LINCOLN ELECTRIC | Cutting Systems

TORCHMATE®
4400 | 4800

USER GUIDE

August 15, 2018

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Lincoln Electric Cutting Systems

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Unpacking your new machine

Your new Torchmate® 4400 or 4800 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® 775-673-2200 to report any shipping damages. Your machine was fully tested at the factory and a cut metal sample can be found in the waterbed of the machine.

☑	Qty.	Description	Part Number
	1	Lincoln Electric 4400 Torchmate CNC Table with FlexCut™ 80 Plasma Unit	LECS-080-4400-00
	1	Lincoln Electric 4400 Torchmate CNC Table with FlexCut™ 125 Plasma Unit	LECS-125-4400-00
	1	Lincoln Electric 4800 Torchmate CNC Table with FlexCut™ 80 Plasma Unit	LECS-080-4800-00
	1	Lincoln Electric 4800 Torchmate CNC Table with FlexCut™ 125 Plasma Unit	LECS-125-4800-00
	1	Touchscreen Monitor and Computer (installed)	
	1	Consumable Starter Package (LC100/LC125)	BK12849-SK / K4302
		TM-CAD/CAM and Security dongle preinstalled	
		Black/Silver Instructional Flash Drive	

To uncrate your new Torchmate 4400/4800, pry the top of the crate off or remove the ghost frame, remove the sides and set it aside. Remove the shrink wrap and inspect the machine for damage. **If damaged, do not accept the shipment!**

Upon acceptance of the shipment, cut the plastic straps holding the plasma power supply to the crate. The plasma power supply weights (75lbs+) and requires a team lift to move it. Set the plasma power supply aside until final machine placement.

A forklift is required to place the machine in its operational position. Do not lift the machine from the gantry or cable carrier side. Place forks in locations marked "fork here" being careful not to hit the motion controller with the forks. Once the machine is in position level the table using the adjustable feet.

Make sure the table does not rock.
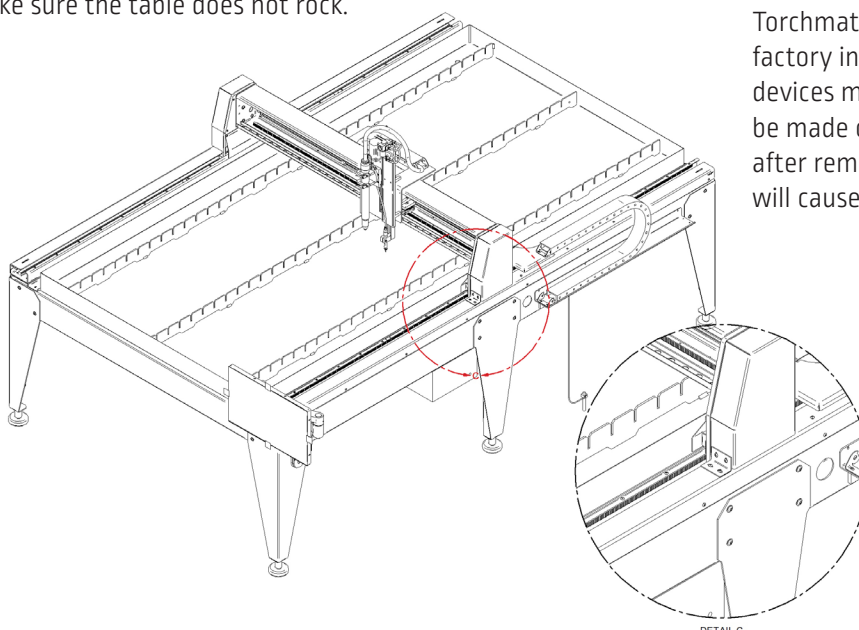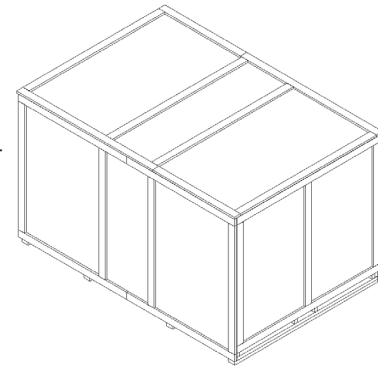
Torchmate 4400-4800 models are shipped with a factory installed Gantry locks. The yellow locking devices must be removed before the machine can be made operational. DO NOT replace the bolts after removing the yellow locking devices as this will cause irreversible damage to the gantry.

Do Not Fork Lift From Cable Carrier Side Of Machine!

DETAIL C

Technical Support | On-site Service

Lincoln Electric Cutting Systems provides a number of technical support opportunities with the purchase of your new 4400 or 4800 Torchmate 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, 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.

- **Email**

Lincoln Electric will return emails to the support@Torchmate.com email 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 University**

Lincoln Electric maintains a number of operational training resources at http://torchmate.com/university

- **Torchmate YouTube Channel:**

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

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

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 (continued)

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.

Limitation of liability

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.

Disclaimer of consequential damages

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.

Acceptance and transportation

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.

Title and risk of loss

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.

General conditions

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.

Severability

Safety First

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 on your part.

> ## WARNING
>
> DO NOT INSTALL, OPERATE, OR REPAIR THIS EQUIPMENT WITHOUT READING THE SAFETY WARN-INGS CONTAINED THROUGHOUT THIS MANUAL. <u>Think</u> before you act— and be careful.

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. I 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.

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.

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-l, "Precautions for Safe Handling of Compressed Gases in Cylinders,"available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

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.

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 gases, and ventilation.

- When preparing to install the Lincoln Electric CNC Cutting System, provide sufficient space. Three feet of work space (914 mm) should be obsta cle 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 10 feet.

4800

74"

114"

Load From This Side

TORCHMATE 4800

MAINTAIN WORK AREA

Power Supply
Air Supply
Provided by Other

Plasma Machine
Under Table

Earth Ground
Provided by Other

Motion Control
Under Table

Operator Console

4400

74"

67"

Load From This Side

TORCHMATE 4400

MAINTAIN WORK AREA

Plasma Machine
Under Table

Power Supply
Air Supply
Provided by Other

Earth Ground
Provided by Other

Motion Control
Under Table

Operator Console

User Guide

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.**

Use 12 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 12 AWG cable from the "star" ground to a dedicated earth-ground rod
Ground rod installations are covered by NEC Section 250.

Replace the plasma unit into the appropriate location. Re-install the power lead and the table ground into the front of the machine.

The FlexCut plasma unit is shipped with a factory ground attached to the star ground. In addition a work ground is attached to the star ground to connect to your material to be cut. If the work piece is painted or dirty it may be necessary to expose the bare metal to make a good electrical connection.

Earth Ground Rod is not included with machine

DETAIL C

DETAIL D

DETAIL A

DETAIL B
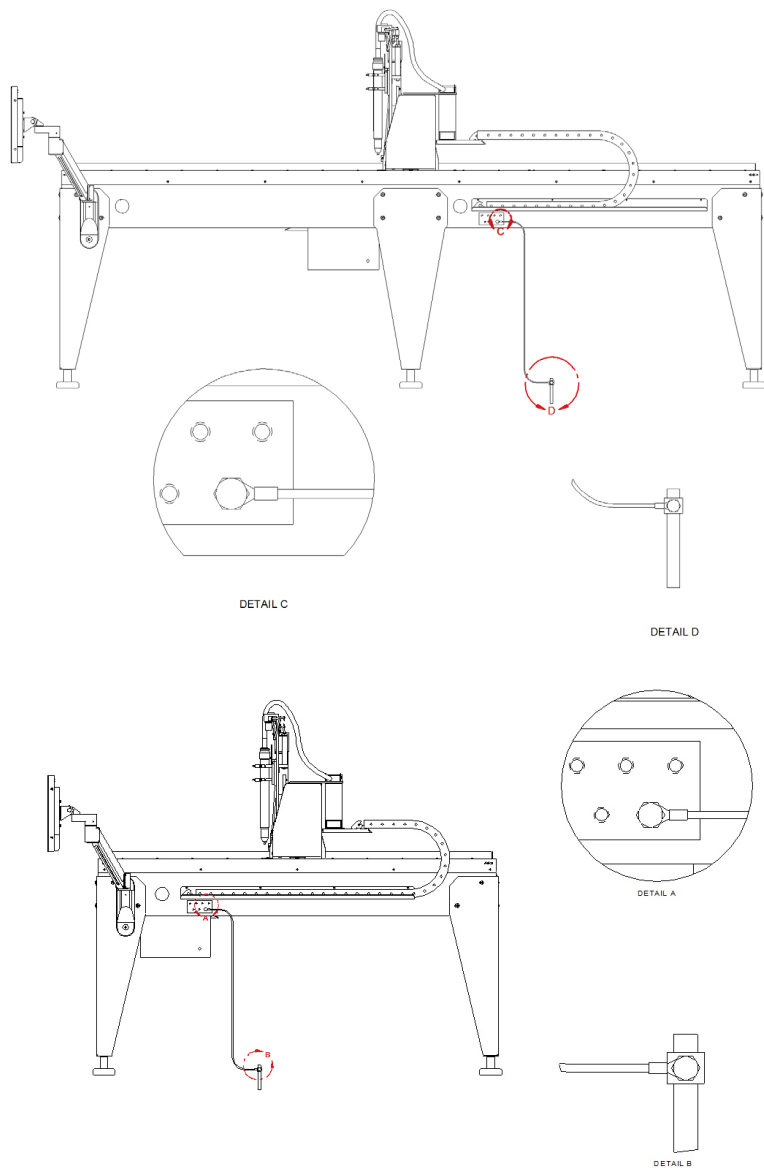
Power/Air/Water Requirements and Installation

Please refer to the FlexCut operators manual for a complete installation and operation guidelines. Only a qualified electrician should connect the input leads to the Torchmate 4400-4800 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 Torchmate 4400-4800.

