A Side-Draft Hood with a Twist

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This article will discuss my design of a side-draft hood – see Figure 1 - for an existing installation where the flue is directly below the forge and neither can be moved. The basis for my design, a detailed pattern layout that utilizes a single a 4x8 sheet of steel, and construction tips will be given.

When I built my shop I was not aware of the merits of the side-draft hood. Rather, I made a simple conical hood and installed it and the flue directly above my forge. While attending a course at The John Campbell Folk School I saw the advantages of a side-draft hood and decided this was what I needed. A great article: (A Side-Draft Forge Hood, by Brian Gilbert, *Hammer's Blow*, Vol. , #2, Spring 2003) illustrated how to make a side-draft hood and this appeared to be exactly what I was looking for. However, upon closer examination, I realized that I couldn't use this design because it would involve either moving the forge or flue, neither of which was a good option.

A modified side draft hood.

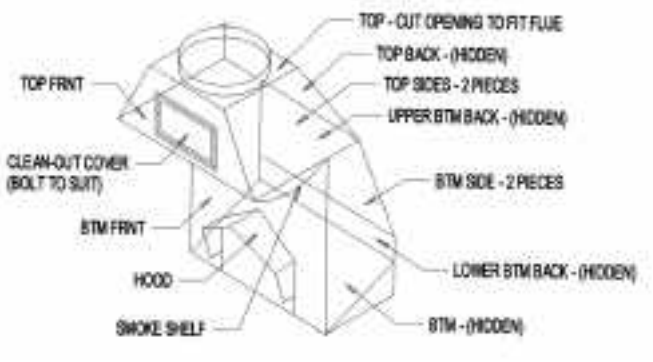

Fig. 1- Hood assembly.

Being a retired engineer I decided to see if I could re-design this side-draft hood for my particular situation. What follows is the basis for my design in the event you need to modify it for your situation. My design drew heavily upon Steve Bloom's article (1) and what he defined as "critical dimensions" along with insights from other articles (2,3,4). The ratio of the width to the depth of the lower chamber should be 2:1 – mine is 24" wide by 12" deep. The area of the opening into the lower chamber is slightly greater than the area of my 12" diameter flue. The area of the entrance to the smoke chamber is also slightly larger than the flue area– I didn't want either of these areas to restrict the flow of the smoke. It was recommended the distance between the opening in the lower chamber to the bottom of the smoke chamber should be at least 12" – mine is 13 1/2". Steve's article was the only reference that recommended a curved smoke shelf, claiming that any air flowing down the flue would be re-directed back up the flue, thus increasing the draw from the main chamber. He recommended the radius of the curved shelf should be equal to the width of the unit. I made a "modified curve" using four short straight sections, thus eliminating the need to form this piece. I'm not certain the curve is critical but I didn't want to take any chances. Finally, the length of the sloped side of the top chamber should be at least 12" long – mine are exactly 12" - and they should form a 30 degree or greater angle with the main chamber – mine forms a 62-degree angle.

The dimensions for my design were chosen to be able to make the hood from a single 4x8 sheet of steel and to eliminate the need to form any large pieces. Looking at Figure 4, you'll see that the goal was accomplished with material to spare. Since I had access to a large shear, my first cut was along the length of the sheet to create two 2x8-foot pieces. All remaining cuts except the opening in the main chamber, the end pieces for the smoke shelf, and the clean-out opening were easily done on the shear. If you decide against the "curved" smoke shelf, then replace the four 3-7/16"x 24" pieces with a single 13" x 24" piece.

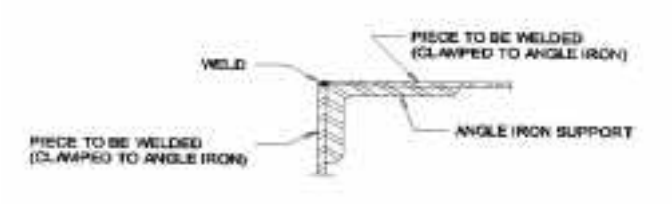

Fig. 2- Corner assembly detail.

Here are some suggestions regarding the fabrication of the hood. If you're going to weld this together the material should be 11 ga. or thicker. A MIG welder is ideal for this fabrication, but this could be stick welded. Using 11 ga. material, the final hood weighs approximately 100 lbs. I would recommend clamping the clean-out cover to the top front piece when drilling the holes for the bolts. After drilling, slightly enlarge only the cover holes to assure easy assembly. The pieces should be butt-welded together as shown in Figure 2. Clamping the pieces to a section of angle iron will make welding easier and assures an accurate fit-up. I first assembled the pieces for the bottom chamber and set this aside. I then assembled the top chamber pieces and set them aside. Next, I assembled my "curved" smoke shelf, and joined it together with the lower chamber. To hold the smoke shelf during welding and make sure it was aligned to the bottom section, I clamped each section to a length of angle iron– see Figure 3. By assembling in this order I had easy access to make an interior weld joint between the bottom chamber and the smoke shelf. The final step then was to weld on the top chamber. Because the top section extends past the bottom, the piece tends to tip. I would recommend some method of restraint based upon your particular situation– I welded a simple clip on the back and attached this to a nearby stud.

