Instructions to Make a Vacuum Hub

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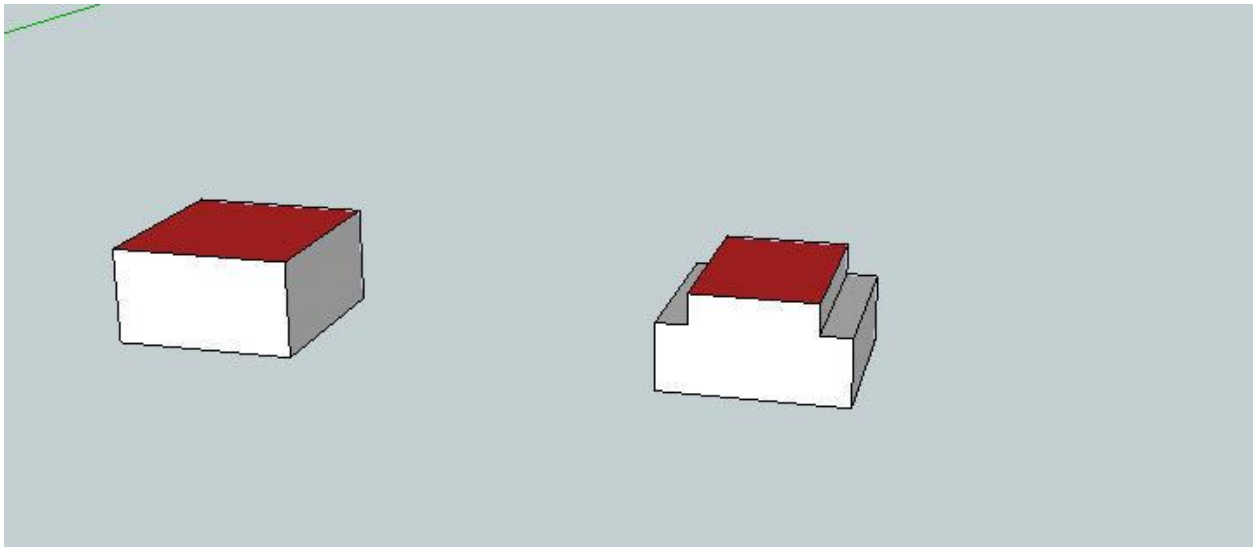
Using a vacuum system significantly enhances your lathe's flexibility and safety. This article deals with only one aspect of the system and that is how your turned objects are attached to the lathe with a vacuum hub. The hub is a assembly that attaches to the spindle tightly so that it holds a vacuum and your turned object. There are two parts to this hub. The first is the outside vacuum cup that actually contacts your turned object and is easily made from a PVC plumbing adapter. The second part is what attaches the PVC cup to the lathe's spindle. It's pretty obvious that this design was copied from JT Turning Tools Vacuum Hub ($79). Go to http://www.jtturningtools.com/ for lots of useful information about vacuum systems. I use their vacuum adapter to attach the vacuum pump to my lathe and have one of their precision vacuum hubs.

The specific measurements in this article are for Powermatic 3520b and Jet 1642 lathes. Depending on your lathe, the measurements and threads may need to be changed. Go to any plumbing supply store to select the PVC plumbing adapters (vacuum cups) you like. I prefer the 2 x 2, 2 x 3 and 2 x 4 inch adapters. You can also add PVC pipe to make longer hubs.

One issue that impacts the design is how tightly the hub will be attached to the spindle. The only situation that I have found where I need it firmly attached is when I am sanding larger bowls with the lathe running in the reverse direction. Having the hub and your turned object unscrew itself from the spindle rarely generates a desireable result. The main purpose of the O-Ring is to enable the hub to be easily removed from the lathe and doesn't really contribute much to holding the vacuum. For your larger diameter hubs, if O-Rings are installed then I suggest that grub screws be added to prevent it from unscrewing. If an O-Ring isn't included then adding the rabbits to the hub will assist in its removal.

