

Vacuum System for Woodturnes by Robin Costelle graphics by Caleb Costelle

Have you ever wondered if you need a vacuum system for your woodturning needs? I would answer 'Yes'. A vacuum system is, to me, an invaluable tool and is in constant use. Most every project I tackle on the lathe is at one time or another held by pressure created by a vacuum. From turning bowls (completely-without the use of mechanical chucks), to adding finishing touches on the bottom of pieces, a vacuum chuck will answer many questions about how to hold pieces.

First off, let me say that there are several ways to go about producing a vacuum for wood turning. I am going to show you the way I accomplish this. Most of the parts can be gotten at your nearby hardware store, but some I have gotten online. Use this guide as a peek into the equipment, but feel free to modify and change anything to suit your particular needs. The basics are the same. Again, this is just how I have mine set up and by no means is the only way or even the best, but it's fairly cheap, simple, and effective.

The first order of business and typically the most expensive is, of course, the vacuum pump itself. There are many to choose from, and I am no expert on any of them. I found a used Gast 1/2hp rotary vane oilless pump on ebay. I have also used a 1/4hp, but I've heard that anything smaller may not be as effective for woodturners. I'm sure that others woodworkers may have preferences about pumps and they are probably correct, but this works for me and I have had no problems.

The most important feature to protect the vacuum pump itself is a vacuum filter, placed inline from the headstock equipment (purchased online). I like to use one with a clear globe so I can see the contaminants and clean the filter cartridge when necessary. (see placement of filter in photo 1). I also use inline filter/mufflers in my set up, one at the air exhaust on the vacuum pump and one at the ball valve to filter the air that is taken in when bleeding off the system (photo 1).

A vacuum gauge will be necessary to determine the actual force drawn by the vacuum. This works in conjunction with the ball valve to regulate vacuum pressure. Too much vacuum on a thin walled turning may implode the piece-nut fun. You'll have to kinda play with this to gain experience, but typically you will use your vacuum at its highest pressure to hold the workpiece secure. (typical holding pressures will range from about 15 to 26 inches of mercury- with the upper values having more holding force, and don't be surprised if your vacuum only gets up to 23 or 24-not all systems will pull a perfect vacuum).

Now we come to the spinning part that attaches to the headstock. (Photo 2) You can buy the adapters from many companies, or you can choose to build your own. You'll need to purchase a '**Double Sealed Ball Bearing**' (you can find these online or at Grainger), with an inside diameter large enough to have the hose barb inserted inside. I use JB Weld to secure the hose barb in place-try to keep the area clean of epoxy to keep the bearing free to spin. The wooden bearing housing is just a cone of hardwood with a 3/8" hole drilled to accept a lamp rod (length of lamp rod is determined by the length necessary to extend completely thru your headstock). I cut a small shoulder on the inside of the housing to give a slight clearance for the bearing/hose barb assembly. All the wood parts should be sealed with sanding sealer, Ca glue, or something to reduce the air flow thru the end grain.

Placement. I have attached my gauge and valve components to the back of the headstock, (photo 5). This positions the vacuum adjustments out of the way but within arm's reach. This also keeps the vacuum hose going to the headstock relatively short. I have also mounted an on/off switch on the lathe below the bed to the left of the headstock end of the lathe-out of the way, but easily accessible, (photo 6).

Notes:

-For any project that needs an adhesive seal, I use Polyseamseal, an adhesive caulk made by Lock Tite and available at most hardware stores. I use the transparent caulk, because I believe it has a stronger bond. This can be used to seal PVC coupling to wood for vacuum chucks, or seat the bearings in the headstock adapter, or just about anything else you need.

-I chose to do away with the lamp rod entirely. I just use the wooden ball bearing adapter and secured it to the shaft opening in the handwheel on the headstock with the Polyseamseal. This allows me to use my spur drive without having to take the vacuum system down. I secure my spur drive in a mechanical chuck so there is no need to use the knockout bar to remove it from the spindle. (The only time I have to remove the vacuum adapter from my lathe is when I'm using a lighted chuck for turning the tops of hats-which is pretty seldom).

