



Cutting
Systems

Vernon Tool® MasterPipe® Compact Profiler



OPERATORS GUIDE

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Lincoln Electric® Cutting Systems

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Machine Specifications

Input Power

- 120V / 1Ph / 15A / 60Hz
- 208-600V / 1Ph/3Ph / 50-60Hz (Plasma Power Supply specific)

Machine Size

- 115" W x 28" D x 63" H

Traverse Speed

- 500 ipm (0.635 mps) linear
- 40 RPM rotary

Cut Speed

- 200 ipm (5.08 m/min)

Tube Capacity

- 1" OD to 8" OD (25.4 - 203.2mm)* 1" pipe requires additional support cradle
- 100 lb (45.3 kg) per foot
- 1000 lb (453.6 kg) maximum tube weight
- 14' foot max (4.27 m) standard
- 24'foot max (7.32 m) with 10' extension

Operating Temperature

- 40-100° Fahrenheit (1-38° Celsius)

Motors

- Bi-Polar Stepper Motors

Drive System

- Precision planetary gear box and belt drive

Linear Guidance

- Precision rack and pinion

Input Pneumatics

- Maximum 110PSI Supply Pressure
- Volume - 7 SCFM (420 SCFH) @ 90PSI

Height Control

- Ohmic Sensing
- Automatic Torch Height Control
- 6.625" Z-axis Travel

Bevel Capabilities

- +/-45° manual bevel

Software

- Visual Machine Designer
- WinMPM Pipe Profile software
- PypeServer (optional)

Motion Controller

- Lincoln Electric Accumove Controller
- Ethernet-based multiprocess controller

Warranty

- 1 Year Warranty

Safety Information

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

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

Please Note:

- PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH
- KEEP CHILDREN AWAY
- IF YOU WEAR A PACEMAKER, YOU SHOULD CONSULT WITH YOUR DOCTOR BEFORE OPERATING
- Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you obtain a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 (free download available at <https://www.aws.org/standards/page/ansi-z491>), or purchase CSA Standard "Safety in Welding, Cutting and Allied Processes," CSA Standard W117.2 (<https://www.cwbgroup.org/store/codes-standards/csa-w1172-2019-safety-welding-cutting-and-allied-processes>).
- BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS



ELECTRIC SHOCK CAN KILL:

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



FOR ELECTRICALLY powered equipment:

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



FUMES AND GASES can be dangerous:

Plasma cutting or gouging may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When cutting or gouging, keep your head out of the fumes. Use adequate ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone.

Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.

When plasma cutting or gouging on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required.

Additional ventilation is required when cutting [zinc] galvanized steel or materials containing or coated with any of the following:



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

The operation of plasma cutting or gouging fume control equipment is affected by various factors, including proper use and positioning of the equipment, maintenance of the equipment, and the specific procedure and application involved. Worker exposure levels must be checked upon installation and periodically thereafter to be certain levels are within applicable OSHA PEL and ACGIH TLV limits. For information on how to test for fumes and gases in your work place, refer to the publications section of this manual.

Do not use plasma cutting or gouging equipment in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products. Remove all sources of these vapors.

Gases used for plasma cutting and gouging can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to ensure breathing air is safe. Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.

Read and understand the manufacturer's instructions for this equipment and follow your employer's safety practices.

This product, when used for cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and/or cancer.

Some dust created by routing, sawing, grinding, drilling, and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Avoid prolonged contact with this dust.

Wear protective clothing and wash exposed areas with soap and water. Allowing dust to get into your mouth, eyes, or lay on the skin may promote absorption of harmful chemicals.

Some examples of these chemicals are:

Lead and/or cadmium from lead or cadmium-based paint.

Crystalline silica from bricks and cement and other masonry products.

Arsenic and chromium from chemically-treated lumber [CCA].

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



Cutting flame and sparks can cause FIRE OR EXPLOSION:

- Fire and explosion can be caused by hot slag, sparks, oxygen fueled cutting flame, or the plasma arc.
- Have a fire extinguisher readily available. Provide a fire watch when working in an area where fire hazards may exist.
- When not cutting or gouging, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- Be sure there are no combustible or flammable materials in the workplace. Any material that cannot be removed must be protected.
- Sparks and hot materials from cutting or gouging can easily go through small cracks and openings to adjacent areas.
- Avoid cutting or gouging near hydraulic lines.
- Do not cut or gouge tanks, drums, or containers until the proper steps have been taken to ensure that flammable and/or toxic vapors from substances inside have been completely removed. They can cause an explosion even though they have been “cleaned.” For information purchase “Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances”, AWS F4.1 from the American Welding Society (<https://pubs.aws.org/p/232/f411999-recommended-safe-practices-for-the-preparation-for-welding-and-cutting-of-containers-and-piping-historical>).
- Vent hollow castings or containers before heating, cutting, or gouging. They may explode.
- Do not add fuel to engine-driven equipment near an area where plasma cutting or gouging is being done.
- Connect the work cable to the work as close to the cutting or gouging area as practical. Work cables connected to the building framework or other locations away from the cutting or gouging area increase the possibility of the current passing through lifting chains, crane cables, or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- Hydrogen gas may be formed and trapped under aluminum work pieces when they are cut underwater or while using a water table. DO NOT cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.
- Read and follow NFPA 51B “Standard for Fire Prevention During Welding, Cutting and Other Hot Work,” available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, Ma 022690-9101.



CYLINDER may EXPLODE if damaged:

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

Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, “Standard for Safe Handling of Compressed Gases in Cylinders,” available from the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202. (<https://portal.cganet.com/Publication/Details.aspx?id=P-1>).



AIR LINES UNDER PRESSURE:

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



ARC RAYS CAN BURN:

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

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



PLASMA ARC can cause serious injury or death:

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



HOT MATERIAL:

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



ELECTRIC AND MAGNETIC FIELDS may be dangerous:

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

For more information on electromagnetic interference please visit:

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



AUTOMATIC OPERATION:

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



NOISE:

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



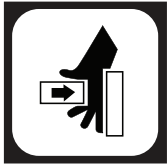
HEAVY PARTS:

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



FLYING DEBRIS:

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



PINCH AND CRUSH POINTS:

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



MECHANICAL DRIVES:

- High-speed mechanical drives made of gears, belts, and/or drive screws are used by CNC machines. Keep clear of them during operation.
- Do not attempt to service, adjust, or otherwise touch these components without first ensuring that the machine is on lock out/tag out.
- Secure any loose clothing and cables to prevent entanglement.



Laser Usage:

- This product contains a diode laser. Make sure to follow all safety precautions when operating.
- DO NOT look into the direct or reflected beam. This can cause eye injury up to 110 ft. (34 m) away.
- NEVER point any laser towards aircraft or vehicles; it is unsafe and illegal. The laser can cause visual interference with pilots and drivers, and interferes with vision up to 2,400 ft (730 m) away. The laser can be a distraction up to 4.5 miles (7.3 km) away.
- Class 3R lasers are safe when handled carefully. DO NOT look into the beam.
- Wear appropriate eye protection when working on the installation of the laser diode.

PUBLICATIONS

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

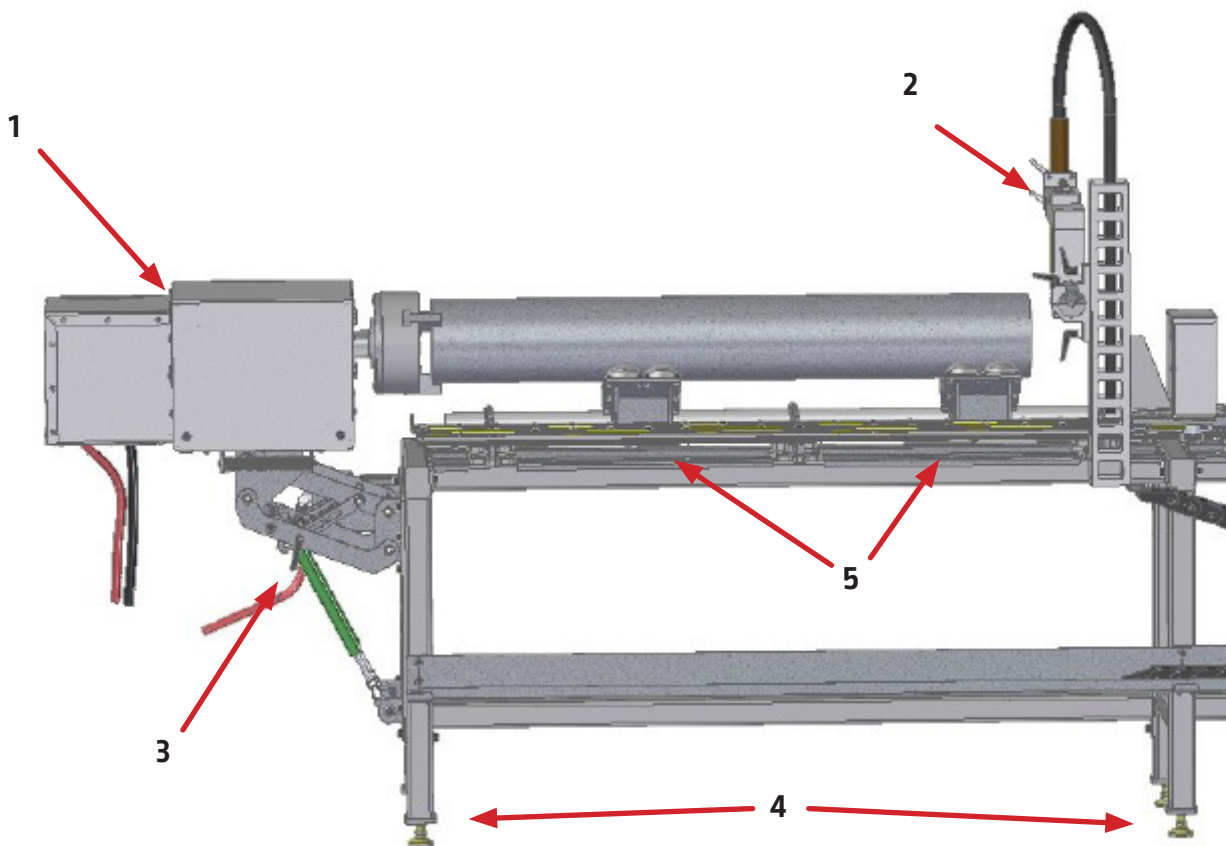
- OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.
- ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING, obtainable from the American Welding Society, 8669 NW 36 Street, #130; Miami, Florida 33166-6672
- NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
- ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
- ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
- AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable from American Welding Society, 8669 NW 36 Street, #130; Miami, Florida 33166-6672
- NFPA Standard 51, OXYGEN-FUEL GAS SYSTEMS FOR WELDING, CUTTING AND ALLIED PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- NFPA Standard 70, NATIONAL ELECTRICAL CODE, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- NFPA Standard 51B, CUTTING AND WELDING PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202
- CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING, obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3
- NWSA booklet, WELDING SAFETY BIBLIOGRAPHY obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103
- ANSI Standard Z88.2, PRACTICE FOR RESPIRATORY PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018

Machine Overview

Overview of the Vernon Tool MasterPipe Compact Profiler, the chuckbox and its frequently moving parts.

