SEGMENTED TURNING BASICS

This is an introduction to the basics of ring-segment assemblies

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Questions?

Post them on the forum for the club to answer
E-mail to author for a response:
jlrodgers@aol.com

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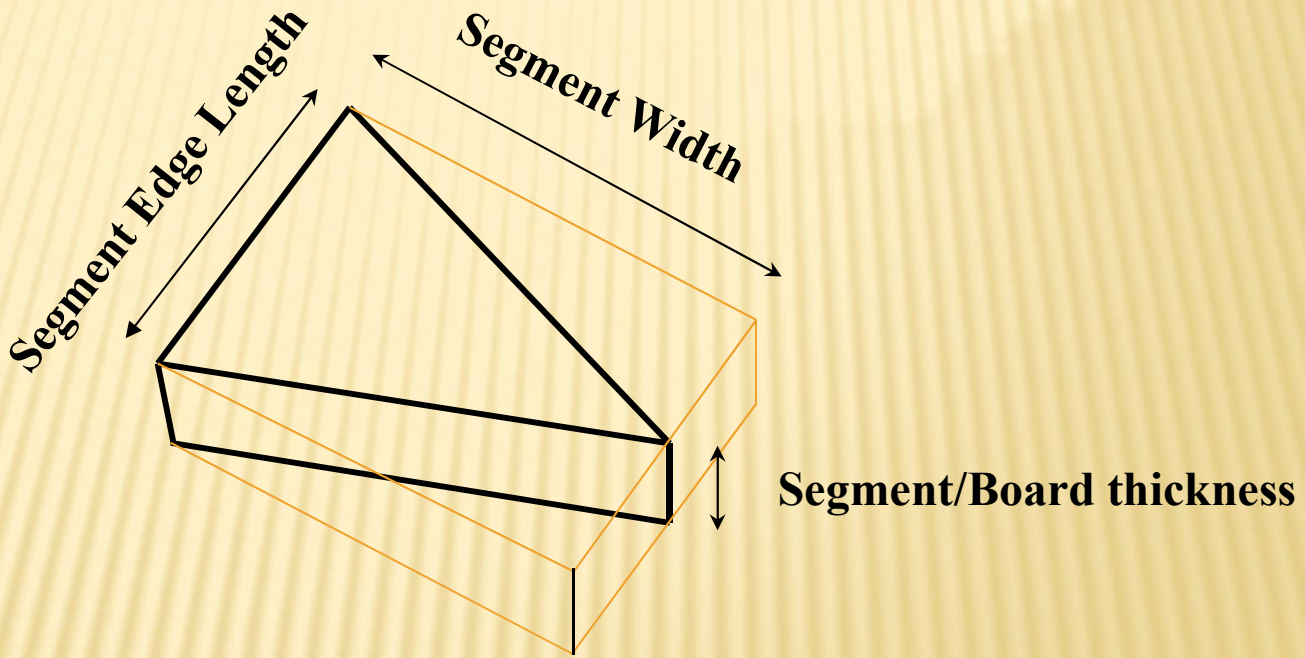
BUILDING BLOCKS FOR THE PROJECT

- CREATE A DESIGN – LAYOUT THE PLAN
- PREPARE WOOD INTO STRIPS
- MAKE SEGMENTS THEN SEGMENTED RINGS
- BUILD THE ASSEMBLIES
- TURN THE VESSEL
- ADD A FINISH AND PART OFF

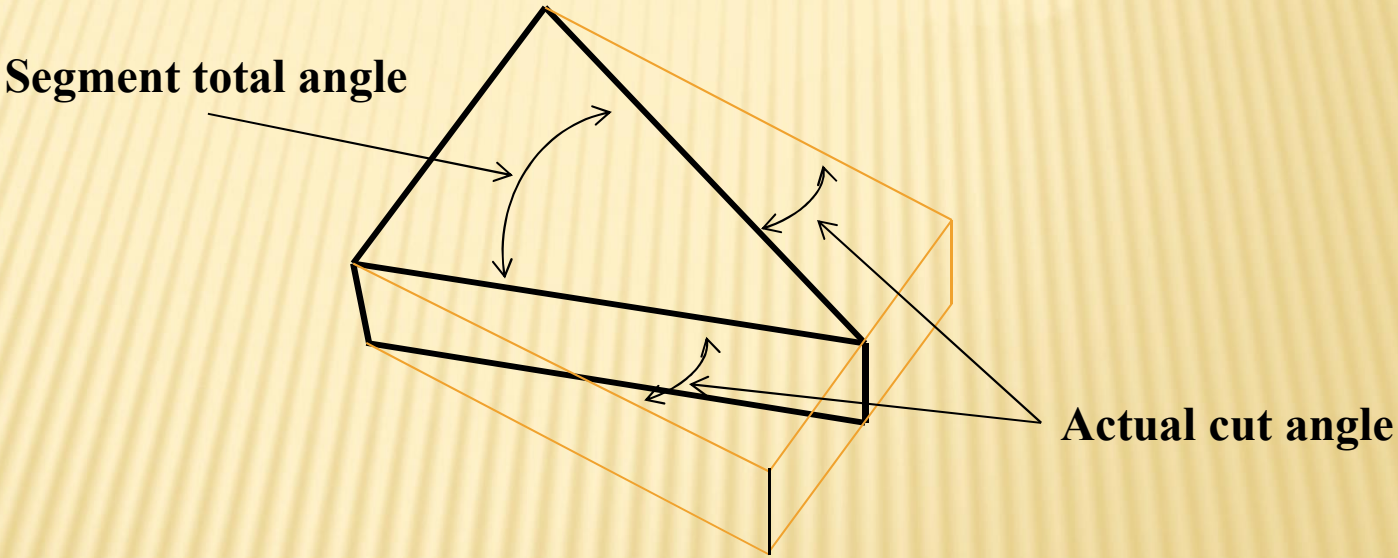
UNLISTED STEPS

- REDRAWING, ADJUSTING DESIGN
- TOOL SETUP & CALIBRATION
- RE-CUTTING COMPONENTS
- ADJUSTING FIT
- ADDRESSING MISALIGNMENT
- ADDRESSING CROSS GRAIN
- ~~CORRECTING TURNING ERRORS~~

