Notes on Multi Axis Woodturning Demonstration

1. Safety

It's very important to have mastered basic woodturning skills before attempting multi axis turning. Particularly the positioning of the tool rest. so, it is not hit by the off-centre work piece, always rotate the work piece by hand to make sure it clears the tool rest. Make the work piece is firmly held between the centres and that the tailstock quill is locked in place. Always start the lathe on its slowest speed, increase the speed slowly until vibrations are felt, the turn the speed down until the vibrations stop. Never put your fingers or hand in front of the tool rest. Wear a visor rather than goggles or safety glasses.

2. Tea Light Holder or Egg Cup

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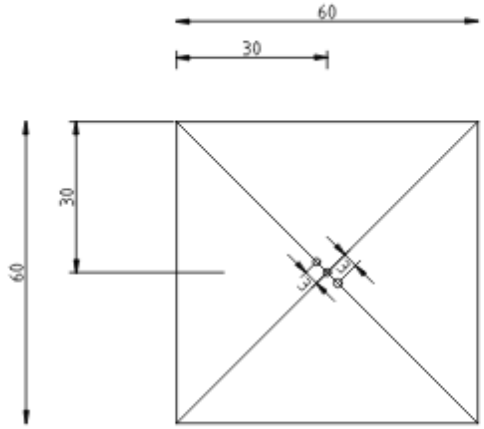
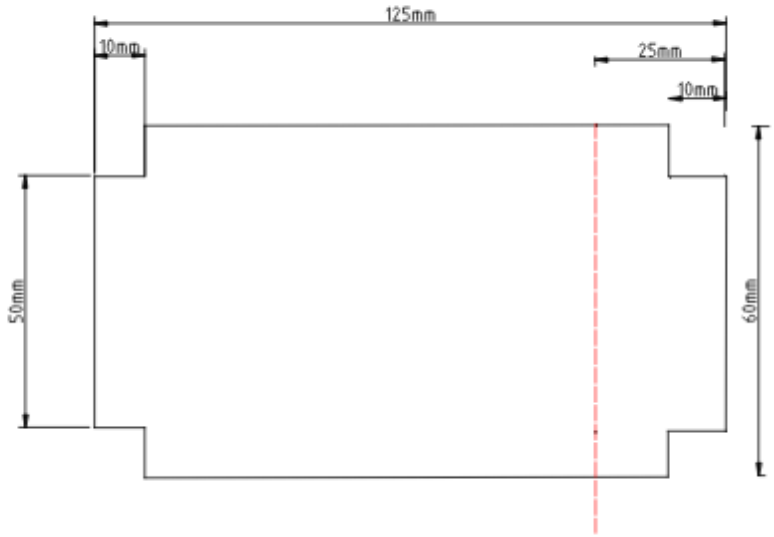


Mark out the off sets at both end

Multi axis tea light holder

Fig. 1
Marking out and preparing the blank.



Rough down to a 60mm cylinder, with 50mm diameter tenon by 10mm on both ends for mounting in a 50mm jaw chuck.

Parting off line

Material required 60 x 60 x 120mm wood of your choice. For first attempt I would use something plane and cheap, like Chestnut or Sycamore and knot free.

Mark a line across both diagonals at each end to find the centre points, mark them, then across one diagonal using either dividers or compasses, mark a point 3mm either side of the centre point. Make sure it's the same diagonal at both ends otherwise you will end up with a twist in the turned item.

Mount the blank the centre line between the drive centre of your choice and a revolving tail stock centre. Using a roughing gauge to turn the work piece down to a 60mm diameter cylinder. Turn a 50mm diameter tenon on either end 10mm deep or to suit your chuck. The tenons will be used to hold the work piece while hollowing out the tea light holder. Draw a line along the entire length of the work piece including the tenons, each end should line up with the lines across the ends with the off-set centre on it. Part off on the cut line shown in red.

Mount the tenon on the long piece in the chuck and tighten the chuck firmly.