MasterPipe Compact Profiler, Back View

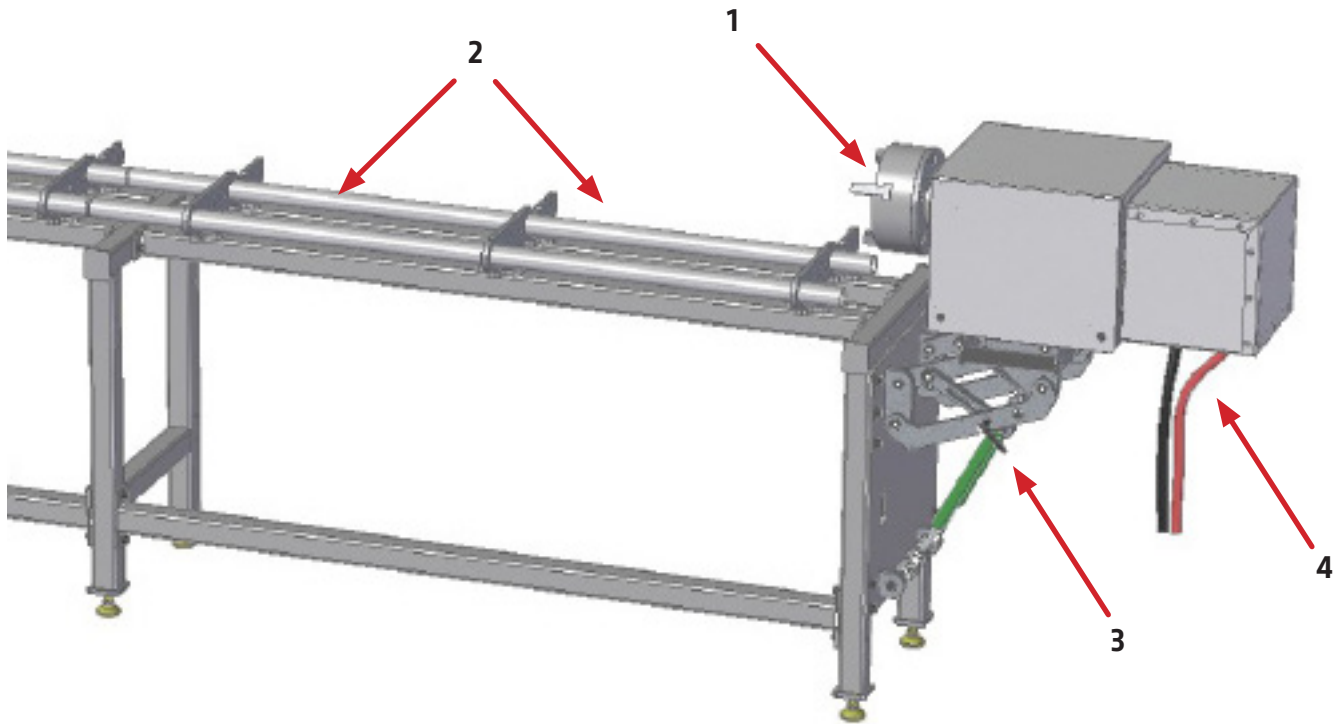
1. Chuck Box
2. Lifter Station
3. Chuck Box adjustment levers
4. Leveling Feet
5. Ball Transfer Cradles



Machine Overview:

MasterPipe Compact Profiler, Front View

1. Adjustable jaw, rotating chuck
2. Cutting bed
3. Chuck Box adjustment levers
4. Air and Ground connections (inside removable chuck box)



Power/Air Requirements

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

The profiling machine has a single 120v NEMA 5-15P plug that powers the table and computer/monitor.

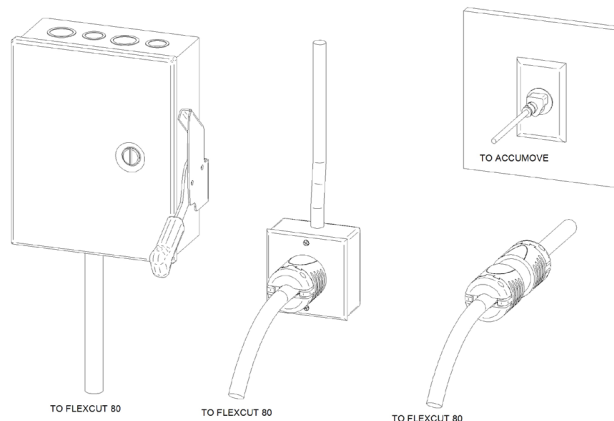
The FlexCut 80 is rated for 208 VAC through 575 VAC input voltages, single or three phase and 50 or 60 Hz.

Before connecting the machine to power, be sure the input supply voltage, phase and frequency all match those listed on the machine rating plate.

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

Warning:

The FlexCut on/off switch is not intended as a service disconnect for this equipment. Only a qualified electrician should connect the input leads to the Torchmate 4400/4800/4510.



The Vernon Tool MasterPipe Compact Profiler machine requires clean, dry, oil-free compressed air or nitrogen. A high pressure regulator **MUST** be used with a compressor or high pressure cylinder.

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

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

A standard nominal 5 micron in-line filter is recommended, but for optimal performance, select a pre-filter with a 3 micron absolute rating. Air must be supplied to the plasma with 3/8" inside diameter tubing and 1/4 NPT quick disconnect coupler. Air lines should be run as to not create a trip hazard. We recommend using the TMS-214-0000-00 approved air filtration assembly, available from www.torchmatestore.com

Remove the chuck box cover:

The MasterPipe Compact Profiler is equipped with a rotating ground located under a protective metal cover at the rear of the machine drive assembly. The pneumatic connection for the air ventilation is also located under this cover. Provided is the steps to follow to remove this cover to make these attachments.

This process requires a 3/16" hex head wrench

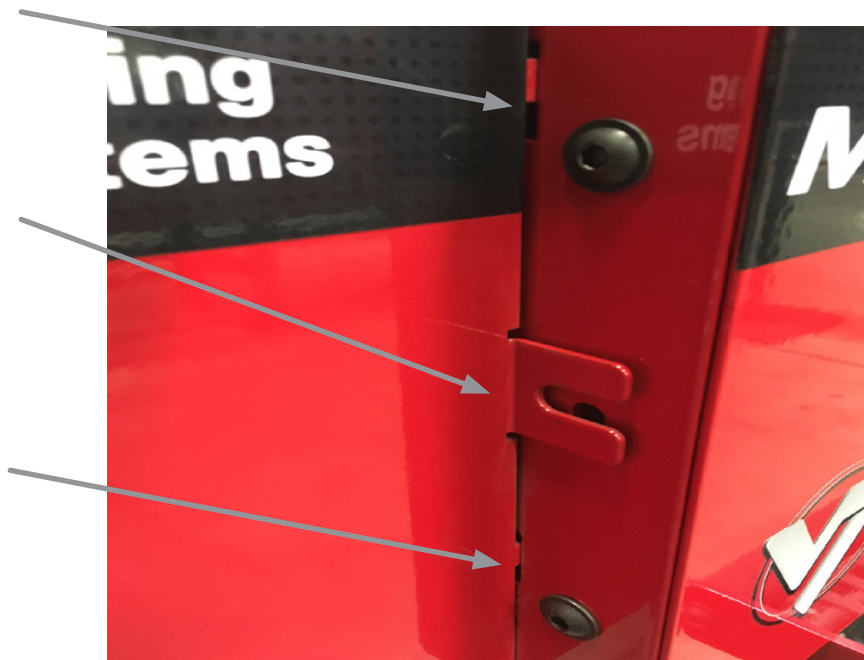
Instructions:

1. Remove the 3/16" hex head bolts from the slotted tabs that hold the chuck box cover in place.
2. Save the screws for reinstallation.
3. To remove the chuck box cover, pull the cover up and out from the four slots in the chuck box cover. Set cover aside until air and ground are attached.
4. To reinstall the chuck box cover, align the four tabs into the slots and realign the 3/16" hex head bolts.

Tabs:

Slotted Tab:
3/16 hex head
bolt

Tabs:



Grounding Your Machine

The MasterPipe Compact Profiler machine requires an earth ground rod to ensure personnel safety, and to suppress the high-frequency noise created by the plasma power supply. A star ground point on the rotating chuck will connect directly to the earth ground rod via a 6 AWG stranded wire or other stranded, grounding cable. Consult with a qualified electrician to verify your connections.

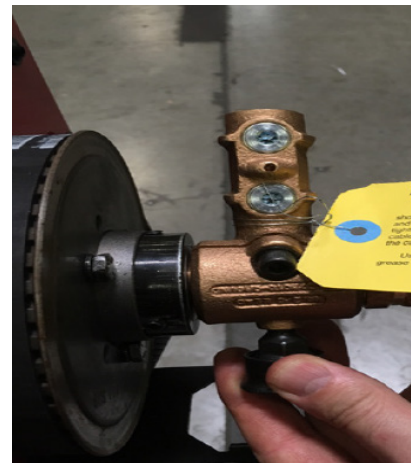
Installing the ground wire:

Plasma cutting depends on a low-resistance return current work lead (ground lead) and this is provided by positive contact with the chuck and its rotating connection. The ground lead from your plasma cutter is connected to the rotating ground assembly via two 1/4" hex head bolts inside the chuckbox assembly.

Attach your ground wire from the independent ground rod to this connection.

Instructions:

1. Remove the #2 slotted setscrew from the gray plastic ground clamp shield.
2. Slide the plastic shield off the ground clamp and slide over the plasma cutter work lead
3. Slide a 6 AWG stranded wire inside the plastic shield along with the plasma work lead
4. Install the bare stranded wire from the plasma cutter work lead into the rotating ground assembly
5. With both the work lead and ground wire installed into the rotating ground clamp, tighten the 1/4" hex head bolts until both ground wires are firmly secured.
6. Locate the plastic shield back into the rotating ground capture and reinstall the #2 slotted set screw.



