



A-Series Plasma Table 5x5 & 5x10

Safety and Operation Manual

Original Instruction: English

Version 1.1.0

Revision and Validity

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Valid for A-series Air Plasma Table with 5x10ft and 5x5 table

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Chapter 1: General Information

As exciting as it is to start running your plasma table, please read Chapter 2 first.

We strive to make this manual easy to use, with detailed step-by-step instructions to make your experience as smooth and quick as possible. If there are questions, comments, or concerns, regarding the machine or assembly and installation instructions, please use the following information.

1.1 Contact Information

For technical support:

Via Phone: +1.815.490.0473

Via Email: service@piranhafab.com

For ordering parts and consumables:

Via Phone: +1.815.490.0472

Via Email: tooling@piranhafab.com

All other inquires:

+1.815.964.6771 or

Toll-free within the US 800.338.5471

Primary address:

Piranha

650 Race St.

Rockford, Illinois 61101, USA

Mailing address:

Piranha

P. O. Box 1206

Rockford, Illinois 61105, USA

Chapter 2: Safety

2.1 Introduction

Read this chapter on safety and the sections of vendor components manuals on safety before beginning to operate the Piranha Plasma Cutting Table.

Do not become complacent about safety or completely dependent on safety devices.

2.2 Safety Symbols Used in the Manual

This document uses the following symbols to highlight areas of importance.

Note:

Indicates information easily overlooked, or of special importance.



Caution

Indicates a hazardous situation with low risk that could result in minor injury and/or damage to machine.



Warning

Indicates a hazardous situation with medium risk that could result in moderate injury.



Danger

Indicates a hazardous situation with high risk that could result in injury or death.

Please do not underestimate the importance of other text not designated by any symbols.

2.3 General Safety for All Users

Read this manual completely before operating the machine.

Read the CNC Control Operator Manual before operating the machine.

2.3.1. Stopping the Machine

To stop the machine, press **ESC** on the keyboard, **stop** in the software, or press the **Emergency Stop** button on the controller.



2.3.2. Accidental Button Push, Torch Activation, or Start

When using a mouse, it is easy to accidentally hit the wrong button, especially the torch activation which is right next to the manual movement arrows.

The machine also uses keyboard shortcuts. Be careful to press the correct shortcut and always know how to stop the machine quickly. Pressing the wrong button or keyboard shortcut can also cause a collision.

2.3.3. General Safety

It is very important that a safe and appropriate working environment is provided for this Piranha equipment and in compliance with applicable federal and local industry standards.

All users should receive the proper instruction to have a complete understanding of the operation of this machine before beginning to program, operate or service it.

Careful programming and debugging of new programs is essential for successful operation of this machine.

- Never allow anyone to place any part of their body into the machine while the machine is active. Ensure that all personnel understand the function and use of EMERGENCY STOP and STOP button. Keep your body and clothing dry.
- Do not stand, sit, or lie in/on any wet surfaces when using this equipment.
- Never work in a damp or wet area without proper insulation against electric shock.
- Disconnect main power before servicing the torch, power supply or service connections to the plasma arc system, or any part of the machine bed.
- Wear adequate personal equipment (overalls, gloves, safety boots etc.) when operating the machine.

2.3.4. User

This equipment has been designed with operator safety in mind (when used under normal operating conditions). The user must always be alert to the possibility of dangerous situations. Always exercise care and caution. Report any minor problems immediately, so that they can be corrected before becoming major difficulties.

1. Be familiar with the machine. Read and review the Piranha and component manuals carefully.
2. Be alert to the significance of the various warning indicators and be conscious of the functions of pushbuttons and other controls. Use the controls properly. Review and understand the operation of the EMERGENCY STOP function and the CYCLE STOP function.
3. Never operate the equipment unless it is in good working order.
4. Wear safety glasses and other personal protective equipment as required by applicable federal, local industry and plant safety program standards.
5. Wear proper clothing. Do not wear watches, rings, jewelry or loose-fitting clothes. Remove or secure articles of clothing, such as ties and loose sleeves, which may catch or be drawn into moving machinery.
6. Avoid all moving parts of the machine or workpiece when setting up or operating the equipment. Never reach into the machine while it is active. Use the EMERGENCY STOP or STOP function to stop machine motion. Do not try to pull parts while the machine is running.
7. Recognize and avoid unsafe operating conditions.
8. Maintain a clean work area. Avoid accidents by keeping work areas clean and neat.
9. Never leave the machine in an unsafe condition.
10. Never leave a machine running unattended.
11. Never remove or bypass safety devices.
12. Report any unsafe conditions, personal injury or machine problems immediately to appropriate supervisor(s) and safety manager(s). In case of personal injury, notify Piranha Service Department giving a brief description and date reported injury occurred.
13. Never operate the machine with someone within a hazardous area.

2.3.5. Servicing and Maintaining the Machine

Only qualified personnel should make repairs on this equipment. Use caution and follow Piranha procedures when working on the machine. Be sure to observe the following guidelines:

1. Before performing maintenance or repair, turn the power OFF and follow lock out/tag out (zero energy shutdown) procedures. Also, follow any lock out/tag out procedures applicable to your specific plant requirements.
2. Wear safety glasses and other personal protective equipment as required by applicable federal, local industry, and plant safety program standards.
3. Wear proper clothing. Do not wear watches, rings, jewelry, or loose-fitting clothes.
4. Read and review the manual carefully.
5. Be familiar with the operation of the machine.
6. Practice preventative maintenance. Inspect the equipment regularly and repair or replace worn components and tooling. Read the components manuals for any additional preventative maintenance.
7. Always replace safety guards and other safety devices removed for service and make sure that they are fully functional before operating the equipment.
8. Never remove, jumper out or bypass a safety device to permit machine production.

9. Never place yourself in a hazardous situation to observe a problem and ask someone else to operate the machine. This could be a very dangerous and life-threatening situation.

2.4 Personal Protection Equipment

2.4.1. Eye Protection



Warning

The plasma arc cutting process produces rays that can burn eyes and skin. Always wear eye protection with appropriate lens shades.



LENS SHADE		
Arc Current	AWS (USA)	ISO 4850
Up to 100A	No. 8	No. 11
100 – 200A	No. 10	No. 11 – 12
200 – 400A	No. 12	No. 13
Above 400A	No. 14	No. 14

Medical treatment facilities and a qualified first aid person should be available for immediate treatment of flash burns to the eyes and skin.

It is recommended that the cutting area be prepared in such a way as to minimize the reflection and transmission of ultraviolet radiation. Walls and other surface areas should be painted in dark colors to reduce reflection. Protective screens or curtains may be installed to avoid unnecessary ultraviolet transmission.

2.4.2. Noise

The noise levels generated during plasma arc cutting may be as high as 105 decibels. This depends on the distance from the machine, arc, plasma torch nozzle design, gas velocity, material type, and plate thickness. Each user should check the sound levels under normal operating conditions. The user and all personnel who must work near the machine should use adequate ear protection, in accordance with applicable local, state, and federal industry standards.



Warning

Exposure to noise from the cutting process can damage hearing. Wear appropriate ear protection when operating the machine or when working in the proximity of the machine.



Noise levels that can cause discomfort or damage to hearing will vary greatly from one individual to another. If the noise level is uncomfortable to you, use noise protection, regardless of applicable industrial standards or tested noise levels.

2.5 Safety Devices

Plasma arc units are provided with certain safety interlocks designed to prevent equipment damage and/or personal injury.

Never short out or in any way attempt to defeat the safety interlock devices.



Warning

Never attempt to operate the plasma unit with any of the power supply covers not in place. This is extremely hazardous to the operator and any other person in the area. It also prevents the equipment from properly cooling critical components and could result in equipment damage.



All exposed electrical connections must be covered with the proper insulation material.

Safety devices must be regularly checked for proper operation and replaced immediately if found to be inoperative.

2.6 Risk of Electric Shock



Danger

Always verify that ALL electrical supplies are isolated before undertaking any service or maintenance work. The machine may have more than one electrical supply.



Plasma cutting equipment uses high open circuit voltages to initiate the plasma arc. Normal load voltages are higher than experienced with other types of welding equipment. Extreme CAUTION must be exercised when operating or servicing this equipment.



Warning

Plasma arc can cause injury and burns. Verify that no person is in the proximity of the plasma torch at any time that the plasma system is switched on. Serious burn and electrical shock hazards exist, even when the plasma cutting system is not active.



2.6.1. Input Connections

1. A wall mounted line isolating switch, fused as required by local electrical codes, must be fitted as close as possible to the plasma arc power supply.
2. Three-phase input conductors must be sized to carry the rated current of the plasma arc power supply.
3. Primary power cable must be provided with a minimum 600v rating.



Warning

Frequently inspect the cable for damage or cracking of the cover. Bare wiring can kill. Replace damaged cable immediately.



2.6.2. Grounding

Input Power

1. Connect the ground lead of the four-conductor / three phase input cable to the electrical system ground in the disconnect box and the ground stud provided in the plasma arc supply.
2. Be sure all ground lugs are of adequate size to carry the rated current load and follow state and local regulations.
3. Make all connections tight to avoid resistance heating.

Output

1. Connect the work clamp to the material grid of the worktable or material.
2. Connect the material grid of the worktable to a good earth ground.

2.7 Fumes and Air Contamination



Caution

Plasma arc cutting systems can produce large volumes of fumes. If you exhaust fumes to the outside atmosphere, additional air pollution control devices may be in order to conform to local, state, and federal government ordinances. Air pollution control devices are the responsibility of each individual user.

2.7.1. Toxic Fumes

Proper precautions must be exercised to prevent the exposure of others in the vicinity to toxic fumes that may be generated while plasma cutting.

Certain chlorinated solvents such as perchloroethylene and trichlorethylene will decompose under ultraviolet radiation to form phosgene and other gases. Care must be taken to avoid the use of these solvents on materials being cut with plasma arc cutting equipment. Containers of these solvents and other degreasing agents should be removed from the immediate area around the plasma arc.

Metals coated with or containing significant amounts of lead, cadmium, zinc, mercury, or beryllium can produce harmful concentrations of toxic fumes when the plasma arc cuts. Adequate local exhaust ventilation must be used, or the operator must be supplied with special equipment to guarantee a supply of fresh air such as a respirator or air supplied helmet.

Metals coated with materials that emit toxic fumes must not be cut unless:

1. The coating is removed prior to cutting.
2. The area is adequately ventilated.
3. The operator is supplied with fresh air breathing equipment.

2.7.2. Air Contamination

The plasma cutting process generates large quantities of hot metal dust and fumes that would be hazardous if uncontrolled. The water in the water table captures many of the contaminants created while plasma cutting.

Note:

When using the water table, water and slag must be disposed of in accordance with state and local codes.

It is important that the table is covered 80-90%, with material for example, for the most efficient fume collection. It is best practice to run the machine in an area with good general ventilation. Low ceilings, confined spaces, nearby welding or torch cutting will all contribute to a higher concentration of fumes. Additional safety measures may be needed to ensure a safe workspace.

The gases listed below either are produced normally during plasma arc cutting or can form under certain conditions.

2.7.2.1 Ozone

Ozone is produced by the reaction of the plasma arc's ultraviolet radiation with oxygen in the air. Uncontrolled, excessive levels of ozone can constitute a hazard. When there is proper venting to the

outside and the machine's internal ventilation system is functioning properly, there is adequate control of ozone during torch cutting.

2.7.2.2 Nitrogen Dioxide

Nitrogen dioxide gas is produced when nitrogen and oxygen in the air pass through the electric arc. A hazard may exist if uncontrolled, excessive levels of nitrogen dioxide are formed. With proper venting to the outside, the machine's internal ventilation system is adequate to control nitrogen dioxide during torch cutting, if the system is functioning normally.

2.7.2.3 Acetyl Chloride

Acetyl chloride gases form in the air surrounding the plasma arc when the airborne vapors of chlorinated solvents or degreasers decompose upon being exposed to the ultraviolet radiation of the arc. A hazard may exist if uncontrolled, excessive levels of acetyl chlorides are formed. A pungent "sweetish" aroma similar to chlorine bleach is the first sign that these gases are being produced. Shut down the plasma arc cutting system immediately if you detect the acetyl chloride odor. Do not resume cutting until you locate and control the source of the vapors.

