USER GUIDE
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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® 775-673-2200 to report any shipping damages. Your machine was fully tested at the factory, a metal cut sample can be found in the bed of the machine.

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<th>Description</th>
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To unpack your new Torchmate 5100 is simple. 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 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.

A 6,600lb + forklift with 8’+ long forks 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 ship with factory installed gantry locks. The yellow locking devices MUST BE removed before the machine can be made operational.

DO NOT REPLACE THE BOLTS FROM THE GANTRY LOCKS AS THIS WILL CAUSE DIRECT DAMAGE TO THE MACHINE.

**Do Not Fork Lift From Cable Carrier Side Of Machine!**
Unpacking your new machine (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.

Then the table is ready to be filled with water. (if water table)
Unpacking your new machine (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.
Unpacking your new machine (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 power supply is disconnected from the system and will require a connection to the machine. The table has a single 120v NEMA 5-15P plug that powers the table and computer/monitor. The plasma power supply chosen requires 3-phase electrical connections along with numerous other connections that are required by your specific power supply to interface with the machine.

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

5100 - Table Power and Air connections:

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

5100 - Pneumatic Connection:

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 or collision sensors will also be provided shop air by tapping into the two provided output 1/4" Tubing Push-Connects.
Unpacking your new machine (FlexCut™ 125)

FlexCut 125:

FlexCut 125 will have two barrel connectors to attach to the bulkhead. When moving your FlexCut 125, use 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.

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.

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.
Unpacking your new machine [FlexCut™ 200/FlexCool™ 35]

FlexCut 200 and FlexCool 35:

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.

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:

- Cut and remove banding straps around skid and carton
- Remove carton
- Cut and remove banding straps around skid and cooler
- 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 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 .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.
Unpacking your new machine (FlexCut™ 200/FlexCool™ 35)

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 hole 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.

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 into 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.

FLEXSTART box mounted to gantry on the 5100. Hoses and cables are run into the cable carrier.
Unpacking your new machine [FlexCut™ 200/FlexCool™ 35]

Connections between the FlexCut 200 and 5100:

5. From the cable carrier, connect the PLASMA GAS and SHIELD GAS to the FlexCut 200.
6. Attach the PLASMA connections from the cable carrier to the NOZZLE, ARC LINK, ELECTRODE.
7. Connect the WORK to the STAR GROUND BLOCK on the machine.

8. Connect the CNC interface cable to the BULKHEAD P1 and P2.
9. 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.
Technical Support | On-Site Service

Lincoln Electric Cutting Systems provides numerous technical support opportunities with the purchase of your new Torchmate 5100 CNC cutting machine. The following is a brief outline of available options. On-site visits are available at an additional cost call 775-673-2200 for additional information.

- **Phone Support**
  Phone support is available Monday – Friday 7:00 am-4:00 pm PST. Lincoln Electric will make every effort to handle phone calls promptly. 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/set-up, troubleshooting, configuration, and quality related issues. Operational or CAD training is not included in phone technical support.

- **Email**
  Lincoln Electric will return emails to the support@Torchmate.com email address within 24 hours Monday-Friday

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

- **Torchmate Training Seminars**
  Lincoln Electric provides a number of training opportunities at our Reno, Nevada campus and at select Regional locations. Please call 775-673-2200 for details or visit
  http://torchmate.com/seminars

- **Torchmate Online Training**
  Lincoln Electric maintains a number of operational training resources at
  http://torchmate.com/training

- **Torchmate YouTube Channel:**
  Lincoln Electric provides a wide selection of how to tutorials on our YouTube page.
  https://www.youtube.com/user/torchmatedotcom
Statement of Warranty

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

Warranty
Electronics and motors are warranted by their manufacturer to the original purchaser for 12 months from the date of Torchmate, Inc.’s sale invoice. Mechanical components are standard industrial parts and are not warranted except by their respective manufacturers. If any of the warranted items are found by Seller to be defective, such Goods will, at Seller’s option, be replaced or repaired at Seller’s cost. No defective goods are to be returned without written authorization of seller. The sole purpose of the stipulated exclusive remedy shall be to provide the Buyer with free repair and replacement of defective Goods in the manner provided herein. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as the Seller is willing and able to repair or replace defective Goods in the prescribed manner. The foregoing warranty is in lieu of all other warranties, express or implied, including those of merchantability or fitness for any purpose not expressly set forth herein. No affirmation of Seller, by words or action, other than as set forth in this Section shall constitute a warranty. Seller’s warranty does not apply to any Goods which have been subjected to misuse, mishandling, misapplication, neglect (including but not limited to improper maintenance), accident, improper installation, modification (including by not limited to use of unauthorized parts or attachments), or adjustment or repair performed by anyone other than Seller or one of Seller’s authorized agents. When returning products to Seller packaging must be adequate or all warranty is null and void. Buyer will pay for the cost of Shipping to and from the Seller for all warranty repairs.

Any claim by Buyer with reference to the Goods sold hereunder shall be deemed waived by the Buyer unless submitted in writing to seller within the earlier of (i) thirty [30] days following the date Buyer discovered or by reasonable inspection should have discovered, any claimed breach of foregoing warranty, or (ii) 12 months following the date of shipment. Any cause of action for breach of the foregoing warranty shall be brought within one year from the date the alleged breach was discovered or should have been discovered, whichever occurs first.
Seller’s liability (whether under the theories of breach of contract or warranty, negligence, or strict liability) for its Goods shall be limited to repairing or replacing Goods found by Seller to be defective, or at Seller’s option, to refunding the purchase price of such Goods or parts thereof.

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

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

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

A. In addition to the rights and remedies conferred upon Seller by law, Seller shall not be required to proceed with the performance of any order or contract if the Buyer is in default in the performance of any order or contract with Seller, and in case of doubt as to Buyer’s financial responsibility, shipments under this order may be suspended.

B. No delay or omission by Seller in exercising any right or remedy provided for herein shall constitute a waiver of such right or remedy and shall not be constituted as a bar to or a waiver of any such right or remedy on any future occasion.

C. The sale of Goods shall be governed by the laws of the State of Maryland. Seller agrees to comply with all applicable laws of the United States.

D. The purchasers of products from Lincoln Electric Cutting Systems are responsible to dispose of consumables, fluids and machinery at the end of the life cycle in accordance with federal and local regulations.

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

Torchmate and Lincoln Electric Cutting Systems equipment is designed and built with safety in mind. Safe operation requires that the user follow proper installation, training, and safe operating procedures.

**WARNING**

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

Think before you act—and be careful.

Read and understand the following safety highlights. For additional safety information it is strongly recommended that you acquire a copy of “Lincoln Electric E205 ‘Arc Welding Safety’” as well as “Safety in Welding & Cutting - ANSI Standard Z49.1” from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2.

**BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS**

While Operating the machine.

