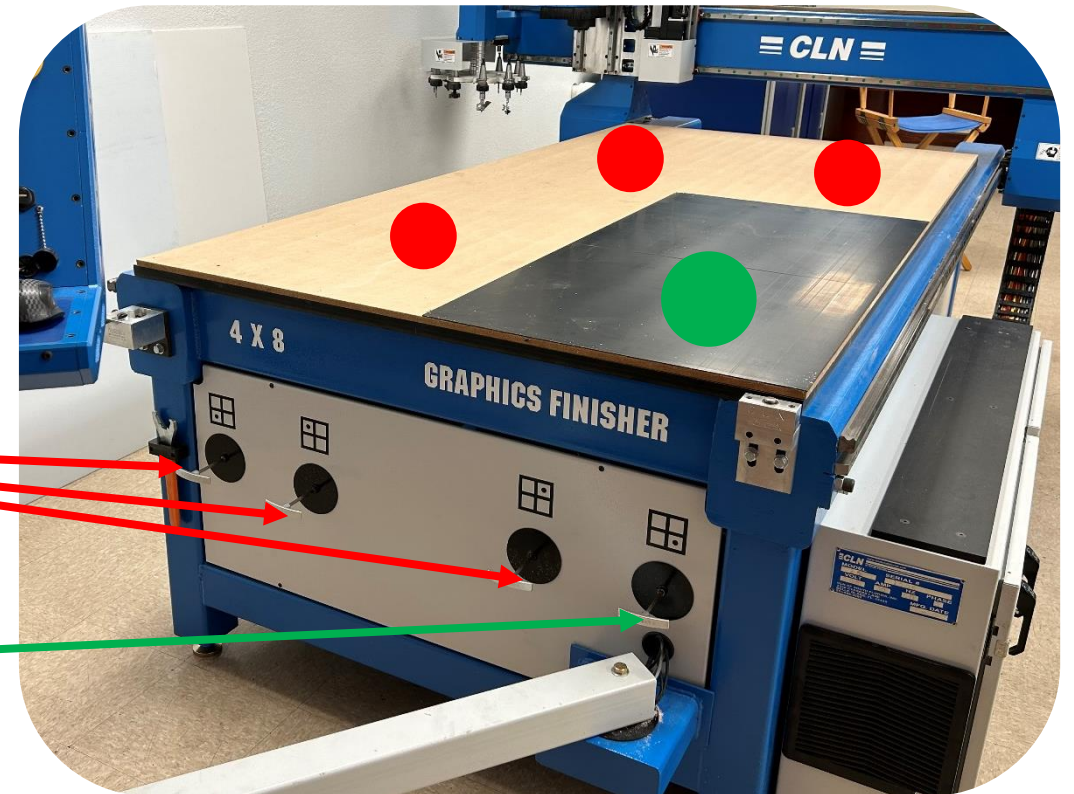
# Loading Material Continued:

**Vacuum Table:**

**Cutting with the spindle:**

- Make sure that all of the vacuum zones are off. Set the material directly on top of the MDF spoil board. Place the material as straight as you can. Only turn on the vacuum zones that are under the material. If needed use a drop of material to cover any area on the table that has air sucking through the MDF. This will ensure that you are using maximum suction to hold your material down to the table.

- For example, in this picture we only need one zone to be turned on. The other 3 need to be shut off.

Off

On

# Loading Material Continued:



## Vacuum Table:

### Cutting with the Knife:

- Make sure that all the vacuum zones are off. Put the felt cutting mat on top of the MDF Set the material to be cut directly on top of the felt. Place the material as straight as you can. Only turn on the vacuum zones that are under the material. If needed use a drop to cover any area on the table that has air sucking through the MDF. This will ensure that you are using maximum suction to hold your material down to the table.

- For example, in this picture all zones should be turned on.
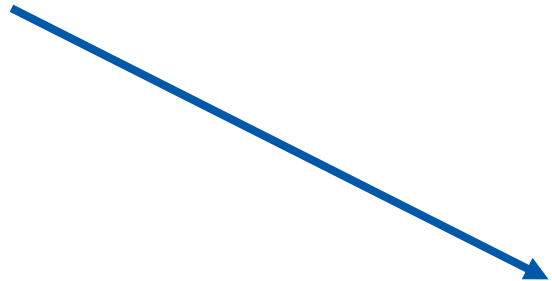
# Mist Coolant:

## Cutting Aluminum:

- When cutting aluminum, you must use the misting unit. However, for ACM material that have a thin alum sheet laminated to a plastic core you do not need the misting unit.

- The misting unit is mounted on the back of the carriage. You must use Cool Lube brand coolant in the unit, or you will void your warranty.

- Fill the coolant reservoir to the fill line with Unist Cool Lube brand coolant.

- To maximize the efficiency, add the coolant. The misting unit will turn on every time the machine lowers the router bit into the material and turn off when it raises the bit out or the cut.

- To manually turn on the misting unit. Make sure that the manual air shut off valve is open. Push it into the misting unit to open the valve. Go to the monitor and Click the (Turn Misting On) button in the CLN Router program.

- To adjust the air flow. Turn the small thumb screw. There are 2 of them, one for each nozzle.

- The amount of lubricant is adjusted by how many times the red pumpers cycle per second. Use a flat screwdriver and turn the frequency screw until it cycles 1 time every 4 seconds.

- The nozzles should be about 1-1/2" away from the router bit and pointed at where the bit is doing the cutting.

# Loading Tools:

**Tool Identification:**

These are MTC tool components. These will be installed directly in the spindle on a MTC machine.

Collet Nut

Collet

Router Bit

# Loading Tools Continued:

**Tool Identification:**

These are ISO 30 tool components. This is for an ATC machine

### Tool Holder



### Collet Nut



### Collet



### Router Bit

# Loading Tools Continued:

**Inserting the collet in the collet nut:**

The collet must snap into the collet nut. Sometimes you will need to use a rubber hammer to set the collet into the nut. Collets war out in time and need to be replace.

Right

Wrong

# Loading Tools Continued:

**Inserting the router bit in the collet:**

- Place the tool holder into the tool changing post. Push the button on the post to allow the tool holder to drop down and lock into place.

- Insert the bit so that most of the shank of the bit in in the collet.

- Use the collet nut wrench and tighten the collet nut firmly.

- In time the wrench and nut may wear out or the wrench isn't seated in the nut correctly. Any rate be prepared for the wrench to slip so brace yourself, so you don't fall and hurt yourself. Where you put your feet makes a big difference if the wrench were to slip.
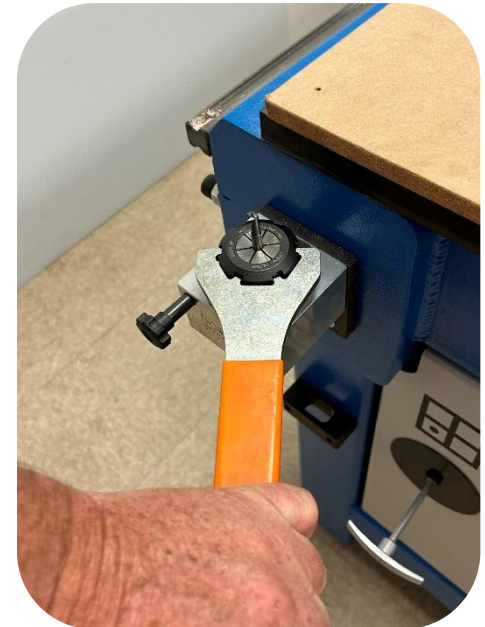
# Loading Tools Continued:

**Loading the Carousel Tool Changer:**

- Press the emergency stop button. Carefully load the tools in the tool forks of the changer.

- Tool the highest tool number must be the spoil board cutter or the fly cutter. There is an offset in the software for the size diameter of your fly cutter.

- You do not need to use all tool forks.

- It's up to the operator to assign a position for the rest of the tools. Whatever position that you decided to use must be transferred over to the CAD program that you're going to output the files from.

- Do not calibrate the tools until you Surface the MDF spoil board and set the machine bed.



Tool Changing Motor

Tool Presence Sensor

Tool Changing Home Sensor

Tool Changing Gear Box
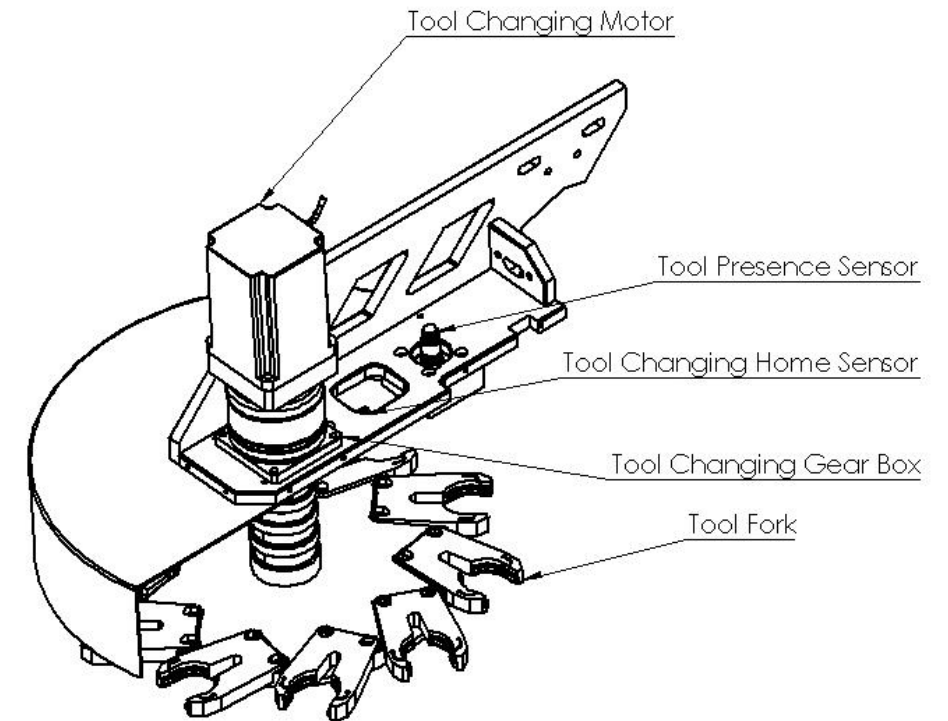
Tool Fork

# Calibrating the ATC:

- Calibrating the ATC is necessary so that the spindle knows where the tool holders are in the tool forks. Calibrating may be necessary if a spindle, tool changer or positioning sensor has been replaced.

- If you have a Tool calibration probe port. You can use the tool calibration probe. If you don't have the tool calibration port. You'll have to adjust the positions manually.

- The spindle probe is only lent out to customers if needed and requires a $2,000.00 refundable deposit after it is returned to CLN

We highly recommend that you click on the link below and watch the video on this step.
How To Calibrate The ATC

# Calibrating the ATC:
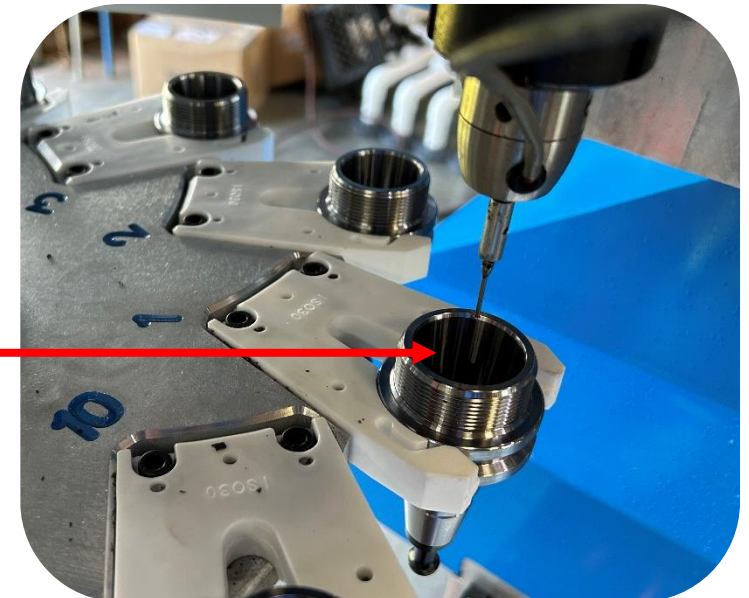
**Carousel Tool Changer**

- To calibrate the carousel tool changer with the probe. Remove all of the collet nuts and install all of the tool holder's upside down in the carousel. Keep track of the nuts because they are balance to each tool holder.

- Remove the ATC wire cover.

- On some older machines you may have to remove the stop bolt located on the left side of the gantry.
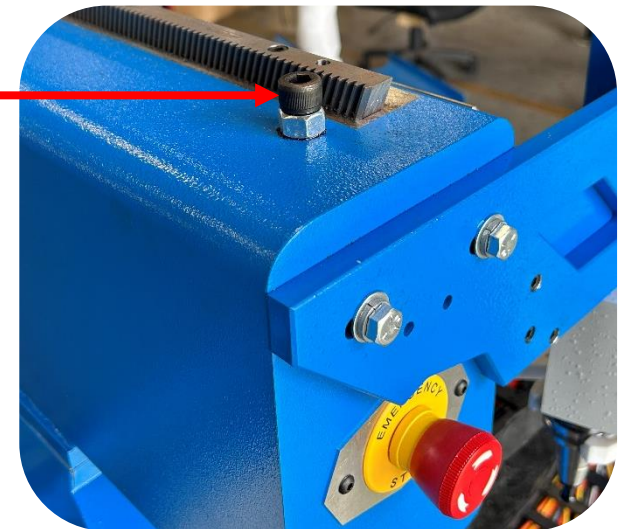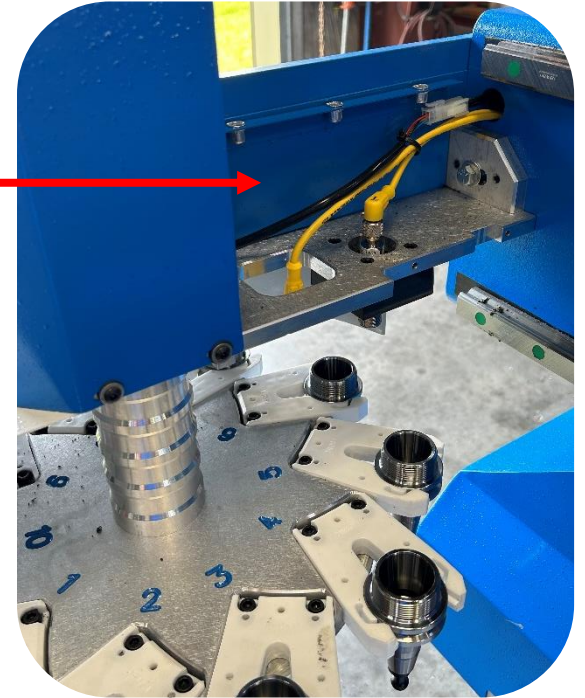
# Calibrating the ATC Continued:

**Carousel Tool Changer**

- Locate the tool calibration port, it will be in the Z energy track. Plug the probe into the port and insert the probe in the spindle.

- Jog the probe over to tool position 1, lower it down to about ½" above the upside-down tool holder. Try to get it as close to the center of the tool holder as possible.

- Click on calibrate ATC and follow the instructions on the screen.

- The probe will come down inside the tool holder and the carousel will rotate back and forth, so that the probe can locate the center of the tool holder. Then it will repeat for every tool in the carousel.

- Next it will touch off the fork to find the height of the fork.

- When the calibration sequence is finished, remove the probe from the spindle, and put all of the tools back in the carousel.

# Calibrating the ATC:

**Rack Tool Changer**

- To calibrate the rack tool changer with the probe. Install all of the tool holder's upside down in the rack. Keep track of the nuts because they are balance to each tool holder.

- Locate the tool calibration port, it will be in the Z energy track. Plug the probe into the port and insert the probe in the spindle.

- Jog the probe over to tool position 1, lower it down to about ½" above the top of the tool holder. Try to get it as close to the center of the tool holder as possible.

- Click on calibrate ATC and follow the instructions on the screen.

- The probe will come down and touch the top of the tool holder to find the top of the tool, then it will touch all 4 sides of the tool holder to find the center of the tool holder. Then it will repeat for every tool in the rack.

- When the calibration sequence is finished, remove the probe from the spindle, and put all of the tools back in the Tool Rack.
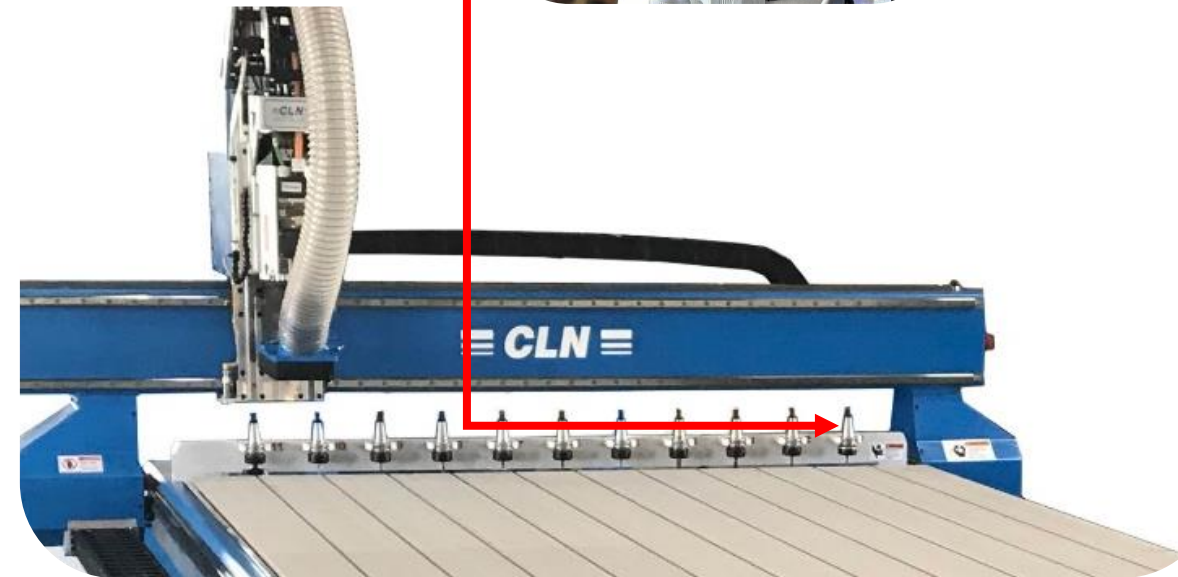
# Installing the Knife Blade:

**Use extreme caution when removing or replacing the knife blade. The blades are extremely sharp and will very easily, severely cut you. It is highly recommended to wear leather gloves.**

### Installing the knife blade

- Click on the Change Blade button on the CLN software. This will move the knife to a convenient location to change the knife blade.

- Insert a knife blade into the knife holder, position the flat on the shank of the bit towards the set screw.

- Use an Allen wrench and tighten the set screw.

- Make sure you set the blade height of the new blade.

### Removing the Knife Blade

- Loosen the set screw located on the knife holder.

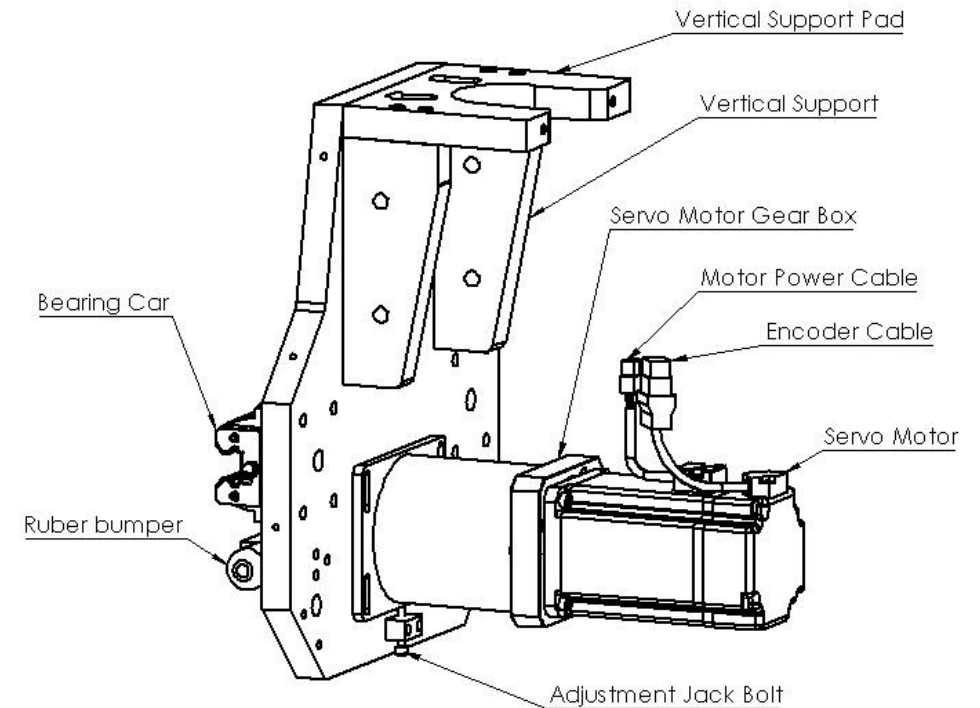- Pull the blade out of the Blade Holder.
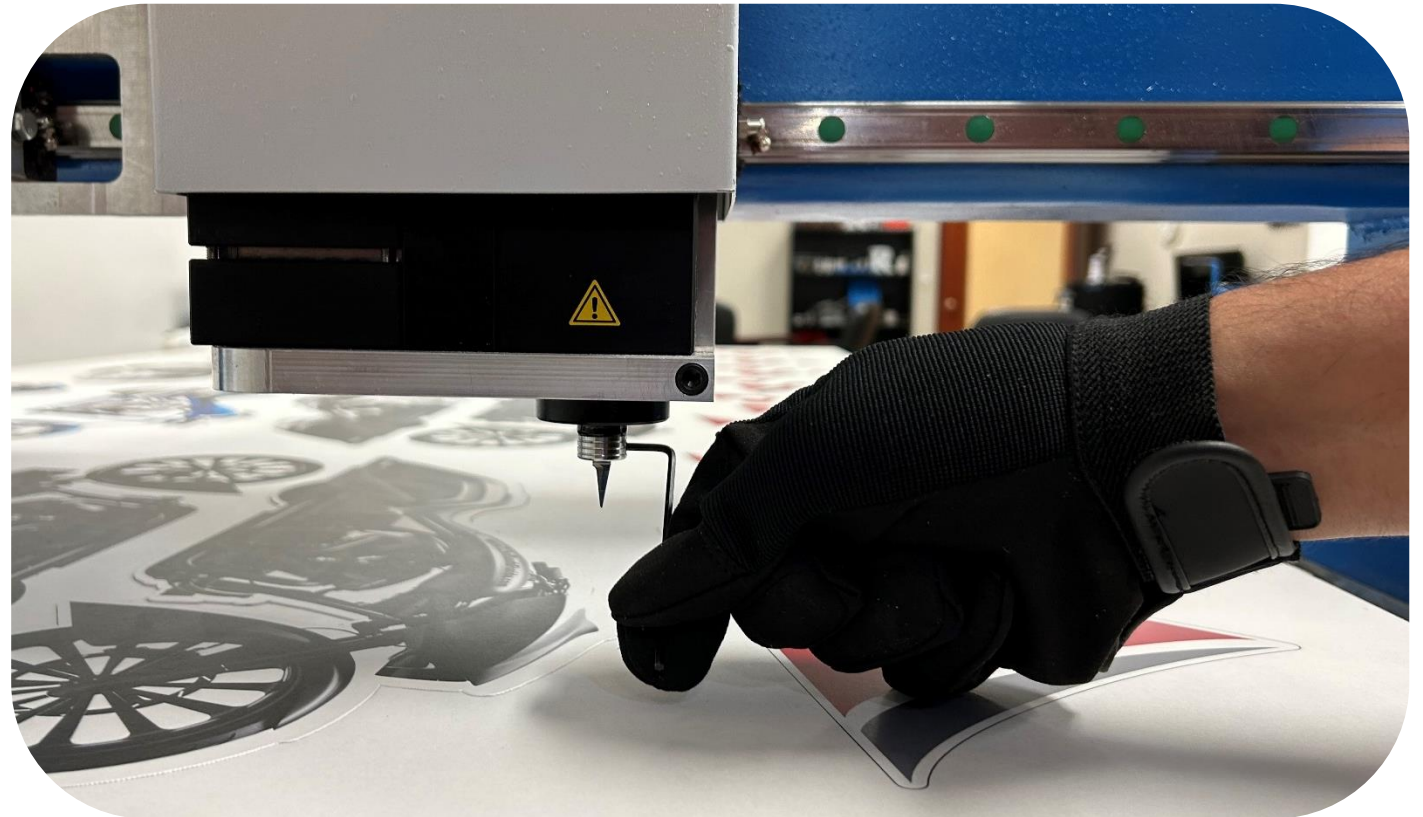
# Mechanical Adjustments:

**Pinion Gear to rack adjustment:**

- After 6 months of using your machine, you may have to adjust the pinion gears for X and Y axis on the machine. The reason for this, is that the pinion is harden steel and the rack is not. Like any mechanical system there is a break in period. Once you perform this operation you probably won't need to do it again.

