



Cutting  
Systems

# TORCHMATE® X

## 5 x 10



# USER GUIDE

January 17, 2020

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Lincoln Electric Cutting Systems



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Systems

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# Unpacking Your New Machine

Your new Torchmate® X with Water Table CNC machine is delivered assembled, but you will need to remove the shipping material and gantry locks before operation. Verify all items have been shipped without damage before you accept the order from the shipping company. Notify Lincoln Electric® at (775) 673-2200 to report any shipping damages. Your machine was fully tested at the factory, and a metal cut sample can be found in the waterbed of the machine.

☑	Qty.	Description	Part Number
	1	Lincoln Electric Torchmate X CNC Table with FlexCut™ 80 Plasma Unit	LECS-080-0510-02
	1	Lincoln Electric Torchmate X CNC Table with FlexCut™ 125 Plasma Unit	LECS-125-0510-02
	1	Touchscreen Monitor and Computer (installed)	
	1	Consumable Starter Package (LC100/LC125)	BK12849-SK / K4302
		Black/Silver Instructional Flash Drive	
	8	Leveling Feet	TMS-448-0002-01

To unpackage your new Torchmate X Table, cut the white plastic wrap off. Inspect the machine for damage. If damaged, do not accept the shipment.

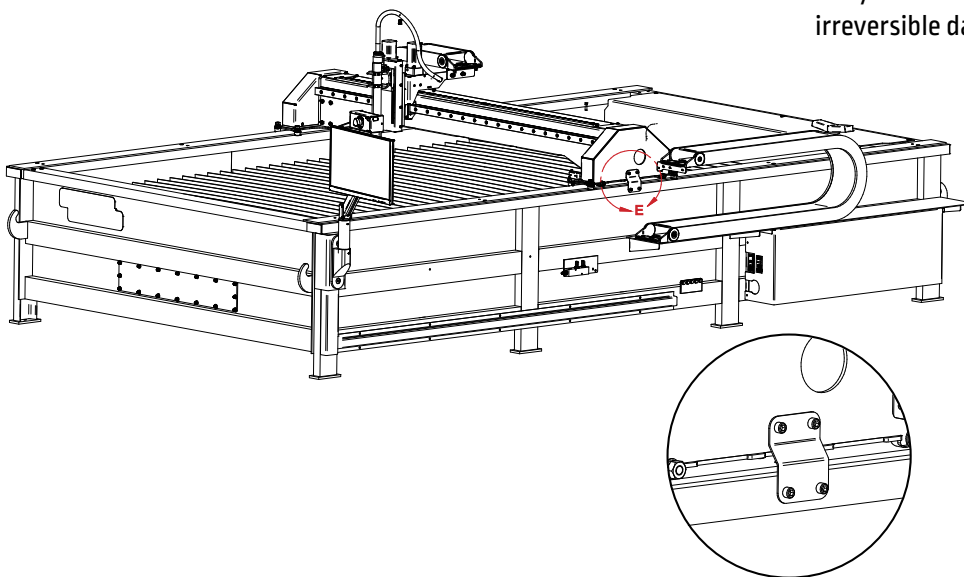
The plasma power supply was shipped separately. Set it aside until the machine has been placed in its final operational location. The plasma unit will sit on the floor near the motion control and operators console.

A forklift is required to place the machine in its operational position. Do not lift the machine from the gantry or cable carrier side. When placing your machine, mount the adjustable feet into ALL leg pads. Once the machine is in position, level the table using the adjustable feet and a level. Use ALL of the adjustable feet to level your table before filling with water.

Table weight is about 4475 lbs (2030 kg)

Make sure the table does not rock.

Torchmate X models are shipped with factory installed gantry locks. The yellow locking devices must be removed before the machine can be made operational. **DO NOT** replace the bolts after removing the yellow locking devices as this will cause irreversible damage to the gantry.



**Do Not Fork Lift From  
Cable Carrier Side Of  
Machine!**

# Technical Support | On-Site Service

Lincoln Electric Cutting Systems provides a number of technical support opportunities with the purchase of your new Torchmate X CNC cutting machine. The following is a brief outline of available options. Onsite visits are available at an additional cost, call 775-673-2200 for additional information.

- **Phone Support**

Phone support is available Monday – Friday 7:00am-4:00pm Pacific Time.

Lincoln Electric will make every effort to handle phone calls in a timely manner, but due to the nature of machine diagnoses and the varied capabilities of machine operators, we cannot guarantee hold wait times for phone-in technical support. Technical support includes machine assembly, troubleshooting, configuration, and quality-related issues. Operational training is not included in phone technical support.

- **E-mail**

Lincoln Electric will return e-mail to the support@Torchmate.com e-mail address within 24 hours Monday-Friday.

- **Webinars**

Lincoln Electric provides live webinars from time to time to assist customers in the optimization and operation of CNC systems. Please subscribe to our newsletter for dates and times. <http://torchmate.com/webinars>

- **Torchmate Training**

Lincoln Electric provides a number of training opportunities at our Reno, Nevada campus. Please call [775]-673-2200 for details or visit <http://torchmate.com/training>

- **Torchmate Academy**

Torchmate Academy is a high definition, detailed video walkthrough covering every aspect of your Torchmate table including setup, operation, detailed Torchmate CAD videos, and maintenance. Call [775] 673-2200 or visit the website to learn more.

<http://torchmate.com/academy>

- **Torchmate YouTube Channel:**

Lincoln Electric provides a wide selection of how to tutorials on our YouTube page.

<https://www.youtube.com/user/torchmatedotcom>

- **Torchmate Store**

A variety of consumables, parts, and accessories can easily be purchased online through the Torchmate store. Visit <https://www.torchmatestore.com/> to learn more.



# Statement of Warranty

## 30 Day Guarantee

If Buyer is not satisfied with the performance of the Goods within 30 days from the date the Goods were shipped from the Seller, Buyer may return the Goods in the original carton(s) for a full refund less Shipping, Handling, Damages and Freight Charges. All sales become final after this 30 day period. Buyer should determine the satisfactory performance of the Goods by using the software, and inspecting and bench running the motors and/or accessory items. Any items to be returned for full refund must be in new, unused (except for bench testing), and saleable condition at the sole determination of the Seller. Items that, in the Seller's judgment, have been used or modified in any way, or kits that have been partially or fully completed will be subject to a restocking fee to be determined by the Seller. A return merchandise authorization number (RMA) must be obtained by the customer prior to any return. Shipments of returned items not marked with a valid RMA will be refused.

## Warranty

Electronics and motors are warranted by their manufacturer to the original purchaser for 24 months from the date of Torchmate, Inc.'s sale invoice. Mechanical components are standard industrial parts and are not warranted except by their respective manufacturers. If any of the warranted items are found by Seller to be defective, such Goods will, at Seller's option, be replaced or repaired at Seller's cost. No defective goods are to be returned without written authorization of seller. The sole purpose of the stipulated exclusive remedy shall be to provide the Buyer with free repair and replacement of defective Goods in the manner provided herein. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as the Seller is willing and able to repair or replace defective Goods in the prescribed manner. The foregoing warranty is in lieu of all other warranties, express or implied, including those of merchantability or fitness for any purpose not expressly set forth herein. No affirmation of Seller, by words or action, other than as set forth in this Section shall constitute a warranty. Seller's warranty does not apply to any Goods which have been subjected to misuse, mishandling, misapplication, neglect (including but not limited to improper maintenance), accident, improper installation, modification (including by not limited to use of unauthorized parts or attachments), or adjustment or repair performed by anyone other than Seller or one of Seller's authorized agents. When returning products to Seller packaging must be adequate or all warranty is null and void. Buyer will pay for the cost of Shipping to and from the Seller for all warranty repairs.

Any claim by Buyer with reference to the Goods sold hereunder shall be deemed waived by the Buyer unless submitted in writing to seller within the earlier of (i) thirty (30) days following the date Buyer discovered or by reasonable inspection should have discovered, any claimed breach of foregoing warranty, or (ii) 12 months following the date of shipment. Any cause of action for breach of the foregoing warranty shall be brought within one year from the date the alleged breach was discovered or should have been discovered, whichever occurs first.

# Statement of Warranty Cont.

Seller's liability (whether under the theories of breach of contract or warranty, negligence, or strict liability) for its Goods shall be limited to repairing or replacing Goods found by Seller to be defective, or at Seller's option, to refunding the purchase price of such Goods or parts thereof.

In no event shall seller be liable for consequential damages arising out of or in connection with this agreement, including without limitation, breach of any obligation imposed on seller hereunder. Consequential damages shall include without limitation, loss of use, income or profit, or loss sustained as the result of injury (including death) to any person, or loss of or damage to property (including without limitation property handled or processed by the use of the goods). Buyer shall indemnify seller against all liability, cost or expense which may be sustained by seller on account of any such loss, damage, or injury.

Upon buyer's receipt of shipment, Buyer shall immediately inspect the Goods. Unless Buyer provides Seller with written notice of any claim for shortage, overcharge, or damage of Goods within ten (10) days from invoice date, such Goods shall be deemed finally inspected, checked and accepted by Buyer and no allowances shall be made thereafter. In absence of shipping and packaging instructions, Seller shall use its own discretion in the choice of carrier and method of packing. Seller shall not be responsible for insuring shipments unless specifically requested by Buyer and any insurance or special packaging so requested shall be at Buyer's expense and valuation.

Title to any Goods sold and risk of loss of such Goods passes to Buyer upon delivery by Seller to carrier and any claims for losses or damages shall be made by Buyer directly with carrier.

- A. In addition to the rights and remedies conferred upon Seller by law, Seller shall not be required to proceed with the performance of any order or contract if the Buyer is in default in the performance of any order or contract with Seller, and in case of doubt as to Buyer's financial responsibility, shipments under this order may be suspended.
- B. No delay or omission by Seller in exercising any right or remedy provided for herein shall constitute a waiver of such right or remedy and shall not be constituted as a bar to or a waiver of any such right or remedy on any future occasion.
- C. The sale of Goods shall be governed by the laws of the State of Maryland. Seller agrees to comply with all applicable laws of the United States.
- D. The purchasers of products from Lincoln Electric Cutting Systems are responsible to dispose of consumables, fluids and machinery at the end of the life cycle in accordance with federal and local regulations.

The invalidity or unenforceability of any one or more phrases, sentences, or sections shall not affect the validity or enforceability of the remaining portions of this Agreement.

## Limitation of Liability

## Disclaimer of Consequential Damages

## Acceptance and Transportation

## Title and Risk of Loss

## General Conditions

## Severability

# Safety Information

Torchmate and Lincoln Electric Cutting Systems equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation and thoughtful operation.

**WARNING: DO NOT INSTALL, OPERATE, OR REPAIR THIS EQUIPMENT WITHOUT READING THE SAFETY WARNINGS CONTAINED THROUGHOUT THIS MANUAL.**

## Please Note:

- PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH
- KEEP CHILDREN AWAY
- IF YOU WEAR A PACEMAKER, YOU SHOULD CONSULT WITH YOUR DOCTOR BEFORE OPERATING
- Read and understand the following safety highlights. For additional safety information it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2.
- BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS

## ELECTRIC SHOCK CAN KILL

- The electrode and work (or ground) circuits are electrically "hot" when the power source is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
- Disconnect the power source before performing any service or repairs. When the power source is operating, voltages in excess of 250 volts are produced. This creates the potential for serious electrical shock - possibly even fatal.
- Insulate yourself from work and ground using dry insulation. Wear dry gloves and clothing. Take extra care when the work place is moist or damp.
- Always be sure the work cable makes a good electrical connection with the metal being cut or gouged. The connection should be as close as possible to the area being cut or gouged.
- Ground the work or metal to be cut or gouged to a good electrical (earth) ground.
- Maintain the plasma torch, cable and work clamp in good, safe operating condition. Repair or replace all worn or damaged parts. Replace damaged insulation.
- Never dip the torch in water for cooling or plasma cut or gouge in or under water.
- When working above floor level, protect yourself from a fall should you get a shock.
- Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others or even piercing safety clothing.

## ARC RAYS CAN BURN

- Plasma Arc Rays can injure your eyes and burn your skin. The plasma arc process produces very bright ultraviolet and infrared rays. These will damage your eyes and burn your skin if you are not properly protected.
- Use safety glasses and a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when performing or observing plasma arc cutting or gouging. Glasses, head-shield, and filter lens should conform to ANSI Z87.1 standards.
- Use suitable clothing including gloves made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- Protect other nearby personnel with suitable non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

Arc Current	Minimum Shade No.	Suggested Shade No.
Less than 20A	4	4
20A-40A	5	5
40A-60A	6	6
60A-300A	8	9
300A-400A	9	12
400A-800A	10	14

### **FUMES AND GASES can be dangerous:**

- Plasma cutting or gouging may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When cutting or gouging, keep your head out of the fumes. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone.
- Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.
- When plasma cutting or gouging on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required.
- Additional precautions are also required when cutting (zinc) galvanized steel or materials containing or coated with any of the following:

Antimony	Beryllium	Cobalt	Manganese	Selenium
Arsenic	Cadmium	Copper	Mercury	Silver
Barium	Chromium	Lead	Nickel	Vanadium

- The operation of plasma cutting or gouging fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment, and the specific procedure and application involved. Worker exposure levels should be checked upon installation and periodically thereafter to be certain levels are within applicable OSHA PEL and ACGIH TLV limits. For information on how to test for fumes and gases in your work place, refer to publications section of this manual.
- Do not use plasma cutting or gouging equipment in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products. Remove all sources of these vapors.
- Gases used for plasma cutting and gouging can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- Read and understand the manufacturer's instructions for this equipment and follow your employer's safety practices.
- This product, when used for cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects
- Some dust created by routing, sawing, grinding, drilling, and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Avoid prolonged contact with this dust. Wear protective clothing and wash exposed areas with soap and water. Allowing dust to get into your mouth, eyes, or lay on the skin may promote absorption of harmful chemicals.

Some examples of these chemicals are:

- Lead from lead-based paint.
- Crystalline silica from bricks and cement and other masonry products.
- Arsenic and chromium from chemically-treated lumber (CCA).

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

### **FOR ELECTRICALLY powered equipment:**

- Turn off input power using the disconnect switch at the fuse box before working on the equipment.
- Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.
- Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

### Cutting flame and sparks can cause FIRE OR EXPLOSION:

- Fire and explosion can be caused by hot slag, sparks, oxygen fueled cutting flame, or the plasma arc.
- Have a fire extinguisher readily available. Provide a fire watch when working in an area where fire hazards may exist.
- When not cutting or gouging, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- Be sure there are no combustible or flammable materials in the workplace. Any material that cannot be removed must be protected.
- Sparks and hot materials from cutting or gouging can easily go through small cracks and openings to adjacent areas.
- Avoid cutting or gouging near hydraulic lines.
- Do not cut or gouge tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned." For information purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).
- Vent hollow castings or containers before heating, cutting or gouging. They may explode.
- Do not add fuel to engine driven equipment near an area where plasma cutting or gouging is being done.
- Connect the work cable to the work as close to the cutting or gouging area as practical. Work cables connected to the building framework or other locations away from the cutting or gouging area increase the possibility of the current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- Hydrogen gas may be formed and trapped under aluminum work pieces when they are cut underwater or while using a water table. DO NOT cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.
- Read and follow NFPA 51B "Standard for Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, Ma 022690-9101.

### Laser Safety Facts:

- This is a class 3R laser product. Handle with caution.
- This product contains a diode laser. Make sure to follow all safety precautions when operating.
- DO NOT look into the direct or reflected beam. This can cause eye injury up to 110 ft. (34 m) away.
- NEVER point any laser towards aircraft or vehicles; it is unsafe and illegal. The laser can cause visual interference with pilots and drivers, and interferes with vision up to 2,400 ft (730 m) away. The laser can be a distraction up to 4.5 miles (73 km) away.
- Class 3R lasers are safe when handled carefully. DO NOT look into the beam. Avoid accidental exposure to eyes.
- Do not aim at aircraft.
- This is not a toy. Always supervise children.

For more information on laser safety please visit:

[LaserSafety.info/3R](http://LaserSafety.info/3R)

or scan the QR code below.



### **CYLINDER may EXPLODE if damaged:**

- Use only compressed gas cylinders containing the correct gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.
- Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- Cylinders should be located: • Away from areas where they may be struck or subjected to physical damage.
- A safe distance from plasma cutting or gouging, arc welding operations and any other source of heat, sparks, or flame.
- Never allow any part of the electrode, torch or any other electrically “hot” parts to touch a cylinder.
- Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, “Precautions for Safe Handling of Compressed Gases in Cylinders,” available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

### **PLASMA ARC can injure:**

- Keep your body away from nozzle and plasma arc.
- Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others or even piercing safety clothing.

