

# Techno Inc.,

## CNC Plasma Cutter Documentation



Techno, Inc.  
2101 Jericho Turnpike  
New Hyde Park, NY 11040  
Tel: 800.819.3366 or 516.328.3970  
<http://www.technocnc.com/>

**HTM04941106**

(Updated 4/2012)

## **TABLE OF CONTENTS:**

- i. [SAFETY INFORMATION](#)
- ii. [PC MINIMUM SYSTEM REQUIREMENTS](#)
- I. [INSTALLING SERVO PCI INTERFACE CARD](#)
- II. [INSTALLING THE CNC G-CODE INTERFACE](#)
  - Opening the Software for the First Time
  - Setting the Machine's Scale Factors
  - Touchpad Interface Settings
  - E-Stop Start/Stop Box Interface Settings
- III. [SETTING UP THE PLASMA TORCH CONTROLLER](#)
- IV. [SETTING UP THE PLASMA TORCH](#)
- V. [PLASMA CUTTER INTERFACE SETTINGS](#)
- VI. [TOOLPATH GENERATION](#)

[APPENDIX A](#) – Glossary of Torch Height Control Parameters

[APPENDIX B](#) – Important Information from Hypertherm Torch Manual

## **I. SAFETY INFORMATION:**



# **WARNING! READ, FOLLOW AND UNDERSTAND THE TORCH MANUAL BEFORE BEGINNING USE.**

- 1) *Use a welding screen when operating Plasma Torch.*
- 2) *Wear proper eye protection.*
- 3) *Wear proper protective clothing.*
- 4) *Disconnect all power before adjusting, loading, or replacing any materials or consumables on the machine table or torch.*
- 5) ***CUT MATERIAL AND MACHINE WILL REMAIN HOT FOR MANY MINUTES AFTER PLASMA TORCH HAS BEEN SHUT OFF. LET COOL ACCORDINGLY. ALWAYS USE GLOVES TO AVOID BURNS AND SHARP EDGES.***
- 6) *Disconnect all power before servicing the CNC machine or torch. The machine may have multiple power sources, disconnect all power sources.*
- 7) *Ensure proper ventilation is setup and used during operation of Plasma Torch.*
- 8) *Install Plasma Cutter on a non-flammable surface only.*
- 9) *Keep all areas around the Plasma Torch free of flammable materials, including but not limited to wood, flammable material scraps, clothing, cleaning solvents, plastic and more.*
- 10) *Keep clothing, hair, and jewelry away from the Plasma Torch and hot metals.*
- 11) *Do not operate unattended.*
- 12) *Have appropriate fire extinguishing equipment available in case of emergency.*
- 13) *Refer to MSDS for material being cut for material-specific safety instructions. Stainless steel can be particularly dangerous.*

## **ii. PC MINIMUM SYSTEM REQUIREMENTS:**

- 32-bit or 64-bit Windows® Operating System (XP, Vista, Windows 7)
- Open PCI Slot with room for Techno PCI Card (Will NOT work with PCI Express)
- Intel Pentium 4 Processor (Dual or Quad Core recommended)
- Must have Administrator privileges to install drivers.

Please Note:

- 1) If you use Windows® 7 or Vista you must turn off User Account Control (UAC) before installing the software. (Details on how-to turn off UAC:  
[http://www.docs.technorouters.com/index.php?title=How\\_to\\_turn\\_off\\_UAC](http://www.docs.technorouters.com/index.php?title=How_to_turn_off_UAC))
- 2) We recommend using Windows® XP or newer. Microsoft no longer supports Windows® 98, therefore it is harder to obtain the appropriate Windows® patches and updates to run the new Techno CNC Interface software successfully.
- 3) Additional information on Choosing a PC and System Requirements can be found online at:  
[http://www.docs.technorouters.com/index.php?title=Computer\\_requirements](http://www.docs.technorouters.com/index.php?title=Computer_requirements).

## **I. INSTALLING SERVO PCI INTERFACE CARD**

*NOTE: Refer to computer manufacturer's manual for the accessibility and location of the PCI Slots. Install the PCI Interface Card before the software.*

**WARNING:** Ground yourself during installation.

**STEP 1:** Turn off and unplug power to your computer. Remove the computers side cover and locate a vacant PCI slot.

**STEP 2:** Remove the vacant PCI slot's cover plate, and the PCI Interface Card from its protective anti-static packaging.



**PCI Card and SCSI Cable**

*NOTE: The PCI Interface Card connectors mate with the PC Motherboard in only one way.*

**STEP 3:** Gently but firmly insert the PCI Interface Card into the vacant PCI slot. Secure with screw (if applicable), and close the computers side cover.

**STEP 4:** Attach the SCSI Cable connector to the newly installed PCI Interface Card.

## II. INSTALLING THE TECHNO CNC INTERFACE

*NOTE: When you reconnect power, turn your computer on and when Windows starts up it will detect "new hardware."*

**STEP 1:** Insert the Techno CNC Interface CD, the install screen should run automatically, if not, browse the CD and double-click AUTORUN.EXE on the CD.

**STEP 2:** Select **Setup Techno CNC Drivers** from the installation screen. When the Driver Installer Screen appears, read thoroughly and click **Continue** on the right side.

