



of South Florida, Inc.

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CLN Fusion and Fusion Plus Manual



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of South Florida, Inc.

Manufacturers of CNC Equipment

www.CLNofSouthFlorida.com



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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 produce Channel Letters out of:**
 - Aluminum Coiled Stock Material in thickness of:
 - 0.032"
 - 0.040"
 - 0.063" (Reverse Channel Letters Only)
 - Aluminum Coiled Stock Material in Width of:
 - 1.0" through 5.3"



- **Machines are not intended for:**
 - Bending, Notching, Flanging, or Shearing steel or similar materials without custom tooling.

Bending Capabilities:

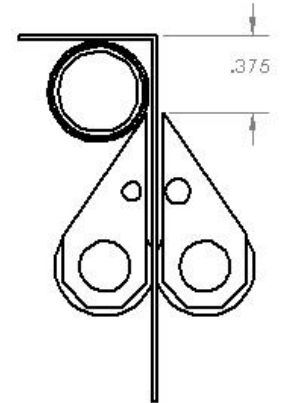
- Smallest positive or negative radius bend is .25 Diameter
- Maxime break bend angle 120 degree

Closest distance between break bends:

- Positive to a positive break bend .375
- Negative to a negative break bend .375

3 different Flange depths:

- .5" standard for attachment with Letter Lok
- .25" for attachment with spot welder
- Or no flange for attachment with MIG welder



Intended Use of Machine Continued

Radius Bend Bypass

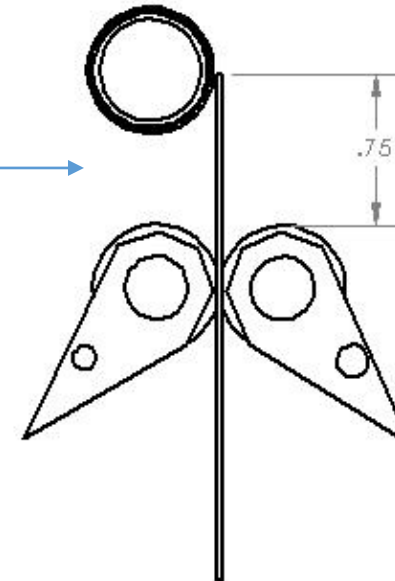
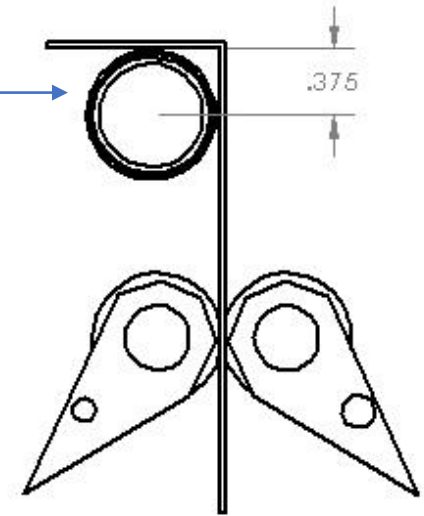
- Radius Bend Bypass is when the machine skips over small sections of a radius bend, this is necessary in special occasions so that the machine doesn't distort a previous break bend. The machine's Artificial Intelligence "AI" does all the calculating automatically, so you don't have to manually manipulate the artwork.

Skip Rule 1, Break bend to Radius Bend

- If the machine makes a break bend and a radius bend starts from that break bend, then the material must feed out $\frac{3}{8}$ " so that the break bend is clear of the bending bar. This prevents the Bend Bar from colliding into the break bend or missing the material and jamming the machine.

Skip Rule 2, Roll Bend at the start of a letter

- A Roll bend that starts at the beginning of a letter with no leading tab, will be skipped until the material feeds out enough to engage the bend bar. If you use a "Leading Tab" which is the default tab, you will never encounter this rule. If you select "No Tab" then you could encounter this rule.
- **Bump bending radiuses do not apply to this rule.**



Introduction

Everyone at CLN of South Florida, Inc. would like to thank you for purchasing the CLN Brand Bending 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.

We highly recommend that you click on the link below and watch the video on this step
[Introduction Video](#)

Table of Contents

Safety

Machine Overview and Assembly

Machine Maintenance

Machine Operation

Machine Software

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 of 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 opening the side covers, you must first unplug the machines 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:

- Follow the safety rules at all times. 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 avoided at all times when operating equipment.

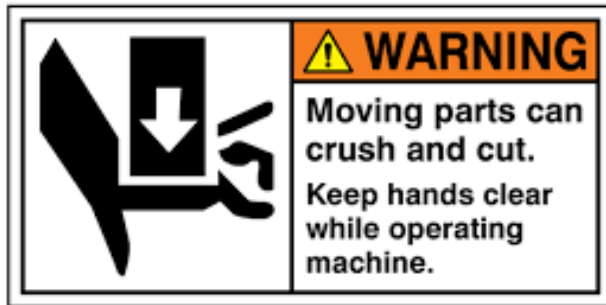
Environmental Considerations:

- **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 2 emergency stops one located at the front of the machine and the other located next to the monitor. Pressing it will halt all motion on the machine as well as bleeding all of 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

Fusion Footprint

Fusion Plus
Footprint

Assembly

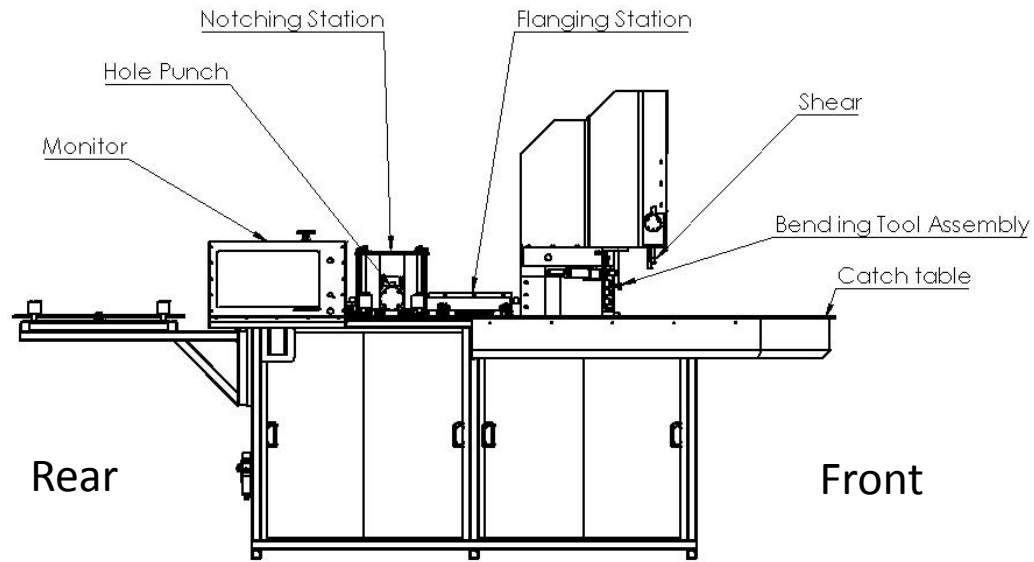
Electrical
Connection

Compressed Air
Connection

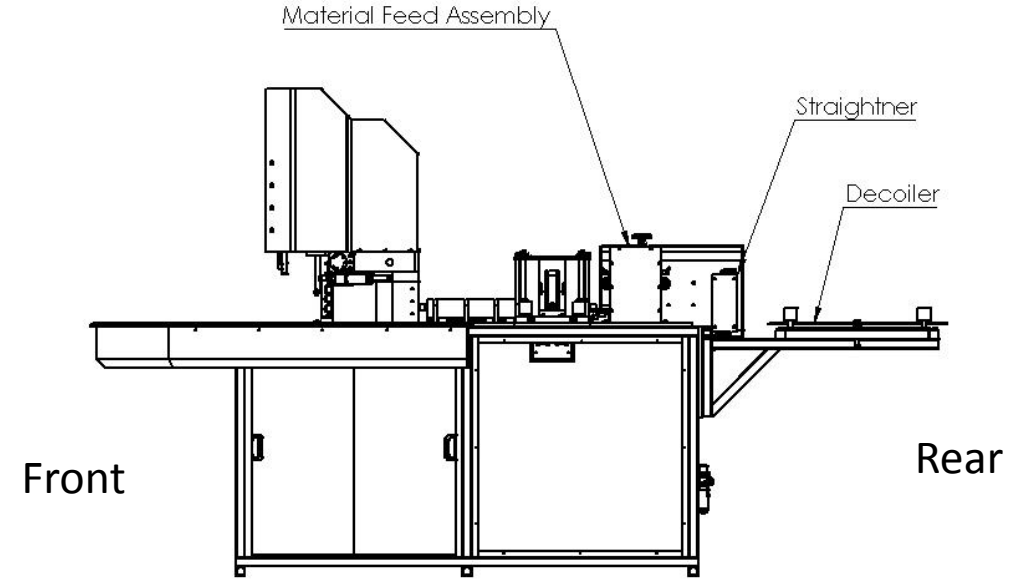
Internet
Connection



Components Overview:



Left Side



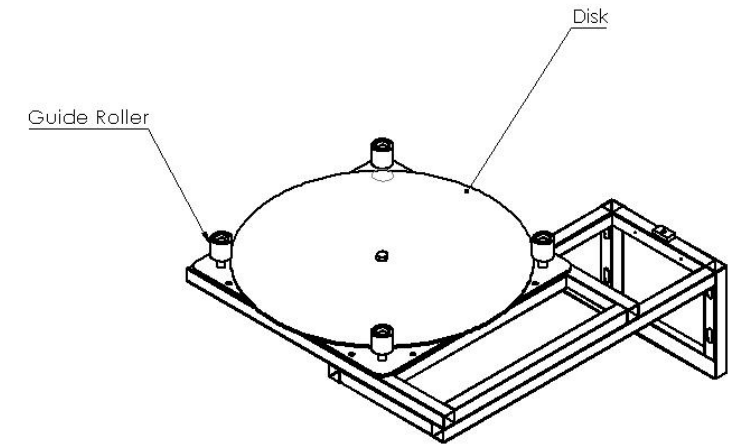
Right side

*Machine displayed with the covers removed.

Components Overview Continued:

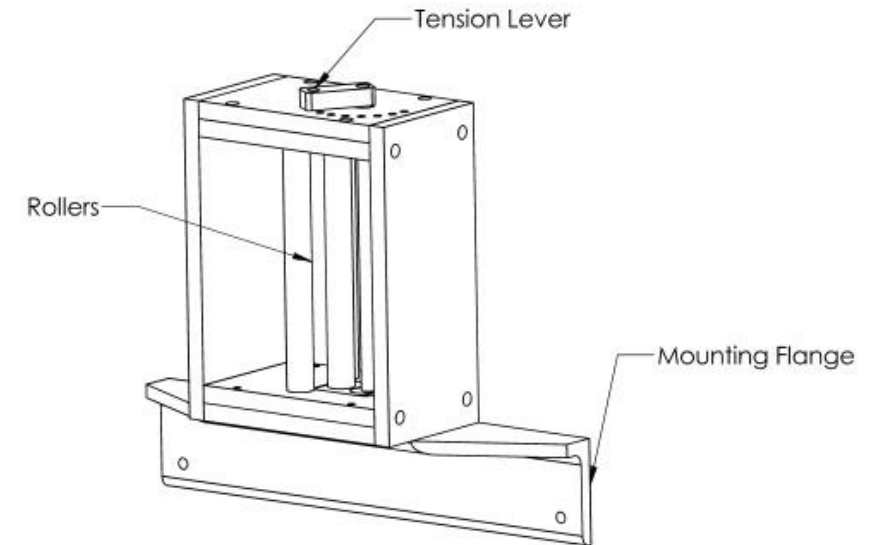
Decoiler

- The Decoiler aids in feeding the material through the machine. It is very important that the Decoiler is at the same height as the CLN Fusion so that the material enters the machine at the same height that it leaves the decoiler.



Straightener

- With the right tension setting this will take the natural bend out of the material that was caused by being wrapped in a coil otherwise known as the “memory” of the coil.



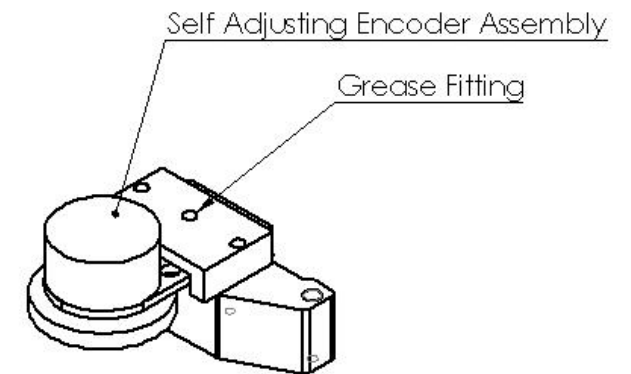
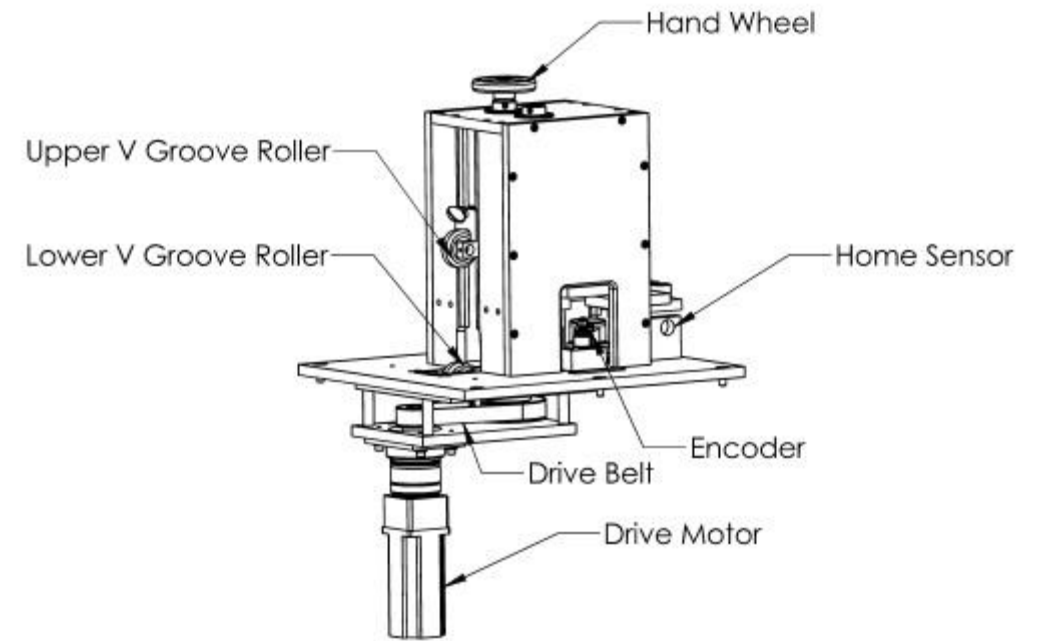
Components Overview Continued:

Material Feed Assembly

- The drive rollers simply move the material through the machine. There are two shafts that have two guide rollers on each of them, four total. One of the shafts is powered by a servo motor mounted on the underneath side of the drive box assembly. The other shaft is just a guide roller.

Encoder

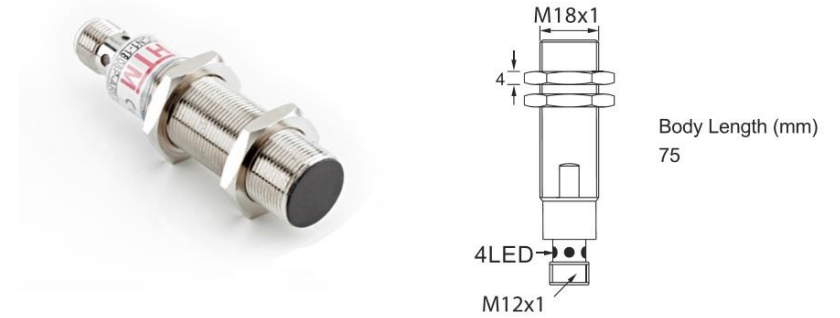
- When the Servo Motor feeds material through the machine, the encoder keeps track the actual distance the material has traveled. If there is a discrepancy the encoder tells the motor to make a correction. The encoder is located just after the rollers and before the homing cell.



Components Overview Continued:

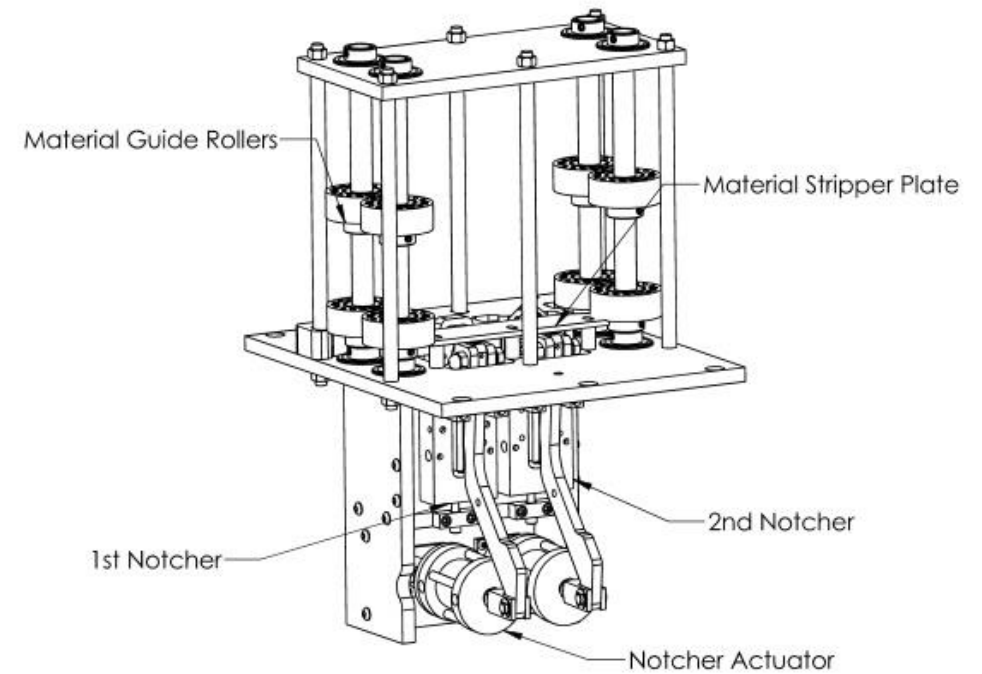
Material Homing Sensor

- This is a Proximity Sensor located just after the last set of V-Groove Material Guides. It senses the material as it moves past the sensor. When the material is in front of the sensor a red LED light will illuminate.



Notcher Assembly

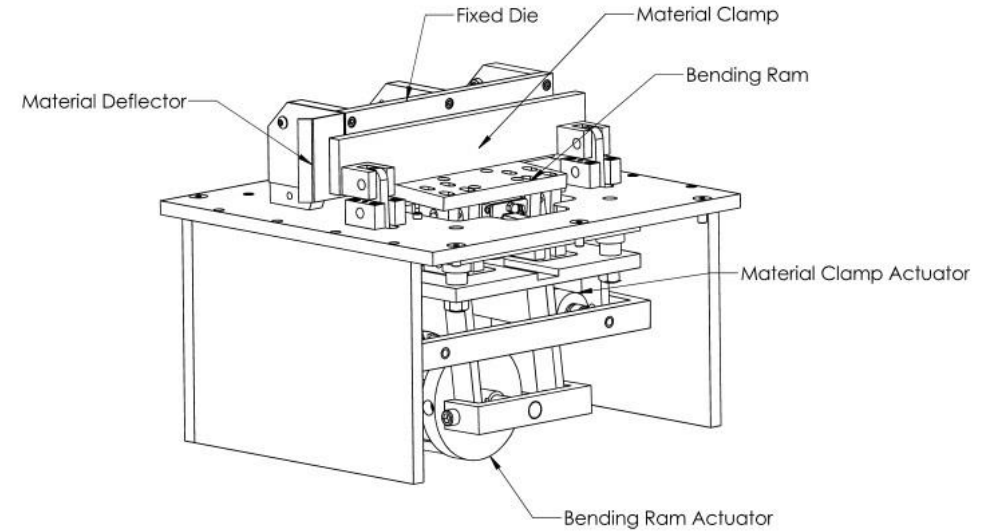
- The notcher assembly consists of two notchers. The first notcher is a 30 Degree notcher and the second is a 100-degree notcher. The 30-degree notcher is used for negative bends and radius bends, as well as a 6-inch repeating relief notch for the flanger. The 100-degree notch is used for positive brake bends.



Components Overview Continued:

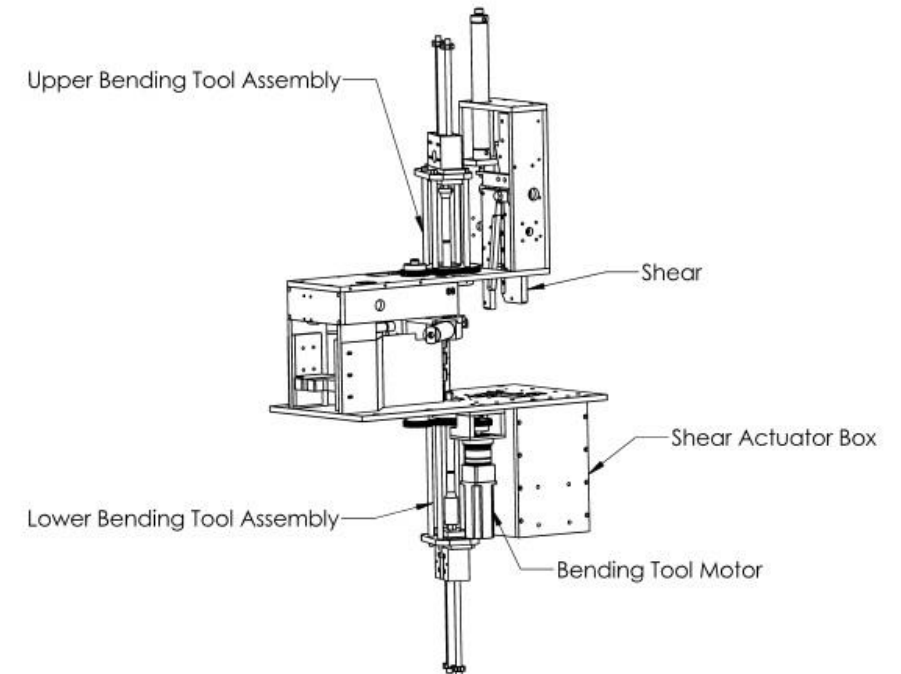
Flanger Station

- This is where the 90-degree flange is bent on the edge of the Channel Letter. It is comprised of a material clamp and a flanging ram. This will bend the flange in 6-inch increments.



Bending Tool Assembly

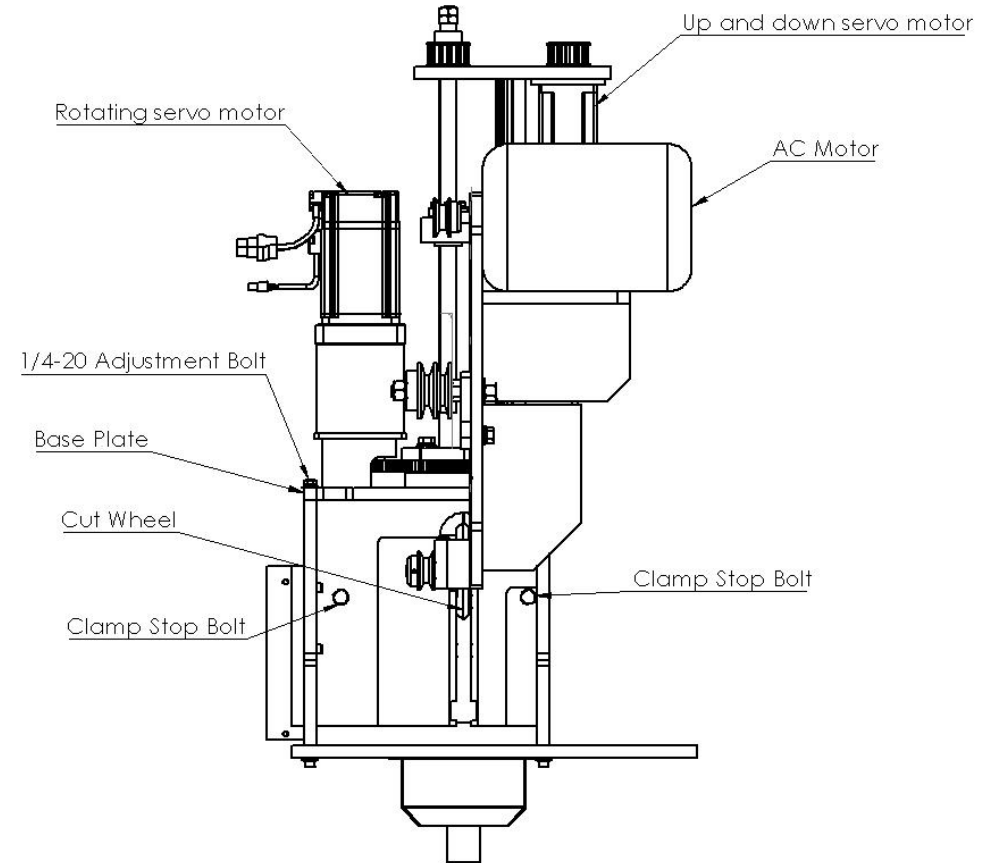
- The Bending Tool Assembly has clamping brake bend dies which allow for a sharper brake bend. When making a radius bend these dies will rotate out of the way allowing the machine to roll form smooth radiuses.



Components Overview Continued:

Broach Station used in Fusion Plus only

- This is where the machine scores the material by using a spinning cut wheel. The wheel spins and moves down then up. It also rotates to whatever angle that the bend angle is for the letter.

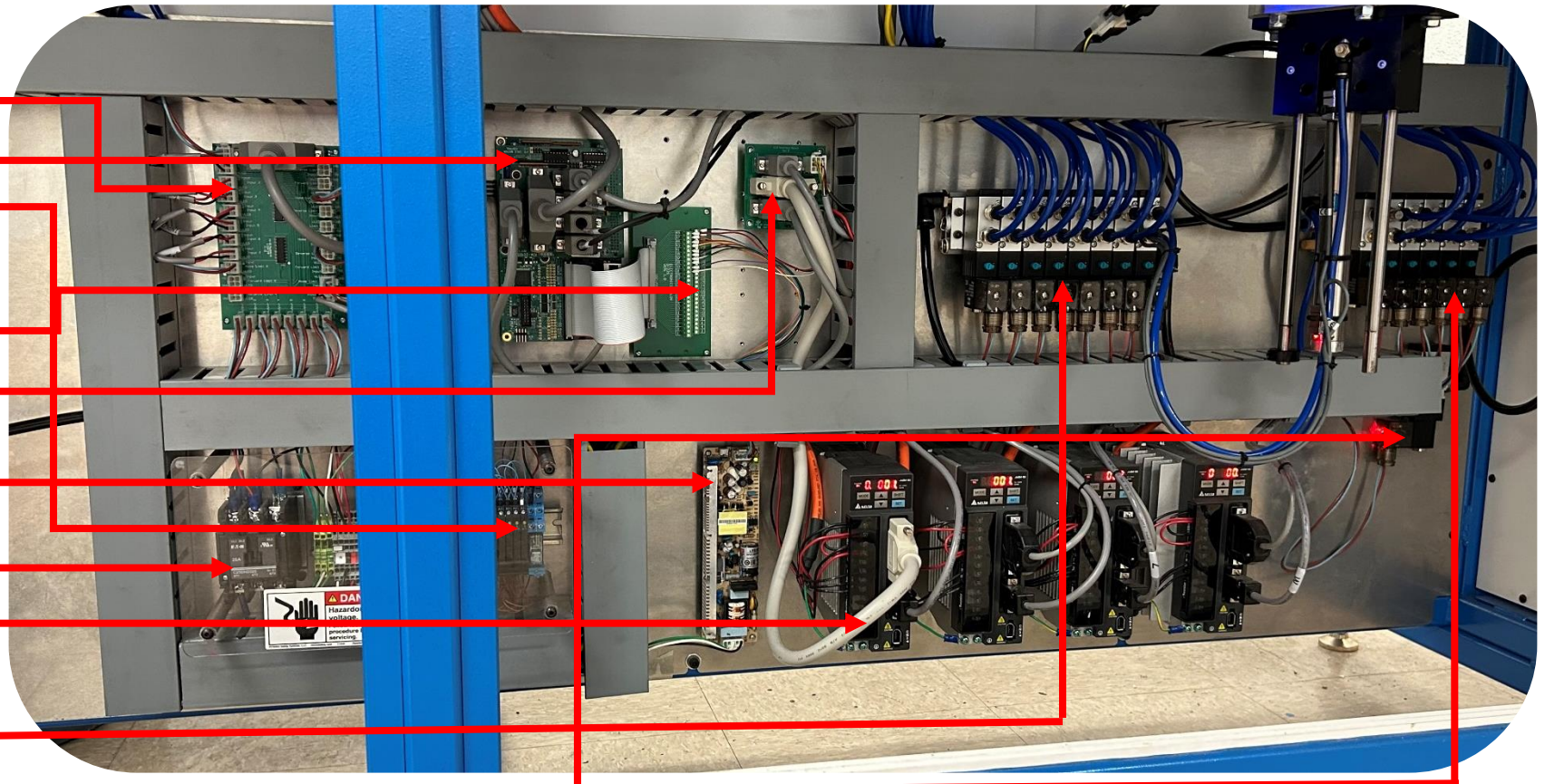


Electronic Components Overview:

This is a Fusion Plus back panel. The only difference between the Fusion and the Fusion Plus is that the Fusion has only 2 servo drives.

Electrical Panel

- Main I/O Breakout Board
- Contactor
- Relays
- Controller
- Sub I/O Board
- Encoder Crossover Board
- 24 Volt Supply
- Servo Drives
- 8 position Valve Manifold
- 6 position Valve Manifold
- Main Air Valve



Electronic Components Overview Continued:

Valve Manifolds

- The machine has 2 Valve manifolds that control all of the tools in the machine. The one on the left is the 8-position manifold and the one on the right is the 6 position.
- The blue buttons will override the valve when you push them. If you push them and turn them a ¼ turn clockwise it will lock the valve in the on position. To release it just push and turn it a ¼ turn counterclockwise.

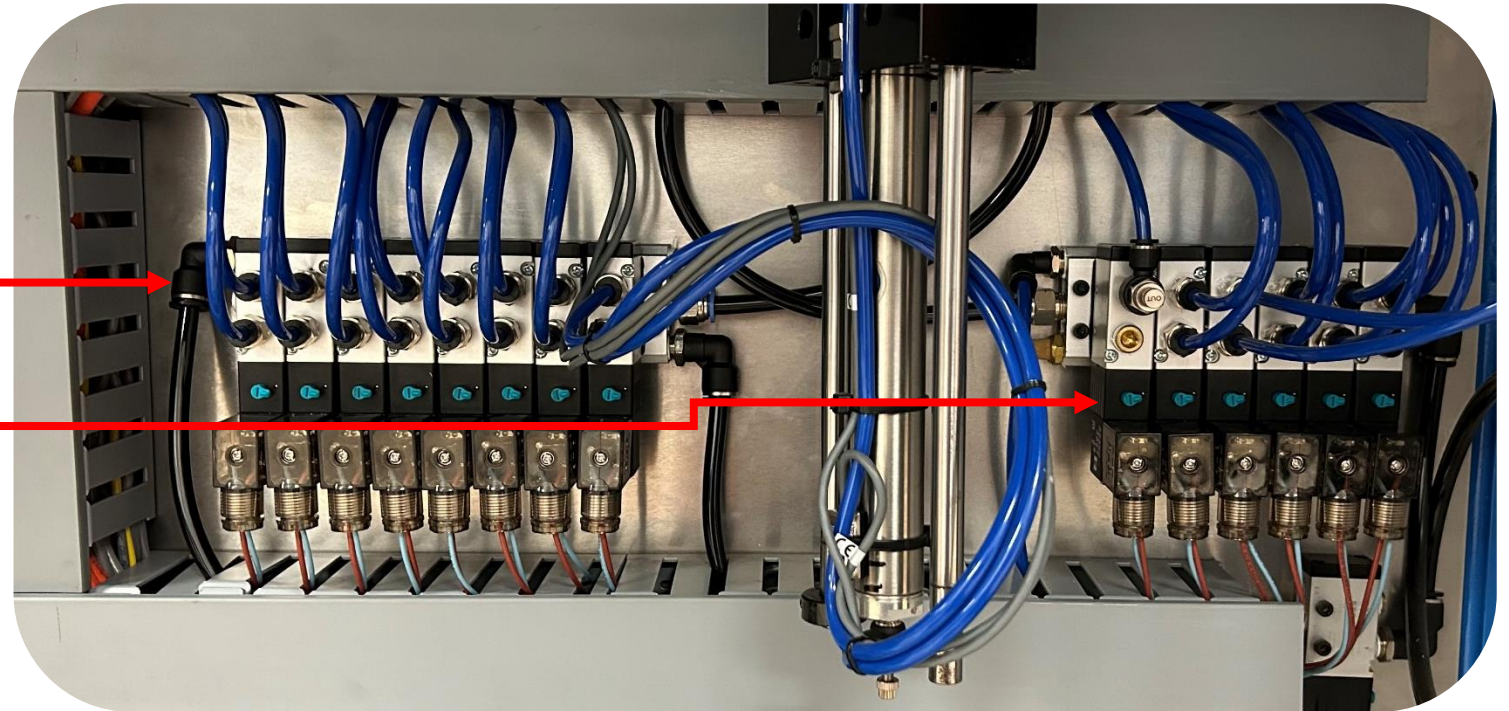
Valve station identification:

Station 1 from left to right

- 1 First Notcher
- 2 Second Notcher
- 3 Flanging Station
- 4 Top Bend Bar
- 5 Break Bend Dies
- 6 Break Bend Die Support
- 7 Sharp Die Lock
- 8 Bottom Bend Bar

Station 2 from left to right

- 1 Shear Arm Drop
- 2 Shear Lock
- 3 Shear Cut
- 4 Bump Bend Shim
- 5 Drain Hole Punch
- 6 Broach Material Clamp (Fusion Plus Only)



Electronic Components Overview Continued:

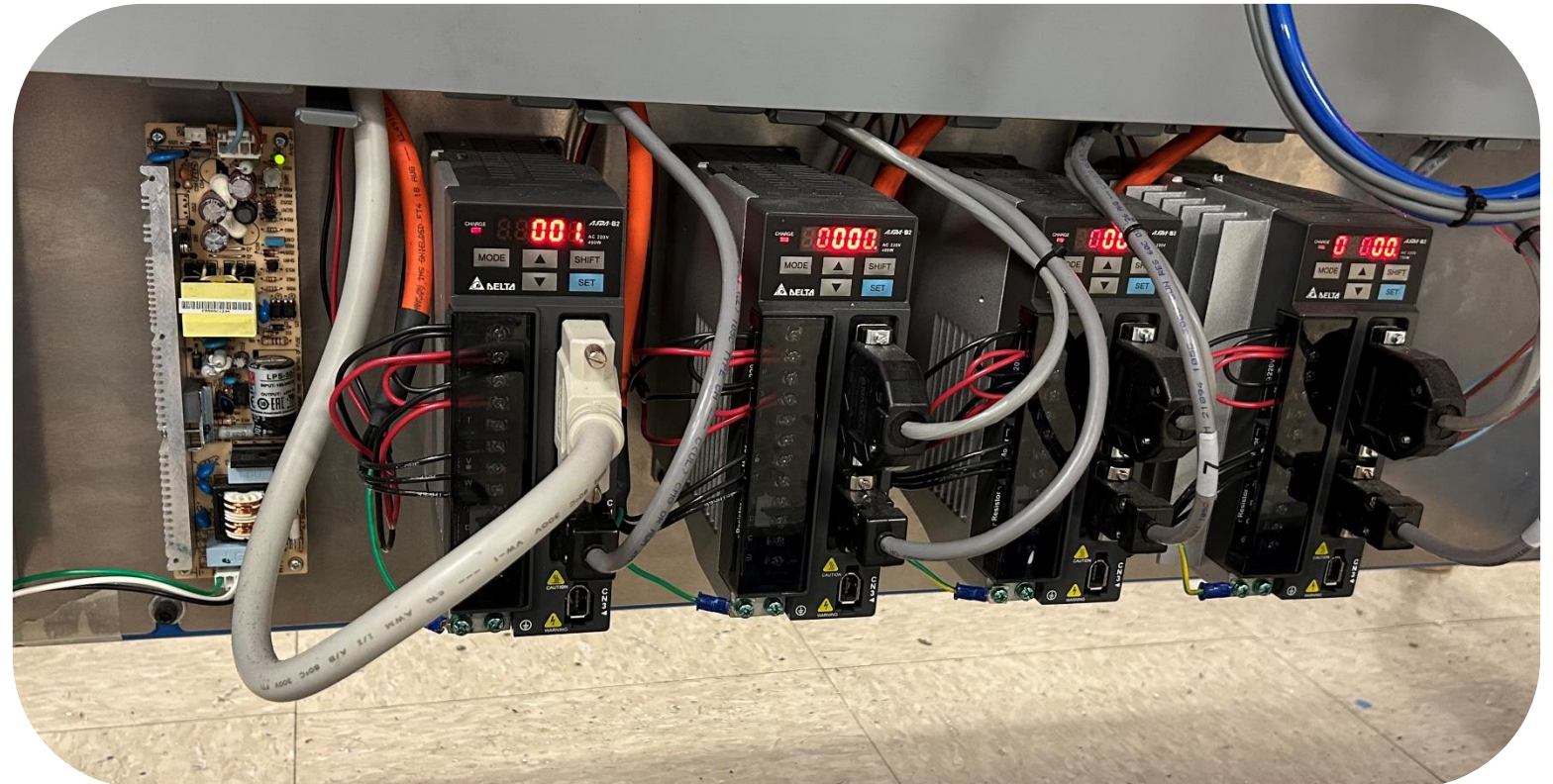
Servo Drives

- 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 Fusion 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