### **ELECTRIC AND MAGNETIC FIELDS may be dangerous:**

- Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Cutting or gouging current creates EMF fields around torch cables and cutting machines.
- EMF fields may interfere with some pacemakers, so operators having a pacemaker should consult their physician before cutting or gouging.
- Exposure to EMF fields during cutting or gouging may have other health effects which are now not known.
- All operators should use the following procedures in order to minimize exposure to EMF fields from the cutting or gouging circuit:
  - Route the torch and work cables together - Secure them with tape when possible.
  - Never coil the torch cable around your body.
  - Do not place your body between the torch and work cables. If the torch cable is on your right side, the work cable should also be on your right side.
  - Connect the work cable to the workpiece as close as possible to the area being cut or gouged.
  - Do not work next to cutting power source.



For more information on electromagnetic interference please visit:

<http://torchmate.com/white-papers/EMI-Reduction>

### **While Operating the machine:**

- WEAR CORRECT EYE, EAR & BODY PROTECTION
- PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate [See ANSI Z49.1].
- PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.
- PROTECT others from splatter, flash, and glare with protective screens or barriers.
- IN SOME AREAS, protection from noise may be appropriate.
- BE SURE protective equipment is in good condition.
- Provide adequate light to the area of the machine.
- Also, wear safety glasses in work area AT ALL TIMES.
- Do not climb on machine. It is not intended as a ladder or to support anything but the intended use of metal cutting. By climbing onto the machine, could cause falling that can result in injury or death.

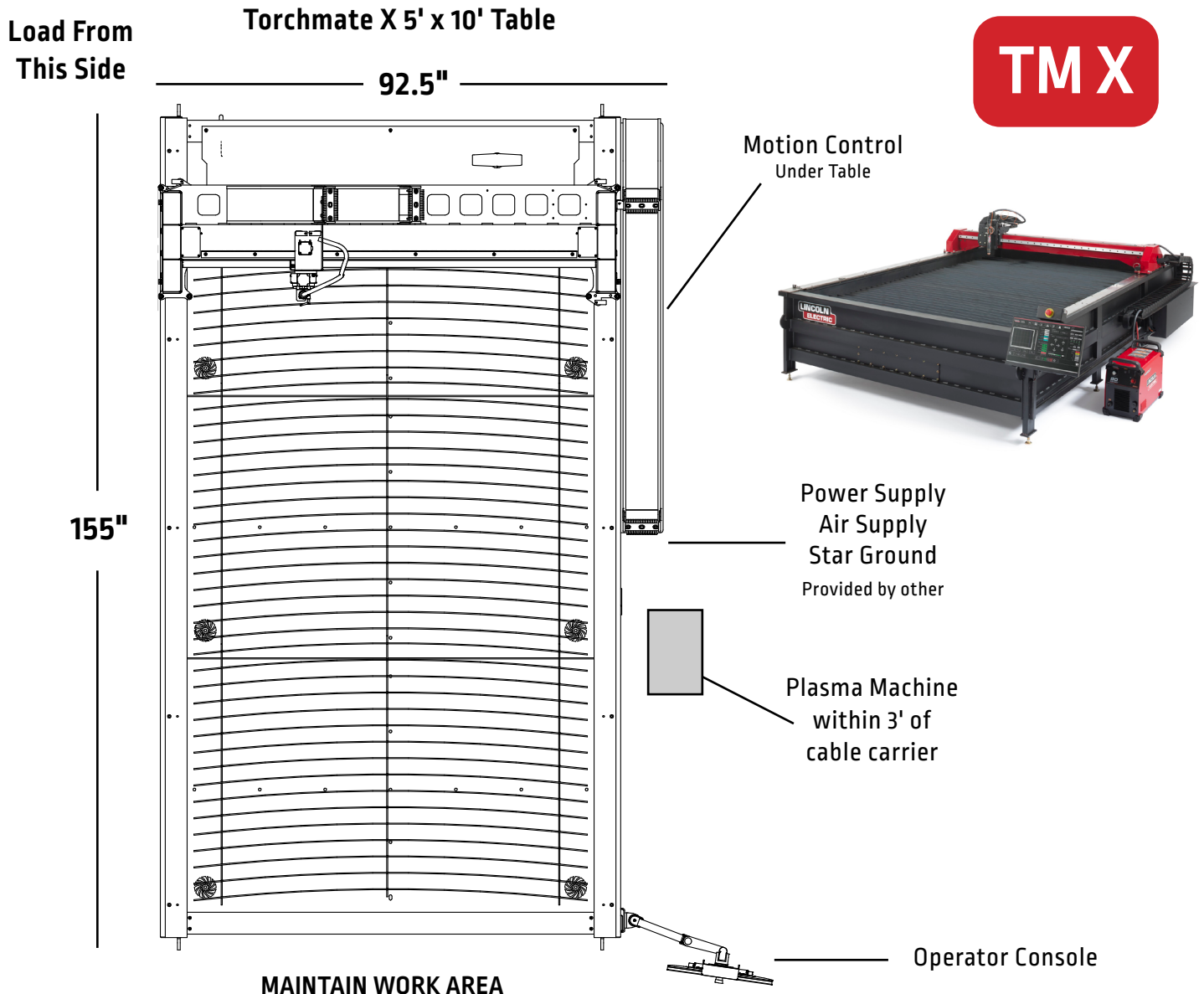


# Site Preparation

When installing a Lincoln Electric CNC Cutting System in your shop, there are many factors that will influence the potential productivity, ease of use of the machine and the safety of the operator. The main factors to prepare for include: the physical layout and placement of the machine in the shop, the availability of power, an EMI ground, compressed air and other gasses, and ventilation.

## **Please Note:**

- When preparing to install the Lincoln Electric CNC Cutting System, provide sufficient space. Three feet of work space (914 mm) should be obstacle free around the machine.
- Forklift load material opposite the cable carrier only. Utilize the back of the machine to park the gantry while loading material.
- A dedicated earth ground must be provided and should be installed in a manner to reduce trip hazard.
- The power lead included is limited to 6 feet.





# Grounding Your Machine

Proper grounding must be provided to ensure personnel safety and to suppress high frequency noise. The foundation of good grounding is an effective earth ground rod. A star ground point connects to the rod with a short, heavy conductor. A simple copper clad steel rod can be driven into the ground to create a Grounding Rod. A ground rod must be installed. Consult with a qualified electrical technician to verify your system grounding.

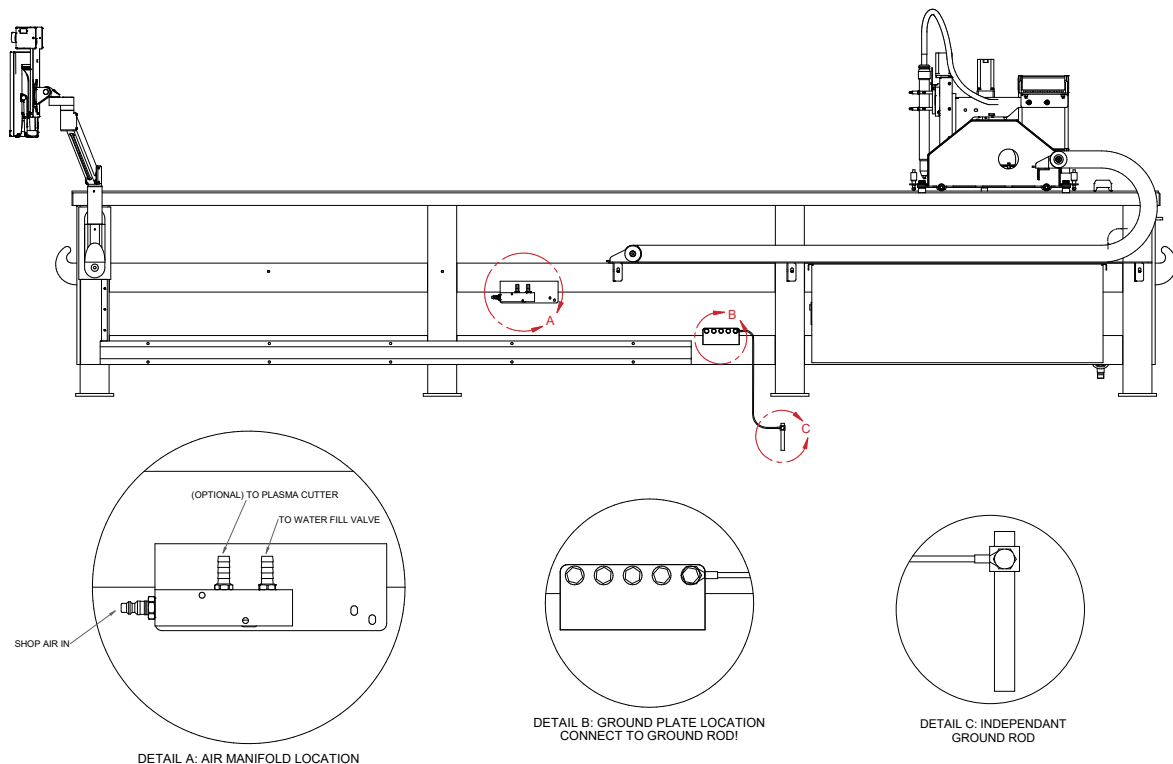
## Please Note:

- Use 6 AWG Stranded Wire to connect the Star Ground on the table to the customer supplied dedicated earth ground.
- For proper operation of your CNC cutting tables you are required to run a 6 AWG cable from the “star” ground to a dedicated earth-ground rod.
- Ground Rod installations are covered by NEC Section 250.
- The earth ground and 6 AWG stranded wire are not included with the machine.

## Step 1:

Place the plasma unit into the appropriate location.

Re-install the power lead and the table ground into the front of the machine.



## Step 2:

The FlexCut plasma unit is shipped with the work ground connected to the star ground.

If the work piece is painted or dirty, it may be necessary to expose the bare metal to make a good electrical connection.



# Power/Air/Water Requirements

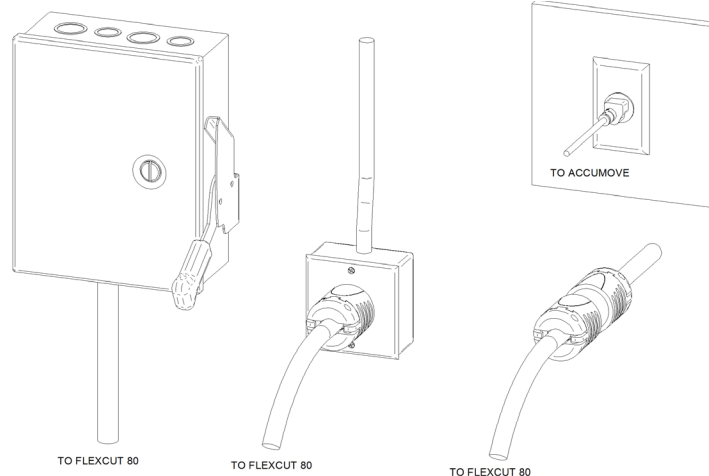
Please refer to the FlexCut operators manual for complete installation and operation guidelines. Only a qualified electrician should connect the input leads to the Torchmate X CNC unit and FlexCut Plasma unit. Connections should be made in accordance with all local and national electrical codes. Failure to do so may result in bodily injury or death.

The FlexCut 80 is rated for 208 VAC through 575 VAC input voltages, single or three phase and 50 or 60 Hz. The FlexCut 125 is rated for 380 VAC through 575 VAC input voltage, three phase only and 50 or 60 Hz. Before connecting the machine to power, be sure the input supply voltage, phase and frequency all match those listed on the machine rating plate.

The FlexCut 80 automatically senses and adjusts to work with any input voltage, phase or frequency listed on the rating plate. No reconnect switch settings are required. The power supply cord is supplied without an attachment plug to accommodate single phase or three phase installations.

## Warning:

The FlexCut on/off switch is not intended as a service disconnect for this equipment. Only a qualified electrician should connect the input leads to the FlexCut Plasma Power source.



The Torchmate X CNC machine requires clean, dry, oil-free compressed air or nitrogen. A high pressure regulator **MUST** be used with a compressor or high pressure cylinder.

Supply pressure must be between 87-110 psi (6-7.6 bar) with flow rated rates of at least 300 SCFH or 140 SLPM.

## **AIR SUPPLY PRESSURE SHOULD NEVER EXCEED 110 PSI OR DAMAGE TO THE MACHINE MAY OCCUR!**

A standard nominal 5 micron in-line filter is recommended, but for optimal performance, select a pre-filter with a 3 micron absolute rating. Air must be supplied to the plasma with 3/8" inside diameter tubing and 1/4 NPT quick disconnect coupler. Air lines should be run as to not create a trip hazard.

Water should be installed in the table pan before operation. Rust inhibitors that are not sodium nitrate/nitrite based products may be used as a corrosion inhibitor in CNC plasma water tables. Operators are encouraged to use a readily available product designed for use in CNC plasma tables.

## Water Capacity

- Torchmate X 5 x 10 models hold approximately 328 gallons, or 1,242 liters.

# FlexCut 80 Plasma Controls & Settings

Please refer to the complete operation and user manual for your FlexCut 80 located with the plasma unit. When the Machine is turned on, and auto-test is executed, all of the LEDs on the Control Panel will light up.

## Controls »

### FRONT

1. CUTTING OPERATING MODE SELECTION
2. PRIMARY AIR, GAS PRESSURE GAUGE AND REGULATOR KNOB
3. TORCH CONNECTION
4. SINGLE PHASE GREEN LED
5. POWER ON/OFF GREEN LED
6. OUTPUT RED LED
7. THERMAL YELLOW LED
8. GAS PRESSURE YELLOW LED
9. PARTS-IN-PLACE (PIP) YELLOW LED
10. OUTPUT CURRENT KNOB
11. CNC INTERFACE
12. WORK GROUND

### BACK

13. INPUT CORD - 10 ft. (3.0 M)
14. POWER SWITCH
15. AIR OR GAS INLET  
[1/4 in. NPT QUICK CONNECT]
16. FAN



# FlexCut 80 Plasma Controls & Settings

Please refer to the FlexCut operators manual for complete installation and operation guidelines.  
Do not overtighten the consumables. Only tighten until the parts are seated properly.

Product Name	Product Number	Input Power Voltage/Phase/Hertz	Rated Output: Current/Voltage/Duty Cycle	Input Current @ Rated Output	Output Range	Gas Pressure Required	Gas Flow Rate	H x W x D in (mm)	Net Wt. lb [kg]
FlexCut 80	K4809-1	200-208/230/380/460/575/3/50/60	60A/140V/100%  80A/140V/80%	3PH/100% 31/28/16/14/12  3PH/80% 41/37/21/18/14	3PH 25-80A	87 to 109 PSI [6.0-7.5 Bar]	380 SCFH @ 80 PSI 180 SLPM @ 5.5 Bar	179 x 11.8 x 25.4 (455 x 301 x 645)	96 [44]
		230/1/50/60	60A/140V/100% 80A/140V/80%	1PH/100% 48 1PH/80% 62	1PH 25-80A				
		200-208/1/50/60	60A/140V/100% 80A/140V/60%	1PH/100% 52 1PH/60% 71	25-80A				

## MECHANIZED CUT CAPACITY - MATERIAL THICKNESS MILD STEEL

Recommended cut capacity at 24 ipm	3/4 in. (19 mm)
------------------------------------	-----------------

## PIERCE CAPACITY - MATERIAL THICKNESS MILD STEEL

Pierce capacity with programmable torch height control	3/4 in. (19 mm)
--	-----------------

## MAXIMUM CUT SPEEDS - MILD STEEL

1/4 in. (6.35 mm)	148 ipm
1/2 in. (12.7 mm)	52 ipm
3/4 in. (19 mm)	26 ipm

## CONSUMABLES STARTER KIT FOR LC100M MACHINE TORCH (BK12849-SK)

Electrode (LC100M)	BK12849-3	5 Qty
Shield Cap 60A-80A (LC100M)	BK12849-15	1 Qty
Nozzle 40A (LC100M)	BK12849-4	1 Qty
Nozzle 60A (LC100M)	BK12849-5	2 Qty
Nozzle 80A (LC100M)	BK12849-6	2 Qty
Swirl Ring (LC100M)	BK12849-9	1 Qty
Retaining Cap-CTP (LC100M)	BK12849-22	1 Qty
Shield Cap-40A (LC100M)	BK12849-14	1 Qty



# FlexCut 125 Plasma Controls & Settings

Please refer to the complete operation and user manual for your FlexCut 125 located with the plasma unit. When the Machine is turned on, and auto-test is executed, all of the LEDs on the Control Panel will light up.