*NOTE: Once the drive install is complete, it will inform the user.*

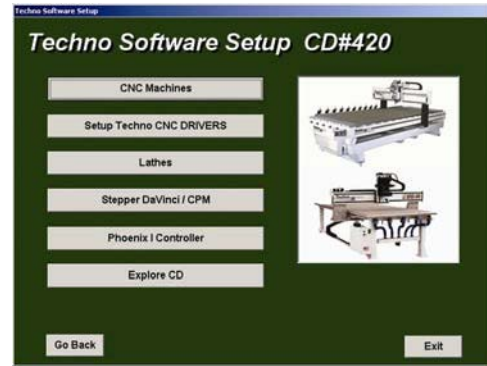
**STEP 3:** Return to the green Techno Software Setup installer window. Click **CNC Machines** from the menu then click **Setup Techno CNC Interface** to install the Techno G-Code Software.

**STEP 4:** Click **OK** when prompted by the Techno CNC Interface installation program.

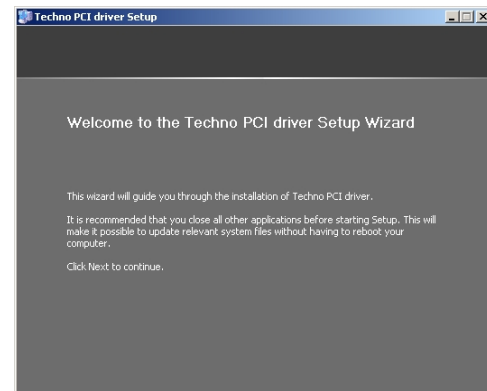
**STEP 5:** Click the computer icon to install the software. Select **Continue** when prompted, default folders and settings are sufficient for this setup.

*NOTE: If you are upgrading your software version and receive a "Version Conflict" screen, select **No to All**.*

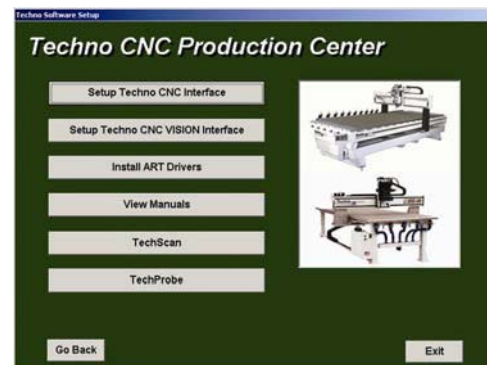
**STEP 6:** Click **OK** when prompted that the Interface Setup is completed. Reboot your PC.



**Techno CNC Interface Setup**



**Driver Installer Screen**

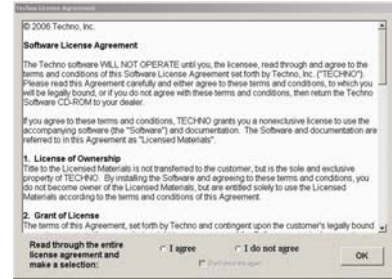


**Production Center Screen**

## Opening the Software for the First Time

Once you have installed the software and drivers, rebooted the machine and removed the CD-ROM from your computer proceed with opening the software.

**STEP 7:** Read the Software License Agreement thoroughly, check **I agree** and **Do Not Show Again**. Click **OK** to continue.



**Software Agreement**

**STEP 8:** Read the software screen carefully, check the type of machine best represents your model and click **OK**.

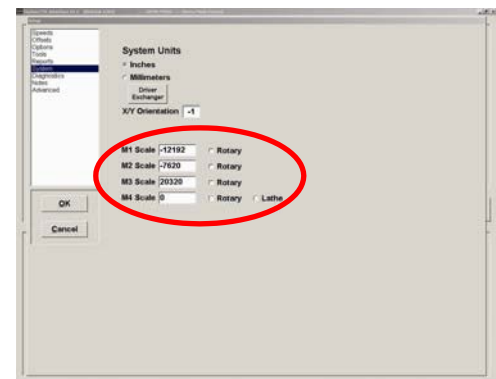
**STEP 9:** Select the type of spindle on your machine; it should be Fixed Collet Spindle on the CNC Plasma. Click the option on the right to "Override Speeds".

## Setting the Machine's Scale Factors

Once the software setup is complete you will need to setup the CNC Plasma machine's scale factors. Locate the scale factor sticker on the front left leg of your machine.

**STEP 10:** From the Main Menu of the CNC Interface, go to *Setup>System*.

**STEP 11:** Refer to the scale factor values on the scale factor sticker, verify that the numbers match those in the software. If they do not, enter the numbers from the scale factor sticker into the appropriate fields in the software.



**Setup>System, Scale Factors**

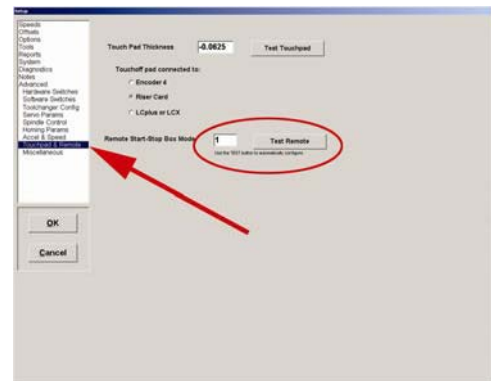
**STEP 12:** Go to *Advanced>Hardware Switches*, and click the checkbox next to "Plasma Cutter Present". Okay the pre-processor message you are prompted with.

**STEP 13:** Click *Software Switches* on the left. In the box to the right of "Spindle Label" on the right side, enter "Plasma" or "Torch" to change the name of the cutting implement on the main interface screen. Click **OK** and restart the Techno CNC Interface.

## Touchpad Interface Settings

The following setup will require you to make contact between the tip of the Plasma Torch and the metal material you are cutting. You must do this through use of a metallic object, such as a screwdriver or wrench. The software will refer to this metallic object as the "Touchpad". Lower the Plasma Torch so it is close, but not touching the metal material.