BASIC TERMS TO KNOW

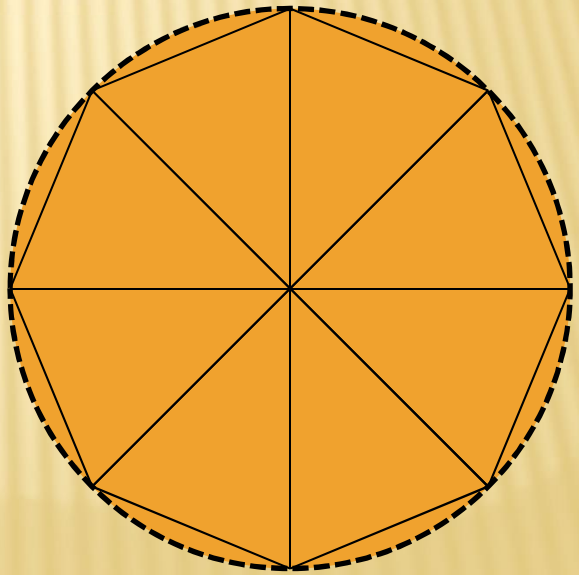


BASIC TERMS



SIMPLE MATH – SEGMENT EDGE LENGTH

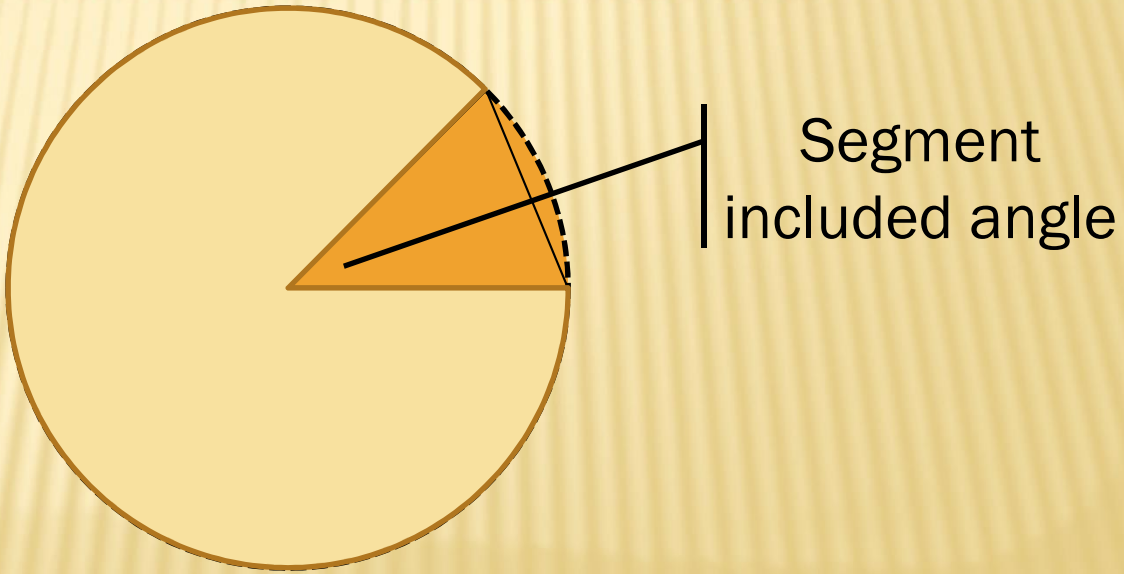
- SEGMENT EDGE LENGTH = CIRCUMFERENCE ÷ # SEGMENTS
- CIRCUMFERENCE IS DIAMETER x PI (3.14)