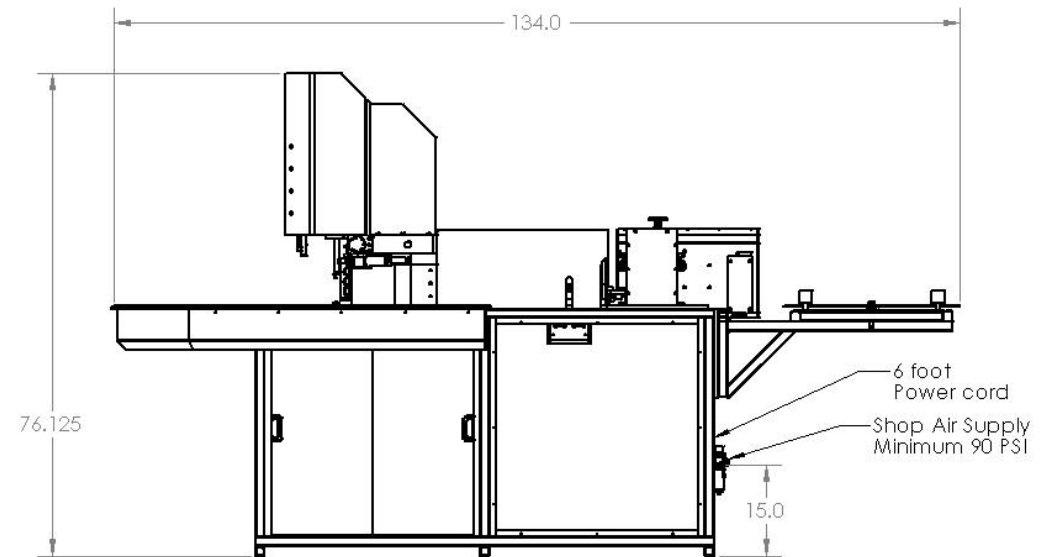
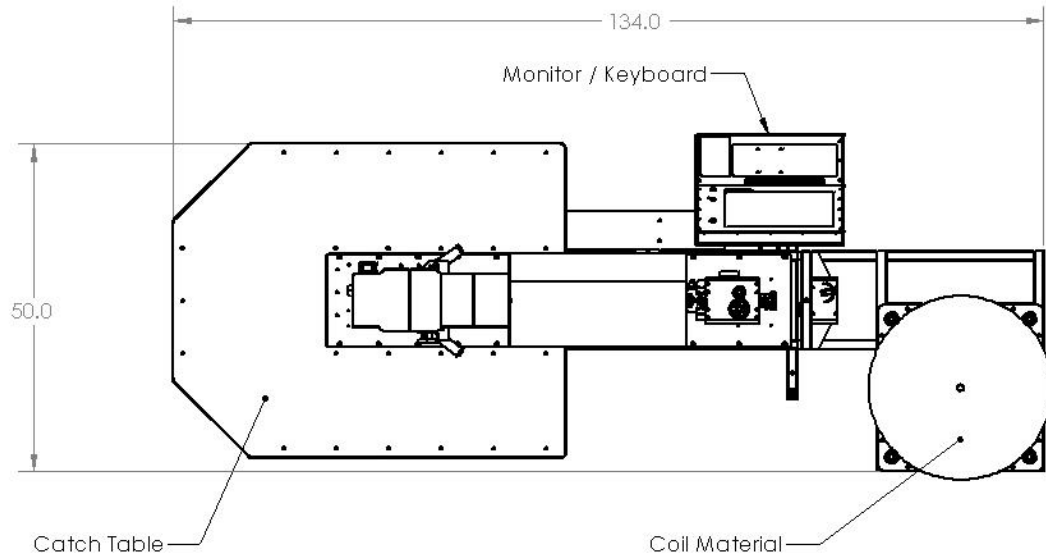
- 1 Feed System
- 2 Bend Head
- 3 Broach Arm Up and Down (Fusion Plus only)
- 4 Broach Arm Rotate (Fusion Plus only)



Fusion Footprint:

Machine Footprint:

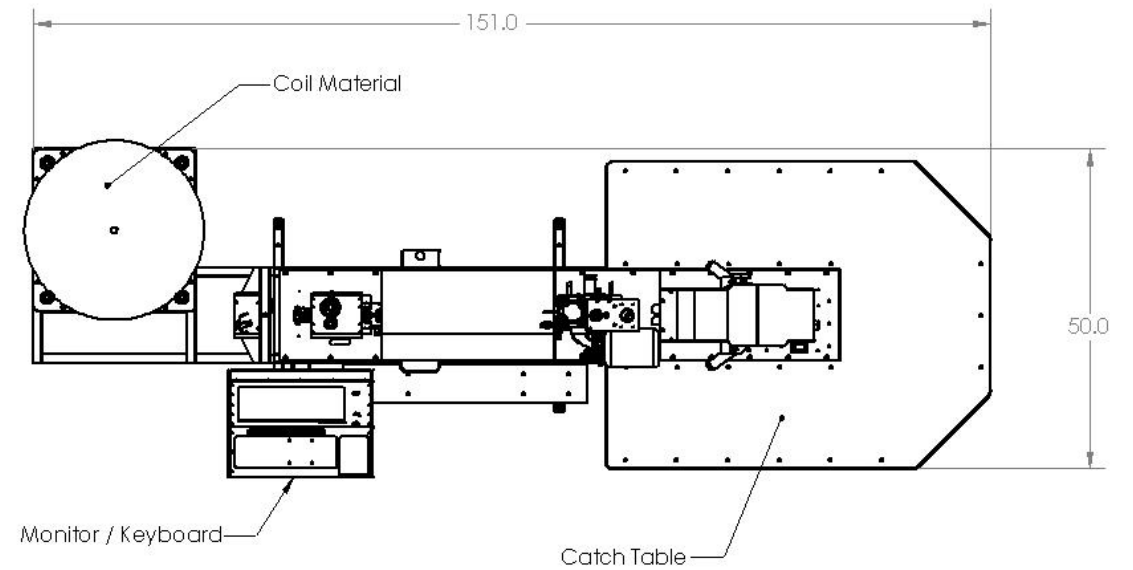
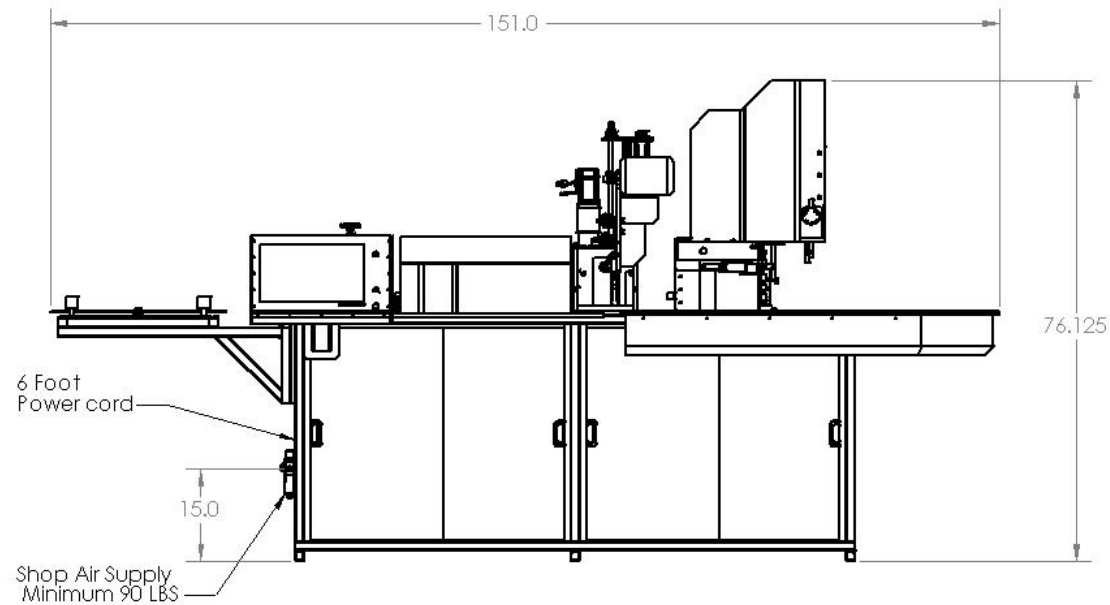
- Make sure you have at least 48" of clear workspace around the perimeter of the entire machine to ensure a safe working area for the machine operator.



Fusion Plus Footprint:

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.



Assembly:

Inspect the Package:

- Prior to opening the package, check for any damages that may have occurred during shipping.

Disassembling the Crate

- Remove the top of the crate.
- Remove the Decoiler side of the wall of the crate.
- Remove the Decoiler and cardboard box.
- Unbolt the Fusion Machine from the base of the crate.
- Now carefully lift the machine off of the base of the crate with a forklift. **THE MACHINE IS EXTREMELY TOP HEAVY.**
- Set in place and level the machine with the leveling feet.



Assembly Continued:

Machine Set Up:

- Remove the Side Doors of the Fusion Machine by lifting up and tilt the bottom of the door out toward you.
- Install the computer on the shelf and plug in all of the computer cables to the back of the computer.
- Remove the tape that is on the wire covers.



Assembly Continued:

- **Machine Set Up:**
- Install the Decoiler on the rear of the machine. “Caution” the Decoiler is heavy. This is a 3-person job. 2 people hold it in place and 1 person puts in the bolts.



Assembly Continued:

- **Machine Set Up:**
- Make sure that you use the shim piece between the straightener and the Decoiler frame.
- Install the Straightener on the Decoiler frame.



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.
- Install the tools in the tool holder located behind the drive box. _____



Electrical Connection:

Electric Power Connection:

- This machine requires a 220 Volt AC, 20-amp electric supply. (If needed contact an electrician to install the required outlet near the machine.)
- A 6ft cord is supplied with the machine.
- Plug the female end of cord into the outlet on the rear of the machine.
- Plug the male end of the cord into the 20-amp outlet installed by your electrician.
- Most shops that have 3 phase can also have high leg. You do not want to be connected to the high leg! **You will damage the electronics in the machine. Your electrician will have to purchase all of the damaged components.**
- **Test the power at the plug before you plug in the machine! L1 to ground should be 120VAC. L2 to ground should be 120VAC. L1 to L2 should be 208 to 240VAC.**
- L1=120 L2=208 L3=120 High leg
L1=120 L2=120 L3=120 No High leg



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.



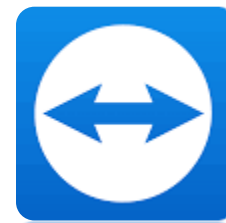
Internet Connection:

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



TeamViewer

Machine Maintenance

Grease
Locations

Oil
Locations

Water
Separator

General
Inspection



Grease Locations:

Grease Needle: The grease needle is used to reach hard to access areas of the machine. A standard grease gun will fit the grease fitting located in the rear of the grease needle.



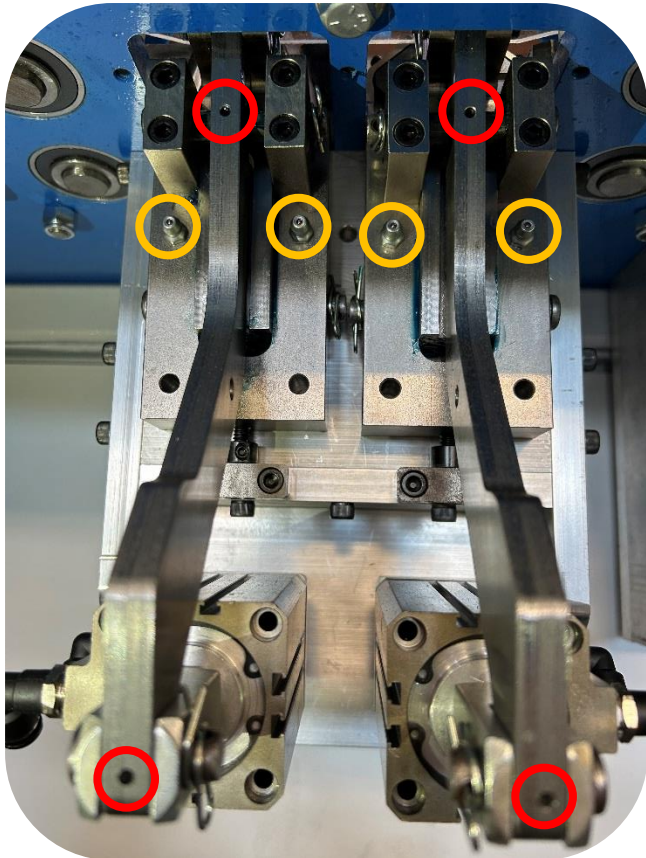
Applying Grease: Grease the machine every 40 hours. Don't over grease the machine. A small amount is all that is needed. The grease won't disappear, it will work its way out to where it's intended to be affective. Then you will have to wipe up the excess.



Grease Locations Continued:

Notcher Assembly: Apply all-purpose grease to these locations.

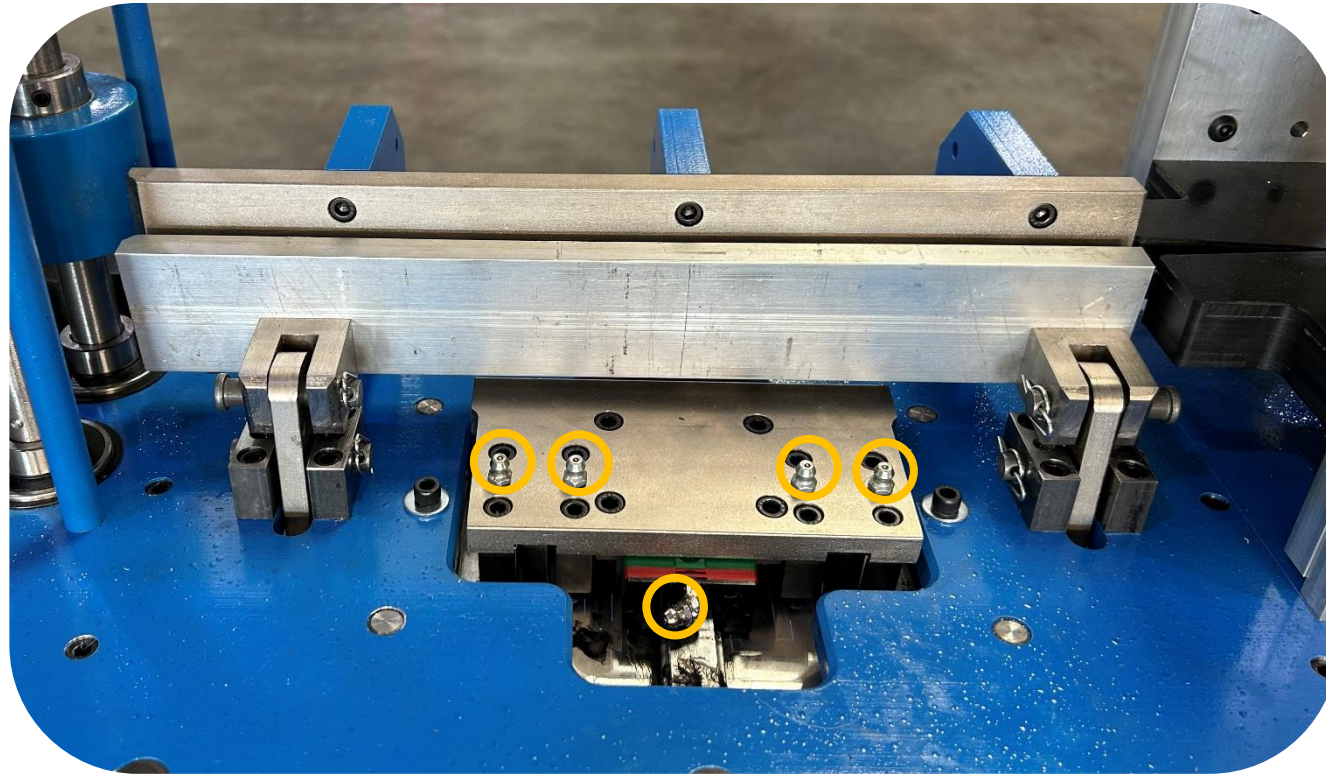
Grease Needle:  Brush: 
Grease Gun: 



Grease Locations Continued:

Flanging Assembly: Apply all-purpose grease to these locations.

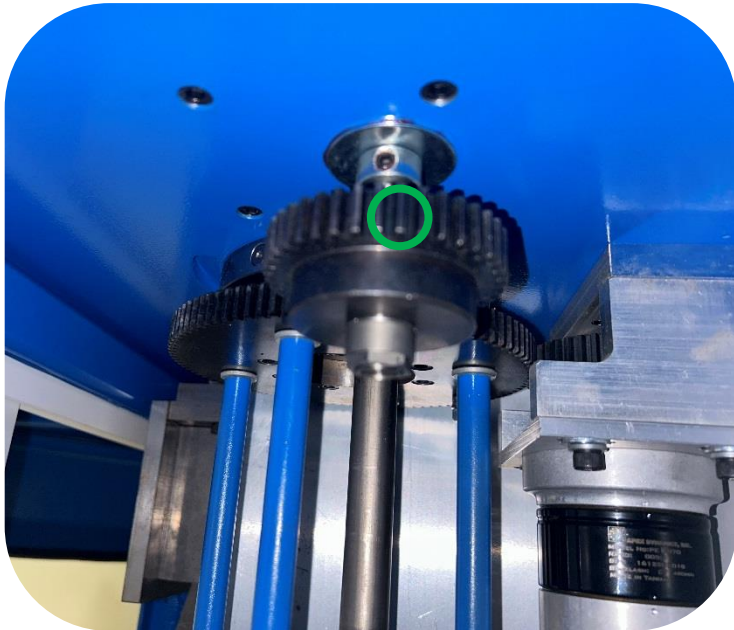
Grease Needle:  Brush: 
Grease Gun: 



Grease Locations Continued:

Bend Head Assembly: Apply all-purpose grease to these locations.

Grease Needle:  Brush: 
Grease Gun: 

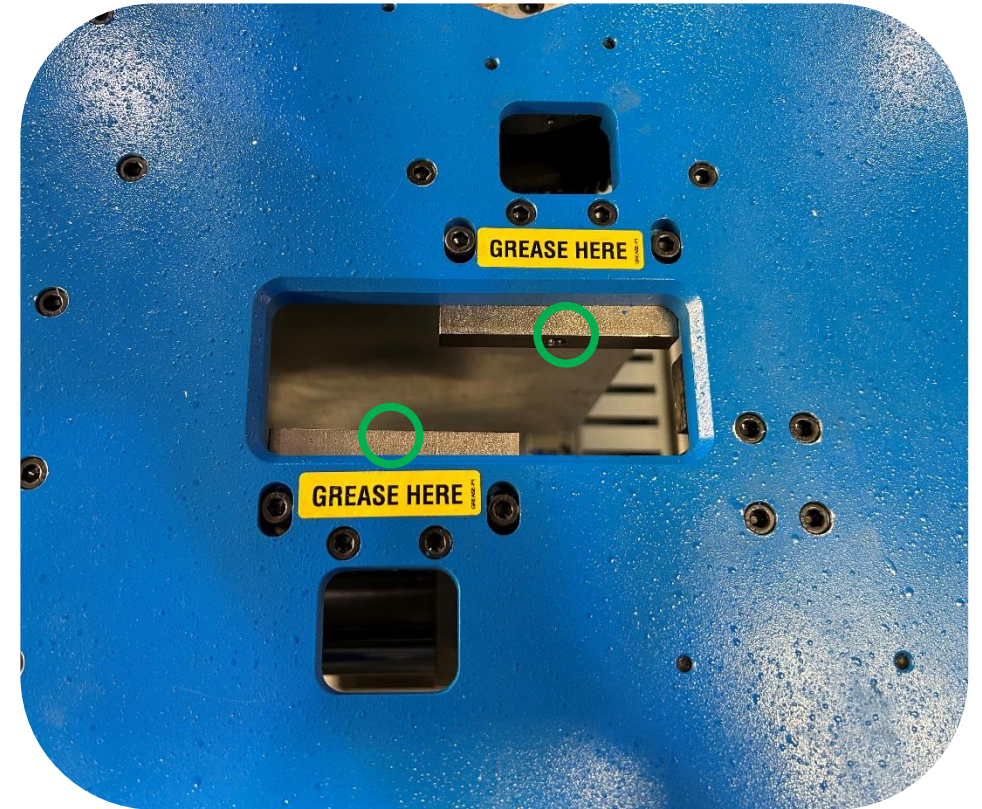


Grease Locations Continued:

Shear Assembly: Apply all-purpose grease to these locations.



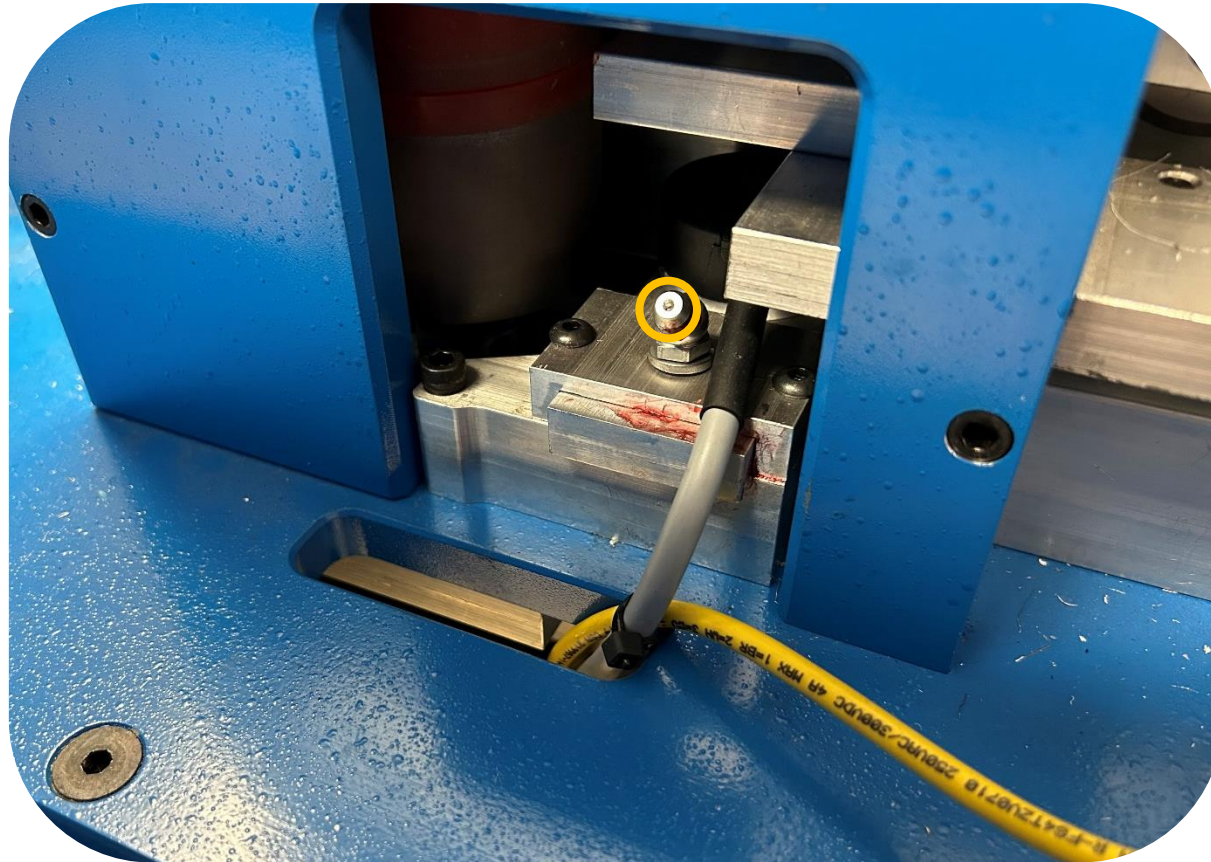
Grease Needle:  Brush: 
Grease Gun: 



Grease Locations Continued:

Encoder Assembly: Apply all-purpose grease to these locations. **Every 6 months**

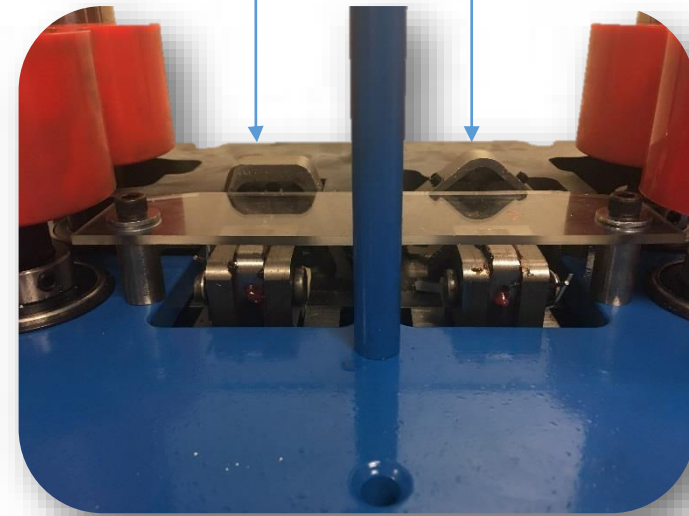
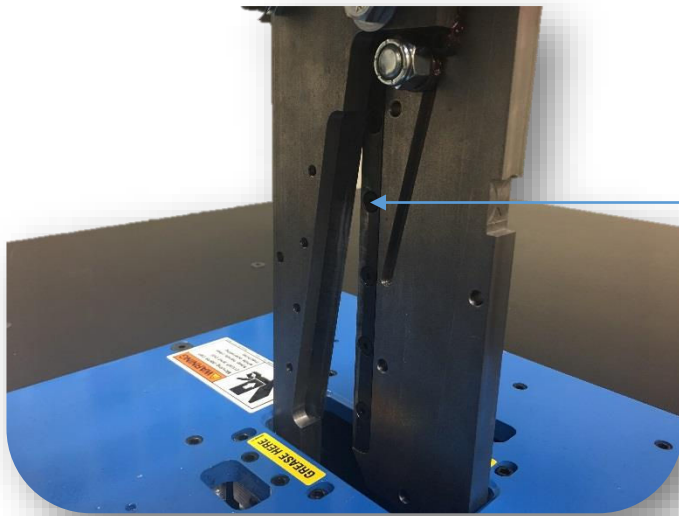
Grease Needle:  **Brush:** 
Grease Gun: 



Oil Locations:

Oil and Cleaning the Machine:

- Maintenance schedules will vary from shop to shop depending on production load; therefore, these are the minimum guidelines.
- Maintaining a clean machine is imperative to prolonging machine life. Wipe down the outside of the machine with mild detergent. Wipe down the raw steel with a Lightweight oil “WD-40”.
- Apply a lightweight lubricant such as “WD-40” to Notcher Dies and Shear Blades daily.



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.



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 tools moving too fast and slamming into each other. A simple air flow adjustment can prevent a big problem.
- Look for any potential mechanical issue like the bending die starting to miss align. Again, a small adjustment to an adjustment bolt can prevent a big problem.



Machine Operation

Turning the
Machine on
and off

Compressed
Air

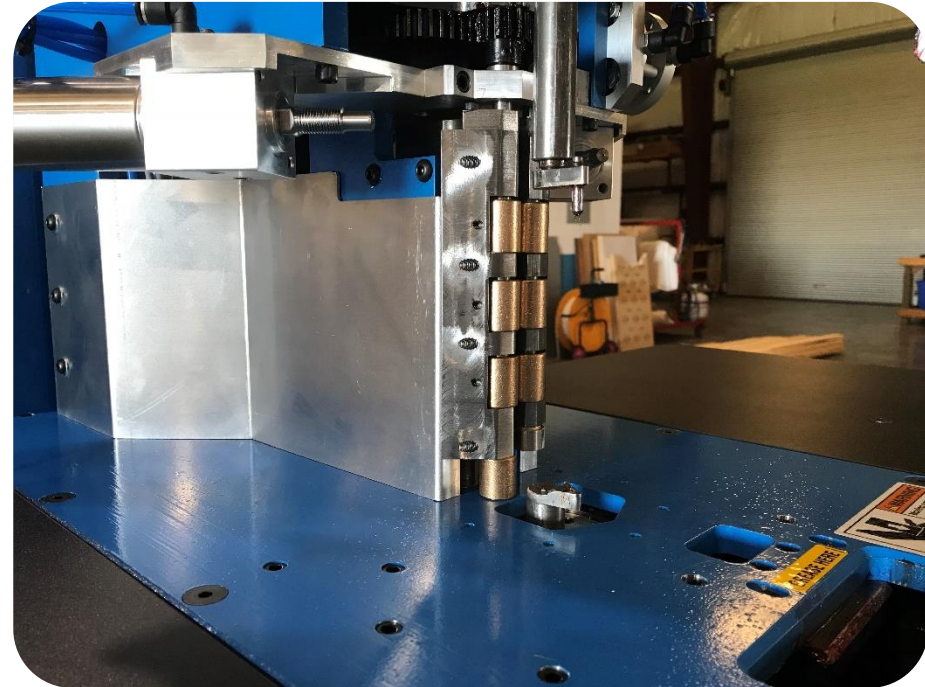
Loading
Material

Set up for
Plastic Face
Letters

Set up for
Reverse
Letters

Set for
Profiled
material

Mechanical
Adjustments



Turning the Machine On and Off:

Power Up Sequence:

- Turn the main power on using the power switch located on the rear of the machine.
- The computer should come on when the main power switch is turned on. Its 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
- Turn off the main power switch located on the rear of the machine.



Compressed Air:

Check the Air pressure:

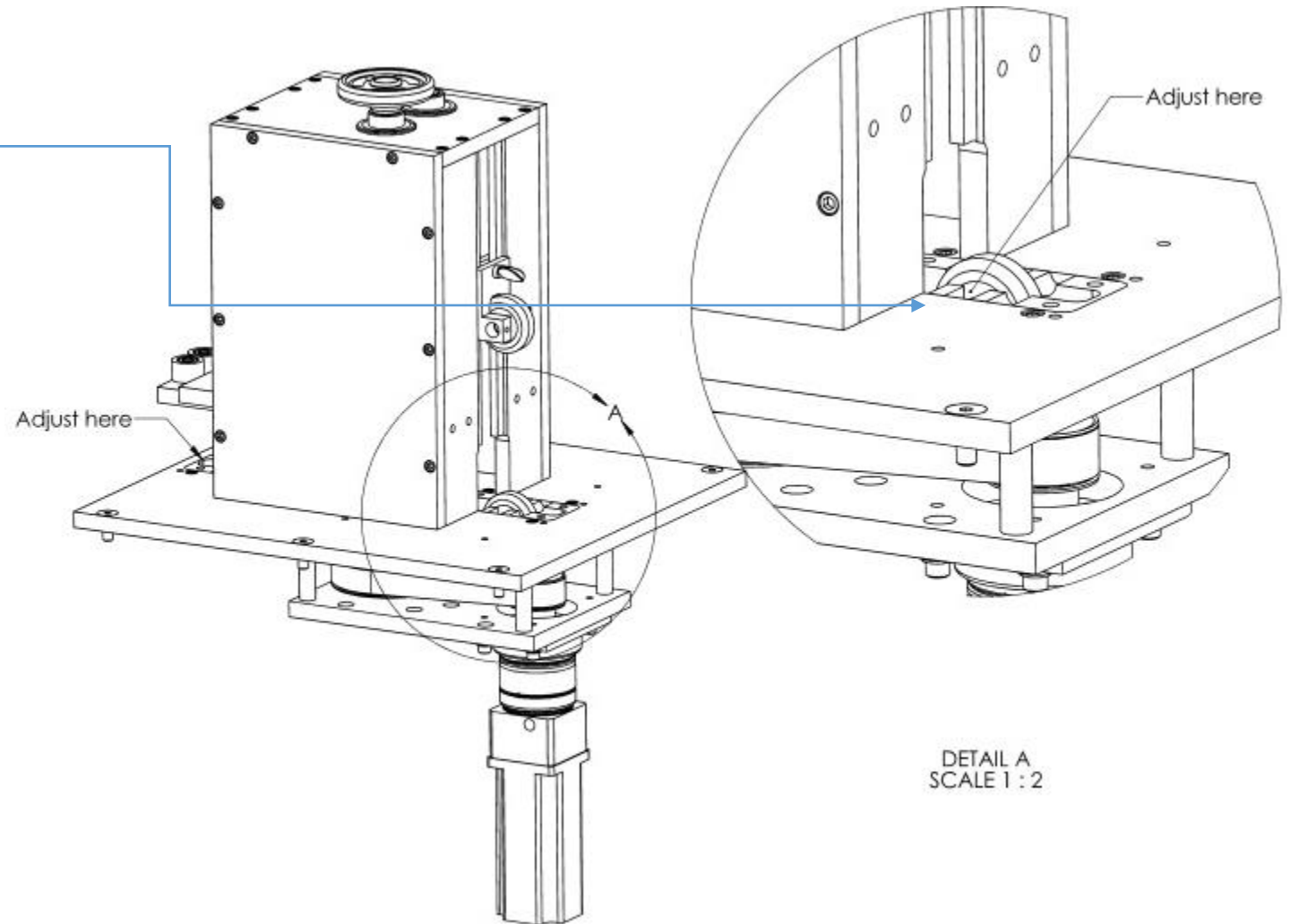
- Before you proceed any further, make sure your air compressor is turned on and connected to the machine. The gauge on the machine should read 80 psi.
- In order for the machine to function properly your air compressor should have a minimum capacity of 5 cfm at 80 psi.
- While the machine is running the gauge shouldn't drop more than 10 PSI.



Loading Material:

Flange Thickness Adjustment:

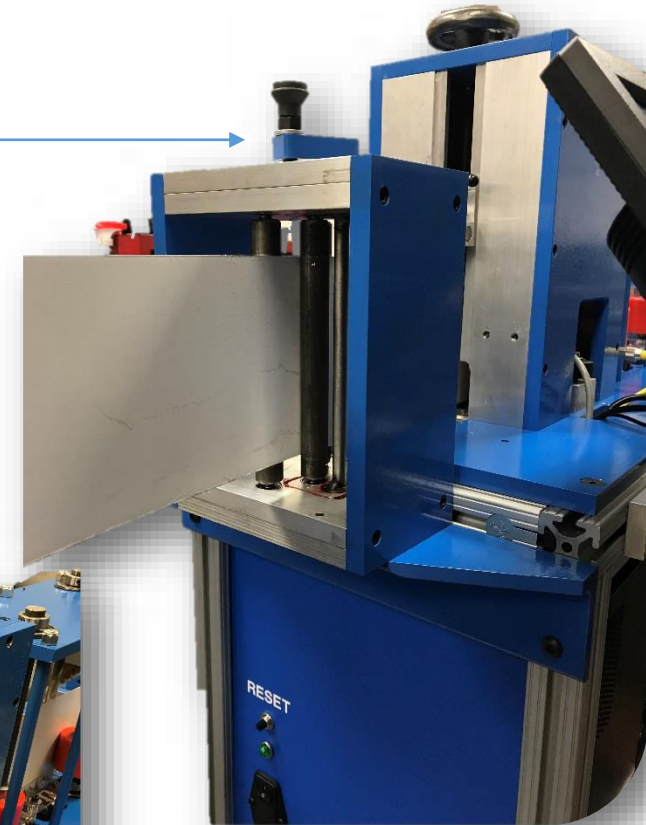
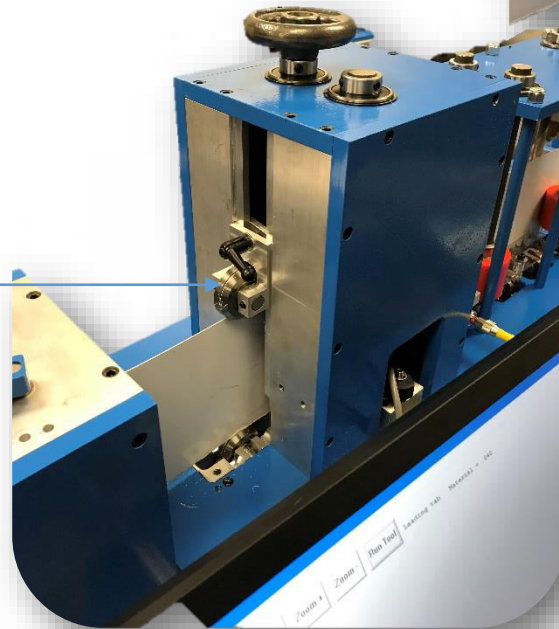
- The machine is capable of producing a standard 0.5" flange, a 0.25" flange or a flangeless letter (Reverse Channel Letter).
- The adjustment is made in the Drive Box.
- The front and rear bottom V Groove Rollers can be placed in different slots to change the height at which the material moves through the machine and this in turn changes the thickness of the flange.
- If you have the V Groove Rollers in the deepest slot this will produce a 0.5" flange, the intermediate slot will produce a 0.25" flange, and the highest slot will produce a flangeless letter.



[Go To Next Page](#)

Loading Material Continued:

- When loading material into the machine the Emergency Stop must be pressed in.
- Now that the Emergency Stop is pressed in the drive rollers will be disengaged and you will be able to manually feed material into the drive box.
- Loosen the tension on the straightener by pulling up on the lever and rotating it toward the operator.
- Adjust the V Groove Rollers so that they are all the way toward the top of the Drive Box.
- Feed material through the Straightener
- Rest the bottom edge of the material on the first lower V Groove Roller and start feeding into the Drive Box making sure the material is parallel to the base of the machine.
- Use the Handle Wheel to aid in feeding the material into the machine.
- Feed the material in until it has moved passed the second roller.
- Make sure the material is seated firmly in both of the bottom V Groove Rollers.
- Now lower the top V Groove Rollers and tighten.

