

Volume

1

PRECISION PLASMA LLC

CNC Plasma Gantry and Table Manufacturer



Plasma Table Selection Guide

PRECISION PLASMA LLC

Plasma Table Selection Guide

© Precision Plasma LLC
info@precisionplasmallc.com

Mechanical Components

Precision Plasma LLC is dedicated to helping the small business owner compete in a challenging economy.

Precision Plasma LLC has been established to manufacture low cost, high quality DIY CNC plasma gantry and table kits. Structured to sell only the mechanics of a system, overhead has been reduced which allows for a cost savings to the customer. Business owners and hobbyists can now obtain a CNC plasma table at a fraction of the price from previous years. Despite having a lower cost than other products on the market, Precision Plasma LLC tables are built from high quality materials and components.

Complete table or gantry kit?

Everyone's situation is different. You need to balance your time, skills, and equipment to determine what product is right for you. If you are a welding shop, why pay to have something manufactured that is part of your core business? If you have the time, purchasing a gantry kit and welding up you own frame is a great way to save money. Not only will you save on the labor, but shipping costs can be greatly reduced. If you are an artist, you may choose to purchase a complete, welded or bolt together table, especially if you don't have the skills or equipment to build your own. We offer both solutions to allow the customer to choose what works best for them.

Frame Prints

Precision Plasma LLC will supply sample frame prints to those who wish to build their own tables. You can choose to build the table as shown or to modify the table design to better meet your needs.

What size table should I buy?

There are three things that need to be considered when deciding what size table to purchase or build.

- What is the largest size part that you want to cut?

Although indexing will work in theory, it doesn't work very well in reality. Choose a table with enough travel to cut your largest part.

- How much floor space do you have available?

Floor space is precious commodity, especially in small shops. Consider a 4x4 or 5x5 table if you have floor space limitations. You can still cut parts from full 4x8 and 5x10 sheets while the smaller tables can be placed on casters to make them more portable.

- What is your budget?

Larger tables cost only slightly more to build than smaller tables. The electronics and motors are the same no matter what the size. If you have the room, the larger tables are a better value.

Direct drive or belt reduction?

Belt reduction is an option for Precision Plasma LLC tables. The tables were designed specifically to perform well for plasma cutting using direct drive technology to keep costs low. Today, 95% of all Precision Plasma LLC tables are run direct drive with excellent results.

Will all tables work direct drive? No. Precision Plasma LLC tables were engineered with low friction v-guide wheels, lightweight aluminum gantry, and small pitch diameter gears. A combination of these three design criteria is required to allow a plasma table to perform well direct drive.

Why buy belt reduction units? Stepper motors inherently have a low speed resonance. Stepper driver technology improvements have minimized the resonance, but has not eliminated it. Adding belt reduction does 3 things.

1. Doubles the rpm of the motor at a certain speed.
2. Insulates the motor resonance from the drive gear with a neoprene belt.
3. Doubles the torque of the drive motors.

There is no doubt that belt reduction improves the smoothness of the machine, especially at low speeds. It is highly recommended if you ever plan on adding an oxy/acetylene torch, since cutting speeds are much slower than plasma cutting. For plasma cutting, all customers have been satisfied with the cut quality using the direct drive method. Belt reduction units can be added at any time as an upgrade when money permits.

What size motor should I use?

All Precision Plasma LLC tables are designed to accept NEMA 23 size stepper motors. This allows the motors to be sourced from numerous vendors. Much testing has been done and the minimum recommended motor torque is 276 in-oz at 2.7 amps per phase and 48VDC. Other motors and drivers may work fine, but have not been tested on the Precision Plasma LLC tables.

Motor of choice: 300 in-oz motors are on the market, which have an amazing amount of torque for such a small package. Running at 3.5 amps per phase and 48VDC, these motors are powerful and fast. 90% of all current Precision Plasma LLC tables are run with these motors.

Alternative: There are also 620 in-oz motors available on the market, which are also now compatible with the Precision Plasma LLC tables. These motors have 3/8" shafts rather than 1/4" normally found on NEMA 23 motors. This requires the gears or pulleys to be bored out to a larger size, but this modification is done free of charge for Precision Plasma LLC customers. Please specify which motors will be used when ordering a table or gantry kit. The greatest benefit of the larger motor is flexibility for the future. If you ever decided to build a larger machine, the 620 in-oz motors could be used. They are not required on the current Precision Plasma LLC gantry and table kits, but work just the same.

Can the table be used for routing?

Many people are interested in dual purposes machines. A table that is designed specifically for plasma cutting does not make a good router or vice versa. Plasma cutting is a non-contact cutting process while routing requires force to push a rotating bit through the material. Cut quality with a plasma operation relies on the ability of the torch to maintain constant velocity as much as possible. This has very little effect when routing. Due to these requirements, the table design needs to be different. Routing requires a heavier gantry, which in turn, makes it more difficult to start and stop rapidly. This greatly affects the cut quality of a plasma machine when cutting sharp corners. Based on this criteria, Precision Plasma LLC has decided to focus solely on plasma tables. This allows for better performance and a lower cost.

