LINCOLN ELECTRIC | Cutting Systems

TORCHMATE® 5100

USER GUIDE

March 31, 2021

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Unpacking Your New Machine

Your new Torchmate® 5100 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 cutting bed of the machine.

Unpackaging your Torchmate 5100 is a simple process. Your machine will arrive on a flatbed truck and wrapped in plastic. Use a razor knife to remove the wrap from the machine. Inspect the contents and verify that there is no damage to the machine or its contents in the bed. If damaged, do not accept the shipment and contact Lincoln Electric Cutting Systems.

The plasma unit, along with all of the connection cables will be secured to a separate pallet. To remove the plasma power supply from the pallet, team lift or forklift the plasma power supply and set aside until the machine is placed in its final operational location. The plasma unit will sit on the floor near the cable carrier exit on the monitor side.

At minimum, a 6,600 lb.+ forklift with a 48" load center is required to place the machine in its operational position. Use the forklift access ports on the machine. Do not lift the machine from the cable carrier side.

Torchmate 5100 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.

A

DETAIL A

B

DETAIL B

C

DETAIL C
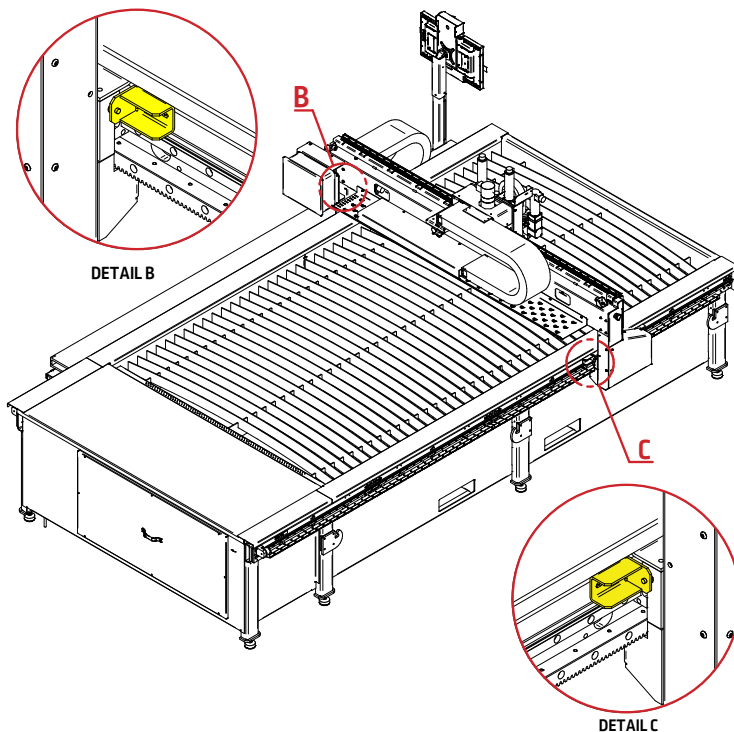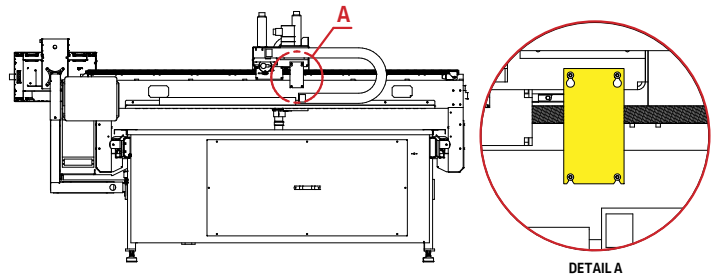
Do Not Fork Lift From Cable Carrier Side Of Machine!

Unpacking: Leveling Feet

When placing the machine, you will need to install the adjustable feet into the pads prior to leveling the machine. With the machine lifted and secured, screw in all of the adjustable feet into each of the pads. DO NOT USE a hydraulic lift to secure the machine when installing the leveling feet. Screw them halfway into the pads to get the most movement for leveling. Once the machine is placed, then level the table. When the machine is level, then follow the WATER FILL process.
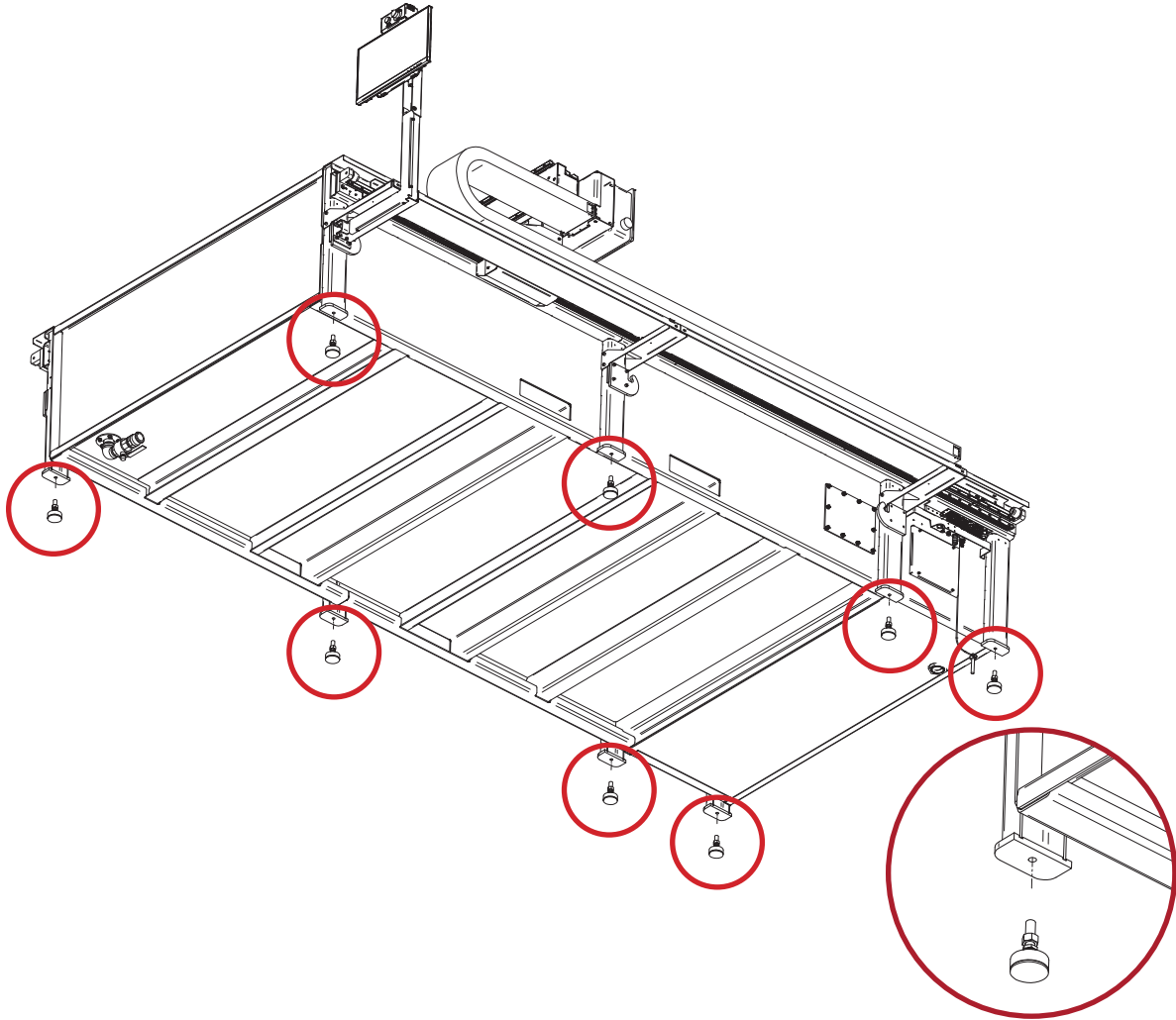
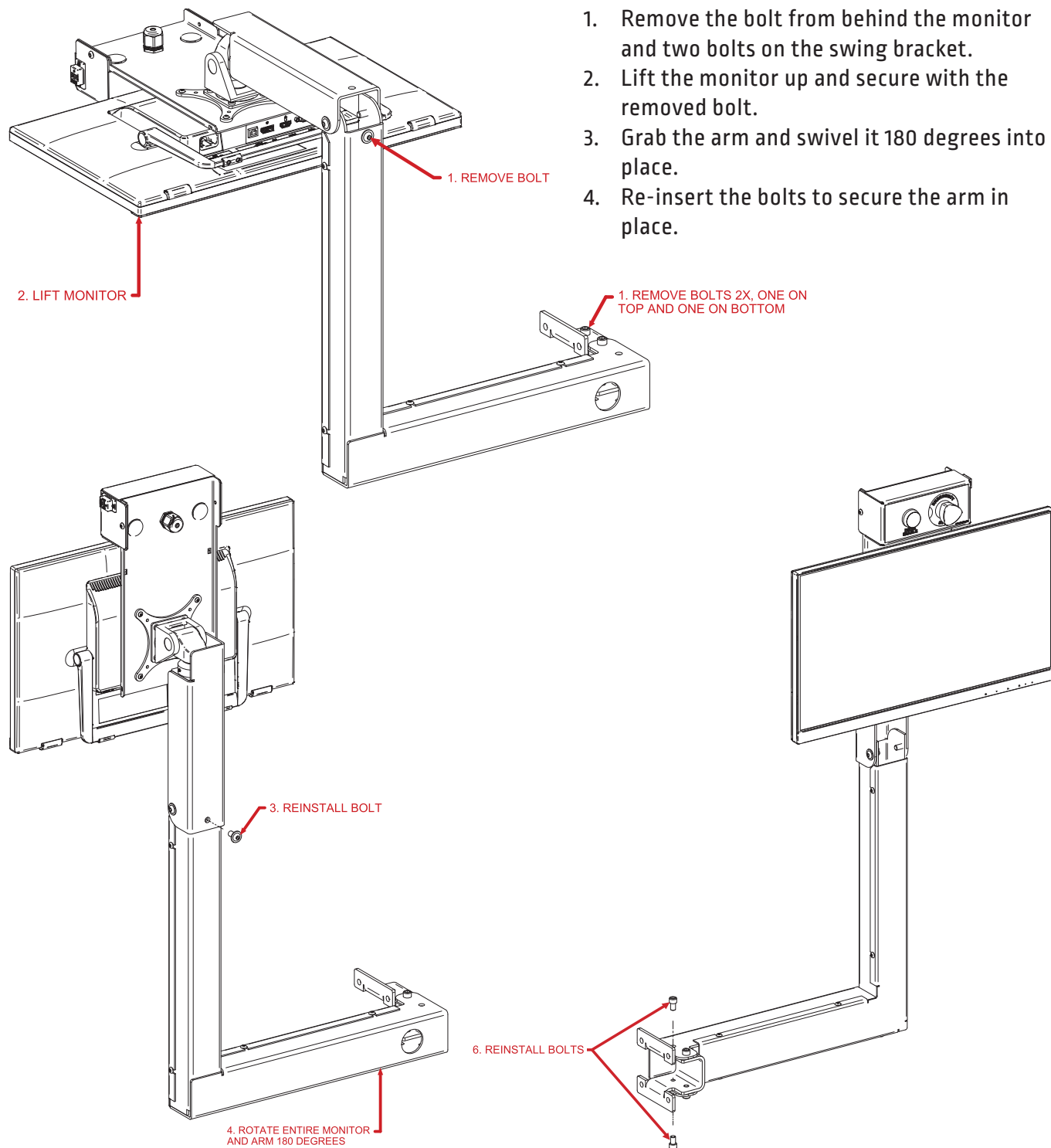Use ALL of the leveling feet to secure and level the table.

Make sure the table does not rock or have any movement once level.

The table is now ready to be filled with water (if water table).

Unpacking: Monitor Arm Assembly

Unfolding and securing the Monitor Arm Assembly requires a few bolts to be removed and reused to secure the arm in place.

Remove the bolts that are indicated in the drawing and reuse them to secure the arm.

1. Remove the bolt from behind the monitor and two bolts on the swing bracket.
2. Lift the monitor up and secure with the removed bolt.
3. Grab the arm and swivel it 180 degrees into place.
4. Re-insert the bolts to secure the arm in place.

1. REMOVE BOLT

2. LIFT MONITOR

1. REMOVE BOLTS 2X, ONE ON TOP AND ONE ON BOTTOM

3. REINSTALL BOLT

6. REINSTALL BOLTS

4. ROTATE ENTIRE MONITOR AND ARM 180 DEGREES

Unpacking: Electrical Connections

Internally the 5100 comes pre-wired and ready to run. All systems are test-fired and disconnected at the facility before packaging and shipping. For shipping purposes, the plasma p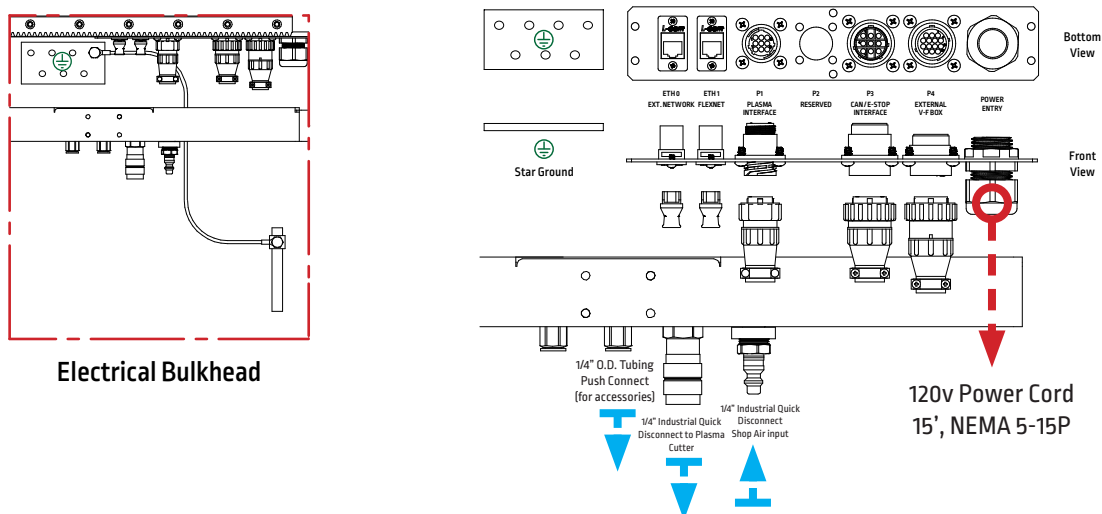ower supply is disconnected from the system and will require a connection to the machine once installed. The table has a single input power cord with a 120v NEMA 5-15P plug that powers the table and computer/monitor. Connections should be made in accordance with all local and national electrical codes. Failure to do so may result in bodily injury or death.

All electrical, air, and interface connections to the machine will be off of the BULKHEAD

5100 - Table Power connections:

Attach the supplied 120v NEMA 5-15P plug into a 120vAC 15A wall outlet. This will power the electronics and table functions.

Electrical Bulkhead

Bottom View

Front View

ETH0 EXT.NETWORK | ETH1 FLEXNET | P1 PLASMA INTERFACE | P2 RESERVED | P3 CAN / E-STOP INTERFACE | P4 EXTERNAL V-F BOX | POWER ENTRY

Star Ground

1/4" O.D. Tubing Push Connect (for accessories)

1/4" Industrial Quick Disconnect to Plasma Cutter

1/4" Industrial Quick Disconnect Shop Air input

120v Power Cord 15', NEMA 5-15P

5100 - Pneumatic connections:

The 1/4" industrial quick disconnect input on the bulkhead will distribute the air to the plasma power supply along with table operations. Any accessories will also be provided shop air by tapping into the two output 1/4" tubing push-connects

The FlexCut 125 will have two barrel connectors to attach to the bulkhead. When moving your FlexCut 125, use a team lift or hoist. A 10 ft (3m) power cord is provided with the FlexCut 125. Three Phase Input Only. Connect green lead to ground per National Electric Code.
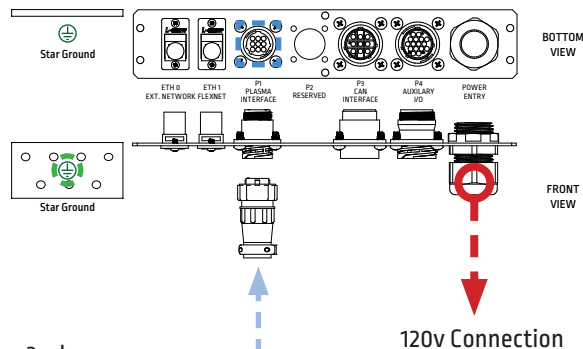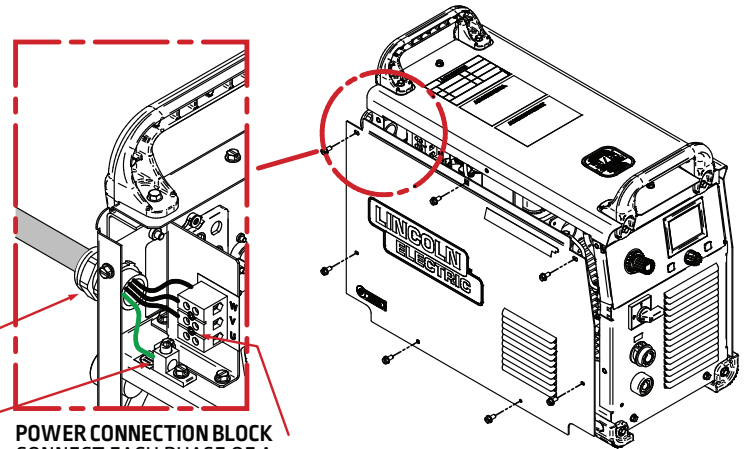
For further information, please reference the FlexCut 125 user guide - IM10300.

Connect black, red and white leads to power. In all cases, the green or green/yellow grounding wire must be connected to the grounding pin of the plug, usually identified by a green screw. Attachment plugs must comply with the Standard for Attachment Plugs and Receptacles, UL498. The product is considered acceptable for use only when an attachment plug as specified is properly attached to the supply cord.

INPUT CORD STRAIN RELIEF
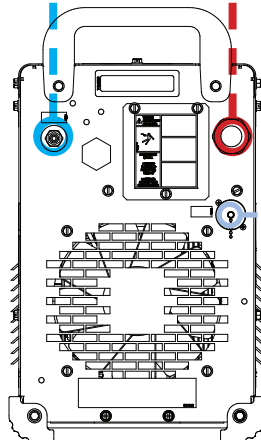ROUTE INPUT CORD THROUGH RELIEF AND TWIST NUT TO TIGHTEN

GROUND CONNECTION
CONNECT GROUND LEAD PER LOCAL AND NATIONAL ELECTRIC CODE

POWER CONNECTION BLOCK
CONNECT EACH PHASE OF A THREE PHASE CONDUCTOR HERE

Star Ground

ETH 0 EXT. NETWORK | ETH 1 FLEXNET | P1 PLASMA INTERFACE | P2 RESERVED | P3 CAN INTERFACE | P4 AUXILARY I/O | POWER ENTRY

BOTTOM VIEW

FRONT VIEW

Star Ground

120v Connection

Air or Gas Inlet (1/4" Female Quick Connect) from bulkhead:

3-ph Main Power

CNC Interface Cable

Main Power Switch

Torch Lead

Work (ground) Connection to Star
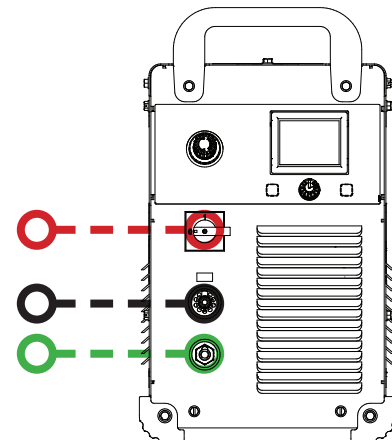
FlexCut 125 Back

FlexCut 125 Front

The FlexCut 200 is liquid cooled and is supplied with the FlexCool 35. For complete instructions on the FlexCut 200 and the FlexCool 35, see their corresponding user guides - FlexCut 200 - IM10422, FlexCool 35 - IM10423

Unpacking the FlexCool 35:

The packaging of the cooler is designed to withstand shipping abuse. If any shipping damage has occurred, contact your certified Lincoln distributor or service center. When unpacking the unit, avoid thrusting sharp objects through the carton, which may damage the machine. Below is the recommended procedure for unpacking the cooler:

1. Cut and remove banding straps around skid and carton
2. Remove carton
3. Cut and remove banding straps around skid and cooler
4. Remove cooler, literature, and other items

Save the instruction manual and service directory supplied with the FlexCool 35 for parts orders and future maintenance service.

Mounting the FlexCool 35 underneath the FlexCut 200:

The FlexCool 35 can be mounted underneath the FlexCut 200 machine or by itself on a flat surface. No power source should ever be installed underneath the FlexCool 35.

Securing the FlexCut 200 to the FlexCool 35:

1. Begin by setting the FlexCool 35 on a hard flat surface.
2. Remove the two 7/16" bolts and the locking bracket from the front mounting bracket.
3. Lift the FlexCut 200 and place it on top and slightly forward of the FlexCool 35.
4. Carefully guide the FlexCut 200 so that the quick lock feet on the bottom of the power source slide into the channels of the mounting brackets on top of the FlexCool 35. Be sure all 4 feet are within the channels.
5. Slide the FlexCut 200 all the way back so that it is sitting exactly overtop of the FlexCool 35. The feet should be all the way at the back of the channels.
6. Replace the locking bracket into the front mounting bracket of the FlexCool 35. Torque both 7/16" bolts to 50 in-lbs.

Filling the Coolant Reservoir:

USE ONLY LINCOLN ELECTRIC TORCH COOLANT - BK500695

1.5 gallons of coolant are preloaded into the machine at the facility for live fire testing.

Pour 0.75 gallons (2.84 liters) of coolant into the coolant reservoir fill hole through a funnel.

Use the coolant purge command in the machine UI menus to help prime the system.

While priming, add additional coolant to keep the reservoir full. The cooler is "FULL" when the coolant lies just below the coolant reservoir opening.

Be certain to replace the reservoir fill cap when the reservoir is full. Operation of the FlexCool 35 without the reservoir cap can cause unnecessary contamination and could be hazardous to others. See the FlexCool 35 manual for complete instructions and safety precautions.
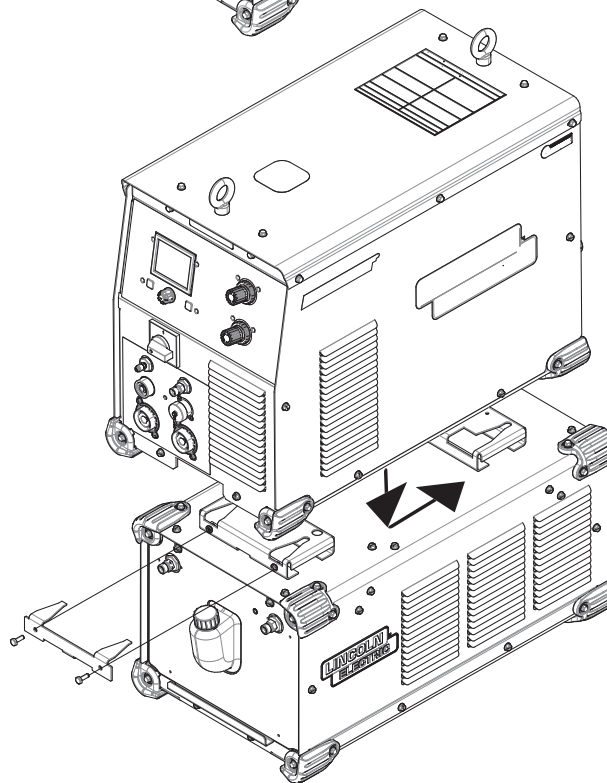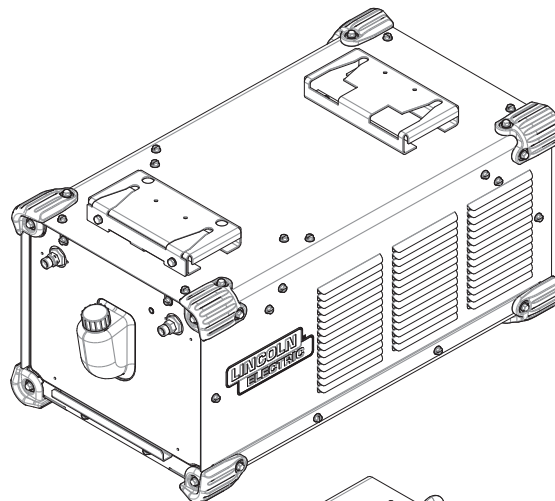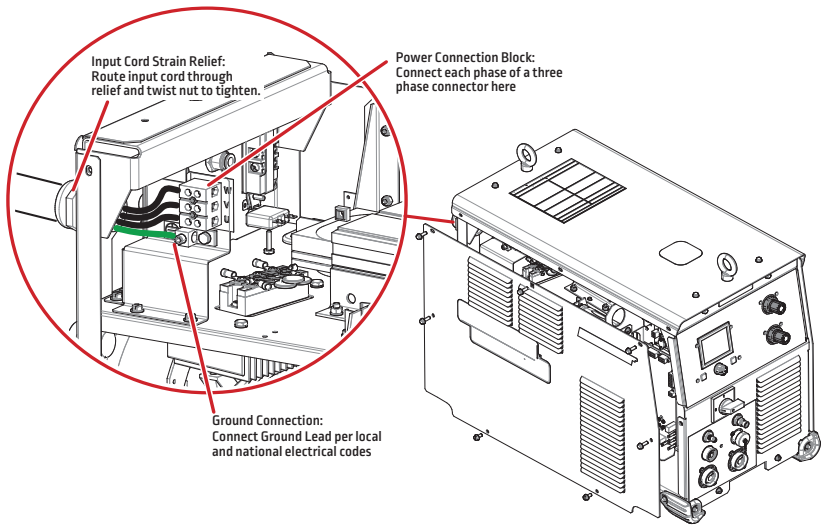
The FlexCut 200 does not come with an SO cord installed for the main power connection. Use a   three-phase supply line. A 1.75 inch (45 mm) diameter access hold for the input supply is located on the case back.
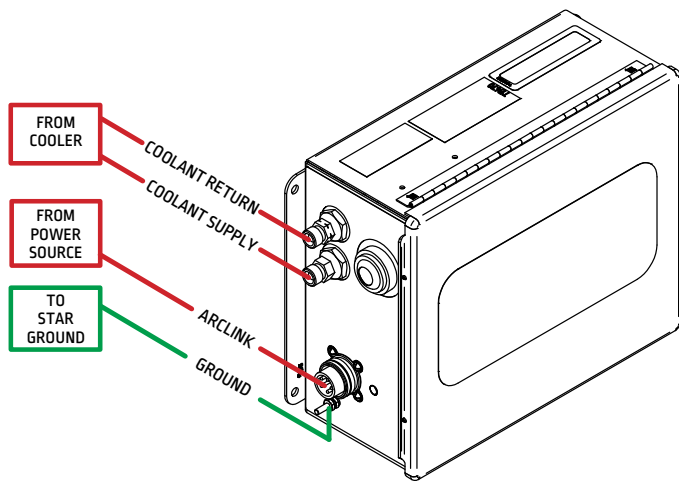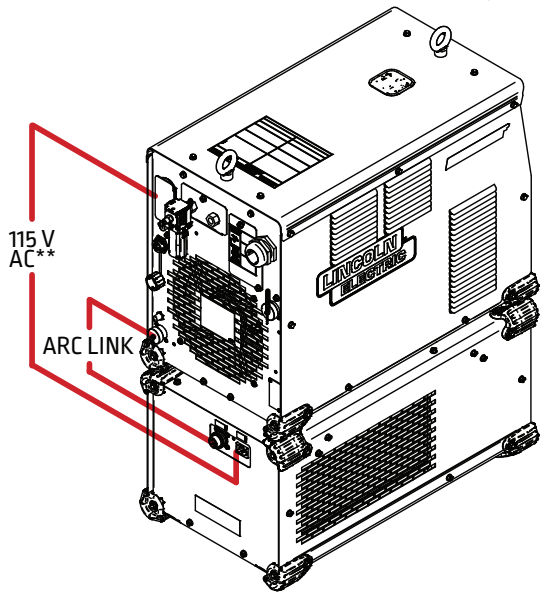
Connect L1, L2, L3 and ground per connection diagrams and National Electric Code.