TO ACCUMOVE

TO FLEXCUT 80   TO FLEXCUT 80   TO FLEXCUT 80
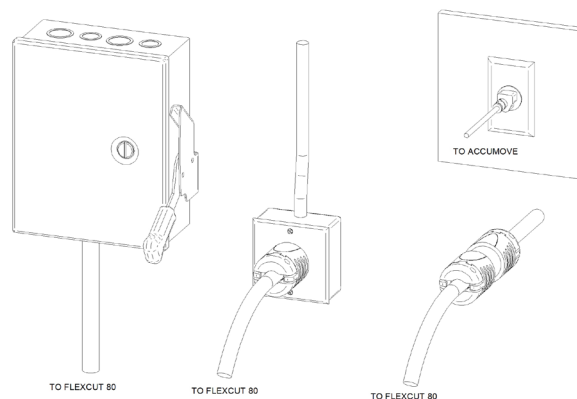
The Torchmate 4400-4800 CNC machine requires a clean, dry, oil-free compressed air or nitrogen. A high pressure regulator MUST be used with a compressor or high pressure cylinder.

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 such as non sodium 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
· 4400 models hold approximately 60 gals or 230 liters.
· 4800 models hold approximately 107 gals or 405 liters.

FlexCut 80 Plasma Controls and 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; during this test all of the LEDs on the Control Panel 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 Cutter Consumable Use

Please refer to the FlexCut operators manual for a complete installation and operation guidelines. Do not over tighten 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	17.9 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 and 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; during this test all of the LEDs on the Control Panel 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
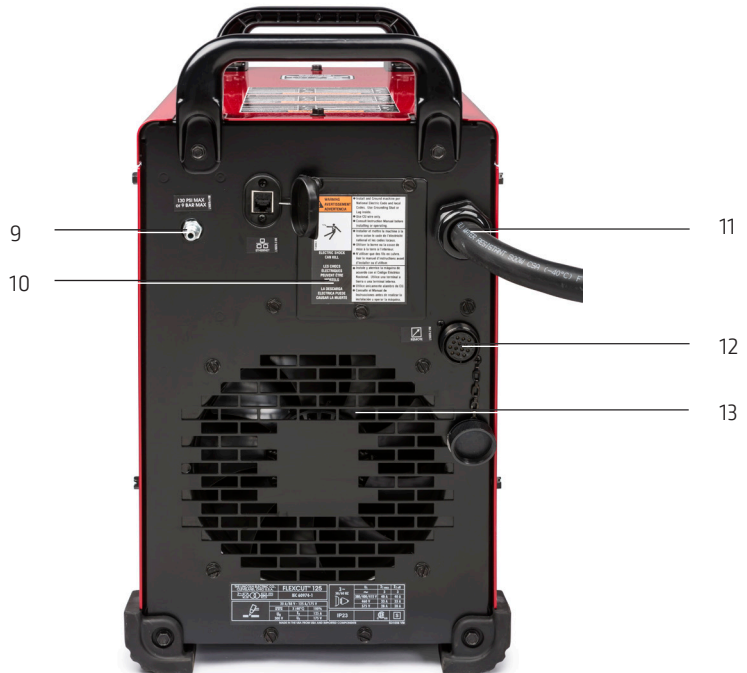
FlexCut 125 Plasma Cutter Consumable Use

Please refer to the FlexCut operators manual for a complete installation and operation guidelines. Do not over tighten 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)

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 4400-4800

To power up your Torchmate 4400-4800 CNC machine, the following items need to be powered up; Monitor, CPU, Motion Control, and Plasma Unit. The Monitor power button is located on the bottom right of the monitor easle of the touchscreen monitor. The CPU power is located behind the touchscreen monitor on the CPU. The Motion Control is located under the table below the cable carrier. The plasma unit power switch is located on the back of the unit near the power cord. To power up the Torchmate 4400-4800 CNC machine please follow the instruction below. The complete user guide is available as an embedded file in the VMD. Use the button with the question mark to access this file.

1. Power up motion control, CPU and touch screen monitor.
2. The VMD application will start up automatically with the computer.
3. Press DATUM. (Machine will seek lower left corner)
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 the material you will be cutting. Cut charts are available in the FlexCut manual. (page B-11 in the FlexCut manual) Verify air pressure is correct per manual.
5. Jog the torch to the lower left corner of the material you are going to cut. Press SET PROGRAM ZERO.
6. Press GO TO PROGRAM ZERO. The head should return to the top of the lifter.

Lower Left Corner

1

2

3

4

5

6

To JOG machine press and swipe your finger in the direction you wish to JOG.

Make Sure You Clamp the Work Ground To Material on Table Before Cutting
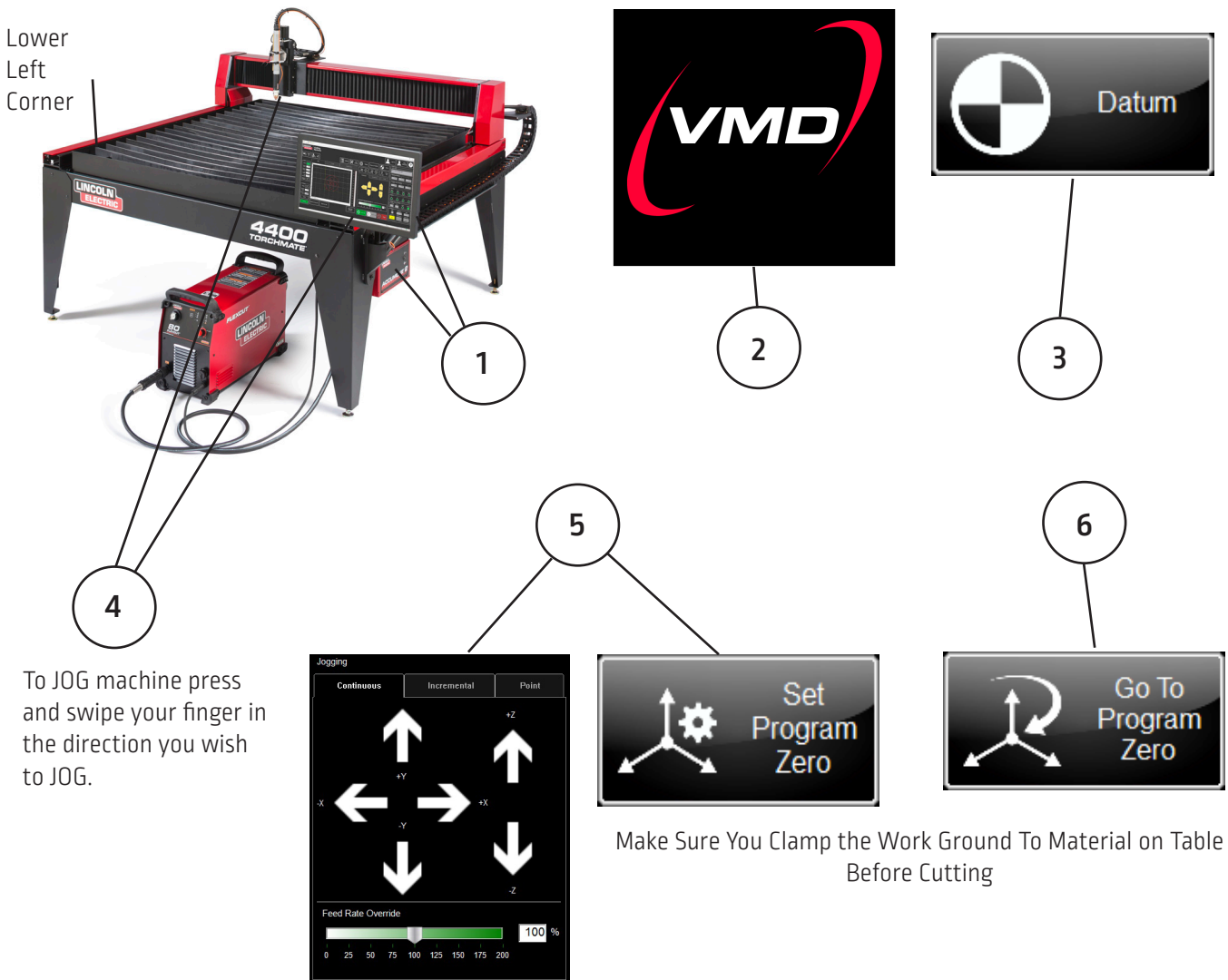
Performing Your First Test Cut

There are multiple test files preloaded on the computer of the Torchmate 4400-4800 models for testing and cut quality purposes. The LINE SPEED TEST and SIMPLE TEST CUT are provided to help determine the proper feed rate in IPMs to cut the material thickness to the amperage you have set on the plasma power supply. The 4x00 80/125 R6.gm files are quality test cuts. One will be cut at the facility prior to your machine leaving the assembly line to verify machine operation prior to shipment. We highly suggest your first cut is the 4x00 80/125 R6.gm to ensure your machine has transported in the same condition it has 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.

1. Press SELECT JOB.
2. Locate the 4x00 80/125 R6.gm and press OK
There are four files loaded to the machine. They correspond to the machine you are running (4400/4800) and the power supply you are using (FlexCut 80/125). Example: if you have a 4400 with a FlexCut 80 you will select the 4400 80 R6.gm file.
3. The opened job will now show in the PLAN VIEW.
4. In the CUT PARAMETERS Set Pierce Height to 0.16, Set Cut Height to 0.08, Set Pierce Delay to .2.
5. In the AVHC tab below the CUT PARAMETERS, MODE will be set to AUTO, Sample Voltage set to ON and IHS set to ON.