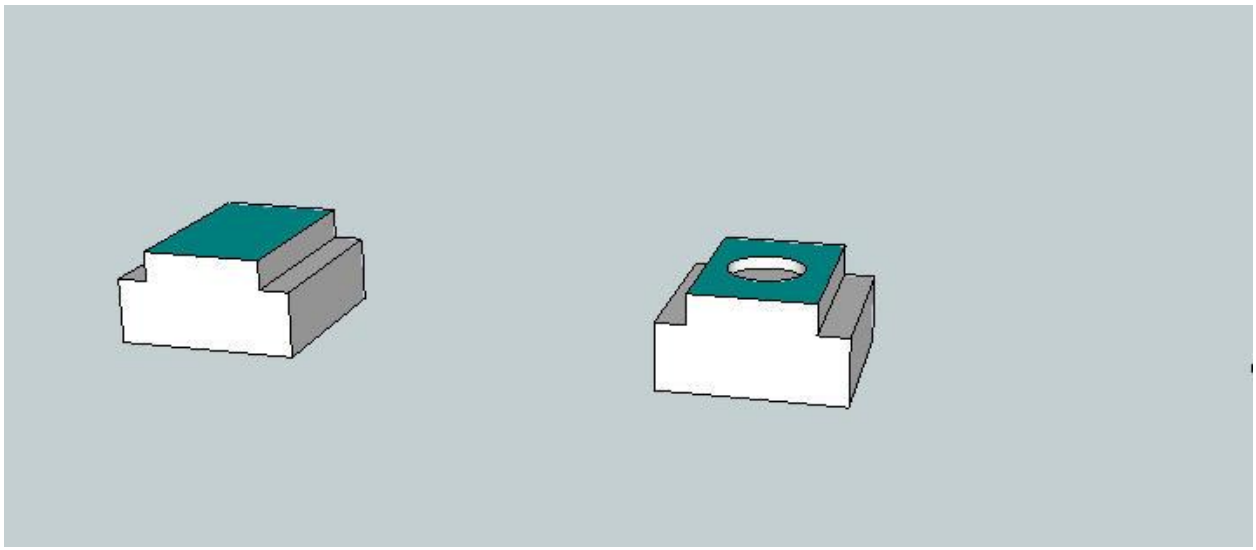
Step 1. Cut the stock into a square and pick the face for the back of the hub (this is the reference face). I used dimensions of 3 x 3 x 1 inches. This block can be made of any nonporous material that is easily turned and machined. I have used wood, plastic PVC decking, laminated hardboard, MDF, and phenolic plastic (Garolite from McMaster Carr, nice but expensive, 1 x 3 x24" = $58).

Step 2. Rabbits can be cut on the back to help mount and unmount it from the spindle. These rabbits are optional since in most cases the hub can be easily removed by hand. (All the figures show the rabbits but I have stopped using them.)