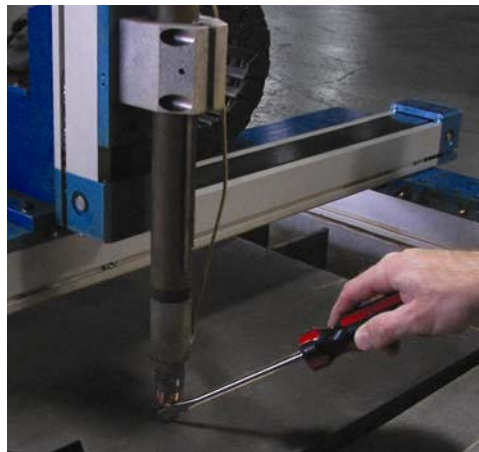
*NOTE: The settings for the Touchpad need to be tested and/or configured in the Techno CNC Interface prior to using the machine.*



**Touchpad & Remote**

**STEP 14:** From the main menu click *Setup>Advanced>Touchpad & Remote*, click the Touchpad Button. The message "Pick up the touchpad and touch it to the tip of the tool in the spindle..." should then appear. Follow the on screen prompts.

**STEP 15:** Insert the screwdriver in between the Plasma Torch and the metal material. Refer to the picture below for a visual.



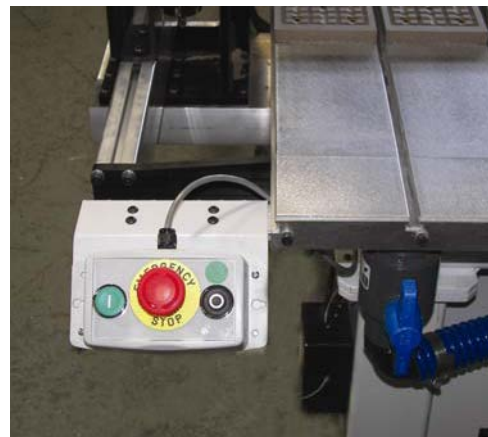
*NOTE: If the "test passed" screen appears, click "ok", the test has indicated that the Touchpad is functioning properly.*

*If the test failed (nothing happened), you need to click where indicated "click here". The "test cancelled" screen should appear, click "ok." Repeat the touchpad test again after selecting a different touchpad interface from the three choices. If it fails for each choice, turn off power, check all connections and call Technical Support for further assistance.*

## E-Stop Start/Stop Box Interface Settings

The green button is the START button; hit this button to resume the machine program after having hit the black PAUSE button. The PAUSE button temporarily stops the machine. ***PUSH THE EMERGENCY STOP (E-STOP) BUTTON WHENEVER YOU NEED TO STOP THE MACHINE IMMEDIATELY.*** To reset the Start/Stop Box E-stop, twist the E-Stop button clockwise. The machine will not work if the E-Stop is still pushed in.

*NOTE: The settings for the E-Stop Start/Stop Box need to be entered and/or configured in the Techno CNC Interface prior to using the machine.*

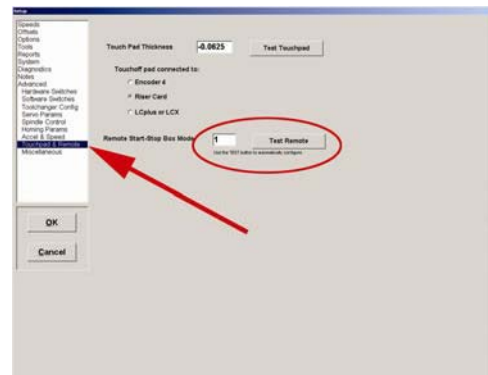


Mounted E-Stop Start/Stop Box

**STEP 16:** From the Main Menu, go to *Setup> Advanced>Touchpad & Remote*. Click on the Touchpad Button. Follow the on screen prompts.

*NOTE: If the "test passed" screen appears, click "ok", the test has indicated that the Remote is functioning properly.*

*If the test failed (nothing happened), you need to click where indicated "click here". The "test cancelled" screen should appear, click "ok." Repeat the Remote test again after selecting a different touchpad interface from the three choices. If it fails for each choice, turn off power, check all connections and call Technical Support for further assistance.*



Touchpad & Remote



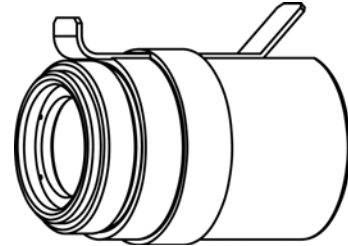
### **III. SETTING UP THE PLASMA TORCH CONTROLLER**

- 1) Connect the air to the Plasma Control Box (PCB) as per the Plasma Torch Manual.
- 2) Connect power to the PCB following the Plasma Torch Manual.
- 3) Connect the ground clamp (GC) from the PCB to the ground stake on the table.
- 4) Set Plasma Torch mode to pierce/cut on the Plasma Control Box (PCB).

*NOTE: In some cases, e.g. if the part is small or light, the ground clamp should be connected directly to the part or the part should be clamped to one of the slats to ensure a good ground connection.*

### **IV. SETTING UP THE PLASMA TORCH:**

**Step 1:** An Ohmic sensing retaining cap MUST be used on the Plasma Torch. This is used for sensing the part on the table. The sensing wire must be connected to one side of the tang on the Ohmic cap. The tang must also be making contact with the shield or the part will not be sensed.

