

# A Brief Introduction to use of Vacuum Devices in Woodturning

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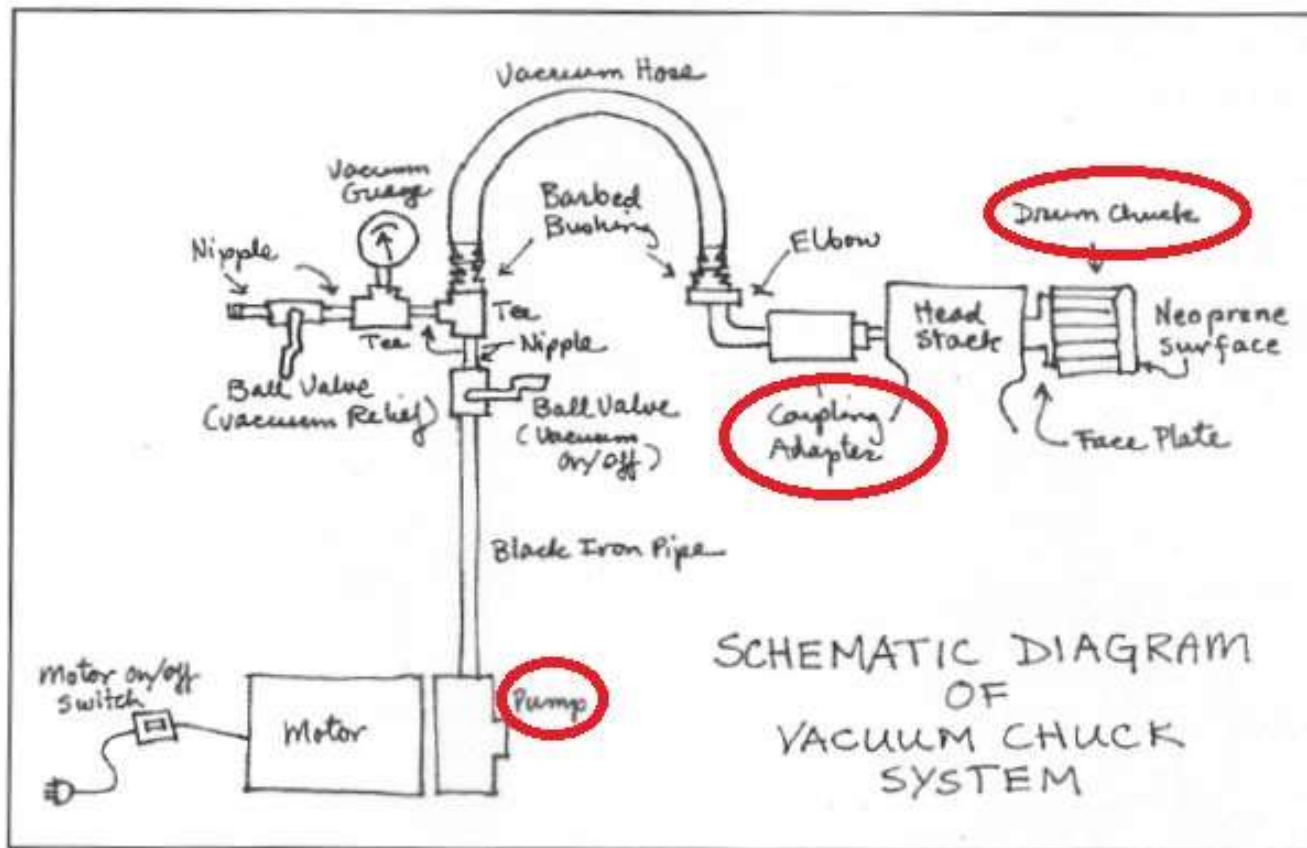