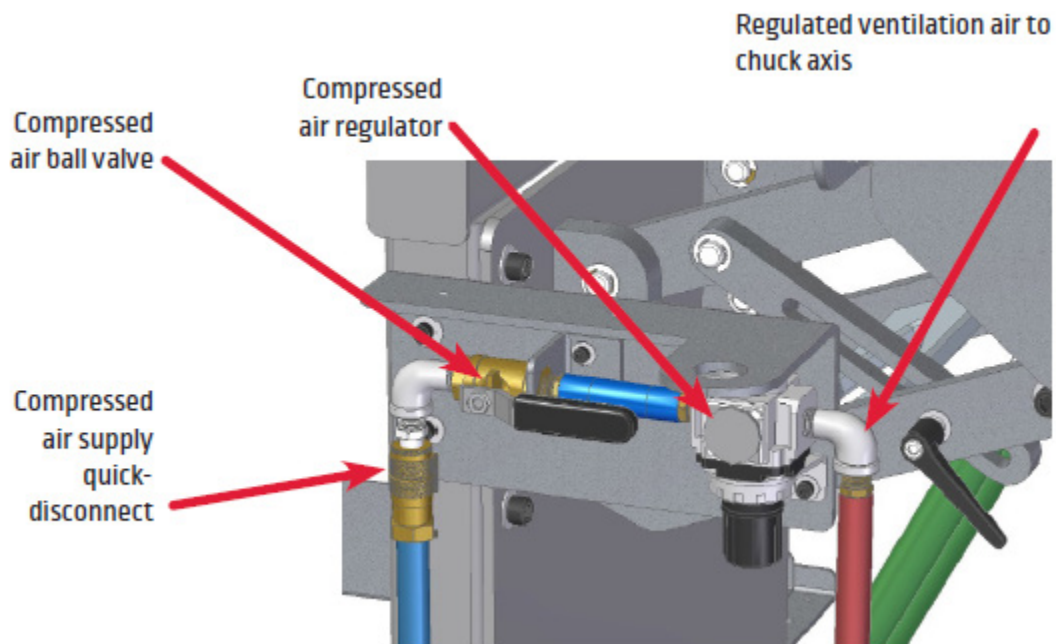
Connect Air Supply

The machine and plasma cutter requires a supply of dry, oil-free, regulated compressed air. Ensure that you have the correct supplies connected to the plasma cutter and that the flow/pressure of the supply falls within the specified ranges. Please see the Lincoln Electric FlexCut 80 user guide for specifications.

Connect the air:

Instructions:

1. Validate the specifications supplied with your plasma cutter. Ensure that you have the appropriate filters and connectors for the connections.
2. Connect one air hose to your plasma cutter and the other to the compressed air connect near the chuck mount. Route the compressed air hose so that they will not be damaged when handling material before, during, or after cutting. Also, do not create a trip hazard for the operator.
3. Set the regulator for the chuck air supply to 35-45 psi. Open the ball valve to allow air to flow through the chuck and through the pipe being cut. This directs air through the chuck and out into the pipe being cut, helping to prevent dust and smoke from entering the chuck and chuck box.
4. Always open the ventilation air supply before executing a cut..



FlexCut 80 Plasma Controls & Settings

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

Controls »

FRONT

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

BACK

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



FlexCut 80 Plasma Controls & Settings

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

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

MECHANIZED CUT CAPACITY - MATERIAL THICKNESS MILD STEEL

Recommended cut capacity at 24 ipm	3/4 in. (19 mm)
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PIERCE CAPACITY - MATERIAL THICKNESS MILD STEEL

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

MAXIMUM CUT SPEEDS - MILD STEEL

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

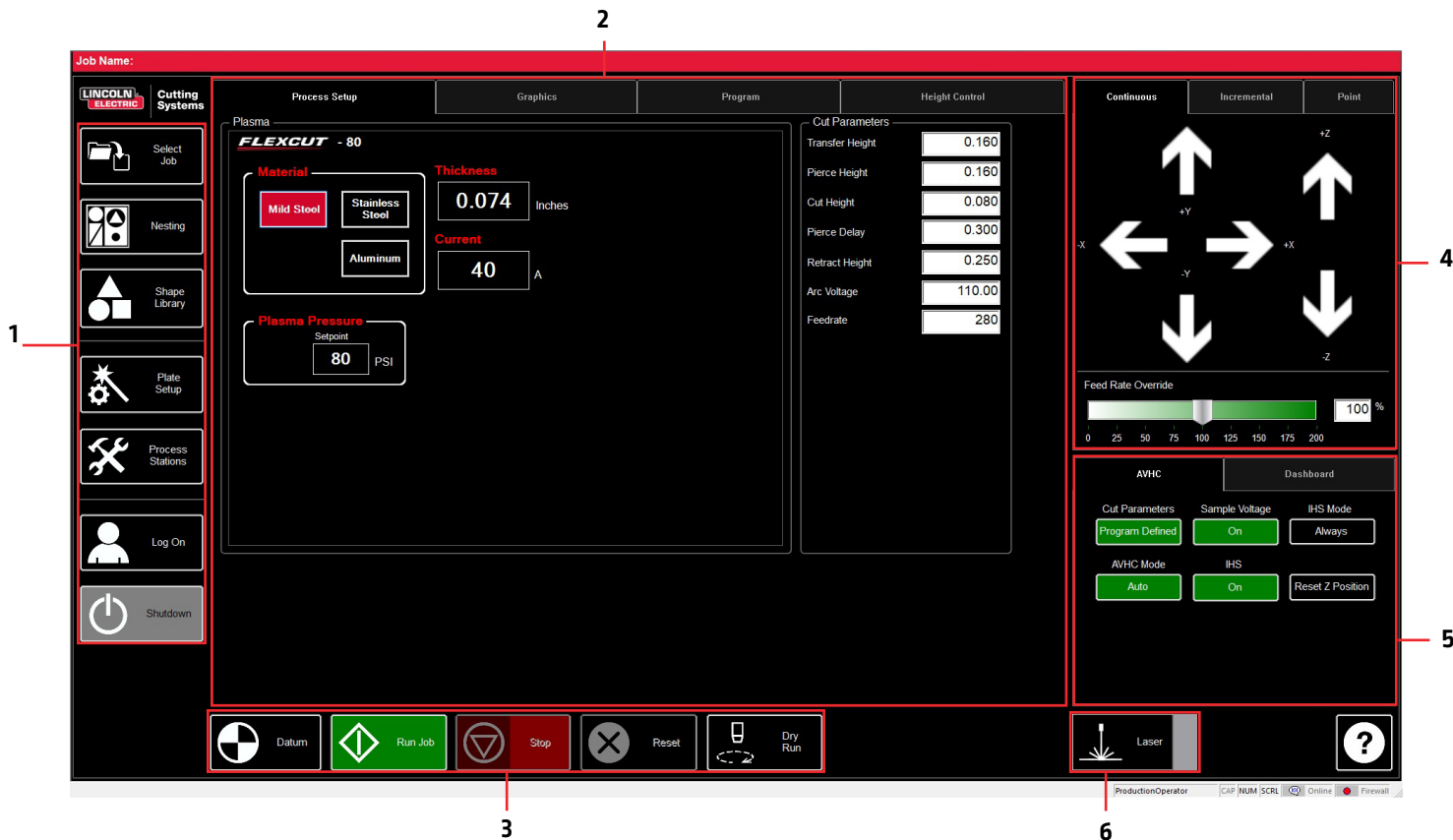
CONSUMABLES STARTER KIT FOR LC100M MACHINE TORCH (BK12849-SK)

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



Overview of the Visual Machine Designer

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



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

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

Job Group

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

Select Job:

Allows the operator to choose the job which they would like to load.

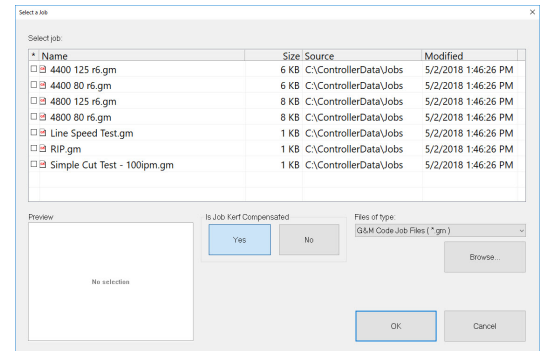
The SELECT JOB folder shows the “HOT FOLDER” and the loaded jobs in that folder.

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

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

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

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



Nesting:

Launches the VMD Nesting program.

Flat Plate operation only.



Shape Library:

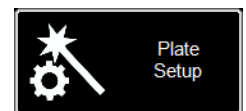
Feature opens the dialog to create a user-defined shape based on 36 of the most common parts.

Flat Plate operation only.

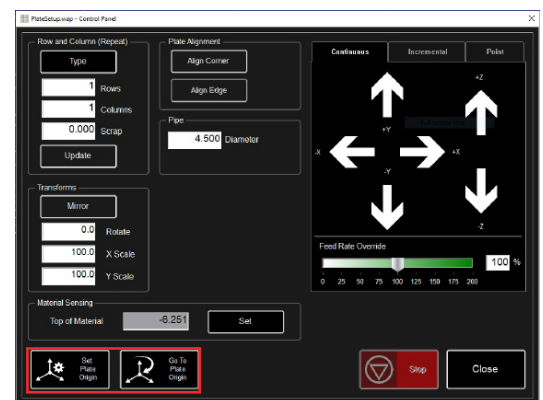


Plate Setup:

The options in Plate Setup allows you to make alterations to the job itself and set the machine up for material.



- **ROW AND COLUMN** - Flat Plate operation only.
- **TRANSFORMS** - Flat Plate operation only.
- **MATERIAL SENSING** - Works in conjunction with the CUT PARAMETERS by setting a measurement for the TOP OF MATERIAL and the MATERIAL THICKNESS of the plate you are cutting. This setting is only utilized when cutting with IHS disabled.
- **PIPE** - User enters the outer pipe diameter being cut.
- **PLATE ALIGNMENT** - Flat Plate operation only.
- **SET PLATE ORIGIN** - Establishes the PLATE ORIGIN.
- **GO TO PLATE ORIGIN** - Moves the head back to the PLATE ORIGIN.



Job Group:

Process Stations:

Configure and control the tool outputs on the machine.

