

# Kurt's clinic

Kurt Hertzog answers readers' questions

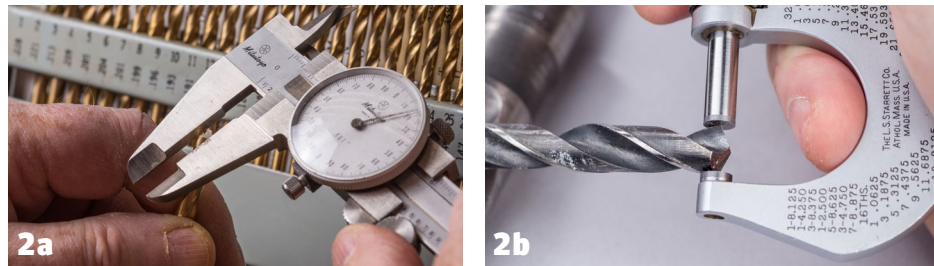
**I'm having difficulty gluing my tubes into my drilled pen blanks. Sometimes, the brass tube slides in easily and other times it is very tight. I always use the same drill so how can this keep happening to me?**

There are several things I can suggest to help with this situation. Let me start with good process, at least for wood. Never drill your blanks until you are ready to glue in tubes. Drilling a boat-load of blanks the day before you glue them lets them sit around for 10-18 hours. In those hours, the blanks have had a chance to stress relieve and change moisture content. Depending on your material, holes change shape and size, blanks can crook or twist, playing havoc with the drilled hole concentricity, along with any moisture changes or equalisation effects on the blank species, three different coefficients of expansion. I usually drill in batches and get my tubes all glued in within a few hours at most. Necessary? In 20-plus years, I've only had problems on the few occasions when I violated this process. Not that I expect any variation, but you may have some tube variation, especially if you mix brands. I don't ever remember seeing an issue with this, but I can see very minor fit differences now and then. You said you use the same drill, but do you use the same process? I'm certain your pistol-drilled hole speeds and feeds are far different to your drill press or lathe drilled. I doubt this would mess with hole size dramatically, but it certainly can vary hole surface finish, which can impact adhesive bonding results. Key to any well-controlled process is minimal variation. The other thought is what your actual desired clearance is. If you are down to the appropriate slip fit clearance, you should have a bit of room for variation. If you are closer to a tighter fit, you don't have any room on the downside. This can be aggravated if you use a brad point bit rather than the traditional point. Only a very well-made brad point tracks well in end grain in my opinion.

Check your drill size. Chances are that it is correct and close to the indicated size. It is still worth checking. Use a pair of Vernier or dial callipers. DON'T measure the drill tang. That doesn't do any of the drilling. Measure across the flutes at the tip of the drill end. That is where the work is being done so that is the important measurement. Comparing that to the measurement you get when you check your brass tube outer diameter should give you a feel for the 'clearance' or gap between the drilled hole and the brass tube side wall.



PHOTOGRAPHS BY KURT HERTZOG



**1** In drilling end grain, I don't favour brad point drills, unless very well (properly) made. I find a standard twist drill tracks better **2** Measuring the shank doesn't tell you what size the working end of the drill bit will drill. Measure across the flutes of the drill **3** Since they will usually drill wood in a light duty manner, even the import drill set can provide good service. I've found this to be a shop asset **4** An inexpensive drill index with letter, number, and fractional is a great tool. You can zero in on exactly what you really want **5** You may find, as I did, you get better results when you size the gap based on which adhesive you plan to use



You'll need a few thousandths per side minimum to allow for the adhesive you are using. If you don't have enough clearance per the measurements, you may need to get a different drill size. Remember, drill indexes come in fractional, letter, and number sizes so you can order sizes that will get you to the clearance you want. The best way I have found is to buy one of the full sets of drills from the discount supply houses. They will have all three of these indexes in the tin. That said, don't believe what the stamped size on the drill

(or drill matrix) says. Again, measure across the flutes of whatever size you think you need. Keep checking until you get the size you want.

Just because you measured the drill flute dimensions doesn't mean that is the size that you'll get when you drill holes. For the most part that is true, but accept the fact that every material will drill a bit differently and the resulting hole size can vary some. The absolute best way to insure you'll get the hole size you want is to test drill a hole is the same

**I'm trying to follow the cutting downhill teachings, but there are times it doesn't seem to work well. If I cut the other direction, I get better results. What is going on?**

Your occasional need to violate one of the 'rules' to get the best results will reoccur, I'm sure. Following the good practices that you learned during your training as best you are able will serve you well. I'm certain that most turners have experienced this cutting direction phenomenon. I can't give you a good answer as to why it does occur. I find it most often with shallower gradients and species dependent. I've found both cherry and oak to present the infrequent occurrence. Since it is surface finish with