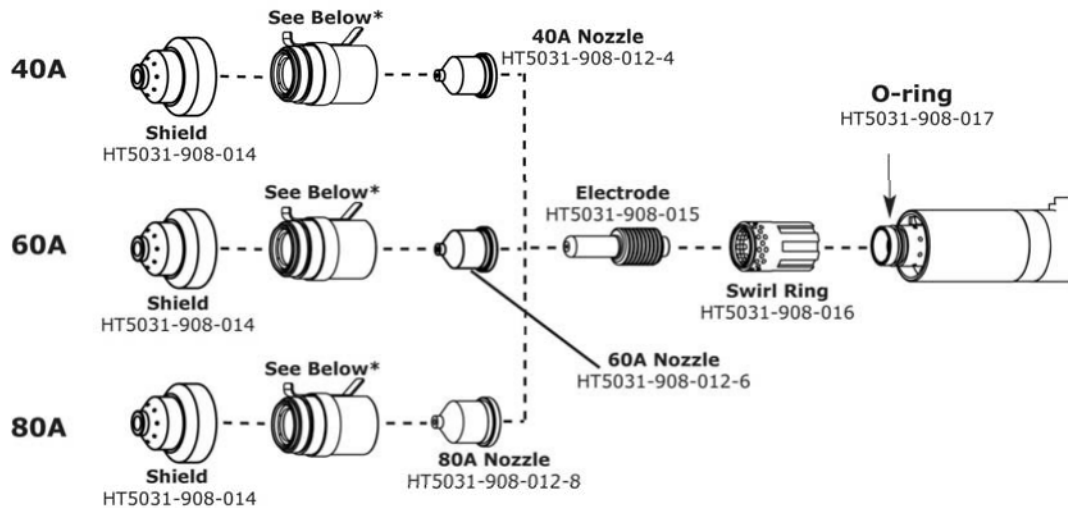


*Ohmic Sensing Retaining Cap*

**Step 2:** Install the appropriate consumables on the torch for either Fine Cutting or Standard Cutting. All cuts must use the Ohmic sensing retaining cap and a compatible Shield. The Techno Plasma System will not work without these.

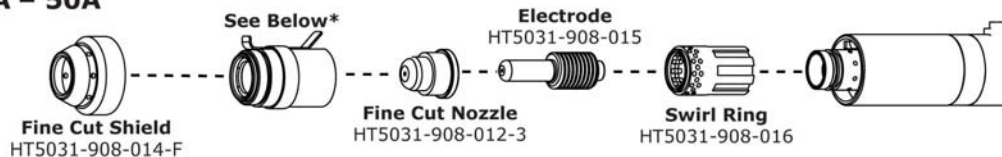
- **DISCONNECT ALL POWER BEFORE CLEANING OR CHANGING CONSUMABLES.**
- Clean the consumables' shield before each use with a fine wire brush. Failure to do so will restrict material sensing, and may destroy consumables if not cleaned.
- Consumables should be replaced as per Plasma Torch Manual instructions. Usually, bad cut quality, exposed flames and software malfunction are signs that the consumables are worn.
- Refer to all cut-charts in Plasma Torch Manual for cut speed and consumable selection.
- Refer to the Plasma Torch Manual for instructions on how to install and replace consumables.

## Shielded Consumable Configurations



## Fine Cut Consumable Configurations

30A – 50A



## Ohmic Sensing Retaining Cap



\* The Ohmic sensing retaining cap must be used with Techno's CNC Plasma, the machine will not work without it.