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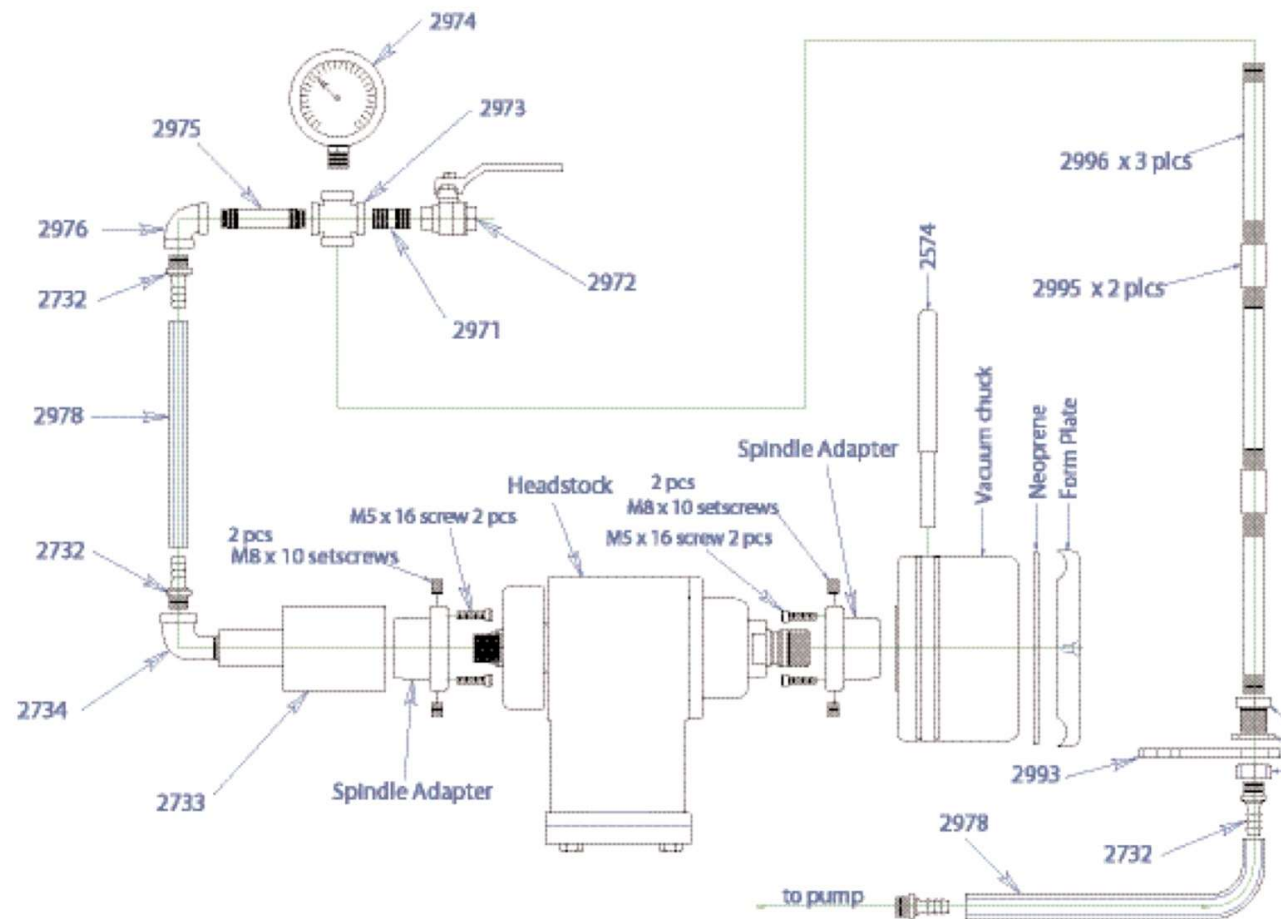
# Possible Uses of Vacuum for Woodturning

