

# Vacuum Chuck II

Ohio Valley  
Woodturners  
Guild

## A Vacuum Chuck On Your Lathe

### HOW TO MAKE A SHOP MADE VACUUM ADAPTER

This adapter provides a conduit from the vacuum pump through the headstock spindle to the work piece.

1. Turn a seasoned piece of hardwood into a cylinder about 3 inches long and about 2 1/4 inches in diameter.

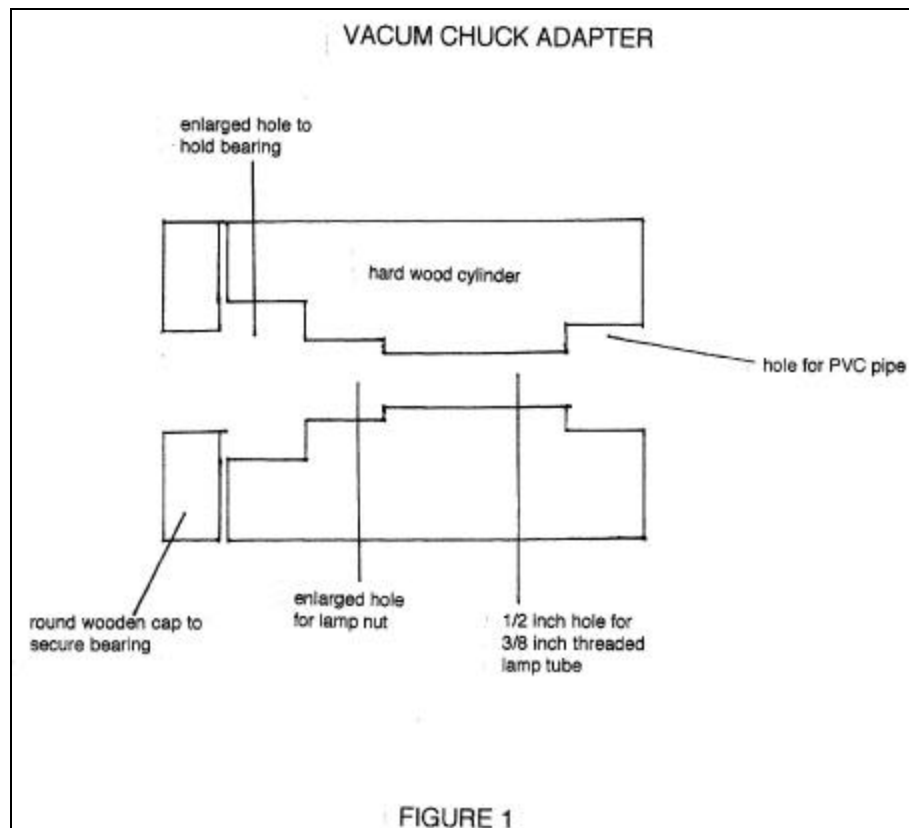
2. While still in the chuck drill a 1/2 inch hole through the longitudinal axis to allow passage of a 3/8 inch diameter lamp rod that is 3 feet long (purchased at Home Depot in the lamp section). Later you will have to cut the lamp rod shorter to adapt to your particular lathe.

3. Using a Forstner bit in the

Volume 1, Issue 1  
February 2004

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## More On Vacuum Chucks

tailstock drill a stepped shallow hole about 1 inch deep (i.e. enlarge the previously drilled 1/2 inch hole) to accommodate a lamp nut for the lamp rod. This nut will be epoxied to the end of the lamp rod see figures 1 and 2.

4. Using a larger Forstner bit (just a little smaller in diameter than the bearing) further

enlarge the hole, see fig. 1. Use a cut off tool to carefully enlarge the hole further until the bearing fits in snugly. A bearing that can be used is one from a Ryobi router Model RE-600. It can be purchased from CCD (phone 1(888) 707-7775). Ask for part RAC 098460040. The cost is about \$10.00. The O.D. is 1.65 inches and the I.D. is 0.785 inches. After you have a snug fit carefully push the bearing out from the other end with a dowel. Do not epoxy the bearing in its seat until step 7.

