

A SWARF STICK

David Haythornthwaite discovers there are much better ways of removing swarf than using your hands.

My smiling friend Henry, the workshop vacuum cleaner, normally digests this stuff with ease, but today's waste was giving poor Henry indigestion and in fact it finished with Henry requiring colonic irrigation by the use of a drain clearing tool. Neither of us was particularly pleased at the interruption to the day's proceedings. Ignoring my safety training, I used my hands to remove the swarf for a while. Oh how I enjoyed removing those shards of metal from my fingers that evening! I tried using a large magnet to pick up the swarf, but that needed the hands to remove swarf from the magnet. There had to be a better way of doing this, so the Swarf Stick was born.

The general design

I needed a tool to pick up the swarf that was magnetic, but where the magnetism could be switched off similar to a magnetic indicator stand. Indeed I thought

about using an old indicator stand, but it was hardly convenient in tight spaces. My ideas centred round making the stick as a small closed tube with a STRONG magnet inside. The tube would be made from non magnetic material such as plastic, stainless steel, copper, brass or aluminium. The magnet would normally be inside the closed end of the tube and would therefore attract steel swarf. The stick, complete with swarf would then be held over the bin and the magnet would be withdrawn up the tube thus releasing the swarf. The finished article is shown in photo 1.

The magnet

I started by looking on the web for Neodymium Magnets and came across the excellent website of Magnet Expert Ltd (Ref 1). For anyone who has not come across these VERY powerful magnets, their strength is incredible compared to the older type of magnets that we used at school. Magnet Experts' strongest range

Background

Whilst turning a 2in. hollow ring in the lathe from a piece of 2 1/2in. steel bar, the tool was working perfectly, the swarf was curling off with a pleasant hiss and life was good. However, the swarf was coming off in large curls and large quantities. Quite frankly I seemed to be nearly knee deep in the stuff.

includes a cylindrical magnet 25mm diameter and 20mm thick which will lift steel to a weight of 26Kg all for £9.95 at the time of writing and if you do get it stuck on steel you will have difficulty getting it off. It comes with serious health and safety warnings about burst fingers. I went for something less exotic, 20mm diameter x 10mm thick with a 5mm countersunk hole in the centre. Their reference is F3414 and it is available in either North or South polarity on the countersunk face. It does not matter which is chosen and this will pick up a mere 7.5Kg. Costing £2.45 in March 2010, this is illustrated in photo 2.

Making the Swarf Stick I found a short length of domestic copper heating pipe of 22mm O.D. and the 20mm magnet was a nice sliding fit in this. I also found in the scrap box both Viin. and 1 in. brass bar so these were the items that I used.

I cut a piece of 22mm copper pipe 210mm long and cleaned off the internal burrs. I then turned the 1 in. (25.4mm) brass bar down to 22mm for a distance of 5mm and turned the very end down to be a tight fit inside the end of the copper tube. Parting off at 5mm gave me a rebated end plug which was a tight fit in



The finished Swarf Stick.





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The kit of parts.

the end of the copper tube, effectively sealing it off. I turned a similar piece of the 1in. brass bar for the other end of the tube, but made this 23mm long and rebated to the internal tube diameter for a length of 10mm. I left the larger external diameter of this piece at 24mm, which just cleaned the brass bar to a nice finish, but when fitted, left a nice collar on the unit for the fingers to grip. This piece was parted off at 23mm length and then reversed in the three jaw chuck, holding it by the rebated section. The end was given a nice chamfer and the centre was centre drilled, drilled 6mm and then reamed $\frac{1}{16}$ in. for my brass bar which was to become the plunger rod.

If you don't have any large brass bar handy, it is possible that you could buy a couple of plumbers end stops in 22mm Yorkshire fittings to make the end caps, drilling and reaming one of them to take the plunger bar. The bearing surface on the plunger rod will not be great and it will be important to fit the central flange round the tube before fitting one of the end caps.

The central plunger rod from Vain, brass bar was cut to 215mm length, faced off and one end was drilled 3.4mm then tapped 4mm for the countersunk 4mm setscrew to fix the magnet. The other end was turned down to 6mm and threaded externally at 6mm to take a knob. I was going to turn a knob, but found a plastic knob from an old router which had a 6mm thread. The parts are shown in photo 3.

Photograph 4 shows the outer tube after securing the end cap with a touch of super glue and with the plunger assembled ready to be inserted into the tube. I left the top cap simply as a push fit into the tube so that it could be removed for cleaning if necessary.

Using The Swarf Stick

Frustratingly, making this item resulted in shavings of copper and brass, none of which could be collected with the swarf stick. However, photo 5 shows the stick collecting some very fine, largely cast iron, shavings. The first time you pull the plunger to drop the shaving off the stick, it comes as a surprise to feel the force required to withdraw the magnet. Sweeping the swarf stick around the work area efficiently collects all the swarf from magnetic materials, but be warned that it will also collect small screws and tools which may be



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Partially assembled.

lying about.

You will see from photo 1 that I have fitted a plastic flange round the swarf stick near to "the business end". The purpose of this is to stop the swarf from creeping back up the stick, following the magnet, when the plunger is withdrawn. I found an old plumbing flanged nut from a water tank fitting, and boring this out to a sliding fit on the tube solved the problem. A simple O Ring worked almost as well, and I have left an O Ring above the plastic flange to stop the flange from creeping up the tube. Leaving this item loose on the tube enables it to be removed for using the swarf stick in small places with restricted access.

Storing the Swarf Stick

One thing that immediately became apparent when using the stick, was that it needed to be stored correctly. Put it down on the bench and tools, nuts and bolts etc. immediately congregate round it. I tried clipping it to the tool board behind my lathe, but all the adjacent spanners immediately leaned towards it in admiration! The solution for me was to hang it upside down, like a bat, from the shelf above my bench. I screwed a small steel plate to the underside of the shelf; the swarf stick hangs neatly from it, and is ready for use. The

plunger does not fall downwards as it is the magnet on the end of the plunger that is holding the whole thing to the shelf.

Notes on using Neodymium Magnets

The website shown in ref 1 offers these magnets in a variety of sizes and layouts - even with hooks incorporated for hanging on threads. I also bought a stack of 10 magnets 10mm diameter x 3mm thick and they are useful for all sorts of things.

If the reader makes the swarf stick, it is recommended to keep the magnet in its box until it is to be used. Put it on an apparently clean surface in the workshop and you immediately have a "fuzz" of metal filings on it which are difficult to remove. Do not get the magnets hot if you are soldering - it does them no good. After making the swarf stick, I see on the website of Magnet Expert Ltd that they make and sell a "Woodstove Magnet" in stainless steel. This is designed to extract nails from wood burning stove ash and which appears to work on exactly the same principle as the swarf stick. This would be an easier, but more expensive, way of obtaining a swarf stick. I find this to be a very useful tool to have around in the workshop. ■

Reference

1. Magnet Expert Ltd - www.first4magnets.com



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The Swarf Stick in use.