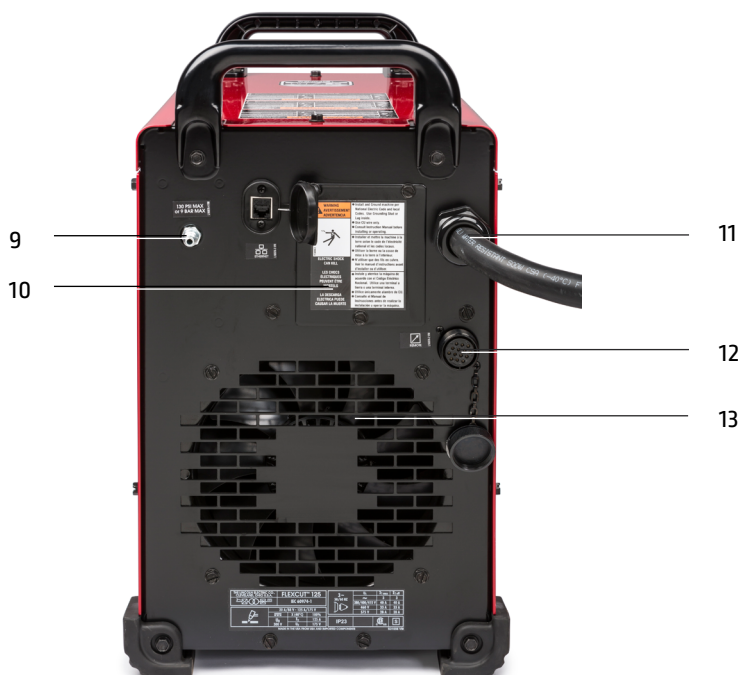
## Controls »

### FRONT

1. LCD DISPLAY
2. PRIMARY AIR, GAS PRESSURE GAUGE AND REGULATOR KNOB
3. HOME BUTTON
4. ON/OFF SWITCH
5. TORCH CONNECTION
6. WORK LEAD CONNECTION
7. MENU CONTROL KNOB/BUTTON
8. PURGE

### BACK

9. AIR OR GAS INLET (1/4"IN. NPT QUICK CONNECT)
10. RECONNECT PANEL ACCESS
11. INPUT CORD STRAIN RELIEF
12. 14-PIN CNC INTERFACE
13. FAN



# FlexCut 125 Plasma Controls & Settings

Please refer to the FlexCut operators manual for complete installation and operation guidelines.  
Do not overtighten the consumables. Only tighten until the parts are seated properly.

Product Name	Product Number	Input Power Voltage/Phase/Hertz	Rated Output: Current/Voltage/Duty Cycle	Input Current @ Rated Output	Output Range	Gas Pressure Required	Gas Flow Rate	H x W x D in (mm)	Net Wt. lb (kg)
FlexCut 125	K4811-1	380/400/415/460 /575/3/50/60	125A/175V/100%	3PH/100% 40/40//40/33/28	3PH 20-125A	90-120 PSI (6.21-8.27 Bar)	550 SCFH @90 PSI 260 SLPM @6.21 Bar	20.72 x 12.25 x 25.53 [526 x 311 x 648]	118 (53.5)

## MECHANIZED CUT CAPACITY - MATERIAL THICKNESS MILD STEEL

Recommended cut capacity at 32ipm	1 in. (25.4 mm)
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## PIERCE CAPACITY - MATERIAL THICKNESS MILD STEEL

Pierce capacity with programmable torch height control	3/4 in. (19 mm)
--	-----------------

## MAXIMUM CUT SPEEDS - MILD STEEL

1/4 in. (6.35 mm)	180 ipm
1/2 in. (12.7 mm)	72 ipm
3/4 in. (19 mm)	40 ipm
1 in. (25.4 mm)	23 ipm

## CONSUMABLES STARTER KIT FOR LC125M MACHINE TORCH (K4302-2)

Electrode (LC125M)	BK14300-1	2 Qty
Shield Cap 45 A - 65 A (LC125M)	BK14300-3	1 Qty
Shield Cap 85 A - 125 A (LC125M)	BK14300-4	1 Qty
Nozzle 45A (LC125M)	BK14300-7	1 Qty
Nozzle 65A (LC125M)	BK14300-8	1 Qty
Nozzle 85A (LC135M)	BK14300-9	1 Qty
Nozzle 105A (LC125M)	BK14300-10	2 Qty
Nozzle 125A (LC125M)	BK14300-11	2 Qty
Swirl Ring 45 A - 125 A (LC125M)	BK14300-13	1 Qty
Retaining Cap-CTP (LC125M)	BK14300-15	1 Qty



# Powering Up the Torchmate X

To power up your Torchmate X CNC machine, flip the switch in front of the electronics enclosure under the cable carrier. This switch powers the machine, computer, and monitor on the table. Power the plasma power supply (based on model) by toggling the power switch on the unit. Provided is the proper sequence to power up your Torchmate TM X table.

## Step 1:

Turn the Accumove power switch to ON. Twist the E-STOP knob 1/4 turn clockwise. This will power the Accumove and start the computer.

\*If a grey WINDOWS screen appears, swipe your finger up on the touchscreen monitor. Enter 'cncop' into the password prompt. Press the arrow.

## Step 2:

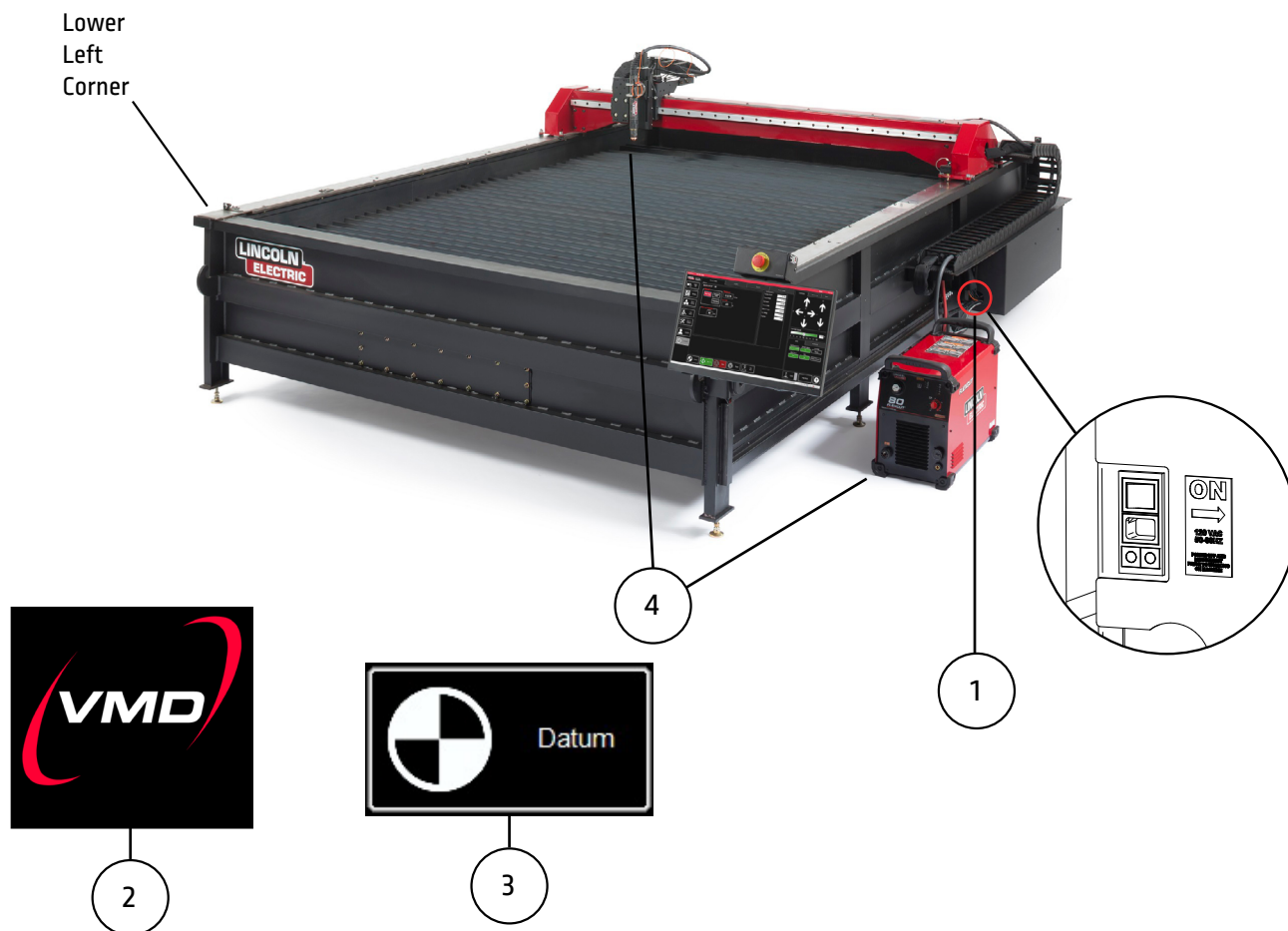
Once the computer boots up, it will launch the Visual Machine Designer software.

## Step 3:

On the screen, press DATUM. This will enable the drives. The head will come to the lower left corner of the table to its 'HOME' position. Your machine is now prepared and ready to run.

## Step 4:

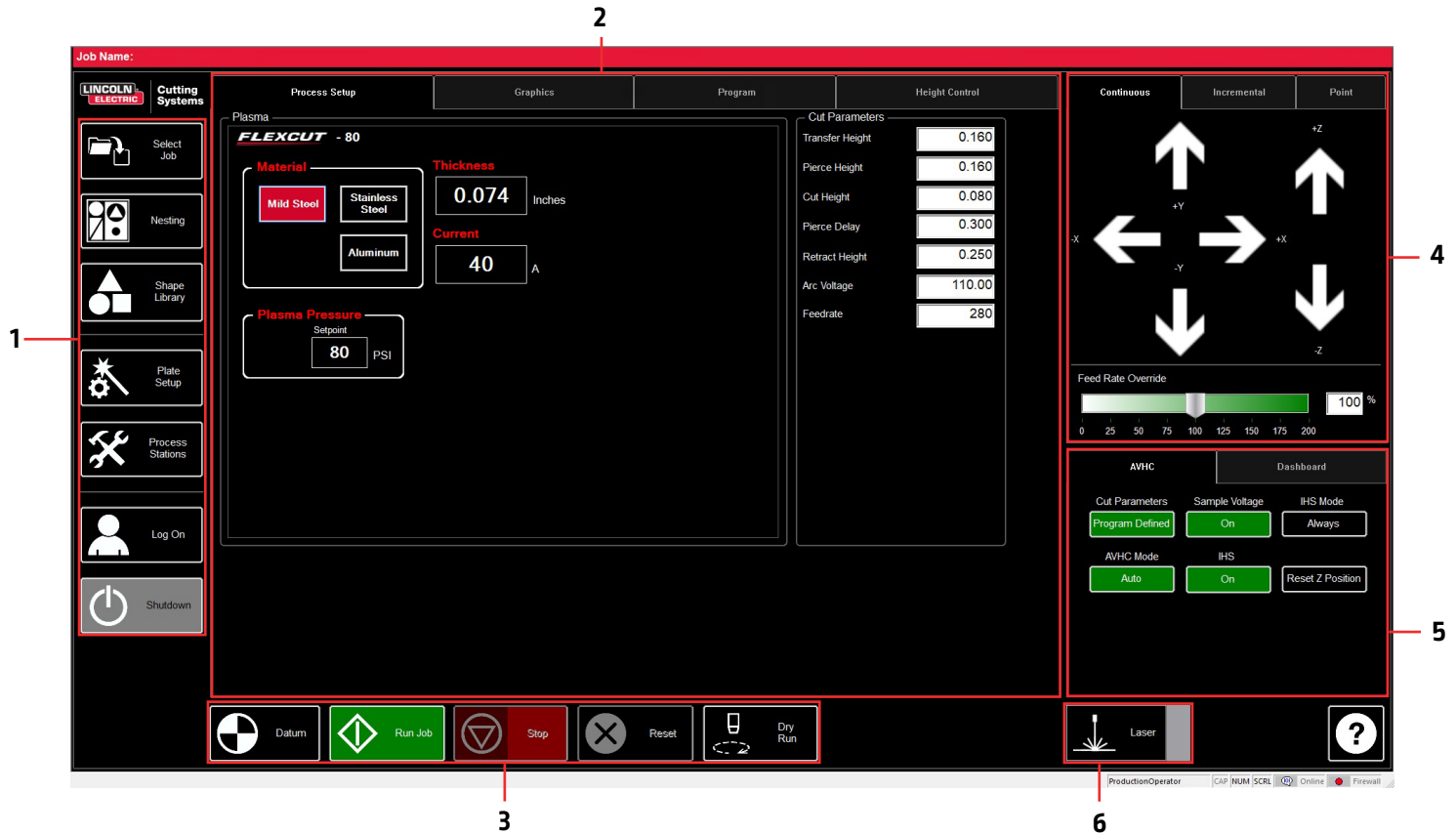
Go to the plasma torch head to check and evaluate the consumables. Turn the plasma power supply on and set the appropriate amperage for the consumables and material you will be cutting. Verify the air pressure is correct per the manual.





# Overview of the Visual Machine Designer

Visual Machine Designer (VMD) is the software that allows the operator to access a majority of the table's controls from the main screen, while hosting other features that aid in creating and manipulating files. This quick guide will give you an overview of the features along with its operation.



The main screen of the VMD is broken into sections for easy navigation and operation. Overview of all the buttons and functions will be covered in sections.

1. Job Group - Opens and controls all aspects of the file being entered or the creation of jobs. Includes SHUTDOWN.
2. View Screen - Shows the Process Setup, graphic of the job, g-code of the job, or a graph of the AVHC lifter station movements.
3. Run Group - These buttons control the start and stop of the job.
4. Jogging - Controls the torch movement on the machine along with program run speed.
5. AVHC/Dashboard - Control the AVHC and displays the coordinates of the head along with all of the indicators being monitored on the machine.
6. Accessory Toggle - This hosts the on/off toggle button for the laser pointer accessory.

# Job Group

The Job Group covers any “job” type functions. This group directly deals with selecting a job, creating a job (Shape Library), Nesting, and other Job type functions.

## Select Job:

This menu allows the operator to choose the job which they would like to load.

The SELECT JOB folder shows the “HOT FOLDER” and the loaded jobs in that folder.

\*C:\ControllerData\Jobs is the HOT FOLDER.

To select another source, press BROWSE and that will open the standard WINDOWS dialog.

The PREVIEW window will display the selected job from the list.

IS JOB KERF COMPENSATED: Toggles the software to accommodate for KERF. If generating parts from TMCAD/VMD NEST, select YES. Shape Library parts require KERF correction, select NO. Uses the KERF diameter setting in TOOL LIBRARY.

## Nesting:

This opens VMD Nesting.

See the Nesting section to get an overview of the features.

## Shape Library:

This allows you to create a user defined shape based on 36 of the most common parts.

See the USING THE SHAPE LIBRARY section for details.

## Plate Setup:

PLATE SETUP allows you to make alterations to the job itself.

ROW AND COLUMN: Allows you to add multiples by adding numbers to generate a GRID ARRAY of the job you have selected.