- **WEAR CORRECT EYE, EAR & BODY PROTECTION**
- **PROTECT** your eyes and face with welding helmet properly fitted and with proper shade rating of filter plate (See ANSI Z49.1).
- **PROTECT** your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.
- **PROTECT** others from splatter, flash, and glare with protective screens or barriers.
- **WHEN OPERATING THIS EQUIPMENT,** wear hearing protection.
- **BE SURE** protective equipment is in good condition.
- **Provide** adequate lighting to the area around the machine appropriate for all the tasks being completed.
- **Wear** safety glasses in work area AT ALL TIMES.
- **Do not climb** on machine. It is not intended as a ladder or to support anything but the intended use of metal cutting. Climbing onto the machine could result in a fall that can result in injury or death.

**ELECTRIC SHOCK can kill.**

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

- Plasma cutting or gouging may produce fumes and gases hazardous to your health. Avoid breathing these fumes and gases. When cutting or gouging, keep your head out of the fumes. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone and general area.
- 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 toxic fumes, keep exposure as low as possible and within applicable limits such as the OSHA PEL and ACGIH TLV limits, using local exhaust or mechanical ventilation. In confined spaces or in some circumstances a respirator will be required.
- Additional precautions are also required when cutting (zinc) galvanized steel or materials containing or coated with any of the following:

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<th>Antimony</th>
<th>Beryllium</th>
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<th>Manganese</th>
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<td>Chromium</td>
<td>Lead</td>
<td>Nickel</td>
<td>Vanadium</td>
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- The operation of plasma cutting or gouging fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment, and the specific procedure and application involved. Worker exposure levels should be assessed by a qualified individual, such as an industrial hygienist, upon installation and periodically thereafter to be certain levels are within applicable exposure limits, such as the OSHA PEL and ACGIH TLV. For information on how to test for fumes and gases in your workplace, refer to publications section of this manual.
- Do not use plasma cutting or gouging equipment in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The ultraviolet rays from the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products. Remove all sources of these vapors.
- Materials containing chromium may release hexavalent chromium compounds during plasma cutting and other hot work.
- Hexavalent chromium compounds are on the IARC list as posing a lung cancer risk to humans. Use adequate ventilation to avoid overexposures.
- 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.
- 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.
- Fumes and gases from hot work and 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. Avoid dust to get into your mouth, eyes, or lay on the skin as this may promote or result in the absorption of harmful chemicals.

**Some examples of these chemicals are:**
- Lead from lead-based paint.
- Crystalline silica from bricks and cement and other masonry products.
- Arsenic and chromium from chemically-treated lumber (CCA).

Your risk from these exposures varies, depending on the nature and frequency of this type of work. To prevent your exposure to these chemicals: Use local exhaust ventilation and/or work in a well ventilated area, and work with approved safety equipment, including respiratory protection that is properly selected in accordance with the contaminants, and their concentrations present in the work environment.
Cutting flame and sparks can cause FIRE OR EXPLOSION.

- Read and follow NFPA 51B "Standard for Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101.
- 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 adequately protected as to avoid any potential for contact with flames, sparks or spatter.
- Sparks and hot materials from cutting or gouging can easily go through small cracks and openings to adjacent areas.
- Avoid cutting or gouging near hydraulic lines.
- Do not cut or gouge tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned." For information purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).
- Vent hollow castings or containers before heating, cutting or gouging. They may explode.
- Do not add fuel to engine driven equipment near an area where plasma cutting or gouging is being done.
- Connect the work cable to the work as close to the cutting or gouging area as practical. Work cables connected to the building framework or other locations away from the cutting or gouging area increase the possibility of the current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- Hydrogen gas may be formed and trapped under aluminum work pieces when they are cut underwater or while using a water table. DO NOT cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.

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ARC RAYS can burn.

- Plasma Arc Rays can injure your eyes and/or burn your skin. The plasma arc process produces very bright ultraviolet and infrared rays. These will damage your eyes and burn your skin if you are not properly protected.
- Use safety glasses and a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when performing or observing plasma arc cutting or gouging. Glasses, head-shield, and filter lens should conform to ANSI Z87.1 standards.
- Use suitable clothing including gloves made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- Protect other nearby personnel with suitable non-flammable screening and warn them about the hazards of the activity taking place, and the precautions they must take.
- According to IARC, ultraviolet radiation from welding causes ocular melanoma. IARC identifies gouging, brazing, carbon arc or plasma arc cutting, and soldering as processes closely related to welding.
CYLINDER may EXPLODE if damaged.

- Use only compressed gas cylinders containing the correct gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.
- Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- Cylinders should be located: • Away from areas where they may be struck or subjected to physical damage. • A safe distance from plasma cutting or gouging, arc welding operations and any other source of heat, sparks, or flame.
- Never allow any part of the electrode, torch or any other electrically “hot” parts to touch a cylinder.
- Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
- Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, “Precautions for Safe Handling of Compressed Gases in Cylinders,” available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

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

PLASMA ARC can injure.

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

ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

For more information on electromagnetic interference please visit

http://torchmate.com/white-papers/EMI-Reduction
## 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 1500 ipm

### Plate Capacity
- Holds Up To 4” (102mm) 5’x10’ (1524mm x 3048mm) Mild Steel

### Weight
- 6,600 lbs

### Operating Temperature
- 32-104° Farenheit (0-40° Celcius)

### 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]

### Height Control
- Ohmic Sensing
- Automatic Torch Height Control
- 6.75” Z-axis Travel

### Bevel Capabilities
- +/-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

### Machine Construction
- Fabricated Steel Frame with Powder Coated Finish

### Warranty
- 1 Year Warranty

### TORCHMATE 5100 CNC PLASMA SYSTEMS

#### PRODUCTION CUTTING CAPACITY

<table>
<thead>
<tr>
<th>Steel Type</th>
<th>FC 125</th>
<th>FC 200</th>
<th>SP 275</th>
<th>SP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Steel</td>
<td>1” (25mm)</td>
<td>1.25”</td>
<td>1.5” (38mm)</td>
<td>2” (50mm)</td>
</tr>
<tr>
<td>Stainless Steel</td>
<td>3/4” (20mm)</td>
<td>3/4” (20mm)</td>
<td>1” (25mm)</td>
<td>1.5” (38mm)</td>
</tr>
<tr>
<td>Aluminum</td>
<td>5/8” (16mm)</td>
<td>3/4” (20mm)</td>
<td>3/4” (20mm)</td>
<td>1.5” (38mm)</td>
</tr>
</tbody>
</table>

#### CUTTING SPEED @ RATED OUTPUT CURRENT

<table>
<thead>
<tr>
<th>MS</th>
<th>FC 125</th>
<th>FC 200</th>
<th>SP 275</th>
<th>SP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4”</td>
<td>210/ipm</td>
<td>@125A</td>
<td>200/ipm</td>
<td>@200A</td>
</tr>
<tr>
<td>1/2”</td>
<td>88/ipm</td>
<td>@125A</td>
<td>110/ipm</td>
<td>@200A</td>
</tr>
<tr>
<td>1”</td>
<td>32/ipm</td>
<td>@125A</td>
<td>40/ipm</td>
<td>@200A</td>
</tr>
</tbody>
</table>

#### PROCESS AMPS

<table>
<thead>
<tr>
<th></th>
<th>FC 125</th>
<th>FC 200</th>
<th>SP 275</th>
<th>SP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>20A - 125A</td>
<td>175A - 200A</td>
<td>30A - 275A</td>
<td>30A - 400A</td>
<td></td>
</tr>
</tbody>
</table>

