

A hybrid ballpoint pen

Walter Hall introduces us to hybrid pens made up from a collection of components

What is he on about now, you may be asking yourself: we have had modified kits and kitless pens, but what exactly is a hybrid? Well, this pen is certainly not just a few modifications to a standard kit, but neither does it qualify as kitless since it makes use of the mechanism from a Sierra-style twist pen, and a tube and the clip and associated parts from a flat top kit. Now let me be clear, I did not buy two kits and throw away the rest of the parts just to make something a bit different.

The mechanism was purchased from Beaufort Ink specifically for this project, while the Flat Top parts came from my scrap box of components (from past, well, let's just call them 'projects' that did not come out as intended). I guess most pen makers who have reached the stage of wanting to move on from kit assembling will have accumulated just such a collection. The front end of the pen, housing the mechanism and the refill, is made from black Ebonite while the barrel is bloodwood (*Brosimum rubescens*).



WALTER HALL



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EQUIPMENT USED

- Pen mechanism
- Flat Top component parts
- Suitable blanks, e.g. Ebonite and bloodwood
- Depth stop
- Board with eve grooves
- Scroll chuck with engineers' jaws
- Keyless chuck
- Callipers
- Drill bits and taps to suit size of components
- Disk sander with jig or barrel trimmer
- Scriber or hacksaw
- Files
- Abrasive cloth
- Epoxy glue
- Cutting tool of choice
- Finish of choice, e.g. cyanoacrylate
- Micro-Mesh and other polishing compounds

1 The first job is to cut the Ebonite to length. This needs to be just a fraction longer than the 65mm finished size of the component to allow for trimming. Cutting round pen blanks on the band saw is not an alarmingly dangerous activity, but the blank can turn when it contacts the blade or get caught between blade and fence if the fence is used as a depth stop. Either of these things could result in fingers being drawn towards the blade, so use a depth stop that stops just short of the blade and attaches to the fence so there is clearance for the separated part. Also use a board with 'V' grooves against which the blank can be held to stop it from revolving

2 Mount the blank in a scroll chuck using engineers' jaws. I prefer to use a collet chuck for accuracy but the blank, at 20mm in diameter, is too large for the 13mm capacity of the collet chuck I have available. I could, of course, turn it down to a suitable size first

3 Mount a keyless chuck in the tailstock to hold the drill bits needed to bore out the component. A little tip I picked up from one of Richard Findley's demonstrations is to give the chuck a light tap with a dead blow mallet, to seat it firmly in the Morse taper. This will help prevent the chuck from revolving in the taper when drilling or withdrawing the bit



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4 Measure with callipers to determine the drill size required for the tip of the refill. As you can see in the photograph, mine measured just over 2.5mm, so a 2.5mm bit would be too small and 3mm, too loose a fit. Not having a full set of small metric drill bits in 0.1mm increments, I opted for a 7/64in imperial bit, which converts to 2.778mm, giving a nice sliding fit



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5 Another important measurement is for the threads of the mechanism. Not all mechanisms are equal or alike. The one on the left in the photograph is taken from a cheap Chinese copy of a Sierra and is a comparatively coarse 8.5 x 1.0mm thread, while the one on the right from Beaufort is 8 x 0.75mm and compatible with original Sierra kits from quality suppliers. The drill and tap sizes you need will depend upon the mechanism you choose



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6 A standard 7/64in drill bit is not long enough to drill all the way through a 65mm blank. Therefore, drill this out first from what will become the tip end of the blank and then turn around the blank and complete the remainder of the drilling from the other end. In order for this to be successful, the drilling must be accurate, so take your time and use good quality drill bits



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7 Make a final check to ensure the fit is good by inserting the end of the refill in the bore. It should slide in easily, but be held more or less horizontally when released. If the fit is tight the refill will not retract against the spring pressure when released; if the refill flops about in the bore it will be difficult and annoying to write with



