PHOTOGRAPHS: WALTER HALL

Tools and techniques for drilling pen blanks

Walter Hall explains the basics of drilling pen blanks and how to avoid common problems

WALTER HALL

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One of the first processes required to make a pen is to drill a hole lengthwise through the pen blank in order to fit the brass tube that forms the backbone of the pen. This apparently simple operation is in fact anything but straightforward and gives rise to many problems for novice and experienced turners alike. In this article, I shall identify some of the problems, analyse why they arise and explain how they can be minimised or avoided, but first it is necessary to consider the tools available for the job.

Drilling machinery

There are two principal ways in which drilling operations can be conducted effectively. The first is to use a pillar drill or a power drill in a stand and the second is to drill on the lathe. I have used both methods and both work well if done properly – I cannot say that one is better than the other.

An important consideration for a pillar drill or drill stand is the chuck travel as this determines the maximum depth of hole that can be drilled. Many cheaper models have a travel of 50mm, which is insufficient for pen making – a travel of 75mm or more is essential. It is also necessary to have a vice or other holding mechanism to keep the blank firmly in position while drilling. This may be a simple drill press vice or a dedicated pen blank vice but what is important is that the blank is held square to the bit and is unable to move during drilling.

The convention when drilling on the lathe is to mount the work in a chuck mounted on the headstock and hold the drill in a tailstock chuck, thus the work revolves rather than the drill bit. The work may be held in any chuck into which it can be tightened securely; this may be a dedicated pen blank chuck or jaws, a pin chuck or simply the central hole of a standard set of jaws. All that matters is that the blank is secure and running true in relation to the drill bit. A tailstock chuck of the keyed Jacobs type or a keyless drill chuck is used to hold the drill bit.

Using a pillar drill and drill press vice will enable accurate drilling

A dedicated pen blank chuck facilitates drilling on the lathe

Drill bits

Drill bits come in many shapes and sizes but there are really only four types that are of interest to us as pen makers. Standard engineer's 'jobber' twist drills will do the job of drilling perfectly adequately in most materials but there are better tools for the job. Lip and spur bits have the advantage that the tip design helps prevent the bit from following the grain in wooden blanks while bullet tip – pilot point – bits have a centre point similar to an engineer's centre drill, which guides the bit through the work, again ensuring greater directional control and thus more accurate drilling. Finally, we have dedicated 'pen drills', which are advertised as having advanced tip or flute designs that allegedly enable faster drilling and are usually of longer length to facilitate the drilling of longer blanks. In practice, I find that while the improved flute design does clear away waste material more effectively, they offer little advantage over good quality lip and spur or bullet tip types in terms of speed and the extra length can actually make centring the bit on the work more difficult and introduce flexing problems, especially with narrower bits under about 9mm diameter.

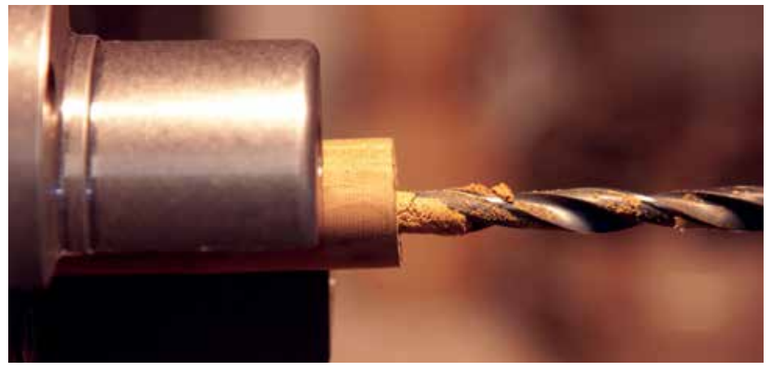
FROM LEFT TO RIGHT: Jobber bit; lip and spur bit; bullet tip bit – pilot point bit – and Colt pen bit

Whatever bits you choose, make sure that they are either kept sharp or treated as consumables and replaced when the edge becomes dull. Using a blunt drill bit is guaranteed to overheat the work, which is a common cause of failure.

Good drilling practice

The first consideration is speed. Excessive speed will cause greater friction and thus increase the chances of overheating. The harder the material, the slower the speed required. With softer timbers you may be able to safely use speeds up to 750rpm, but harder woods and acrylics require slower speeds. 400-450rpm works well for most materials but if the drill bit starts to get warm, or a squealing noise indicates that heat expansion is causing it to bind in the work, then allow the work to cool and select a slower speed.

Getting the drill properly centred on the work is essential. Not only will this ensure that the hole is central to the blank, maximising the amount of material left around the hole and minimising the risk of splitting, when drilling on the lathe it will also reduce the risk of vibration and 'out of round' holes.