#### CUTTING GAS

<table>
<thead>
<tr>
<th>Steel Type</th>
<th>Air / Air</th>
<th>Air / Air, Oxygen / Air</th>
<th>Oxygen / Oxygen / Oxygen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Steel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stainless Steel</td>
<td>Air / Air Nitrogen</td>
<td>Air / Air Nitrogen</td>
<td>Air / Air - Nitrogen H17 / Nitrogen Nitrogen / Air</td>
</tr>
<tr>
<td>Aluminum</td>
<td>Air / Air</td>
<td>Air / Air</td>
<td>Air / Oxygen Nitrogen Air</td>
</tr>
</tbody>
</table>

#### INPUT VOLTAGE

<table>
<thead>
<tr>
<th></th>
<th>380/400/415V/3Ph50/60Hz</th>
<th>380/460/575V/3Ph50/60Hz</th>
<th>380V 3Ph 50/60Hz</th>
<th>400V 3Ph 50/60Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>460V 3Ph 50/60Hz</td>
<td>400V 3Ph 50/60Hz (CE)</td>
<td>415V 3Ph 50/60Hz</td>
<td>440V 3Ph 50/60Hz</td>
<td></td>
</tr>
<tr>
<td>575V 3Ph 50/60Hz</td>
<td>480V 3Ph 50/60Hz</td>
<td>600V 3Ph 50/60Hz</td>
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<td></td>
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</tbody>
</table>

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5 User Guide
Site Preparation

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

- When preparing to install the Lincoln Electric CNC Cutting System, provide sufficient space. Three feet of workspace should be maintained at the front of machine.
- Forklift load material opposite the cable carrier only. Utilize the back of the machine to park the gantry while loading material.
- A dedicated earth ground must be provided and should be installed in a manner to reduce trip hazard.
Burny Kaliburn Spirit II power supplies have a larger power box and a gas box. The placement of these products need to be moved to the cable carrier side within 6’ of the end of the cable chain.
Grounding Your Machine

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

Consult with a qualified electrical technician to verify your system grounding.

Use 6 AWG Stranded Wire to connect the Star Ground on the table to the customer supplied dedicated earth ground.

For proper operation of your CNC cutting tables you are required to run a 6 AWG cable from the “star” ground to a dedicated earth-ground rod. Ground rod installations are covered by NEC Section 250.

Place the plasma unit on the appropriate location. Re-install the power lead and the table ground into the plasma power supply.

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

Earth Ground Rod is not included with machine.
Power/Air/Water Requirements and Installation (non-HD)

Please refer to the FlexCut/Spirit II operators manual for a complete installation and operation guidelines. Only a qualified electrician should connect the input leads to the Torchmate 5100 CNC unit and FlexCut/Spirit II Plasma unit. Connections should be made in accordance with all local and national electrical codes. Failure to do so may result in bodily injury or death.

The FlexCut 125/200 is rated for 380 VAC through 575 VAC input voltage, three phase only and 50 or 60 Hz. Before connecting the machine to power, be sure the input supply voltage, phase and frequency all match those listed on the machine rating plate.

The Burny Kaliburn Spirit II plasma cutters are manufactured to the customer’s power availability.

The power supply cord is supplied on the FlexCut 125 without an attachment plug to accommodate three phase installations of being hard wired to a disconnect or for a wall plug. FC200/Spirit II do not include SO cord for connection to customers power and will need to have the appropriate cable connected per electrical requirements.

**Warning:**
The FlexCut on/off switch is not intended as a service disconnect for this equipment. Only a qualified electrician should connect the input leads to the Torchmate 5100.

The Torchmate 5100 CNC machine requires a clean, dry, oil-free compressed air. A high pressure regulator MUST be used with a compressor or high pressure cylinder.

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

**AIR SUPPLY PRESSURE SHOULD NEVER EXCEED 130 PSI OR DAMAGE TO THE MACHINE MAY OCCUR!**

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

Water should be installed in the table before operation. Operators are encouraged to use a readily available anti-corrosive water additive designed for use in CNC plasma water tables.

**Water Capacity: 428 gallons (1620 liters)**
Slats inside the cutting bed.

The 5100 WT/DD 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” [4.7625mm] 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 the build up is hindering the plate from being flat.

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

- The slats can be used on one side and flipped over to increase usage time on one set of slats.
Powering up the Torchmate 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 backside of the machine. Once switched on, the computer and all the electronics will power up. The power switch for the plasma power supply is located on the front of the unit. The complete user guide is available as an embedded file in the VMD. Use the button with the question mark to access this file.

1. Power up the machine by using the toggle switch. (back left of the machine)
2. The VMD Application will auto start with the computer, wait for control panel to load (run.wap)
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)
6. Go to the plasma torch head to check and evaluate the consumables. Turn the plasma power supply on and set the appropriate amperage for the consumables and the material you will be cutting. Cut charts are available in the Flex-Cut manual. Verify air pressure is correct per manual.
7. Jog the torch to the lower left corner of the material you are going to cut. Press SET PROGRAM ZERO.
8. Press GO TO PROGRAM ZERO. The head should return to the top of the lifter.
Water Table Operation

The 5100 in Water Table configuration, the water level is controlled by the HMI to raise and lower the machine. The button RAISE switches a valve to use compressed air to "push" the water to the cutting bed. While pressing LOWER releases the air from the lower chamber.

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.
Filling the Water Table

The 5100 has an automated water level feature that is controlled on the RUN panel. 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.

1. Press LOG ON. Select ADMIN (password 1234). Press OK

2. MACHINE SETTINGS will open. Press the WATER FILL tab.

2.a] 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 MACHINE SETTINGS panel will open.
Filling the Water Table

3. 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.

4. 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

5. Once the WATER FULL indicator turns on, turn the input water off to the table. Close the EXHAUST by pressing the EXHAUST button.

6. Raise the water into the main chamber by pressing and holding the RAISE WATER button. Once the water reaches the top of the slat, then 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 now use the WATER LEVEL controls on the RUN HMI.
Downdraft Operation

The 5100 in Downdraft configuration, 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 PROGRAM ZERO is established.

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 SET PROGRAM ZERO.

If a part or 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 Fume Extraction (Optional Accessory)
- 61,801 ft³/hr or 1,750 m³/hr minimum
- Automatic Filter Cleaning, Pressure Controlled.
FlexCut 125 Plasma Controls and Settings

Please refer to the complete operation and user manual for your FlexCut 125 located with the plasma unit. When the machine is turned on, an auto-test executes; during this test the Control Panel light up.