- To see if you need to adjust the pinion gear, just grab the gantry and shake it back and forth. If you detect and back lash or slop in the gears, then you have to adjust the pinion gear.

- For the X axis, remove the vertical support cover. For the Y axis, remove one of the carriage covers.

- Loosen the 4 motor flange bolts.

- Shake the vertical support while turning the jack bolt until the slop in the gears goes away.

- Tighten the 4 motor flange bolts.

We highly recommend that you click on the link below and watch the video on this step.
[Adjust the Pinion Gear](Adjust the Pinion Gear)



Vertical Support Pad

Vertical Support

Servo Motor Gear Box

Motor Power Cable

Encoder Cable

Servo Motor

Bearing Car

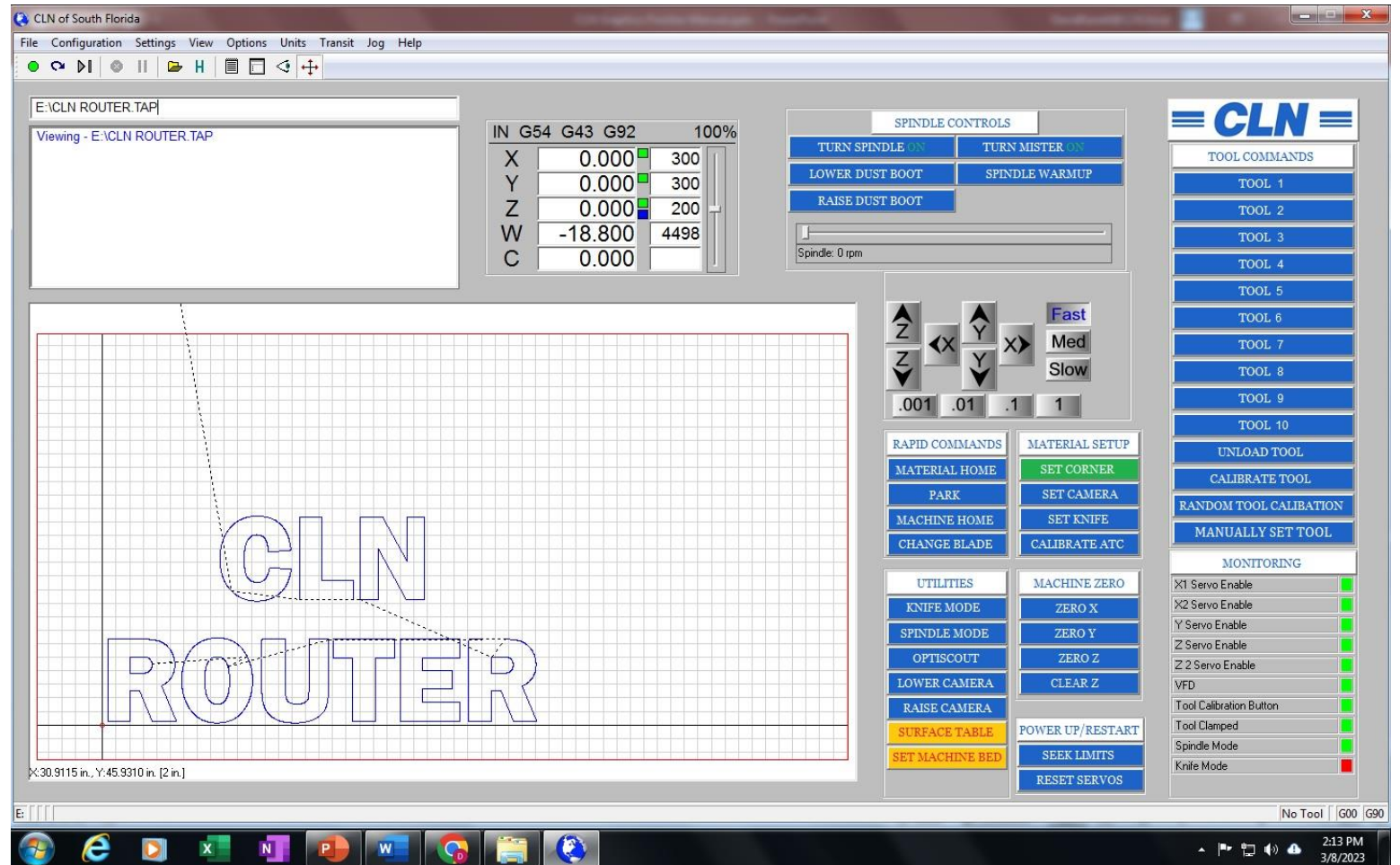Ruber bumper

Adjustment Jack Bolt

# Machine Software



CLN Software Overview

Using the CLN Software

Optiscout

Camera Alignment

# CLN Software Overview:

- **Software**

The purpose of the CLN software is to give the operator a way to view the parts that was sent via a .TAP or G-Code file and convert it so that the machine can process the information correctly. The CLN software has no ability to create code for the machine. Creating code for the machine come from a CAD program. A CAD program can be installed on your machine and most CADS programs will work together seamlessly.

## Machine control

**Overrides**
- At any time that you are running the machine you can override the Feed Rate and the Spindle RPM

**Home Positions**
- The CLN Software can set multiple home positions anywhere on the table. It can also set a Z position at the bottom of the table or at the top of your work piece.

**Proximity restart**
- In the event that you break a bit. Or you are running a large 3D file and you want to shut the machine down for the night. You can restart where you left off at with the restart feature.

**Pausing the Matching**
- The space bar will pause the machine. Hitting enter will resume operation.

# CLN Software Overview Continued:

**Shortcut Icon**

**XYZWC Position Window**

**Spindle Controls**

**Jog and Transit Controls**

**Rapid Commands**

**Material Setup**

**Utilities**
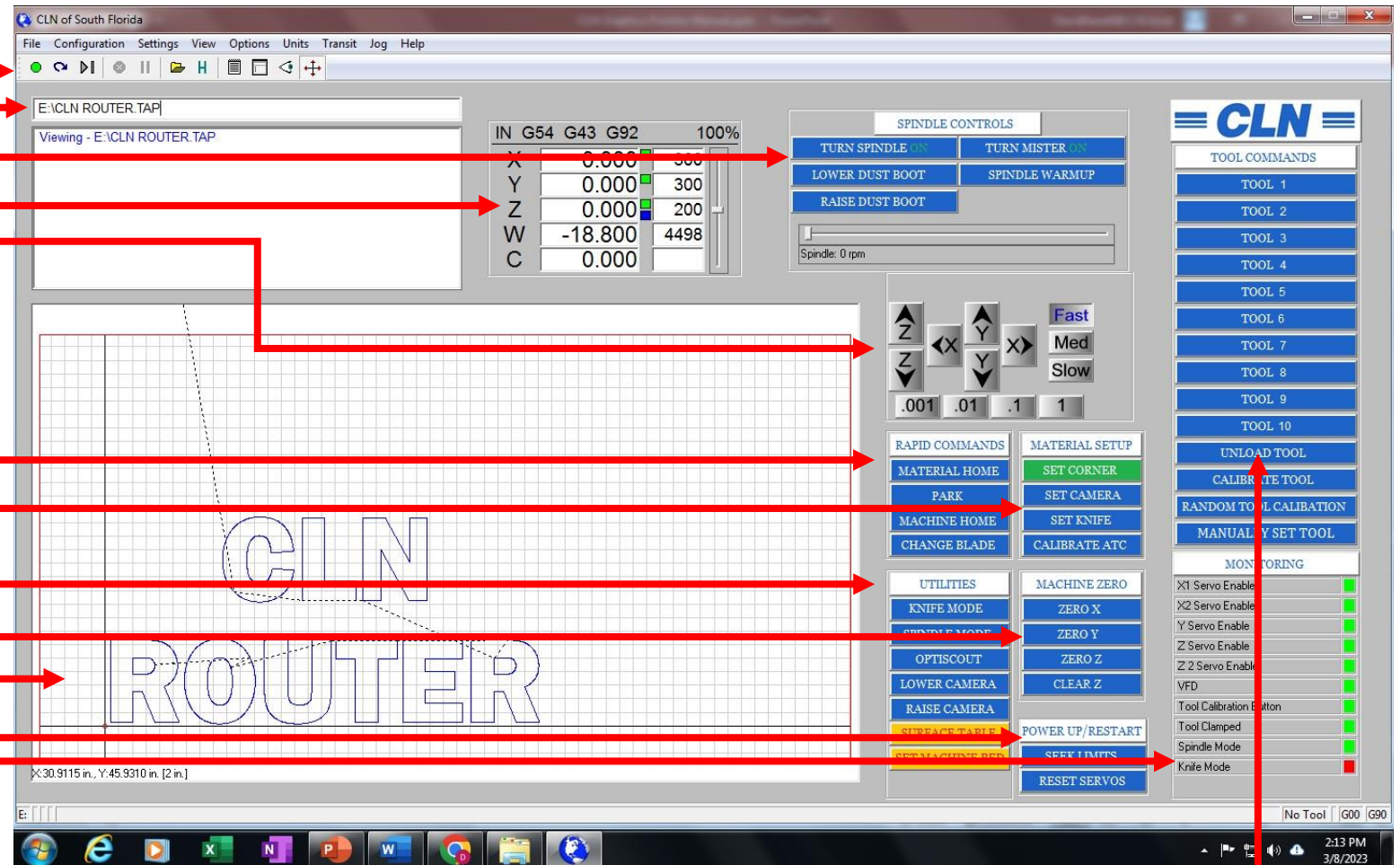
**Machine Zero**

**Power Up / Restart**

**Tool Commands**

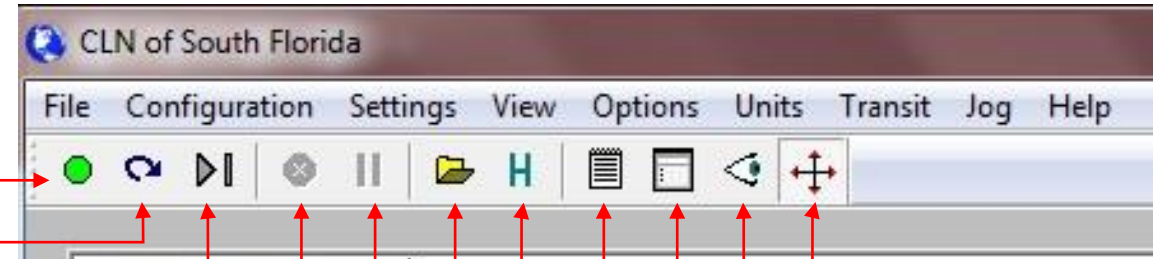**Command Line Terminal**

**Display Viewer**

**Monitoring**

# CLN Software Overview Continued:

**Shortcut Icon Definitions:**

- Begin cutting
- Restart from a line number
- Step Mode
- Abort
- Pause
- File Open
- History
- Job Editor
- Simulate
- Previewer
- Soft limits on and off

# CLN Software Overview Continued:

## CLN Keyboard Short Cut Keys

- **Jog Speed**
  - Fast – (F4)
  - Medium – (F3)
  - Slow – (F2)

- **Machine Jog Keys**
  - Left – (Left Arrow)
  - Right – (Right Arrow)
  - Forward – (Up Arrow)
  - Backward – (Down Arrow)
  - Spindle Up – (Page Up)
  - Spindle Down – (Page Down)

- **Spindle RPM's**
  - Increase – (+)
  - Decrease – (-)

- **Feed Rate**
  - Increase – (Insert)
  - Decrease- (Delete)
  - Jump to 100% - (Ctrl & Delete)

- **Machine Operation**
  - Start File – (Enter)

  - Restart – (Ctrl & R)

  - Single Step – (Ctrl & P)
  - Abort – (Esc)
  - Pause – (Space Bar)
  - Open File – (Ctrl & O)
  - File History – (Tab)
  - Edit File – (Ctrl & E)
  - Simulate – (Ctrl & S)
  - View File – (Ctrl & V)
  - Soft Limits On/Off – (Ctrl & L)
  - Resume – (Enter)

- **File Editing Shortcut Keys**

  - **Copy** – (Ctrl & C)
  - **Paste** – (Ctrl & V)
  - **Cut** – (Ctrl & X)
  - **Find** – (Ctrl & F)
  - **Find & Replace** – (Ctrl & H)
  - **Undo** – (Ctrl & Z)
  - **Redo** – (Ctrl & Y)
  - **Display what line your cursor is on** – (Ctrl & G)

> The Commands highlighted in red, are the most common short cut keys that you will use.

# CLN Software Overview Continued:

**XYZWC Position Window:**

**Spindle Mode G54**

- This window tells you the position of the tool. For X and Y, the distance is from the center of the tool. For Z, the distance is from the tip of the bit.

**X and Y**

- When you see the green box next to the position, this means that the displayed position is the distance from where you set a zero for your material. Otherwise know as a local hone position.

- No box or, If you click on the green box, it will turn red. This is the displayed position from the machine home to the tool. For normal operation leave the box green because machine home is rarely used.

**Z**

- The blue box is the position from the machine bed or the (MDF Spoil Board). This position is defined when you set the machine bed. Typically, after you surfaced the spoil board you must set the machine bed. Setting the machine bed means that you are setting the distance from the tip of the bit to the spoil board to zero. Moving the spindle up will result in a positive number.

- No box or, If you click on the green box, it will turn red. This is the displayed position from the machine bed to the tip of the tool.
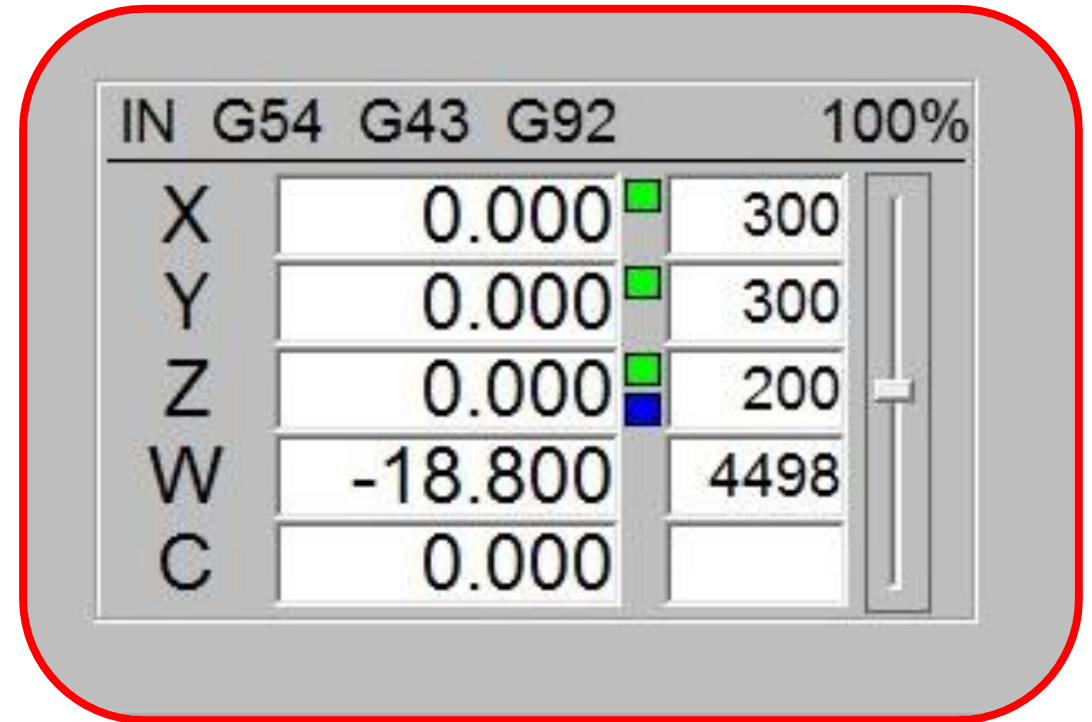


**W**

W is the position of the carousel tool changer; the position are in degrees.

**C**

C is the position of the Knife the position are in degrees. A zero position means that the blade of the knife is pointed at the end of the table or the X positive direction.

# CLN Software Overview Continued:

**XYZWC Position Window:**
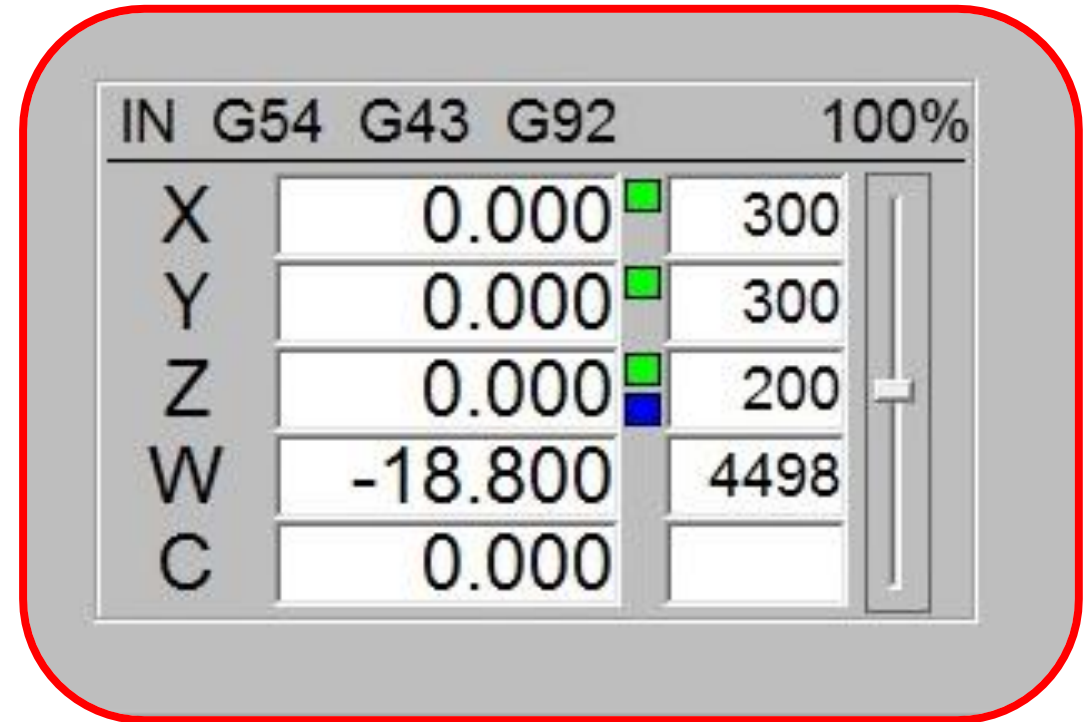
**Knife Mode G55**

- The position window for knife mode, works just like spindle mode, except there are blue boxes that contain the offsets from the knife to the spindle for X and Y. These positions are not important to the operation of the machine and should be left alone.

**X and Y**

- When you see the green box next to the position, this means that the displayed position is the distance from where you set a zero for your material. Otherwise know as a local home position.

- No box or, If you click on the green box, it will turn red. This is the displayed position from the machine home to the tool. For normal operation leave the box green because machine home is rarely used.

**Z**

- The blue box is the position from where you clicked set knife. This position is defined when you clicked set knife. Setting the knife on the machine means that you are setting the distance from the tip of the blade to the location from where you clicked set knife. Moving the spindle up will result in a positive number.

- No box or, If you click on the green box, it will turn red. This is the displayed position from the location that you set the knife to the tip of the blade.

| IN | G54 | G43 | G92 | 100% |
|----|----|----|----|----|
| X | 0.000 | | 300 | |
| Y | 0.000 | | 300 | |
| Z | 0.000 | | 200 | |
| W | -18.800 | | 4498 | |
| C | 0.000 | | | |

**Feed Rate**

Next to the Positions is the feed rate. You can adjust the feed rate by moving the slide bar up or down with your mouse. You can also press delete or insert on the keyboard to adjust the feed rate.

# CLN Software Overview Continued:

**Spindle Controls:**

- **Turn Spindle On:** This button turns the spindle on and off. The slide bar at the bottom will adjust the spindle RPM.

- **Lower Dust Boot:** This button lowers the dust boot.

- **Raise Dust Boot:** This button raises the dust boot.

- **Turn Mister On:** This button turns the misting unit on and off.

