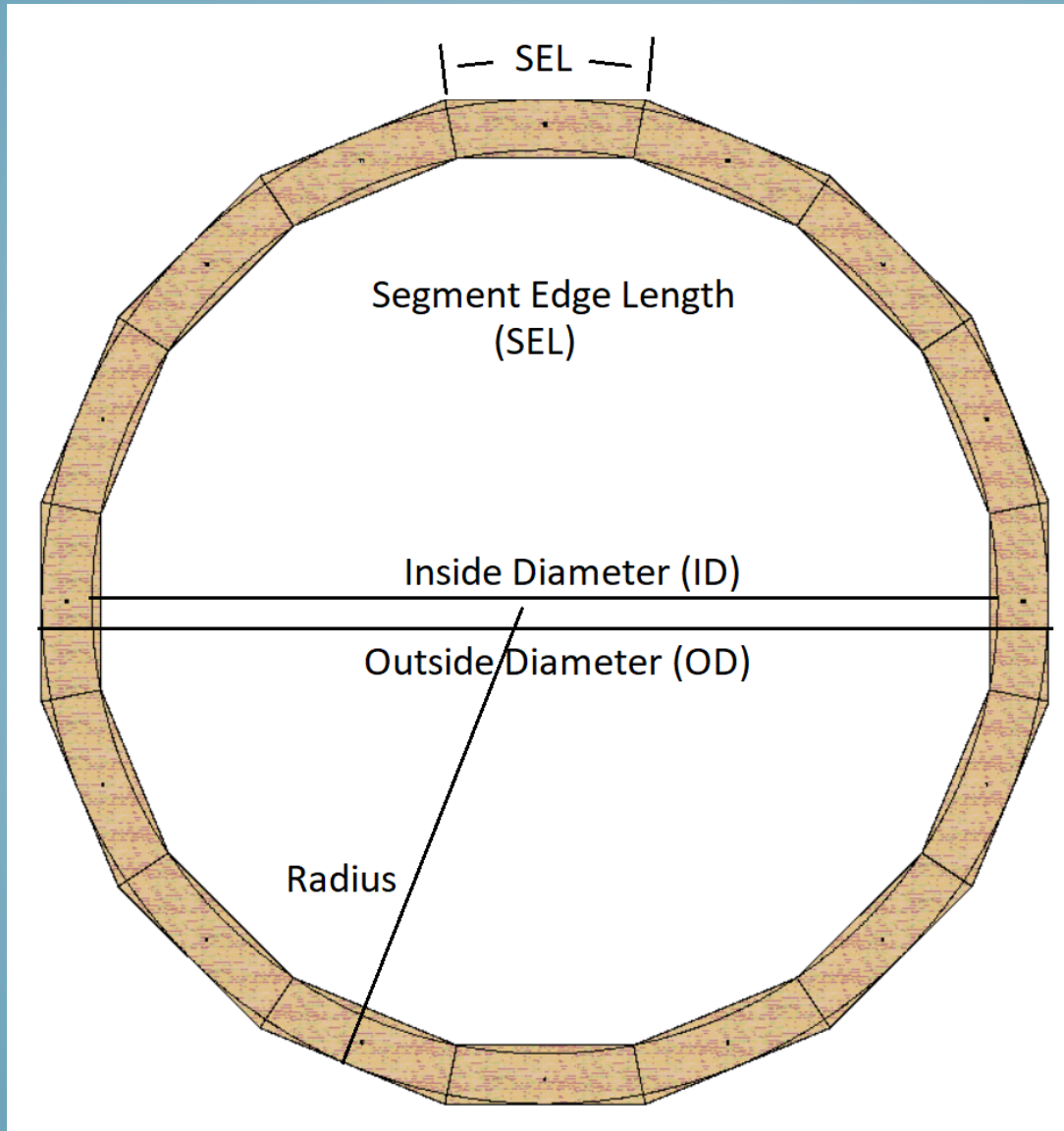


Segmented Woodturning

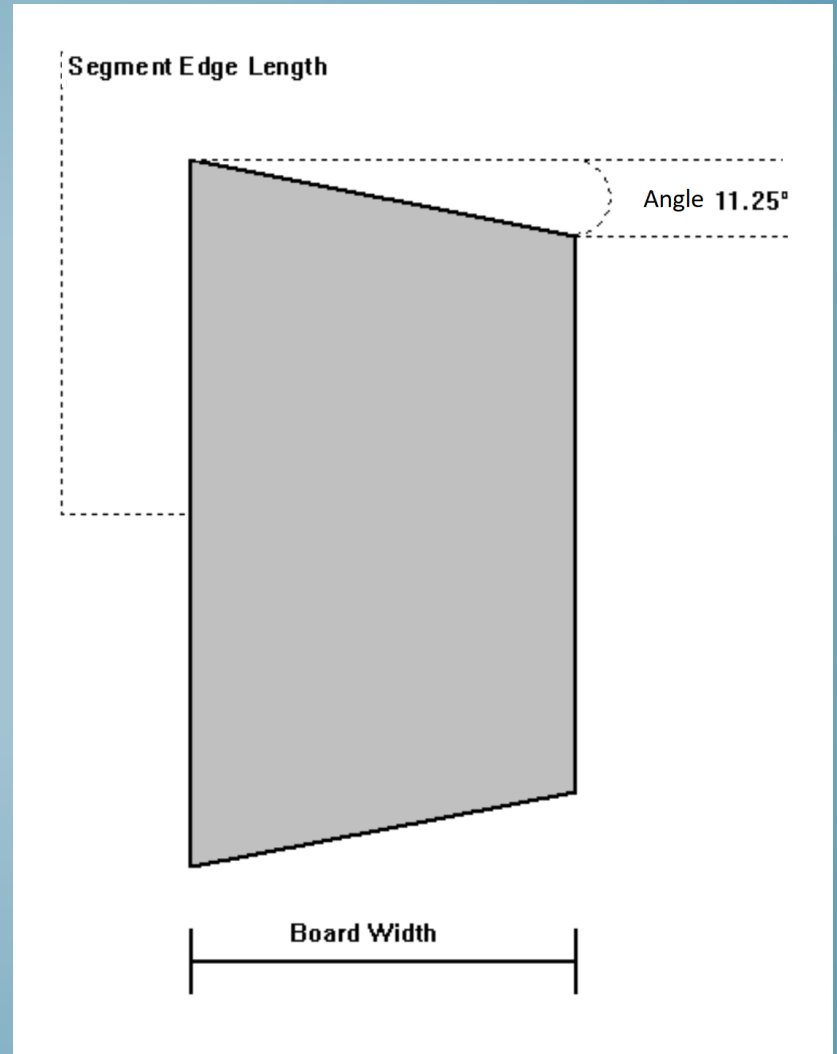
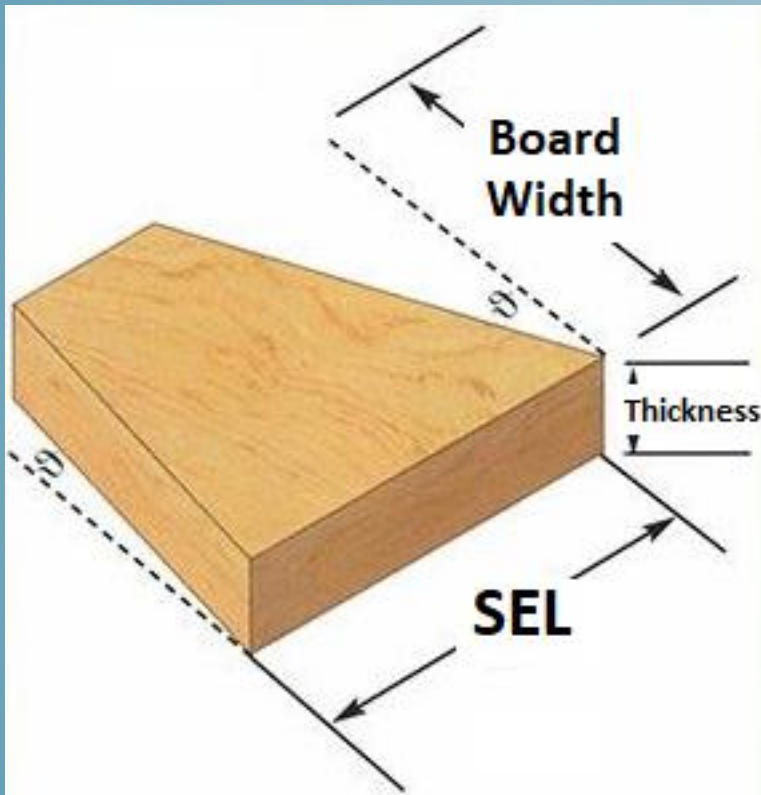
Agenda

