Quick Overview of the Plasma Design to Cut Process
Version 8.26

This article aims to give the prospective customer a quick overview into the plasma design to cut process. It's intended as a brief summary only.

How the Plasma Design to Cut Process Works
1 - Design or find a part
2 - Modify or change the part
3 - Arrange the parts (nesting)
4 - Cut the parts

Step 1 - Design or find a part
The first step is to find a design you want to cut. There are several ways to do this. The easiest method is to buy a plasma table with a smart controller that has a built in parts library. But let's say you wanted a design or logo that wasn't in the parts library. This leads to the second method, which is to find an image online. Most images found online are 'raster' or bitmap images. Simply put, this means that they're made from dots, which when zoomed in, become 'pixelated'. In order to be useful for plasma cutting, these images must be converted to a vector based image by a CAD (Computer Aided Design) software program. This brings us to the third method of finding a design, which is by drawing it yourself. Obviously, this requires learning a CAD software program. The advantage of learning CAD is that once mastered, you can draw nearly anything you want. The challenge here is that there are a whole range of CAD programs available, from extremely easy to incredibly complex. And the price ranges just as wide, from free, to costing thousands of dollars *every year*.

Step 2 - Modify or change the part
If you're using a part found in a smart controller, you can very easily change the parts parameters. If you've found an image online, you really won't be able to change anything about it, except perhaps its' size. But if you've designed a part with a CAD program, you can easily change any of the parameters.

Step 3 - Arrange the parts (nesting)
Nesting is the process of arranging the most amount of parts in the smallest, most efficient manner possible. It maximizes efficiency, and minimizes scrap. If you're cutting a single part, then you can skip this step. But if you're cutting more than one piece at a time, you'll need to find a nesting solution. If you're producing a part on a professional controller by using the parts library, it can automatically create an efficient nesting pattern. Otherwise, you'll need to use a CAM program with a nesting capability.

Step 4 - Cut the parts
Once we have a part (or nest of parts) to cut, the plasma table must be told precisely how to cut the part(s). If you're using a part from the smart controller, the controller

determines the cut paths automatically, and it's a very simple process. But if you've found an image online or designed your own part in a CAD program, you'll need to process the part through a CAM (Computer Aided Machining) software program. This may seem relatively straightforward, but it's more complex than one might first imagine. To begin with, the plasma table needs to know which lines to cut first. This is referred to as the 'cut sequence'. Imagine cutting a donut shape from a square sheet of metal. If the outside perimeter is cut first, the donut can drop or shift from the sheet of metal, so when the plasma table moves to cut the inside 'hole', the piece is no longer in the correct position for cutting. For this reason, and in most cases, it's important to cut the inside lines first, followed by the outside lines second.

Adjusting for kerf is also necessary. Kerf is the width of the plasma beam. The CAM process must precisely offset the cut lines by half the kerf value. Determining which side to offset towards or away from is equally important. In the previous donut example, the inside cut line of the donut 'hole' would be offset towards the center, whereby the outside perimeter of the donut would be offset to the outside. Another variable is determining the pierce point, or where the plasma first begins, or 'pierces' the material. Since the initial pierce point creates a hole wider than the kerf width, it's best to pierce the material away from the part, and slowly arc into the part, as the plasma is cutting. This technique is known as creating 'lead-in' and 'lead-out' arcs or lines.

Summary
In summary, choosing a plasma table with a smart controller can dramatically simplify the plasma cutting process. Smart controllers provide the user with a large library of pre-designed shapes, which can be easily modified. Further, a smart controller can automate duplication of parts, compute nesting patterns, and automatically generate cut paths, all without the need to learn a CAD or CAM program.

Realistically, however, the need will eventually arise to design your own, custom designed parts. Please reference our other article titled "Choosing the Best Plasma Software".