- Holding work – Vacuum Chucking
- Holding work on a bench for surface texturing
- Vacuum pots or vessels for wood stabilization or addition of polymers to fill voids.
- Last item not covered in this material



Taken from American Woodturner Winter 1998 by Dave Lancaster

# Oneway Vacuum Schematic from Gauge Manual

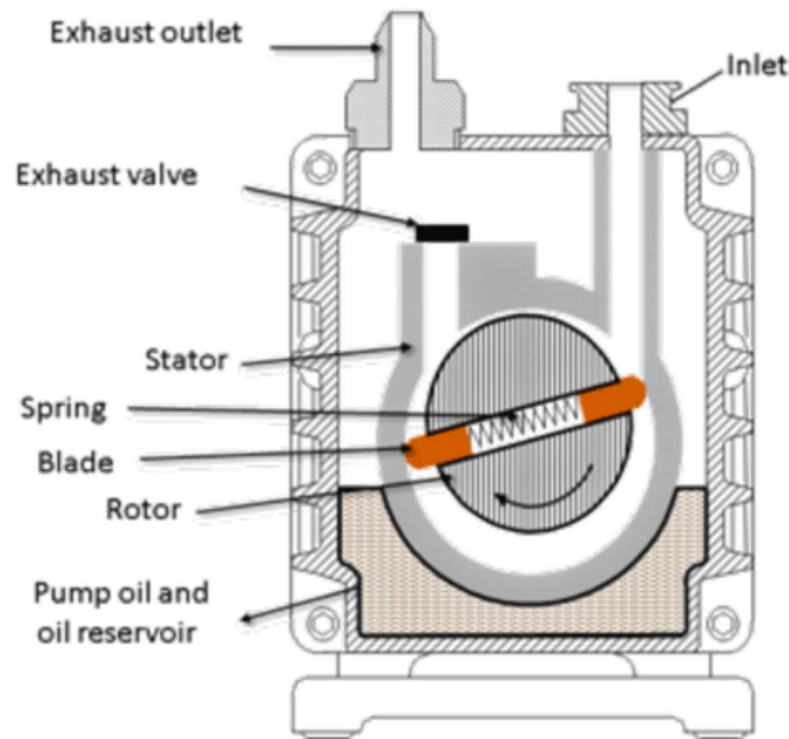


# Types of Vacuum Pumps

- Vacuum Generator – Venturi effect, requires high volume air pressure like 5 HP Air Compressor, cheap except to run.
- Diaphragm – low cost, usually not enough volume
- Oil filled mechanical pump, industrial, laboratory or dairy milking machine pump
- Dry Carbon (Graphite) Vaned

As wood is porous depending on species, requirement is 4-5 CFM volume and ability to pull a vacuum of about 25 inches of Mercury. ¼ HP generally minimum recommended motor.

# Generic Vacuum Pump



Eccentric mounted rotor with spring loaded vanes. Oil based have metal vanes (Blade in drawing) needing lubrication. Dry pumps use self lubricating Graphite Vanes.

Pumps with Oil create exhaust mist which must be dealt with and are noisy on initial pump down. Port the exhaust to a box filled with large surface area absorbent like fiberglass insulation.

Used laboratory oil filled pumps may have noxious chemicals in oil.

# Pump Sources

## Piecemeal build your own system

- Used – Kijiji, eBay, auctions, Estate sales, used laboratory equipment sellers, Government Surplus [gcsurplus.ca](http://gcsurplus.ca)
- New – Amazon – oil based, Oneway – Gast Dry Vane (**Most recommended**)
- Gast Distributor in Canada is Wainbee [www.wainbee.com](http://www.wainbee.com)
- Spend hours sourcing vacuum gauge, fittings, valve, making adapter etc.

## Easy Peasy – Buy it and get it going quick

- Oneway have all the components for less than \$1000, Adapter, Gauge/Tubing Kit and Gast Pump. May have to make a support for plumbing to adapt to non Oneway lathe.