A brass fitting was bought with a larger O.D. at one end than the other (see fig 3). The one I purchased had internal threads at both ends and was purchased at the plumbing department of Home Depot or Lowe's. The larger end (O.D. of 0.785 inches) was pressed into the bearing using a vise. When you purchase the brass fitting, bring the

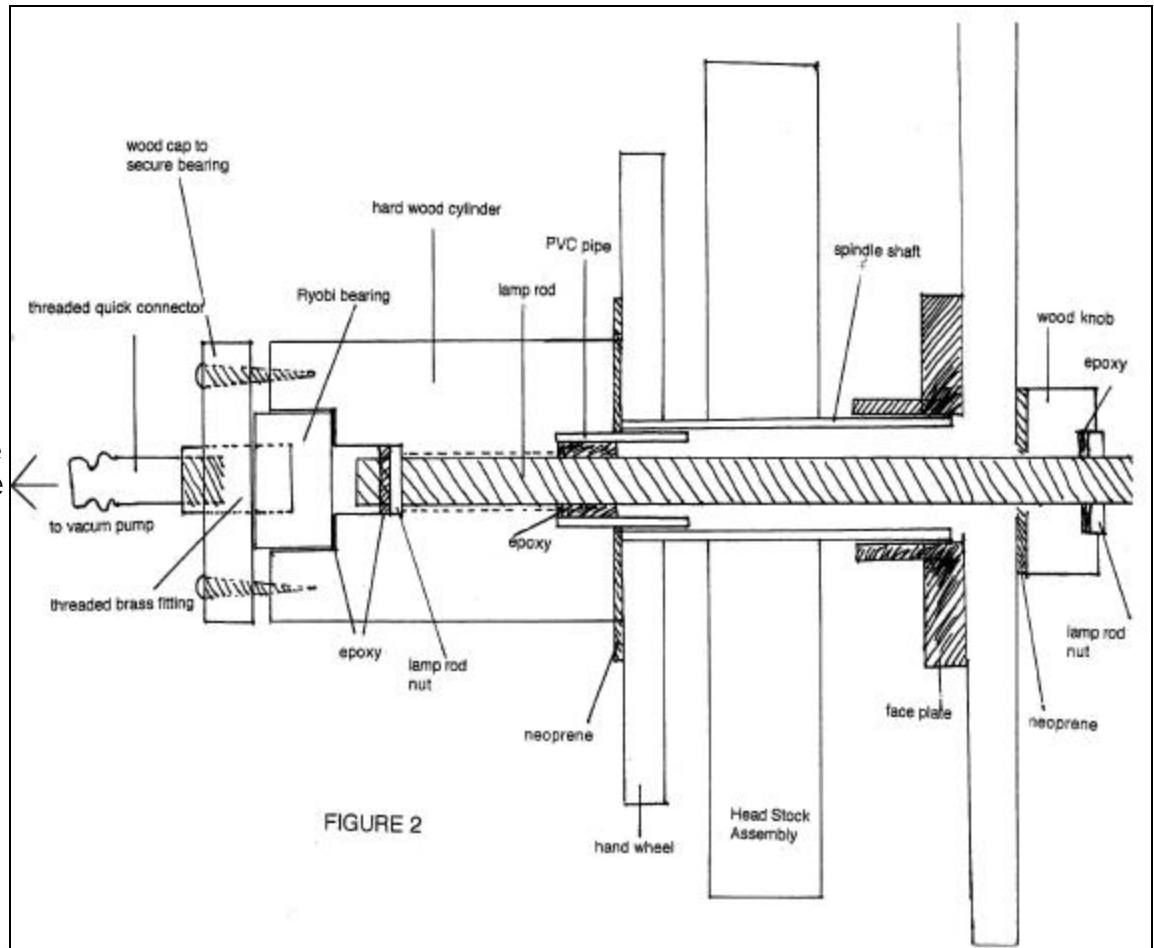


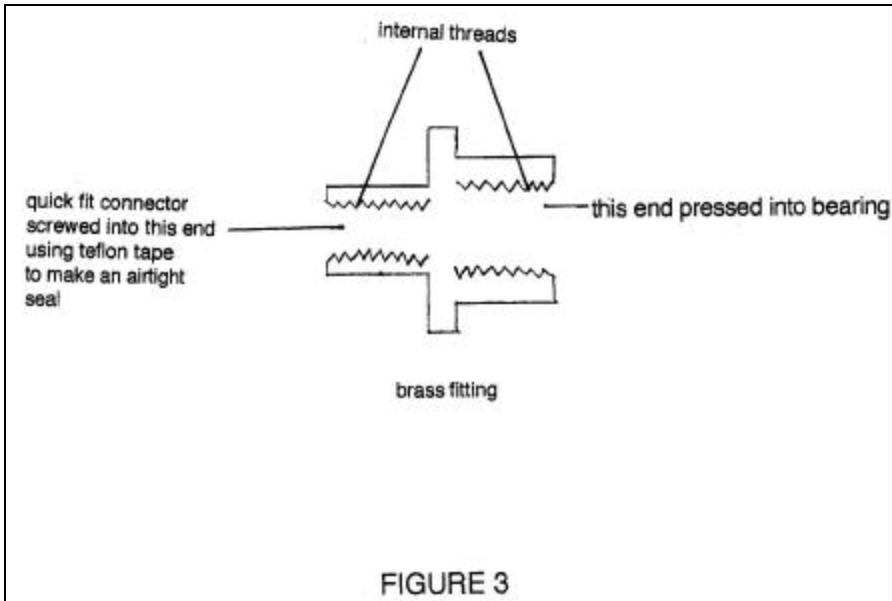
FIGURE 2

bearing with you to make sure it will fit. The end of the brass fitting opposite the end pressed into the bearing must have internal threads (purchased that way) to accommodate a "quick fit" pressure hose adapter which will be screwed in using Teflon tape for an airtight fit, see fig. 2.

5. Try to find a short piece of PVC pipe that can be made to fit snugly into the outboard spindle shaft of your lathe. You may have to turn or sand the PVC to fit. Enlarge the hole in the wooden cylinder at the end opposite the bearing and epoxy the short piece of PVC pipe, see figures 1 and 2.

As an alternative to the PVC pipe, turn a shallow point on the wood cylinder opposite the bearing. The shallow point will fit into the outboard spindle. Use a circular piece of neoprene as an interface in order to make a good airtight seal.

## Still More



9. To make a flat vacuum chuck, secure a face plate to a circular piece of 3/4 inch thick medium density fiberboard (MDF). Pre-drill a 1/2 inch hole through the center of the MDF to allow the lamp rod to pass through. Different diameters of MDF can be used to make different sizes of these flat vacuum chucks. You might assume that you could make just one large size and it would accommodate large and small bowls. However, using a 15 inch diameter piece of MDF can get a little cumbersome when you are only working on a bowl just 6 inches in diameter. A nonporous

