Vacuum Chucks for Wood Lathes

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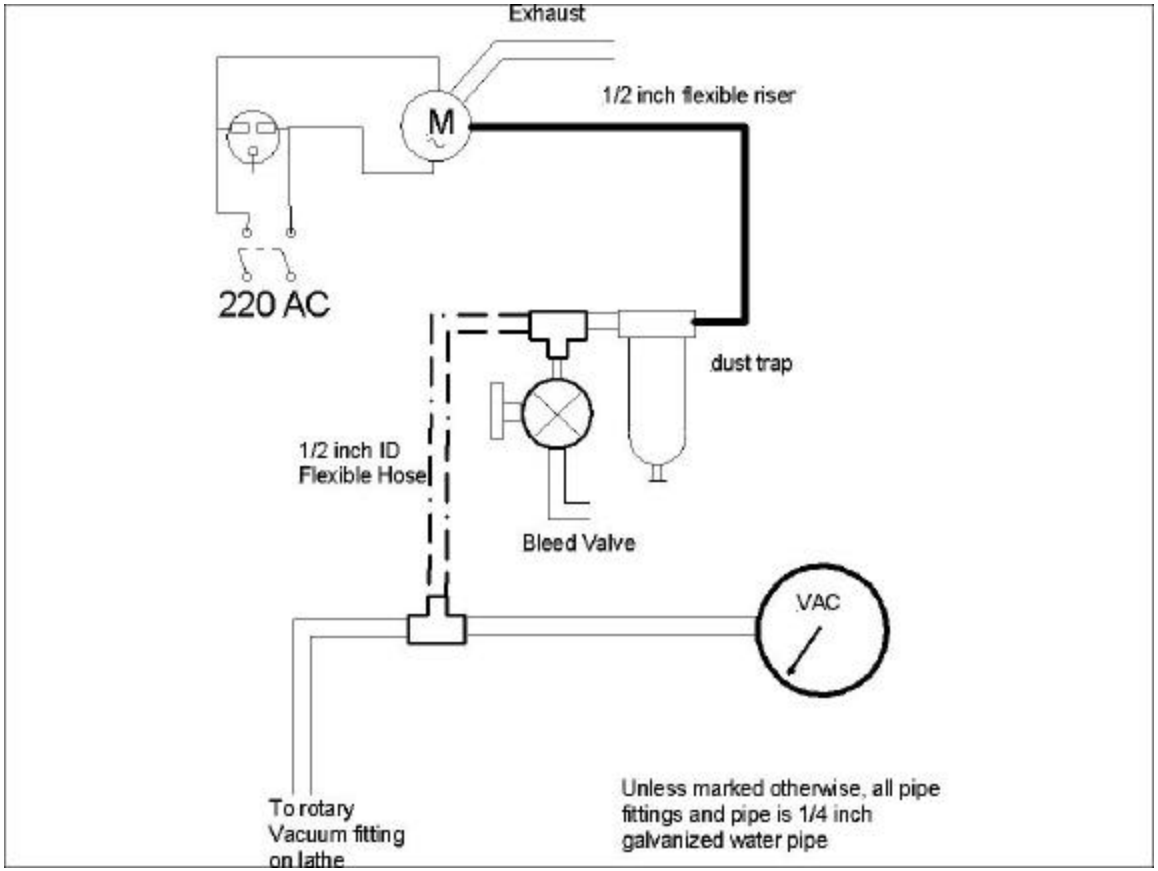
Why?

- Hold stuff without marking it
- Quicker than a jam chuck (and no waste wood)
- It’s another tool to play with
- Can hold irregular objects too

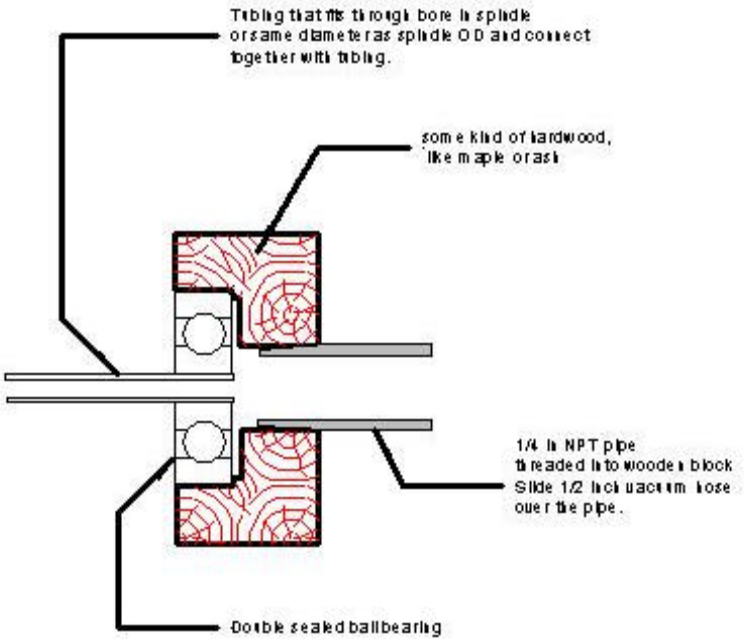
How?