- **PowerPoint**
 - **Segmented Basic's**
 - **Segmented Styles**
 - **Traditional Segmented (no feature ring)**
 - **Feature Rings**
 - **Segmented Vessels With Feature Rings**
 - **Stacked Lamination**
 - **Bowl From a Board**
 - **Open Segmented (with jig)**
 - **Closed Segmented (with jig)**
 - **Step by Step Segmented Build**
- **Design Time**
- **Build Time**

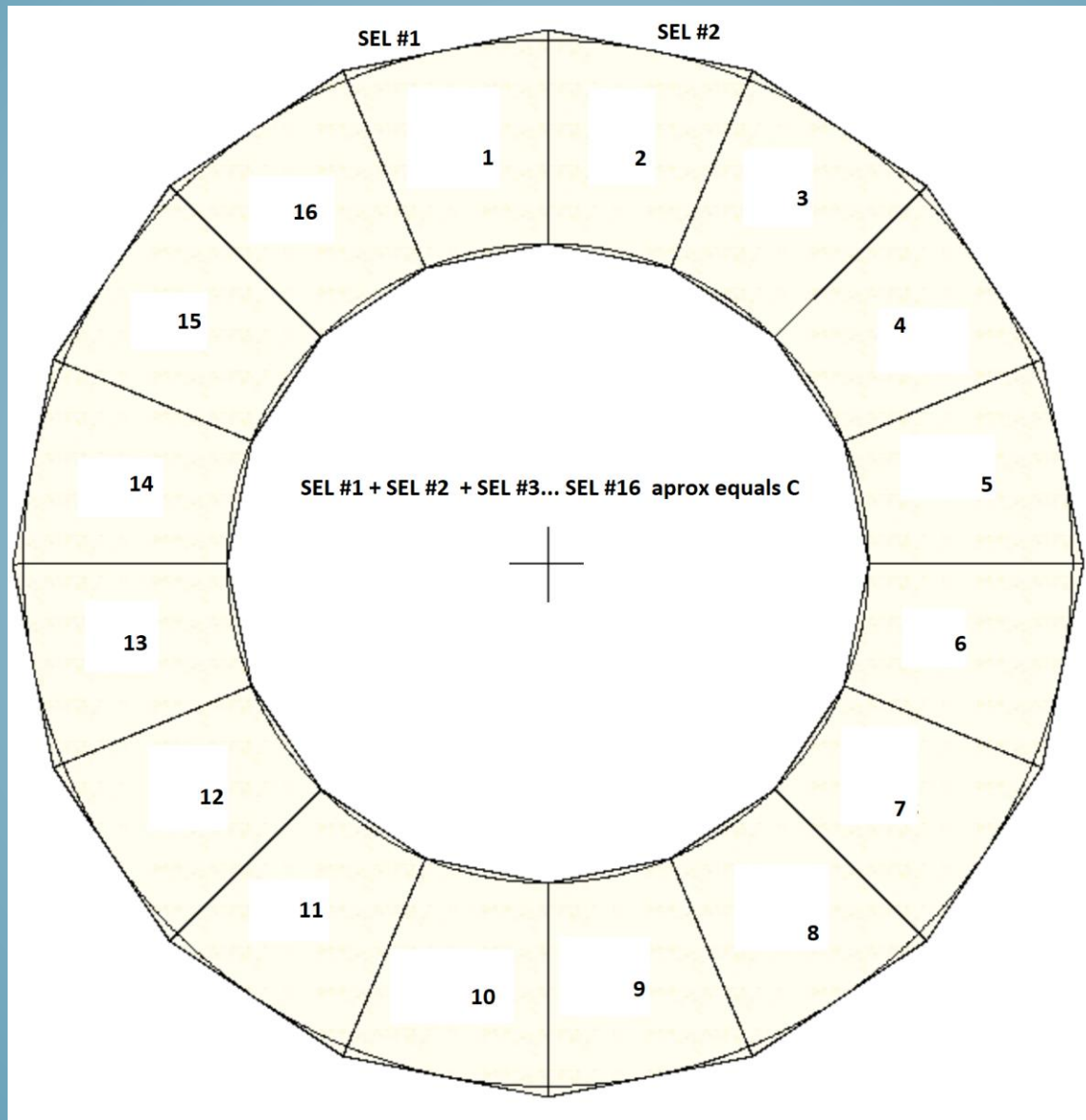
Segmented Terms



Segmented Terms



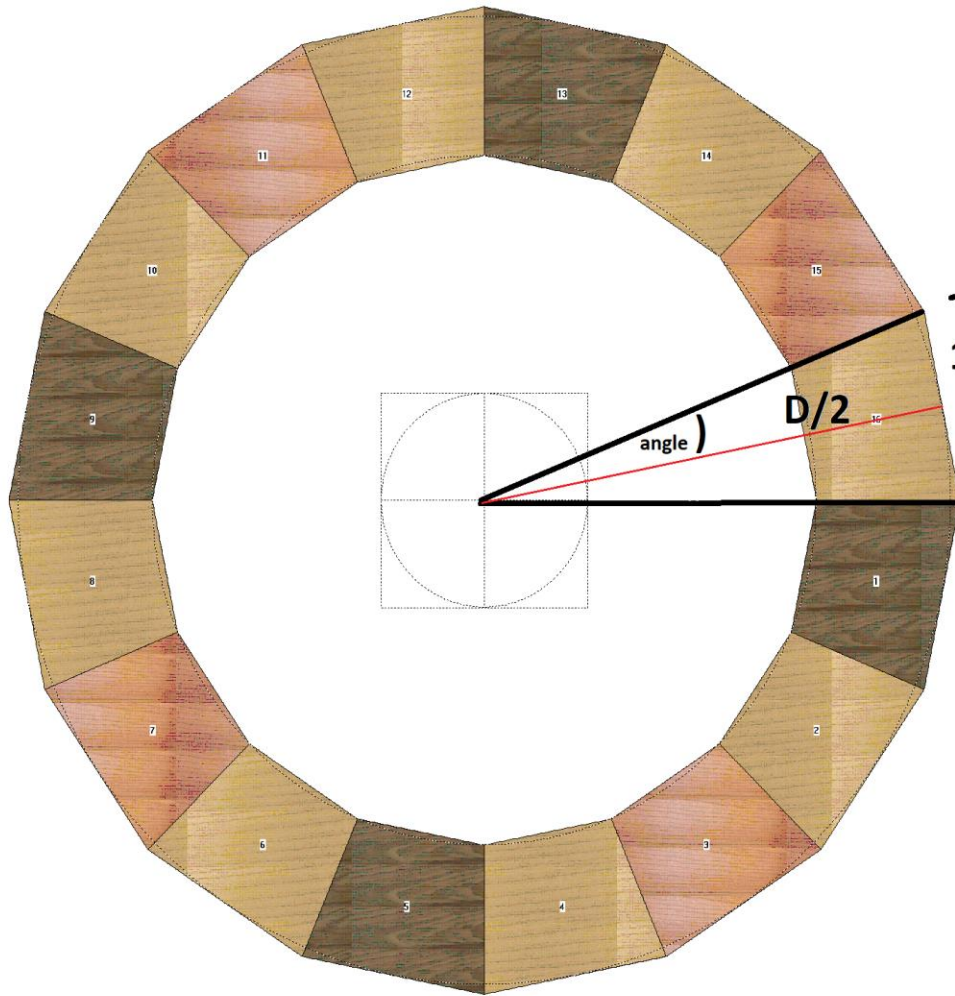
Segmented Ideas



Segmented Math

- Circumference (C) = Diameter(D) $\times \pi$
 - This the most important formula to remember ($C = D \times \pi$)
- Angle = $180 / \# \text{ segments}$
- Segment Edge Length (SEL) = $D \times \tan(\text{angle})$
- $C \approx \# \text{ segments} \times \text{SEL}$
- $\text{SEL} \approx C / \# \text{ segments} \approx (D \times \pi) / \# \text{ segments}$