To access the input power connection block, remove the seven screws and the left case side of the machine as shown.

Input Cord Strain Relief: Route input cord through relief and twist nut to tighten.

Power Connection Block: Connect each phase of a three phase connector here

Ground Connection: Connect Ground Lead per local and national electrical codes

Connections between the FlexCut 200 and FlexCool 35:

1. Connect the 115v from the FlexCool 35 to the 115v connection on the back of the FlexCut 200.
2. Connect the ARCLINK cable from the FlexCut 200 to the FlexCool 35.
3. The two coolant supply lines from the FLEXSTART box will be   coming out the cable carrier. Attach the supply lines to the FlexCool 35.
4. On the gantry by the FLEXSTART box, remove the zip tie and connect the two hoses and ARCLINK barrel connector to the FLEXSTART.

115 V AC**

ARC LINK
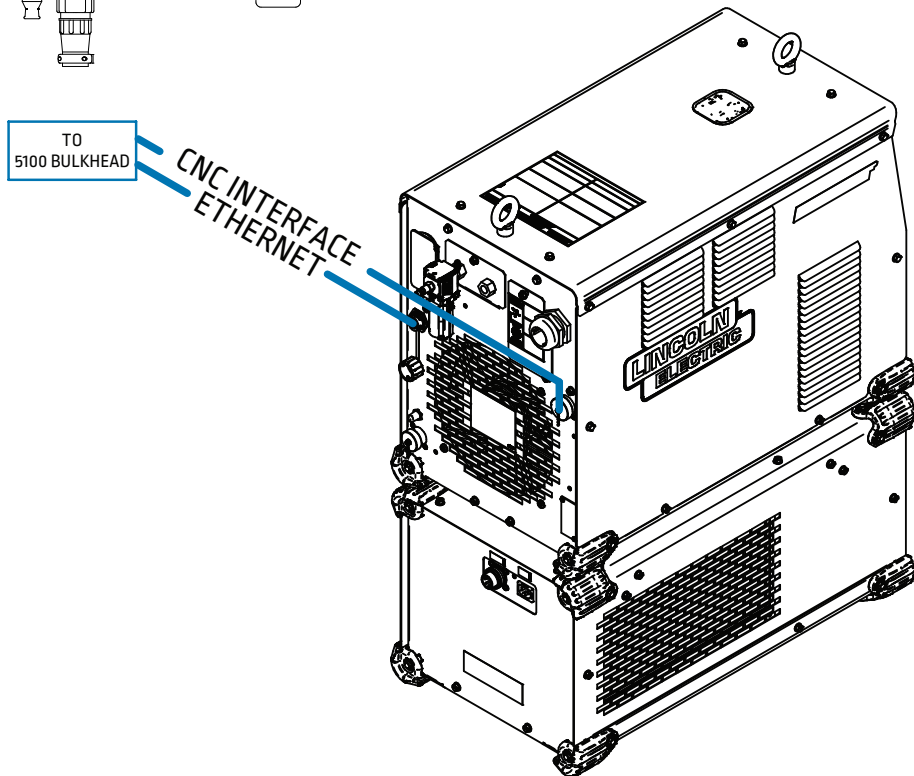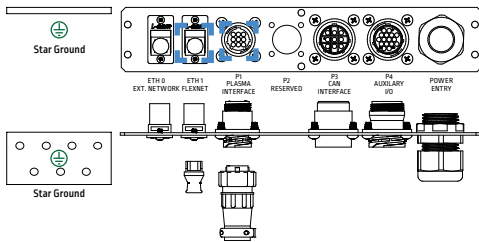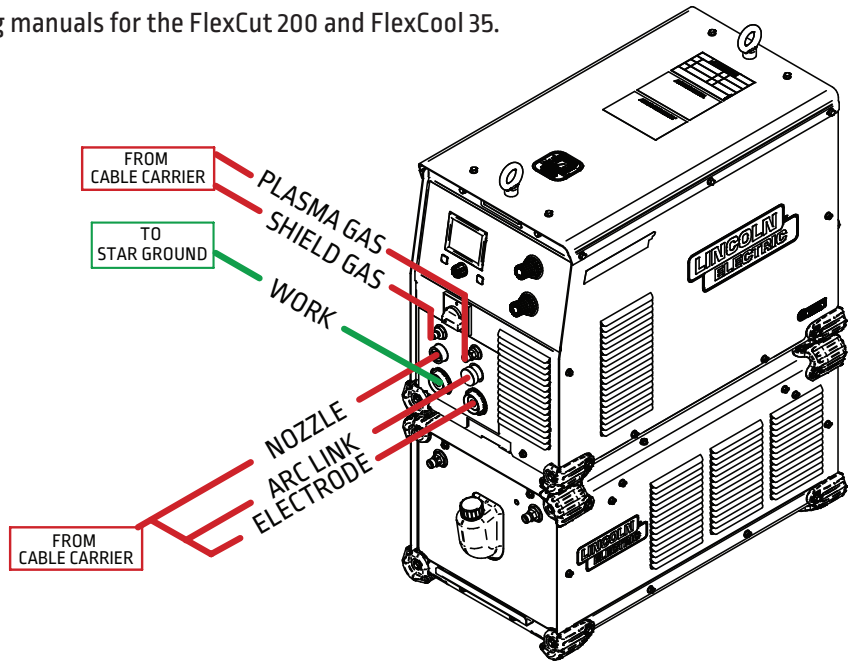
FROM COOLER

COOLANT RETURN

COOLANT SUPPLY

FROM POWER SOURCE

TO STAR GROUND

ARCLINK

GROUND

FLEXSTART boxes are mounted to the gantry on the 5100. Hoses and cables are run into the cable carrier.

TO FLEXSTART

COOLANT RETURN

COOLANT SUPPLY
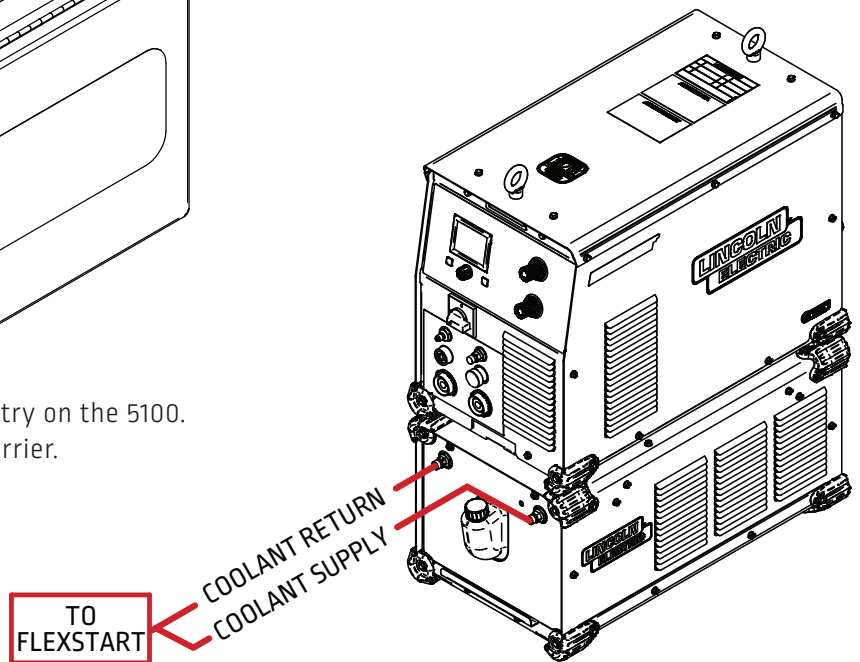
Connections between the FlexCut 200 and FlexCool 35:

1. From the cable carrier, connect the PLASMA GAS and SHIELD GAS to the FlexCut 200.
2. Attach the Plasma connections from the cable carrier to the nozzle, ARCLINK, and electrode.
3. Connect the WORK to the STAR GROUND BLOCK on the machine.
4. Connect the CNC interface cable to the BULKHEAD P1 and P2.
5. Connect the ETHERNET connector to the back of the FlexCut 200. Attach the other end to the ETH1 port to the Fiber Optic box. Attach the fiber optic and power cable to the converter box.

For full wiring instructions, see the corresponding manuals for the FlexCut 200 and FlexCool 35.

FROM CABLE CARRIER

PLASMA GAS
SHIELD GAS

TO STAR GROUND

WORK

FROM CABLE CARRIER

NOZZLE
ARC LINK
ELECTRODE

Star Ground

ETH 0 EXT. NETWORK FLEXNET | ETH 1 | P1 PLASMA INTERFACE | P2 RESERVED | P3 CAN INTERFACE | P4 AUXILARY I/O | POWER ENTRY

Star Ground

TO 5100 BULKHEAD

CNC INTERFACE
ETHERNET

Unpacking: FineLine 170HD / 300HD

The 5100 with the FineLine HD systems will be professionally installed at a customers location. Due to the weight of the power supplies, 700lbs+, there are requiremnts that need to be met when handling the equipment. For complete instructions, see the FineLine Operators Manual.

The FineLine 170HD and Fineline 300HD should be lifted by a forklift, pallet jack or crane. In order to prevent damaging the Power Supply when lifting with a forklift or pallet jack, the forks should be of adequate length to protrude on the far side of the Power Supply.

If lifting by lifting eye, ensure the following:

- Material handling equipment must comply with local and national laws and regulations. The personnel involved in the move must be properly trained and qualified to use such equipment.

- All power supply covers must be securely installed.

- Lift slowly -*not more than 8 in. [203.2mm] high*- to ensure even weight distribution.

- Move slowly to prevent uncontrollable acceleration/deceleration.

Unboxing and Leveling

1. Place the FineLine Power Supply on a flat and level surface.

2. Remove the wooden crate and plastic bag surrounding the Power Supply.

3. Remove the rear input cover to find the operator's manual and accessories.

4. Remove the eight screws and washers and four mounting plates between power supply and skid.

5. Lift the machine off of the skid.

6. With the machine properly lifted and secured, carefully thread each leveling foot in place while keeping the jam nut between the foot and the base. Be careful not to cross thread the feet and be sure the threads are fully engaged with the base. Roughly adjust all four feet to the same desired height.

7. Set the machine on the floor, adjust the feet to level the machine, and then tighten the jam nut against the base to lock their position.

Lifting Eye

Tighten to Lock Position

Height Adjustment
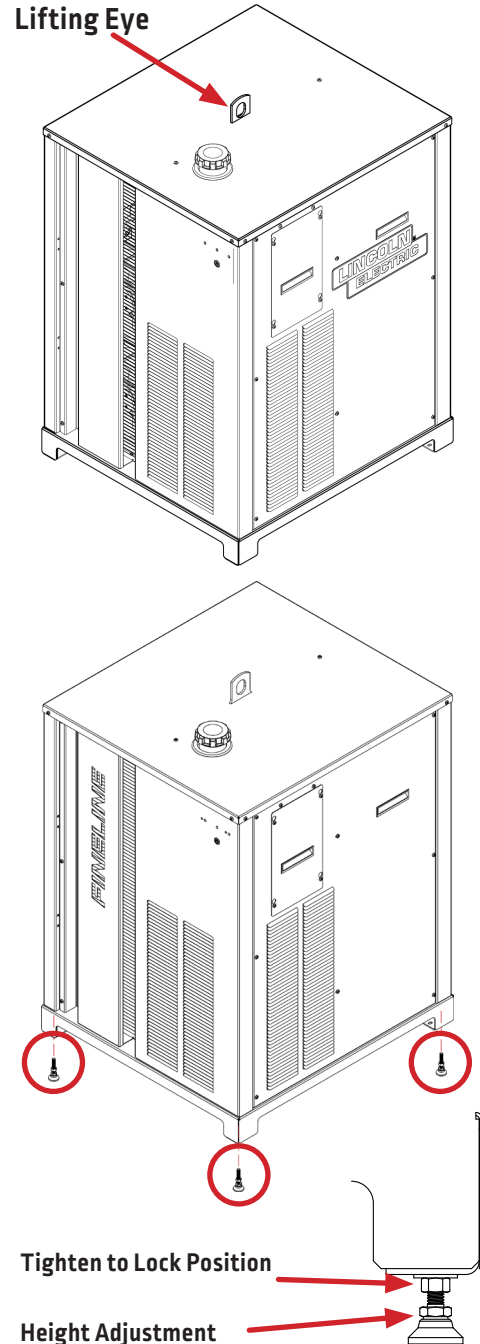
Technical Support | On-Site Service

Lincoln Electric Cutting Systems provides a number of technical support opportunities with the purchase of your new Torchmate 5100 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.

- **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.

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 obtain a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 (free download available at https://www.aws.org/standards/page/ansi-z491), or purchase CSA Standard "Safety in Welding, Cutting and Allied Processes," CSA Standard W117.2 (https://www.cwbgroup.org/store/codes-standards/csa-w1172-2019-safety-welding-cutting-and-allied-processes).

- BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR PROCEDURES ARE PERFORMED ONLYBY 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 under any circumstances. Use suitable clothing, including gloves made from durable, flame resistant material.
- 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 in good condition. Take extra care when the workplace 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.

FOR ELECTRONICALLY POWERED 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, all local codes and the manufacturer's recommendations.
- Turn off input power using the disconnect switch at the fuse box before working on the equipment and comply with lock out/tag out procedures.

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 adequate 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 ventilation is 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 must 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 the 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 ensure breathing air is safe. Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.

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 and/or cancer.

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 and/or cadmium from lead or cadmium-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 factors that include: how often you do this type of work, the duration of the work, the metal alloy(s) being worked and the composition, and the number and types of other operations taking place in the work area. To reduce your exposure to these chemicals; work in a well ventilated area, and work with approved safety equipment, such as respiratory protection approved for the contaminants present and their airborne concentrations.

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 ensure that flammable and/or toxic vapors from substances inside have been completely removed. 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 (https://pubs.aws.org/p/232/f411999-recommended-safe-practices-for-the-preparation-for-welding-and-cutting-of-containers-and-piping-historical).
- 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 cablesm, 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 Fire 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 must be located away from areas where they may be struck or subjected to physical damage.
- They must be 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, "Standard for Safe Handling of Compressed Gases in Cylinders,"available from the Compressed Gas Association, 1235   Jefferson Davis Highway, Arlington, VA 22202. (https://portal.cganet.com/Publication/Details.aspx?id=P-1).

AIR LINES UNDER PRESSURE:
- Some tools use compressed air or gas. Flexible tubing (lines) bring the pressurized air and gas to the machine. Inspect all lines prior to machine operation. Damaged lines should be replaced prior to operation.
- Hot sparks, flying debris, or wear can melt, burn, or puncture these lines and cause damage to the operator.
- Route air and gas lines to keep away from traffic and from underfoot.

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, which 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

PLASMA ARC can cause serious injury or death:

- Keep your body away from the 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.

HOT MATERIAL:

- Plasma cutting uses an electric arc that can reach temperatures of 45,000°F (25,000°C). Oxygen-fuel cutting flames can reach up to 6330°F (3500°C). Any parts and scrap will be hot after cutting.
- Use proper tools and wear heat-sheilded protective gloves in good condition when handling recently cut material.
- Allow proper cooling time prior to parts being handled.

ELECTRIC AND MAGNETIC FIELDS may be dangerous:

- Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMFs). Cutting or gouging current creates EMFs around torch cables and cutting machines.
- EMFs may interfere with some pacemakers and other medical implant devices, so operators who have a pacemaker should consult their physician before cutting or gouging.
- 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 and secure them with tape whenever 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

AUTOMATIC OPERATION:
- Any computer numerical control (CNC) machine may begin to operate automatically without warning. Only a trained individual familiar with the software, machine, and computer system should operate this equipment.
- All untrained persons should not work on or near a CNC machine.
- Keep the immediate area around the CNC machine clear of materials that may cause interference. Keep area clear of bystanders.
- Do not leave the CNC machine unattended while power is on to the computer, controller, or plasma power source of the system.

NOISE:
- Long exposure to noise can lead to hearing damage or loss. CNC operations, plasma arc cutting, plate marking can create noise levels that exceed safe limits. Use appropriate ear protection when operating the system
- Protect the operator and others around the system by using appropriate ear protection suited for the work environment and decible rating of the facility.
- Recommended to test the noise levels (decibles) during operation to validate excess of safe levels.

HEAVY PARTS:
- Parts of CNC machines and raw materials can be heavy. To avoid injury, get someone to help you, or use a mechanical lifter in the event material needs to be lifted or moved. When using a mechanical lifter, follow all the manufacturer's safety guidelines.

FLYING DEBRIS:
- Metal cutting and marking operations create waste that can fragment and fly. Make sure you and everyone close to the CNC machine during operations has proper eye protection.

PINCH AND CRUSH POINTS:
- Pinch and crush points are those normally moving parts of machinery, like CNC machines, that can pinch, capture, crush, or sever parts of the body. Be aware of hazardous pinch and crush points.
- Never repair or adjust the machine without the controls on lock out/tag out.
- When the end of a CNC machine's travel creates a "hard stop," it creates a crush point. Keep fingers and hands away from this.
- Do not stack or store any additional items on or in contact with the CNC machine, as this can create pinch or crush points, and a falling hazard.

MECHANICAL DRIVES:
- High-speed mechanical drives made of gears, belts, and/or drive screws are used by CNC machines. Keep clear of them during operation.
- Do not attempt to service, adjust, or otherwise touch these components without first ensuring that the machine is on lock out/tag out.
- Secure any loose clothing and cables to prevent entanglement.
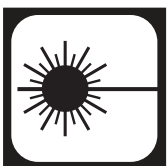
Laser Usage:
- This product contains a diode laser. Make sure to follow all safety precautions when operating.
- DO NOT look into the direct or reflected beam. This can cause eye injury up to 110 ft. (34 m) away.
- NEVER point any laser towards aircraft or vehicles; it is unsafe and illegal. The laser 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 (7.3 km) away.
- Class 3R lasers are safe when handled carefully. DO NOT look into the beam.
- Wear appropriate eye protection when working on the installation of the laser diode.

PUBLICATIONS

Refer to the most recent vesrions of the following standards for more information:

- OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

- ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING, obtainable from the American Welding Society, 8669 NW 36 Street, #130; Miami, Florida 33166-6672

- NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

- ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018

- ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018

- AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable from American Welding Society, 8669 NW 36 Street, #130; Miami, Florida 33166-6672

- NFPA Standard 51, OXYGEN-FUEL GAS SYSTEMS FOR WELDING, CUTTING AND ALLIED PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269

- NFPA Standard 70, NATIONAL ELECTRICAL CODE, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269

- NFPA Standard 51B, CUTTING AND WELDING PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269

- CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202

- CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING, obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3

- NWSA booklet, WELDING SAFETY BIBLIOGRAPHY obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103

- ANSI Standard Z88.2, PRACTICE FOR RESPIRATORY PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018

Table Specifications

Input Power

- 120V / 1Ph / 15A / 60Hz (table and computer)
- 380-600V / 3Ph / 50-60Hz (Plasma Power Supply specific)

Machine Size

- 60″ x 120″ (1524mm x 3048mm) Cutting Area
- 113.5″ x 167″ (2895.6mm x 4241.8mm) Footprint

Traverse Speed

- 1,500 ipm (0.635 mps)

Cut Speed

- Up to 450 ipm

Plate Capacity

- Holds Up To 4″ (102mm) 5'x10' (1524mm x 3048mm) Mild Steel

Weight

- 4400 lbs (1995.8 kg) - Water Table
- 5200 lbs (2358.7 kg) - Downdraft Table

Operating Temperature

- 32-104° Fahrenheit (0-40° Celsius)

Motors

- Servo Motors Fitted with Rotary Glass Encoders

Drive System

- Helical Gear Rack and Hardened Pinion with Lubrication System

Linear Guidance

- Profile Linear Rail

Acceleration Rate

- 0.08g (0.06g Bevel)

Deceleration Rate

- 0.08g (0.06g Bevel)

Input Pneumatics

- Minimum 115PSI Supply Pressure
- Volume - 7 SCFM (420 SCFH) @ 90PSI

Height Control

- Ohmic Sensing
- Automatic Torch Height Control
- 6.75″ Z-axis Travel

Bevel Capabilities (optional FC125/FC200)

- +/-45° Rotation (dependent on material thickness and power supply configuration)

Software

- Easy-To-Use Lincoln Electric User Interface
- CAM with Irregular Part Nesting
- Popular Shape Library

Fume Extraction (Optional Accessory)

- 61,801 ft³/hr or 1,750 m³/hr minimum
- Automatic Filter Cleaning, Pressure Controlled

Downdraft Configuration

- Multiple Zones Controlled By Motion Controller

Safety

- Dual-Channel Safety System Supporting Emergency Stop Switch
- Safety System Extended To External Peripherals
- External Drive Power On Switch

Warranty

- *1 Year Warranty

TORCHMATE 5100 CNC PLASMA SYSTEMS	FlexCut 125	FlexCut 200	FineLine 170HD	FineLine 300HD
PRODUCTION CUTTING CAPACITY				
Mild Steel	1″ (25mm)	1.25″ (32mm)	1.25″ (32mm)	1.75″ (45mm)
Stainless Steel	3/4″(20mm)	3/4″(20mm)	1″ (25mm)	1.25″ (32mm)
Aluminum	5/8″(16mm)	3/4″(20mm)	1″ (25mm)	1″ (25mm)
CUTTING SPEED @ RATED OUTPUT CURRENT				
1/4″ MS	210 ipm @125A	200 ipm @200A	230 ipm @ 170A	230 ipm @ 200A
1/2″ MS	88 ipm @125A	110 ipm @200A	120 ipm @ 170A	135 ipm @ 275A
1″ MS	32 ipm @125A	40 ipm @200A	50 ipm @ 170A	70 ipm @ 300A
PROCESS AMPS	20A - 125A	15A - 200A	10A - 170A	30A - 300A
CUTTING GAS				
Mild Steel	Air / Air	Air / Air Oxygen / Air	Oxygen / Air Oxygen / Oxygen	Oxygen / Air Oxygen / Oxygen
Stainless Steel	Air / Air Nitrogen	Air / Air Nitrogen	Air / Air Air / Nitrogen H17/Nitrogen	Air / Air Air / Nitrogen H17/Nitrogen
Aluminum	Air / Air	Air / Air	Air / Nitrogen	Air / Nitrogen
INPUT VOLTAGE	380/400/415V3Ph50/60Hz	380/460/575V3Ph50/60Hz	380-415/460/575V/3Ph/50/60Hz	380-415/460/575V/3Ph/50/60Hz
	460V 3Ph 50/60Hz	400V3Ph 50Hz (CE)	380-415/3Ph/50/60Hz (CE)	380-415/3Ph/50/60Hz (CE)
	575V 3Ph 50/60Hz			

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 placement of the machine, the availability of power, an EMI ground, compressed air, other input gases, 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.

·   Side 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.

5100

14" Duct, Downdraft
Models Only

15' Power Cord, NEMA 5-15P
Shop Air Supply
Earth Ground (provided by customer)

Incoming AC power
for Plasma Cutter
Shop air supply

FlexCut
Plasma
(within 10' of cable carrier)

167"

Load From
This Side

Operator
Console

113.25"
MAINTAIN WORK AREA
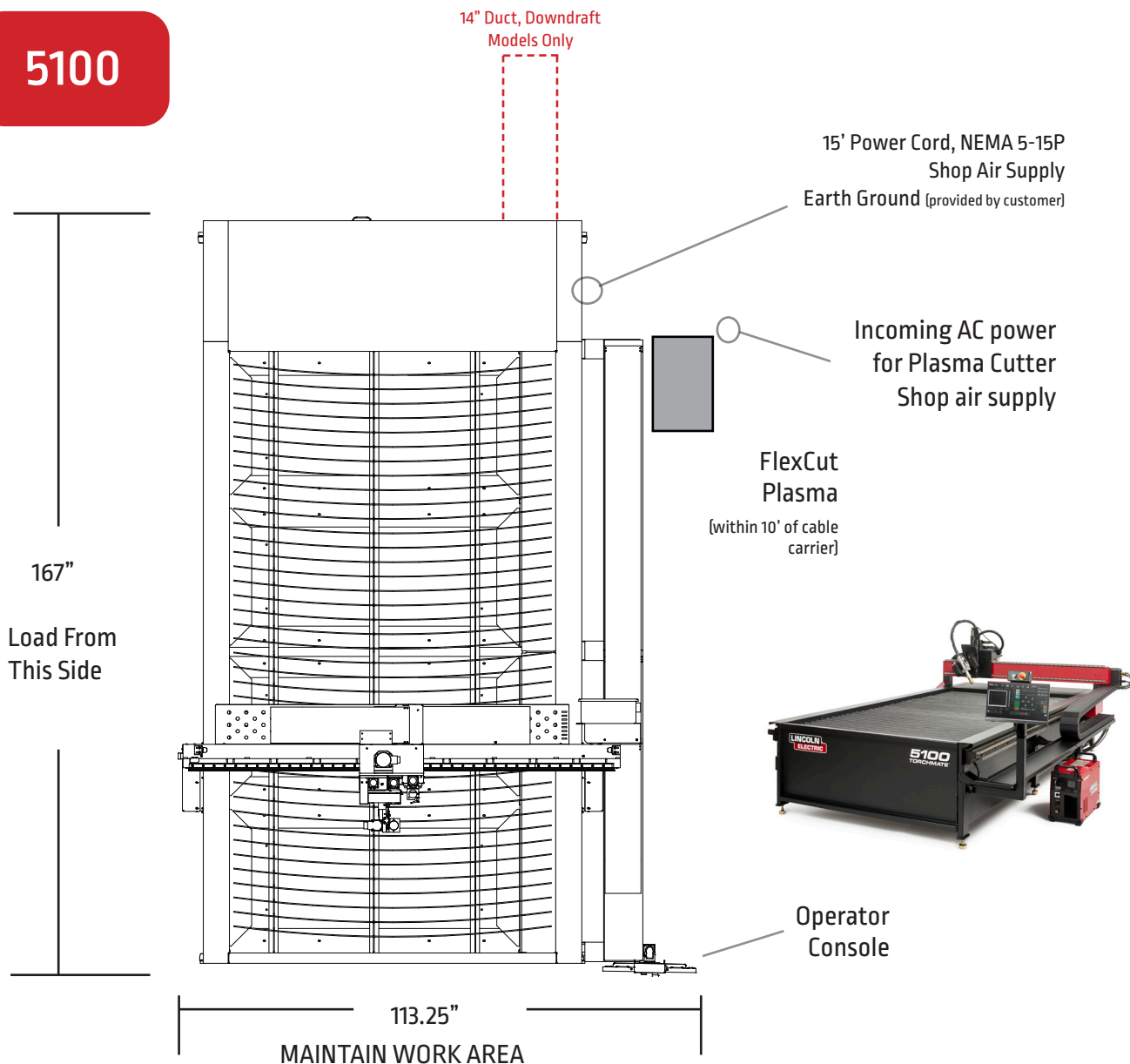
Site Preparation - HD

Lincoln Electric FineLine® High Definition Power Supplies have a larger power box and a gas controller to mix several different types of gases utilized in HD plasma cutting. The placement of these products with the 5100 must be within 6' of the cable chain's end. This also determines the location of incoming power to the FineLine plasma cutter, and the termination of gas leads to the plasma cutter.

The FineLine plasma cutting system requires a minimum of 100% oxygen source, 100% nitrogen source, and shop air for steel and aluminum cutting. Consult the FineLine users manual for gas pressure and volume requirements.

5100 HD

14" Duct, Downdraft Models Only

15' Power Cord, Nema 5-15P
Shop Air Supply
Earth Ground (provided by customer)

Gases (provided by customer)
placed within 15' of FineLine

Incoming AC power for plasma cutter, shop air supply, and termination of gas hoses from supply

33"

FineLine Power Supply

37"

Locate power supply within 6' of table cable chain.

167"

Load From This Side

113.25"

MAINTAIN WORK AREA

Operator Console

Power, Air, Grounding Connections

Internally the 5100 comes pre-wired and ready to run. All systems are test-fired and disconnected at the facility before packaging and shipping. For shipping purposes, the plasma power supply is disconnected from the system and will require a connection to the machine once installed. The table has a single input power cord with a 120v NEMA 5-15P plug that powers the table and computer/monitor. All Connections should be made in accordance with all local and national electrical codes. Failure to do so may result in bodily injury or death.

