Turning non-ferrous metal pens on a wood lathe

Walter Hall uses his woodturning lathe to make a pen from an aluminium bar

PHOTOGRAPHS BY WALTER HALL

WALTER HALL

Walter Hall is a woodturner who has specialised in making pens and pencils for more than 20 years. Based on the beautiful Northumberland coast in the UK, Walter sells his bespoke pens and pencils through local craft centres and via his website.

walter@walterspens.co.uk
www.walterspens.co.uk

EQUIPMENT USED
Hacksaw
Range of drill bits
Brass brush
30-minute epoxy
HSS end mill
HSS roughing gouge, flat scraper or TCT-tipped cutting tool
Swept-back fingernail profile bowl or spindle gouge
Aluminium oxide abrasives
Metal polish or burnishing cream
Safety cloth

This month's article was inspired by the work of Bill Mooney who is registered blind and makes pens to raise funds for the charity Blind Veterans. I saw a pair of beautiful aluminium pens that Bill had made using simple Slimline kits displayed on the Woodworkers Institute forum and this reminded me that I had not covered the use of non-ferrous metals for pen making either in my book or in this series of articles.

I must make it clear at the outset that a woodturning lathe is not designed for turning metals and the methods I am recommending here would be scorned by engineers and serious metalworkers who have access to machinery that is better suited to the purpose. I make no apology for this as most pen makers are amateur woodturners who must work within the constraints of the equipment available to them and there is much satisfaction to be gained from the challenge of making pens from different materials.

As ever, I will prioritise health and safety issues. To begin with, a metalworking lathe is not only generally more heavily built and employs a lower speed range than a wood lathe, but its operation is also fundamentally different in that it has a cutter fixed in a tool post that is in turn attached to a cross slide and moved against the work by mechanical means, whereas a wood lathe relies upon the use of hand tools manipulated by the operator. This gives the metalworking machine the capacity to turn hard materials such as steel, which should not under any circumstances be attempted on a wood lathe.

Machining softer metals such as brass, aluminium and copper with a wood lathe is however perfectly possible but metals that have been annealed or hardened should be avoided. Normal HSS scrapers and gouges may be used and the newer TCT tipped tools are very effective but whatever tools are used light cuts should be taken and lower speeds used than would be appropriate for wood or acrylic materials. You should aim to use just sufficient pressure to produce curls of swarf rather than fine dust or chips. Appropriate PPE is essential, full face protection is recommended.

Turning metals will produce swarf, which conducts electricity, so bear this in mind if your lathe has a motor that is located beneath the bed where waste from the cutting may find its way into the casing causing a short circuit or mechanical damage. Depending upon how you dispose of your waste, you may wish to take care to keep wood and metal shavings separate. I give my wood waste to a local organic farmer who uses it for poultry bedding and then composts it. I don't think he would thank me if it was contaminated with aluminium or brass swarf.

Cutting metal will blunt woodturning tools very quickly and as we all know blunt tools are much more dangerous to use than sharp ones, so make sure to start with sharp tools and resharpen regularly as soon as the cutting effort increases.

When sanding metals, extraction and respiratory protection should be used, metal dust and lungs do not go well together. Finally remember that metal swarf can be sharp and careless handling can cause injury.

If these H&S caveats have not put you off, then the rest of this article demonstrates step-by-step how I went about making a pen from round aluminium bar using the components from a gold-plated Streamline kit. The kit was upgraded with a refill from Beaufort Ink.

SUPPLIERS

Beaufort Ink
Web: www.beaufortink.co.uk
Streamline pen kits
Web: xxx

1 Begin by marking the aluminium bar to length using the brass tubes from the pen kit as a guide and leaving a few millimetres over length to allow for squaring off the ends. Then cut to size using a hacksaw

2 If you have sufficient confidence in the accuracy of your drilling equipment and a wide range of drill bits in 0.1mm increments, it is possible to drill brass or aluminium bar to accept the kit components directly without using the brass tubes from the kit. For those of us who are not precision engineers, it is better to do as I have done here and treat the aluminium blank as you would any other and drill it out to accept the brass tube. Accuracy is still important, so begin by using a centre drill to start the hole accurately. I used pen blank jaws on the lathe but a pillar drill is just as good