CUT PARAMETERS will change for different amperage and material thickness being cut. Complete CUT PARAMETERS settings for various material can be found in the plasma power supply cut charts.
6.   Jog the head over to the Lower Left corner of the material you are going to cut and press SET PROGRAM ZERO
7. Assure that the PROGRAM FEEDRATE OVER RIDE % is set to 100%
8 PRESS RUN JOB (machine may throw sparks)
9. The cut will progress as follows.
       1. Inside circles and polygon first
       2. Numbers will cut next
       3. Outside perimeter

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!

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

Cutout of the 4400 80 R6.gm

Overview of the Visual Machine Designer

Visual Machine Designer (VMD) is the driver software to all ACCUMOVE® CNC controllers. The majority of the control of the table can be found on the main screen while hosting features that can create and manipulate files. This quick guide will give you an overview of the features along with it's operation..

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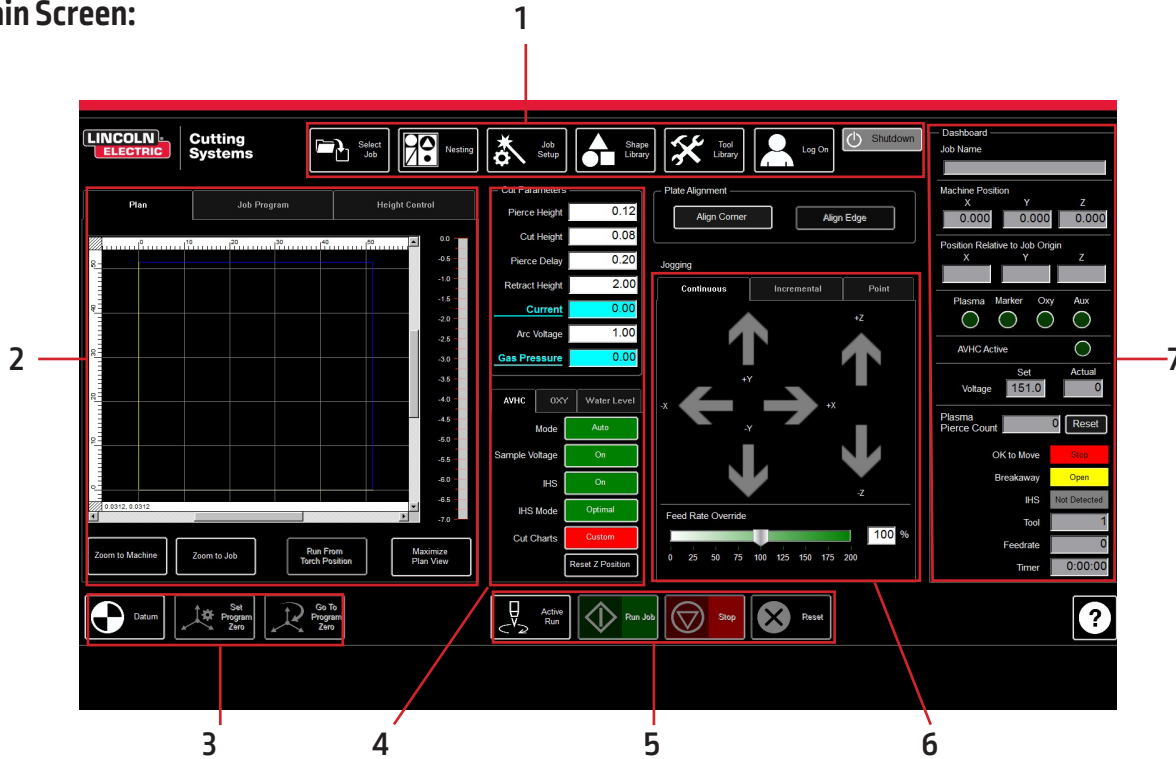
The main screen of the VMD is broken into sections for easy navigation and operation. Overview of all the buttons and functions will be covered in sections.

1. Job group - Opens and controls all apects of the file being entered or creation of jobs

2. View Screen - Shows the graphic of the job, g-code of the job, or a graphic of the lifter station movements.

3. Datum/Program Zero - Establishes the machine zero through DATUM along with the program zero on the machine.

4. Cut Parameters/AVHC - Settings for the height control and it's functions.

5. Run group - These buttons control the start and stop of the job.

6. Jogging - Controls the torch movement on the machine along with program run speed

7. Dashboard - Displays the coordinates of the head along with all of the indicators being monitored on the machine.

Job Group:

The JOB GROUP at the top, covers any "job" type functions. This group directly deals with selecting a job, creating a job (Shape Library), or Alter job functions.
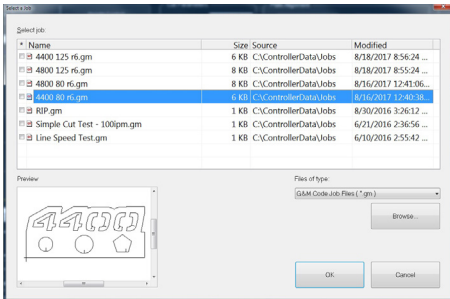
Select Job:

This is how to open jobs into the VMD.

In the SELECT JOB area shows the "HOT FOLDER" and the loaded jobs in that folder. * C:\ControllerData\Jobs is the HOT FOLDER.

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

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

Nesting:

This opens the 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 27 of the most common parts.

See the USING THE SHAPE LIBRARY section for details.

Job Setup:

In JOB SETUP allows you to make alterations to the job itself.

ROW AND COLUMN: Allows you to add mulitples 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 conjuction with the CUT PARAMETERS by setting a measurement for the TOP OF MATERIAL and the MATERIAL THICKNESS of the plate you are cutting.

Job Group: (cont)

Tool Library:

In TOOL LIBRARY configures and controls the tool outputs on the machine.

KERF and DWELL times can be added along with programming the offset to the plate marker assecority.
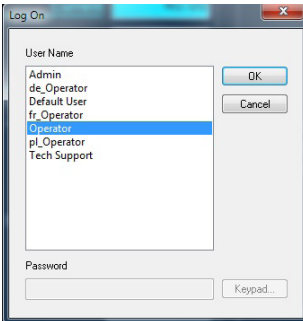
Log On:

LOG ON switches users of the VMD software.

OPERATOR is the standard user.

ADMIN opens the MACHINE SETTINGS. (password protected)

TECH SUPPORT is used only for Tech Support

Shutdown:

SHUTDOWN will close the VMD and power down the computer.

This should be used when shutting down the system.

View Screen:

The VIEW SCREEN in the VMD uses colors and will display the machine limits, head location and job location. There are three tabs along the top that will show a visual of the job, g-code of the job, or a graph of the lifter station.
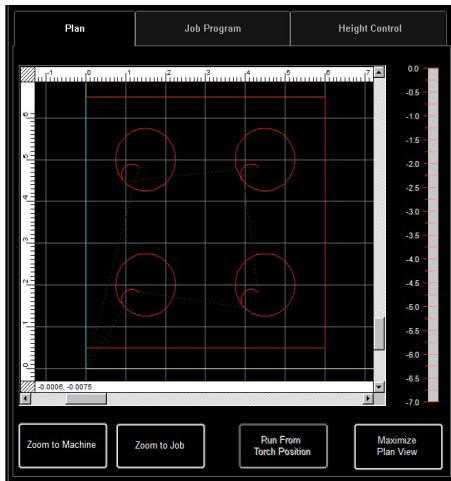
Plan View:

This displays the MACHINE LIMITS in blue. The head is represented with white crossed lines. Plasma assigned tool paths are display in red. Plate Marker assigned tool paths are displayed in Magenta. Rapid travels will be a dashed grey line.

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 job where the torch is located on the job.

Maximize Viewport will display all views in one screen.
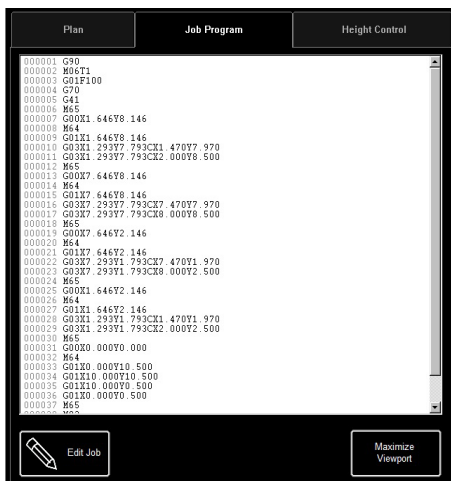
Job Program View:

This displays the g-code of the job that is loaded.

Edit Job will open the current g-code in a text editor.
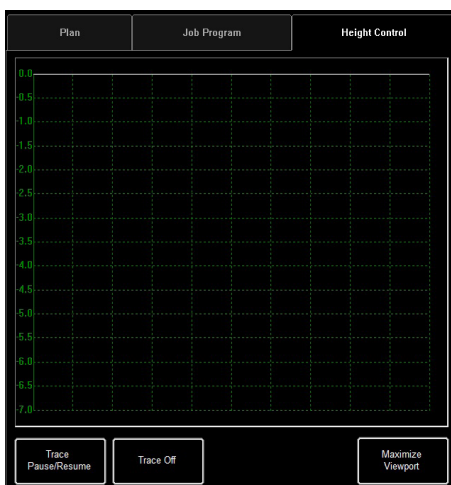
Height Control View:

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

Trace Pause/Resume will pause the graph if tracing.

Trace off/on will toggle showing the lifter station being monitored.

Datum / Program Zero Group:

This group controls the startup of the machine along with setting jobs to start from a certain location on the table.

DATUM:

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

Once the torch has moved to the lower left corner the machine is ready to operate.
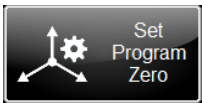
Set Program Zero:

This establishes the x0:y0 where the torch body is at. This will be where the job will start from.

