

Volume

1

PRECISION PLASMA LLC

CNC Plasma Gantry Manufacturer



Magnum II Gantry Kit Guide

PRECISION PLASMA LLC

Magnum II Gantry Kit 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 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.

Why only gantry kits?

If you are a fabricator, 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.

Frame Prints

Precision Plasma LLC supplies frame prints to match our gantry kits. 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.

Why 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.
4. Allows for a resolution of .0005" (smallest table movement of 1 step)

There is no doubt that belt reduction improves the smoothness of the machine at very low speeds (under 15 ipm). It is highly recommended if you ever plan on adding an oxy/acetylene torch, since cutting speeds are much slower than plasma cutting.

What size motor should I use?

All Precision Plasma LLC gantry kits are designed to accept NEMA 23 620 in-oz motors with a GeckoDrive 3.5 amp driver. These motors have 3/8" shafts, which match the components shipped with the gantry kit.

Can the table be used for routing?

Many people are interested in dual purposes machines. Our Heavy Duty gantry kits are designed specifically to allow for routing and plasma cutting. A lighter gantry is better for plasma cutting while a heavier gantry is better to add rigidity while routing. The Magnum II gantry kit provides a balance of weight and rigidity to perform both tasks. Router mounts for the Velox Z axis are available directly from Velox CNC.

What about cable management?

You will want an industrial cable carrier or cable track to run your table wiring and torch cable. We supply Igus cable track with every gantry. It can handle a torch cable as large as the Hypertherm 85. Oversized cable track is required for larger plasma cutters and oxy/acetylene cables and hoses.

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 torch mounts are equipped with the special limit switch. The switch needs to be connected to the Z axis home of the electronics or to the ohmic sensor connection. Velox CNC has a Z axis design where the float is built into main Z axis slide.

Why a magnetic breakaway machine torch mount?

Each belt reduction unit can produce 250 lbs of linear force. Since the gantry is dual drive, it can generate up to 500 lbs of force. If you have a tip-up when cutting heavy plate, the gantry has the ability to damage a machine torch. A magnetic breakaway mount will decouple if the torch has a collision and protects the torch from damage. A magnetic breakaway machine torch mount is included with the Magnum II gantry kit.

What is the difference between the Magnum and Magnum II gantry kits?

The only difference between the Magnum and Magnum II gantry kits is that the side belt reduction motors face inwards on the Magnum II kit. This is a cleaner design and eliminates the motors and cabling from hanging out the sides of the gantry. The Magnum II gantry kit replaces the Magnum gantry kit and is the only kit available.

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 250. This is a single axis driver that can be found in the GeckoDrive G540 4 axis system and in the Candcnc.com Bladerunner series.

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.

Does anyone sell a complete package with support?



CandCNC 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 Bladerunner with Dragon Cut 620-4 package is compatible with the Magnum II gantry kit. Order with 15' motor leads for a 4x4 table, 20' for a 5x5 or 4x8 table, and 25' for a 5x10 table.

What is the best plasma cutter?



Hypertherm manufactures plasma cutters with excellent cut quality at a fair price. The Hypertherm 45, 65, or 85 with a machine torch is compatible with the gantry kits. Due to extended consumable life, the Hypertherm units can cost less to operate than cheaper plasma cutters while providing better cut quality. The plasma unit is the most important factor in part quality, so an investment in a high quality machine is highly recommended. The CPC connector is standard on the Hypertherm 45, while it is an option on the 65 and 85. Be sure to order this option on the larger units. An RS485 serial port option is also available for the 65 and 85 which allows all functions to

be controlled from the computer screen when the HyT connection option is purchased with the CandCNC controller. The MIC-01 connection cable from CandCNC is required to connect the controller to the Hypertherm CPC port.

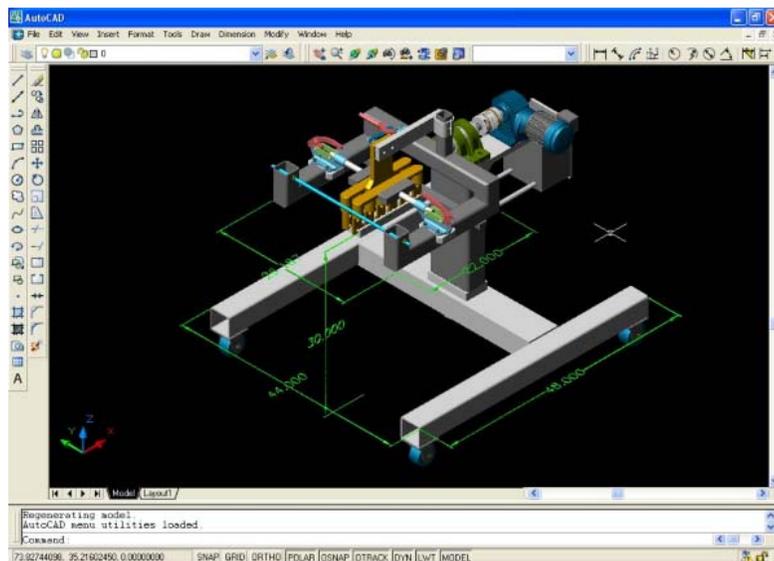
Software and Programming

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.