## Consumables Lubricant

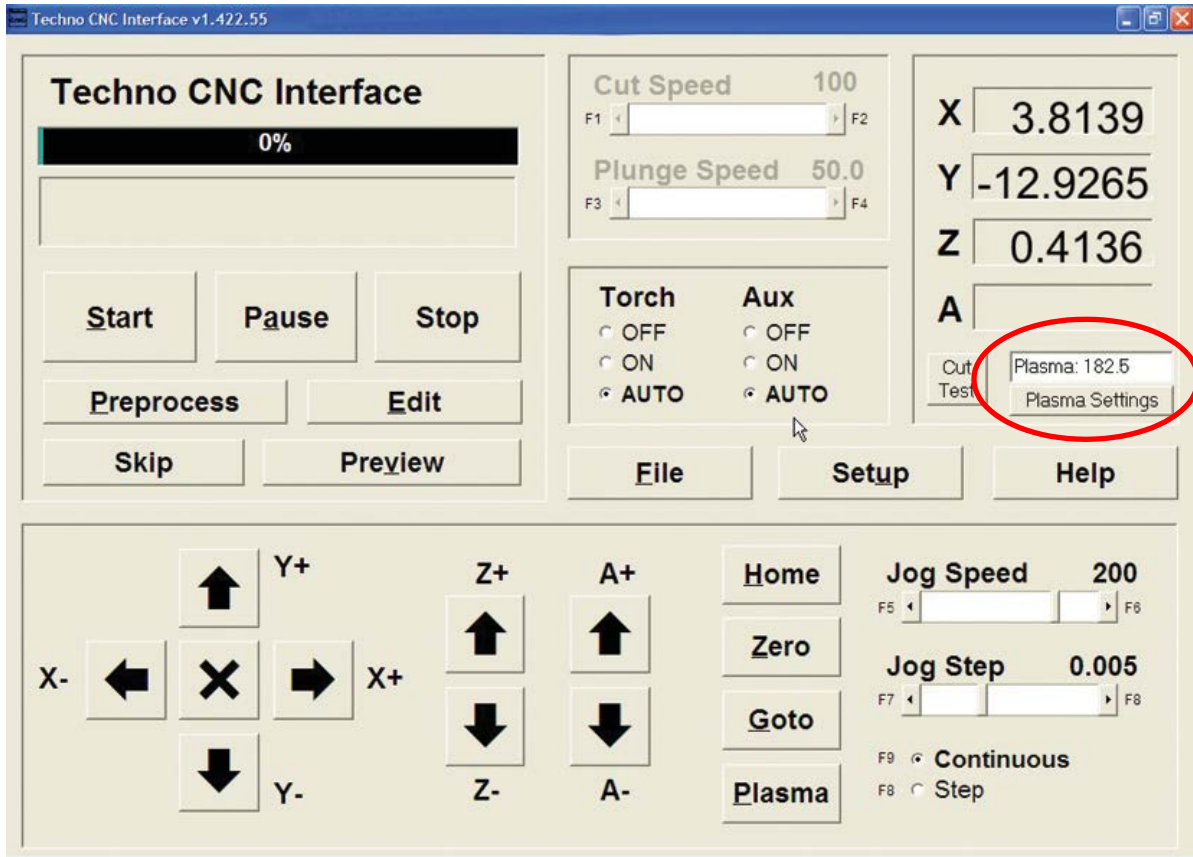
HT5031-908-018

Consumables silicon lubricant.

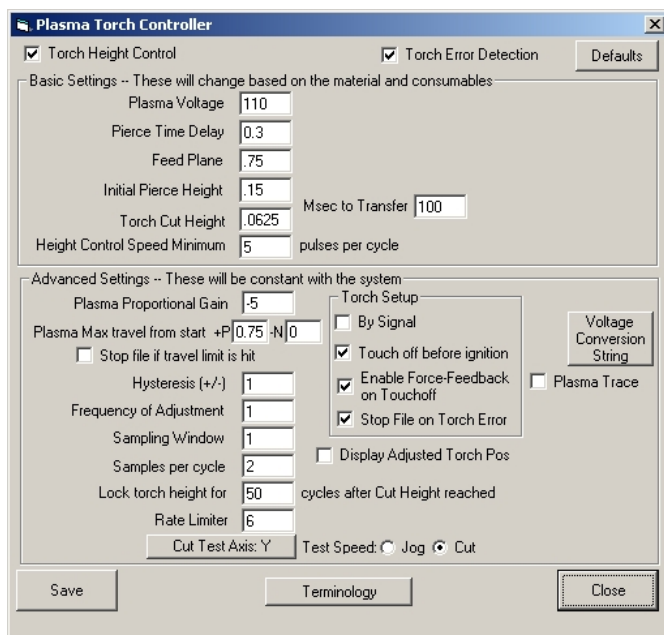
***Refer to the Plasma Torch manual for proper use of consumables.***

**Step 3:** Connect the AC power to the Plasma Control Box, following the Plasma Torch Manual instructions.

## V. PLASMA CUTTER INTERFACE SETTINGS

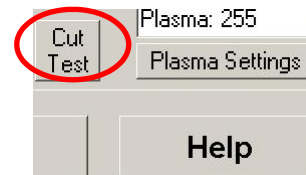


**Step 1:** Click the Plasma Settings button in the main CNC Interface menu to view and set the Plasma Torch Controller parameters. *Refer to Appendix A for additional information.*



**Step 2:** Conduct material tests:

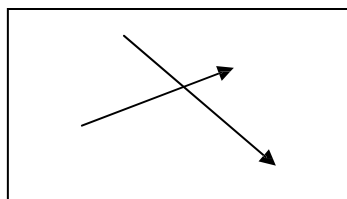
- a. Test will use the jog speed and height that the interface is currently set at, adjust these accordingly.
- b. Click the 'Cut Test' Button in the Techno Interface and enter distance to define the length of the cut.
- c. The 'Plasma feedback number' shown will coincide with your height/speed.
- d. Repeat this test using Appendix B as a guide until the cut quality is acceptable.
- e. Once you have the correct speed and 'plasma feedback number' plug feedback number into 'plasma settings' and note the speed to use when generating your G-Code. If your G-Code is already done you can 'override speeds' in the 'Setup>Speeds' screen of the Techno Interface.
- f. Settings on the PCD must also be addressed as per plasma manual.



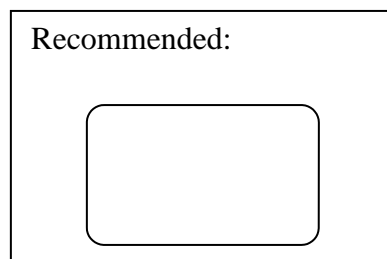
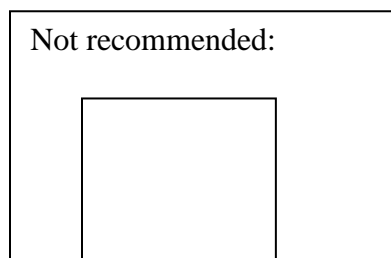
*NOTE: The two main components that effect cut quality are voltage and speed. The height will adjust based on the voltage. Adjust the voltage (plasma feedback) until you get a straight cutting edge and then adjust the speed to minimize dross. See Appendix B.*