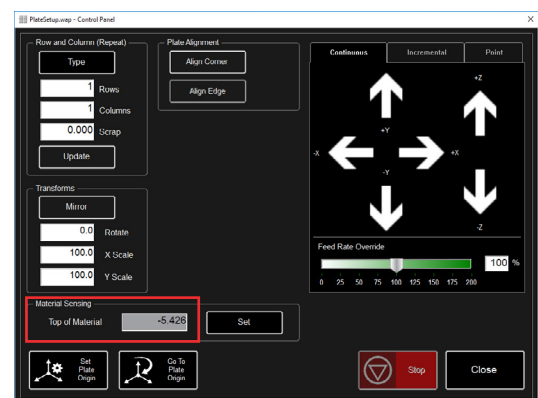
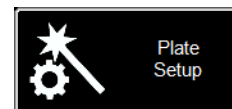
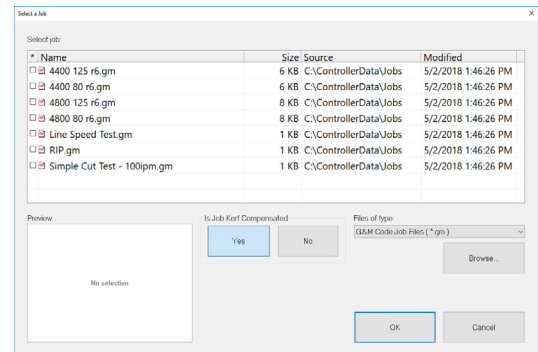
TRANSFORMS: Allows you to MIRROR, ROTATE, or SCALE your job.

MATERIAL SENSING: This works in conjunction with the CUT PARAMETERS by setting a measurement for the TOP OF MATERIAL and the MATERIAL THICKNESS of the plate you are cutting.

PLATE ALIGNMENT: Used to have the controller ‘angle’ the job to the skewed material on the table.

SET PLATE ORIGIN: This establishes the PLATE ORIGIN.

GO TO PLATE ORIGIN: Moves the head back to the PLATE ORIGIN.





## Process Stations:

PROCESS STATIONS configure and control the tool outputs on the machine.

KERF and DWELL times can be added along with programming the offset to the plate marker accessory.



## Log On:

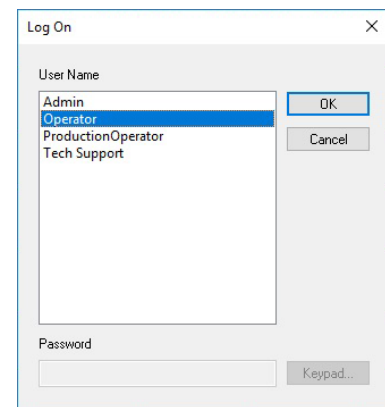
LOG ON switches users of the VMD software.

ADMIN opens the MACHINE SETTINGS (password protected).

OPERATOR is the standard user with the standard interface.

PRODUCTION OPERATOR (default) is a standard user with a simplified interface.

TECH SUPPORT is used only for tech support (password protected).



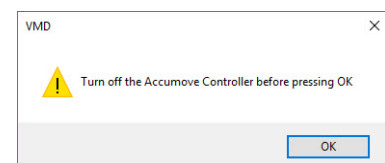
## Shutdown:

SHUTDOWN will close the VMD and power down the computer.

This should be used when shutting down the system.

This will prompt a dialog to TURN OFF ACCUMOVE CONTROLLER. Press the E-STOP button to power down the controller.

Press OK. The computer then will go into hibernate mode.



# View Screen

The main VIEW SCREEN of the VMD hosts tabs that control and display the job and the corresponding settings for cutting the material. The TABS at the top of the screen gives the operator different views and controls for the job planning to be cut.

## Process Setup:

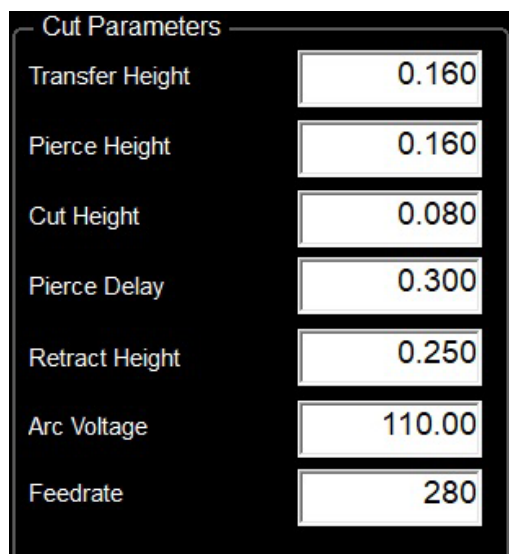
The PROCESS SETUP tab is used to enter the material you are planning to cut. Once entered, the Cut Parameters for the specified material type, thickness, and amperage selection will automatically be loaded into the Cut Parameters section.

- **Material** is the type of material you will be cutting.
- **Thickness** is the material thickness.
- **Current** is the amperage being used for cutting.
- **Plasma Pressure** displays the appropriate air pressure required for the Amperage/Thickness entered.
- **Selected Process** adjusts the CUT PARAMETERS to either PLASMA or MARKING settings. [FC125 only]



## Cut Parameters:

All the parameters in the Cut Parameters and AVHC tab set the torch in proper position in relation to the material during operation. Most of the parameters can be found in your FlexCut manual under Cut Charts.



- **Transfer Height** is the distance the torch will retract off the material to initiate a pilot arc, prior to moving up to the pierce height.
- **Pierce Height** is the distance the head sits above the material during piercing.
- **Cut Height** is the distance between the torch tip and top of material during cutting.
- **Pierce Delay** is the time delay for the torch to pierce through the material before executing movement.
- **Retract Height** is the distance the head will retract off the material during rapid travels when moving in between cuts in a job.
- **Arc Voltage** is the voltage feedback comparison value. If using SAMPLE VOLTAGE this will adjust during cutting.
- **Feedrate** displays/sets to the OPTIMAL FEEDRATE in the cut charts for the thickness of material and amperage set.

## Graphics View:

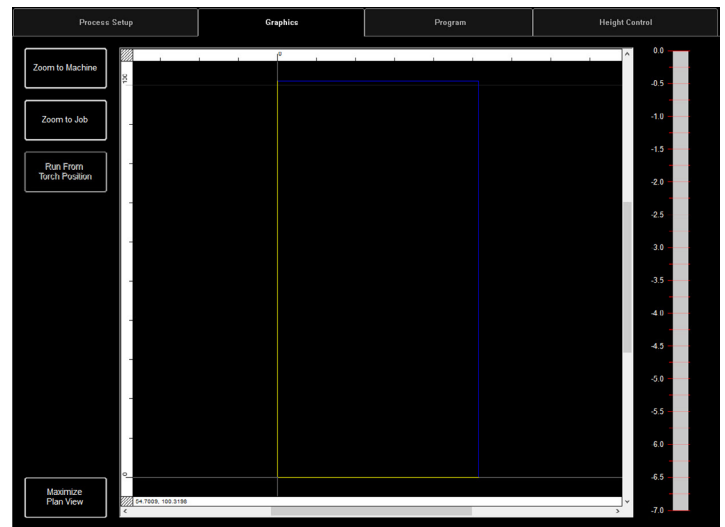
The MACHINE LIMITS are displayed in blue. The head is represented with white crossed lines. Plasma assigned tool paths are displayed in red. Plate Marker assigned tool paths are displayed in green. Rapid travels will be a dashed grey line. Oxy fuel cuts are displayed in purple.

**Zoom to Machine** will zoom to the programmed machine limits.

**Zoom to Job** will zoom to the job loaded.

**Run From Torch Position** will start the stopped job where the torch is located on the job.

**Maximize Plan View** displays all views in one screen.

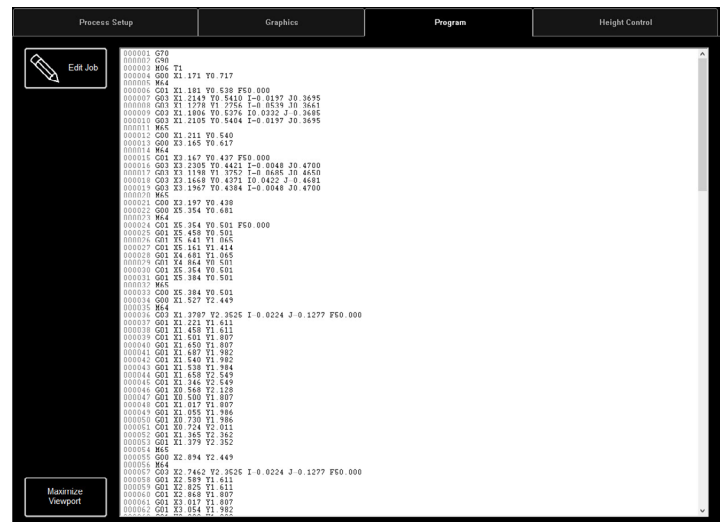


## Program View:

This displays the G-Code of the job that is loaded.

**Edit job** will open the current G-Code in a text editor.

**Maximize Viewport** will display all views in one screen.



## Height Control View:

This displays the lifter station movements while operating in a moving graph.

**Trace Pause/Resume** will pause the graph if tracing.

**Trace off/on** will toggle showing the lifter station's movement during operation.

**Maximize Viewport** Displays all views in one screen.



# Run Group

This group controls the startup of the machine along with running jobs.

## Datum:

Datum has several features. When first starting up your machine, datum will power your motors and move the machine to establish its MACHINE ZERO.



Once the torch has moved to the lower left corner, the machine is ready to operate.

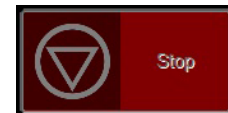
## Run Job:

- RUN JOB will start the job that is loaded into the VMD.



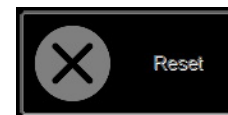
## Stop:

- STOP button will stop the machine during any movement or process.



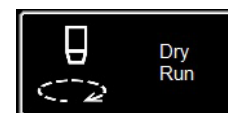
## Reset:

- This will reset the job to start over. If the job has started and not completed you will need to RESET to start the job over.



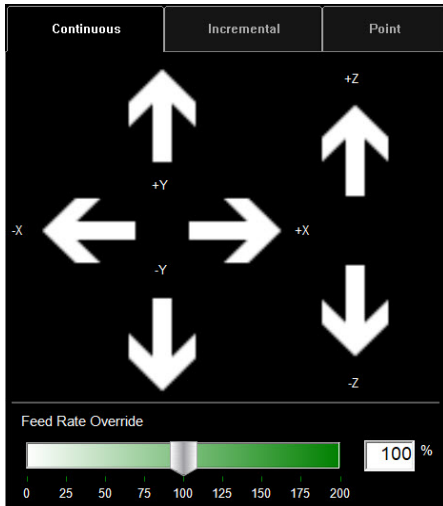
**Active Run/Dry Run:** This button is a TOGGLE between ACTIVE RUN and DRY RUN.

- ACTIVE RUN: This will activate your torch to fire when you RUN a job.
- DRY RUN: This deactivates your torch from operation. If in DRY RUN, the torch will simulate all movements without firing the torch.



# Jogging

Jogging allows the user to move the head by pressing on the direction. The Jogging group has several types of jogs that can be executed, allowing the user finite control over the direction, distance, and speed the head will move.

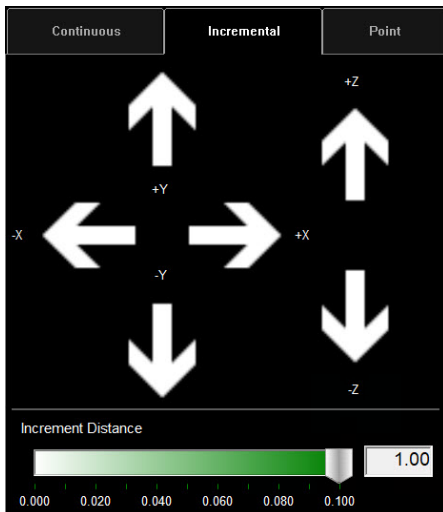


## Jog:

The JOG keys are laid out in the manner the table moves. By pressing more towards the center of the arrow, the torch body will move slower. Pressing more towards the outside of the arrow, the torch body will move faster.

On the bottom is the FEED RATE OVERRIDE % Slider. This will alter the running feedrate of the job that is active. This is used to “feather” the feedrate while running to get the best cut quality.

Continuous will move as long as your finger is active on the direction.



## Incremental Jog:

Pressing a direction will move the torch body in the direction you are pressing while using the Increment Distance slider bar to move that distance.

Using the slider will give you increments between .000 - .100. You can directly enter any number into the dialog.



## Point Jog:

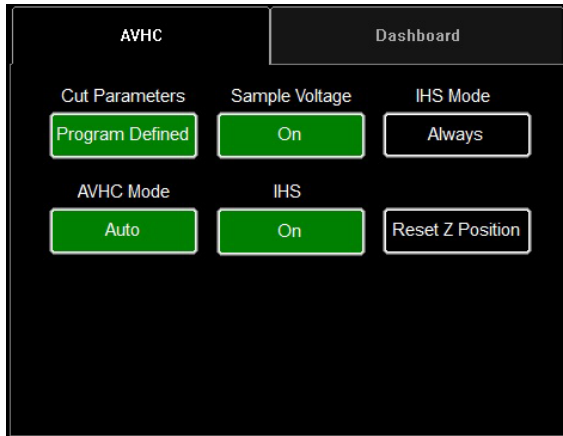
Point jog allows the user to define where they want the head to travel to, and from what source location.

Select where you want the torch to start, what feed rate to travel, and the X/Y coordinates and press MOVE TO POSITION.

CUT TO POSITION works the same way except it will go through the IHS sequence and fire the torch. This works to help cut remnants and straight lines.

# AVHC & Dashboard

AVHC (Arc Voltage Height Control) hosts “HOW” the controller handles the lifter station. Dashboard gives the operator insight into the head position and other status indicators.



## AVHC (Automatic Voltage Height Control):

Cut Parameters can be toggled between Program Defined and User Defined.

- Program Defined - The cut parameters will automatically generate based on the type of material and material thickness entered in the PROCESS SETUP tab.
- User Defined - You can manually enter the cut parameters based off of the cut charts found in the FlexCut manual.

## Sample Voltage is a toggle between On or Off.

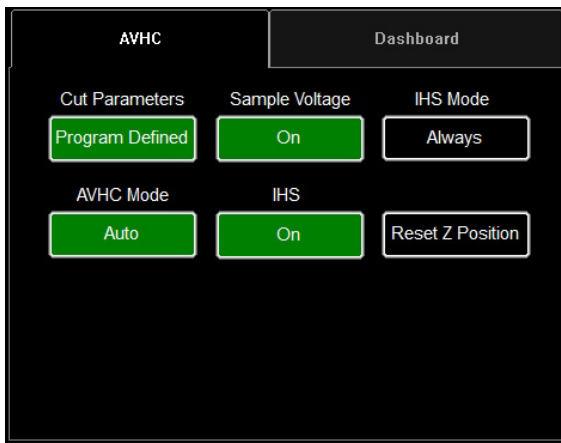
- On [with MODE: AUTO]: At the beginning of the cut the controller learns the proper Arc Voltage and maintains the desired Cut Height value entered in the CUT PARAMETERS.
- Off [with MODE: AUTO]: The AVHC will adjust based on the SET VOLTAGE and CURRENT VOLTAGE only. If the SET VOLTAGE is different than the CURRENT VOLTAGE then the lifter will adjust to account for the difference.
- On/Off [with AVHC MODE: MANUAL]: This feature is disabled.

## IHS MODE is the process used to detect the material height and how it reacts between pierces.

- Optimal: Optimal makes an initial [ohmic] material detection and utilizes a parameter based on material thickness to process another ohmic detection. This process makes the head “skip” detecting ohmic until out of that material thickness, based on that parameter.
- Always: The head will detect the material via OHMIC at every pierce.

## AVHC MODE is a toggle between MANUAL or AUTO.

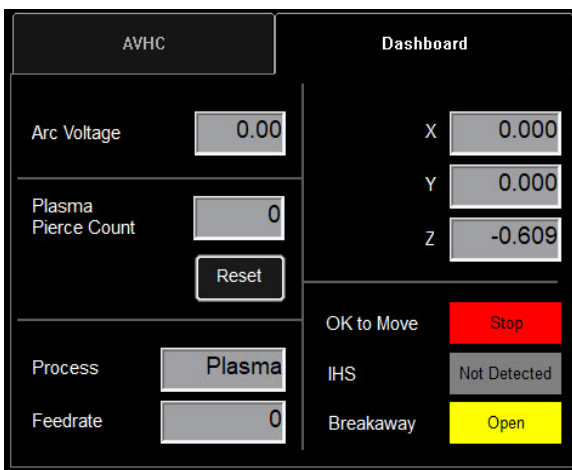
- Manual - The torch will stay at the Cut Height established at each material pierce. Will not automatically adjust the cut height during cutting.
- Auto - The torch will maintain the distance entered in CUT HEIGHT and profile the material based on the SET VOLTAGE and the CURRENT VOLTAGE being read from the plasma power supply.