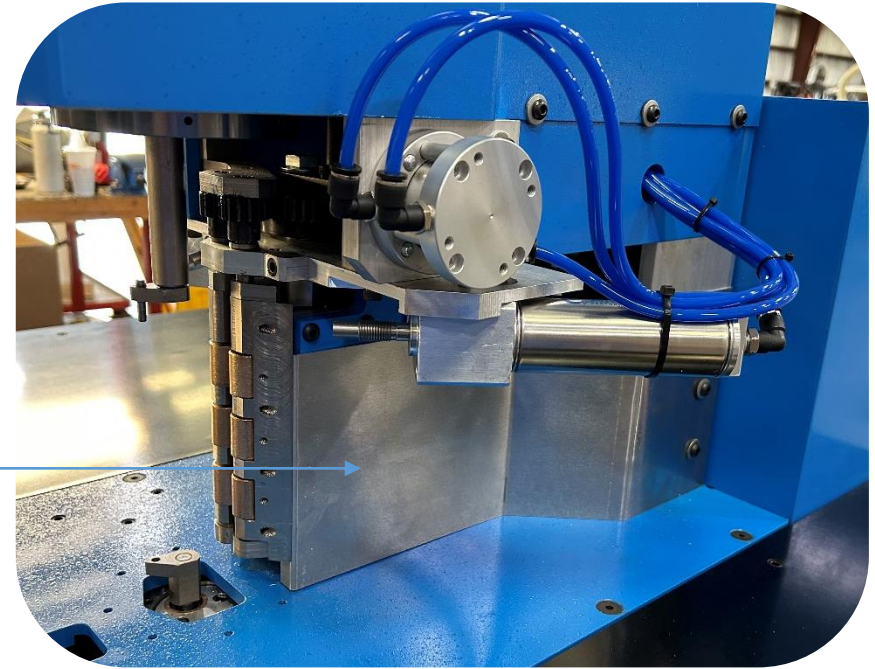


We highly recommend that you click on the link below and watch the video on this step.
[How to load material in the machine](#)

Loading Material Continued:

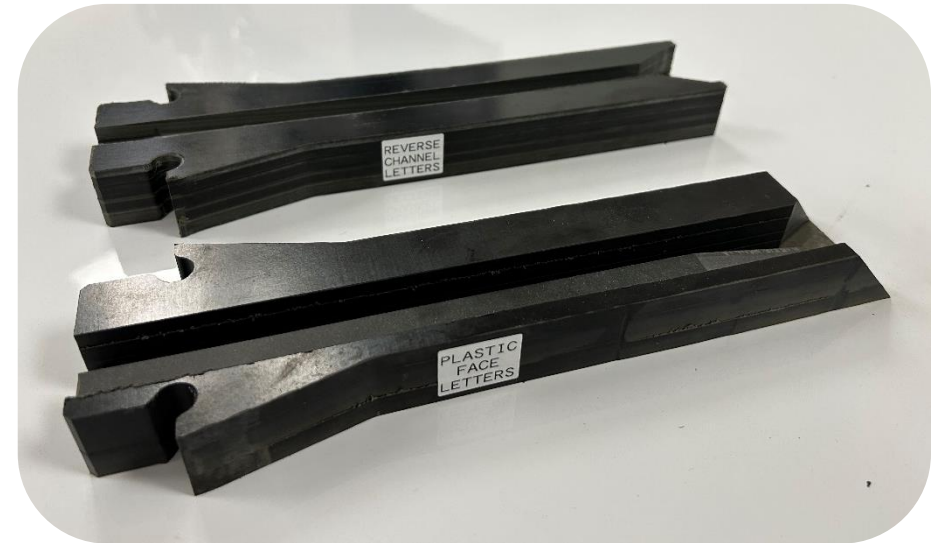
Support Ramp:

- The support ramp supports the weight of the material as it goes through the bend head.
- There are two different support ramps that are used in the machine. One is for Reverse Channel Letters (no flange) and the other is for standard plastic face channel letters (with a flange).
- To switch out the ramp. Press the emergency stop button. Remove the right-side deflector, loosen the set screw and pull the ramp out of the machine. Install the correct ramp for the operation then snug up the set screw, do not over tighten the set screw. Then replace the deflector.



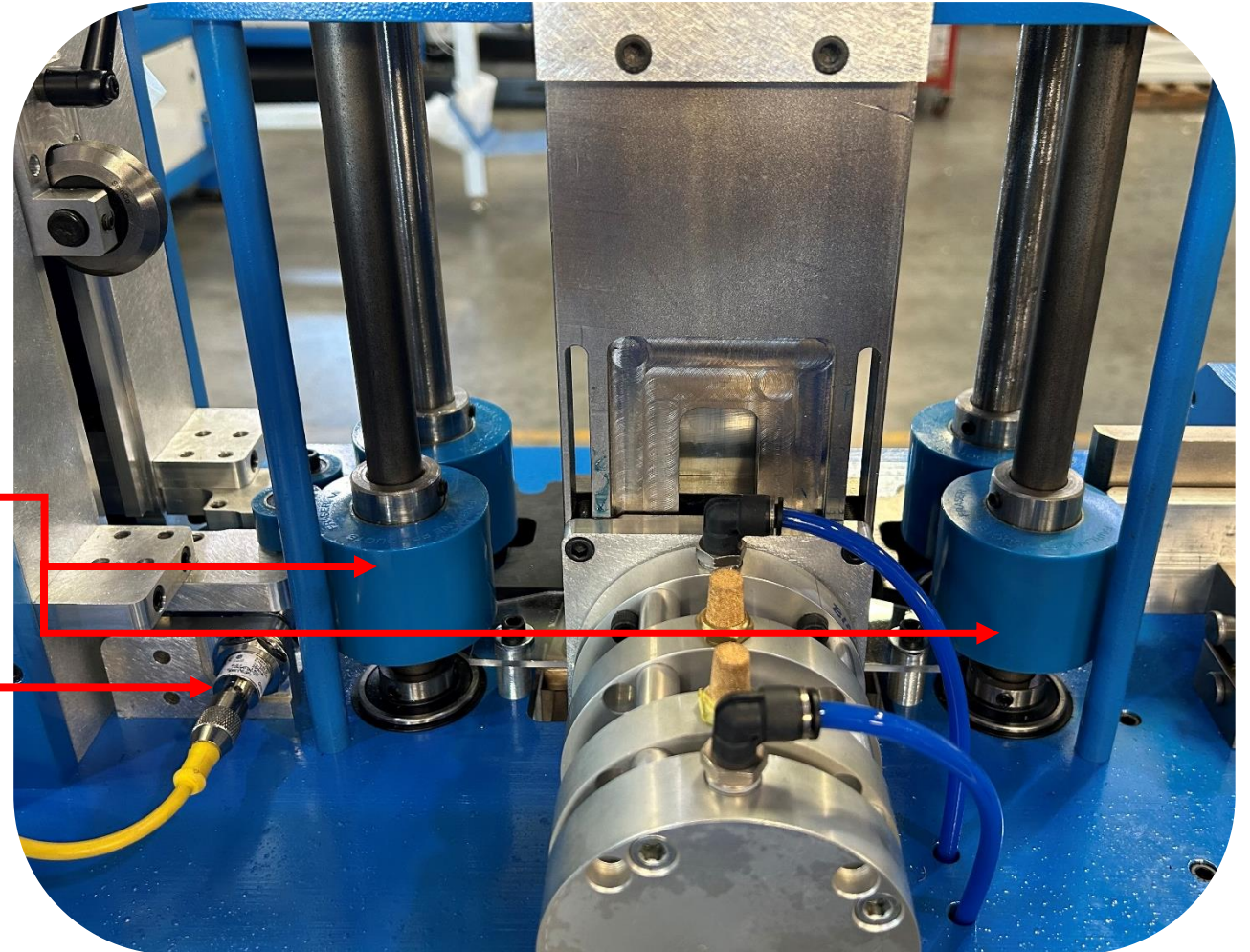
We highly recommend that you click on the link below and watch the video on this step.

[Support Ramp](#)




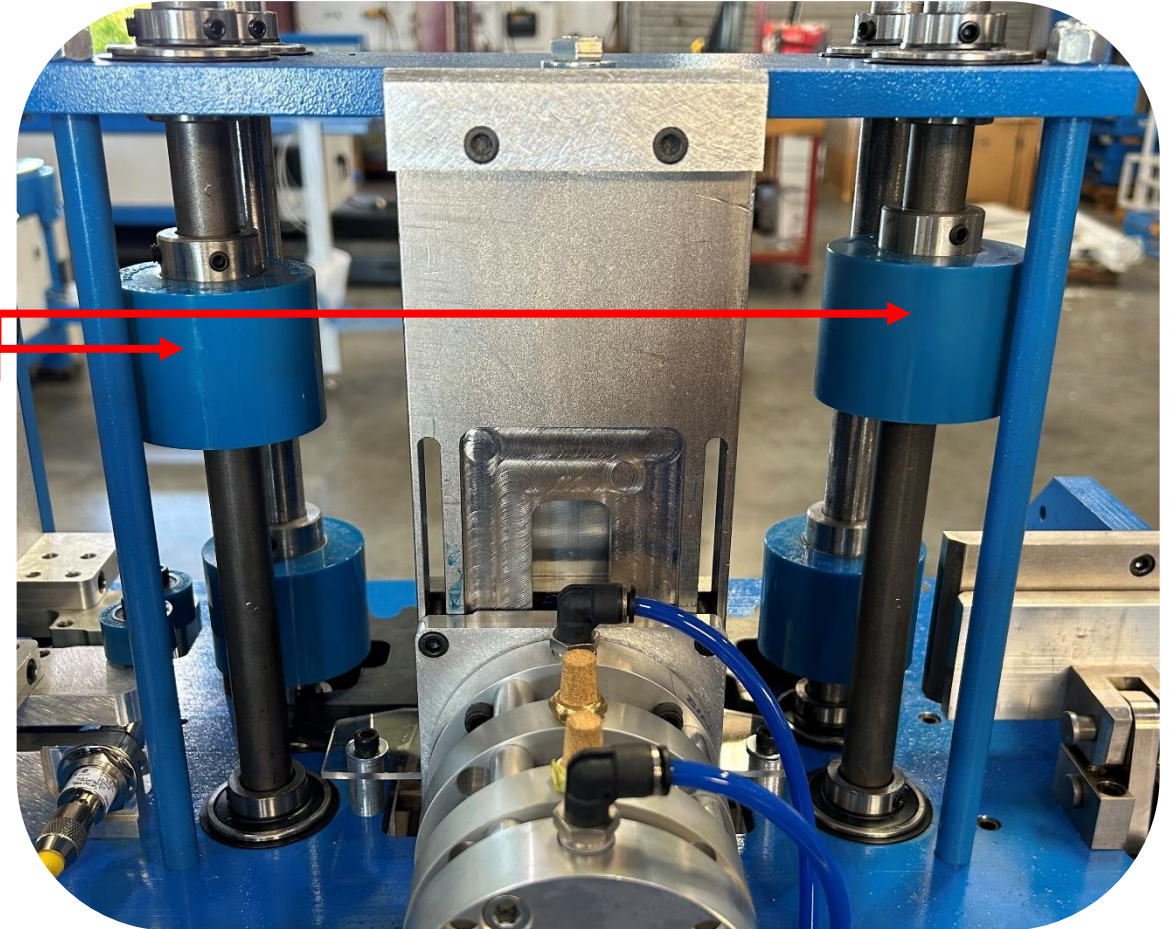
Set up for Plastic Face Letters

- Set the V groove rollers for a ½ inch flange, or a ¼” flange. [See Flange Thickness Adjustment.](#)
- Load the material into the machine [See loading material.](#)
- Make sure that the plastic face ramp is installed. [See Support Ramp.](#)
- Check the material thickness setting. [See Material Selection.](#)
- Set the Machine mode to Notch Flange and Bend or Notch and Flange. [See Material Selection.](#)
- Make sure that the 2 guide rollers are lowered.
- Push the material just past the, material homing sensor.



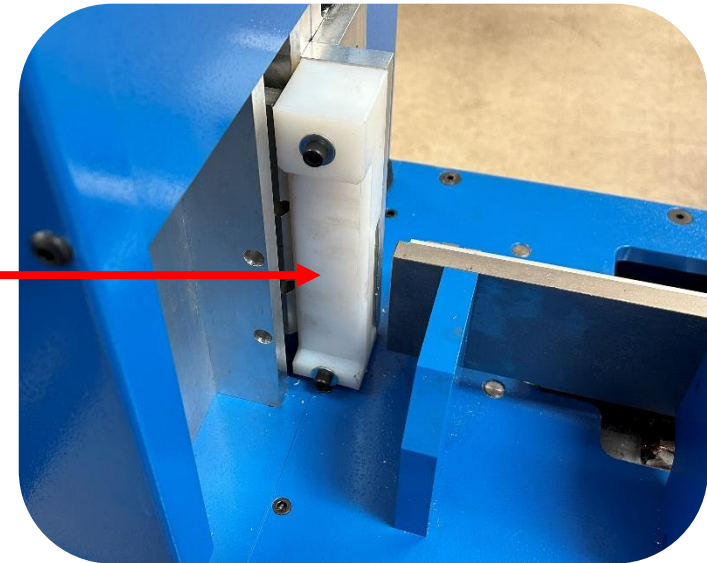
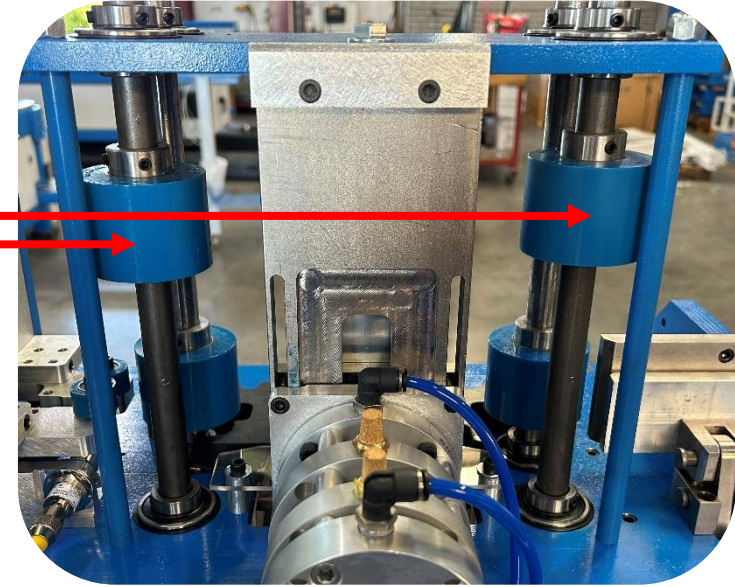
Set up for Reverse Channel Letters

- Set the V groove rollers in the highest groove. [See Flange Thickness Adjustment.](#)
- Load the material into the machine [See loading material.](#)
- Make sure that the Reverse Channel Letter ramp is installed. [See Support Ramp.](#)
- Check the material thickness setting. [See Material Selection.](#)
- Set the machine mode to bend head only. [See Material Selection.](#)
- Make sure that the 2 guide rollers are Raised up out of the way. 
- Push the material just past the shear.
- Shear the material. This will be the starting point of the letter. [See Manually Shearing material](#)



Set up for Profiled Material

- Only the Fusion Plus can run Profiled Material
- Set the V groove rollers in the highest groove. [See Flange Thickness Adjustment.](#)
- Load the material into the machine [See loading material.](#)
- Make sure that the Reverse Channel Letter ramp is installed. [See Support Ramp.](#)
- Make sure that the Material Support is installed.
- Check the material thickness setting. [See Material Selection.](#)
- Set the machine mode to **Broach Pos Brk Bends and Bend All Bends** or **Broach All Brk Bends and Bend All Radiuses.** [See Material Selection.](#)
- Make sure that the 2 guide rollers are Raised up out of the way.
- Push the material just past the shear.
- Shear the material. This will be the starting point of the letter. [See Manually Shearing material](#)

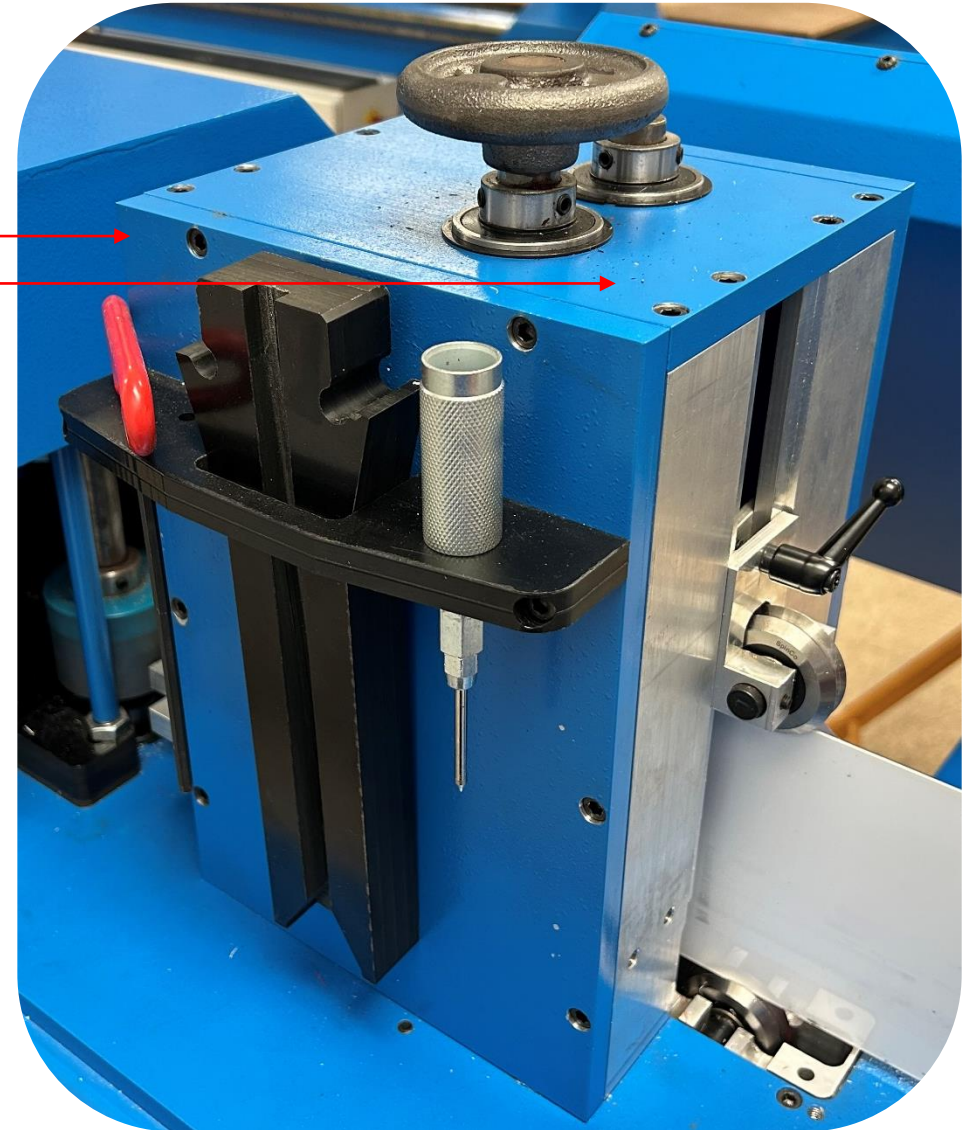


Mechanical Adjustments:

Drive Roller Replacement:

- Use a 3/16" Allen wrench to remove the 10 1/4-20 SHCS that hold the rear access cover on the material feed assembly.
- There are 2 1/4-20 SHCS located under the drive pulley assemble. There are 1/2" access holes drilled in the drive pulley assemble so you can access the screws.
- Remove the top plate. Loosen the set screws around the bearing and the hand wheel. Remove the hand wheel. Use a 3/16" Allen wrench to remove the 12 1/4-20 SHCS.

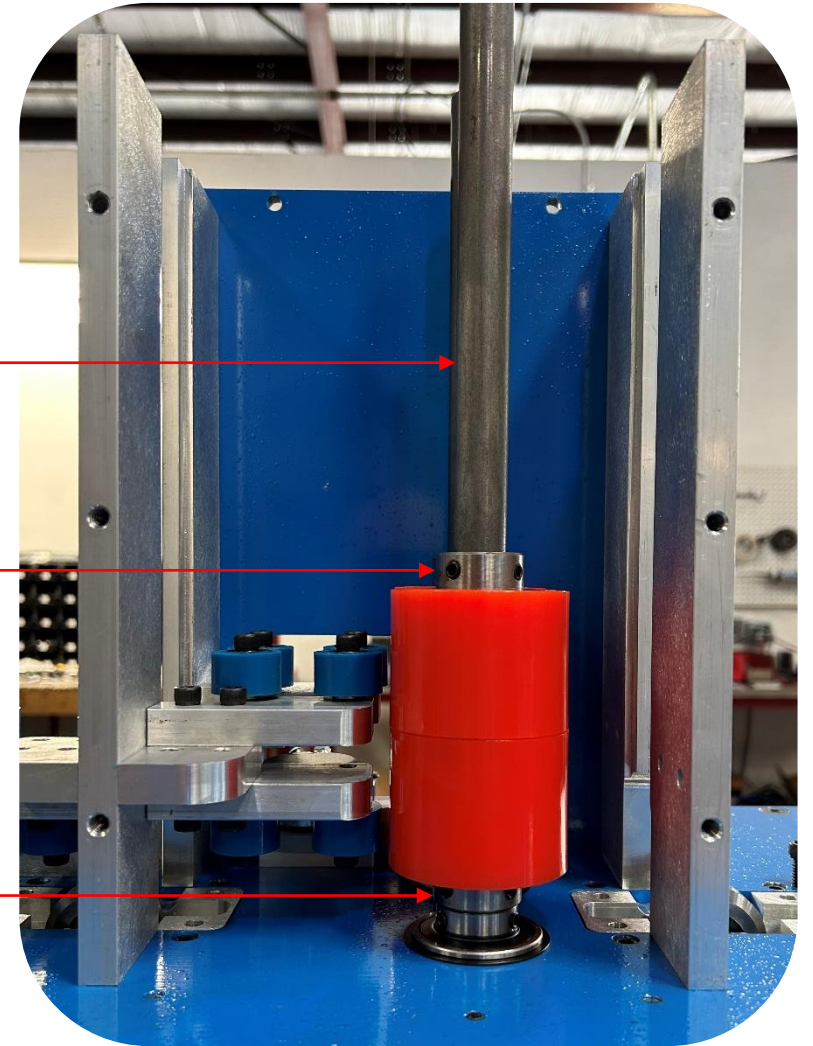
Go To Next Page



Mechanical Adjustments:

Drive Roller Replacement Continued:

- Loosen the set screws around the drive rollers. And remove the 2 drive rollers.
- Inspect the $\frac{3}{4}$ " shaft. Sand any burs with sand paper.
- The shaft should have 4 dimples in it, 2 for each drive roller. The set screws are supposed to seat in the dimples.
- Skip this step if you have dimples in the shaft. The early machines may not have dimples in the shaft. If the machine does not have dimples, you must put them in. Slide the new roller on the shaft, remove the set screws. Use a $\frac{3}{16}$ " drill bit, and carefully stick it in the set screw hole and drill the shaft $\frac{1}{6}$ ". Replace the set screw then drill the other hole. Do this for both drive rollers.
- Tighten the set screws and replace the drive roller assembly plates.

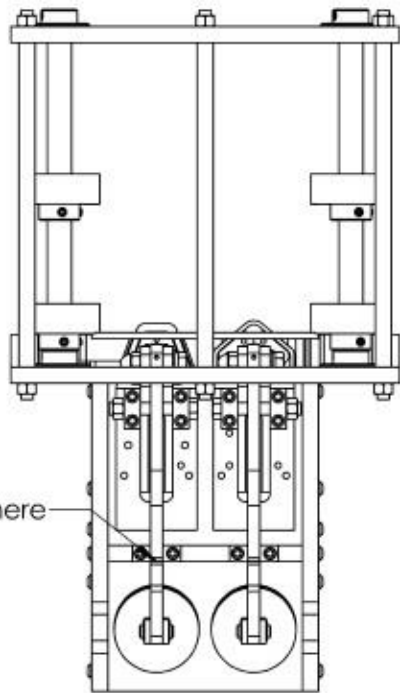


Mechanical Adjustments:

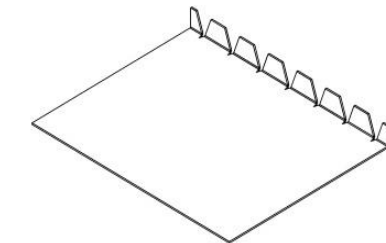
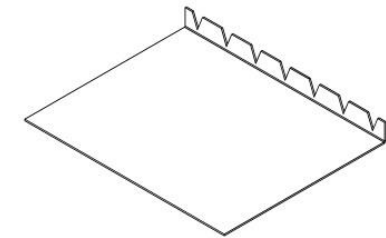
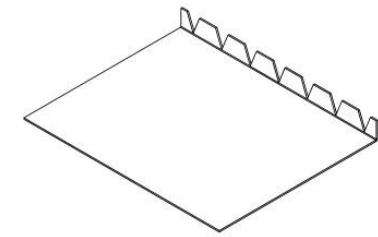
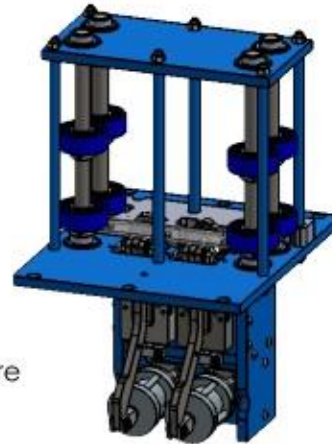
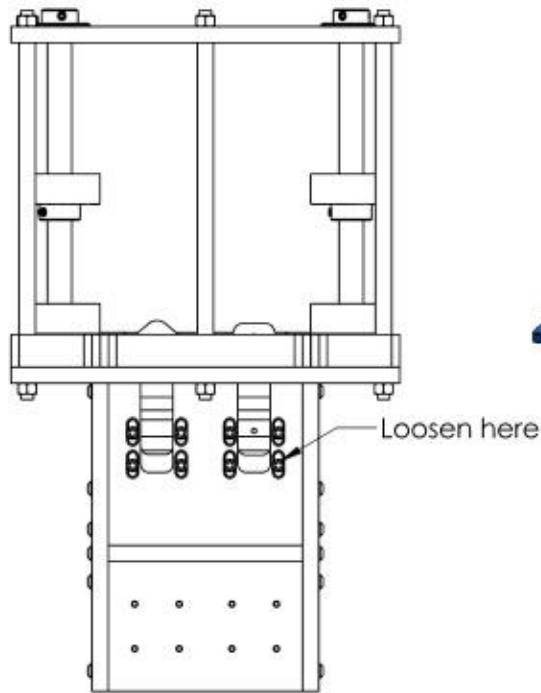
• Notcher Depth Adjustment:

- You can easily adjust the depth of the notch if your machine is notching either too close to the sidewall of the letter or too far away from the sidewall of the letter.
- Loosen the four bolts on the rear of the Notcher Base that you wish to adjust.
- Adjust the jack bolt to raise or lower the notch depth.
- Once your depth is adjusted tighten the four bolts on the rear of the Notcher Base.

Front View



Rear View



Mechanical Adjustments Continued:

• Flange Angle Adjustment:

• If you find that your machine is not bending a perfect 90-degree bend on the flange of the letter you can make an adjustment in the tolerance between the Bending Ram and the Fixed Die.

• A 1/2-13 bolt is threaded into the Bending Ram Plate; this bolt holds the plate in place.

• The bottom sub plate is stationary.

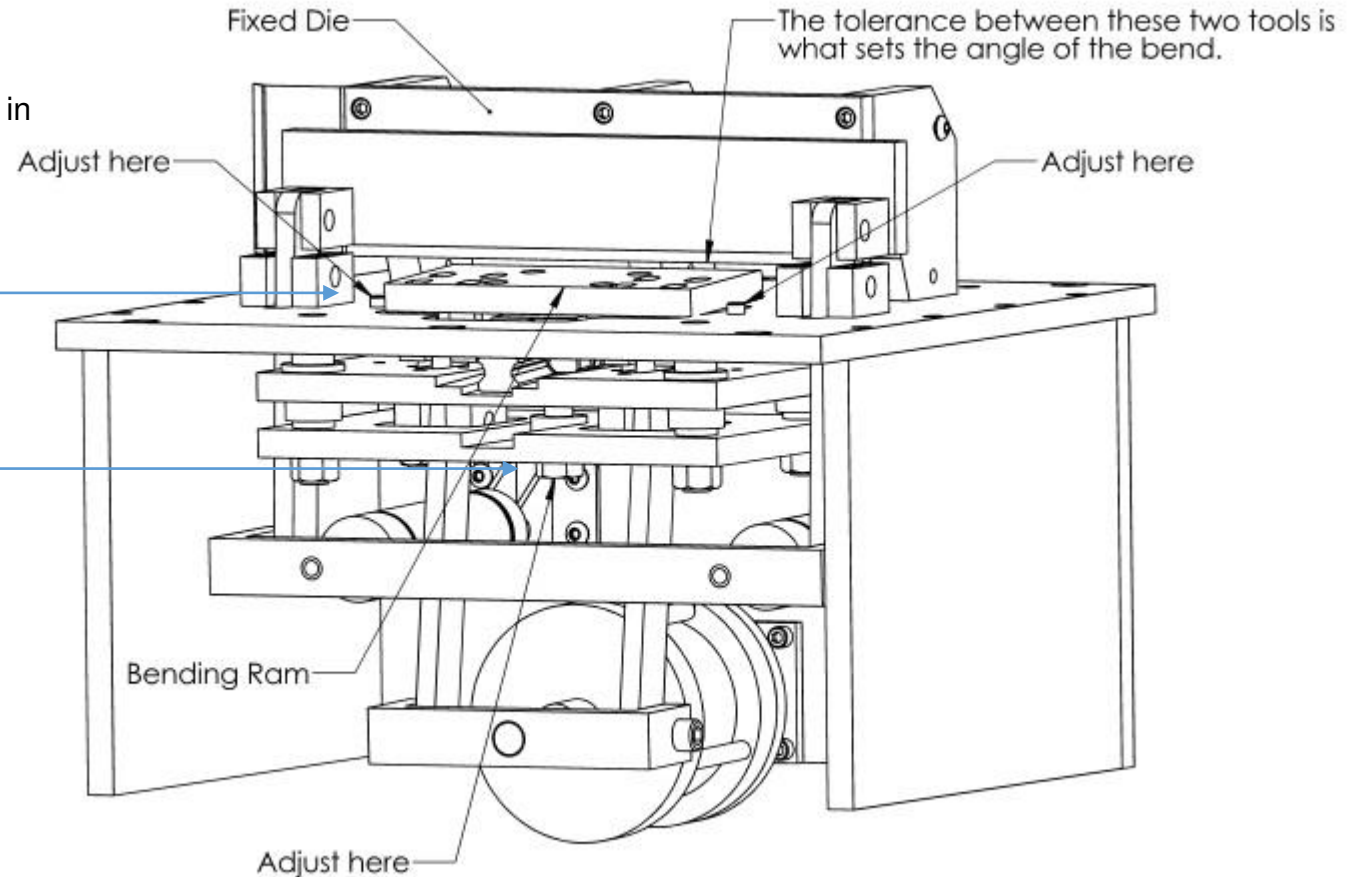
• Two 1/4-20 bolts on either side of the Bending Ram are also used to help adjust the Bending Ram up.

• To increase the flange angle.

• Loosen the 1/2-13 bolt that is threaded into the Bending Ram Plate. This will allow the plate to move up.

• Turn the 2 - 1/4-20 bolts on both sides of the Bending Ram clockwise to raise the bending ram. This will increase the flange angle. The bolts will adjust the bending ram left and right independently. Check each side with a piece of .040 material, use it like a feeler gauge to make sure that the bending ram is parallel.

• Gently snug up the 1/2-13 bolt this will hold the bending ram in place.



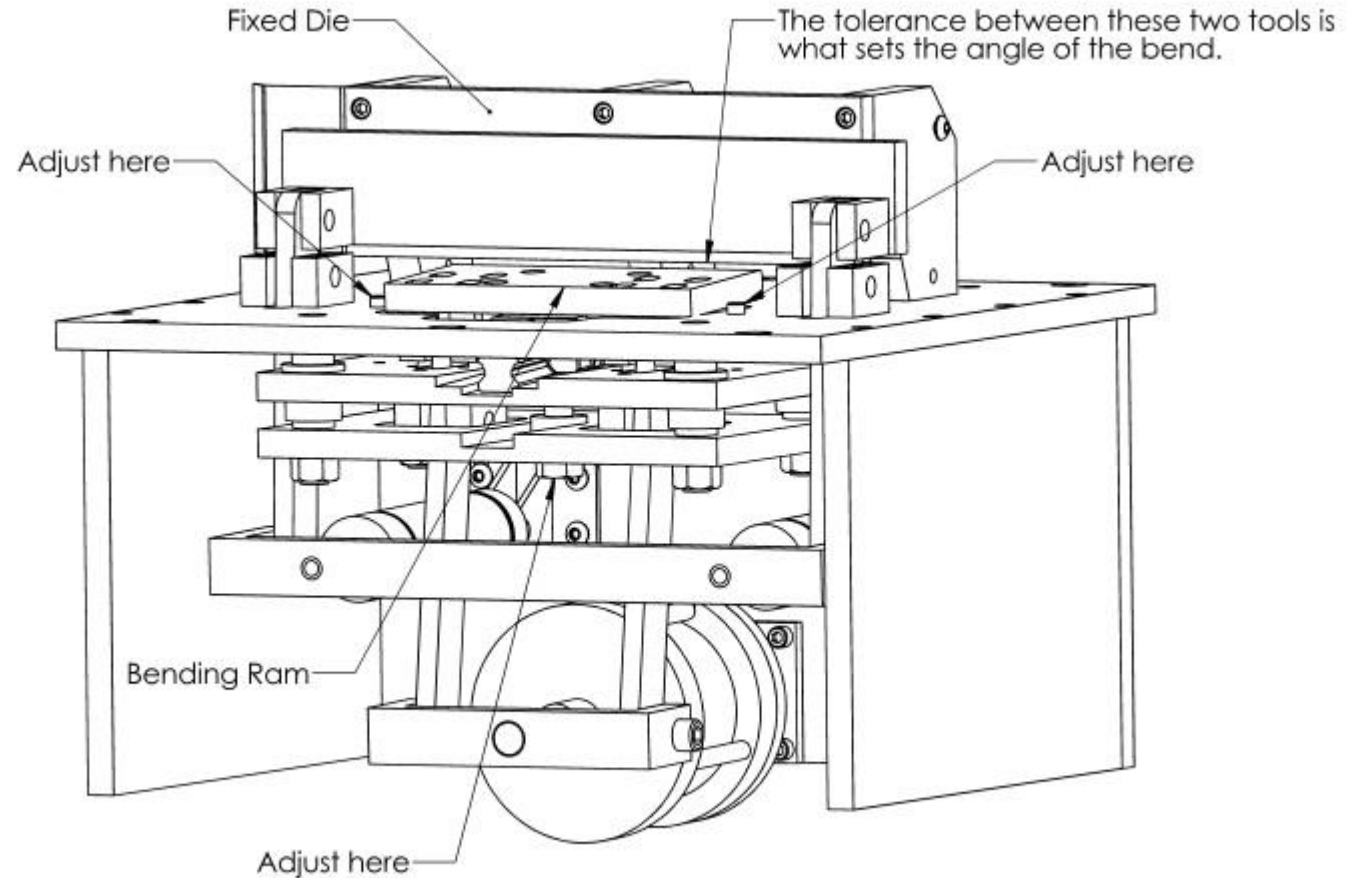
[Go To Next Page](#)

Mechanical Adjustments Continued:

- **Flange Angle Adjustment Continued:**

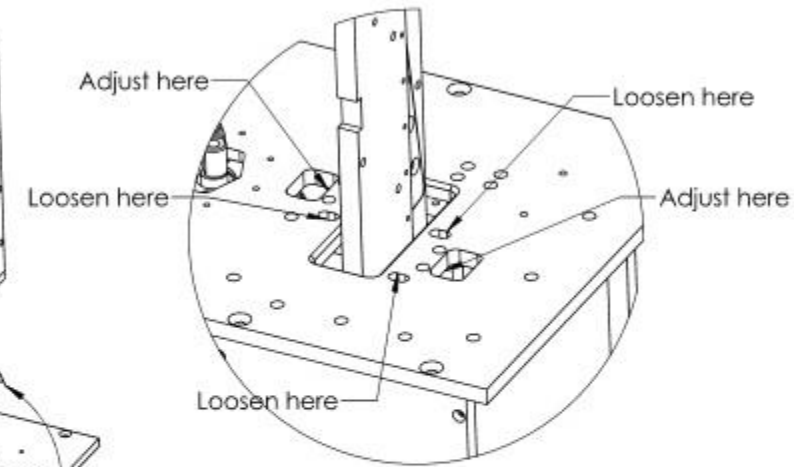
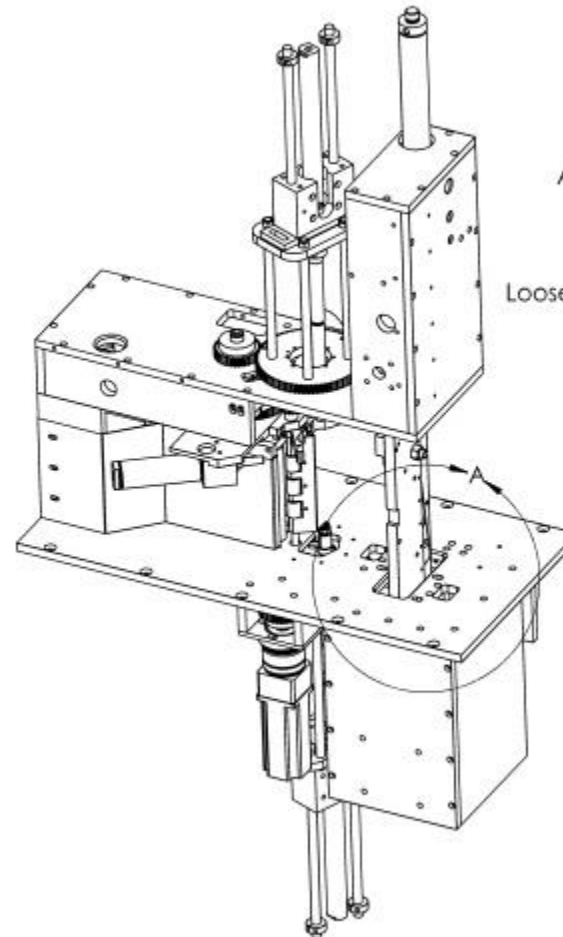
- **To decrease the flange angle.**

- Turn the 2 - 1/4-20 bolts on both sides of the Bending Ram counterclockwise. Use a soft hammer and tap the bending ram down past the desired depth. It's easier to achieve the desired distance by raising the bending ram. Follow the next step.
- Turn the 2 -1/4-20 bolts on both sides of the Bending Ram clockwise to raise the bending ram. This will increase the flange angle. The bolts will adjust the bending ram left and right independently. Check each side with a piece of .040 material, use it like a feeler gage to make sure that the bending ram is parallel.
- Gently snug up the 1/2-13 bolt this will hold the bending ram in place.