Controls »

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

BACK
9. AIR OR GAS INLET (1/4"IN. NPT QUICK CONNECT)
10. RECONNECT PANEL ACCESS
11. INPUT CORD STRAIN RELIEF
12. 14-PIN CNC INTERFACE
13. FAN
FlexCut 125 Plasma Cutter Consumable Use

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

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Product Number</th>
<th>Input Power Voltage/Phase/Hertz</th>
<th>Rated Output: Current/Voltage/Duty Cycle</th>
<th>Input Current @ Rated Output</th>
<th>Output Range</th>
<th>Gas Pressure Required</th>
<th>Gas Flow Rate</th>
<th>H x W x D in (mm)</th>
<th>Net Wt. lb (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FlexCut 125</td>
<td>K4811-1</td>
<td>380/400/415/460</td>
<td>125A/175V/700%</td>
<td>1PH 20-125A</td>
<td>90-120 PSI</td>
<td>60 SCFH @90 PSI</td>
<td>260 SLPM @6.21 Bar</td>
<td>20.72 x 12.25 x 25.53</td>
<td>118 (53.5)</td>
</tr>
</tbody>
</table>

MECHANIZED CUT CAPACITY - MATERIAL THICKNESS MILD STEEL

Recommended cut capacity at 32 ipm 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

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Speed (ipm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 in. (6.35 mm)</td>
<td>180</td>
</tr>
<tr>
<td>1/2 in. (12.7 mm)</td>
<td>72</td>
</tr>
<tr>
<td>3/4 in. (19 mm)</td>
<td>40</td>
</tr>
<tr>
<td>1 in. (25.4 mm)</td>
<td>23</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Part Number</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrode (LC125M)</td>
<td>BK4300-1</td>
<td>2 Qty</td>
</tr>
<tr>
<td>Shield Cap 45 A - 65 A (LC125M)</td>
<td>BK4300-3</td>
<td>1 Qty</td>
</tr>
<tr>
<td>Shield Cap 85 A - 125 A (LC125M)</td>
<td>BK4300-4</td>
<td>1 Qty</td>
</tr>
<tr>
<td>Nozzle 45A (LC125M)</td>
<td>BK4300-7</td>
<td>1 Qty</td>
</tr>
<tr>
<td>Nozzle 65A (LC125M)</td>
<td>BK4300-8</td>
<td>1 Qty</td>
</tr>
<tr>
<td>Nozzle 85A (LC125M)</td>
<td>BK4300-9</td>
<td>1 Qty</td>
</tr>
<tr>
<td>Nozzle 105A (LC125M)</td>
<td>BK4300-10</td>
<td>2 Qty</td>
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<tr>
<td>Nozzle 125A (LC125M)</td>
<td>BK4300-11</td>
<td>2 Qty</td>
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<tr>
<td>Swirl Ring 45 A - 125 A (LC125M)</td>
<td>BK4300-13</td>
<td>1 Qty</td>
</tr>
<tr>
<td>Retaining Cap-CTP (LC125M)</td>
<td>BK4300-15</td>
<td>1 Qty</td>
</tr>
</tbody>
</table>
FlexCut 200 Plasma Controls and Settings

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; during this test the screen will change.

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 Plasma Cutter Consumable Use

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

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Product Number</th>
<th>Input Power Voltage/Phase/Hertz</th>
<th>Rated Output: Current/Voltage/Duty Cycle</th>
<th>Input Current @ Rated Output</th>
<th>Output Range</th>
<th>Gas Pressure Required</th>
<th>Gas Flow Rate</th>
<th>H x W x D in [mm]</th>
<th>Net Wt. lb [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FlexCut 200</td>
<td>K4812-1</td>
<td>380/400/415/460</td>
<td>200A/100V/100%</td>
<td>3PH/400V/100%</td>
<td>90-120 PSI</td>
<td>560 SCFH @ 90 PSI</td>
<td>260 SLPM @ 6.21 Bar</td>
<td>23.66 x 15.97 x 32.19</td>
<td>190 [86.2]</td>
</tr>
</tbody>
</table>

MECHANIZED CUT CAPACITY - MATERIAL THICKNESS MILD STEEL

Recommended cut capacity at 32ipm 1 in. [25.4 mm]

PIERCING CAPACITY - MATERIAL THICKNESS MILD STEEL

Pierce capacity with programmable torch height control 3/4 in. [19 mm]

MAXIMUM CUT SPEEDS - MILD STEEL

<table>
<thead>
<tr>
<th>Material Thickness</th>
<th>Maximum Cut Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 in. [6.35 mm]</td>
<td>180 ipm</td>
</tr>
<tr>
<td>1/2 in. [12.7 mm]</td>
<td>72 ipm</td>
</tr>
<tr>
<td>3/4 in. [19 mm]</td>
<td>40 ipm</td>
</tr>
<tr>
<td>1 in. [25.4 mm]</td>
<td>23 ipm</td>
</tr>
</tbody>
</table>

CONSUMABLES STARTER KIT FOR LC125M MACHINE TORCH (BK244100-SK)

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalog Number</th>
<th>Qty</th>
</tr>
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<tbody>
<tr>
<td>Removal Tool, Nozzle</td>
<td>BK277056</td>
<td>1</td>
</tr>
<tr>
<td>Removal Tool, Swirl Ring</td>
<td>BK260105</td>
<td>1</td>
</tr>
<tr>
<td>O-Ring Lubricant</td>
<td>BK716012</td>
<td>1</td>
</tr>
<tr>
<td>Internal Retaining Cap 50 A</td>
<td>BK244453</td>
<td>1</td>
</tr>
<tr>
<td>Internal Retaining Cap 100 A</td>
<td>BK244452</td>
<td>1</td>
</tr>
<tr>
<td>Internal Retaining Cap 150-200 A</td>
<td>BK244466</td>
<td>1</td>
</tr>
<tr>
<td>Outer Retaining Cap 50-200 A</td>
<td>BK244454</td>
<td>1</td>
</tr>
<tr>
<td>Shield Cap 50 A</td>
<td>BK244450</td>
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<tr>
<td>Shield Cap 100 A</td>
<td>BK244417</td>
<td>1</td>
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<tr>
<td>Shield Cap 150 A</td>
<td>BK244474</td>
<td>1</td>
</tr>
<tr>
<td>Shield Cap 200 A</td>
<td>BK244463</td>
<td>1</td>
</tr>
<tr>
<td>Electrode 50 A</td>
<td>BK244431</td>
<td>1</td>
</tr>
<tr>
<td>Electrode 100 A</td>
<td>BK244492</td>
<td>1</td>
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<tr>
<td>Electrode 150 A</td>
<td>BK244491</td>
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<td>Swirl Ring 50 A</td>
<td>BK244442</td>
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<td>Swirl Ring 100 A</td>
<td>BK244439</td>
<td>1</td>
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<tr>
<td>Swirl Ring 150 A</td>
<td>BK244443</td>
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<tr>
<td>Swirl Ring 200 A</td>
<td>BK244458</td>
<td>1</td>
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<tr>
<td>Nozzle 50 A</td>
<td>BK244425</td>
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<td>Nozzle 100 A</td>
<td>BK244493</td>
<td>1</td>
</tr>
<tr>
<td>Nozzle 150 A</td>
<td>BK244489</td>
<td>1</td>
</tr>
<tr>
<td>Nozzle 200 A</td>
<td>BK244469</td>
<td>1</td>
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</tbody>
</table>
Performing Your First Test Cut (straight torch NON BEVEL)

The LINE SPEED TEST.gm and 5100 Test Cut.gm is provided to determine the proper feed rate in IPMs to cut the material thickness to the amperage you have set on the plasma power supply. These have been included in your pre-loaded first cut on the Torchmate 5100 models. The plasma torch body is pre-loaded with 65 amp consumables (FlexCut 125) or 100 amp (FlexCut 200) for a 3/16" material cut from the factory. We highly suggest your first cut is our pre-loaded, "FC125/200 INLINE TEST CUT 65A/100A.gm to ensure your machine has transported in the same condition it has left the factory. Please locate the factory test sample located in the waterbed and load a piece of 3/16" mild steel for the comparison cut test.

