Segmentation Basic

Bay Area Woodturners Association
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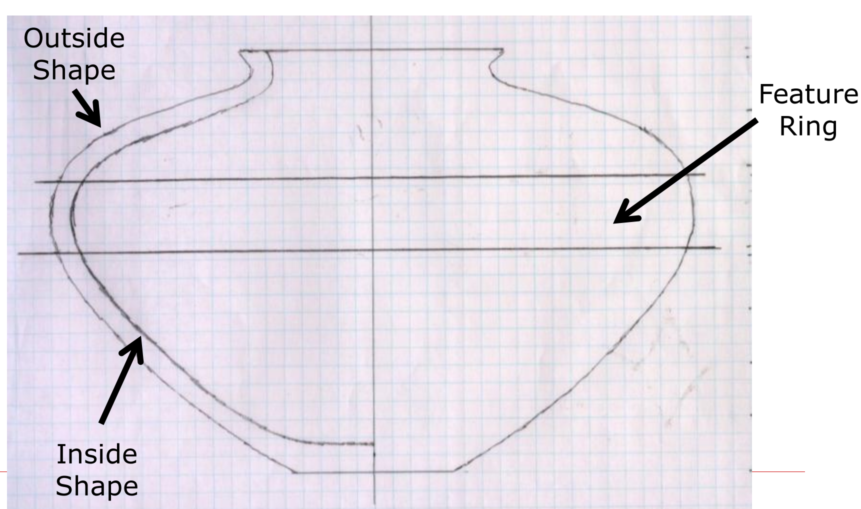
In January We….

- Did an overview of Process
- Picked A Shape
- Discussed Feature Rings and Selected A Chain Pattern for our Feature Ring

Today We Will

- Finish Our Planning & Create A Cut List
- Show How To Make The Chain Pattern
- Discuss Jigs & Fixtures
- Show How to build this vessel in two halves
- Maybe we can talk Warren into showing us how to turn the bottom first

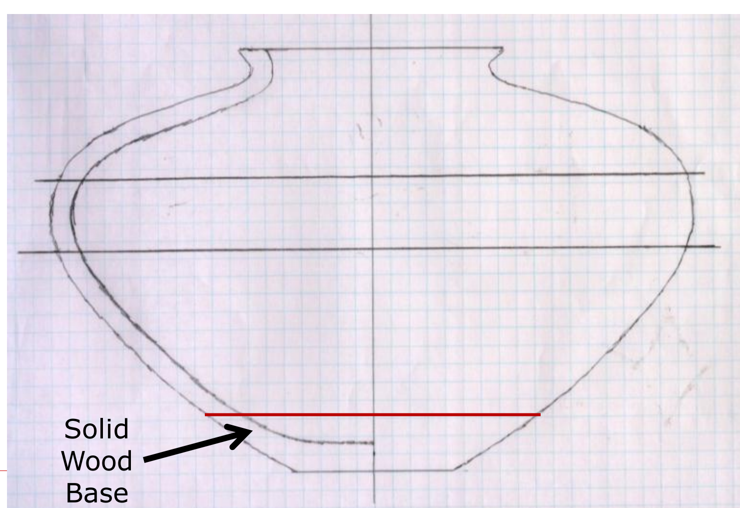
Placing the chain feature ring on our vessel



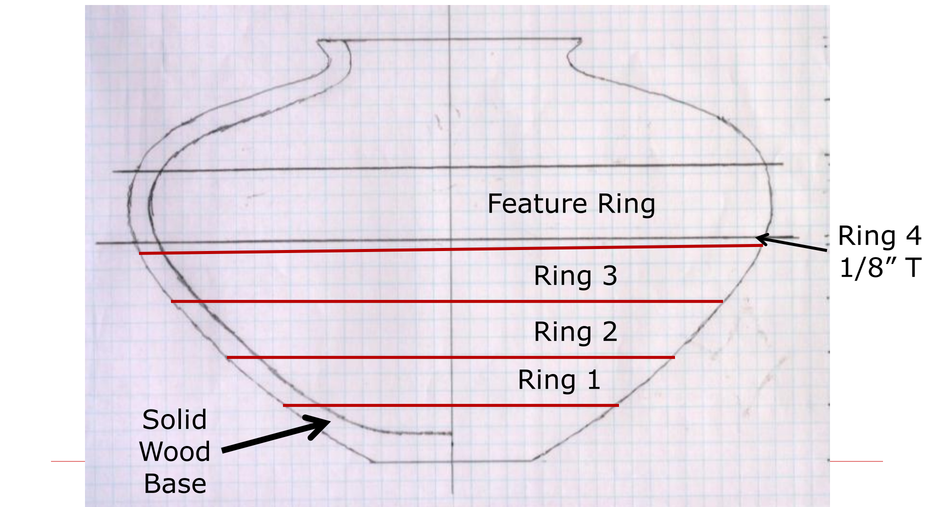
Now we need to "divide" the vessel into Rings