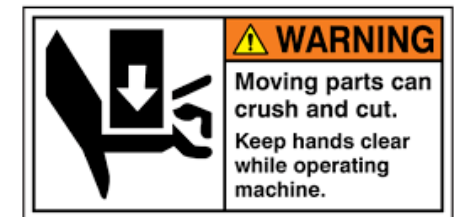


Mechanical Adjustments Continued:

- **Shear Adjustment:**
- Adjusting the tolerance is between the Fixed and Moving Shear Dies:
- You should not have any gap between the dies that is observable with the human eye.
- On the valve manifold located far to the right. From left to right, locate air valve station # 2. Locate the manual override button on the valve. Press the button and turn clockwise $\frac{1}{4}$ turn. This will release the shear lock. Then do the same to air valve station # 1. The shear will drop into the Shear Receiver. See [Valve station identification](#)
- Now, press in the Emergency Stop Button. This will drain all of the compressed air out of the machine allowing you to safely work on setting the Shear.
- Loosen the two $\frac{1}{4}$ -20 bolts that hold the shear shims in place. They are the only bolts that are in slots on the top of the base plate of the machine.
- There are two Shear Shims, one on the Fixed Die and one on the Moving Die Side.
- Now make an adjustment as needed and retighten the bolts.
- Release air valve Station # 1 by turning the blue button counterclockwise to raise the Shear. Once the Shear is raised, release air valve Station # 2 by turn the blue button counterclockwise to activate the Shear Lock. Release the Emergency Stop and Restart the software.



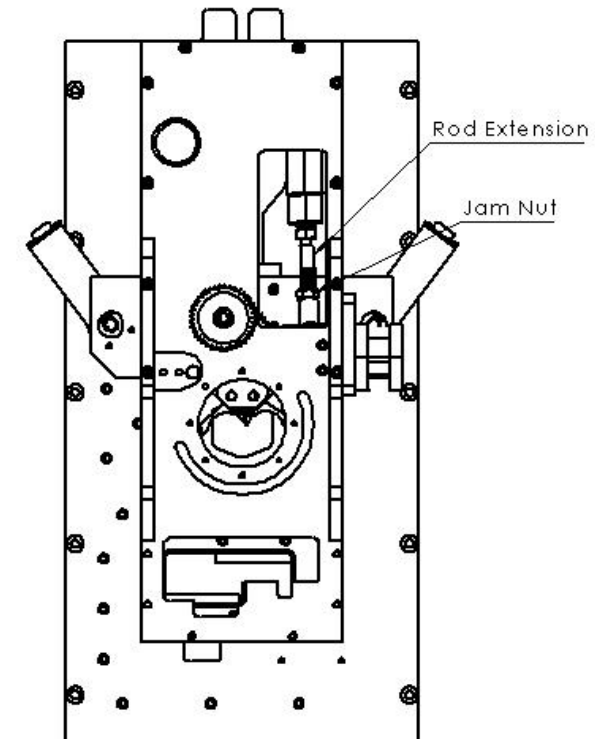
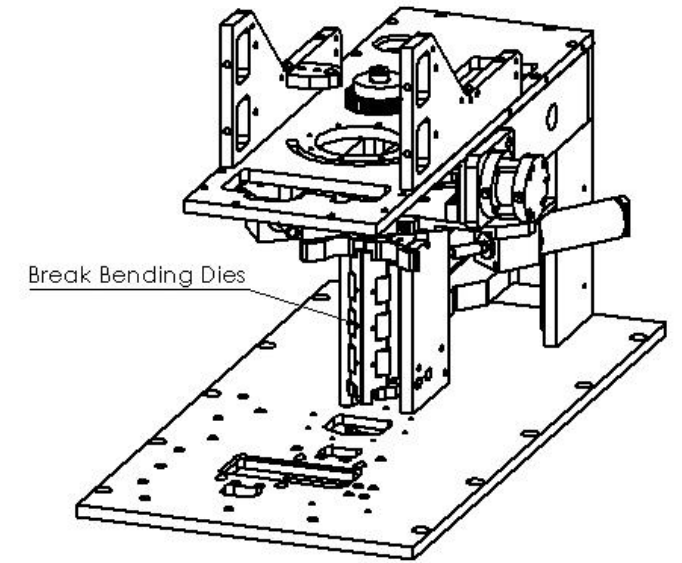
DETAIL A
SCALE 1 : 4



Mechanical Adjustments Continued:

- **Break Bend Die Adjustment:**
- Realigning the Break Bend Dies is a difficult task and should be done by a technician or someone with mechanical skills.

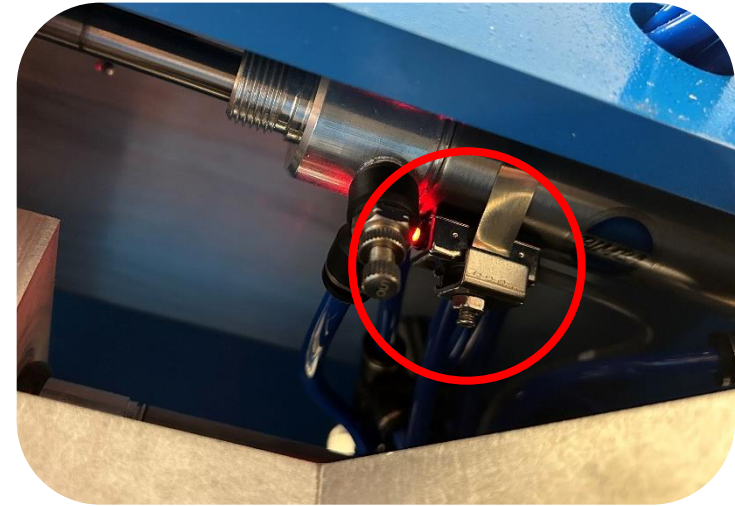
We highly recommend that you click on the link below and watch the video on this step.
[Link to Break Bend Die video](#)



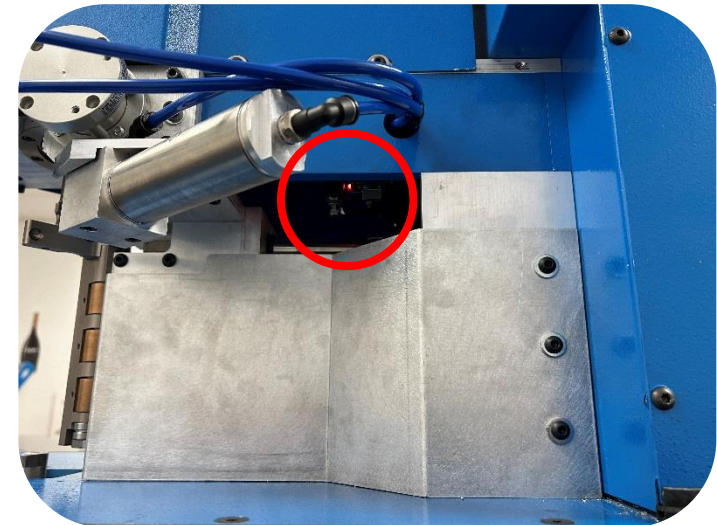
Mechanical Adjustments Continued:

- **Break Bend Die Sensor:**
- The Break bend Dies are opened and closed by using an air cylinder. The sensor that tells the machine that the dies are closed is mounted on that air cylinder.
- If you receive a message from the Fusion program that says, “the Break Bend Dies hit something,” but there not hitting anything, then you will have to adjust the sensor.
- With the machine on, locate valve station number 5 and turn it on. See [Electronic Components Overview Continued](#): for details. Locate your sensor in the machine. You may have access to it from below the bend head or you may have to remove the top cover to gain access to it.
- Loosen the sensor slide it back and forth on the cylinder while you watch the red light turn on and off. Move the sensor to the center from where it turned off and on then tighten the clamp. You may want to use a marker and mark where the light turned off and on for a reference.
- Turn off valve station number 5.

View from below



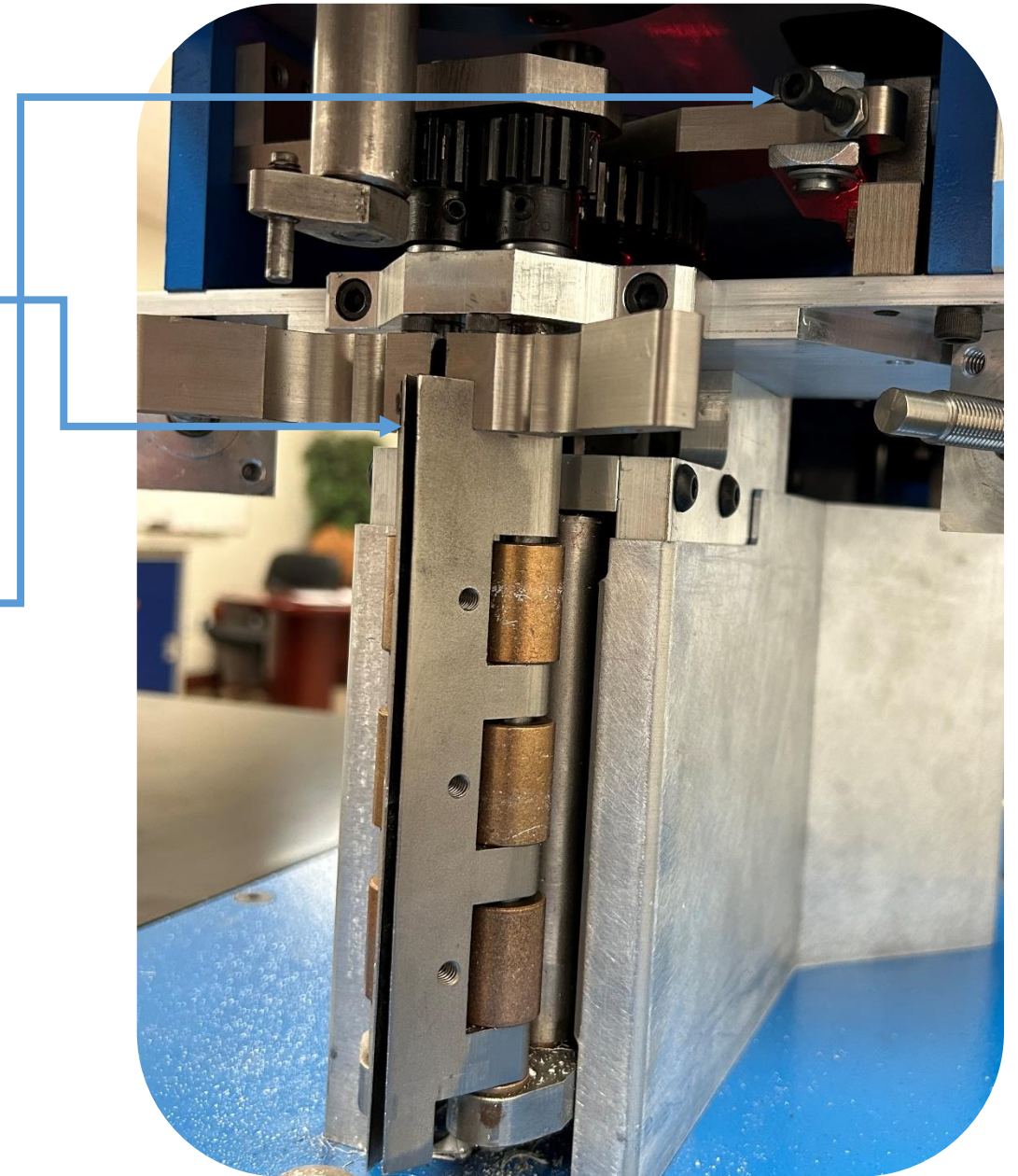
View from below



Mechanical Adjustments Continued:

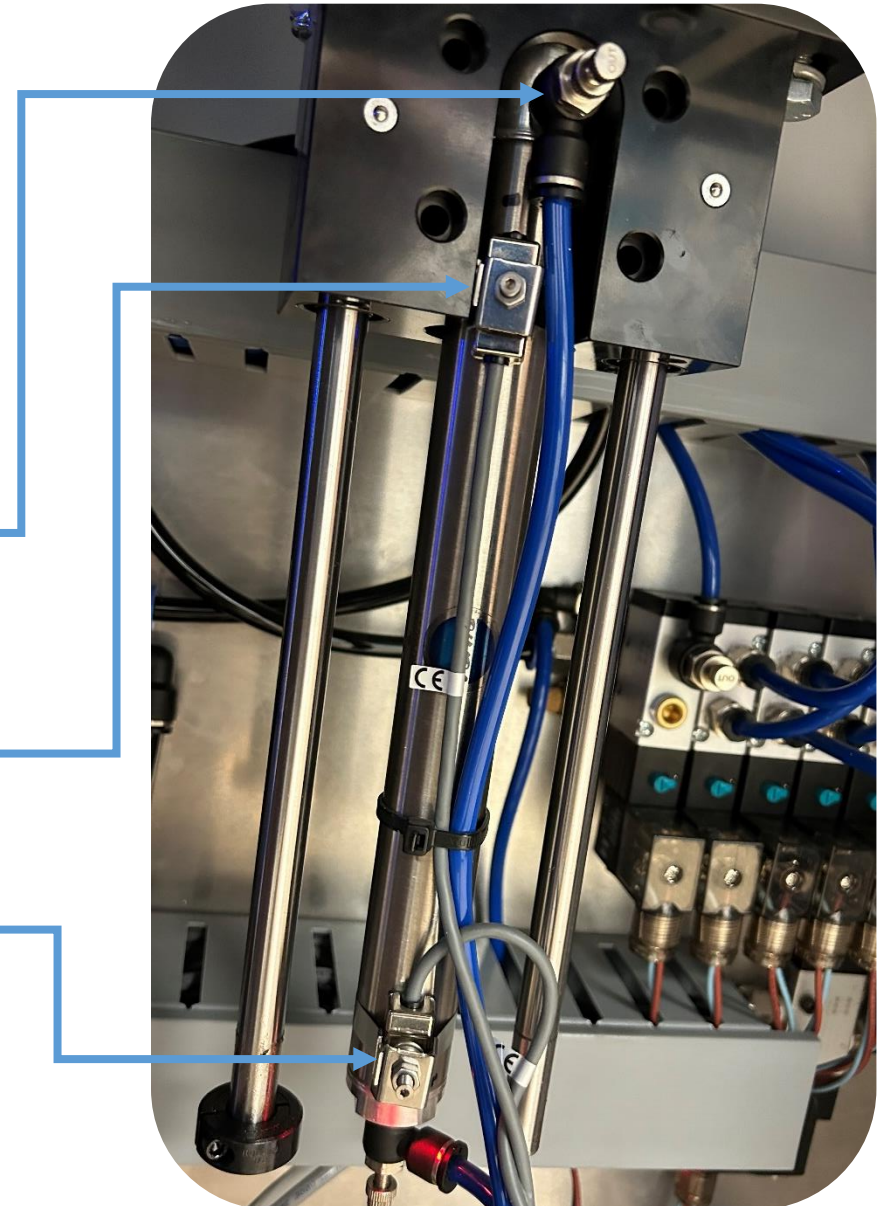
- **Break Bend Die Resting Position:**

- The resting position is when the Break Bend Dies has a small opening (Around 1/8"). When a break bend occurs, the dies close all the way, then the bend bar makes a bend in the material. After that the dies open to the resting position. In time this position may need adjusting.
- With the machine on and air applied to the machine, manually turn on air valve station # 5. Then turn on station # 7. Now turn off air valve station # 5. (See [Valve Station Identification](#)).
- The gap should be enough for .063 to pass through. Usually about 1/8" is fine. If it needs adjusting loosen the 10-24 jam nut, adjust the jack bolt then tighten the jam nut. After you make an adjustment cycle air valve station # 5 a few times to see where it's naturally sitting.
- After making adjustments. Turn on air valve station # 5. Turn off air valve station # 7. Then turn off air valve station # 5.



Mechanical Adjustments Continued:

- **Bend Bar Sensor Adjustment:**
- If you receive a message from the Fusion program that says (the Bend Bar hit the material while trying to do a bend), but it did not hit anything. Then you need to check two things. The Bend Bar speed and the Bend Bar sensors there are three Bend Bar sensors located on the air cylinders.
- **Bend bar speed:** When the Bend Bar is activated, it needs to fully extend so that it comes in contact with the Sensor within 2 seconds. If the Bend Bar doesn't make it in time, then it assumes that it hit the material. However, it could be just moving too slowly. A flow controller used to extend the air cylinder is located by the cylinder's rod and to retract, is located on the rear of the cylinder. Adjust the flow controller to achieve a reasonable speed. Don't make it move too fast so that it slams into itself. See [Flow Controller](#).
- **Lower Bend Bar, Upper Sensor:** With the machine on, locate valve station number 8 and turn it on. See [Electronic Components Overview Continued](#): for details. The lower Bend Bar should be in the up position. Loosen the sensor slide it back and forth on the cylinder while you watch the red light turn on and off. Move the sensor to the center from where it turned off and on then tighten the clamp. You may want to use a marker and mark where it turned off for a reference.
- **Lower Bend Bar, Lower Sensor:** With the machine on. The lower Bend Bar should be in the down position. Loosen the sensor slide it back and forth on the cylinder while you watch the red light turn on and off. Move the sensor to the center from where it turned off and on then tighten the clamp. You may want to use a marker and mark where it turned off and on for a reference.
- **Upper Bend Bar Sensor:** Remove the top Bend Head Cover. With the machine on, locate valve station number 4 and turn it on. See [Electronic Components Overview Continued](#): for details. The upper Bend Bar should be in the down position. Loosen the sensor slide it back and forth on the cylinder while you watch the red light turn on and off. Move the sensor to the center from where it turned off and on then tighten the clamp. You may want to use a marker and mark where it turned off and on for a reference.



Mechanical Adjustments Continued:

- **Flow controller:**
- Flow Controllers are used to control the speed that the air cylinder extends and retracts. Only adjust the side of the cylinder that exhaust the air, this will allow you to have a smooth control of the cylinder rod. Note some cylinders are dual action, so there will be two flow controllers on certain cylinders.
- Locate the air valve that controls the tool that you need to adjust. See [Electronic Components Overview Continued:](#) for details.
- Loosen the large thump nut. You may need a pair of pliers to crack it loose.
- Adjust the speed by turning the smaller thumb screw by hand. Turn it clockwise to slow the air cylinder down and counterclockwise to speed it up.
- After you make an adjustment cycle the air cylinder. Adjust the flow controller to achieve a reasonable speed. It should extend or retract within 2 seconds. Don't make it move to fast so that it slams into itself.
- Tighten the thumb nut, then test again to make sure that the speed is satisfactory.



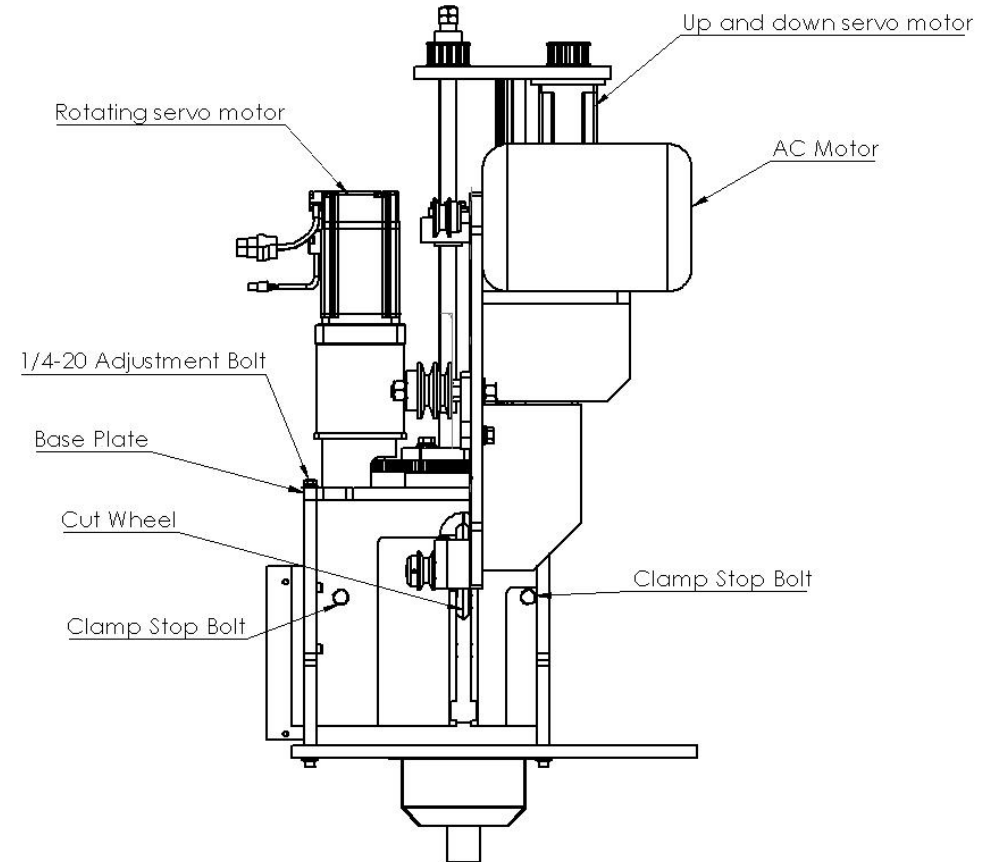
Mechanical Adjustments Continued: Fusion Plus machines only

Broach Wheel Adjustment:

- To adjust the depth of the cut wheel, loosen the 6 - 1/4 -20 bolts, 3 on each side of the base plate. With a soft hammer tap the plate in the direction that you want it to go and retighten the bolts. We recommend that you only move it a very small amount at a time. Then run the test fie to see if its correct.

Broach clamp Stops

- Depending on the different types of material that you are running through the machine the material clamp stops may need some adjustment. The purpose of the clamp stops is to make sure that the clamp plate stays parallel to the material. If your running 2-inch .063 material the bottom of the clamp plate will come in contact with the material and the top of the clamp plate will come in contact with the stops. If you want to change material from .063 to something thinner, you will need to back off the clamp stops.
- To set the stops put a 12-inch piece of material in the between the clamp plate just under the stop bolts. This will act as a feeler gauge. With the machine on, press and turn clockwise air valve station # 6 on the air manifold located to the front of the machine. This will activate the clamp plate. Adjust the 2 - 3/8-16 bolt by loosening the jam nut and adjust the bolt until it touches the plate. Then tighten the jam nut.



Mechanical Adjustments Continued:

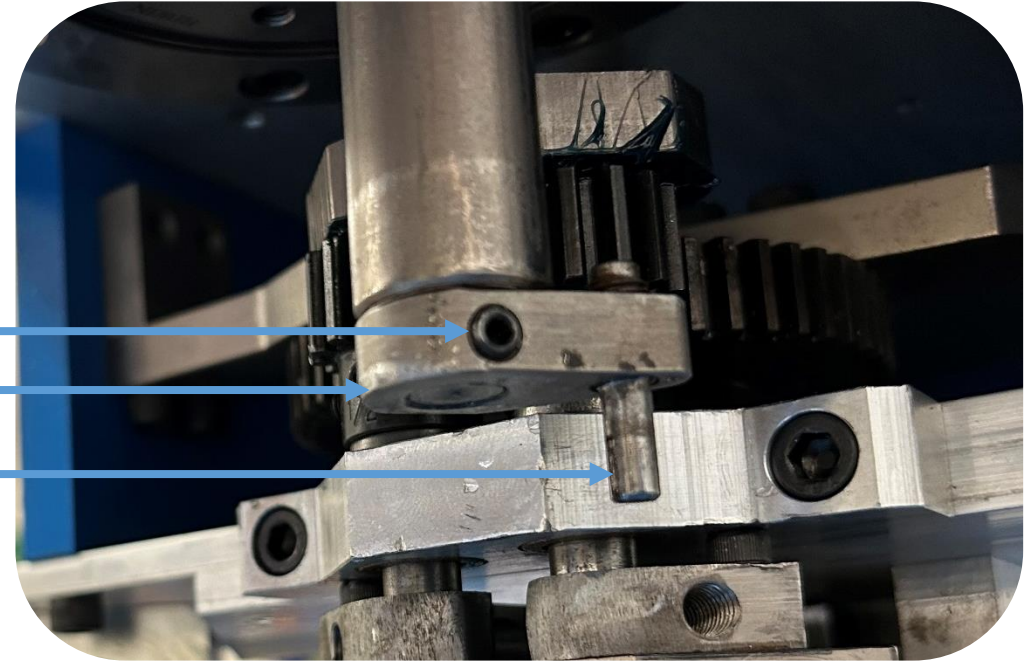
Replacing the Upper Lobe and Pin:

Replacing the Pin

- The pin threads into the upper lobe.
- Use a pair of pliers and unthread it from the upper lobe. Then thread the new one in.

Replacing the Upper Lobe

- The upper lobe is attached to a 3/8 round shaft that has a flat machined on it. The set screw in the lobe gets tightened to the flat on the shaft. Epoxy Like “JB Weld” is used around the 3/8” shaft and the inside of the lobe to fill any gaps between the connection.
- To replace the upper lobe, use a propane torch and apply a little heat to the lobe this will loosen the epoxy. Hold the torch on the lobe for about 5 seconds.
- Loosen the set screw and gently wiggle the lobe off with a pair of pliers.
- Mix a small amount of JB Weld and apply it to the 3/8” shaft and the hole of the new lobe.
- Position the set screw over the flat of the 3/8” shaft and tighten.
- Allow the epoxy ample time to fully cure.



Mechanical Adjustments Continued:

Replacing the Lower Receiver Lobe:

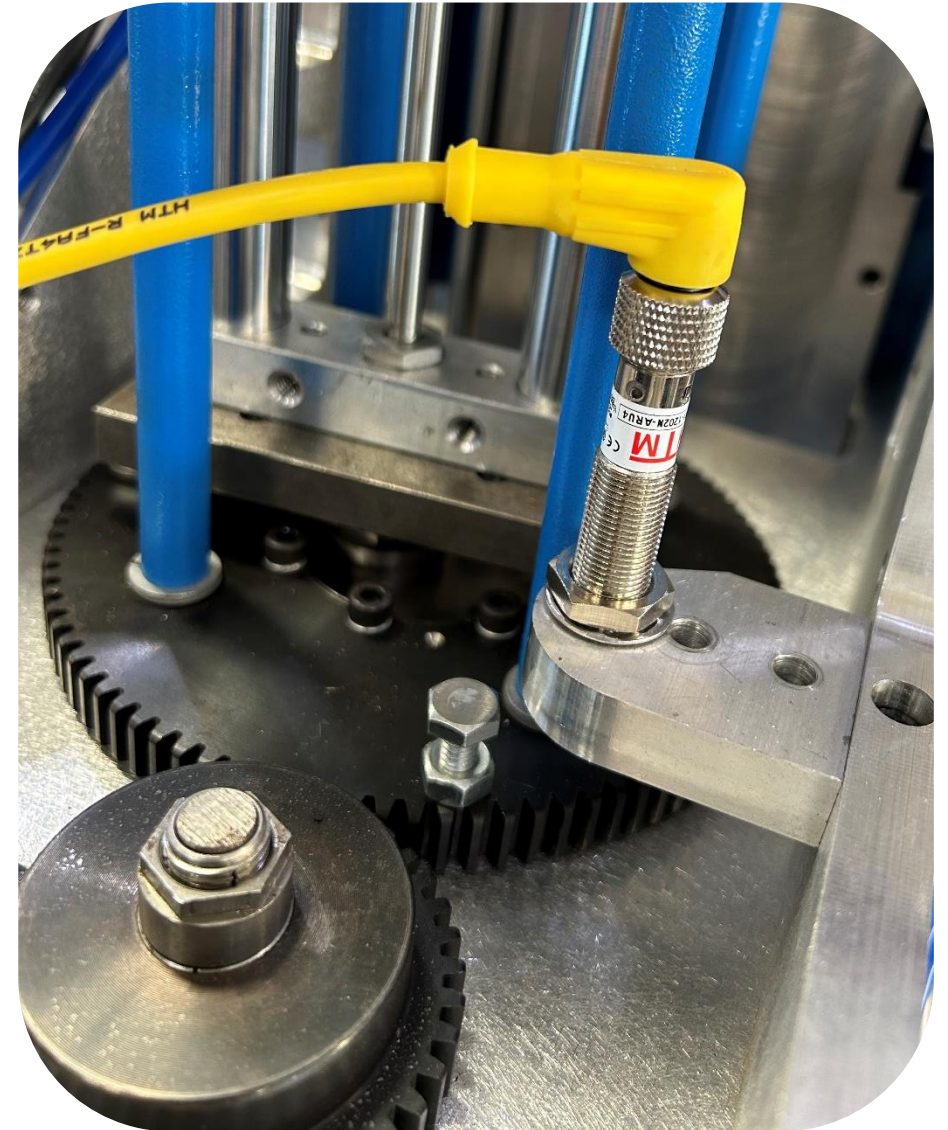
- The receiver lobe is attached to a 3/8 round shaft. The set screw in the lobe gets tightened to the round shaft. Red Loctite is used around the 3/8" shaft and the inside of the lower receiver lobe to secure the connection.
- To replace the lower receiver lobe, use a propane torch and apply a little heat to the lobe this will loosen the Loctite. Hold the torch on the lobe for about 5 seconds.
- Loosen the set screw and gently wiggle the lobe off with a pair of pliers.
- Test fit the new lobe. Slide it on the shaft, Make sure that it's 5/8" above the blue base plate.
- You must position the receiver lobe to the pin that is in the upper lobe. It is important to rotate the bend bar assembly counterclockwise until it stops, then clockwise a few degrees. This position is where the machine rotates the assembly to lower the bend bar.
- If the receiver lobe fits snugly on the shaft, use Loctite around the shaft and the hole that's in the new lobe. If there's play, then use an epoxy like JB Weld.
- Position the lower receiver so that the pin slides into it, then tighten the set screw.
- Allow the Loctite or epoxy ample time to fully cure.



Mechanical Adjustments Continued:

Adjusting the Bend Head Home sensor:

- When the program starts the first thing it ask you, if it is okay to rotate the bend head. [See Homing the bend head](#) . What it its actually doing is setting a zero for the bend head, so the machine knows exactly where the bend bar is located, so it can bend the material correctly.
- If the sensor malfunctions the bend head will rotate counterclockwise pass the home sensor and run into the stop and fault the servo drive.
- Remove the top cover.
- To test the sensor, use a piece of metal and wave it under the sensor. A red light will appear on the sensor if it is working.
- Wave a piece of metal under the sensor again and look at the second blue relay behind the clear plastic on [the electric panel](#). It should light up green.
- This tell us that the sensor and the relay is working.
- Let the machine try and home itself, when it fails the servo will fault out. You will be able to turn the bend head by hand. Rotate it until the bolt head is under the sensor. If the sensor comes on, then there is a bad connection on the relay or the breakout board. Or the sensor is right on the cusp of working or not working and will need to be adjusted.
- If the sensor doesn't come on, then adjust the sensor down until it comes on. Rotate the bend head a few time to test.



Machine Software

Software Overview

Using the Software

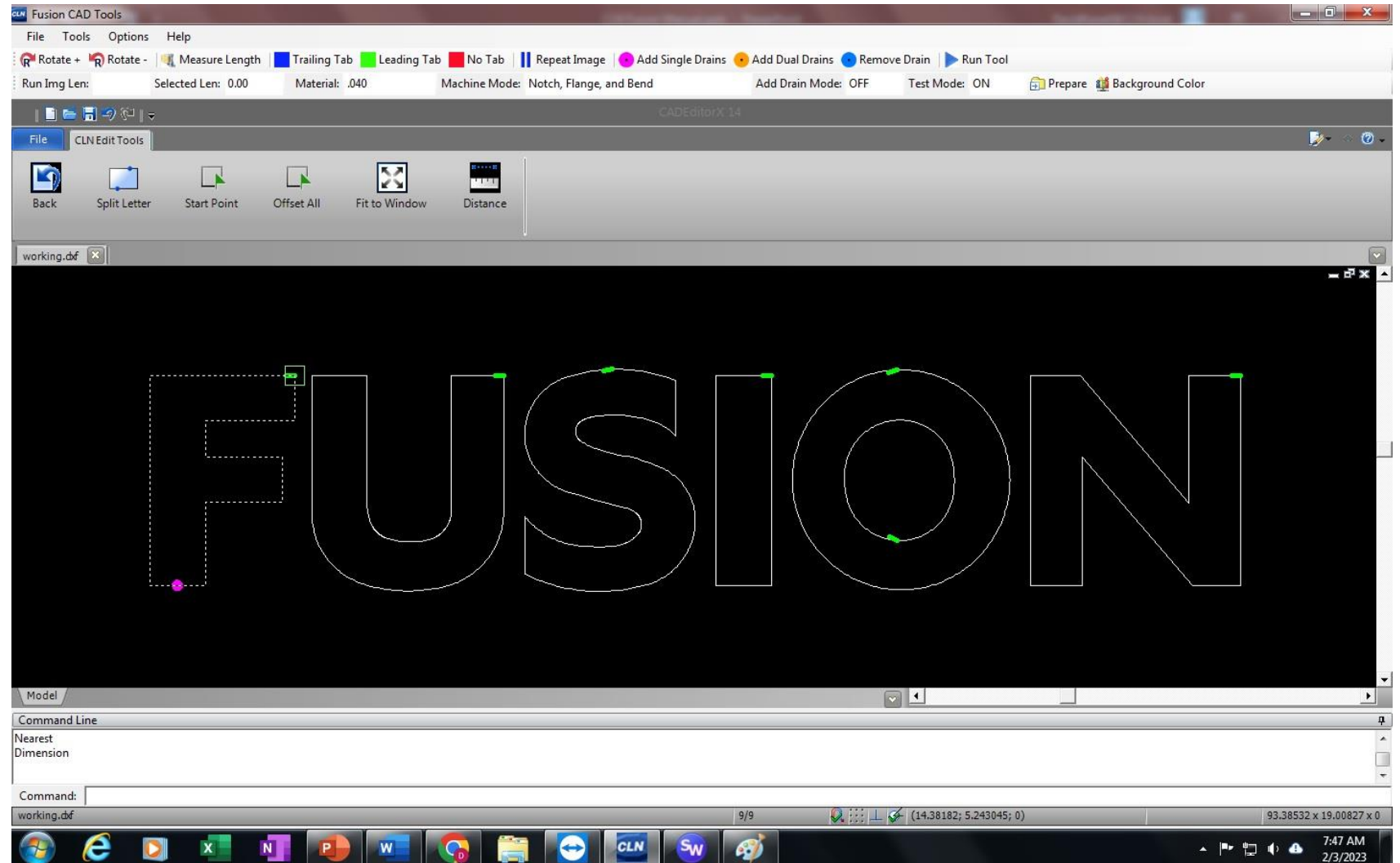
Manual Machine Control

Material Settings

Software Settings

Tool Settings

Machine Calibration



Software Overview:

- **Software**

The purpose of the CLN software is to give the operator a way to view the artwork that was sent via a DXF and convert it so that the machine can process the information correctly. From the CLN Software you can alter the start point, split the letter up into sections, set an inline or outline and set drain hole locations.

Types of Bends

Break Bends

- A break bend is two lines meeting together with one point. The program calculates the two adjacent lines and provides an angle. If the angle is greater than 15 degrees, then the machine will engage the break bend dies and bend the calculated angle however it will not bend past 170 Degrees. Because the bending bar will hit the die. If it is less than 15 degrees then the machine will skip over it, because less than 15 degrees is a minuscule amount and is most likely to be a condition of bad artwork and it is a waste of time.