All electrical, air, and interface connections to the machine will be off of the BULKHEAD

5100 - Table Power connections:

Attach the supplied 120v NEMA 5-15P plug into a 120vAC 15A wall outlet. This will power the electronics and table functions.

Electrical Bulkhead

Star Ground

ETH0 EXT. NETWORK | ETH1 FLEXNET | P1 PLASMA INTERFACE | P2 RESERVED | P3 CAN/E-STOP INTERFACE | P4 EXTERNAL V-F BOX | POWER ENTRY

Bottom View

Front View

1/4" O.D. Tubing Push Connect (for accessories)

1/4" Industrial Quick Disconnect to Plasma Cutter

1/4" Industrial Quick Disconnect Shop Air input

120v Power Cord 15', NEMA 5-15P
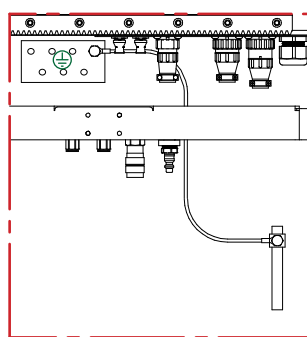
5100 - Pneumatic connections:

The 1/4" industrial quick disconnect input on the bulkhead will distribute the air for table operations. Any accessories will also be provided shop air by tapping into the two output 1/4" tubing push-connects.

The FineLine power supplies require a dedicated, 3/8 I/D hose for all inlet gas connections. Quick-connect fittings must not be used when connecting air to the FineLine power supply.

Power to Plasma:

The plasma power supply chosen requires 3-phase electrical connections and numerous other connections needed by your specific power supply to interface with the machine; consult the specific plasma power supply's user manual for more details.
Depending on the particular model plasma cutter, an input power cord may not be included.

Fuse the input circuit with the recommended super lag fuses or delay type breakers. Choose input and grounding wire size according to local or national electric codes. Using input wire sizes, fuses, or circuit breakers smaller than recommended may result in "nuisance" shut-offs from high inrush currents, even if the machine is not being used at high currents.

Connection to the supply circuit can be by means of flexible supply cables or supply cables through conduit to a permanent installation. The supply cables should have a 600 volt minimum rating and be sized according to local and national codes.

FineLine® 170HD:

Voltage	Input Ampers	Fuse (Super Lag) or Breaker Size[2]
380-415V / 3 / 50/60	69	80
460V / 3 / 50/60	58	70
575V / 3 / 50/60	53	60

FineLine® 300HD:

Voltage	Input Ampers	Fuse (Super Lag) or Breaker Size[2]
380-415V / 3 / 50/60	123	150
460V / 3 / 50/60	108	125
575V / 3 / 50/60	95	100

FlexCut® 125:

Voltage	Input Ampers	Fuse (Super Lag) or Breaker Size[2]
380-415V / 3 / 50/60	40	50
460V / 3 / 50/60	33	40
575V / 3 / 50/60	22	30

FlexCut® 200:

Voltage	Input Ampers	Fuse (Super Lag) or Breaker Size[2]
380-415V / 3 / 50/60	71	80
460V / 3 / 50/60	63	70
575V / 3 / 50/60	55	60

Ground the 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 with a short, heavy conductor wire connected to the star ground point on the machine. For proper operation of your CNC cutting tables, you must run at least a 6 AWG or matching AWG wire to the work lead from the star ground to a dedicated earth ground rod. Ground rod installations are covered by National Electrical Code.
Consult with a qualified electrical technician to verify your system grounding.
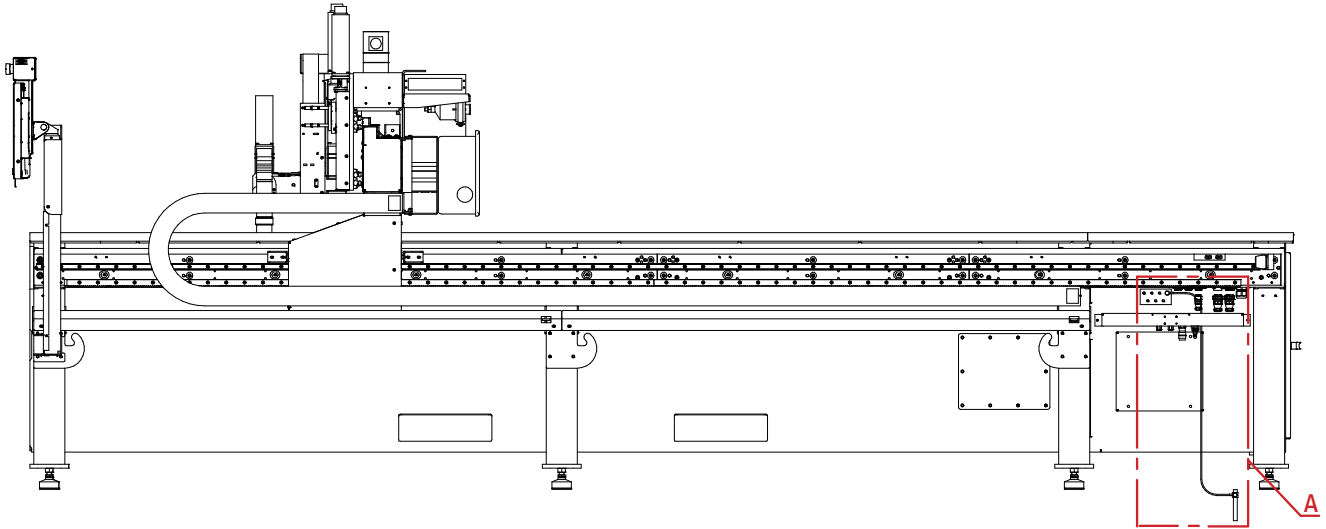
Place the FlexCut plasma unit in the appropriate location. Re-install the torch lead and the work lead into the plasma power supply.

The FlexCut plasma unit is shipped with a work lead (Ground Clamp) attached to the star ground.

The FineLine plasma unit is shipped with a factory ground included, but not attached 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.

The ground rod is not included with machine.
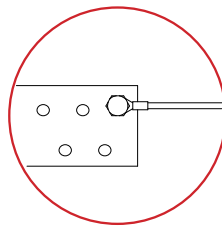
STAR GROUND
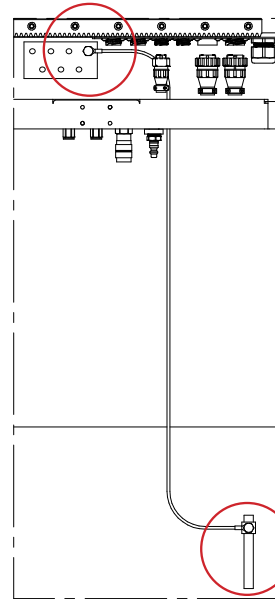
DETAIL A
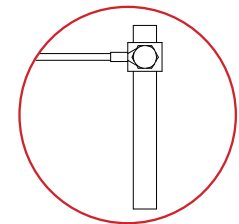
GROUND ROD

Slats and Cutting Bed

The 5100 water table/downdraft table has an array of slats inside the cutting area. These slats hold your material level for cutting. They are considered a "consumable" item and will need to get replaced on a regular schedule.

Inside the table sit an array of 69.625" x 3" x 3/16" (4.7625 mm) thickness slats that support the material being cut. After repeated cutting, generally after a year or so of normal cutting time, you will need to replace the slats. Perform the replacement when the slats can no longer support the material properly or if the build up is hindering the plate from being flat.

- The center slat support is offset, to create an ARC of slats. This makes the slats less prone to getting damaged in straight cuts, along with keeping the material from moving during cutting.

- These slats can be used on one side and flipped over to increase usage time on one set of slats.
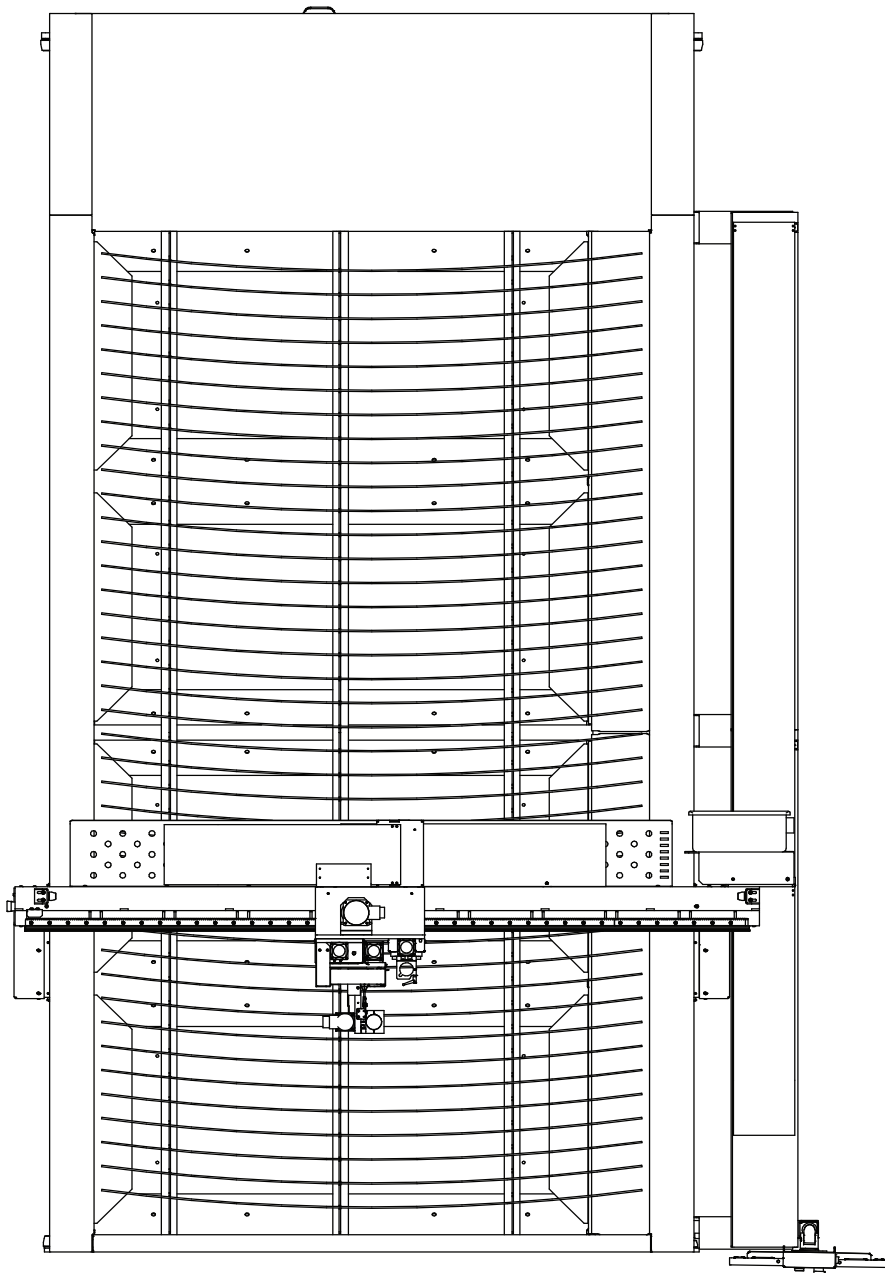
Power Up the 5100

To power up your Torchmate 5100 CNC machine, the following items need to be powered up; Machine and Plasma Unit. The machine will power the controller, computer, and touchscreen. The switch is located on the rear of the machine. The power button for the plasma power supply is located on the front of the unit.

1. Power up the machine by using the ON/Off switch. (Located at the back left of the machine)

2. The VMD Application will auto start with the computer, wait for control panel to load.

3. Verify the EMERGENCY STOP(s) are disengaged by turning the RED EMERGENCY STOP button clockwise. One on the non-cable carrier side of the gantry and one above the monitor.

4. Press the GREEN BUTTON above the Operators Console. (This will power the motors)

5. Press DATUM. (Machine will seek back left corner)

Back Left Corner (Machine Zero)

Gantry E-Stop
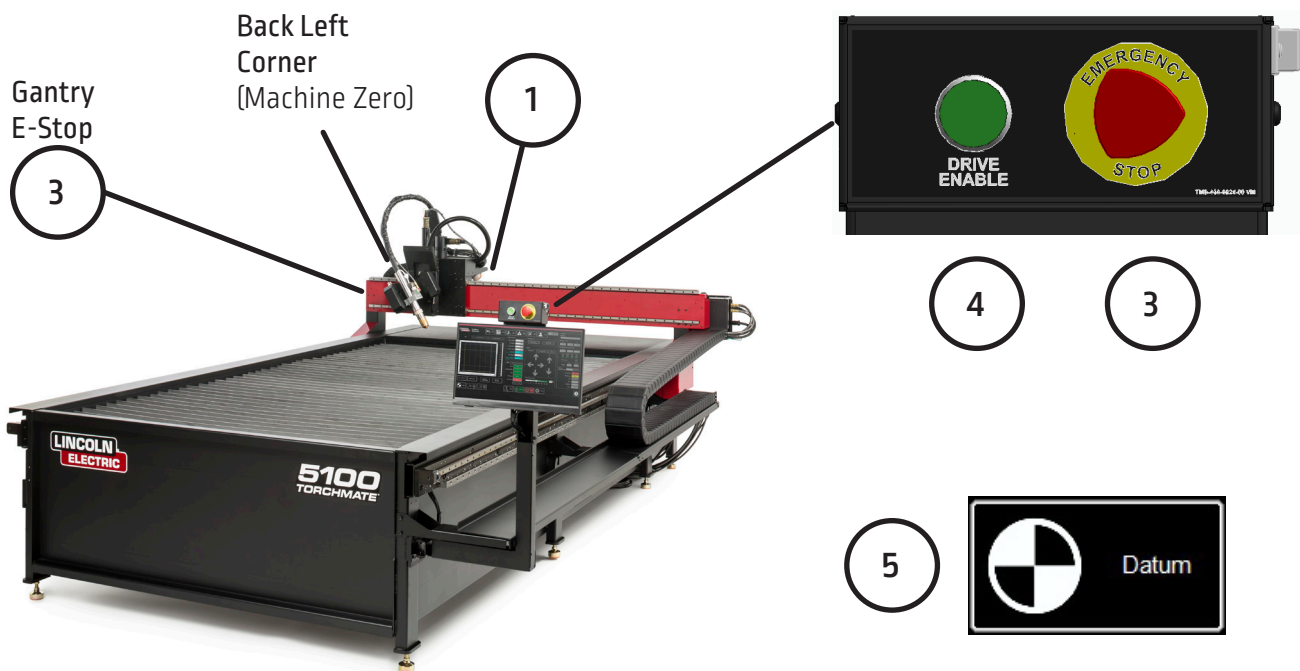
Water Table Operation

The water level is controlled in the Plate Setup menu in the VMD software to raise and lower the machine in the 5100 water table configuration.

Lincoln Electric Cutting Systems recommends PlateGuard™ Water Table Additive to maintain the water in the table. See the PlateGuard specifications for more details.

FILL / DRAIN

Table Drain

- The water table is controlled by the HMI.

- When you press RAISE WATER, compressed air is pushed into the lower chamber. This "pushes" the water up into the cutting table.

- When you press LOWER WATER, the ball valve will OPEN, releasing the compressed air from the bottom chamber. This allows the upper chamber to drain the water into the lower chamber.

- To completely drain your table, use the 2" QC ball valve in the FRONT LEFT of the table.

Water Capacity

- Torchmate 5100 models hold approximately 428 gallons, or 1,620 liters.

- PlateGuard Quantity - 35 gal.

Table Drain

Table Drain

BALL VALVE   OVERFLOW TUBE

Air IN

Water UP

WATER TABLE
LOWER CHAMBER

OVER FLOW DRAIN
[DRAINS TO FLOOR]
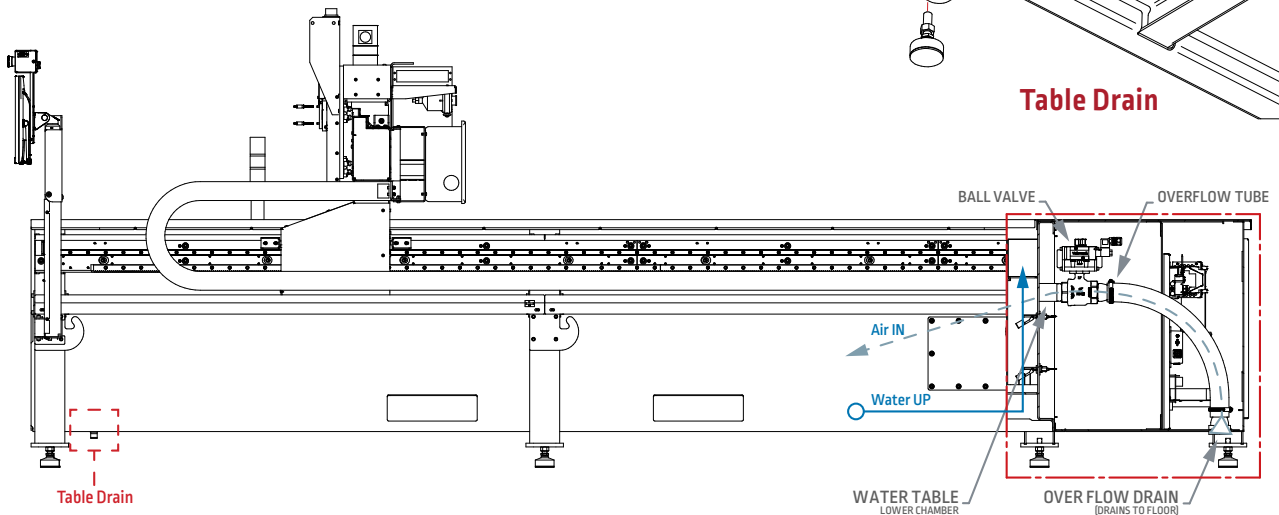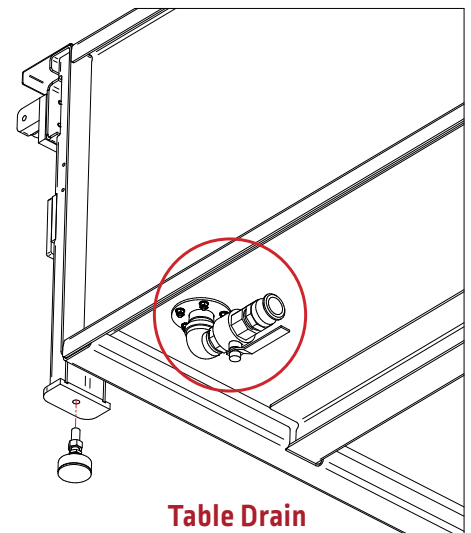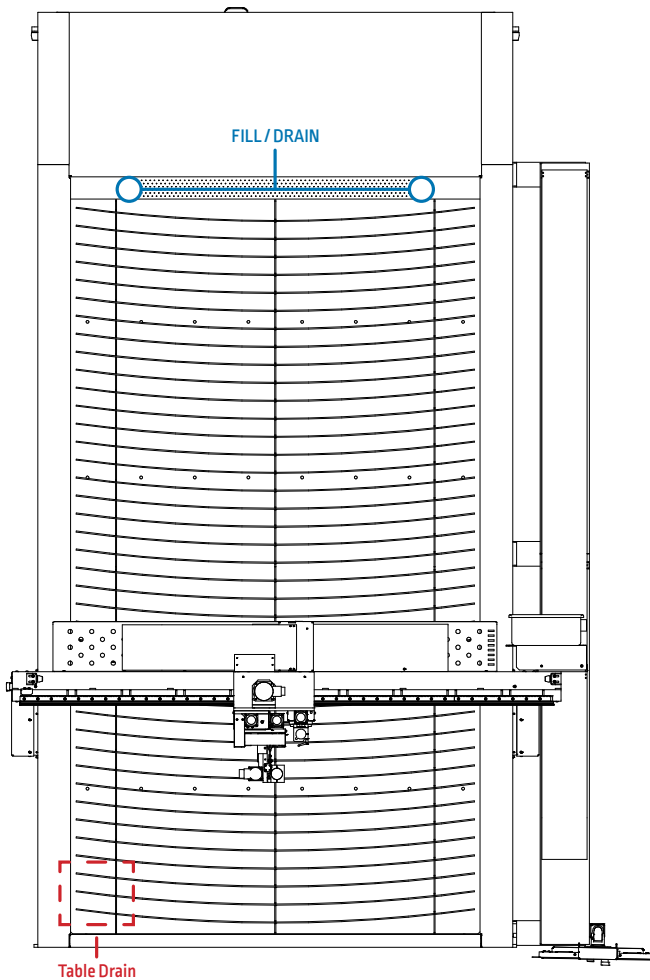
Filling the Water Table

The 5100 has an automated water level feature that is controlled in the Plate Setup menu item in the VMD software. There is a process that needs to be followed to properly fill the table to allow proper operation. Connect your air supply to the air inlet on the machine to proceed.

Step 1:

Press Log On. Select Admin (password 1234).

Press OK.
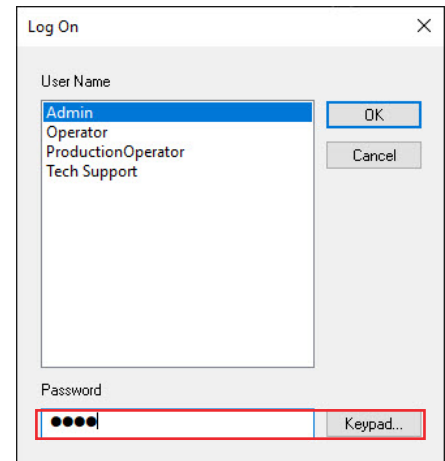
Step 2:

Configuration.wap will open.

Press the Water Fill tab.
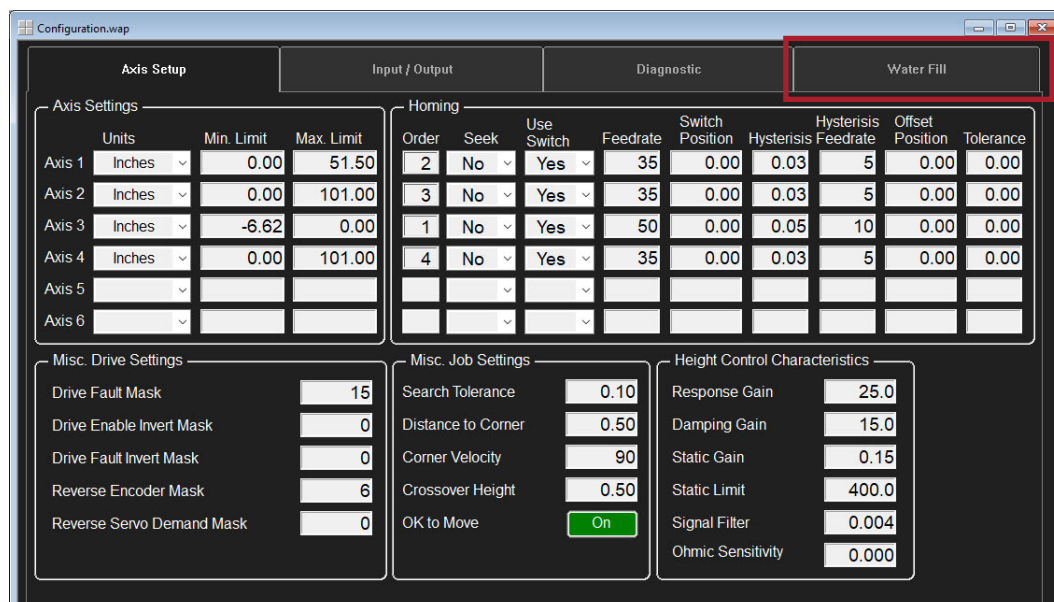
If the Machine Settings window does not open, in the upper left corner press MAIN MENU. In the SELECT A PANEL window, left click on CONFIGURATION.wap. Press OK, and the Machine Settings panel will open.

Filling the Water Table:

Press the EXHAUST button. This opens the external exhaust vent to allow the air to transfer out of the empty water tank while the water fills up.
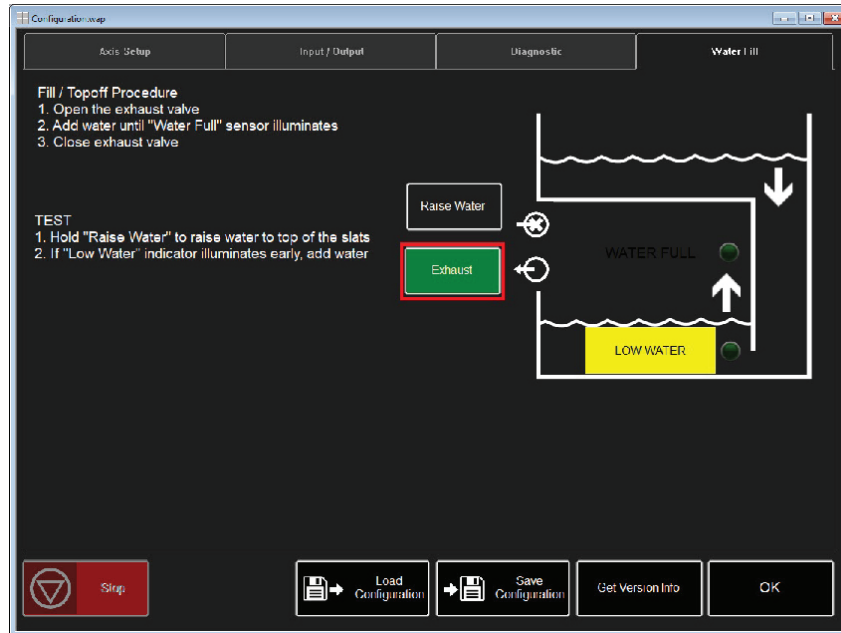
Start to fill the table with water. Once the internal tank fills past 2" in the tank, the LOW WATER indicator will no longer display.
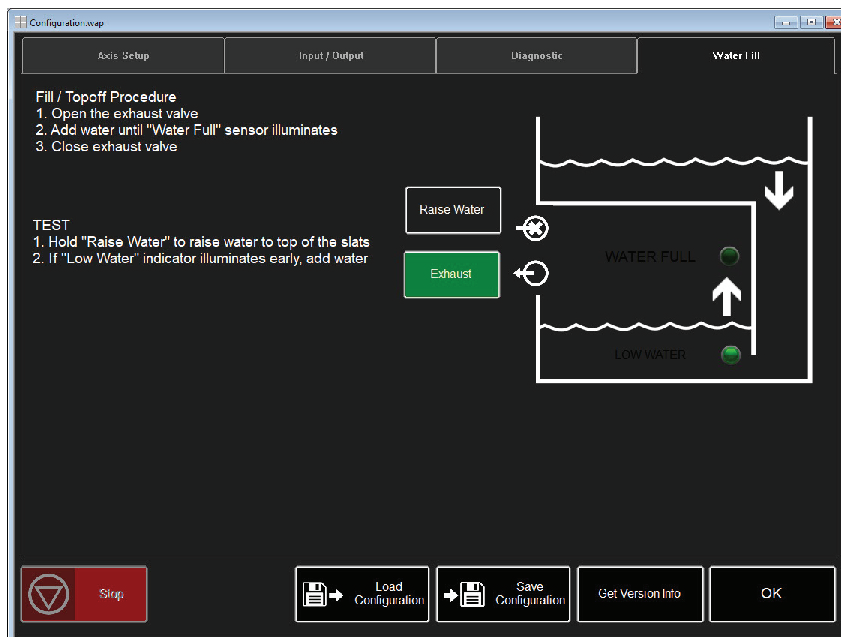
Filling the Water Table:

Once the WATER FULL indicator turns on, stop filling the water into the table.