- Start with the base
  - Bases must be solid wood
  - Burl is one way of minimizing wood movement problems
  - See Malcolm's book for a "floating base"
  - The thicker the base, the heavier the vessel
  - Minimum thickness of the base is determined by making sure that the inside is turned into the solid base

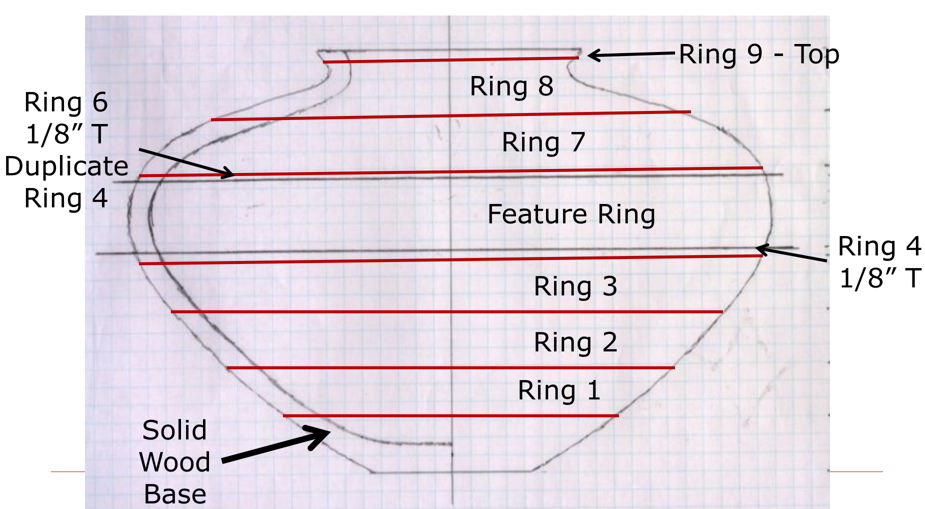
Place a ¾" Thick base



Continue Placing ¾” Rings up to Feature Ring



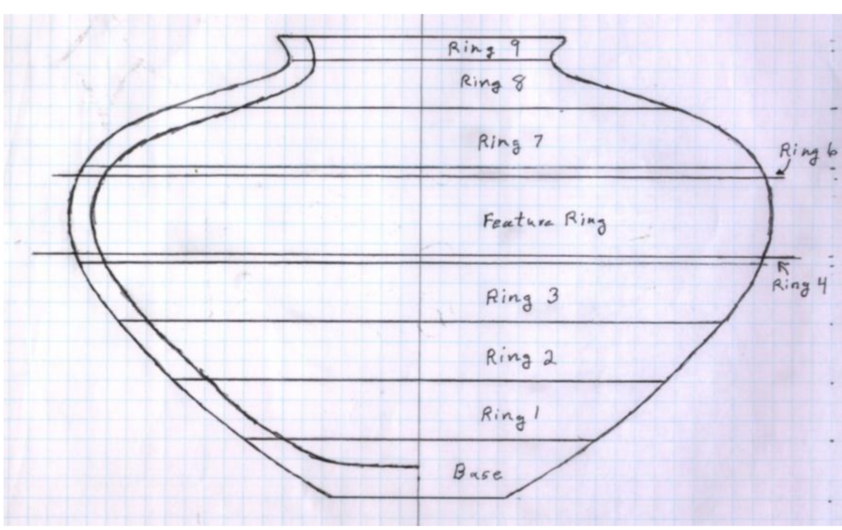
Now Work from Feature Ring to Top



This Leaves The top ring as 1/8" Thick

- This is a little too thin for my tastes
- Adjust the top to ¼" thick
- Shrink the rings below
- Either equal Reduction or out of the "larger ring"
  - Larger is defined by surface area
  - In this case, I reduced Ring 8 by 1/8" to 5/8" thick