# Adapters – Get the Vacuum to the chuck

A headstock with a hole through it is highly desirable. Not covering situation with solid headstock, adapters do exist. Many manufacturers have an adapter for their lathe available. Must have a path with a sealed rotating bearing. Many possibilities for home design can be found by Googling including your lathe make. Simplest is a piece of lamp tubing passing through the headstock with a rubber stopper or other seal near the vacuum chuck and a sealed bearing with barb for tubing connection. Sometimes on Midi lathes this is the best approach or adapting a tubing/bearing to the handwheel.



**HF Vac Adaptor Kit -  
Universal**

Adapter from Packard Woodworks - USA



# Oneway Vacuum Adapter



**Part No. 2733 - Vacuum Chuck  
Adaptor (03XX REQ'D)**

PACKAGE INCLUDES Vacuum  
Adaptor Taper-Lock Adaptor (packaged  
separately) Removal Lever 4mm Allen  
Key Scre..

\$110.95

Uses same taper  
adapter as Oneway  
Stronghold Chuck and  
available for pretty  
much any thread size  
for the outboard  
connection, so if you  
change lathes, you can  
purchase a new taper if  
needed. Extremely well  
made and good value!  
Available from Oneway  
dealers or factory.

# Commercial Vacuum Chucks



**Part No. 2979 - 5 1/2" Drum Chuck**

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\$94.95



**Part No. 2980 - 8" Drum Chuck**

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\$214.95



**Part No. 2987 - 12" Drum Chuck**

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\$284.95



**Part No. 3008 - 3 1/2" Drum Chuck**

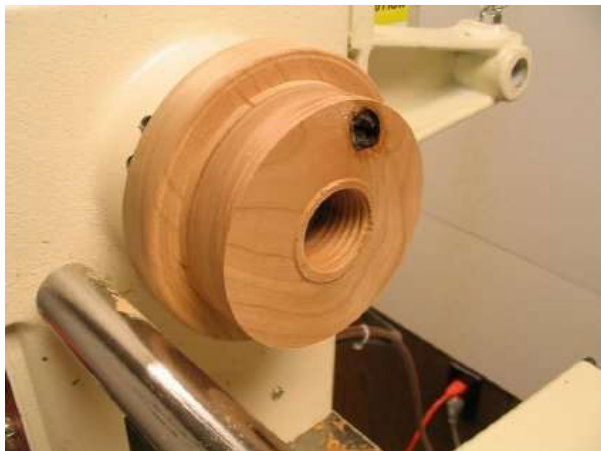
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\$74.95

Oneway line of chucks are of very high quality and machined from a solid block of aluminum. Use the same taper as a Stronghold Chuck, so can adapt to other headstock outboard thread sizes if you change lathes. A variety of other chucks are available if you wish to support foreign rather than Canadian workers.

# Homebuilt Vacuum Chucks

Smaller chucks can be easily made for minimal cost and many designs are available on various woodturning forums. Starts with a backplate of nonporous wood or other strong material, perhaps with a faceplate for fastening or an embedded nut or threaded to suit headstock. True up after mounting. Smaller chucks can also be made from a solid block of wood. Cylinder can be whatever, Aluminum pipe of sufficient thickness, PVC or ABS plumbing or sewer pipe fitting, secured on a shoulder or in a groove in the backplate with silicone caulk or epoxy. True up the front face after the adhesive is set. The face securing the work needs a sealing material of closed cell foam, neoprene, weatherstripping etc.



From a posting by Steve Schlumpf at Sawmill Creek Forum 2010



# Some of my Homemade Vacuum Chucks



Design I made in 2002. Works in standard four jaw chuck. Rubber stopper seals in Morse Taper of Headstock. Packard adapter inspired.



Left – 5", Right 4". Embedded 1" x 8 TPI Nut to mount. Closed cell foam gasket glued on with contact cement type adhesive.