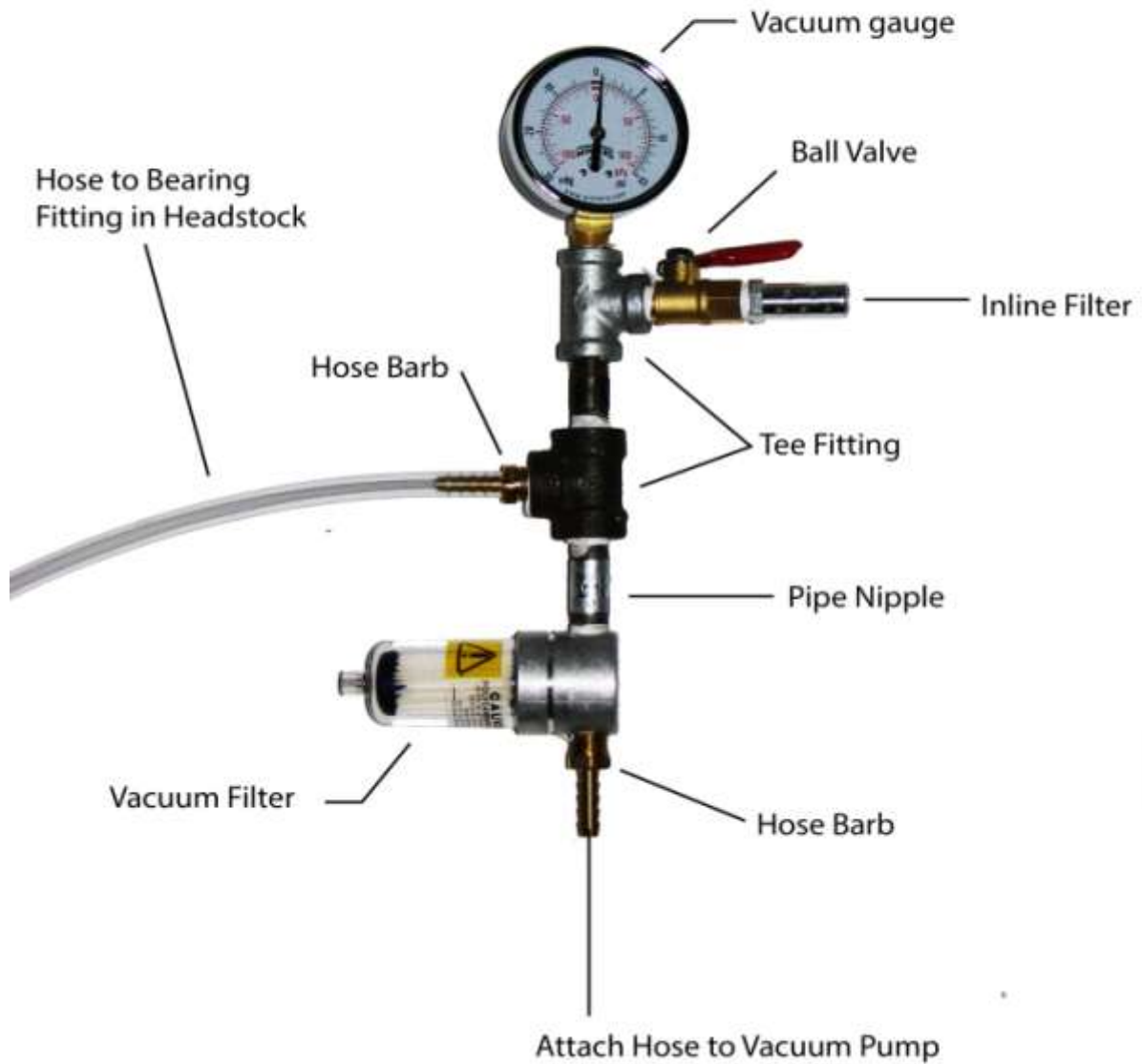
-I bought the vacuum filter online at <http://www.veneersupplies.com>.

-I don't remember where I bought the inline muffler/filters or the gauge, but I'm sure they can be found fairly easily. Everything else can be found at your local hardware stores.