When running a job, you will move the torch body to the lower left corner of the material you are cutting and by pressing SET PROGRAM ZERO will establish the job from that position.
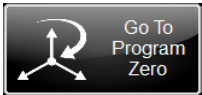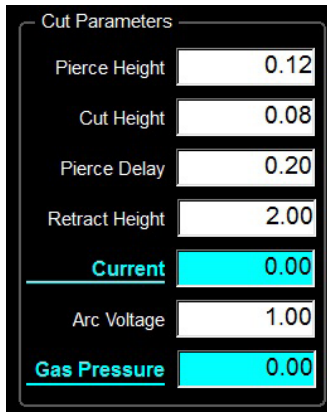
Go To Program Zero:

This will move the torch body back to the established PROGRAM ZERO

CUT PARAMETERS and AVHC:

Once you have your job ready to run, getting the settings correct and understanding their function is crucial to getting quality cuts on your table. This will go over the Cut Parameters and the AVHC settings.

Cut Parameters:
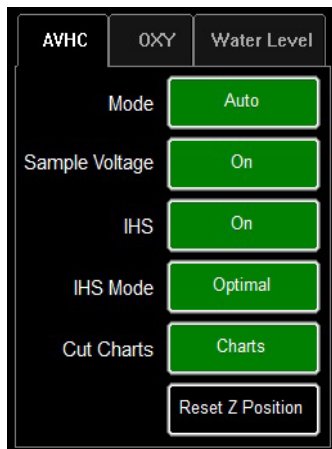
All the parameters in the Cut Parameters and AVHC tab set the torch in proper position in relation to the material during operation. Most of the parameters can be found in your Flex-Cut manual under CUT CHARTS.

- **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 move up during rapid travels when running a job.

- **Current** displays the AMPERAGE the plasma needs to be set to. (if job is NESTED)

- **Arc Voltage** is the voltage feedback comparison value. If using SAMPLE VOLTAGE this will adjust during cutting.

- **Gas Pressure** displays the proper air pressure required for the material/amperage being cut.(if job is NESTED).

AVHC (Automatic Voltage Height Control):

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.
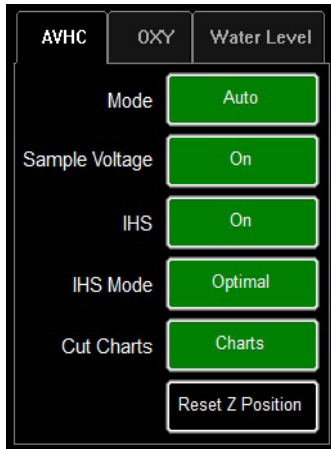
AVHC (Automatic Voltage Height Control):

Sample Voltage is a toggle 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 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 MODE: MANUAL): This feature is disabled.

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 PIERCE HEIGHT setting.

- · OFF: The head will move to TOP OF MATERIAL setting (Job Setup) and retract to PIERCE HEIGHT.

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

- · Optimal: First pierce the head will detect the material via OHMIC and will not detect the material for a set number of pierces after.

- · Always: The head will detect material via OHMIC at every pierce.

CUT CHARTS this setting will allow the user to define the cut parameters or have them prepopulate via g-code generated throught the nesting process.

- · Charts: Uses the predefined cut settings generated through the NESTING process and populates the settings in the CUT PARAMETERS

- · Custom: The operator enters the values into CUT PARAMETERS from the cut charts.

RESET Z POSITION resets the Z lifter to its Zero Position by moving the head to its upper stroke and re-establishing its zero position.

RUN Group and Jogging:

This group controls the start and stop of a job plus allows you to alter states of the plasma. Jogging allows the user to move the head by pressing on the direction. Also the jog is tabbed so being about to move the head to the proper location anywhere on the table.

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.

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.
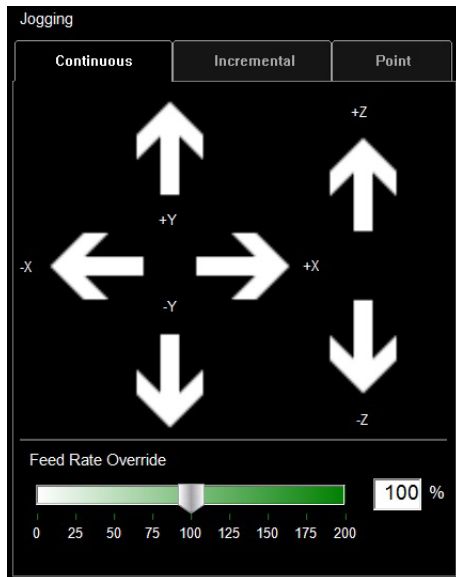
Jog:

The JOG keys are laid out in the manner as the table moves. By pressing more towards the center of the jog key will move the torch body slower and then on the outside it will move faster. The JOG window is comprised of three seperate tabs:

Continuous, Incremental and Point.

On the bottom, is the FEED RATE OVERRIDE %. 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.
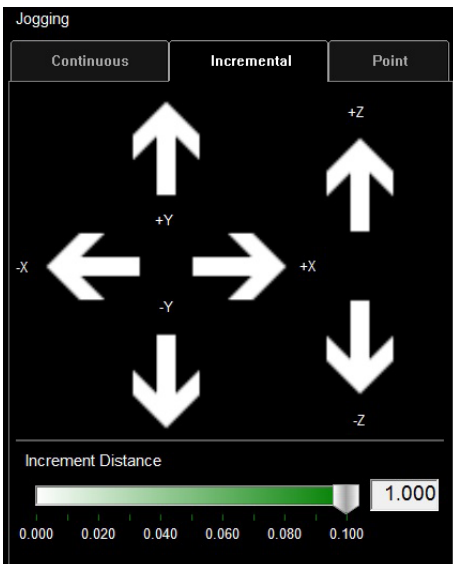
Jog: (cont)
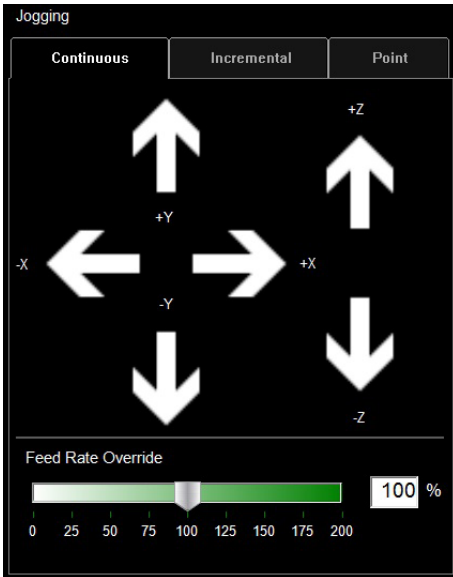
Continuous Jog:

By pressing a direction will move the torchbody in the direction you are pressing. When released the head will stop.

Incremental Jog:

By pressing a direction will move the torchbody in the direction you are pressing while using the Increment Distance slider bar to move that distance.

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

Jog and Dashboard:

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.

Dashboard:

DASHBOARD displays job name and table coordinates along with other details about the machine.

- Job Name: Display the active job loaded in the VMD

- Machine Position: This shows the torch coordinates to the MACHINE space

- Position Relative to Job Origin: These coordinates display based off of the SET PROGRAM ZERO

- Green Indicators: The green indicators show when the signal is turning on/off the assicated tool.

- AVHC Active: Displays when the AVHC is adjusting.

- Voltage: Displays the SET VOLTAGE the machine is tracking along with the current RAW ARC VOLTAGE feedback from the plasma during cutting.

- Plasma Pierce Count: This is for keeping track of how many pierces the plasma consumables. You will RESET when you change the consumables.

- OK TO MOVE: Indicates when the plasma has pierced through the material and is ready to start the program.

- Breakaway: Indicates if the breakaway circuit is open/closed

- IHS: Indicates when the material is detected via OHMIC.

Dashboard: (cont)

Dashboard:

DASHBOARD displays job name and table coordinates along with other details about the machine.

- · TOOL: Indicates which tool is active. 1 is plasma, 2 is platemarker
- · Feedrate: This displays the actual feedrate the machine is moving at.
- · Timer: This is the elapsed time from pressing RUN JOB to when the job is completed.

Using the Shape Library in VMD

In the VMD, you can generate one of 27 standard shapes without needing to generate them in your CAD software.
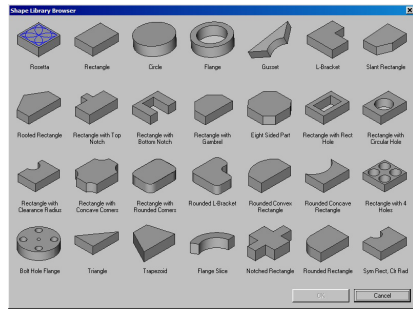
Access the Shape Library:

To get to the Shape Library press SHAPE LIBRARY on the top center of the VMD screen. The Shape Library offers the most popular 27 shapes to customize to your dimensions along with Lead in/Out, Feed Rates, and Tools. Select the shape you are looking for and press OK. This will open the shape configuration for the shape selected.

Configure your shape:
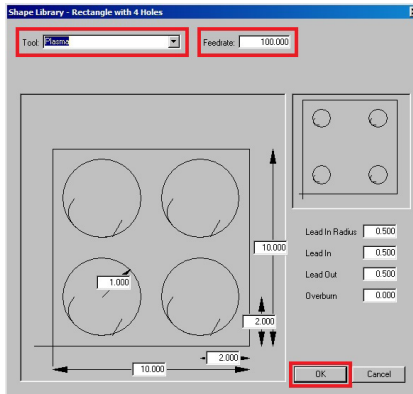
First you will select the TOOL you are planning to use. Plasma, Plate Marker, or Oxy.Then enter a value for the Feed Rate. Recommend the feed rate to be set to the cut charts in the plasma the feed rate with the FEED RATE OVERRIDE % slider.

Lead in radius will create a radius for your lead in. If a line lead in is required then enter 0.

