



Tools for pen makers

Kurt Hertzog looks at the core tools used by pen makers

Most woodturners already have most of what they need to turn pens. There are many manufacturers that feature tools specifically for pen makers. They all work nicely and you can add them to your turning kit if you like the performance they give you. When you think of turning pens, you obviously need a lathe and a cutter of your choice but what else would be needed to let you craft pens? In this article I'll put together the items I recommend to make a very workable pen-making package. I believe it is fully functional for virtually any pens or materials for pens you'll run across. For the sake of simplicity, I'll tailor this article to the 7mm pen kit-maker, although everything here will apply to those beyond that level.

When you think of woodturning, turning pens is probably one of the safest

endeavours. The mass is low, the work holding is robust, and all of the tools, finishing and chemicals are common to the shop. Regardless of how familiar these are to you, please don't become less vigilant with your safety regimen. Follow all the good practices for PPE and safe operating procedures that you do when turning any project.

Pen mill

You can buy your pen blank, wood, plastic or other material through your local woodturning retailer. Don't be afraid to cut your own from existing stock. Nearly every kit will require a blank in the 20mm x 20mm x 140mm range. There are ways to economise on this size but, for example, that is a generous size that should do nearly any kit. The blank will need to be



Pen mills are available with different pilot sizes. I often use tape in a pinch



Using a slow speed and piloting on the tube I.D., the pen mill will create a perpendicular face

cut into two pieces of length sufficient to completely encapsulate the kit-provided brass pen tubes. You can cut the blanks with your bandsaw or by hand to obtain the proper lengths. A 7mm drill is used to drill the blanks for the brass tubes. If you

don't own one, the kit retailers have them for purchase. A drill press, pistol drill, or the lathe can be used for drilling the blank. The goal is to create the hole in the centre of the blank to receive the tube. Adhesively bond the tube as per the instruction sheet and allow it to cure. The facing of the tube ends to be flush and perpendicular is a key step to a perfect pen. The excess wood needs to be removed so the tube can be made flush to the brass at each end, being perpendicular to the brass tube. This can be done one of two ways, using either a sanding process or a milling process.



The facing should only be deep enough to expose the end of the brass tube



Alternatively, piloting on the I.D. of the tube and sanding will face the blank

For those starting out or not having a belt or disk sander, the pen mill works marvellously in my opinion. I use a pen mill for everything except the laser cut kits. Using the mill, piloting on the inner diameter of the glued-in tube, remove excess wood until the brass tube end is just exposed and flush. Once all four faces of the two blanks are done, you are ready for turning. There are other methods of facing the glued-up pen blank which involve a belt or disc sander. These all work, including those with a sanding mechanism installed in the lathe. I believe the pen mill provides the best result at the lowest cost for most. The key is that the final faces have no sanding scratches and are truly perpendicular to the glued-in tubes (the true axis of rotation).



Care must be taken to keep the fence and the platten properly aligned to yield a good result

Pen mandrel

Pen blanks can be turned between centres. You can make up your own wooden drives or tapers to do so. Now, there are manufacturers that offer bushings for the various kits that will drive between centres. They work nicely but I'm a fan of the old-fashioned pen mandrel.

I favour the adjustable-length mandrel for a variety of reasons, so I suggest you buy that. The mandrel has a Morse taper on it at the drive end and tail centrepoint at the other. We'll discuss the tail centre issues in the mandrel saver section.



Tailstock centres have a variety of nose angles. This causes problems with the standard pen mandrel



A mandrel saver swallows the shaft putting all of the force on the bushings and brass tubes

Mandrel saver

I believe the mandrel saver is absolutely key. The traditional pen mandrel relies on a brass nut to press the blanks together on the mandrel. That compression keeps things from spinning freely at you turn the stock away. The tailstock centre presses into the end of the mandrel to keep the shaft properly located. The age-old problem is two fold. First, the angle machined into the mandrel end is rarely a match for the nose angle of your tailstock centre. With a poor fit between the two, the mandrel isn't being supported well. The other problem is that most turners use too

much force on the tailstock centre, whether the nose fit is correct or not. This tendency to use excessive force flexes the mandrel during rotation causing eccentricity in the final results. That, along with the possibility of permanently bending the mandrel shaft, is reason enough for me to recommend a mandrel saver. This device, whether purchased or homemade, removes all pressure from the end of the mandrel shaft. It places all of the necessary force to support the shaft and compress the workpieces where it belongs, on the workpieces themselves straight through to the headstock.