Segmented Math



$$\text{angle} = 180 / \# \text{ segments}$$

$$\text{radius} = \text{diameter} / 2$$

Diameter (D)

$1/2 \text{ SEL}$

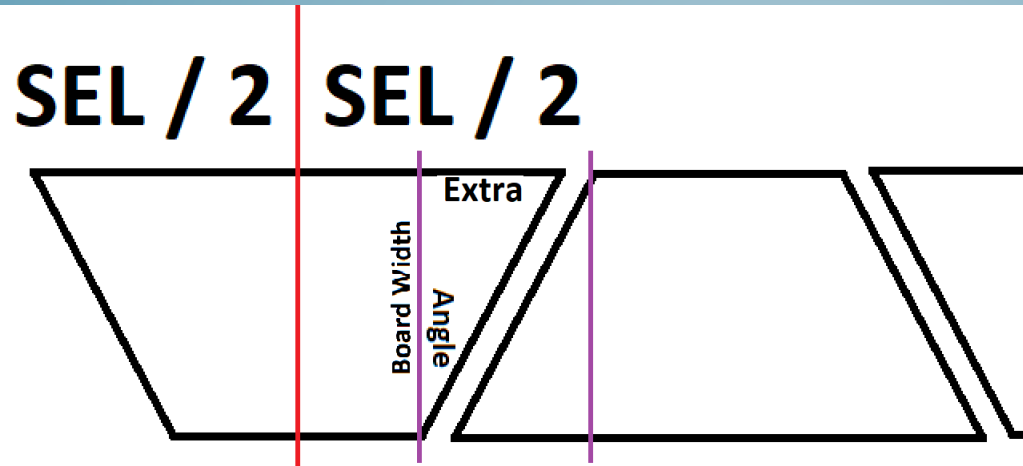
Segment Edge Length (SEL)

$1/2 \text{ SEL}$

$$\tan(\text{angle}) = \frac{1/2 \text{ SEL}}{D/2} = \frac{\text{SEL}}{D}$$

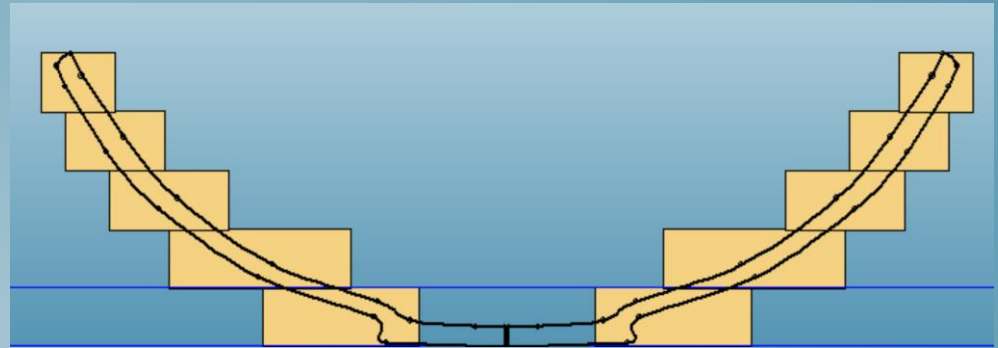
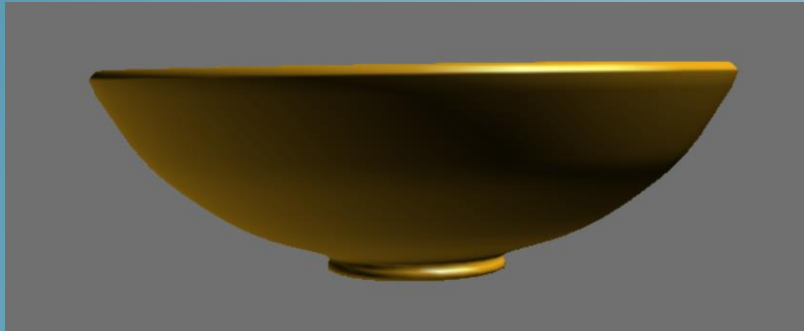
$$\text{SEL} = D \times \tan(\text{angle})$$

Segmented Math



$$\text{Board Length} = (\text{SEL} + \text{Blade Width} - \text{Board Width} \times \tan(\text{angle})) \times \# \text{SEL}$$

Segmented Details

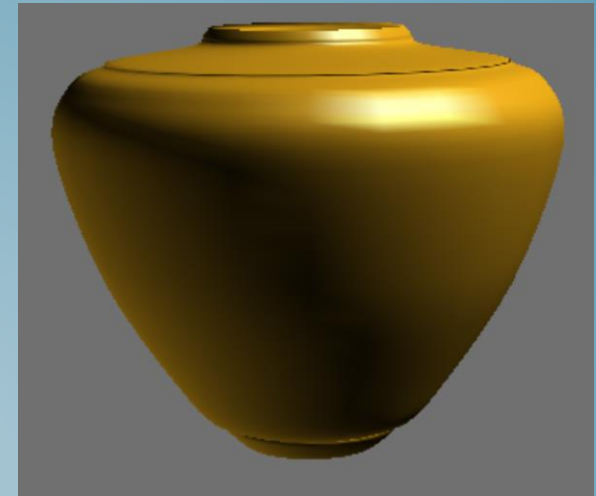
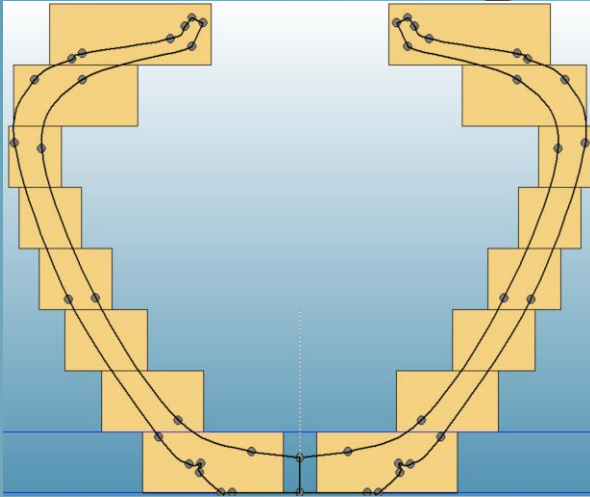


Cutting Summary Untitled

Row	Type	Segments	Board Thickness	Diameter	Diameter	Segment Edge Length	Vertical Spacer Width	Board Width	Economy Board Length	Miter Angle
5	Flat Ash	16	0.75"	11.9" od	10.01" id	2.37"	0"	1.04"	36.77"	11.25°
4	Flat Ash	16	0.75"	11.28" od	8.76" id	2.24"	0"	1.34"	33.89"	11.25°
3	Flat Ash	16	0.75"	10.15" od	7.13" id	2.02"	0"	1.58"	29.59"	11.25°
2	Flat Ash	16	0.75"	8.63" od	4" id	1.72"	0"	2.35"	22.44"	11.25°
1	Flat Ash	16	0.75"	6.25" od	2.25" id	1.24"	0"	2.02"	15.86"	11.25°

od = Outside Diameter, id = Inside Diameter, uod = Upper Outside Diameter, lod = Lower Outside Diameter