- Vacuum source (pump)
  - Positive displacement VS non positive displacement
    - Vacuum pump(more costly, more vacuum, less volume)
    - Shop Vac (cheap, low vacuum, more volume)
- Rotary Vacuum Fitting
- Miscellaneous plumbing
- Chucks to hold the work

Positive Displacement Setup

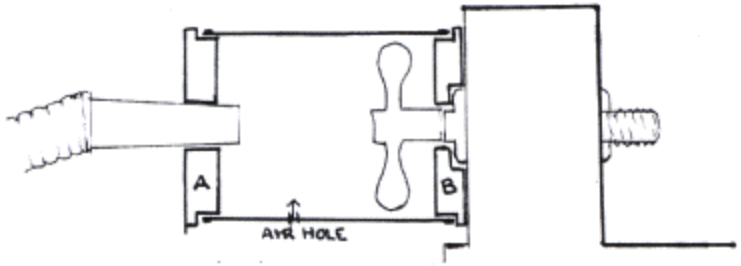


Rotary Vacuum Fitting



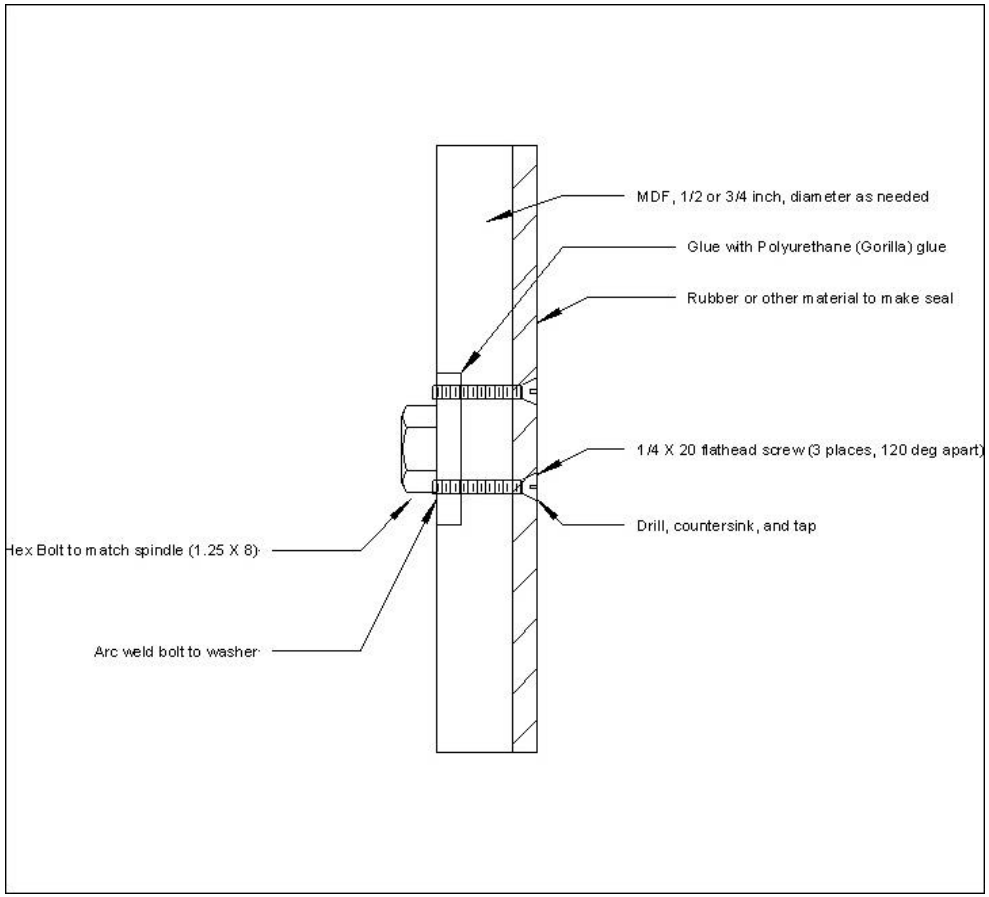
- Buy
  - See list of sources
- Make
  - Double sealed ball bearing
  - Tubing and wood