1. Press SELECT JOB.
2. Locate FC125/200/400 (amperage of plasma) INLINE TEST CUT 65A/100A (plasma machine).gm and press OK.
3. Verify that your amperage on your plasma power supply is set to 65 amp (FC125) or 100 amp (FC200).
4. 5100 Inline test cut will now show in the display.
5. For the FC125, set the CUT PARAMETERS:
   - PIERCE HEIGHT to 0.16
   - CUT HEIGHT to 0.12
   - PIERCE DELAY to .5
   For the FC200, set the CUT PARAMETERS:
   - PIERCE HEIGHT to .20
   - CUT HEIGHT to .11
   - PIERCE DELAY to .3
6. Set MODE to AUTO and SAMPLE VOLTAGE to ON.
   IHS (ohmic detection) set to ON and IHS MODE to ALWAYS.
   Complete AVHC settings for various material can be found in the plasma power supply cut charts.
   AVHC settings will change for different amperage and material thickness being cut.
   See your FlexCut manual for further instruction after performing your first cut.
7. Jog the head over to the Lower Left corner of the material you are going to cut and press SET PROGRAM ZERO.
8. PRESS RUN JOB (machine may throw sparks).
9. The cut will progress as follows.
   - Rapid travel to the first inside feature.
   - Z Axis moves toward the material, touching the top of the material.
   - Torch retracts to set PIERCE HEIGHT and will fire.
   - Dwells until the PIERCE DELAY is expired.
   - Drops to set CUT HEIGHT and starts the program.
   - Will 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.

If you need to stop the machine at any time please hit the stop button on the touch screen.
Performing Your First Test Cut (BEVEL)

With the BEVEL head, the plasma torch body is pre-loaded with 125 amp consumables (FlexCut 125) or 150 amp (FlexCut 200) for a 1/2" MS material cut from the factory. We highly suggest your first cut is our pre-loaded, "FC125/200 BEVEL TEST CUT 105A/150A.gm to ensure your machine has transported in the same condition it has left the factory. Please locate the factory test sample located in the waterbed and load a piece of 1/2" mild steel for the comparison cut test.

1. Press SELECT JOB.
2. Locate FC125/200/400 (amperage of plasma) BEVEL TEST CUT 105A/150A (plasma machine).gm and press OK
3. Verify that your amperage on your plasma power supply is set to 105 amp (FC125) or 150 amp (FC200/SPII).
4. 5100 BEVEL test cut will now show in the display.
5. The CUT PARAMETERS along with the AVHC settings are pre-coded in the g-cod eof the files. To have the system "see" these parameters, TOGGLE the CUT CHARTS to CHARTS. This will tell the controller to look at the code to pre-populate the settings. AVHC settings will change for different amperage and material thickness being cut. See your FlexCut manual for further instruction after performing your first cut.
6. Jog the head over to the Lower Left corner of the material you are going to cut and press SET PROGRAM ZERO.
7. Assure that the FEED RATE OVERRIDE is set to 100%
8. PRESS RUN JOB (machine may throw sparks)

The cut will progress as follows.
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.
Dwells until the PIERCE DELAY is expired.
Drops to set CUT HEIGHT and starts the program.
The Torchbody will laydown inside the loops to accommodate the bevels in the design.
Will 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.

If you need to stop the machine at any time please hit the stop button on the touch screen.
Overview of the Visual Machine Designer

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

Main Screen:

1. Job group - Opens and controls all aspects of the file being entered or creation of jobs
2. View Screen - Shows the graphic of the job, g-code of the job, or a graphic of the lifter station movements.
3. Datum/Program Zero - Establishes the machine zero through DATUM along with the program zero on the machine.
5. Run group - These buttons control the start and stop of the job.
6. Jogging - Controls the torch movement on the machine along with program run speed
7. Dashboard - Displays the coordinates of the head along with all of the indicators being monitored on the machine.

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

Select Job:
This is how to open jobs into the VMD.
In the SELECT JOB area shows the “HOT FOLDER” and the loaded jobs in that folder. * C:\ControllerData\Jobs is the HOT FOLDER.
To select another source, then press BROWSE and that will open the standard WINDOWS dialog.
In the PREVIEW window will display the selected job from the list.

Nesting:
This opens the VMD NESTING.
See the NESTING section to get an overview of the features.

Shape Library:
This allows you to create a user defined shape based on 27 of the most common parts.
See the USING THE SHAPE LIBRARY section for details.

Job Setup:
JOB SETUP allows you to make alterations to the job itself.
ROW AND COLUMN: Allows you to add multiples by adding numbers to generate a GRID ARRAY of the job you have selected.
TRANSFORMS: Allows you to MIRROR, ROTATE, or SCALE your job.
MATERIAL SENSING: This works in conjunction with the CUT PARAMETERS by setting a measurement for the TOP OF MATERIAL and the MATERIAL THICKNESS of the plate you are cutting.
Tool Library:

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

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

Log On:

LOG ON switches users of the VMD software.

OPERATOR is the standard user.

ADMIN opens the MACHINE SETTINGS. (password protected)

TECH SUPPORT is used only for Tech Support. (password protected)

Shutdown:

SHUTDOWN will close the VMD and power down the computer.

This should be used when shutting down the system.
View Screen:

The VIEW SCREEN in the VMD uses colors and will display the machine limits, head location, and job location. There are four tabs along the top that will show a visual of the job, g-code of the job, or a graph of the lifter station. If you have a FlexCut 200 attached to the machine, you can directly control the FlexCut 200 by using the Plasma Control tab.

Plan View:

This displays the MACHINE LIMITS 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 Magenta. Rapid travels will be a dashed grey line.

Zoom to Machine will zoom to the programmed machine limits.

Zoom to Job will zoom to the job loaded.

Run From Torch position will start the job where the torch is located on the job.

Maximize Viewport will display all views in one screen.

Job Program View:

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

Edit Job will open the current g-code in a text editor.

Height Control View:

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

Trace Pause/Resume will pause the graph if tracing.

Trace off/on will toggle showing the lifter station being monitored.
The Plasma Console controls the settings of the plasma from the HMI. This allows the operator to directly control the plasma power supply without having to navigate away from the HMI.

The settings that can be changed are:

- Current
- Plasma Process Mode (Cut, Plasma Mark, Expanded, Gouge)
- Purge
- VMD in Control: Determines the HMI, or Plasma, controlling the plasma settings.
Datum / Program Zero Group:

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

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

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

Set Program Zero:
SET PROGRAM ZERO establishes the x0:y0 where the torch body is positioned on the table. This is the origin where the job will start from.