Segmented Details



Cutting Summary VaseExample

Row	Type	Segments	Board Thickness	Diameter	Diameter	Segment Edge Length	Vertical Spacer Width	Board Width	Economy Board Length	Miter Angle
8	Flat Ash	16	0.75"	6.17" od	2.19' id	1.23"	0"	2.01"	15.64"	11.25°
7	Flat Ash	16	0.75"	7.04" od	4" id	1.4"	0"	1.56"	19.76"	11.25°
6	Flat Ash	16	0.75"	7.17" od	5.68' id	1.43"	0"	0.7"	22.73"	11.25°
5	Flat Ash	16	0.75"	6.92" od	5.38' id	1.38"	0"	0.82"	21.57"	11.25°
4	Flat Ash	16	0.75"	6.42" od	4.63' id	1.28"	0"	0.94"	19.63"	11.25°
3	Flat Ash	16	0.75"	5.79" od	3.75' id	1.15"	0"	1.06"	17.28"	11.25°
2	Flat Ash	16	0.75"	4.88" od	2.38' id	0.97"	0"	1.27"	13.73"	11.25°
1	Flat Ash	16	0.75"	3.86" od	0.41' id	0.77"	0"	1.74"	9.16"	11.25°

Segmented Styles

Traditional Segmented (no feature ring)



Segmented Styles

Segmented Feature Ring



Segmented Styles

Segmented With a Feature Ring



Segmented Styles

Segmented Feature Ring



Segmented Styles

Segmented Feature Ring



Segmented Styles

Stacked Lamination



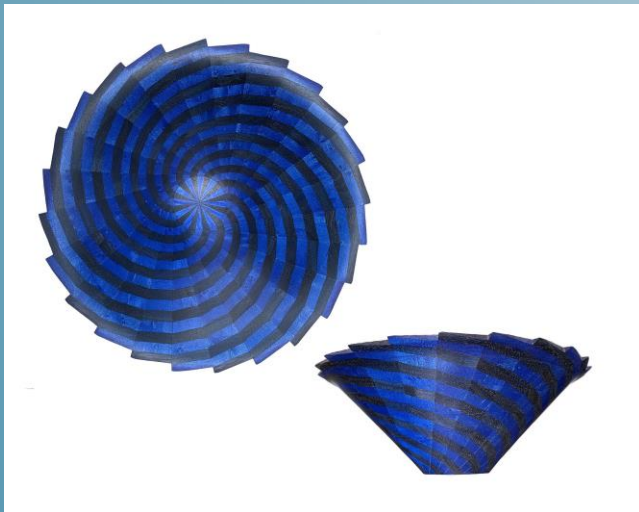
Segmented Styles

Stacked Lamination



Segmented Styles

Bowl From A Board (BFB)



Segmented Styles

Bowl From A Board (BFB)