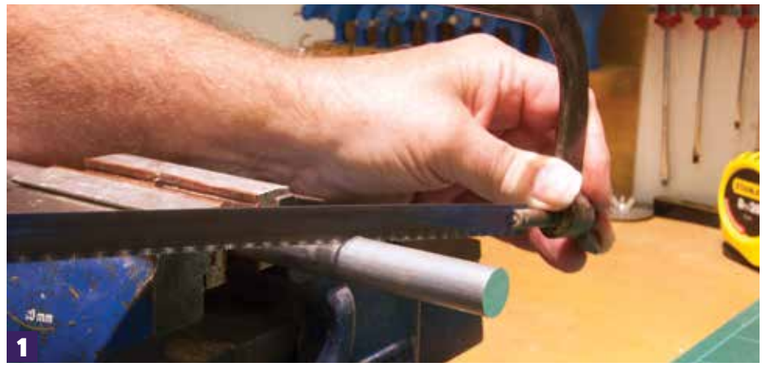
3 Next use jobber drill bits to drill to size for the tube. I found that greater accuracy could be achieved by drilling with a smaller diameter bit first and then opening out the hole with the correct size bit. I used a 6mm bit followed by a 6.9mm bit, which gave a good sliding fit. The brass tubes are nominally 7mm so if you don't have a 6.9mm bit then 7mm will be fine. Apologies to the engineers among you, please don't have a conniption over 0.1mm!

4 As with any drilling operation it is important to keep the flutes of the drill bit free from swarf by withdrawing regularly. An old toothbrush or small brass brush is useful for removing any stubborn particles

5 Careless drilling, excessive speed, failing to clear the waste and poor quality machinery or tooling can result in a bore that is too large, out of true or larger at one end than the other, so take your time, set up your machine properly and work with care and you should end up with a perfect fit, as shown here

6 For reasons that escape me – probably the lack of patience to wait for other adhesives to set – most pen makers choose to use CA glue to fix their pen blanks to the brass tubes. While this generally works OK for wooden or acrylic blanks I really cannot recommend it for gluing metal to metal. I used a 30-minute epoxy and left it overnight to be absolutely certain it was fully cured. Turning metal will place a lot of stress on the glue joint

7 Once the adhesive is set, the ends of the blanks can be trimmed and squared to the tubes using a normal HSS end mill as used for wooden blanks. I did this by holding the blanks in a vice and using the end mill in a cordless drill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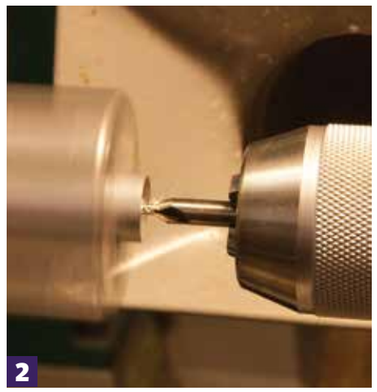
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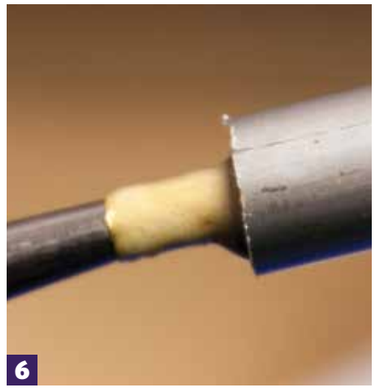
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8 Mill away the aluminium until it is just flush with the brass tube, take care not to reduce the length of the tube by overzealous trimming or you may have problems with the fit of the components or the operation of the pen mechanism

9 If you have a suitably sized collet chuck and the bore is drilled true to the sides of the blank or has been turned true before trimming then you could hold the blank in the collet chuck and trim the end square with a scraper or with the end mill fitted in a tailstock chuck

10 With the blank mounted on a mandrel fitted with suitably sized bushes, you can use an HSS roughing gouge to begin turning down to size. I prefer to mount the blanks separately and turn them one at a time for greater accuracy

11 An alternative and arguably better option than the roughing gouge is a flat scraper, which is a more robust tool and more suited to the scraping action of cutting metal

12 Perhaps the best choice of all, however, is a TCT tipped cutting tool, which not only lasts longer before needing resharpening but also gives a cleaner cut on the hard material

13 Turning metal will produce lots of curly swarf that should be cleared away regularly to avoid it catching on the revolving work. You do not want strings of sharp aluminium swarf spinning at 1,000 rpm

14 Fine shaping can be done with a swept-back fingernail profile bowl or spindle gouge, but this should be restricted to the final stages as the delicate edges of the tool will not stay sharp for long when used in this way. A round TCT tipped tool could also be used and would need resharpening less frequently

15 Once the material is turned down to match the bushes and you are happy with the shape, sand through the grits of aluminium oxide abrasive to about 600 or 800 grit. Which grit to start with will depend upon the quality of the surface you have produced with the tools. You should aim to produce an even scratch pattern with each grit, ensuring that at each stage you remove any scratches from the previous grit

16 Once you have achieved an even matte surface with 600 or 800 grit, apply metal polish or burnishing cream to achieve a polished surface. You should use a non-woven fabric or safety cloth for polishing on the lathe

17 A final polish on a buffing wheel will remove any trace of annular marks from the polishing on the lathe

18 All that then remains is to assemble the components using a pen press or vice ...

19 ... and you will have an all-metal pen that you can be proud of ●


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