Leaving Us With this design



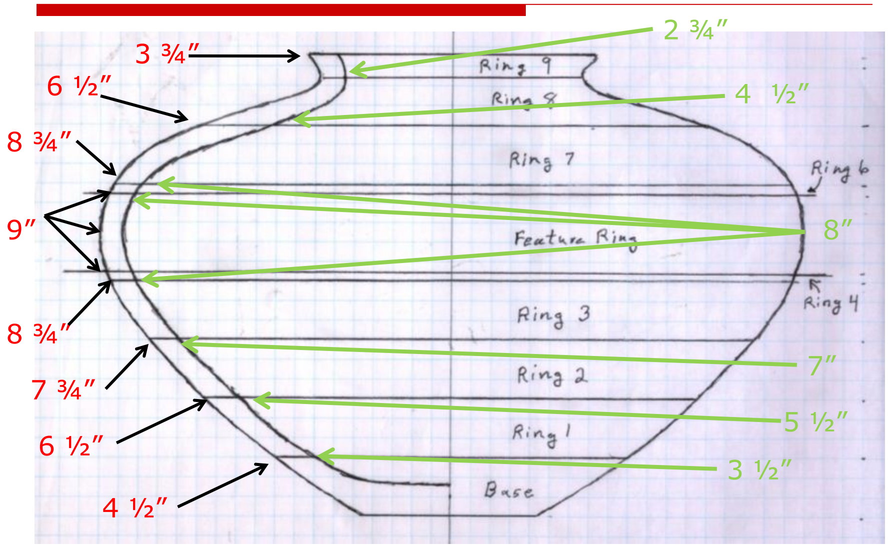
This is a good time to decide on wood types. I selected…

- Purple heart for the base & top
  - Start & stop with the same wood
- Cherry wood for Ring 1, 2, 3, 7, & 8
- Maple for Ring 4 & 6
- Bloodwood & Maple for the Feature
- Veneer could be added between rings 3 & 4, as well as rings 6 & 7

Next: Size the rings

- Mark and Measure the largest diameter for the outside of each ring
- Mark and Measure the smallest diameter for the inside of each ring

Sizing the Rings



Now select the Number of Segments/Ring. So How?

- Long segments on small vessels don't look as good, I shoot for less than 3″
- Large vessels can use large segments
- "Guesstimate" Minimum number of segments = Max Vessel Diameter
  - In Our case, this is 9″, or 9 Seg/Ring

What are the options?

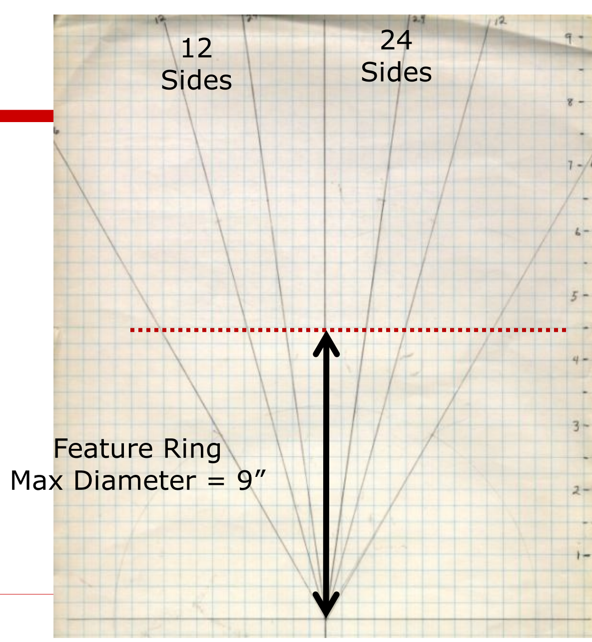
- Divide 180 by the number of segments to get the cutting angle
- My segment options are:
  - 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 40, 60, 72, 80, 90, 120, 180, 360 per ring
  - My cutting sled works in ½ degree increments
  - If You Make Your Own sled or sanding jig (later), other options are possible