Segmented Styles

Open Segmented With a Gluing Jig

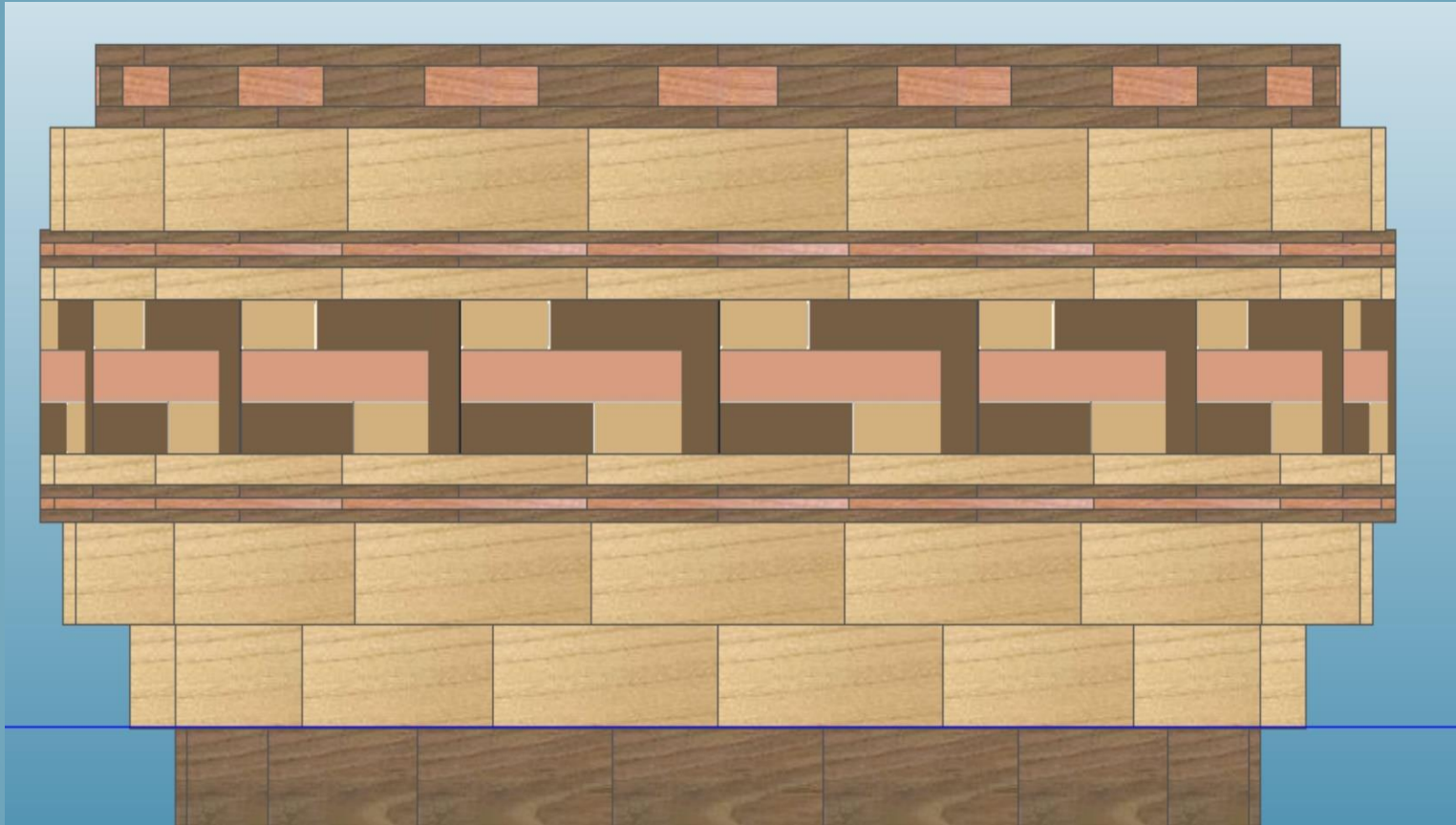


Segmented Styles

Closed Segmented With a Gluing Jig

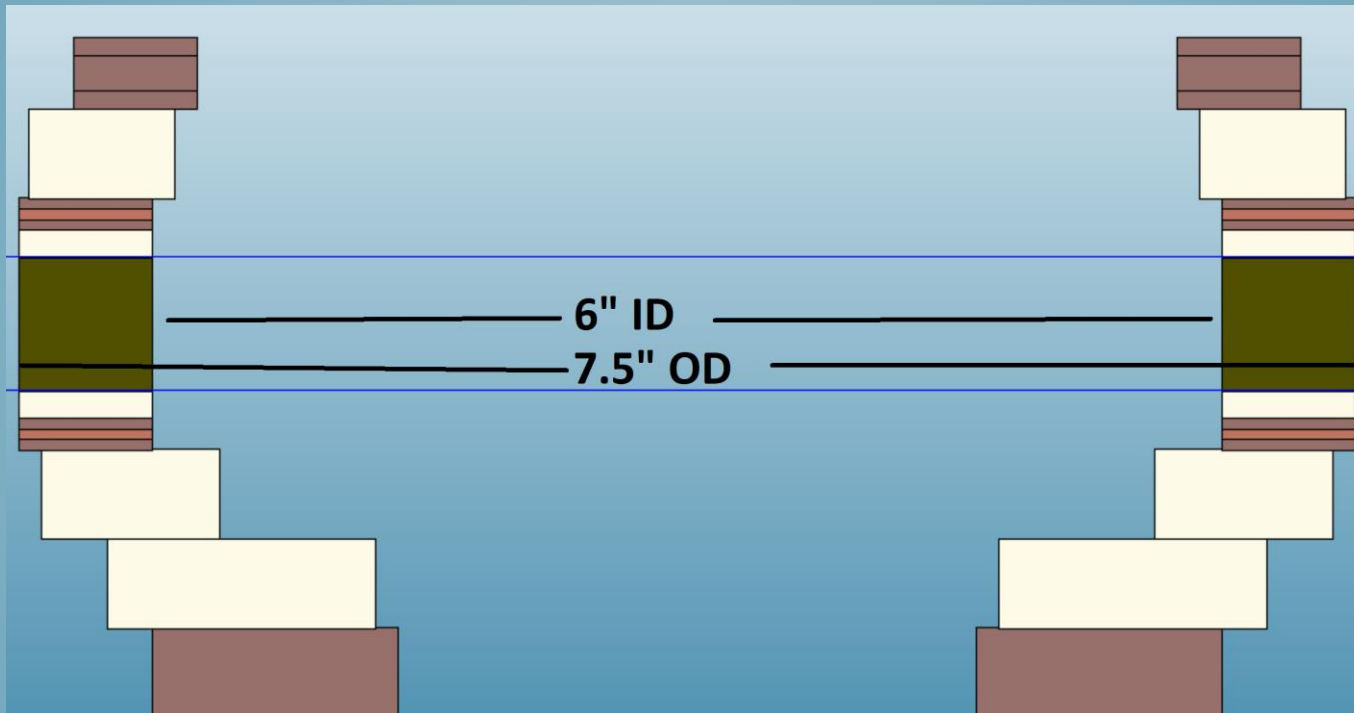


Step By Step Segmented Build



Step By Step Segmented Build

The Plan



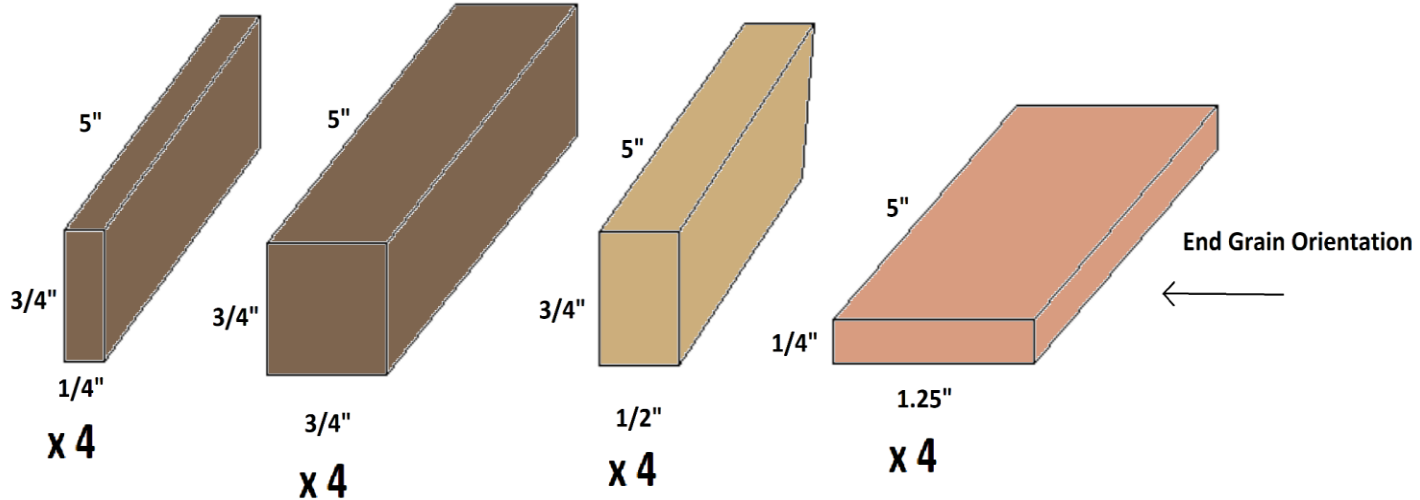
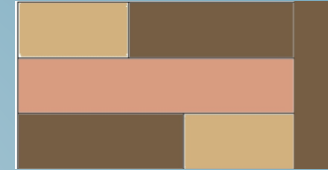
Plan calls for 1.49" SEL 1.25' for segment and 0.25" for spacer of Walnut
 $C = D \times 3.141 = 23.56$, so SEL approximately $23.56'' / 16 = 1.472''$,
good to do a quick check.