Lead In is the length of the pierce point movement into the tool path. This is usually .12.
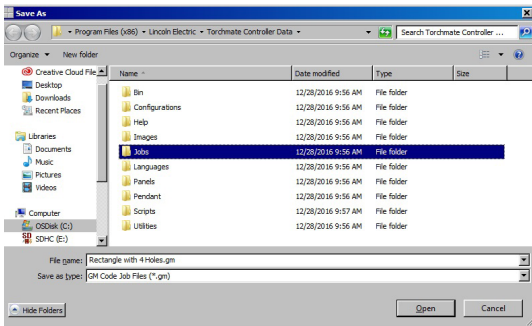
Lead out is the length of the cut created out of the cut path. If using plasma enter 0

Overburn is the measured length past the end/start point. Used for thicker materials or in the oxy process.

Once all of the parameters are entered press OK.

Using the Shape Library in VMD (cont)

Save your Shape:

Once you press OK, you will be prompted to SAVE your shape. Double click the JOBS folder. By default, the name of the file will be the shape you selected or can be changed to a user defined naming convention. Once named press SAVE.

Open shape in VMD:

In the MAIN 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. Once selected, press OK. The job will display in the RUN screen.
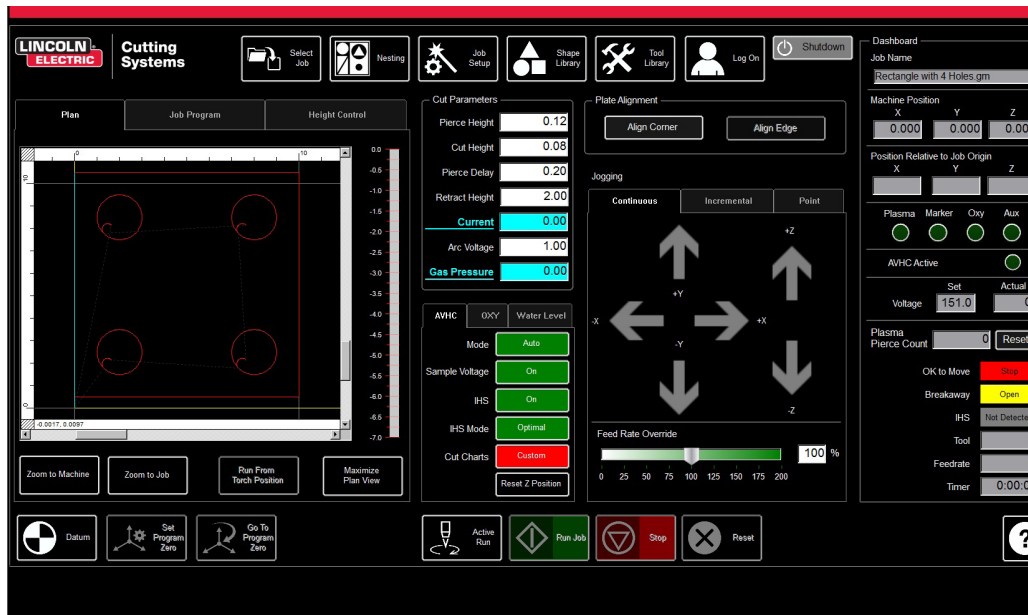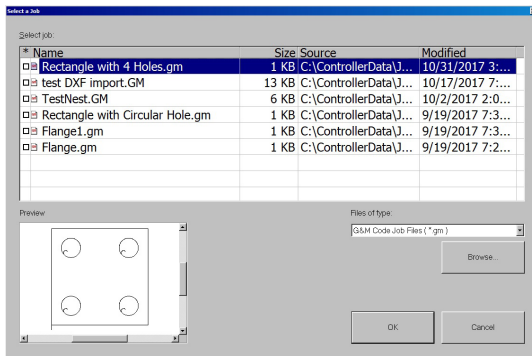
Running a Job

When you have a GM format file to run or shape generated in the VMD ready to cut there is a simple process to follow to get the job produced though the VMD. This will go over the workflow of running the job.
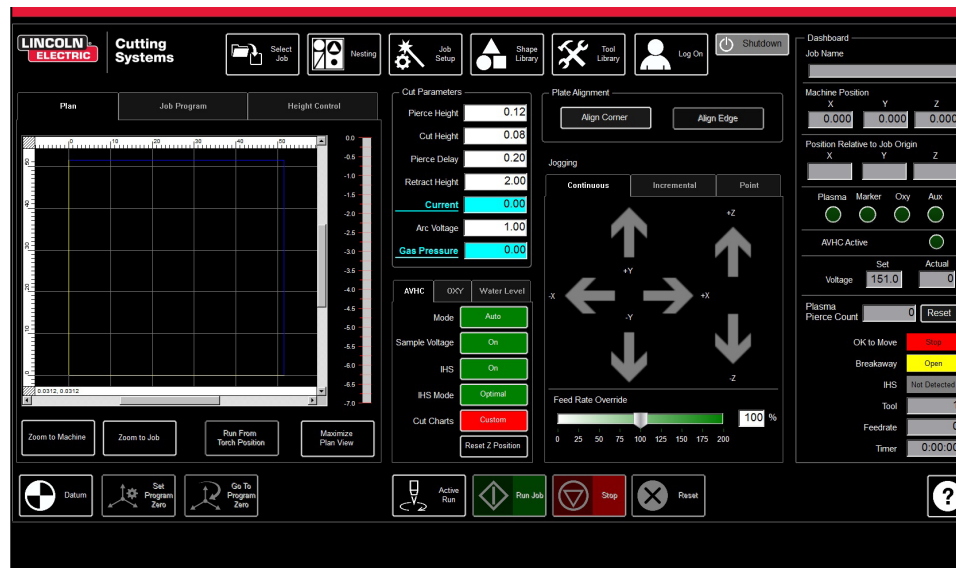
Datum:

When you first start the Visual Machine Designer and are connected to the Accumove controller the machine needs it's configuration loaded and motors powered on. 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 the 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.

Establish Program Zero:

With the job loaded, you will need to determine the start point of the job. Using the JOG keys, move the head to the lower left point (-X, -Y) of the material where you want to start your cut. Once there, press SET PROGRAM ZERO. Your job that is loaded will move to that point in the RUN screen. Press ZOOM TO JOB to view your part. The PROGRAM ZERO can be established anywhere within the machine limits as long as the job will fit. The PROGRAM ZERO point established is where the job will run from. The G-CODE will run in positive directions (+Y,+X) from the ZERO point.

Verify that the job will fit on the material along with enough margin that the torch will not run off of the material.

Running a Job (cont)

Cut Parameters and AVHC Settings:

The final step is entering the cut chart settings into the Cut Parameters and AVHC panels based on the material thickness and amperage on the plasma.

For this example will be entering the settings for 14 gauge material using a FlexCut 80 plasma power supply set at 40 amps with 40 amp consumables.

FlexCut 80 40 amp CUT CHART provided:

Mild Steel

| Material Thickness			Pressure	Pierce Height		Cutting Height		Pierce Delay	Optimum Settings		Production Settings		Kerf Width		Edge Start
ga	in	mm	psi	in	mm	in	mm	sec	IPM	Arc Voltage	IPM	Arc Voltage	in	mm	
26	0.018	0.5						0	350	107	480	107	0.045	1.1	
22	0.028	0.7						0	350	108	475	108	0.045	1.1	
18	0.049	1.2						0.1	350	109	450	108	0.045	1.1	
16	0.065	1.7						0.1	350	110	385	108	0.045	1.1	
14	0.083	2.1	80*	0.16	4.1	0.08	2.0	0.3	260	110	280	110	0.045	1.1	
12	0.109	2.8						0.4	180	112	200	110	0.045	1.1	
10	0.134	3.4						0.5	110	115	145	113	0.050	1.3	
-	3/16	4.8						0.6	65	116	90	113	0.053	1.3	
-	1/4	6.4						0.8	45	117	55	115	0.060	1.5	

- 26-10 ga steel is cold rolled, 3/16 and 1/4 in steel is hot rolled

Settings that need to be entered in your Cut Parameters panel are as follows.

- PIERCE HEIGHT: .16
- CUT HEIGHT: .08
- PIERCE DELAY: .03

Other settings in the AHVC panel that will be changed.

- MODE: AUTO
- SAMPLE VOLTAGE: ON
- IHS: ALWAYS
- OHMIC SENSING: ON
- CUT CHARTS: CUSTOM
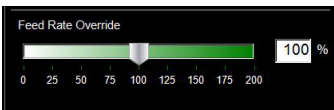
Set Feed Rate:

In the Cut chart is the OPTIMUM FEED RATE. Pending on how the job was created the feed rate will need to be established in the job. If feedrate was set to the OPTIMUM FEEDRATE then make sure the FEED RATE OVERRIDE is set to 100%.

You can alter the feedrate by percentage by adjusting the sliderbar.

Run the job:

With all the settings entered into the CUT PARAMETERS/AVHC boxes and the feed rate set in the FEED RATE OVERRIDE % time to run the job. To verify the machine will run with the settings change the ACTIVE RUN to DRY RUN to "simulate" the job. Dry Run will perform all machine sequences and movements without firing the plasma. Once the Dry Run is complete the job will automatically reset.

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

Press RUN JOB

Cut Quality

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 visual reference to the output. The test cut is a 3" x 4" coupon that consists of 9 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 material. Change the PROGRAM FEEDRATE OVERRIDE % if you need the feed rates higher or lower according to the thickness of 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 PROGRAM ZERO
- Run the LINE SPEED TEST.