6. The 3 foot lamp rod is inserted into the hole at the PVC pipe end of the wooden cylinder, screwed into a lamp rod nut and epoxied onto the lamp rod nut. In addition, epoxy the lamp rod to the PVC pipe, see fig 2. It is important to make sure the lamp rod is centered in the short piece of PVC pipe. The centering process can be facilitated by using 5 minute drying epoxy. While the epoxy is drying, keep the apparatus in a horizontal position and slowly turn it, making sure the lamp rod is in the center of the PVC pipe until the epoxy sets. Allow the epoxy to dry for 24 hours.

7. Epoxy the bearing (with the brass fitting already pressed in) back in its seat (apply the epoxy to the wood, not the bearing) being careful not to put on too much epoxy or you will "freeze" the bearing and the inner ring will not turn. (see fig 2).

8. A wooden "cap" with a center hole slightly smaller than the diameter of the bearing is screwed into the wood cylinder at the bearing end. This cap will secure the bearing in position (in addition to the epoxy) See figure 2.

rubber-like material (purchased at Harbor Freight, the material is called Fender Mat and is 24"x36"). This rubber-like material serves as an airtight seal with your work piece.

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*It is important to make sure the lamp rod is centered in the short piece of PVC pipe.*

For the Powermatic lathe in my studio (shop), I purchased a custom machined adapter [Best Wood Tools, (931) 788-0429] at a cost of about \$70.00. The adapter is screwed onto the spindle shaft and the other end is machined so I can use ordinary pipe flanges as dedicated face plates for my MDF chucks. These pipe flanges which are 4 inches in diameter can be purchased at a plumbing supply house or perhaps Home Depot for about \$5.00 each. The pipe flange has four holes in it and I drilled four more. Thus, eight screws (dry wall) were used to secure the pipe flange to a circular piece of 3/4 inch thick MDF.