$(7.5'' - 6'') / 2 = 0.75''$, board width of feature ring

Step By Step Segmented Build

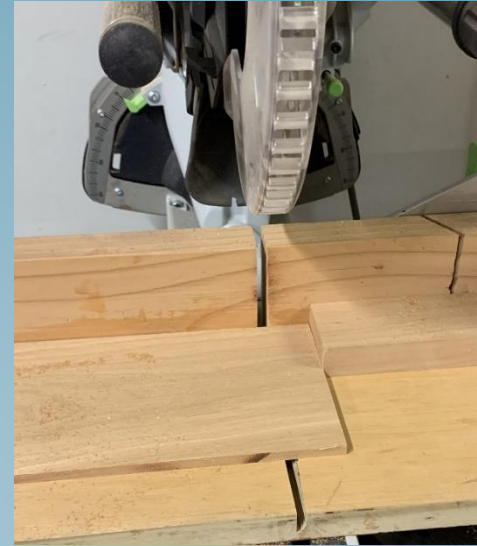
Feature Ring

Make 16

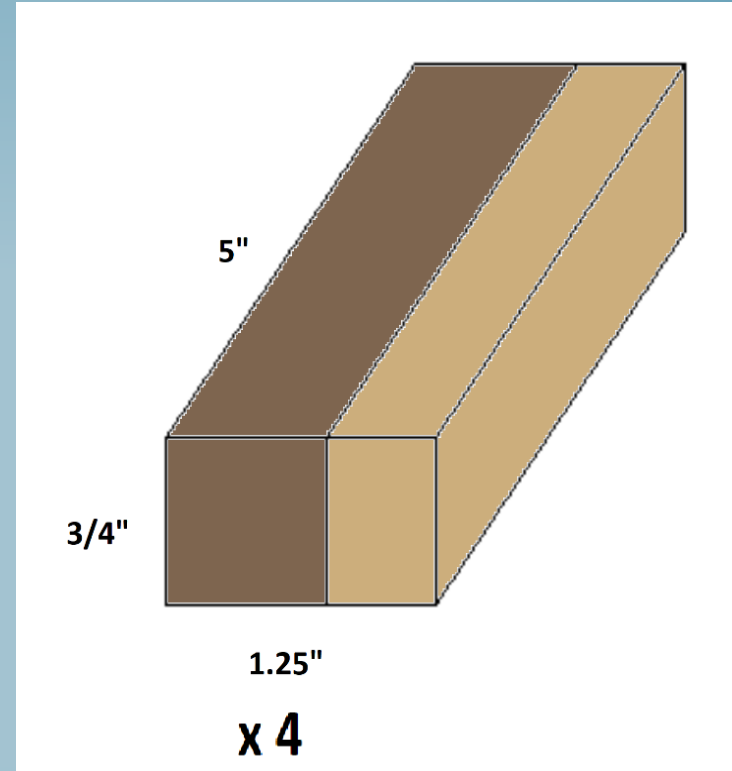


Step By Step Segmented Build

Feature Ring

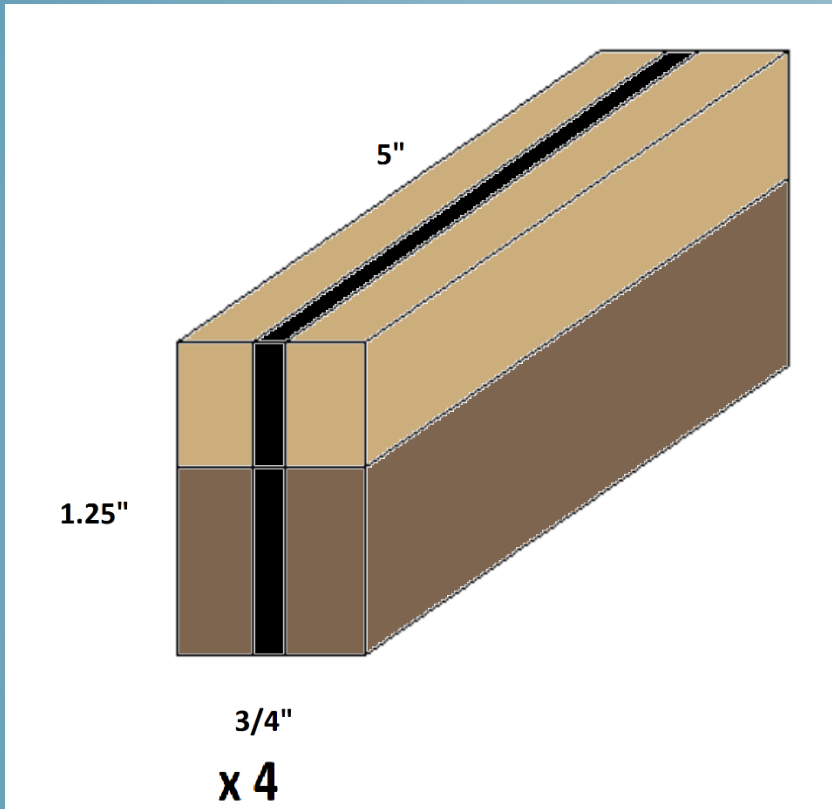


Step By Step Segmented Build – Feature Ring



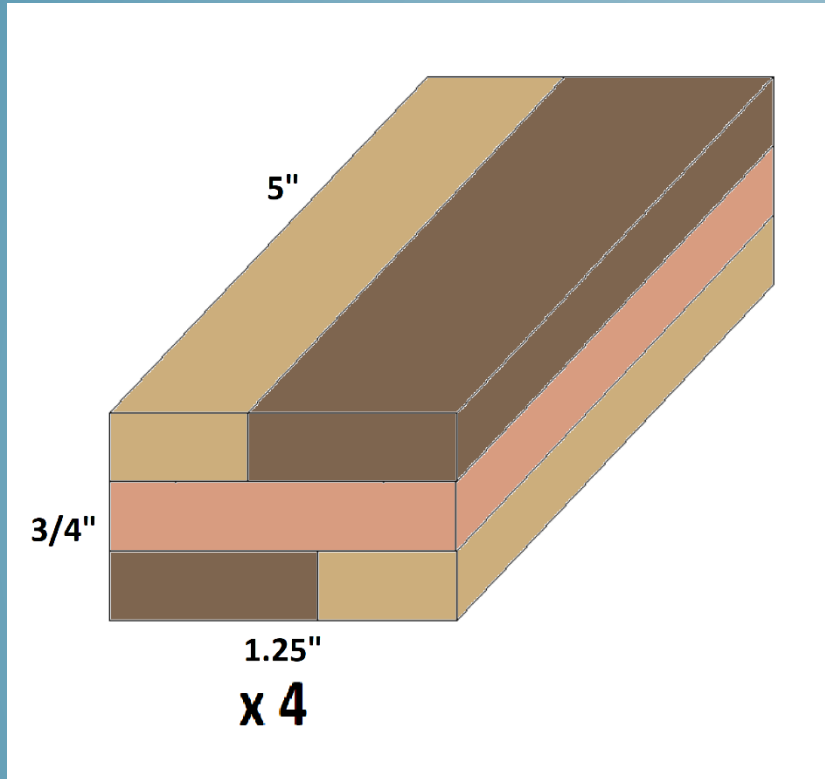
Glue up four Maple and Walnut blocks

Step By Step Segmented Build – Feature Ring



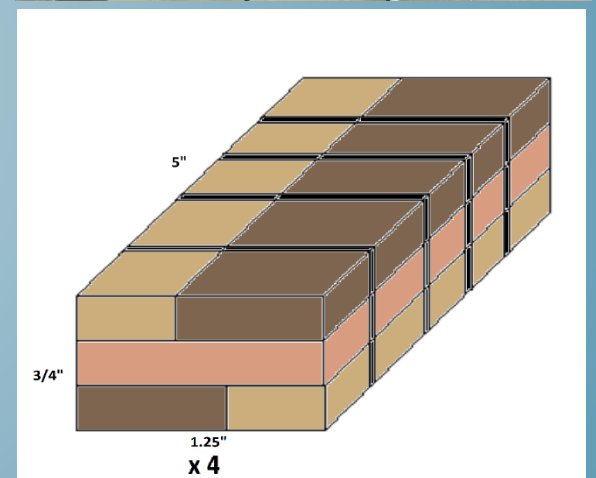
Cut Maple and Walnut blocks in half and sand to 1/4"