**IHS (Initial Height Sense):** This setting turns OHMIC DETECTION on or off.

- **ON:** The head will detect material when the ohmic cap comes into contact with the grounded, conductive material on the table. Once detected the head will retract to the TRANSFER HEIGHT setting.
- **OFF:** The head will move to TOP OF MATERIAL setting [Plate Setup] and retract to TRANSFER HEIGHT.

**RESET Z POSITION:** Resets the Z lifter to its Zero Position by moving the head to it's upper most position.



### Dashboard:

The dashboard displays the host indicators and tools for the operator.

- **Arc Voltage:** Displays Arc Voltage feedback from the plasma during cutting.
- **Plasma Pierce Count:** This is used for keeping track of how many pierces the plasma consumables make. You will RESET every time you change the consumables.
- **Process:** This displays the current cutting process.
- **Feedrate:** This displays the overridden (actual) feedrate.
- **X, Y, Z:** This shows the torch coordinates relative to the machine space.
- **OK to Move:** Indicates when the plasma has pierced through the material and is ready to start the program.
- **IHS:** Indicates when the material is detected via OHMIC.
- **Breakaway:** Indicates if the breakaway circuit is open/ closed.

# Accessory Toggle

The accessory panel hosts the added accessories toggle buttons. These added toggle buttons are not visible unless commissioned through the OPTIONS PANEL. Below are the instructions to operate the laser pointer accessory.

## Laser Operation:

The Laser Plate Finder is intended to aid an operator at the control console to locate the approximate centerline position of the torch body on the surface of the material by projecting a red laser dot onto it. This can assist in the locating of the PLATE ORIGIN position, performing Plate Alignments, as well as performing a dry run with the laser indicating the approximate cut position of the part.

It is critical to the proper function of this attachment that the torch position be set properly and the material thickness be defined before setting program zero, performing a plate alignment, or running a program using DRY RUN with the laser enabled.

## How the Laser Works:

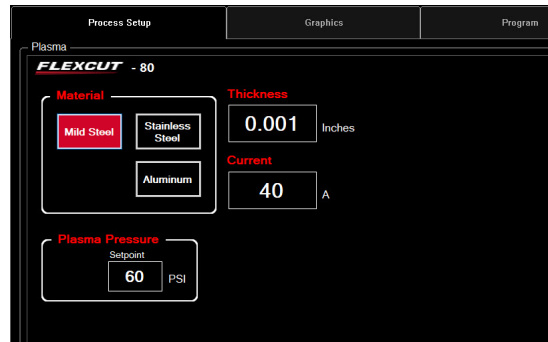
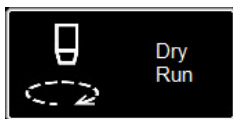
The laser is positioned at a slight angle to the torch, so that it crosses directly under its centerline. With the torch positioned properly on the machine and the material thickness entered into the system, the z axis will make a position adjustment when activated so that the projected dot will land on the surface of the material underneath the centerline of the torch.

The laser can only be activated when the system is switched to the Dry Run mode, but will automatically turn itself off when the system is set to Active Run, and a part program is executed.

### Step 1:

In the PROCESS SETUP tab, enter the thickness of material and the proper amperage.

Toggle to DRY RUN.



### Step 2:

Toggle the LASER ON. The button will display GREEN. The head will move down to the proper position and illuminate the laser.



### Step 3:

Move the head and use the indicator for setting PLATE ORIGIN, setting plate alignment, dry run a job, or for visualizing a point on the plate.

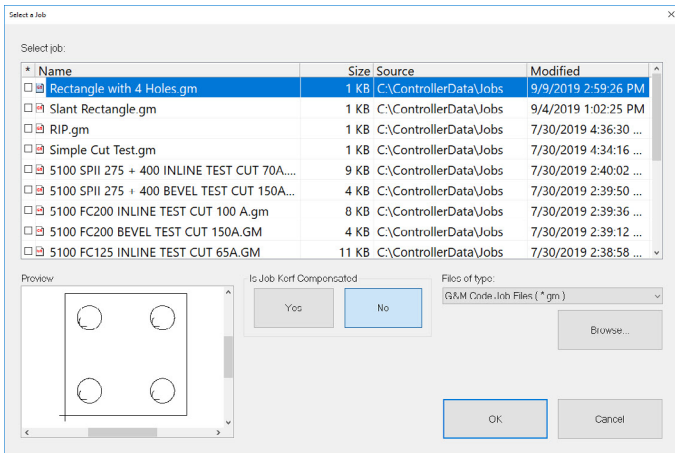
### Step 4:

Once done using the laser, toggle the laser to OFF.

By changing to ACTIVE RUN, the laser will power off automatically.







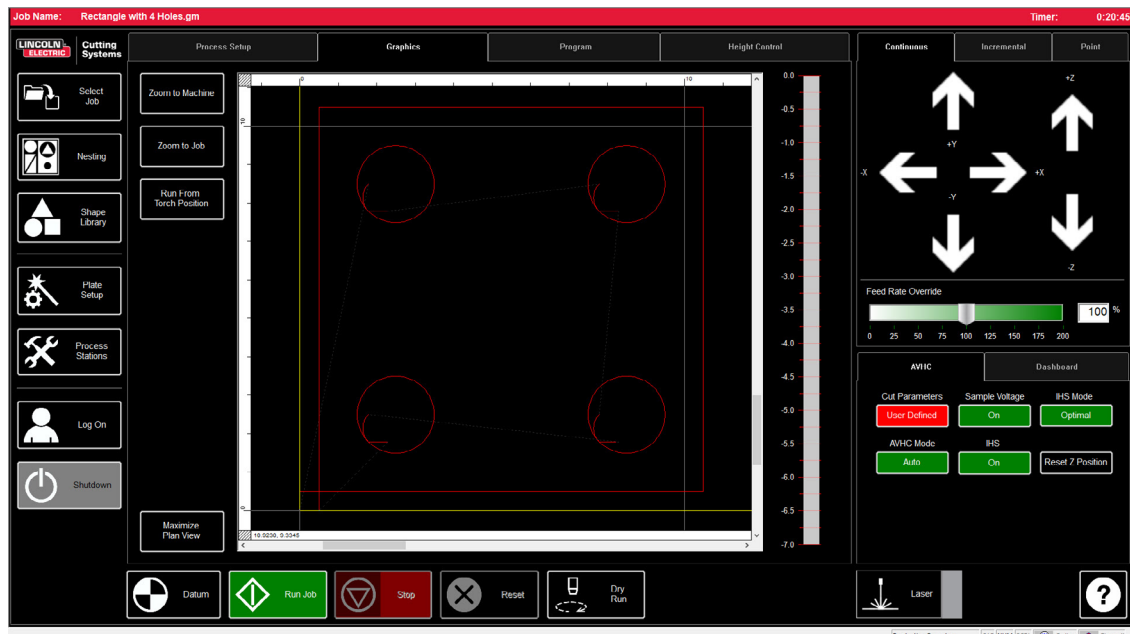
## Open Shape in VMD:

In the upper left of the screen, press SELECT JOB. This will open the Select a Job screen. Select the job from the list. If you didn't save in the JOBS folder, you will need to press BROWSE and locate your job.

IS JOB KERF COMPENSATED? The SHAPE LIBRARY parts DO NOT accommodate for KERF compensation. SELECT NO and it will add the kerf based on the material thickness to the part.

On VMDNest and TMCAD programmed jobs, SELECT YES.

Once selected, press OK. The job will display in the GRAPHICS screen.



# Running a Job

To run a job, follow the simple procedure explained below.



## Datum:

When you first start the Visual Machine Designer and are connected to the Accumove controller, the machine needs its motors powered on and MACHINE ZERO position established. A screen displays PLEASE SWITCH DRIVES ON. Press HIDE and then in the lower left corner press DATUM. The torch will travel to the limits of the machine and establish the MACHINE ZERO.



## Open a Job:

Once MACHINE ZERO has been established, it is time to open a job and get it prepared to cut. Press SELECT JOB and locate your file.



## Set your Process:

In the PROCESS SETUP tab, enter in the material thickness and amperage you are planning to cut. This will populate the CUT PARAMETERS with the appropriate settings for the thickness/amperage.

IF USING a different material thickness parameter than being cut, the outcome will not be to specification!



### Plate Setup:

Press PLATE SETUP. Use the jog keys in PLATE SETUP to move the torch body to the lower left corner of the material you are planning to cut.



Press SET PLATE ORIGIN. This establishes the PROGRAM ZERO of the program, or the ABSOLUTE X 0: Y 0 of the job.

Press CLOSE.



On the bottom of the screen, toggle to DRY RUN. Press RUN JOB. This will 'simulate' the job loaded without firing the plasma torch.

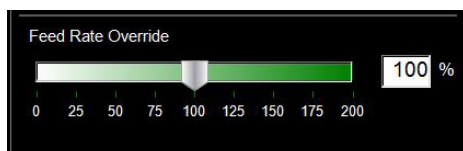
If satisfied with the Dry Run and the machine movements, toggle DRY RUN to ACTIVE RUN to cut the job loaded.



Press RUN JOB.

If you find that the machine is moving too fast for the material, you can alter the feedrate by using the FEEDRATE OVERRIDE % slider bar.

By default, the slider is set to 100%. To slow down based on percentage, move the slider to the left. To speed up the feedrate, slide past 100%.



# Cut Quality

## Line Speed Test:

The total goal is to make sure the cuts coming off of your table are the best possible. This means that there is minimal dross accumulation on the underside of your cut parts and minimal bevel on the sides.

We have provided a file to cut to verify the feed rate for the material you are planning to cut with the amperage set on the power supply. The LINE SPEED TEST is in the job list and should be run on every thickness of material at the specified amperages in the cut chart to give you a visual reference to the output. The test cut is a 3" x 4" coupon that consists of nine lines. Each line is programmed to run at different speeds to illustrate the effects that speed has on cut quality.

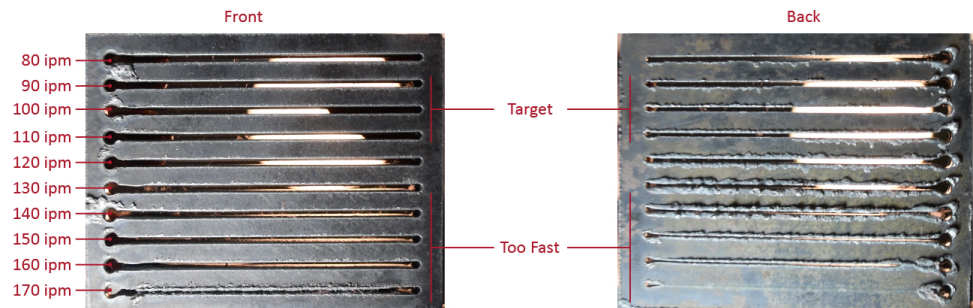
With the FEED RATE OVERRIDE % at 100, the first line cuts at 170 ipm and drops 10 ipm each line until the last line set at 80 ipm, and the outside perimeter is 100 ipm. If the FEED RATE OVERRIDE % set to 50, the lines would range from 85 to 40 with the outside at 50. In the cut chart, verify the amperage and thickness of the material. Change the PROGRAM FEEDRATE OVERRIDE % if you need the feed rates higher or lower according to the thickness of the material and amperage you are running.

- Load the LINE SPEED TEST.gm file
- Enter in the AVHC settings according to the cut chart.
- Jog the head to the bottom left corner. SET PLATE ORIGIN.
- Run the LINE SPEED TEST.

Once the test is complete there are a few things to look for. On the top of the cut you want to see a clean cut without a lot of bevel. Ideally, it has the same kerf width both on top, all the way through to the bottom.

On the backside you will observe the width of the cut and the dross accumulation. The key is the 3-4 lines that have least amount of dross. The dross should be easy to remove by picking at it. Usually the optimum speed is the high end of the three lines that are relatively clean. Straight lines will cut relatively clean but the "inside features" of your cuts will be at a lower speed because of the nature of movement and mechanics of the machine. With those three you know that the inside features will be just as clean as the straight line.

## Line Speed Test Cut:



So in this example the 110 - 90 ipm will be the best speed for this material thickness and amperage setting. Now this process will be used for every thickness of material you plan on cutting to establish the proper speed. Once established, these coupons can be used as a visual cut chart or you can use the provided sheet to document your settings.

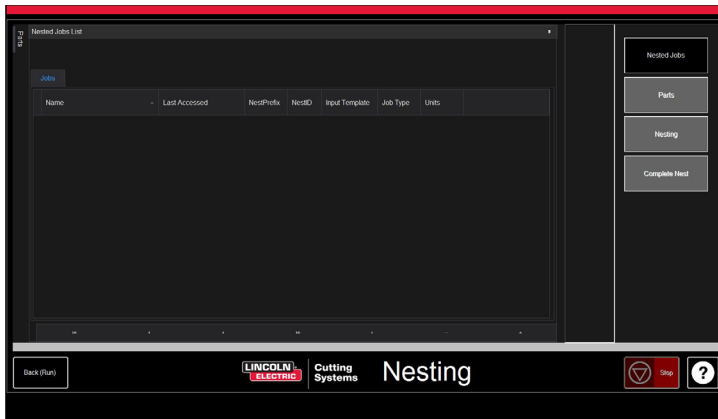
# Build Your Own Cut Chart

Use this template to create your own custom cut charts using the line speed test.

Material Thickness Type	Amperage	Cut Speed	Pierce Delay	Pierce Height	Cut Height

# Nesting

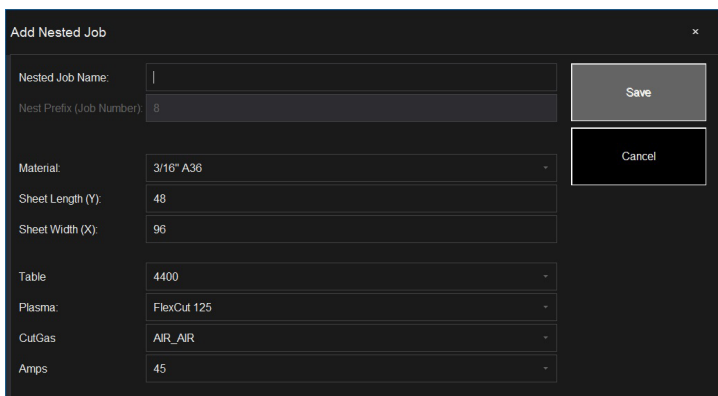
VMDNesting is an irregular parts nesting program. This allows the operator to import DXF or DWG files without the need for an offline CAM software to generate the proper G-Code. The NESTING will apply the kerf correction along with the appropriate lead-ins to all features. Also, it will generate the tightest nest available for the size of material you enter in.



Start by clicking the NESTING button and it will display the NESTED JOB LIST screen.

To start a new nest, press NESTED JOBS.

Select NEW NESTED JOB and the ADD NESTED JOB dialog opens.



In this dialog, enter a name for your nest in NESTED JOB NAME. This will become the file name of your project. Each dialog after is a drop down.

Enter the thickness of material you plan on cutting along with the size of sheet.

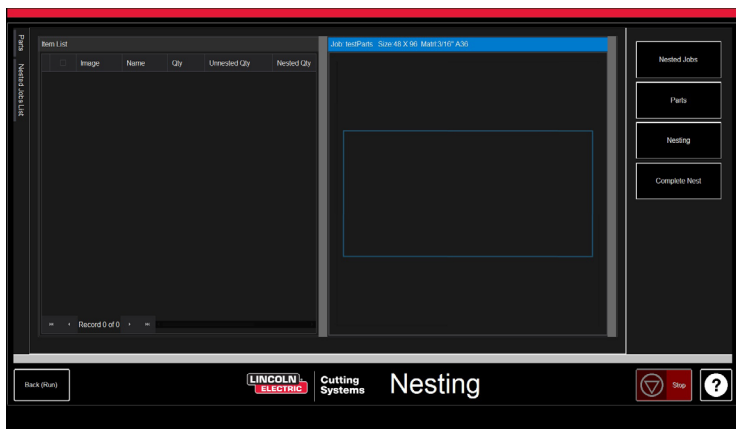
Select the table and plasma cutter you are using along with the amperage appropriate to the application, and press SAVE.



ITEM LIST will open along with the NEST LAYOUT.

To add parts, go to the right toolbar and press PARTS. This will open the parts list.

