Since constructing my home-made vacuum chucking system (described in *WW&WT July 2006*) I have been very pleased with it but, annoyingly, it ties up two faceplates, one for the chuck itself and another for the rotary adaptor that fits on the outboard end of the spindle. These 100mm faceplates currently cost £28 each, so they represent a considerable investment if you suddenly find you need one for something else.

Really I needed something cheaper than a faceplate as a means of attaching my vacuum chuck to the lathe spindle, and it occurred to me that a simple nut would probably do the job – if I could find one to fit.

An hour or so spent trawling the internet for 'nuts' revealed sources of all sorts from Brazils to Walnuts, and it slowly dawned on me that I should look for 'fasteners' rather than 'nuts'. Several zips and buttons later I eventually arrived at a firm whose website (www.newformdistribution.co.uk) definitely said that they stocked the M33 x 3.5 nuts I wanted (photo 1).

photo 1

On emailing them I found that, although they normally supply in bulk, they were prepared to sell me a few at a very reasonable price, so I bought ten.

Two new vacuum chucks

photo 2

Before dismantling my existing vacuum chuck (photo 2), I wanted to be sure that I could successfully make the replacement.

I decided to leave the original chuck as it was for the time being and test the idea by making an entirely new chuck from scratch.

One of the nuts was mounted in my metalworking lathe and a recess bored to match the register of my VL175 lathe (diagram 1). This allows the nut to butt up to the face of the register when it is screwed onto the spindle, and ensures that the nut (and eventually the chuck itself) will rotate

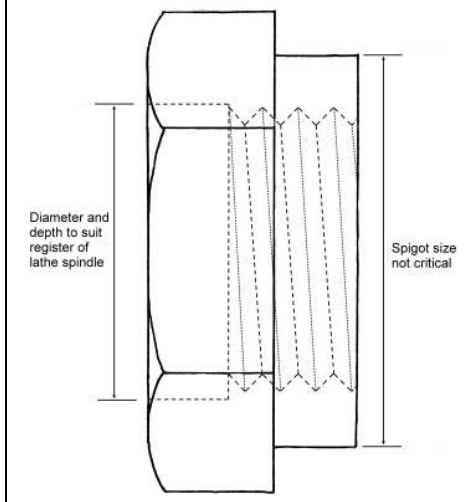

Diagram 1

'true' on the spindle. With the recess bored out the nut was reversed and a square faced spigot turned on the opposite side (diagram 1).

With a piece of MDF on a screw chuck in the Vicmarc, a recess was turned to take the spigot on the nut, which was then superglued into it. The assembly was reversed by screwing the nut directly onto the lathe spindle and the MDF was trued up. The rest of the chuck was then constructed as previously described. There is one slight difference in that now the spindle screws straight through the nut and protrudes out of the front face. The hole in the MDF must be big enough for this to happen (photo 3).

photo 3

In this way I made two additional chucks, one using 3" diameter plastic drainpipe and another using 2" pipe (photo 4). All that remains now is to dismantle the original chuck, reclaim the faceplate and replace it with a nut. I'll get round to it soon. Honest.

photo 4

The rotary adaptor

The original rotary adaptor (photo 5) also uses a faceplate. It will be especially pleasing to get this one back as it serves no function other than to carry the bearing that allows a stationary vacuum pipe to connect to a rotating lathe spindle.

photo 5

Imagine an unaltered nut simply screwed onto the spindle. Obviously it will go as far as the end of the threads and then stop. Because the nut does not go over the register and butt up to the face, it would not necessarily run true when the lathe is switched on, but for the rotary adaptor, I don't think it matters. This persuaded me to try an even simpler approach to the construction.

After rubbing one side of a nut on some sandpaper to give the glue a key, it was simply superglued to a small block of MDF. More superglue was added inside and out to ensure a good seal (photo 6).

photo 6

photo 7

With the nut screwed onto the lathe spindle the MDF was trued up by skimming the face and edge (photo 7) and then given a coat of sanding sealer.

Before dismantling the old rotary adaptor, I wanted to be sure such a simple arrangement would sustain a vacuum, so I connected up the pump and tested it out. The gauge showed a good vacuum and I knew the project was likely to work.

The time had come to dismantle the old rotary adaptor, so it was disconnected from its pipe and screwed onto the inboard lathe spindle. I should perhaps explain that the Vicmarc lathe has a right hand thread on *both* sides of the headstock. By carefully cutting in with a parting tool at the side of the bearing, both the bearing and its connector can be released as a unit (photo 8). The rest of the MDF can then be removed and the faceplate cleaned up for use when needed (photo 9).

photo 8

photo 9

Returning the nut/MDF assembly to the spindle, drill a small hole all the way through the MDF and cut a recess to take the bearing assembly (photo 10). Superglue the bearing into the recess, using the tailstock to press it gently into place (photo 11). After giving it a coat of paint which further seals the MDF, the rotary adaptor is ready for use (photo 12).

photo 10

photo 11

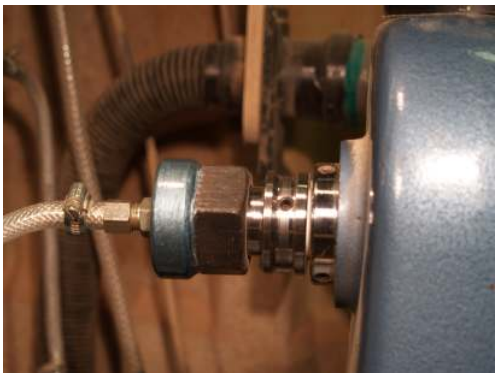

photo 12

The vacuum volume

The potential problem that all vacuum chucks suffer from is the unexpected power cut. If the electrical supply is cut off, for whatever reason, both the lathe motor and the vacuum pump stop, and air begins to refill the system. If the lathe spindle hasn't stopped rotating by the time the vacuum is lost, the workpiece may go walkabout, and much bad language may result.

Working on the principle that the bigger the volume of the system, the longer it will take to refill with air, I decided to build a large container into the system. It had to be something which would withstand air pressure when the system was operating under vacuum, and this really means some sort of cylindrical container. Flat faced containers such as five litre oil cans will simply collapse, quite spectacularly, when the air is taken out of them by the vacuum pump. After much searching around for something suitable an old friend, who is a farmer, asked if a small milk churn might do.

The churn in question turned out to a five gallon container, made of some sort of strong aluminium alloy, with the required cylindrical shape. It was a simple matter to glue two thicknesses of MDF together and turn them to make a lid to fit the churn opening.

With the lid in place, sealed all round with bath sealant, the churn can be connected into the system by a T connector placed anywhere between the chuck and the vacuum pump. You do not need an 'in' and an 'out'. The air will leave and re-enter the churn via the same pipe (photo 13).

photo 13

In use the system now takes longer to get to maximum vacuum, but it also takes longer for that vacuum to be lost when the pump is switched off. I now have around 30 seconds for the lathe to stop before the vacuum releases the workpiece.

A bit of cautious testing has shown that even with a large bowl blank on the chuck, going at a faster speed than I would actually turn at, the lathe will still stop before the vacuum gives out. Touch wood, I've never actually had a power cut whilst using the lathe, so the precautions have never been tested in real life. I hope they never are, but I'm now quietly confident that neither the workpiece nor I will come to grief if the power does cut out.