# Custom shaped chucks can be made



Vacuum chuck for holding balls or spheres by Malcolm Cumming at his January 2020 demonstration on sanding techniques. Longer cylinders can be used for hollow vases etc.

# Useful Accessory for Reversing Bowls



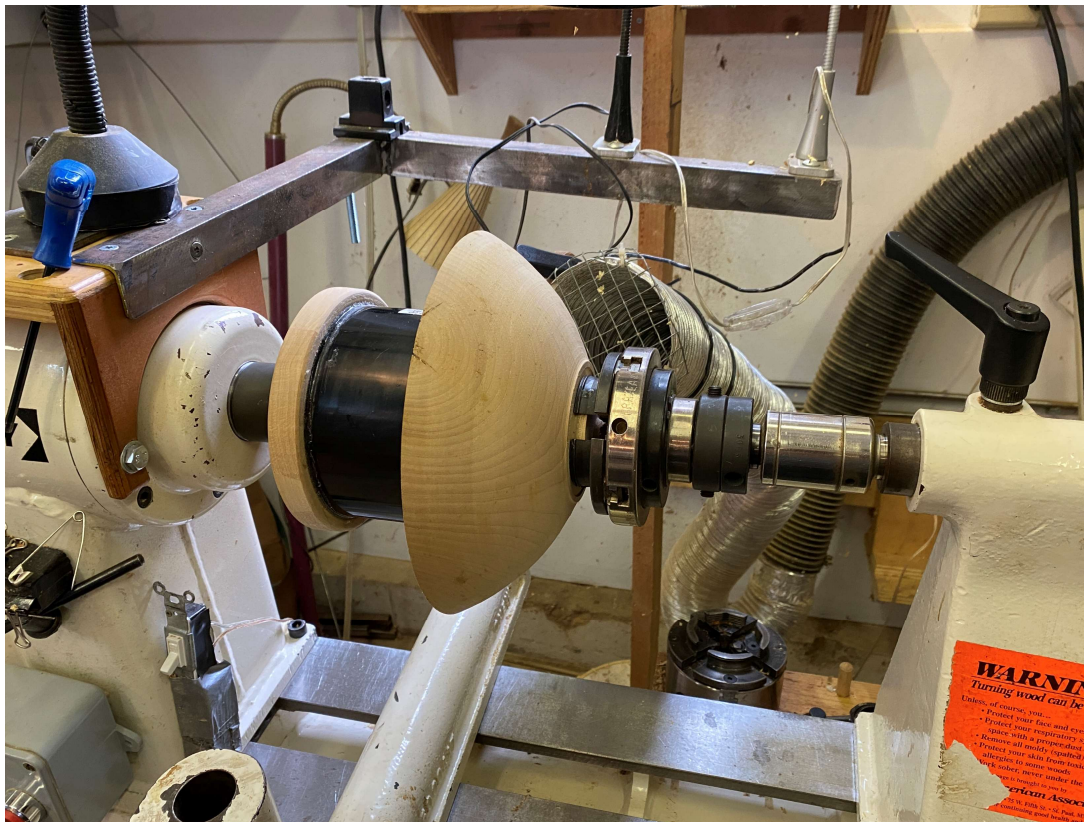
**Part No. 3941-222 - Live Centre  
Adaptor 3/4"-10 TPI to 1 1/4"-8 TPI**

..  
\$42.95

Screws into the chuck holding the work and can then be reversed to mount on the tail centre  $\frac{3}{4}$ " x 10 TPI perfectly centred. Available in a variety of thread sizes.