Select IMPORT CAD DRAWINGS for DXF/DWG files. This will bring up the PART SELECTOR.



## Apply Tool Paths:

At the top of the screen will be FILE TYPE, SOURCE, and DESTINATION.

**File Type:** Toggles between DXF and DWG type files.

**Source:** Location of file source (i.e. Flash Drive, Job Folder)

**Destination:** Location on where the output files will save. VMD default folder is located at C:\ControllerData\Jobs



**The two check boxes VERIFY and ARTWORK:** Verify will display the parts to look at layers and other details on the individual parts. Artwork will change the toolpaths to an ONLINE toolpath and bypass the kerf adjustments.

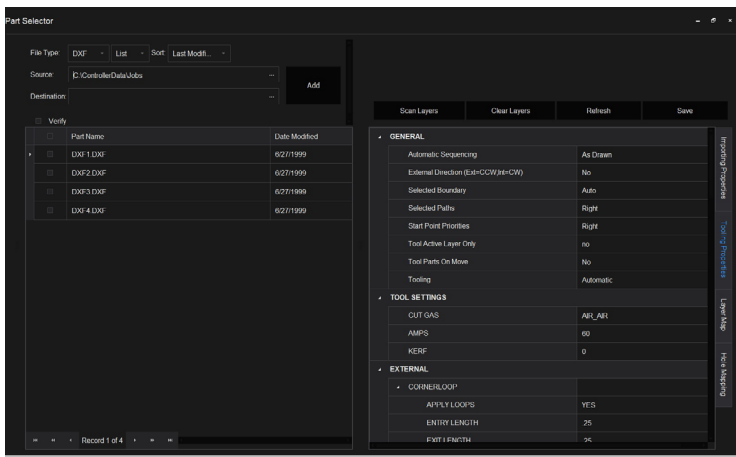
On the right, is the **JOB PROPERTIES** that will be applied to your parts when posting.

**IMPORTING PROPERTIES** holds basic changes to the POST and importing of the file.

**TOOLING PROPERTIES** holds tool pathing configuration for sequencing, kerf correction, and lead-ins.

Change this setting if you need particular lead-ins or kerf diameters.

**LAYER MAP** separates the layers present in the job. Select the appropriate process for the layers to be PLASMA, PLASMA MARKING, IGNORE.



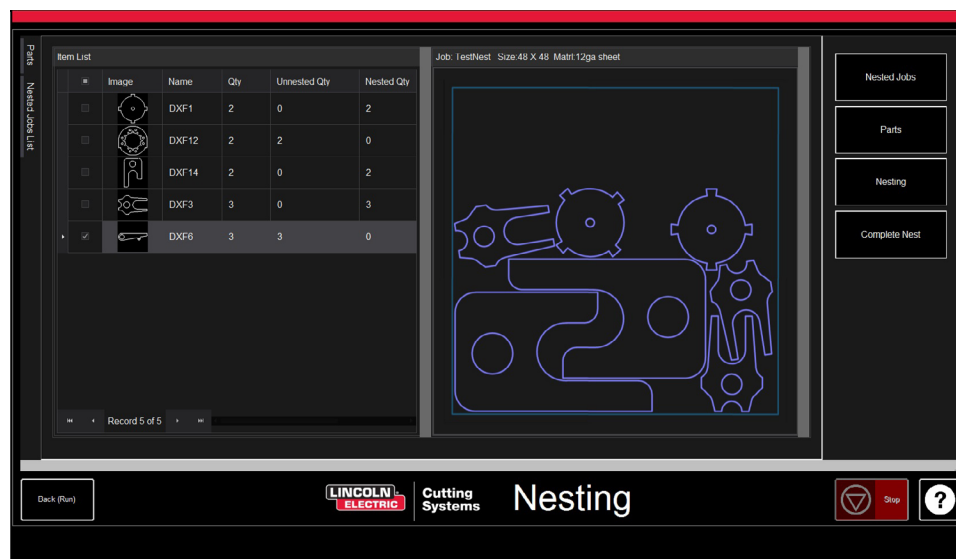


## Make Nest:



When all the parts have the proper quantity, go to the right button list and select NESTING.

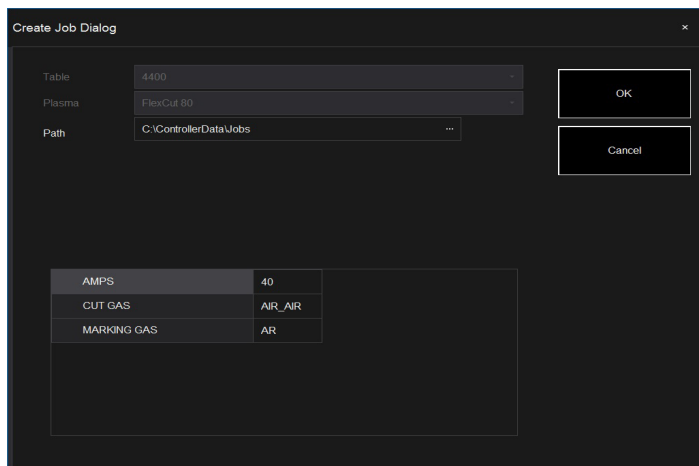
Press NEST and it will display a pop up asking for ALL or SELECTED parts. Make your selection and press OK. This will then arrange your parts into the material and display the layout in the Job screen.



## Complete Nest:



If your nest does not need editing or if it is just a single part, then in the right toolbar select COMPLETE NEST. This will open the CREATE JOB DIALOG. Enter the location you want the job to save to and verify the amperage you are cutting. Then press OK.



## Open Nest in VMD:



In the NEST screen at the bottom left, press the BACK (RUN) button and it will return you to the VMD RUN screen.

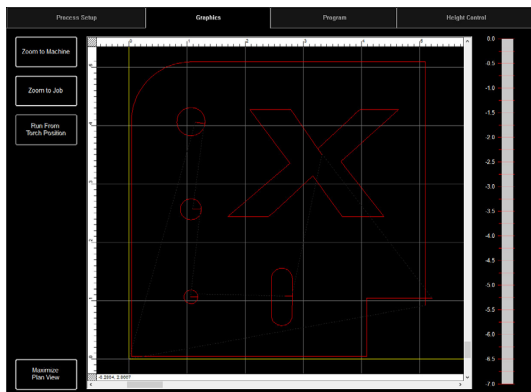
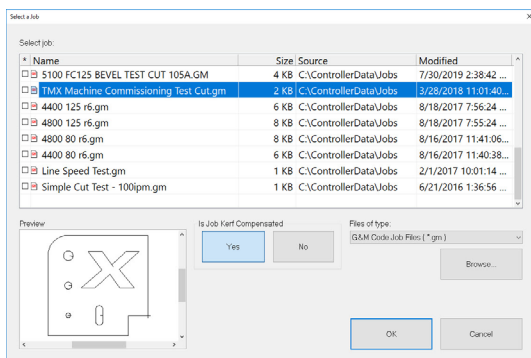
To run your nest, go to SELECT JOB and locate your file. In the AVHC tab, toggle AVHC CUT CHARTS to CHARTS. In the file, the optimum values will auto populate the CUT PARAMETERS for the material thickness and amperage set.

Process and run the file as any normal file.



# Performing Your First Test Cut

The Line Speed Test and TMX Commissioning Cut is provided to determine the proper feedrate in Inches Per Minute (IPM) to cut the material thickness to the amperage you have set on the plasma power supply. These have been included in your pre-loaded cut files on the Torchmate X models. The machine is pre-loaded with 40 amp consumables for a FlexCut 80, and 65 amp consumables for a FlexCut 125. Lincoln Electric highly suggests your first cut be the TMX Commissioning Cut to verify your machine has arrived in the same condition it left the factory. Please locate the factory test sample located in the waterbed and load a piece of 3/16" mild steel for the comparison cut test.



If you need to stop the machine at any time please hit the stop button on the touch screen.



1. Twist the ESTOP Knob 1/4 turn.

\*If a WINDOWS clock appears, swipe your finger on the monitor up. Enter 'cncop' into the password prompt. Press the arrow by the prompt.

2. Once the computer boots, it will launch into the Visual Machine Designer software.

3. Press DATUM to establish the machine.

4. In the PROCESS SETUP tab, enter the material thickness (3/16" = .188) along with the amperage on the plasma cutter. FC80 – 40amp/ FC125 – 65amp. This will populate the CUT PARAMETERS to the proper settings based off of the cut charts.

5. Press SELECT JOB.

6. Locate the TMX COMMISSIONING CUT and press OK. Since this file is tool pathed, IS KERF COMPENSATED? Select YES and press OK.

7. Press PLATE SETUP. Use the jog keys to move the torch head to the lower left of the material planning to be cut.

8. Press SET PLATE ORIGIN. This is PROGRAM ZERO (X= 0, Y=0). Press CLOSE.

9. At the top of the screen, press GRAPHICS to see the file.

10. PRESS RUN JOB (machine may throw sparks)

11. The cut will progress as follows.

1. The machine will move over to the first hole and cut.
2. All inside features will cut next.
3. Outside perimeter will cut last.

Once the file is done cutting, compare the output with the cut provided with your table to verify settings along with cut quality. Congratulations on your first cut!



TMX Commissioning Cut.gm

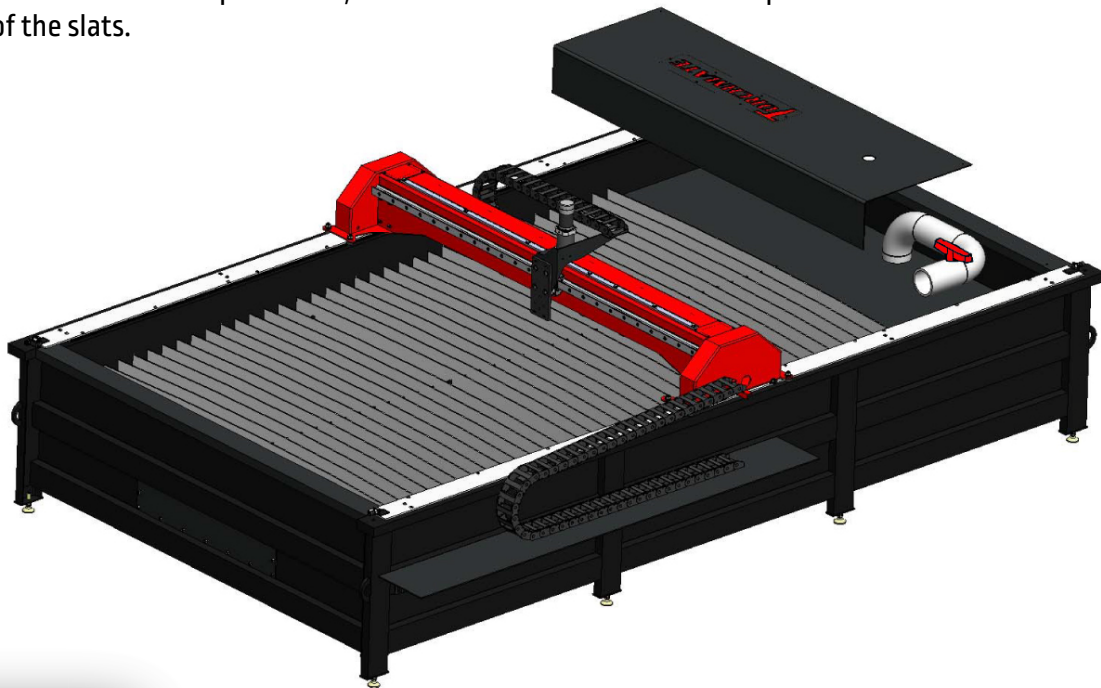
# Table Components

## Slats and Water Cutting Bed:

- Inside the table sit an array of 3/16" (4.7625mm) thickness slats that support the material being cut. After repeated cutting, generally after a year or so of repeated cutting time, you will need to replace the slats. The slats can be flipped one time before needing to be replaced. Perform the replacement when the slats can no longer support the material properly.
- The slats sit in a bed that is designed to hold water while cutting steel. Water is held in a storage tank underneath the bed and raised using compressed air.

## Filling the Table with Water:

- The 5' x 10' Water Table holds 328 gallons of water. To properly fill to the correct levels, turn the large red drain handle to the OPEN position.
- Place a hose in the bed and start to fill it.
- Monitor the drain tubes in the bed. You will turn the water off when the water level gets about 3" from the bottom of the drain tubes.
- Turn the RED HANDLE to the SHUT position and then turn the air ball valve ON. This will pressurize the bottom tank and push the water to the top chambers.
- Once all the water is at the top chamber, turn off the air valve and fill the top chamber with water until the level is at the top of the slats.