Close the EXHAUST by pressing the EXHAUST button.
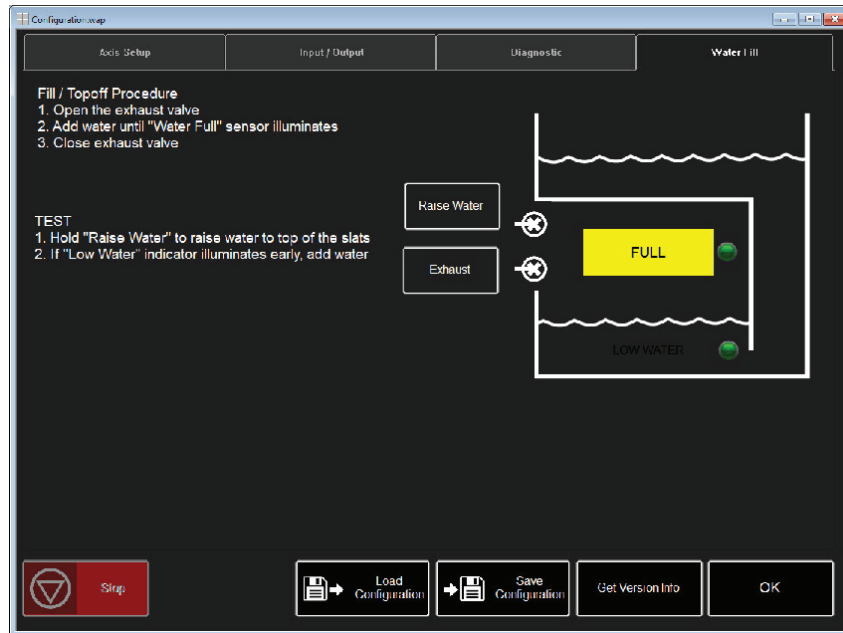
Raise the water into the main chamber by pressing and holding the RAISE WATER button. Once the water reaches the top of the slat, release the RAISE WATER button. If the water does not reach the top of the slats, then directly add water to the table to get the water level to the top of the slats. Now to control the water level function, you will use the WATER LEVEL controls in the Plate Setup menu.
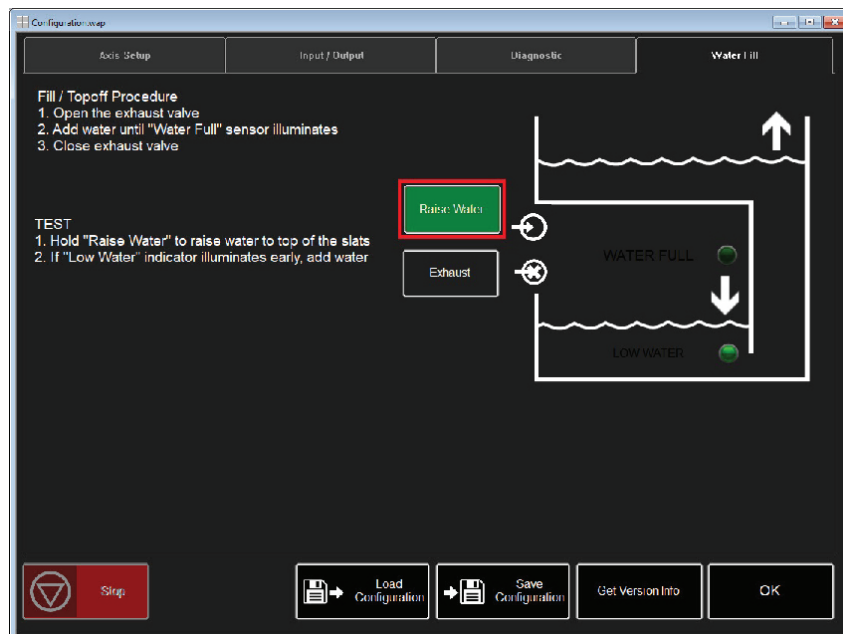
Downdraft Operation

In the downdraft configuration of the 5100, there are 4 zones that are controlled by the program. The zone that is active (open) is dependent on where the job is located in the cutting bed when Plate Origin is established.

Lincoln Electric recommends utilizing a filtration system rated for plasma cutting applications, with automatic filter cleaning to extend life between filter servicing.

OUTPUT

ZONE 4

ZONE 3

ZONE 2

ZONE 1
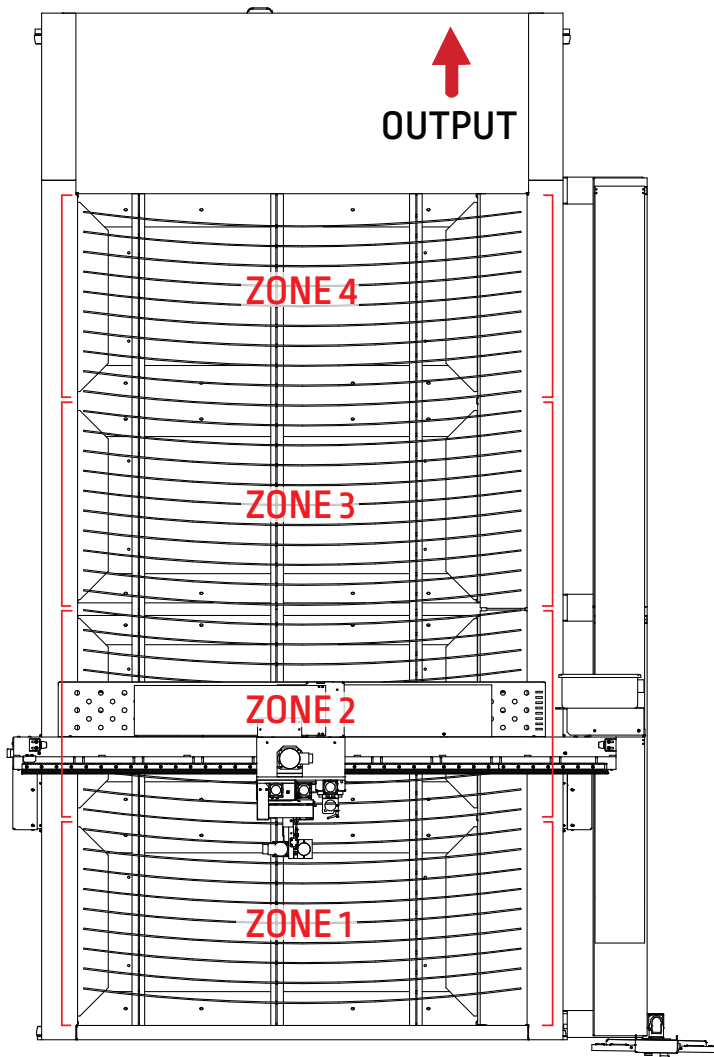
- Each zone is controlled by pneumatic actuators to open/close the dampers inside the table to allow for proper air flow. The zones will open/close based on where the parts are established on the cutting bed and the plate origin.

- If a part of a nest covers more than one zone, then multiple zones will open to allow proper ventilation.

- Output diameter connector ring is 14" diameter.

- Output air flow required for Fume Extraction
  - 61,800 ft^2/hr or 1,750 m^2/hr minimum
  - Automatic Filter Cleaning, Pressure Controlled

ZONE 1 ZONE 2 ZONE 3 ZONE 4 OUTPUT
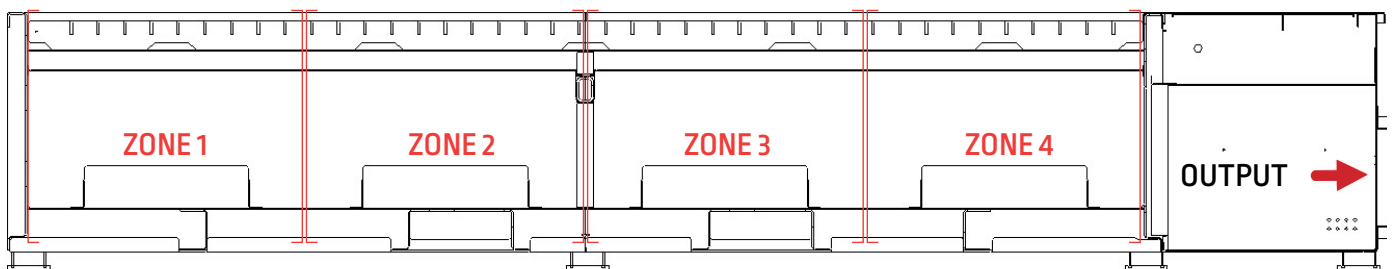
FlexCut 125 Overview

Please refer to the 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
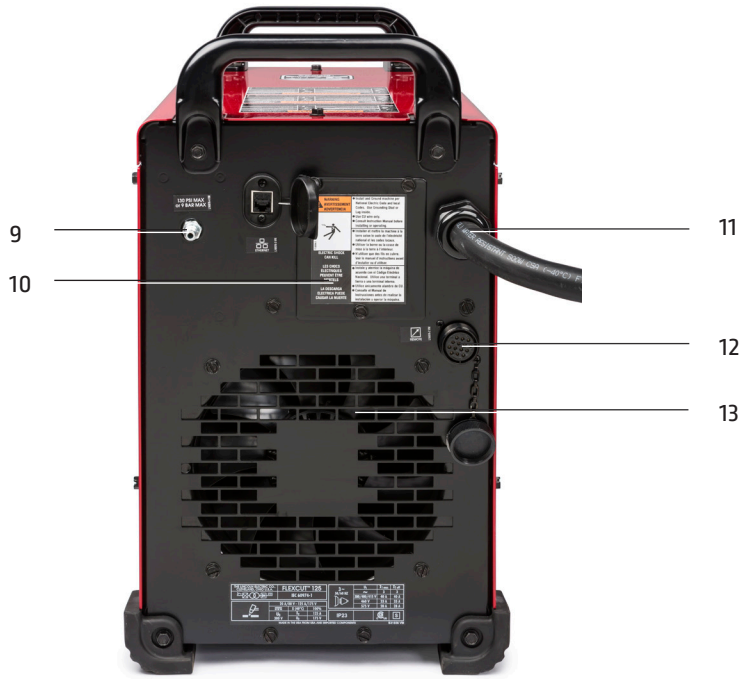
FlexCut 125 Specifications and Consumables

Please refer to the FlexCut operator's 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]

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

Please refer to the complete operation and user manual for your FlexCut 200 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. HOME BUTTON
3. MENU CONTROL KNOB/BUTTON
4. ON/OFF SWITCH
5. SHIELD GAS OUTLET
6. NOZZLE LEAD CONNECTION
7. WORK LEAD CONNECTION
8. ELECTRODE LEAD CONNECTION
9. ARCLINK CONNECTOR (5-PIN)
10. PLASMA GAS OUTLET
11. PURGE
12. SHIELD GAS REGULATOR
13. PLASMA GAS REGULATOR

BACK

14. AIR OR GAS INLET (1/4"IN. NPT QUICK CONNECT)
15. 115V/15A AUXILIARY POWER RECEPTACLE
16. 15 AMP CIRCUIT BREAKER
17. ETHERNET CONNECTOR
18. 10 AMP CIRCUIT BREAKER
19. FLEXCOOL CONNECTOR
20. INPUT CORD STRAIN RELIEF
21. CNC INTERFACE CONNECTOR
22. FAN
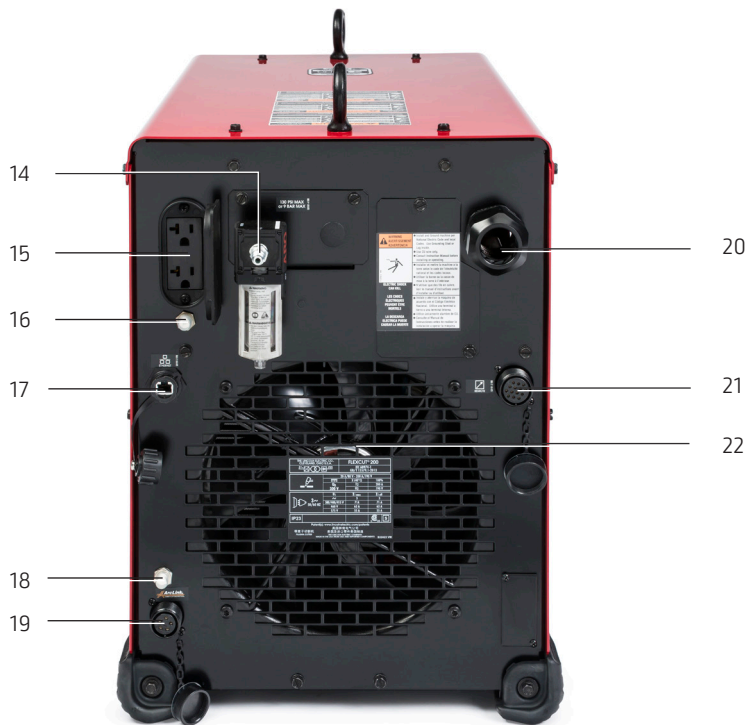
FlexCut 200 Specifications and Consumables

Please refer to the FlexCut operator's 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 200	K4812-1	380/400/415/460 /575/3/50/60	200A/300V/100%	3PH/100% 71/63/55	3PH 20-200A	90-120 PSI (6.21-8.27 Bar)	550 SCFH @90 PSI 260 SLPM @6.21 Bar	23.66. x 15.97 x 32.19 (601 x 406 x 818)	190 (86.2)

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 (BK244100-SK)

Removal Tool, Nozzle	BK277056	1 Qty
Removal Tool, Swirl Ring	BK260105	1 Qty
O-Ring Lubricant	BK716012	1 Qty
Internal Retaining Cap 50 A	BK244453	1 Qty
Internal Retaining Cap 100 A	BK244452	1 Qty
Internal Retaining Cap 150-200 A	BK244466	1 Qty
Outer Retaining Cap 50-200 A	BK244454	1 Qty
Shield Cap 50 A	BK244450	1 Qty
Shield Cap 100 A	BK244417	1 Qty
Shield Cap 150 A	BK244474	1 Qty
Shield Cap 200 A	BK244463	1 Qty
Electrode 50 A	BK244431	1 Qty
Electrode 100 A	BK244492	1 Qty
Electrode 150 A	BK244491	1 Qty
Electrode 200 A	BK244470	1 Qty
Swirl Ring 50 A	BK244442	1 Qty
Swirl Ring 100 A	BK244439	1 Qty
Swirl Ring 150 A	BK244443	1 Qty
Swirl Ring 200 A	BK244458	1 Qty
Nozzle 50 A	BK244425	1 Qty
Nozzle 100 A	BK244493	1 Qty
Nozzle 150 A	BK244489	1 Qty
Nozzle 200 A	BK244469	1 Qty

Please refer to the complete operation and user manual for your FineLine located with the plasma unit.

Press the power button on the face of the FIneLine to cycle the power.

Controls »

FRONT

1. LIFTING EYE
2. COOLENT FILL
3. STATUS LEDS
4. POWER ON/OFF BUTTON

BACK

5. FILTER ACCESS PANEL (SIDE)
6. INPUT / OUPUT ACCESS PANEL
7. INPUT POWER ACCESS PANEL
8. POWER CORD STRAIN RELIEF
9. COOLENT HOSE CONNECTORS
10. GAS SUPPLY CONNECTORS
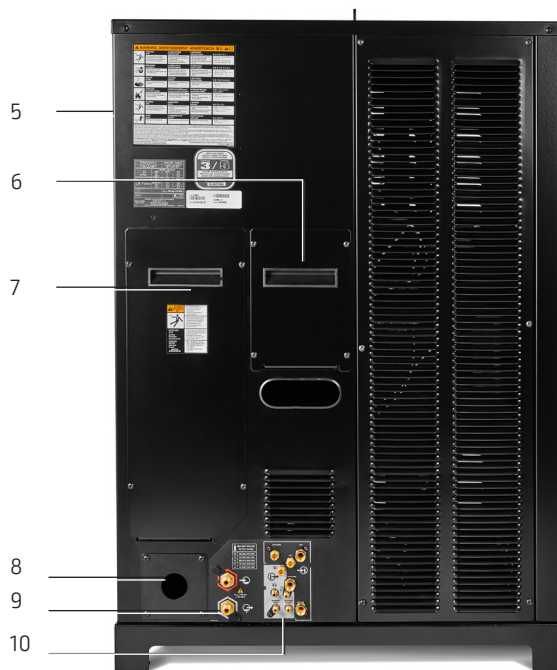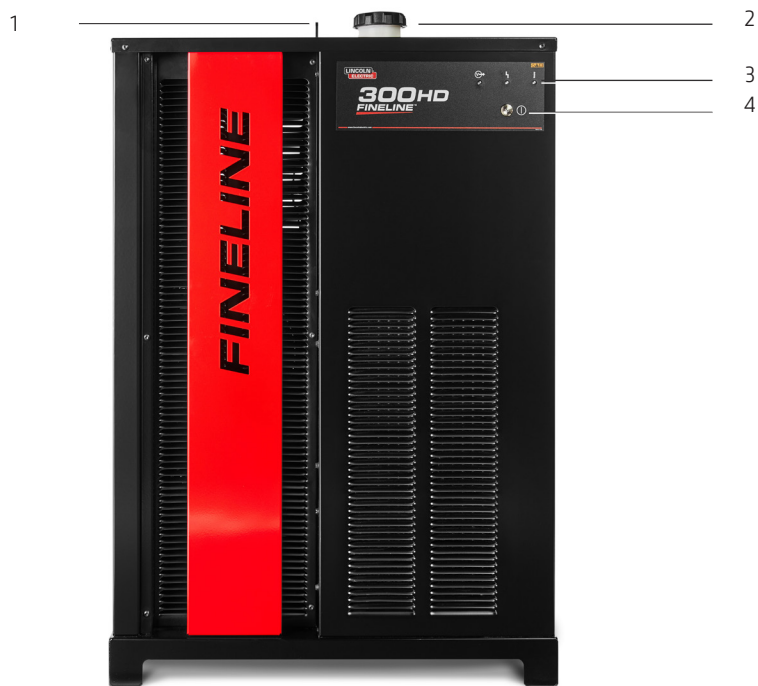
FineLine Specs and Consumables

Please refer to the FineLine operator's 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)
FineLine 170HD	K4910-1	380-415 / 460 / 575 3 / 50/60	170A / 210V / 100%	3PH / 100% 69 / 58 / 53	3PH 20 - 170A	105-145 PSI (7.6-10.0 Bar)	125 SCFH @145 PSI 3540 SLPH @10 bar	50.4 x 33 x 36.93 (1280 x 838 x 938)	700 lbs (318 kg)
FineLine 300HD	K4900-1	380-415 / 460 / 575 3 / 50/60	300A / 210V / 100%	3PH / 100% 123 / 108 / 95	3PH 20 - 300A	105-145 PSI (7.6-10.0 Bar)	125 SCFH @145 PSI 3540 SLPH @10 bar	50.4 x 33 x 36.93 (1280 x 838 x 938)	750 lbs (340.2 kg)

MECHANIZED CUT CAPACITY - MATERIAL THICKNESS MILD STEEL

Recommended cut capacity at 45ipm	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 @ 170A

1/4 in. (6.35 mm)	195 ipm
1/2 in. (12.7 mm)	105 ipm
3/4 in. (19 mm)	65 ipm
1 in. (25.4 mm)	45 ipm

CONSUMABLES STARTER KIT FOR FINELINE MACHINE TORCH (BK602631)

Removal Tool, Electrode, Socket	BK602396	1 Qty
Removal Tool, Electrode, Driver	BK277086	1 Qty
O-Ring Lubricant, 5 gram tube	BK716012	2 Qty
Retaining Cap 80 A	BK602338	1 Qty
Retaining Cap 140 A	BK602339	1 Qty
Retaining Cap 300 A	BK602369	1 Qty
Outer Retaining Cap ALL	BK602365	1 Qty
Shield Cap 80 A	BK602342	1 Qty
Shield Cap 140 A	BK602342	2 Qty
Shield Cap 300 A	BK602346	2 Qty
Electrode 80 A	BK602301	3 Qty
Electrode 140 A	BK602309	3 Qty
Electrode 300 A	BK602305	3 Qty
Swirl Ring 80 A	BK602356	1 Qty
Swirl Ring 140 A	BK602358	1 Qty
Swirl Ring 300 A	BK602360	1 Qty
Nozzle 80 A	BK602314	5 Qty
Nozzle 140 A	BK602315	5 Qty
Nozzle 300 A	BK602318	5 Qty

User Guide

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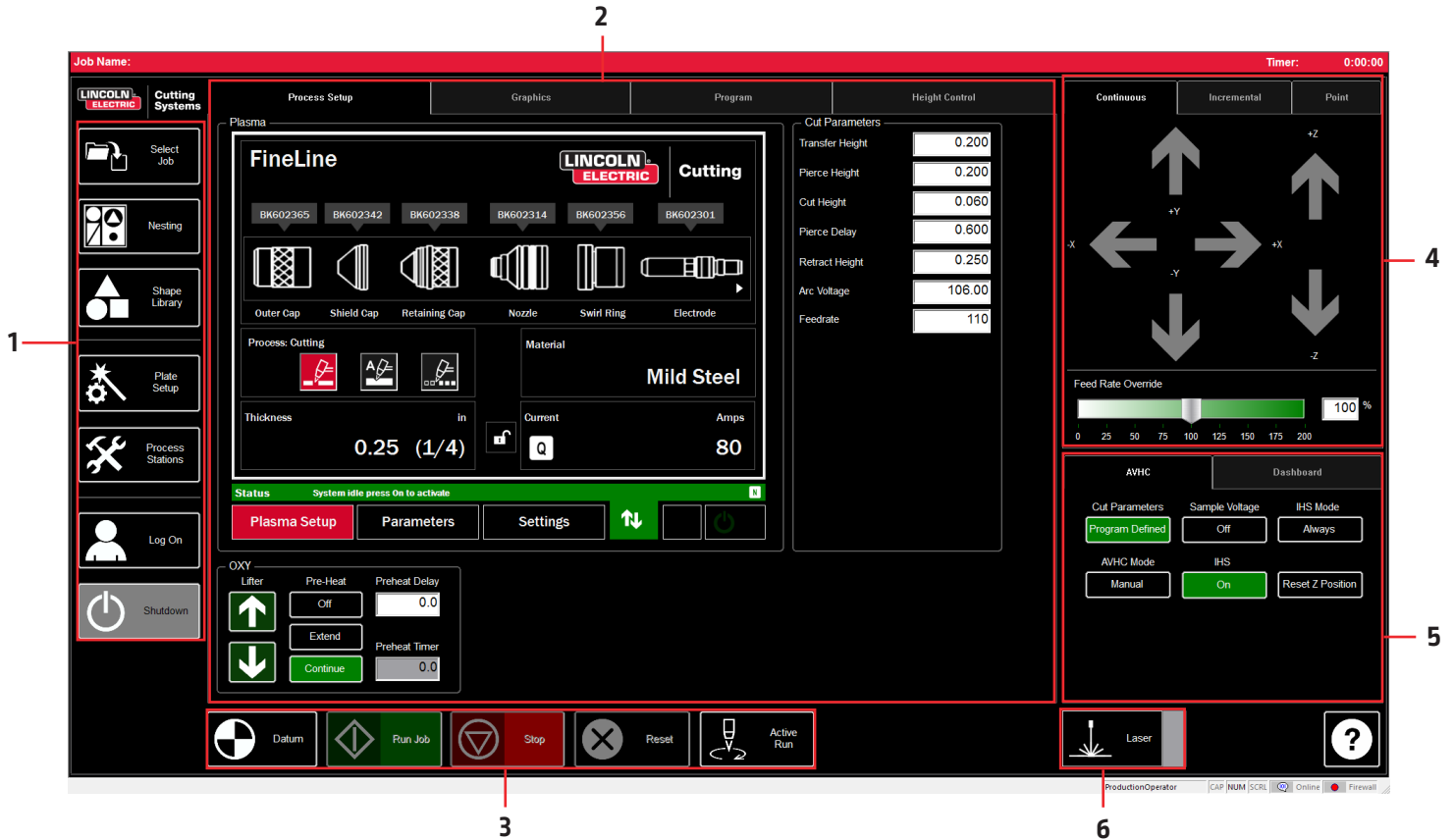
The main screen of the VMD is broken into sections for easy navigation and operation. Overview of all the buttons and functions will be covered in sections.

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, graph of the AVHC lifter station movements, and Oxy Fuel and Water Fill controls.

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:
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:
Launches the VMD Nesting program.

See the Nesting section for an overview of the features.

Shape Library:
Feature opens the dialog 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:
The options in Plate Setup allows you to make alterations to the job itself and control the water level on water table configurations.

- **ROW AND COLUMN:** Allows you to add multiples by adding numbers to generate a GRID ARRAY of the job you have selected.
- **TRANSFORMS:** \MIRROR, ROTATE, or SCALE your job.
- **MATERIAL SENSING:** 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. This setting is only utilized when cutting with IHS disabled.
- **PLATE ALIGNMENT:** Used to have the controller 'angle' the job to the skewed material on the table.
- **SET PLATE ORIGIN:** Establishes the PLATE ORIGIN.
- **GO TO PLATE ORIGIN:** Moves the head back to the PLATE ORIGIN.
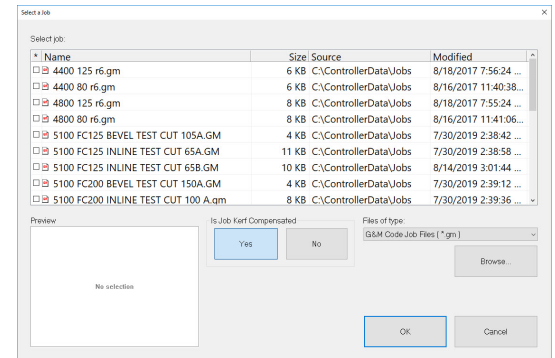
Job Group:

WATER LEVEL allows the operator to control the level of water in the water table.

- **RAISE WATER -** When held down, this will raise the water. Release the button to stop raising the water.

- **LOWER WATER -** When held down, this will lower the water. Release the button to stop at the level required.

- If the LOW WATER indicator is displayed, the water level in the tank is low and will not raise the water past that level until the water level is satisfied.
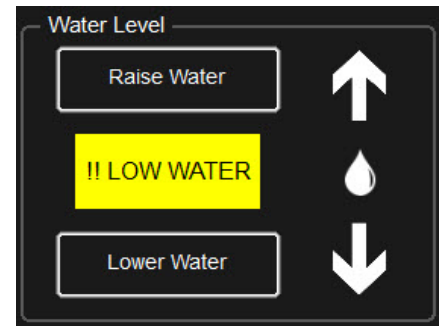
Note: Hydrogen gas may be formed and be trapped under aluminum work pieces when they are cut using a water table.

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.

Process Stations:

Configure and control the tool outputs on the machine.

- **Kerf -** Add a Kerf value to compinsate for the tool kerf value.

- **Set Offset -** Capture the distance based on the torch position to a Plate Origin

- **On/Off Dwell -** Add time delay to sending signals to the associated tool.

- **Pierce Count -** Counts the processes ARC ON commands.

- **Activate -** Toggles the tool to get a ON command. Toggle to turn off.

- **State -** Indicates the ON/OFF status of the tool.

Job Group:

Log On:

LOG ON switches users of the VMD software.

- · **ADMIN -** Opens the MACHINE SETTINGS (password protected).
- · **OPERATOR -** Displays the standard user with the standard interface.
- · **PRODUCTION OPERATOR (default) -** Standard user with a simplified interface.
- · **TECH SUPPORT -** Used only for tech support (password protected).
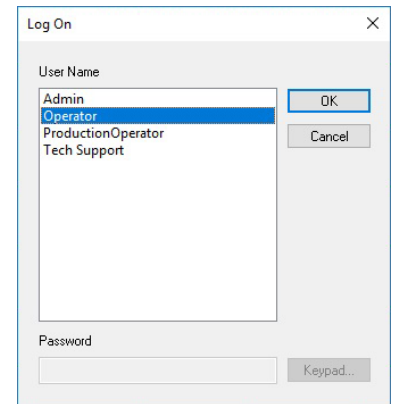
Shutdown:

SHUTDOWN will close the VMD and power down the computer. This should be used when shutting down the system.

- · Prompts a dialog box to TURN OFF ACCUMOVE CONTROLLER.
- · Press the E-Stop button to power down the controller.
- · The computer will then shut down.
- · Turn the power switch to OFF.
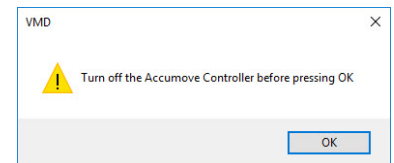
View Screen

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, it will update the cut parameters to the cut chart parameters.

- **Process Cutting** - Determines the mode of the loaded job. Plasma, Marking, or Grid (Expanded)
- **Thickness** - Material thickness.
- **Material** - Type of material being cut. Mild Steel, Aluminum, or Stainless Steel/H17
- **Current** - Amperage used to cut the material.

Once entered, the appropriate consumables and part numbers will display and auto-fill the Cut Parameters to the appropriate settings.will display. For full overview of the FineLine Plasma console see the FineLIne Operators Manual.