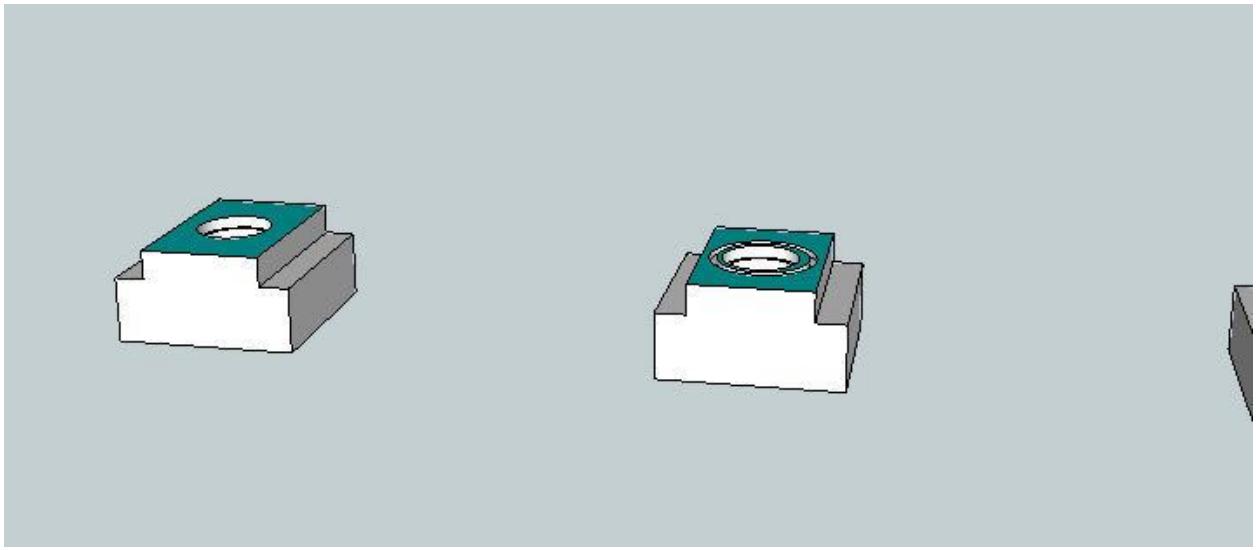
Step 3. Mount in a chuck and true up the face. This is the reference face. When using a chuck, I mount a wood spacer behind the block so I can drill through the block without drilling into the chuck.

Step 4. Drill hole for the spindle collar 3/16” deep with a 1 1/4” Forstner bit.



Step 5. Drill hole for the tap (normally 1/8” less than the tap size). For my Powermatic I used a 1 1/8” Forstner bit. Also be sure not to drill into your chuck.

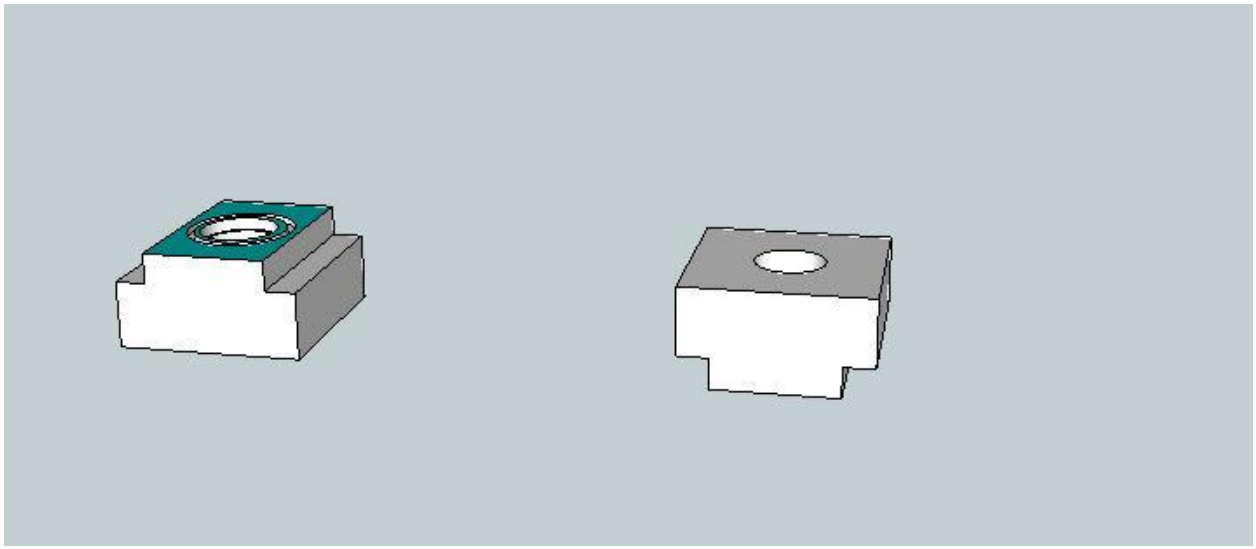
Step 6. Cut groove for O-ring if desired. I use 1.75” ID x 1/8” O-Rings from Debbie Supply in Fairport.



