

Handheld Plasma Cutter – Setup and Operation

Name: _____ Block: _____ Date: _____

Safety checklist:

- Our plasma cutter uses the same BIG plug as our Mig welder. It has a 240v plug and you should never touch the metal prongs when plugging or unplugging the plasma cutter.
- Shade 5 or darker eye protection is required.
- Leather gloves and protective clothing required.
- Pants are required to cover the entire leg.
- Protective footwear is recommended due to sparks travelling towards the floor.
- You should always have effective ventilation as close to the area you are cutting.
- Warn users nearby before turning on the torch and work with a protective safety screen.
- Do not cut in a wet area.
- Never cut a container that has held flammables.
- Always ground your work or worktable with the included ground clamp.



Tips for Better Plasma Cutting

- Drag or pull the cutting tip (do not push) along the metal at a 90-degree angle, ensure the sparks go right
- Don't pull the trigger until the torch is next to the metal and you are ready to cut
- Plan your cut and work in a comfortable position.
- Set the output control dial to the appropriate power amount based on the thickness of your material (see next page)

Our classroom handheld plasma cutter –

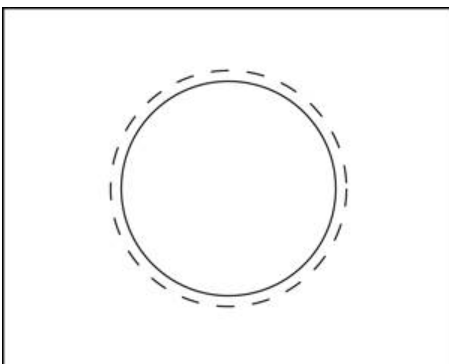
We have a “Miller Spectrum 375 Extreme with XT30 hand-held torch” which is a 30-amp, inverter-based plasma cutter with a cut rating of 3/8 inch at 18 ipm (inches per minute). It has more than enough power to quickly pierce 1/8-inch steel, and it allows placing the tip directly on the metal.

Procedures:

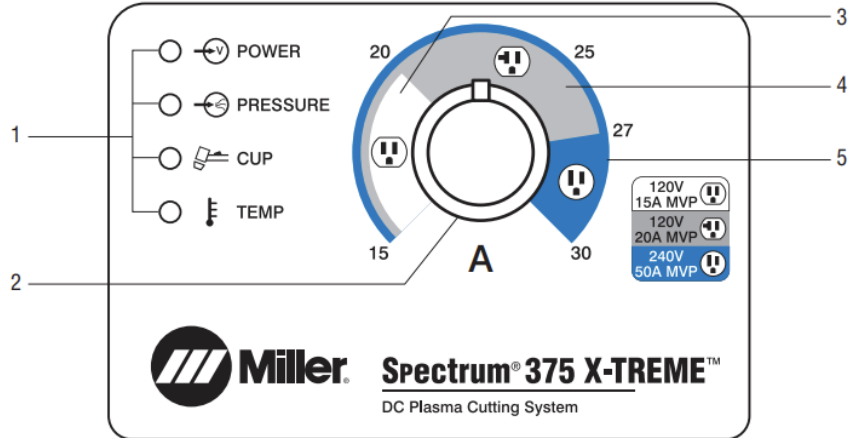
- Turn on your ventilation and ensure you have set up correctly based on the page 1 safety checklist!
- When piercing the metal at the beginning of a cut, start in an area outside of your design and hold the torch at a slight angle, as shown in the classroom demo. Push the trigger and roll the gun until it's perpendicular to the metal. Then move to the side of your drawing/template and begin cutting.
- Remember to keep the gun perpendicular while cutting. If the gun is angled, it will create a beveled edge.
- If you need to see the cutting arc, angle your head to the side for a better view.
- Use your non-cutting hand as a brace to maintain the proper position. Rehearse it beforehand to ensure that you can make the cut without changing position.
- After your cuts are complete you will most likely get "dross" on the back or top of your project. You can sometimes hit it off with a chipping hammer but most likely you will need to use an angle grinder to clean up your work piece



If tracing a pattern or using a piece of flat bar as a straight-line guide, you need to account for the radius of the cutting tip or drag shield in your initial design. For instance, to cut the circle (solid line) shown below from a piece of metal, your template would need to be drawn to the size of the outer dotted line.



Cutting speeds and fine tuning the control panel



1. Status and Troubleshooting Lights
2. Output Control
3. Range for 120 V, 15 A, 5-15 P, MVP™
4. Range for 120 V, 20 A, 5-20 P, MVP™
5. Range for 240 V, 50 A, 6-50 P, MVP™

Recommended Cut Speeds At 30 Amperes Output

	Thickness		Recommended Cut Speeds*	
	Inches	mm	ipm	mm/min
	Mild Steel	12 ga	2.8	104.8
1/8		3.2	98.4	2,499
3/16		4.8	63.2	1,605
1/4		6.4	36.0	914
3/8		9.5	18.4	467
1/2		12.7	10.4	264
5/8		15.9	6.4	163

*Recommended Cut Speed is approximately 80% of maximum.

☞ Aluminum and Stainless Steel cut speeds at these thicknesses may be reduced as much as 20%.

Recommended Cut Speeds At 27 Amperes Output

	Thickness		Recommended Cut Speeds*	
	Inches	mm	ipm	mm/min
	Mild Steel	12 ga	2.8	115.0
1/8		3.2	88.0	2,235
3/16		4.8	50.4	1,280
1/4		6.4	28.0	711
3/8		9.5	15.2	386
1/2		12.7	8.0	203
5/8		15.9	4.8	123

*Recommended Cut Speed is approximately 80% of maximum.

☞ Aluminum and Stainless Steel cut speeds at these thicknesses may be reduced as much as 20%.

Recommended Cut Speeds At 20 Amperes Output

	Thickness		Recommended Cut Speeds*	
	Inches	mm	ipm	mm/min
	Mild Steel	1/16	1.6	158.4
1/8		3.2	49.6	1,260
3/16		4.8	32.8	833
1/4		6.4	16.8	427
5/16		7.9	8.0	203
3/8		9.5	6.4	163

*Recommended Cut Speed is approximately 80% of maximum.

☞ Aluminum and Stainless Steel cut speeds at these thicknesses may be reduced as much as 20%.

Parts of the XT30 torch handle.



The most common consumable parts (parts that wear down over time) that need to be checked and replaced are the 1) drag shield, 2) tip, and 3) electrode. If treated carefully you can get over a year of use without having to buy new parts. If you abuse the tool or use it incorrectly it is easy to burn up the parts (especially the electrode) in a matter of minutes!

IPM (inches per minute) or mm/min (millimeters per minute) is the recommended speed of your movement based on the thickness of the material and the power output of the machine.

Our most common materials in the shop are 16gauge mild steel and 1/8 (10 gauge) steel.

If set to 25 amps (grey zone) and cutting 16g steel you can move your cutting torch up to around 160 'inches per minute'. That is a difficult calculation to do with your mind and body because you are not a programmed CNC machine. Instead you can drag the cutting tip slow enough that you can see the arc has gone all the way through the metal and you have a clean line. If you cut is only halfway through the metal you either need to turn up the power or SLOW down with your cutting speed. Going too fast will result in metal splattering UP and into the tip of the torch. This will wreck the torch consumables quickly. I recommend practicing on scraps because using this machine is all about feel and being aware of your results. Watch the demonstrations and enjoy practicing!