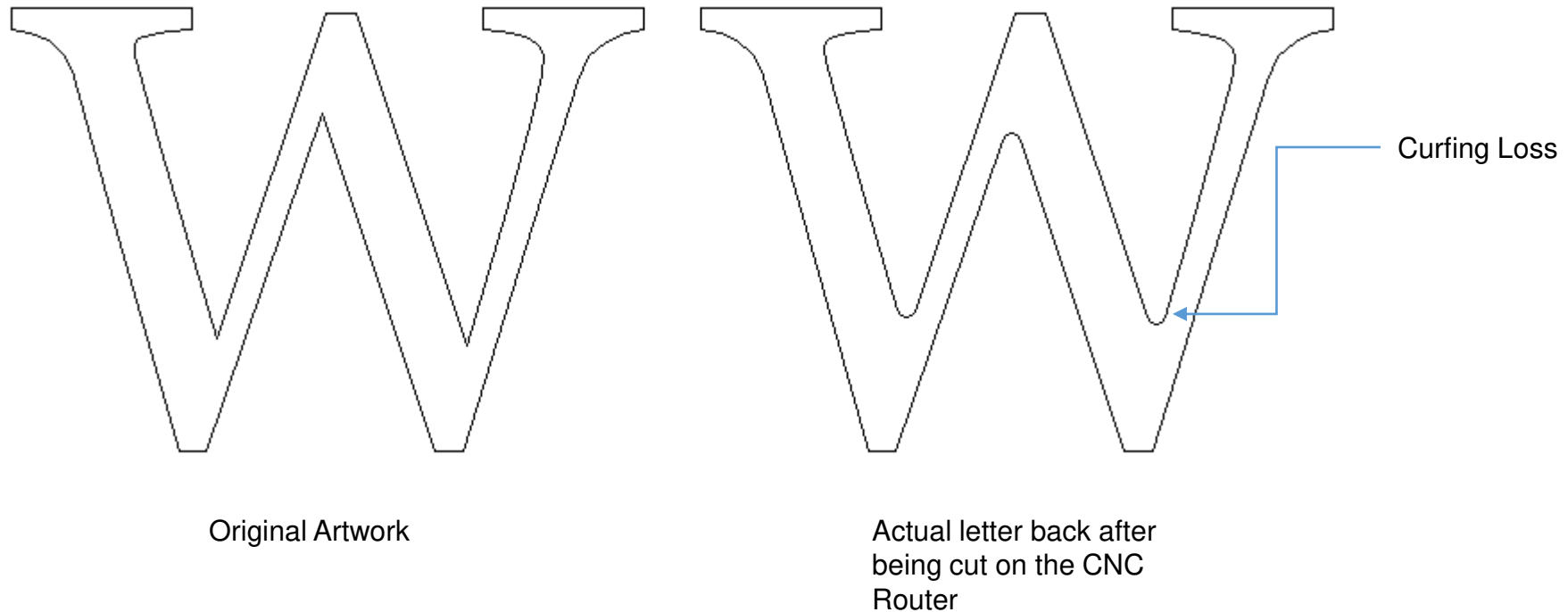
Radius Bends

- When the program reads a radius, it calculates the size of the radius. It then tells the machine to engage the round die, move the material forward to the round die location then engage the round bending roller. Then rotate the bending roller to the correct angle and feed the material through the two round dies to form the radius. If the radius is less than .75" the machine will bump it around the break bend die. After every bend the machine makes sure that the material did not slip, if it did then the machine will automatically correct itself by using the encoder.

Software Overview Continued:

Curving loss

- Curving loss occurs when the router cuts the letter back, the router bit can't cut a sharp corner down in the crotch of letters like W or V. This routine calculates what the router bit can not cut and compensates for it by subtracting out the difference from the two lines that create a negative angle. The setting is called Router Bit Size and is in Options > Software Settings.

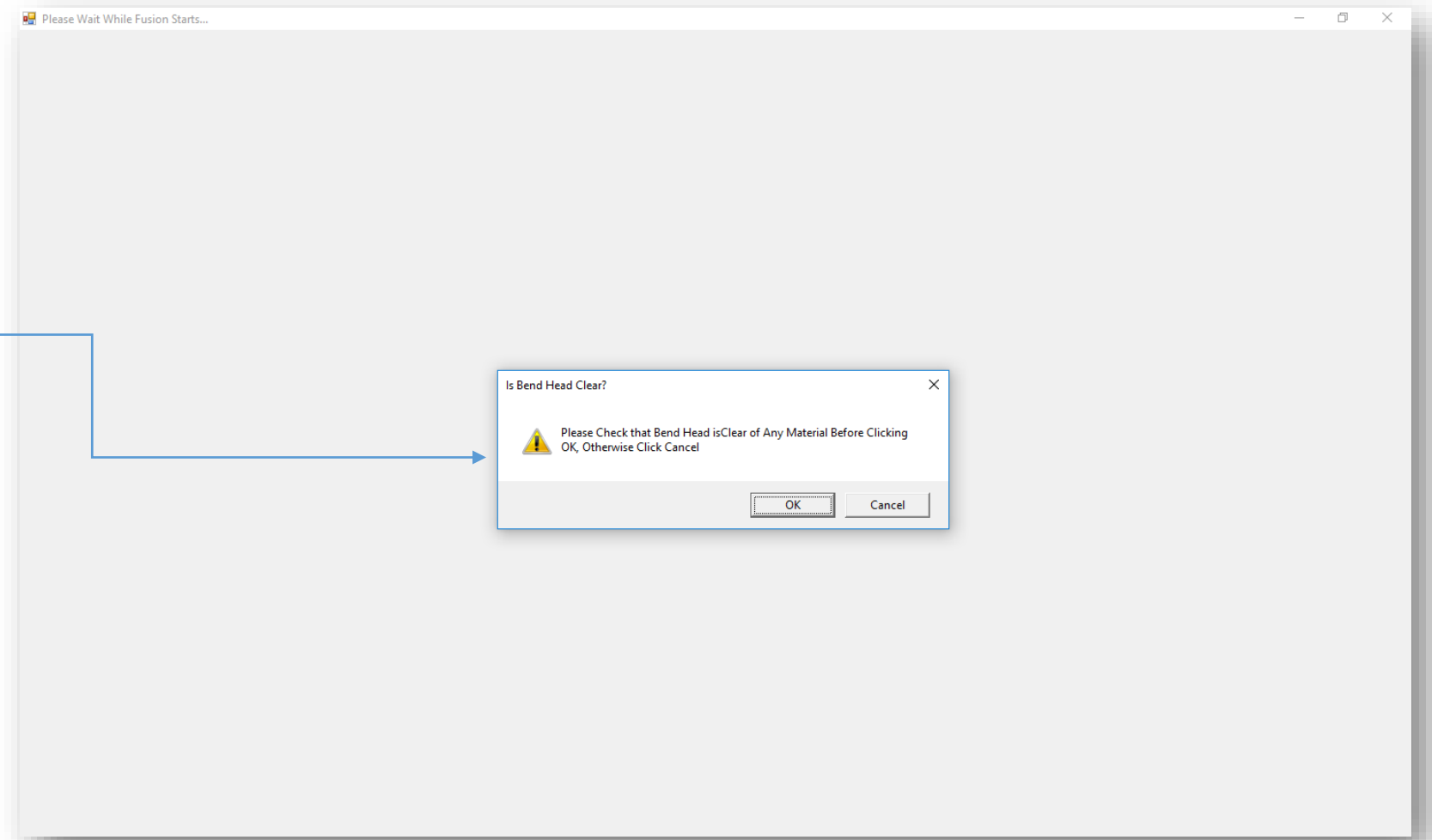


Using The Software:

Start the program:

- To open the operating software on the machine simply double click on the desktop icon “CLN Fusion”.
- A message will display asking you if it is safe to home the bend head.

[\(Please see Homing the Bend Head before you click okay\)](#)



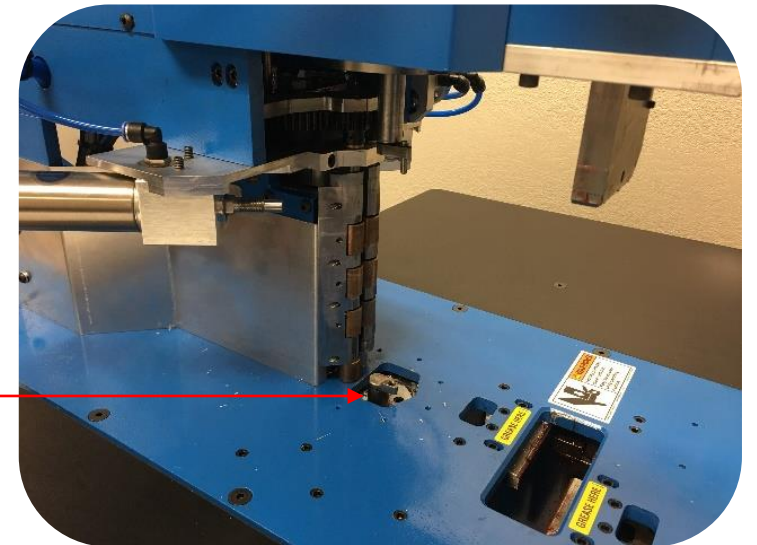
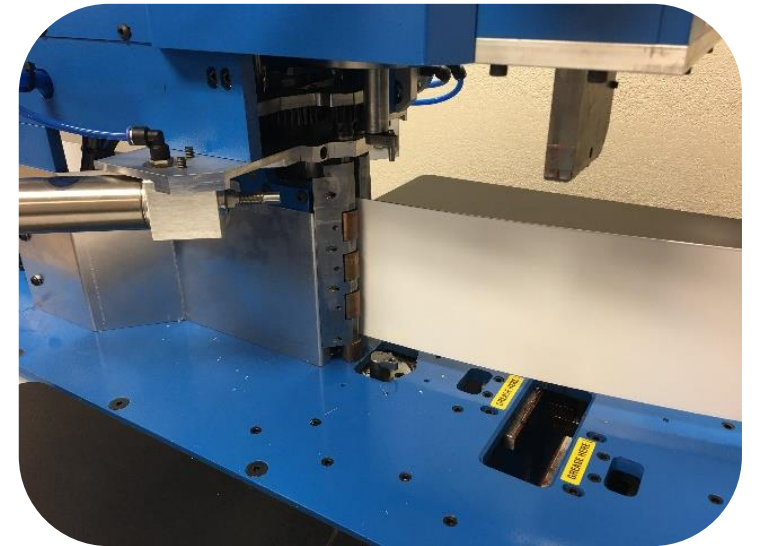
Using The Software Continued:

Homing the Bend Head:

- If you have material out passed the bend head, **click Cancel** and the machine will not home the bend head at this time.
- If the bend head is clear and it is safe to rotate the bend head, then **click Ok** and the machine will home the bend head.
- If you click cancel because you have material out passed the Bend Head, the machine will not allow you to process a letter until you home the Bend Head. Therefore, if you click "Run Tool" the message will display again asking you if it is safe to home the Bend Head.

Look and wait for it to finish the rotation sequence.

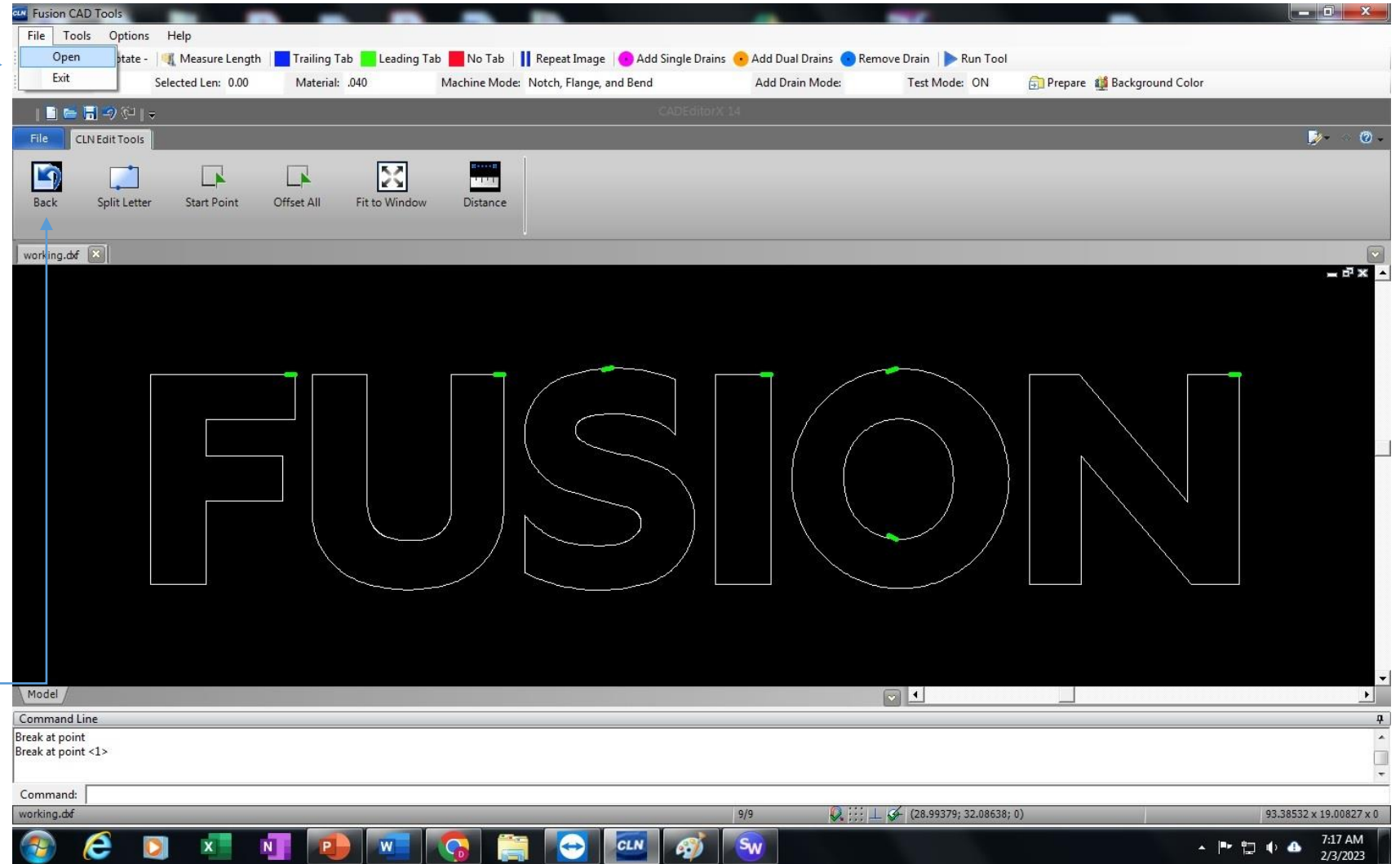
- The Bend Head message will always come up when you start the Fusion program.
- To save time the machine will not rotate the Bend Head if it has successfully completed the sequence. So, when you click okay, it will skip this task.
- Every time that you click Okay to the rotate Bend Head message, you should watch the Bend Head and see if it rotates normally. Wait for it to come to a stop on the left side of the machine, or the side that's closest to the monitor, before you continue.



Using The Software Continued:

Open a DXF File:

- To open your .dxf file and view your artwork on the machine, Open the Fusion program, go to, File > Open and select your file. _____
- The Artwork will be displayed on the screen in a tab called Working. This tab is reserved for processing the letters with the Fusion machine. Notice that the letters have tabs atomically inserted at the start point of each letter. _____
- You can alter your letters, but you have to click the back button on the fusion program to open the job up in a new editing tab. There you have access to the editing tools. _____

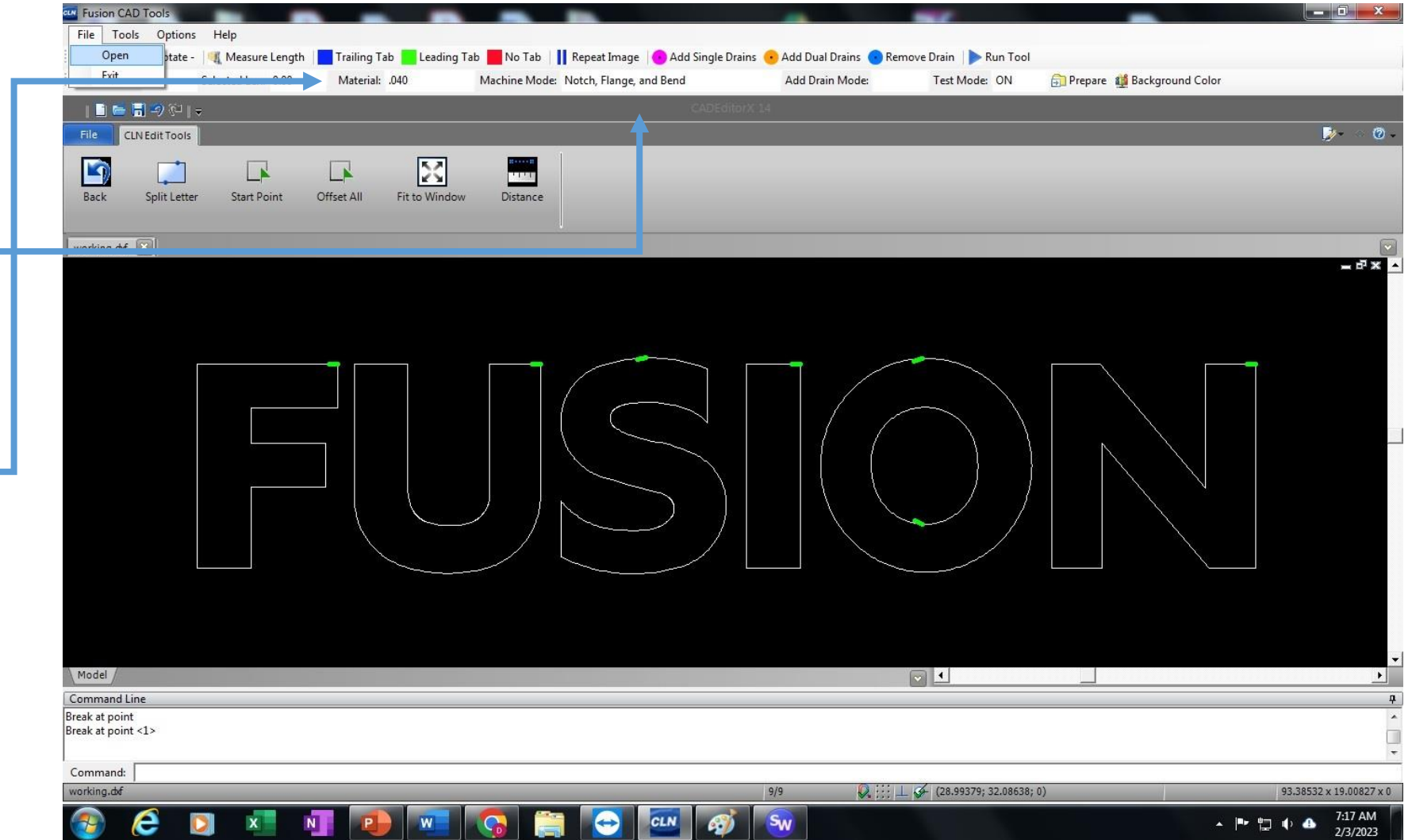


We highly recommend that you click on both links below and watch both videos on Master file and Artwork setup. [Master File](#) and [Artwork Setup](#)

Using The Software Continued:

Material Selection:

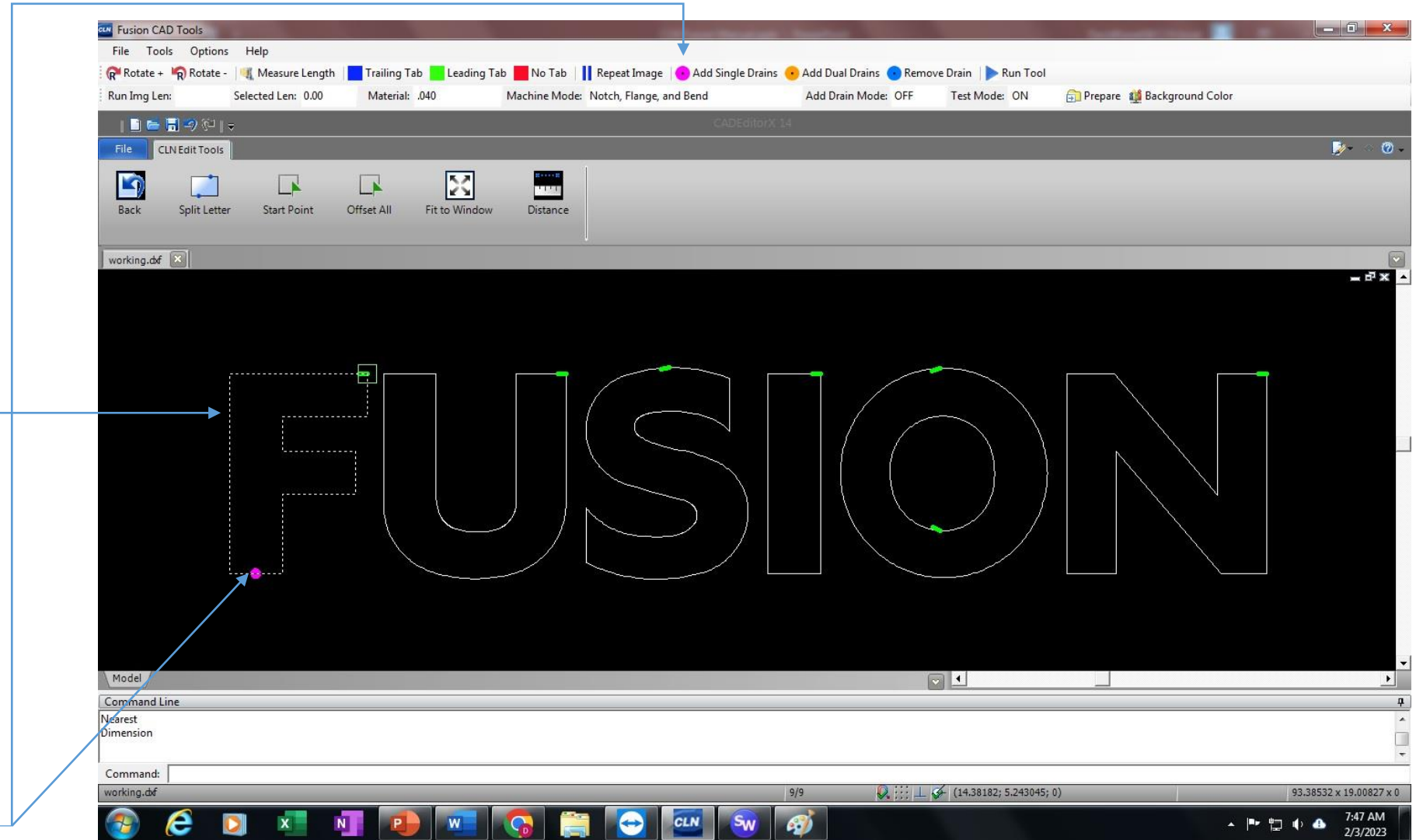
- Make sure that you have the machine in the right mode for the kind of letter that you want to make.
- [Machine Mode](#)
- Make sure that you have the right material selected for the type of coil that you have loaded.
- [Material Selection](#)



Using The Software Continued:

Running A Letter:

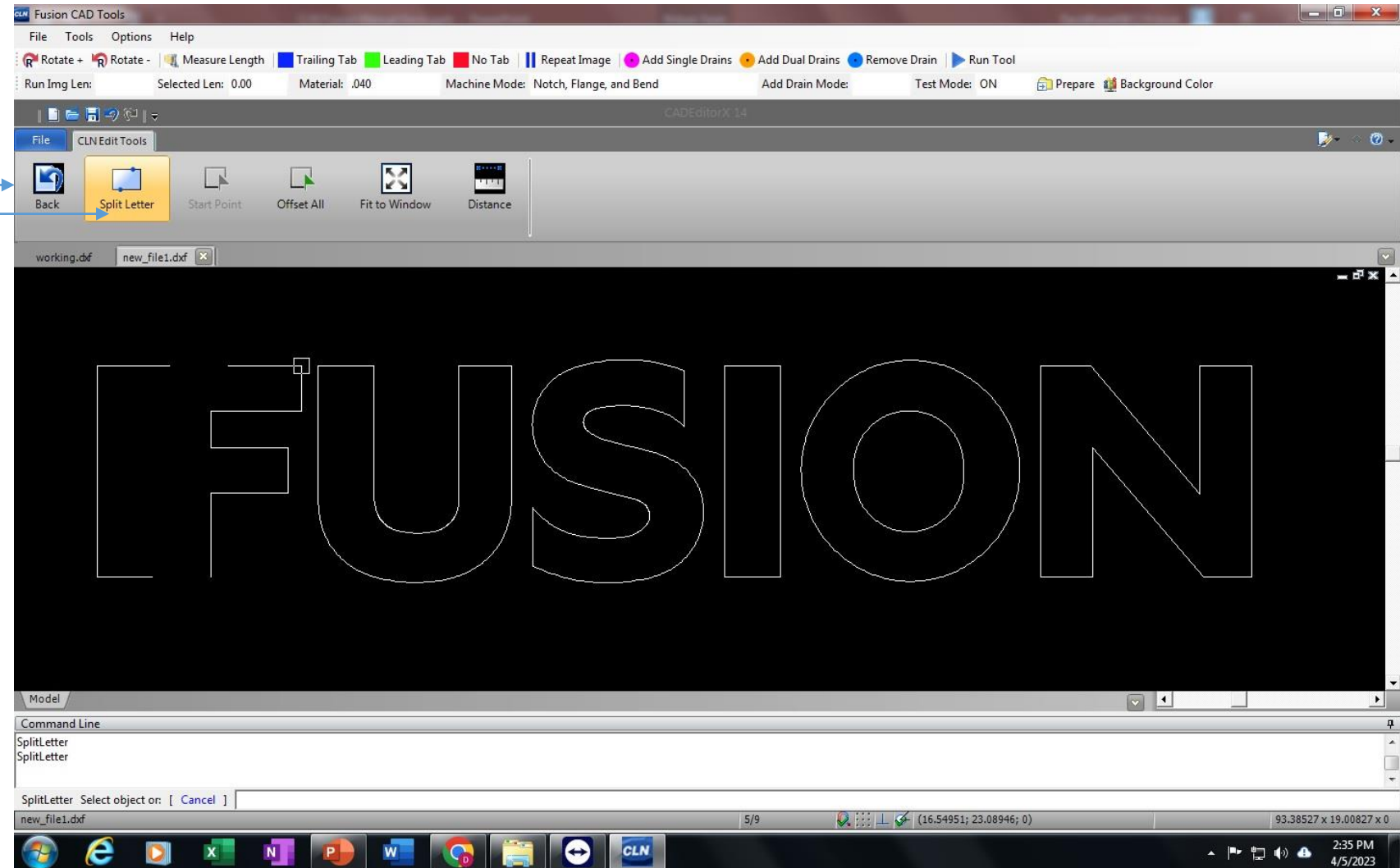
- To select the letter, you can either click on the letter or hold shift and click on more letters. Or drag a box around the letters. Dragging a box from left to right, you have to drag the box completely around the letter. Drag a box from right to left you just need to come in contact with the letter. To select it.
- If the machine is in Notch Flange and Bend mode or Notch and Flange mode “Standard Channel Letters”. You can set a single drain hole by clicking on the “Single Drain Hole” icon, allow the cursor to snap to the part of the letter that you want to insert a drain hole and click on the letter. If you must have 2 drain holes per letter. Select the “Add Dual Drain” for letters like the “I”. To process the letters. Select the letter or letters that you wish to run and click Run Tool. The machine will begin making letters.



Using The Software Continued:

Splitting A Letter Into Sections:

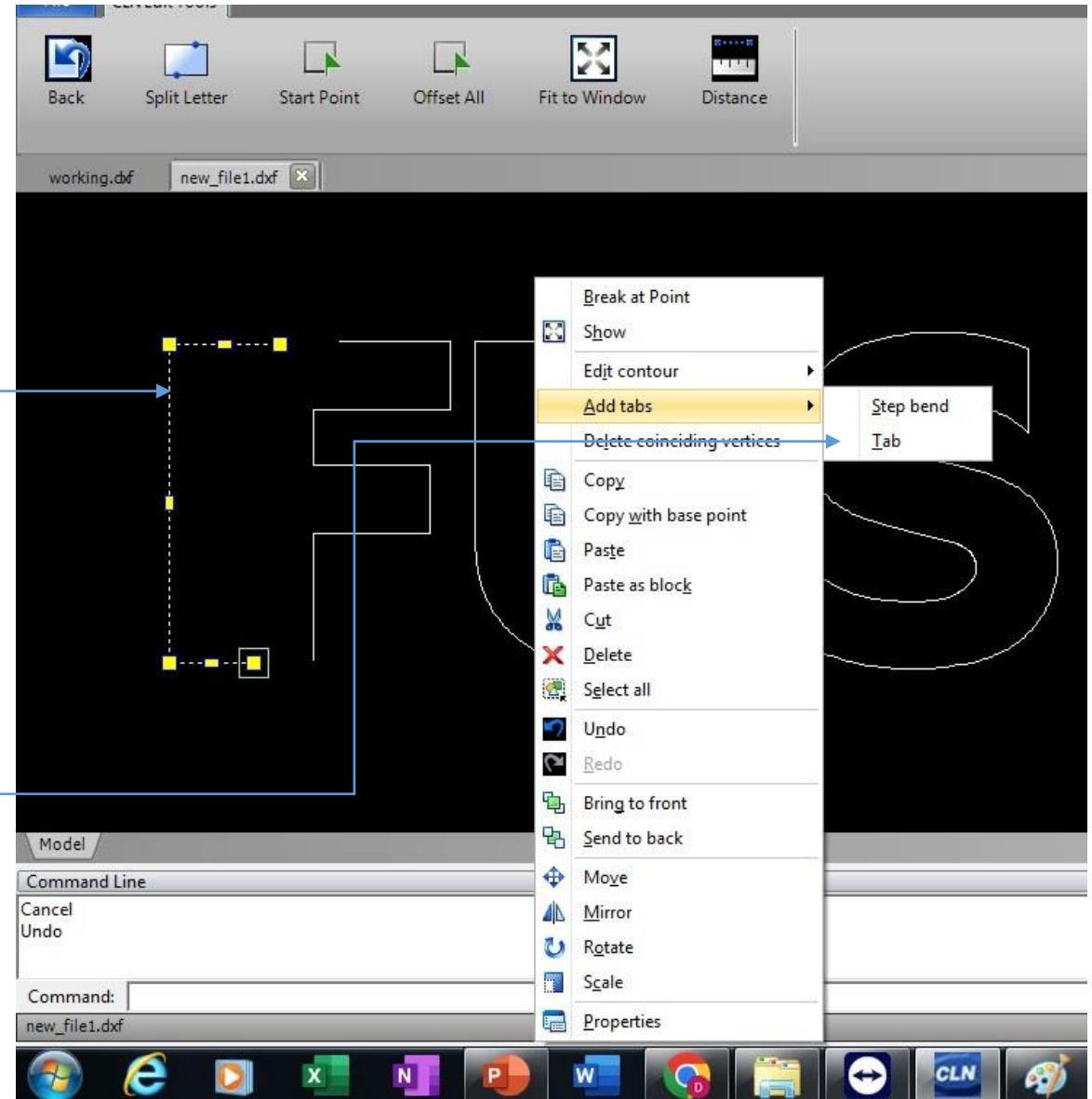
- To split a letter, you have to first click on the back button. This will open a new folder that allows you to edit the artwork.
- Select the letter. Then click on split letter. It will turn yellow when its active.
- Click any where you want to split the letter. A green square will appear letting you know that you cut the letter in that spot.
- Click on split letter again to cancel the function.
- Click anywhere in the black screen.
- Click on one side of the letter and drag or use the arrow keys to move the letter away from itself.



Using The Software Continued:

Splitting A Letter Into Sections Continued:

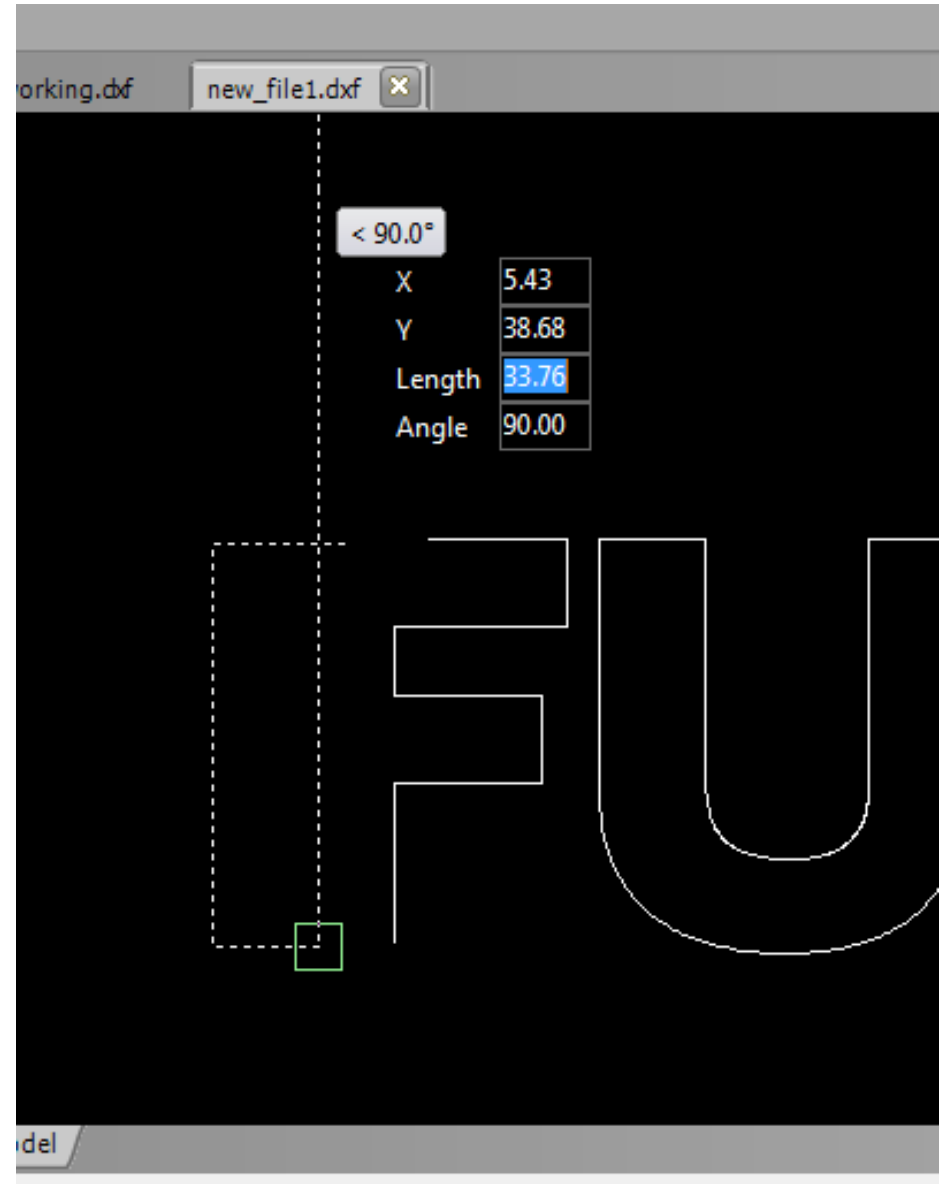
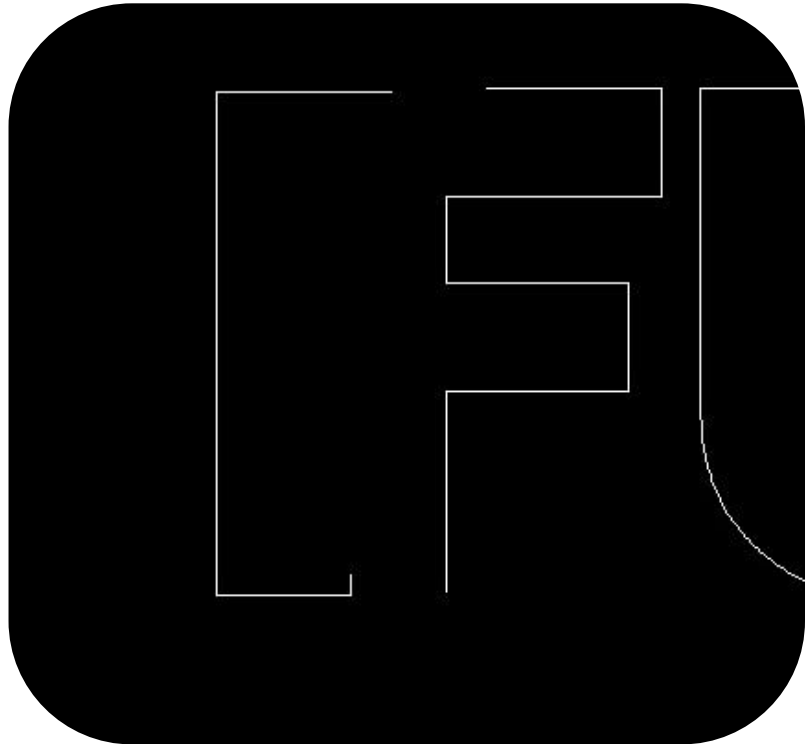
- The fusion program can only add tabs for letters that are not split into sections.
- Only in the Working folder will you see this. By default, the green Tab will be applied for connected letters and the open path letters will have a red marker on the start of the letter
- For split letters you have to manually add the Tabs.
- Now that the letter is split into two pieces. You can set a Tab if you need one. Click on one piece of the letter to highlight it.
- Right click anywhere in the black screen and select Add Tabs.
- Notice that the F is split in the center and at the corner. Let's focus on the left side of the letter for now.
- To set a Tab in the corner, for this part of the letter you need to select Tab.