- **Spindle Warmup:** This button turns the spindle on so that it will run for a few minutes to warm up the bearings in the spindle.
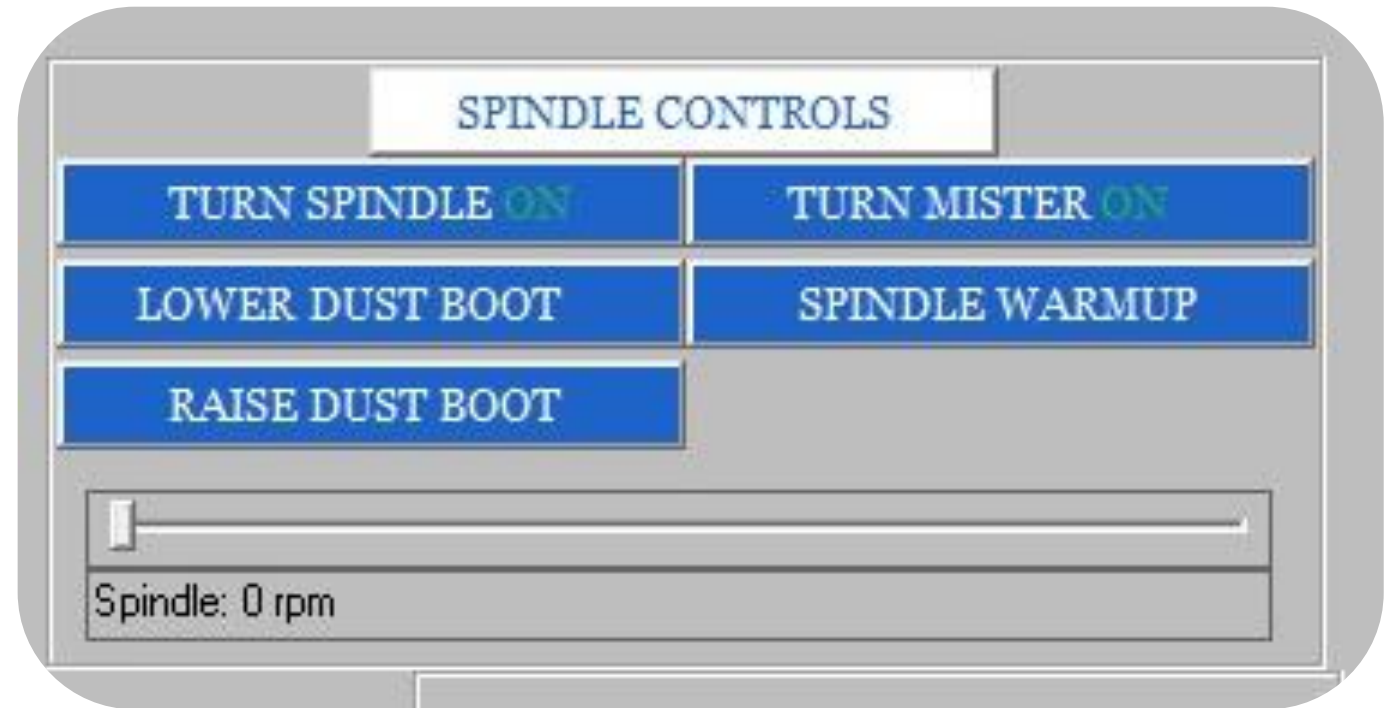
# CLN Software Overview Continued:

**Jog and Transit Controls:**

- **Fast Med Slow:** These buttons set the transit speed

- **XYZ:** This group of buttons will move the tool around the table.

- **.0001 .001 .1 1:** These buttons set the jog distance
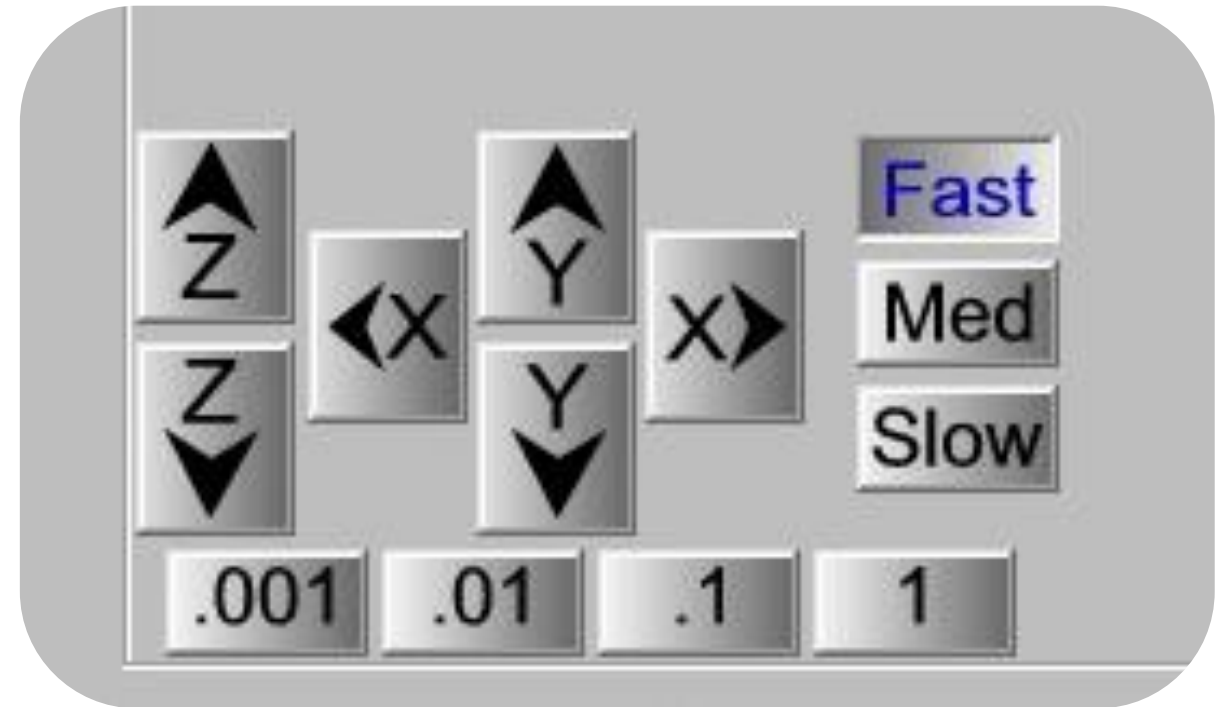
# CLN Software Overview Continued:

**Rapid Commands:**

- Rapid commands mean that the machine will move as fast as it can to particular location. Make sure that everyone is clear of the machine before you click on any of these buttons.

- **Material Home:** This button moves the spindle to where you set the XY corner of the material otherwise known as the local home position for XY.

- **Park:** This button moves the spindle to where you establish the park position.

- **Machine Home:** This button moves the spindle to where the machine was after it seeks limits otherwise known as machine zero.

- **Change Blade:** This button moves the knife to where the change blade area is, so that the operator can conveniently change the knife blade.

# CLN Software Overview Continued:

**Material Setup:**

- The material setup is where you can set the tools to the material or to the table.

- **Set Corner:** This button sets the bit to the corner of the material. Otherwise known as local home position for XY

- **Set Camera:** This button sets your desired position of the camera height from the material.

- **Set Knife:** This button sets your desired position of the tip of the knife.

- **Calibrate ATC:** This button is used to calibrate the positions of the tools that are in the tool holders. This operation requires special a spindle probe tool that goes in the spindle. The spindle probe is only lent out to customers if needed and requires a $2,000.00 refundable deposit after it is returned to CLN.

We highly recommend that you click on the link below and watch the video on this step.
How To Calibrate The ATC

# CLN Software Overview Continued:

**Utilities:**

- The Utilities buttons are where extra features are located.

- **Knife Mode:** This button will put the machine in Knife mode.

- **Spindle Mode:** This button will put the machine in Spindle mode.

- **Optiscout:** This button starts the Optiscout program.

- **Lower Camera:** This button is used to lower the camera.

- **Raise Camera:** This button is used to raise the camera.

- **Surface Table:** This button is used to run a routine that requires you to have your spoil board bit loaded in the spindle. Lower the spoil board cutter to the top of the MDF then click Surface Table. Follow the direction on the screen. When it is finished surfacing the table it will ask you to set the machine bed then calibrate all of the tools. When the machine bed is set, you do not have to set it again unless you resurface the table.

- **Set Machine Bed:** This button is used set the machine bed if you haven't done so with the Surface Table routine. Lower any Router bit to the top of the MDF then click Surface Table. Follow the direction on the screen. After the machine bed is set, calibrate all of the tools. When the machine bed is set, you do not have to set it again unless you resurface the table.

# CLN Software Overview Continued:

**Machine Zero:**

- The Machine Zero buttons allow you to set local coordinates one at a time on the table.

- **Zero X:** This button sets a zero for only the X axes.

- **Zero Y:** This button sets a zero for only the Y axes.

- **Zero Z:** This button sets a zero for only the Z axes.

- **Clear Z:** This button is used to clear the saved Z position.

> We highly recommend that you click on the link below and watch the video on this step.
> How to Adjust The Z Height

**Power Up / Restart:**

The Power Up / Reset are initialization buttons

- **Seek Limits:** This button is used at program startup it makes the machine find machine zero.

- **Reset Servos:** This button is only needed if a servo faults out. Pressing it will reset most servo faults. Otherwise, you have to power down the machine completely to reset other servo faults. It is always a good idea to read the servo fault code on the servo drive before pressing this button. Unless you crash the machine, faults are not normal and should be addressed. See  Delta Servo Fault codes  go to page 288 for a complete list.

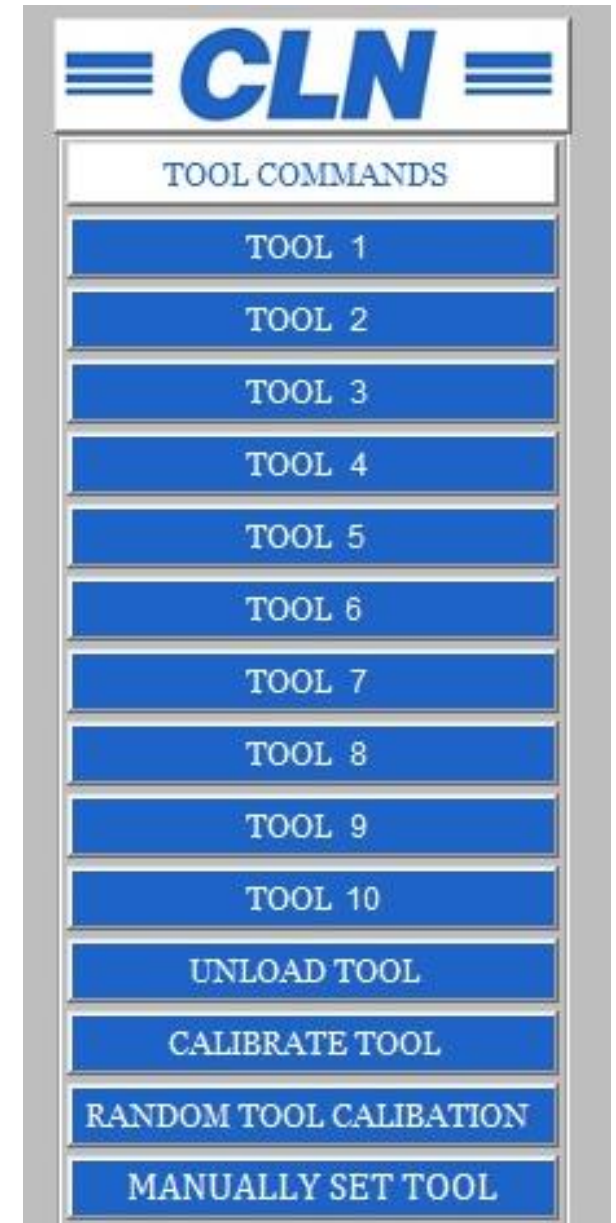# CLN Software Overview Continued:

**Tool Commands:**

- The tool commands buttons are ware you can manually tell the machine to change tools and calibrate them

- **CLN:** Clicking on the banner will take you to our website ware you can find lots of training videos on this machine.

- **Tool numbers:** By clicking on any of the tool numbers, the machine will automatically pick up the selected tool.

- **Unload Tool:** This button put the current tool that is in the spindle back in the tool holder.

- **Calibrate Tool:** This button is used to calibrate the current tool that is in the spindle.

- **Random Tool Calibration:** This button is used to calibrate any tool that you decide to calibrate.

- **Manually Set Tool:** This button is used to manually set the tool height of a tool to the machine bed. Its useful for odd shape tools like fly cutters. However, the highest tool number in your tool changer can accept spoil board or fly cutters.
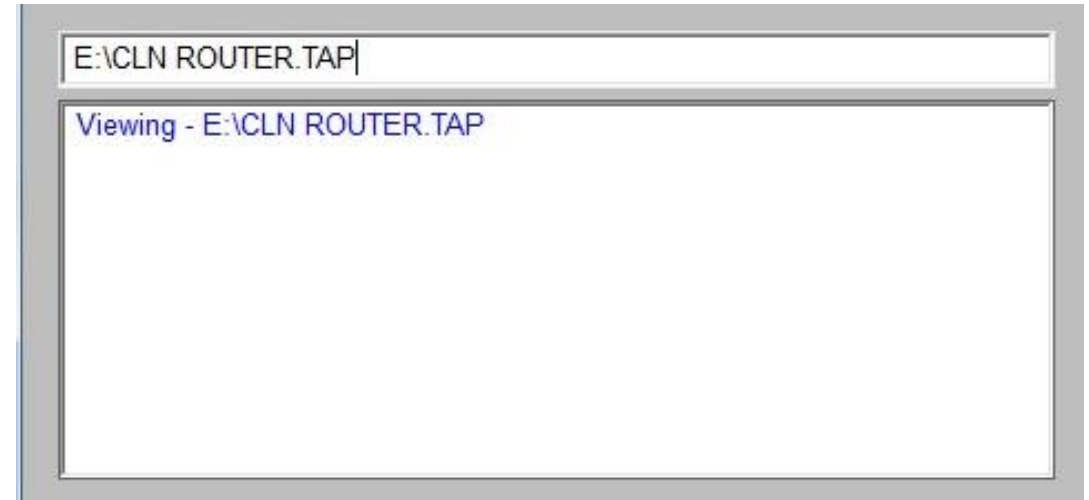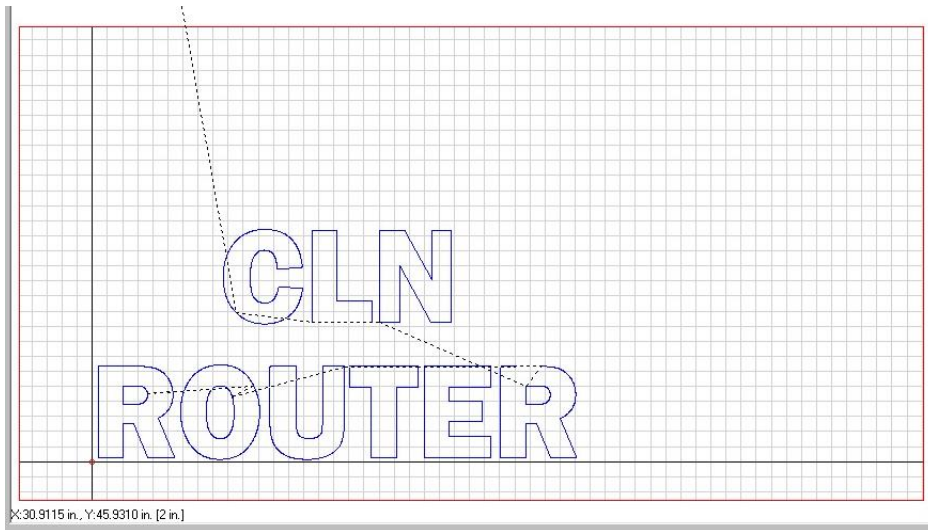
We highly recommend that you click on the link below and watch the video on this step.
How to Calibrate The Router Bits

# CLN Software Overview Continued:

**Command Line Terminal:**

- The command line is where you can type in any valid command. The terminal is where the machine displays information from the machine.

# CLN Software Overview Continued:

**Display Viewer:**

- The display viewer displays the job and tracks the machines path. The Red crosshairs represent the router bit and as you jog the machine around on the table you can see the tool move around the viewer. The long black line represent the material home position.

- This picture shows the future path of the tool coming from the tool changer and cutting the letters



X:30.9115 in., Y:45.9310 in. [2 in.]
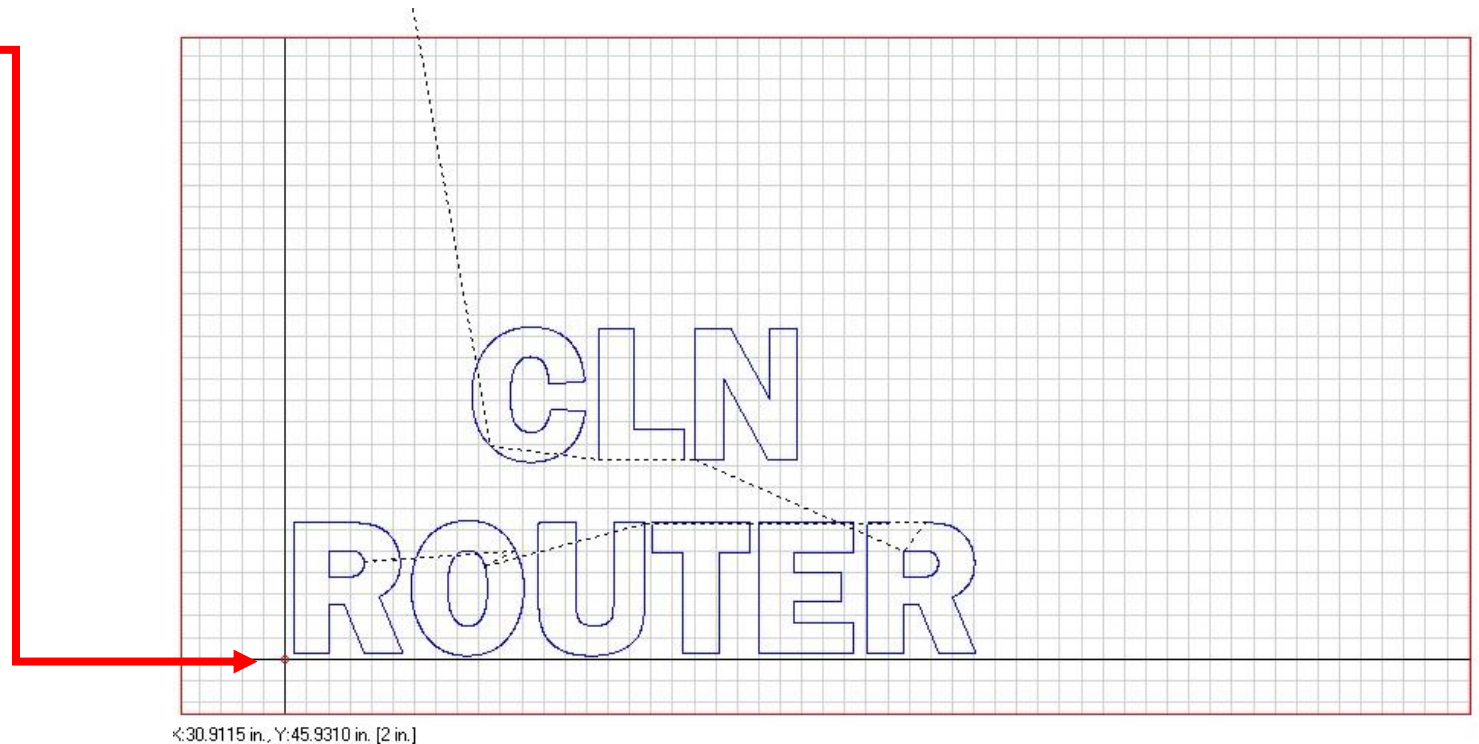
# CLN Software Overview Continued:

**Monitoring:**

- The Monitoring display will tell you the status of various features of the machine. If a fault is detected, then you have to open the electronical box and read the fault code on the drive. See Electronic Components Overview: for a description of the electrical components.

- **Servo Drive:** When the square indicator is green, it means all systems are good. If it turns to red, then you have a fault on the servo drive and you need to retrieve the fault code from the drive. See Delta Servo Fault codes go to page 288 for a complete list.

- **VFD:** When the square indicator is green, it means all systems are good. If it turns to red, then you have a fault on the VFD and you need to retrieve the fault code from the VFD. See go to page 288 for a complete list.

- **Tool Calibration Button:** When the tool calibration buttons square indicator turns red, it means that the tool calibration button is pressed.

- **Spindle Mode:** When the Spindle Mode square indicator turns red, it means that the machine is in Knife Mode.

- **Knife Mode:** When the Knife Mode square indicator turns red, it means that the machine is in Spindle Mode.

- **Current tool number:** The current tool number that the machine thinks, is in the spindle, is displayed here. It is shown here as No Tool. This doesn't mean that there is no tool in the spindle. You can manually put a tool the spindle and it won't change. Remember its what the machine thinks is in the spindle.
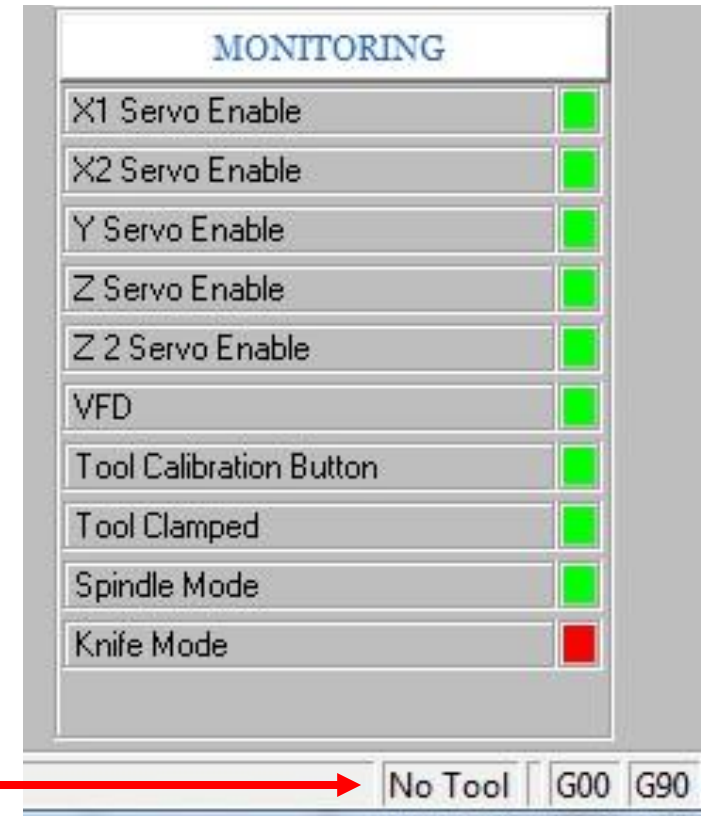
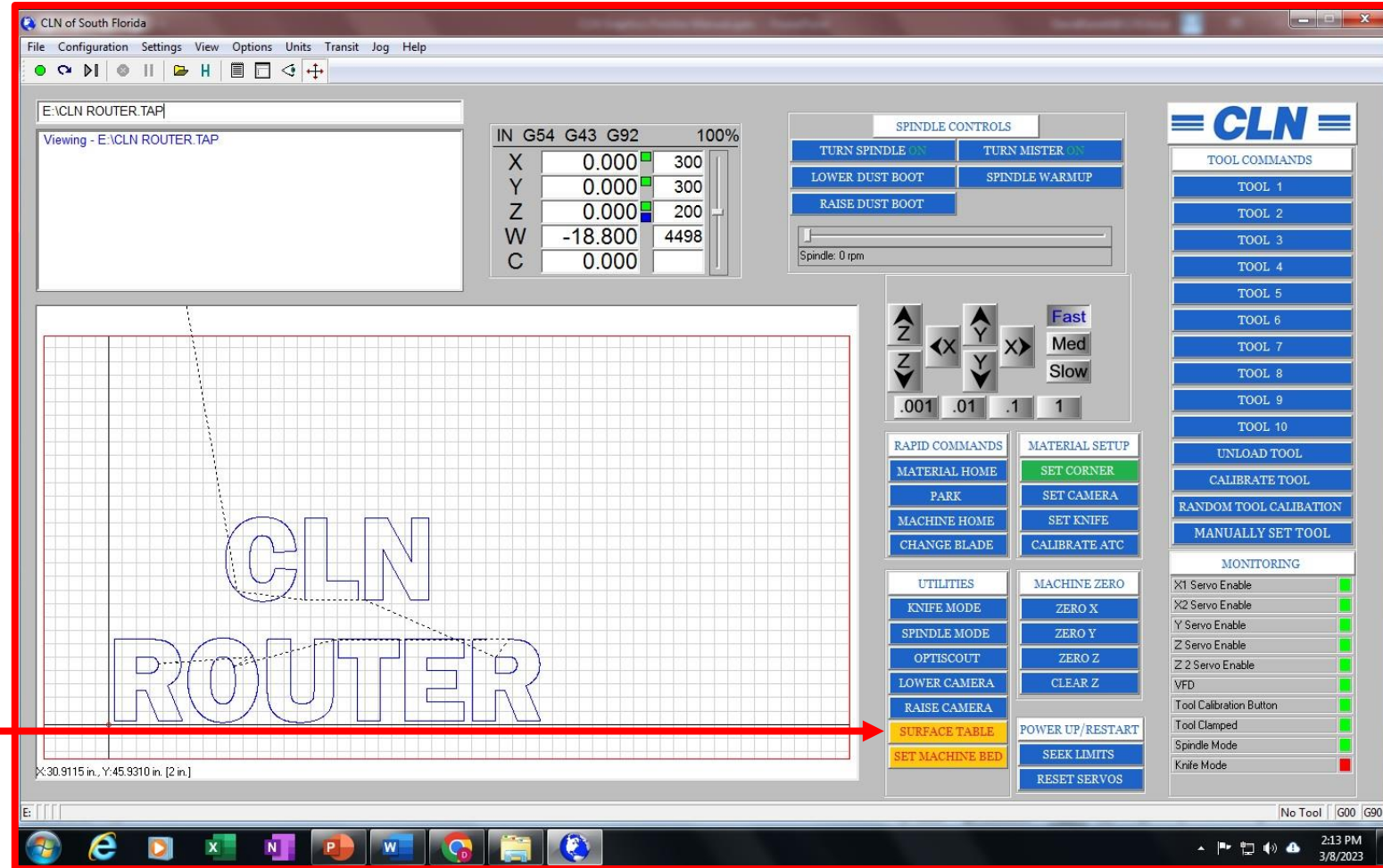# Using The CLN Software:

**Start the program:**

- To open the operating software on the machine simply double click on the desktop icon "CLN Router".

