

A Cross Drilling Tape, Version 1.2

By R. G. Sparber

Copyright protects this document.¹



When I need to cross drill a piece of pipe, there are two options. I can pull out my V block, align it under my drill bit set in my drill press, and accurately cut the hole. Alternately, I can eyeball it and be off an unknown amount.

Why not have a third way that is almost as fast as eyeballing and almost as accurate as the V block approach?

Here is my cross drilling tape measure:

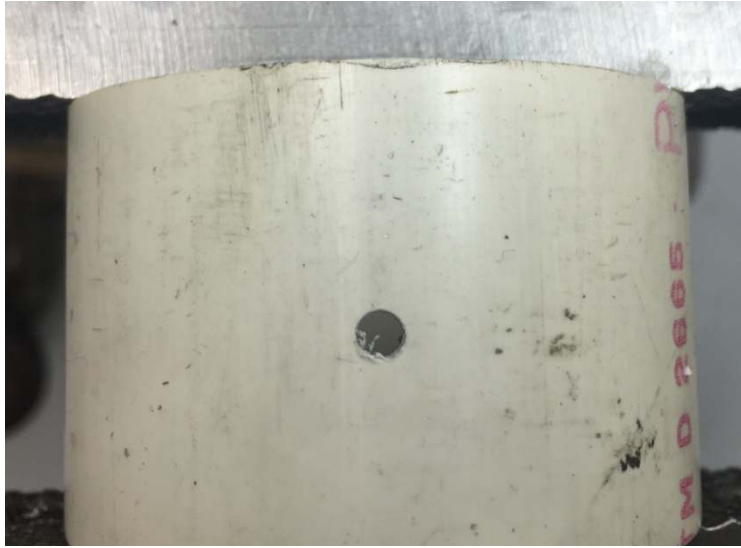


It was built from a scraped out tape measure and some heat glue.

I will first show you how I use it and then explain how it was built.

¹ You are free to distribute this article but not to change it.

Using the Tool



First I drill a hole in the pipe.



Then I center the hole in the cross drilling tape on the hole I just drilled.



Turning the pipe around, I find the point that is equal distance from the same number. In this case it is about $\frac{1}{4}$ inch beyond 3 on both tapes. Mark this spot and drill the hole.

Why Does it Work?



Two features of this tool insure that the two holes are lined up.



With the two ends of the tool wrapped around the pipe, it will only sit flat if it is square with the surface. This insures radial alignment².

When I have located the point along the tool that has the same number on both tapes, I am equal distance from the first hole going clockwise and counterclockwise. This has to be the point opposite the first hole.

Dave Kellogg points out

1. Because the error will be fixed (i.e. $\pm \frac{1}{16}$ inch), the percent accuracy of this method will improve as the diameter increases.
2. This method will work when the pipe diameter is larger than the length of the drill - when through drilling is not possible.

² If I sawed the pipe off at the edge of the tool, the end of the pipe would be square.

How Well Does the Tool Work?



I started by marking a longitudinal line through each hole.



Then I transferred the line to the one square cut end of the pipe.



Using a center finding scale, I verified I was on a diameter.



My caliper showed me that the two holes are the same distance from the square cut end of the pipe.

Making the Tool

You will need about 2 feet of broken tape measure. Locate the first "11" at the start of the tape.



Cut³ the tape between the 1's. Move along the tape until you find another "11" and make a second cut. This will give you a segment of tape that starts and ends with "1".



Repeat so you have two of these tapes.



Cut some short lengths of the measuring tape and put them on a flat surface.

Flip one segment of tape around and overlap the ends as shown here.

The goal is to glue it all together. I ran a thin bead of heat glue on the backs of the segments and pushed them down on the three short pieces of scrap. Then I used my heat gun to heat it all up. Finally, I pushed down on the stack with a wood dowel so the segments laid flat. Hold till the glue cools.

³ I used an old pair of scissors.

I then trimmed off the excess tape.



I own a rather beefy paper punch so was able to just punch a $\frac{1}{4}$ inch diameter hole.



I rounded the corners on my belt sander.

A Variation on the Idea



If you have kids, you probably know about slap bracelets. They are strips of tempered steel that lay flat or curl around your wrist. I bought this one from Claire's® for \$2.50.

This one happens to be coated in rubber so should be resistant to rust and grease. It was easy to mark up with a pen.

As a proof of concept, I marked it up with 1 inch lines and ½ inch tick marks.



Unlike the tape measure which naturally goes straight, this material will also curl making it easier to put around a pipe and have it stay there.



The added thickness does introduce error but for larger diameters, it is not bad. A bare strip of just the steel would probably be more accurate. Alternately, I might be able to cut it longitudinally except at the center so it looks more like the tape measure version. That would avoid the thickness problem.

Acknowledgement

Thanks to Dave Kellogg for his insights. Thanks to Kayla, the clerk at Claire's, for both finding this item for me and being genuinely interested in how I was planning to use it. May this experience kindle your interest in invention enough to entice you to become an engineer.

I welcome your comments and questions.

If you wish to be contacted each time I publish an article, email me with just "Article Alias" in the subject line.

Rick Sparber

Rgsparber.ha@gmail.com

Rick.Sparber.org