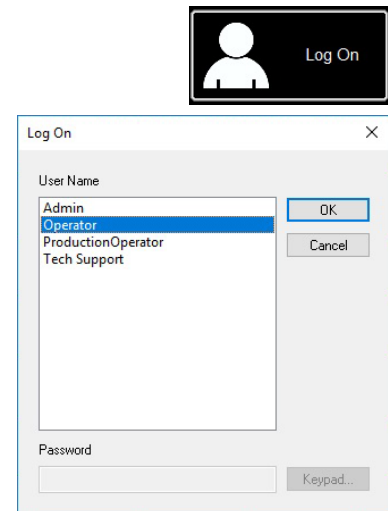
- **Kerf** - Add a Kerf value to compensate for the tool kerf value.
- **Set Offset** - Capture the distance based on the torch position to a Plate Origin.
- **On/Off Dwell** - Add time delay to sending signals to the associated tool.
- **Pierce Count** - Counts the processes ARC ON commands.
- **Activate** - Toggles the tool to get a ON command. Toggle to turn off.
- **State** - Indicates the ON/OFF status of the tool.



Log On:

LOG ON switches users of the VMD software.

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

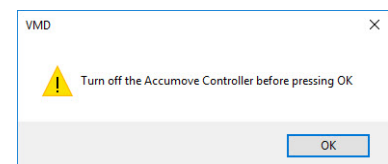
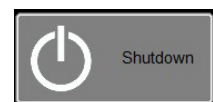


Shutdown:

SHUTDOWN will close the VMD and power down the computer.

This should be used when shutting down the system.

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



View Screen

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

Process Setup:

The process setup tab is used to enter the material you are planning to cut. Once entered, it will update the cut parameters to the cut chart parameters.

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

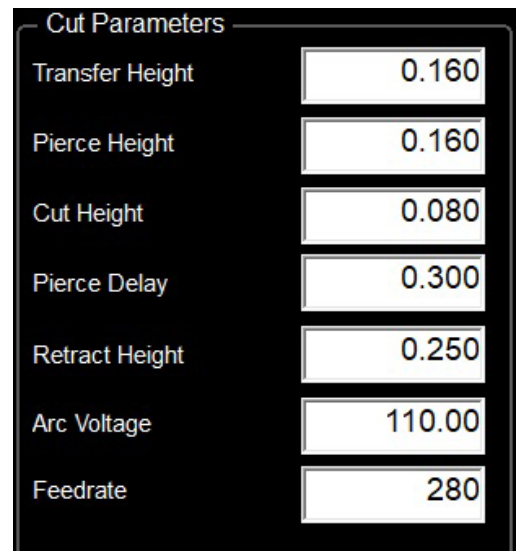


Once entered, the appropriate consumables and part numbers will display and auto-fill the Cut Parameters to the appropriate settings.

Cut Parameters:

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

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

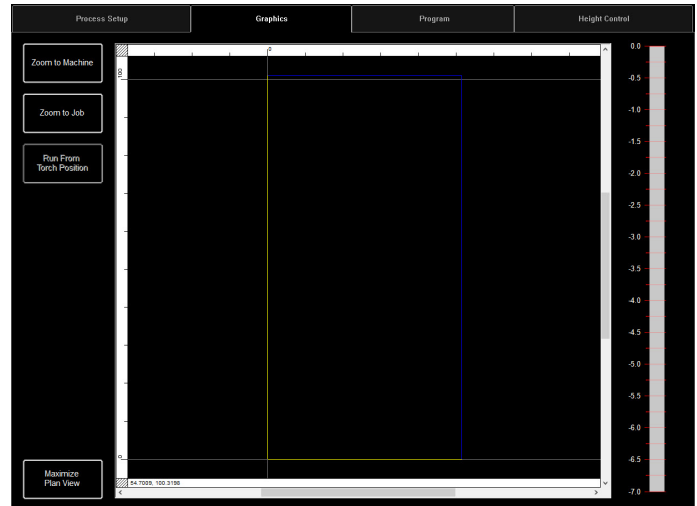


View Screen:

Graphics View:

The machine limits are displayed in blue. The head is represented with white crossed lines.

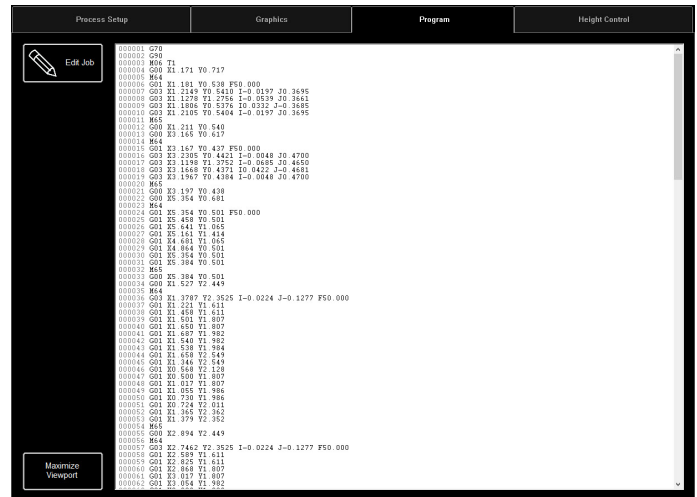
- Plasma assigned tool paths are displayed in red.
- Plate Marker assigned tool paths are displayed in green.
- Rapid travels will be a dashed grey line.
- **Zoom to Machine** - Zoom to the programmed machine limits.
- **Zoom to Job** - Zooms the display to the job loaded.
- **Run From Torch Position** - Starts the stopped job where the torch is located on the job.
- **Maximize Plan View** - Displays all views in one screen.



Program View:

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

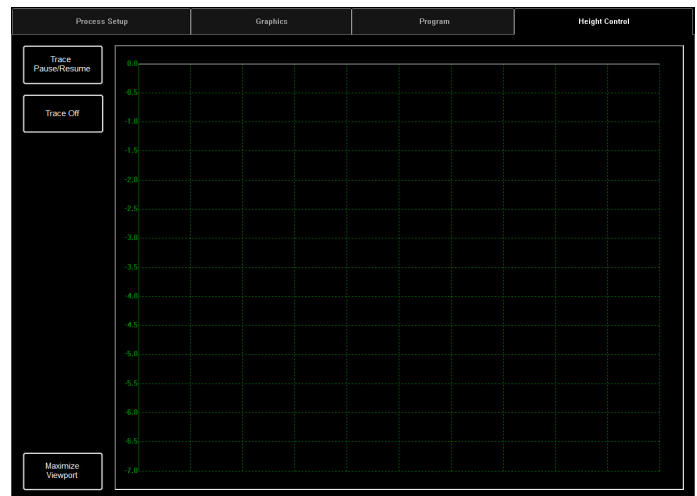
- **Edit Job** - Opens the current G-Code in the default text editor.
- **Maximize Viewport** - Display all views in one screen.



Height Control View:

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

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



Run Group

The Run group controls the startup of the machine along with running jobs.

Datum:

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

When pressing DATUM, the Z-AXIS will travel to it's top zero point.



Run Job:

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



Reset:

The resets the job to start over. If the job has started and not completed you will need to RESET to start the job over.



Active Run/Dry Run: Toggles between ACTIVE RUN and DRY RUN.

- **ACTIVE RUN** - Activates your torch to fire when you RUN a job.
- **DRY RUN** - Deactivates your torch from operation. If in DRY RUN, the torch will simulate all movements without firing the torch.



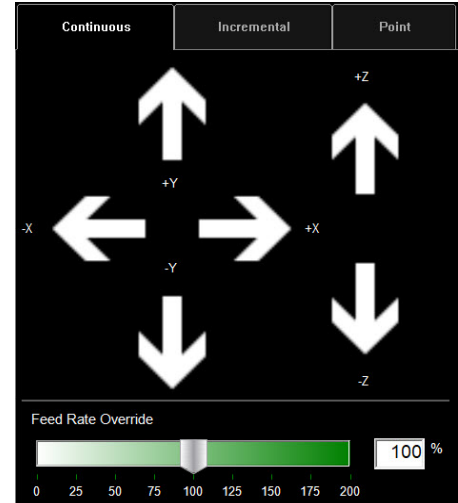
Jogging

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

Jog:

The JOG keys are assigned to the movement of torch to the origin of the operators console. By pressing more towards the center of the arrow, the torch body will move slower. Pressing more towards the outside of the arrow, the torch body will move faster. Continuous will move as long as your finger is active on the direction.

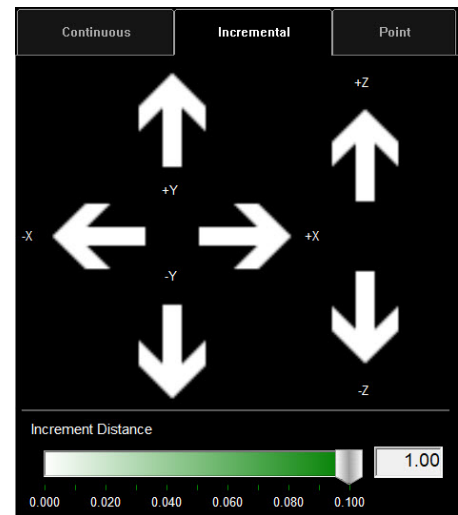
FEED RATE OVERRIDE - Alter the running feedrate of the job that is active. The feedrate updates the change on the next ARC ON command.



Incremental Jog:

Pressing a direction will travel the torch the assigned Incremental Distance

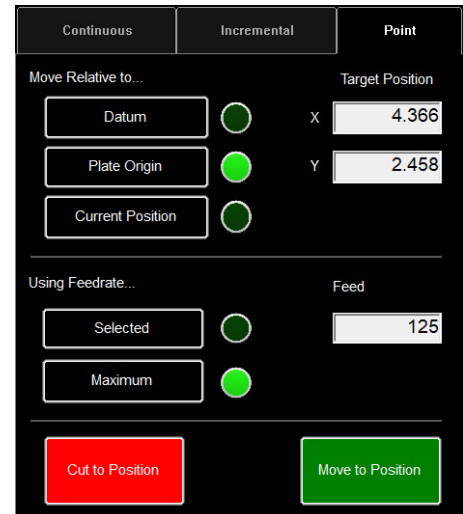
Using the slider will give you increments between .000 - .100. Directly enter any number into the dialog.



Point Jog:

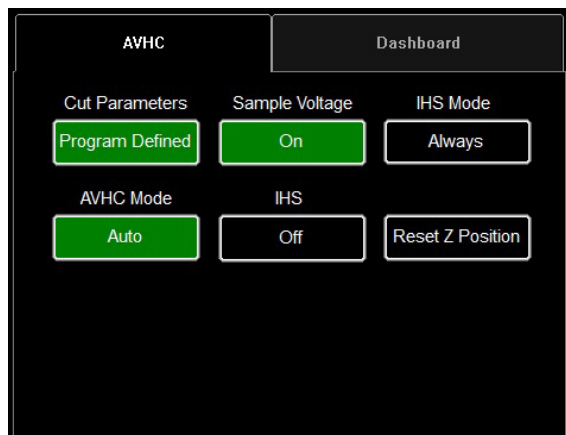
Allows the user to define the position the torch to travel to, an origin, and a set feedrate.