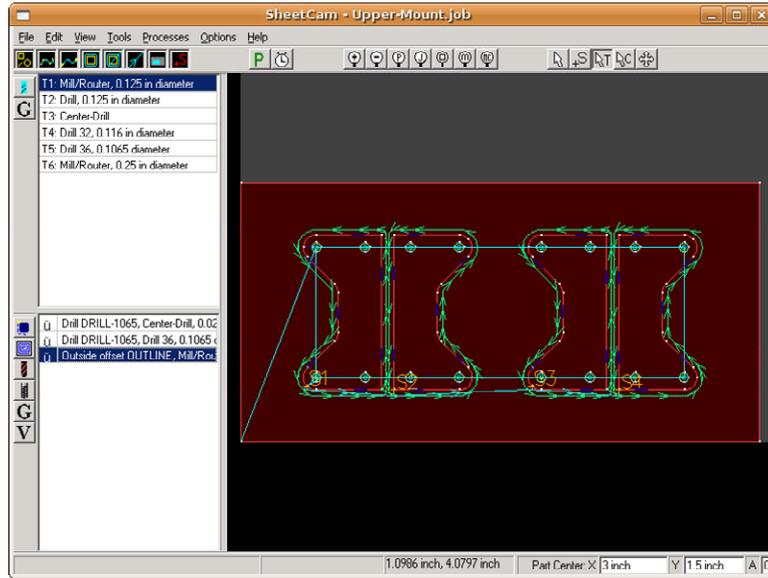
What is CAD?

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 a file as a DXF. DXF is an acronym for drawing exchange format, which is a universal drawing file.



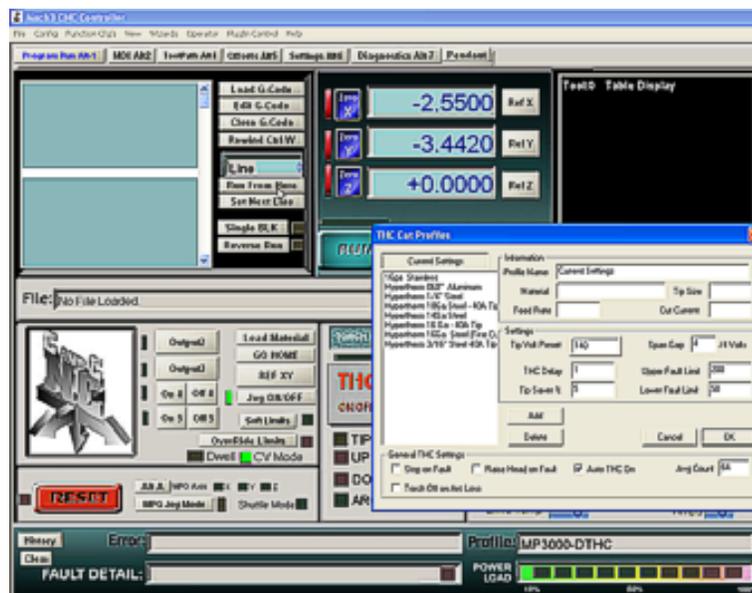
What is CAM?

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 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 or Command CNC 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 each program. This information can be found in the gantry documents.

Making a cut

1. Load the g-code for the part to be cut into Mach 3 or Command CNC.
2. Place a piece of material on the table.
3. Adjust the current setting on your plasma cutter.
4. 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.
5. Zero all axis.
6. 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 $3/16^{\text{th}}$ of an inch, fire the torch, and pierce the material. The torch will lower to $1/16^{\text{th}}$ 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 Magnum II Gantry Kit.

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 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.

List of components and vendors:

Precision Plasma LLC

Magnum II Heavy Duty gantry kit (4X4, 5X5, 4X8, or 5X10)

Options:

Ballscrew Z axis

Oversized cable track

CandCNC

Bladerunner AIO Windows 7 620-4 (motor lead length based on table size)

MIC-01 Hypertherm connection cable

Mach 3 and SheetCAM Software

Optional:

Bladerunner AIO Linux 620-4 (motor lead length based on table size)

MIC-01 Hypertherm connection cable

SheetCAM Software

Cost to build a 5X10 Magnum II table

Magnum II mechanical gantry kit \$3495

Bladerunner control package with software \$2500

Steel to fabricate table \$1000

Total Cost \$6995