**VI. TOOL PATH GENERATION:**

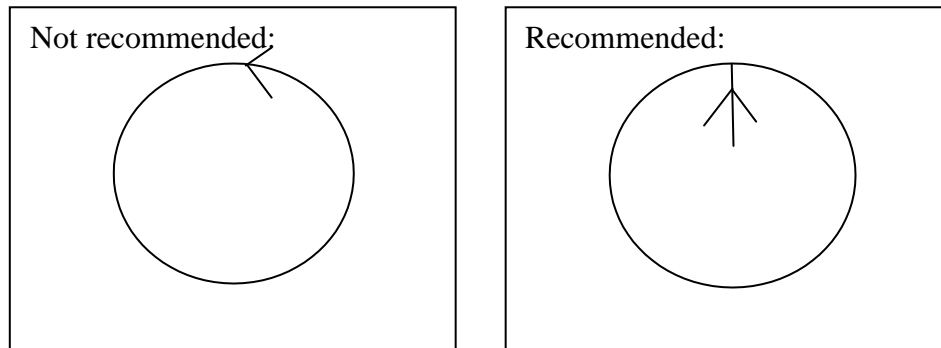
- 1) There is a parameter called RAPID CLEARANCE PLANE which sets a height at which it is safe for the torch to make RAPID motions. This should be set to some nominal height above the work surface - typically about .75".
- 2) Generate G-Code using your purchased CAM software package, following appropriate guidelines for plasma cutting and keeping in mind that the torch can not maintain an arc if there is no material under it. This means that you cannot cut over an area where material has already been removed. This will cause the torch to go out.
  - a. Do not generate tool paths that go over cutout areas. This will cause the torch to turn off and the program will produce an emergency stop.
  - b. Try not to produce tool paths that crossover themselves as this might also cause the torch to turn off. The following type of tool path should be avoided.



- c. Sharp corners should be avoided in the tool path when possible. Sharp corners cause the motion to decelerate and then re-accelerate. This will always produce a poor quality cut in the corner. If possible, sharp corners should be rounded or filled.



- d. When possible, an ARC lead in should be used to start a motion. The point at which the torch is turned on generally produces a "spot". The use of the ARC lead in will generate the spot at a location that is of no concern as in the following diagram:



- 3) When the tool path is run on the Techno Plasma system and the SPINDLE ON command is encountered in the tool path, the system will
- first touch off on the part surface
  - retract the specified amount
  - send the signal to the Plasma Control Box to turn the torch on
  - wait for the READY signal from the Plasma Control Box, indicating that the torch has ignited
  - wait the specified DELAY time before starting the motion
  - execute the tool path motions
- 4) The 'Spindle Off' command (M5) will turn off and retract the torch to the clearance height.

**Example code, cuts 2 squares:**

```
G90
G0X0Y0Z.75
M3
G1X1Y1
G1Z-.5
G1X2
Y2
X1
Y1
G0Z.75
G1X3Y3
G1Z-.5
G1X4
Y4
X3
Y3
Z.75
M5
```

## **APPENDIX A – Glossary of Torch Height Control Parameters**

*NOTE: Most of these numbers will not change from cut to cut. Refer to the consumables chart for the manufacturer recommendations.*

The screenshot shows the 'Plasma Torch Controller' window. It has a title bar with a close button. Inside, there are two checked checkboxes: 'Torch Height Control' and 'Torch Error Detection'. A 'Defaults' button is in the top right. The window is divided into two main sections: 'Basic Settings' and 'Advanced Settings'.  
**Basic Settings** (captioned 'These will change based on the material and consumables') includes:  
- Plasma Voltage: 110  
- Pierce Time Delay: 0.3  
- Feed Plane: .75  
- Initial Pierce Height: .15  
- Torch Cut Height: .0625  
- Height Control Speed Minimum: 5 pulses per cycle  
- Msec to Transfer: 100  
**Advanced Settings** (captioned 'These will be constant with the system') includes:  
- Plasma Proportional Gain: -5  
- Plasma Max travel from start: +P 0.75 -N 0  
- A checkbox 'Stop file if travel limit is hit' is unchecked.  
- Hysteresis (+/-): 1  
- Frequency of Adjustment: 1  
- Sampling Window: 1  
- Samples per cycle: 2  
- Lock torch height for: 50 cycles after Cut Height reached  
- Rate Limiter: 6  
- A 'Torch Setup' sub-section contains:  
 - 'By Signal' checkbox (unchecked)  
 - 'Touch off before ignition' checkbox (checked)  
 - 'Enable Force-Feedback on Touchoff' checkbox (checked)  
 - 'Stop File on Torch Error' checkbox (checked)  
 - 'Display Adjusted Torch Pos' checkbox (unchecked)  
- A 'Voltage Conversion String' button is present.  
- A 'Plasma Trace' checkbox is unchecked.  
At the bottom, there is a 'Cut Test Axis: Y' button, a 'Test Speed' section with 'Jog' and 'Cut' radio buttons (where 'Cut' is selected), and three main buttons: 'Save', 'Terminology', and 'Close'.

**Torch Height Control** should be checked if doing plasma, this turns it on.

**Torch Error Detection** should be checked (same thing).

**Plasma Trace** will show debug information if turned on BEFORE a cut is run, useful only to tech support.

**Defaults** sets default values to get started from. Some numbers will change based on recommendations by the consumables charts.

**Plasma Proportional Gain** is how forcefully the torch will try to adapt to changes in the metal height. Too high a value will result in the torch bouncing around; too low a value will result in the torch not compensating well. The sign (+/-) of this number must be the same as the sign of the scale factor in "setup>system", or the height will compensate in the wrong directions.

**Plasma max travel from start** will stop the program if the torch travels more than that value in units (inches/mm depending on what the interface is set to).