When running a job, you will move the torch body to the front left corner of the material you are cutting. By pressing SET PROGRAM ZERO, will establish the job’s absolute zero position.

Go To Program Zero:
Pressing this will move the torch body back to the established PROGRAM ZERO
CUT PARAMETERS and AVHC:

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

Cut Parameters:

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

- **Transfer Height** is the distance the Z-Axis will travel down to transfer the PILOT ARC prior to Pierce height. (used on Spirit II HD only) Enter 0 for conventional plasma
- **Pierce Height** is the distance the head sits above the material during piercing.
- **Cut Height** is the distance between the torch tip and top of material during cutting.
- **Pierce Delay** is the time delay for the torch to pierce through the material before executing movement.
- **Retract Height** is the distance the head will move up during rapid travels when running a job.
- **Arc Voltage** is the voltage feedback comparison value. If using SAMPLE VOLTAGE this will adjust during cutting.

AVHC (Automatic Voltage Height Control):

**MODE** is a toggle between MANUAL or AUTO.

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

Sample Voltage is a toggle On or OFF.

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

IHS (Initial Height Sense) this setting turns OHMIC DETECTION on or off.

- ON: The head will detect material when the ohmic cap comes into contact with the grounded, conductive material on the table. Once detected the head will retract to PIERCE HEIGHT setting.
- OFF: The head will move to TOP OF MATERIAL setting (Job Setup) and retract to PIERCE HEIGHT.

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

- Optimal: First pierce the head will detect the material via OHMIC and will not detect the material for a set distance away from the first OHMIC detection.
- Always: The head will detect material via OHMIC at every pierce.

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

- Charts: Uses the predefined cut settings generated through the NESTING process and populates the settings in the CUT PARAMETERS
- Custom: The operator enters the values into CUT PARAMETERS from the cut charts.

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

The VMD can control OXY cutting torches with the OXY tab. This allows to SET and CAPTURE time delays. The WATER LEVEL tab, controls the water level in the table along with a LOW WATER indicator.

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

**WATER LEVEL:**

WATER LEVEL allows the operator to control the level of water in the table. A LOW WATER indicator to show when water needs to be added to the table. To properly fill the table with water, follow the water fill instructions on pg. 43.

- RAISE WATER. When held down, will raise the water. Release the button to stop raising the water.
- LOWER WATER. When held down, will drop 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 allow to 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.
RUN Group and Jogging:

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

**Active Run/Dry Run:**
- This button is a TOGGLE between ACTIVE RUN and DRY RUN.
- **ACTIVE RUN:** This will activate your torch to fire when you RUN a job.
- **DRY RUN:** This deactivates your torch from operation. If in DRY RUN, the torch will simulate all movements without firing the torch.

**Laser:**
- This will activate the Laser pointer accessory.

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

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

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

**Jog:**
- The JOG keys are laid out in the manner as the table moves. By pressing more towards the center of the jog key will move the torch body slower and then on the outside it will move faster. The JOG window is comprised of three separate tabs:
  - Continuous, Incremental and Point.
- On the bottom, is the FEED RATE OVERRIDE %. This will alter the running feedrate of the job that is active. This is used to ‘feather’ the feedrate while running to get the best cut quality.
Continuous Jog:
By pressing a direction will move the torchbody in the direction you are pressing. When released the head will stop.

Incremental Jog:
By pressing a directional arrow, it will move the torch body in the direction you are pressing, while using the Increment Distance slider bar to move it that distance.

Using the INCREMENT DISTANCE slider will give you increments between .000 - .100. or enter any distance into the dialog to get exact measured movement.
Jog and Dashboard:

Point Jog:

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

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

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

Dashboard:

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

- **Job Name**: Display the active job loaded in the VMD
- **Machine Position**: This shows the torch coordinates to the MACHINE space
- **Position Relative to Job Origin**: These coordinates display based off of the SET PROGRAM ZERO
- **Green Indicators**: The green indicators show when the signal is turning on/off the associated tool.
- **AVHC Active**: Displays when the AVHC is adjusting.
- **Voltage**: Displays the SET VOLTAGE the machine is tracking along with the current RAW ARC VOLTAGE feedback from the plasma during cutting.
- **Plasma Pierce Count**: This is for keeping track of how many pierces the plasma consumables. You will RESET when you change the consumables.
- **Material Thickness**: Enter the material thickness of the plate you are cutting.
- **TOOL**: Indicates which tool is active. 1 is plasma, 2 is platemarker
- **Feedrate**: This displays the actual feedrate the machine is moving at.
- **Timer**: This is the elapsed time from pressing RUN JOB to when the job is completed.
Dashboard: (cont)

Dashboard:

DASHBOARD Indicators:

- **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

Extended:

EXTENDED tab displays details about the job and its ACTIVE CUTTING perimeters. Times are in seconds and lengths are in in/mm.

- **X Y Z**: Display the overall dimensions (in/mm) of the job being cut.
- **FEED**: This shows the speed of the torch body.
- **Plasma ON/OFF**: Displays the amount of ON/OFF commands as the code is read. Can be used as a pierce counter.
- **Acceleration Time**: Displays the time the machines is accelerating during the cut.
- **Constant Velocity Time**: Displays time spent during rapid travels inbetween features.
- **Deceleration**: The time spent in deceleration.
- **Torch On/Off Time**: Displays the total time of the torch being active/inactive.
- **Cycle Time**: Timer showing TOTAL active program time. Timer will pause when the machine is paused.
- **Cut Length**: Shows the total length of the cut.
- **Slew Length**: Length of non-cutting, rapid commands.
- **Output ON/OFF Mask**:
- **Tool Mask**: Total tools used in job.
Using the Shape Library in VMD

In the VMD, you can generate one of 35 standard shapes without needing to generate them in your CAD software.

Access the Shape Library:

To get to the Shape Library, press SHAPE LIBRARY on the top center of the VMD screen. The Shape Library offers the most popular 35 shapes to customize to your dimensions along with Lead in/Out, Feed Rates, and Tools. Select the shape you are looking for and press OK. This will open the shape configuration for the shape selected.

Configure your shape:

First, select the TOOL you are planning to use: Plasma, Plate Marker, or Oxy. Then enter a value for the Feed Rate. Recommend using 100 for the feed rate and controlling the output feed rate with the FEEDRATE OVERRIDE PERCENTAGE slider bar.

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

Lead In is the length of the pierce point movement into the tool path. This is usually .12.

Lead out is the length of the cut created out of the cut path. If using plasma, enter 0.

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

Once all of the parameters are entered, press OK.
Using the Shape Library in VMD (cont)

Save your Shape:

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

Open shape in VMD:

In the MAIN screen, press SELECT JOB. This will open the Select a Job screen. Select the job from the list. If you didn't save in the JOBS folder you will need to press BROWSE and locate your job. Once selected, press OK. The job will display in the RUN screen.
Running a Job

When you have a GM format file to run or shape generated in the VMD ready to cut there is a simple process to follow to get the job produced through the VMD.