What about cable management?

There are two common solutions for cable management, a support arm or cable track. A support arm is a stationary arm which supports the motor, limit switch, and plasma torch cables. Motor and switch cables can run through the tube while the plasma unit cable can be supported on top of the arm utilizing broom clips. A pivoting arm can be used on larger tables to allow for the extended movement of the gantry. Another solution is the use of industrial cable carriers or cable track.

Do I require a special Z axis?

A special Z axis is required for plasma cutting. In the plasma process, the computer needs to know the height of the material before turning on the torch and cutting the part. This is accomplished by the torch lowering until it touches the material. In order to sense the touch, a “floating” switch is required on the Z axis. This process is referred to as “touch and go” plasma cutting. All Precision Plasma LLC Z axis are equipped with the special limit switch. The switch needs to be connected to the Z axis home of the electronics.

Is there a low cost remote pendant?

Since the controls are PC based, game controllers can be used as a low cost pendant. A Mach 3 plugin has been developed for the Xbox 360 controller to allow it to be used as a remote pendant for plasma cutting. The buttons can be reprogrammed to activate common controls and the analog joysticks can be used to jog the axis.



Possible configuration:

- Green button Cycle start Starts program
- Red button Cycle stop Stops program
- Yellow button Feedhold Feedhold program
- Blue button Rewind Rewind Program
- Left trigger Zero all Zero all axis
- Right trigger Torch on/off Toggles torch on and off

Electrical Components

Precision Plasma LLC does not sell and is not responsible for any choices made by the customer regarding the electrical components.

Precision Plasma LLC sells only the mechanics of a CNC plasma table. This allows the consumer the freedom to choose an electronics package that best meets their needs. Numerous vendors can be found on the web which can supply the electronics and motors required to drive a Precision Plasma LLC gantry or table. We do suggest that you purchase a package with support if you are new to building CNC equipment. No support for electronics or software will be given by Precision Plasma LLC, since we don't sell these items.

Which Motor Driver Should I Use?

All Precision Plasma Tables require 4 motors, thus a 4 axis system is required. The gantry is driven by both ends, and requires that the motors be slaved together with hardware or software. The best driver on the market that matches the requirements of the Precision Plasma LLC tables is the GeckoDrive G250. This is a single axis driver that can be found in the GeckoDrive G540 4 axis system and in the Candcnc.com Bladerunner series.

Chinese 4 axis driver boards

Low cost Chinese 4 axis boards can be found on the internet with specifications that match the requirements of the Precision Plasma LLC tables. We have purchased and tested these boards with very poor results. You will be disappointed with the performance, if you can get them to run long enough to make a cut. Invest in a quality drive if you don't want electrical or performance issues.

What is THC?

THC is the acronym for "Torch Height Control". THC automatically adjusts the height of the Z axis to maintain a certain height above the material, even if it warps.

PRECISION PLASMA LLC

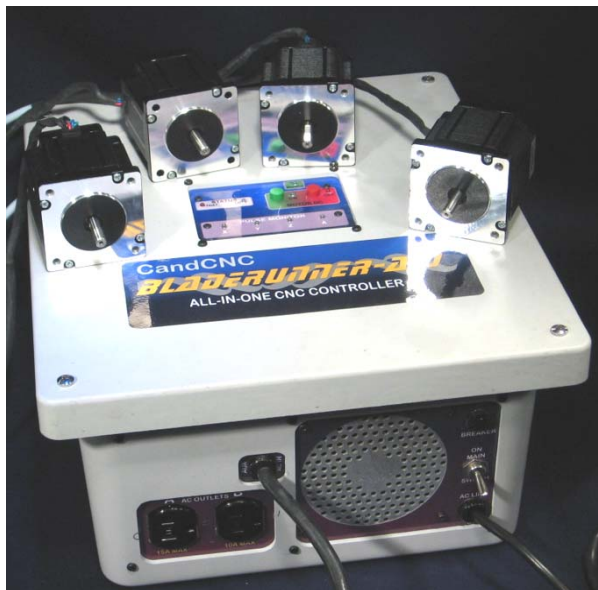
A plasma cutter is a constant current device. You set the current on the plasma unit before making a cut and the plasma unit will automatically adjust its voltage to maintain the set current. As the torch is moved further away from the material being cut, the plasma unit will increase the voltage to maintain the set current. As the torch is moved closer to the material being cut, the plasma unit will lower the voltage to maintain the set current. By monitoring the voltage of the plasma unit, the computer knows the distance from the torch to the material and can make adjustments to maintain the optimal distance.

