

Simply Spherical

This technique of turning spheres without a jig or even a template is described by Allan Batty in a video on YouTube. It can be found by searching 'An Audience with Allan Batty' or by clicking on this link:

https://www.youtube.com/watch?v=AcxSDfGbB_4

Unfortunately the quality of the video is poor and it is difficult to see exactly what Allan is doing but it is an entertaining watch. Allan says that this technique was used to turn ivory billiard balls for over 300 years and he recommends it as the simplest, most accurate way of turning a perfect sphere.

I see that a different technique (using a jig) is employed in this old video:

<https://www.facebook.com/Fuscothespot/videos/history-of-billiard-ballsearly-billiard-balls-were-made-of-various-materials-inc/2233678606888749/>

Start with a spindle blank, it needs to be about 1 inch longer than it is square. Rough it down to round. Measure its diameter. Divide the diameter by two and add 1 or 2 mm. Make a mark this distance in from the free end, this will be the centre mark. Make a second mark the same distance again to the left. I used a chuck for turning but you could also use centres.



Shape a rough sphere centred on the middle mark. Do not remove the middle mark. The nearer to a sphere you get at this stage, the easier chucking will be in the next stage but don't spend too much time on it.



Like me, you will probably create a rugby ball at this stage but it doesn't matter.



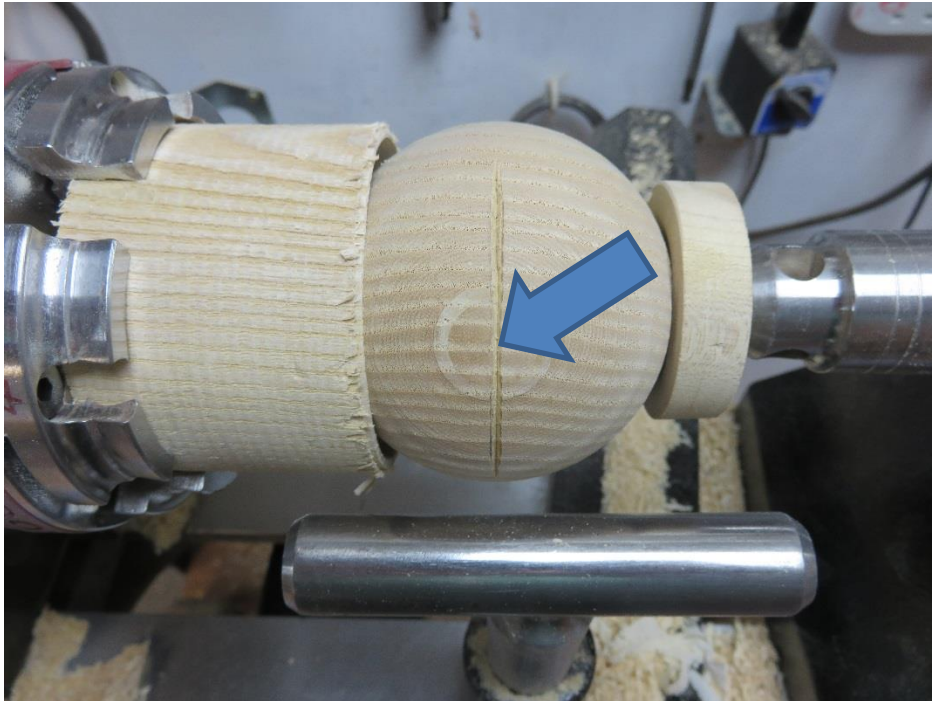
Part off. Make a jam chuck. This should be tapered internally (Allan Batty recommends 3 or 4°).



Size the jam chuck so that it accommodates the work piece. The nearer the first stage turning was to spherical, the better it fits into the jam chuck. If it doesn't hold that isn't a problem, just secure it with the tailstock. For this photo I made a concave face on a scrap of wood on the live centre. It is important that the original centre mark is nicely aligned along the axis of the lathe.