Various cleaning solvents and vapor degreasers contain chemicals that decompose rapidly when exposed to ultraviolet radiation.

If the solvents, cleaning solutions, or vapor degreasers used in the shop contain any of the following chemicals, *do not use them near the plasma arc cutting system*:

1. trichloroethylene
2. trichloroethane
3. perchloroethylene
4. perchloroethane
5. trifluoro-trichloroethane (fluorocarbon-113)

These chemicals also decompose into small amounts of the toxic gases phosgene and chlorine. You will notice the acetyl chloride odor long before phosgene or chlorine levels become harmful.

The vapors can decompose up to several feet away from the arc, *do not rely on the machine's internal ventilation system to control solvent vapors and their products*. Do not use or store chlorinated solvents, cleaning solutions, and vapor degreasers close to the machine, where the vapors can enter the torch-cutting area.

Note:

It may prove advisable to provide separate ventilation for the solvent/degreaser storage area.

2.7.3. Metal Fumes

Metal fumes are produced when the plasma arc vaporizes the metal. A hazard may exist when uncontrolled, excessive levels of metal fumes are produced. Some vaporized metals form toxic gases. These metals may be in their pure metallic state, in an alloy, or in a coating such as paint or plating.

Metals that are known to produce toxic fumes include beryllium, cadmium, lead, manganese, mercury, and zinc. Beryllium products require particular care, because their fumes are highly toxic. If there is proper venting to the outside and the machine's internal ventilation system is functioning normally, there should be adequate control of metal fumes during torch cutting.

2.7.4. Metal Dust

Metal dust is formed as metal vaporizes during torch cutting. A hazard may exist when uncontrolled, excessive levels of metal dust are produced. If there is proper venting to the outside and the machine's water level is high enough, there should be adequate control of metal dust during torch cutting. For proper dust capture, at least 90% of the worktable should be covered by the workpiece (or other sheet metal covers).

2.7.5. Additional Ventilation

While the water table captures much of the fumes and dust, due to the noxious and toxic nature of many torch cutting by-products, Piranha recommends additional ventilation. This recommendation is especially important when the shop has one of the following:

1. Low ceilings and/or confined area
2. Large amount of welding and/or torch cutting near the plasma system
3. Poor cross plant ventilation

2.8 Fire, Explosion, and Burn Prevention



Warning

Since plasma arc cutting produces hot metal, sparks, and slag, precautions must be taken to prevent fire or explosions.



All combustible materials must be removed from the immediate cutting area to at least 35 feet away. Appropriate fire extinguishing equipment must be available in the immediate cutting area.

After cutting, be sure to allow the metal to cool sufficiently before handling or before allowing contact with combustible materials.

Never plasma cut empty containers that have held toxic or potentially explosive materials. Those containers must be thoroughly cleaned according to national standards prior to cutting or welding.

Never plasma cut in an atmosphere that contains heavy concentrations of dust, flammable gas, or combustible liquids (such as petrol).

2.8.1. Hot Surfaces and Hot Material

Plasma arc cutting creates a Heat-Affected Zone (HAZ) around the cut edge of the workpiece. Until the hot edges cool, the HAZ will burn an unprotected hand severely.



Warning

Components may remain hot for a considerable period of time. Always wear gloves to remove cut parts, skeleton, and scrap from the bed.



Warning

During prolonged periods of cutting, parts of the machine bed may become hot to the touch.



Warning

Moving machinery can be dangerous.



Assure that the bed is free of obstructions and no person or articles of clothing are in the proximity of moving parts when the machine is in operation. This safety precaution also applies when the machine is manually moved and when the plasma system is off.

2.8.2. Sparks

Sparks form as the plasma arc torch vaporizes metal. These sparks are tiny droplets of extremely hot molten metal and are a possible fire hazard. The volume of sparks formed and the area over which they are scattered depend on several variables. These variables include the type and thickness of the

material being cut, the cutting current, and the feed rate. Where practical, keep all combustible material at least 35 ft. (10.7 m) away from the plasma arc work area. Where this is not practical, protect all combustible materials with close fitting, flame proof covers or shields. Protect wooden or other combustible floors by covering them with sand or installing fire-resistant shields. Shield any wall openings, floor openings, cracks, ducts, or conveyors within 35 ft. (10.7 m) of the torch to prevent sparks from passing into adjacent areas.



Warning

Sparks from the cutting process may ignite flammable items in the machine bed which may then be drawn into the extraction unit, possibly causing a fire.



2.8.3. Burn Prevention

High intensity ultraviolet and infrared radiation is produced by the plasma arc and is of similar intensity to typical high current welding arcs. This radiation is damaging to the eyes and skin. As the operator comes closer to the torch, the level of exposure increases rapidly.



Warning

The operator and any other persons in the vicinity of the arc must wear proper protective clothing and equipment.



2.8.4. Cutting Aluminum on a Water Table



Warning

Aluminum slag mixed with water can cause an explosion. Always follow these precautions.

- When cutting aluminum with plasma over a water table, hydrogen bubbles form. These bubbles can accumulate and get trapped beneath the workpiece causing an explosion in the presence of an ignition source (such as an arc ignition).
- Do not leave workpieces on the table if it is not being cut at that moment. For example, do not leave a sheet on the table overnight. Cut aluminum, and all materials, in a well-ventilated area.
- Use a fan to increase air circulation beneath the workpiece on the plasma table. Make sure the fan is turned on for several minutes prior to initiating an arc on the plasma table.
- Allow at least one inch (25mm) of clearance between the aluminum plate and the water level.
- Use pointed slats to improve air flow. Do not use sheared, rectangular slats.
- Consider installing an aerator, circulator, or filtration system if cutting consecutive sheets of aluminum, anything that agitates the water to break up the bubbles of hydrogen.
- Clean out fine aluminum particles from the water table after each use.
- See the plasma power supply safety manual for additional information.

2.9 Light and Radiant Energy

When it is necessary to look directly at the arc for diagnostic purposes, do so briefly. Use shade #10 welding glass (for up to 200 amps) or shade #12 (for 200 amps). During operation, use a shade not less than #8.



Warning

Do not look directly at the arc without proper eye protection.



Caution

During plasma arc cutting, clothing worn should conform to the instructions presented in the General Safety Requirements section of this manual.

Ultraviolet rays and other radiant energy reflected off the workpiece can produce sunburn. Therefore, when plasma arc cutting is being performed, anyone working within 25 feet (7.5M) of the arc should wear an approved, protective full-face mask, a long-sleeved shirt, gloves, and long pants.

Operations, such as edge cutting, that can cause the arc to be exposed to view should be avoided, because they can increase exposure to radiant energy.

Shield personnel at nearby workstations from accidental exposure to radiant energy by the use of non-reflective, fireproof enclosures, open at the top and at floor level to allow air to circulate freely.

The pilot arc in the plasma cutting systems is initiated and stabilized by a high-voltage signal. This signal can create electromagnetic interference.

As with any equipment that can create such interference (e.g., microwave ovens and TIG welders), people who have implanted heart pacemakers must exercise caution when working near the equipment. Piranha recommends that a person with a pacemaker who works near where plasma arc cutting is being performed should wear a Holter monitor for one day of work to record the existence of electromagnetic fields. A qualified doctor should review the recorded data with the pacemaker manufacturer to determine whether the worker can safely continue working in the area on which the study is based.

Note:

There is no history of problems caused to pacemakers by the plasma arc cutting equipment that have been reported to Piranha.

2.10 Compressed Gas Equipment

Gas cylinders should be mounted securely to a wall or other stable supporting device.

2.10.1. Cylinders

Compressed gas cylinders must be handled and used in accordance with appropriate national safety standards.

- Never use a cylinder that is physically damaged or leaks.
- Never move or transport a cylinder without the protective valve cover in place.
- Never use a gas cylinder or its contents for any other purpose than that for which it is intended.
- Never lubricate cylinder valves with oil or grease.
- Never allow electrical contact such as welding arcs with cylinders.
- Never expose cylinders to excessive heat, sparks, slag, or open flames, which may cause rupture.
- Never use hammers, wrenches or other tools to open stuck valves. Send these cylinders back to the supplier.

2.10.2. Pressure Regulators

All regulators used to operate plasma equipment must be maintained in proper working condition.

- Faulty equipment can cause equipment damage or operator injury. Faulty equipment must be serviced at the manufacturers designated facility by trained repair technicians.
- Never use a regulator for any other gas than that for which it is intended.
- Never use a regulator that leaks, excessively creeps, or is physically damaged in any way.
- Never attempt to lubricate a regulator with oil or grease.

2.10.3. Hoses

Gas hoses used for plasma arc cutting systems adhere to the following color coding:

Red.....	Acetylene
Orange.....	LPG
Blue.....	Oxygen
Black.....	Inert gases and air

- Replace any hose that is damaged by physical abuse or from sparks, heat or open flame.
- Lay hoses out straight to prevent kinks.
- Coil excess hose and place out of the way to prevent loose connections, or other damage.
- Keep hose lengths to a minimum to prevent damage, reduce pressure drop and prevent possible volume flow restriction.
- Please refer to national standards for more information on hoses.

2.11 Additional Safety Information

The general safety information presented in this chapter does not constitute a complete list of safety instructions for any particular configuration of the Piranha Plasma Cutting Table. Warnings and other safety information related to operations described in this manual are presented in the chapters in which those operations are explained. Specific equipment being used by the customer and its particular application in the customer's factory may require supplementary safety information.

Note:

It is the responsibility of the customer's company to make sure safety information covering the equipment being used and its particular application is available to personnel operating and maintaining the equipment and is read by them.

SAFETY STANDARDS PUBLICATIONS

It is recommended that companies using the kind of equipment covered in this manual consult the applicable Safety Standards publications available from the agencies listed below:

OSHA

<https://www.osha.gov/> (202) 512-2457

ANSI

American National Standards Institute
<https://ansi.org/> (212) 642-4900

NFPA

National Fire Protection Association
<https://www.nfpa.org/> (800) 344-3555

FINAL SAFETY RECOMMENDATION

Piranha strongly urges that problems encountered in the operation and maintenance of the equipment be reported to our Field Service Department. The department is prepared to give additional information and to answer questions in regard to the equipment. When contacting the Field Service Department, please give the model number, serial number, and purchase date of the equipment.

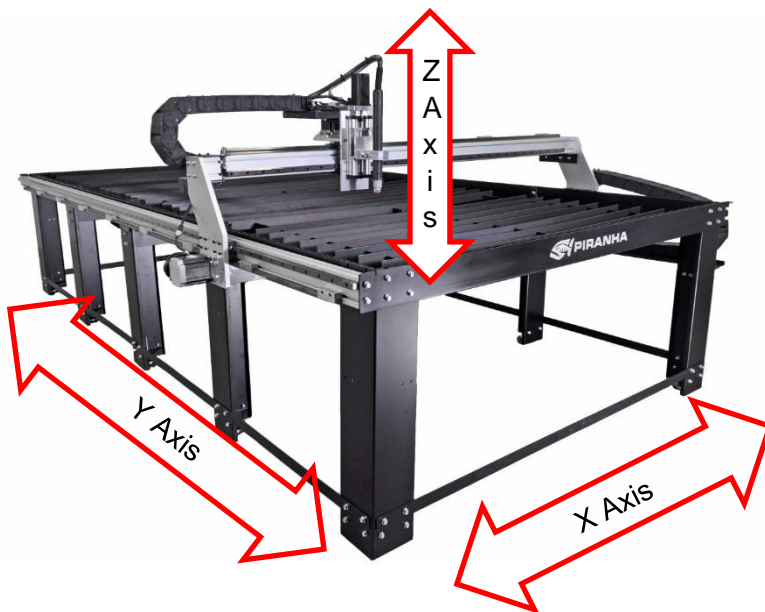
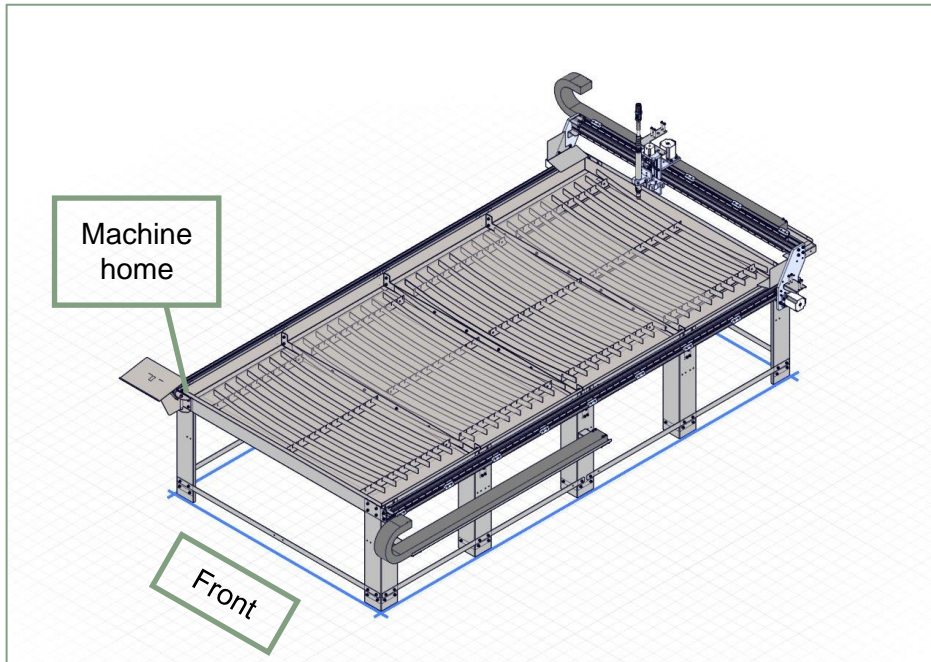
Piranha/MegaFab.
P.O. Box 1206
Rockford, Illinois 61105, USA
Telephone (815) 490-0472

The preceding safety instructions are advisory, general in scope, and not necessarily complete. Specific safety information for the Piranha plasma cutting machine appears throughout this manual.