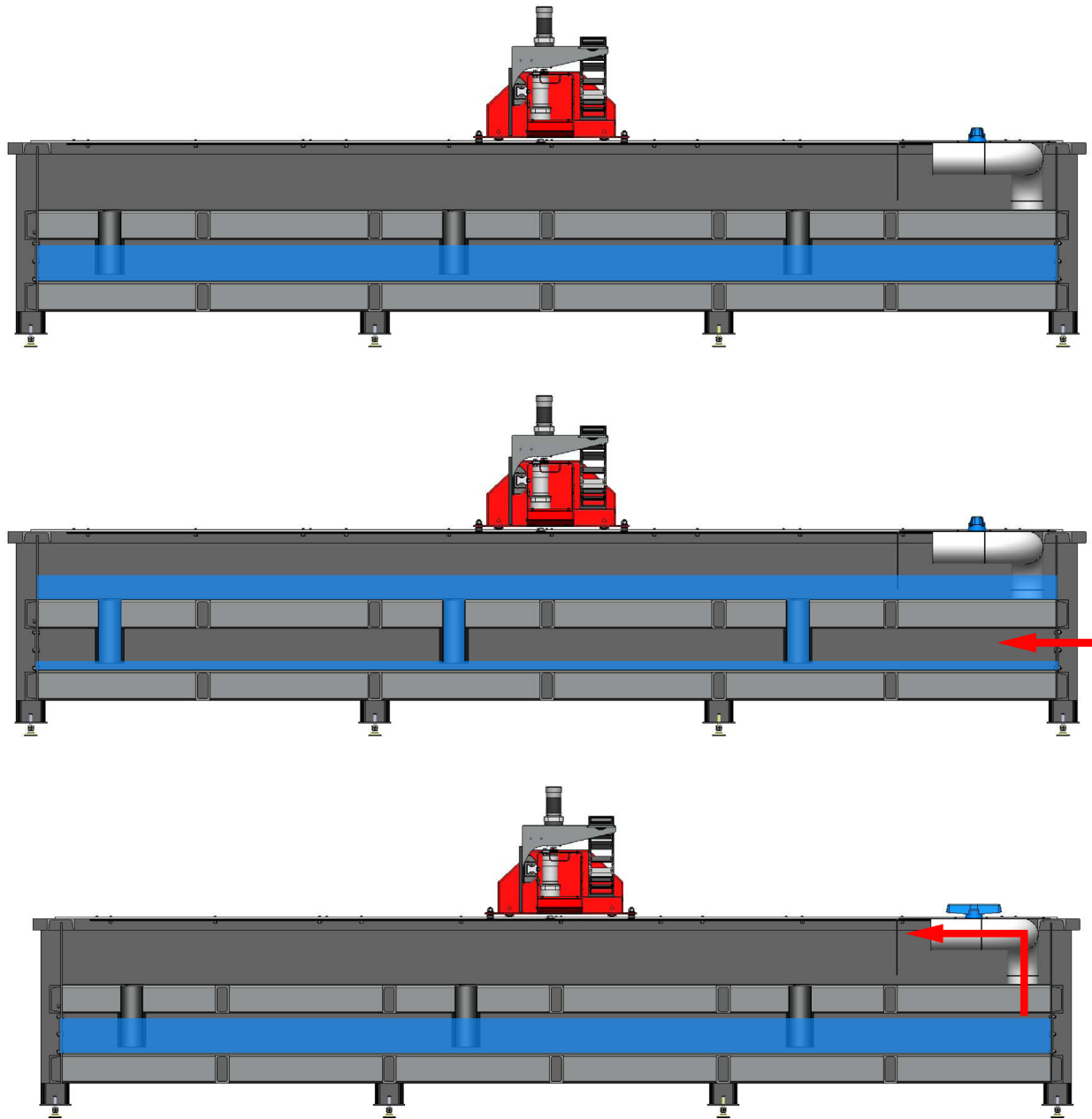


**Note:** Hydrogen gas may be formed and be trapped under aluminum work pieces when they are cut using a water table.

**DO NOT** cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.

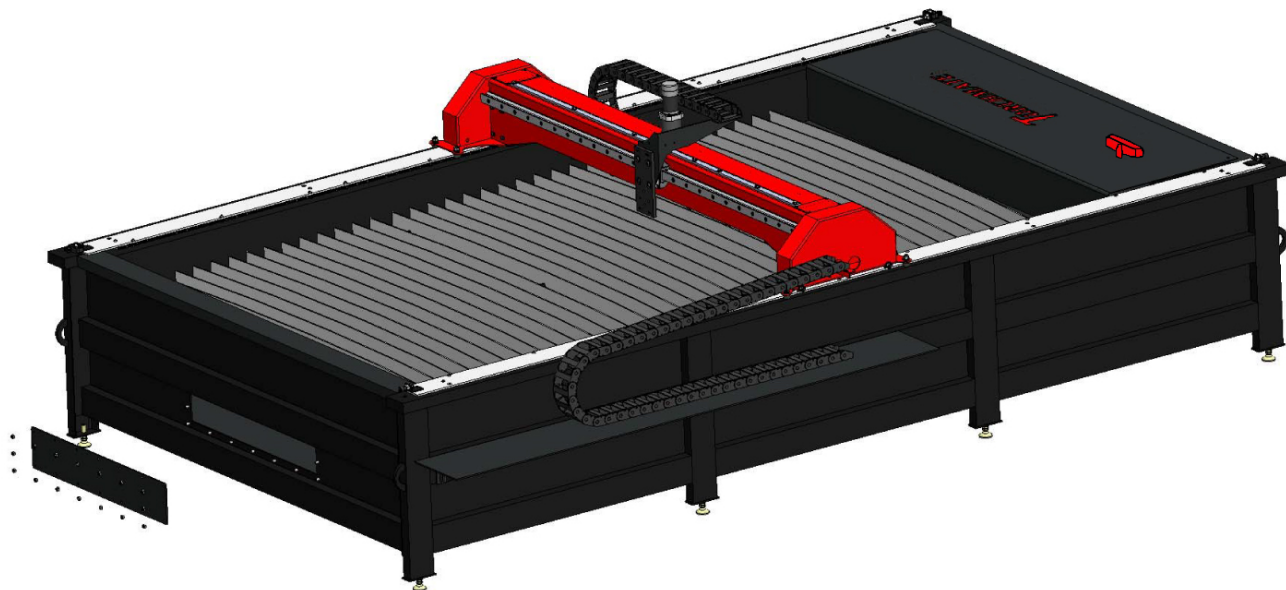
# Water Table Operation

- The Torchmate X water table uses compressed air in the lower tank to raise and lower the water level in the cutting area water bed.
- Without pressurized air in the lower tank, the water flows down to fill the tank.
- When pressurized air is forced into the lower tank, the water is forced up through channels into the cutting area water bed.
- When the water has risen to the desired level, close the air inlet valve.
- To lower the water level, open the air release valve. Water flows back into the lower tank.



### Access to the Water Holding Tank:

- Access to the lower holding tank is through two covers, one on each end of the table.
- This tank will rarely need to be accessed.
- These covers are sealed for water tightness. If you remove a cover, it will need to be re-sealed with a silicone sealant when the cover is replaced.



# General Maintenance

As with all machinery, there is required maintenance. This will cover Daily, Monthly, and 'As Needed' tasks to keep your Torchmate X table running like new.

## Daily Maintenance:

### Plasma Power Supply:

The plasma power supply and torch body will need to be evaluated between material thicknesses or prior to cutting. Remove and check if the consumables need to be changed. Apply the following to know when the consumables need to be changed:

For reference and complete maintenance on the FlexCut plasma power supplies, see your Owners Manual. For a replacement manual, please call Torchmate technical support.



**The nozzle** is the most frequently replaced consumable. A sign the nozzle needs to be changed is an excessive amount of both dross and bevel angle appearing in your cuts. On the nozzle itself, you'll find that a larger orifice or an irregularly shaped hole will be the telltale signs of excessive wear.



**The electrode:** pay close attention to the amount of Hafnium left in the tip. The larger the crater within the electrode tip, the more wear that the electrode has gone through. Replace the electrode if the center pit depth is greater than .06" (1.5 MM). Also, notice darker swirl marks near the tip of the electrode. Although these swirl marks don't have a correlation with the life of the electrode, they do indicate contaminants within the air supply, such as excessive moisture or oil.



**The shield cap:** hold it up to a light and check if any of the holes are plugged. If they are then replace the shield. These holes are the outlet for the shield gas, and when clogged, they can misshape the plasma arc which leads to imprecise cuts.



**The swirl ring** will need to be checked intermittently for clogs or cracks.



**The retaining cap** is the most durable of the consumables, and will only need to be replaced when corrosion, clogging, or cracking is physically apparent.

### Please Note:

- When not in use, we recommend removing the consumables from the torch until next time the machine is in use to help prevent corrosion building in the pins.

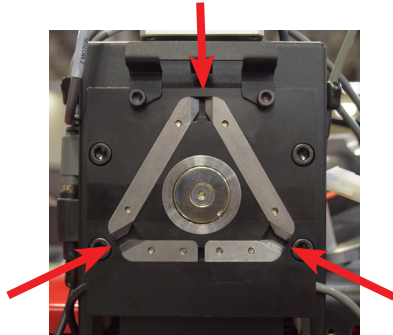


## Daily Maintenance:

### Machine:

The breakaway assembly has some uncoated parts used for the signal to be sent to the controller. Corrosion will impede the signal and prevent the breakaway from functioning properly.

To access the breakaway, move your machine to the DATUM position and then press SHUTDOWN. Remove the power to the machine for safety.



Grab the torch body and “break” it free off of the back plate. Move the safety hanger wire from the assembly to free the torch assembly from the lifter station. Place the torchbody on the top of the gantry.

The back plate should now be exposed.

Take a scour pad or wire brush and remove the surface rust from the points.

Coat the breakaway at the points in the picture with a dry silicone lubricant or light-weight machine oil and wipe off any excess product. This will help you keep your contacts clean and rust free.

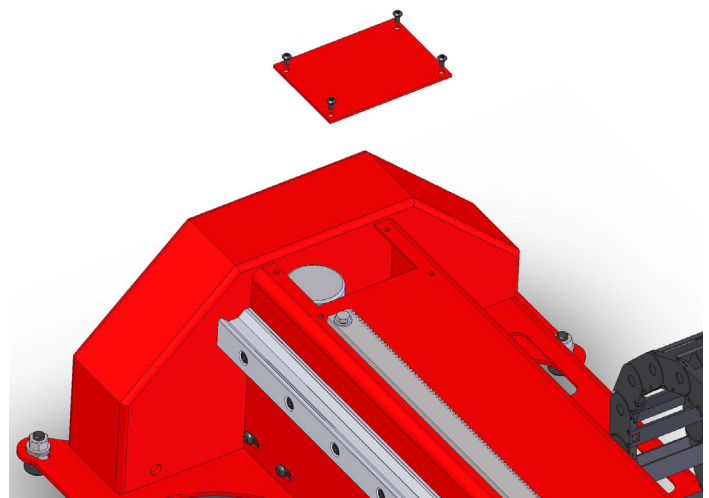
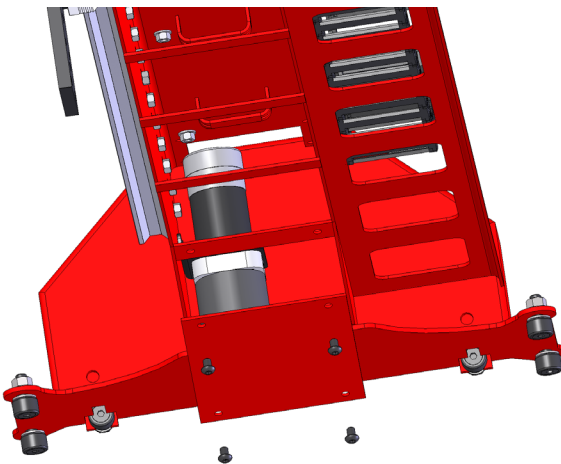
## Monthly Maintenance:

### Machine:

Regular cleaning ensures that the table runs as precisely as possible. A build up of dust can put stress on parts and cause excessive wear or lead to cutting problems.

Tight set screws ensure that motion is transferred from the motors to the gear boxes and to the gears. These set screws can loosen in transport or through normal operation of the table over time. Access the gantry drive motors through the cover on the top of the gantry and check the set screws for tightness.

Additional access to the motors and gear boxes that drive the gantry can be found behind two plates that block blow back from reaching the motor assemblies. These plates can be removed for cleaning or to access the motor assembly. It is best not to cut with these plates removed as damage to the motors or gear boxes can occur.

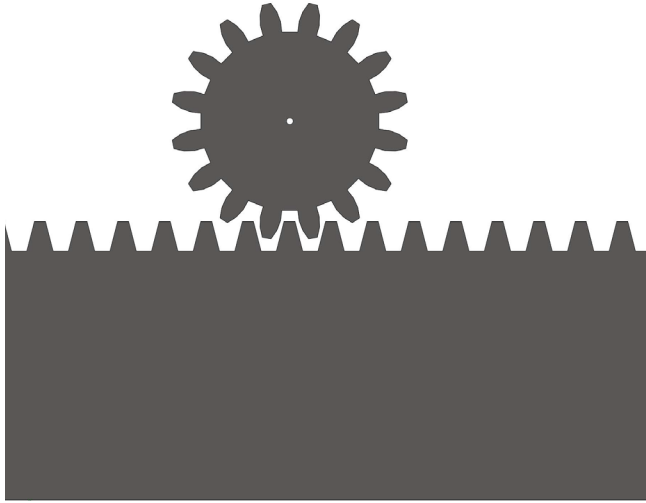


### Gear Spacing:

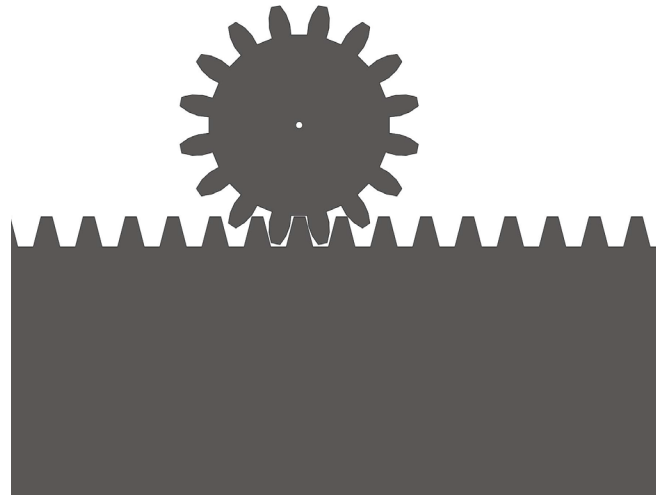
Gear spacing is important to achieving the correct movement of the machine.

If the gear is too far out of the gear rack, there will be excessive backlash. This backlash will result in poor direction changes, because the motor's motion does not fully translate into machine motion.

Set the gears so they fully engage the gear rack. Normally, a paper's thickness of 0.004" (0.1 mm) between the gear and rack is sufficient clearance.



**Incorrect**



**Correct**

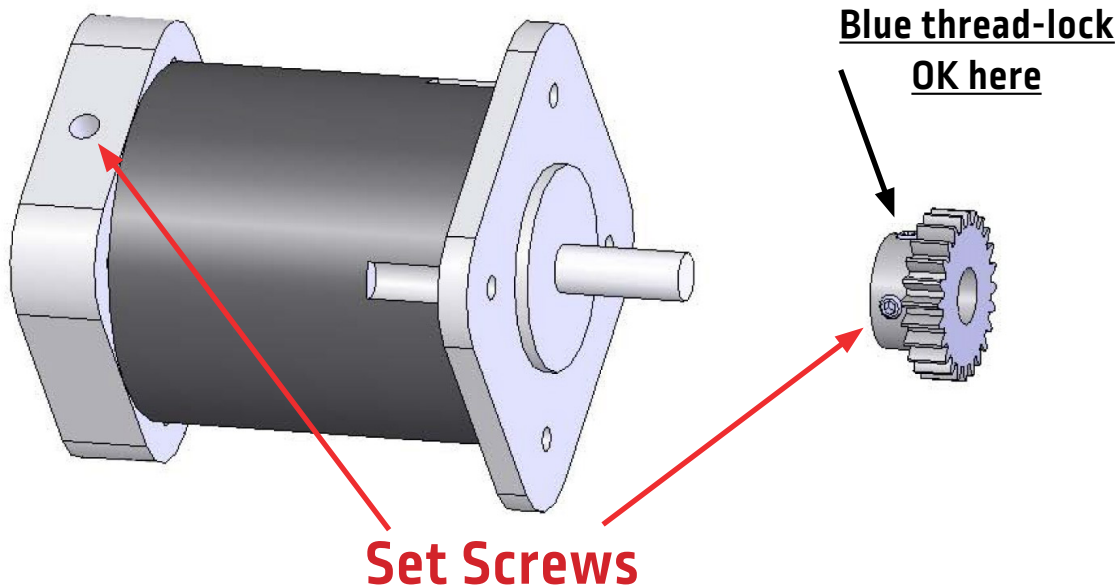
### Loose Set Screws:

If the table is going out of square, or if the motion is not consistent, there may be a loose set screw.

Set screws in the spur gear and gear box ensure that motion from one component is properly carried to the other components.

Check the tightness of all set screws to ensure that the table moves correctly.

Blue thread-lock may be applied to the spur gear set screws, but never to the gear-box set screws.





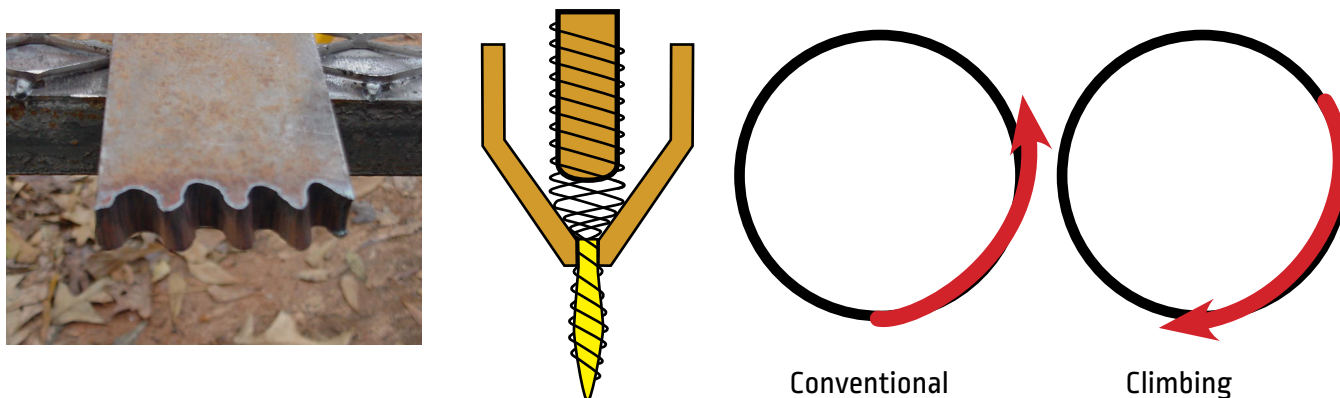
# Cut Quality

Beveled edges are caused by the motion of the plasma gas as it is emitted from the nozzle. In plasma cutting, it is unavoidable. A high-definition plasma cutter produces less bevel than a standard cutter.

Torch height, air pressure, air quality, cut direction, and consumable condition all influence bevel.

In plasma arcs used for cutting, the gas forms into a vortex. Because of this, the arc has a direction of rotation, which causes one side of the cut to have more bevel than the other side. To reduce the bevel on the part, the proper direction of travel must be used.

The direction of cuts are referred to as “conventional” and “climbing”. In a conventional cut, the torch will go counter-clockwise on outside cuts and clockwise on inside cuts. A climbing cut is the opposite, and the best bevel is achieved by using a climbing cut. The best bevel is to the right of the direction of travel.



Corners can have more bevel than a normal cut. This is caused when the machine slows down for the direction change. A lower amperage in some cases allows for slower travel speeds and reduces “slowdown” bevel through corners.

