

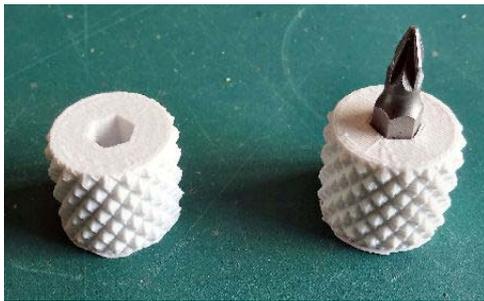
3D Print of the month.

October 2018

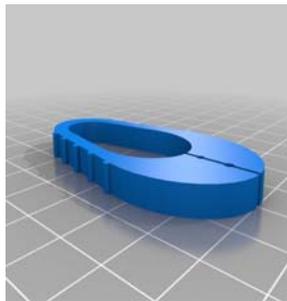
## Making your own tools

There's an old saying that 'Every new job you undertake is an excuse to buy a new tool'. Nowadays that has become 'Every new job you undertake is an excuse to design a new tool'. Tools fall in to three categories, **General purpose tools**, that are useful for lot's of things, **specific tools** that align very closely with one craft, or in our case, hobby, and **jigs** or one off tools that have a single purpose. In the past these would either be bought or made specifically by a toolmaker, which was a recognised trade, but with the coming of 3D printing it is possible for an 'ordinary joe' to conceive, invent, design, develop and implement tools, of all of the above categories.

**GP tools:** Nobody is going to 3D print pliers or a hammer, because they'll get better results cheaper and easier by buying a decent tool. That said, more niche gp tools like the finger driver in the Wosag brochure is a general purpose tool that is cheaper and more flexible for being 3D printed. This is a tool that basically no-one had thought about before. Another good source is things that folk **had** thought about before, but aren't very common. There are some examples in the photos below.



Finger Driver for access to tight spots.



Panel pin holder saves thumbs

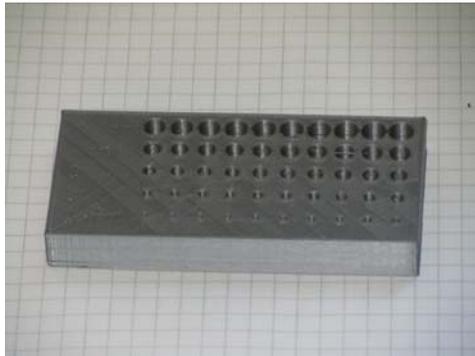


Catch stoor whilst ensuring drill goes in perpendicular to wall

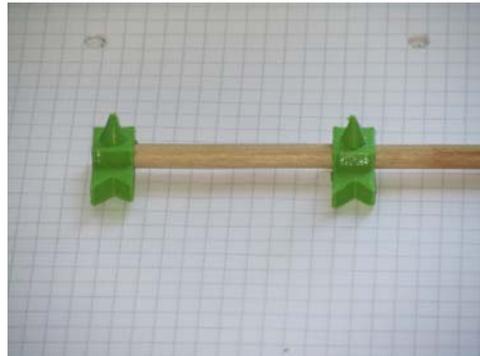
These general purpose tools might be 'impulse purchases' if visiting an out of town retail shed, but with 3DP they can be made to your exact spec, as and when you need them. Anyone can look at a general purpose tool and see what it is about.

**Job / craft: specific tools:** These are the tools that are specific to the job or craft we are involved with. For the railway modelling aspect of the hobby there are track layout guides, Tools to help lay ballast evenly, etc. For the electronics side there are stripboard bending guides, pin straighteners, etc, etc. Again these have been covered here before, so please have a look at the Wosag 3D prints brochure for more details. Interestingly 3D printing specific tools are also available, both as items others have designed, and as opportunities to innovate personally. The purpose of job/craft specific tools is obvious to anyone involved in that area, but maybe not to those outside the area of interest. Some of these are outlined below.

**Guage Block** When using machine screws, ie little bolts, in 3D prints one often finds that holes left for them do not turn out as expected. Sometimes a hole needs to take a 3mm screw 'snugly', another time we may need the screw to just bind in the hole, or for the hole to be so tight that the screw cuts a thread in the plastic. The guage block contains holes from 1.0 mm all the way to 5.9mm in 0.1mm increments. This allows trials to be made during the design process, so that the hole designed in to the print is exactly what is required.



Guage Block



'Madonna'

**Madonna:** Most printed circuit boards mount by means of a series of small holes, usually in the corners. Judging the centres of these using a steel rule or caliper is always a bit tricky. This tool pops into the holes and lets the centres measurement be transferred to a linear measure which is much easier for the rule or caliper to get accurately.

**Radius Guage:** It's easy to work out the radius of a hole in something. One simply tries drills or allen keys of increasing diameter until the one is found that is 'neat' in the hole. It's a little more difficult to work out what the external radius or diameter is of something that one is trying to leave a hole for in a 3D print.

For example if designing a bracket to take a D-type plug it's tricky to work out the radius of the shoulders on the plug, so that the print can be snug. The radius guage has 8 different radii on it, so by putting the part in question against it one can quickly suss the best radius to apply to the design.



Radius guage

**Jigs:** Not very much to do with dancing, jigs are those tools that have but one very specific purpose in life. The purpose of these tools is only apparent to the person who made it or who needs it.

**Offset jig:** In assembling a 3D printer it became apparent that a little inductive sensor had to be a fairly critical distance above the heatbed during operation. If the sensor is too low it could foul the print in progress, too high and it would lose accuracy, and could cause head crashes. A little 3D printed jig was designed to allow this 1mm offset to be accurately setup.



Inductive sensor offset jig



Dial guage and mounting jig

Unless you own this particular printer this little tool is totally useless. If you do have this printer, this little tool is invaluable. Once!

**Dial guage:  
mount:** Bed levelling is an important part of getting good results from a 3D printer, or any other CNC machine. The dial guage / quill combination can be used to either adjust the level of the bed of the machine, or to just read the errors in the level of the machine, so that they can be compensated for in software. This involves securely mounting the dial guage to the machine and carefully lowering it into contact with the bed at a number of places.

Unfortunately every machine offers different opportunities for mounting the dial guage, and every dial guage has a different shape and size. Thus a one off guage/machine combination requires a one off solution, and, as usual, a 3D print is the answer.

**Conclusion:** 3D printing is great for tools, be they general purpose, specific purpose or one off jigs. Have a dig through the Wosag brochure for general purpose and railway modelling / electronics specific tools, and then have a rummage through the 3D printing sites like thingiverse.com for even more ideas.

If you have a specific need, then please contact myself, Davy or one of the MERG WOSAG 3D printing team to discuss it. Could be it's useful to more than you and you're just the first to think of it!