SIMPLE MATH – SEGMENT CUT ANGLE

SEGMENT INCLUDED ANGLE = 360 DEGREES (CIRCLE) ÷ # SEGMENTS

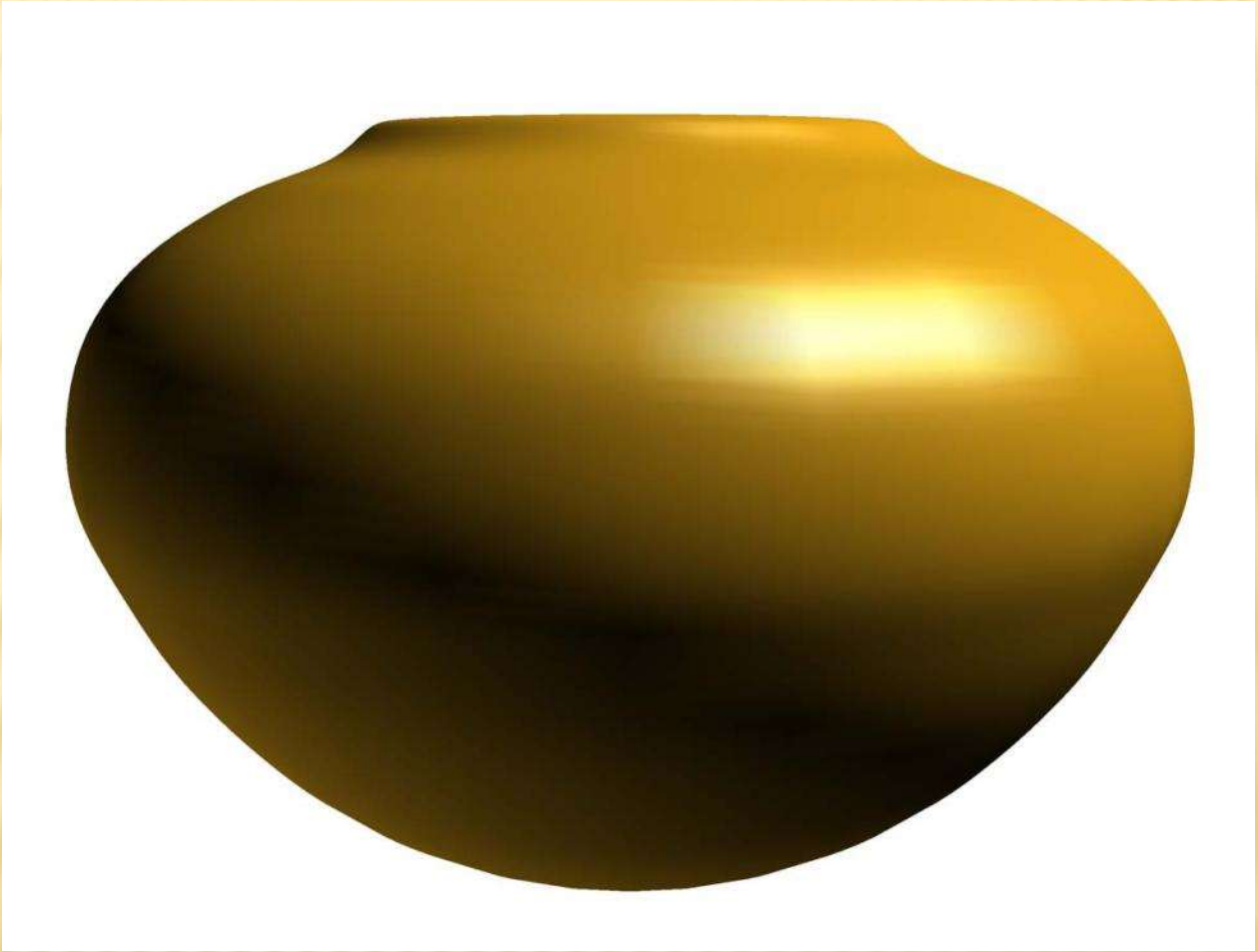
- SEGMENT CUT ANGLE IS ½ OF ABOVE



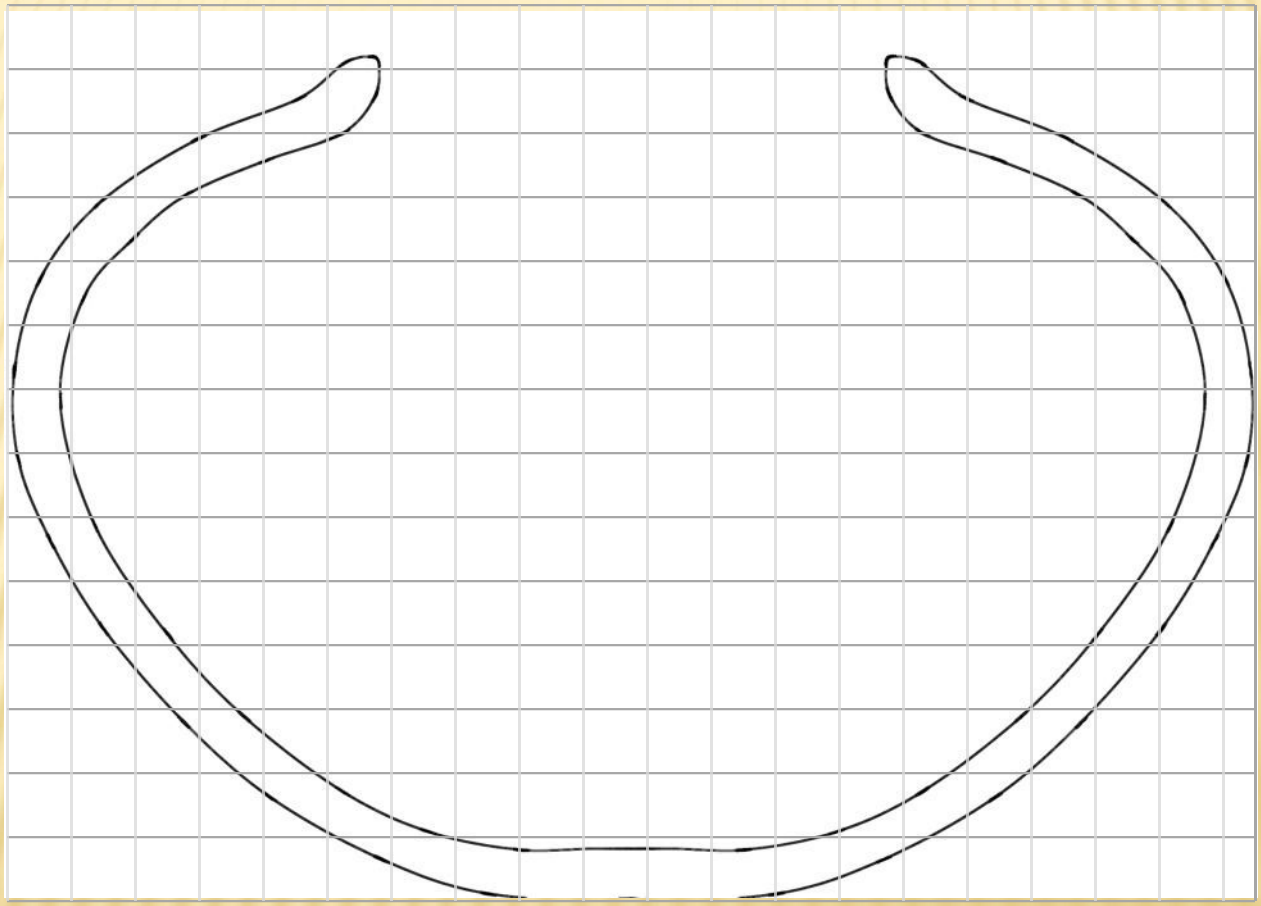
EXAMPLE:
MAKE A RING 10 INCHES IN DIAMETER
MAKE A RING WITH 12 SEGMENTS

- DIAMETER 10” X 3.14 (Π) =
  - 31.4 INCHES CIRCUMFERENCE
- SEGMENT EDGE LENGTH 31.4” ÷ 12 =
  - 2.6 INCHES
- SEGMENT INCLUDED ANGLE IS 360° ÷ 12 SEGMENTS =
  - 30°
- SEGMENT CUT ANGLE IS 30° ÷ 2 =
  - 15°

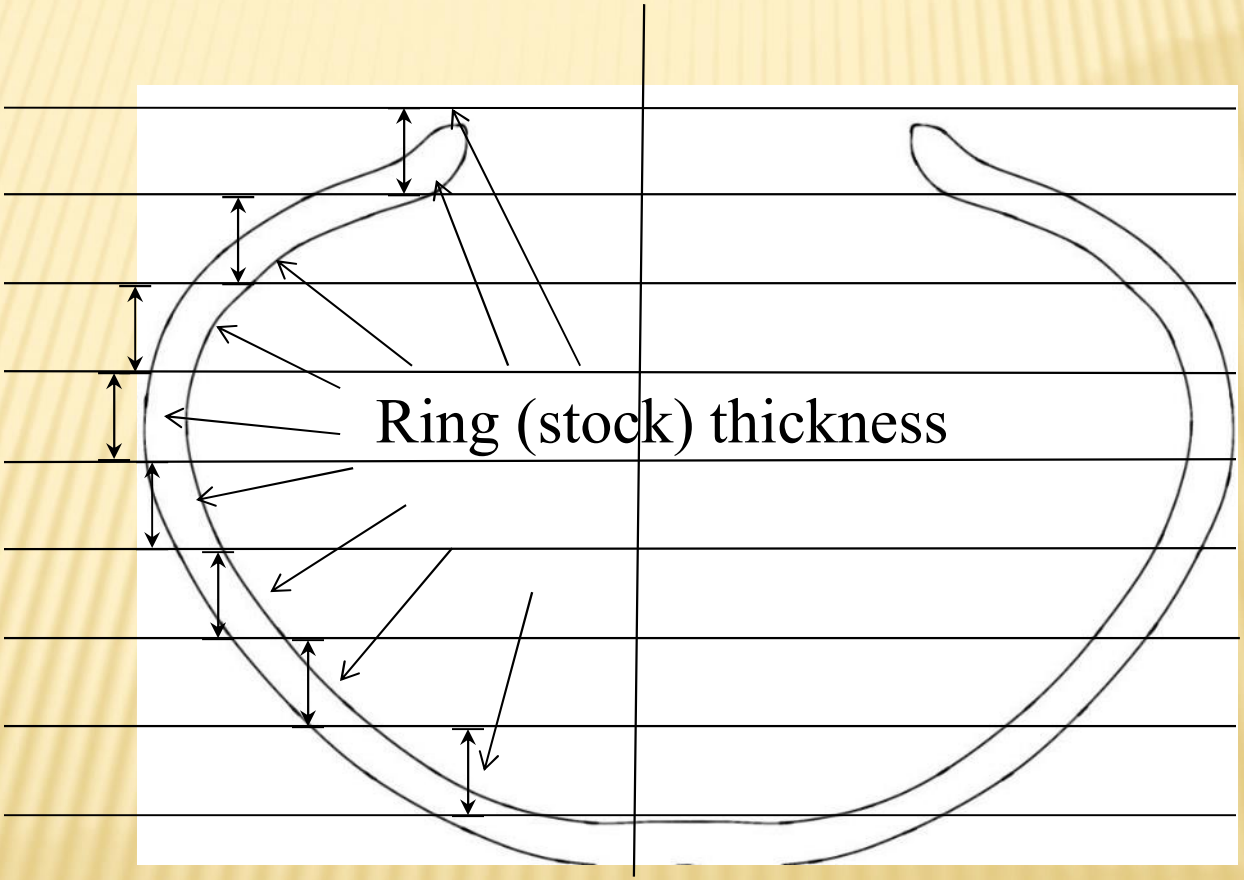
WE NEED A SHAPE!



WE NEED A DRAWING!