Once the test is complete there is a few things to look for. On the top of the cut you want to see a clean cut without a lot of bevel. Ideal is 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. Also picking at the dross it should be easy to remove. 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.
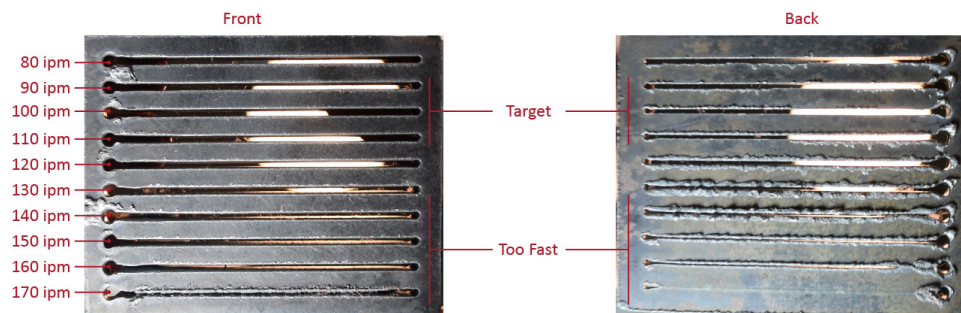
So in this example the 110 - 90 ipm will be the best speed for this material thickness and amperage setting. Now this process will be used for every thickness of material you plan on cutting to establish the proper speed. Once established these coupons can be used as a visual cut chart or you can use 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

With the VMD we are able to do irregular parts nesting. This allows you to IMPORT DXF and DWG files without needing an offsite 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 will generate the tightest nest available for the size of material you enter in.
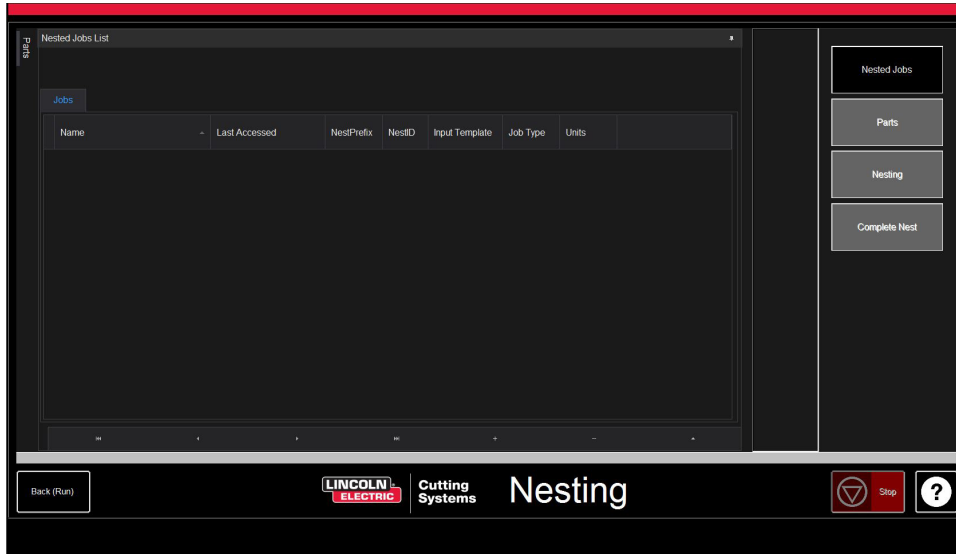
When you want to import a DXF/DWG into the VMD or if you want to add multiple files and nest into a predefined layout you need to use the NESTING feature. By pressing NESTING, will display the NESTED JOB LIST screen. To start a new nest, press NESTED JOBS. Select NEW NESTED JOB and the ADD NESTED JOB dialog opens.
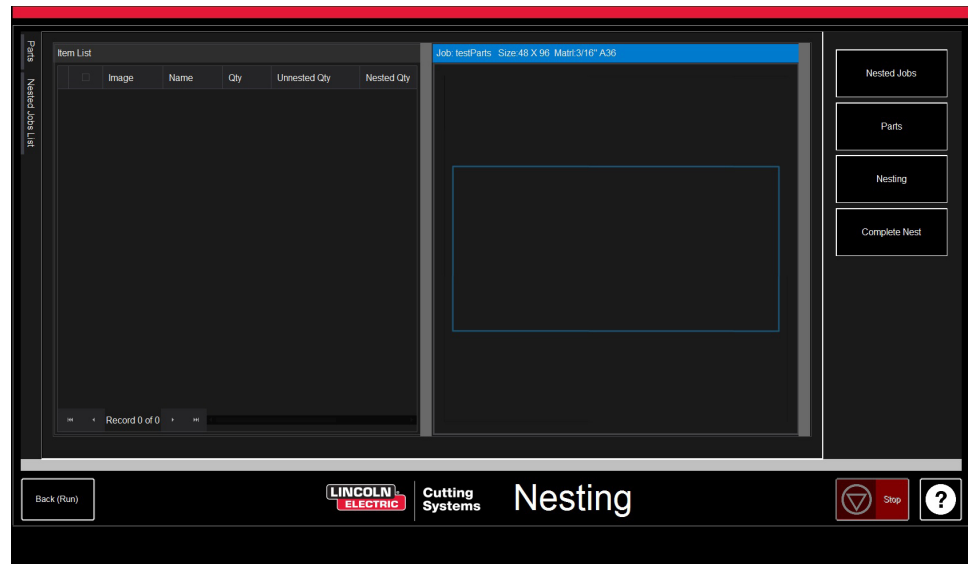
Start New Nest:
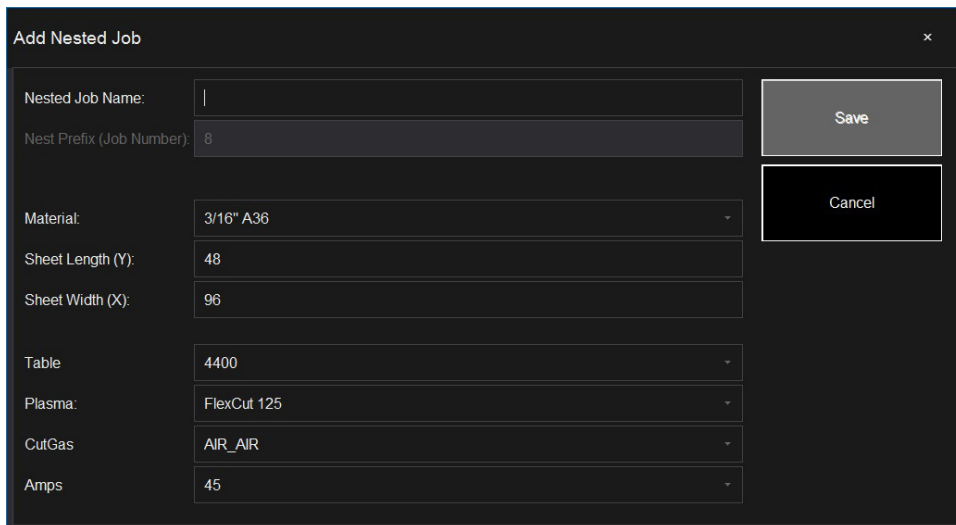
In this dialog, enter a name for your nest in NESTED JOB NAME. This will become the file name of your project. Each dialog after is a drop down. Find the thickness of material you plan on cutting along with the size of sheet. Select the table/plasma cutter you are using along with the amperage approriate to the application and press SAVE.

Nesting

Add Parts:

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.
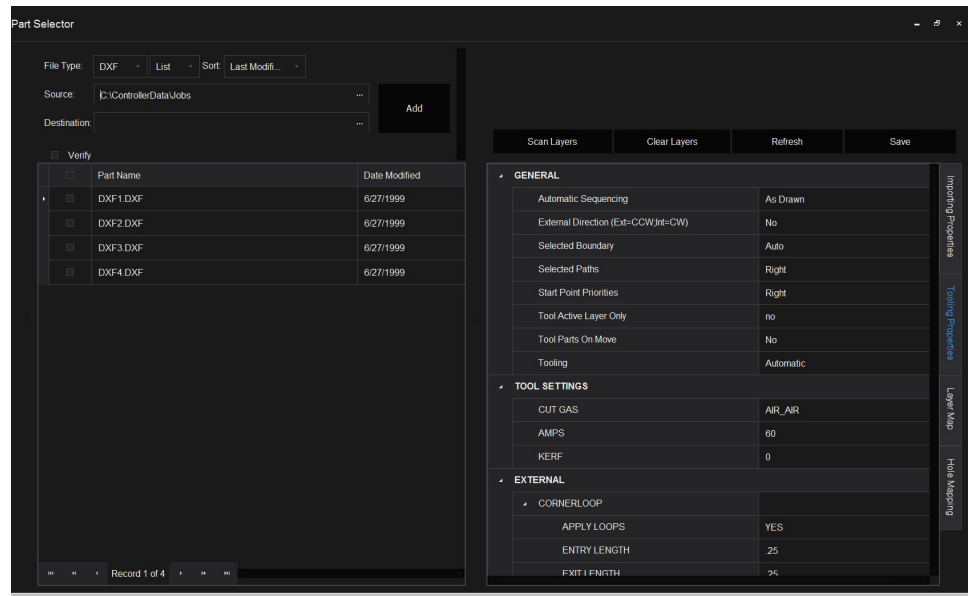
Apply Tool Paths:

At the top of the screen will be SOURCE. This allows you to browse for your file source (ie. Flash Drive, Job Folder) and populate the list with all of DXF/DWG on that SOURCE. On the right is the JOB PROPERTIES that can be applied to your parts.

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 these setting if you need particular leadins or kerf diameters.

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

Nesting

Once all of the settings are made in the TOOLING PROPERTIES, press SAVE and it will maintain those settings for that material and amperage.