- Make sure that it is safe to move the machine then click (Seek Limits). This sets a machine zero.

- You are now able to move the machine around with the jog buttons.

- Clicking on any one of the tools on the right side of the screen will cause the machine to tool change to your selected tool.
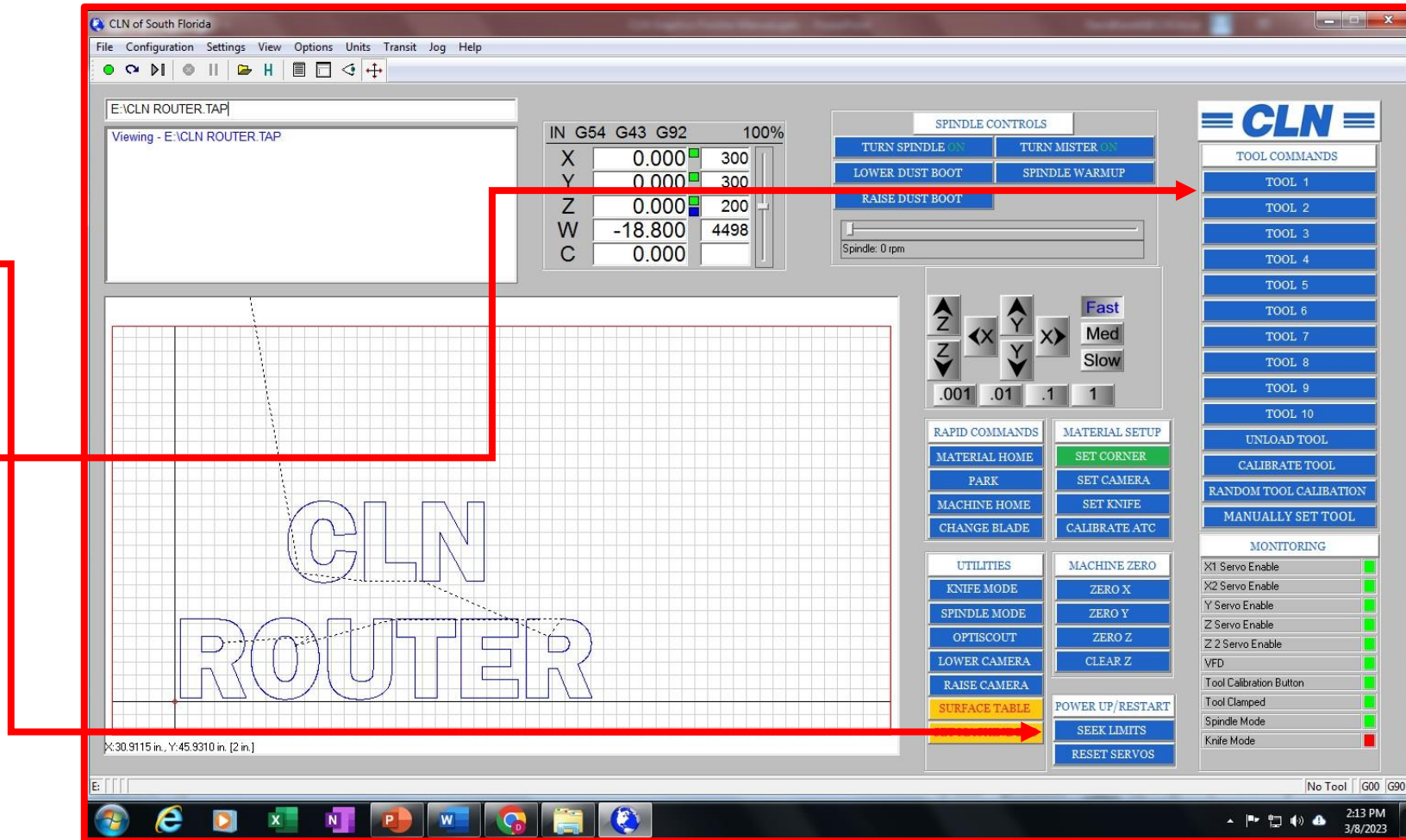
# Using The CLN Software Continued:

**Surfacing the MDF Spoil Board:**

- The MDF spoil board must be surfaced on both sides. The reason for this is to remove the glue that's on the surface to let the air flow through it more efficiently.

- If the machine is new, CLN most likely surfaced one side all ready. However, when you replace the MDF spoil board remember to surface both sides.

- For (ATC): The highest tool number in your tool changer is allocated for the spoil board cutter. Click on it to retrieve the spoil board cutter.

- For (MTC) insert the spoil board cutter. In the spindle.

- Lower the spoil board cutter to the top of the MDF.

- Click on the "Surface Table" button on the screen and follow the directions that follow.

- When the machine is finished surfacing the MDF, it will ask you to set the machine bed. This will set the bed height to zero.

- After you surface the MDF, remember to calibrate all of the tools in your tool changer. If you don't do it now, there's a good chance that you will forget then you run the risk of crashing your machine.
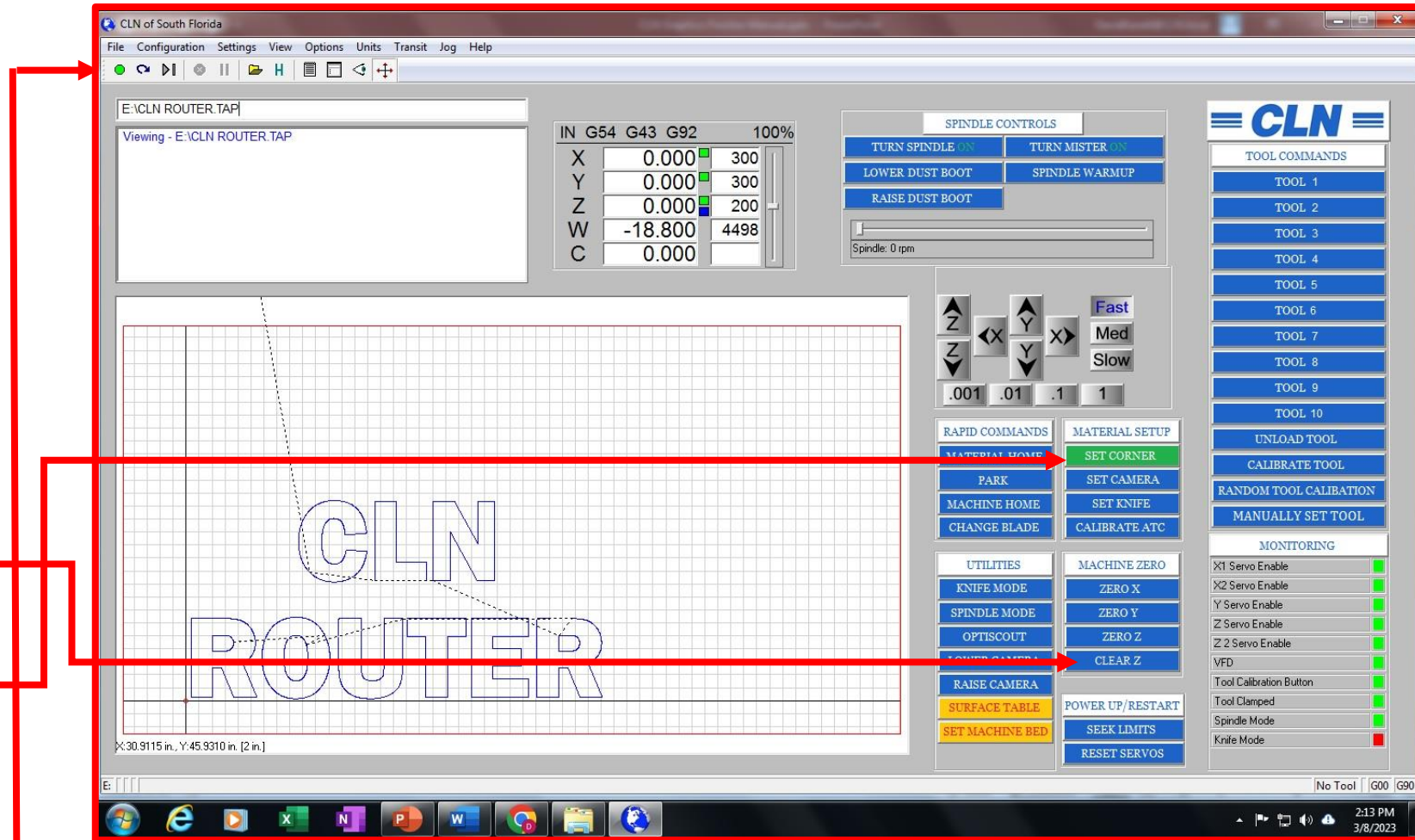
# Using The CLN Software Continued:

**Running the machine without Opti Scout:**

**Cutting with the Spindle:**

- The Graphics Finisher can be operated two ways. One is through Opti Scout and the other is by running files that have ben sent from a CAD program.

- On the CAD program. Before you output the .TAP file from your cad program, you want to set the zero for Z at the bottom of your material.

- On the machine, click the Clear Z button to make sure that you don't have a saved zero set for Z. Jog the tip of the router bit down to the MDF. Zero for Z should be at the top of the MDF spoil board. You should only be able to jog the bit down -.01 below the top of the MDF spoil board at this time.

- Load a sheet of material on the table. Jog the router bit to the lower left corner of the material them click the green button called set corner.

- Click on File / Open. Then open the .TAP file. Click on the view job icon to view the job.

- To begin cutting click on the green button in the top left corner of the screen.

# Using The CLN Software Continued:

**Running the machine without Opti Scout:**

**Cutting with the Knife:**

- The Graphics Finisher can be operated two ways. One is through Opti Scout and the other is by running files that have ben sent from a CAD program.

- On the CAD program. Before you output the .TAP file from your cad program you want to set the zero for Z at the bottom of your material.

- Lay the felt down on top of the MDF spoil board.

- Click on Knife mode. The machine will switch to knife mode and Z will control the knife.

- On the machine, click the Clear Z button to make sure that you don't have a saved zero set for Z. Jog the tip of the blade about halfway into the felt, then click Set Knife. Notice that the Z position was set to zero. Now park the machine.

- Load a sheet of material on the table. Jog the Knife to the lower left corner of the material them click the green button called set corner.

- Click on File / Open. Then open the .TAP file. Click on the view job icon to view the job.

- To begin cutting click on the green button in the top left corner of the screen.
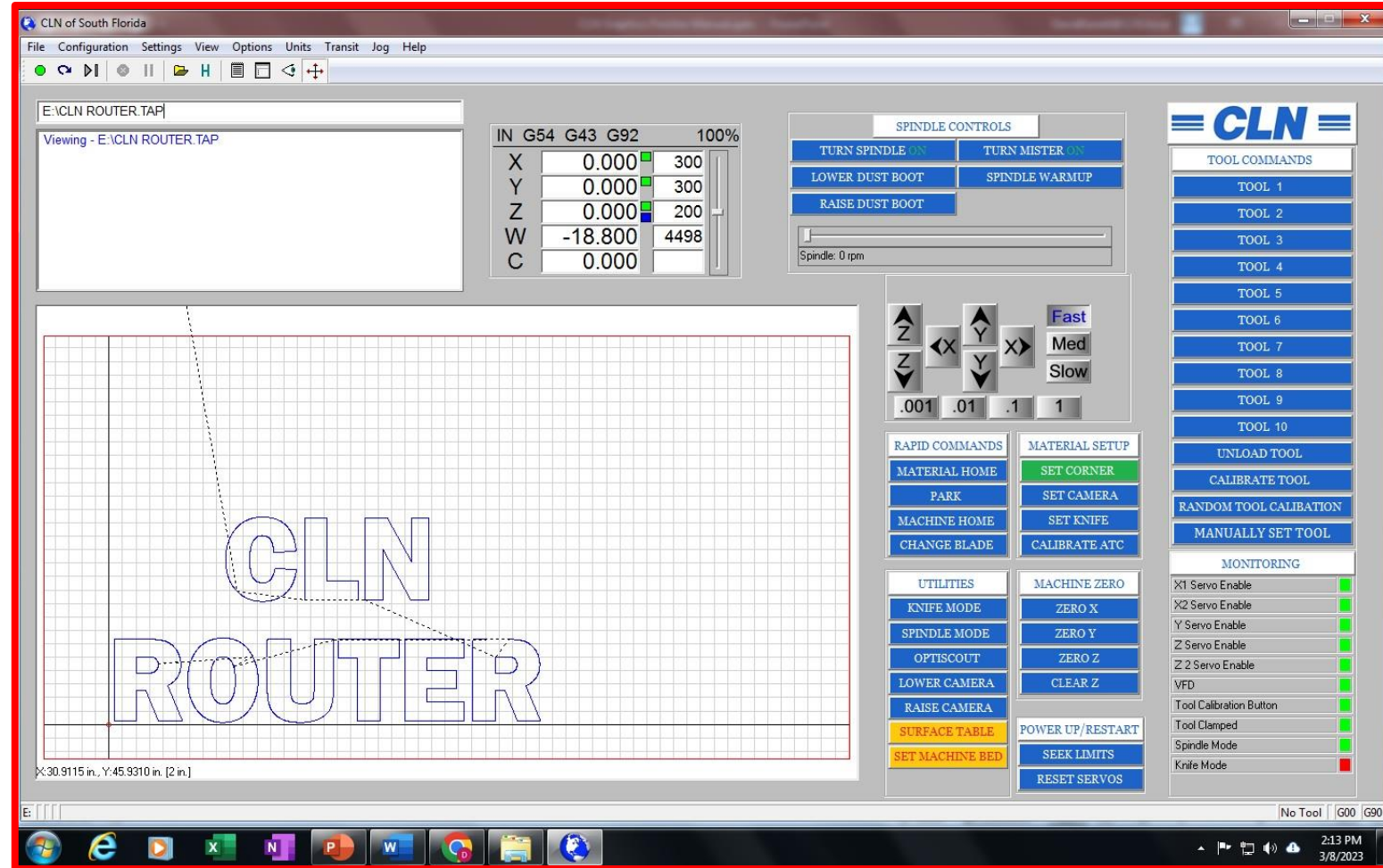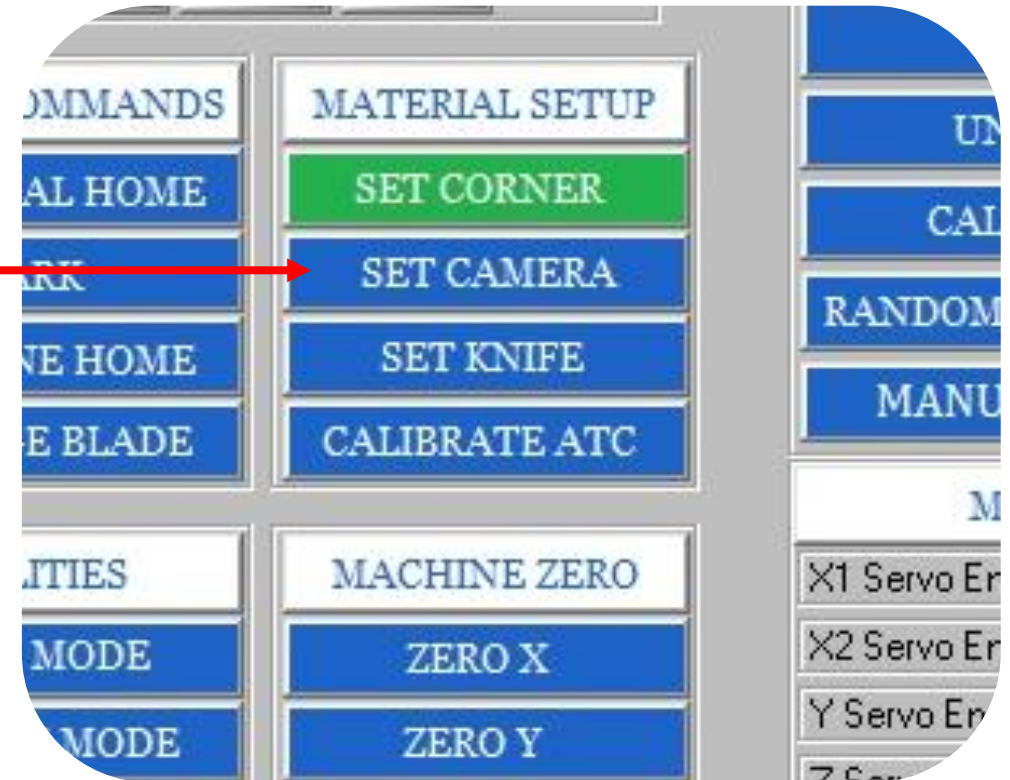
# Optiscout Software:

**Getting Started:**
- Open the CLN software by double clicking on the desktop icon on your computer. Once the program has opened and you have "Seek Limits" you can now click on the button that reads "Optiscout". This will open a separate program to run the Vision System. Make note, these programs work in conjunction with each other, so, in order to use the camera, you must have both programs open.

**Setting the Camera Height:**
- It is imperative that your camera height has been set correctly before using Optiscout. The recommended height setting is 1" above the material you are cutting. Be aware that this distance will vary depending on the lighting and material you are cutting. If your camera does not recognize the registration marks correctly, or the registration marks seem out of focus, try adjusting your height accordingly.

- Make sure your vacuum pump is on or your material is securely clamped in place. To set the height of the camera, click "Lower Camera" in the CLN software. The Spindle will raise up and the camera will lower down. With the camera down, slowly jog the Z Axis down using the jog buttons on the CLN Software. Lower the camera until it is 1" above the material and click "Set Camera". (You may have to turn your soft limits off if you cannot jog the camera down close enough to the material.) Once you have clicked "Set Camera" you can test to make sure you have set the height correctly jogging the camera down, if it was set correctly, you should not be able to jog past the point at which your camera was when you clicked "Set Camera".

- This only needs to be done when you change material thickness. The machine will remember its last set location, even after you power the machine down.

