A Sheet Metal Drill Guide (How to Not Drill Your Hand), Version 3.0

By R. G. Sparber

This black dot is where I want to drill a 10-32 clearance hole. Since the hole goes through two layers and is curled around a frame, removing the stock and placing it on a flat surface for drilling is not practical.

As I start drilling, the drill tends to dance away from my black dot. I also bend the soft aluminum sheet metal. By pushing harder plus backing up the site with my hand, the dancing stops along with the distortion. Hmmm. What's wrong with this picture?

The drill is going to quickly cut through the sheet metal and into the backing material. But, oh wait, that backing material is my hand! Maybe this wasn't such a good idea.

It is time for a homemade tool.

Since I didn't know if this would work, I built my prototype out of aluminum. Steel would last longer.

The tool consists two 1/8 inch thick by ½ inch wide straps. One end is secured with two 6-32 screws. The other end was drilled using the drill I plan to use to cut through the sheet metal. Call this my guide hole.

The guide hole was drilled all the way through the top strap and deep enough into the bottom strap to contain the point of the drill.

Ideally, the two straps are separated by two layers of the sheet metal I am drilling. They could be a little farther apart since I squeeze the straps together as I drill.

Here you see the tool in action. To improve contrast, I have stuck blue tape to it.

I slid the tool over the two pieces of sheet metal and aligned the guide hole with the black dot. Then I supported the rear strap with my hand.

There is enough room on the bars to drill a few more guide holes of different diameters.

The tool clamps the inside curl of sheet metal. This guarantees that the hole through the exterior sheet metal will align with the inside.

I don't need much room for the tool.

I had no problem drilling the hole. The tool prevented any dancing of the drill away from my black dot.

Since the sheet metal was well supported by the tool, there was no distortion around the hole.

And, best of all, the project is not covered in my blood!

I have a few construction tips to offer.

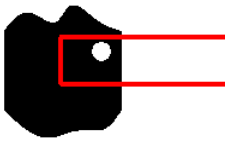
I started by sawing the top strap. Then I use it as my ruler to define the length of the bottom strap.

I punch the two holes for the 6-32 screws in the top strap. I drilled my two tap holes using a #36 drill. Then I drilled my guide hole.

After deburring, I stacked the top and bottom straps together and drilled through one of the #36 holes using my #36 drill. I opened out the hole in the top strap using a #27 drill. The bottom hole was tapped 6-32.

I ran a screw through the hole, aligned the two straps, and tightened the screw. Then I used my #36 drill to go through the remaining hole in the top strap and through the bottom strap. After removing the screw, I tapped the bottom strap and opened out the hole in the top strap. Then I deburred the hole.

I stacked up two pieces of scrap sheet metal and drilled a 6-32 clearance hole through them about ¼ inch from a straight edge.



Next, I put the top strap on them as a drill guide and drilled the second clearance hole. Both holes were then deburred.

I assembled the tool being careful to align the straps.

With the two screws tight, I trimmed the scrap sheet metal close to the shape of the strap. I then used my belt sander to make it flush on three sides.

The final step was to use my 10-32 clearance drill to partially drill through the back strap. This enables the drill to cut entirely through the sheet metal without going into my hand.

After a few uses, I found that it was hard to tell when the drill was through the sheet metal and into the back strap. I could make the back strap thicker, but that would just delay the day when I drilled all the way through.

I needed a way to stop the drill without damaging it. After a bit of head-scratching, I remember the time when I tried to drill out a bolt that was stripped. The drill spun the bolt, and no hole could be cut.

Frustration became feature as I decided to install a Torx pan head #4 screw into the back strap's hole. I figured that this head would be hardened while the Torx recess would engage the cutting edges of the drill.

I first drilled down about 0.02 inches with a ¼ inch drill. Then I used a three flute ¼ inch end mill to flatten the bottom of the hole. The ¼ inch drill had gone all the way through, so there was no need to drill a #4 clearance hole.

I coated the #4 screw with synthetic grease and put a Nyloc nut on the back. The screw freely turns.

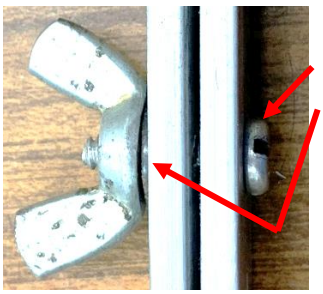
The drill now cuts through the sheet metal, and then the point contacts the screw head. This causes the screw to spin, which prevents further cutting while also protecting the drill.

After using this tool for a day, I realized it would be nice if it didn't slide around after I lined up the guide hole and before I held it firmly in my hand for drilling. The following morning I added a clamping screw:

I give the wing nut a half-turn, and the top and bottom bars squeeze together.

The clamp is located 1 inch from the clamped sheet metal.

I first drilled through both bars with my #32 drill. Then I ran my #27 drill through the top bar. And, finally, I ran my 6-32 tap through the bottom bar.



These threads, cut into aluminum, are not robust, so I ran a steel screw in from the back. On the top side, I put down a small steel washer and my wing nut. In this way, I have steel on steel for minimum wear. If I ran a screw in from the top, I would have the steel screw wearing on aluminum threads. That wouldn't last long.

Acknowledgment

Thanks to Gregg Kricorissian for pointing out that some of the pictures are hard to see.

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