Using a Shop Vac



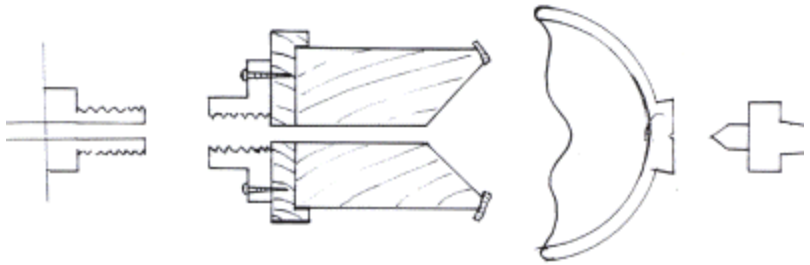
- Coffee can and wood to seal to headstock
- Shop Vacuum connected via hose
- Remove can when not using so you can reach the hand wheel

Making a Chuck



- MDF main body
- Nut/Washer for faceplate (weld)
- Rubber face for sealing to work

Another Chuck



- Use MDF or hard wood
  - Paint to seal if it's porous
- Can use previous chuck with a groove and PVC pipe
  - Seal pipe to MDF with hot melt adhesive or urethane glue

What do I make seals out of?

Material	Comment
Artificial chamois (for washing cars)	Good seal to a flat/round surface. Will provide a solid base for work
Closed cell foam (mouse pad, wet suit)	More conformal, will seal to more irregular or imperfect work. But because it is flexible, the work itself can move a bit, so you will have to use much lighter cuts
Neoprene rubber	Like the chamois, it is a rigid material that won't conform much to irregular surfaces
Other foam	Make sure the foam is closed cell. An open cell foam will allow air to pass and you will have a major vacuum leak.
Styrofoam	Haven't tried it, but it's pretty brittle.
Leather	See Chamois
Vinyl	Not a good choice, too rigid to seal to any but the most perfect surface.
Hot-Melt Glue	Soren Berger likes this seal

Choosing a Pump

- Cost, Availability, Performance
  - Noise, ease of use
  - Rotary vane is best performance (CFM), but noisy

Table 5 Pump Capacities and Applicable Vacuum Pumps

Vacuum Pump Types	Maximum Vacuum Level (in. Hg)		Range of Capacities (CFM Free Air at 0 in. Hg.)	
	Continuous	Intermittent	Smallest	Largest
Piston	27.5-28.5	-	1.3	10.5
Rocking Piston	25.5-29.0	-	1.22	2.7
Diaphragm	23.5-29.0	-	0.49	3.6
Rotary Vane (oil-lubricated)	10-28	25-28	1.3	55
Rotary Vane (Oil-less)	15-27	15-27	0.35	55

Safety !!!

- Vacuum can cause significant pressure on the work – risk of implosion.
  - The larger the area evacuated, the greater the pressure

Diameter	Area (square inches)	Force on a bowl as a function of vac		
		5 in Hg	10 in Hg	20 in Hg
4 in	12.6	29	58	116
8 in	50.3	115.5	231	462
16 in	201.1	462	924	1848
32 in	804.2	1847	3694	7389

  - Watch the walls
  - Do not use the “coffee can” approach with a positive displacement pump (may crush the can)
- Power failure or a catch can cause loss of vacuum
  - Take light cuts, protect yourself, keep RPM reasonable

Sources

- Pumps and info
  - **Gast** Manufacturing Inc., a Div. of IDEX Corp.
    - P.O. Box 97
      Benton Harbor, MI 49023
      Tel: 616/926-6171
      Fax: 616/925-8288
    - Web: http://www.gastmfg.com
  - **Thomas** Industries Inc.
    1419 Illinois Avenue
    P.O. Box 29
    Sheboygan, WI 53082-0029
    Tel: 920-457-4891
    e-mail: rtaylor@thomasind.com
    Web: http://www.thomaspumps.com
  - Surplus stores, Swap meets, etc
- Vacuum chuck kits and supplies
  - (Craft Supplies USA), 1-800-551-8876, www.woodturnerscatalog.com has a kit called the Artisan Vacuum Chuck System
  - E-Z Vacuum Adapter
    One-way Rotary joint
    http://www.packardwoodworks.com/ 1-800 683-8876 Packard Woodworks, PO Box 718 Tryon, NC 28782
  - ***Venturi Based Vacuum System***
    http://www.collectcraft.com/venturivacuum/