Benefits:

- Longer consumable life
- Square cuts
- Better cut quality
- Less dross

Precision Plasma LLC highly recommends purchasing an electronics package with torch height control. If you don't have the money now, be sure that you can add torch height control as an option later.

Does anyone sell a complete package with support?



Candcnc.com is a manufacturer who specializes in the electronics of CNC plasma machines. When you purchase a package from candcnc.com, you are also purchasing unlimited technical support via phone, email, and web forum. If you are new to CNC electronics, support is very important to the rapid success of your plasma table. The AIO (all in one) Bladerunner with Dragon Cut 300-4 and 620-4 packages are compatible with all Precision Plasma LLC gantry and table kits.

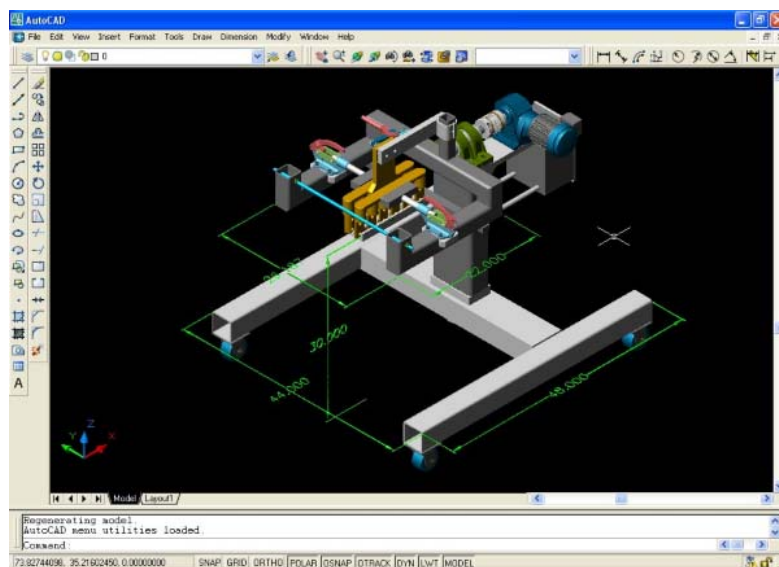
Software and Programming

Precision Plasma LLC does not sell software nor supports any software described below.

Plasma cutting requires three software programs to go from part design to part cutting. A CAD or drawing program, a CAM program, and a g-code translator to run the table.

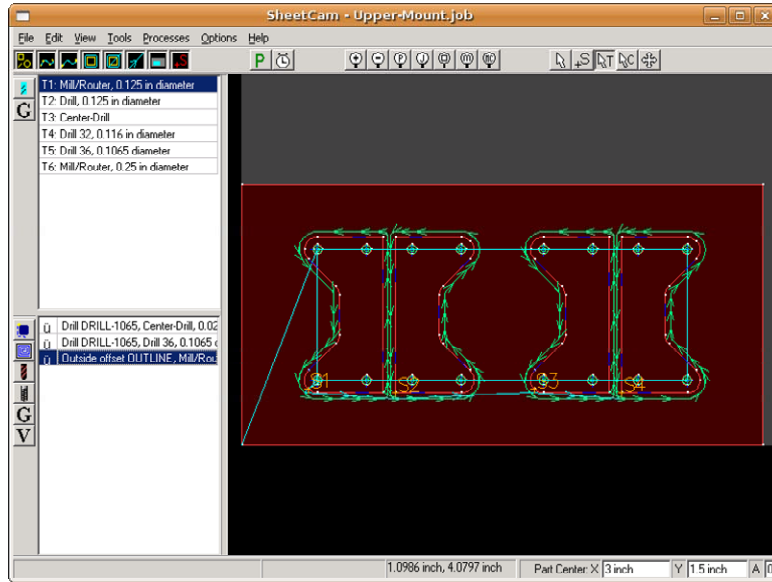
What is CAD?

CAD is an acronym for computer aided design. This is a program which allows the user to accurately design and draw a part. The most common program is AutoCAD. Other programs include BobCAD, ProgeCAD, Corel Draw, and Adobe Illustrator. Whatever program you choose, the program must be able to export the file as a DXF. DXF is an acronym for drawing exchange format, which is a universal drawing file.