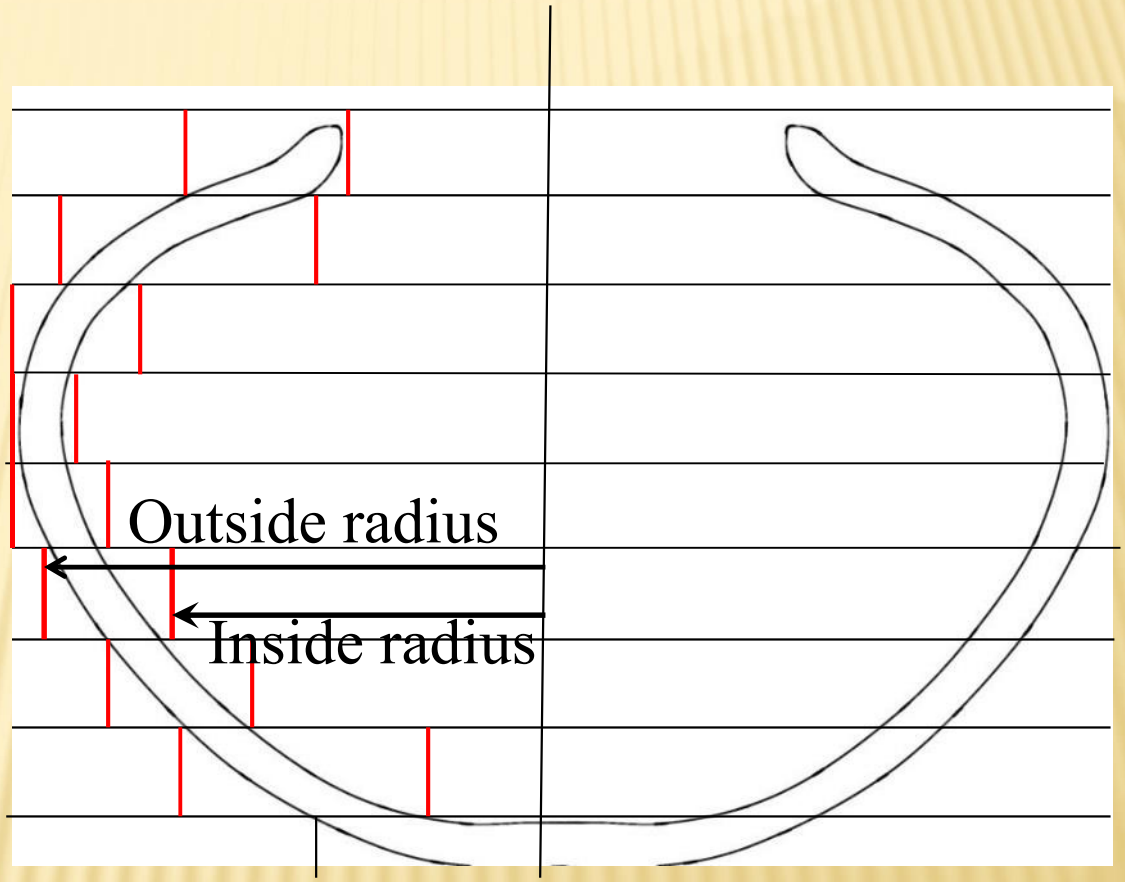


DETERMINE RING THICKNESSES

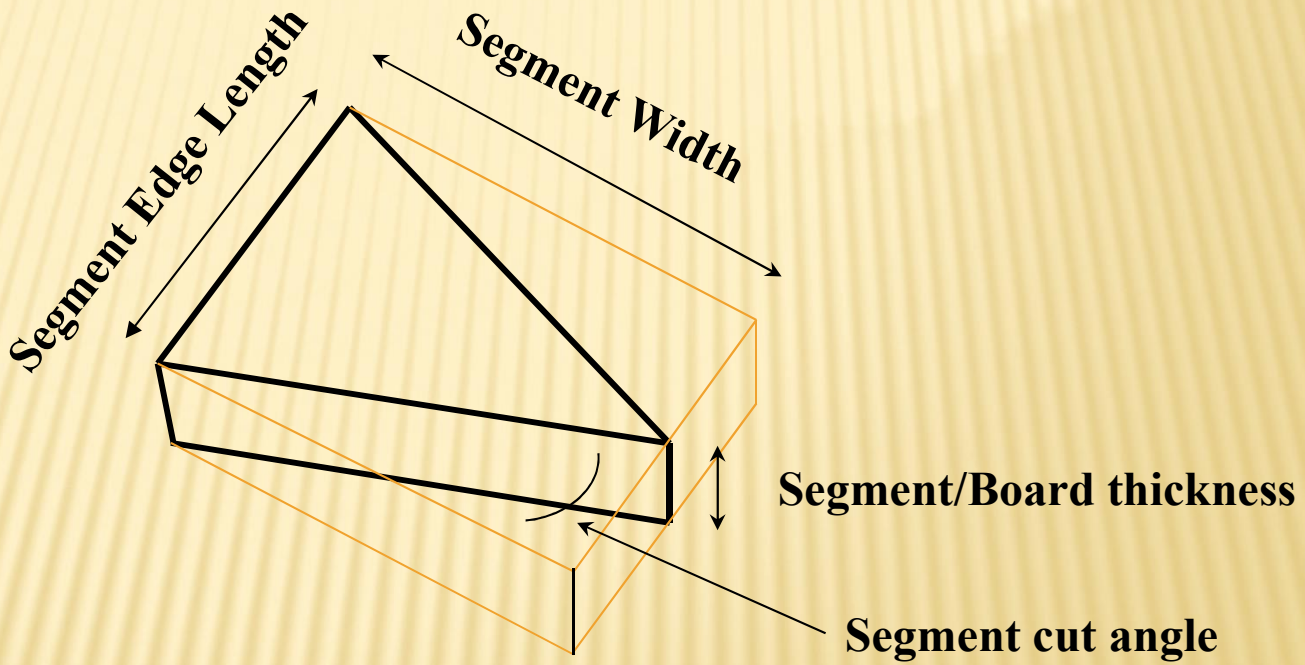


DETERMINE SEGMENT WIDTH

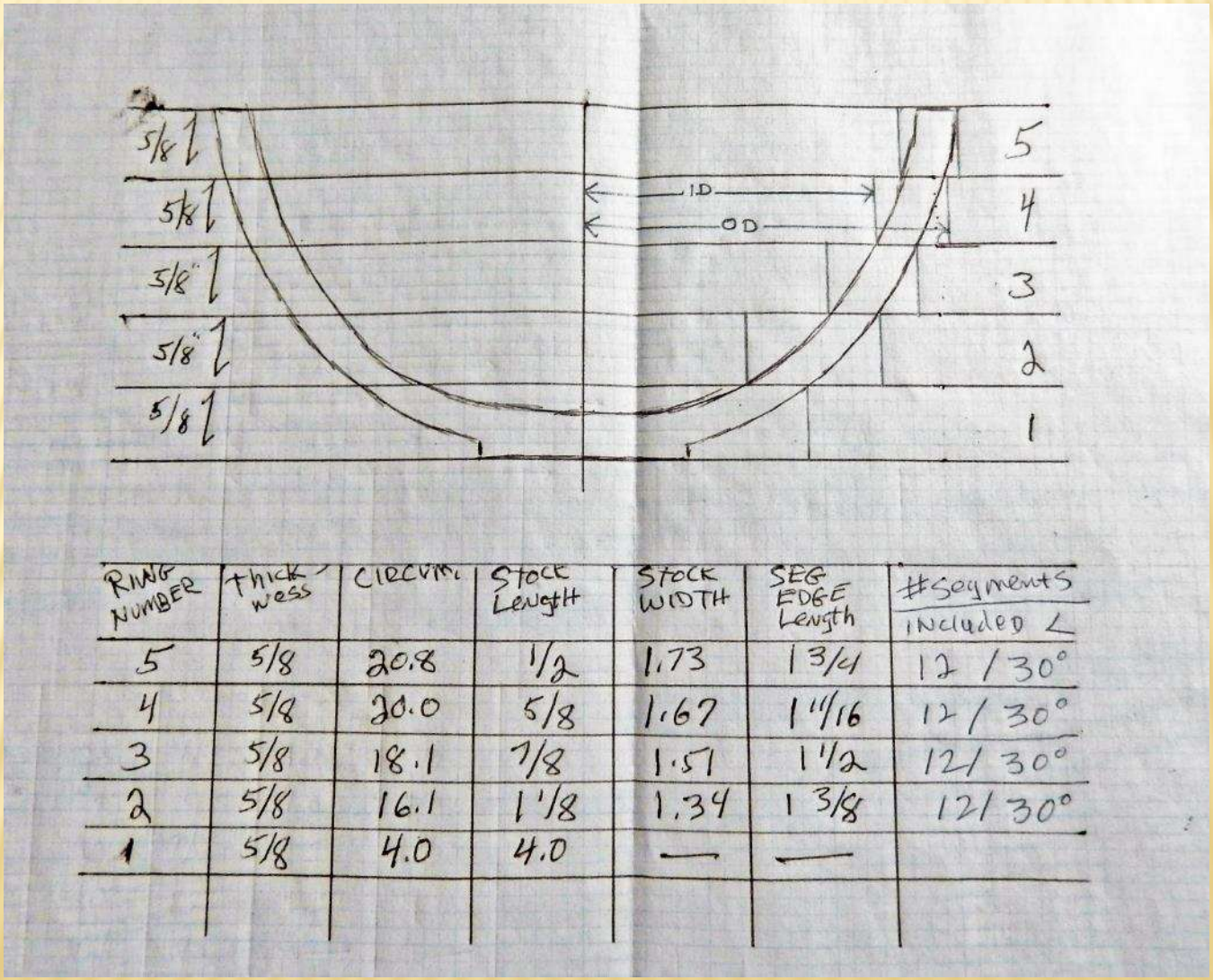
- Mark inside/outside limits for each “layer”
- Draw center line
- Measure inside radius & outside radius
- Subtract inside radius from outside radius
- Record as segment width