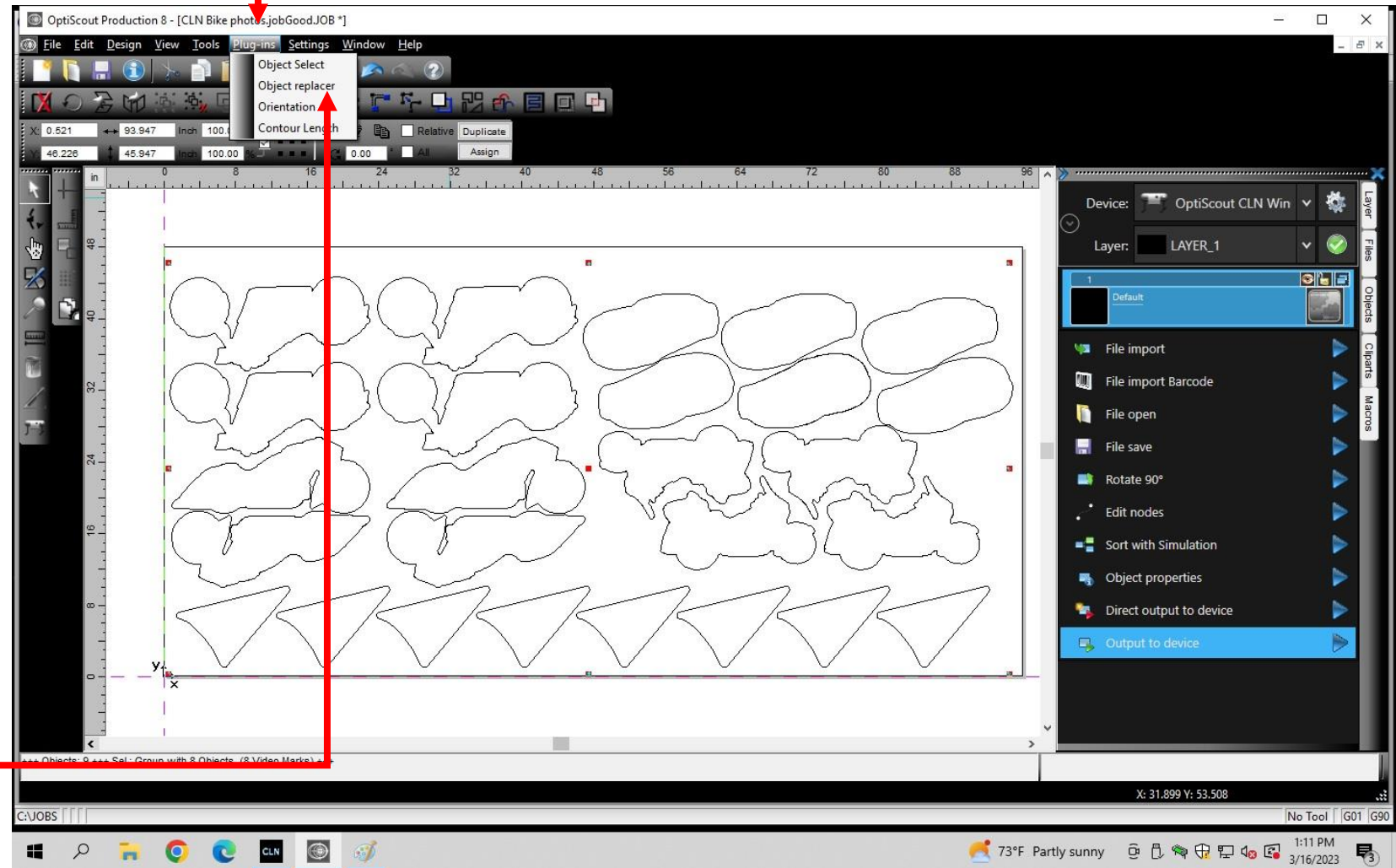# Optiscout Software Continued:

**Importing Artwork:**

- Now that we have the machine set up, we can import your artwork to Optiscout. Optiscout will allow you to open any number of files. (For a complete list open OptiScout and click on file> import and then click the drop-down box where it says "Files of type")

- In the OptiScout software click on "File Import" and select the type of file you wish to import by using the drop-down box "Files of type" and then locate your file. Click on the file and then click open. For certain types of files, it will give you the option to select the "Units" you wish to import the file in, make sure you have the correct units selected.
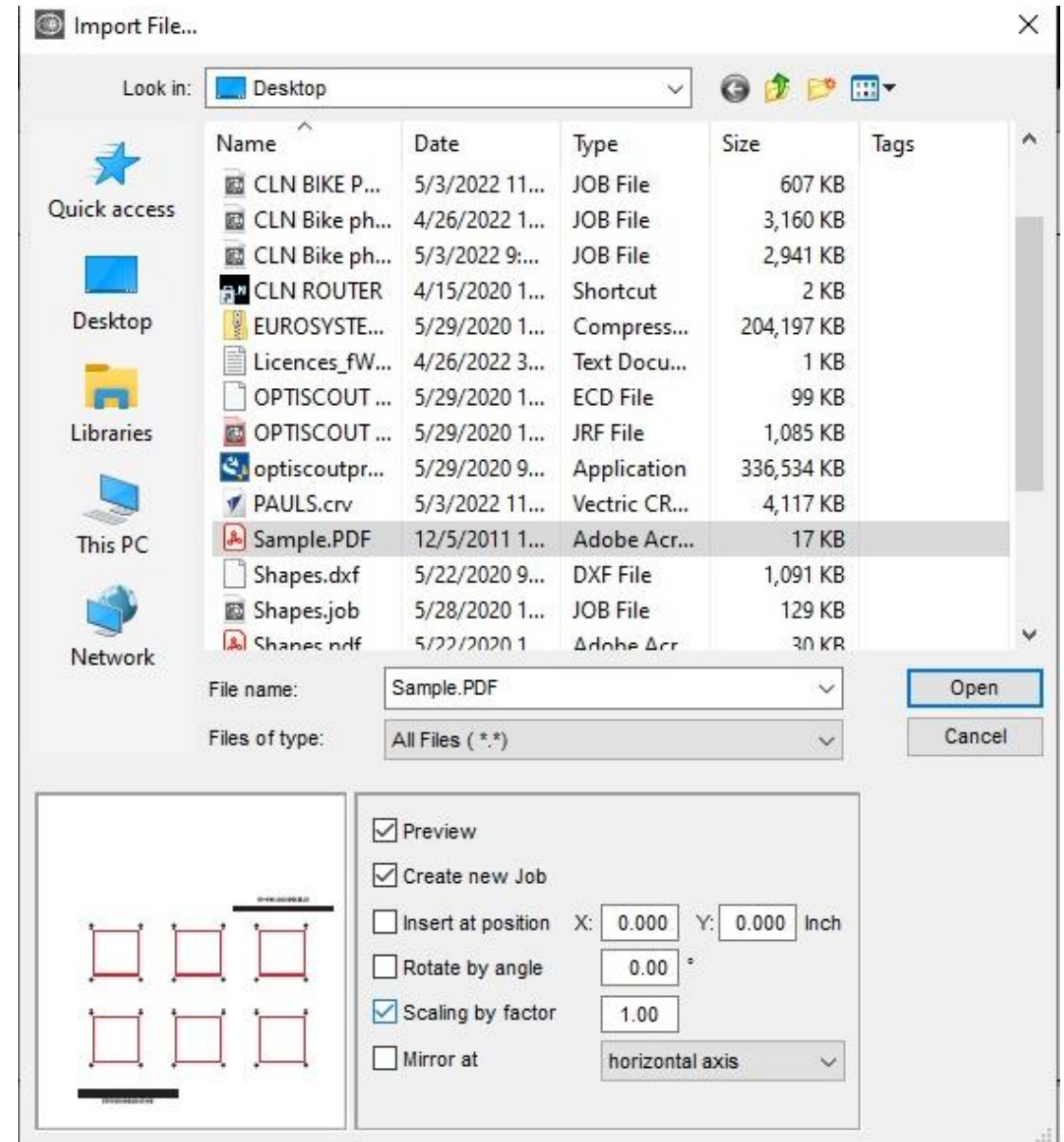
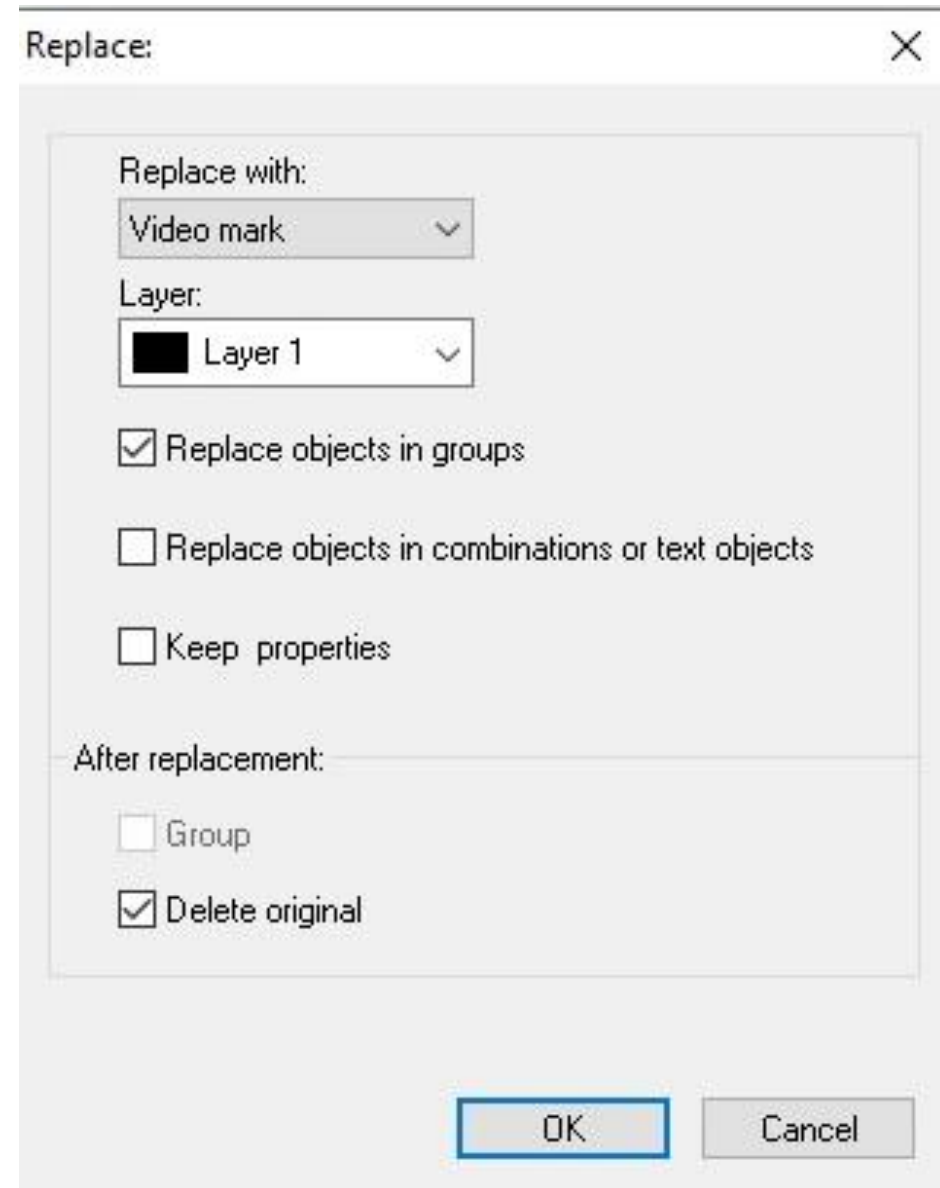# Optiscout Software Continued:

**Defining the Reg-marks:**

- Your printer must print a ¼" solid circle on the material around the parts but still with in the material size.

- You must convert the ¼" circles to Reg-marks in the Optiscout software.

- Select the ¼" circles, To do so select the circles left clicking on them. If you wish to select multiple circles you can left, click while holding down the shift key on your keyboard or left click and draw a box around the vectors you wish to select.

- Group them together. Press Ctrl-G on the keyboard.

- Then click on Plugins.

- Click on Object Replacer.

# Optiscout Software Continued:

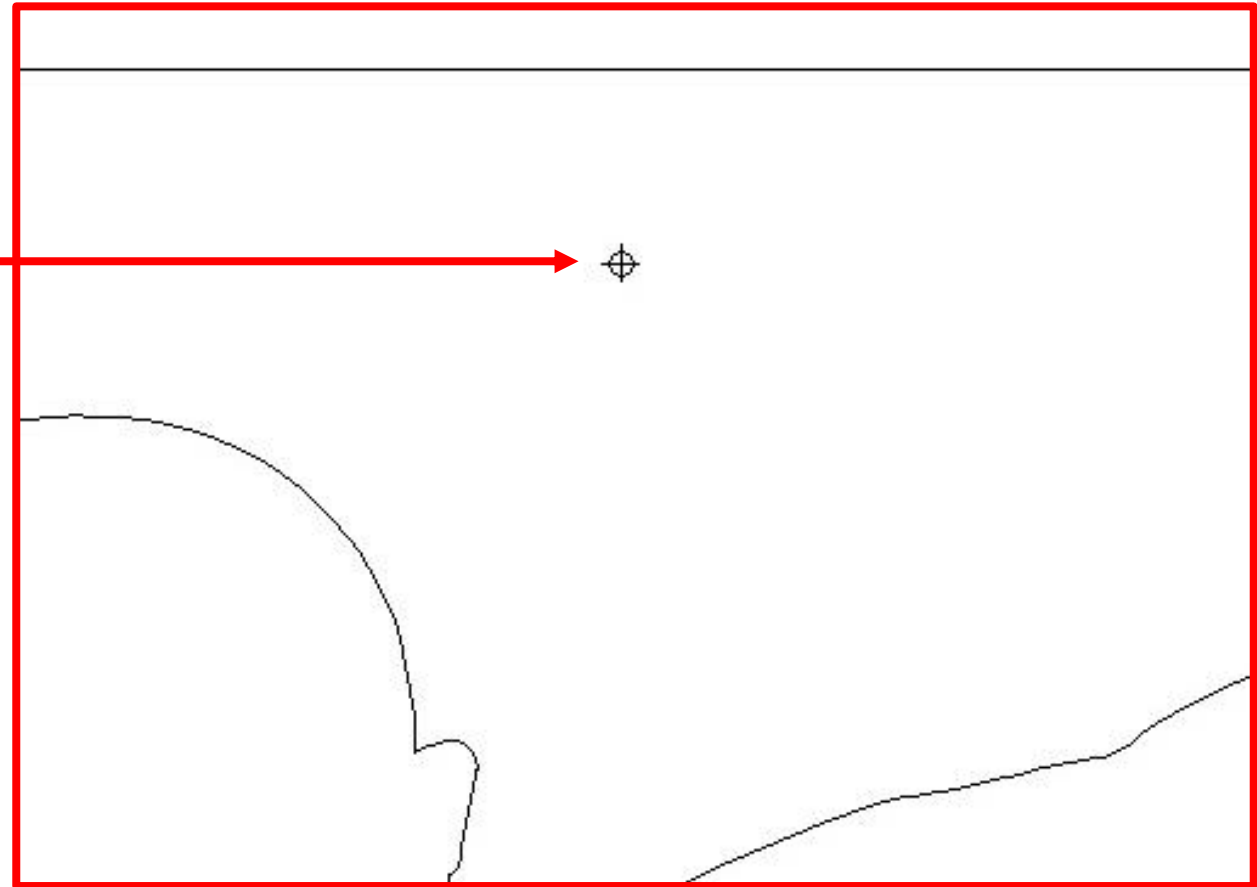**Defining the Reg-marks:**

- Select: video Marks

- Check: Replace objects in groups

- Check: Group

- Check: Delete original

- Click Okay

# Optiscout Software Continued:

**Defining the Reg-marks:**

- Optiscout will convert the ¼" circle to a Reg-mark.

- The camera can only recognize a ¼" circle so you can't print this on the material. You have to print a ¼" circle.

# Optiscout Software Continued:

**Preparing a Cut path:**

- To prepare a cut path we must first assign a layer to the vector lines we wish to either route or cut with the knife. To do so select the vectors you wish to cut by left clicking on them. If you wish to select multiple vectors you can, left click while holding down the shift key on your keyboard or left click and draw a box around the vectors you wish to select.

- Do not select the reg-marks. If you select one by accident, just click it again while holding the shift key.
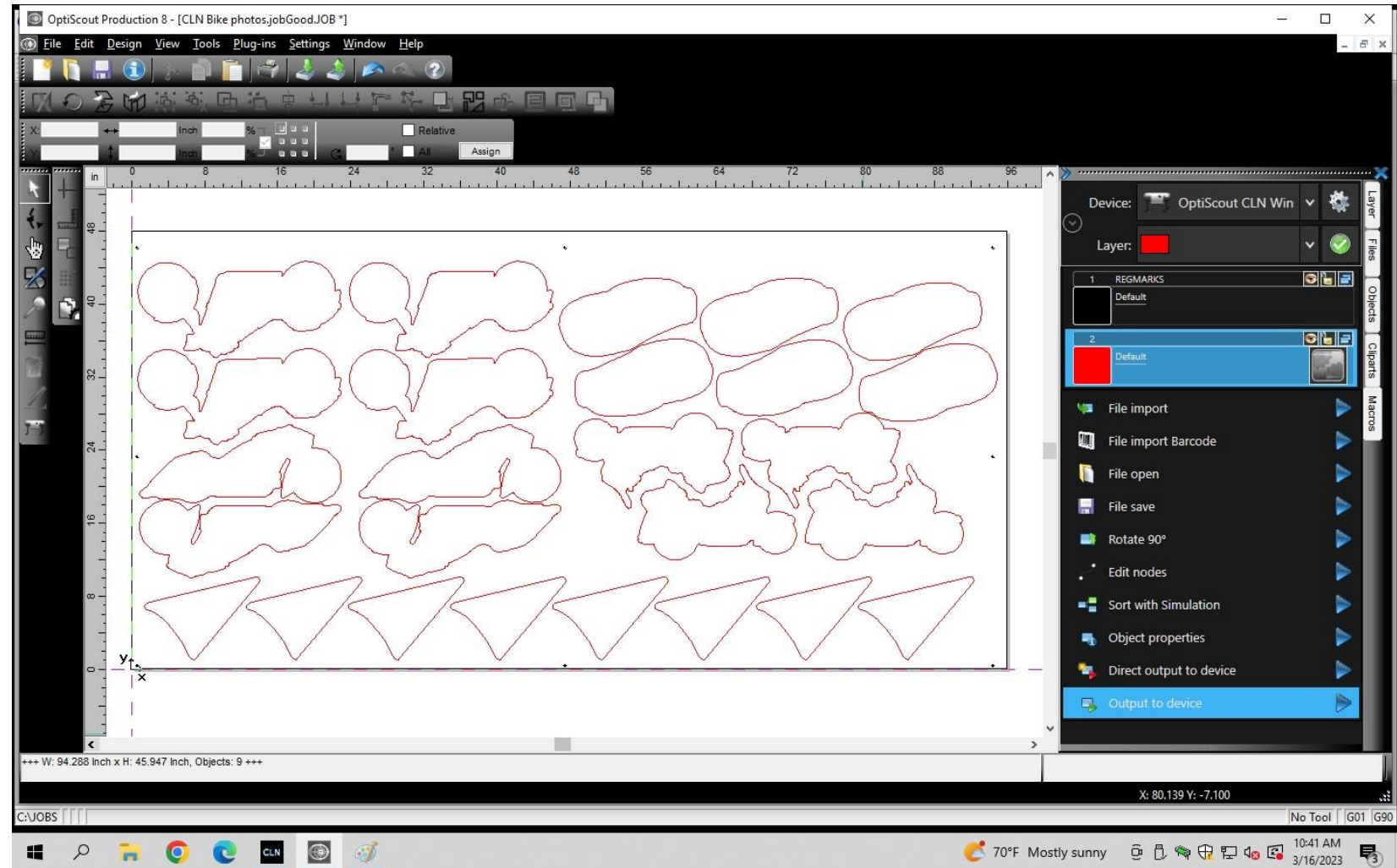
# Optiscout Software Continued:

**Assign A layer:**

- Once you have the desired vectors selected, we can now assign a layer to them. To do this click on the dropdown box to select a color. As shown below.
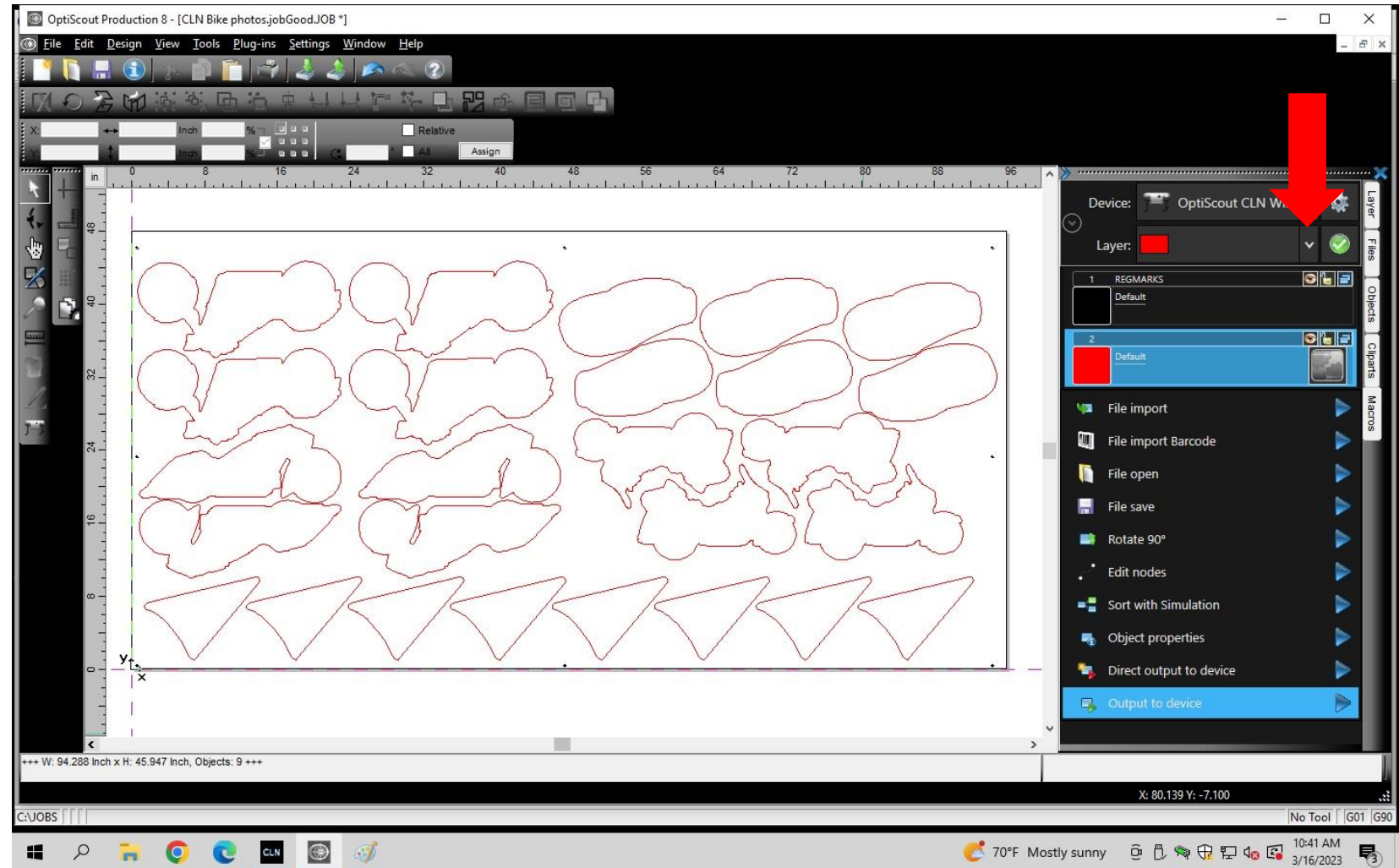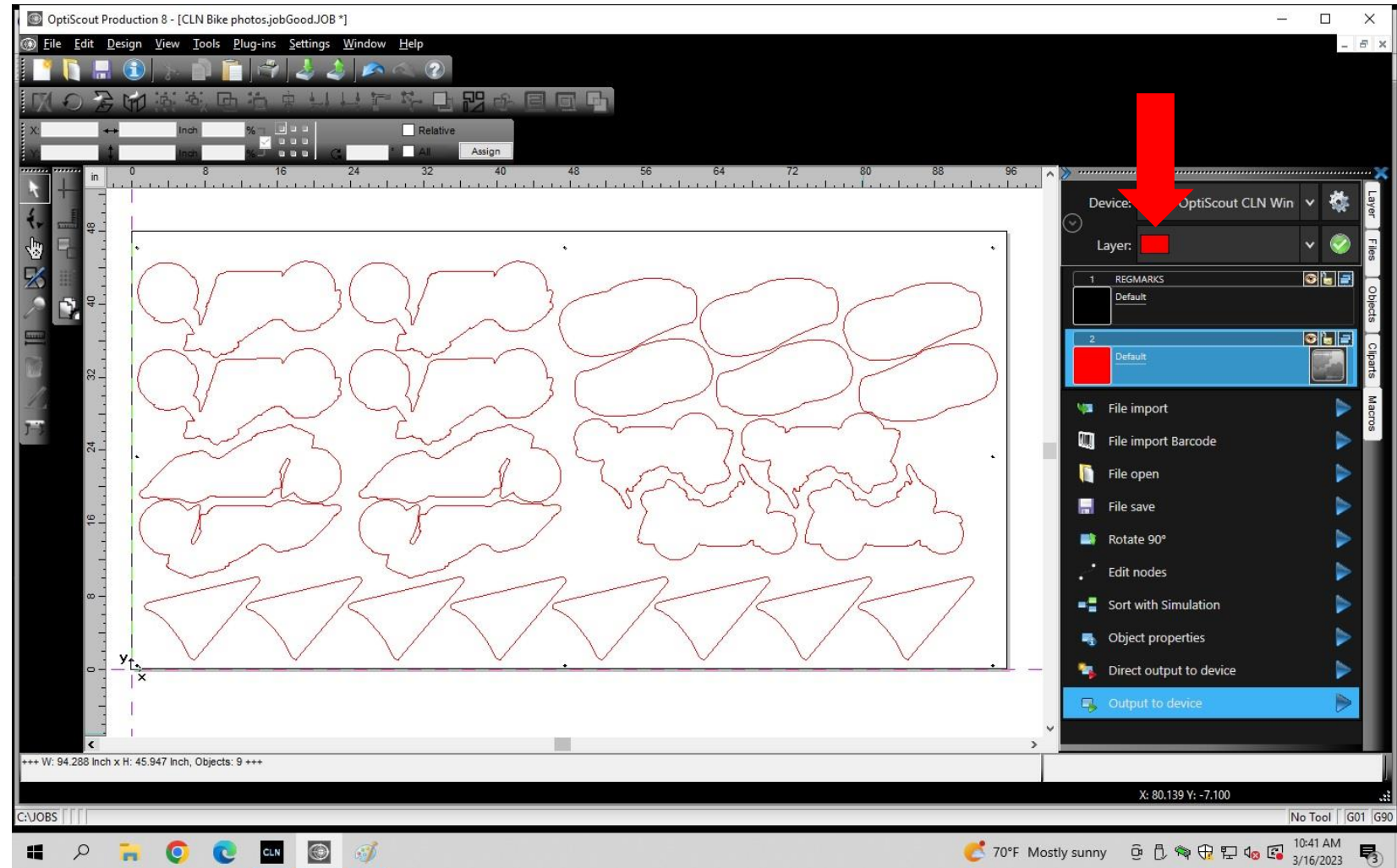
# Optiscout Software Continued:

**Select A Color:**

- Now, select a color from the list and then click the green check mark next to the drop-down box. It can be any color as long as you do not have repeating colors, for this example we will use red.