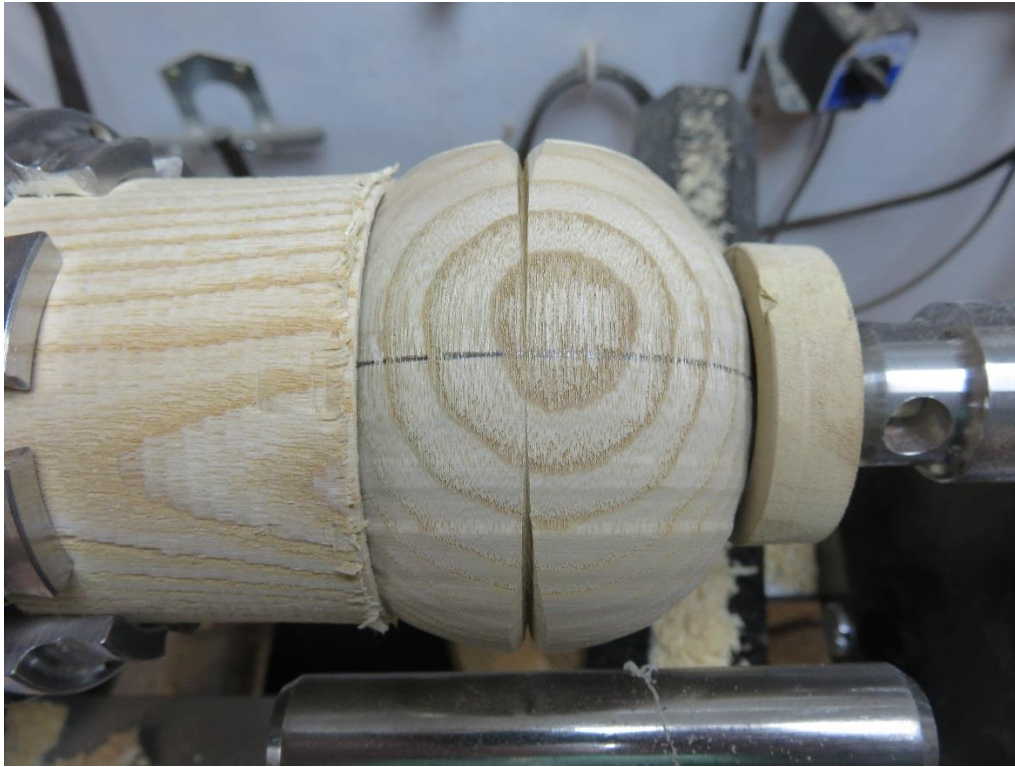
Next carefully find the widest part of the work piece, its equator. Using a skew chisel make a vee cut here. Because we don't have a perfect sphere at this stage the cut will be deeper in some places than others. The cut should go through the centres of the original ends of the work piece (arrow). It may be possible to use a narrow parting tool in place of a skew for this.



The vee cut is deeper at the ends of the rugby ball made in the first stage of turning.