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** - Distance the torch will retract off the material to initiate a pilot arc, prior to moving up to the pierce height.
- **Pierce Height** - Distance the head sits above the material during piercing.
- **Cut Height** - Distance between the torch tip and top of material during cutting.
- **Pierce Delay** - The time delay for the torch to pierce through the material before executing movement.
- **Retract Height** - Distance the head will retract off the material during rapid travels when moving in between cuts in a job.
- **Arc Voltage** - 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.
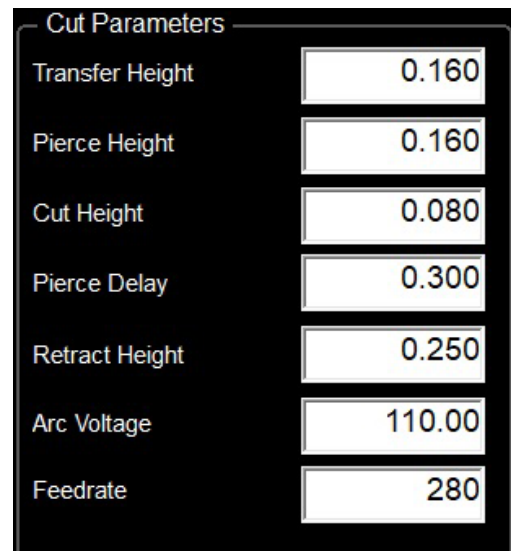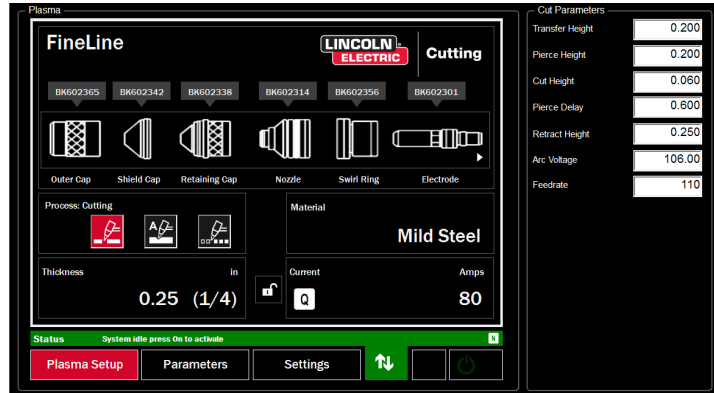
View Screen:

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.
- · **Zoom to Machine -** Zoom to the programmed machine limits.
- · **Zoom to Job -** Zooms the display to the job loaded.
- · **Run From Torch Position -** Starts the stopped job where the torch is located on the job.
- · **Maximize Plan View -** Displays all views in one screen.
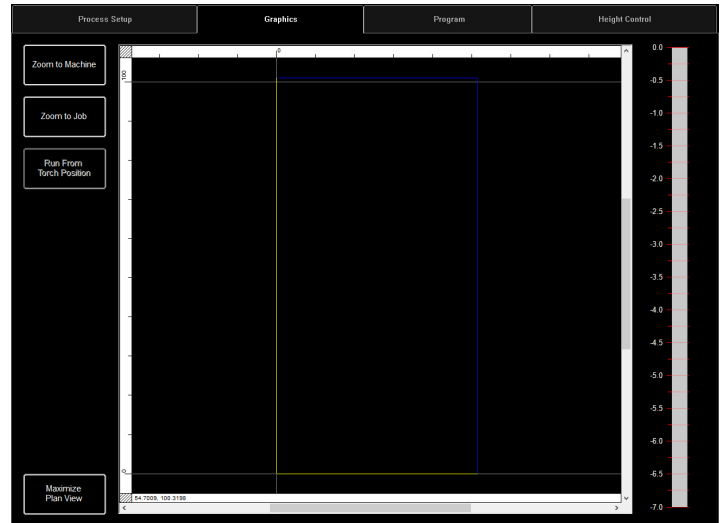
Program View:

Displays the G-Code of the job that is loaded.

- · **Edit Job -** Opens the current G-Code in the default text editor.
- · **Maximize Viewport -** Display all views in one screen.
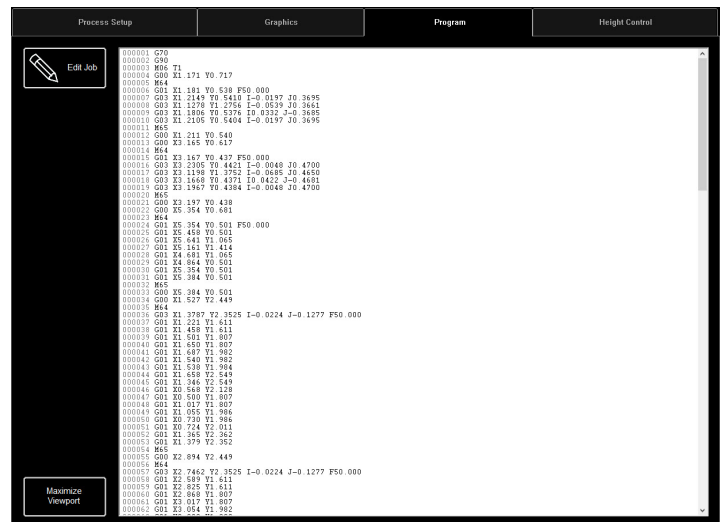
Height Control View:

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

- · **Trace Pause/Resume -** Pauses the graph if tracing.
- · **Trace Off/On -** Toggles viewing the lifter station's movement during operation.
- · **Maximize Viewport** - Displays all views in one screen.
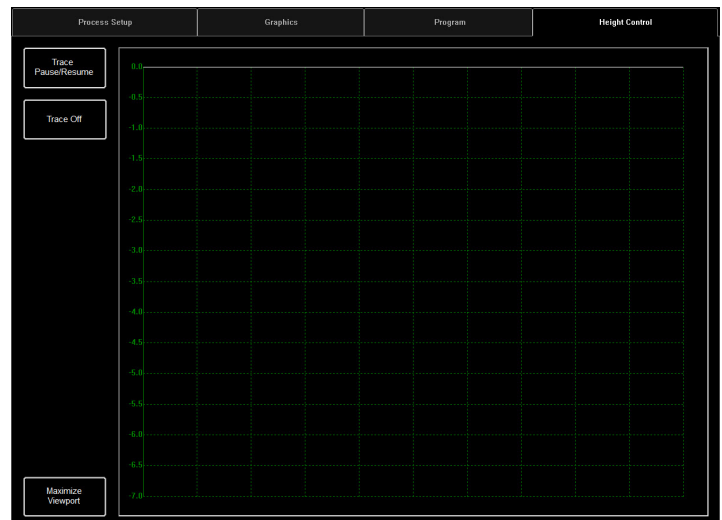
Run Group

The Run 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 far left corner, the machine is ready to operate.

Run Job:
- **Run Job -** Starts the job that is loaded into the VMD.
- **Stop -** Stops any activity or motion of the machine.

Reset:
The resets 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: Toggles between ACTIVE RUN and DRY RUN.
- **ACTIVE RUN** - Activates your torch to fire when you RUN a job.
- **DRY RUN** - Deactivates your torch from operation. If in DRY RUN, the torch will simulate all movements without firing the torch.
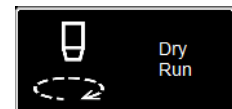
Jogging

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.
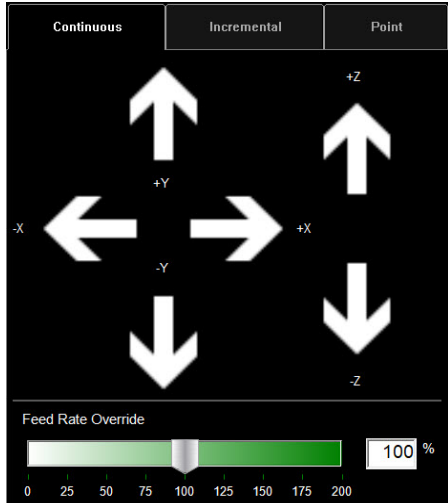
Jog:

The JOG keys are assigned to the movement of torch to the origin of the operators console. 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. Continuous will move as long as your finger is active on the direction.

- **FEED RATE OVERRIDE -** Alter the running feedrate of the job that is active. The feedrate updates the change on the next ARC ON command.
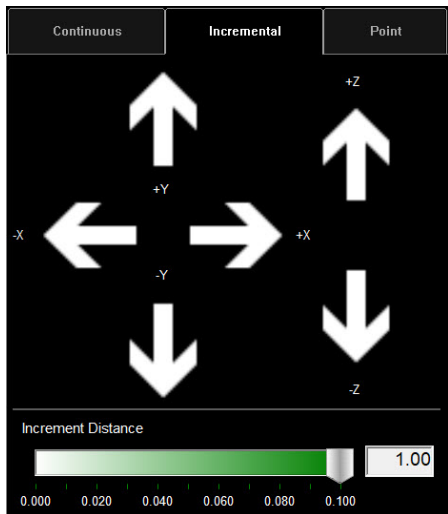
Incremental Jog:

Pressing a direction will travel the torch the assigned Incremental Distance

Using the slider will give you increments between .000 - .100. Directly enter any number into the dialog.
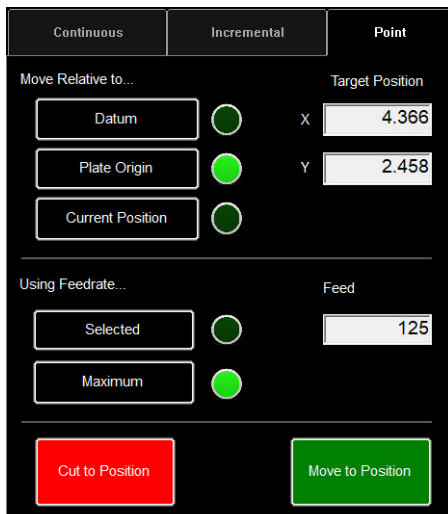
Point Jog:

Allows the user to define the position the torch to travel to, an origin, and a set feedrate.

- **CUT TO POSITION -** Process a ARC ON signal and move the torch to the postion and feedrate defined.
- **MOVE TO POSTION -** Moves the torch to the defined position and feedrate defined.

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.
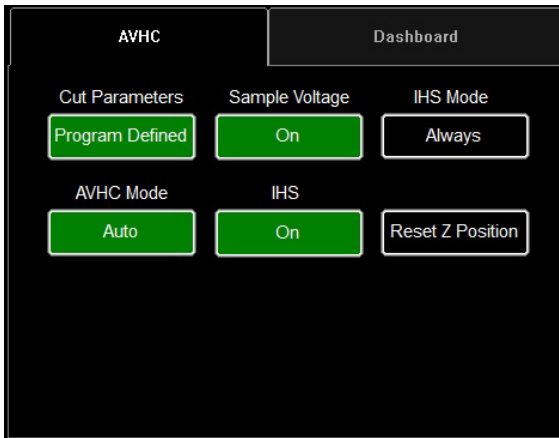
AVHC (Automatic Voltage Height Control):

Cut Parameters can be toggled between Program Defined and User Defined.
- **Program Defined** - The cut parameters will automatically generate based on the Process Setup parameters.
- **User Defined** - Job runs off of the manually entered cut parameters.

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)** - Disables the feature.

IHS MODE is the process used to detect the material height and how it reacts between pierces.
- **Optimal** - Optimal makes an initial IHS (ohmic) material detection and utilizes a parameter based on material thickness to process another IHS (ohmic). This allows the machine to skip the full ohmic detection process on cuts that are located very close to the previous sense, increasing productivity.
- **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. It 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 & Dashboard:
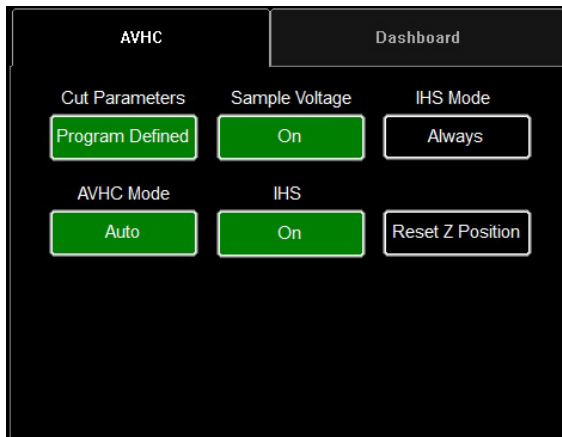
IHS (Initial Height Sense): This setting turns OHMIC DETECTION on or off.
- **ON -** The head will detect material when the ohmic cap comes into contact with the grounded, conductive material on the table. Once detected the head will retract to the TRANSFER HEIGHT setting.
- **OFF -** The head will move 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 and resets Z-Axis zero point.
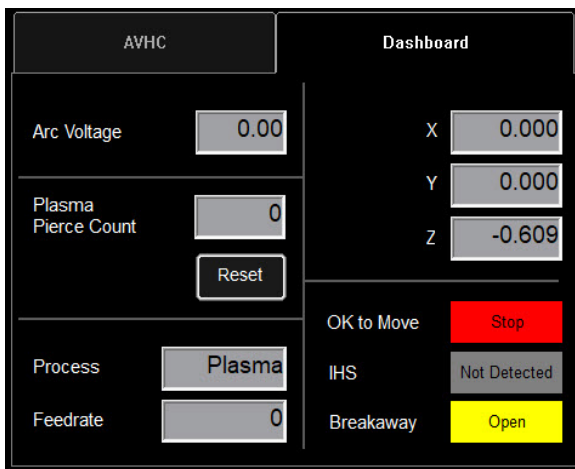
Dashboard:
The dashboard displays the host indicators and tools for the operator.
- **Arc Voltage -** Displays the Arc Voltage feedback from the plasma during cutting.
- **Plasma Pierce Count -** Counts the ARC ON commands as they take place. Reset clears the count back to zero. Recommend to reset with changing of the consumables.
- **Process -** Displays the current cutting process.
- **Feedrate -** Displays the real-time feedrate.
- **X, Y, Z -** 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. NOTE: The laser is not available with BEVEL machine configurations.

Laser Operation:

The Laser Plate Finder is intended to aid an operator at the control console to locate the 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 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.
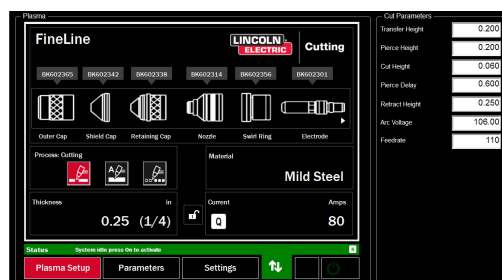
Step 2: Toggle the LASER ON. The button will display GREEN. The head will move down to the proper position and illuminate the laser.
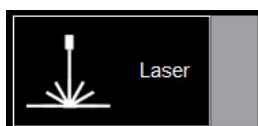
Step 3: Move the head and use the indicator for setting PLATE ORIGIN, setting plate alignment, dry run a job, or for visualizing a point on the plate.

Step 4: Once done using the laser, toggle the laser to OFF.

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

Oxy Controls

The VMD can control OXY cutting torches with the OXY tab. This allows SET and CAPTURE time delays.
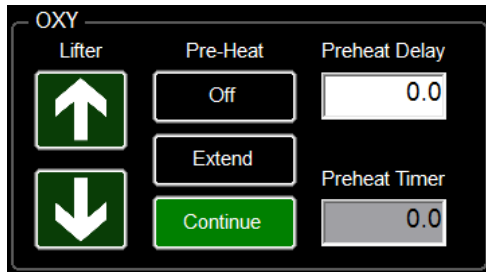
OXY:

Lifter:
Controls the lifter stations UP/DOWN position.

- · Up will raise the lifter.
- · Down will lower the lifter.

Pre-Heat:
Sets and alters the Pre-Heat time required for the OXY cutting.

- · **OFF -** Toggle to ON or OFF. This will activate the PREHEAT DELAY time that is entered in the PREHEAT DELAY dialog.
- · **EXTEND -** Toggles between EXTEND and CAPTURE. When EXTEND is PRESSED, this will extend the time until released. It will then CAPTURE the time.
- · **CONTINUE -** Active or not. When pressed, it will turn on the HIGH PRESSURE REGULATOR to start cutting.

Preheat Delay:
Input for the delay for Preheat

Preheat Timer:
Displays the total time elapsed

Using the Shape Library in VMD

In the VMD, you can generate one of 36 standard shapes without needing to generate them in your CAD software.

Step 1:

To get to the Shape Library, press SHAPE LIBRARY located on the left hand side of the VMD screen, in the Job Group.

Step 2:

Select the shape you are looking for and press OK. This will open the shape configuration screen for the shaped selected.
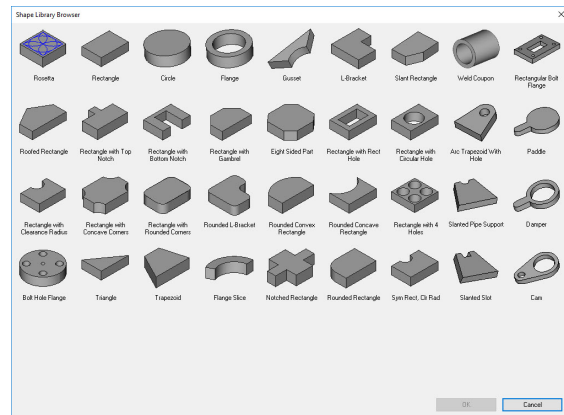
Step 3:

Select the TOOL you are planning to use: Plasma, Plate Marker, or Oxy.

- **Lead In Radius -** Creates a radius for your lead-in. If a line lead-in is required, then enter 0.

- **Lead In -** The length of the pierce point movement into the tool path. This is usually twice the kerf value of the set average

- **Lead Out -** Length of the cut created out of the cut path. If using plasma, enter 0.

- **Overburn** - Measured length past the end/start point. Used for thicker materials, or in the oxy process.
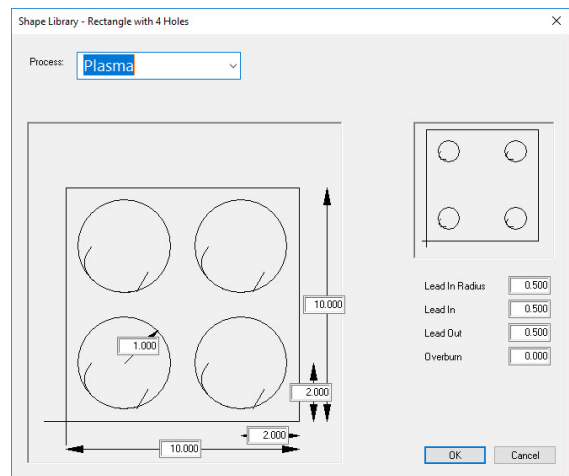
Press OK once the parameters are entered.

Step 4:

SAVE the 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.

The VMD will LOAD the job to active and toggle to 'NO KERF'.
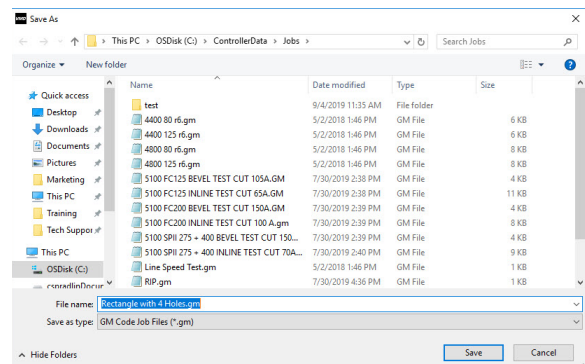
Using the Shape Library in VMD:

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.
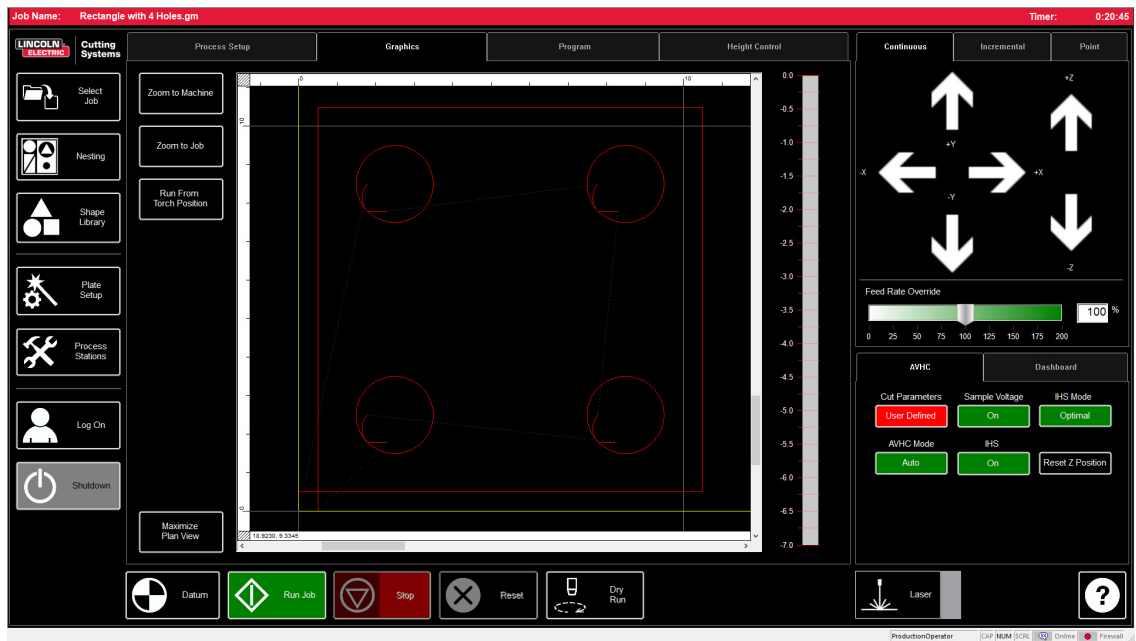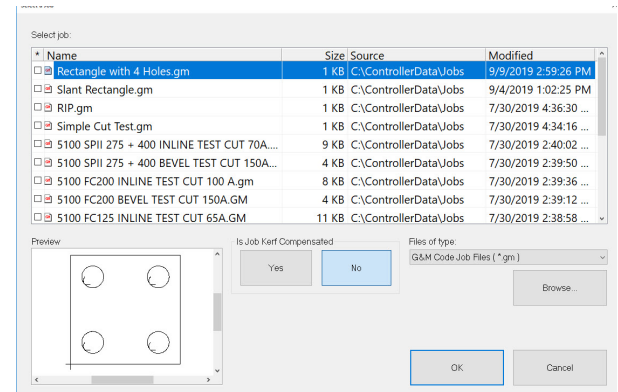
Running a Job

To run a job, follow the simple procedure explained below.
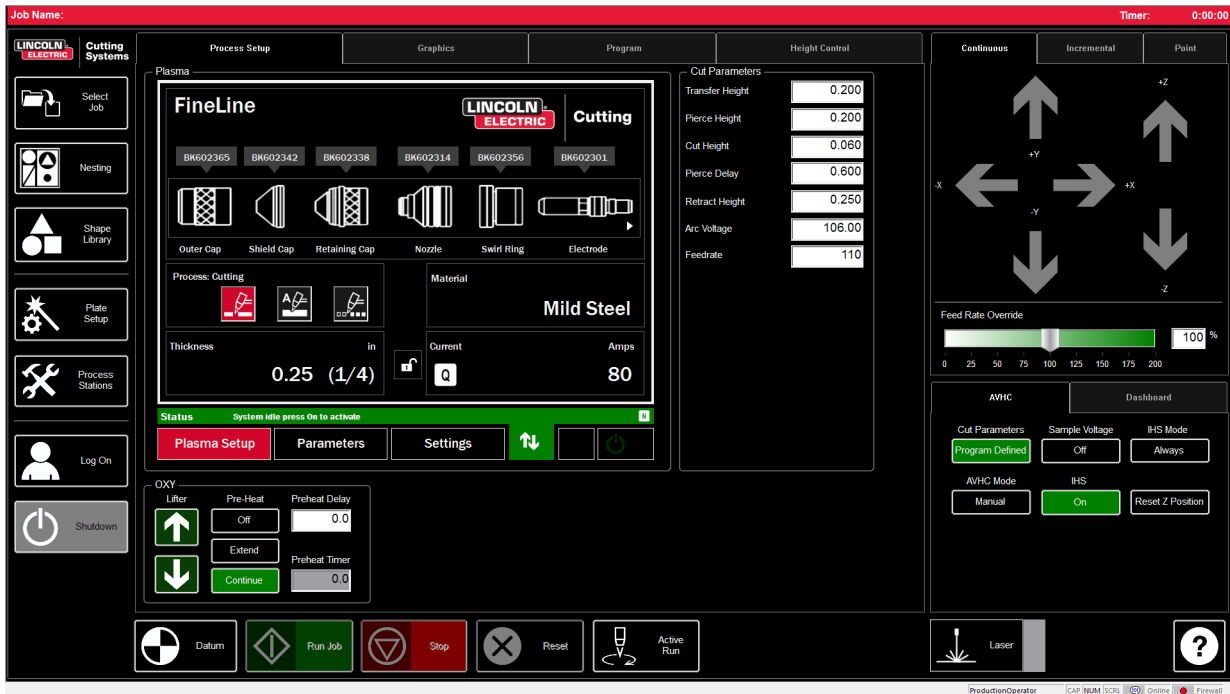
Datum:
When you first start the Visual Machine Designer and are connected to the Accumove controller, the machine needs its motors powered on and MACHINE ZERO position established. A message will appear stating PLEASE SWITCH DRIVES ON. Release the E-STOP above the controller by turning is clockwise 1/4 turn, then press the DRIVE ENABLE green button to power the motors. The machine can now be datumed.

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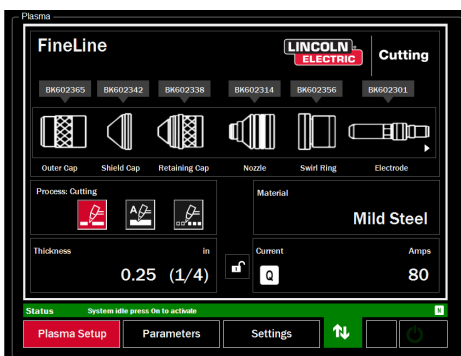
Set your Process:
In the PROCESS SETUP tab, enter in the material thickness and amperage you are planning to cut. This will populate the CUT PARAMETERS with the appropriate settings for the thickness/amperage.

If using a different material thickness parameter than being cut, the outcome will not be to specification.

Running a Job:

Plate Setup:

1. 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.

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

3. Press CLOSE.

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

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

6. 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%.
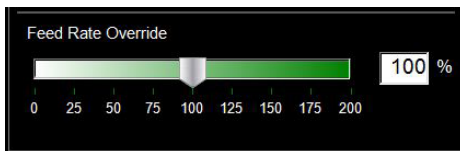
Quality Test Cut

When commissioning your new table, it is recommened to cut the same quatity test cut included with the machine to validate similar output. This quality check test cut is included with the machine for comparison.
The proper consumables for the factory test cut are preloaded into the torch prior to shipping.

1. Press SELECT JOB.

2. Locate the appropriate g-code for your machines configuration and press OK.

3. Set the Plasma Console to Steel, the thickness to 3/16", and the Current to 80 amps. The proper Cut Parameters are populated in the inputs.
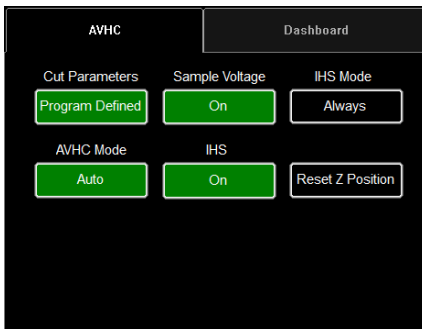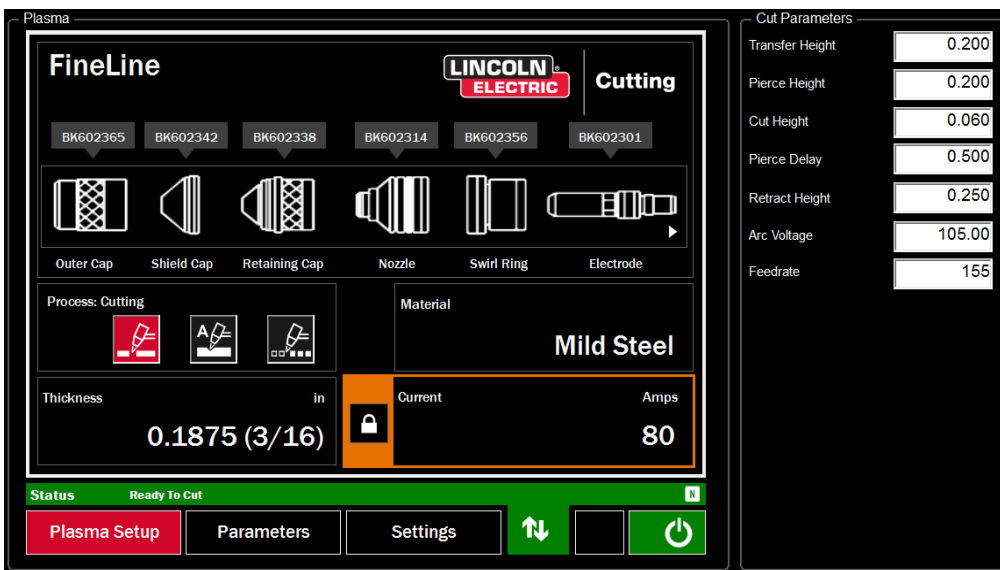
4. 5100 Inline test cut will now show in the display.