NOW WE HAVE ALL THE DIMENSIONS



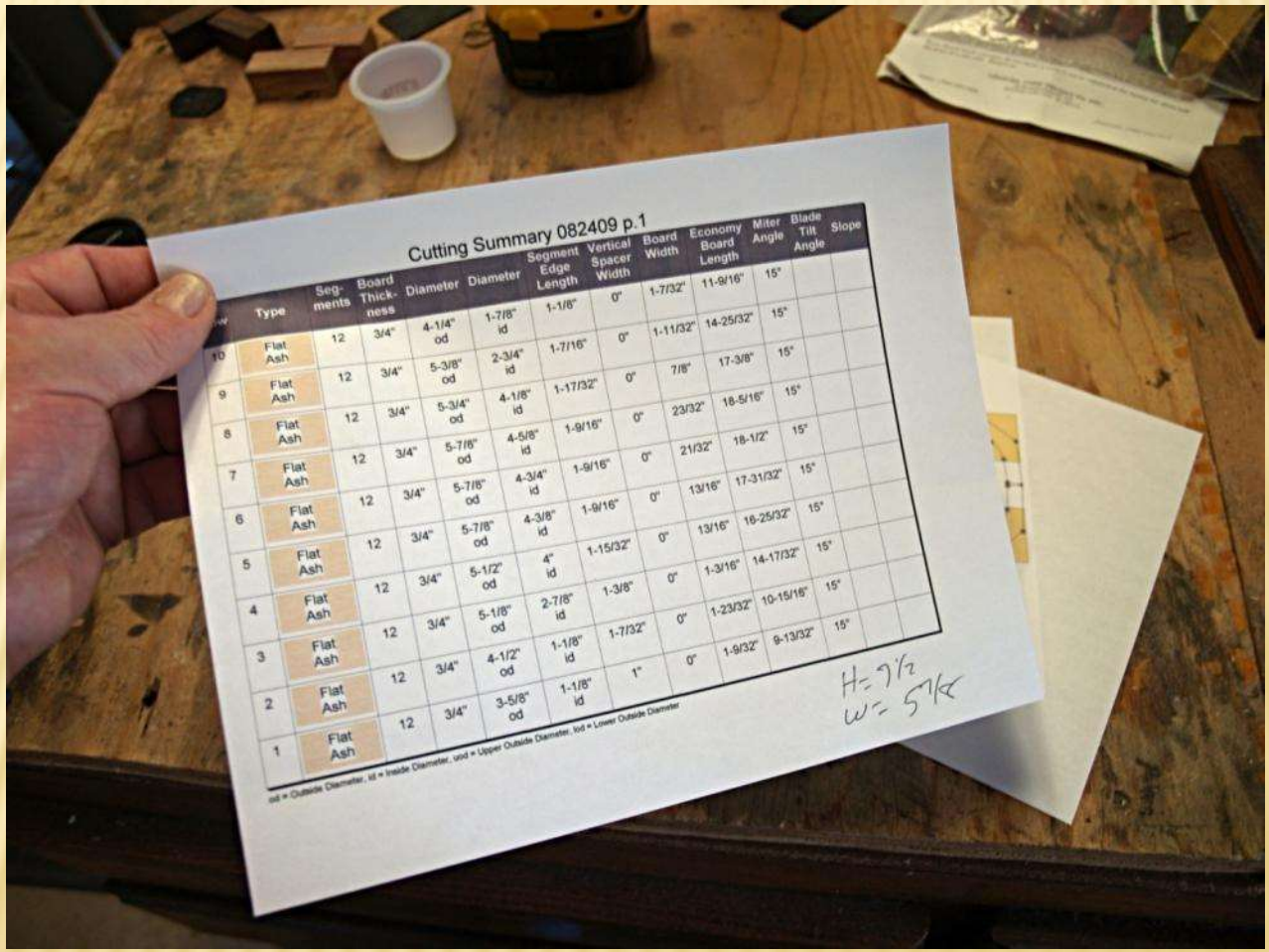
CREATE A CUT LIST



RING NUMBER	Thickness	Circum.	Stock Length	Stock Width	Seg Edge Length	#Segments / Included ∠
5	5/8	20.8	1/2	1.73	1 3/4	12 / 30°
4	5/8	20.0	5/8	1.67	1 11/16	12 / 30°
3	5/8	18.1	7/8	1.51	1 1/2	12 / 30°
2	5/8	16.1	1 1/8	1.34	1 3/8	12 / 30°
1	5/8	4.0	4.0	—	—	

USE COMMERCIAL SOFTWARE

SOFTWARE GENERATED CUTTING PLAN



Row	Type	Segments	Board Thickness	Diameter	Diameter	Segment Edge Length	Vertical Spacer Width	Board Width	Economy Board Length	Miter Angle	Blade Tilt Angle	Slope
10	Flat Ash	12	3/4"	4-1/4" od	1-7/8" id	1-1/8"	0"	1-7/32"	11-9/16"	15°		
9	Flat Ash	12	3/4"	5-3/8" od	2-3/4" id	1-7/16"	0"	1-11/32"	14-25/32"	15°		
8	Flat Ash	12	3/4"	5-3/4" od	4-1/8" id	1-17/32"	0"	7/8"	17-3/8"	15°		
7	Flat Ash	12	3/4"	5-7/8" od	4-5/8" id	1-9/16"	0"	23/32"	18-5/16"	15°		
6	Flat Ash	12	3/4"	5-7/8" od	4-3/4" id	1-9/16"	0"	21/32"	18-1/2"	15°		
5	Flat Ash	12	3/4"	5-7/8" od	4-3/8" id	1-9/16"	0"	13/16"	17-31/32"	15°		
4	Flat Ash	12	3/4"	5-1/2" od	4" id	1-15/32"	0"	13/16"	16-25/32"	15°		
3	Flat Ash	12	3/4"	5-1/8" od	2-7/8" id	1-3/8"	0"	1-3/16"	14-17/32"	15°		
2	Flat Ash	12	3/4"	4-1/2" od	1-1/8" id	1-7/32"	0"	1-23/32"	10-15/16"	15°		
1	Flat Ash	12	3/4"	3-5/8" od	1-1/8" id	1"	0"	1-9/32"	9-13/32"	15°		

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

PREPARE STOCK

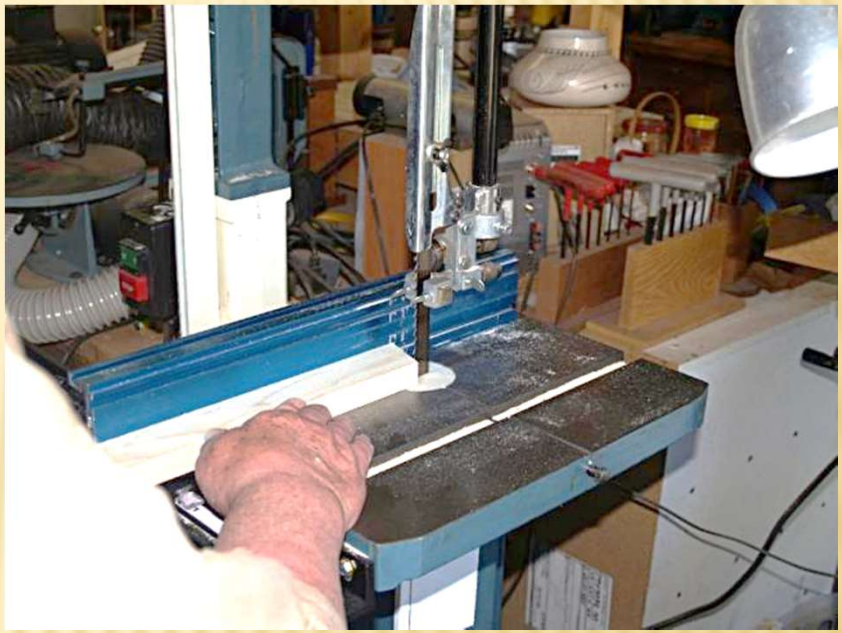
"True & Square" lumber.

For each layer (ring):

Cut to length (# of segments + 3" for safety).

Rip to width (segment width).

Number for each ring.



CUTTING SEGMENTS METHOD #1

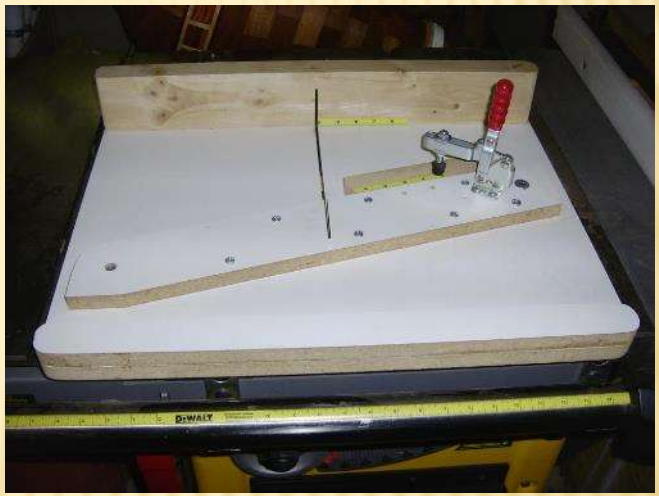
Miter Sled

- Set to the desired cut angle
- Cut test ring and check fit
- Adjust until test ring is a perfect fit
- Make a segment stop to measure segment edge lengths that are cut off
- Cut segments flipping the stock before each cut