Using The Software Continued:

Splitting A Letter Into Sections Continued:

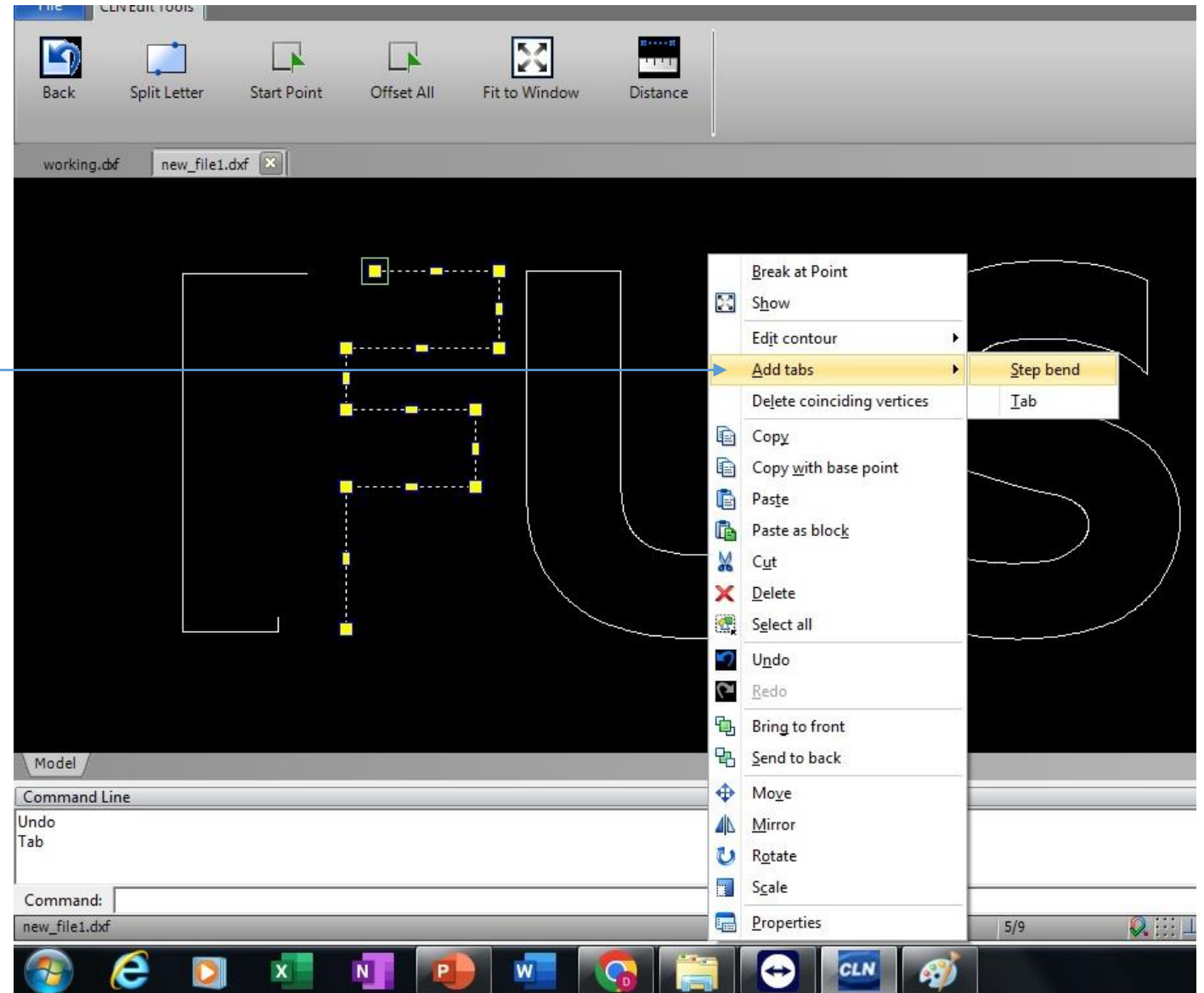
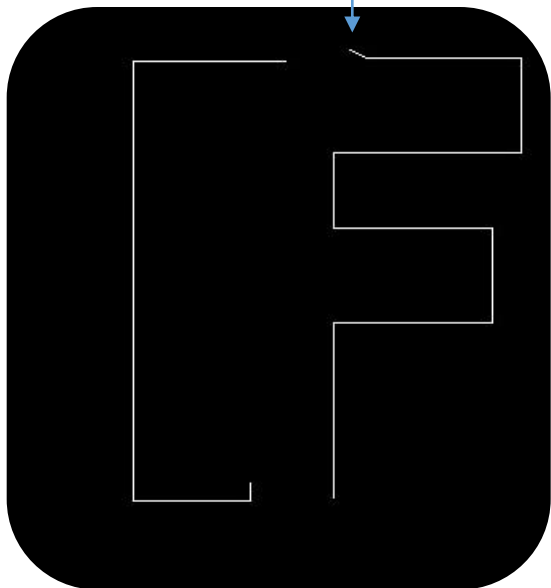
- A long line will pop up, use this line to set the angle of the Tab, then click on the screen.
- A $\frac{3}{4}$ " tab will be inserted.



Using The Software Continued:

Splitting A Letter Into Sections Continued:

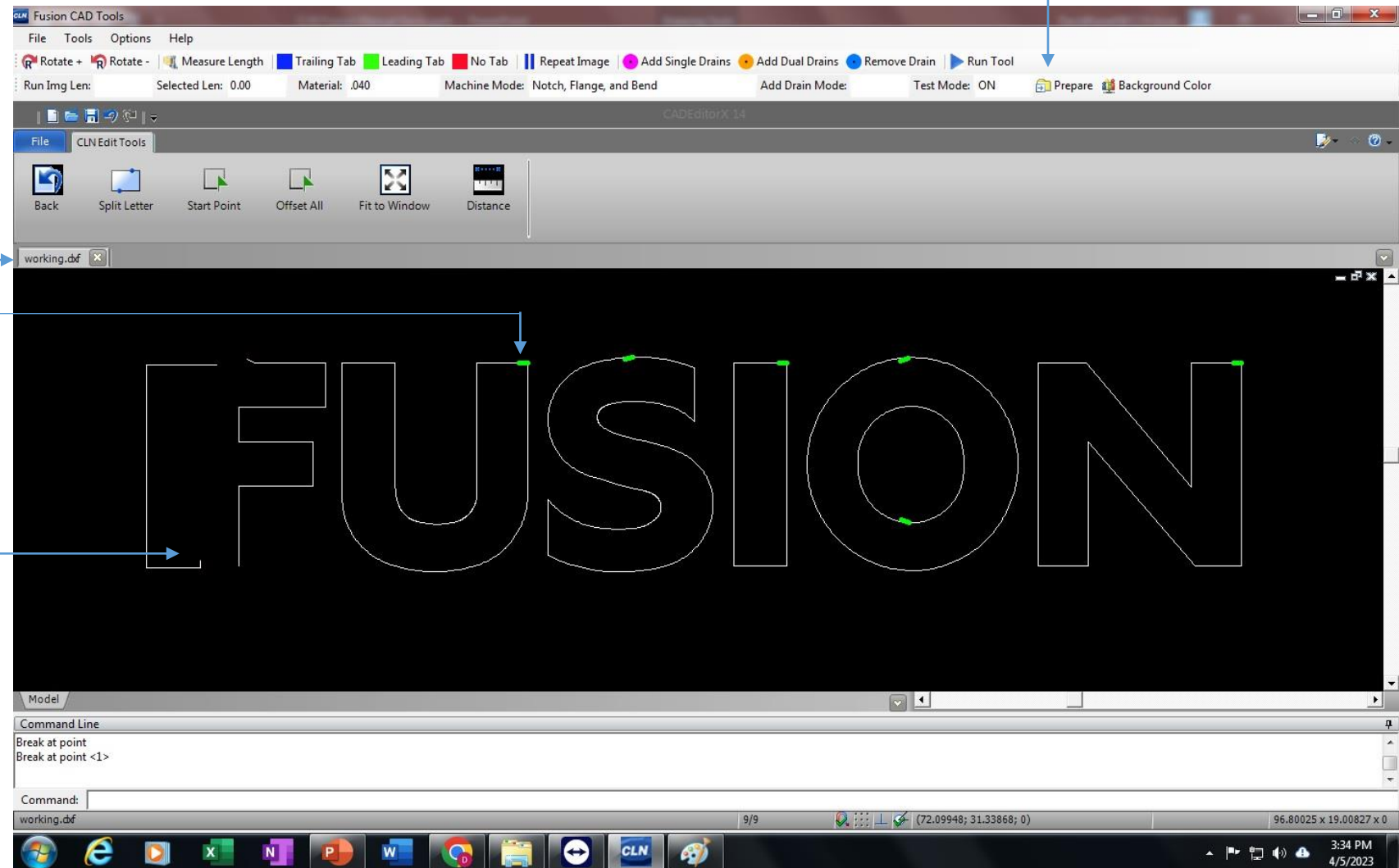
- The other side of the F was split in the center.
- Right click anywhere in the black screen and select Add Tabs.
- Select Step Bend. This will add the step bend on the beginning part of the letter.



Using The Software Continued:

Splitting A Letter Into Sections Continued:

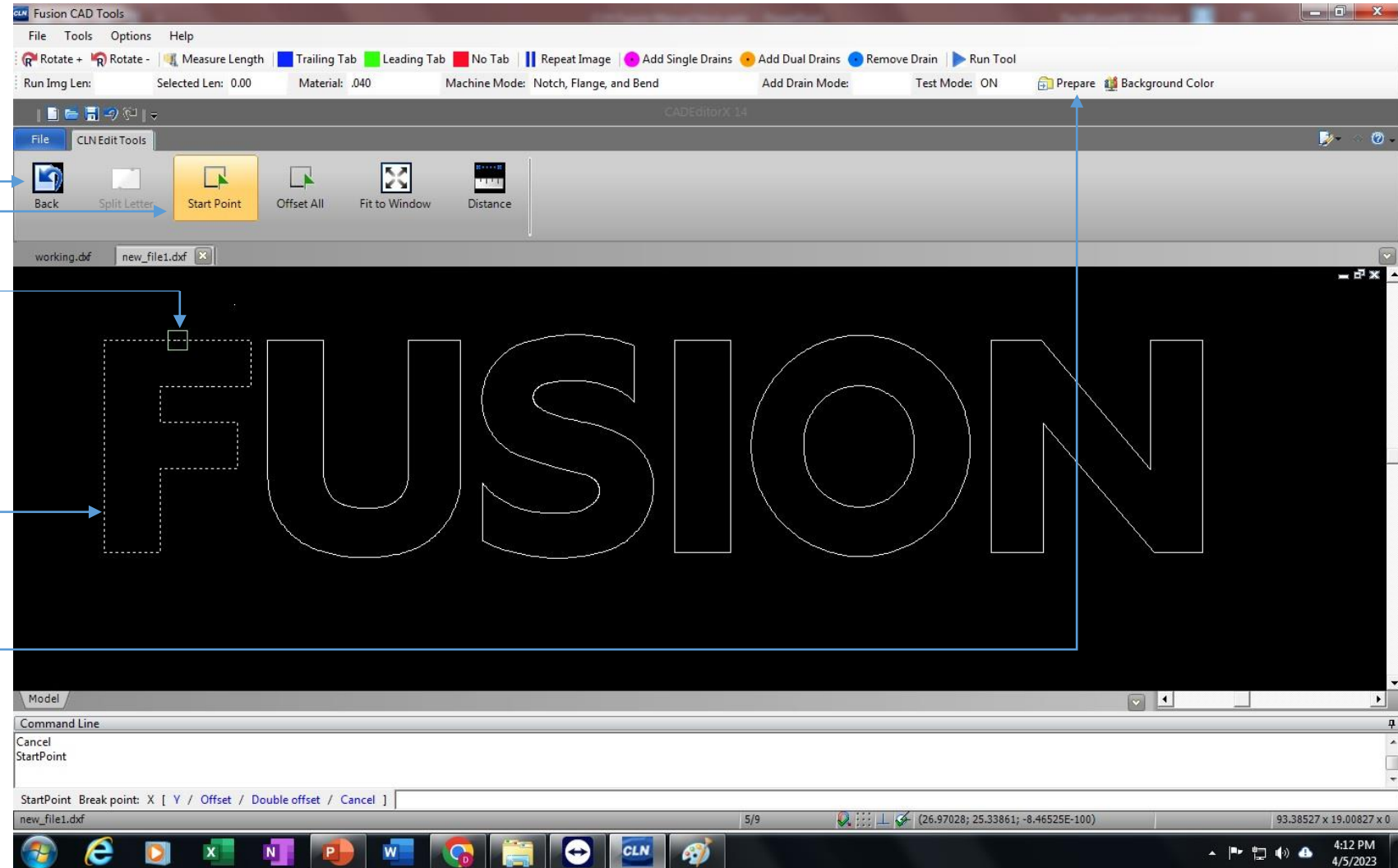
- Click on Prepare. This will prepare the file for the machine.
- Notice that it put the artwork back in the Working folder.
- Inserted green Lead Tabs for the letters that are not split.
- Inserted Red markers on the letters that are open.



Using The Software Continued:

Moving the start point:

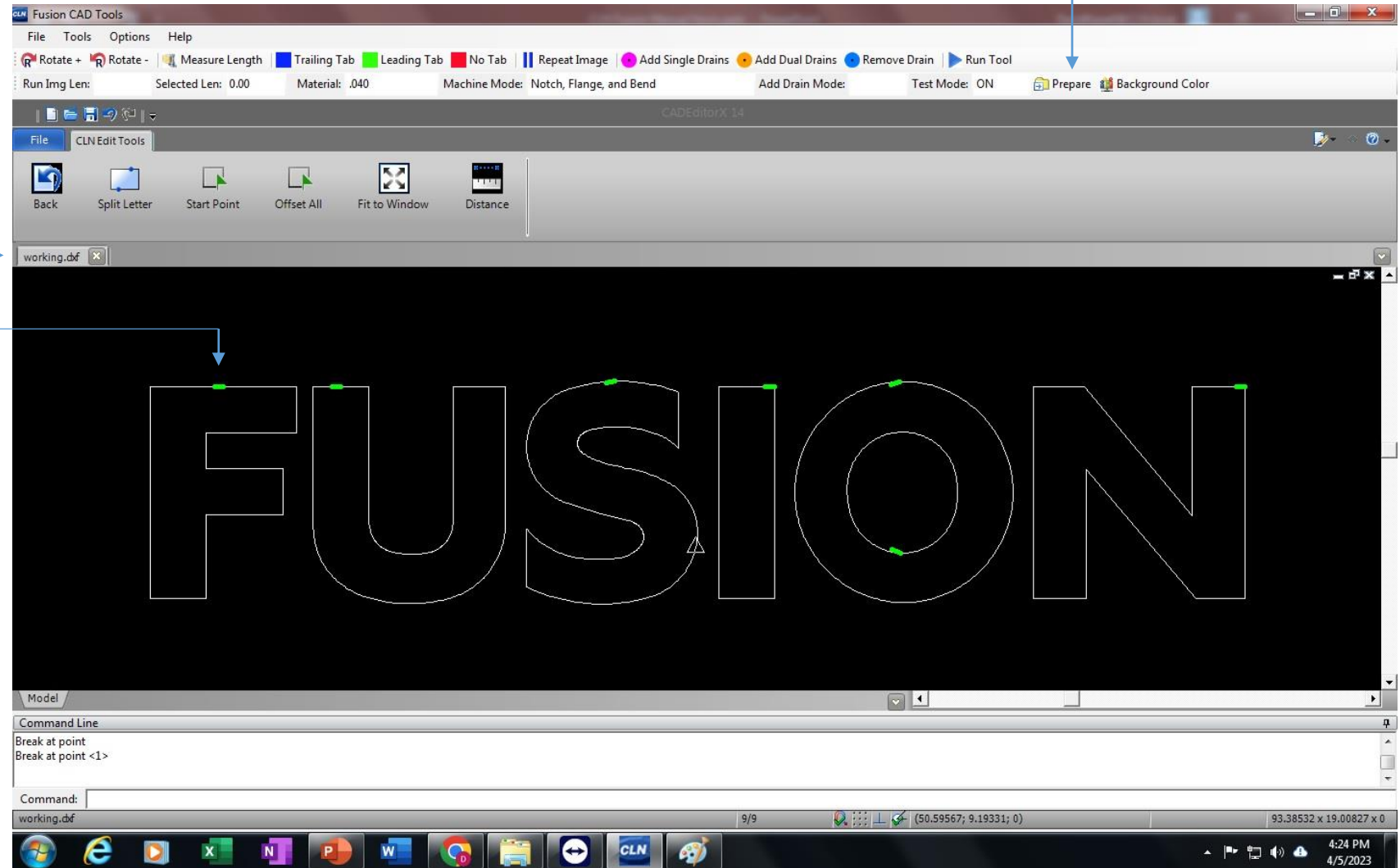
- Click on the Back Button.
- Click in the black screen to deselect the artwork. The start point can not be moved while the control points are active.
- Click on the Start Point button.
- Click on the letter once to select it.
- Click on the letter where you want to move the start point to.
- Repeat this process for any letter that you wish to alter the start point.
- Click on Prepare. This will prepare the file for the machine.
- Notice that it put the artwork back in the Working folder.
- Inserted green Lead Tabs for the letters that are not split.
- Inserted Red markers on the letters that are open.



Using The Software Continued:

Moving the start point Continued:

- Click on Prepare. This will prepare the file for the machine.
- Notice that it put the artwork back in the Working folder.
- Inserted green Lead Tabs for the letters that are not split.
- Inserted Red markers on the letters that are open.



Manual Machine Control:

Manual Control:

- There are a few functions on the machine that can be manually controlled by the operator:
 - Feed Material
 - Home Material
 - Shear Material

Feeding Material

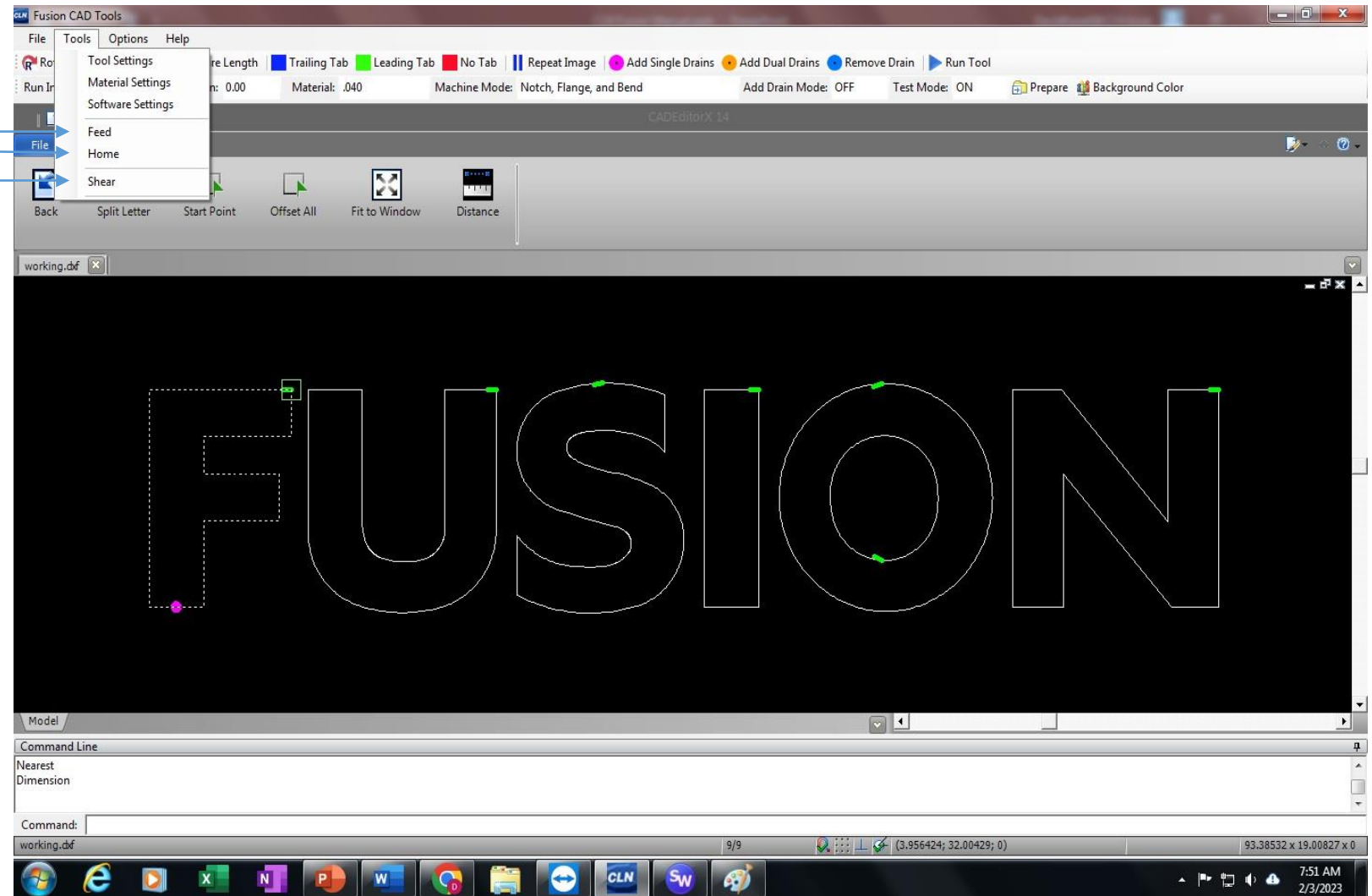
- To Feed material through the machine, click on Tools > Feed. You will be prompted with a dialog box that you can enter in a value in inches of material to be moved. Once you click Ok the machine will move the material.

Homing Material

- To Home the material, click on Tools > Home. The machine will bring the lead edge of the material all the way back to the homing sensor. The homing sensor is the starting position for standard plastic face channel letters.

Shear Material

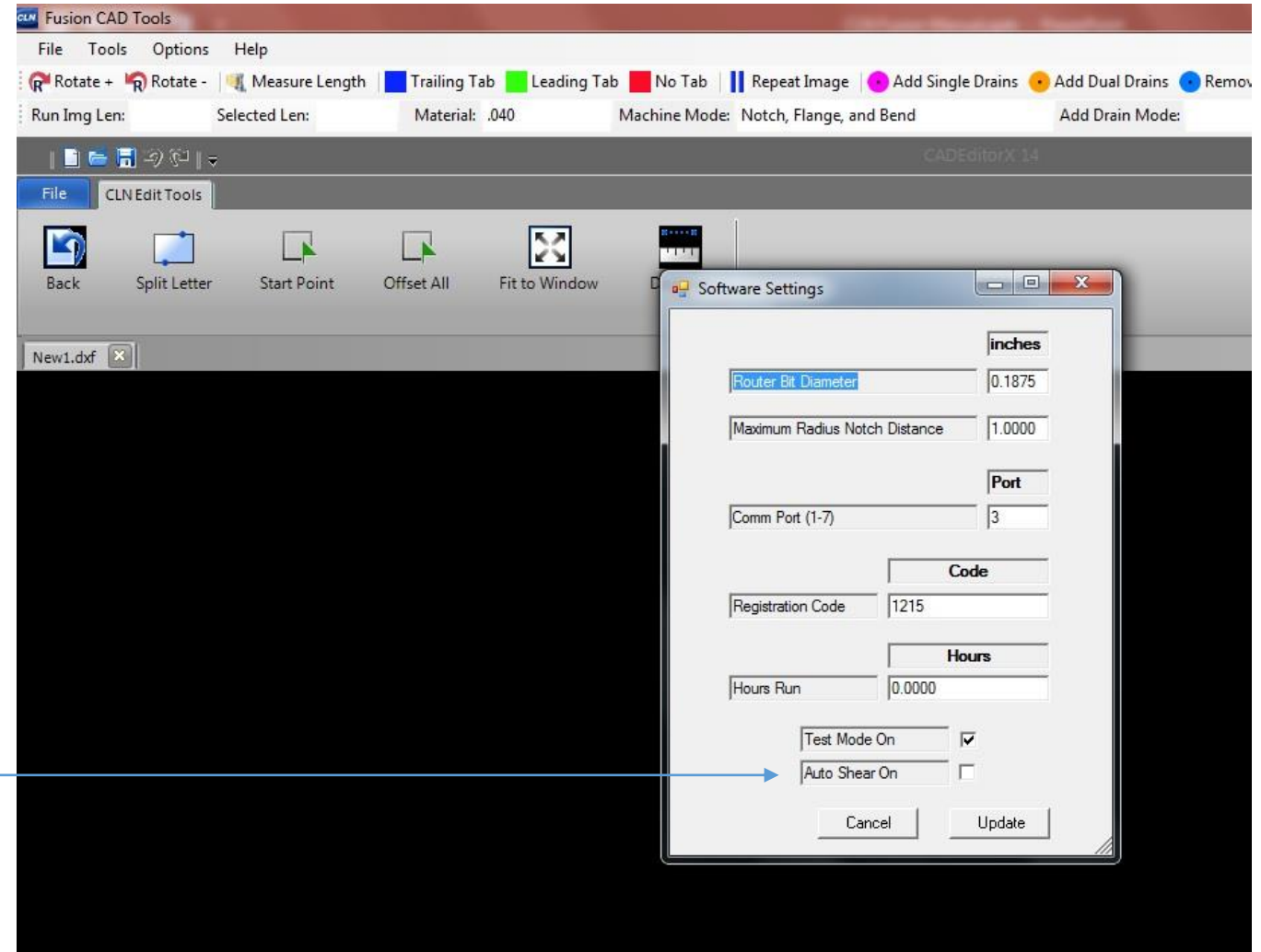
- To shear the material, click on Tools > Shear. As long as you're in automatic shear mode, the machine will deploy the shear and cut the material. If you're in manual shear mode or the shear hits the letter on the way down, it will display a message asking you to press the shear button.



Manual Machine Control Continued:

Manual shear mode

- To use the shear button to manually shear material. First you must be in manually shear mode. Go to tools / software settings, uncheck “Auto Shear On” box. Now when you click on tools / shear material the machine will then wait for the user to press and hold the Shear Button down to complete a full Shear Cycle. This mode is useful if you want to wait for an operator to confirm that the letter is positioned under the shear. Large logos can fall off the table and the shear could miss the return as it comes down to cut the letter.
 - The Shear Cycle is broken up into two separate routines that for safety reasons the user must keep the button pressed in though out the shearing cycle.
 - The first part of the routine lowers the shear down into the receiver. If at any time the operator releases the button before the shear lowers all the way down into the receiver the shear will retract, and the cycle will start over again.
 - Once the Shear makes it down into the receiver the second part of the cycle will begin. At this point the operator can release the button and the Shear will not retract, but it will stay in the down position until a full cycle of the cutting dies takes place. The user must continue to hold the button until the cutting dies close all the way, the material is sheared, and the material backs up away from the dies a one inch.
 - Now the Shearing cycle is complete, and the Shear will automatically retract without the need for the operator to hold the button.

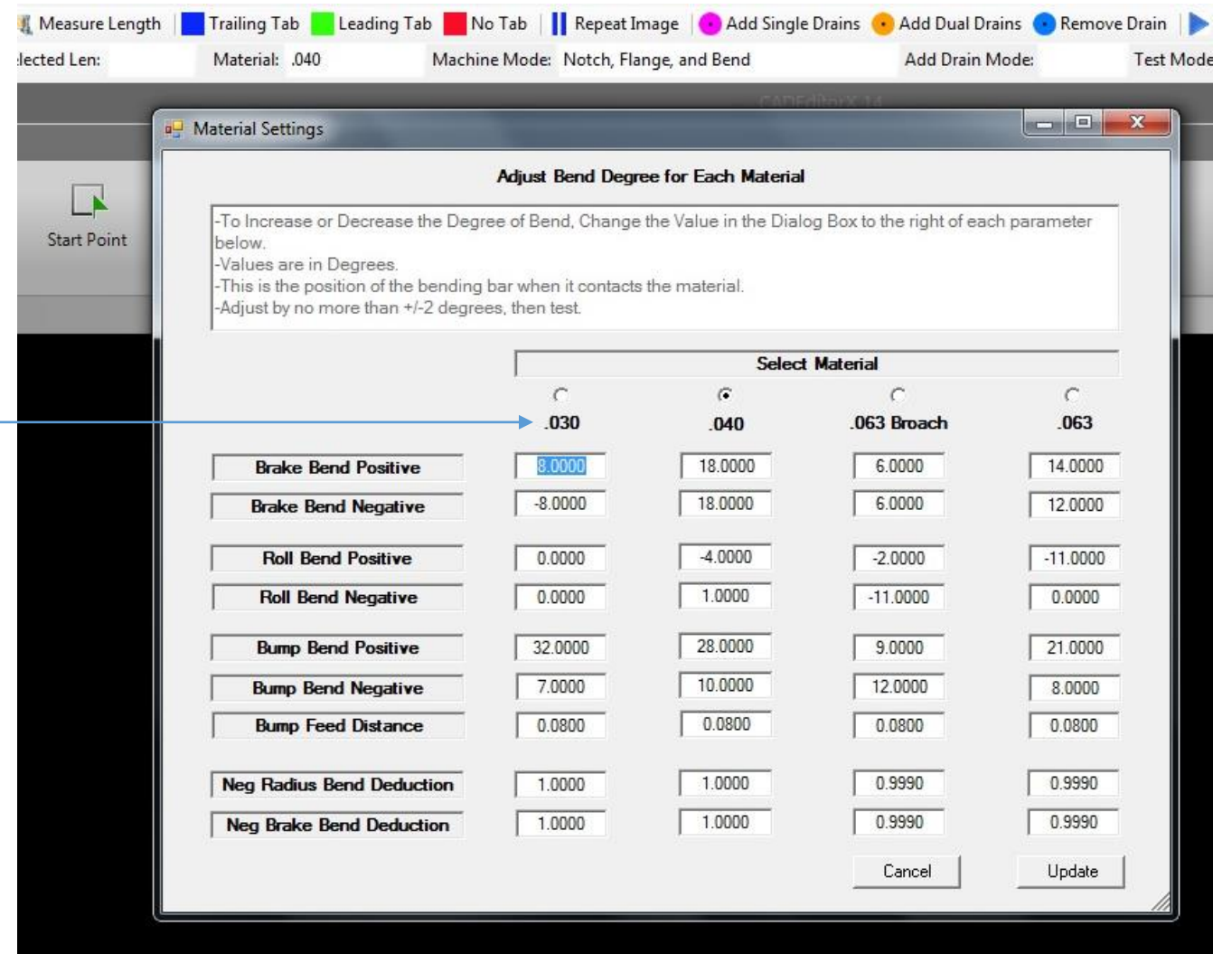


Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings.

Material Settings:

- Go to tools / Material Settings. These are settings based on the thickness of material that you are running.
- The Fusion is capable of handling a multiple sizes of materials from 0.032" to 0.063". There are 4 categories. The title for each category can be renamed.
- When bending metal material there is a certain degree of spring and memory in the material, so to achieve the correct angle the machine has to over bend the material.
- Different material and thicknesses will require slightly different over bend specifications.
- You can teach the machine to remember different types of material by adjusting the offset values. The values are arbitrary and increasing or decreasing by 2 degrees is a good rule of thumb.
- The factory sets the .040 and the .063 category when they manufactured your machine, the rest will be very close however you may need to adjust them. These settings are unique to your machine.

These are settings are being used as an example. Actual Material Settings will vary.

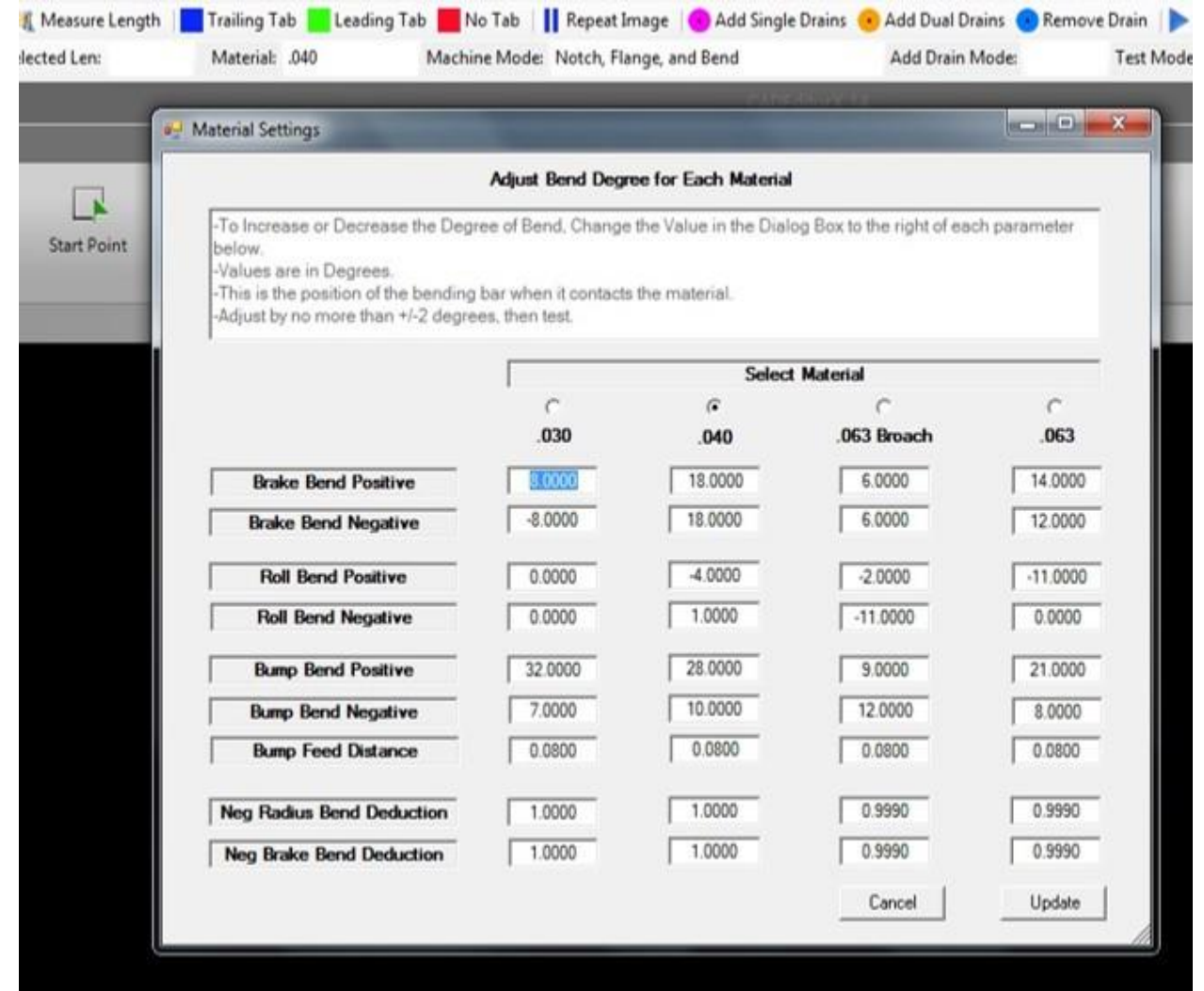


Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

Material Settings Continued:

Material Definitions Settings and Adjustments:

- You need to run the test files located in **C:\Jobs\Fusion Test Files** to adjust the following.
- Brake Bend Positive:** This adjust the degree of the bend for the positive break bend function. Increasing this value will make the machine bend more. Run the file called “Break Bend Positive.DXF” Adjust the value until the machine is bending a 90-degree Bend.
- Brake Bend Negative:** This adjust the degree of the bend for the negative break bend function. Increasing this value will make the machine bend more. Run the file called “Break Bend Negative.DXF” Adjust the value until the machine is bending a 90-degree Bend.
- Roll Bend Positive:** This adjust the degree of the bend for the positive roll bend function. Increasing this value will make the machine bend more. Run the file called “6-inch diameter test Pos.DXF” Adjust the value until the machine is bending a 6-inch semi circle. Plus, or minus ¼”
- Roll Bend Negative:** This adjust the degree of the bend for the negative roll bend function. Increasing this value will make the machine bend more. Run the file called “6-inch diameter test Neg.DXF” Adjust the value until the machine is bending a 6-inch semi circle. Plus, or minus ¼”
- Bump Bend Positive:** This adjust the degree of the bend for the positive bump bend function. Increasing this value will make the machine bend more. Run the file called “1.5-inch diameter test Pos.DXF” Adjust the value until the machine is bending a 1-1/2-inch semi circle. Plus, or minus 1/16”
- Bump Bend Negative:** This adjust the degree of the bend for the negative bump bend function. Increasing this value will make the machine bend more. Run the file called “1.5-inch diameter test Neg.DXF” Adjust the value until the machine is bending a 1-1/2-inch semi circle. Plus, or minus 1/16”
- Bump Feed Distance:** This is the length of material to be fed through the machine during a bump bending routine. .080 works the best.



Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Material Settings will vary.