Step By Step Segmented Build – Feature Ring



Glue Up Blocks

Step By Step Segmented Build – Feature Ring



Cut blocks into 5 equal segments, also cut Walnut segment separation

Step By Step Segmented Build – Feature Ring



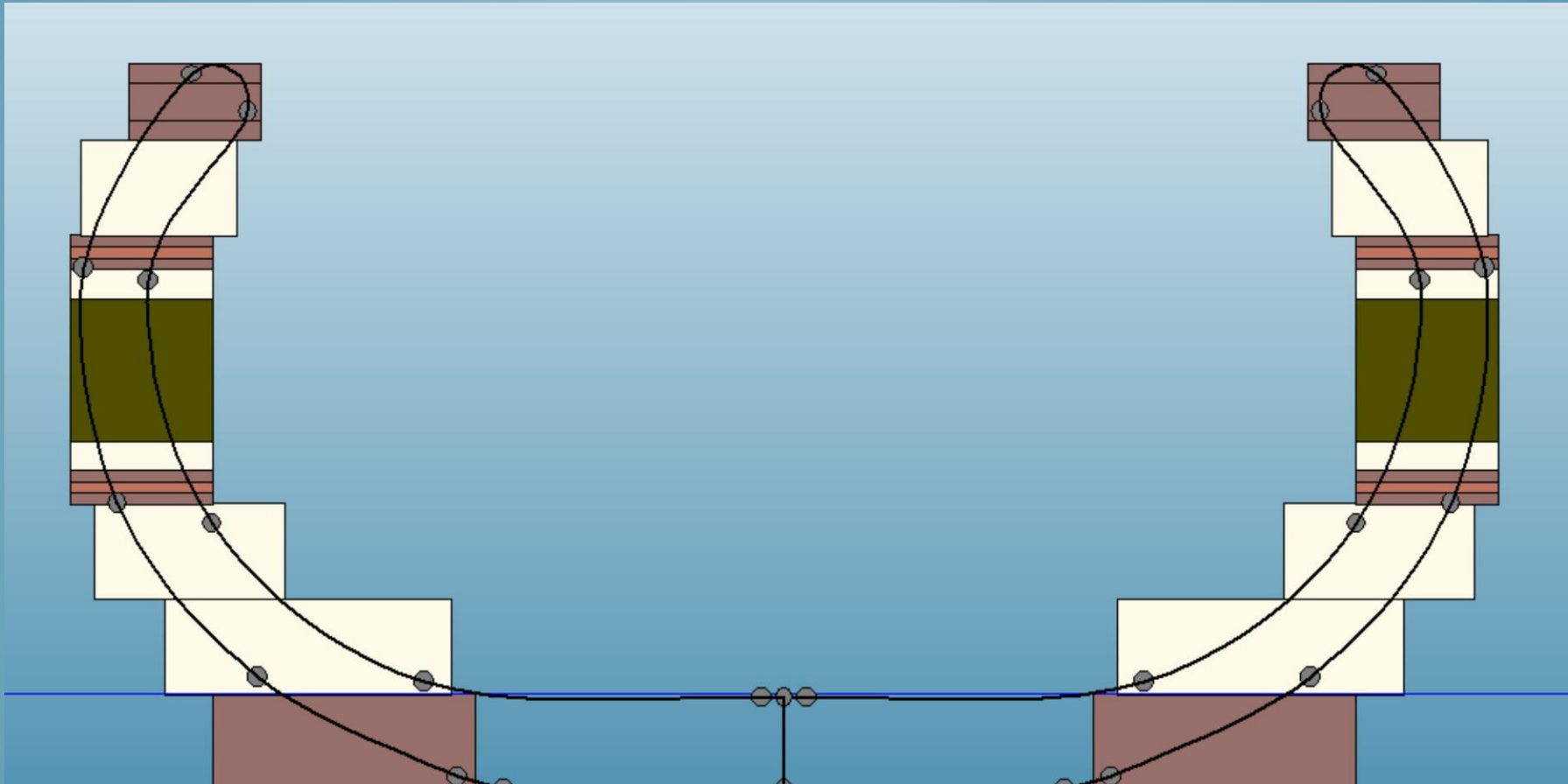
11.25-degree angle on each side

Step By Step Segmented Build – Feature Ring



Glue up ring, insert Walnut segment spacers

Step By Step Segmented Build – Bowl



Adjust if feature ring deviates from original plan

Step By Step Segmented Build – Bowl

Row	Type	Segments	Board Thickness	Diameter	Diameter	Segment Edge Length	Vertical Spacer Width	Board Width	Economy Board Length	Miter Angle	Blade Tilt Angle	Slope
16	Flat Walnut	16	0.1"	6.88" od	5.5" id	1.37'	0"	0.74"	21.68"	11.25°		
15	Flat Walnut	32	0.2"	6.88" od	5.5" id	0.88"	0"	0.7"	23.54"	5.63°		
14	Flat Walnut	16	0.1"	6.88" od	5.5" id	1.37"	0"	0.74"	21.68"	11.25°		
13	Flat Maple	16	0.5"	7.38" od	5.75" id	1.47"	0"	0.87"	22.89"	11.25°		
12	Flat Walnut	16	0.06"	7.5" od	6" id	1.49'	0"	0.81"	23.46"	11.25°		
11	Flat Cherry	16	0.06"	7.5" od	6" id	1.49'	0"	0.81"	23.46"	11.25°		
10	Flat Walnut	16	0.06"	7.5" od	6" id	1.49'	0"	0.81"	23.46"	11.25°		
9	Flat Maple	16	0.15"	7.5" od	6" id	1.49'	0"	0.81"	23.46"	11.25°		
8	Flat Bowl#2	16	0.75"	7.5" od	6" id	1.49'	0"	0.81"	23.46"	11.25°		
7	Flat Maple	16	0.15"	7.5" od	6" id	1.49'	0"	0.81"	23.46"	11.25°		
6	Flat Walnut	16	0.06"	7.5" od	6" id	1.49'	0"	0.81"	23.46"	11.25°		
5	Flat Cherry	16	0.06"	7.5" od	6" id	1.49'	0"	0.81"	23.46"	11.25°		
4	Flat Walnut	16	0.06"	7.5" od	6" id	1.49'	0"	0.81"	23.46"	11.25°		
3	Flat Maple	16	0.5"	7.25" od	5.25" id	1.44"	0"	1.05"	21.94"	11.25°		
2	Flat Maple	16	0.5"	6.5" od	3.5" id	1.29"	0"	1.53"	18.11"	11.25°		
1	Flat Walnut	16	0.5"	6" od	3.25" id	1.19"	0"	1.41"	16.9"	11.25°		

Adjust if feature ring deviates from original plan

Step By Step Segmented Build – Bowl



Mill wood needed to complete project

Step By Step Segmented Build – Bowl



Make waste block and screw faceplate to waste block



Put double sided tape on one side of thin square of Walnut, this will be for the bottom of the bowl. Stick board to waste block and turn a circle.



The outside diameter needs to be larger than row 2 ID and fit into row # 1.

Step By Step Segmented Build – Bowl

Note:

For all stock add wavy line on the top of the board and a straight line on the side. Use to position segments.



Arrange segments so all have line on top and the line on the outside of the segment alternate between line and no line. Then apply glue.

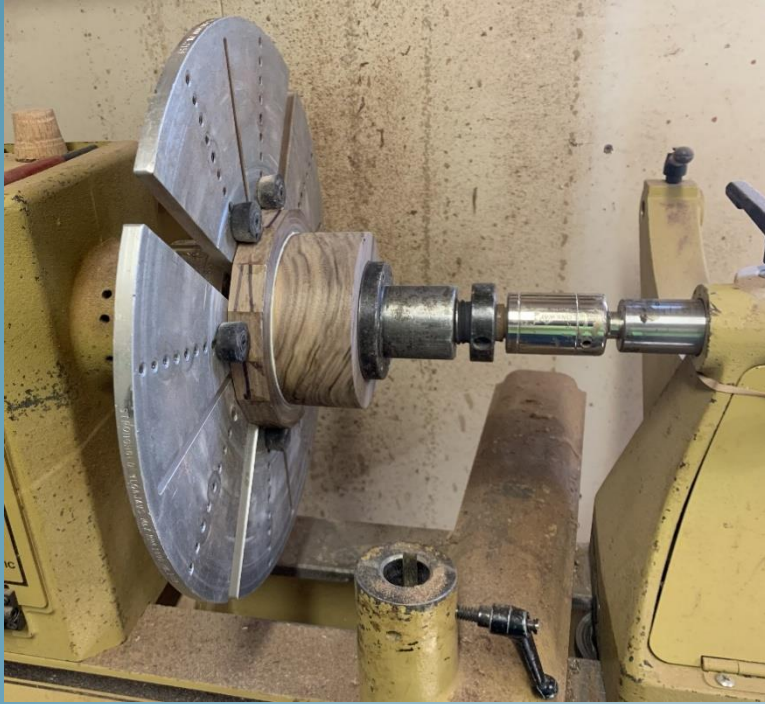


Cut segments for row #1 and glue up, SEL = 1.19", board width = 1.41"



Apply pressure by putting rubber bands on the outside of ring

Step By Step Segmented Build – Bowl



Sand row 1 flat and glue to waste block



For row 1 clean out space for bowl base.

Step By Step Segmented Build – Bowl



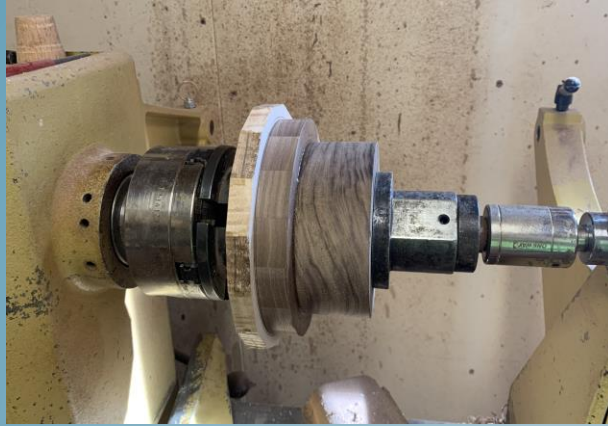
Sand row 2



Clean row 2 inside diameter first if possible so you will not need to clean it after you glue it to row 1.

This will reduce the possible tooling on the base of the bowl.

Step By Step Segmented Build – Bowl



Center Row 2 onto Row 1, mark with pencil on Row 2 OD of Row 1



Mark on Row 2 the outline of Walnut base.

Add tape to Walnut Base incase glue gets onto it.

Step By Step Segmented Build – Bowl



Only apply glue to Row 2.