Step 7. Since the block is still in the chuck, tap threads with a Beall 1 ¼" x 8 tap ($27.95). Use the tailstock to help align the tap so it is perpendicular to the face. The threads should be reinforced with CA glue.

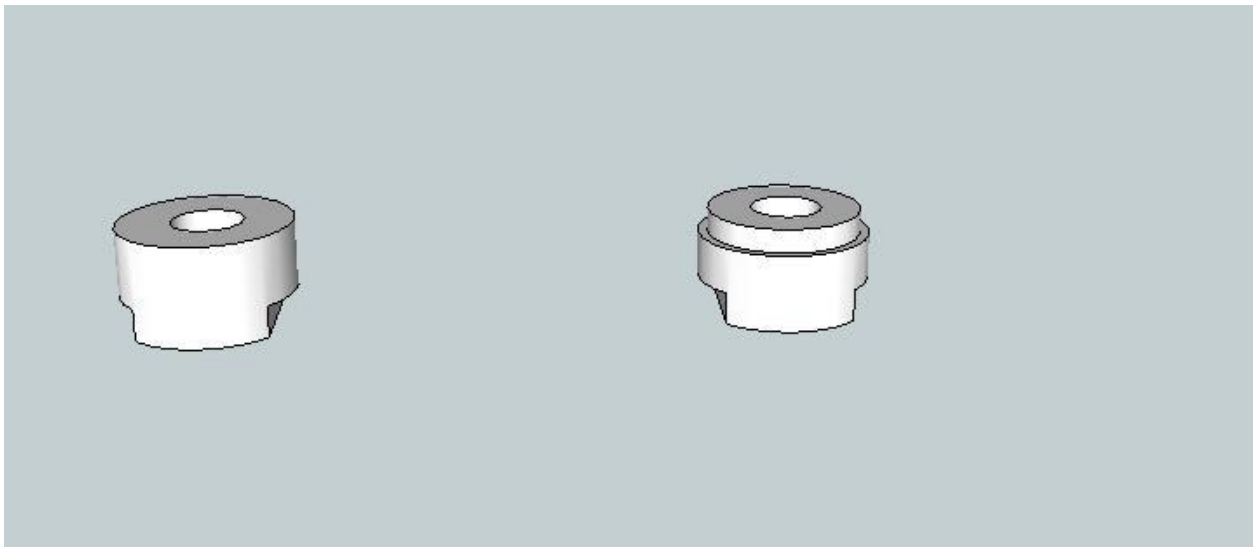
Step 8. Remove the hub from the chuck. If desired, holes for the grub screws can be drilled and tapped. (The grub holes are not shown in the figures.) I use 5/16" x 18 Allen bolts because they use the same Allen wrench as my scroll chucks and gouges. I drilled two 15/64" holes that were 0.325 inches from the reference face. If your hub is made with a soft material like decking you may be able to drill the Allen bolts directly in and not use a tap. Clean the threads so the hub doesn't bind on the spindle.

Step 9. Reverse the hub and mount onto the lathe's spindle.



Step 10. Turn the hub into a cylinder that is a little oversized for your PVC plumbing fixtures.

Step 11. Turn a collar on hub to attach the PVC fitting (7). If the PVC fitting's base is irregular you may need to true it up. One method to do this is with scroll chuck to hold the adapter. Turning PVC with a conventional scraper can be very "catchy" so you will find negative rack scrapers are much more relaxing to use.



Step 12. Glue the PVC adapter to the hub with epoxy or another suitable glue. After the glue is set, remount and turn the base down to the size of the PVC adapter.

Step 13. Use a Negative Rake scraper to true up the working end of the PVC.

Step 14. Attach the closed cell foam seal (from Michaels or Hobby Lobby) with contact cement. Leave about 3/8" of the foam around the outside of the adapter. After it sets, mount the hub on the lathe and use an Xacto knife to trim off the excess material.

Step 15. Now go use your new vacuum hub and turn something beautiful.