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8 With the blank reversed in the chuck, now bore out to 6mm for the body of the refill. The bore needs to be deep enough to allow room for the compressed spring. Start at about 72mm and then gradually increase the depth until the correct fit is achieved



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9 At this point it may be necessary to take the component off the lathe a few times to check the fit. The tip should freely extend by about 4 to 5mm when the spring is fully compressed. It will not be extended this far by the mechanism but this measurement will prevent over compression of the spring



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10 Then open the bore out for about 10mm depth to the correct size, for whatever tap you will be using. Tap the hole using the methods described in my previous articles



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11 Should adjustments to length be needed, to achieve the correct tip extension once the components are assembled, trim down with a thin parting tool

12 With the refill and spring installed and the mechanism screwed into place, it should be possible to extend the tip of the refill smoothly by twisting the mechanism and retracting it against the spring pressure without any sticking. Now is the time to make any adjustments required to achieve this



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13 Cut the bloodwood blank to length and bore it out for the cap end of the pen. Drill in stages to first accommodate the brass tube and then the body of the mechanism. The exact sizes and depths will be determined by measuring the components you are using

14 Square off the ends of the blank true to the bore, using a jig on the disk sander or with a barrel trimmer. In this instance, I did this before installing the brass tube. You may need to make suitably sized sleeves for the jig to ensure accuracy

15 The tube from the Flat Top kit should be a good fit over the end of the mechanism, providing just enough grip to turn it without slipping. If it is too loose, slightly compress the very end of the mechanism to a slight oval shape with a pair of pliers to resolve this. The tube will not slide all the way onto the mechanism and it does not need to. Slide it as far as it will go and then pull it back to about 5–6mm for clearance



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16 Slide the drilled wooden blank over the tube and mechanism until it is firmly seated against the Ebonite lower body. Mark the length of the protruding tube with a scribe or hacksaw, then remove the blank and tube and cut the tube to the marked length

17 Clean up the end of the tube with files or abrasive cloth and glue it into what will become the clip end of the blank. Using epoxy, make a good strong joint that will stand up to the twisting action of operating the pen. Of the alternatives, cyanoacrylate (CA) is not the best adhesive for wood-to-metal joints, while polyurethane glue, which might otherwise be a good choice, risks expanding into the part of the bore that does not contain the tube



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18 With the refill and spring removed, mount the Ebonite section of the pen in a collet chuck with a suitably sized collet fitted to engage with the body of the mechanism, while supporting the tip end by a revolving centre in the tailstock. The Axminster Trade Series Precision Pro Lathe (that I review in this issue) is ideally suited for this. Do not overtighten the tailstock quill or you will flare the tip



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19 Now, using the cutting tool of your choice, turn the body of the pen down to whatever shape you wish. Ebonite is very abrasive and it blunts cutting tools quickly, so start with your tools honed to razor sharpness and re-hone every few minutes as soon as the edge becomes dull. Remove the tailstock support should you need to, to make the finer (and lighter) cuts needed to shape the tip



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20 Once shaped, sand the component in preparation for final finishing. I would not recommend polishing until you have done a final check for a good fit of the two parts of the pen



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21 The pen is fitted with the clip insert, clip and finial screw fitting from the flat top kit. Press the insert into place once the cap is shaped and finish and then screw the clip and finial into place



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22 Carry out the shaping between centres. I used a stepped centre in the collet chuck of the lathe, but a normal 60° dead centre would be fine. Size your work using callipers, occasionally checking against the other components to ensure accuracy



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23 Apply your chosen finish to complete the cap. I used CA for a high gloss, but there are many alternatives available. Assemble the clip components to finish this part of the job



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24 Do one final check for fit, then return the Ebonite section to the lathe and polish with Micro-Mesh and/or suitable polishing compounds



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25 Your final pen should look something like this. The finished pen is unique and will reflect your own design choices. You could make it a little thinner if you choose, but do not over do this or you will make the unsupported wooden part of the cap too thin and weak. I may revisit mine and turn a brass centre band to add a highlight between the upper and lower parts ●