![Image of VMD interface]

**Datum:**

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

**Open a Job:**

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

**Establish Program Zero:**

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

Verify that the job will fit on the material along with enough margin that the torch will not run off of the material.
Running a Job (cont)

Cut Parameters and AVHC Settings:

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

For this example, will be entering the settings for 3/16” material using a FlexCut 200 plasma power supply set at 100 amps with 100 amp consumable stack.

FlexCut 200 100 amp CUT CHART provided:

<table>
<thead>
<tr>
<th>Material Thickness</th>
<th>Plasma Pressure</th>
<th>Shield Pressure</th>
<th>Arc Voltage</th>
<th>Travel Speed</th>
<th>Cutting Height</th>
<th>Pierce Height</th>
<th>Pierce Time</th>
<th>Kerf Width</th>
<th>Edge Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/16</td>
<td>0.188</td>
<td>153</td>
<td>0.110</td>
<td>0.200</td>
<td>300</td>
<td>0.087</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2</td>
<td>0.250</td>
<td>157</td>
<td>0.120</td>
<td>0.240</td>
<td>400</td>
<td>0.093</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/8</td>
<td>0.375</td>
<td>159</td>
<td>0.150</td>
<td>0.250</td>
<td>600</td>
<td>0.095</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2</td>
<td>0.500</td>
<td>168</td>
<td>0.190</td>
<td>0.300</td>
<td>700</td>
<td>0.096</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/32</td>
<td>0.625</td>
<td>174</td>
<td>0.215</td>
<td>0.325</td>
<td>900</td>
<td>0.107</td>
<td></td>
<td></td>
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<tr>
<td>3/4</td>
<td>0.750</td>
<td>180</td>
<td>0.250</td>
<td>0.350</td>
<td>1200</td>
<td>0.111</td>
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</tbody>
</table>

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

- PIERCE HEIGHT: .20
- CUT HEIGHT: .11
- PIERCE DELAY: .3

Other settings in the AHVC panel that will be changed.

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

Set Feed Rate:

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

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

Run the job:

With all the settings entered into the CUT PARAMETERS/AVHC boxes and the feed rate set in the FEED RATE OVERRIDE 9% time to run the job. To verify the machine will run with the settings change the ACTIVE RUN to DRY RUN to "simulate" the job. Dry Run will perform all machine sequences and movements without firing the plasma. Once the Dry Run is complete, the job will automatically reset.

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

Press RUN JOB
Cut Quality:

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

We have provided a file to cut to verify the feed rate for the material you are planning to cut with the amperage set on the power supply. The LINE SPEED TEST is in the job list and should be run on every thickness of material at the specified amperages in the cut chart to give you a visual reference to the output. The test cut is a 3" x 4" coupon that consists of 9 lines. Each line is programmed to run at different speeds to illustrate the effects that speed has on cut quality.

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

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

Once the test is complete, there 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. The ideal cut has the same kerf width both on top through to the bottom.

On the backside, you will observe the width (kerf) of the cut and the dross accumulation. The key is the 3-4 lines that have the least amount of dross. Picking at the dross with a tool, the dross should be easy to remove from the test cut. The optimum speed is the high end of the three lines that are clean without much dross accumulation. Straight lines will cut 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.

In this example: the 110 - 90 ipm will be the best speed for this material thickness and amperage setting. This process will be used for every thickness of the material you plan on cutting to establish the proper speed. Once established, these coupons can be used as a visual cut chart. Use the provided sheet to document your settings.
Build Your Own Cut Chart

The FlexCut manual includes a factory cut chart. Use this template to create your own custom cut charts using the line speed test.

<table>
<thead>
<tr>
<th>Material Thickness Type</th>
<th>Amperage</th>
<th>Voltage</th>
<th>Cut Speed</th>
<th>Pierce Delay</th>
<th>Pierce Height</th>
<th>Cut Height</th>
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VMD On-Board Nesting:

The VMDNest is an onboard irregular part nesting CAM software. This allows IMPORTING DXF and DWG files without needing an offsite CAM software to generate the proper G-Code. The NESTING will apply the kerf correction along with the appropriate lead ins to all features. This will generate the tightest nest available for the size of material entered into the system.

When you want to import a DXF/DWG into the VMD or if you want to add multiple files and nest into a predefined layout you need to use the NESTING feature. By pressing NESTING, will display the NESTED JOB LIST screen. To start a new nest, press NESTED JOBS. Select NEW NESTED JOB and the ADD NESTED JOB dialog opens.

In this dialog, enter a name for your nest in NESTED JOB NAME. This will become the file name of your project. Each dialog after is a drop down. Find the thickness of material you plan on cutting along with the size of sheet. Select the table/plasma cutter you are using along with the amperage appropriate to the application and press SAVE.
ITEM LIST will open along with the NEST LAYOUT. To add parts, go to the right toolbar and press PARTS. This will open the parts list. Select IMPORT CAD DRAWINGS for DXF/DWG files. This will bring up the PART SELECTOR.

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

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

TOOLING PROPERTIES holds tool pathing configuration for sequencing, kerf correction, and lead ins. Change these setting if you need particular leadins or kerf diameters.

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

The two checkboxes: VERIFY and ARTWORK.

Verify will display the parts to look at layers and other details on the individual parts.

Artwork will change the tool-paths to an ONLINE toolpath and bypass the lead in, kerf adjustments.

By checking VERIFY, then pressing ADD will open the PART IMPORT PREVIEW.

In this screen allows the user to select and change the properties to the individual parts and its components. If you have LAYERS assigned in your file, then you can change to a particular tool.

Once all adjustments have been made, press EXPORT ALL PARTS and the job will get a tool path assigned to the part.

The TOOLPATHS will display in the PARTS LIST on the right. Once all of the parts are toolpathed, press ADD TO JOB.

This will take you back to the ITEM LIST.
Nesting

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

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

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

Press NEST and will display a pop up asking for ALL or SELECTED parts. Make your selection and press OK. This will then arrange your parts into the material and display the layout in the Job screen.
If your nest does not need editing or is just a single part then in the right toolbar select COMPLETE NEST. This will open the CREATE JOB DIALOG. Enter the location you want the job to save and verify the amperage you are cutting. Then press OK.

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

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

Process and run the file as any normal file.

For more detailed instructions of the VMD and it's complete feature set go to the VMD manual.
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 3/8” (9.5 mm).

BEVEL AXIS IDENTIFICATION

**Bevel Axis:**

A: Moves towards/away from lifter station

C: Moves clockwise/counter clockwise on lifter station

Z: Moves up/down while controlling the height of the torch.

**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 laucher 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”. To toggle between metric and imperial measurements is available in the drop down.

Press OK

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

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

Select the file you want to create the CUT FILE out of and press OPEN.

In order 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 (cont.)

The NEST SETTINGS dialog will display which amperage is appropriate for the material that was selected along with 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 on. 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 (cont.)

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

Each process has different variables that can be entered for each type cut. Cuts with LANDs will process two cuts per bevel to accommodate the land portion.

After entering the parameters for the bevel, press OK.
Create a Bevel Cut (cont.)

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 (cont.)

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 (cont.)

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.
Create a Bevel Cut (cont.)