**Continue to the next page to: Make a Tool Path For the Router Bit**

**Go to: Create a Path For The Knife**

# Optiscout Software Continued:

**Make a Tool Path For the Router Bit:**

- Now that the parts are is on a different layer. We will make the Red layer our Cut path.

- Click on the new layer to expose the edit icon.

- Click on the edit button to the right of the red layer task bar. It will open a window where we can now select the tool we wish to use.

- Click on the dropdown box where it says "mode/tool" and select Routing.

-
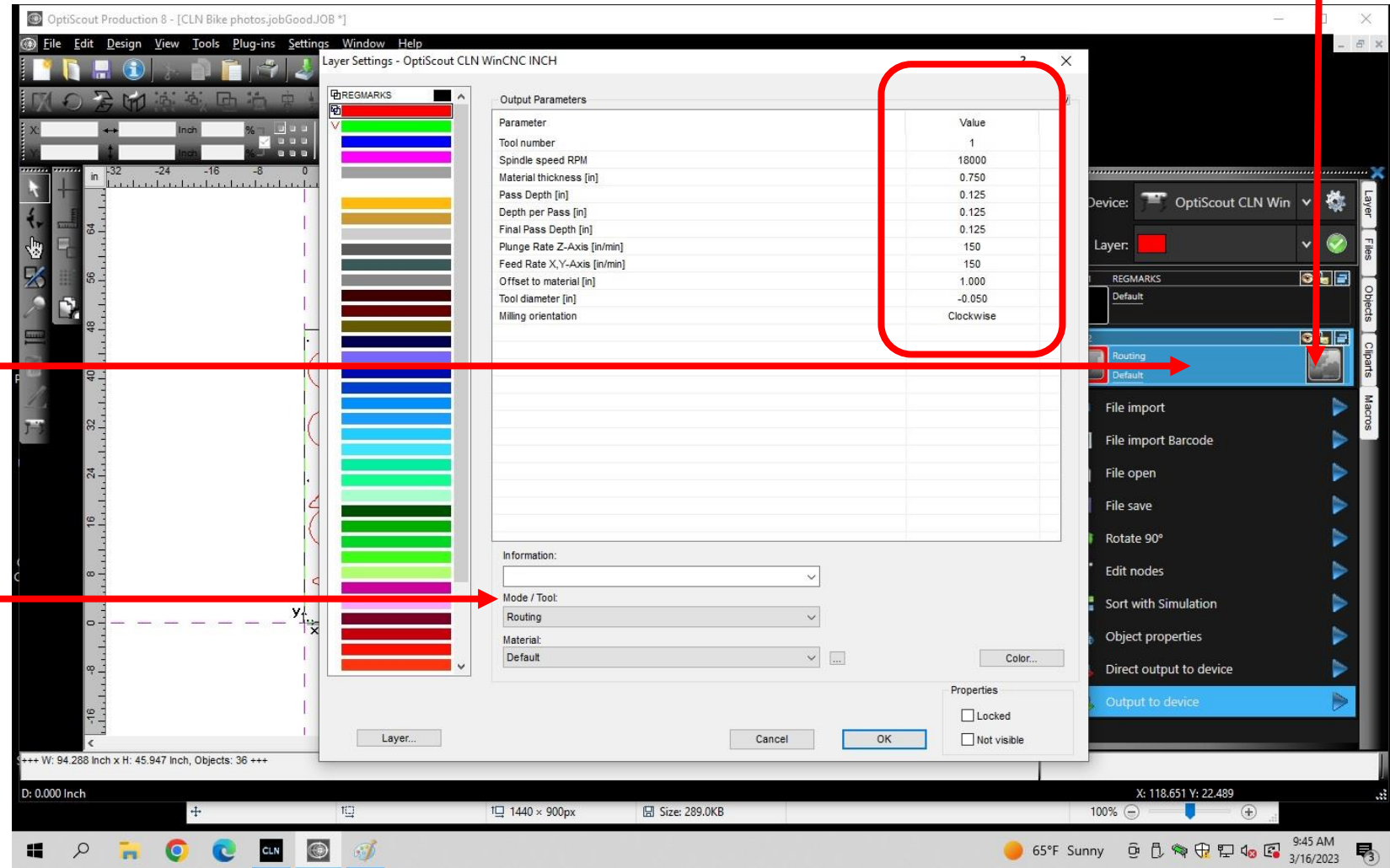
# Optiscout Software Continued:

**Make a Tool Path For the Router Bit Continued:**

- After you select Routing, a window will open with a few settings for the Router Bit.

- **Tool Number:** Must correspond with the tool changer.
- **Spindle Speed RPM:** Bit rotation speed.
- **Material Thickness:** How thick the material is.
- **Pass Depth:** Max depth that you want to cut.
- **Depth Per Pass**: For multiple passes.
- **Final Pass Depth:** The final pass for multiple passes.
- **Plunge Rate Z**: How fast the bit plunges into the material.
- **Feed Rate X Y:** How fast the bit cuts the material.
- **Offset To Material:** Bit height in between cuts.
- **Tool Diameter:** Size router bit.
- **Milling Orientation:** Direction of the cut around the part.

- For the tool diameter, a negative number will make the bit cut on the inside of the part. The picture shows that the bit diameter is -0.05 and its going to cut on the inside of the part.

| Output Parameters | |
|---|---|
| Parameter | Value |
| Tool number | 1 |
| Spindle speed RPM | 18000 |
| Material thickness [in] | 0.750 |
| Pass Depth [in] | 0.125 |
| Depth per Pass [in] | 0.125 |
| Final Pass Depth [in] | 0.125 |
| Plunge Rate Z-Axis [in/min] | 150 |
| Feed Rate X,Y-Axis [in/min] | 150 |
| Offset to material [in] | 1.000 |
| Tool diameter [in] | -0.050 |
| Milling orientation | Clockwise |

# Optiscout Software Continued:
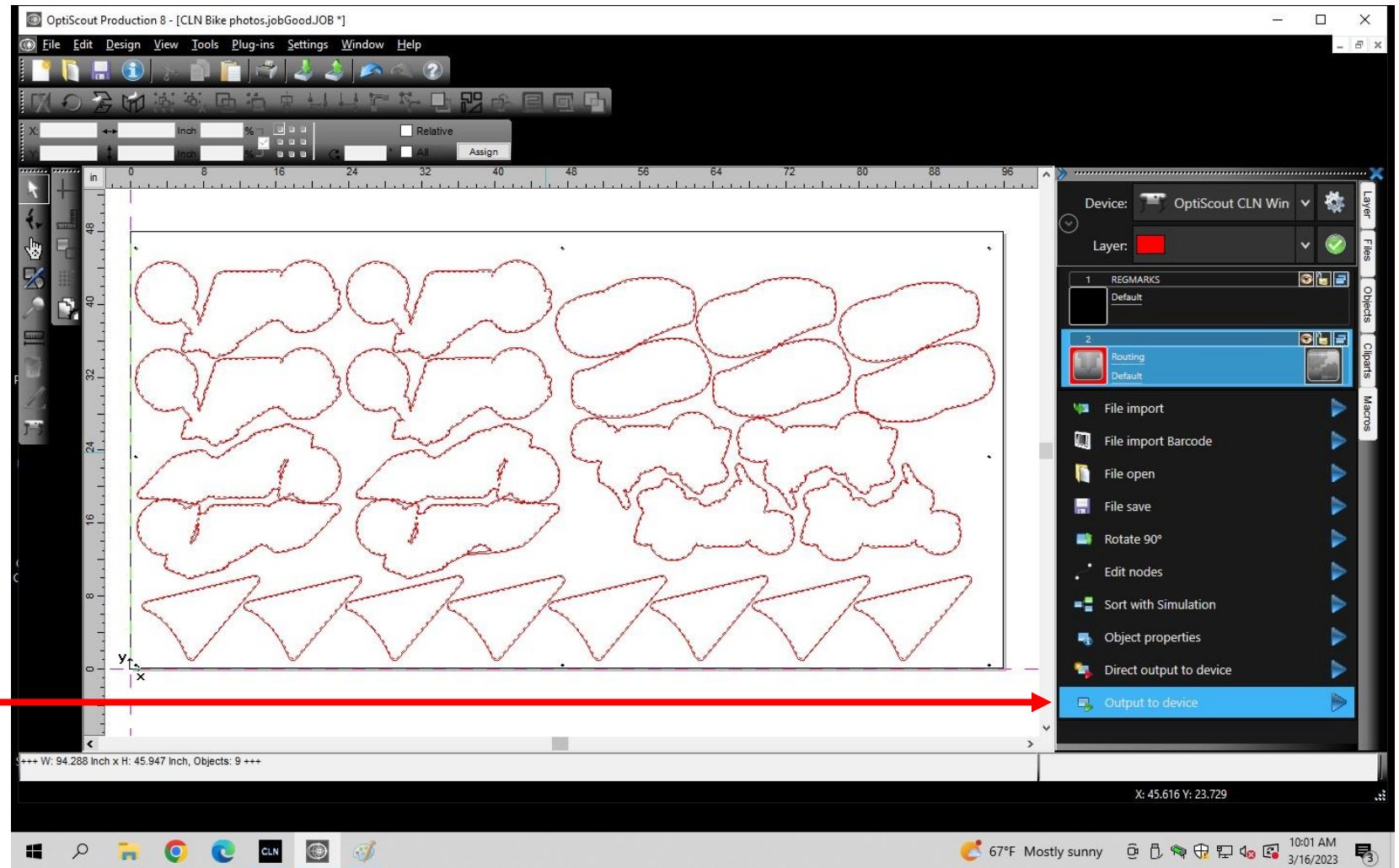
**Make a Tool Path For the Router Bit Continued:**

- You will see the tool path shown as a solid line around the parts. The parts will be shown as a doted line.

- F9 will show the Router Bit Tool Path. Below is an example of parts nested to close together. This is incorrect and needs to be fixed, then retool pathed.
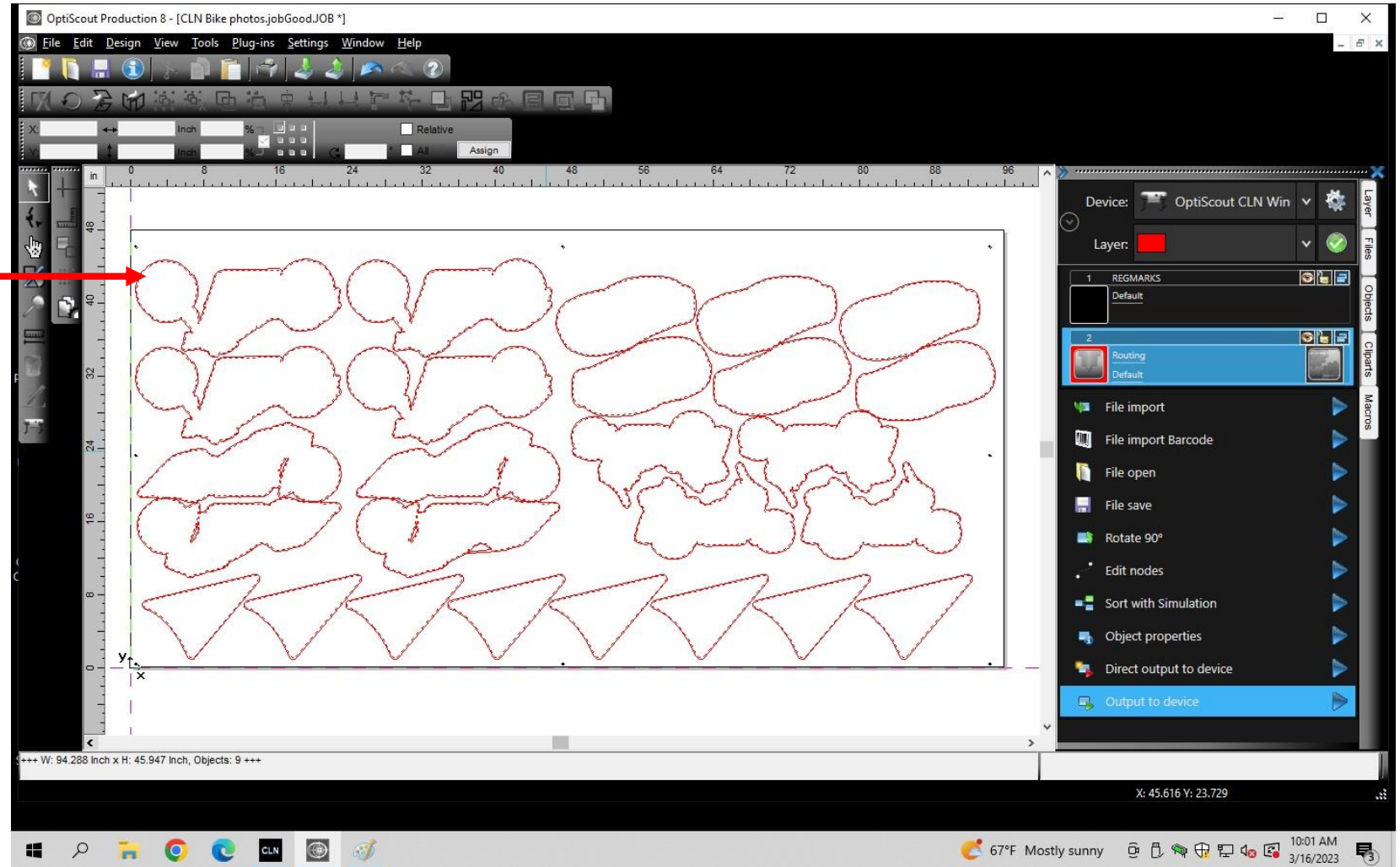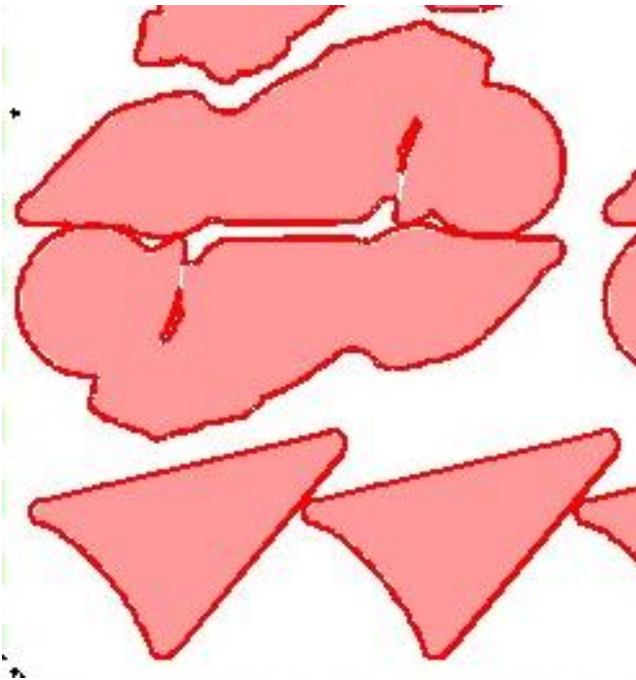
# Optiscout Software Continued:

**Make a Tool Path For the Router Bit Continued:**

- Before you output a job you must make sure that you don't have a saved Z position set on the table. The tip of the bit should be at zero when it's in contact with the MDF. Click Clear Z on the CLN Router Software to clear any saved Z position.

- Click on Output To Device.

- Once you get more familiar with Optiscout you can use Direct Output to Device. This is for production jobs

# Optiscout Software Continued:

**Make a Tool Path For the Router Bit Continued:**

- Production Mode- If you chose "production" the machine will run the entire job without you having to prompt it to the next step. If you choose "manually production" you will have to find the first registration mark and then the machine will take over from that point. If you choose "manually" you will have to find the first registration mark and then continue to press run until your machine begins cutting.

- For the first time: Set production to manual.

- Set the mister.

- Click output.

- The machine will unload a tool if there is one in the spindle then lower the camera.

# Optiscout Software Continued:

**Make a Tool Path For the Router Bit Continued:**

- Locate the first reg-mark. It will be highlighted in pink.

- Use the arrows on the keyboard to jog the camera as close as you can to the first reg-mark. Then click on the red circle. The machine will move to the exact position of the circle.

- Click on the Reg-mark Icon to make the machine automatically search for the other Reg-marks.

- Now click on Run. The machine will begin the routing sequence.

- Quickly switch back to the CLN Router software to regain control of the machine. Hitting the space bar to Pause the machine only works while the CLN Software is active.

# Optiscout Software Continued:

## Create a Path For the Knife:

**Setting the Knife Height**
- Before you begin to cut with your knife you must set the height of the blade. When using the Knife, the machine cuts to the machine bed. For example, if you are cutting 0.25" material then, when you are in the cut you will be at Z 0.0", when you make a rapid move to your next cut you will be somewhere above 0.25", let's say, 0.3125" which would make your blade come out of the material 0.0625" before it makes a rapid move or adjusts its cut angle.

**Set the Blade Height**
- To set the blade height, make sure that the machine is in Knife mode. In the CLN software slowly lower the Z Axis with jog buttons on the screen. You are going to want to lower the blade to the cutting felt, so make sure your table is free of material. (If you have not yet installed a blade, please refer to Change the Knife Blade section of this manual. Once you have the blade in contact with the cutting felt, click "Set Knife". (You may have to turn your soft limits off if you cannot jog the Blade down to the cutting felt.) If your blade has been set correctly the reading for the Z Axis should read 0.000 at this time. You will need to do this again when you change blades. Basically, what we are doing here is calibrating the knife blade.
- **Note:** The blade oscillates. That means the blade moves up and down, so when you set Z for the knife, the blade could be at the down stroke. So check the cut on the first part you may have to set the blade a bit deeper. .001 deeper should be enough.
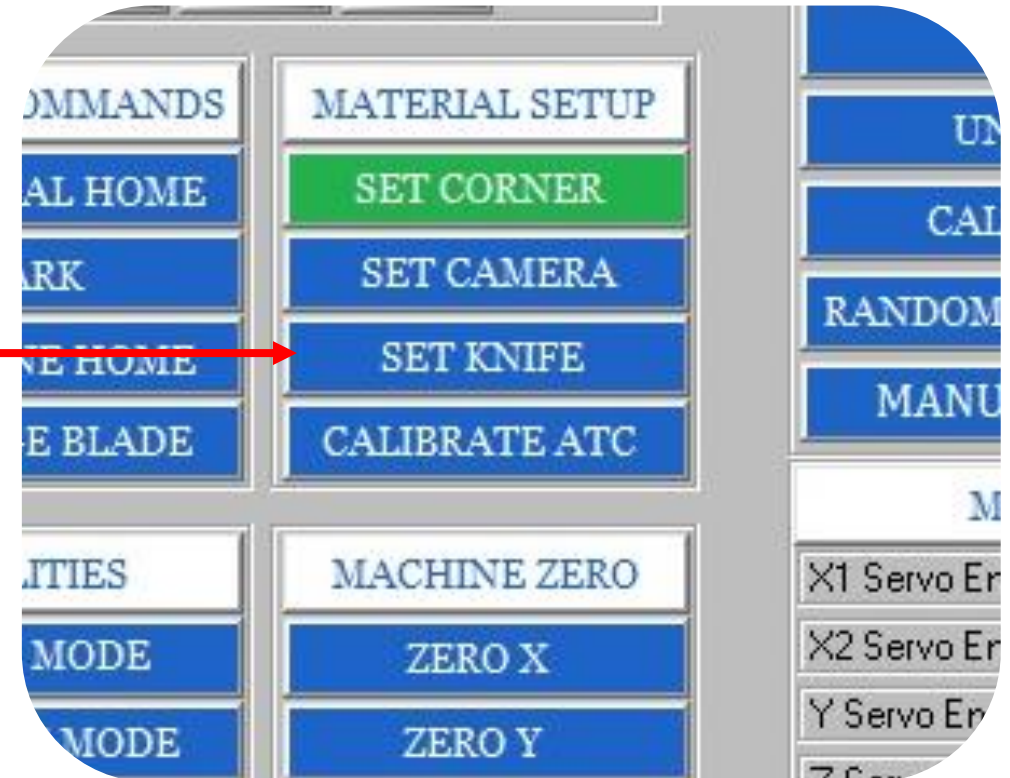
# Optiscout Software Continued:

**Create a Path For the Knife Continued:**

- Now that the parts are is on a different layer. We will make the Red layer our Cut path.

- Click on the new layer to expose the edit icon.

- Click on the edit button to the right of the Red layer task bar. It will open a window where we can now select the tool we wish to use.

- Click on the dropdown box where it says "mode/tool" and select Oscillating Knife.