5. Set Cut Parameters to Program Defined.

6. Set the AVHC MODE to AUTO.

7. Set the SAMPLE VOLTAGE to ON.

8. Set the IHS (ohmic detection) to ON.

9. Set the IHS MODE to ALWAYS.

10. Set the Machine to Active Run (If Dry Run is displayed, press once to toggle to Active Run)

11. Verify that the FEED RATE OVERRIDE is set to 100%
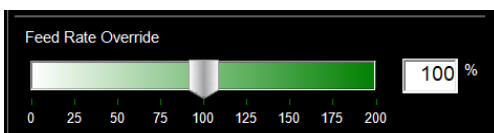
Quality Test Cut:

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

12. PRESS RUN JOB. This will move the torch to the plate and start the job.
(PLASMA TORCH WILL FIRE! WEAR APPROPRIATE EYE PROTECTION.)

13. The sample cut includes a plasma marked '5100' feature then processes the inside features. The code switches the plasma to marking and populates the settings.

- Rapid travel to the first inside feature

- Z Axis moves toward the material, touching the top of the material (IHS -ohmic detection)

- Torch retracts to set PIERCE HEIGHT and will fire and starts the program.

- Once the marking is complete, the plasma will switch to cut all inside features first, then move to the outside geometry

Once cut is complete, compare the cut to the provided sample and verify that they match. This will provide proof that the machine is functioning properly.

NOTE: Part will be hot after cutting. Wear proper gloves prior to handling the processed cut.
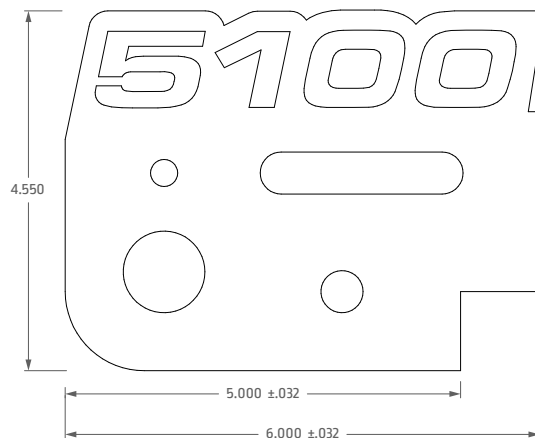
VMD Nest

VMDNesting is an irregular parts nesting and CAM program. The nesting allows the operator to import DXF files without needing offline CAM software to generate the proper G-Code. The process will apply the specific kerf correction along with the appropriate lead-ins to all features. Nesting will develop the tightest nest available for the size and thickness of material entered into the PROCESS STATIONS.

To properly process a job through the VMD Nest, Start by entering the material in the PROCESS STATIONS tab. The VMDNest program will use these parameters to assign the proper kerf and cut parameters to job.

Once all the parameters and consumables are established, press NESTING.
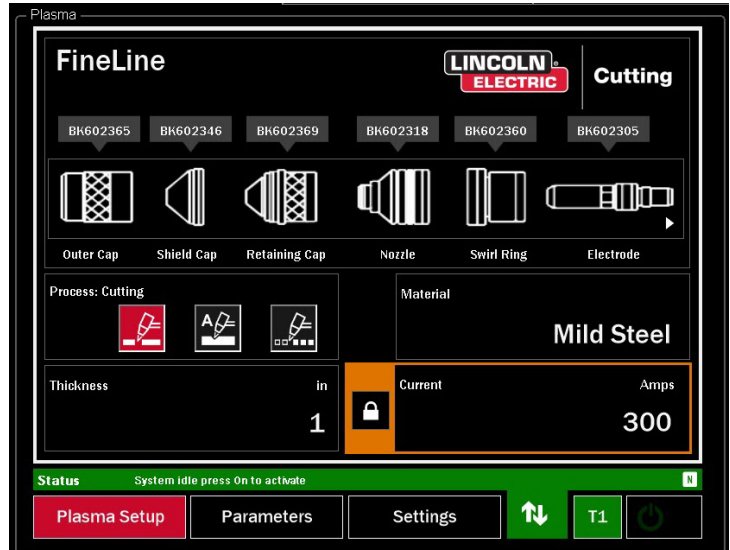
The Nesting browse window displays the previous nested jobs.

To start a new nest, press NESTED JOBS.

Select NEW NESTED JOB and the ADD NESTED JOB dialog opens.
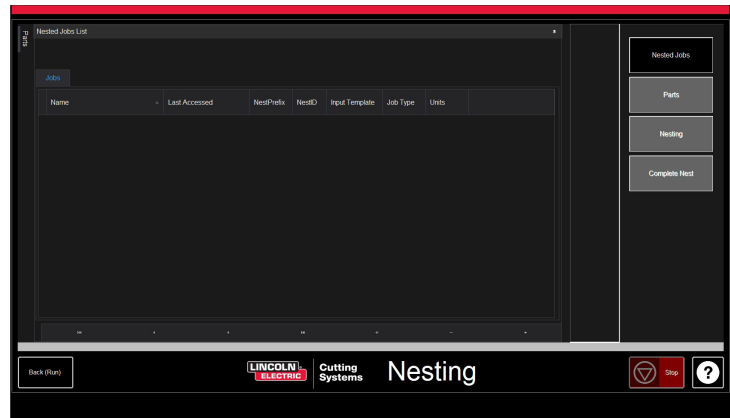
VMD Nest:

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

Enter the dimentions of the plate being used. This will establish the material limits for the nest.

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.

45
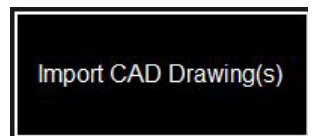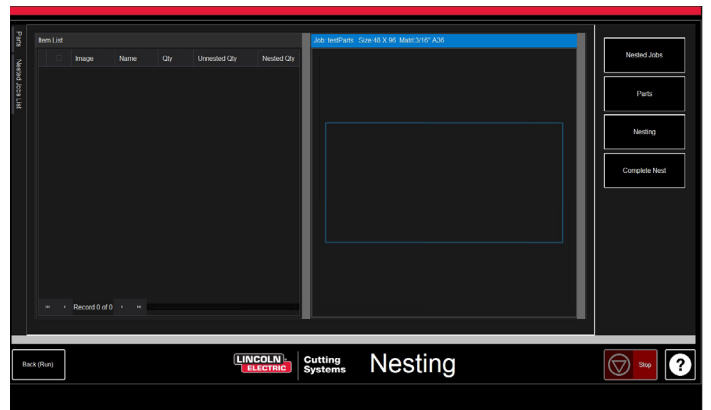
VMD Nest:

Apply Tool Paths:
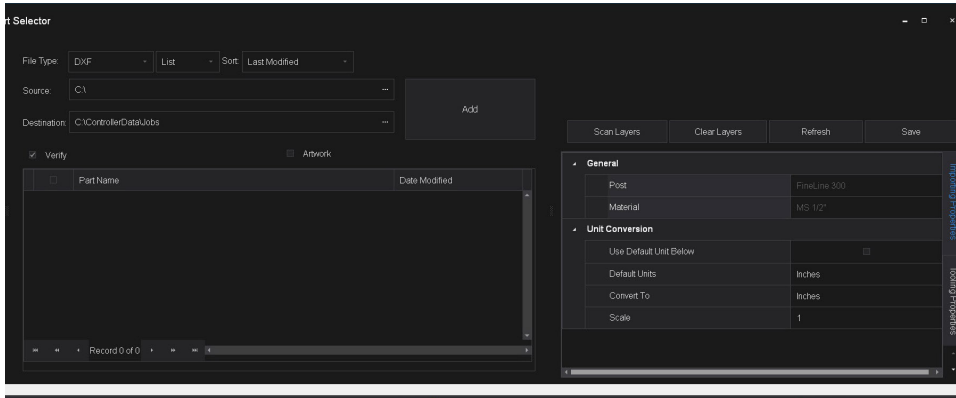
At the top of the screen will be FILE TYPE, SOURCE, and DESTINATION.

- **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

Checkboxes:

VERIFY: Verify will display the layers assigned to the part.

ARTWORK: 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.

Once the directory is assigned, will display all of the files in the source location.

Select the parts you want to add to the nest, and press ADD.
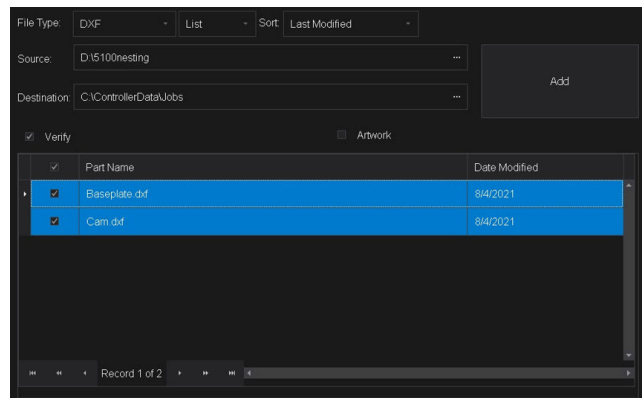
VMD Nest:

Verify: When VERIFY is checked, the operations will be moved to the Part Import Preview screen. This screen allows the operator to evaluate the drawings, toggle layers, assign layers to processes.
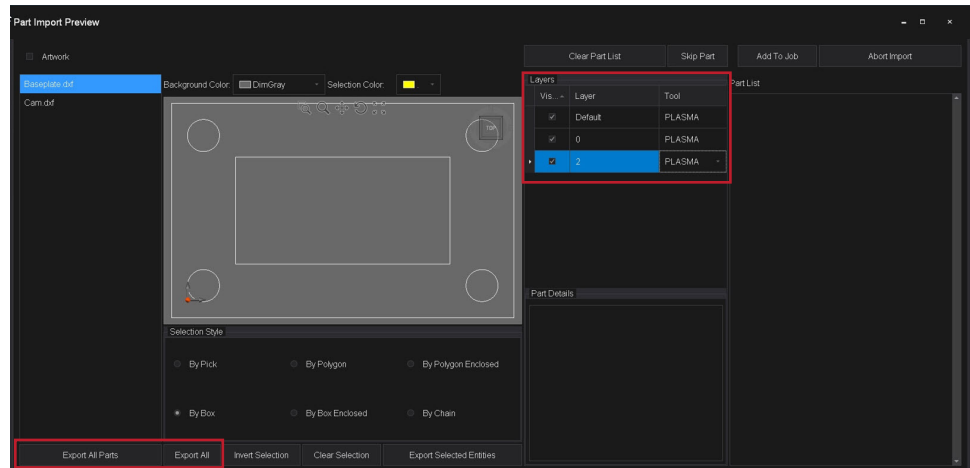
The left side hosts the parts that have been imported.

By selecting each part displays the part, shows the layers that are present, and gives the part details.

In the LAYERS, toggling the check boxes for the layers will display which portion of the drawing is assigned to which layer in the display.

If needing to change to a different process, use the drop down list to assign that layer to the process.

By setting to IGNORE, will drop out that layer from the toolpath process.

After validating, at the bottom of the screen, press Export All Parts.

The Part List will display the part along with the tool path that is assigned. Once validated, press ADD JOB.
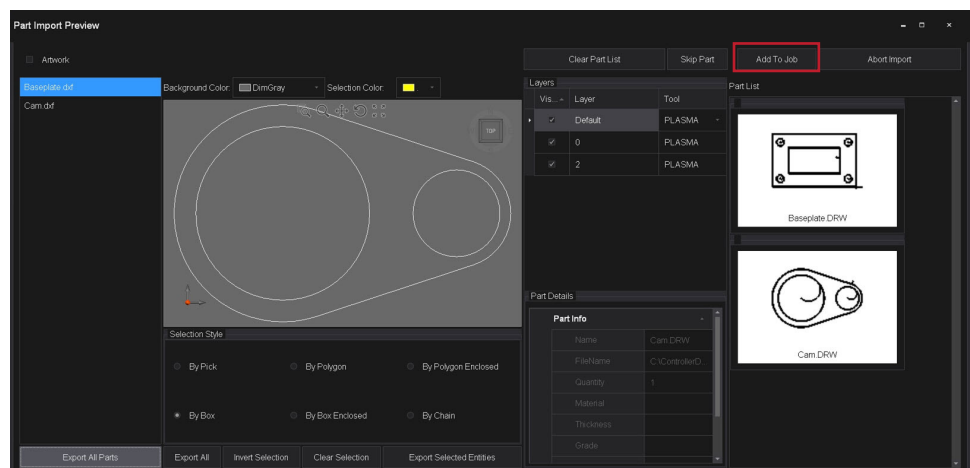
VMD Nest:

Start the nest:
The parts list will display in a list, along with the display of the nest size area. In the parts list, adds quantity, displays nested/unnested quantity, and size of the part.
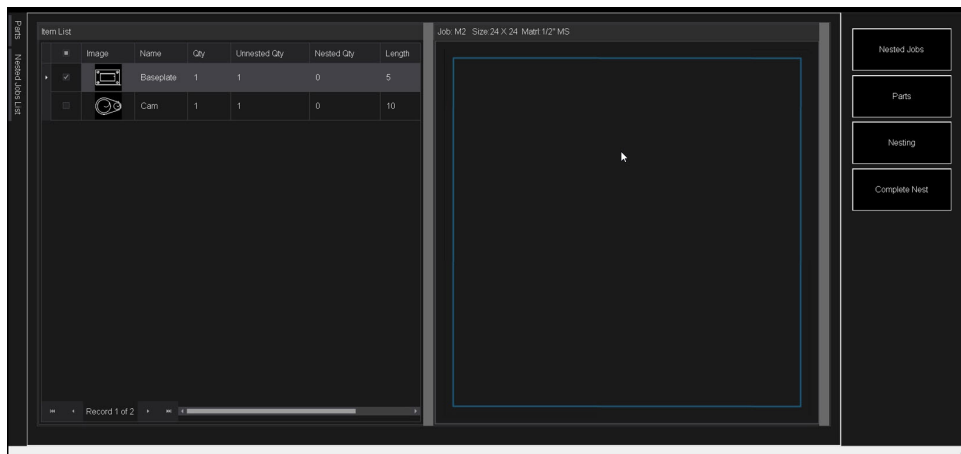
Start the nest:
Once the quantities are entered, select NESTING. Then press NEST.

A prompt will ask ALL or SELECTED.

In the display will show the parts layed out in the material area assigned.
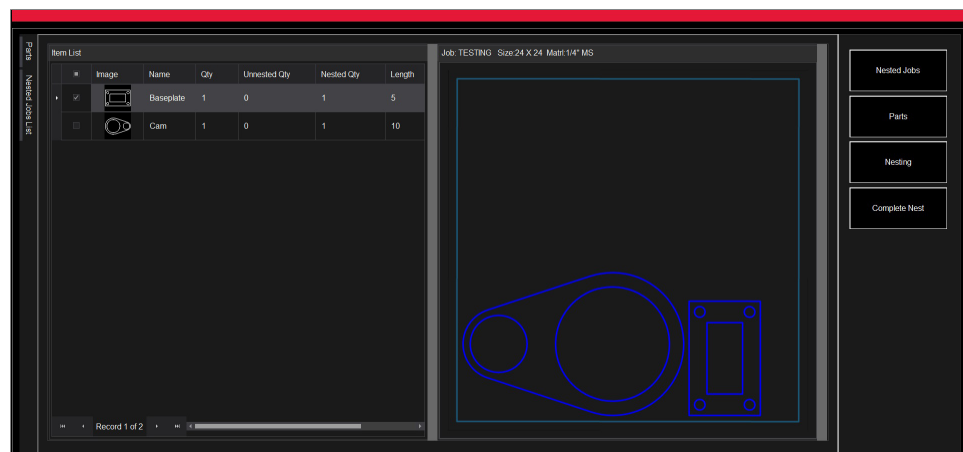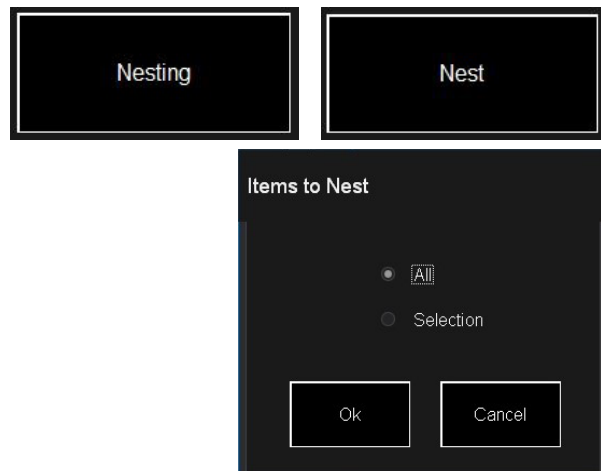
VMD Nest:

Complete the nest: In the right toolbar select COMPLETE NEST.

Open Nest in VMD: After pressing COMPLETE NEST, the job will auto load into the VMD software.

In the AVHC tab, set CUT PARAMETERS to PROGRAM DEFINED and process the job.
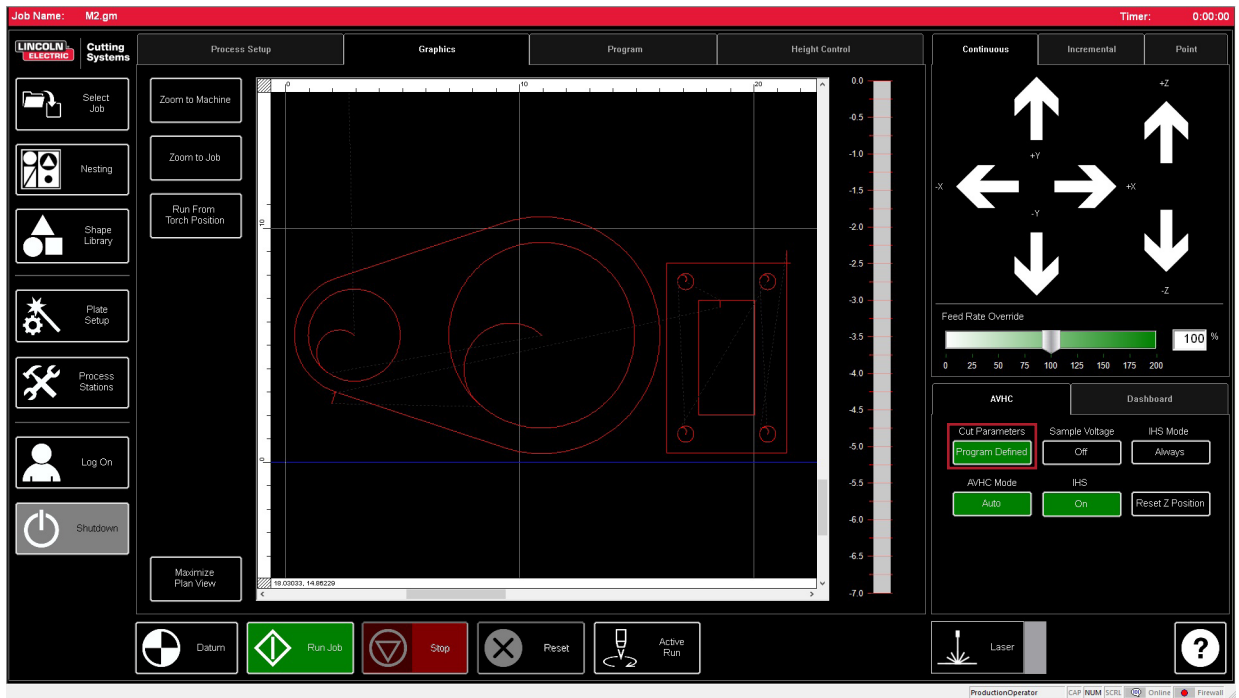
5100 Bevel

Understanding the capabilities of the bevel head and the cuts that can be programmed is the first step in getting quality cuts on the 5100. The mechanics of the bevel can support up to 50° of movement in the A and C axis (limited by consumables). The bevel allows for a variety of complex cuts that can be produced on the 5100 with material thicker than 3/" (9/5 mm).
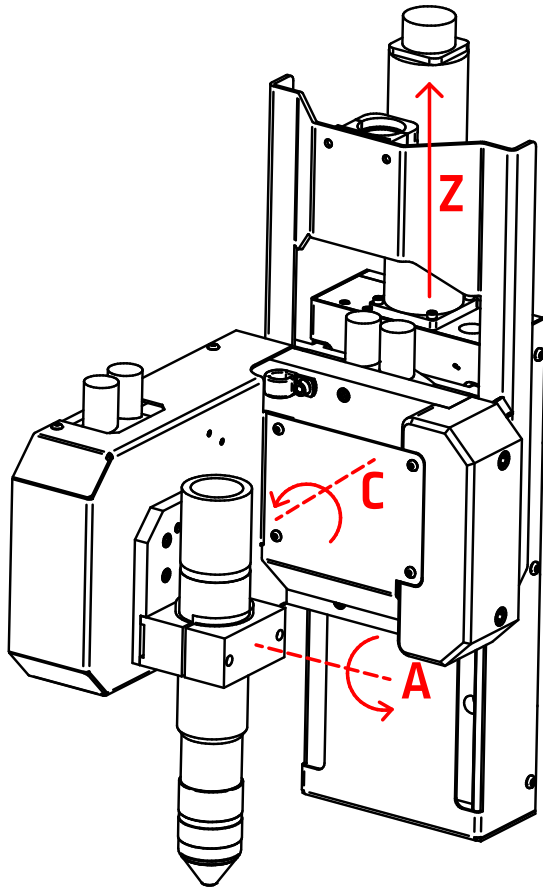
Bevel Axis:

- A - Moves toward/away from lifter station

- C - Moves clockwise/counter clockwise on lifter station

- Z - Moves up/down while controlling the height of the torch

45°　　　　**45°**
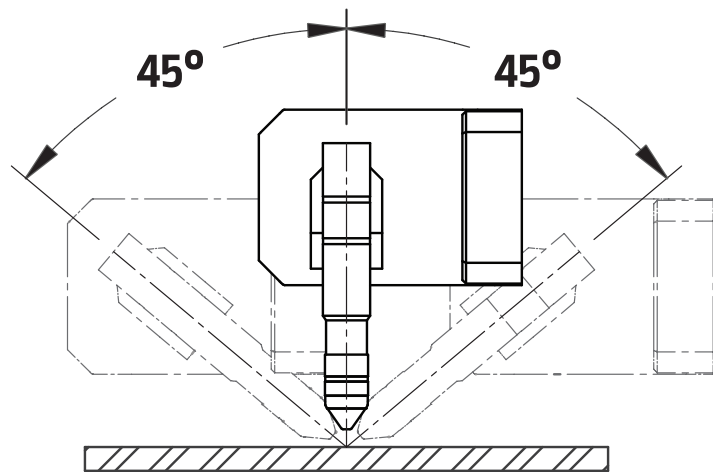
Bevel Cuts Available:
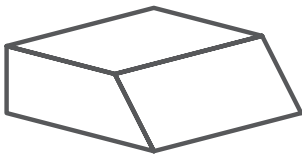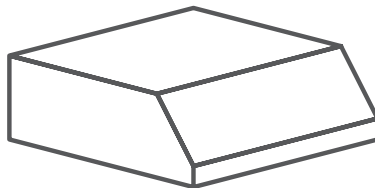
BEVEL KNIFE EDGE　　　　BEVEL KNIFE EDGE WITH LAND　　　　BEVEL K-CUT NO LAND
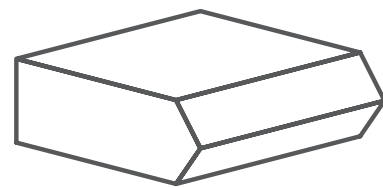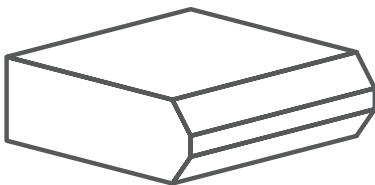
BEVEL K-CUT WITH LAND　　　　BEVEL UNDERCUT KNIFE EDGE　　　　BEVEL UNDERCUT WITH LAND
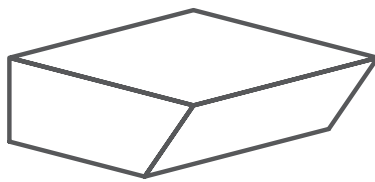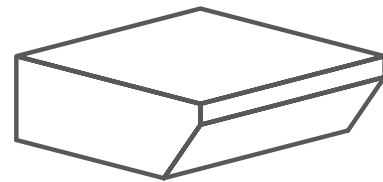
Create a Bevel Cut

To program a bevel cut requires the file to be processed through the QuickCAM Pro software package.
This walkthrough will cover importing a basic shape (DXF), apply two separate bevel cuts, and export the G-CODE for the machine to cut.

DXF Part:

To start, have a DXF part from your CAD software generated.

Launch the QuickCAM Bevel software by double clicking the icon.
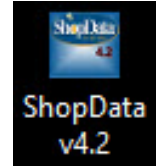
Once open, a launcher will show all of the options that are available. Select DRAW.

The software will open and DRAWING TYPES window will display. Enter in a SHEET LENGTH and SHEET WIDTH. This measurement will default to 120" x 60". The toggle between metric and Imperial measurements is available in the drop down.

Then press OK.
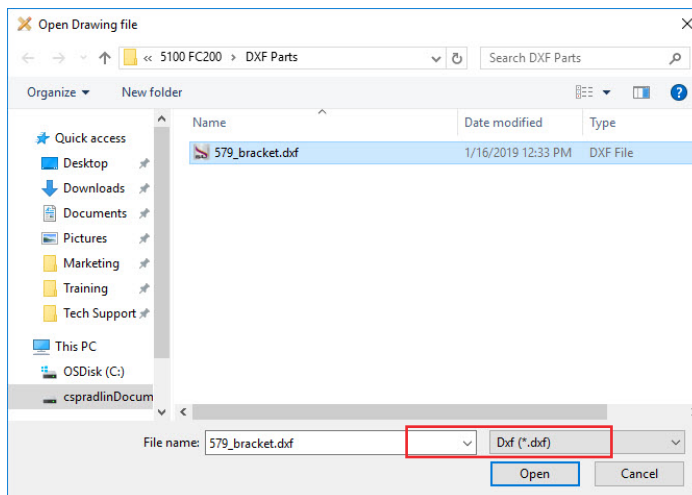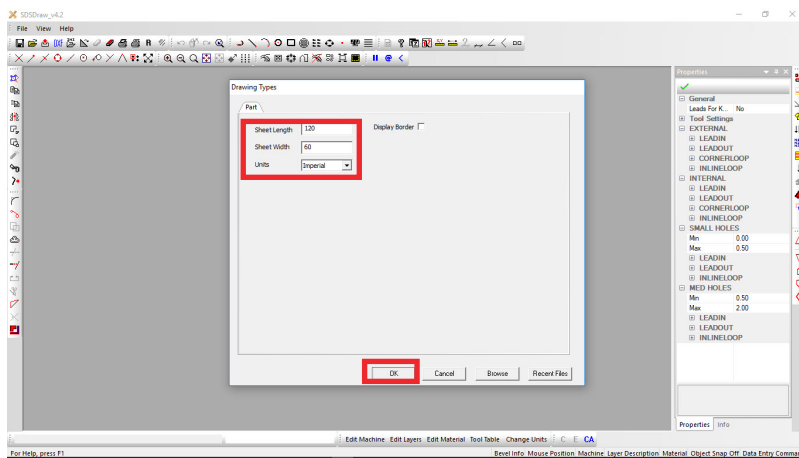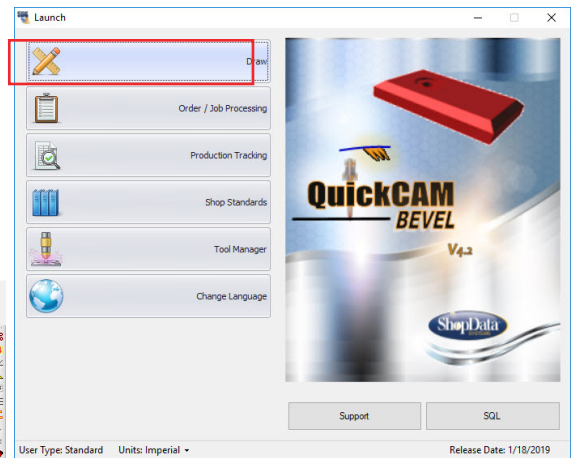
In the upper left corner, select the FOLDER or go to FILE/OPEN.