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



AVHC & Dashboard

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



AVHC (Automatic Voltage Height Control):

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

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

Sample Voltage is a toggle between On or Off:

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

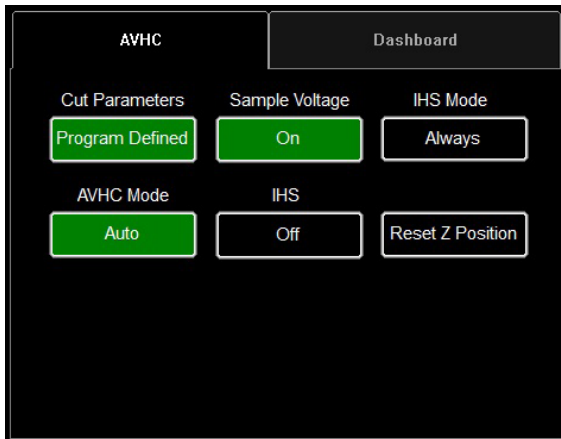
IHS MODE is the process used to detect the material height and how it reacts between pierces:

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

AVHC Mode is a toggle between manual or auto:

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

AVHC & Dashboard:

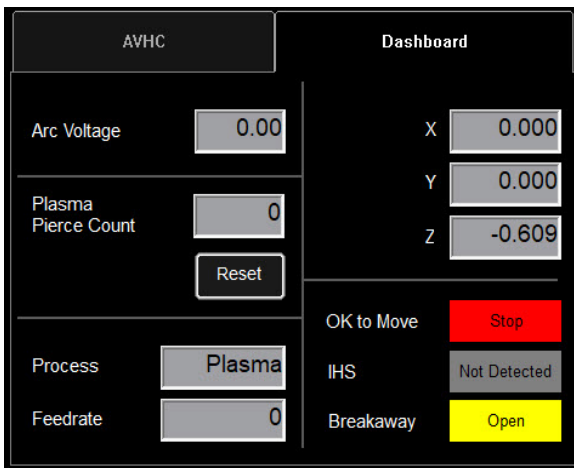


IHS (Initial Height Sense): This setting turns OHMIC Detection on or off:

- **On** - The head will detect material when the ohmic cap comes into contact with the grounded, conductive material on the table. Once detected the head will retract to the transfer height setting.
- **Off** - The head will move to top of material setting (Job Setup) and retract to transfer height.

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.



Dashboard:

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

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

WinMPM Operation

The following section illustrates how to program a simple cut via the WinMPM software. The same steps can be applied to generate more complex cuts in the WinMPM software. The WinMPM software can program up to 5 axis cuts. The MasterPipe Compact Profiler only allocates 2-axis cutting as the A-axis is a manual adjustment.

Please access the WinMPM User's Guide through the HELP menu for more details.

Each button at the bottom of the WinMPM main screen will populate the option in the main screen. Most options will have dialog boxes that will populate the right hand side and display the feature in the center.

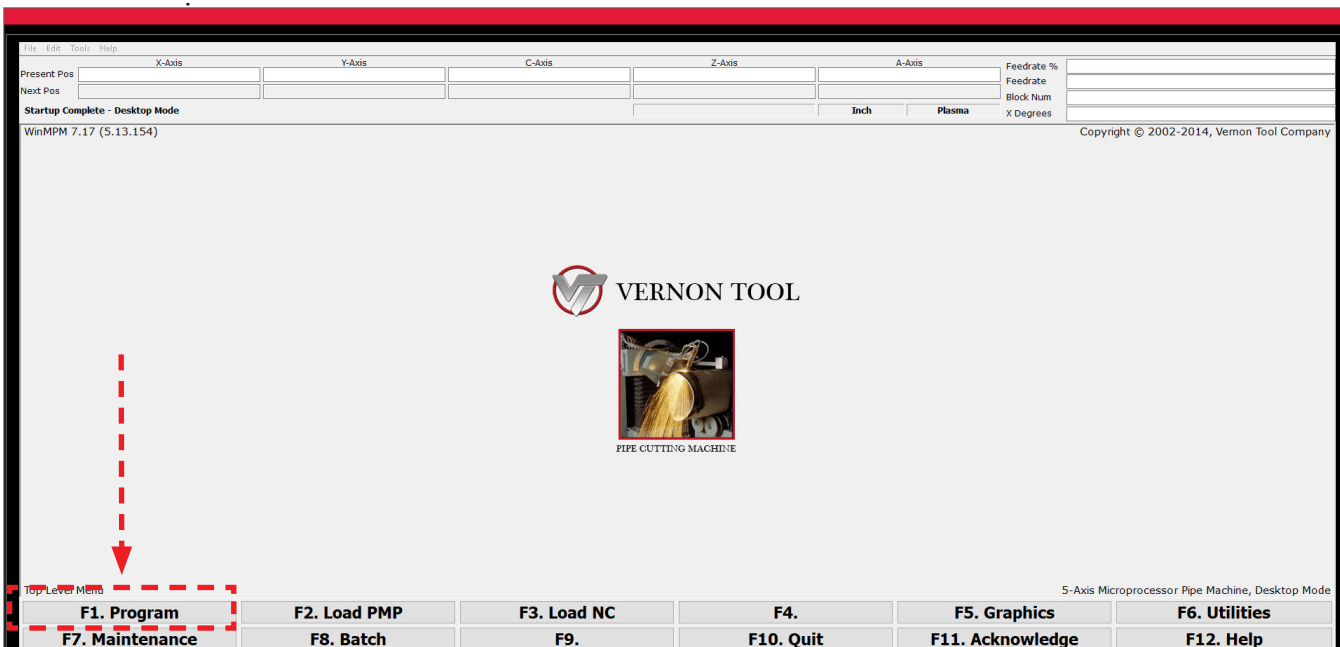
Step 1:

Open the WinMPM software by swiping from right to left from the right edge of the screen, and clicking the WinMPM program on the taskbar.



Step 2:

Select the **F1. Program** button to begin programming a pipe to cut.



WinMPM Operations:

F1. PROGRAM:

The following example will illustrate how to create a program that will cut a 3.5 inch O.D. Schedule 40 pipe with a 45 degree saddle on one end, and a straight cut on the opposite end. The Baseline length will be 5" long between the bottom (ID) of the saddle and the straight cut.

Here, you will enter:
(Select a menu size or enter manually)

File Name

Pipe Diameter

Wall Thickness

Desired Cut Length

Cutting Method (Plasma or Oxy/Act Torch)

F1. Pipe Data (Inch)

File Name: example

Material Size: [dropdown]

Pipe Diameter: 3.500

Wall Thickness: .236

Baseline Length: 5

Cutting Method: Plasma

Part Number: [field]

Specification: [field]

File Name – The file name that the completed cut program will be saved under. The part number may be up to 32 alphanumeric characters long.

Pipe Diameter - The outside diameter of the pipe being cut. The “Pipe Diameter” is the actual pipe diameter, not the nominal size: i.e. 6.625 must be entered for the diameter of 6” pipe. The lower limit for size is 1.5” outer diameter and the upper limit is 6.625 inches.

Wall Thickness - This is the wall thickness of the pipe being cut. The value must be entered as a decimal value. This can be any value from 0.01 to 6.625 inches.

Baseline Length - This will be the length input for the piece being cut. There are two different methods of determining the length value. The program option Offset is set to Baseline length by default. The Baseline length is from the shortest point on the first cut to the shortest point on the second cut, measured along the inside of the pipe. The WinMPM software can be configured so the program option Offset is set to Workpoint length, this sets the length so it is the distance between centerline of the member intersecting the first end and the centerline of the member intersecting the second end. Workpoint length is further discussed in Program Options section of the WinMPM software user’s guide.

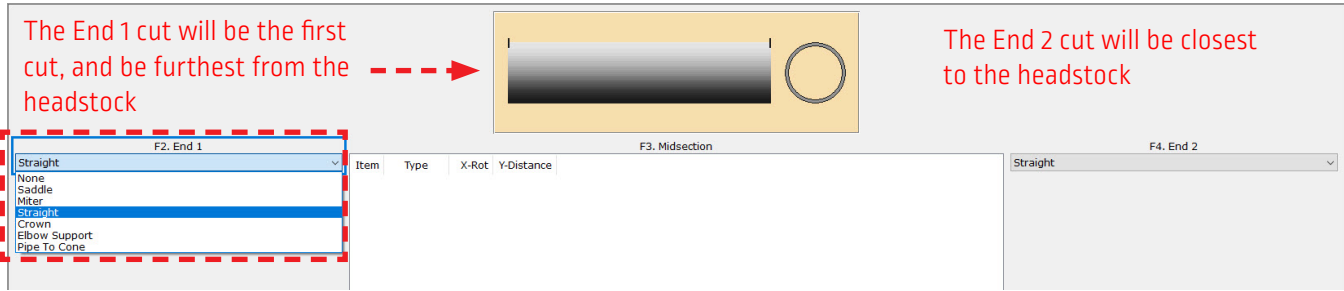
Cutting Method – The MPC is only offered with a Plasma tool as an option, therefore this will be set to Plasma only.

Part Number, Specification, Material, and Quantity – This data is stored in the file data for user reference only and does not have an effect on the programming of the cut.

WinMPM Operations:

Step 3:

With the basic program information entered, Click the **F2. End 2** drop down list to choose a straight feature for End 2 of the cut.



Step 4:

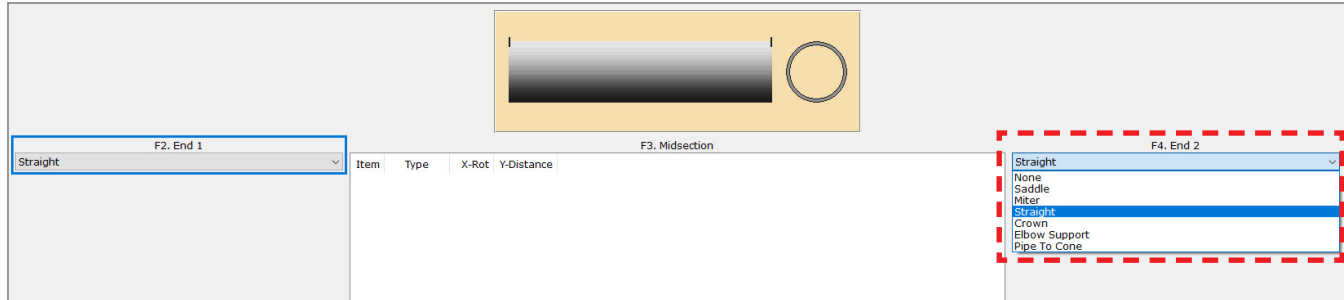
Selecting a Straight cut will program a single revolution cut to bring the pipe to length, there are no parameters that need to be input by the user to produce this cut.

