Another Viewpoint On Segmentation

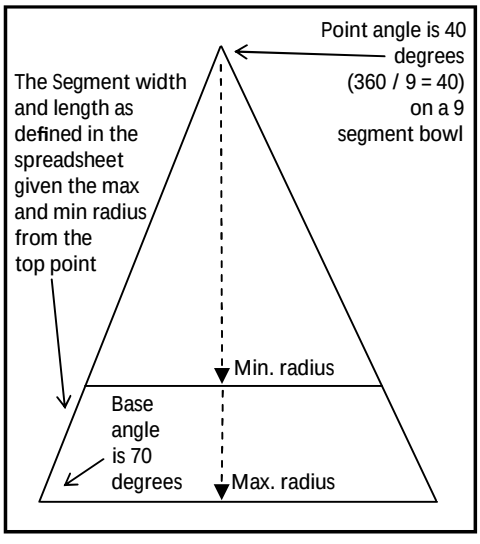
You all know how things go in woodturning. You watch someone do something with interest, and when you have a go yourself you find alternate ways of doing things. It has nothing to do with "doing it better", it's all about "doing it in a way that feels more comfortable".

I had previously spent a morning with a fellow club member who produces the most excellent segmentation work. In 2 or 3 hours he taught me a good deal, and I decided to have a go for myself. My first effort is shown above, and I was very pleased with it, made of Pine acquired from B & Q (other DIY stores are available to the user). I do not own a planer / thicknesser, so now, wood is bought at the local timber mill and a friend down the road who runs a joinery business prepares the planks for me.

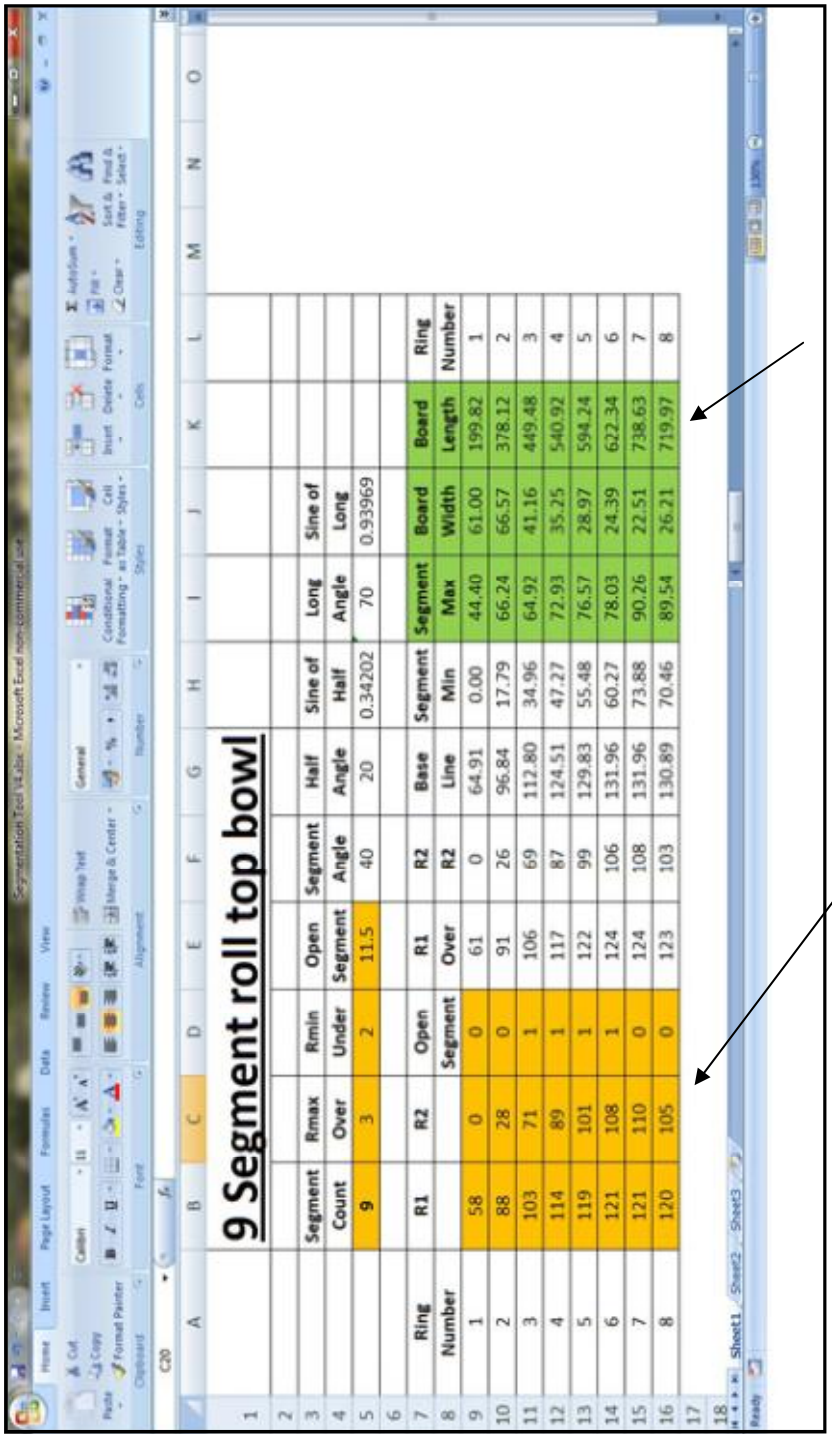
During the following weeks I did more, and for my comfort, I chose to tweak the methods somewhat. Many will say "you cannot do it like that", others will say "that's interesting, I could try that". It is about evolution after all.