10. The lamp rod, the wooden cylinder, the outer ring of the bearing, the lamp nut and the short piece of PVC pipe are now all glued together and

## The Final Word

will turn as one piece with the hand wheel. The inner ring of the bearing with the pressed in brass fitting and the threaded quick connector (figure 2) when connected to the vacuum pump, will not turn.

Insert the lamp rod into the spindle shaft from the outboard end. The

lamp rod will pass through the lathe shaft spindle and through the pipe flange and the Circular piece of MDF with the rubber-like material glued to it, see figure 4. Using a hack saw you can now saw off the end of the lamp rod. Just make sure you leave about 2 1/2 inches protruding beyond the MDF plate. If you cut off too much of the lamp rod you will have to start all over again (speaking from experience). Make a small wooden knob (about three inches in diameter) to which a lamp rod nut is epoxied into a small pocket on one surface of the knob. Screw the knob onto the end of the lamp rod. Tightening this knob will now secure the entire vacuum adapter system.

11. When you first use your vacuum system, turn on your lathe slowly at first. If you are getting 20 to 25 inches of vacuum as registered on your vacuum gauge---- congratulations! You now have a working vacuum chuck.

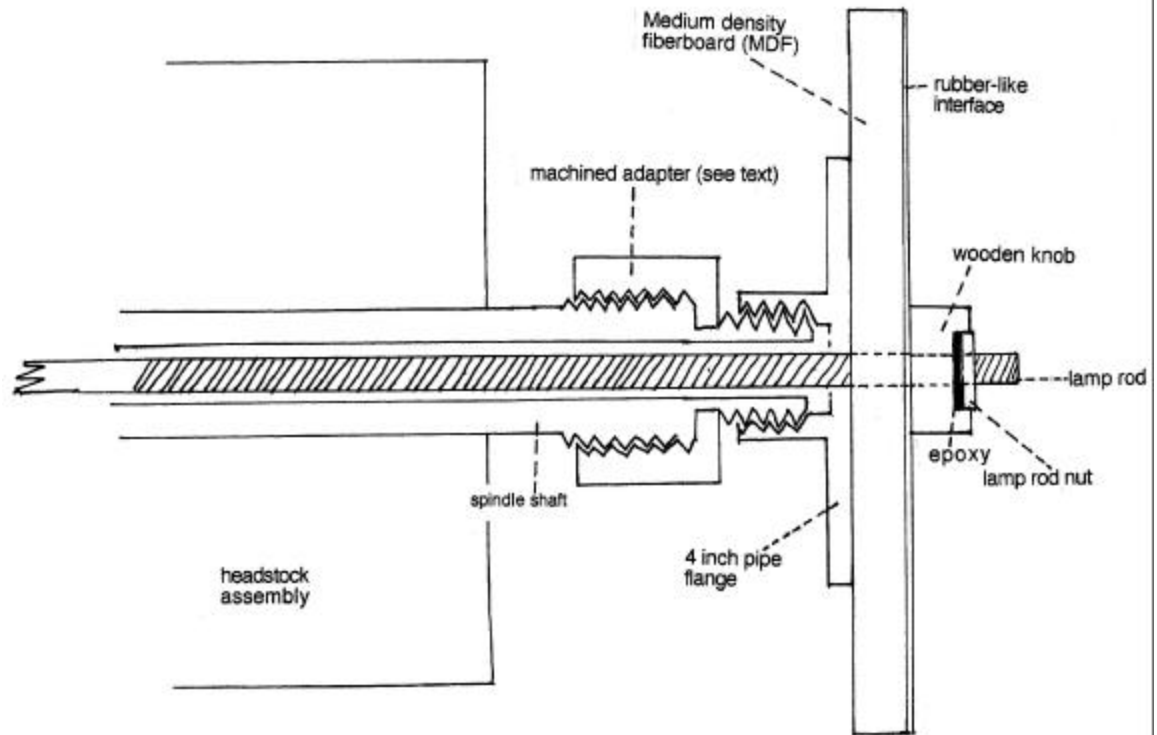


FIGURE 4 NOT ACCORDING TO SCALE

12. In paragraph 9, I have described the construction of a flat circular MDF chuck which will accommodate the mouth of a bowl. Cylindrical chucks can also be made by modifying the disc with a PVC coupler as previously described by Bruce Gibson.

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