The left side of the screen select the parts you want to IMPORT and Press ADD. This will bring up the ITEM LIST again but with the parts populating the left side. Change the quanities of your parts by clicking over the QUANTITY and will bring up a dialog to add numbers to the quantity.
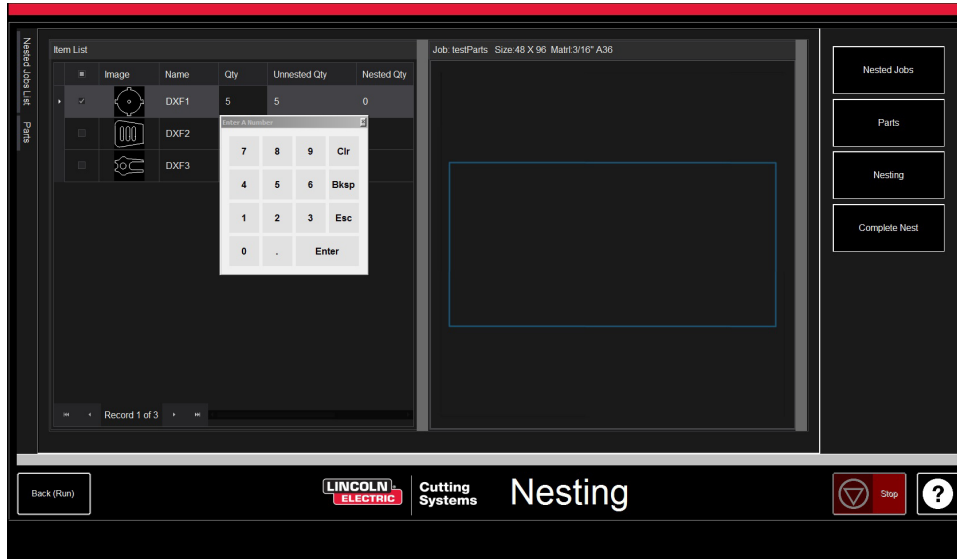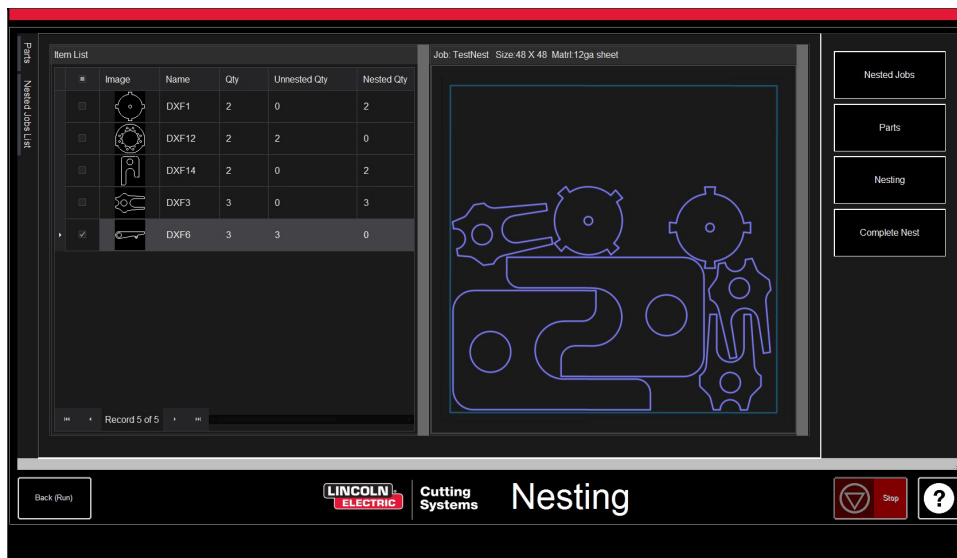

When all the parts have the proper quantity, go to the right button list and select NESTING.

Press NEST and 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.
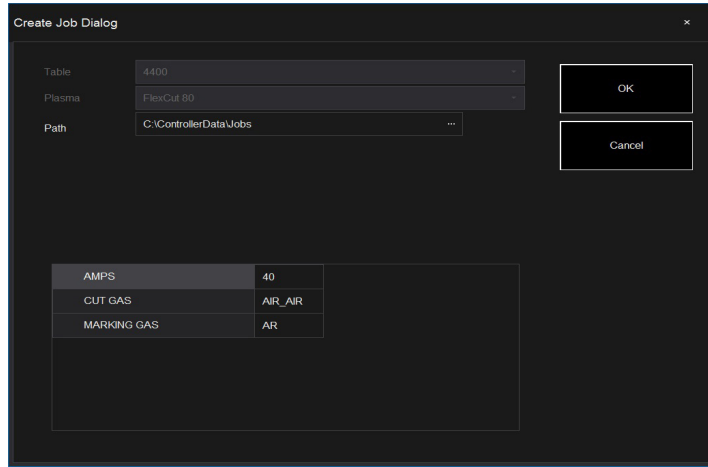

Add Parts:

Make Nest:

Nesting

Complete Nest:

Complete Nest

If your nest does not need editing or 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 and verify the amperage you are cutting. Then press OK.

Open nest in VMD:

Back (Run)

Select Job

Cut Charts   Charts

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

Now 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.

For more detailed instructions of the VMD and it's complete feature set go to the VMD manual.

Maintenance

As with all machinery there is required maintenance. This will cover Daily, Monthy, and 'As Needed' tasks to keep your 4400/4800 running like new.

Daily Maintenance

Plasma Power Supply:

The plasma power supply and torch body will need to get evaluated between material thickness 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.

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 on the pins.

Daily Maintenance:

Machine:

The breakaway assembly has some uncoated parts used for the signal to be sent to the controller. Corrosion will impead the signal and cause the breakaway from functioning properly.
To access the breakaway, move your machine to the DATUM position and press SHUTDOWN. Remove the power to the machine for safety.
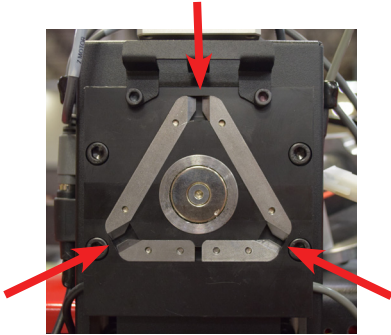
Grab the torch body and "break" it free off of the back plate. Move the safety hanger wire from the assembly to free the torch assembly from the lifter station. Place the torchbody on the top of the gantry.
Now the back plate should be exposed.

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 keep your contacts clean and rust free.

Monthly Maintenance:

Machine:

Since the gantry rides on linear rails, you will need to occationally grease the cassettes that ride on that rail. Build-up and water can impead the smooth operation of the cassettes that can cause issues for the gantry to move properly on the linear rails.
The grease that is recommened is Mobil SHC Mobilith SHC 100 Lithum based grease. This can be sourced and pur-chased locally.
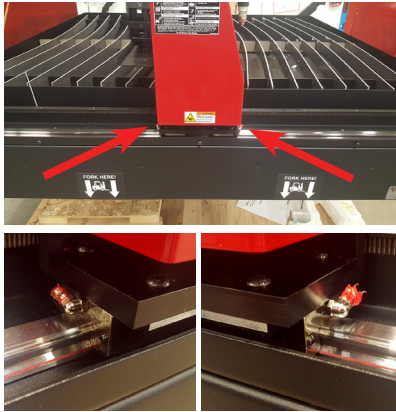Load the grease cassette into a grease gun and follow these steps to grease the side rails.

1. With the machine on, move the gantry to the center of the table.

2. Shutdown the Accumove controller, and loosen the 1/8" Hex head bolts that hold the side cover in place, two turns. DO NOT REMOVE THESE BOLTS.

3. Slide the side cover so the bolts can fit through the keyholes and remove the cover.

5. With the cover removed the zerk fittings will be visible, attach the grease gun and pump until the grease comes from the bottom of the cassette. Grease front and back zerk fittings.

6. Attach the side cover to the table.
IMPORTANT Slide the cover so the bolts go back into their original position at the bottom of the keyhole, and torque the bolts to 17.8 in. lbs.

7. Repeat step 1-5 for the other side.

8. Once complete, turn on the machine and DATUM.

Maintenance as Needed:

The following is based on how often the machine is being used. If the machine is running once a week the following steps will not be needed as often as a machine running every day.

Bellows:

The Bellows are a consumable item that protect the inside of the Gantry from water and debris. When the bellows are no longer protecting the inside of the Gantry they should be replaced. Please contact the Parts team to purchase new bellows.

Maintenance as Needed: (cont)

Slats

Over time the slats will accumulate build up that will create an uneven cutting surface and poor continuity to the table that will directly affect your cut quality. When this occurs, replace the slats with new slats. Slat size used in the 4x00 tables are 3/16" (T) 2" (H) 53" (L). If the machine is used to cut primarily in the front of the table another option is to rotate the slats from back to front and vice versa. Clean the slats off by using a pneumatic needler or grinder and can flip the slats over to elongate the use.
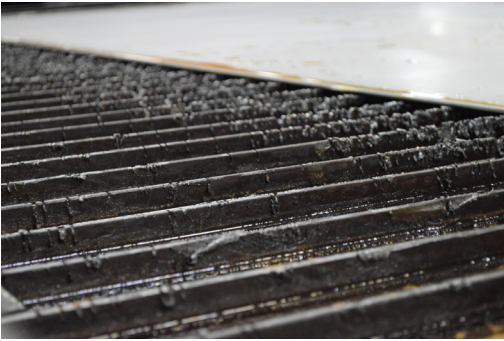

Water Pan

The water in the pan needs to be drained and cleaned every 2-4 weeks. There is a plumbing valve (1/2 inch) in the back left corner of the table. To dispose of water, please contact your local EPA or water district authorities. After water is drained remove all pieces of metal and discard according to local and federal regulations. Close the valve and refill the table with water. The 4400 holds 60 Gallons (230 Liters) and the 4800 holds 107 Gallons (405 liters). Lincoln Electric Cutting Systems recommends GreenCut® by Lab Corp® is used for a water additive for rust prevention and anti-bacterial growth

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.

