Drilling Pen Blanks on the Lathe

By Walter Hall

The purpose of this short tutorial is to help less experienced pen turners to learn how to use a wood turning lathe to safely drill clean accurate holes through wooden or acrylic pen blanks.

The methods used and opinions expressed are primarily my own, but I have tried, as far as possible, to include methods preferred by others in order to be as inclusive as possible.

Tools and Equipment needed

A means of holding the blank in the headstock. Options include a dedicated pen blank drilling chuck; pen blank jaws fitted to a scroll chuck; pin jaws fitted to a scroll chuck. Any of these will work just fine but my preferred option is that of pen blank jaws fitted to a scroll chuck as I consider these to give the strongest hold on the work piece.

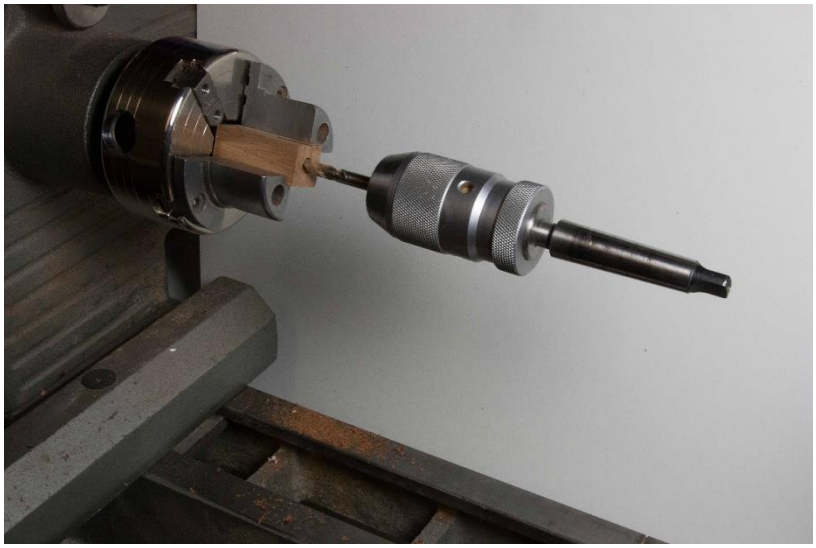
A chuck to hold the drill bits in the tailstock. Jacob's chucks, keyless chucks and collet chucks are all suitable. Apart from the convenience of tool-less bit changing afforded by keyless chucks I do not think there is much to choose between these options. A chuck with a drawbar fitted will prevent the risk of the chuck becoming detached from the tailstock (see Health and Safety below) but this is not

essential if good practice is followed and is not possible with lathes that do not have a hollow tailstock.

Drill bits. Standard “jobber” twist drills are cheap as chips and will do the job. The centre point of lip and spur or dowel bits make it easier to centre the bit on the work. Better still in my opinion are bullet point bits which centre even more easily. Dedicated “pen drill bits” are available and I find these work well too but some turners find that the thinner sizes tend to have too much flex in them and consider them inaccurate. The manufacturers claim that these can be run at high speeds and drill in one pass. I find these claims to be a little exaggerated. (If you look carefully at their own promotional video you will see a wooden pen blank burst out at the side as it is drilled) The flutes do clear more readily than standard drills and they are very useful for drilling long blanks but don’t expect miracles. Some turners like to make a starter hole with an engineers’ centre bit to ensure the drill bit is centred others say this doesn’t make a blind bit of difference. I have no strong opinion because I use the bullet point bits which centre themselves.

Health and Safety

The biggest health and safety problem arises if the drill bit jams in the work and the tailstock is then withdrawn far enough for centrifugal force to snap the drill bit or cause it to break out from the work and hurl the chuck off the lathe. Working in the ways described here will prevent that.

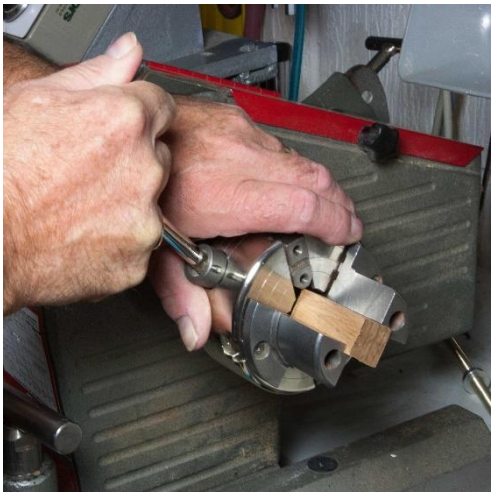


There is also a small of risk of injury caused by holding on to the chuck whilst drilling. Again, by working carefully and following the guidance in this tutorial this risk can be minimised.