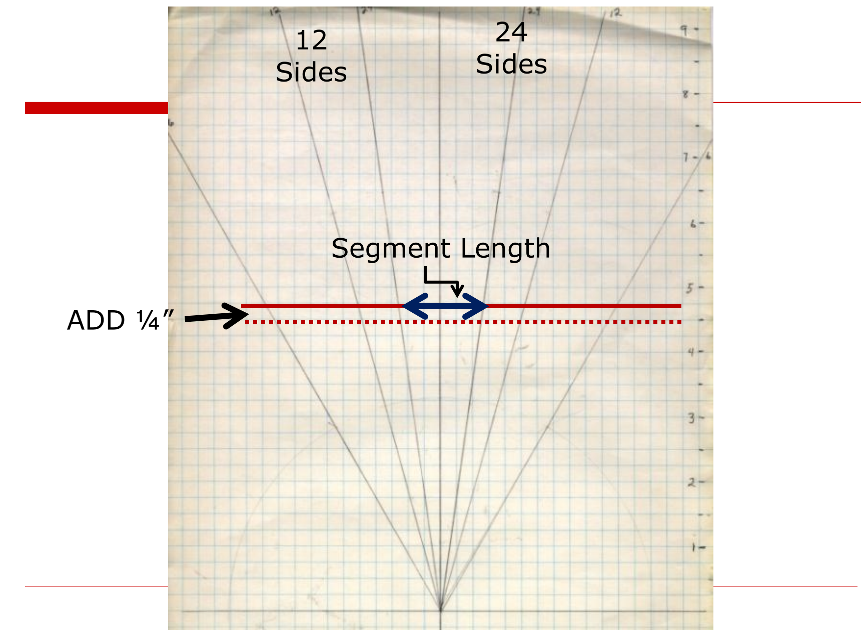
Rings that can be built in Halves are Easiest

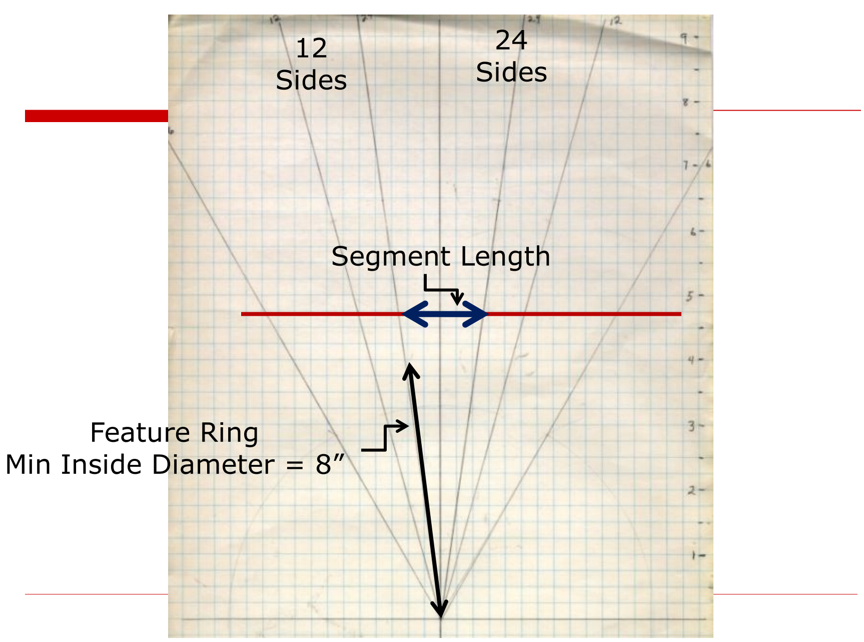
- Will explain when we discuss gluing the segments into rings
- Doing More than 24 segments per ring can be tough to apply glue and clamp before the glue dries
- With this in mind, my options were
  - 10, 12, 18, 20, or 24
  - I picked 12 segments/ring