Bevel Basics

- 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.

- Basically, the best bevel is to the right of the direction of travel.

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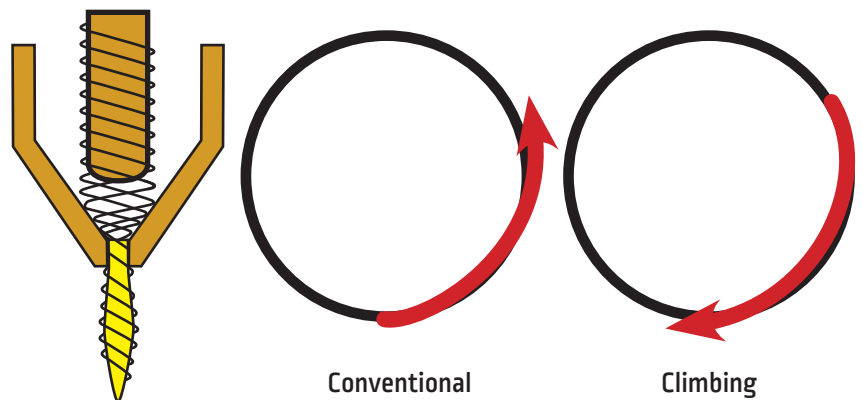
- Corners can have more bevel than a normal cut. This is caused when the machine slows down for the direction change. A lower amperage, in some cases, allows slower travel speeds and reduces "slowdown" bevel through corners.

- 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 at constant pressure and clean and dry also decreases bevel.
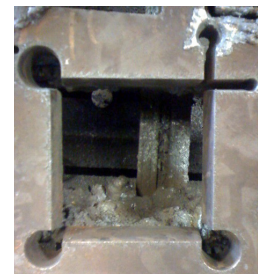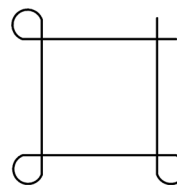
Beveled Edge   *Corner Loops*
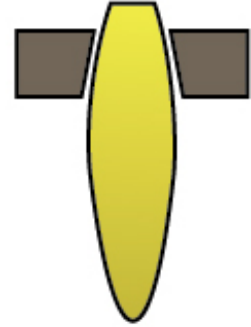
How Torch Position Affects Bevel

	Correct torch height Torch square to material	Torch angled to material	Incorrect torch height Torch too high	Incorrect torch height Torch too low

Position of torch while cutting
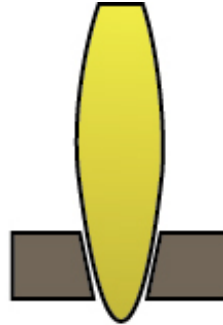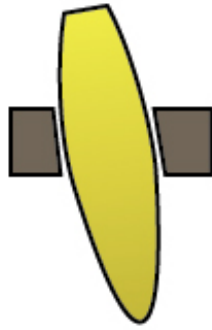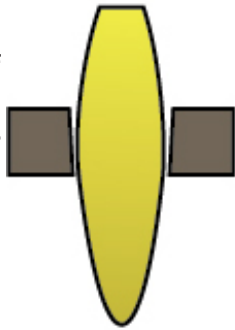
Bevel of finished part

Equal bevel on all sides	Unequal bevel	Excessive bevel	Reversed bevel
Minimal bevel	One side may be straight the another excessively beveled	Cut may not go all the way through material	Torch may contact material and short out or damage tip
Longest consumable life	Can be caused by worn tip		

What Causes Bad Cuts

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

    1) Ground clamp 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 <u>not</u> 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.
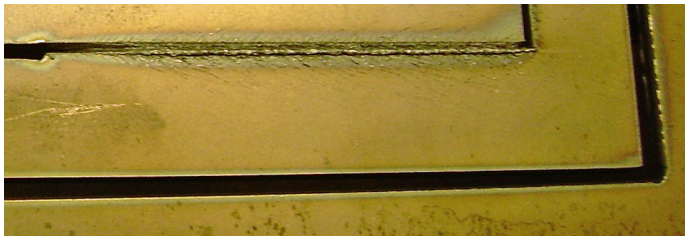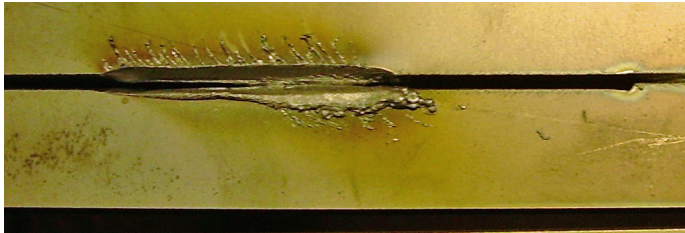
Basic Troubleshooting

This will cover the most basic operational faults you might encounter with your 4x00 machine.

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	Grease the side cassettes. 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 square to the material on the table. Folow the CUT QUALITY section pg. 29

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

Software Faults cont.:

Problem	Solution
During the initial cut movement, the torch shield comes into contact with the material stopping the machine.	Check that the Cut height is set at the correct value. Check that the AVHC Auto/Manual mode is set to Auto. Check that the Sample Voltage mode is set to ON. Check if at the point of stopping the machine crossed into another previous cut, or collided with another previous cut.
During cutting, the torch retracts far enough away from the material the arc is stretched or extinguished.	Check that the Cut height is set at the correct value. Check that the AVHC Auto/Manual mode is set to Auto. Check that the Sample Voltage mode is set to ON. Verify Raw Arc Voltage connection to VFC box and Plasma Cutter.
The torch traces the part out but does not fire.	Check that the Dry Run/Active Run button says Active Run. If OK to Move is disabled, check Plasma Power Supply for errors. Verify that the G-CODE has M64/M65 in the code. If not then the POST isn't configured correctly in the TMCAD.
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.	Close the VMD software completely, shut off the Accumove controller for at least 30 seconds. Then power on the Accumove controller, wait another 30 seconds and open the VMD software 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

Software Faults cont.:

Problem	Solution
When VMD is opened, a Trial Period screen appears.	To register the software, email the support@torchmate.com email address with the 8 digit alpha numeric code that appears on the registration screen.
The Breakaway Indicator shows as Yellow and Not Connected, even though the torch is in the correct position.	Check that the breakaway capture leash and any debris on the magnet are not keeping the torch from sitting fully in position. Check contact points for any signs of corrosion, clean and oil to keep the breakaway functioning normally. Verify the Breakaway cable is connected at the breakaway, and at the back of the Accumove Controller, reseat if necessary.
When attempting to Datum the machine, the machine runs into the hard stops making a loud grinding noise.	Verify that the Input harness is plugged in fully on the back of the Controller (Accumove 2) Verify the Limit Switch input cable is screwed in fully on the back of the controller (Accumove 3)
The torch does not retract off the material when moving between cuts, but the torch does shut off.	Jog the Z axis all the way to the top of its travel and click Reset Z, then click Run Job. Verify that the Retract Height value is set to the desired retract distance in between cuts.
Part way through a program a Limit Exceeded in X or Y axis occurs.	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. 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
Torch fires at the material, but does not pierce fully through it, no motion occurs.	Verify plasma cutter work lead connection to the machine. Verify material is contacting the slat supports and nothing is electrically hindering that connection. Verify Pierce Height is at recommended values and not any higher both in the settings and visually at the machine.

Software Faults cont.:

Problem	Solution
When opening the VMD software a "Language Deserialization Error" appears.	Verify that the windows installation is using the language package English (US). Verify that the user has full administrative rights to the local computer. Verify the .NET 3.5 Framework is enabled under Windows Features, both HTML Activation and Non-HTML Activation.
The controller won't turn on (Accumove 2).	Disengage the E-STOP Verify the power brick is plugged in and indicates a solid Blue LED light. Verify the power brick is plugged fully into the back of the Accumove 2 controller. Listen for fans spinning inside the Accumove 2 controller when the switch is turned ON.
The controller won't turn on (Accumove 3).	Disengage the E-STOP Verify the power cable is plugged in. Verify the fuse on the back power port is in intact Verify the Voltage Selector switch is set to the proper 110v or 220v incoming power.
The controller has a Blinking Power light (Accumove 2).	An input is shorted to ground, disconnect the Breakaway, Height Control, and Input harness and identify which connection causes the blinking light condition. Resolve the short to ground.
VMD screen displays a "Please update the firmware" error message.	The firmware currently uploaded to the controller is not the matching version for that software. Log in as an Admin (password 1234) and load the firmware under the Machine Settings - Advanced tab, follow the onscreen instructions After FIRMWARE is complete, go to BASIC tab and press FACTORY RESET.

Software Faults cont.:

Problem	Solution
One of the machine's motors is not moving when attempting to Datum or Jog the machine	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. 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
Job displays rotated or angled on the Job Plan screen.	Verify that the plate is aligned properly by setting program zero at the lower left corner, then choosing Align Corner, jog the Y axis Postive a small amount, and clicking Align Edge. The machine will return to the program zero position. Return to Select Job and reopen the job. If the part displays incorrectly the issue is present in the g-code file itself and it must be recreated correctly
Error occurs "Execution Error Overtravel Detected" when clicking the Run Job button.	Verify that all home and limit switches are not depressed (TMX table Only). If operating near the extents of the machine, reset program zero and material further away from machine extents.
Error occurs "Limit Exceed in Z-axis" when running a job.	Jog the Z axis all the way to the top of its travel, and click Reset Z, then click Run Job to continue. If indicator for Ohmic detection comes on when clicking Run Job briefly before the error is displayed, remove and clear consumables of any debris.
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.	Check Flexcut power supply for error codes on the front panel. Verify that the CNC interface cable is plugged into the Flexcut Power Supply, and to the Accumove controller & VFC box.

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

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 for any updated information.

LINCOLN ELECTRIC | **Cutting Systems**

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