Once the WINDOWS BROWSE dialog opens, change the FILE TYPE to DXF. This will allow you to see only DXF files.
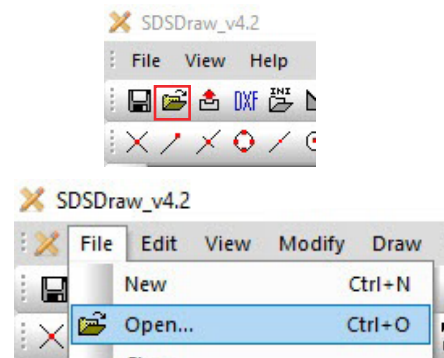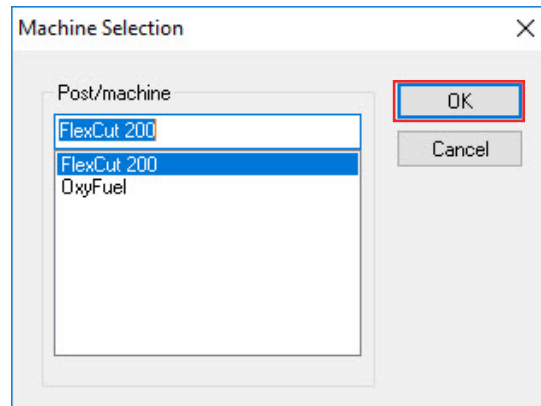
Create a Bevel Cut:

Select the file you want to create the CUT FILE out of and press OPEN.
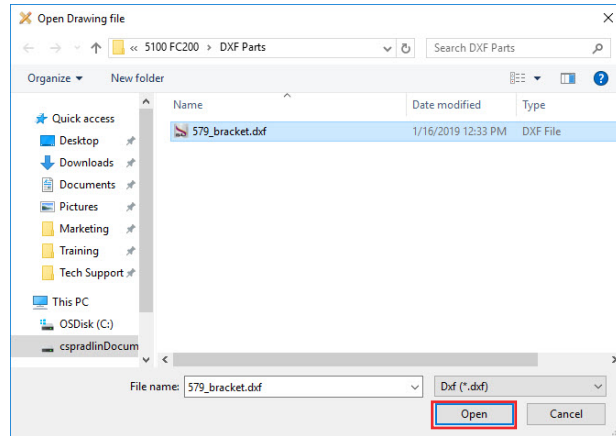
To get the proper POST and material set up for the cut file, navigate to the bottom of the layout and select EDIT MACHINE.
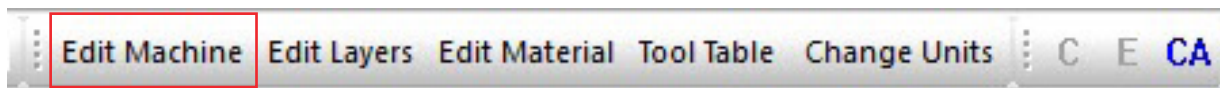
Once the MACHINE SELECTION window opens, select the FLEXCUT 200 (or other power supply/oxy). Press OK.


Select EDIT MATERIAL. The MATERIAL window will display. Locate the thickness of material planning to be cut. SELECT it and press OK.
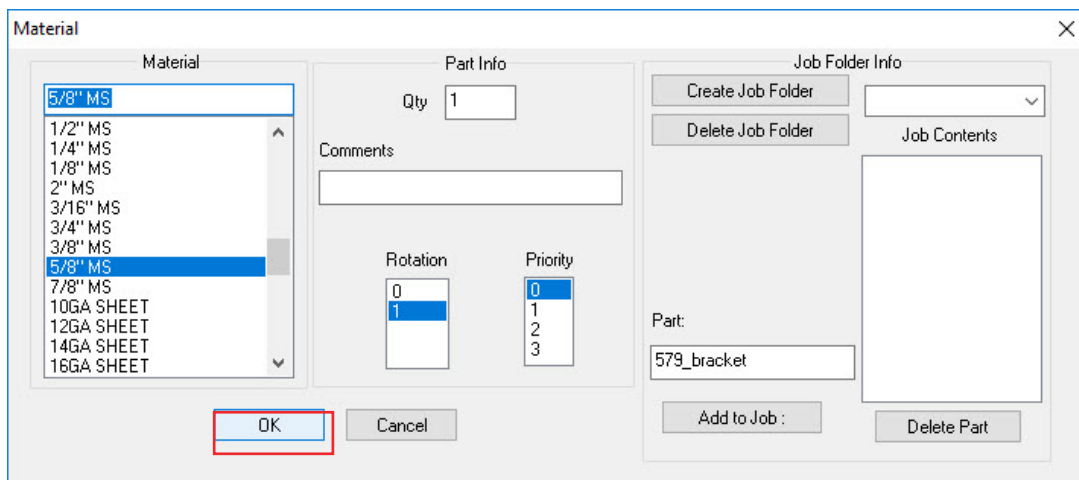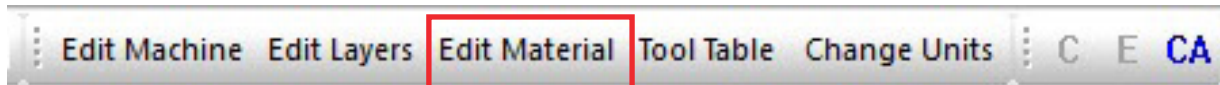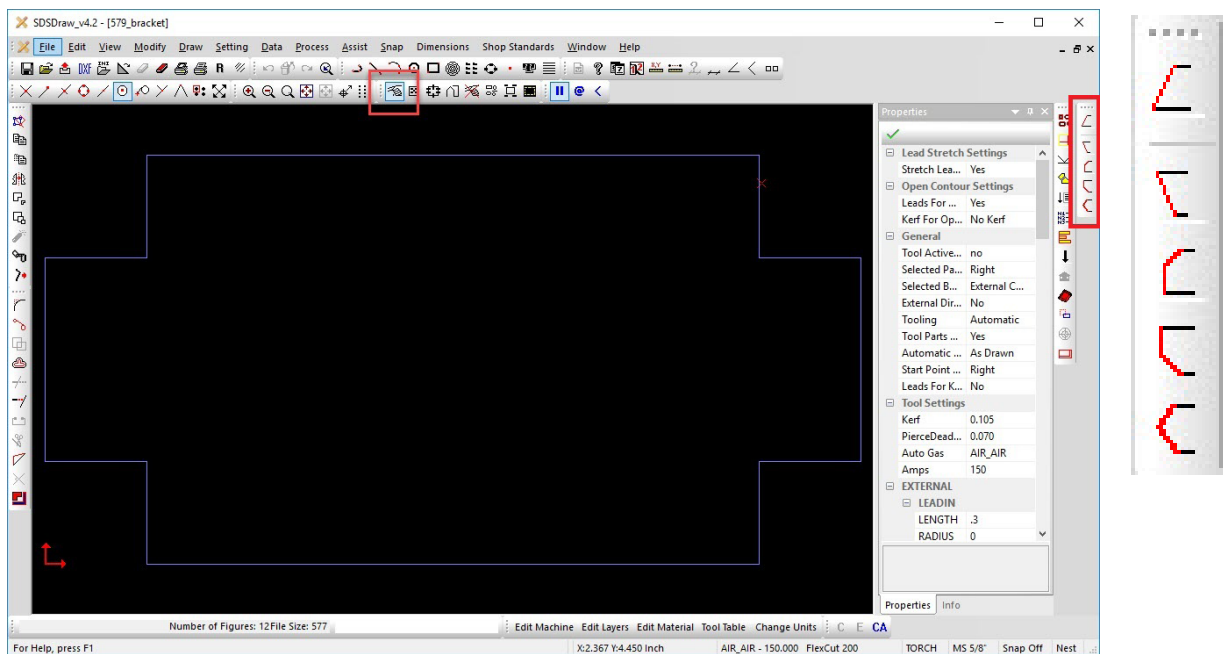
Create a Bevel Cut:

The NEST SETTINGS dialog will display which amperage is appropriate for the material that was selected along with the air combination you are using. The AMPERAGE can be changed if the thickness is within multiple amperages. CUT GAS can be altered based on the material and amperage being used. Press SAVE.
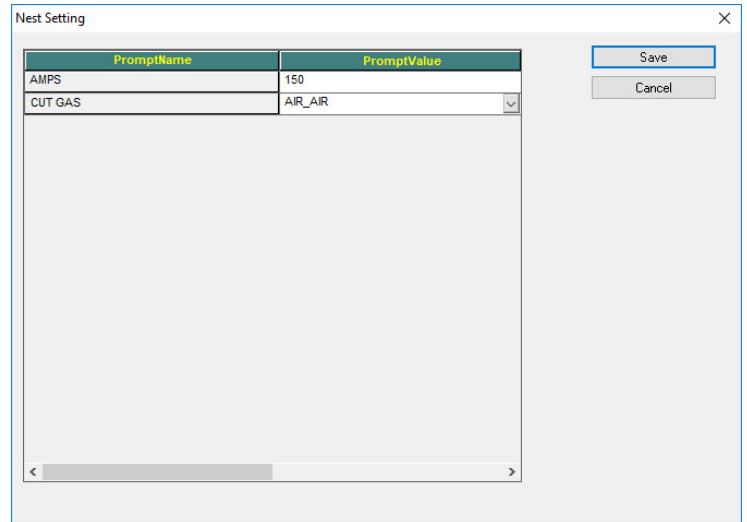
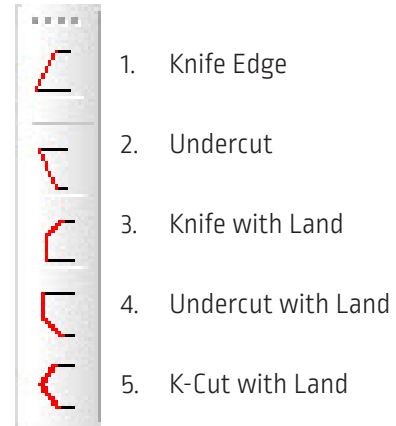The job will now display in the DRAW program.

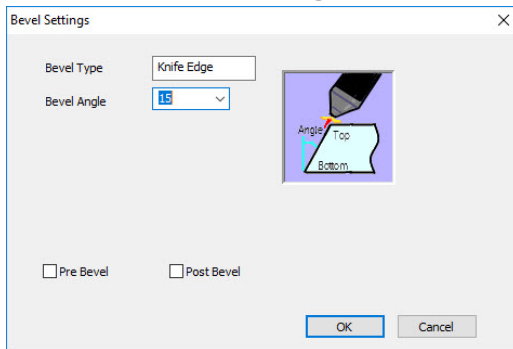Left-click on SELECT OBJECT in the top tool bar.

Left-click on the lines to create the BEVEL. Each line will show dotted when selected. On the right side of the screen will display the BEVEL tool path toolbar. Select the bevel type you wish to apply to the job.
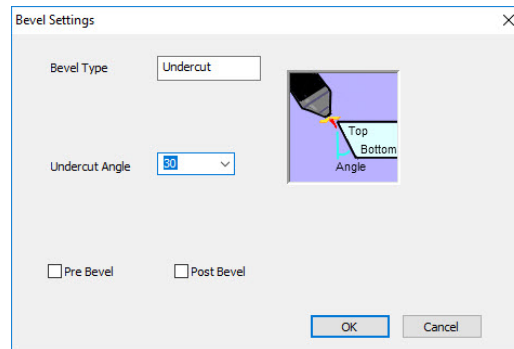
Create a Bevel Cut:

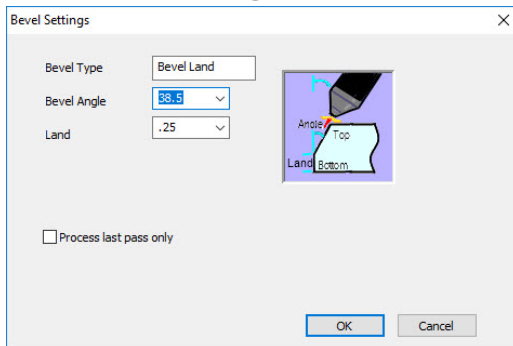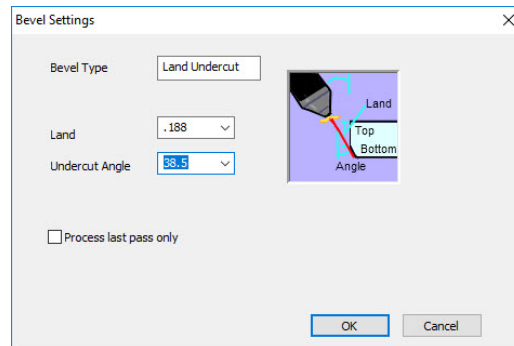Once the bevel type is selected, it will bring up the options for that bevel process.

1. Knife Edge

2. Undercut

3. Knife with Land

4. Undercut with Land
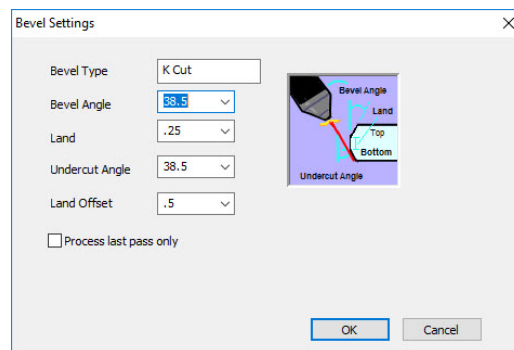
5. K-Cut with Land

1. Knife Edge

Bevel Settings	×
Bevel Type	Knife Edge
Bevel Angle	15

☐ Pre Bevel   ☐ Post Bevel

OK   Cancel

2. Undercut

Bevel Settings	×
Bevel Type	Undercut
Undercut Angle	30

☐ Pre Bevel   ☐ Post Bevel

OK   Cancel

3. Knife Edge with Land

Bevel Settings	×
Bevel Type	Bevel Land
Bevel Angle	38.5
Land	.25

☐ Process last pass only

OK   Cancel

4. Undercut with Land

| Bevel Settings	×
Bevel Type	Land Undercut
Land	.188
Undercut Angle	38.5

☐ Process last pass only

OK   Cancel

Each process has different variables that can be entered for each type of cut.

Cuts with Lands will process two cuts per bevel to accommodate the land portion.

After entering the parameters for the bevel, press OK.

5. K-Cut with Land

Bevel Settings	×
Bevel Type	K Cut
Bevel Angle	38.5
Land	.25
Undercut Angle	38.5
Land Offset	.5

☐ Process last pass only

OK   Cancel

Create a Bevel Cut:

The image will display THICKER lines where the bevels have been applied. If multiple bevel cuts need to be applied, select the lines and assign the bevel type.
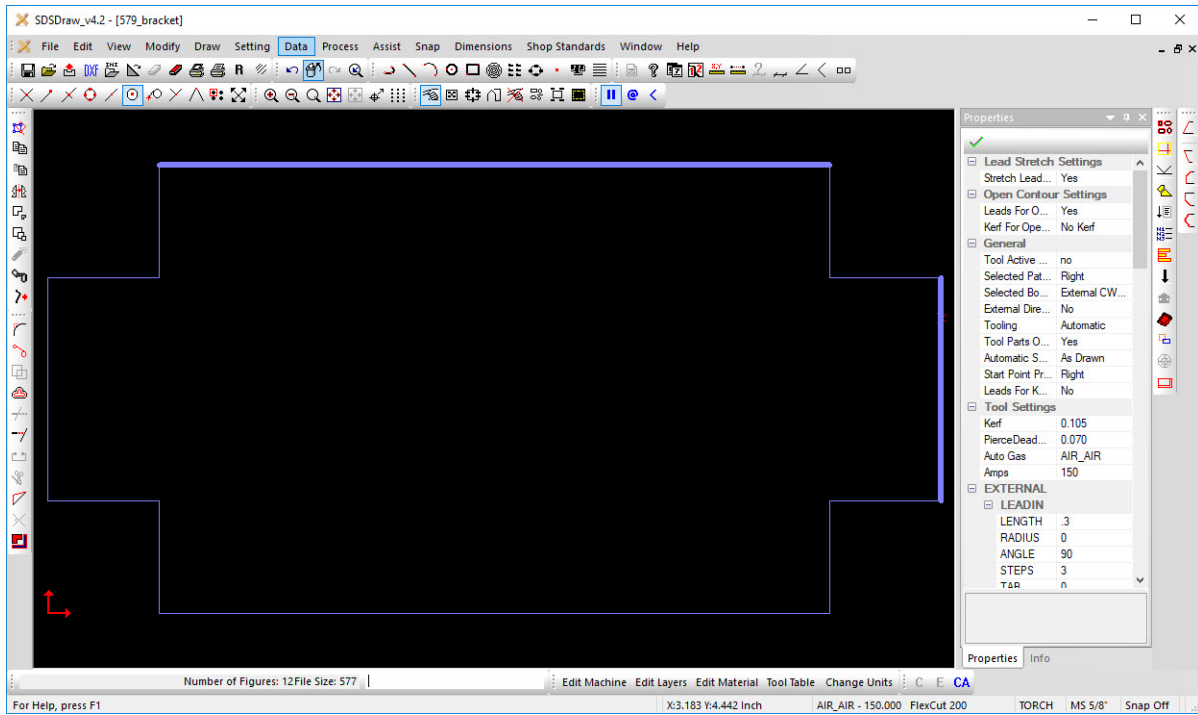

To apply the tool path to the job after all the bevels have been entered, press the APPLY PATH function. This will APPLY the appropriate tool path for your cut. The drawing is blue, and the tool path will be red. BEVEL cuts will generate a "LOOP" to allow the torch body to maneuver into the appropriate position for the bevel cut.
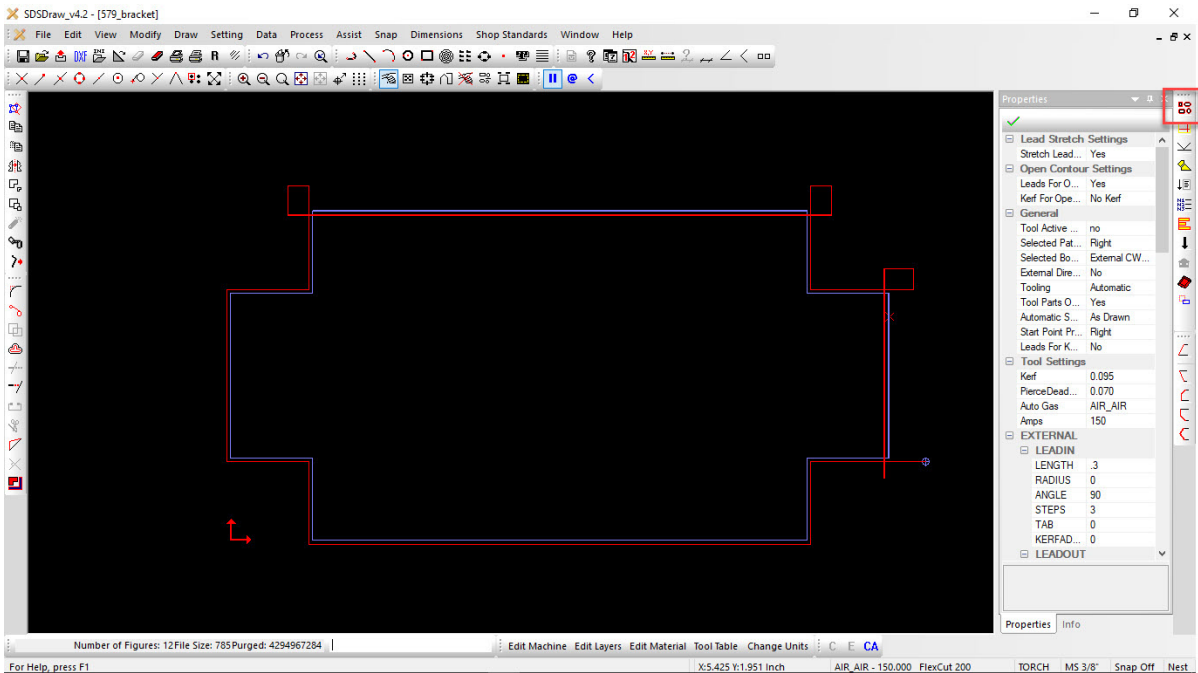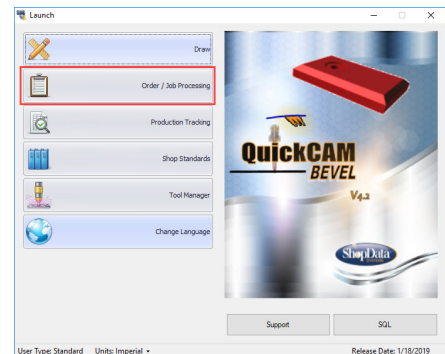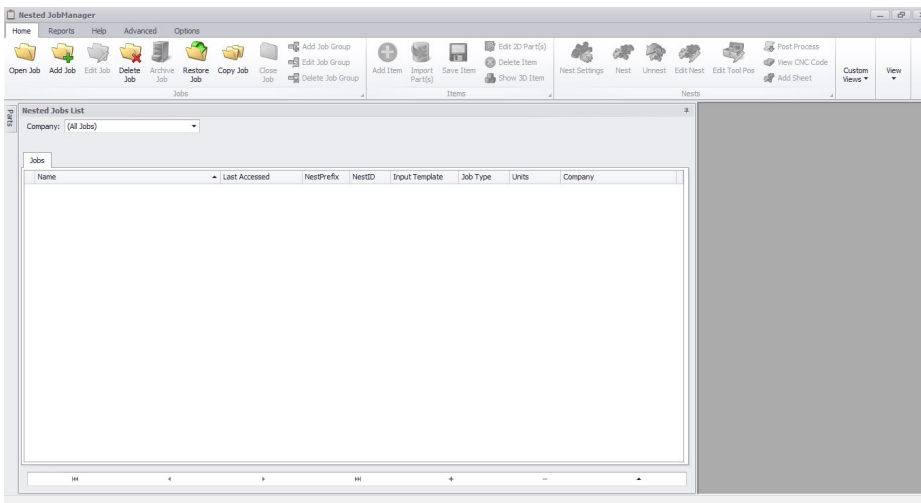
Create a Bevel Cut:

After pressing the APPLY PATHS button, save your file by going to FILE/SAVE.

When the dialog comes up to SAVE THE NESTED SHEET press YES.
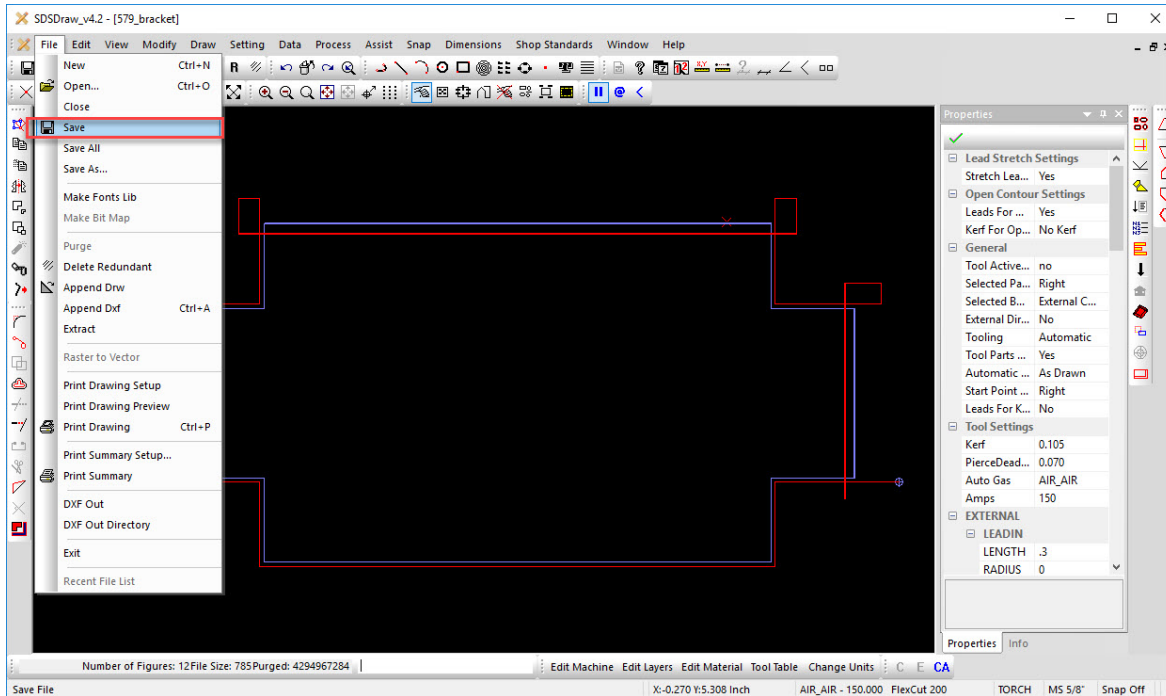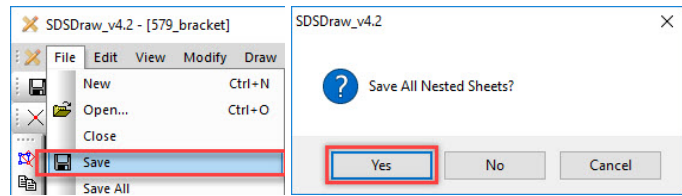
Now go to FILE/EXIT.

In the QuickCAM Bevel dialog, select ORDER PROCESSING.

In the ORDER PROCESSING window, press ADD JOB.

The ADD JOB window will appear.

Create a Bevel Cut

Enter a name into JOB NAME: If METRIC is required, check METRIC.

Press SAVE.

The EDIT JOB GROUP window will populate. Press SAVE.

To add the part to the NEST, press ADD ITEM.

Crete a Bevel Cut:

The BROWSE window will open. Locate and select the job; the file will have a .DRW extension.