**Warning**

In keeping with standard safety practices, it's recommended to use eye protective equipment, with side shields, during the operation of this machine.

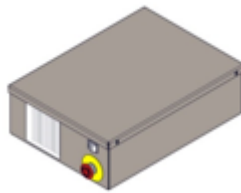
Chapter 3: Major Components



Laptop



Controller



Plasma Source



Chapter 4: First Time Power On

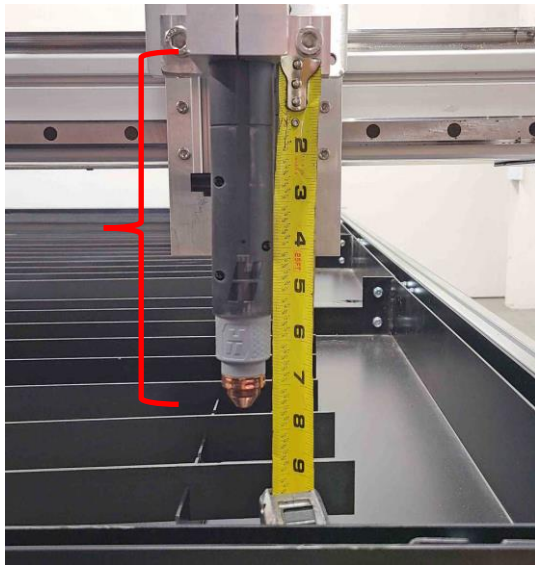


Caution

Leave the plasma source off until setup and testing are completed. Leave the controller off until instructed to turn it on.

4.1 Adjust the Torch Height

Adjust the torch so that it reads approximately 7.5" from the torch holder to the nozzle.



4.2 Laptop Setup

4.2.1. Setup for Laptop Purchased from Piranha

The laptop purchased as an option will come loaded with the MyPlasm CNC software and with the function keys set up already. Skip to the next section.

4.2.2. Setup for Laptop Not Purchased from Piranha

Download and install the software:

<https://proma-elektronika.com/to-download/>

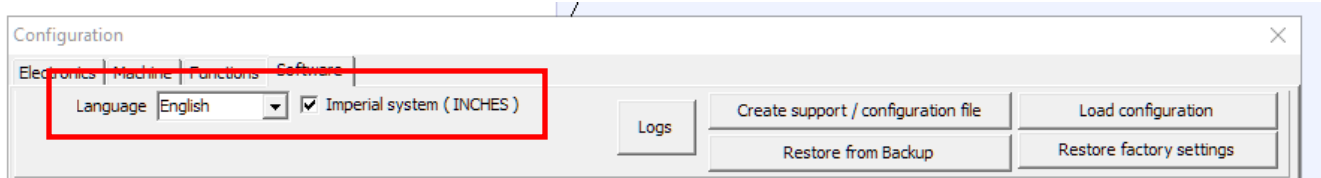
MyPlasm CNC will use the function keys, F1-F12, as machine functions. For these keys to work correctly, you may need to change the BIOS settings on the laptop. Because this varies from computer maker to computer maker, we cannot provide exact instructions on how to adjust this on your laptop. Here is some general information:

<https://www.howtogeek.com/235351/how-to-choose-whether-your-function-keys-are-f1-f12-keys-or-special-keys>

4.3 MyPlasm CNC Software Setup

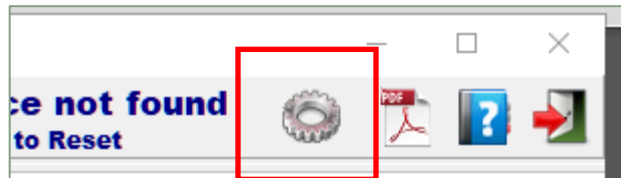
4.3.1. First Time Software Setup

When opening the software for the first time, it may ask to verify the language is **English** and **Imperial** system is selected. Once selected, click the X to close this window.



4.3.2. Parameter Verification

1. Press the **Gear icon** in the upper right to open the Configuration settings.



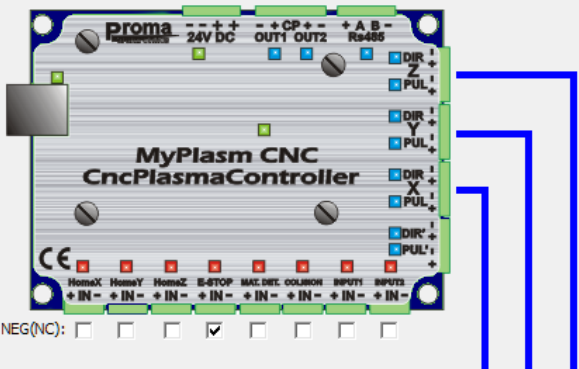
2. If the laptop was purchased from Piranha, these settings are loaded but should be double-checked. If the laptop was not purchased from Piranha, the settings need to be either loaded with a configuration file or entered manually.
 - a. If a configuration file is available, go to the **Software** tab and press **Load Configuration** to load the zip file.
 - b. If not, enter the values for the configuration manually.

See next page.

Configuration

ElectronicsMachineFunctionsSoftware

MyPlasm CNC Controller



NEG(NC): ☐ ☐ ☐ ☒ ☐ ☐ ☐

PLASMA INTERFACE

☒ Enabled

50:1 Voltage Divider

100 Voltage Calibration [%]

1 Height of transfer max.[in]

100 0-100 THC Speed

☒ Waiting for ARC OK


Microstepping Motor Drivers

6400 (1 / 32) X ☒ revers

6400 (1 / 32) Y ☒ revers

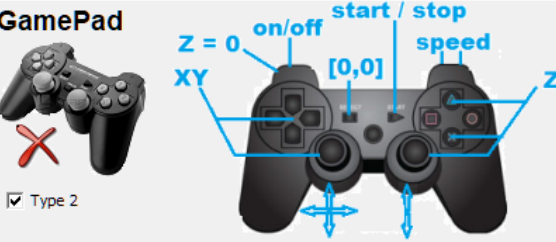
800 (1 / 4) Z ☐ revers

Not Active ' axis func



GamePad

☒ Type 2



Configuration

ElectronicsMachineFunctionsSoftware

XY Axis moving parameters

XY maximum speed [in/min] 600

Hand XY speed [in/min] 500

XY safety speed [in/min] 10

Acceleration XY (RAMP) 12

Z Axis moving parameters

100 Z maximum speed [in/min]

75 Hand Z speed [in/min]

20 Z safety speed [in/min]

18 Acceleration Z (RAMP)

☒ **Axis soft limits**

X Y Z

See next step

Homing

☒ Home switches active

☐ Revers 120 X Speed [mm/min] 20 Z Speed [mm/min]

☐ Revers 120 Y Speed [mm/min]

XY moving / gear parameters

2.828 X Axis move per motor rev [in]

2.828 Y Axis move per motor rev [in]

Z moving / gear parameters

0.31496 Z Axis move per motor rev [in]

5 Rotary Gear

Continued next page.

Configuration

Electronics | Machine | Functions | Software

Z axis initial height

Test

☐ Touch ohmic Sensor

☒ Floating head switch

0.5 detection height [in]

0.01 ohmic correction [in]

0.22 switch correction [in]

50 detection speed

Objects

Apply Cutting Speed 2 for objects smaller that [in] 1

Park

	X	Y	Z
F1			max
F2			max
F3			max
F4			
Start			
Finish			max

Special

Any value here; customer defined

This value will be calibrated later.

3. Select the **Machine** tab and double-check the **Axis soft Limits** are correct for the table size:

5x10 Table Size

☒ **Axis soft limits**

X	Y	Z
67	132	3.7

5X5 Table Size

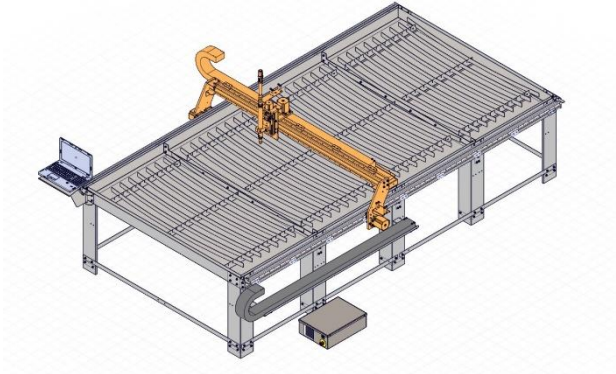
☒ **Axis soft limits**

X	Y	Z
67	62	3.7

4. Click **X** to close this window.

4.3.3. Communication Status

5. **Manually** move the machine to roughly the middle of travel in both the X and Y axis. The exact location is not important at all; the machine just cannot be on the limits for the next steps.



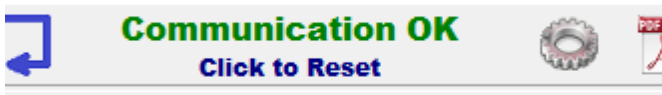
6. Turn to release the e-stop if it was pressed in. Turn on the controller.



7. In the software, click on the top of the screen, where it says **Click to Reset**.
 - a. If you get a message to update the firmware, press **YES**.



8. Verify it says **Communication OK**. If it does not, try **Click to Reset** again and then double check the connections. Refer to the MyPlasm CNC Software User Manual for further information.

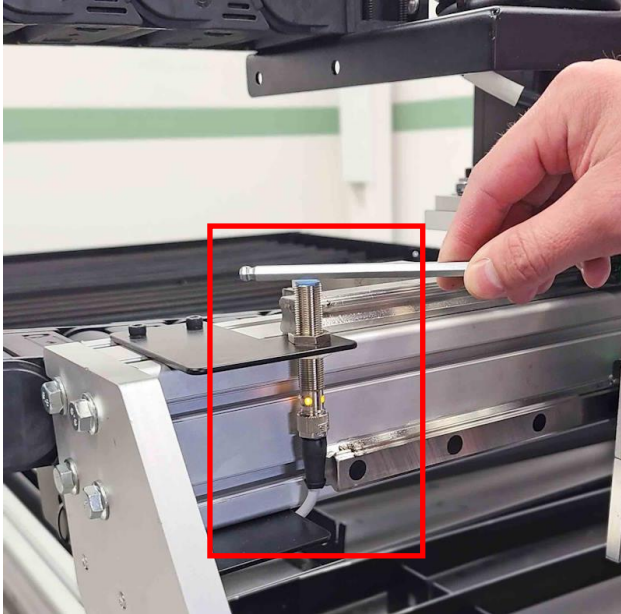


4.4 Limit Sensor Checks

If any of these checks fail, double-check the wiring.