All of the other H&S advice for lathe work needs to be followed. Eye protection or better still full face protection is essential. Respiratory protection advisable with some timbers. No loose clothing or jewellery, long hair tied back, don't wear gloves etc. etc. Read the lathe instructions.

Methods of operation

Mount your preferred chuck onto the headstock spindle ensuring it is tightly secured. Mount the pen blank in the chuck and ensure that it is tightly secured and running true.



Ensure that the tailstock Morse taper and the Morse taper of the tailstock chuck are both clean and free from grease or other contaminants then mount the chuck securely in the tailstock. If your lathe has a self-ejecting taper make sure the quill is not wound too far back as this will prevent the Morse taper from seating properly. Once properly seated in the Morse taper it should not be possible to turn the chuck by hand or pull it out of the tailstock. Select the appropriate size of bit and secure this in the tailstock chuck ensuring it is centred in the jaws and the chuck fully tightened. For larger sizes some turners prefer to drill a pilot hole with a smaller bit first.

Select the most appropriate spindle speed for the material you are drilling and turn on the lathe. I find that 300 to 500 rpm will suit most timber and acrylic blanks. Too slow a speed and centring the bit at the start of the cut will be difficult, too fast and the bit and work piece will both overheat. This is one of the main causes of jammed bits and can also cause irreparable damage to both drill bit and blank. Timbers with pronounced grain patterns typically don't have homogenous hardness - there are hardness variations between portions of the wood that grew during warm weather, and the portions that grew during colder weather. And if the drill bit is advanced into the blank too quickly, it will tend to follow the grain pattern staying in the softer wood. So it is critical that the tailstock quill is advanced slowly so that the point of the drill can actually cut a straight hole for the drill to follow.

Bring up the tailstock until the point of the drill bit is a few millimetres away from the end of the revolving blank and lock the tailstock to the bed. Check to ensure that the point of the drill is centred on the blank and you are ready to begin drilling.

Note: Some turners like to hold on to the chuck whilst drilling, however, in my opinion, holding onto the chuck whilst drilling serves no purpose and here is why I believe this.

If the Morse taper is properly seated in the tailstock I can neither turn it by hand nor pull it out. Thus the friction between the chuck and tailstock is greater than the torque I can apply by hand. If the bit jams and starts to turn the chuck then the torque applied by the lathe turning the jammed bit must be greater than the friction between the chuck and tailstock. It therefore necessarily follows that the torque applied by the lathe is also greater than the torque I can apply by hand. Thus holding on to the chuck is not going to stop it from turning. For this reason and because of the slight risk of injury I do not recommend to beginners holding on to the chuck whilst drilling and if you choose to do so then be careful to use a grip that can be easily and quickly released.

Once drilling has stopped and the bit is being withdrawn either to clear the flutes or at the end of the job and the lathe is still running, holding the chuck lightly once the bit is disengaged from cutting in case it catches in the hole and is pulled out of the tailstock is in my opinion perfectly safe and sensible.

Photo © Doug Barratt

Begin drilling by winding in the tailstock using the hand wheel. After a few turns of the wheel wind the bit back out again to clear swarf and chips from the flutes of the bit. Failure to do this is the second most likely cause of jammed bits after excessive speed. Allowing swarf to accumulate in the flutes of the bit increases the friction that causes heat. But the nature of the timber has a role here - the swarf from oily woods such as cocobolo will clump into a hard mass in the drill bit flutes far more rapidly than will be the case from dry, brittle woods. As a result, the more oily the wood, the less depth one can drill without clearing the swarf. With extremely oily woods (or if a lubricant us used when drilling), it may be necessary to pick the hardened swarf out of the flutes with an awl.

As noted above, holding the chuck lightly once the bit is disengaged from cutting in case it catches in the hole and is pulled out of the tailstock is in my opinion perfectly safe and sensible. If your tailstock has a self-ejecting taper take care not to wind the quill so far back that the chuck is ejected from the taper.

Repeat this process until the blank is drilled completely through. With acrylic blanks, even with careful drilling you may get breakout or splitting when the bit exits the blank. This can be avoided by leaving the blank over long and drilling just short of breakthrough then sawing the blank to length after drilling. To facilitate this you will need to mark the depth of cut required on the drill bit with masking tape.

When boring long blanks that exceed the length of movement of the tailstock quill it may be necessary to reposition the tailstock closer to the work part way through the process. It is safest to switch off the lathe to do this.

Once the drilling is completed, with the lathe still running, withdraw the bit completely from the blank by winding back the tailstock quill, at the bit is withdrawn you should lightly hold onto the chuck to prevent it from being pulled out of the tailstock. If the tailstock was moved closer to the work as described above then it will be necessary to slide the tailstock back to completely withdraw the bit.