CUTTING SEGMENTS METHOD #2

Custom sled

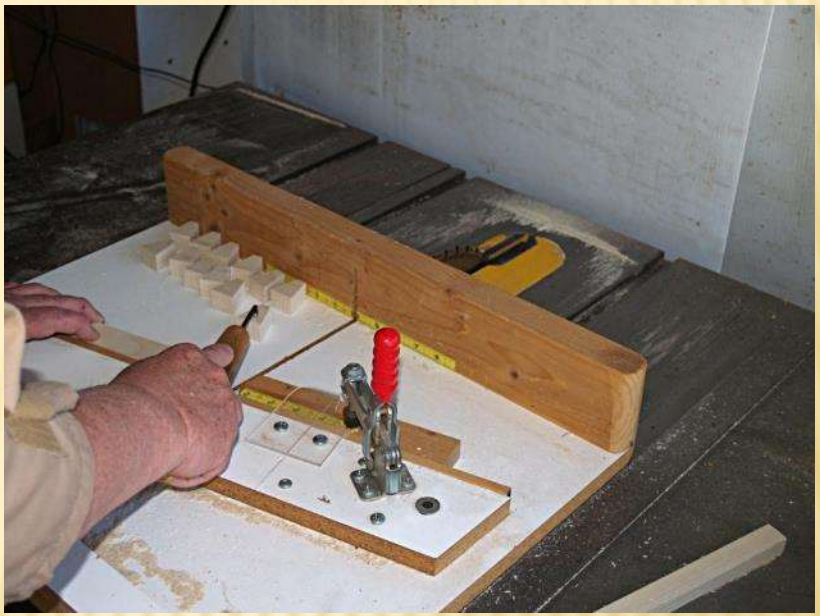
- Build a custom sled
- Calibrate with test rings for specific rings
- Secure fence permanently
- Add a built in stop for measuring segment edge length



CUTTING SEGMENTS METHOD #2

Use the stop to measure segment edge lengths

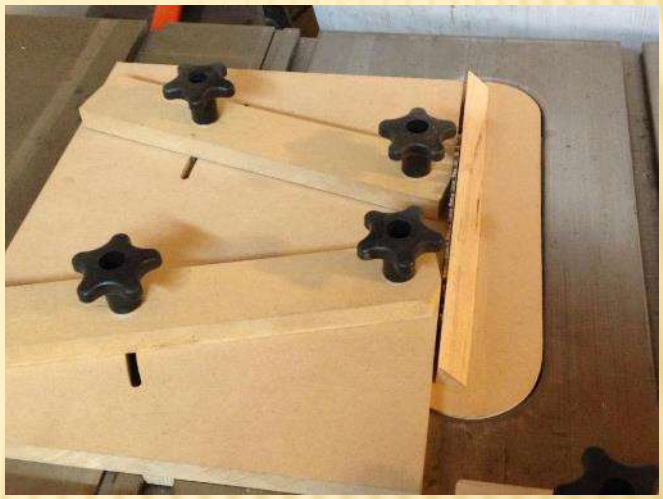
Use a hold down tool for safety



CUTTING SEGMENTS #3 NEW SLED

Build a adjustable two-fence sled which will reduce setup errors

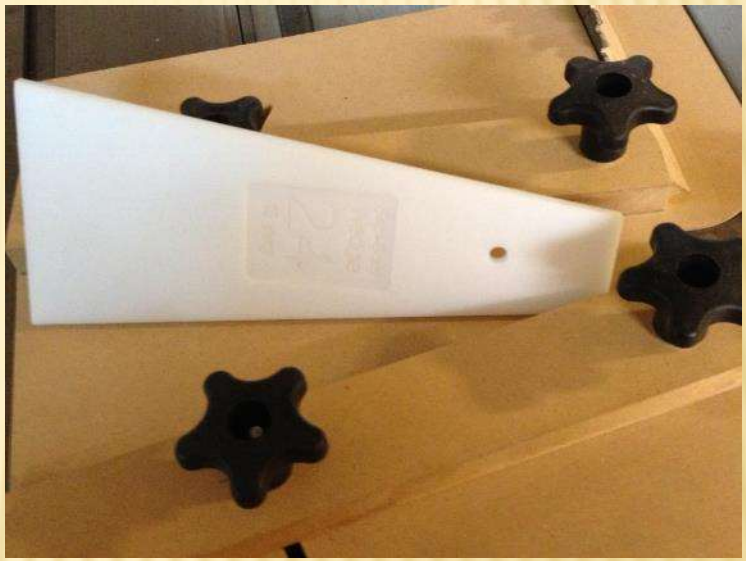
Build planes at:
www.segeasy.com



CUTTING SEGMENTS #3

Spacing between the two fences is set with a precision angle plate

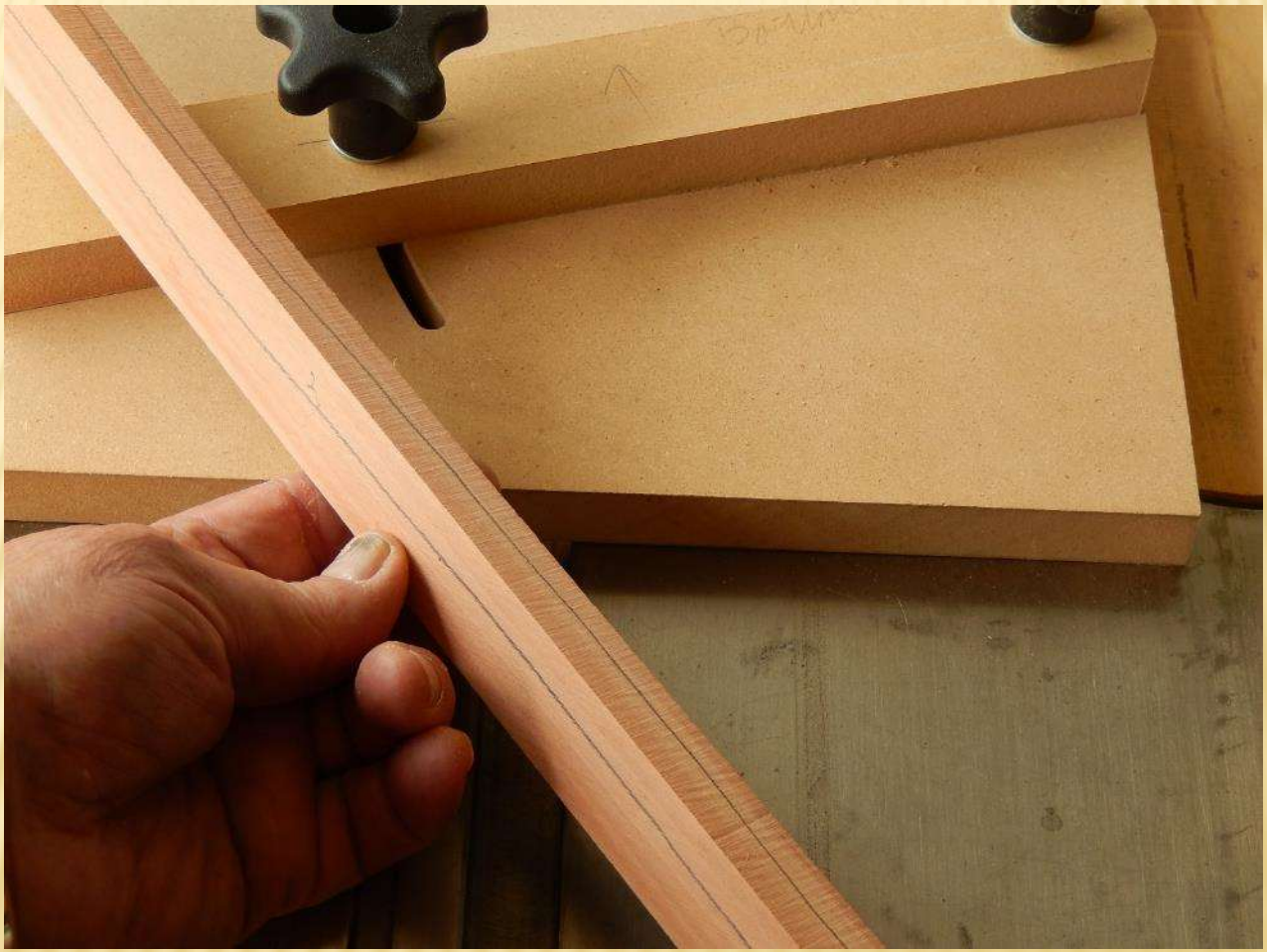
Wedgie™ plates can be purchase at www.segeasy.com