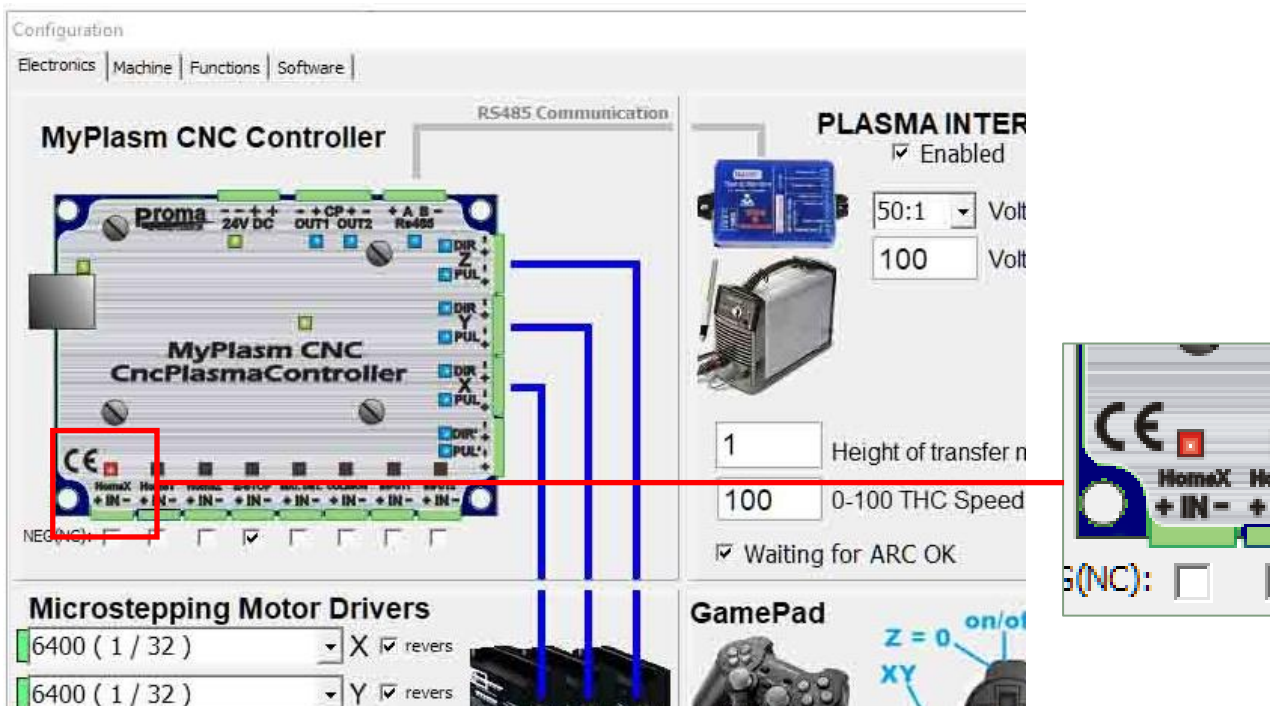
4.4.1. Check the Home Sensors

9. Touch a metal object, such as an Allen wrench on top of the X-home sensor. This is on the left side of the gantry. It should light up.



10. Press the **Gear icon** in the upper right to open the Configuration settings and then **Electronics**.

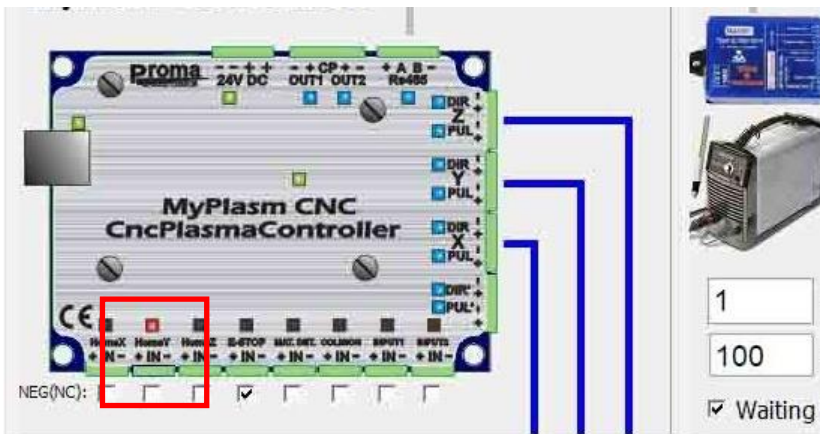
11. Touch the sensor again and check that the **HomeX +IN-** is lit up in the software.



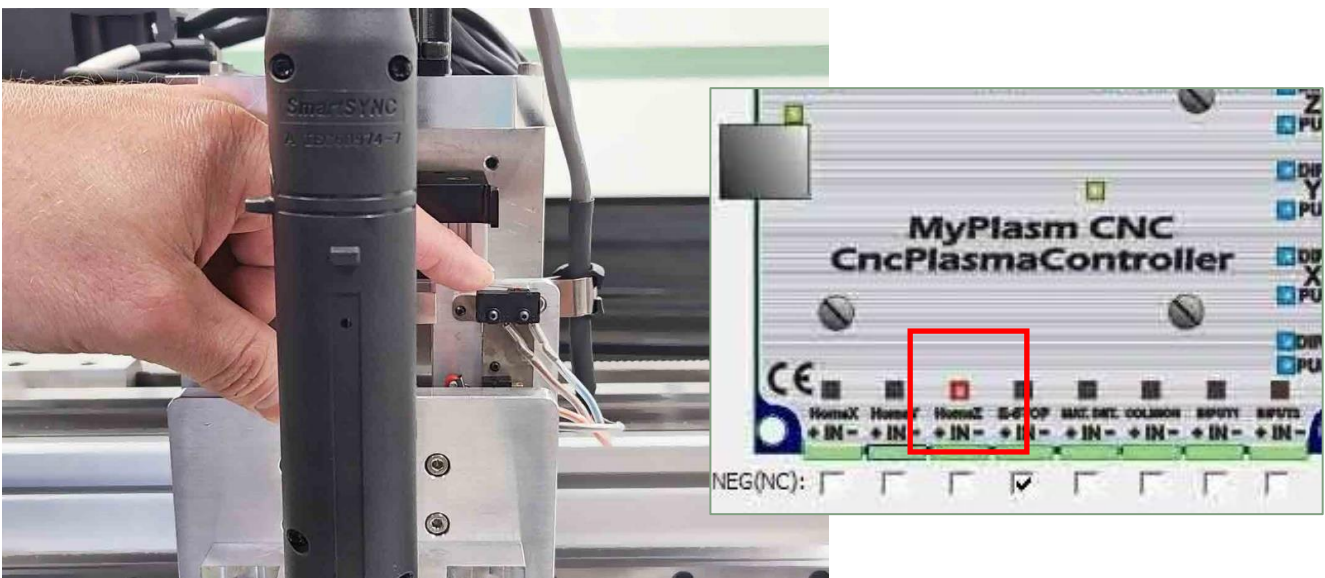
12. Next, touch the Y-home sensor with the Allen wrench and check that it lights up. This is next to the Y1 motor on the right side of the gantry.



13. Check that the **HomeY +IN-** is lit up in the software when touching the sensor.



14. Using your finger, press the Z-home sensor behind the top of the torch. Check that **HomeZ +IN-** lights up in the software. Close the configuration window.



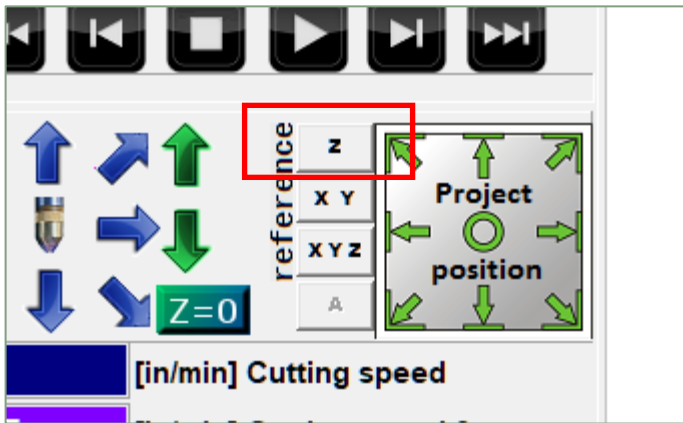
4.5 First Time Home the Machine



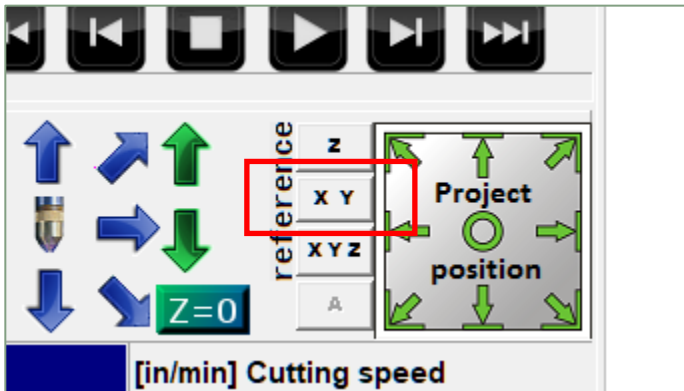
Caution

The next steps include automatic movement. To stop the machine, press **ESC** on the keyboard, **stop** in the software, or press the **Emergency Stop** button on the controller

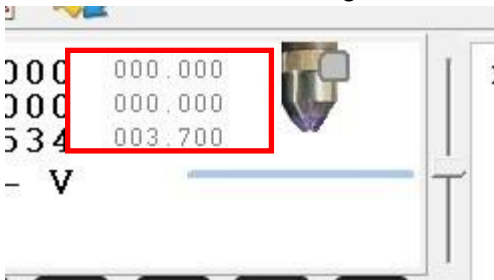
15. Double-check there are not any tools or objects on the table that may interfere with machine movement.
16. Press **reference Z** to home just the Z axis. The torch will move to its home position.



17. Press **reference X Y** to home the X and Y axes. The X axis will home first and then the Y axis will home.



18. When it is done homing, the machine reference should read 000.000 for the X and Y.



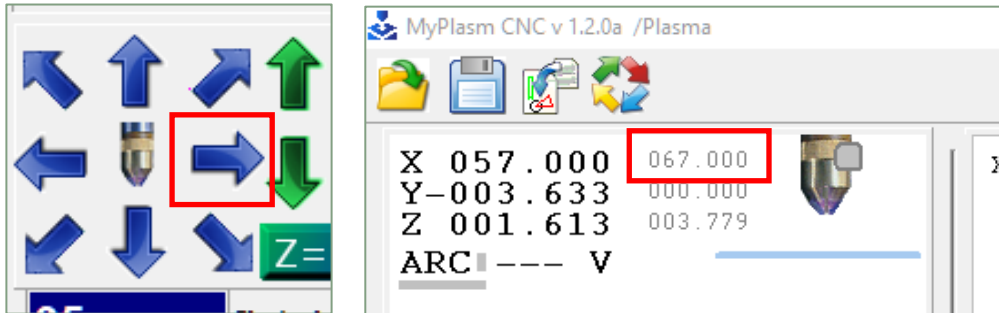
4.6 Check Travel Limits



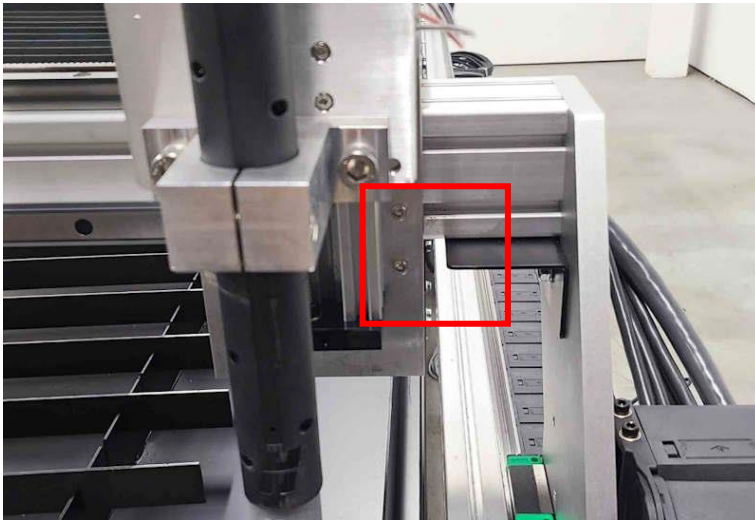
Caution

As you are moving the machine, make sure nothing is in the way, like cables moving and getting caught or the machine contacting something it shouldn't.