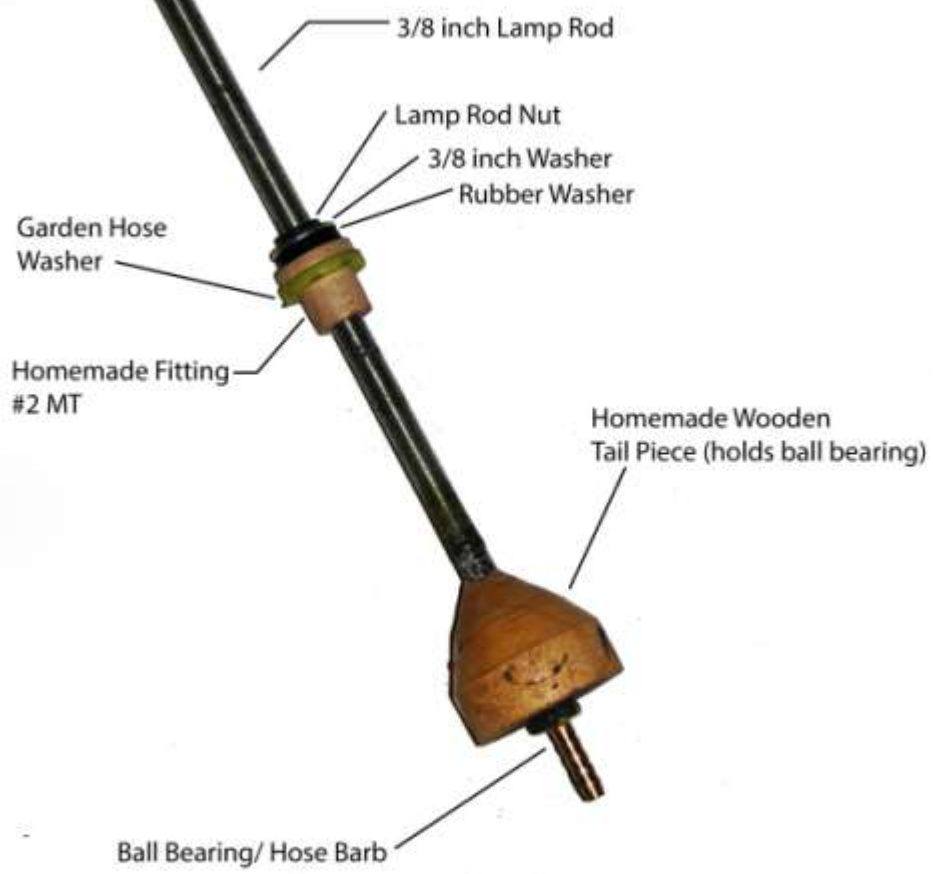
-A very handy chuck for turning the bottom of very small diameter pieces can be made from 1 ¼" PVC. I have one that's about 6" long that I use to remount finials with bases. This allows me to finish sanding and even put a couple of decorative grooves on the underside of the base. But be aware that such a small diameter PVC will not have the holding power of a larger one. You can only take very light cuts and sanding.

1

Vacuum Pump System



Homemade Headstock Vacuum Adapter





3



4



5 Placement for gauge and valve



6 Placement for on/off switch

Chucks-This is a large chuck made from a 6" PVC coupling. I've mounted it in a groove cut into a large piece of maple. A hole has been drilled thru the center and tapped (in my case tapped to 1 1/4 x 8). You can also use a faceplate with sealer between the faceplate and a wood base. Two 3/8" holes were cut into the face grain sides of the maple, about 1 1/2" deep to accept my Allen chuck key for tightening purposes (example in photo 4). Once again, all the wood has been sealed with sanding sealer or equivalent to reduce the possibility of air leakage. I used Polyseamseal to seal the PVC to the wood.

I like to true the PVC chuck before I mount a piece of wood to the surface. It only takes a quick pass over the edge with a gouge to insure a true plane. I also use close cell foam package sheets (acquired from a furniture packing company's discarded waste). It isn't quite reusable, but it's cheap and for me, readily available. The thicker the foam the better the seal in my opinion.



1



The chuck mounted to the lathe ready to be trued.



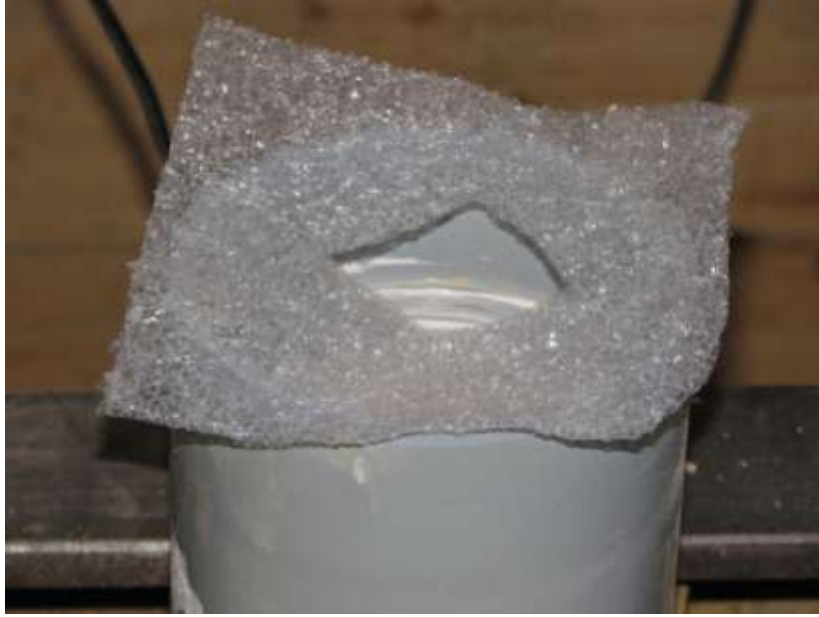
3

Threads cut in base for spindle



4

3/8" hole for chuck key. Helps tighten the chuck. Make sure you cut these in the face grain. An end grain hole could pry the chuck into halves.



5

Piece of packing foam. Just cut enough of the center to open up for vacuum.