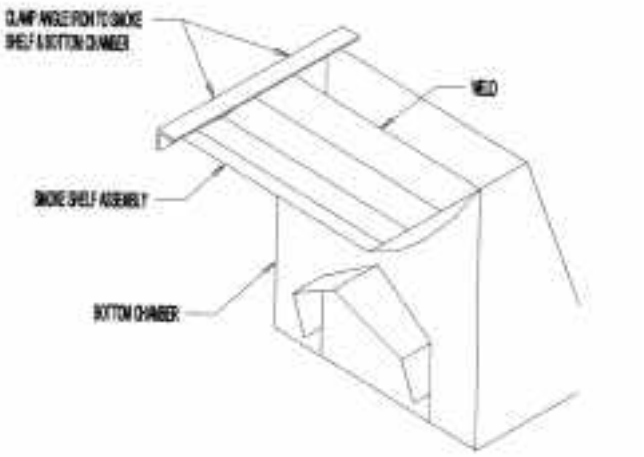

Fig. 3- Assembly of bottom chamber and smoke shelf.

I'm happy to report this design met all my expectations. The unit draws almost immediately, even as it is warming up. Because all the smoke and fine particles are drawn into the hood, my shop air is much cleaner and it's easier to breathe. If you have any questions or comments about this unit please feel free to contact me at james-blksmth@spamcloak.net.

References:

1. Side-Draft Flue for a Coal Forge, by Steve Bloom, http://www.blacksmithing.org/projects/sideflue.htm

2. Illustration from Appalachian Blacksmith's Assn., by Dave Allen, http://www.appaltree.net/aba/images/sd%20hood.GIF

3. Side Draft Hoods, Copyright © 2000 Jock Dempsey, http://www.anvilfire.com/21centbs/forges/sidedraft.htm

4. The Steel Side Draft Hood, author not given http://www.beautifuliron.com/steelhoods.htm

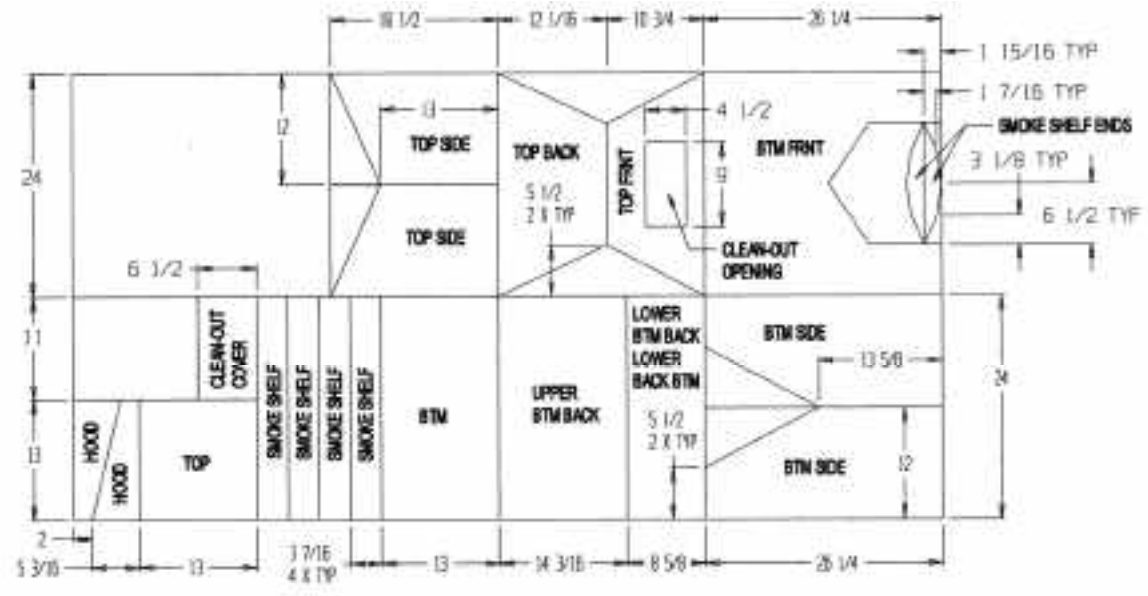

Fig. 4- Pattern layout.