JT Turning Tools, LLC

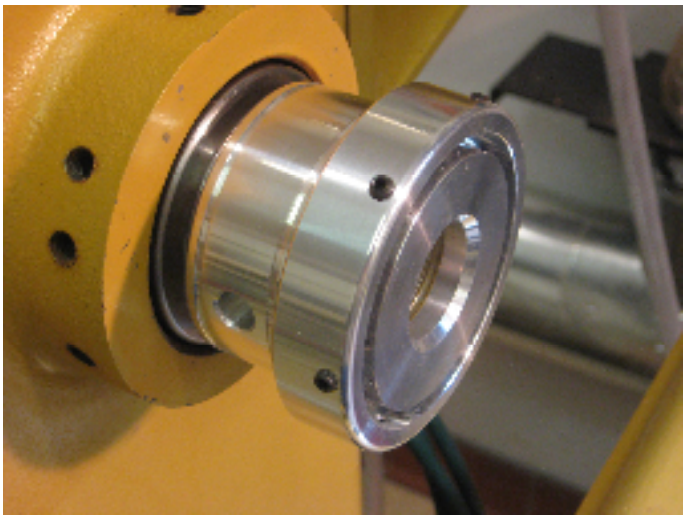
Installing the Precision Vacuum Hub and vacuum cups.

Precision Vacuum Hub: Carefully unpack your Precision Vacuum Hub, checking to make sure that the face groove O-ring and six set screws are in place.

- **Tools Required:**
  - 3/8" diameter lever wrench (tommy bar)
  - 3/32" Allen hex wrench

- Begin by making sure that the face groove is clean and free of debris.

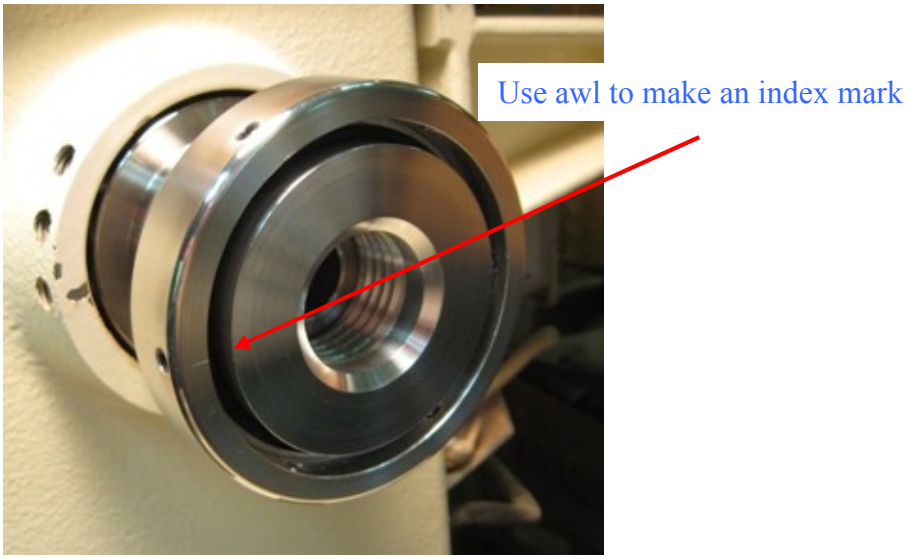
- Thread the hub, small end first, onto the inboard end of your lathe spindle. The use of a soft plastic spindle washer is recommended when installing aluminum accessories onto steel spindles.
- Tighten the hub on the spindle with a 3/8" diameter lever wrench. Lever wrenches and spindle washers are available from JT Turning Tools if you do not have them.