Press OPEN.
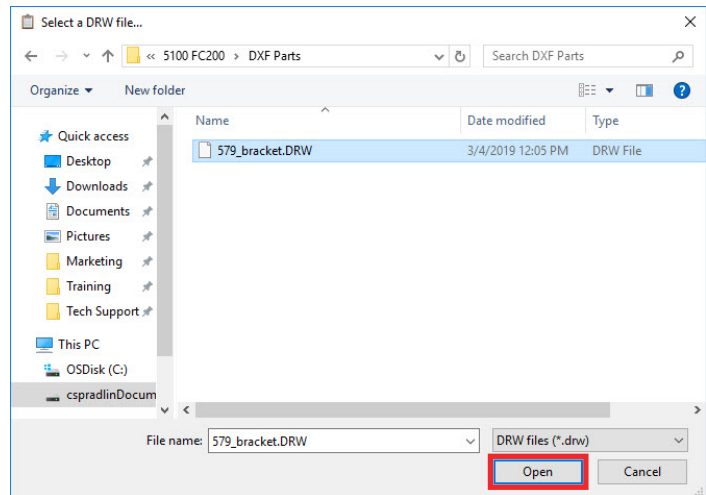
The JOB MANAGER will show the loaded job and display the tool path to the job in the lower left. In the ITEM LIST, changing the QUANTITY will allow for irregular part nesting based on the sheet size entered.
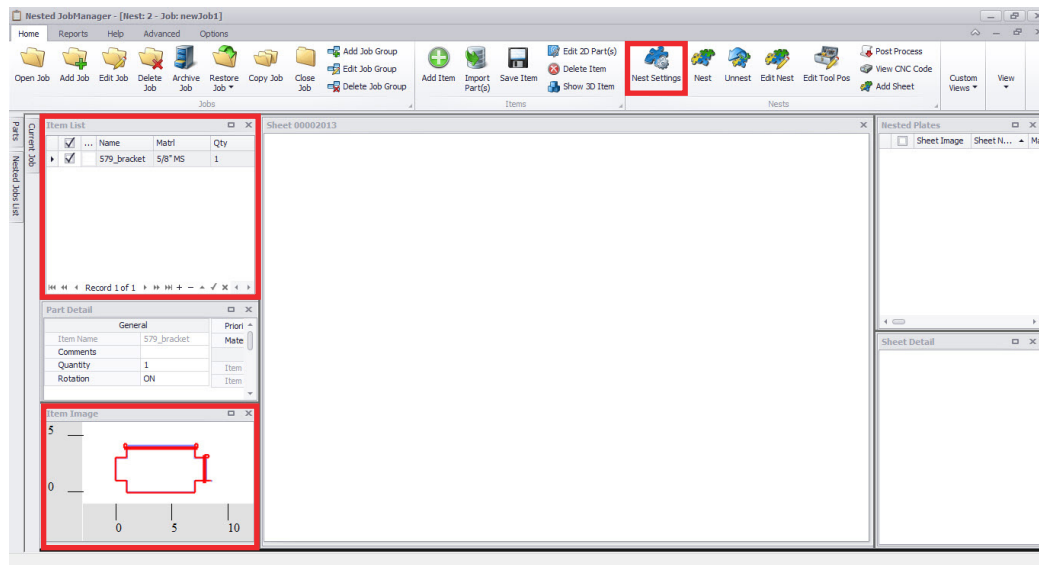
Press NEST SETTINGS at the top of the screen.

This will open the NEST properties. In the upper left, verify that the POST is set to your Plasma power supply. At the bottom of the NEST SETTINGS, verify the AMPS and AIR.

Create a Bevel Cut:

In the CENTER, enter the size of material you have for the NEST.

Enter 1 in the # OF SHEETS.

Press NEST SETTINGS at the top of the screen.

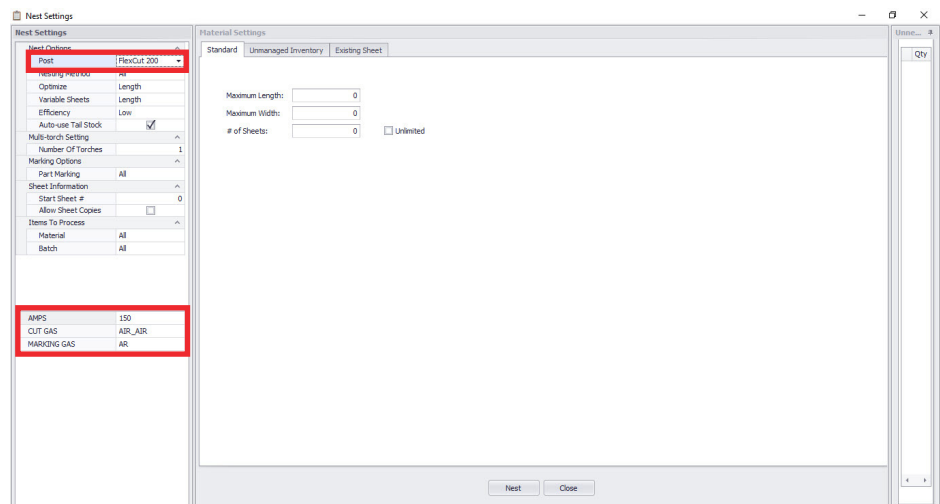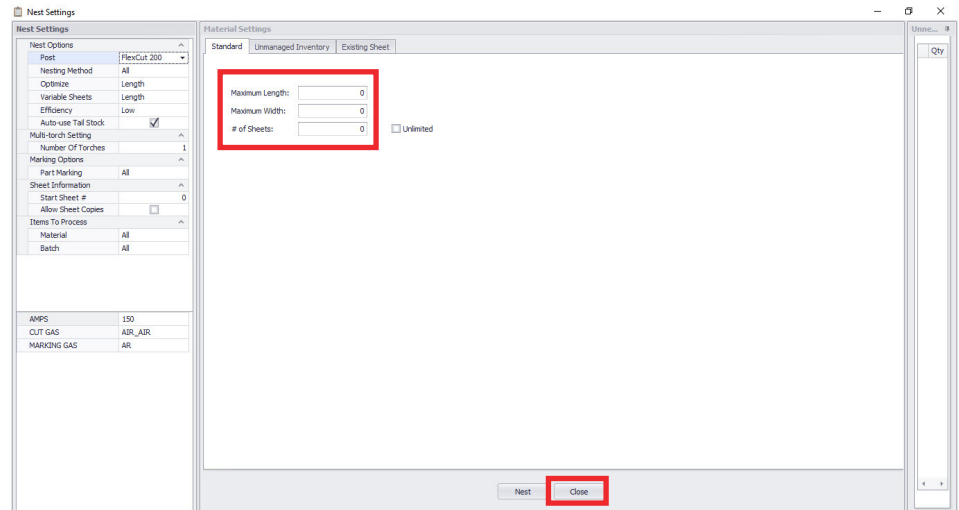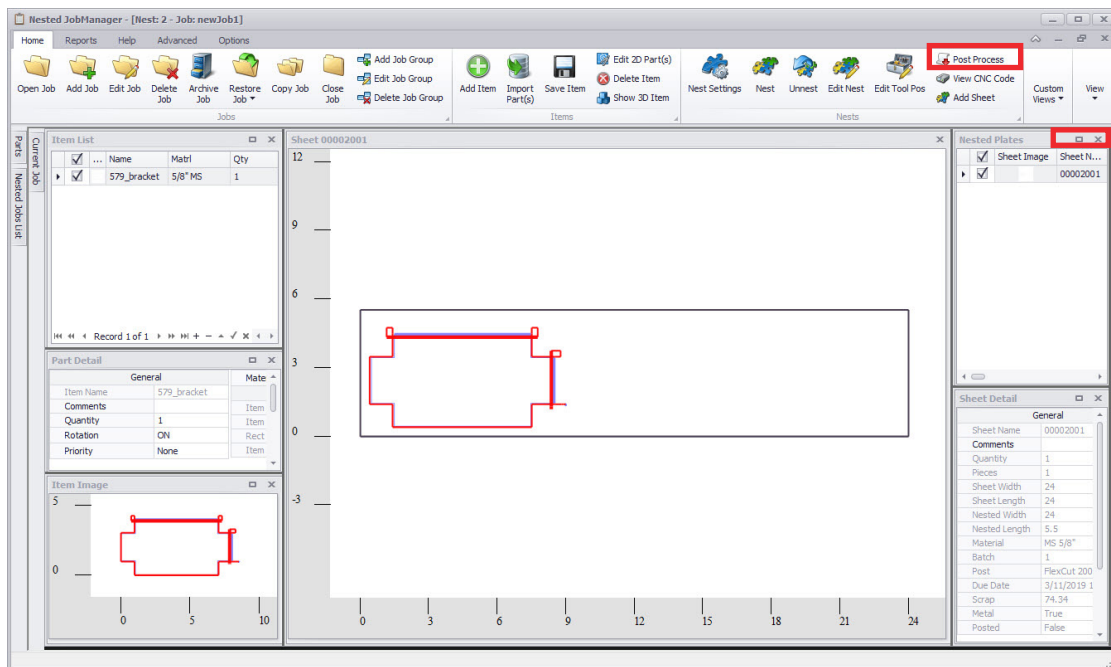This will open the NEST properties. In the upper right, verify that the POST is set to your plasma power supply. At the bottom of the Nest Settings, verify the AMPS and AIR for the POST to write the CUT SETTINGS for your part.

Press NEST.

JOB MANAGER will open and display your nest along with the part in the display.

Press POST PROCESS.

Create a Bevel Cut:

After pressing POST PROCESS, the POST SETTINGS dialog will open.

This will state the POST to use in a drop-down dialog. Verify that the plasma power supply is correct.

The default PATH is C:\DOWNLOADS

To save to the HOT FOLDER in VMD, change the PATH to C:\CONTROLLER DATA\JOBS

To save to a Flash Drive, or another drive, press the three dots and open the BROWSE dialog.

Your FILE will be named numerically based on the NESTED PLATES SHEET NAME.

In this example, the cut file would be named 0000200001.GM
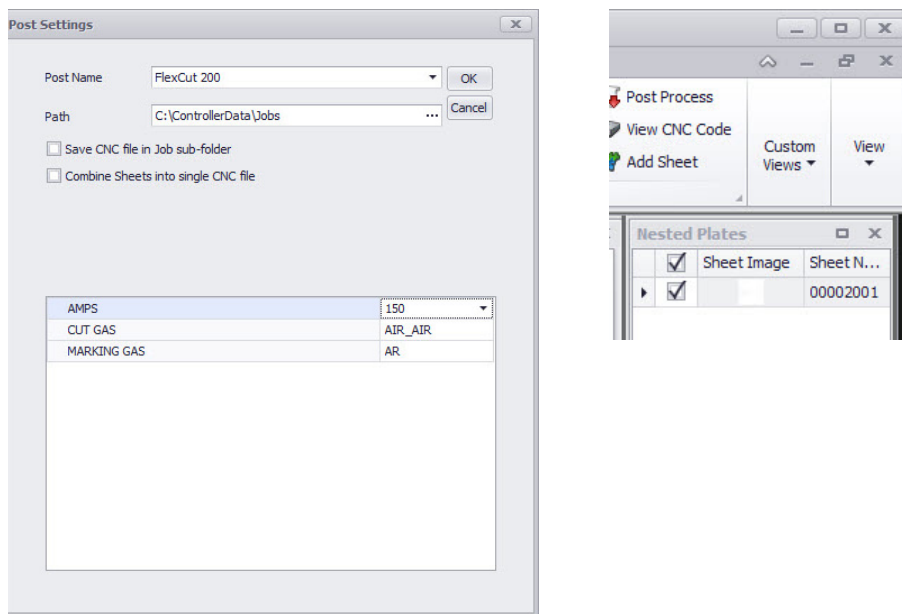
In the TOP tool bar area, press CLOSE JOB.
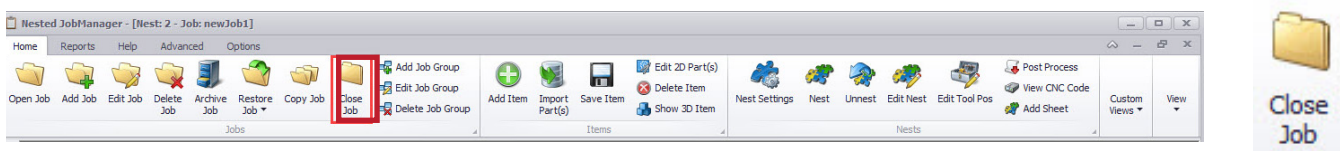
The NESTED JOB MANAGER will display. Press the X in the upper right to exit out of the software.
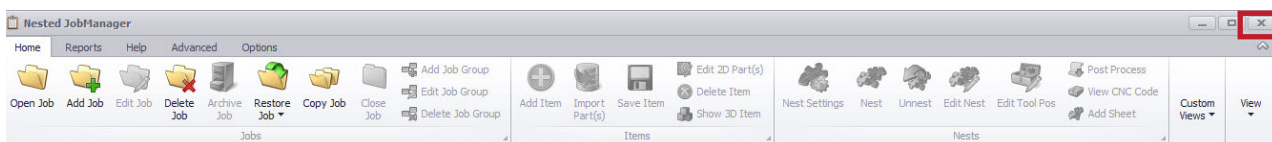
The file can then be brought into VMD for cutting.

General Maintenance

As with all equipment, follow the maintenance and proper operating procedures outlined in the guides included with this machine. By practicing a consistent maintenance and cleaning schedule, will ensure the reliability and productivity of the machine. Follow all guidelines and safety precautions outlined in the user guide of the table, along with the equipment attached to the 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.

· It is recommended to wipe down any exposed, un-coated metal and spray with a dry silicone lubricant and wipe off the excess. This process will help eliminate any corrosion build up on the exposed metal.

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 and FineLine plasma power supplies, see their Owners Manual.

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.

Basic Maintenance:

Machine:

Since the gantry rides on linear rails, you will need to grease the cassettes that ride on the rail every 3-6 months. Build-up and water can impede the smooth operation of the cassettes that can cause issues for the gantry to move properly on the linear rails.

LECS recommends Mobil SHC Mobilith SHC 100 lithium based grease. This product can be sourced and purchased locally.

Load the grease cartridge into a grease gun and grease each zerk.

The arrows indicate all the zerks that need to be greased.
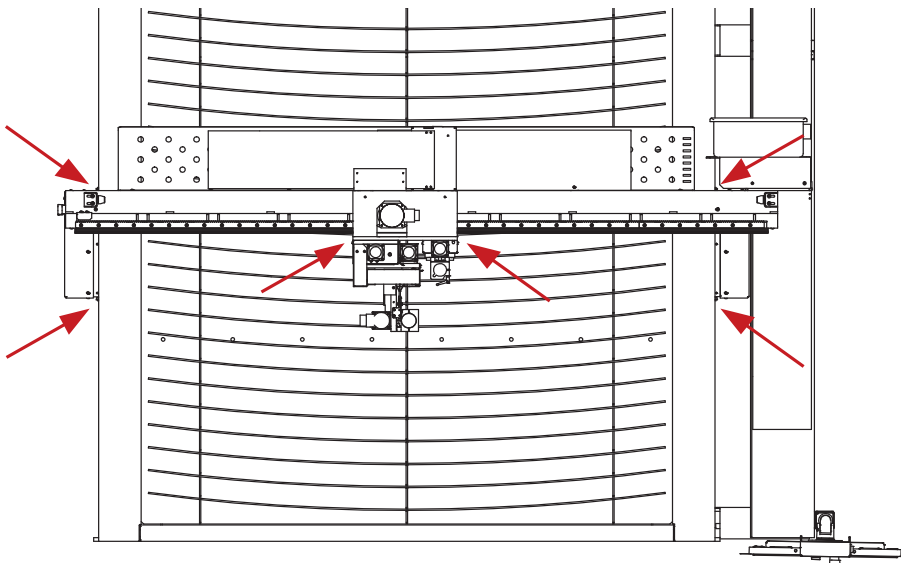
Side Linear Rail (Y-Axis) Zerk

Torch Carriage Linear Rail (X-Axis) Zerk

Basic Maintenance:

Electronic Controlled Lubricators: - pn #TMS-151-3025-00

The system is comprised of replaceable, electronically controlled oil cartridges which apply the proper amount of lubricant onto the gear rack. The felt roller follows the gear and applies small amounts of oil to the surface of the gear rack to reduce friction, keeping the machines performance optimal and extending the life of the gear rack. The cartridges need to be turned on and set to the appropriate setting for your application.
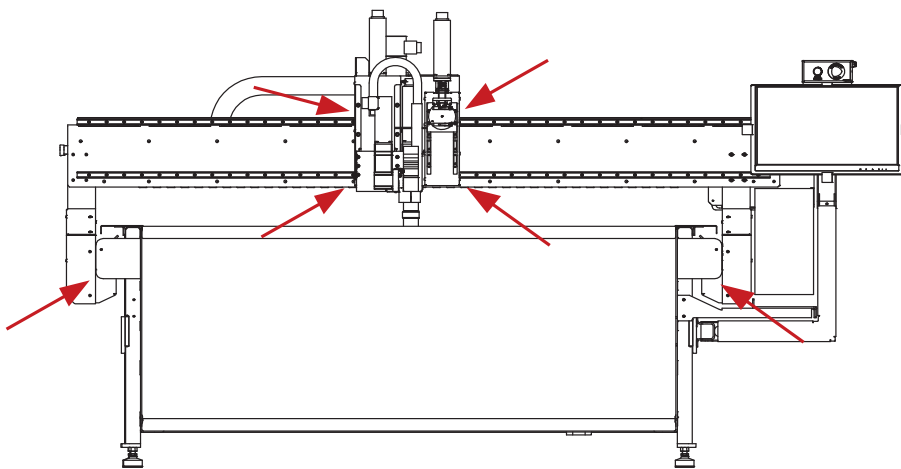
At the factory, these oilers will have their application tubes primed and will "pressurize" the system to start applying the oil to the felt rollers.

There are 3 lubricators installed on the 5100. One on each end of the gantry, under the side panels, and one behind the torch carriage.

The cartridges will need to be replaced on a preventative maintenance schedule.

TMS-151-3025-00
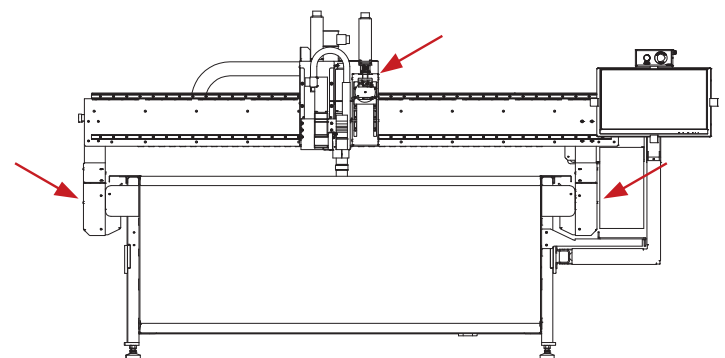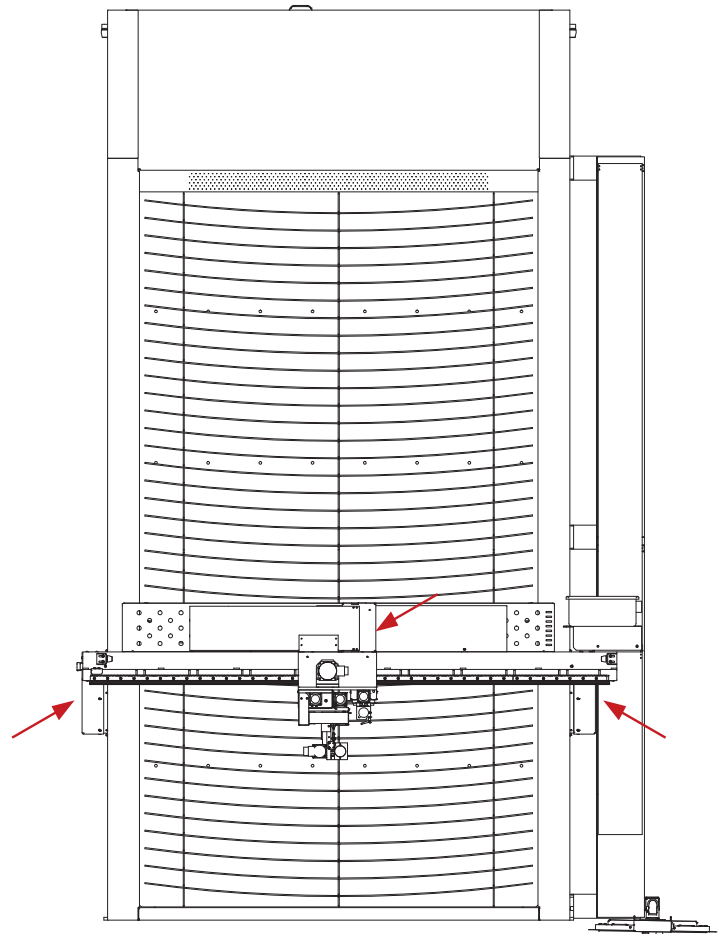
Electronic Controlled Lubricators:

To set the lubricators, you will remove the top lid to expose the dip switches.
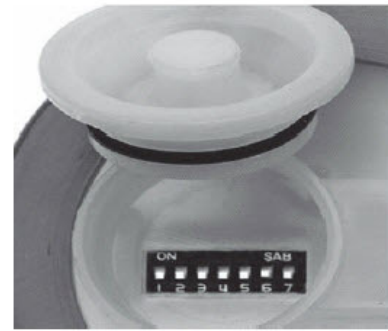
The dip switches will arrive all in the OFF position. To adjust, get a flat head screwdriver to move the dip switches UP to activate that switch.
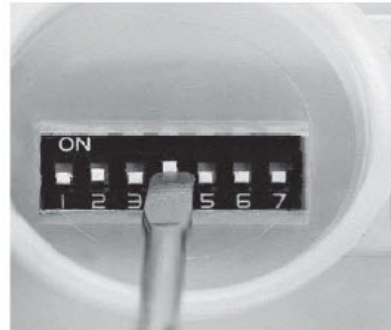
An LED indicator will illuminate the "position" the dip switches are set to and will blink every 20 seconds.
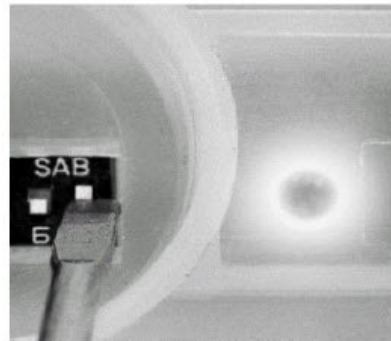
We recommend setting the dip switches to #4 ON until the machine use is determined. This setting states that the lubricator will apply oil to the felt wiper for 6 months and the cartridge will need to be replaced.

Use this chart to help determine the proper setting for your application. If you notice "pooling" of the lubricant, then adjust the dip switches to a longer period of time.

Setting time in months	1	2	3	6	12	18
DIP switch	1	2	3	4	5	6
Pressure build-up time in days	1	2	3	6	10	14

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.
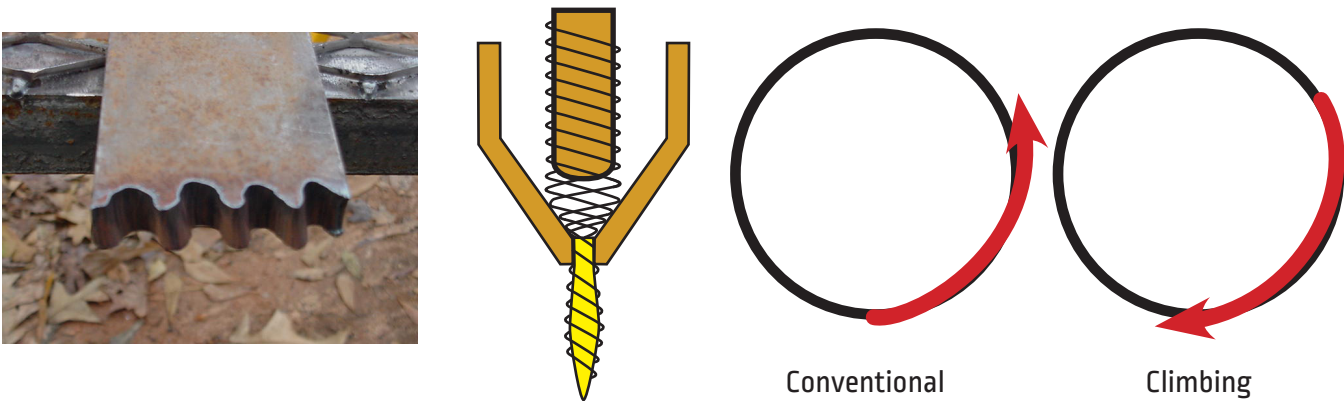

Conventional   Climbing

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 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
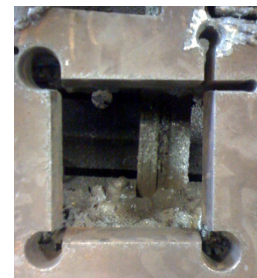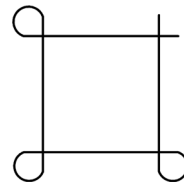
Corner Loops

How Torch Position Affects Bevel:

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 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.
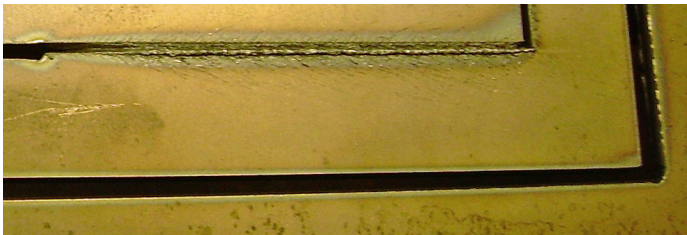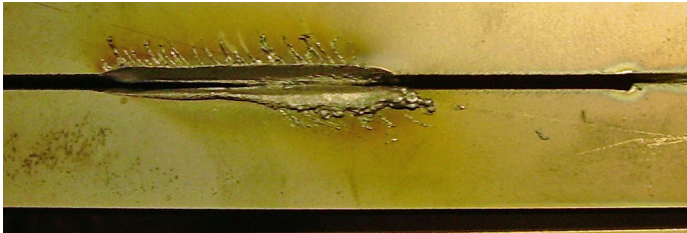
Line Speed Test:

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 ten 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:
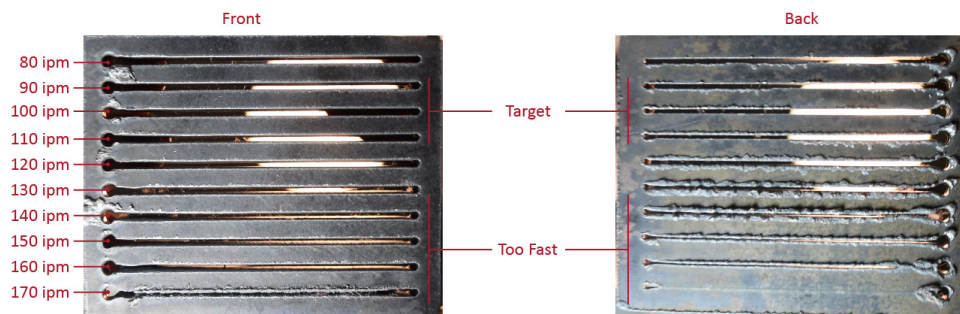
So in this example the 110 - 90 ipm will be the best speed for this material thickness and amperage setting. Now this process will be used for every thickness of material you plan on cutting to establish the proper speed.

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

Basic Troubleshooting

Machine Faults:

Problem	Solution
"Please Enable The Drives" Error Message Appears	Release BOTH Emergency Stops buttons and press the green "ENABLE" button.
Following Error (AXIS ID)	Push the red Emergency stop button, move the gantry or axis to clear the obstruction, release the Emergency stop button and enable the drives. Datum the machine.
Drive Fault (AXIS ID)	Push the red Emergency stop button. Release the Emergency stop button and enable the drives. Datum the machine. If the error message persists and the axis ID is X, Y, U, or Z, check Fuse #1 in the electrical cabinet. If the axis is W or V check Fuse #2 in the electrical cabinet.
When the machine is turned on, the computer and monitor do not power on	Check power at the supply side. Verify breakers and any GFCI outlets. Check Fuse #4 in the electrical cabinet.
The water level does not adjust when clicking the Up/Down button on the main screen	Restore Shop Air to the tables manifold.
None of the downdraft doors operate during a cut	Restore Shop Air to the tables manifold.
The bevel motors make a light humming noise	The motors apply power to hold their position in normal operation. This will be heard as an audible hum.
Accumove Controller Connecting Screen	If this screen is displayed for longer than 1 minute, turn off power to the machine for 1 minute. Turn the power back on. If the same condition exists, check Fuse #3 inside the electrical cabinet.

Machine Faults:

Problem	Solution
WATER LEVEL LOW is illuminated. The water cannot be raised any higher.	LOGIN as ADMIN, under the WATER FILL TAB, follow the steps to add sufficient water to the table.
Constant Z-Axis following error on attempted DATUM	Check brake relay connection & double terminated pin at servo drive. Verify motor cable connections.
Large "backlash" symptom in X Axis. Oblong holes.	Remove X cover and evaluate belt condition. Loosen the motor bolts and tighten tension screw to proper tension. Tighten motor bolts.

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.

Customer Assistance Policy

The business of Lincoln Electric is manufacturing and selling high quality welding equipment, automated welding systems, consumables, and cutting equipment. Our challenge is to meet the needs of our customers, who are experts in their fields, and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or technical information about their use of our products. Our employees respond to inquiries to the best of their ability based on information and specifications provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment, or to provide engineering advice in relation to a specific situation. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or communications. Moreover, the provision of such information or technical information does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or technical information, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose or any other equivalent or similar warranty is specifically disclaimed.

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