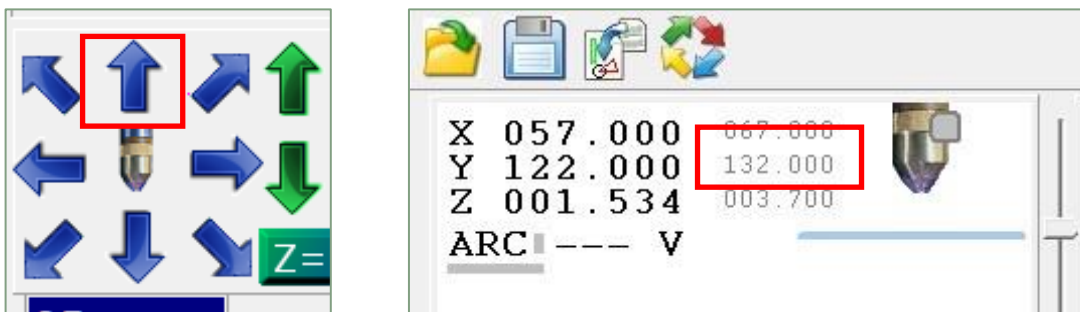
19. Use the right arrow in the software or on the keyboard to move the machine **slowly and carefully** all the way to the right. The machine coordinate system should read 67.0.



20. With the torch all the way to the right, check that the torch moved without colliding or touching anything, for example the bridge support bracket. There should be a small gap.



21. Use the up arrow in the software or on the keyboard to move the machine slowly and carefully all the way to the back. The machine coordinate system value **will vary by machine table size**.

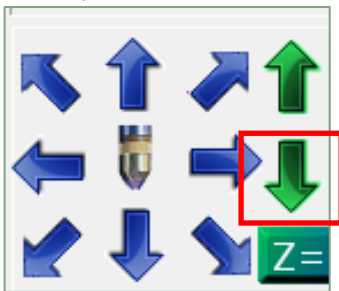


22. Check that the gantry does not make contact with the hard stop or any other components. There should be a gap between the gantry and the hard stop.

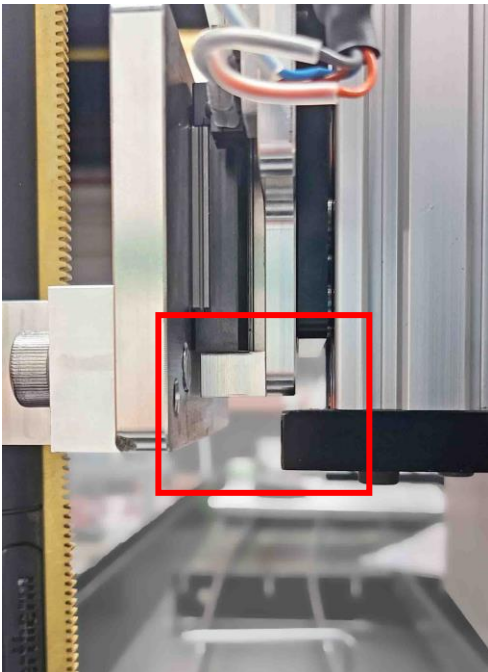


23. You can use the down and left arrows to bring the torch closer to the front of the machine.

24. Bring the Z all the way down carefully by pressing the **green down arrow** or **PgDn** on the keyboard.



25. On the side of the torch, check that there is some clearance between the aluminum backplate and the black bottom of the z axis assembly.



4.7 Filling the Water Table

Fill the table with water and an additive before cutting. The water should be no less than an inch below the material to about a quarter inch below the material. If the water is too low, the water will not capture the fumes. If the water is too high, cuts quality will suffer with more dross on the bottom, and the water will splash out more.



Figure 4-1: Plasma Pink Additive in a Water Table (left) and Water Level Range (right)

Use an additive that works as both a rust inhibitor and biocide. Plasma Green 9010, Piranha part number 230812, comes in a 5-gal (19 L) container. Follow the manufacturer's instructions on safety, dilution, storage, and disposal. Pour the additive in all parts of the table equally for good distribution.

Use the table below to determine the amount of Plasma Green 9010 is needed based on model and table size. Users in areas where biological growth thrives (high heat, high humidity, near sources of natural water) may need more than 5% dilution.

A Series	5x10	5x5
Water Volume (Gallons) with Typical 3" Water Depth	128	63
Plasma Green 9010 Needed at 5% Typical Dilution	6.4	3.2

The pH level of the water table should be checked periodically, monthly or if water level changes significantly, in accordance with the plasma cutting fluid used. Plasma Green 9010 should be 9.7 pH or higher at minimum concentration of 3% by volume. Use pH paper, Piranha part number 649511.

Chips and slag should be scooped out of the table frequently to keep from accumulating. If the water in the table is heavily contaminated with slag and metal dust, it can cause hard starting of the plasma torch. It may also cause rust accumulation on the cut pieces. Drain and clean out the table every 6 months to a year. Machines with particularly heavy use may need to be cleaned more often.

Note: When using the water table, water and slag must be disposed of in accordance with state and local codes.

While it is not advised to place water tables in an area subject to freezing temperatures, users in those areas should consider using antifreeze as an additional additive. KCI Industrial Chemicals sells Plasma Add AF (708-878-7636 or contact Mark Konzen at mkonzen@kcichemicals.com).

4.8 Set Up the Plasma Unit

Set up the plasma unit if it has not been done already. Double-check the power, air, and work clamp are all set up correctly.

Insert a set of consumables into the torch according to the manual as well.

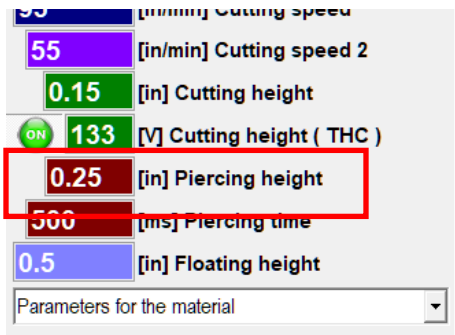
Please refer to the Hypertherm Operator Manual for your plasma unit. As specifics vary depending on which model was purchased, they will not be covered here.

4.9 Z-Height Calibration

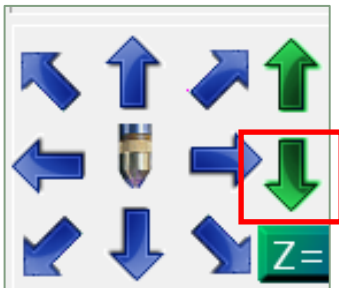
The z height needs to be calibrated so that z-axis starts at the correct height.

Tools: 1/4" or similar Allen wrench or calipers

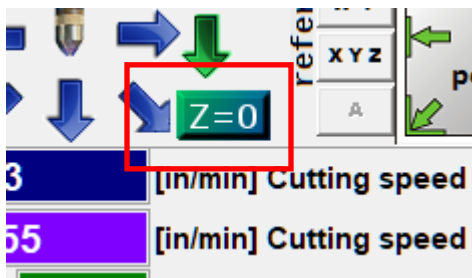
1. Start with material on the table and move the torch over the material using the arrow keys.
2. Change the **Piercing Height** to the size of the wrench, for example 0.25. The other values do not matter right now.



3. Bring the Z all the way down carefully until it touches material by pressing the **green down arrow** or **PgDn** on the keyboard.

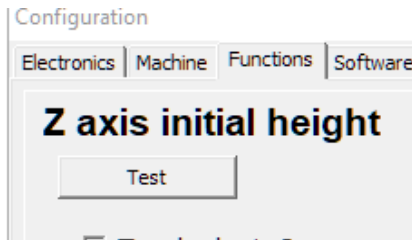


4. Press **Z=0** to zero out the z-coordinate.



Continued on next page.

5. Press the **Gear icon** in the upper right to open the Configuration settings and then **Functions**.
6. Press **Test**. The torch will come down, touch off the material, and should lift to the height specified above.

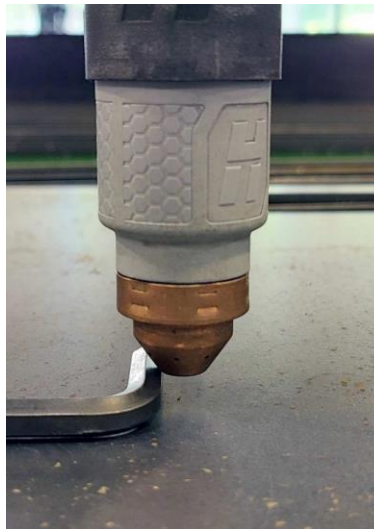


7. Use the wrench to roughly measure the height from the material. The wrench should just barely fit under the torch.

Too high



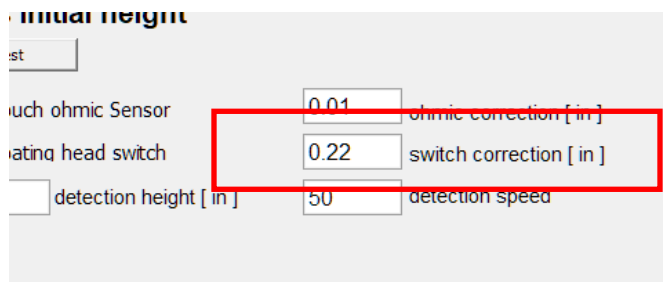
Too low



Just Right



8. Adjust the **switch correction** value in the Function tabs.



9. Raise the torch with the **green up arrow** and repeat the steps until the height is correct. It does not need to be perfect.

Chapter 5: Operation

5.1 Checklist

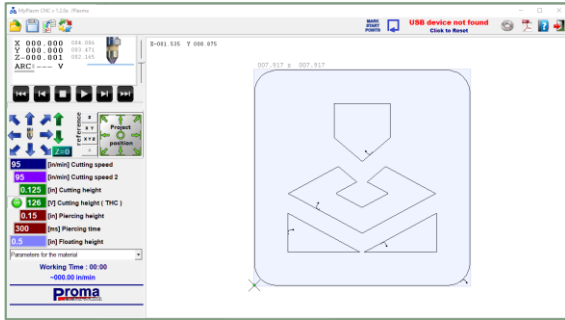
The following checklist includes all the steps needed to successfully run a program, and the page number to find explanations on how to do those steps.

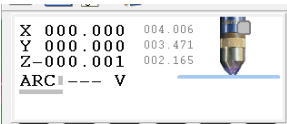

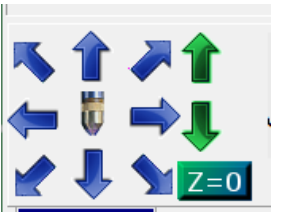
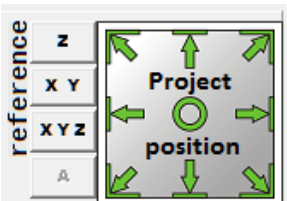
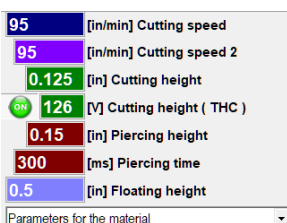
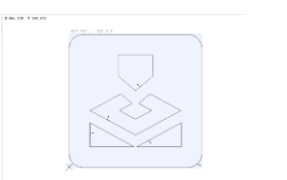
It is **strongly recommended** to watch the YouTube video <https://youtu.be/pNvoQ8wTKNE>.

✓	Step Needed	Page
	1. Turn machine on & home the machine	39
	a. Move the machine manually and load the material.	40
	b. Clamp the material.	
	2. Import DXF	42
	a. Apply leads and change sequence, then load the program	42
	3. Set program zero.	46
	4. Insert the correct consumables into the plasma torch.	47
	5. Setting the cutting parameters	49
	6. Simulation	50
	7. Automatic operation	50

Note that part quality is determined by selection of proper consumables, as well as correct setup of cutting speed, and height control. Failure to set these correctly will result in poor quality parts, or the inability to cut a part at all.