With the Straight cut selected, press the **F10. Return** button. This will return you to the new pipe data screen.

F1. Pipe Data	F2. End 2	F3. Midsection	F4. End 1	F5. List/Edit
F7. Calculate	F8. Save PMP	F9.	F10. Return	F11. Acknowledge

Step 5:

To program the other end of the part, select the **F4. End 1** drop down list, and choose a Saddle cut from the list.



Step 6:

Select the **F1. Edit** button to access the saddle cut's parameters.

F1. Edit	F2.	F3.	F4.	F5.	F6.
F7.	F8.	F9. Control Panel	F10. Return	F11. Acknowledge	F12. Help

WinMPM Operations:

Step 7:

Once the **F1. EDIT** is pressed, the **Saddle - Single Intersection diagram** displays, input the parameters of the saddle cut.

For this example, a 45 degree saddle on 3" Schedule 40 pipe is being programmed. Note that as parameters are entered under the End 1 Saddle Cut Data section, the short description underneath will update to match.

Status: Ready Inch Plasma

End 1 Saddle Cut Data (Inch)

Transition Weld Prep
No

Main	Diameter	Intersection Angle	Centerline Offset
1	3.5	45	0.000
Baseline Offset	Axial Angle	Through	Weld Prep Angle
0.000	0.0	Yes	0.000

SADDLE - SINGLE INTERSECTION

Main	Diameter	Intersection Angle	Centerline OS	Baseline OS	Axial Angle	Through	Weld Prep Angle
1	3.500	45.000	0.000	0.000	0.000	Yes	0.000

Step 8:

With the saddle cut completed, the programing is finished. Press the **F10. Return** button. This will return you to the new pipe data screen.

F1. Pipe Data	F2. End 2	F3. Midsection	F4. End 1	F5. List/Edit
F7. Calculate	F8. Save PMP	F9.	F10. Return	F11. Acknowledge

Step 9:

To generate the G- CODE for the machine, press **F7. Calculate** button.

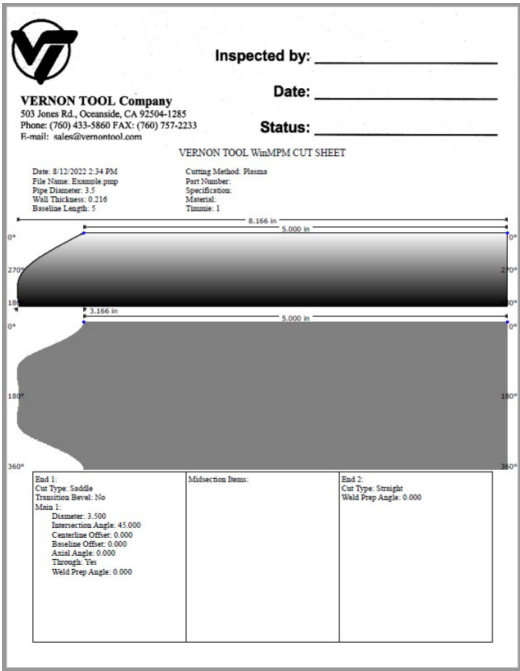
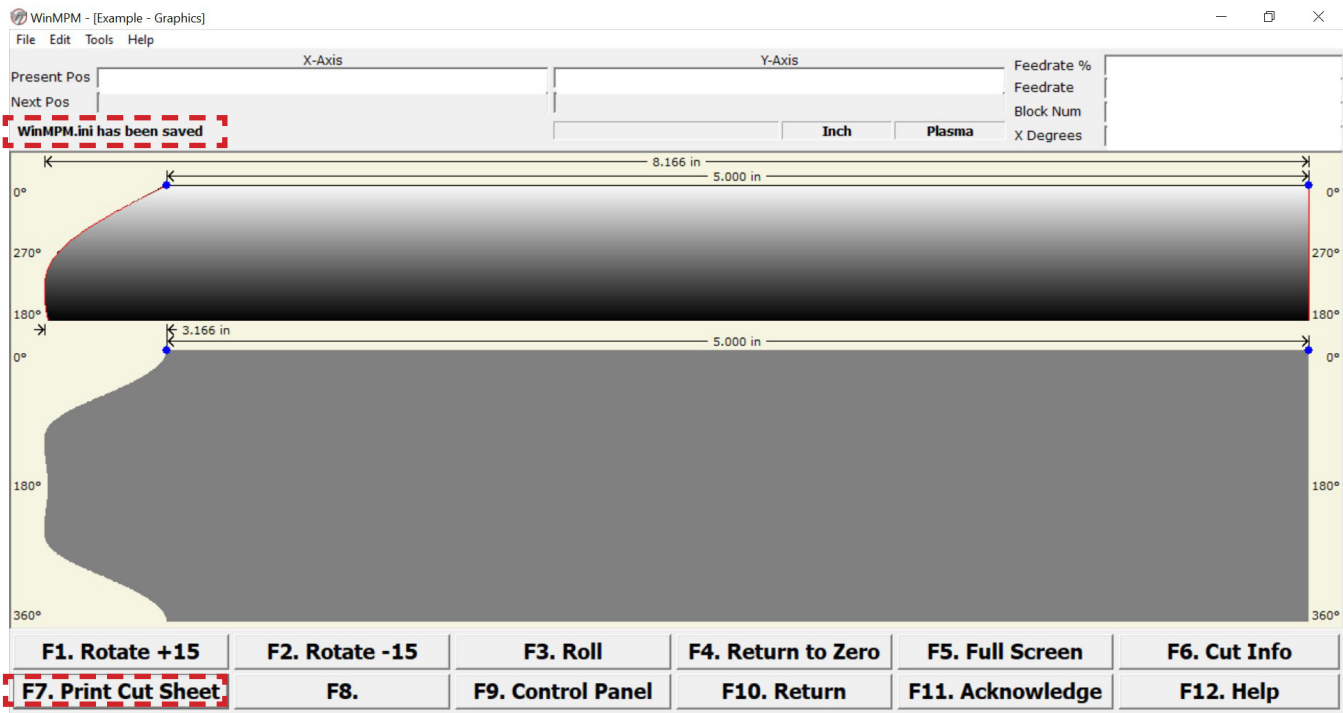
F1. Pipe Data	F2. End 2	F3. Midsection	F4. End 1	F5. List/Edit
F7. Calculate	F8. Save PMP	F9.	F10. Return	F11. Acknowledge

WinMPM Operations:

Step 10:

If all parameters are valid, a preview of the completed pipe profile will be displayed.
“Calculation complete, data files generated” confirms that the g-code file was generated

The Display screen shows a 2.5 dimensional preview of the pipe profile that was programmed. The tools at the bottom allows the operator to rotate to visualize the cut. Choosing **F7. PRINT CUT SHEET** will generate a cut sheet to provide production personnel with information regarding the final pipe product. A printer is required for a cut sheet to be generated.

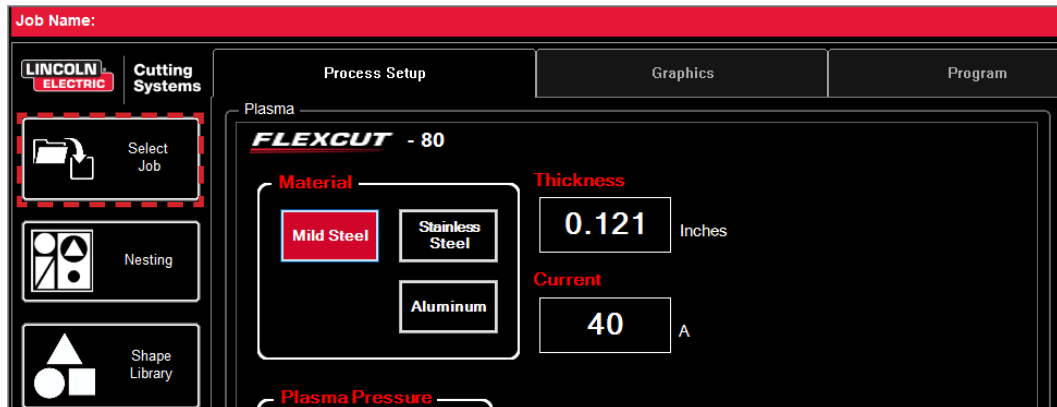


WinMPM Operations:

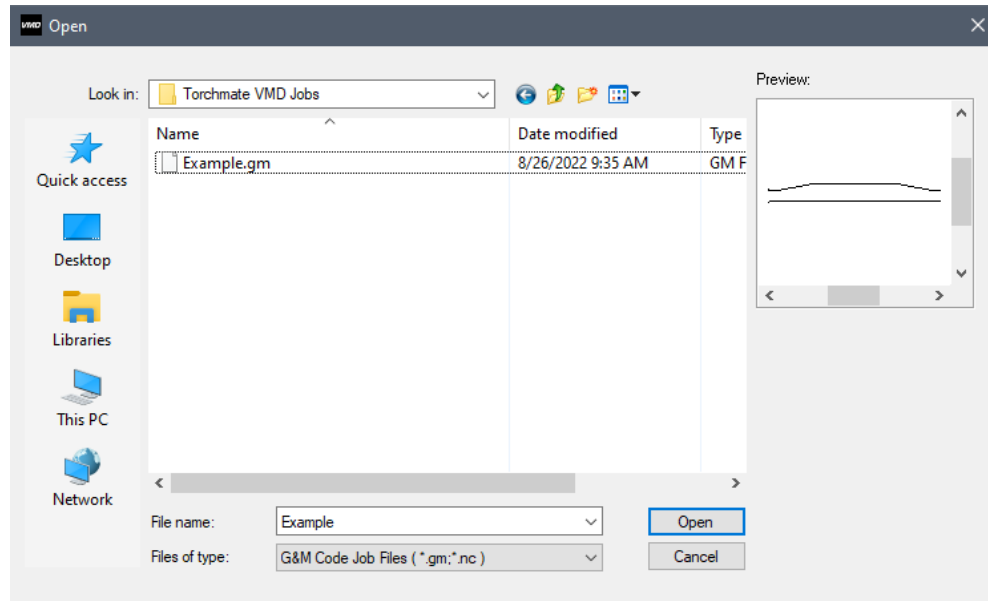
Once the G-CODE has been generated, switch over to the Visual Machine Designer to load.