-
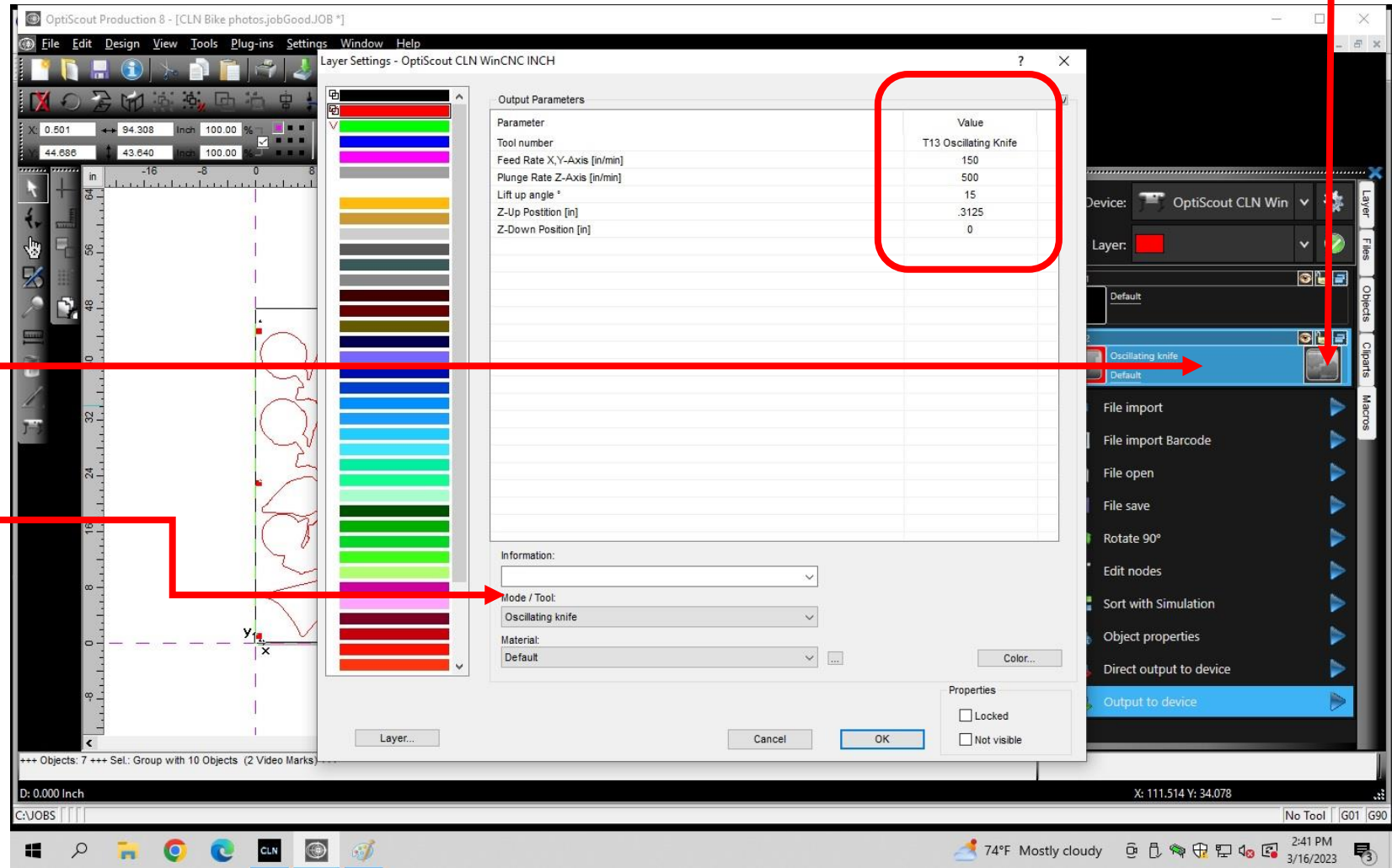
# Optiscout Software Continued:

**Create a Path For the Knife Continued:**

- After you select Routing, a window will open with a few settings for the Router Bit.

- **Tool Number:** Don't change this. Default tool number for the knife.
- **Feed Rate X Y:** How fast the knife cuts the material.
- **Plunge Rate Z**: How fast the knife plunges into the material.
- **Lift Up Angle:** Max angle without lifting the blade out of the material..
- **Z Up Position:** Blade height in between cuts. Must be greater than the thickness of the material
- **Z Down Position:** Blade depth in the material.

- For Z up position, you have to calculate the thickness of the material plus the height that you want the blade to move to in between cuts.

| Output Parameters | |
|---|---|
| Parameter | Value |
| Tool number | T13 Oscillating Knife |
| Feed Rate X,Y-Axis [in/min] | 150 |
| Plunge Rate Z-Axis [in/min] | 500 |
| Lift up angle ° | 15 |
| Z-Up Postition [in] | .3125 |
| Z-Down Position [in] | 0 |

# Optiscout Software Continued:

**Create a Path For the Knife Continued:**

- Before you output a job, you must make sure that you don't have a saved Z position set on the table. The tip of the knife should be at zero when it's in contact with the felt. Click Clear Z on the CLN Router Software to clear any saved Z position.

- Click on Output To Device.

- Once you get more familiar with Optiscout you can use Direct Output to Device. This is for production jobs
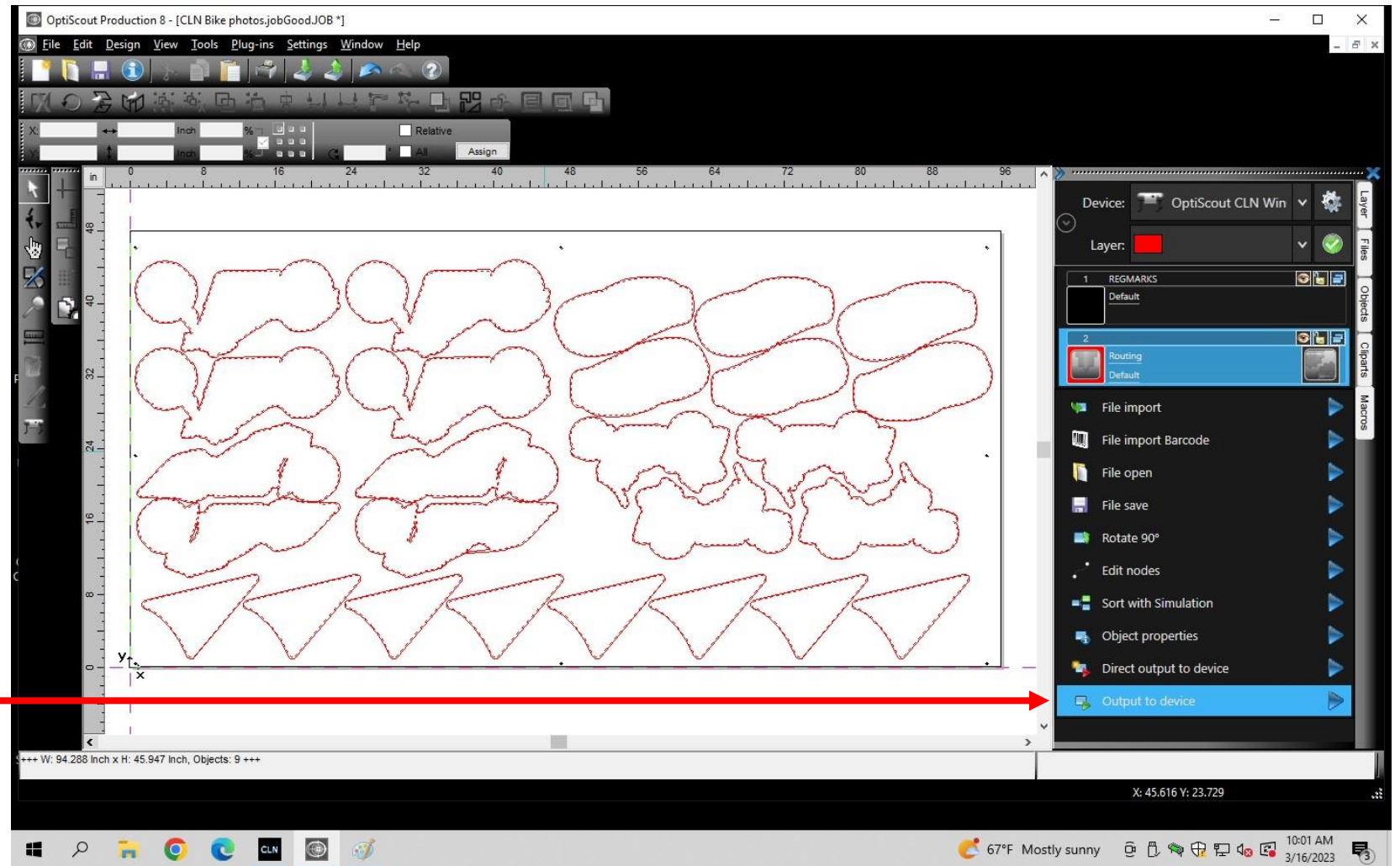
# Optiscout Software Continued:

**Create a Path For the Knife Continued:**

- Production Mode- If you chose "production" the machine will run the entire job without you having to prompt it to the next step. If you choose "manually production" you will have to find the first registration mark and then the machine will take over from that point. If you choose "manually" you will have to find the first registration mark and then continue to press run until your machine begins cutting.

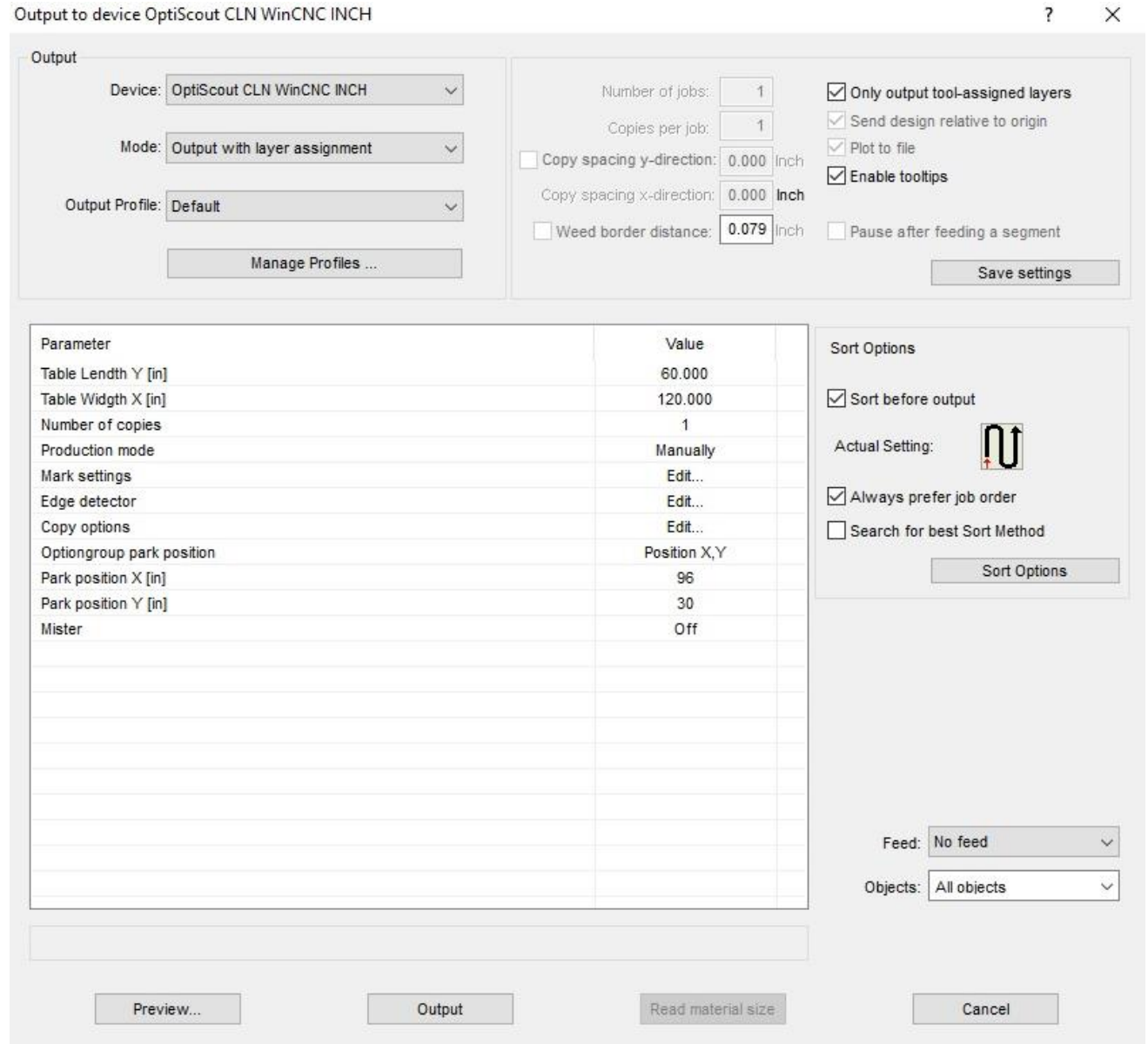- For the first time: <span style="color:red">Set production to manual.</span>

- Set the mister to off.

- Click output.

- The machine will unload a tool if there is one in the spindle then lower the camera.

---

Output to device OptiScout CLN WinCNC INCH

**Output**

Device: OptiScout CLN WinCNC INCH

Mode: Output with layer assignment

Output Profile: Default

Manage Profiles ...

Number of jobs: 1
Copies per job: 1
☐ Copy spacing y-direction: 0.000 Inch
☐ Copy spacing x-direction: 0.000 Inch
☐ Weed border distance: 0.079 Inch

☑ Only output tool-assigned layers
☑ Send design relative to origin
☑ Plot to file
☑ Enable tooltips
☐ Pause after feeding a segment

Save settings

| Parameter | Value |
|---|---|
| Table Lendth Y [in] | 60.000 |
| Table Widgth X [in] | 120.000 |
| Number of copies | 1 |
| Production mode | Manually |
| Mark settings | Edit... |
| Edge detector | Edit... |
| Copy options | Edit... |
| Optiongroup park position | Position X,Y |
| Park position X [in] | 96 |
| Park position Y [in] | 30 |
| Mister | Off |

**Sort Options**

☑ Sort before output

Actual Setting:

☑ Always prefer job order
☐ Search for best Sort Method

Sort Options

Feed: No feed
Objects: All objects

Preview...    Output    Read material size    Cancel

# Optiscout Software Continued:

**Create a Path For the Knife Continued:**

- Locate the first reg-mark. It will be highlighted in pink.

- Use the arrows on the keyboard to jog the camera as close as you can to the first reg-mark. Then click on the red circle. The machine will move to the exact position of the circle.

- Click on the Reg-mark Icon to make the machine automatically search for the other Reg-marks.

- Now click on Run. The machine will begin the cutting sequence.

- Quickly switch back to the CLN Router software to regain control of the machine. Hitting the space bar to Pause the machine only works while the CLN Software is active.
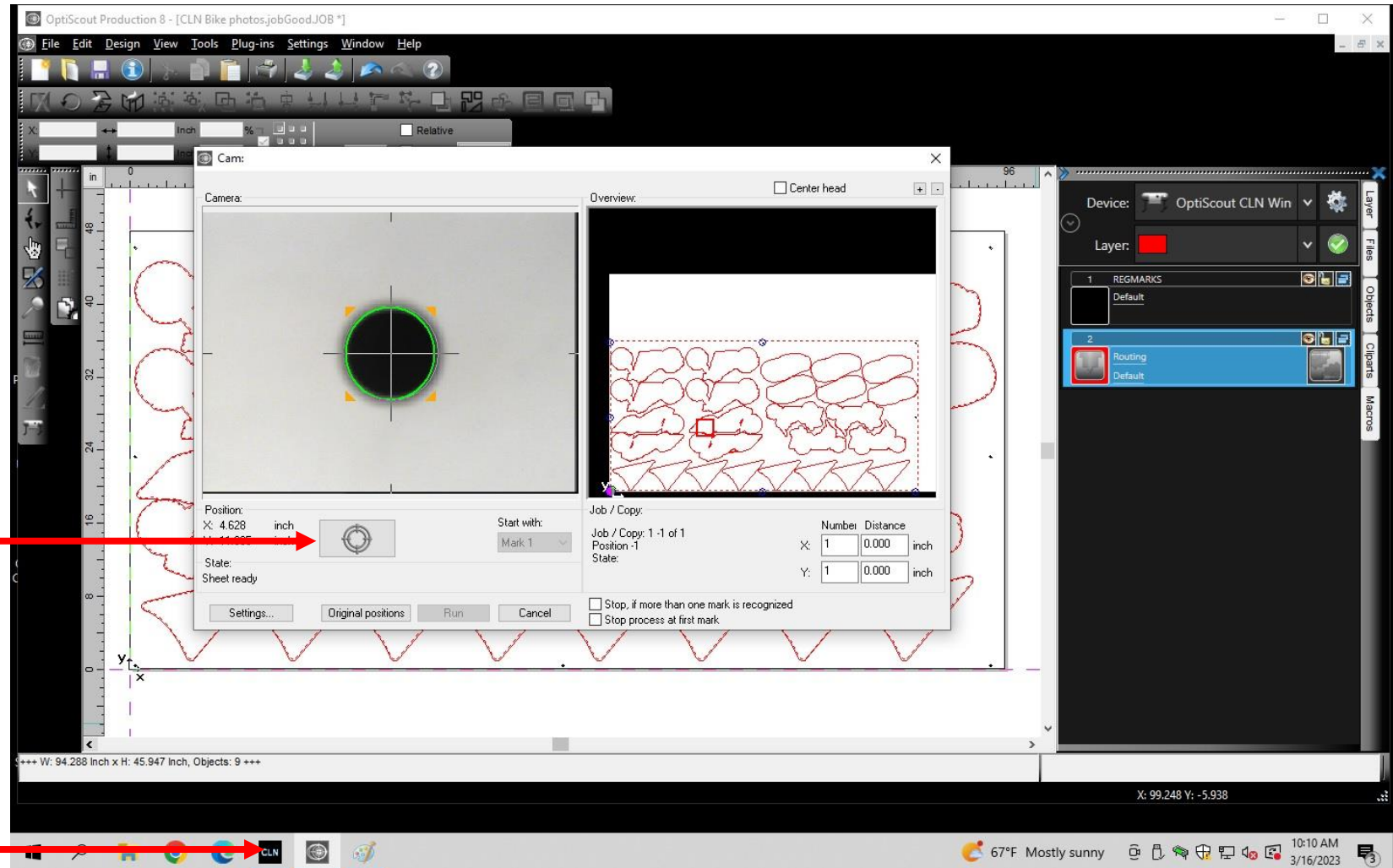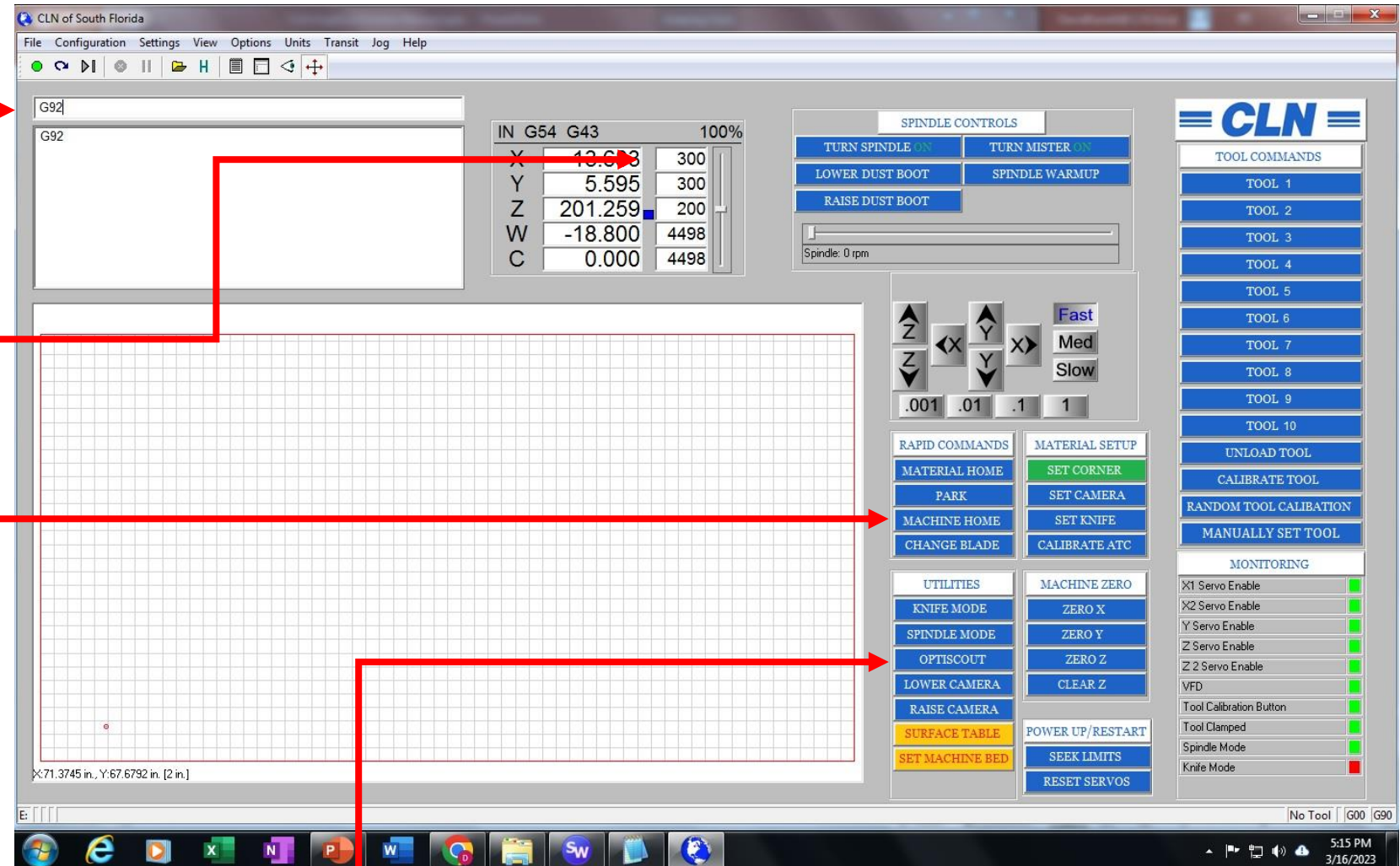
# Camera Alignment:

**Camera alignment is not required on new machines. The camera is set at the factory.**
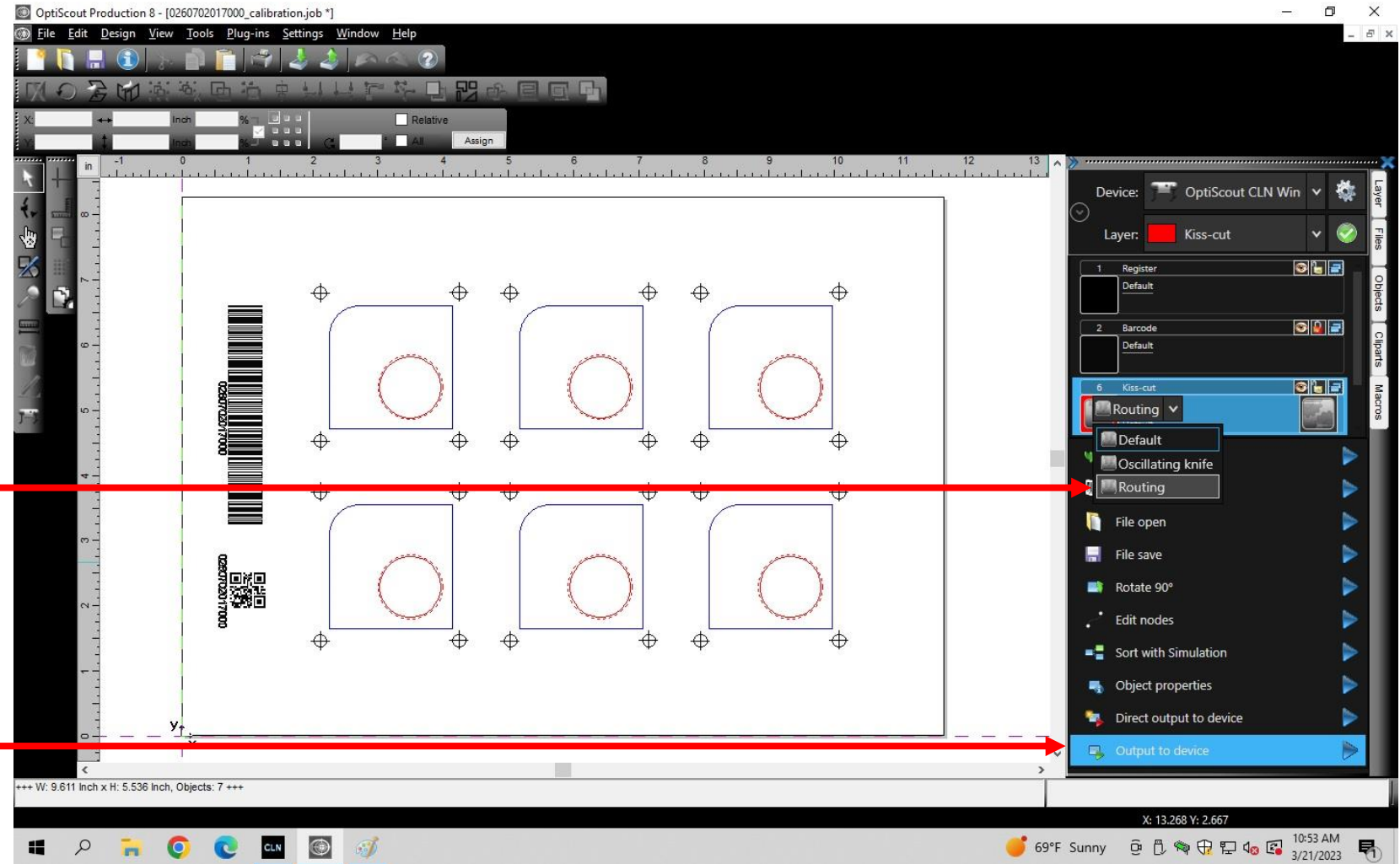
**Aligning the Camera to the Spindle:**

- Insert a ¼" bit in the spindle. Then lay a sheet of ACM on the table.

