

Let's make a vacuum chuck – at practically no cost.

Cole jaws or jam chucks are usually fine for mounting bowls for finishing the foot, but sometimes neither are convenient and it is well worth while to consider a vacuum chuck. This is particularly the case when after finishing a bowl you realise that a bit more work or some modifications are needed. For example, I recently wanted to remount a round-bottomed (footless) bowl to improve the inside form and finish. Of course there are some good vacuum chucks on the market, but they are relatively complicated and expensive, mostly involving a costly vacuum pump. The one I want to describe here was made of odd bits and pieces already available in the workshop.

There are two alternative approaches. The commercial models mostly use a pump which can achieve quite a high vacuum, but with a limited airflow rate. Everything has to be well made and leak-proof. This system is required if the object to be held is small, because the force holding the work in place is given by the surface area of the chuck opening (square inches) multiplied by the reduction in air pressure (lb/square inch). The other approach used here and suitable for larger objects is to use a large volume-low pressure pump such as a vacuum cleaner or shop vacuum. These can typically only pull about 2.0 lb/sq. in., but if you have a chuck of say 7 inches diameter the area is about 38 sq. in and the force holding the work in place is 76 lb. force. This is plenty to hold a large bowl seated on a gasket in the form of a rubber ring. Because the vacuum cleaner can shift a very large volume, leaks are not important.

Components needed

1. The lathe must have a hollow headstock spindle
2. The chuck. This shown in Fig. 1 and consists of a face plate screwed on to a wooden disc hollowed out or built up to accommodate the profile of the bowl. A cove is turned close to the edge of the hollow to fit a ring made of rubber tubing about 1 cm outside diameter. The tube is carefully and squarely cut to size with a sharp blade and joined with CA glue. The ring is then glued into the cove with a little CA glue. Finally, a hole is drilled through the centre of the disc.
3. The vacuum source is connected to the lathe spindle by a piece of brass tubing, which fits nicely inside the bore so that the tube can be held still by a simple wooden bracket while the spindle rotates. It could be lubricated, but I have not found this to be needed. A PTFE washer fits over the tube and is glued in place to prevent the tube being drawn into the bore.
4. The final component is a length of rubber tube and some way of adapting it to the vacuum cleaner hose. A vacuum gauge is not needed, but if one is available it can be connected in with a T piece.



The photos show: the chuck mounted on the lathe via a face plate, the vacuum connection, a bowl mounted on the chuck.

How to use it

With the lathe stationary, the bowl should be offered up to the chuck as well centred as possible and the vacuum turned on. When the bowl has seated securely, rotate by hand to check that it is running true. If necessary, reduce the vacuum and adjust. Now with the full suction, check that the bowl is very firmly held and proceed with the turning. It is sensible to make just light cuts. If by any chance the power should fail, then of course the work will come lose, but the vacuum will last long enough for you to catch the bowl as the lathe slows.

I spent some time looking at all the different vacuum chucks on the market and, after making this simple but effective one, am very glad I did not get round to buying one.

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