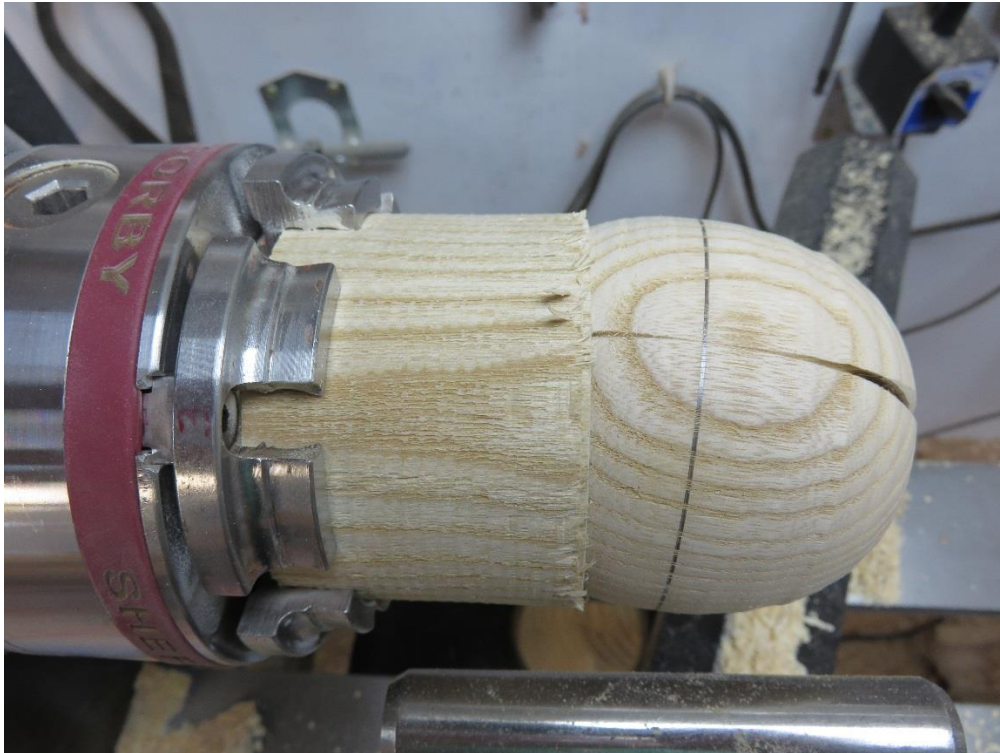
Carefully continue to cut deeper.



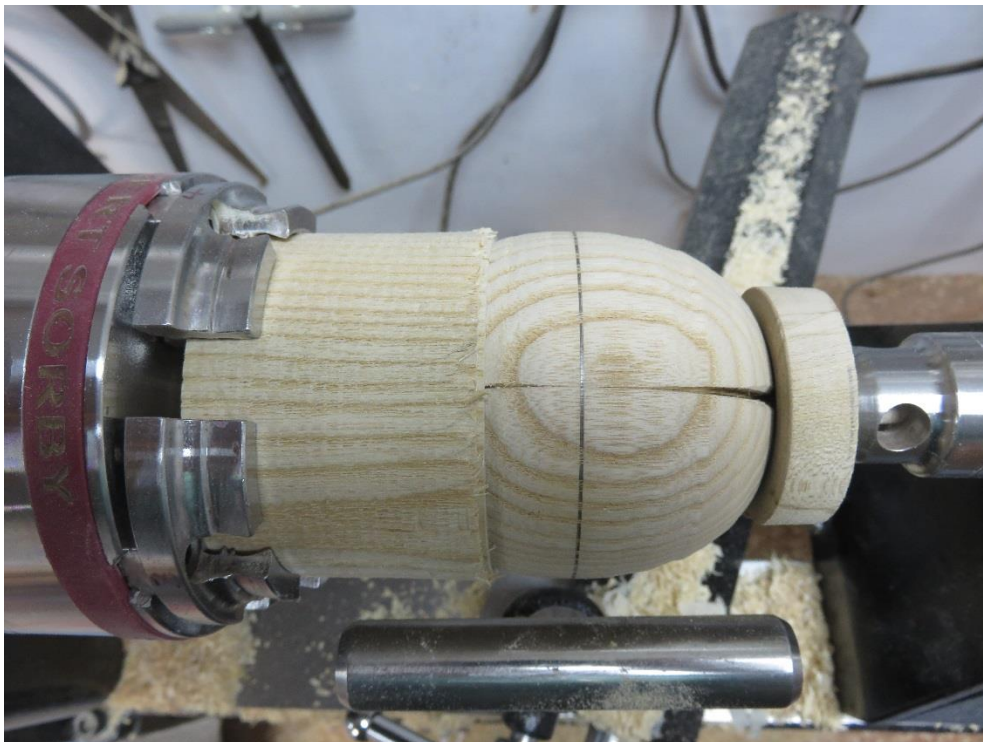
Stop cutting just as the cut reaches all the way round the work piece.