Withdraw the bit frequently to prevent clogging of the flutes

While drilling we need to ensure that the flutes are frequently cleared of swarf, shavings or sawdust as the work progresses. Flutes packed with waste material exacerbate the problem of overheating and dramatically increase the chances of splitting the blank or the bit wandering off course. The bit should be withdrawn frequently and if the

waste does not fall away of its own accord, it should be removed with an old toothbrush or similar tool.

When drilling, a steady pressure should be maintained so as to keep the cutting tip in contact with the work but without forcing it. If you are drilling all the way through the blank, it is best to slightly reduce the pressure and thus the rate of cut as the bit nears the point of breakthrough. This reduces the chance of splitting or breaking away of material as the bit exits the work.

When drilling on the lathe, resist the temptation to hold on to the chuck as you are drilling. If the bit binds, your grip on the chuck will not stop it from revolving and there is a small chance of minor injury. It is, however, good practice to maintain a light grip on the chuck when withdrawing to clear swarf or on completion of the work in order to prevent the chuck from being pulled out of the tailstock Morse taper. If this happens, the chuck will be left unsupported and spinning on the headstock and centrifugal force may then cause it to be thrown across the work area with unpleasant and potentially dangerous consequences.

Grip the chuck lightly when withdrawing to avoid disengaging from the Morse taper

If the chuck is allowed to disengage from the Morse taper it may become a potential projectile

Problems, causes and solutions

The hole runs offcentre in the blank

This problem occurs most frequently in wooden blanks and is usually caused by the drill bit following the grain of the wood rather than the desired path down the centre of the blank. Following the good practice outlined in the previous section of this article will minimise this problem occurring, but selecting a bit with a centre point that will guide it through the work is also important to remember. It is good practice to minimise the effect of this problem on grain alignment by drilling the barrels of two-part pens from the inner end out towards the ends.

The blank splits while drilling

There are several reasons why your blanks may split while drilling, including attempting to drill too large a hole in a narrow blank, drilling at too high a speed or with too much pressure, or failing to clear the waste from the flutes of the drill bit as you progress. The solutions are self-evident. Alternatively, it may just be that a defect in a wooden blank caused the split and there was nothing you could have done to avoid it. Such is the unpredictable nature of the material we have chosen to work with.

The blank splits as the drill breaks through the end of the work

Excessive speed and blocked flutes are the main causes of this problem. It happens less frequently with bullet tip bits where the narrow tip breaks through first, leaving the main body of the drill to open up the hole, thus placing fewer stresses on the end of the blank. One way of avoiding the problem altogether is to cut your blanks slightly over length, drill just short of breaking through and then saw off the excess.

Material breaks away around the exit hole on an acrylic blank

The cause of this particular problem is the same for blanks that split on exit and the methods of causing this from happening in the future are the same.

The hole is oval rather than round

This occurs mostly when drilling on the lathe and is caused by not centring the bit properly on the work, causing it to vibrate and/or run out of true to the rotation of the lathe.

The hole is wider at the point of entry than it is at the point of exit

As for oval holes, the most likely cause is failure to centre the bit properly at the commencement of the work, but it may also result from carelessness when withdrawing and reinserting the bit to clear the waste. ●

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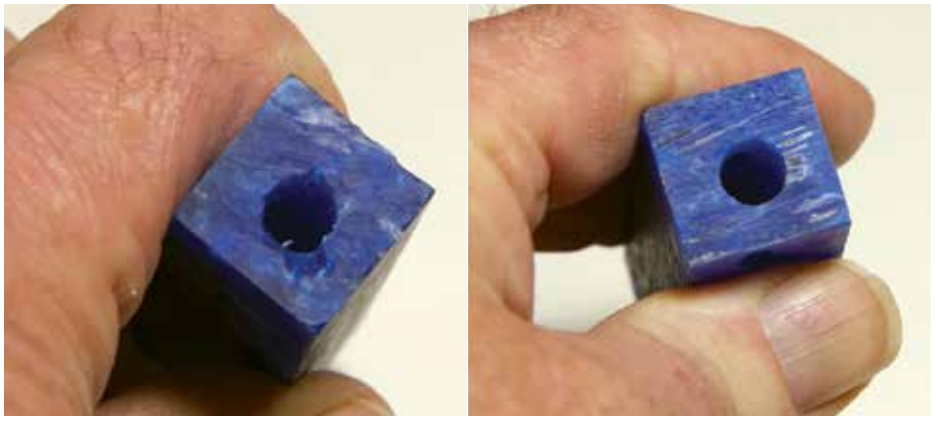

Careless drilling may result in breakout. This can be avoided by drilling short and sawing off to length