Step 11:

To load a cut program, go to the Select Job button.
Follow the process described in the Performing a Test Cut section of this user guide.



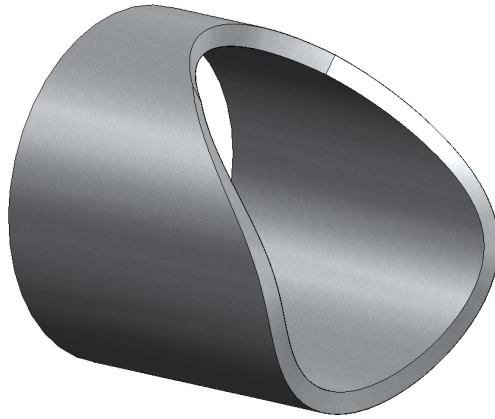
By default, WinMPM saves the programmed G-Code to- C:\WinMPM\Torchmate VMD Jobs\



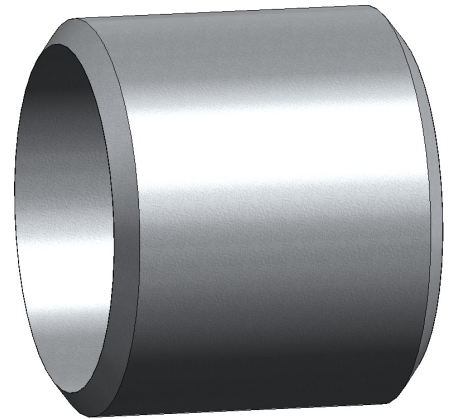
Performing a Test Cut

The MasterPipe Compact Profiler ships with two factory test cut pieces.

The first test cut piece is a 3" Schedule 40 pipe: 45° saddle feature on one end, and a straight cut on the other. The second cut is a 3" Schedule 40 pipe weld coupon: 3" overall length with a 38.5° bevel on both ends.



45° Saddle Coupon



Beveled Weld Coupon

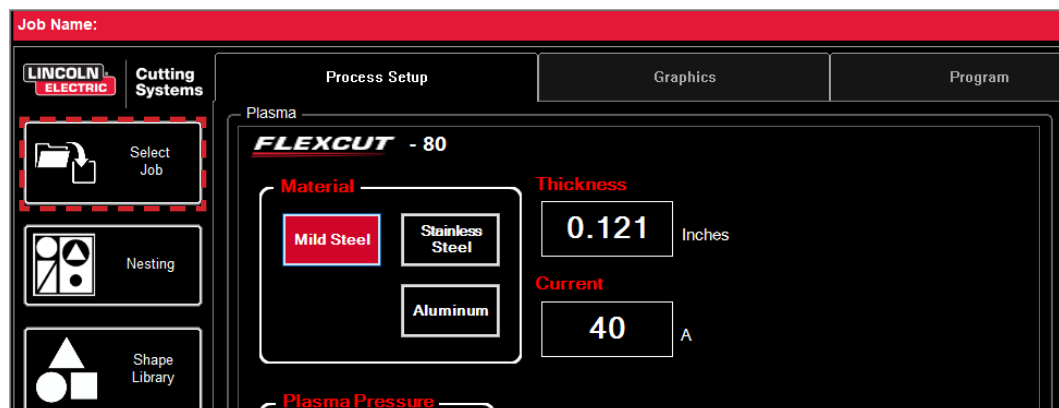
It is recommended that you cut each of these sample programs to verify it's operation against the factory cuts, and ensure that the machine is operating to factory specifications.

MATERIAL REQUIRED:

Minimum of 12" long, 3" Schedule 40 pipe

Select the job.

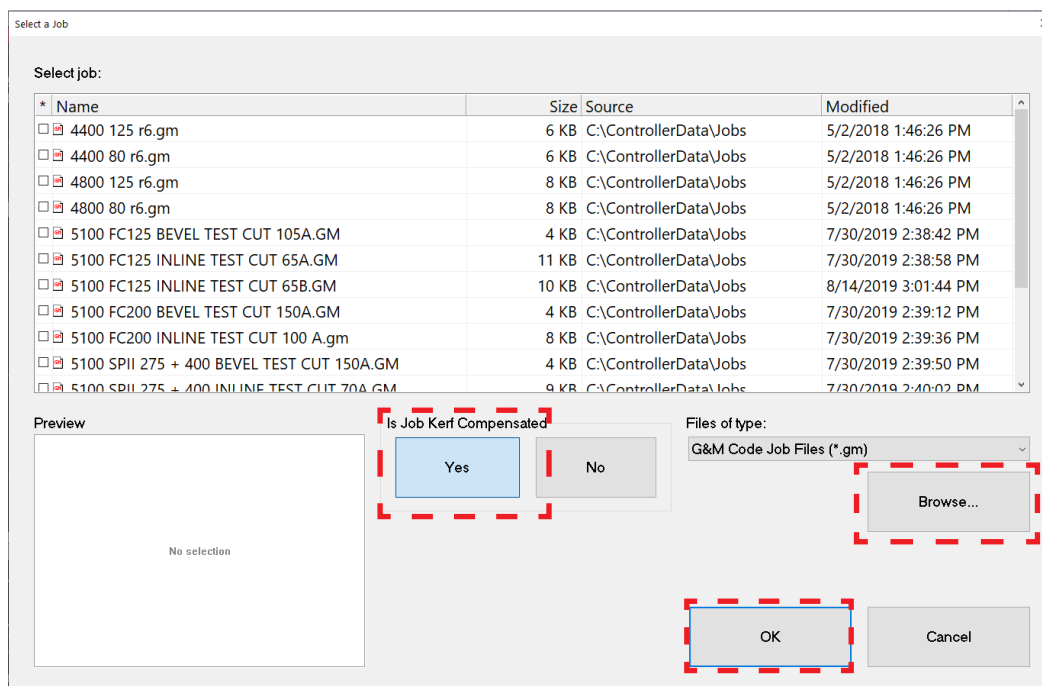
To open the factory test cut, press the **SELECT JOB** button.



Performing a Test Cut:

Since these test pieces were created in WinMPM, the kerf is compensated. Select the 'Yes' button under the "Is Job Kerf Compensated" option. Click the browse button and locate either the 4000 TC Saddle Cut FC80.gm or 4000TC Saddle Cut FC125.gm file, located in the WinMPM folder at *C:\WinMPM\Torchmate VMD Jobs*. Each file has specific settings to either the FlexCut 80 or FlexCut 125 plasma cutters, please verify you open the appropriate file for your model plasma cutter.

Verify that the "Is Job Kerf Compensated" selection is set to Yes.



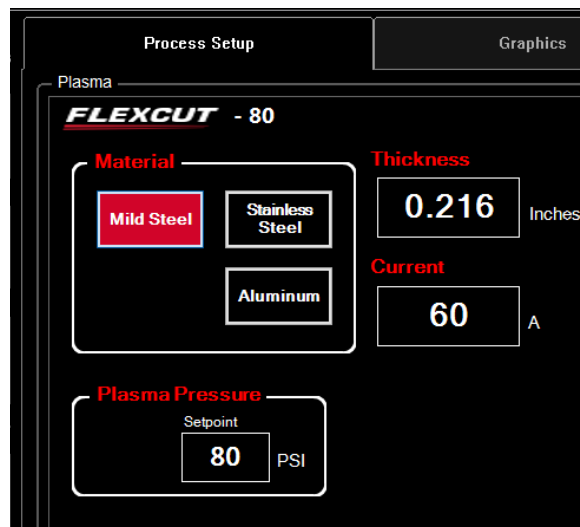
With the job selected and the "Is Job Kerf Compensated" selection set to Yes, click the OK button to open the job.

Performing a Test Cut:

Setup the job:

In the PROCESS SETUP tab:

- Set the Material type to Mild Steel
- Set the Thickness to .216
- Set the Current to 60



Load a piece of 3" Schedule 40 pipe into the machine at least 12" long.

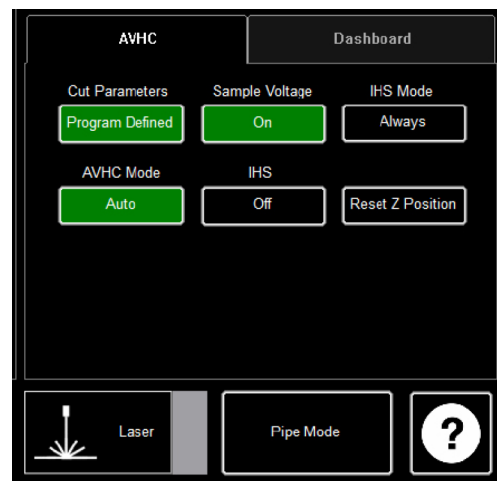
Verify the installed consumables are for 60 or 65 amps (depending on your model FlexCut plasma cutter.)

Set the amperage on the FlexCut power supply to match the loaded consumables and the Process Setup tab in the VMD software.

Set the air pressure output on the plasma cutter to match the Plasma Pressure on the Process Setup tab (consult the plasma cutters users manual for specific instructions to properly set the Plasma Pressure.)

