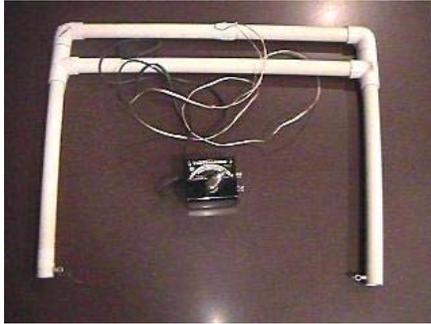


Hot Wire Foam Cutter



I built this tool because I needed to develop a way to shape a big block of Styrofoam when I built [The Happy Birthday Party Napkin Rocket of the Apocalypse](#). The photos here are from that project, but I've utilized this concept in the construction of a variety of items.

Hot wire foam cutters are used by hobbyists of all stripes to contour Styrofoam into a vast array of shapes for a wide variety of uses. Model railroad builders shape foam into landscapes. RC plane builders shape foam into aircraft wings and fuselages. Stagehands shape foam for theatrical sets and props. And because Fiberglass can be applied over the shaped foam to create a rugged and lightweight structure, rocket builders can shape foam for use as nose cones or airframes.

There's more than one way to shape foam. You can sand it, cut it with a saw, sculpt it with a knife -- I even know some rocket makers who use a hand router to shape large nose cones. Different tools work better for different craftsmen, but the tool that has worked best for me is a homemade contraption that uses a heated wire to easily melt its way through the foam. Small hot-wire tools can be purchased at hobby stores for thirty to forty dollars, but these are really too small to use on anything but the smallest model rockets. The good news is that you can make a hot-wire tool for only a few bucks that is big enough and burly enough to make Tim 'The Tool Man' Taylor grunt in approval.

Parts List

- Louis Marx Model #1229 50 Watt Transformer, 13 volts variable (or similar)
- Two (2) 10-inch lengths of 1.25-inch PVC
- Two (2) 2-inch lengths of 1.25-inch PVC
- Two (2) 18-inch lengths of 1.25-inch PVC (this length is up to you -- more or less will change the working area of your tool)
- Two (2) 90-degree elbow fittings for 1.25-inch PVC
- Two (2) T-joint fittings for 1.25-inch PVC
- PVC Cement
- Two (2) 10-32 eyebolts with wing nuts and washers
- 10 feet of heavy stranded wire (16 gauge or thicker)

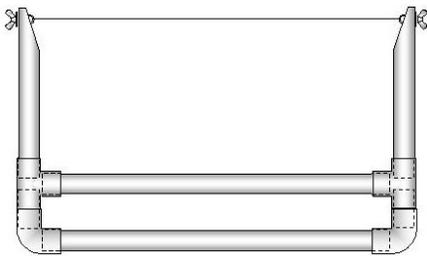
- 0.008 to 0.015-inch (thickness) single-wire steel guitar strings (available at your local music store)

Power Supply



I purchased my vintage model train transformer on eBay for \$7. You may have a better alternative for a power source, but I recommend you use one with a variable voltage control. Also, newer models have circuit breakers built into them that disqualify them for use in this application, so older power supplies seem to work best.

Cutting Bow



Assemble the 'bow of the hot-wire cutter as shown in the drawing. Drill holes in the ends of the prongs for the eyebolts and attach with wing nuts and washers. (You don't need to cut the ends at an angle as shown -- I added the angled cuts when my third foam project was too wide for the bow I'd made for my previous two foam projects). Attach the stranded wire to the eyebolts with the wing nuts and tape the wire to the

bow to keep it out of the way. Use heavy wire (like power cord or hefty speaker wire) to minimize current loss from the transformer.

Cutting Wire

Hobby stores sell nichrome wire specifically for hot wire cutters, and I tried using this stuff first. It broke immediately. After knocking myself in the temple with the heel of my palm for a few minutes, I ran into the house and pulled a steel 'E' string from a spare guitar. The knots of twisted wire I used to attach it to the eye bolts would probably draw horrified screams from an Eagle Scout, but they held together and I was in business! I found that I could compress the prongs of the bow together when attaching the guitar string, and when released the prongs pulled the wire to just the right tension (unless I compressed the prongs too enthusiastically and the string broke when I let go). I've used guitar strings as thin as 0.008" up to 0.015", and decided I prefer the thicker ones. The strings eventually fatigue and break, so keep a few spares around when you're working on bigger projects.

Tips

1. Use safety glasses and try not to stab yourself in the finger when twisting the guitar string onto the eyebolts. The ends are really sharp.
2. Attach the stranded wire to the transformer before trying to cut foam. It is possible to skip this step and generate heat by rubbing the guitar string rapidly

back and forth, but it is not recommended. The wire will emit a slight hum when current is applied, and will continue to hum until you teach it the words.

3. Increase voltage incrementally and test the heated wire on a spare piece of foam. Add power if the wire doesn't cut easily through the foam. Back off on the power if the foam instantly vaporizes. Also back off on the power if the wire vibrates uncontrollably or spontaneously plays the theme from *Shaft*.
4. Don't bother trying to use wound strings or nylon strings. If you do, don't complain to me that your tool doesn't work.
5. This tool really works well in conjunction with the [Styrofoam Shaping Fixture](#).



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