Manual screwcutting - part 2

Following from our previous article [Bulletin 261] on manual screwcutting, where we looked at the process of producing internal threads, our intention was to supplement this with a look at how external threads are created. So let's have a look at the tools and techniques that will get you started.

Dies

An external thread is cut on a cylindrical bar or tube by means of a die which is securely held in an instrument called a stock or die holder. Dies are made from high speed steel (HSS) and come in various forms. The main ones being; a circular split die or a die nut. There are other forms such as half nut dies though these are not as common now in school workshops. The circular split die (Figure 2) is the most commonly used die to create thread forms from scratch in the workshop as there is some scope for adjustment. Die nuts (Figure 4) are more useful to repair damaged threads or clean thread forms that have been previously cut.

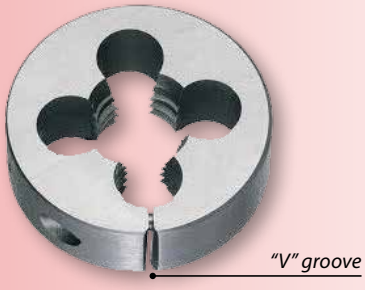

Figure 2 *- Circular split die.*

Figure 3 *- Die nut.*

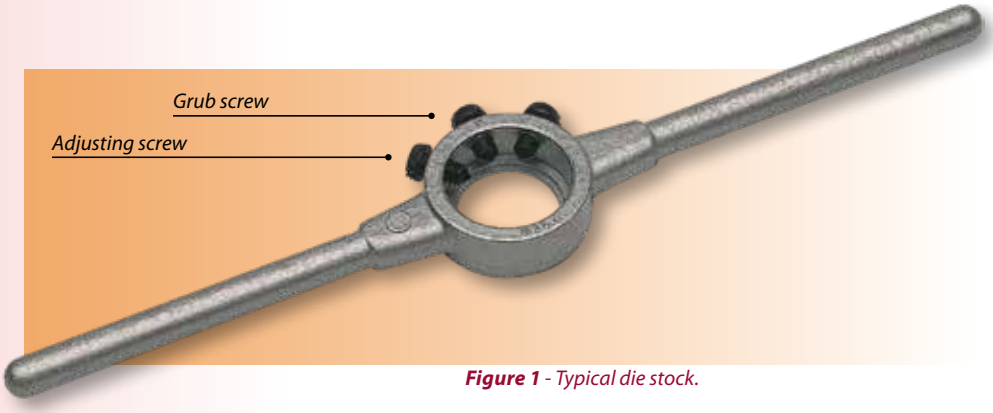

Figure 1 *- Typical die stock.*

Cutting an external thread

To cut an external thread on a round bar of metal, for example mild steel, the die is placed in the stock with the tapered end outwards. This also has the details of the size and thread stamped on it.

The stock is flanged at the opposite side to enable the die to be correctly located and also to enable positive pressure to be applied to the die when in use.

To take the first cut, the die must be opened wide. This is done by screwing the adjustment screw as far as it will go into the "V" groove (see Figure 2). The grub screws are then tightened to secure the die (see Figure 1).

The rod to be threaded must have a taper filed on one end as an aid to starting the die (see Figure 4). Just as for tapping, the stock and die must be pressed down on the rod and rotated clockwise, pausing to check the "squareness" of the stock and die to the rod from front and side. If the stock and die are not square with the rod a "drunken" thread will result (see Figure 5).

Figure 4 *- End of rod tapered to assist start of cut.*

Figure 5 *- Even pressure applied downwards, while being rotated. Check for square against rod.*

Figure 6 *- Die stock is turned clockwise half a revolution.*

Figure 7 *- Die stock turned a quarter turn back to "break" and clear the cutting.*

Figure 8 *- Note the cutting compound.*

Once cutting has started the die should be turned half a revolution forward, then back a quarter turn to break off and clear the swarf (see Figures 6 and 7). Once the cut has been completed, the stock and die is wound back up the rod and the die is removed and adjusted before taking a further cut. Cutting oil should be used throughout the process (see Figure 8).

It should be noted that taps cut an internal thread to a fixed size and no adjustment is possible. Dies, however, can be adjusted by loosening or tightening the adjustment screw. This forces the circular split die open (if tightened) or closed (if loosened). This allows small cuts to be taken at a time thereby making the thread on the bolt to the desired fit (Figure 9).

For this reason the internal thread on the nut must always be cut first. The external thread on the bolt is then cut to fit it.

Figure 9 *- Completed thread ready for test fit.*

Check out the video link!

http://www.sserc.org.uk/images/technology/video clips/general bench skills/external threading.mp4

Make your own 'Keck' clips

Any chemist will be familiar with 'Keck' clips - though they may not know the name. These are the plastic clips that are used to hold Quickfit glassware together.

It is important that Quickfit setups hold together for two main reasons:

1) If the setup comes apart there may be a leak of hazardous chemicals that could cause harm.
2) If it comes apart and falls, there is a good chance that you will break some of your expensive glassware.

Despite the fact that these clips are just specifically shaped pieces of plastic, they are surprisingly expensive - even 'own brand' clips come in at around £3 each.

However, help is at hand. Many schools now have 3D printers and there is a freely downloadable file to enable you to print your own for only a few pennies each [1].

Reference

[1] https://www.thingiverse.com/thing:275336.

Figure 1 *- Keck clips in use (© Cole-Parmer).*

Figure 2 *- 3D printed clips.*