5.2 Software Introduction



	General Description	Notes	Additional information
	Machine and Program coordinates	Machine coordinates are on the left.	MyPlasm CNC manual
	Path selection, simulation, and automatic operation	Use the navigation keys to jump to the desired.	50
	Manual axis movement, setting Z height, and manual torch ignition	Pressing the torch icon turns on the torch. Be careful not to select accidentally.	40
	Machine Home and program reference		39 & 46
	Process parameters and saved process parameters library		49
	Graphics area		45

5.2.1. Keyboard Shortcuts: Main Window

ESC: STOP

Spacebar: torch start-up

PageUp / Page Down: Manual Z-axis control

Keyboard arrows: Manual XY axis control

+SHIFT: max manual speed

+CTRL: manual speed 10%

F1 - F4: Parking

CTRL+F1 CTRL+F4: Assign parking coordinates

F5: Start automatic operation

SHIFT + F5: start of simulated operation

CTRL + F5: cut the selected path in the opposite direction (from the end)

F6: resume cutting from the break point

F7: material detection

F9: XY = 0, sets program zero

F12: driving along the project outline

CTRL + Z: undo material positioning operation

CTRL + S: save cutting parameters to base

CTRL + D: remove parameters from the base

5.2.2. Keyboard Shortcuts: Import Window

CTRL: allows you to select multiple items with the mouse

SHIFT: Selects all elements inside the outline selected with the mouse.

CTRL + A: Select all

CTRL + C: copy

CTRL + V: paste

CTRL + Z: undo the last operation

DELETE: remove the selected items

CTRL + Q: converts **CAM** result to raw tracks / disables **MyMiniCam**.

CTRL + E: Export item/path as HPGL.

While holding down the CTRL key:

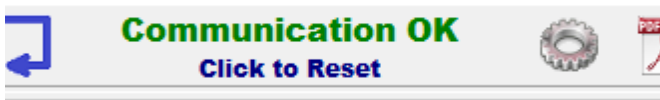
- **Rotation tool:** force **rotation** in 0.25 degree increments
- **Scaling tool:** "serial" scaling of holes

5.3 Power Up and Home

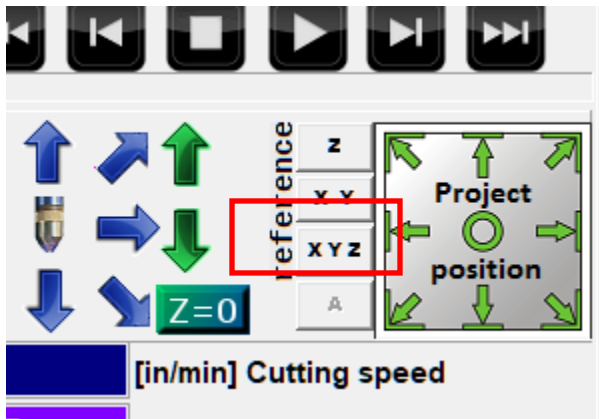
1. Turn on the controller.



2. Turn on the laptop and open the **MyPlasm CNC** software.
3. Verify it says **Communication OK**. If it does not, double check the connections and then refer to the MyPlasm CNC Software User Manual for further information.



4. Double-check there are not any tools or objects on the table that may interfere with machine movement. Press **reference X Y Z** to home the machine.

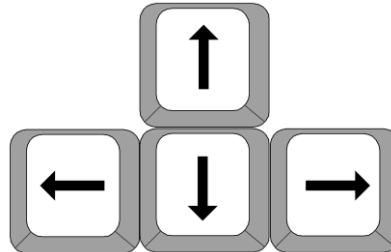
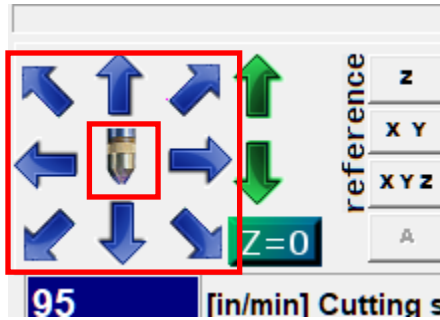


5. Place the material to be cut on the work table.
6. Connect the work lead to the material or worktable as described by the Plasma Source Operators Manual.

5.4 Manual Movement

5.4.1. X and Y

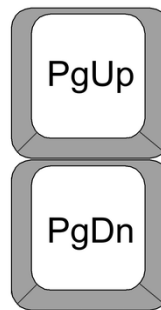
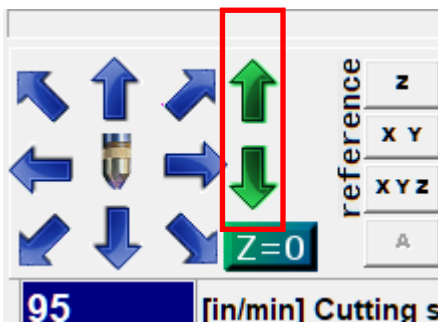
Use the arrow keys in the software or on the keyboard to move the machine manually.



- Press CTRL on the keyboard + arrows for slow speed, 10% of regular speed
- Press Shift + arrows for maximum speed

5.4.2. Z Movement

Use the green arrows in the software or the **PgUp** and **PgDn** buttons on the keyboard to move the Z-axis.



5.4.3. Speeds

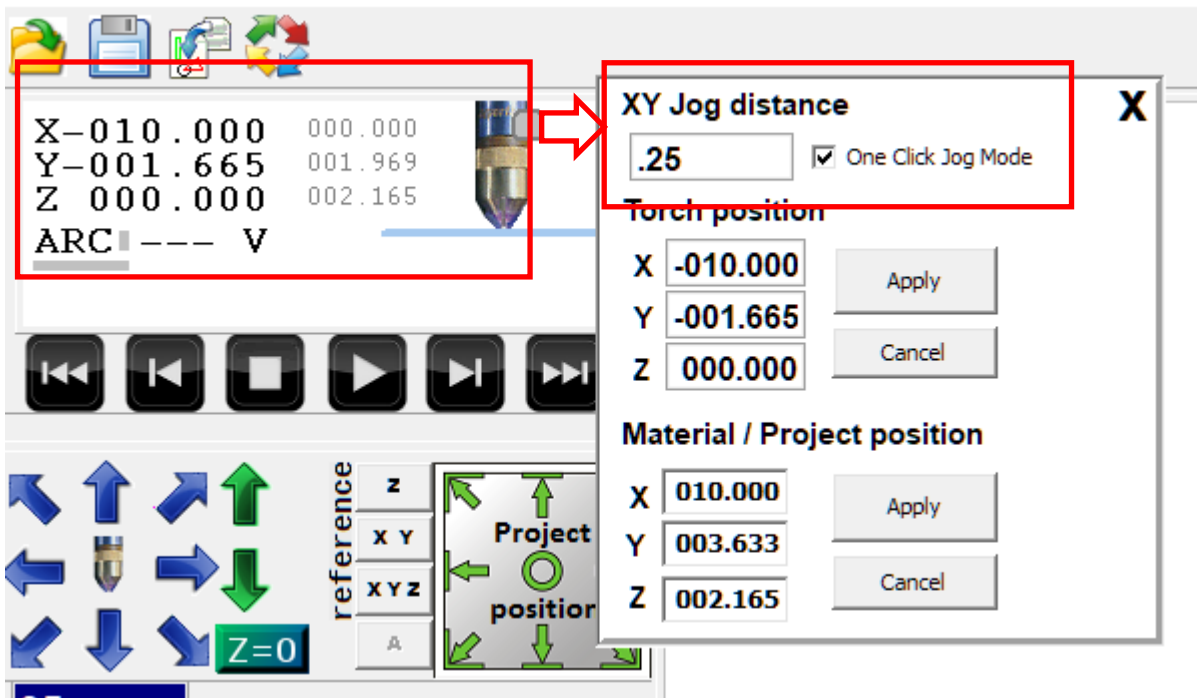
The speeds for the above functions are determined by the setting in the configuration.

XY Axis moving parameters		Z Axis moving parameters	
XY maximum speed [in/min]	600	100	Z maximum speed [in/min]
Hand XY speed [in/min]	500	75	Hand Z speed [in/min]
XY safety speed [in/min]	10	20	Z safety speed [in/min]
Acceleration XY (RAMP)	12	18	Acceleration Z (RAMP)

5.4.4. Moving a Preset Amount

It is possible to move a set, precise distance, for example, to move exactly 0.25".

1. **Right-click** in the coordinates area to open a new window.
2. Type in the distance to be moved, in this case, **.25**.
3. Click **One Click Jog Mode**.
4. Click the arrow to move the machine in the direction desired.
5. Uncheck **One Click Jog Mode** and change the value back to **0** when done.



XY Jog Distance: If this has a value and One Click Jog Mode is not selected, this will set a limit of movement. For example, if this value is 10.0, the machine could be moved any distance but no more than 10 inches at a time. Setting this to 0 is the default and will have no limit.

One Click Jog Mode: Allows you to move the amount set above with a single click of the movement arrows. However, having 0 as the distance value while leaving this checkbox selected is not recommended. Clicking the jog arrow will move in that direction until it hits the limits or ESC is pressed.

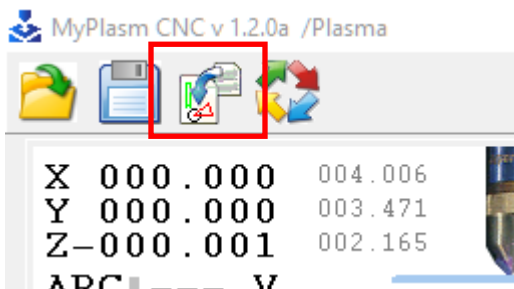
5.5 Import Program File and Load

File formats officially supported are DXF and HPGL. Remember to convert/explode any text to lines/arcs. Files created in MyMiniCad are also supported and those will have *.2d extension.

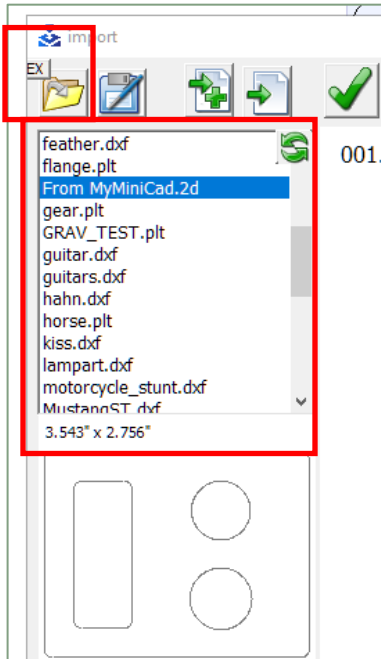
Please watch the YouTube video *#05 MyPlasm CNC in 10 min* <https://youtu.be/pNvoQ8wTKNE?t=298>. At the 5 minute mark, import and part edit will be discussed in much more detail.



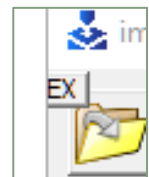
1. Click on **Import Graphics** button. This will open the Import Window.



