6th Oct

Machining the Pendulum Bobs has indeed been interesting - and I haven't even looked at drilling the through hole! I originally intended to use a 6mm cutter for the outline but then realized that the only 6mm cutter I have is only capable of cutting up to 15mm deep and I need at least 25mm. Fortunately I do already have a 63mm long router bit but it is ½" Ø so I had to re-jig the G-Code accordingly.

The first P-Bob blank I left as it came off the saw which meant that the ½" cutter was taking a full width cut for about 50% of its travel but by the time that it was 24mm deep there were issues with parts outside the pentagon breaking free and causing some surface damage. Not that it mattered too much since it was a 'roughing' cut and the finishing cut of 0.3mm would clean that up but it made me decide to trim the other three blanks to within 5mm of the finished size before mounting them. Once I'd done that it was just a matter of letting the Denford take its time and a travel distance in excess of 20m @ 200mm/min does take some time.

While that was being done I did the lathe work on the Pendulum adjusting nuts so the next job will be cutting the ridges in the sides of those. I haven't cut Brass on the CNC machine before so I first made a 'dummy' out of Maple just to check that the G-Code did what I expected. You'll notice in Fig-50 that I've crossed out the original design dimension of 30mm and penciled in 28mm. The brass I had on the shelf was only 1-1/8" diameter so I took the pragmatic approach and re-designed the part rather than order new

Fig-50

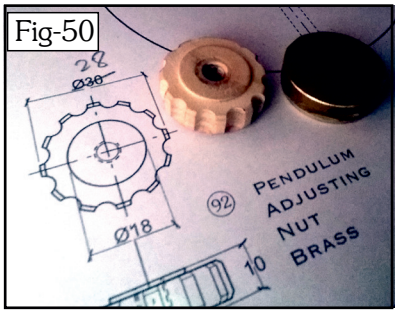
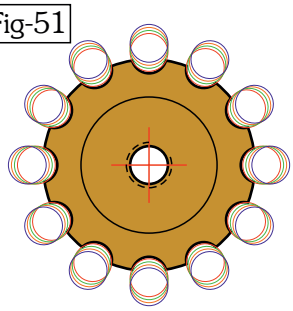


Fig-51



The brass billet is there because I did a physical test to make sure the Denford could handle the forces needed to cut brass but I forgot to turn it around so that you could see the test cut. In fact it proved that I needed to reduce my estimated feed and speed. Rather than cut a 'Profile' I had decided to use a 'Drill' Canned Cycle MOP so that I could easily control the amount of material being removed with each pass which I'd assessed to be 0.4mm. It would also give me a cleaner edge to the indentations though to some extent these will be smoothed out when I do the final polishing - Brass deserves to be polished! - Fig-51 is a drawing of the four cuts that I need to take and Fig-52 shows the Denford part way through one of the cycles.

Fig-52

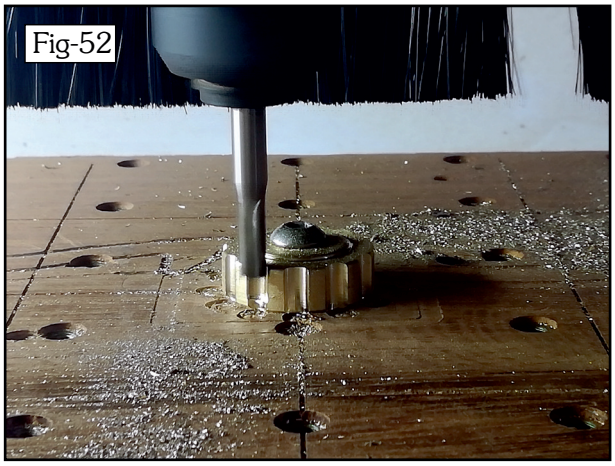
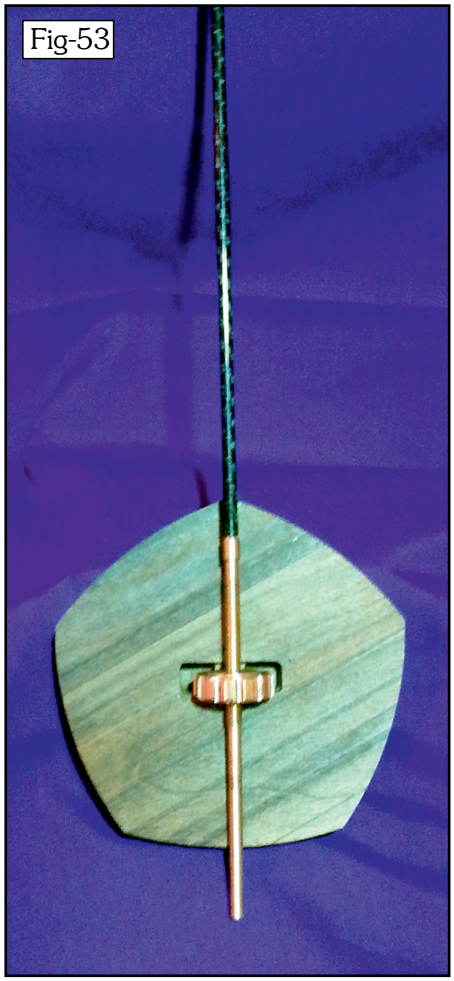