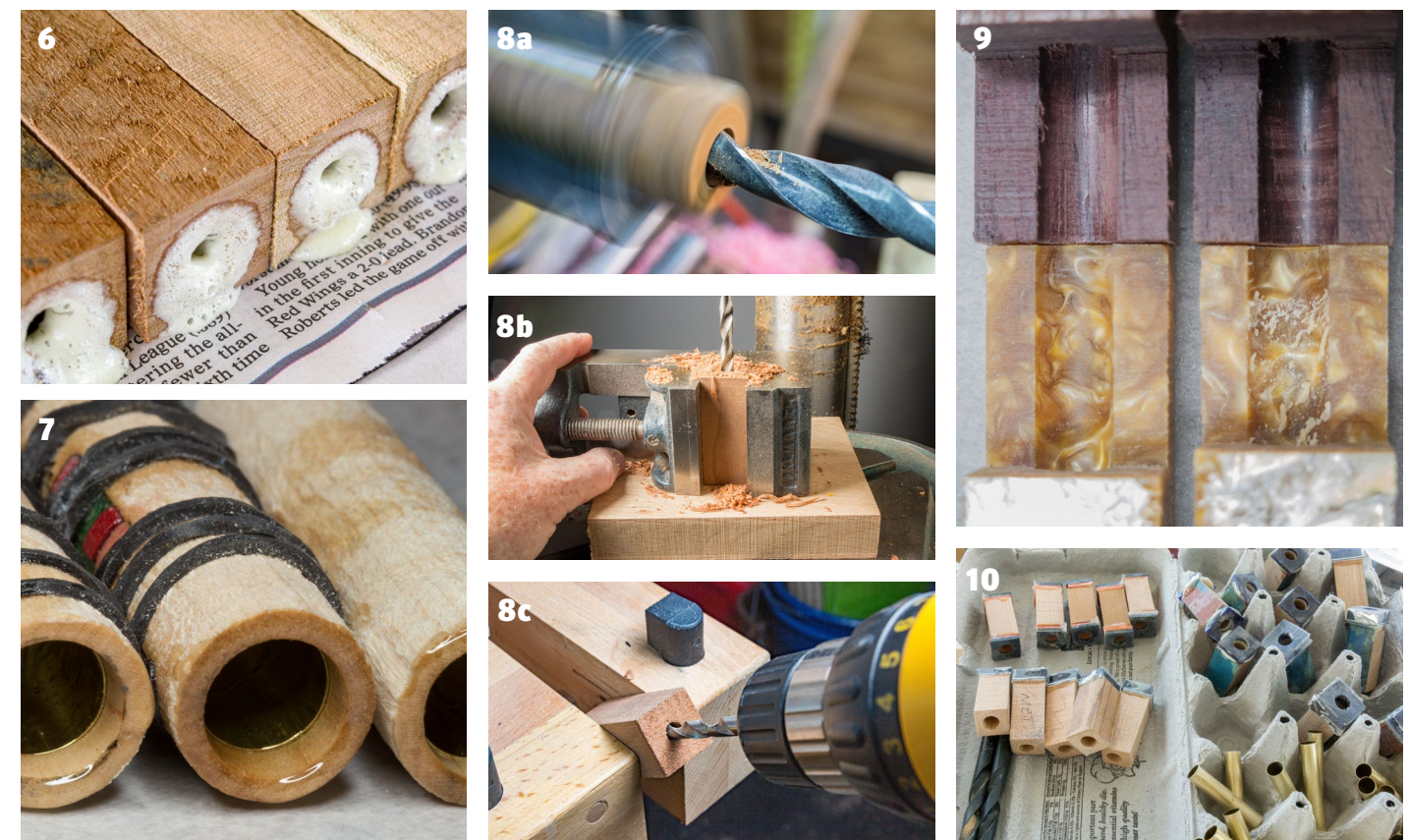


The uphill vs downhill surface finish changes I have run into on rare occasions have been with cherry or oak. Usually on long, gentle radius curves

those cuts being the whisper finish cut dexterity, I struggle thinking about grain tightness, actual gradient angle, sharpness and type of tool, speeds and feeds, grain bond strength, along with other potential

material characteristics that could play into this. I'm hoping my non-answer answer will spark our readers to email me their explanation. I'll look forward to sharing anything learned.

**6** Unless there is a reason I can't use polyurethane adhesive, it is my go-to adhesive. I find it offers many advantages despite a bit of added work **7** Laser-cut assemblies work best with epoxy. With these kits, there are some ways to make minor changes to the adhesive gap **8** Your speeds and feeds are far different depending on whether you drill using a pistol drill, drill press, or your lathe **9** Tool sharpness, along with speeds and feeds, will have a direct impact on the inner wall surface finish. It's key that the adhesive bonds well with the inner wall **10** Whether large or small batch size, I drill just before my tube glue-in. With little time to stress relieve or twist out of size or shape, I hit no problems.



species and same orientation. Obviously, a hole drilled into face grain of an oak blank drills differently to a hole drilled in end grain of the same blank. Angle of drilling with respect to grain axis can make a difference too. When I'm in doubt, I use a piece of the offcut from that blank. Nearly all of your pen blank drillings are into the end grain so drill your offcut piece in the same orientation. Rather than measuring the drilled hole, use one of the tubes to test the clearance. The ease of inserting your tube into your test-drilled hole will tell you how

that species drills with respect to the actual drill. In my experience, every species drills differently and can yield a different size. It kind of makes sense that snakewood drills far differently than Mahogany. The same resulting size differences will show up between various plastics and metals. Remember, we're not talking big numbers here. The difference of a few thousandths clearance or lack thereof can be a pound in, slip in, or fall through fit. Depending on your adhesive choice, you may want to tweak this a bit depending on your technique.

I have a rather bizarre polyurethane technique that serves me well.

I hope you are taking good care of your 'one drill'. Do keep it sharp so you get the most consistent results based on sharpness. I wouldn't expect you to break it based on size, but with the minimal cost of quality drills, buying a few spares just in case something happens to your one drill is a good idea. Remember, generating quality holes takes sharp cutters, proper speeds and feeds, and good drilling technique.