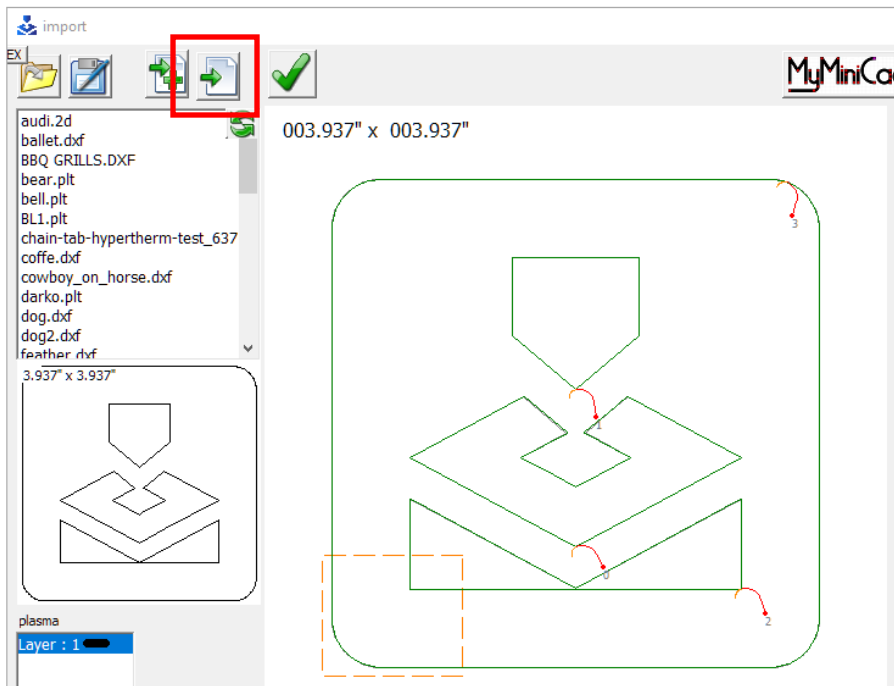
2. Select a file from the list. "From MyPlasmCNC.plt" a good first part to start with. Or click on the open folder icon and select a file from the computer.



- Press the tiny **EX** button in the top left corner to return to the list of example files at any time.
- Selecting files from the list shows a preview of the file below the list and dimensions.
- If the dimensions are incorrect, metric vs inch for example, press the gear icon in the upper right corner.
 - Check **Force mm** for metric or **Force inch** for inch.
 - Or change the scale after importing.

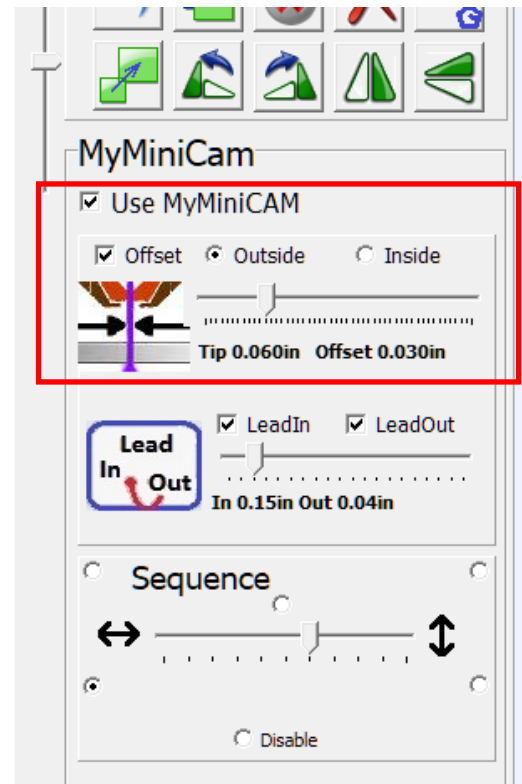
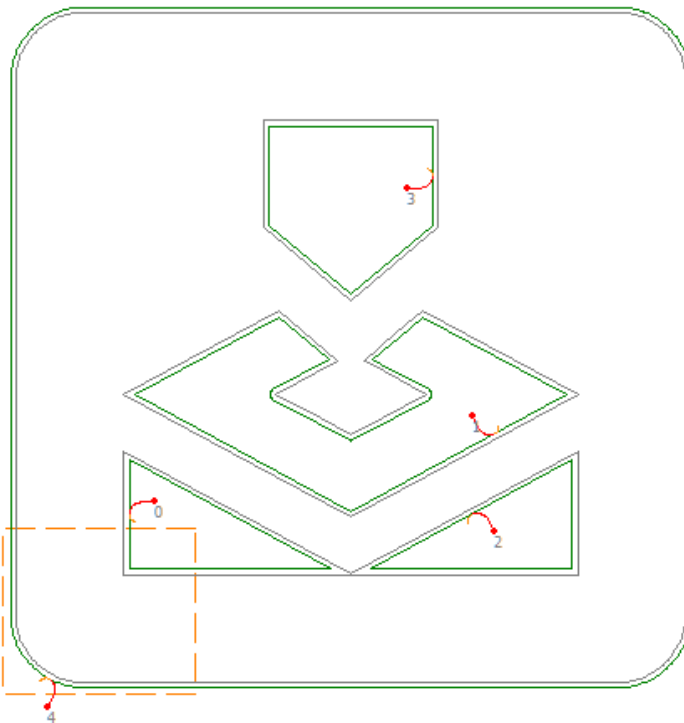


3. Click the **Load File** icon, 4th from the left, to load the selected file for editing.



4. Select **Outside** or **Inside** to flip lead-ins to the correct side.

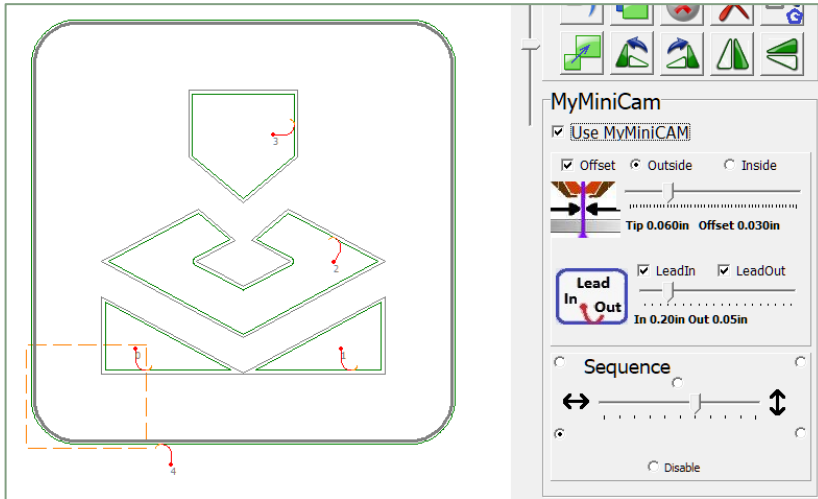
5. Select **Offset** if desired and use the scrollbar to change the amount. Offset is only applied to closed profiles.



Note: The orange box in the graphics is just a reference box. The size can be adjusted in the configuration settings for the import screen, the gear icon, under show area.

6. Change the lead-ins and lead-outs as desired.

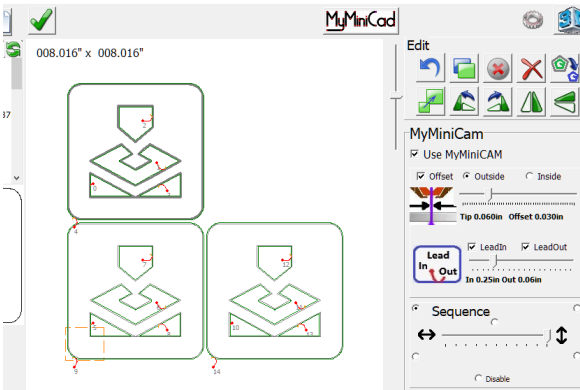
- The scroll bar changes the size of the lead-in and lead-outs. This will vary with material type, thickness, and geometry. A good starting point is 0.25".
- The length of the lead-in to lead out is a fixed ratio. That ratio can be adjusted in the configuration settings; more information in the MyPlasm CNC software user manual.



- To change the location of the lead-in/out, right-click on the geometry where you want it to be.
- To change the style of lead-in or out, double-click directly on the button. Clicking on the left side changes the lead-in style. Clicking on the right changes the lead-out style.



7. The sequence of cuts, or cutting order, can be changed by giving priority to a more horizontal or vertical sequence. The start of the cutting order is determined by whichever of the five radio buttons are selected, either one of the four corners or the center.



8. Left-clicking **Add Another File** icon will add another part horizontally. Right-clicking will add another part vertically.



9. Editing part functions include copy, paste, scale parts or features, 90° and 3° rotation, mirroring, and manually setting the sequence. All these functions are discussed in the YouTube tutorial from Proma.

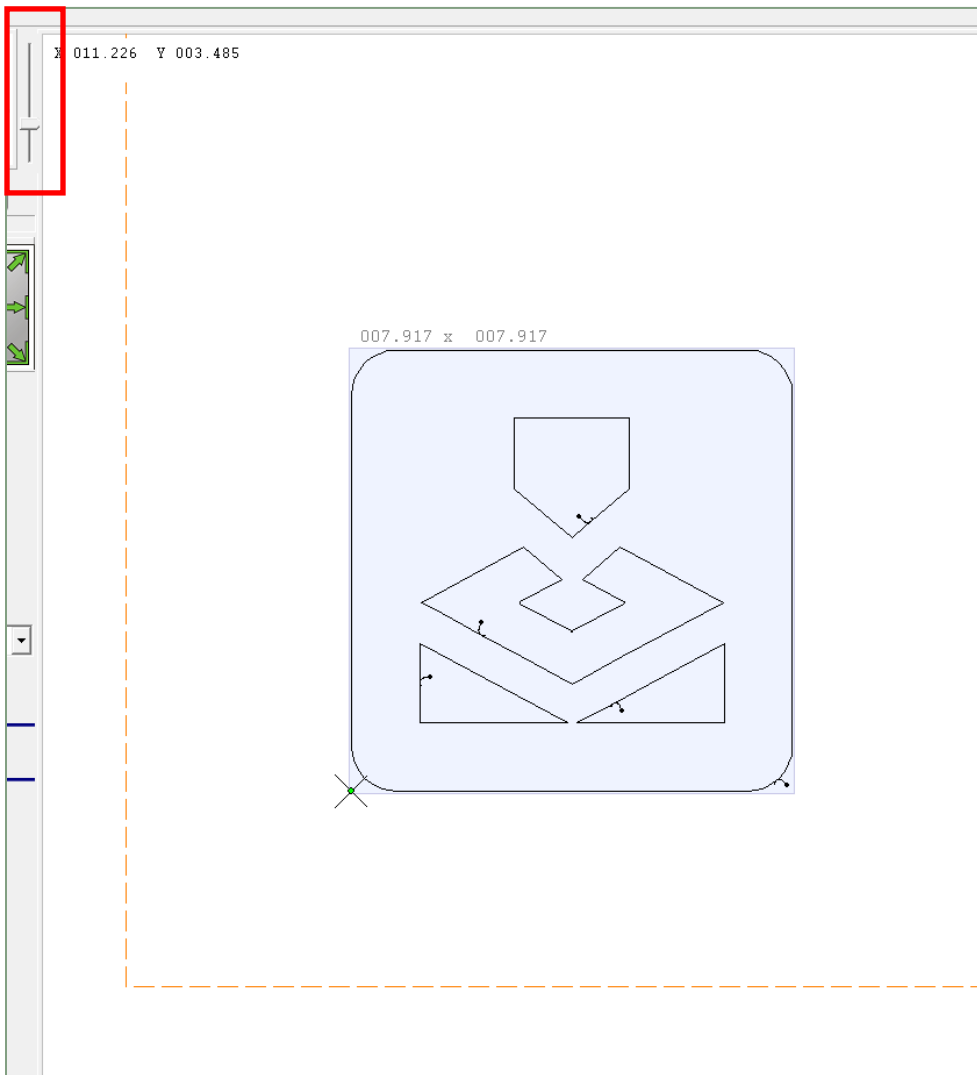
10. Press the **Save** icon to save the file for future use.



11. When you are done editing, click the green checkmark to load the program for running.

5.6 Graphics Screen

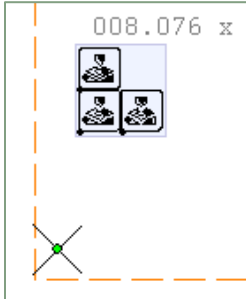
- Hold the mouse wheel to move the view.
- Double-click the left mouse button to reset the view and adjust the magnification to the size of the project.
- Use the mouse wheel to zoom in and out.
- Use the slider in the software to the left of the graphics area to zoom in and out.
- The orange dashed line represents the limits of the table.