Remove the work piece, rotate it to its original orientation and fix it into the jam chuck. The jam chuck may need some reshaping. The work piece should be less than halfway into the jam chuck to allow access to its centre part. Do not insert the work piece at an angle like this:

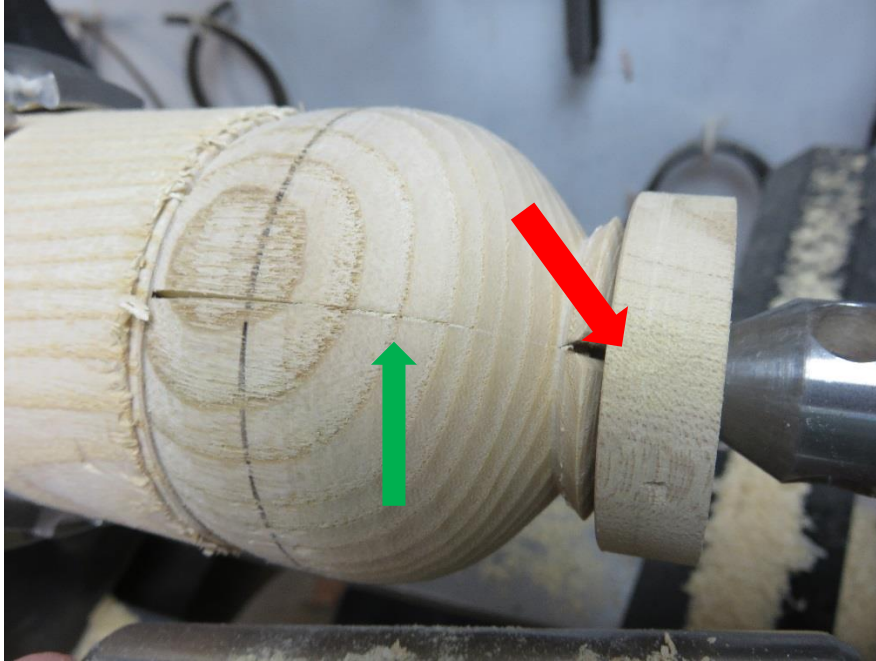


The original centre mark must be exactly aligned with the jam chuck, i.e. at right angles to the axis of the lathe, like this:

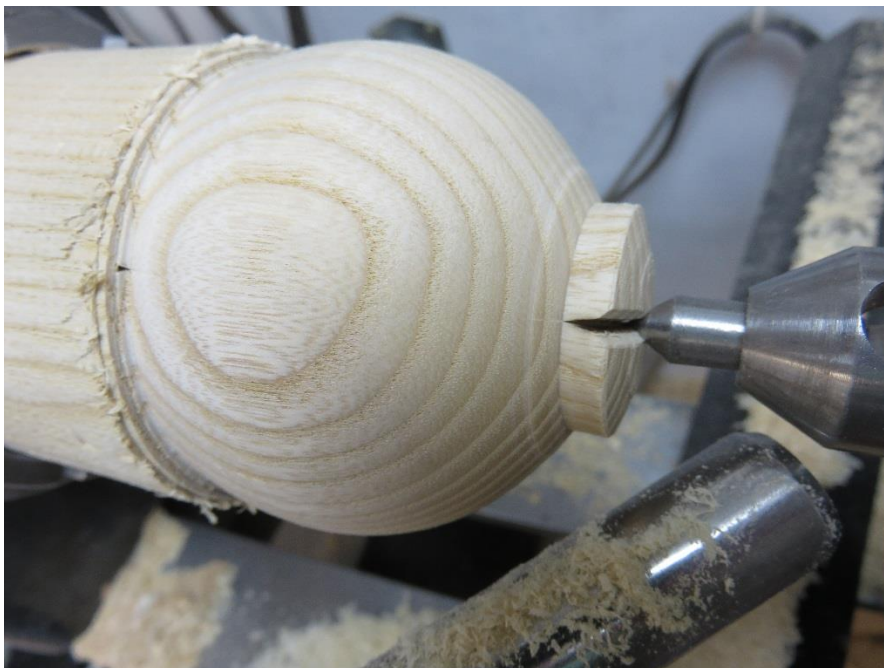


Use tail stock for additional security if required.