Material Settings Continued:

Material Settings Definitions Continued:

- **Negative Radius Bend Deduction:** This value will shorten the negative radius bends. Because the encoder wheel is mounted on the positive side of the material, the negative side of the material will grow slightly while the machine is bending the return. The amount that the material will grow is based on the thickness of the material. .063 will need to be reduced more than .032. Actually .040 and smaller needs no reduction because the amount that the material grows is not noticeable at all. This value is important for .063 materials, for reverse channel letters when you are trying to get the return to fit on the inside of the letter face. If every location on the letter is good, except a negative radius between two break bends, then reducing this value will shorten the return between the two-break bends. 1.0 = no deduction. Adjust this value by .001

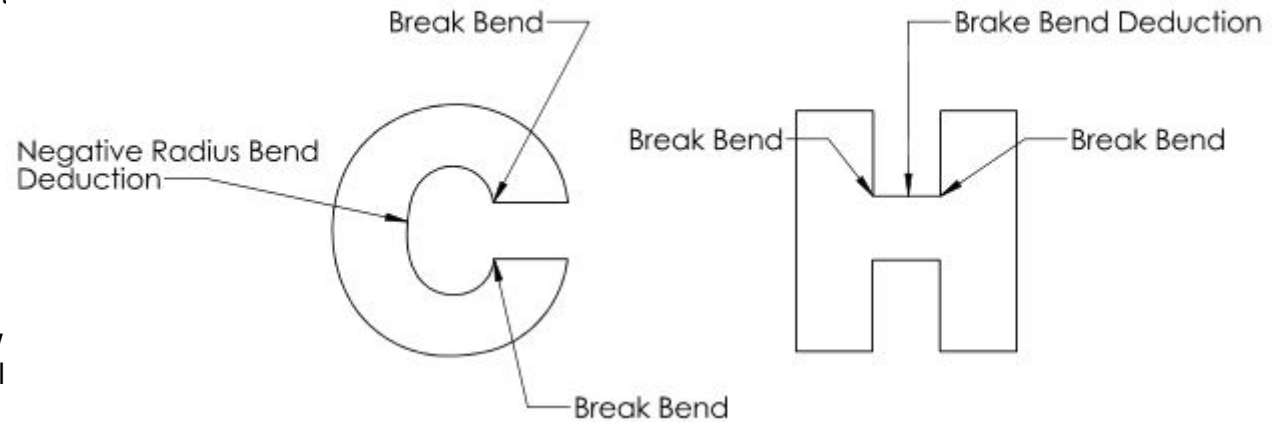
Note: Typically happens on the inside of an upper case “C” The outside of the “C” is controlled by the outline from the cad program.

- **Negative Brake Bend Deduction:** This value will shorten two negative break bends that are back-to-back. Because the encoder wheel is mounted on the positive side of the material, the negative side of the material will grow slightly while the machine is bending the return. The amount that the material will grow is based on the thickness of the material. .063 will need to be reduced more than .032. Actually .040 and smaller needs no reduction because the amount that the material grows is not noticeable at all. This value is important for .063 materials, for reverse channel letters when you are trying to get the return to fit on the inside of the letter face. If every location on the letter is good, except the distance between two negative break bends, then reducing this value will shorten the return between the two negative break bends. If there is a radius between the two-break bends, then refer to “Negative bend factor”. 1.0 = no deduction. Adjust this value by .001

Note: Typically happens on the inside of an upper case “H” The outside of the “H” is controlled by the outline from the cad program.

Neg Radius Bend Deduction	1.0000	1.0000	0.9990	0.9990	000
Neg Brake Bend Deduction	1.0000	1.0000	0.9990	0.9990	000

Cancel Update



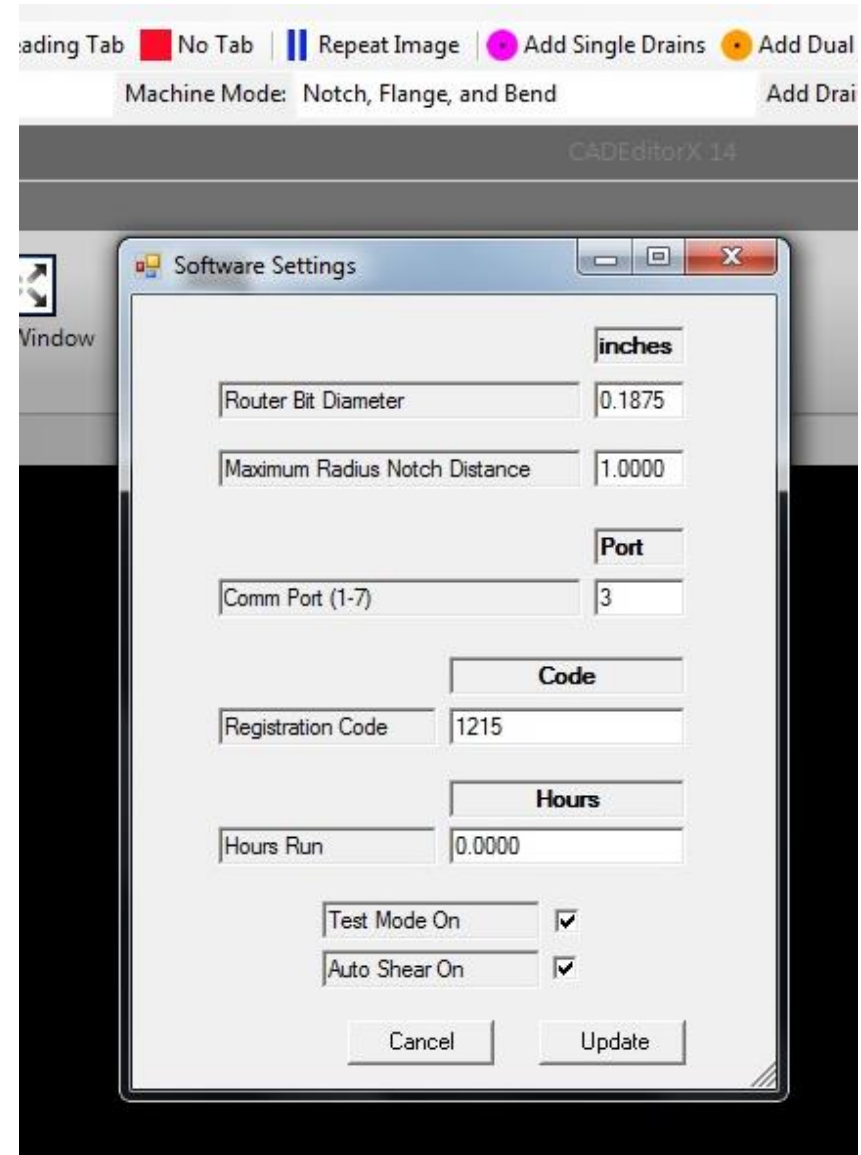
Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Material Settings will vary.

Software Settings:

- **Router Bit Diameter:** Depending on what size router bit you are using to cut out your letter backs the machine will automatically make calculations for the [curving loss](#) that will occur. Set this setting to match the diameter of the router bit being used on your CNC Table.
- **Maximum Radius Notch Distance:** When your machine encounters a large radius it will place a notch no farther apart than what you set this setting to.
- **Comm Port:** Typically set to Port 3. This is what Comm Port the computer is using to communicate with the controller.
- **Registration Code:** Depending on your payment plan your machine has a code that will make the machine unusable after a certain period of time. Once your machine has been completely paid for you will receive a payoff code.
- **Hours Run:** This counts the hours that the machine was processing a letter
- **Test Mode On:** Allows the program to be used without being connected to a machine.
- **Auto Shear On:** When this box is checked the machine will automatically shear the letter at the end of the process. Otherwise, you will have to press the shear button to shear the letter.

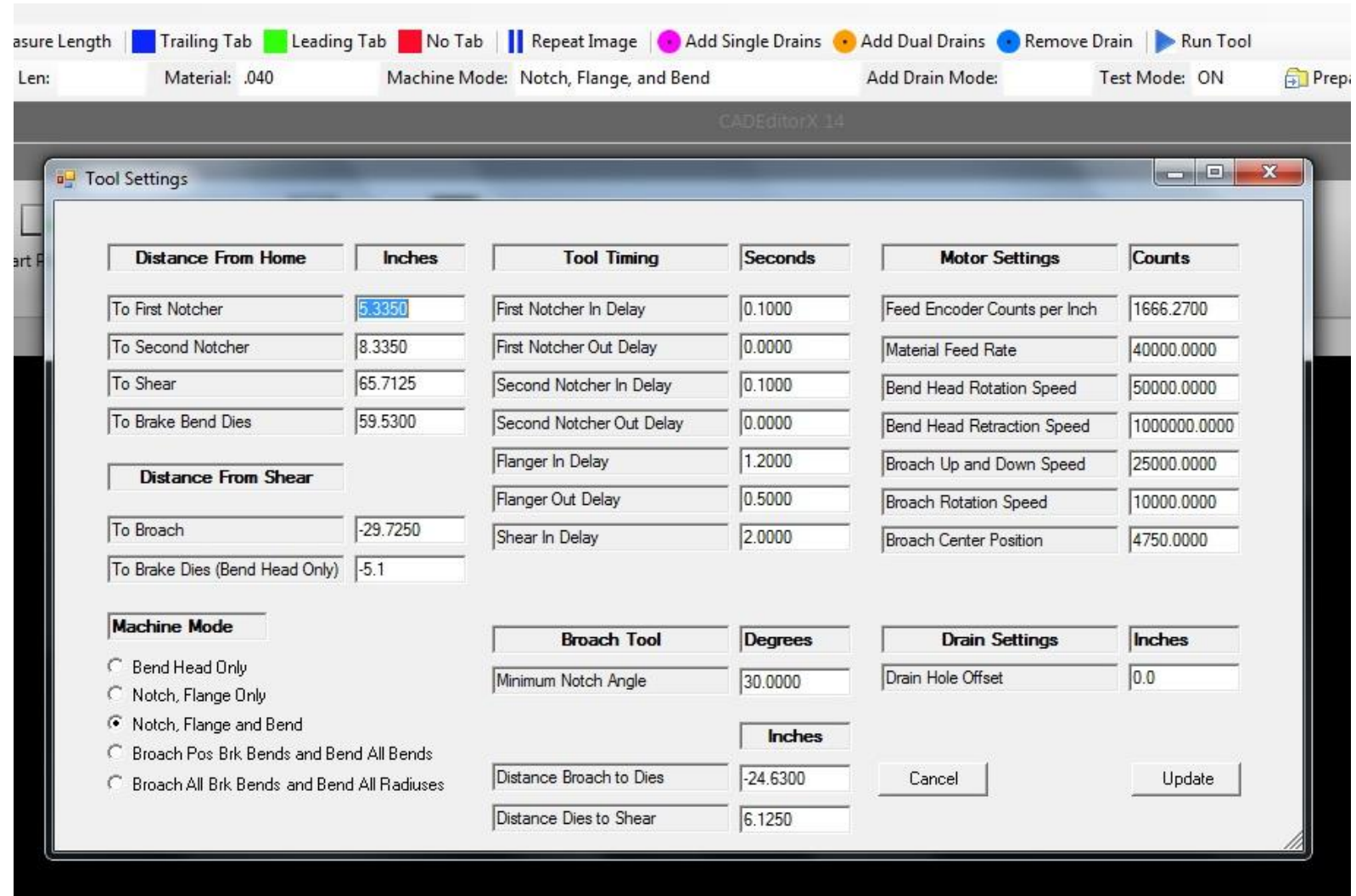
These are settings are being used as an example. Actual Material Settings will vary.



Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

Tool Settings:

- **Distance From Home:** These values are in inches, and they are the distance from where the material homes to the respected tool in the machine.
- **To First Notcher:** To set or confirm that the value is correct. Home the material with the manual home command. Then copy the value “To First Notcher” and paste it the manual feed dialog box. Click okay to move the material. Look to see if the material is centered on the first notcher. If not make small moves with the manual feed command until its centered. Take note of all the moves you used to get the material centered on the first notcher. Add them up and put them in the “To First Notcher” category. Then test your new value by repeating these steps.
- **To Second Notcher:** The second notcher should be 3” from the first notcher. This is how to test this. Move the material out in front of both notchers. Locate the 8-position valve manifold press the manual override button on air station # 1 and # 2. The machine will punch 2 notches in the material. Feed the material out past the bend head and measure the center distance between the notchers. Put this valve in “To Second Notcher.”
- **Important:** Making a change to the “To First Notcher” value will affect the “To Second Notcher” value. It will add the amount to the “To Second Notcher” value. Making a change to the “To Second Notcher” value will NOT affect the “To First Notcher” value. Once they are set, they stay grouped together.

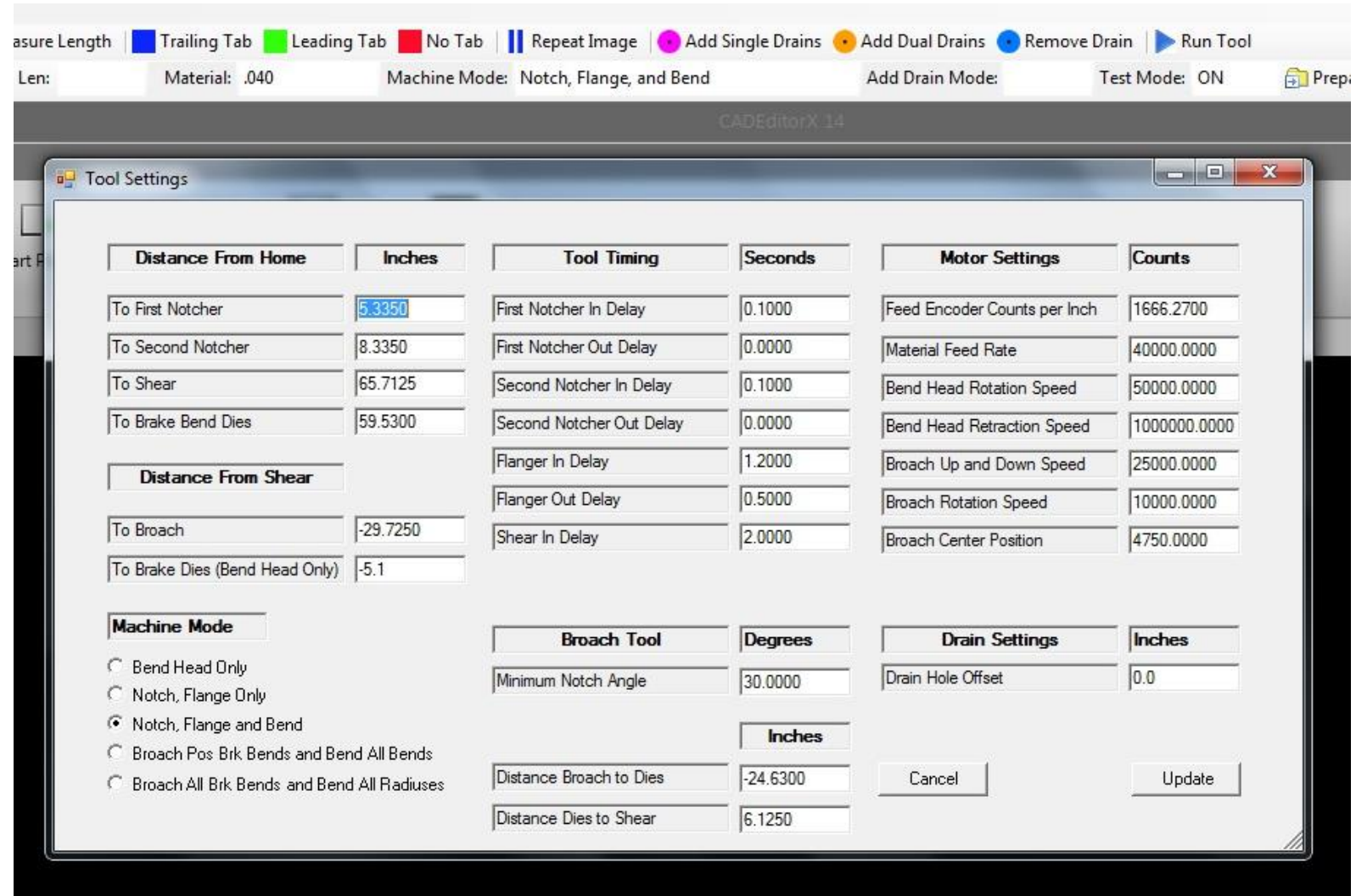


Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Tool Settings will vary.

Tool Settings Continued:

- To Shear:** The best way to figure out what this number should be, is to run a small letter and see where the shear cut the material. Measure the error and add or subtract it from the current value. There will be a notch at the end of every letter. You're trying to get the shear to cut the center of the last notch. If it fall short, then add to the "To Shear" value.
- To Break Bend Dies:** To set or confirm that the value is correct. First home the material with the manual home command. Then use the feed material command. Copy the value located in "To Break Bend Dies" and paste it in the manual feed dialog box. Click okay to move the material. Locate the 8-position manifold located under the machine, press the manual override button on air station # 5. Lock the valve on by pushing it in and turning it a ¼ turn clockwise. Look and see if the edge of the material is past the dies by .02". If not release air station # 5 by pushing and turning the button counterclockwise a ¼ turn. Make small moves with the manual feed command check it by pushing air station # 5 to close the dies. Repeat until the material is .02 past the dies. Take note of all the moves you used to get the material .02 past the dies. Add them up and put them in the "To Break Bend Dies" category. Then test your new value by repeating these steps.
- Important:** Making a change to the "To Break Bend Dies" value will affect the "To Shear" value. It will add the amount to the "To Shear" value. Making a change to the "To Shear" value will NOT affect the "To Break Bend Dies" value. Once they are set, they stay grouped together.

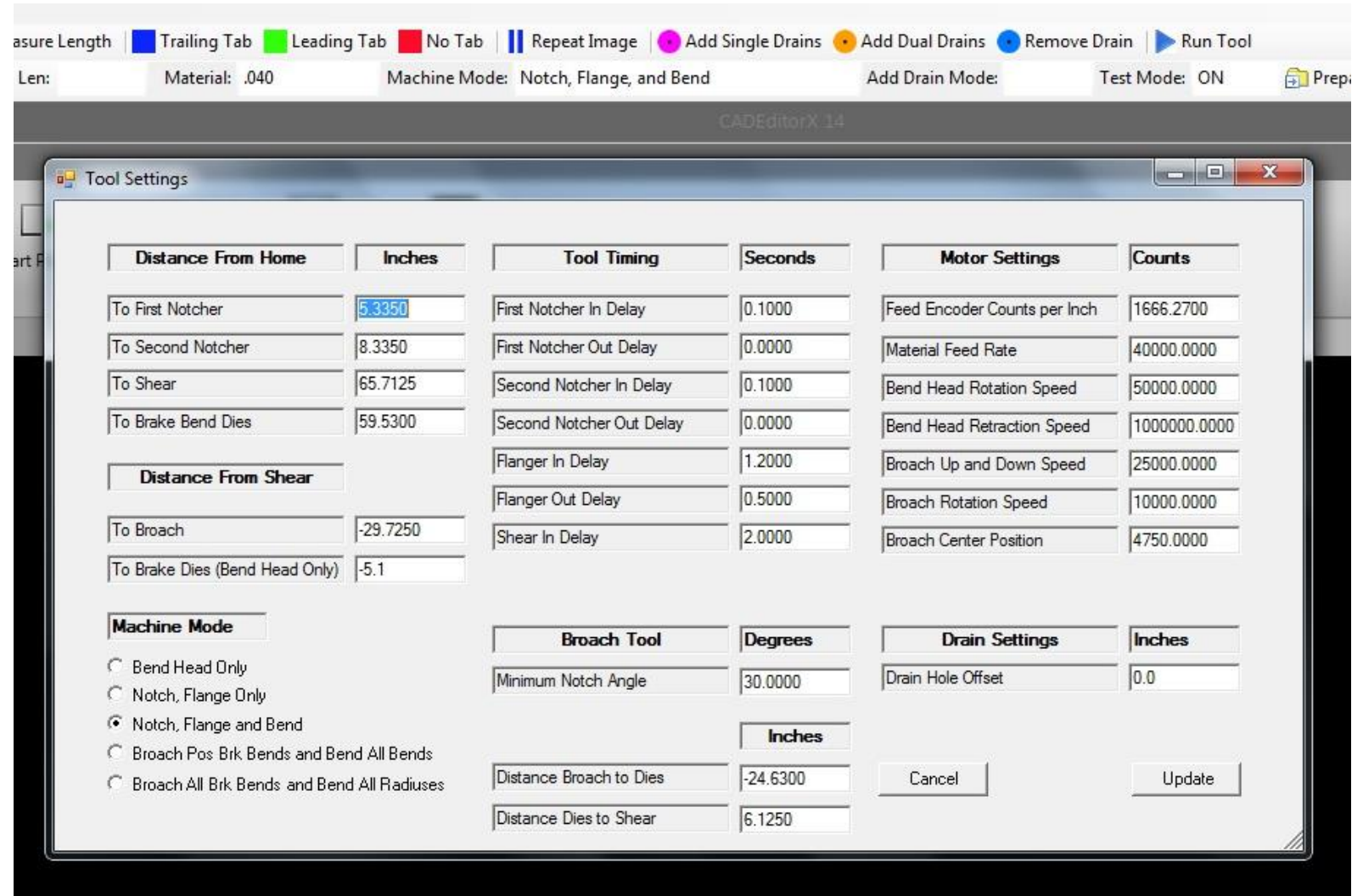


Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Tool Settings will vary.

Tool Settings Continued:

- **Distance From Shear:** These values are in inches and they are the distance from where the material homes to the respected tool in the machine.
- **To Broach:** **Only for the Fusion Plus.** This is the distance from the shear to the broach cutting wheel. It's shown as a negative number because it measures backwards from the shear. This will adjust the start of the letter. Increasing this number will move the start of the letter out past the break bend dies. So, by Increasing this value it will make the distance from the first broach notch to the start of the letter longer.
- **To Break Bend Dies (Bend Head Only):** This value is from the break bend dies to the shear after it cuts the material and backs up 1 inch. It is only used when the machine is in "Bend Head Only" mode. It's shown as a negative number because it measures backwards from the shear. This value sets the starting position for reverse channel letters. Making this value smaller will move the cut into the coil stock. This is useful if fabricator needs a little extra material to finish off the seam piece of the letter.

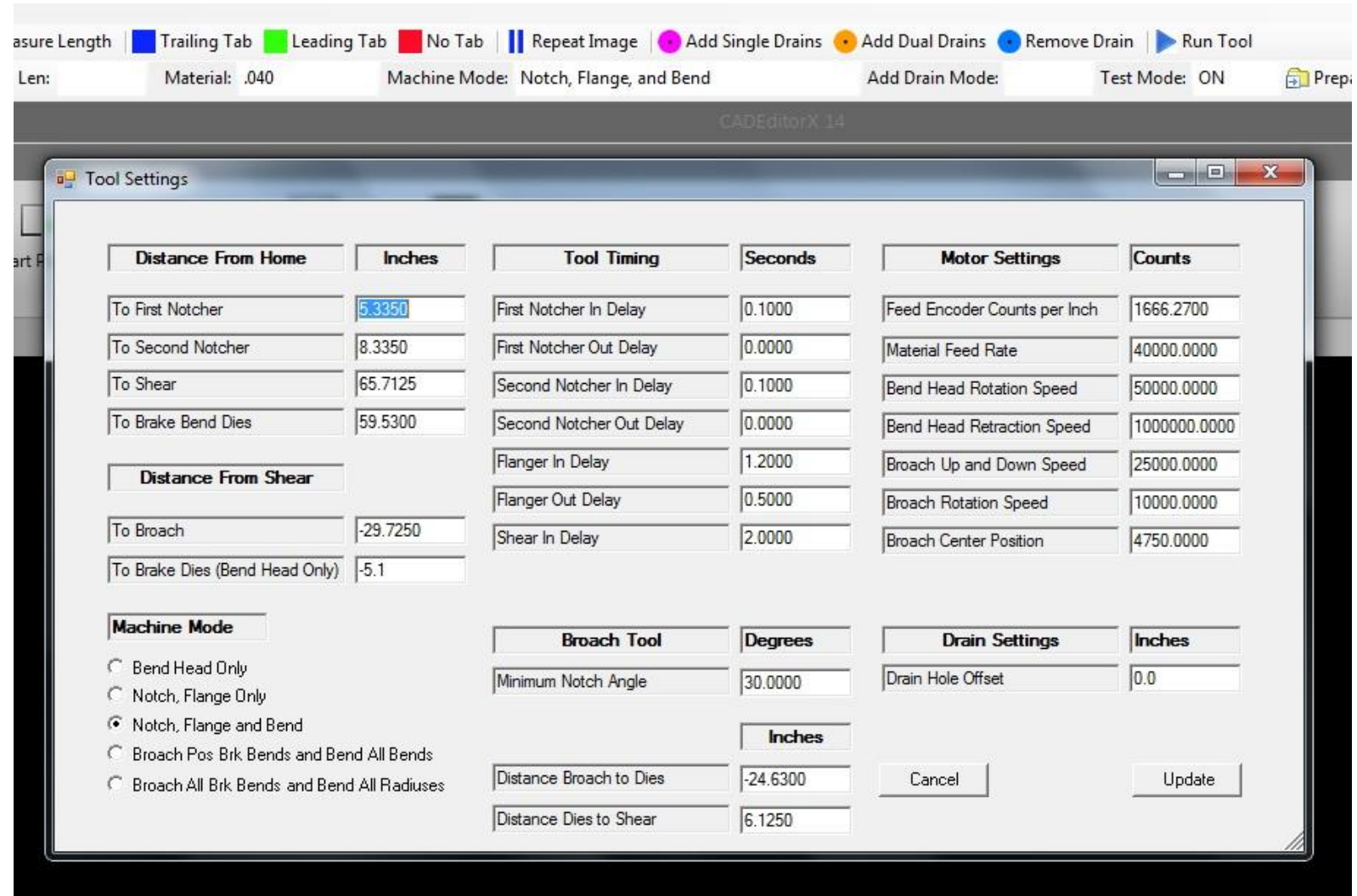


Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Tool Settings will vary.

Tool Settings Continued:

- **Machine Mode:** Your machine can be operated in different modes.
- **Bend Head Only:** This mode will just bend the letter. For Reverse Channel Letters.
- **Notch, Flange Only:** This mode will Notch and Flange your return allowing you to bend the letter by hand.
- **Notch, Flange and Bend:** This mode will Notch Flange and Bend the Letter. For Standard Channel Letters.
- **Broach Pos Brk Bends and Bend All Bends:** This mode is only for the Fusion Plus. This mode will only broach cut the positive break bend locations and will not broach the negative bend locations. Then it will break bend all bend, sharp bends, roll bends and bump bends the letter into shape. This is for Letter Edge Material or anything similar.
- **Broach All Brk Bends and Bend All Radiuses:** This mode is for the Fusion Plus. This mode will broach cut positive and negative break bend locations. It will roll bend and bump bend all the radiuses. It will not break bend the sharp bends. This is useful if you want to make very sharp break bends out of .063 alum. However, this mode will weaken the integrity of the break bend.

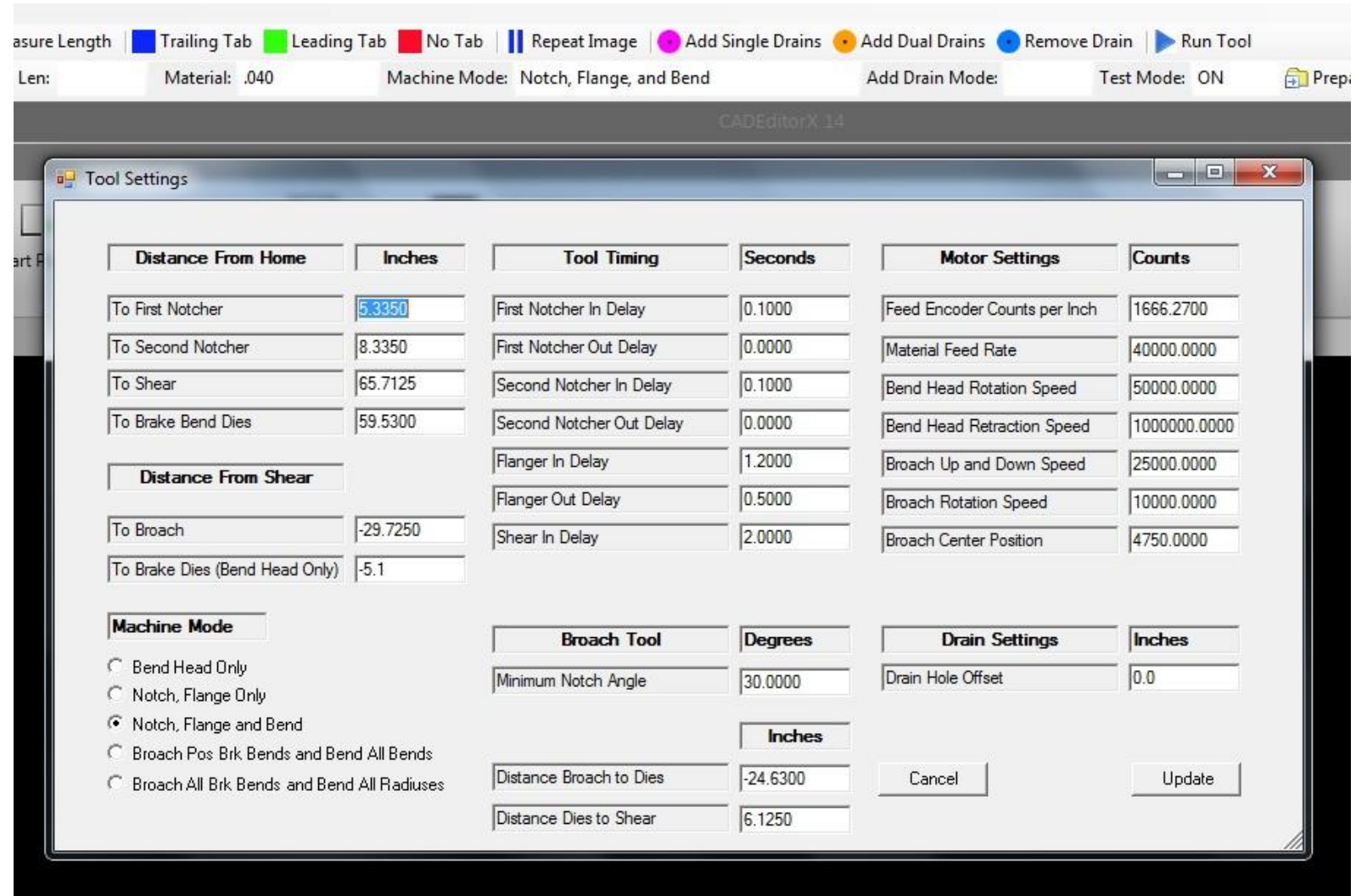


Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Tool Settings will vary.

Tool Settings Continued:

- **Tool Timing:** These values are in seconds, and they are delays to allow your tooling time to work properly. Too much delay and your machine will operate slower than normal, too little delay and tools in the machine will not clear the material before the material feeds and cause a jam..
- **First Notcher In Delay:** This is the time that it takes for the tool to go through the material.
- **First Notcher Out Delay:** This is the time that it takes for the tool to return back from where it started.
- **Second Notcher In Delay:** This is the time that it takes for the tool to go through the material.
- **Second Notcher Out Delay:** This is the time that it takes for the tool to return back from where it started.
- **Flanging In Delay:** This is the time that it takes for the tool to go through the material.
- **Flanging Out Delay:** This is the time that it takes for the tool to return back from where it started.
- **Shear In Delay:** This is the time that it takes for the tool to go through the material.

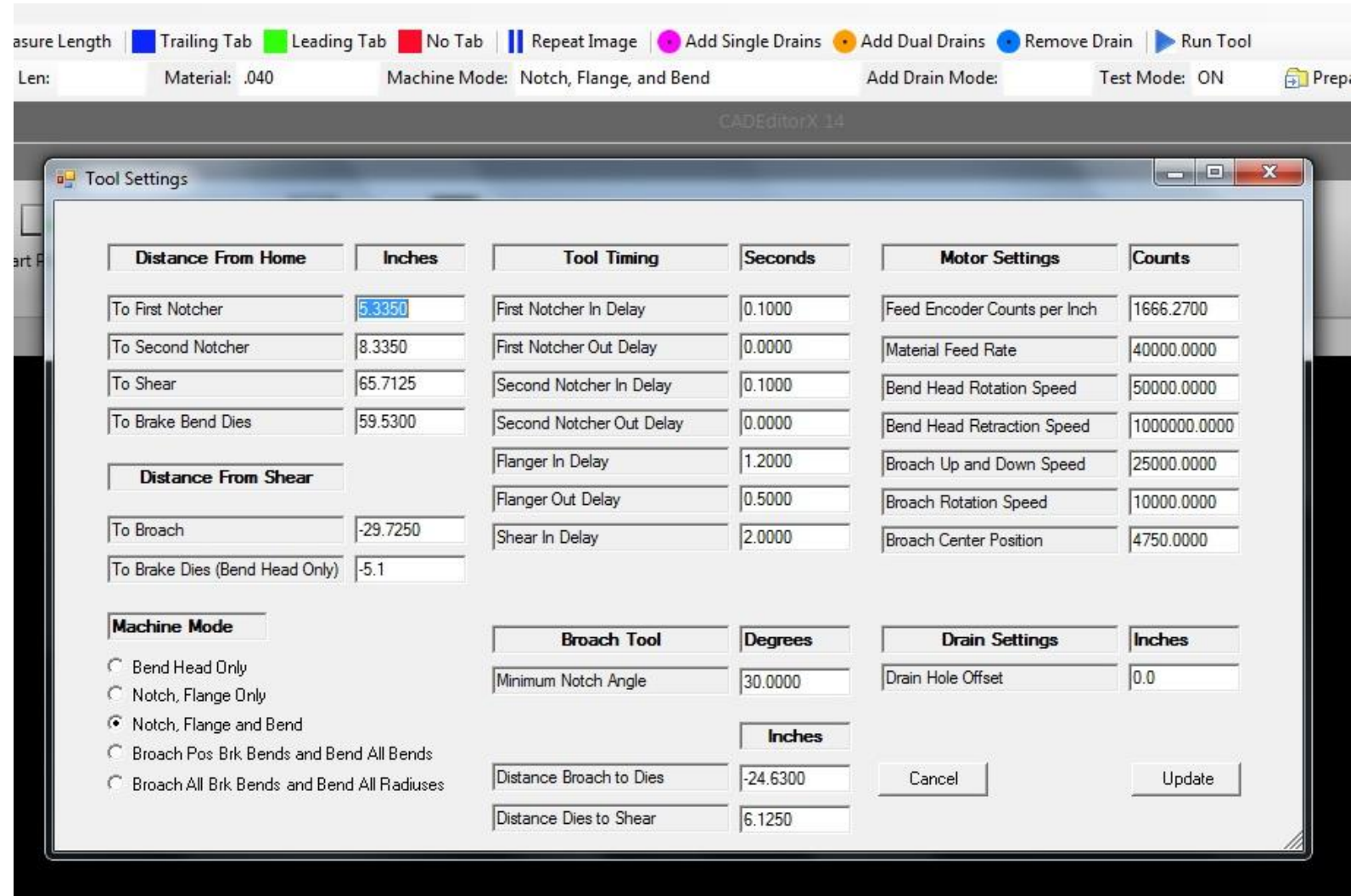


Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Tool Settings will vary.

Tool Settings Continued:

- **Broach Tool:** This mode is only for the Fusion Plus. These values are all related to the Fusion Plus.
- **Minimum Notch Angle:** This value prevents the broach from cutting miniscule break bend angles in the letter that are not needed. The value is in degrees.
- **Distance Broach to Dies:** This is the distance from the broach cutting wheel to the break bend dies. It's shown as a negative number because it measures backwards from the break bend dies. Increasing this number will move the broach notch out past the break bend dies.
- **Distance Dies to Shear:** This sets the distance from the last broach notch in the letter to the end of the letter. Increasing this number will move the material out past the break bend dies causing the shear to cut into the coil stock. So, by increasing this value it will make the distance from the last broach notch to the end of the letter longer.

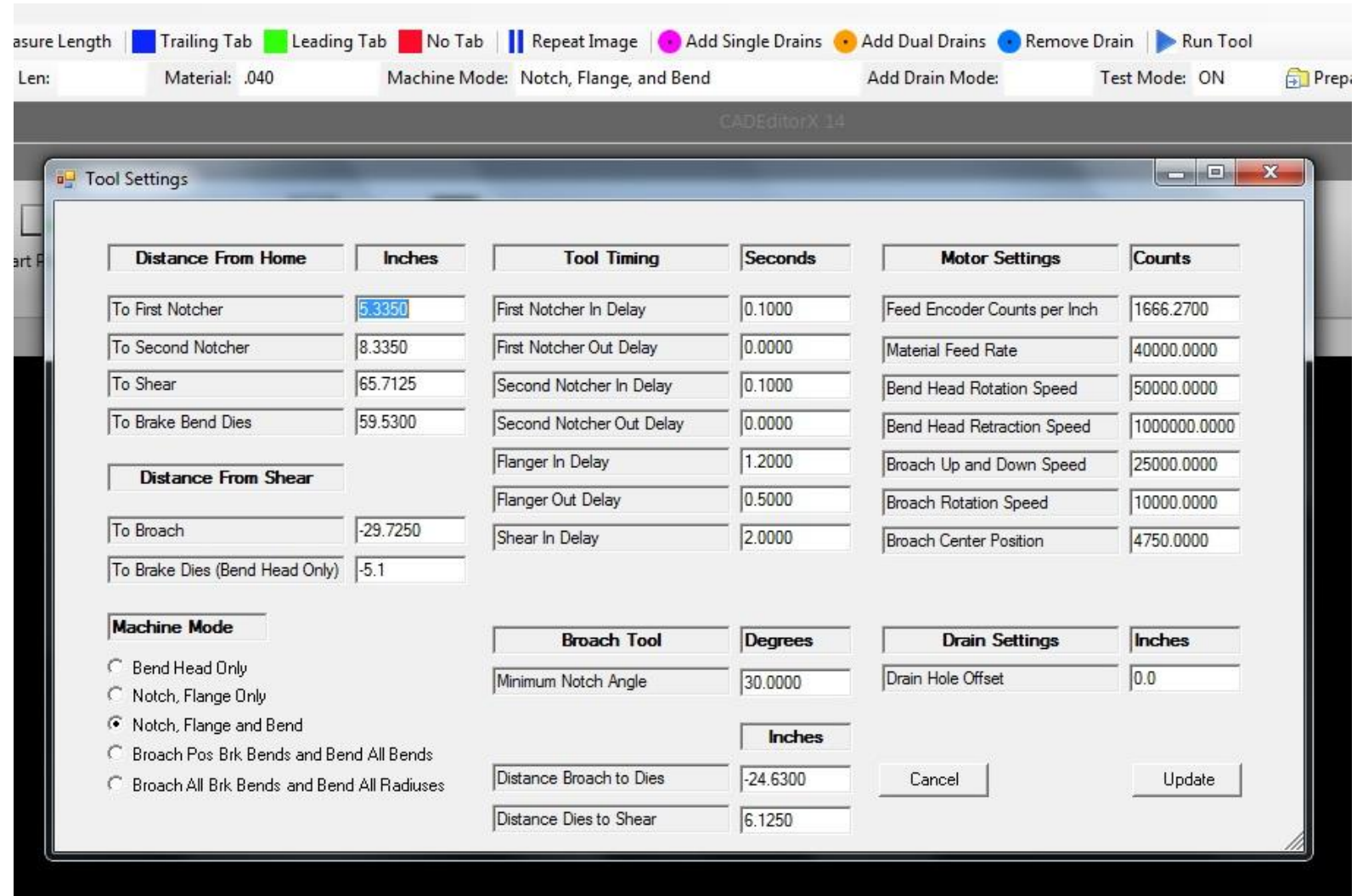


Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Tool Settings will vary.