CUT STOP

A stop is required to measure the segment edge length

STOCK IS MARKED ON TOP AND ONE EDGE



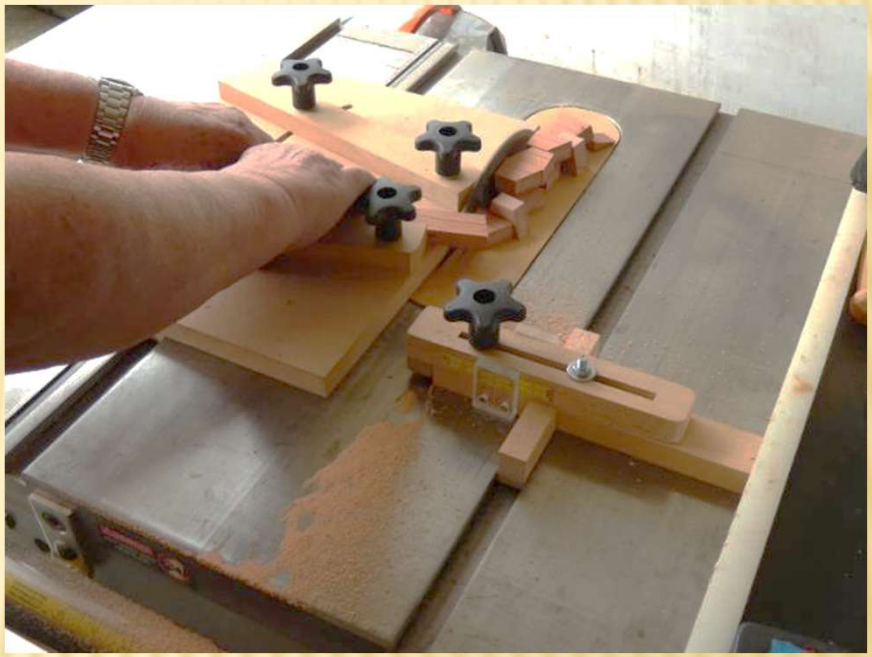
CUTTING SEGMENTS – THE NEW WAY!

Stock is NOT flipped between cuts

First cut is on the front fence

Second cut is on rear fence
In all cut the stock remains in the same position

For more information see videos on:
www.segeasy.com



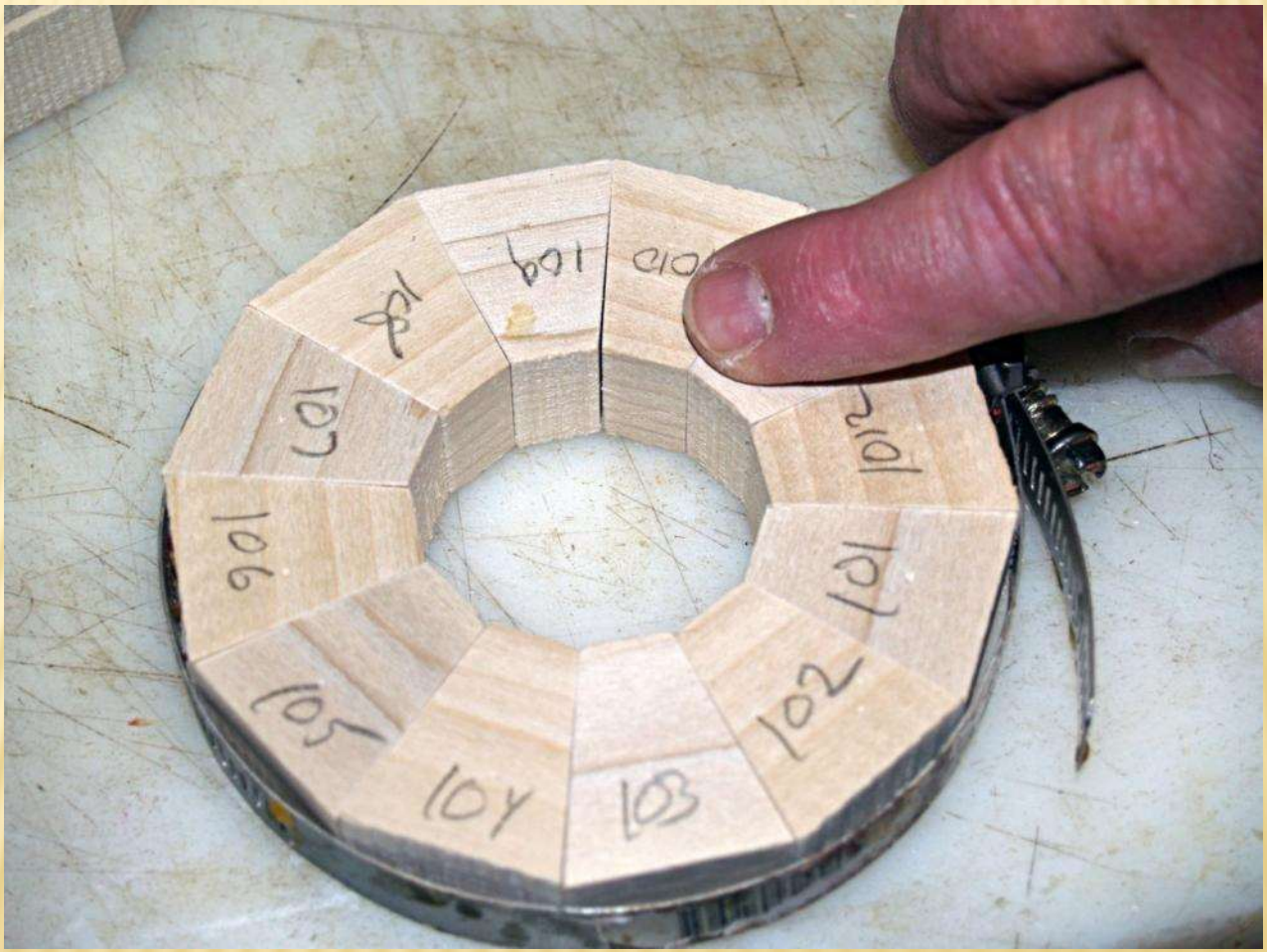
PREPARE SEGMENTS FOR BUILDING RINGS

Always sand burrs on segments to prevent poor fit.

Do not sand faces of cut edges.

GLUING RINGS (WHEN THEY FIT TIGHT)

GLUING UP RINGS (WHEN THEY DON'T)