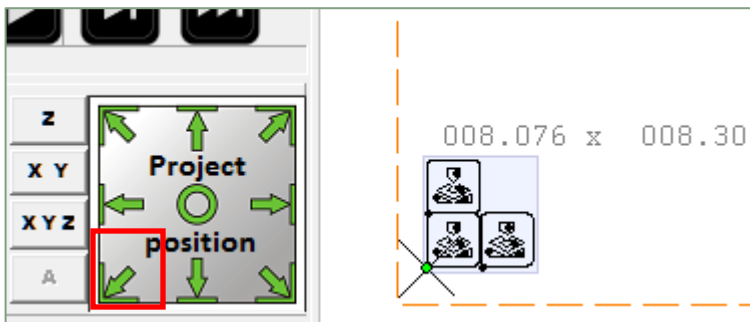
5.7 Set Program Reference Zero

5.7.1. Setting Program Zero

1. Move the torch manually to the position you want to set as the reference point. In this example, the torch, the crosshair, is close to machine home but the part is far above.



2. Press the **Project position** arrow button in the lower left corner to update the program reference point. F9 keyboard shortcut can be used as well.



5.7.2. Using Park to Set Program Zero

Four predefined locations can be set up in the **Configuration > Function** page.

- These values are absolute values from machine home.
- Once values are entered, pressing F1 (or F2, F3, F4) will move the torch to that location.
- Use **Project position** to update the program zero.
- Quickly update the F1 park location to the current torch position by pressing **Ctrl+F1**.
- **+XX/-XX** can set a relative location. **Finish** is where the torch will travel when it is done cutting. Setting the Finish values to +2, +2 means the torch will move away 2 inches in X and Y when it is done cutting.
- More information found in the MyPlasm CNC software user manual.

Park	X	Y	Z
F1	5	5	max
F2			max
F3			max
F4			max
Start			
Finish	+2	+2	max

5.8 Choosing Cutting Process and Consumables

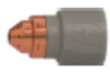
5.8.1. About Powermax Cut Charts

The Operators Manual for the Plasma Power Supply is needed for this section.

Materials can often be cut at more than one amperage setting. This is referred to as a process. For example, with a Hypertherm Powermax 85, materials may be cut at 85 amps, 65 amps, 45 amps, or less, depending on material type and thickness. Different processes will produce different results and speeds.

Locate the cut quality chart in the Plasma Power Supply manual*. It is an easy way to see what processes are available for a particular material, although not every thickness is listed. The chart below is an example for a Powermax 85 SYNC manual. Please refer to **your** manual. Using this example, when cutting 1/8" mild steel, the 45A, the 65A, and 85A process is available. The darker color shows the better cut, in this case 45A. The highest-powered process will produce the fastest speed.

*As of 2023, Hypertherm only provides this chart in the Powermax SYNC manuals and does not provide this chart to 45A or 125A customers.

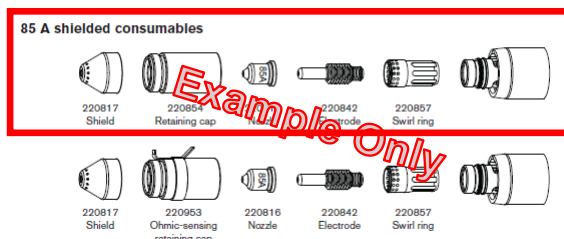
	English material thickness (in.)										
	0.02	0.06	1/8	1/4	3/8	1/2	5/8	3/4	1	1-1/4	1-1/2
FineCut											
45 A											
65 A											
85 A											
105 A											

5.8.2. Prepare the Plasma Power Supply and Change Consumables

1. Select the process for the material being cut using the explanation above.
2. In the same PowerMax Operator Manual, locate the consumables or cartridge needed for that process. Powermax SYNC shown on below left and Powermax shown on below right.
 - a. Insert the correct consumables into the plasma torch per your Operator Manual.
 - b. Replace damaged consumables as needed. See note below for more information.
 - c. Do not use "Ohmic-sensing" consumables.



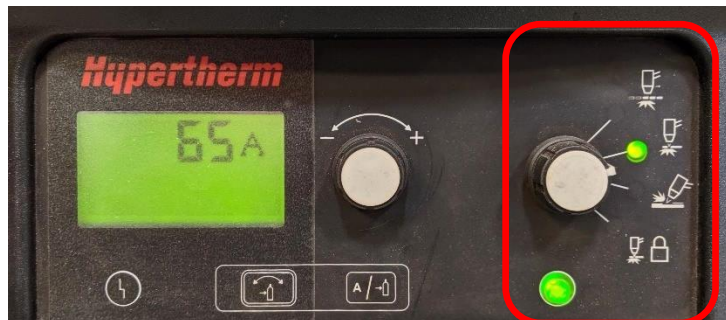
TORCH SETUP



3. Reset the Plasma Power Supply after changing consumables. Changing consumables will cause an alarm on the Power Supply, seen below. To reset, turn off, wait 10 seconds, turn back on.



4. **Powermax:** Adjust the amperage on the plasma power supply to the desired amperage.
Powermax SYNC: The system automatically detects amperage based on cartridge. It can only be adjusted when using the FineCut consumables.
5. Check other settings on the Plasma Power Supply, if applicable:
 - i. Operating Mode set to non-continuous pilot arc or appropriate cutting mode.
 - ii. Leave Plasma Power Supply in Automatic mode.



Notes on Consumables/Cartridges

Consumables can last 100-1000 starts, and last, very roughly, on average of 400 starts. If settings are incorrect, the consumables can be damaged immediately just from 1 pierce. Some consumables may be able to last even 3000 pierces. Hypertherm has videos available online on when consumables should be changed out:

For information on the Powermax SYNC cartridges
<https://www.youtube.com/watch?v=S9QMTThsaQi8>

5.9 Setting the Cutting Parameters

English

Material Thickness	Cut Height	Initial Pierce Height		Pierce Delay	Best Quality		Highest Production		Kerf Width
		inches	%		Cut Speed	Arc Voltage	Cut Speed	Arc Voltage	
inches	inches	inches	%	seconds	in/min	volts	in/min	volts	inches
10 GA	Example Only			0.1	191	133	225	132	0.053
3/16				0.2	138	133	166	131	0.057
1/4		0.150	120	0.5	93	133	117	132	0.062
3/8	0.125			0.7	44	133	64	134	0.072
1/2				1.2	30	140	138	138	0.081
5/8		0.250	200	2.0	22	145	27	145	0.089

For the best results, remember values are a starting reference and may need to be adjusted.

Cutting Speed: Select either Best Quality or Highest Production

Cutting Speed 2: Slower speed for small holes and cutouts. Use 60% of above Cutting speed as a starting value.

Cutting Height: Value only needed if THC is not being used. It is recommended to use THC instead of this value.

Cutting Height (THC): Use the Arc Voltage column from the corresponding Best Quality or Highest Production used for the Cutting Speed. The icon to the left should say ON to use the Torch Height Control (THC).

93 [in/min] Cutting speed

55 [in/min] Cutting speed 2

0.15 [in] Cutting height

ON 133 [V] Cutting height (THC)

0.15 [in] Piercing height

500 [ms] Piercing time

0.5 [in] Floating height

Piercing Height: Use the value from the Initial Pierce Height column.

Piercing Time: Use the value from the Piece Delay column. Notice that in the Hypertherm cut charts this value is in seconds, and it is in milliseconds in MyPlasm. 1 second = 1000 milliseconds.

Floating Height: Lift height, no need to adjust.

5.9.1. Cutting Database

To save the parameters for future use, type in an appropriate name for the table in the field below the parameters and press **CTRL+S** to Save. Use the pulldown to select other saved tables. Press **CTRL+D** to delete a selected table.

0.5 [in] Floating height

65A .25 Mild Steel

5.10 Frame and Simulation



This frame icon starts the movement of the torch in the X/Y axis at manual speed along the rectangular outline of the design. This makes it possible to determine whether the design is correctly positioned on the material. It is recommended, but not necessary, to run the frame every time prior to cutting a different program.

Full simulation can be achieved by holding SHIFT before clicking Start or **SHIFT + F5**.

5.11 Automatic Operation



Warning

Be ready to stop the machine immediately if needed. Pressing **ESC** on the keyboard or **Stop** button in the software will stop automatic operation.

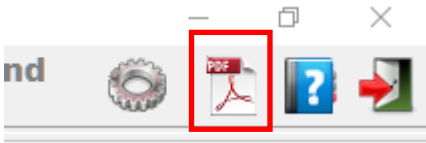
Note: Double-check the checklist on page [36](#) and make sure the material is clamped.



Start the cut by pressing **start** in the software or by pressing **F5** on the keyboard.

5.12 Other Topics

More information can be found in the **MyPlasm CNC** manual. The manual can be accessed in the software by pressing the PDF icon on the top right or by visiting the <https://proma-elektronika.com> website. These include:



- Restarting/resuming the cutting
- Explanation of path colors/path analysis
- Manual cutting
- Troubleshooting
- Using a gaming controller

Chapter 6: Maintenance

The following maintenance items should be done on a planned basis:

Maintenance Item	Frequency
Clean slag out of water pan on machine	Daily or as needed
Check water level and pH- See section 4.7	Weekly
Inspect slats and replace where necessary	Weekly
Wipe and lubricate linear guides X and Y Axis Wipe with dry, lint-free cloth; Then apply light machine oil e.g. Mobil Vactra #2	Weekly
Check the frame for loose fasteners	Weekly or as needed
Clean X-Axis (1) and Y-Axis (2) Racks Use a toothbrush or similar to remove debris	Quarterly
Lubricate X-Axis (1) and Y-Axis (2) Racks Moly dry film spray lubricant (Found at Grainger or some auto supply stores)	Quarterly
Clean the Height Control Sliding Surface Use a toothbrush or similar to brush away debris on the sliding surface on the top exposed section and bottom. Only about ½ of the surface is accessible to clean. Lubricate with Moly dry film spray lubricant.	Quarterly
Clean the Z-Axis Ball Screw Use a toothbrush or similar to brush away debris on the ball screw on the top exposed section and bottom. Only about ½ of the surface is accessible to clean. Then wipe with lint-free cloth. Lubricate with Moly dry film spray lubricant. Piranha P/N: 665580 Molykote Spray	Quarterly
Lubricate X-Axis (4 total) and Y-Axis (2 Each Side) Bearings A couple pumps from a grease gun into the grease fittings using premium grade lithium base, extreme pressure grease such as Shell Alvania EP-1 or Mobil Mobilux EP-1, or equivalent	Annually

In addition, clean the machine and surrounding areas regularly, as needed, to maintain a safe work environment.

The Powermax unit has a separate Maintenance list in the Operators manual. Please refer to that manual as details will change with different models.

Chapter 7: Parts

7.1.1. Powermax SYNC Consumables

	Cartridge	Piranha#
105	428936	3857R731
85	428934	3857R730
65	428930	3857R729
45	428925	3857R727
Finecut Shielded	428926	3857R728

7.1.2. Powermax Consumables

Powermax Air Plasma 45/65/85/105 A

Shielded

	Shield	Piranha#	Retaining Cap	Piranha#	Nozzle	Piranha#
105	220993	3857R618	220854	3857R464	220990	3857R619
85	220817	3857R538	220854	3857R464	220816	3857R466
65	220817	3857R538	220854	3857R464	220819	3857R444
45	220817	3857R538	220854	3857R464	220941	3857R536
Finecut Shielded 45-105A	220948	3857R644	*220854	3857R464	220930	3857R534

*Powermax book says 220953, this is a typo.

Continued on next page.

Powermax Air Plasma 45/65/85/105 A Cont.

	Electrode Piranha#		Swirl Ring Piranha#	
105	220842	3857R443	220994	3857R672
85	220842	3857R443	**220857	3857R462
65	220842	3857R443	**220857	3857R462
45	220842	3857R443	**220857	3857R462
Finecut Shielded 45-105	220842	3857R443	220947	3857R537

** Powermax 105A uses swirl ring 220994 even on lower amperages.

Powermax Air Plasma 125A

Shielded

	Shield	Piranha#	Retaining Cap	Piranha#	Nozzle	Piranha#
125	220976	230740	220977	230741	220975	230744
105	220976	230740	220977	230741	220975	230744
65	420168	3857R679	220977	230741	420169	3857R678
45	420168	3857R679	220977	230741	420158	230742
Finecut Shielded	420152	3857R700	220977	230741	420151	3857R701

	Swirl Ring	Piranha#	Electrode	Piranha#
125	220997	230741	220971	230745
105	220997	230741	220971	230745
65	220997	230741	220971	230745
45	220997	230741	220971	230745
Finecut Shielded	220997	230746	220971	230745