Tool Settings Continued:

- **Motor Settings:** These values are in counts, and they are what the machine uses to calculate a speed or a distance.
- **Feed Encoder Counts Per Inch:** This value is what you use to calibrate the feed distance of the material. Larger the value, the longer the feed distances will be. Default value is 1666.0
- **Material Feed Rate:** This value is used to control the speed of the material as it travels through the machine. Larger the value, the faster it moves. The range is 0 to 40000.0 Do not exceed the maximum value
- **Bend Head Rotation Speed:** This value is used to control the speed that the bend head, bends the material. Larger the value, the faster it moves. The range is 0 to 50000.0 Do not exceed the maximum value
- **Bend Head Retraction Speed:** This value is used to control the speed that the bend head moves away. Larger the value, the faster it moves. The range is 0 to 1000000.0 Do not exceed the maximum value

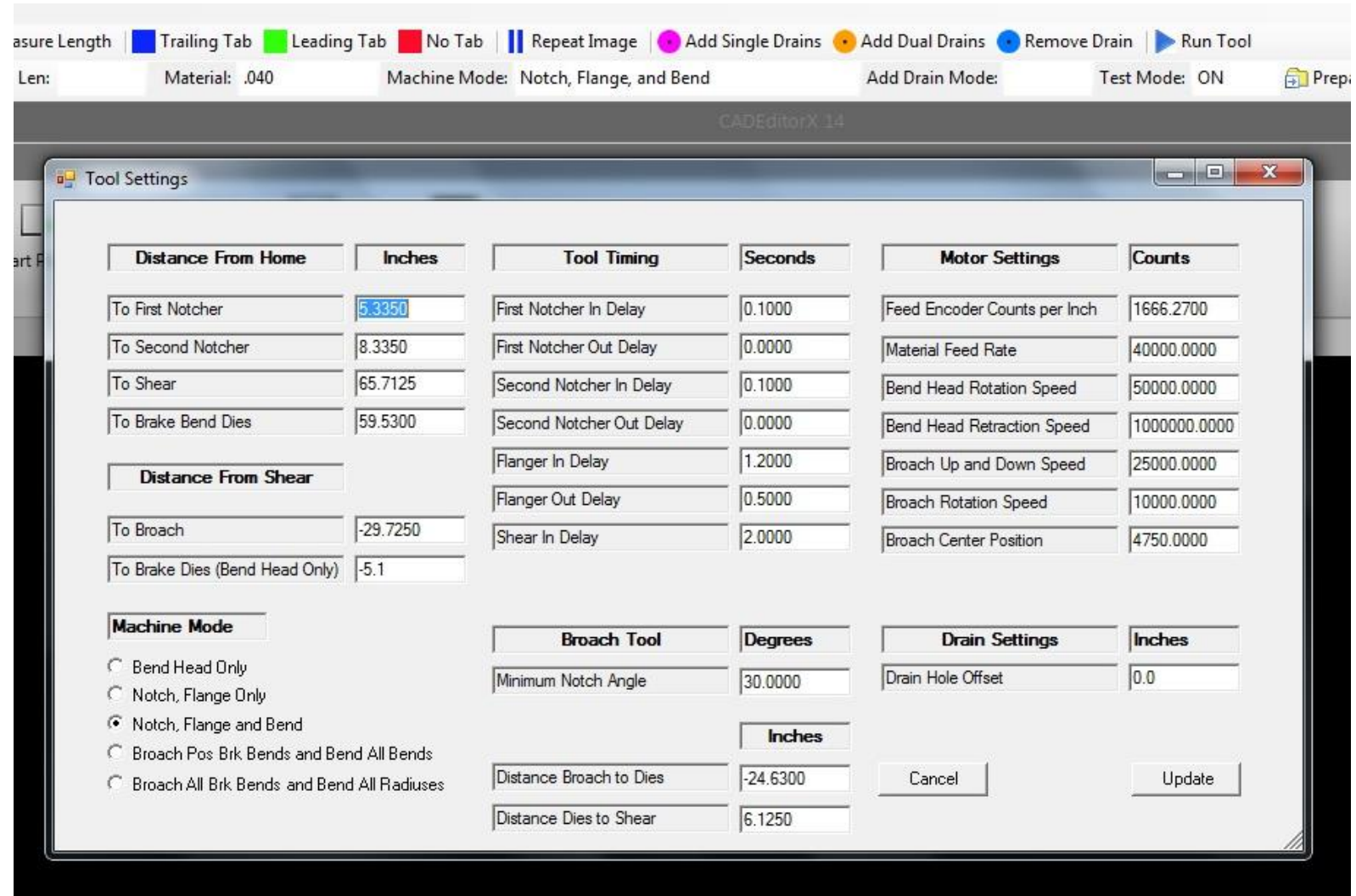


Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Tool Settings will vary.

Tool Settings Continued:

- **Motor settings continued:**
- **Broach Up and Down Speed:** This value is used to control the speed that the Broach moves up and down. Larger the value, the faster it moves. The range is 0 to 25000.0 Do not exceed the maximum value
- **Broach Rotation Speed:** This value is used to control the speed that the Broach rotates left and right. Larger the value, the faster it moves. The range is 0 to 10000.0 Do not exceed the maximum value
- **Broach center position:** This value is used to control the center position of the Broach after it finds the homing sensor. A larger value will make the Broach move to the right after it homes itself. Default value is 4750.0
- **Drain Settings:** This value is in inches, and it will move the location of the drain hole punch.
- **Drain Hole Offset:** This value is used to control the position of the drain hole punch. A larger value will move the punch to the left. Default value is 0.0



Note: Its normal for the program to close when you click Update. This is necessary for the machine to receive the new settings

These are settings are being used as an example. Actual Tool Settings will vary.

Machine Calibration:

Calibrating the Material Feed System:

- To calibrate the feeding system, first load material into the machine.
- Home the material with the manual home command. Click on Tools > Home
- Use a square and hold it on the material and bump it up against the straightener. Put a line in the material.
- On the material, measure 48" back from the line that you have drawn against the straightener and put another square line on the material. These two line need to be perfectly 48" apart. Get help holding the tape measure, make sure that the tape measure is straight and flat against the material. Also burn an inch on the tape measure so you are as precise as you can be.
- Remeasure the distance just to be sure that the helper holding the tape didn't make a mistake.
- Go to Tools > Feed. Move the material 48". Use the square and see if the second line has moved to where the first line was. If so, no calibration is needed. If not go to Tools > Tool settings. The "Feed Encoder Counts per Inch" Value will need to be adjusted.
- To figure out the correct calibration value, you have to use this formula.
Commanded distance / Distance the material moved * the current "Feed Encoder Counts per Inch" Value
- Example: $48.0 / 48.125 * 1662.0 = 1657.6$



We highly recommend that you click on the link below and watch the video on this step.
[Calibrate the material feed system](#)

Machine Calibration Continued:

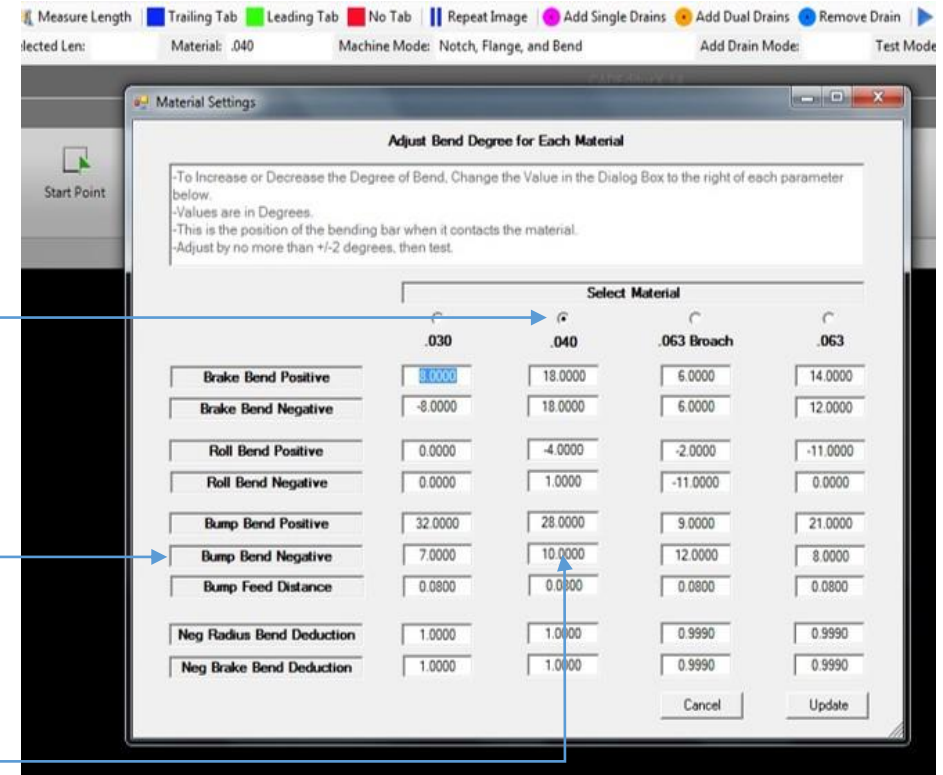
Calibrating the Bend Head

Bump Bend Calibration:

- Calibrating the bend head requires you to run 4 different test files that are located in C:\Jobs\Fusion Test Files. You have to run each file and adjust the bend values until the machine makes the correct shape.
- To calibrate a Bump Bend, Start with file (1.5 - inch diameter test Neg.DXF). Run the shape. The diameter of the semi circle should measure 1-1/2" across. +/- 1/16". If the shape needs adjusting, then go to Tools > Material Settings. Make sure that you have the correct material selected then make a change to the "Bump Bend Negative" value. Change the value by 2 degrees at a time.
- If the bend is to much then, decrease the negative Bump bend value. If the bend is to not enough then, increase the negative Bump bend value.
- Repeat these step for a Positive Bump Bend. Use test file (1.5 - inch diameter test Pos.DXF).

[Go To Next Page](#)

We highly recommend that you click on the link below and watch the video on this step.

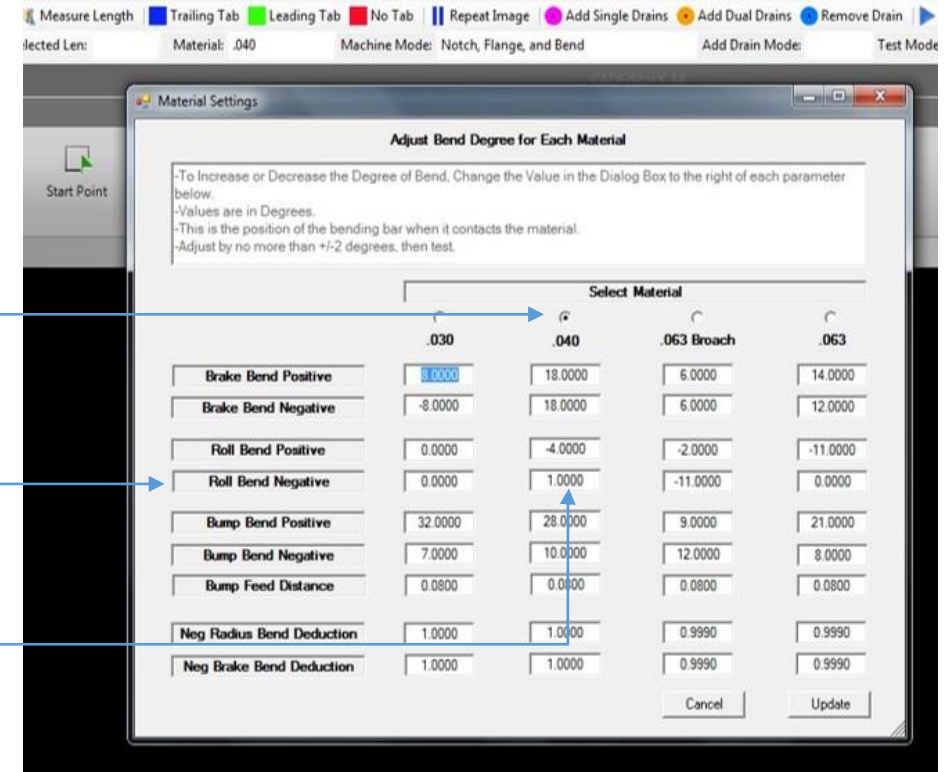


Machine Calibration Continued:

Calibrating the Bend Head Continued

Roll Bend Calibration:

- To calibrate a Roll Bend, Start with file (6 - inch diameter test Neg.DXF). Run the shape. The diameter of the semi circle should measure 6" across. $\pm 1/2$ ". If the shape needs adjusting, then go to Tools > Material Settings. Make sure that you have the correct material selected then make a change to the "Roll Bend Negative" value. Change the value by 2 degrees at a time.
- If the bend is too much then, decrease the Roll bend negative value. If the bend is not enough then, increase the Roll bend negative value.
- Repeat these steps for a Roll Bend Positive. Use test file (6 - inch diameter test Neg.DXF).



We highly recommend that you click on the link below and watch the video on this step.



Trouble Shooting

Software
Won't Start

Material
Stuck in the
Machine

The Notch is
off the Bend

Bend Head
Crash on
Start Up



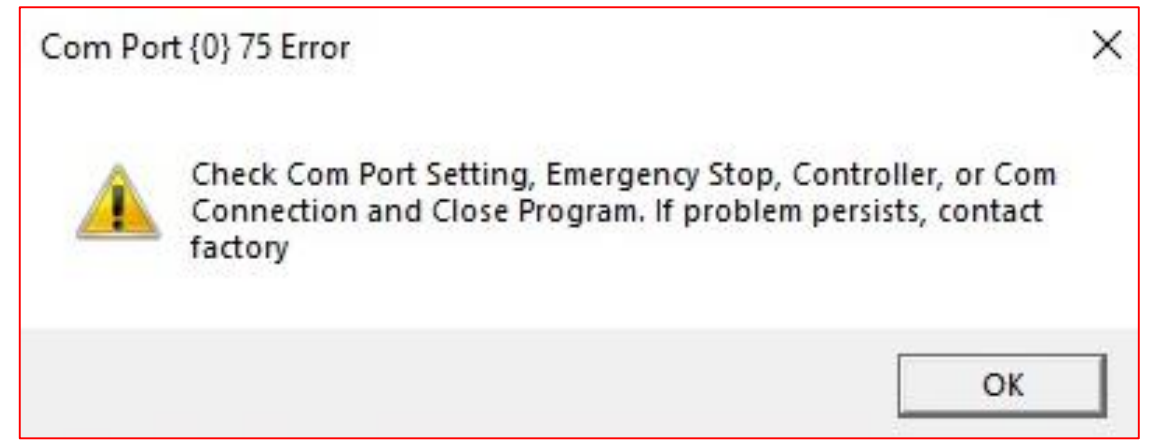
Software Will not Start:

Com Port (0) 75 Error

- The Fusion software starts on 2 stages. The first stage closes all existing parts of the program that are running in the background. If it can't successfully shut them down a message will pop up in a large black screen telling you to shut it down with the task manager. Press reset on the side of the machine. Then try starting it again.
- Make sure that both emergency stops are released.
- Try pressing reset on the side of the machine.
- Make sure that the green ready light next to the reset button is on.
- Try restarting the program.

If the program still will not start:

- Click on this link to continue [Com Port \(0\) 75 Error](#)

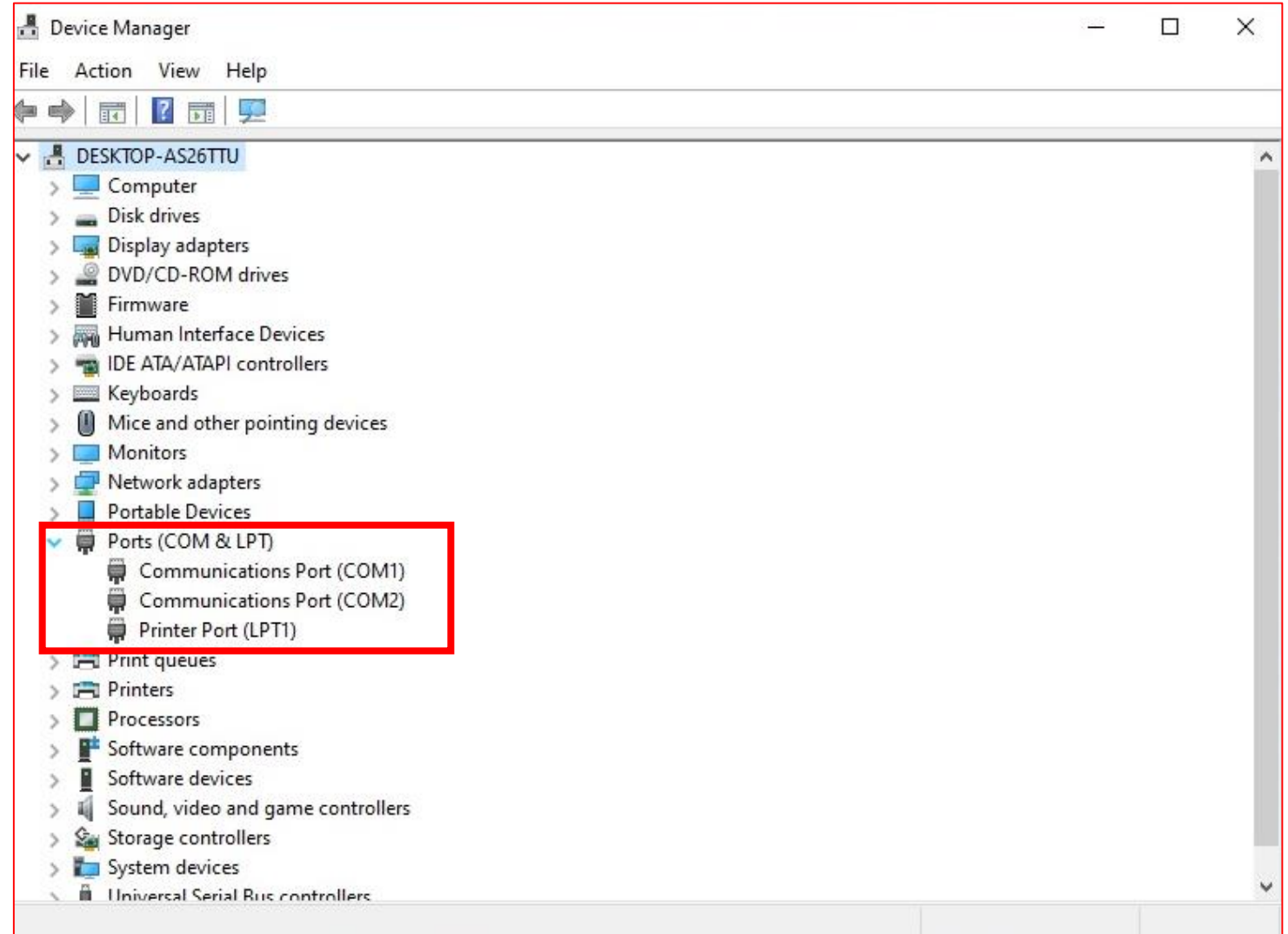


Software Will not Start Continued:

Com Port (0) 75 Error Continued

- Take a look and Identify what kind of Com port the computer is using. There are 3 different kind of Com Ports that it could be. Com Ports and VGA look the same other than the VGA has 15 pins, and a Com Port has 9. Make sure that you're not looking at the monitor cable.
1. A Comport that is directly mounted to the mother board. Should be Com Port (1)
 2. A PCI to Com Port card will usually have 2 Ports. The Com Ports should be (3 and 4). We usually use Com Port 3
 3. USB to Com Port adapter. Is usually Com Port 3
- Go to the device manager and make sure that the com port is working correctly. Take note of the com Port number, you will need this number later.

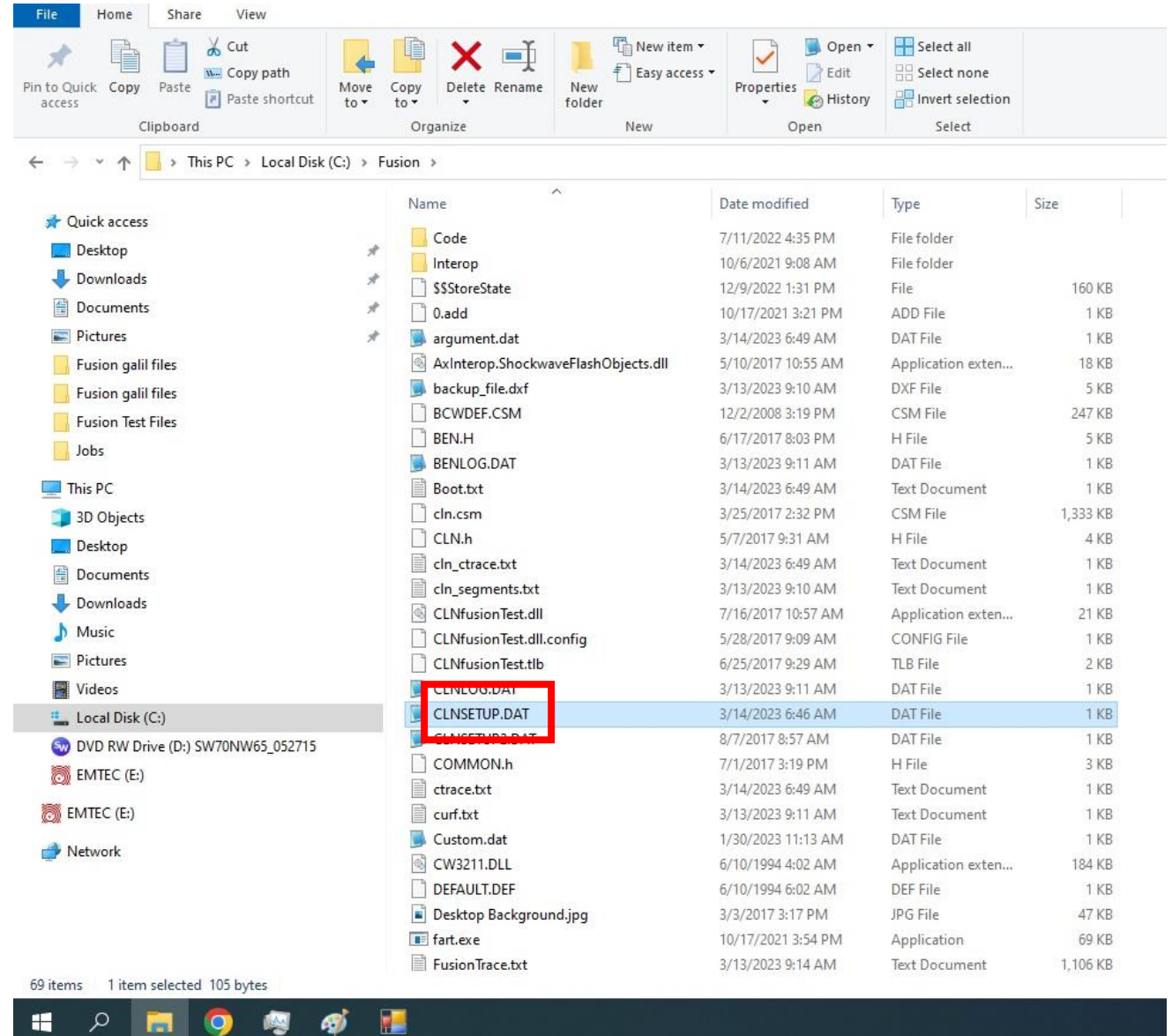
9 Pin Com Port



Software Will not Start Continued:

Com Port (0) 75 Error Continued

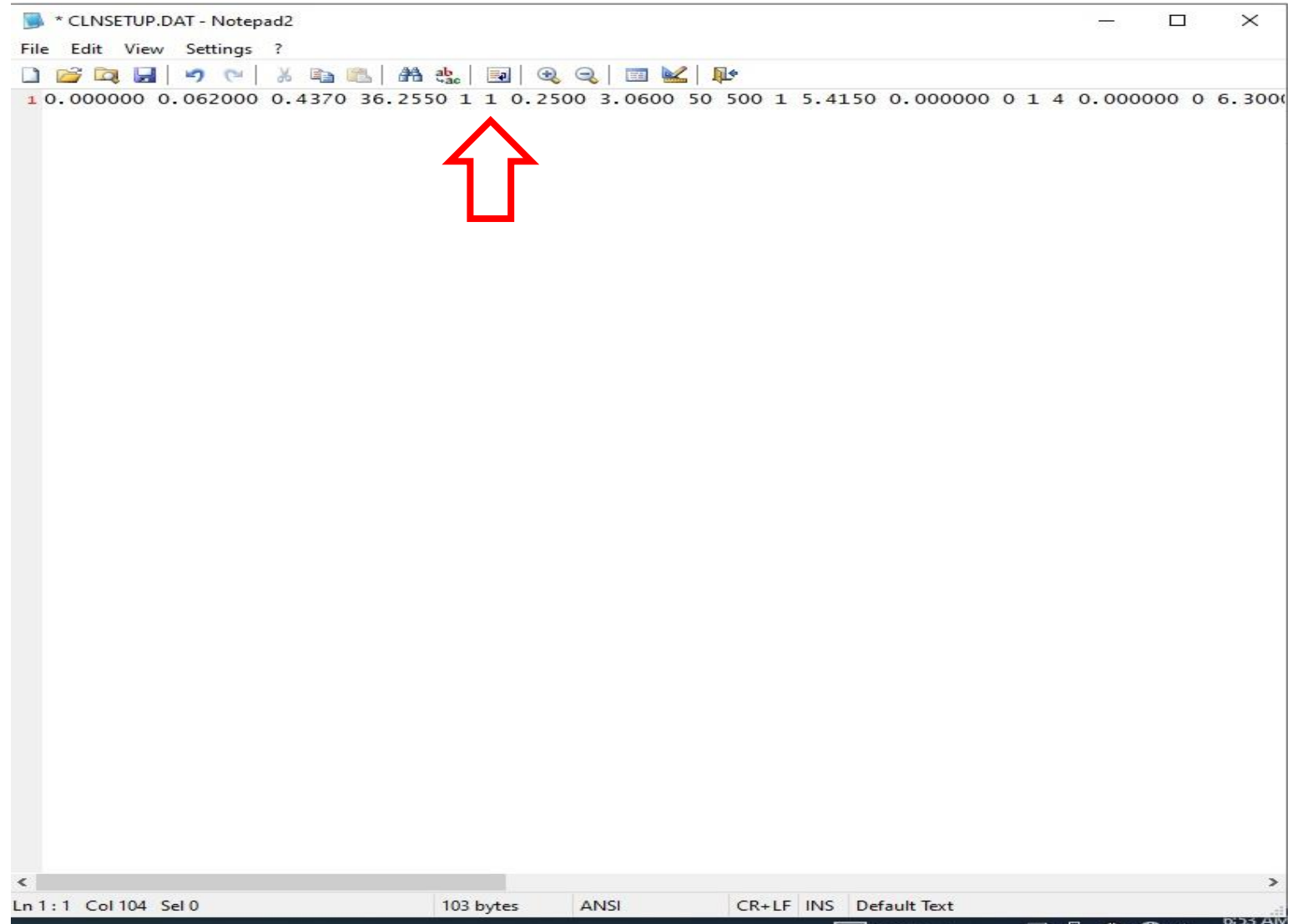
- You need to manually edit the data file that contains the Com Port setting for the Fusion program.
- Go to the windows folders, C:\Fusion. Double click on CLNSETUP.DAT It should open with note pad.



Software Will not Start Continued:

Com Port (0) 75 Error Continued

- You will see a line of numbers. From left to right change the 6th number to the active Com Port that you saw in the device manager.
- Be careful not to change anything else while you are editing this file. Even the spaces are important. If you have any doubt that you made an accidental change just close it without saving it and start over.
- Save and close CLNSETUP.DAT
- Press reset on the machine.
- Try restarting the program.
- If the program still will not start, then try repeating these steps with the other Com Ports that are available in the device manager.
- If the program still fails to start, contact tech support at CLN of South Florida Inc.



The screenshot shows a Notepad2 window titled '* CLNSETUP.DAT - Notepad2'. The text in the window is a single line of numbers: '1 0.000000 0.062000 0.4370 36.2550 1 1 0.2500 3.0600 50 500 1 5.4150 0.000000 0 1 4 0.000000 0 6.3000'. A red arrow points to the 6th number, which is '1'. The status bar at the bottom indicates 'Ln 1 : 1 Col 104 Sel 0', '103 bytes', 'ANSI', 'CR+LF INS', and 'Default Text'.

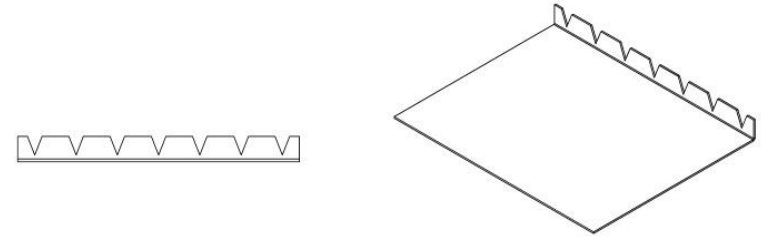
Material Stuck in the Machine:

Material stuck in the machine

- First press the emergency stop. Use the hand wheel on the feeding assembly to see if you can figure out where it got stuck. Turn the wheel back and forth slowly while inspecting all possible places that it could be hitting something.

Stuck some where in the bend head

- The number one reason for a jam, is the material is not loaded correctly. A good indication is that the flange is larger than it should be. The flange should be $\frac{1}{2}$ ", if its more that that, the material will get stuck in the bend head where you can't easily see it. To make sure that the material is loaded correctly See [Loading Material](#).
- [Material stuck in the notching station](#)
- [Dull Notching Dies:](#)



Material Stuck in the Machine Continued:

Material stuck in the notching station:

- **Notcher not completely going through the material**
- If the notcher is not notching through the material all the way. You must check the air pressure at the time that the machine jammed. You could have had a loss of pressure at the time of the incident and the air pressure recovered before you notice that it dropped. It should be set to 80 PSI and not drop below 70 while running.
- The linkage from the air cylinder could be wore out preventing the tool to cycle all the way. Lack of maintenance will cause this.
- Try increasing the notch in delay see [Tool Timing](#)
- Examine the notch cycle manually. Press the Emergency stop. Wear a pair of gloves and grab ahold of the notching arm pull it toward you to cycle the notcher. Make sure that it moves smoothly Then do it again with material under the dies. You should be able to cycle it by hand. Compare the resistance to the other notcher that's function correctly. Look for anything that looks abnormal.
- **Notcher not returning through the material**
- The linkage from the air cylinder could be worn out preventing the tool to cycle all the way.
- Try increasing the notch out delay see [Tool Timing](#)
- The artwork could have a series of points very close together (about .005" apart.) It will appear that the notcher didn't return through the material. However, this will cause the material to lift back with the die. You will also hear the notcher cycle very quickly like a machine gun. To fix this clean up the artwork.



Material Stuck in the Machine Continued:

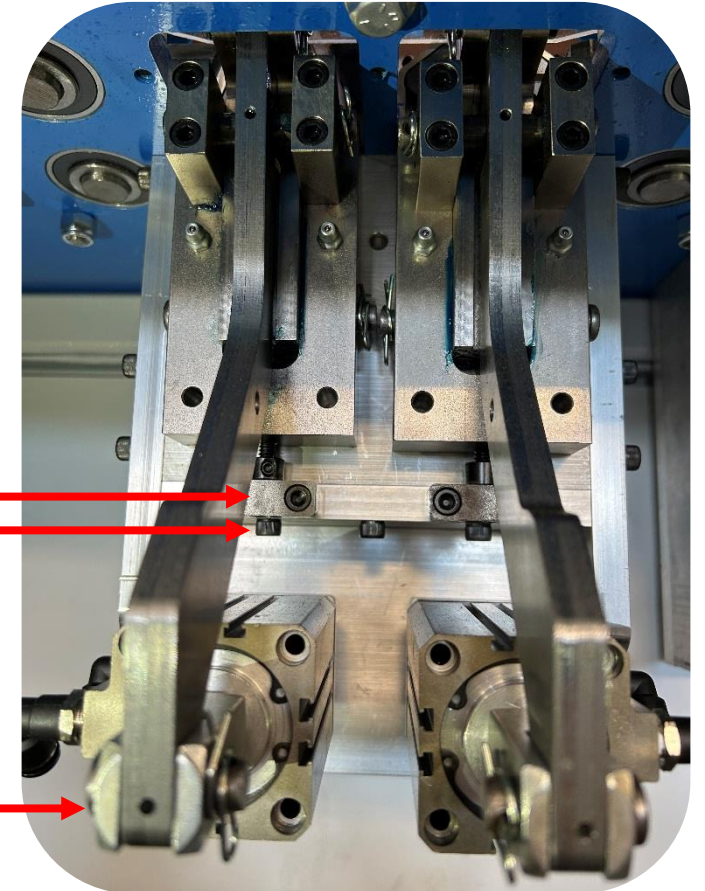
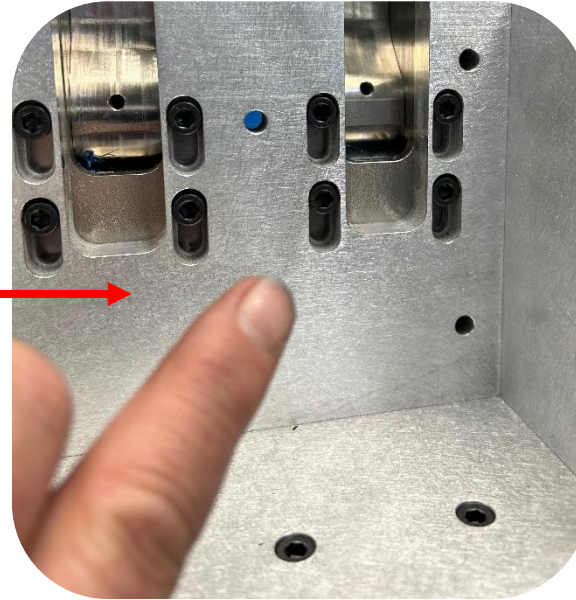
Material stuck in the notching station Continued:

Dull Notching Dies:

The dies could be wore-out and need sharpening. To sharpen the dies, you must remove the Notching assembly and send it to CLN of South Florida..

Removing a Notching Assembly:

- Remove the Clevis pin.
- Remove the chip slide.
- Remove the 4 bolts that hold the notcher in place.
- Remove the 2 bolts that hold the adjustment block.
- If you don't turn the adjustment bolt the notcher will reinstall exactly where it was.



The Notch is off the Bend:

- If the notches are not lining up with the Break Bend. The first thing to check is the Encoder calibration. See [Encoder Calibration](#).
- If the problem is inconsistent. Let's say on some letters everything is fine and other letters the bend gets off the notch. There are two possibilities. First Identify what kind of encoder you have on the machine. Its either a pivot arm Encoder or a self tensioning Encoder.

Pivot Arm Encoder

- For a Pivot Arm Encoder, The spring tension could be to lose. See [Pivot Arm Encoder Adjustment](#) video.

Self tensioning Encoder

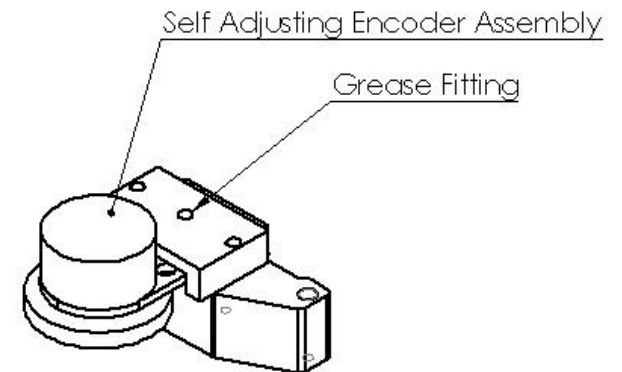
Check to see if the Self tensioning Encoder is sliding back and forth in its track. To do so press the emergency stop, use the hand wheel and move the lead edge of the material back and forth, making contact with the encoder wheel, then backwards coming off the encoder wheel. Watch the encoder make sure that the Encoder is moving back and forth about 1/8 inch. This will tell you that the spring is doing its job of keeping a consent pressure between the material and the Encoder wheel.

The Encoder wheel may be loose on the encoder shaft. Remove the Encoder Assembly and check the set screws in the Encoder Wheel. See [Encoder Wheel Set Screw](#) video.

Pivot Arm Encoder



Self Tensioning Encoder



Bend Head Crash on Start Up:

- If you click okay to rotate bend head message and the Bend Bar rotates counterclockwise, then stops. It most likely missed the home sensor. [See Bend Head Sensor Adjustment.](#)