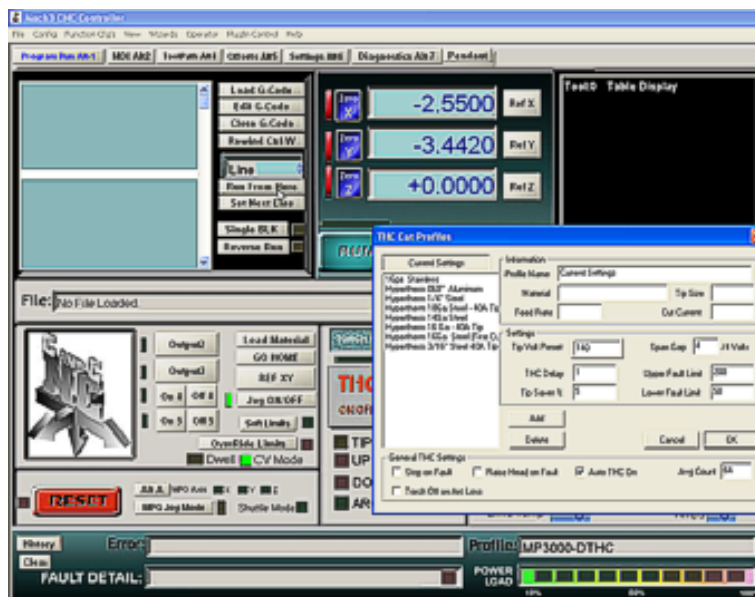
What is CAM?

CAM is an acronym for computer aided manufacturing. SheetCAM is an example of a CAM program. SheetCAM imports a DXF file, adds lead ins, lead outs, and kerf offsets. It exports the cut path in g-code format.



What is a g-code translator?

A g-code translator is a program that sends information to the electronics that drives the table. Mach 3 is a widely used program that interprets g-code files and sends the information, line by line, to the electronics controller.



Running the Table

This section describes the process of cutting a part.

Now that you have all of the pieces to the puzzle, it is time to cut some parts. This section will walk you through the process and describe how the table will operate.

CAD

Using any CAD or compatible drawing program, draw the part that you want to cut. Export the part as a DXF file and store on your computer.

CAM

Import the DXF file in Sheetcam to add the CAM features. First, you need to choose a reference point. Typically the lower left corner is used, but any corner will work. This will be the starting point of the torch before you start cutting. When you first start using Sheetcam, you need to set up the tools. One way is to define each tool as the material to be cut. For example, 16 gage steel. Your plasma cutting manual should provide you with optimal cutting parameters, like feed speed, current setting, tip size (determines kerf width), pierce delay, and arc voltage. When setting up each tool in Sheetcam, feed speed, pierce delay, and kerf width will need to be entered once. The next time you cut the same material, you can just choose the proper material tool.

Since the tables use “touch and go” plasma cutting, the Z axis switch travel needs to be programmed. First, you need to find the switch travel dimension.

1. Place a piece of paper on the material on the table.
2. Lower the torch until you feel a slight drag on the paper.
3. Zero the Z axis.
4. Continue to lower the Z axis slowly until you hear the switch trip.

5. Read the dimension on the Z axis DRO.
6. Enter this number in the switch travel line of the Sheetcam post processor.

G-code translator

Mach 3 also needs to be set up before running the table. Follow the electronics manufacturer's instructions. Some information about the table will need to be entered in the motor tuning section of Mach 3. This information can be found on the print of the gantry for the kit that you have purchased.

Making a cut

1. Load the g-code for the part to be cut into Mach 3.
2. Place a piece of material on the table.
3. Adjust the current setting on your plasma cutter.
4. Enter the arc voltage on the screen of Mach 3.
5. Using the remote pendant or keyboard arrows, steer the torch to an unused portion of the table. Be sure there is enough material available for the size of part that you are cutting.
6. Zero all axis.
7. Start cycle.

What happens next?

Now the table cuts your part. The torch will move to the position of the first pierce. The Z axis will lower until the torch switch is activated. It will then retract the distance of the switch travel that you entered in the Sheetcam post processor. This is the level of the top of the material. The torch will then raise 3/16th of an inch, fire the torch, and pierce the material. The torch will lower to 1/16th of an inch above the material and start cutting the part. At this time, torch height control will take over. As the computer monitors the arc voltage, it will adjust the Z axis up and down to remain within one volt of the setting.

Another part?

At this point, you can move the torch to another area of the material, rewind the program, zero the axis, and cut a duplicate part. Otherwise, load another g-code file to cut a different part.

Final Words

Precision Plasma LLC DIY Kits.

Precision Plasma LLC was established to lower the cost of CNC plasma tables to help DIY individuals and businesses compete in a challenging economy. Our company structure differs from typical business practices in the industry. This difference in structure allows us to sell gantry kits and tables at a fraction of the cost of our competitors

What are the benefits?

Lower cost that previously possible.

High quality.

Proven design.

What are the trade-offs?

Need to purchase from multiple vendors.

Wiring required by the customer.

Mechanical support only.

If you are a DIY individual and want to save money building your own CNC plasma table, Precision Plasma LLC can provide you with a high quality kit to dramatically shorten your build time. If you are looking for a turnkey package, there are many other CNC plasma table manufacturers in the marketplace to meet your needs.