The BROWSE window will open. Locate and select the job; the file will have a .DRW extention. 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 (cont.)

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 (cont.)

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 numberically based on the NESTED PLATES SHEET NAME.

In this example, the CUT file would be named 000020001.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.
Red Dot Indicator Accessory:

The Red Dot Indicator on the 5100 allows the operator to get exact placement of the torch body on the table by emitting a laser “DOT” onto the plate. The DOT will show where the torch body is at in relation to the plate. This works for setting the PROGRAM ZERO or using the PLATE ALIGNMENT feature. The Red Dot will only be active during DRY RUN and will automatically shut off when RUN JOB is pressed.

Operation:

To operate the laser finder, toggle the ACTIVE RUN to DRY RUN.

In the DASHBOARD, enter the thickness of material you are cutting, in the MATERIAL THICKNESS dialog. This will make the Z-Axis move to a preset position based on the material thickness when the LASER is active.

Once the MATERIAL THICKNESS is entered, press on the LASER button. The head will lower towards the plate to its set measurement and turn the laser is on. You will see a red dot on the material.

To start a job, toggle the DRY RUN to ACTIVE RUN. The laser dot will turn off when RUN JOB is pressed.
Basic Maintenance:

The 5100 requires basic maintenance to keep the machine working and moving properly. The operator will be responsible for several tasks as outlined in this basic guide.

- 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.
- Recommend 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.

Machine:

Since the gantry rides on linear rails, you will need to grease the cassettes every 3-6 months that ride on the rail. 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.
The system comprises 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) three 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 preventive maintenance schedule.
Electronic Controlled Lubricators (cont.)

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” of the dip switches are set to and will blink every (20) seconds.

We recommend setting the dip switch(es) to #4 ON until the machine use is determined. By using the setting, this 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.

<table>
<thead>
<tr>
<th>Setting time in months</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>6</th>
<th>12</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dip switch</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Pressure build-up time in days</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>
Cut Bevel Basics

- Beveled edges are caused by the motion of the plasma gas as it is emitted from the nozzle. In plasma cutting, it is unavoidable. A high-definition plasma cutter produces less bevel than a standard cutter.
- Torch height, air pressure, air quality, cut direction, and consumable condition all influence bevel.
- In plasma arcs used for cutting, the gas forms into a vortex. Because of this, the arc has a direction of rotation, which causes one side of the cut to have more bevel than the other side. To reduce the bevel on the part, the proper direction of travel must be used.
- The direction of cuts are referred to as “conventional” and “climbing”. In a conventional cut, the torch will go counter-clockwise on outside cuts and clockwise on inside cuts. A climbing cut is the opposite, and the best bevel is achieved by using a climbing cut.
- Basically, the best bevel is to the right of the direction of travel.

- Corners can have more bevel than a normal cut. This is caused when the machine slows down for the direction change. A lower amperage, in some cases, allows slower travel speeds and reduces “slowdown” bevel through corners.
- Sharp corners can be achieved by cutting a larger shape that puts the slow down and acceleration of the machine into a scrap area. This cut is used more often on thicker materials, where the corner bevel is increased dramatically.
- Replace consumables regularly to reduce bevel. A worn tip or one with slag buildup, can redirect air flow causing random bevel and varying cut quality. Always check consumables when troubleshooting bevel.
- One of the easiest ways to reduce bevel is by cutting at the proper speed and height for the material and amperage.
- Air that is at constant pressure and clean and dry also decreases bevel.
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

Can be caused by worn tip

Longest consumable life

Torch may contact material and short out or damage tip
What Causes Bad Cuts

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

  1) Ground clamp not properly attached to the material
  2) Air pressure drop or surge
  3) Moisture in the air line
  4) Drop in power
  5) Contact with the material by the torch
  (Most plasma cutters go into a low power mode on contacting the material, causing the cut to 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 path does not return to the starting point, there may be mechanical slipping or binding. In some cases it will be clear which axis is losing position. Examine the particular axis for build up or obstructions that can cause binding.
# Basic Troubleshooting

This will cover the most basic operational faults you might encounter with your 5100 machine.

## Machine Faults:

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Description</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Please Enable The Drives” Error Message</td>
<td>The drives for the machines are disabled.</td>
<td>Release BOTH EMERGENCY STOP buttons and press the green “ENABLED” button.</td>
</tr>
<tr>
<td>Following Error (AXIS ID)</td>
<td>During a motion, the defined axis encountered a physical obstruction and the drive was tripped as a safety measure.</td>
<td>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.</td>
</tr>
<tr>
<td>Drive Fault (AXIS ID)</td>
<td>The Enable signal from the specified axis was not received due to a fault condition.</td>
<td>Push the red Emergency stop button, release the Emergency stop button and enable the drives. Datum the machine. If the error message does not clear and the axis ID is X, Y, U or Z, check Fuse #3 in the electrical cabinet. If the axis is W or V check Fuse #4 in the electrical cabinet.</td>
</tr>
<tr>
<td>When the machine is turned on, the computer and monitor do not power on</td>
<td>The machine is not receiving 110 vAC power.</td>
<td>Check power at the supply side, verify breakers and any GFCI outlets. Check Fuse #1 in the electrical cabinet.</td>
</tr>
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<td>The water level does not adjust when clicking the Up/Down button on the main screen</td>
<td>The table is not receiving sufficient compressed air to the table to operate the drain valve, or to fill the table with water.</td>
<td>Restore Shop Air to the tables manifold.</td>
</tr>
<tr>
<td>None of the downdraft doors operate during a cut</td>
<td>The table is not receiving sufficient compressed air to the table to operate the doors.</td>
<td>Restore Shop Air to the tables manifold.</td>
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<tr>
<td>The bevel motors make a light humming noise</td>
<td>The motors apply power to hold their position in normal operation. This will be heard as an audible hum.</td>
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<td>Accumove Controller Connecting screen</td>
<td>This screen is displayed for longer than 1 minute.</td>
<td>Shut down the computer, turn off power to the machine for 1 minute. Turn power back on. If the same condition exists, check Fuse #2 inside the electrical cabinet.</td>
</tr>
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</table>
### Machine Faults:

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<tr>
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<th>Description</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER LEVEL LOW is illuminated, the water cannot be raised any higher</td>
<td>The LOW WATER level sensor is tripped, preventing the water from being raised.</td>
<td>LOGIN as ADMIN, under the WATER FILL tab, follow the steps to add sufficient water to the table.</td>
</tr>
<tr>
<td>Constant Z-Axis following error on attempted DATUM</td>
<td>Z brake may not be releasing.</td>
<td>Check brake relay connection &amp; double terminated pin at servo drive.</td>
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<td></td>
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<td>Verify motor cable connections.</td>
</tr>
<tr>
<td>Large &quot;backlash&quot; symptom in X Axis. Oblong Holes.</td>
<td>Loss of belt tension in X-axis belt RDX assembly.</td>
<td>Remove X cover and evaluate belt condition. Lossen the motor bolts and tighten tension screw to proper tension. Tighten motor bolts.</td>
</tr>
</tbody>
</table>
Customer Assistance Policy

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

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