**Torch cut height** is the height the torch should be from the material while cutting.

**Transfer cycles** is the number of milliseconds to take to go from the pierce (initial) height to the cut height

**Take value after \_\_cycles** is the number of milliseconds to wait before taking the plasma feedback number.

**Frequency of Adjustment** is how many milliseconds between torch height adjustments.

**Sampling Window** is how many milliseconds to keep track of for the adjustment process.

**Samples per cycle** is how many times to read the value per millisecond.

**Torch On Delay** is how long to wait after starting the torch before moving. *This value is taken from the consumables charts.*

**By Signal** uses the torch on signal to determine when the torch is ready. *This should almost always be checked.*

**Touch off before ignition** will "find" the metal and properly zero the torch before starting. *This must remain checked!*

**Lock Torch Height for \_\_cycles before ignition.** When the torch fires up initially, the feedback numbers will be off. Locking the height for, say, several cycles will ignore these numbers and keep things steady, which is okay, since the metal probably won't deviate that much in those few moments.

**Feed Plane** is the height the torch will retract to when the torch is turned off. This value should be higher than the highest possible deviation of the metal, or the torch could hit the material.

*Note: There is pierce height and there is cut height. They are two different things. Both are dictated in the cut charts. Don't confuse them.*

Cut height is the distance to the material when the torch is moving along, cutting.

**Pierce Torch Height** is for when the torch is starting up and is the distance the torch should be from the material when it is initially turned on. This will depend on the nozzle, metal type, thickness, and amperage. *This value is taken from the consumables charts.*

**Rate Limiter** will limit the amount of travel the torch will attempt to correct height by. Output from the torch will sometimes spike, and this will prevent erratic movements.

**THC (Torch Height Control) Speed Minimum** is the minimum number of pulses the machine must be going at for THC to be enabled. This will make it so the torch doesn't change height drastically in sharp corners, which will burn the metal. Depending on the sizes of slowdowns, the cut acceleration set and so forth, this value should be between 5 and 50. If it is too low, the parts will show burning in the corners; if it is too high, the THC will not correct.

## ***Cut Quality***

### **Reading the cut**

There are four basic measurements used to determine good cut quality:

- Bevel Angle
- Dross Levels
- Appearance of Cut
- Lag Lines  
(Mild Steel – O<sub>2</sub> cutting only)

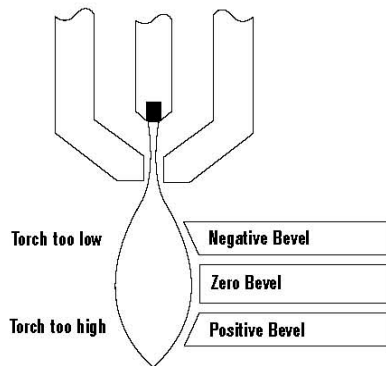
The adjustments that the operator can make to improve these qualities are:

- Torch Height or Arc Voltage
- Cut Speed

Remember: the cut charts are the place to start, but cut speed and torch height may need to be adjusted on some materials.

### **Bevel angle**

- By increasing or decreasing the height of the torch, the bevel angle can be changed.
- This is done by adjusting the Arc Voltage setting on plasma systems with arc voltage torch height control (THC). If the plasma system is not equipped with THC, then it must be manually adjusted.
- If the angle is not equal on all sides of a cut part, then the torch may not be square to the plate and will need to be adjusted.



**EFFECTS OF TORCH HEIGHT**

### **Decreasing dross (slag)**

#### **Top dross**

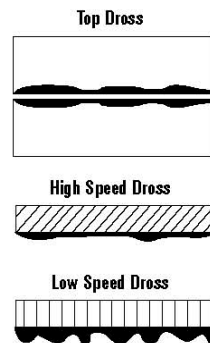
Splatter appears on the top edge of both pieces of the plate. Lower the voltage in increments of 5 volts (maximum) until top dross disappears. Usually only seen with air plasma.

#### **High-speed dross**

Fine, roll-over dross that welds to bottom edge. Cleaning requires chipping or grinding. Reduce cut speed to decrease high-speed dross.

#### **Low-speed dross**

Globular dross that forms in large deposits. Comes off very easily, in large pieces. Increase cut speed to decrease low-speed dross.





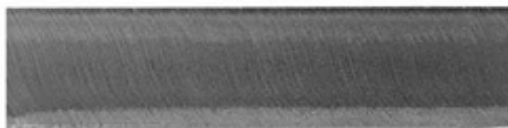
# Cut Quality

## More on dross

- Some types of metal inherently cut with more dross than others. Some of the more difficult plates and treatments are:
  - High carbon content
  - Clean metal surfaces
  - Shot-blasted plate
  - Aluminum
  - Hot-rolled steel
  - Warm or hot metal
  - High Silicon Steel
- Some of the easier types are:
  - Cold-rolled steel
  - Oil-pickled steel
- If plate has an oily, scaly or rusty surface, cut with this side down.
- A water muffler or underwater cutting will tend to increase dross levels.

## Appearance of cut

- When cutting metals besides mild steel with  $O_2$ , lag lines are not a good indicator of cut speed.
- Bevel angle, dross levels and appearance of the cut must be factored together. The smoothness or roughness of the face and the dross levels will determine correct speed.
- Concave cut face is due to torch-to-work distance being too low or consumables are worn.
- Convex cut face is due to torch-to-work distance being too high or consumables are worn.



