Home Sheet Metal Basics

The ability to fabricate simple sheet metal objects can greatly enhance the versatility of the mechanically competent. The work itself is not difficult, but if you are not careful you can waste a lot of valuable time adding bandages to your fingers. I worked in a sheet metal shop for a year and a half, and immediately developed the habit of carrying bandaids in my wallet. This has remained a habit, and a good one. Your own or someone else's child is always in need of a bandaid for something, and it's nice to have one to offer. Soon however, I developed the more logical habit of being careful.

If you are likely to be doing a bit of household homesteading, and have room for a little more junk, begin keeping your eyes open for sheet metal -- consider the following sources:

1. Construction site dumpsters, particularly at commercial projects often contain large pieces during the phases following the initial framing.

2. 5-gallon cans can be modified or cut apart for many small projects.

3. 55-gallon drums can provide a heavy gauge that is useful for some projects, especially stove parts.

4. Consider metal signs, metal roofing materials, pieces of flashing, and auto body parts.

5. Houses being demolished, or about to be, can often be good sources. Flue pipes from stoves, furnaces, and water heaters are valuable in their present form. Also look for heating ducts and furnace plenums. The exterior of water heaters is normally one large sheet of metal.

6. Hate to disappoint you, but though I have obtained metal form all of the above sources (except the water heater), I have bought most of my sheet metal from hardware or heating supply stores.

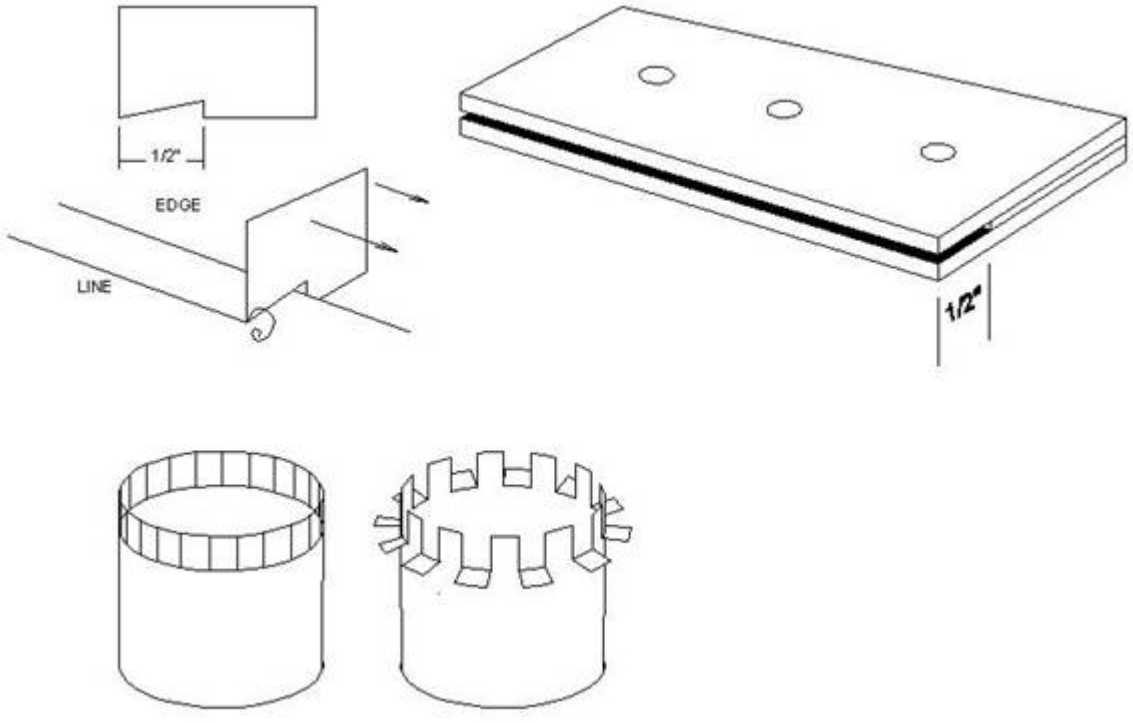
The tools you need for any of the projects I describe here are a pair of tin snips, a tape measure, a straight edge (preferably a metal yardstick), a scribe or awl, a pair of pliers, a hammer, and a drill with an 1/8" bit.

There are a few additional things that are nice to know if you have the resources and urge to go beyond the minimum:

Not all tin snips are the same. The most basic and frequently needed tin snips are called "straight snips". These are designed for straight cutting, and will also cut reasonably well in a counter-clockwise direction. If the handles of straight snips are anything besides black, they will probably be yellow or grey. Left-handed snips are made to cut circles in a clockwise direction, and are also capable of cutting straight. Normally they come with green handles to indicate their style. Right-hand snips cut counter clockwise, and they wear red.