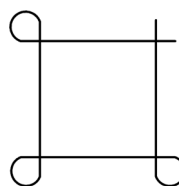
Sharp corners can be achieved by cutting a larger shape that puts the slow down and acceleration of the machine into a scrap area. This cut is used more often on thicker materials, where the corner bevel is increased dramatically.

Replace consumables regularly to reduce bevel. A worn tip or one with slag buildup can redirect air flow causing random bevel and varying cut quality. Always check consumables when troubleshooting bevel.

One of the easiest ways to reduce bevel is by cutting at the proper speed and height for the material and amperage. Air that is clean, dry, and at a constant pressure can also decrease bevel.

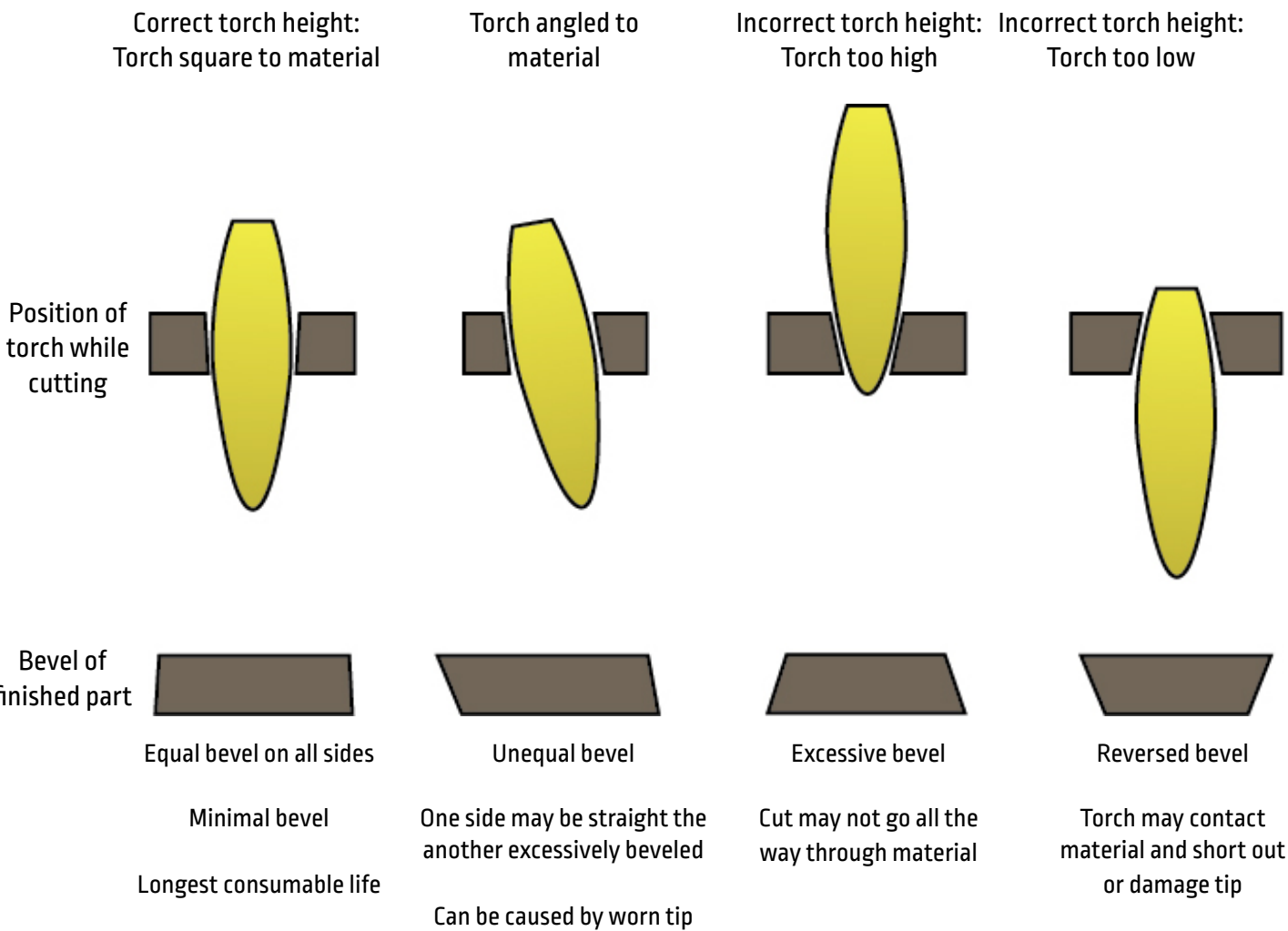


Beveled Edge



Corner Loops

How Torch Position Affects Bevel:



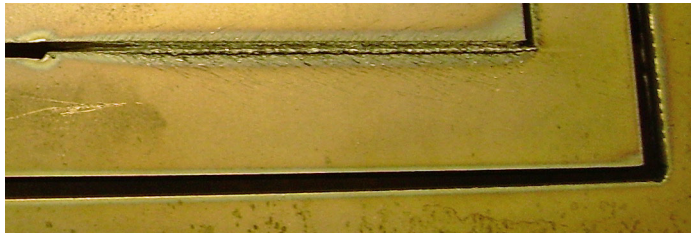
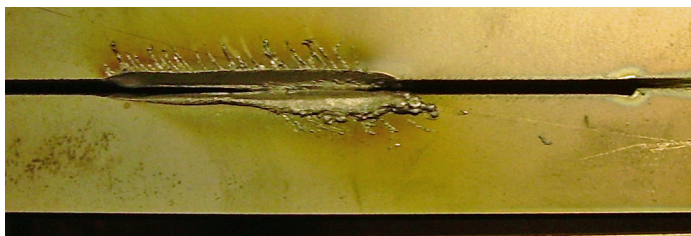
## What Causes Bad Cuts:

Instances where the metal was not fully cut indicate a few problems:

1. Ground clamp is not properly attached to the material
2. Air pressure drop or surge
3. Moisture in the air line
4. Drop in power
5. Contact with the material by the torch - most plasma cutters go into a low power mode on contacting the material, causing the cut to not fully penetrate the material.

When the machine begins to move before a pierce is completed, the cut will not complete. In this case, the dwell time or pierce delay must be adjusted to allow for enough time to pierce the material.

When a cut's path does not return to the starting point, there may be mechanical slipping or binding. In some cases, it will be clear which axis is losing position. Examine the particular axis for build up or obstructions that can cause binding.



# Basic Troubleshooting

## Machine Faults:

Problem	Solution
One motor will not engage when DATUM the machine.	LOG ON as ADMIN. Reload your configuration. Press OK. DATUM machine. If the issue still persists, contact Customer Support.
Binding of the gantry when running parts	Validate the gear mesh between the gear box and gear rack. Check for debris or buildup on the gear rack. Clean if necessary.  If the issue still persists, contact Customer Support.
Cuts are not coming out square or degraded cut quality	Check consumables in the Plasma torch along with the settings from the cut chart. Check the torch is square to the material on the table. Follow the CUT QUALITY section pg. 29

## Laser Faults:

Problem	Solution
An error message occurs when attempting to turn the Laser on stating "The laser cannot be activated in Active Run"	Toggle the system to Dry Run mode.
The laser does not appear to be landing where the centerline of the torch would be on the material	Reset the Z axis. If a larger error is reported, the laser position would be off. Enter the material thickness decimal equivalent, and turn the laser off and back on again.

## Software Faults:

Problem	Solution
During an Initial Height Sensing routine, the Ohmic Light does not indicate a Yellow Detected status when the torch contacts the material.	<p>Check to make sure the Orange Ohmic Wire is connected to the ohmic clip. Validate the clip is contacting the shield.</p> <p>Check that the material surface is free of rust or corrosion that may inhibit an electrical contact with the shield.</p> <p>See Ohmic Troubleshooting Guide.</p>
During an Initial Height Sensing routine, the torch does not come down and sense the material, but rather fires the torch in the air.	<p>Remove the retaining cap from the torch body and inspect/clean consumables for any debris, replace once cleaned.</p> <p>Verify under Job Setup the TOP OF MATERIAL has the proper thickness of material entered in.</p>
Error "IHS Failure: Check VFC Ground"	<p>Check to make sure the Orange Ohmic Wire is connected to the ohmic clip. Validate the clip is contacting the shield.</p> <p>Check that the material surface is free of rust or corrosion that may inhibit an electrical contact with the shield.</p> <p>See Ohmic Troubleshooting Guide.</p>
Error "IHS Failure: Clear slag from consumables" With the torch not contacting the material surface.	<p>Remove the retaining cap from the torch body and inspect/clean consumables for any debris, replace once cleaned.</p> <p>Replace the consumables with new items, including the retaining cap.</p> <p>Check Orange Ohmic wire for Short to Ground.</p>
Torch pierces the material, but no motion occurs.	<p>Check g-code programmed feed rate, and feedrate override percentage value for proper settings.</p> <p>Check that the torch has enough material at the pierce point that the plasma can establish a full power cutting arc.</p> <p>Check that the Aux Input Cable is plugged into the back of the Accumove Controller.</p>

## Software Faults (Cont.):

Problem	Solution
During the initial cut movement, the torch shield comes into contact with the material stopping the machine.	<p>Check that the Cut height is set at the correct value.</p> <p>Check that the AVHC Auto/Manual mode is set to Auto.</p> <p>Check that the Sample Voltage mode is set to ON.</p> <p>Check if at the point of stopping the machine crossed into another previous cut, or collided with another previous cut.</p>
During cutting, the torch retracts far enough away from the material the arc is stretched or extinguished.	<p>Check that the Cut height is set at the correct value.</p> <p>Check that the AVHC Auto/Manual mode is set to Auto.</p> <p>Check that the Sample Voltage mode is set to ON.</p> <p>Verify Raw Arc Voltage connection to VFC box and Plasma Cutter.</p>
The torch traces the part out but does not fire.	<p>Check that the Dry Run/Active Run button says Active Run.</p> <p>If OK to Move is disabled, check Plasma Power Supply for errors.</p> <p>Verify that the g-code has M64/M65 in the code. If not then the POST isn't configured correctly in the TMCAD.</p>
The torch stays firing between cuts, and the job preview shows solid red lines for all of the machine's motions.	When in the Torchmate CAD/CAM software, check that the Machine Output screen has the Device set to Accumove Imperial and the Tool set to Multi-Tool.
VMD screen displays an "Accumove Controller Not Connected" screen for more than 30 seconds.	<p>Close the VMD software completely, shut off the Accumove controller for at least 30 seconds.</p> <p>Then power on the Accumove controller, wait another 30 seconds and open the VMD software</p> <p>Check the Red Ethernet cable is plugged into the computer and the Accumove controller. Also verify that the red Ethernet cable is plugged into the right or outermost port on Accumove 2 controllers</p>



## Software Faults (Cont.):

Problem	Solution
The Breakaway Indicator shows as Yellow and Not Connected, even though the torch is in the correct position.	<p>Check that the breakaway capture leash and any debris on the magnet are not keeping the torch from sitting fully in position.</p> <p>Check contact points for any signs of corrosion, clean and oil to keep the breakaway functioning normally.</p> <p>Verify the Breakaway cable is connected at the breakaway, and at the back of the Accumove Controller, re-seat if necessary.</p>
When attempting to Datum the machine, the machine runs into the hard stops making a loud grinding noise.	<p>Verify that the Input harness is plugged in fully on the back of the Controller [Accumove 2]</p> <p>Verify the Limit Switch input cable is screwed in fully on the back of the controller [Accumove 3]</p>
The torch does not retract off the material when moving between cuts, but the torch does shut off.	<p>Jog the Z axis all the way to the top of its travel and click Reset Z, then click Run Job.</p> <p>Verify that the Retract Height value is set to the desired retract distance in between cuts.</p>
Part way through a program a Limit Exceeded in X or Y axis occurs.	<p>When executing a program the system will determine whether or not the next line of g-code keeps the machine within its normal operating envelope. If this message is occurring, the program is too large to fit on the machine based on its current program zero position.</p> <p>Verify Program Zero position Use the View panel to verify the part is extending beyond the machine limits, and adjust zero position and/or program accordingly</p>
Torch fires at the material, but does not pierce fully through it, no motion occurs.	<p>Verify plasma cutter work lead connection to the machine.</p> <p>Verify material is contacting the slat supports and nothing is electrically hindering that connection.</p> <p>Verify Pierce Height is at recommended values and not any higher both in the settings and visually at the machine.</p>

## Software Faults (Cont.):

Problem	Solution
When opening the VMD software a “Language Deserialization Error” appears.	<p>Verify that the windows installation is using the language package English (US).</p> <p>Verify that the user has full administrative rights to the local computer.</p> <p>Verify the .NET 3.5 Framework is enabled under Windows Features, both HTML Activation and Non-HTML Activation.</p>
The controller won’t turn on (Accumove 3).	<p>Disengage the E-STOP</p> <p>Verify the power cable is plugged in.</p> <p>Verify the fuse on the back power port is in intact</p> <p>Verify the Voltage Selector switch is set to the proper 110v or 220v incoming power.</p>
VMD screen displays a “Please update the firmware” error message.	<p>The firmware currently uploaded to the controller is not the matching version for that software.</p> <p>Log in as an Admin (password 1234) and load the firmware under the Machine Settings - Advanced tab, follow the on-screen instructions</p> <p>After FIRMWARE is complete, go to BASIC tab and press FACTORY RESET.</p>



## Software Faults (Cont.):

Problem	Solution
One of the machine's motors is not moving when attempting to Datum or Jog the machine	<p>Power down the Accumove controller and verify all motor cable connections are fully seated on the back of the Accumove controller, as well as at each motor.</p> <p>Power up the Accumove controller and after 30 seconds open the VMD software. Log in as an Admin, go to the Machine Settings button and then choose Load Configuration. Choose the appropriate configuration file for your machine and click OK. Restart the controller and VMD software</p>
Job displays rotated or angled on the Job Plan screen.	<p>Verify that the plate is aligned properly by setting program zero at the lower left corner, then choosing Align Corner, jog the Y axis Positive a small amount, and clicking Align Edge. The machine will return to the program zero position. Return to Select Job and reopen the job.</p> <p>If the part displays incorrectly the issue is present in the g-code file itself and it must be recreated correctly</p>
Error occurs "Execution Error Overtravel Detected" when clicking the Run Job button.	<p>Verify that all home and limit switches are not depressed (TMX table Only).</p> <p>If operating near the extents of the machine, reset program zero and material further away from machine extents.</p>
Error occurs "Limit Exceed in Z-axis" when running a job.	<p>Jog the Z axis all the way to the top of its travel, and click Reset Z, then click Run Job to continue.</p> <p>If indicator for Ohmic detection comes on when clicking Run Job briefly before the error is displayed, remove and clear consumables of any debris.</p>
Torch does not purge air or fire after completing an Ohmic Sense, the Stop button is illuminated and the Plasma indicator light is lit up green on the VMD Dashboard.	<p>Check FlexCut power supply for error codes on the front panel.</p> <p>Verify that the CNC interface cable is plugged into the FlexCut Power Supply, and to the Accumove controller &amp; VFC box.</p>

## Software Faults (Cont.):

Problem	Solution
Torch retracts fully to the top after sensing the material in an ohmic sense, and the Run Job button becomes available to click.	<p>Clear the surface of the material of any corrosion that would hinder the ohmic sensing process.</p> <p>Verify the torch lead is not getting pulled tight on the way down to the surface of the material.</p> <p>Check for the torch pushing against the material deflecting it before stopping and retracting.</p>
<p>Torch collides with the material after 1" of cut.</p> <p>The torch is cutting too high from the material.</p>	<p>Verify Pierce and Cut height are at recommended book values.</p> <p>Verify the height control mode is set to Auto and not Manual.</p> <p>Verify the Sample Voltage function is turned ON.</p> <p>Check for part tip-ups near the piercing points that may interfere with the torch sensing the materials height.</p>
Torch does not appear to maintain a consistent cut height with the material as it warps.	<p>Verify the height control mode is set to Auto and not Manual.</p> <p>Verify the Sample Voltage function is turned ON.</p> <p>If the part involves very complex geometry, the system may be in a Lockout Mode for extended periods of time.</p> <p>Login as Admin, go to Machine Settings, and on the Basic tab change the Distance to Corner value to .250.</p>



# Customer Assistance Policy

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric Cutting Systems for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric Cutting Systems is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric Cutting Systems is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric Cutting Systems is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric Cutting Systems affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to [www.torchmate.com](http://www.torchmate.com) for any updated information.