I had been shown how to stick paper patterns onto the timber, and then cut and sand the pieces to shape, then get all the paper and glue off. Having tried it, I very quickly decided to find methods more in my comfort zone, with the need to avoid all the paper and glue bit. Also, I did not like the idea of only being able to make segment layers containing an even number of segments, another problem to be designed out of the process. The first stage of the evolution was to write an XL spreadsheet. After several versions, I am now able to define 1) how many segments I want in each ring, 2) the maximum and minimum radius of each ring, 3) over and under cutting allowances, and latterly, 4) whether or not an individual ring has "open" or "closed" segments.

The net result is an Excel spreadsheet that tells me all the segment sizes I need to cut for each layer, from timber of a pre-defined width and length. A full screen print of the spreadsheet is shown on the next page, and if anybody would like a copy of this to use on your own computer, you only have to ask.



The remainder of this description defines how I make an 8 layer bowl with 9 segments in each layer. To the right you see a layout defining at the top, the arc covered by a layer, 40 degrees, typical segment size, the max and min radius, and the base angle which is 70 degrees.



9 Segment roll top bowl

Segment Count	Rmax Over	Rmin Under	Open Segment	Segment Angle	Half Angle	Sine of Half	Long Angle	Sine of Long
9	3	2	11.5	40	20	0.34202	70	0.93969

Ring Number	R1	R2	Open Segment	R1 Over	R2 Segment Angle	Base Line	Segment Min	Segment Max	Board Width	Board Length	Ring Number
1	58	0	0	61	0	64.91	0.00	44.40	61.00	199.82	1
2	88	28	0	91	26	96.84	17.79	66.24	66.57	378.12	2
3	103	71	1	106	69	112.80	34.96	64.92	41.16	449.48	3
4	114	89	1	117	87	124.51	47.27	72.93	35.25	540.92	4
5	119	101	1	122	99	129.83	55.48	76.57	28.97	594.24	5
6	121	108	1	124	106	131.96	60.27	78.03	24.39	622.34	6
7	121	110	0	124	108	131.96	73.88	90.26	22.51	738.63	7
8	120	105	0	123	103	130.89	70.46	89.54	26.21	719.97	8

Within the spreadsheet you need to create a separate row for each layer of your bowl.

The 3 columns of green boxes define the board width and length you need and the maximum length of each segment in the layer.

This is achieved having first completed all the gold boxes on the left hand side of the spreadsheet.

It looks complicated at first, but when you get into designing a bowl and cutting the timber, it will all fall into place.

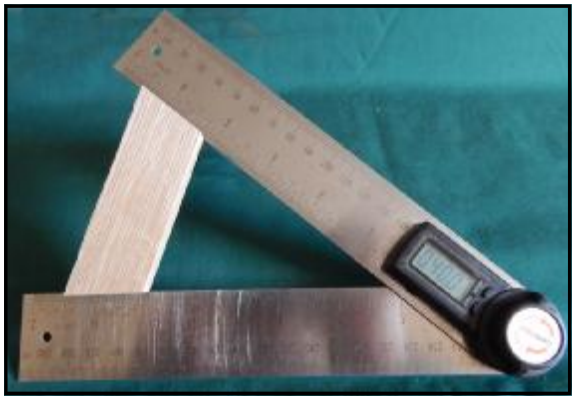
The next bit of the evolution was to purchase a digital angle finder / protractor from a well known internet auction site. It only cost me £15 with free postage and has been an absolute god-send within this project work.

Stage one of the build process is to set the mitre fence on the bandsaw VERY ACCURATELY, so as to cut timber at the correct base angle.

DO NOT measure the fence angle and assume that it will cut timber at the same angle. Cut a scrap piece of timber, measure the angle of the cut, and re-adjust the fence until the correct base angle of 70 degrees is achieved.

Cut one end of a piece of scrap timber, flip it over, and set the rip fence to give you the correct “max length” for your segment. You are now ready, and should proceed with cutting a set of segments.