Fig-53



7th Oct

To give you a clearer idea about how these parts go together Fig-53 shows the Pendulum Rod (Carbon Fiber Tube) with the connecting piece as well as the Adjusting Screw and Nut.

Eventually they will all be inside the Pendulum Bob of course but since I haven't yet drilled that hole, this just shows you where they will fit - assuming I can drill a straight hole through the Bob.

I said that drilling the hole would be 'interesting' well it certainly was! The first thing that brought me concern was the fact that the Bob Blanks do not have a 'flat' side which I can use as a datum so positioning them in a four-jaw independent chuck needs to be done with some care. The 'points' can be used to check that it is held centrally the one at the top must lie on the lathe centre-line and the next two must be equidistant from the centre-line.

To check this I used pointers in the lathe tool-posts and the first one took me about 10 minutes to get to a satisfactory position. In Fig-54 you can see the two pointers, one connecting to the top point and the other locating the side point. To check that the Bob was centred, I could flip it over 180° and the pointers should still connect to both points.

It is also necessary to make sure that the Bob is centred when rotated 90°. To do this, all I needed to do was set it upright and bring a centre drill up in the

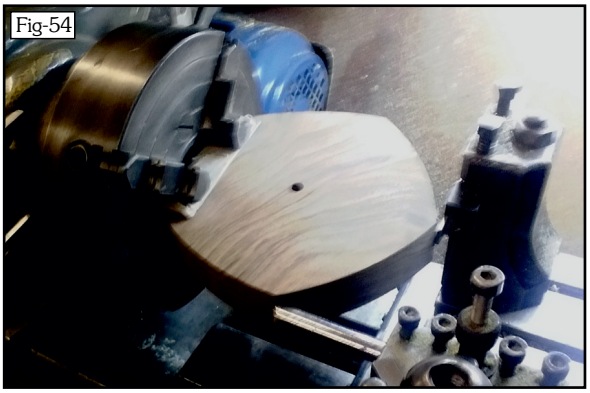


Fig-54

tail-stock. The centring is not hypercritical so holding a steel rule with the centre-drill and making sure the two sides are equal. Fig-55 shows this. I could have done this by checking the cross-slide dial reading for each side as well.

Once I was happy that the Bob Blank was centred I could start the lathe and drill a centre hole followed by the various length drills, finishing with the 12" long ¼". This was necessary because although the long series drill did break through, it is only 6mm diameter and the hole needs to be a clearance for the 6mm Ø adjusting screw. Although the blank is not a solid round, the fact that it is centred means that there is no danger of it being 'out of balance' but even so there is no need for high speed. In Fig-56 you can see the long series drill but the blank is a blur.


Fig-55


Fig-56

Now I have to make a small jig to locate the Pendulum Bobs so that I can position them so that I can cut the centre slot accurately in line with the side that is already done - but that's for another day!