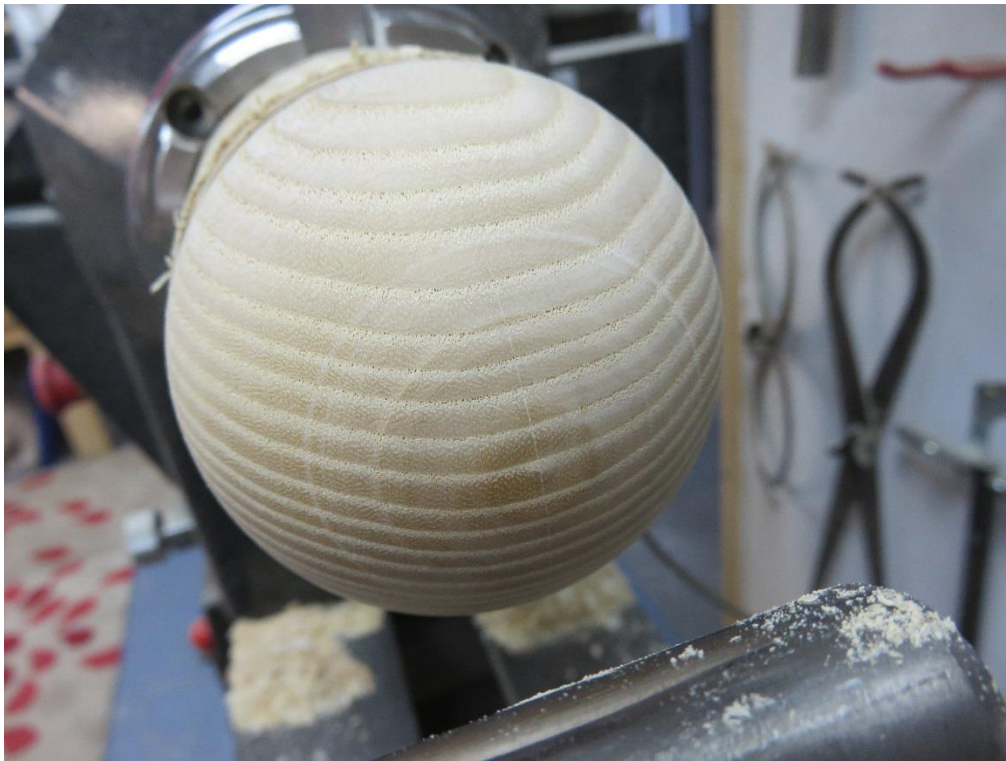
Slowly and carefully turn away material down to the bottom of the vee cut. The red arrow shows that a lot of material remains at the end, this is because the first stage of turning created a rugby ball shape, which we are now correcting. The green arrow shows the vee cut is still just visible, requiring another pass with a sharp spindle gouge. Each time you stop the lathe to check if you have reached the bottom of the vee remember to look at the back of the piece because the vee might be deeper at that side. You need to turn away material until you reach the deepest part of the vee cut everywhere on the piece.



At some point the tail stock support must be removed to turn away the excess material from the first stage turning. A live centre with a point can be used at this stage if you're unsure about the jam.



A scraper will remove the final trace of the vee cut which is just visible in this photo. Do not remove any more material than necessary to bottom out the vee.



Then reverse the work piece into the jam chuck and repeat the process for the second half.



Sand through the grades. For each paper remove, rotate and reposition the ball several times in the jam chuck so as to obtain an even finish. Wax or oil as usual, this is easiest using a buffing wheel.

