Trellis Something We Don't Know

A striking copper trellis with humble plumbing roots.

This is my favourite project of all time because it's an insanely cocky and decorative application of plumbing skills.

Now, plumbing is irritating for numerous reasons, but this trellis is not. Here's why: when you're plumbing household water lines, you cannot use leaded solder, even though it melts quickly and is a joy to work with. But, alas, lead can leach into the water supply and screw up your health. Just ask the Romans. Oh wait. They're dead. See what I mean?

So when you're plumbing, you must use un-leaded solder for safety. The problem is, un-leaded solder takes roughly forever to melt, plus the copper surfaces must be vigorously sanded to remove oxidization and provide a good seal with no leaks.

But here's my point: you're never going to be drinking from a trellis. So you can actually use solder WITH lead in it. And, since you don't need watertight joints, you can be quite blowsy about your technique, and you don't have to bother sanding the copper AT ALL. So this trellis project gets the Handywoman's Seal of Approval for my three favourite attributes: Speed, inaccuracy and bragging prospects.

Materials:

- 60/40 leaded solder and matching flux (from a stained glass shop)
- Flexible copper refrigerator tubing - from 3/16" to 3/4"
- Rigid copper pipe - selection of 1/2" and 3/4"
- Copper plumbing fittings to fit 1/2" and 3/4" pipe
- Copper wire
- Copper plumber's tape
- Copper pipe-strapping

Tools

- Pipe cutter
- Plumber's soldering torch
- Pliers
- Vise-grips
- Vise
- Fireproof Kevlar soldering cloth
- Eye protection
- Gloves
- String

Steps:


Flexible three-quarter inch copper tubing


Bend the flexible three-quarter inch tubing to fit the drawing

Drawing Room

Draw a trellis design on paper. Note the rough dimensions and sizes of tubing you intend to use. I suggest sturdy 3/4" tubing for the outside frame and 1/2" everywhere else. You'll need fittings ('T"s and 'unions') at every joint. When you've figured out the design details, transfer the drawing full-scale to a plywood tabletop (or sketch it out on the driveway with chalk).


Cut it to fit with a pipe cutter

Pipe Dreams

Begin cutting copper tubing to match your drawing, starting with flexible 3/4" tubing for the top arch. (Double arches are pure hell so unless you have the patience of granite, avoid them.)

Accurately measure lengths of coiled tubing with a flexible dressmaker's measuring tape, or string. (Lay the string out on your full scale drawing, then mark the correct length on the string. Then lay the string hand over hand alongside the coiled tubing until you reach your mark, then cut the copper tubing at the mark.


Use a smaller pipe to gently straighten the ends so that the fittings slip on


Use a rubber mallet to take the waves out


Cut all the pieces to fit the drawing

Fit to be Tried

Try putting fittings in place. They'll bind if there's any curve left in the ends of the flexible tubing. Straighten the ends by inserting a smaller pipe into the larger one, levering the end straight. Be very careful not to distort the circular pipe opening, because once you geek it up, you can never get it round again to take a fitting. If you have trouble, file the tubing down using a bastard file.

Tip: If the flexible tubing isn't lying flat on the tabletop, tap along its length with a rubber mallet. Just don't crush the ends!

When you have everything fitting together happily, get ready to flux and solder.


Steel wool will quickly clean the tubing, removing manufacturer's info


Use screws to help hold the pieces in position for soldering


Use flux and leaded solder from a stained glass shop

Solder to Lean On

Soldering is easier than you could possibly expect. Simply brush the flux on the inside of the fittings and the outsides of the pipe at each joint. Then push the pieces tightly together. Spark up your torch and aim the blue tip of the inner flame steadily at the fitting.


Brush the solder on the outside of the tubing


Brush the flux on the inside of the fittings


Push the pieces firmly together

You can tell when the joint is hot enough to accept solder by touching a length of solder to the metal on the far side of the joint. If the joint is hot enough, solder will melt instantly and flow between the metal surfaces wherever flux has been applied.


Place a plumber's fire proof mat under the joint to be soldered


Use a plumber's torch to heat the joint


When it's hot enough, the solder melts and flows into the joint


Cool the joint with a spray of water


Completed frame

To avoid setting fire to the table (or driveway), use a fireproof plumber's cloth under the joint being soldered. Also, wear eye protection and keep a spray bottle of water nearby to cool the hot metal quickly.


C- shape detail


S- shape detail


Placement of S


Placement of C

Twisted Imagination

Using smaller gauges (3/16" to ¼") of flexible tubing, make the decorative 'C' and 'S' shapes to form the lacy design inside the frame.


Use sash cord to help determine the length of tubing to cut


Mark the length on the sash cord


Transfer the length to the tubing


Pinch the end of the tubing in a vise and then form the shape with your fingers

Form the shapes first with a piece of sash cord. Then use the rope mock-up to determine the length of pipe to cut. Clamp one end of the cut tubing in a bench vise, working curves into the copper with your fingers.

Tip: Bending copper repeatedly can make it brittle. Loosen it up again by heating it with your torch and letting it cool off.


Place all the shapes


Make fasteners out of plumbers strapping


Or plumber's tape

Lay the decorative curls inside the frame and secure them to each other by wrapping the contacting points with rounds of copper wire. Secure the wired units to the outer frame with copper plumber's tape or copper strapping.


To solder - Clamp the pieces together


Flux from the outside


Heat the metal thoroughly before applying the solder

Flux and clamp the overlapping ends of the copper strapping with Vise-Grip pliers, then solder.


Slide the trellis over half inch re-bar set in ground

To create a free-standing trellis, pound two three-foot pieces of re-bar halfway into the ground and slip the bottom openings of the trellis frame over them. Stand back and admire. If you want it to turn green quickly, spray on a coat of household ammonia followed by pickling vinegar. If you don't want it to tarnish at all, clear-coat the entire trellis with spray-on clear acrylic.


Detail - top of the small trellis


Detail - centre of the small trellis


Detail - bottom of the small trellis


Large trellis


Detail - top of large trellis


Detail - centre of large trellis


Detail - bottom of large trellis