Having cut a set of segments to the defined size, sand ONE end of each segment on the disc sander, having previously gone to great lengths to set it’s mitre fence correctly also (set it by testing the wood, NOT the fence). The only result which is acceptable here is a base angle of 70 degrees, plus or minus NOTHING. Also worth noting here is the importance of having the table set accurately (without flex) so that you sand at 90 degrees. Again, measure the angle on the wood, not the table.



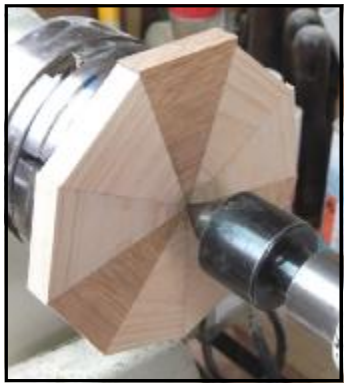
Having sanded the first end of each segment correct with respect to the LONG edge of the timber, all that remains is to sand the second end to 40 degrees with respect to the first. This is all very easy when you have a tool which will measure angles for you with good repeatable accuracy to within 1/10th of a degree.

My next innovation is something akin to a nine legged spider. It is an old piece of kitchen worktop, pierced in many places to take the leg of a re-shaped tent peg. These have been shortened a little and bent so as to form clips that can be pushed into holes in the worktop, firmly holding a set of segments in place. The segment set you see here has been laid down without adjustment to form a perfect circle.

The basic process here is to lay down a sheet of cling film to work on followed by the set of segments (without glue), each being held in place with its own clip. Latterly I have used tinfoil, it is much easier to handle and just as effective. You should work with care, ensuring the joints are tight. You might need to fine tune the position or shape of some to get the last piece to fit correctly.

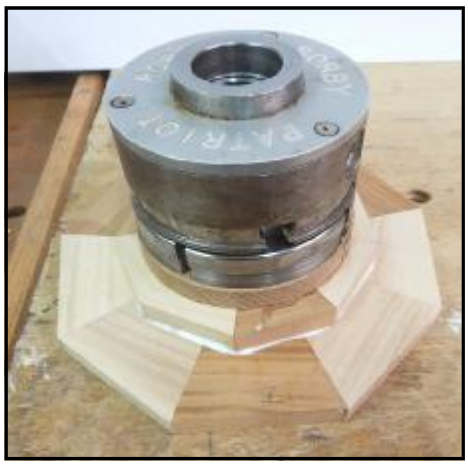

Only when you are happy with the layout do you start gluing. If you are working with an odd number of segments, remove one piece and apply glue to one edge only. Continue by removing alternate pieces, one at a time, applying glue to both edges and then clipping them back into place in the circle. After about an hour you can remove the ring from the spider board and move on to the next layer.

When all layers have hardened overnight you then sand the top and bottom surfaces until they are smooth and no joint ridges can be felt. Don't bother sanding the top surface of the top ring.

Make a sacrificial mount to hold in the chuck and use a sharp bowl gouge to cut a clean flat surface on the outside face. Use an awl to lightly mark the exact centre of your base ring, glue the face of the sacrificial chuck and hold the base ring in place with a live centre in the tail stock until the glue has gone off.

Take several measurements of the opening in the next ring up in the stack and calculate the average internal diameter. Draw a circle of that diameter on the face of the "work in progress" which is still mounted in the chuck. Take the chuck off the lathe, do not be tempted to take the work out of the chuck. With the lump standing face up on the bench, apply glue to the area outside the drawn circle and apply the next ring, taking care to stagger the joints correctly and get it aligned as best you can with the

drawn circle. As soon as it is safe to do so (a few minutes), turn the lump over and leave on the bench for an hour or so to harden off under the weight of the chuck.

In the 9 segment project being shown here I have used 6 Ash segments and 3 Oak segments in each layer and the layers are rotated one third of the segment length to produce the spiral patterns. Repeat the process all the way to the top of your form, and leave it to dry for 24 hours.

Turning is not the reason for writing this article. This has been nothing more than an attempt to further define the methods I have used, but for the sake of completeness, we see here a picture of the finished bowl.

At the Norwich club night on 6th March, the bowl was described as having good form and function with clean lines and finished well. That's fine by me, I am very happy with it.

Here is my first ever attempt at open segment work.

My Excel spreadsheet allows you to combine both forms of segmentation, so clearly, there is a huge range of opportunities for me to pursue now.

I didn't know I would ever say this, but segmentation is not difficult, it does however involve accurate cutting and sanding, and we are all be capable of that and I hope I have explained enough of my methods to get you to have a go.

Also, I have been surprised at how little wood you need to use to make quite a large form. So, have a go, it is great fun to see a project quite literally "grow before your eyes".

Jon Simpson