The least complicated fastening system uses #8 sheet metal screws in 1/8" holes. But for a speedier and cleaner-looking job, you might consider getting a pop-rivet gun, and a supply of 1/8" pop rivets. Screws of course, are reusable and are easier to remove, but once you learn to quit making mistakes, that ceases to be an issue.

Since 1/2" is the most common dimension used in sheet metal work for forming joints and edges for corners, a tool for making lines 1/2" in from an edge can be very handy. Such a tool can be easily made from a small scrap of metal (The sketch illustrates how to make it and use it).



A line is made by hooking the tool's notch on the edge of a sheet of metal, and running the tool along the length to be marked, while dragging the point along the metal surface. NOTE: For most of your sheet metal work you will find that lines made by scratching are adequate, and a scribe is normally used for this. A scribe is also frequently driven by a hammer to mark measurement points that define lines to be drawn. There are times however, when a felt-tipped pen is handy for making custom fits, as in cases where you are joining the end of one pipe to the side of another pipe.

Frequently you will be bending a half-inch strip along an edge at right angles to the rest of the work. A simple break that will assist in this task can be made by bolting together a couple pieces of 1/8" steel, with about a 1/16" spacer sandwiched between them. You can buy 1/8" steel in 2" wide strips at hardware stores, and if you don't have 1/16" sheet metal, stack a couple of precisely- cut thinner pieces together. This spacer should be set back 1/2" from the edges of the 1/8" steel, and the length can be whatever you consider convenient. If you set your spacer 1/2" in from both an end and a side, you will have a tool with two sizes. In the tool I made for myself, I also indented the back side to 1/4", and one of the ends to 3/4" -- might as well make it as versatile as possible.

Fifty-five gallon drums are handy resources in themselves, but modifying them for other functions is more than tin snips can manage. The easiest way to cut up a drum is with a cutting torch, but if you want a cleaner cut, or don't want to risk some nasty consequences of combining fire with unknown leftovers within the drum, an jigsaw with a fine-toothed metal cutting blade does a nice job (You could

still light things off with it, so know what's in there before you mess with it at all). Take your time, don't try any sharp corners, and you'll do alright. If all you want to do is cut an end out, use a cold chisel and a hammer around the inside edge of the rim. Unless you are trying to prove how macho a deaf person can be, I would recommend that you put some kind of protection in your ears for either of these operations.

For lighter gauges of sheet metal, cutting a hole is begun by driving a scribe or screwdriver deeply through metal near the center of the hole-to-be. The scribe is then bent sideways and moved around to enlarge the hole as much as convenient. Insert the tip of the snips into the hole and begin cutting in a spiral pattern as required until the line defining the edge of the hole can be reached. I find it convenient and safer at this point, to cut out a smaller circle from the center of the hole, before completing the hole to its' finished dimension.

To prepare the end of a pipe for joining to another piece of metal, or a cap, cut a series of 1/2" deep slits around its' end, about 1/2" to 3/4" apart.

I find it best to make the first cut next to the seam of the pipe. As you approach the completion of the circle, adjust the spacing so that you wind up with an even number of slits.

When you want to join flexible ducting to sheet metal work, or to a plywood structure such as the back of a home-made solar panel, prepare a short (4 to 5 inches will do) piece of pipe in the above manner to use as a collar. Try to do it so that there is a crimped end available to make it easier to slide on the ducting. If the wood is very thick, you might want to make the tabs a little longer and wider than you would if you were attaching to sheet metal.

In order to join the pipe to a hole, first bend every-other tab outward at right angles Then stick the rest of the tabs through the hole and bend them outward against the inside surface, securing this surface between the outer and inner tabs. It helps at this point to take a small hammer and lightly tap the outer tabs to set them firmly against the outer surface.

If you are joining the pipe to a hole in a curved surface, begin by inserting the end of the pipe into the hole, and making a line around the pipe where the edges of the hole meet it (This is where a felt-tipped pen can come in handy). Trim the end of the pipe around this line, and then do your slits and attaching as described above.

Capping a pipe begins with the same set of slits, but proceeds by bending every-other tab INWARD instead of outward. You then lay a disk cut to the inside diameter of the pipe on these tabs, and bend the remaining tabs over it. Now you tap these outer tabs lightly to set them in place. It makes things a lot tighter if you can hold a piece of wood or metal against the inner tabs during this tapping process.

Joints at the corners of boxes are formed by bending a 1/2" strip along one edge of one piece at right angles. This is then screwed or pop-riveted to the other piece.