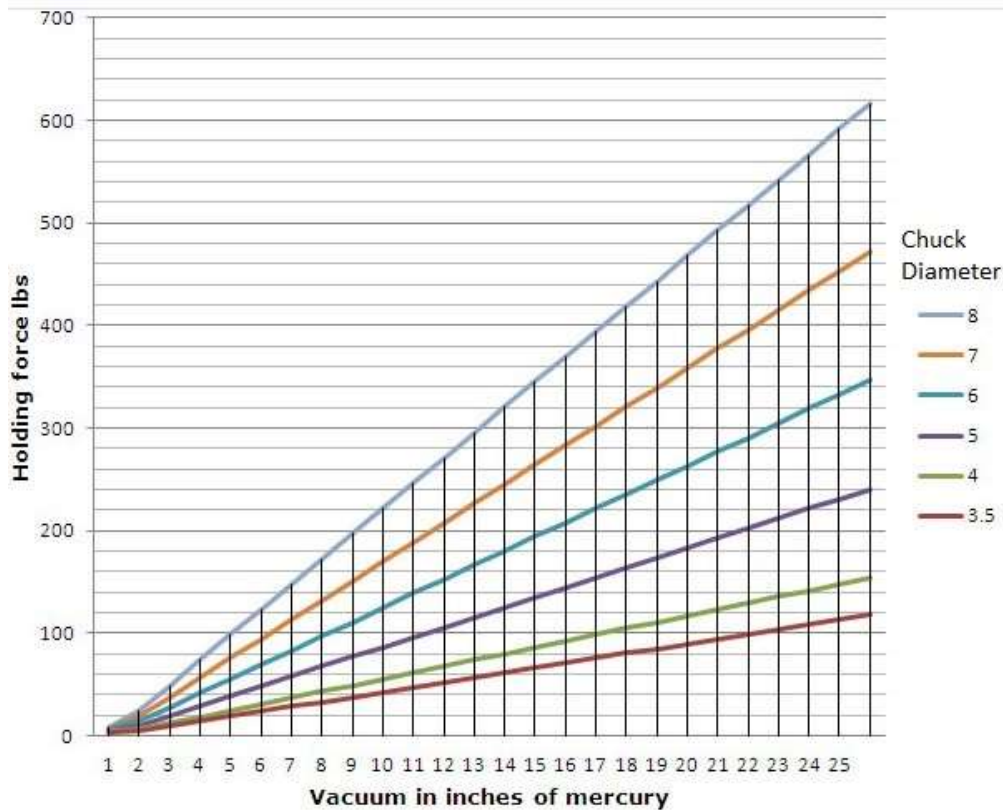


# Oneway Live Centre Reversing Adapter in Use



Perfectly centers  
and aligns the  
bowl on the  
vacuum chuck  
face.

# Holding Power



Tremendous holding power is available. This chart is taken from the website of Paul Hannaby Woodturning [hannaby.com](http://hannaby.com)

## Calculations

( $A = \pi r^2 \times \sim 15 \text{ psi}$ ) are approximate and can vary according to the quality of the seal and porosity of the wood.

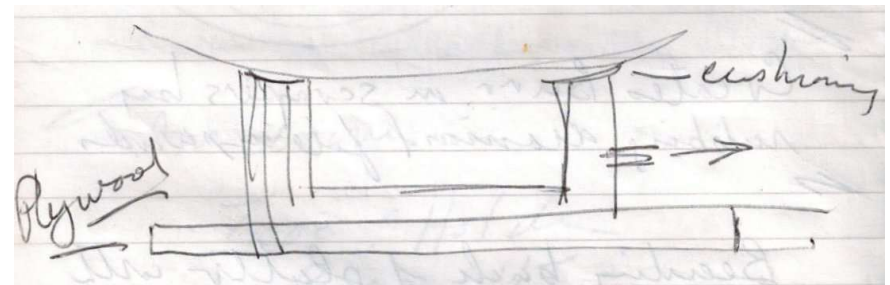
The beauty of vacuum is the free access that it allows to finish off the base of bowls with decorative effects. Final sanding and form detailing around the foot area can also be done.



The bowl bottom should hold a surprise



# Bench Holding Work for Carving



Custom made chuck by Al Stirt for Holding a piece for embellishment  
Grey Bruce Demo March 2004