Vacuum Cups:

- **Tools Required:**
  - 3/32" Allen hex wrench
  - Small round-nose scraper
  - 220 sand paper
  - Closed-cell foam gasket material
  - Scratch awl or sharp pointed knife
- Two of the set screws in the Precision Vacuum Hub were utilized to retain the O-ring in place during shipping. Loosen all six set screws so that they do not protrude into the face groove on the front of the vacuum hub. Check to make sure that the O-ring is inserted down to the bottom of the face groove.
- You may utilize Schedule 40 PVC pipe ***couplings*** as vacuum chuck cups with this hub. Most users choose a 2" coupling, a 2"-3" reducing coupling, and a 2"-4" reducing coupling as their vacuum chuck cups. These are inexpensive common PVC fittings, generally available at most home centers, hardware stores, and plumbing supply houses.

- Prepare the chuck cups for installation as follows:
    - As purchased, the PVC fittings will often have part numbers, Mfg. name, and other mold "flash" on the ends. Begin by removing these imperfections – the best method is to chuck them mechanically if possible and clean up the ends of the fittings with a small round nose scraper, with the part spinning at very low RPM. Higher speeds tend to induce heat, softening the plastic, and may cause chatter. Sanding is another acceptable clean-up alternative. If it is not possible to chuck the fittings in your lathe, you can prepare the ends by taping a sheet of ***220 paper*** to a flat surface and manually dressing the ends. You only need to prepare one end of the fitting at this point – the 2" end that will be inserted into the face groove of the Precision Vacuum Hub.
- Install the cups into the hub as follows.
    - Check to make sure that the O-ring is down against the bottom of the groove, and that all six set screws are sufficiently loosened.
    - By hand, begin inserting the prepared end of the coupling into the groove on the face of the hub.
    - Once started, bring up the tail stock - insert an appropriate size plywood scrap between the cup and the tailstock quill – lock down the tailstock and use the quill to drive the coupling to the bottom of the groove. Note: apply enough pressure to compress the O-ring.
    - While maintaining pressure with the tailstock, tighten the six set screws in a cross-circle pattern – like you would the lug nuts on a car wheel. The cup points of the set screws will indent the plastic, so tighten them securely. Release the tailstock pressure and check to make sure the cup spins with no or very minor wobble.
    - Start your lathe at low RPM and use a small round nose scraper to true up the outboard face of the cup. With the face true, continue using the scraper to slightly round the edges of the face so no sharp corners remain. Sanding is also an acceptable method. A nice smooth surface is necessary to prevent damage to the foam gasket you will apply later.
    - When you are satisfied that the cup is true and smooth, use an awl or similar tool to make a small index mark on the face of the hub, outside the edge of the plastic cup. Now, make a corresponding mark on the plastic, directly below the mark on the hub. These index marks will allow you to return the cup to exactly the correct position in the future.



  - Repeat the above process for each cup that you want to make. When properly index marked, you can repeatedly switch cups and return them to the proper position each time.

- Install gasket material on the vacuum cups.
  - Closed-cell foam materials make the best gaskets for vacuum cups. They are inexpensive, and readily obtainable from craft supply stores or craft departments in department stores. Known by various names such as Craft Foam, Play Foam, Funky Foam and the like, the foam is available in sheets of various colors. We recommend 3mm (1/8") foam, white in color. This thickness provides a good cushion and is easy to work, although other thicknesses, (2mm or 4mm) will work too. The white color is preferred because there is minimum chance of a color mark being transferred to your project during vacuum chucking. The foam is usually available in plain back or self-adhesive backed. Either will work, but I think the self-adhesive is easier to use, because you don't have to apply any glue. Cut a disc at least 1"-1.5" larger than the diameter of the cup, peel off the backer, and apply directly to the face rim of the cup. Work the material over the outside of the rim and press down on the outside of the cup. Apply a wrap of masking tape or electrical tape across the joint between the foam and the cup – this foam has a "memory" and will try to straighten out if it can. You can cut out the center of the disk if you want to, but all you really need is a ½" hole in the middle to allow the vacuum to work. You will find this material to be surprisingly durable, but you will have to replace it occasionally when worn out or damaged.

That's it! You should be all set to use your Precision Vacuum Hub and vacuum cups.