Apply glue to Row 2 in between the pencil lines, don't overdo the amount of glue applied.



Glue Row 2 to Row 1.

Step By Step Segmented Build – Bowl



Build row 3



Step By Step Segmented Build – Bowl



True up row 2. cut, glue up and sand row 3 and mount it to row 2



Clean row 2 and true up row 3

Step By Step Segmented Build – Bowl



Row 15 has 32 segments, so the Wedgie Sled need to be adjusted to cut 32 segments per row. Also, the origin on the digital table saw stop will be needed set. Cut Row 15 last if possible

Step By Step Segmented Build – Bowl



Cut segments, glue up the rest of the rings, rows 4 – row 16.

Step By Step Segmented Build – Bowl



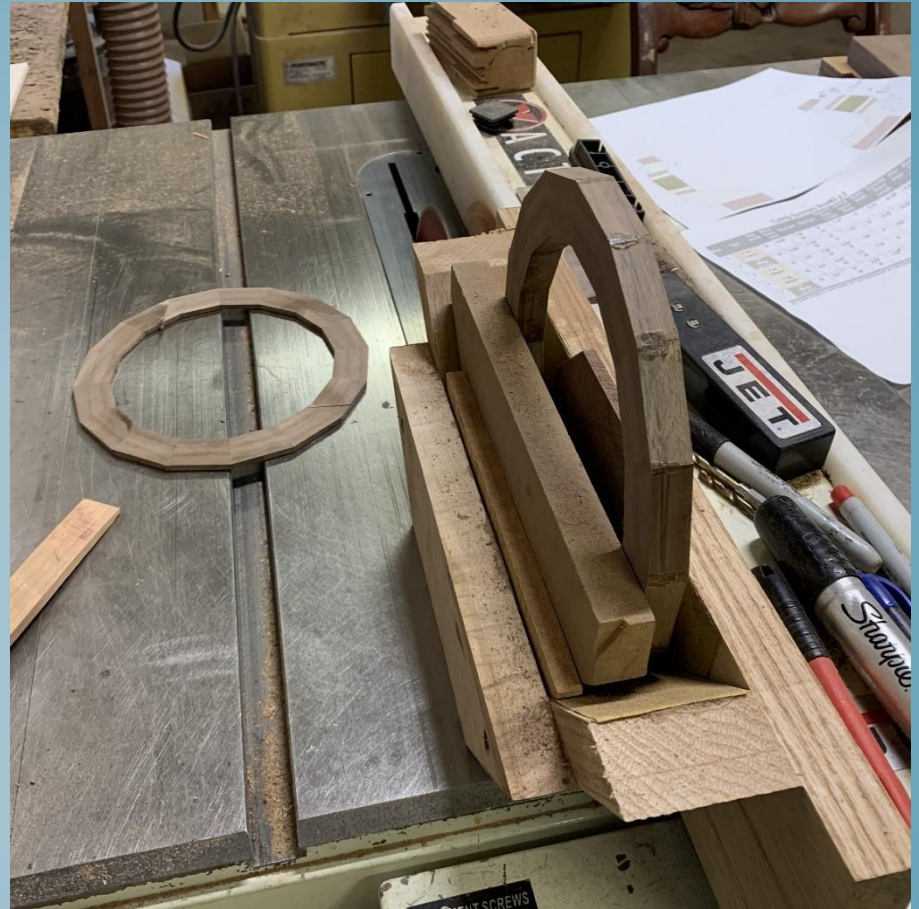
Sand rows then start splitting them as needed.

Row 5 and Row 11 share one ring (split into 3) with extra ring

Step By Step Segmented Build – Bowl



Row 7 and Row 9 share one ring split into 2



Row #4, #6, #9 and Row 12 all share one ring, spilt into 4 rows

Step By Step Segmented Build – Bowl



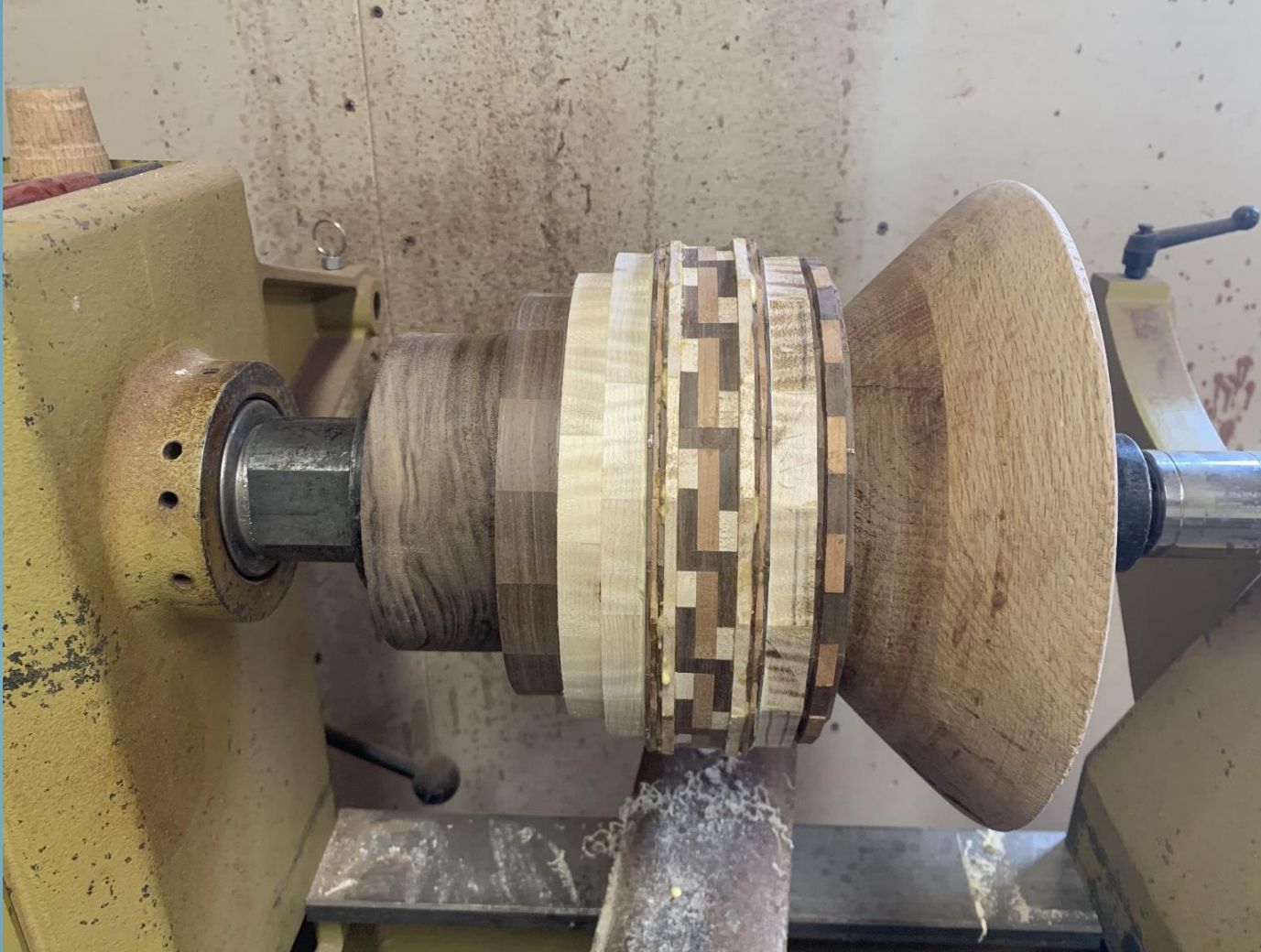
Glue rows 14, 15 and 16 together

Step By Step Segmented Build – Bowl



After all the split rings have been cut and sanded, they need to be glued together to follow plan

Step By Step Segmented Build – Bowl



Glue all ring groups together to follow plan

Step By Step Segmented Build – Bowl



Done

SEGMENTED WITH A JIG



SEGMENTED WITH A JIG