Turning tools

As mentioned in the opening, there are speciality pen-making tools offered by nearly all the tool manufacturers. I have used them all and they all perform well. You can pick any of these and do quite nicely with your pen-making needs. My favourite pen-making tool is a 20mm spindle roughing gouge. Properly sharpened, I find it will do everything I need on any pen I make, barring cutting reliefs for slip-over components. In that instance,

I'll also bring a 3mm parting tool to bear. The roughing gouge alone will do 95% of the pens I make. The parting tool is needed for only a few. Depending on what tools you have in your kit and which you are most proficient with, you can use any tool you own to make pens. Knocking off the corners and turning a pleasing shape to meet the bushings won't be your most challenging turning task.

Dial callipers

You can make pens by only using the bushings as your guide for sizing. This approach works but isn't ideal in my opinion. Bushings not only vary in size compared to the mating kit components, they also get smaller with use. Every time you sand your pen barrels, your bushings will get a bit smaller. Even if they started as a perfect match, time will progressively make the fit less perfect. My recommendation is that you own an inexpensive pair of dial callipers. Most people have difficulty reading Vernier callipers so buy the dial version. They don't need to be expensive. You'll be using them as a transfer measurement. Measure the mating part to know what your finished mate on the pen barrel needs to be. Use this measurement as your guide on



Parts and bushings vary in size. Bushings will continue to get smaller with sanding

how small to turn your diameter at the pressed-in ends, allowing for sanding and finishing changes in size. When the two measurements match, your fit will be perfect regardless of what the number on the dial says. The number does not need



The measurement is comparative. Any repeatable measuring tool will work fine

to be accurate to the Bureau of Standards. Only repeatable. If you already own callipers or a micrometer that you can use, you are all set. If not, buy an inexpensive pair of dial callipers at your discount tool or automotive supply source.

Abrasives

If you are using wood, you'll likely have the necessary abrasives at hand to properly sand your pen blanks for finishing. Start at the necessary low end and work through the grits until you are content with the sizing and surface finish. Usually, you'll need to sand to 400 grit but at times 320 is sufficient. This always depends on the species and finish planned for the pen. For plastics, the story is quite

different. Plastics rarely have a finish applied relying on the super-finishing of the plastic itself to be the finished product. Working with plastics in this manner requires abrasives up through the automotive finishing products in the range of 2000 grit or finer to bring the plastic to its true glory. An alternative to the automotive abrasives is a product named Micromesh. More on this later.

Finishes

Plastic pens require no applied finish. You usually will polish the plastic to a high gloss and call it completed. For woods, you can use nearly any finish you would on other wood turnings but I don't recommend just anything. Pens that will see use, as opposed to the desk ornament types, need a tough finish to protect them. Pens lead a brutal life, being exposed to everything from the bottom of purses to pockets filled with car keys and change. Their environment can range from the unheated car in the winter to the glove box on a summer's day. Any finish that is not supremely tough will wither with this use, not to mention the ongoing general abrasions and finger chemicals. I can only recommend three finishes that I believe are tough enough for pens. All three are easily applied and will provide a mechanically tough and chemical-resistant finish. These finishes, in my order of preference, are cyanoacrylate, lacquer or epoxy. All are build finishes, allowing you to apply repeated coats to increase the final thickness to your wishes. These are covered in detail in *WT298*, *299*, and *306*.



The toughest finish is needed for pens – cyanoacrylate, epoxy, or spray acrylic lacquer will provide it

Ultra-fine abrasives

I recommend that you polish or buff the finished pen tubes prior to assembly. This is easily done while you have them mounted on the pen mandrel. If you have applied one of the three finishes I recommended, you can punch them up by using Micromesh or similar micro-fine abrasives to provide a high gloss. If the finish was properly applied, you don't need to level it, only bring up the gloss. If you need to level the finish, you should revisit how to apply the finish so you won't need to level it. When you start polishing with the Micromesh, don't start at the coarsest grit. If you are using Micromesh, remember that the numbered scaling is different from conventional abrasives – 1200 on the Micromesh scale is the sandpaper equivalent of 400 grit. That is far too coarse and will remove your finish. Start about halfway through the packet and work through the grits to the finest Micromesh, 12000. At the 8000 pad – or, if using conventional abrasives, finer than 1500-2000 grit – your finish will pop. If it doesn't, you've got some improvements possible in your finish application techniques.



