

3D Snowflake

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In this article, you will find constructions notes for a three dimensional snowflake. Don Neuenschwander showed me one that Ken Dettmer made based on Don's specifications. Don himself saw someone up north make one of these.

The snowflake is made from a 3" piece of $\frac{3}{4}$ " square stock. It needs to be cut in several ways. To start, make two $1\frac{3}{4}$ " cuts along one side, splitting the side three ways. From the opposite end, make two cuts that are $\frac{3}{4}$ " long, again splitting the side three ways. You will be left with $\frac{1}{2}$ " in the center that is not cut. The cut layout is shown on the left side in figure 1 below.

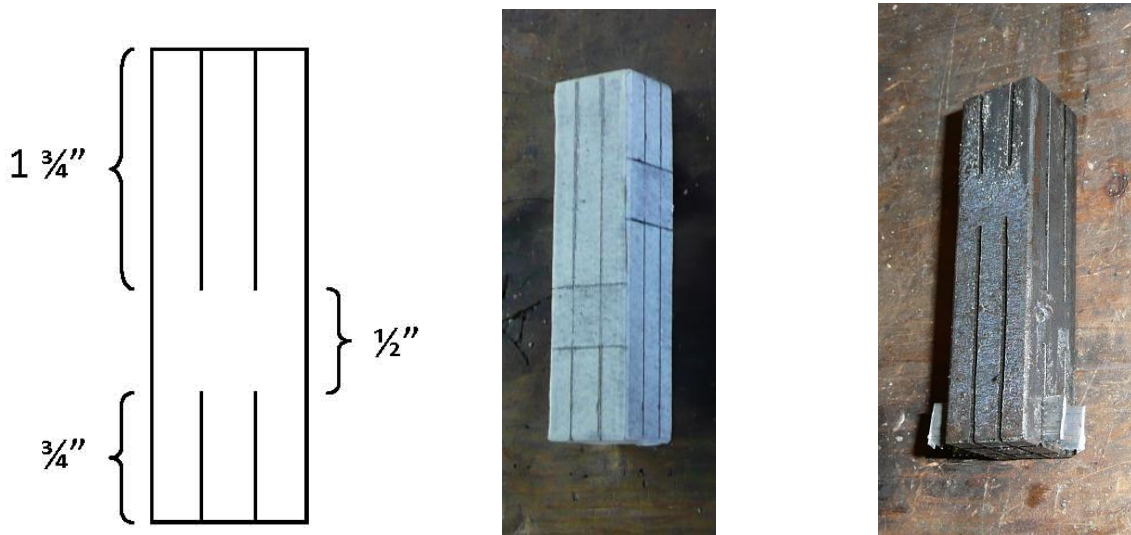


Figure 1: Cut layout (left), blank with marked cuts (center), cut blank with spacers (right)

Turn the bar 90 degrees and make the same cuts except from opposite ends. I like to put masking tape on the steel and draw my lines on it. The marked up blank can be seen in the center of figure 1. I insert some old saw blade pieces in the short cuts of one end. This is the end that gets to be put in the vise first. By placing the spacers in the cut, it is easier to open them up later on. The sawn blank, prepared for heating is shown on the right in figure 1.

In order to get the three dimensions, the primary bends are along the long cuts. When bending this piece, it is advisable to use tongs and a vise rather than a hammer and anvil, as the folds will be rather delicate and can easily be bent beyond repair.

To begin, heat up the bar and place the end with the saw blades in the vise so that the saw blades are parallel to the jaws. You need to place the bar in the vise so that the long cuts are about $\frac{1}{4}"$ proud of the top of the vise. This ensures that there is space for the jaws of your tongs. Before bending the long sides, it helps to open them up with a chisel. Once started use flat tongs to grab a side and bend it out. You may have to perform a sequence of grabbing part of the side, bending it, grabbing some more, straightening it with the tongs and bending it. See about producing a nice bend, not too tight and not too wide. The underside of the bent hand needs to be $\frac{1}{8}"$ proud of the cut to be centered. The picture on left side in figure 2 gives you a sense of the

radius of the bend as well as how much the long cuts have to be proud of the top of the vise. If the arms are not straight, a chisel can be used to pry them off the vise jaws.



Figure 2: Blank after first set of bends, notice the spacers (left), finished snowflake (right)

Next, put a little bit of heat in the end that contains the saw blades and knock them out. Heat up the bar and cool down the center of the piece. Use a chisel to open up the long ends that are to be bent next. Put the piece back into the forge and heat it up. Now comes the hard part. The entire snowflake will be orange hot and any attempt to cool parts of it invariably cools down other parts that should not be cooled. Furthermore, any bending you do, will upset other parts of the piece. When opening up one of the hands, you will bend the snowflake out of shape. Just ensure that when you bend the other hand, you bend it back into shape. You may consider using several heats to open up the two long hands.

The four bent arms should be in one plane. You may consider placing the piece in the hardy hole, placing a piece of pipe over the hands that need to be aligned and gently tapping on it. Notice that the sum of the two hands that have not been bent remains 3" long, yet the sum of the bent hands making up either of the two other dimensions are about 3 1/2" long. This is due to the fact that the outside hands are 1/4" off the center of the bar. The unequal length cannot be helped except for cutting 1/4" of the ends of each of the bent hands and then deepening the cuts by 1/4". You may consider hanging the snowflake so that the bent hands are vertical.

You are now left with having to bend the outside fingers made by the 3/4" cuts. If you split open the fingers with a chisel, you need to cool down the center of the snowflake as the hammer blows will compress the delicate bends at the center of it. You want to use some fairly narrow tongs to open up the fingers to about a 45 degree angle. Here again, consider using a process of repeatedly grabbing, bending, re-grabbing, straightening and bending. Notice that fingers of neighboring hands will end up parallel to each other.

I finished my snowflake by immersing it in vinegar overnight, brushing off the scale using a brush and water and polishing it with an angle grinder and the Dremel tool.