In the AVHC tab:

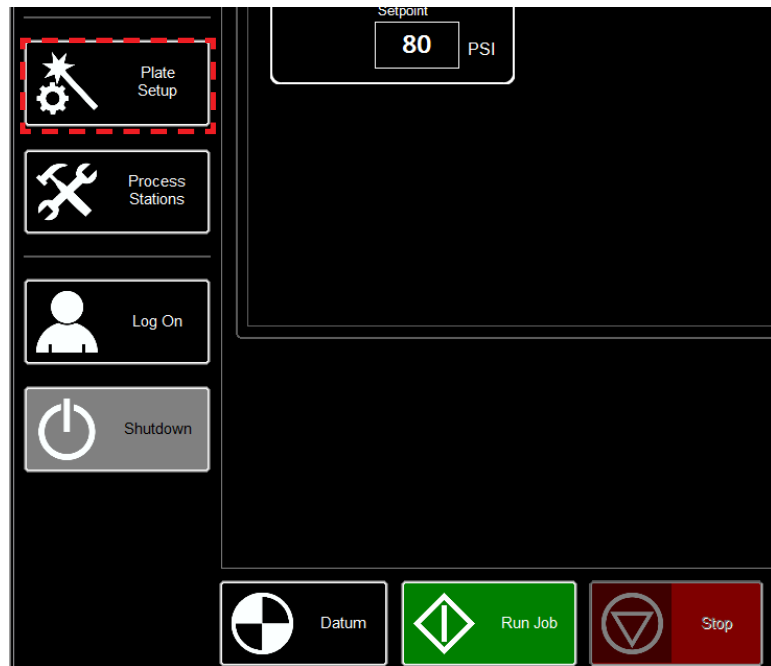
- Set the Cut Parameters to Program Defined
- Set the Sample Voltage to On
- Set the IHS mode to Always
- Set the AVHC mode to Auto
- Set the IHS to Off



Performing a Test Cut:

Setting the Pipe Diameter and Plate Origin:

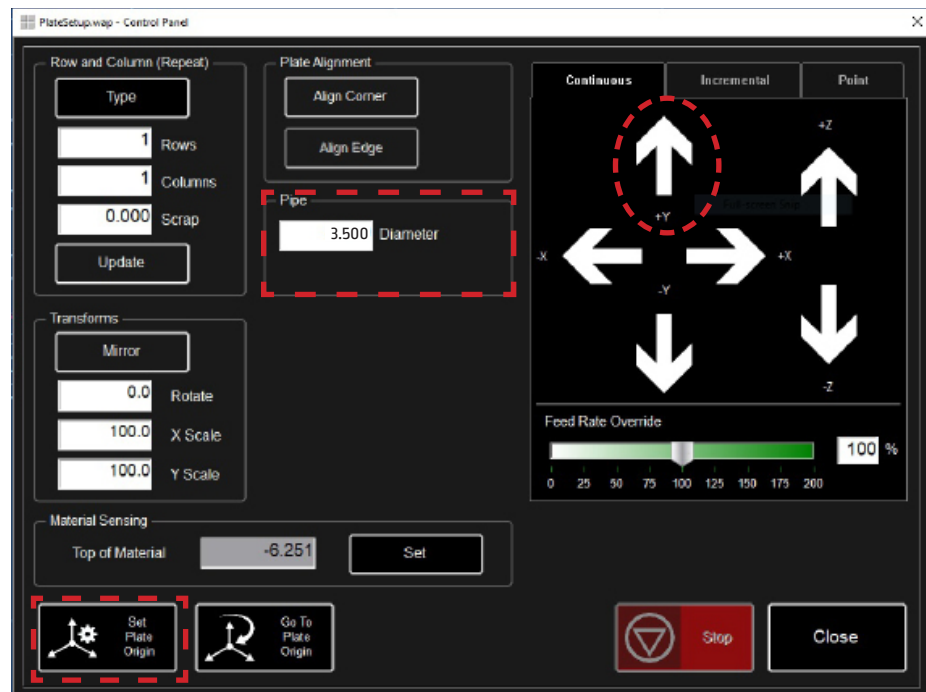
Select the PLATE SETUP button.



In the Plate Setup panel under PIPE, enter the pipe O.D. of 3" sch 40 (3.5")

Jog the Y axis in the positive direction until you reach the end of the pipe opposite the chuck.

Press the **SET PLATE ORIGIN** button. This tells the machine where the end of the loaded material is located and where to start the program.

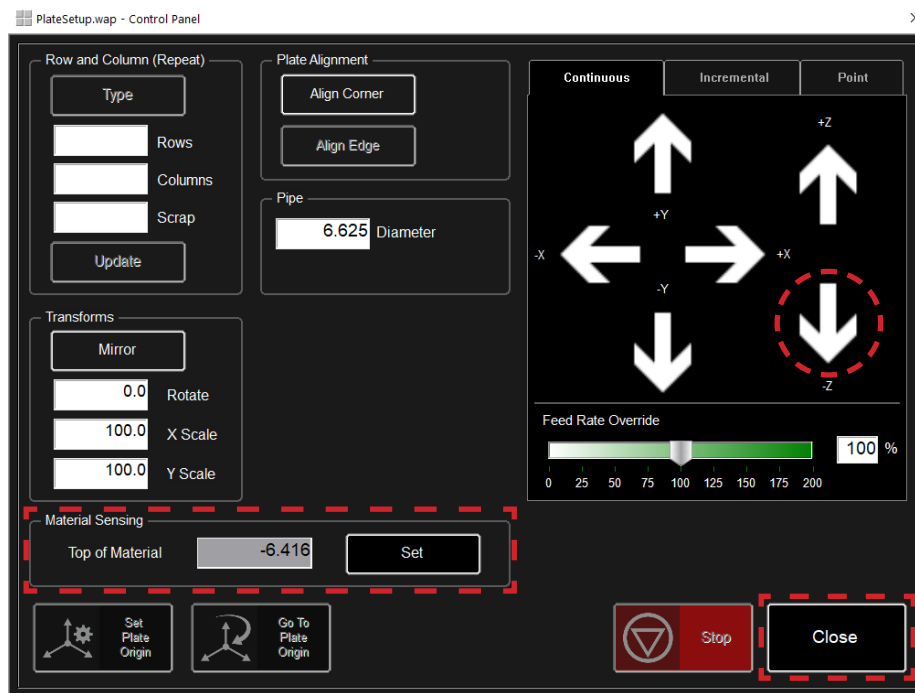


Performing a Test Cut:

Setting the Pipe Diameter and Plate Origin:

After setting the plate origin, jog the Z axis in the negative direction slowly to bring the torch down to touching, or just above the surface of the material, within 1/32".

Press the **Set** button next to **TOP OF MATERIAL** input box. The TOP OF MATERIAL tells the machine where the surface of the pipe being cut is located.



Click the Close button to return to the operators panel.

Once on the operators panel, toggle the machine to an Active Run mode to allow the torch to fire.

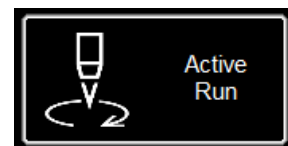
The machine and job are now ready to run. Execute the program by clicking the Run Job button. This will perform the test cut through to completion.

To stop the program at any time, click the red **Stop** button, this will halt the program's operation and turn off any activated tools.

The part will be extremely hot once cut, allow the part to cool before removing it from the machine.

With the part sufficiently cooled, compare the size, angles, and overall cut quality to the factory test cut provided with the machine.

If desired, load the Weld Coupon.gm file that was created earlier in the users manual and repeat the performing a Test Cut section to cut the second factory sample, with a beveled cut on each side.



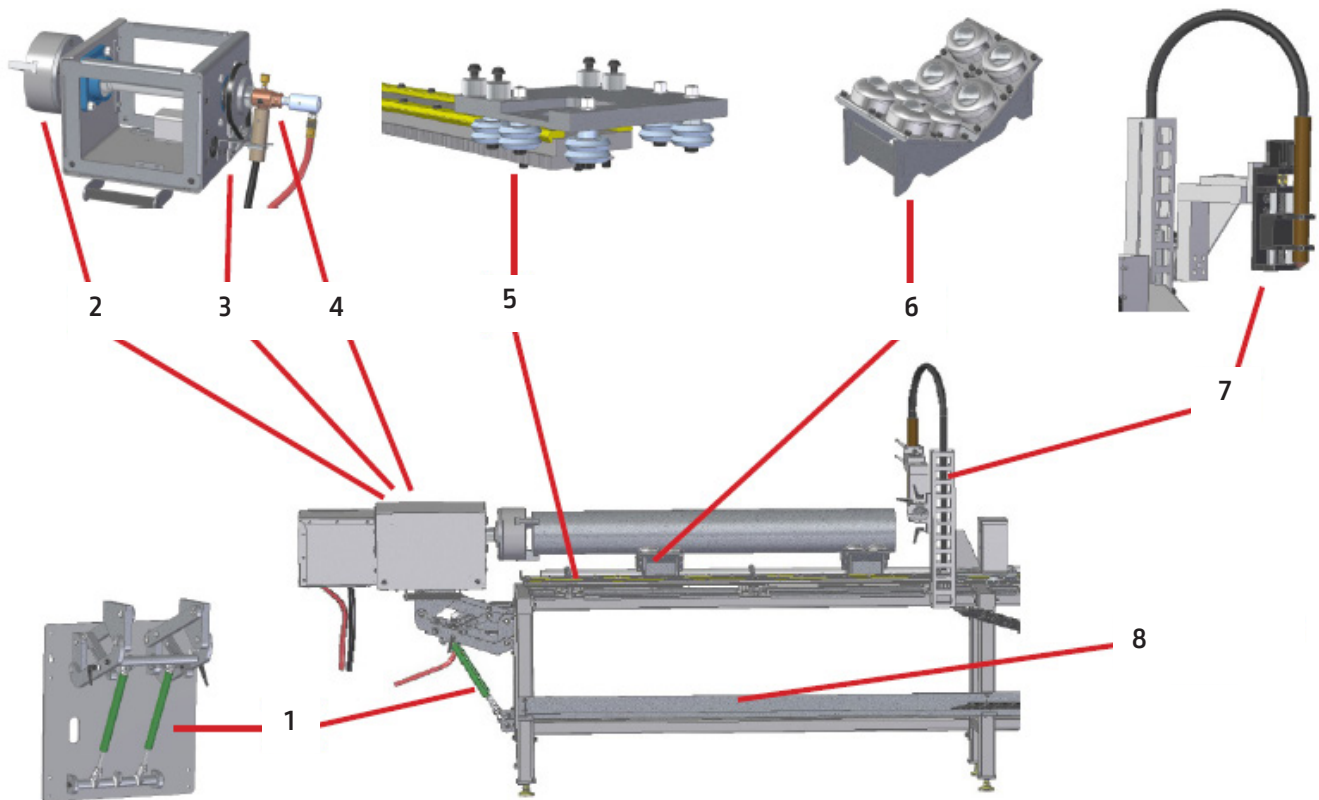
This concludes the Performing the Test Cut section.

Maintenance

The MasterPipe Compact Profiler is designed to offer consistent cut quality, when maintained. Cut quality and repeatability are dependent on routine maintenance of the mechanical system of the machine as well as proper plasma consumable use, and a clean reliable air supply. For maintenance details and consumable replacement schedules please refer to the plasma cutter owners manual. The following maintenance should be performed on the mechanical system after every 40 hours of use.

Use dry graphite on the wear parts, as petroleum products will collect metal dust and cause premature mechanical wear.

1. Clean and lubricate hinge parts on the floating chuck.
2. Clean chuck assembly (compressed air)
3. Tighten X-Belt
4. Lubricate rotating ground
5. Clean and lubricate Y-Rail assembly and bearings (compressed air)
6. Remove debris from the ball transfer cradles (compressed air)
7. Clean AVHC assembly (compressed air)
8. Clean out cable track (compressed air)



Customer Assistance Policy

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

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Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.vernontool.com for any updated information.



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