

Accurate Hole Placement Only Where You Need It, Version 1.1

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This article only applies to situations where you need to get holes to align and don't care exactly where they are drilled. So if you are working on your hobby and want each hole to be perfect, don't read on. My intended audience are people new to metalworking.



Recently I grew tired of my little workbench moving when certain loads were applied. The only solution was to anchor it to the floor in such a way that I could remove it when needed.

The task is a mix of sloppy and precision. I don't care exactly where the holes are drilled but all must exactly line up. The solution is a timeless technique called "match drilling".

My plan was to install 2 brackets between the floor and near the front of the table plus one piece on the back.



I started by slapping some angle stock against the first leg of the bench. I don't care about its cut length, just want it to match the leg. So a quick mark with a pencil is precision enough.

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Then it's off to my bandsaw to cut off the piece. Note that the stock is placed with corner up. Assuming you are using a blade with at least 12 teeth per inch and with 1/8 inch thick stock, more than 4 teeth are in contact with the stock at the same time. This presents a constant amount of metal to the blade and, overall, saves time and stress on the blade.

You want at least 3 teeth in contact at the same time. However, right at the corner, caution must be exercised. To meet the 3 tooth criteria, a flat spot at least 1/4 inch long is prudent. I usually start the downfeed at a very slow rate but

it would be safer to file or hand saw the needed flat.

Not shown here is the cutting oil applied as I ran the saw.



Moving over to my drill press, I drilled my first hole with a 3/16 bit. Eventually, this hole will pass one of two lag screws. The location of the hole looks about right but I couldn't tell you its exact position.

When drilling through steel, there is a lot of twisting force as the drill breaks through the bottom. It can break the drill bit but, far more distressing, it can break your hand. Securely clamping the stock will minimize damage to the drill and eliminate any chance of you getting hurt. The wood under the steel provides friction to help prevent rotation of the part.

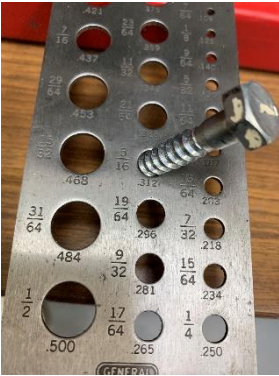


I located the second hole by eye. It should be "pleasingly close" but, again, the exact position is not important. Ultimately, this hole will also pass a lag screw.



The third hole will eventually pass a concrete anchor bolt.

All three holes will be opened up later. Having a small pilot hole makes it easier to drill later since the point of the drill does not have to do any work.



The next step was to rummage around in my selection of used lag screws and find two that were alike. Then I used my hole gage to find the closest fitting clearance hole, 5/16 of an inch. This will ensure minimal sliding of the angle stock around the screw when installed.



Next I selected a drill that was about the same diameter as the body of the screw.



I then opened up the two adjacent holes with this drill.

I also opened up the hole on the other face of the angle stock with a 3/8 inch drill. It will pass my concrete anchor.



After verifying that my workbench was exactly where I wanted it to stay, I placed my new bracket against its 4 by 4 leg. That 3/8 inch hole tells me exactly where to drill the concrete.



Using my Bosch hammer drill, I begin drilling the concrete through the bracket hole.



I drilled down just enough to form a shallow hole in the concrete. Then I was able to finish drilling with the bracket out of the way.



After vacuuming out the hole and the floor around the leg, I fitted the bracket with the concrete anchor.

The workbench was moved out of the way during drilling and is not aligned yet.



Using a large hammer, I drove the concrete anchor down until the nut contacted the top of the bracket. Then the nut is tightened to lock in the anchor.

Consider these last few steps. The bracket was first placed where we wanted it. Then the anchor hole was used to position the concrete drill. And finally, the anchor was set in the hole. This anchor must be in exactly the right location.



With the workbench back in the desired position and the bracket secured to the floor, I used the drill that matches the body of the screw. Remember that I last used this drill to open out the two adjacent holes.

Since the drill is passing through a hole that it made, alignment must be as good as it gets. I drill through the bracket and into the workbench leg. Then I change to the clearance drill and open out just this hole in the bracket.



The first screw is then installed and fully tightened.

At this point, the bracket is in the exact right spot, the first screw hole in the bracket exactly matches the hole in the workbench leg, and fasteners have been installed to keep all from moving.

When I change back to the smaller drill and drill my second hole in the leg, it must also be in perfect alignment.

It may be tempting to drill both holes into the wood at the same time. After all, you save changing out drill bits twice. But doing that risks having the bracket shift resulting in the second hole being out of alignment. By fully securing one fastener at a time, nothing can shift.



The second screw is installed. No surprise – it fits perfectly².

With this first leg secured, I again verified that my workbench was in the correct position. Then I started the process all over again to secure the second leg. Will the position of the second bracket be in perfect alignment relative to the first bracket? Of course. Did I measure anything, nope.

After the second bracket is fully installed, I started on the third bracket. One word of warning, do not mix up which bracket goes with which location. They are all unique.

Acknowledgment

Thanks to Marv Klotz for keeping me honest about sawing the angle stock.

I welcome your comments and questions.

If you wish to be contacted each time I publish an article, email me with just "Subscribe" in the subject line. If you are on this list and have had enough, email me "Unsubscribe" in the subject line.

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² Clearly, the bracket is slightly shorter than the leg is wide. This is because this first bracket was scrap and not cut to fit. Let me assure you that the other two brackets are a very close match.