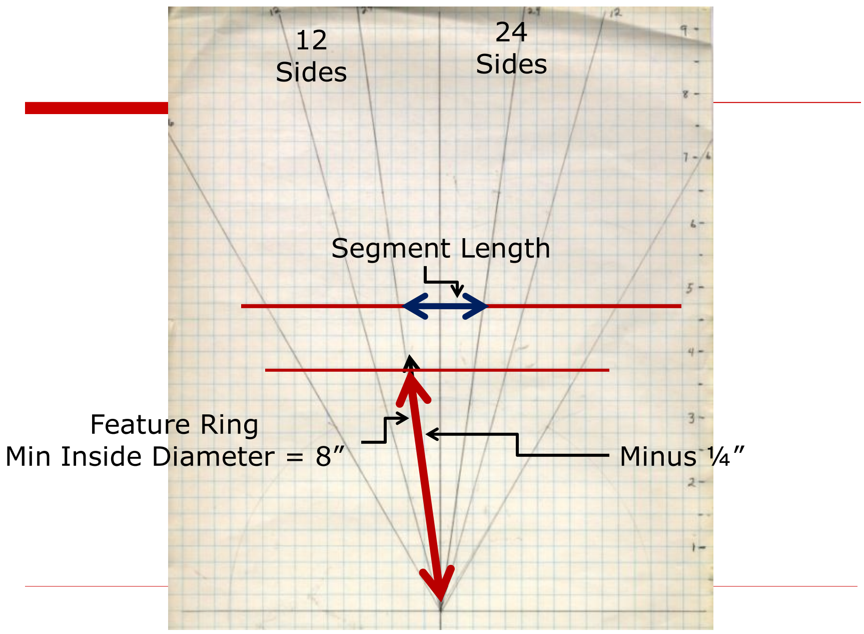
3 Methods of determining Segment Lengths

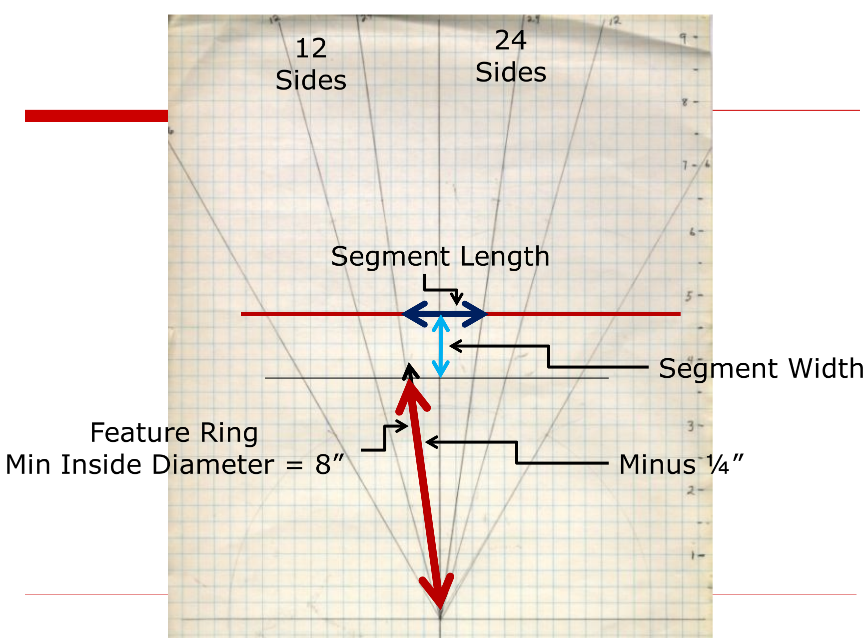
- Option A – Measuring off a graph
  - Extremely accurate, requires make your own graph
- Option B – Using a table
  - Fast & Easy, Not the most accurate
- Option C – Using an excel spread sheet
  - Produces a printed cut sheet, requires sitting in front of a computer