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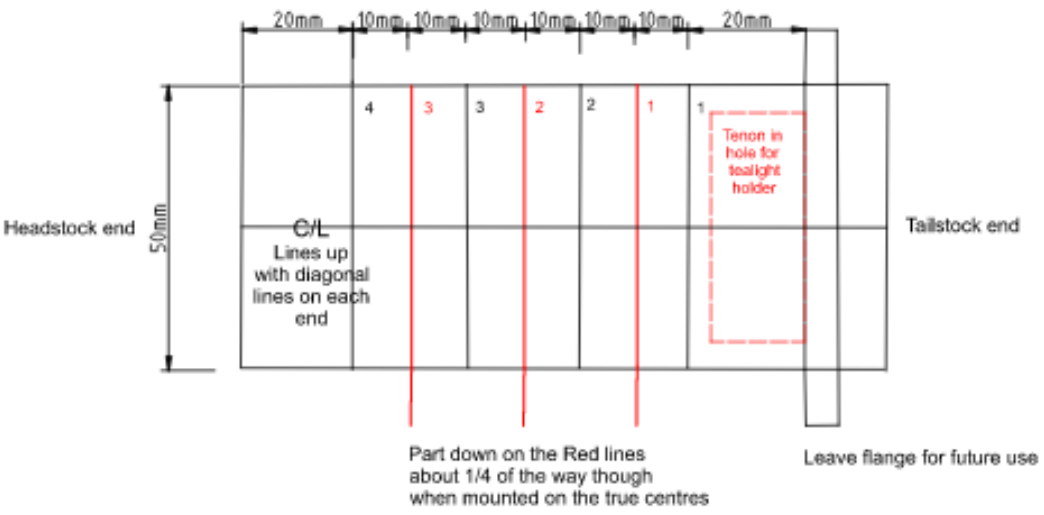
Adjust the lathe speed to about 1000 rpm and face off the end of the work piece, using a spindle gauge. Mount a Jacobs chuck in the tail stock, fit a small drill, 2mm or 1/16" drill a hole the same depth as the tea light holder. I use to use glass one from Ikea or Wilkinson's, but they have stopped selling them. There are metal ones available online, please do not put the tea light directly on wood. Now fit a 35mm or 40mm Forstner bit in the Jacobs chuck and drill down to the depth of the tea light holder. Stop the lathe & remove the Jacobs chuck. Set the tool rest at right angles to the hole just drilled in the work piece and use either a small parting tool or a scrapper. I use a box scrapper I made so that the so the side are parallel with the outside or a small skew chisel works equally well. Open the hole out so the holder fits.

Remove the work piece from the chuck & put the short work piece in the chuck turn a tenon about 10mm long with a diameter that fits in the hole for the tea light holder. It needs to be a reasonable fit but not too tight. Remove the work from the chuck and the chuck from the lathe. Put your drive centre and tail stock revolving centre back on the lathe. Insert the tenon on the short part into hole for the tea light holder on the long piece and align the pencil lines. Place between the lathe centres on the true centre position.

Fig. 2
Marking out for multi axis work

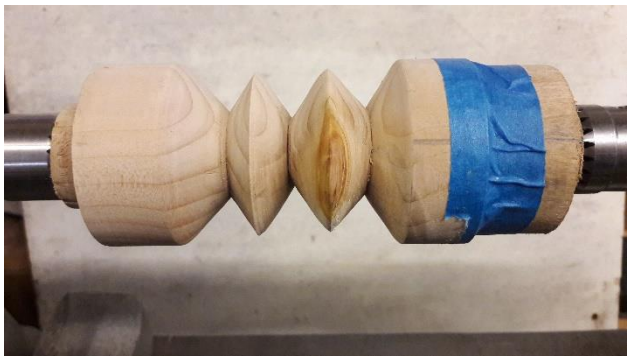


Start making a V-cut at a 45-degree angle with a skew chisel or spindle gauge between the first black line and the first red line at the tail stock end. The cuts make with the parting tool will free up the material cut with the skew chisel. Continue to make cuts with the skew chisel or spindle gauge until you reach the bottom of the parting tool cut. Repeat the at the Headstock end (the base of the piece). Cutting down from black line 4 to red line 3.

Remount the work on a pair of the 3mm off-set centres, make sure that they are on the same side to the true centres otherwise there will be a twist in the work. Using the skew chisel or spindle gauge cut from the second black line down to the first red line at the tailstock end, using multiple cuts, down to base of the parting cut. Then repeat the process from the second black line to the second red line.

Next remount the work on the other pair of parallel centres, cutting down from the third black line to the second red line, then from third black line to the third red line. Then replace the work on the true centre line, and repeat the above sequence until you are happy with the appearance of the work. Always start each sequence from the tailstock end, it tends to keep the pressure on the work to a minimum as the material between section is reduced.

To clean up the joins between each section, switch off the lathe, rotate the work by hand, using a sharp small skew chisel, toe down, follow the contours between each section. With the lathe running at about 600rpm sand each section on its appropriate centres. To clean up the base remove the work from the lathe, using the tenon on the tailstock end mount this in the chuck, use a small revolving centre in the tailstock end to clean up the base. Then move back the tailstock and gentle remove the drive point marks by sanding sand. If you have a lathe steady this will help a lot.



If the tenon on the tail piece is a bit loose it can be held in position with a piece of masking tape after lining up both pieces.

Work on the lathe before the final finishing cuts.

If you want to make another one, you can use the same tailstock piece, you only have to prepare another main section 100mm long by 60mm square.

I hope you find this interesting Good Luck.

Harold