Ultra-fine abrasive products are key to getting the pop you'd like. Available in sheet or pads

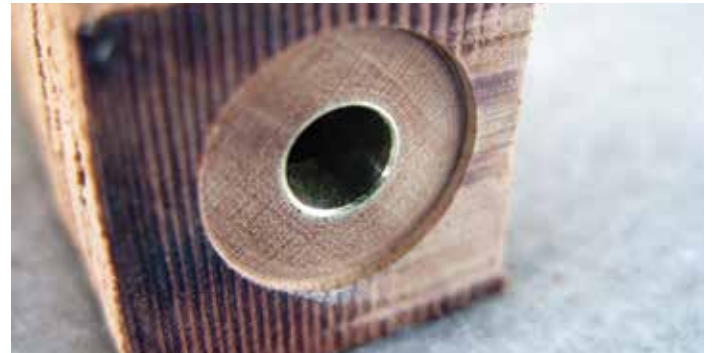
Chamfer tool

Because you will be assembling components permanently using a hard-press fit, it helps to chamfer the edges of the brass tubes prior to assembly. This helps the lead-in of the press fit and helps minimise galling of the brass pressed in pieces. A quick twist of a chamfer tool in the ends of all of the brass tubes prior to assembly is worth the time and trouble. You can

chamfer the brass tubes before turning or before assembly. A chamfer tool can be purchased at your retailer but a very modestly priced and serviceable version can be had at the discount houses. Many try to use a larger drill face but I find it less than optimal. Buy the inexpensive chamfer tool for less than a buck (or UK equivalent) and you'll be happier.



Chamfer tools are available from machine tool grade to bargain basement. They all work fine



Chamfering the brass tubes lead-ins will make the assembly process easier

Assembly

There are many ways to assemble your pen once you have the barrel parts turned and finished. With the components in hand and the brass tubes chamfered, you are ready to press the parts to complete the pen. The press fits for pens are a 'hard press'. The term 'hard press' isn't a physically stressing situation, rather an interference fit requiring a bit of force to make it happen. Following the instructions with regards to sequence of assembly, you'll need to seat some presses flush and control the transmission press to

a depth. All easily done with a variety of tools and techniques. A hand clamp can be brought to bear, although it's a bit tedious. Your drill press with a bolt clamped in the chuck to provide a press face will work. There is a pen press on offer that is designed for the purpose, but I have only found one that I feel is rigid enough to do a quality press job. A bench vice with some padding, such as painter's tape, to prevent marring will work as well. In my opinion, the best assembly press in the world is your

lathe. You already have it so it costs nothing extra and takes up no additional space. You can easily turn a couple of press blocks that will set in the tapers and use the lathe to perform your assembly. A couple of blocks of wood will work but are a bit awkward to hold. Regardless of the press faces, your lathe will provide far more force than is ever required. The control and resolution via the tailstock handwheel is exceptional for starting the press and controlling the depth-dependent presses.



A bench clamp can be used for assembly. Take the rubber cushions off



The best assembly tool is your lathe. A couple of wood blocks work great

Niceties

There are a lot of ancillary items you could buy if you wish but they are certainly optional. They may make the job easier or faster but they rarely, if ever, improve the final product. You can do very nicely with the items as listed. As a matter of fact, technique may even allow you to skip a few of those but I don't suggest it. If you own a drill press and will drill your blanks there, a pen-drilling vice is a fast way to drill blanks accurately. It can also double as an assembly vice, depending on its opening capabilities. A pen press can make assembly easier by having fixed stops rather than adjusting via the tailstock handwheel. For that final high buff, you might consider a pen-buffing system for your kit.

Niceties you might consider are: a dedicated pen press, a drilling vice and pen-buffing system



The added kit that will let you turn pens is quite simple and modestly priced

Conclusions

You can make pens with a spindle roughing gouge and a couple of home-turned tapers to turn between centres. That said, doing a quality job entails a few more items and capabilities. My recommended kit is the lathe equipment and tools you already probably own with the addition of: a mandrel with bushings; a mandrel saver; a pen mill; a chamfer tool; a pair of inexpensive dial callipers; and ultra-fine abrasives. The couple of items you can make are the assembly press fittings, drilling aid and mandrel saver. It's not a major investment to turn pens. Things do change a bit when you get to different kit complexities and non-kit efforts, but these basic additions will get you going and serve you over the long haul. Can you spend more and get more tools and equipment? Certainly. Your pocket is the only limit. These convenience additions will make your process quicker on occasion but the results will only be as good as your technique, not your tools. ●