- On the CLN router program, click on Machine home.

- In the command line terminal type, a G92 then press enter to clear all of the save's local positions.

- All green boxes for X and Y should be removed.

- From the CLN Router program, move the router bit to a location near machine home, You can use any position that you wish just use whole numbers. In the command line terminal type X10.0 then press enter, then type Y10.0 then press enter. The spindle should be at X / Y 10".

- Turn on the spindle and use the jog keys to lower Z and Drill a 1/4" hole in this spot. The hole color should be in sharp contrast to the surrounding area. The camera will use this hole for calibration purposes.

- Without moving X or Y record the X, Y location on a piece of paper for example we moved it X 10.0", Y 10.0".

- Start Optiscout from CLN Router Software.

# Camera Alignment Continued:

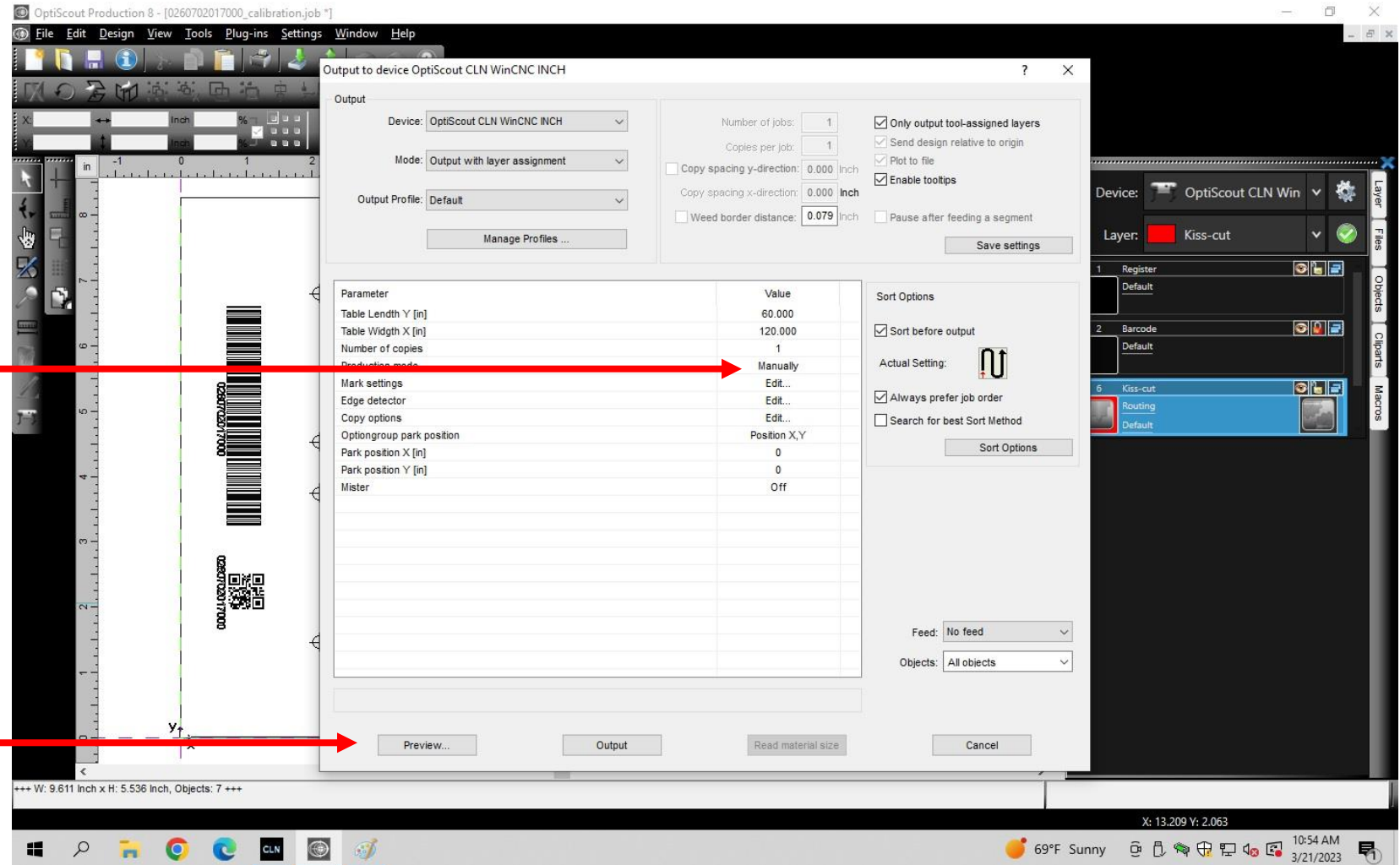**Aligning the Camera to the Spindle Continued:**

- Click on file open, go to: C:\ Program filesx86 \ Eurosystems \ OptiScout \ Production 8 \ Jobs \ 0260702017000_Calibration.job

- In the red layer click on device then click on routing.

- Click on output to device.

# Camera Alignment Continued:

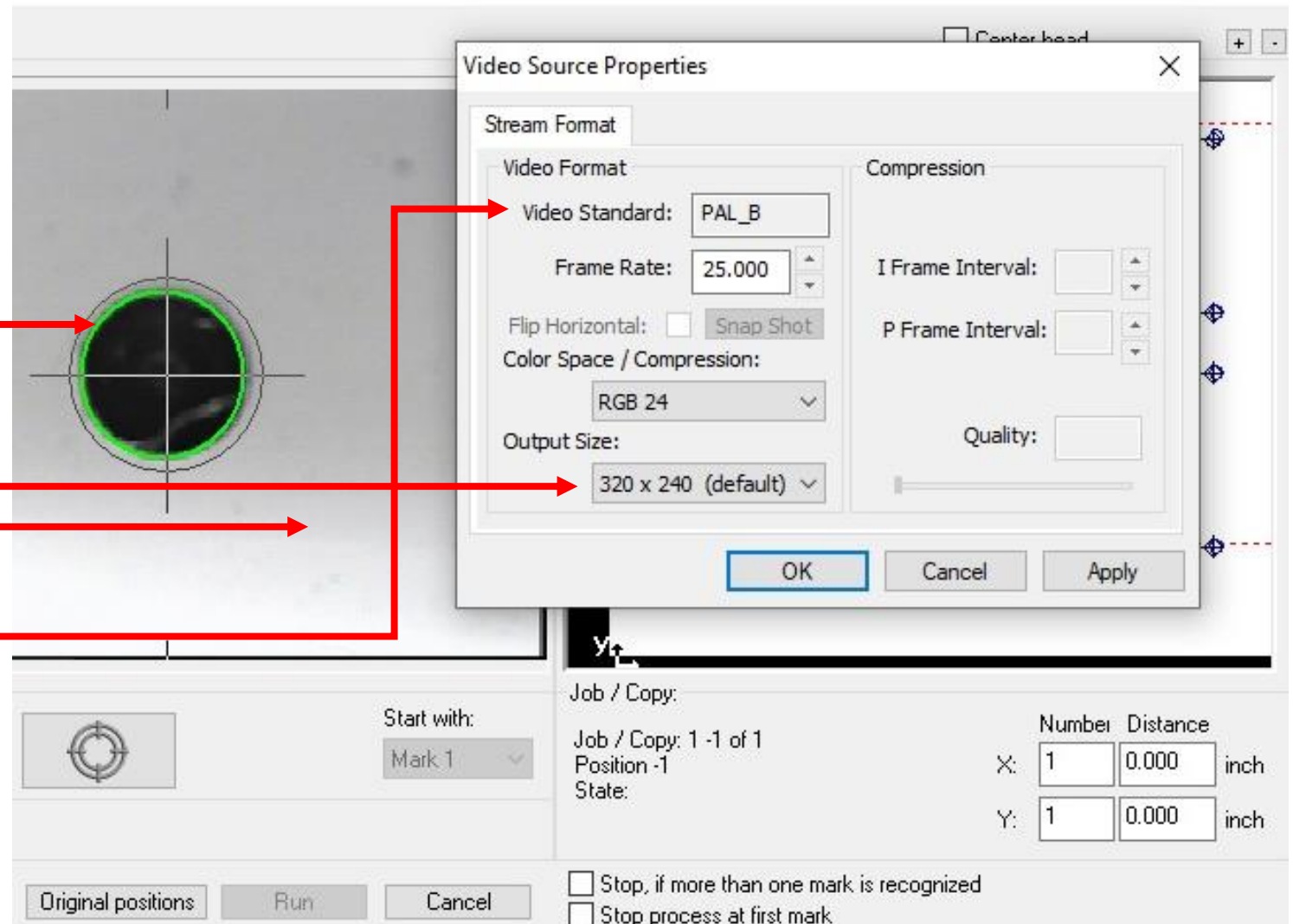**Aligning the Camera to the Spindle Continued:**

- Set "Production Mode" to "Manually".

- Click "Preview". The Camera will now come down to the top of the table.

# Camera Alignment Continued:

**Aligning the Camera to the Spindle Continued:**

- Move to view the drilled hole. Click the red circle so that the machine will automatically find the circle.

- Right click on the camera screen, then select (Default Settings) then (Video Settings) then (Video Format)

- In the view source properties window, you will see the Output Size, it must be set to (320 x 240, its the default size!!!!!!)

- Make sure the Video Standard: is PAL_B

- Click Apply then click Okay.

# Camera Alignment Continued:

**Aligning the Camera to the Spindle Continued:**

- Right click on camera window and click (Default Settings)  then (Mark Recognition)

- You may have to adjust the Frame Size. The orange box that's around the green circle!, must be larger than the green circle Set it to 130.

- Click Measure then Save.
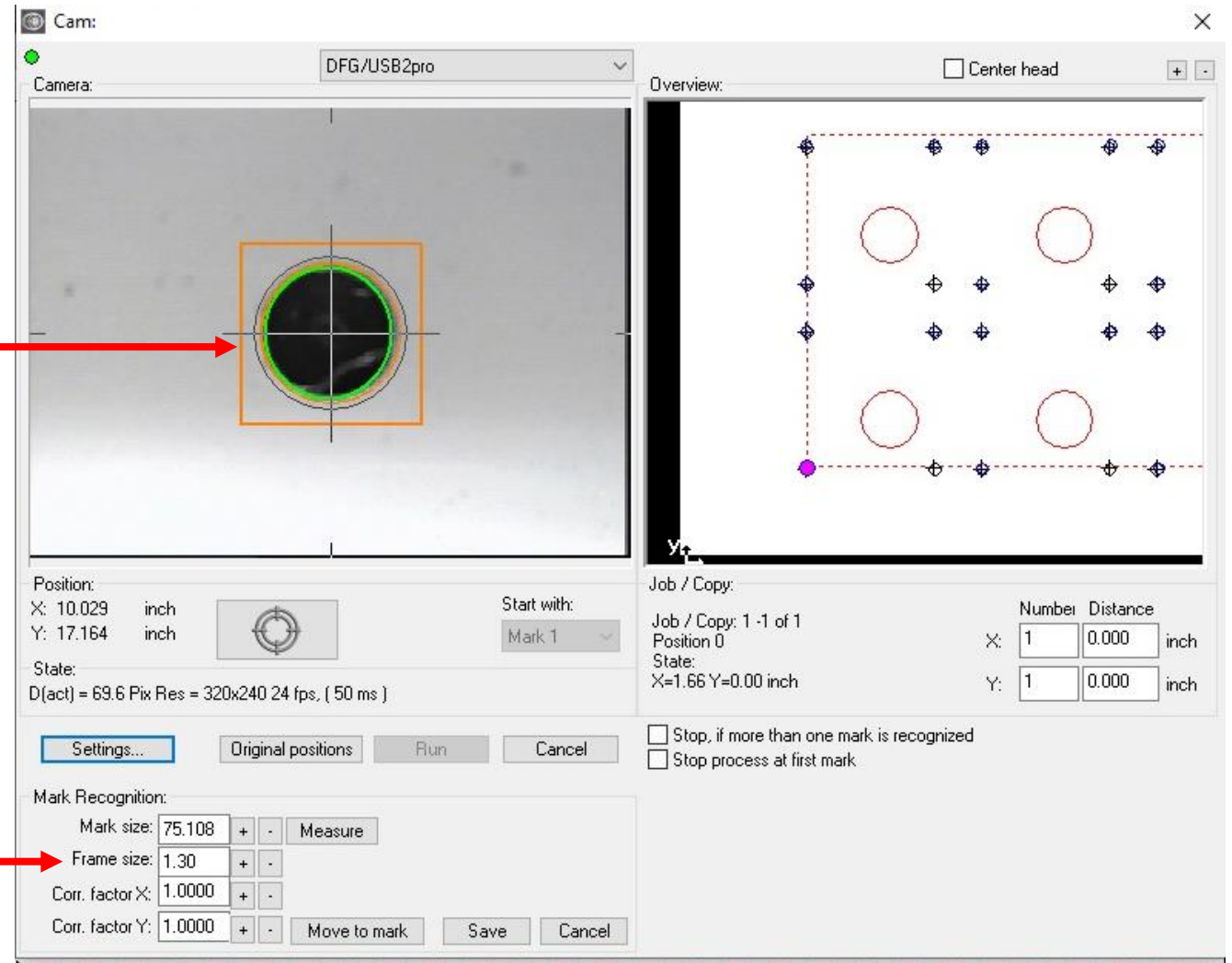
# Camera Alignment Continued:

**Aligning the Camera to the Spindle Continued:**

- Right click on camera screen and select (Default Settings) then (Camera offset)

- Set the Pattern Size to .25. This is the size of the Reg-Mark that is printed on the material.

- There are two places, one over the other that say, "Pos". Set the top Pos to the X value of the hole you cut. Set the bottom Pos to the Y value.
- (X10 and Y10).

- Click Snap Circle Size.

- It's important to Click Measure one time and wait for the X and Y camera offsets to change to change.

- Click save. Wait 5 seconds.

- Click Cancel.

**For new Optiscout installs Only:**
- Copy and paste this {Optiscout CLN VER 2.ECD} driver, to the following path. C:\ PostP \ Optiscout install \ Optiscout drivers \ Optiscout

- When you click this file it will bring up a screen to select the correct driver then, click save.
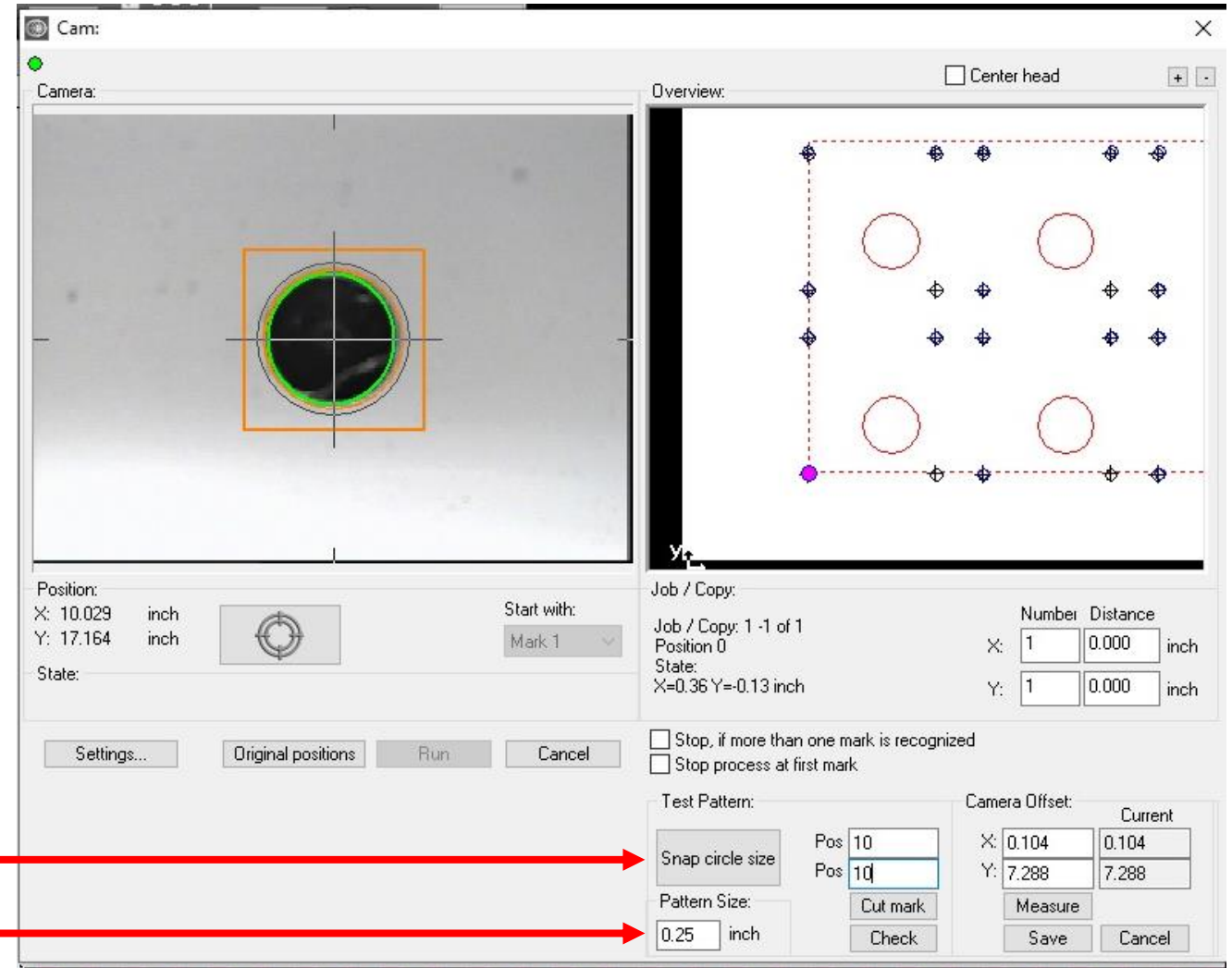
# Router Bit Height:

- It is very important to control the Router bit height while it's cutting. You must first set the machine bed then calibrate the tools.

- The object is, to have the bit cut into the MDF by as little as posable, no more than .01".

- For a vacuum table that is pulling a vacuum through a sheet of MDF. The MDF, after awhile will compress a small amount. For a clamp down table, that has MDF on it, the MDF will swell if you are located in a high humidity area. So you will have to adjust the Z height to compensate for it.

- To adjust the bit, stop the machine from cutting. Move X and Y so that the bit is clear of the material. In the Command Line Terminal type Z0, press enter. The bit will move to the current set zero position. Set the transit buttons to .001 and adjust the bit height.

- Click Zero Z, Notice a green box appeared next to the Z position. This is a local home position. You have just overridden the machine bed height. The machine will let you cut deeper by .001 before you must reset the machine bed. Clear Z will set Zero back to where the machine bed was set.

- Continue cutting and inspect the cut depth. Repeat if necessary.

# Trouble Shooting

Camera

Knife

Spindle

# Camera:

**Problem-** Camera does not pick up the registration marks.
**Solution-** Reset the camera height, either up or down.

**Problem-** The file you imported comes in but is not the right size.
**Solution-** Make sure when you import the file that you have the correct units of measurement  selected.

**Problem-** The cut path is not lining up with the print.
**Solution-** You might need more registration marks to properly adjust the cut path for stretch and distortion.
**Solution-** Your camera offset is set incorrectly. Refer to the Camera Alignment section of the manual.

# Knife:

**Problem**- Knife does not cut all the way through the material.
**Solution**- Reset the knife height. See [Set the Blade Height](#) The blade oscillates. That means the blade moves up and down, so when you set Z for the knife, the blade could be at the down stroke. So, check the cut on the first part you may have to set the blade a bit deeper. .001 deeper should be enough.

# Spindle:

**Problem-** Spindle is making a strange nose, losing speed and lose of power.
**Solution-** This could be two things a bad Spindle cable or a Bad Spindle.

**Check for a broken cable.**
* Turn off the main power to the machine.

* Locate the large black or orange cable. It will have 4, 10 Gage wires in it labeled, UVW and ground.

* Use an Allen wrench and remove the cable connector screw. Pull the connector upwards to remove the Spindle cable connector.

* Remove the VFD cover

* Check continuity on all 3 phases (UVW) of the cable from the spindle to the VFD.

* With a continuity tester, check for continuity on all 3 wires label UVW.

**Check the windings on the spindle.**
* Use a Ohm meter. You should have 1.7 OHMs between all 3 phases on the spindle.
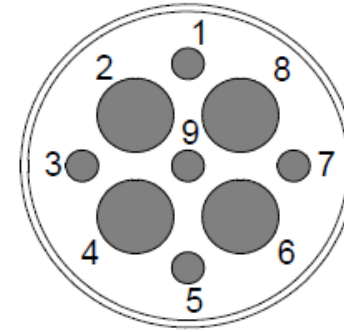
* Spindle connector Pin Out

# Spindle nose and lose of speed Continued:

**Spindle connector Pin Out.**

The position of the electrical connectors is shown in section 2.

## 4.6.1.1 Layout of POWER connector (fixed part)



| PIN | DESCRIPTION |
|-----|-------------|
| 1 | Thermal alarm 230V AC MAX; 48V DC MAX; 1.6A MAX |
| 2 | Common PE with PIN 7 |
| 3 | 230V AC 50/60Hz electric fan (if present) |
| 4 | U Motor phase |
| 5 | Thermal alarm 230V AC MAX; 48V DC MAX; 1.6A MAX |
| 6 | Motor V phase |
| 7 | Common PE with PIN 2 |
| 8 | Motor W phase |
| 9 | 230V AC 50/60Hz electric fan (if present) |

ℹ️ Use cables of not less than 6mm² (or AWG10) for the even PINs, and 1mm² (or AWG18) for the odd ones

⚠️ The electrical power supply to the electrospindle MUST be provided via inverter.

# Cutting:

**Router bit not cutting at the correct height:**

- Machine bed not set correctly. See Set Machine Bed

- Router bit not calibrated. See Calibrate Tool

- The bit is cutting at the desired height then after awhile it needs to be adjusted. See Router Bit Height.