Good Quality Stainless Steel Cut

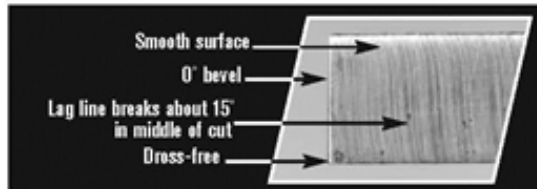


Good Quality Aluminum Cut

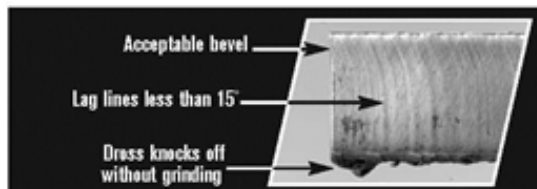
## Reading lag lines

### Mild Steel, $O_2$ cutting only

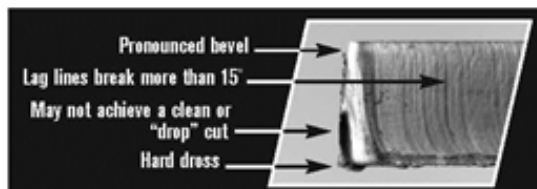
- Using the lag lines of a cut are an excellent way to determine proper cut speeds.
- The lines should generally trail the cut by approximately 10–15 degrees.
- When the lines are more vertical, the speed is too low.
- When the lines are more trailing, the speed is too high.



Correct Speed



Too Slow



Too Fast

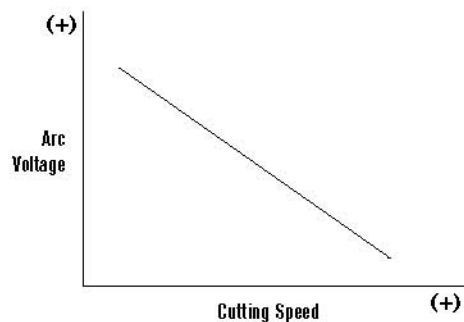
## Effects of cutting speed on arc voltage

- As cutting speed *increases*, arc voltage *decreases* and vice versa.
- Cutting speed changes:
  - When going in and out of corners\*
  - At beginning and end of a cut\*
  - When cutting circles and contours\*

\* This will cause dross in corners and contours.

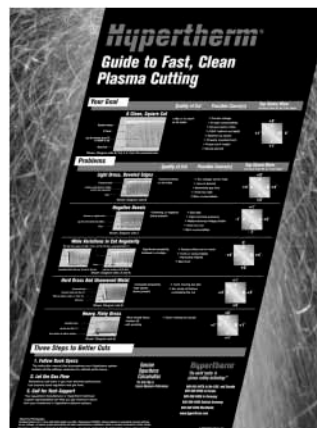
- Reaction of THC
  - Torch will dive as speed decreases\*\*
  - Torch will rise as speed increases\*\*

\*\* THC must be turned off or "Locked Out" when speed decreases.



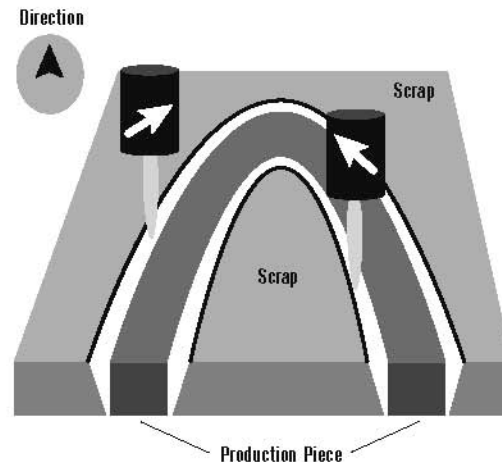
Note: Graph is independent of system and metal thickness.

Contact Hypertherm to get a free copy of our Cut Quality poster.



## Cutting direction

- Due to the swirling action of the plasma gas, one side of the cut will always have a bevel angle. This is called the "bad side" of the cut.
- In order to get the minimum amount of bevel on your production pieces, the torch must travel in the proper direction. The "good side" is on the right as the torch is traveling away from you. Refer to picture.
- The swirl direction can be reversed, by using different swirl rings on some models to achieve the opposite results (Used for cutting mirror image parts).



Clockwise: Cutting outer boundary of part. Part falls out.  
Counter-Clockwise: Cutting inside hole. Scrap falls out.

# Cut Quality

## Cutting holes

- Cutting internal holes can be very difficult with plasma. The minimum hole size, assuming excellent motion control characteristics are:
  - HyDefinition( $O_2$  on mild steel)
    - $\frac{1}{8}$ " (3 mm) plate and less:  $\frac{3}{16}$ " (4.7 mm)
    - Above  $\frac{1}{8}$ " (3 mm): 1.5 times material thickness
  - Conventional ( $O_2$  on mild steel)
    - $\frac{1}{8}$ " to  $\frac{1}{2}$ " (3–12.7 mm) plate: 2 times material thickness
    - Above  $\frac{1}{2}$ " (13 mm): 1.5 times material thickness
  - For best results:
    - Turn THC off.
    - Reduce speed.
    - Make lead-in perpendicular to side.
    - Minimize lead-out. Only enough for part to drop out.

## Operator troubleshooting

### Status LEDs

The green or amber lights on the front of the power supply are good indicators of common problems. If the LEDs are green then they should be on; if they are amber they should be off. Check your instruction manual to see how to troubleshoot with these LEDs.

### Tips

- System shuts off during cut or when trying to cut: Hold down on the Start button to see which LED "flickers". This may be the one causing the system to shut down.
- Constant bevel: Check for the proper direction of cut, torch height, cut speed, condition of consumables and torch alignment (perpendicular to plate). If all appear to be correctly set and in good condition, have maintenance check for any leak or restriction, then replace torch.

## PLATE WITH INTERNAL HOLE