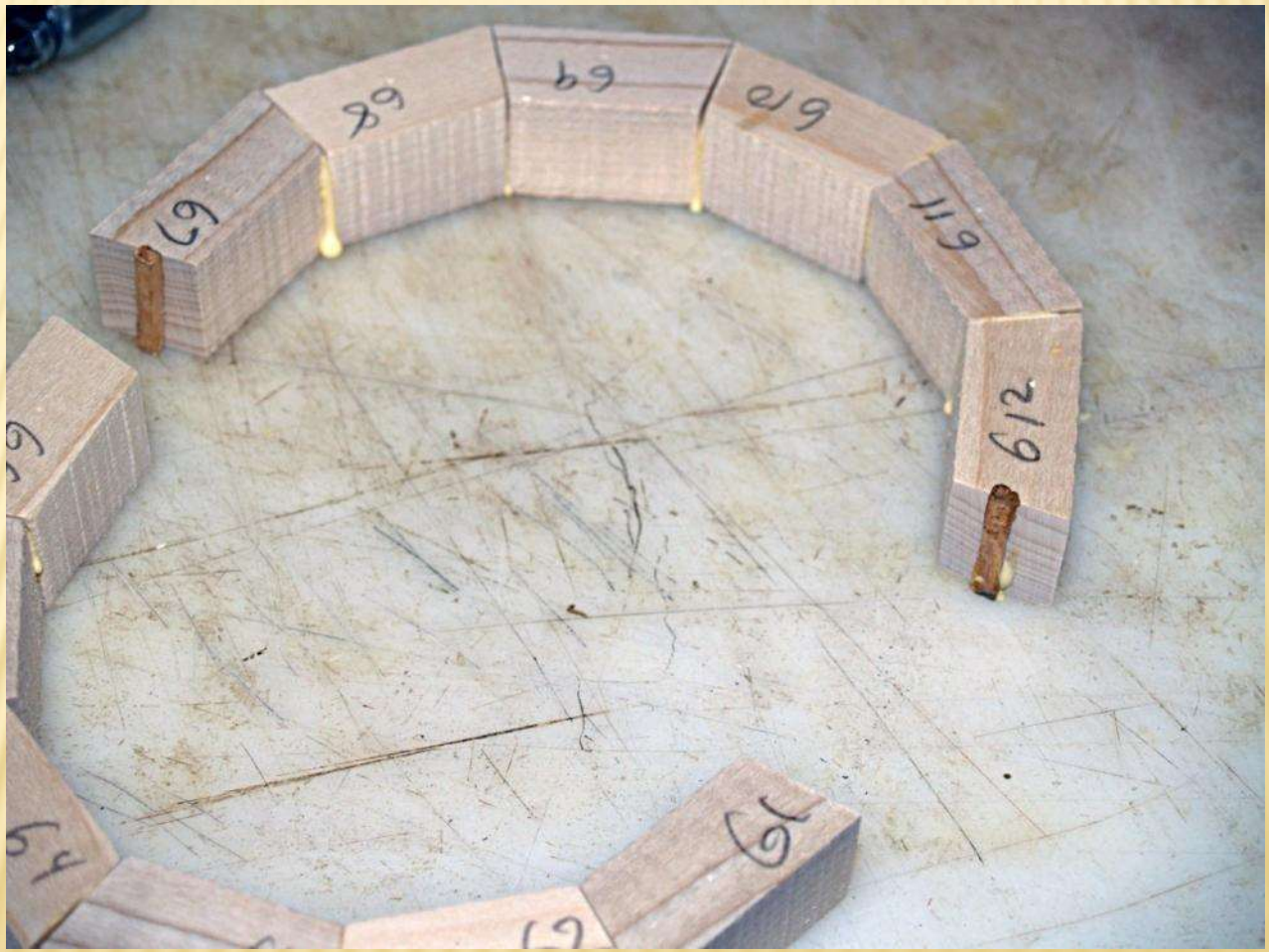
HALF –RING METHOD

Glue half-rings together.

Use small dowels to pivot error to un-glued location.

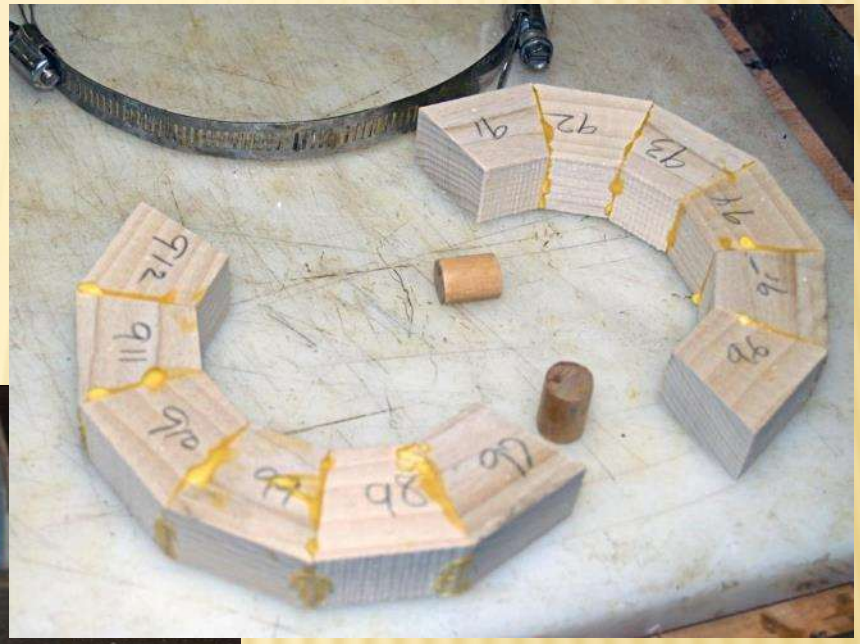
Place pivot dowels in dead center of open joint.

SMALL RINGS – SMALLER DOWELS



PREPARING TO SAND ½ RINGS

When dry, remove dowels.



Pencil al line across the unglued faces.

SAND UNGLED FACES TO FLATTEN

Assure thee sander table is dead square.

Brace half ring across sander's center to assure even sanding.

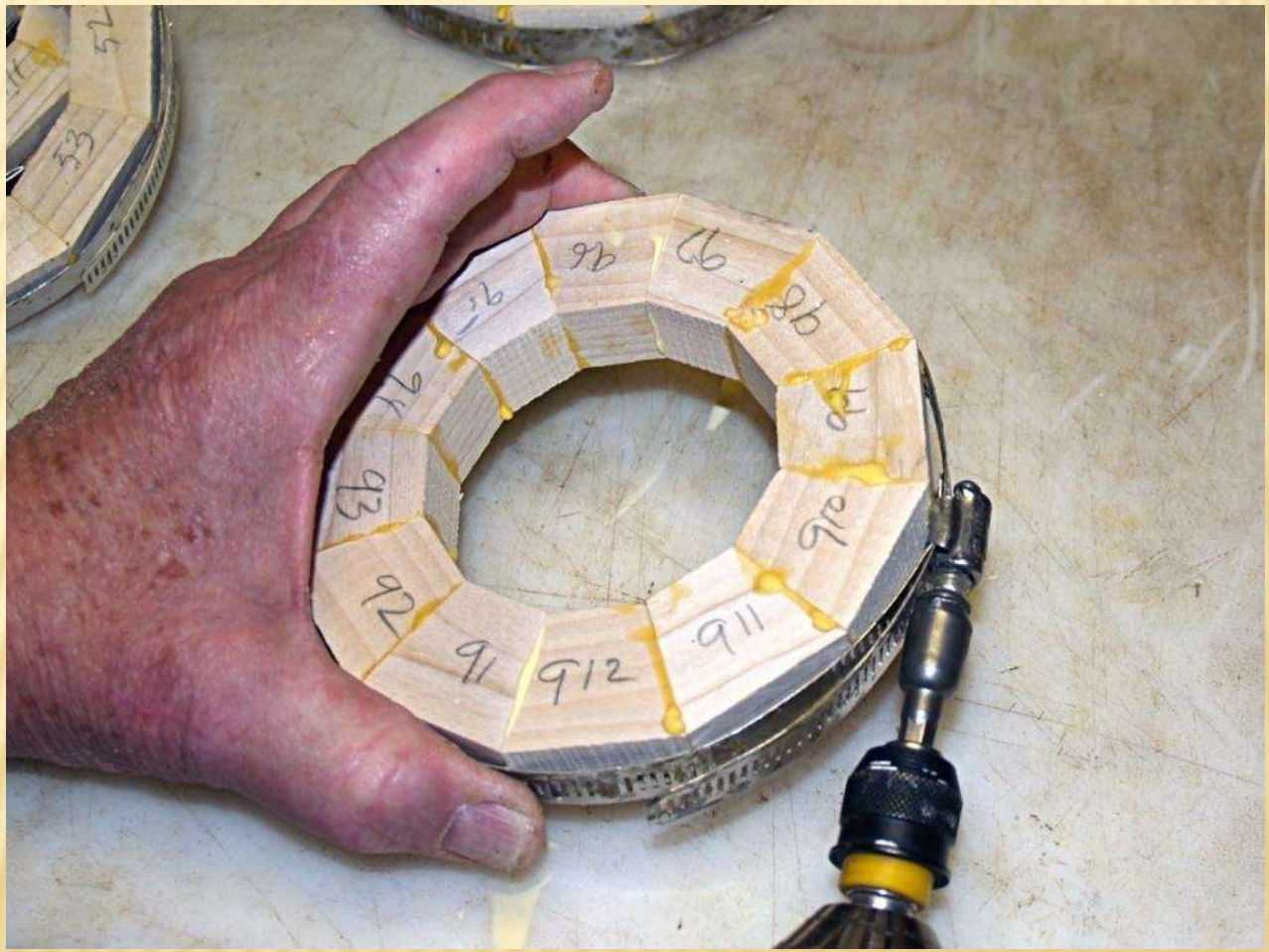
Hold down firmly.

ASSURE EACH HALF RING IS FLAT

Check the pencil lines – when they are gone the half ring is flat.

Sand the second half ring “upside down” to cancel any errors in the sander.

RE-GLUE ½ RINGS



ALL RINGS GLUED & NUMBERED

Continue to Part Two to build the vessel from the rings we just created.