12
Sides
24
Sides
Segment Length
ADD ¼″


12
Sides
24
Sides
Segment Length
Feature Ring
Min Inside Diameter = 8″


12
Sides
24
Sides
Segment Length
Feature Ring
Min Inside Diameter = 8″
Minus ¼″


12
Sides
24
Sides
Segment Length
Segment Width
Feature Ring
Min Inside Diameter = 8″
Minus ¼″

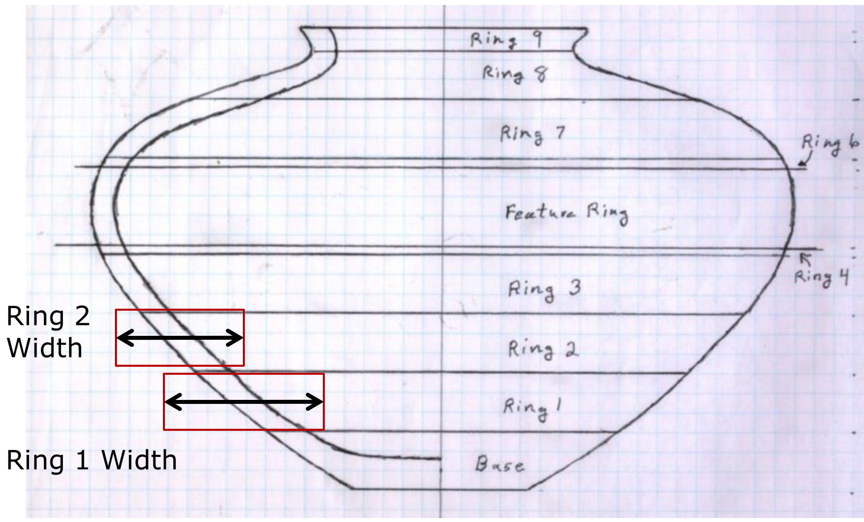
Option B) Using The table

- Read the Segment Length off a table
  - Don’t forget to add ¼”
- Then measure the segment Width off our vessel drawing
- Estimate the length of board required to cut the segments by taking the maximum diameter x 3.14 (PI) And adding board to hold down (~6”)

Using a Table: By Ken Horner

- See separate file: From More Woodworkers by Ken Horner.pdf

Determining the Widths



Option C) My Excel Spread Sheet

- Enter
  - # of segments/ring
  - Ring Thickness
  - OR – Largest Outside Radius (= ½ diameter)
  - IR – Smallest Inside Radius (= ½ diameter)
- Guardband are preset to ¼"
  - I've used 1/8"
- Segment Lengths and Widths are calculated
- BL = Board Length. Note this does NOT include extra wood to hold on to

Feature Ring = 24 segments

- For 12 segments, the segment is 2 9/16” long. Too long.
- Vertical “spacers” are ¼”
- Cut the Segment Lengths to 1”
  - 1 ¼ minus ¼” (spacer)
- Cut 24 spacers, & 12 of each of the chain pieces
  - This will be tough to glue!

How about CAD packages that are available?

- I’ve found them cumbersome to enter the shape
- Stuck with whatever assumptions the software makes
- Bottom line: Not worth the money in my humble opinion

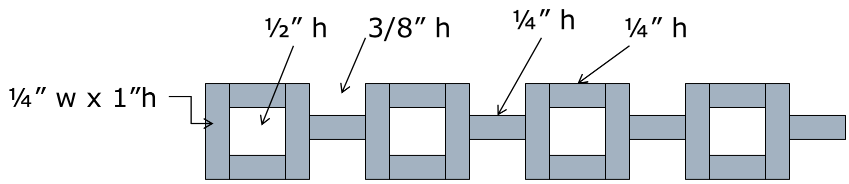
So now we have a cut list

- Next we need to prepare some wood
- Then we can
  - Cut the segments
  - Glue the rings
  - Build the vessel
  - Turn the vessel

Board Sizes

- Min Board Width = Segment Width
  - Larger is ok
  - Different widths in the same ring is also ok
- Board Lengths can be approximated by the circumference of the circle (diameter x PI)

Preparing the wood required to make the Chain Pattern



- Make 2 strips:
  - ¼″ (blue) + ½″ (white) + ¼″ (blue)
  - 3/8″ (white) + ¼″ (blue) + 3/8″ (white)
- Make 1 strip 1″ thick (blue) for vertical spacers
- Remember to keep all the grain running horizontal

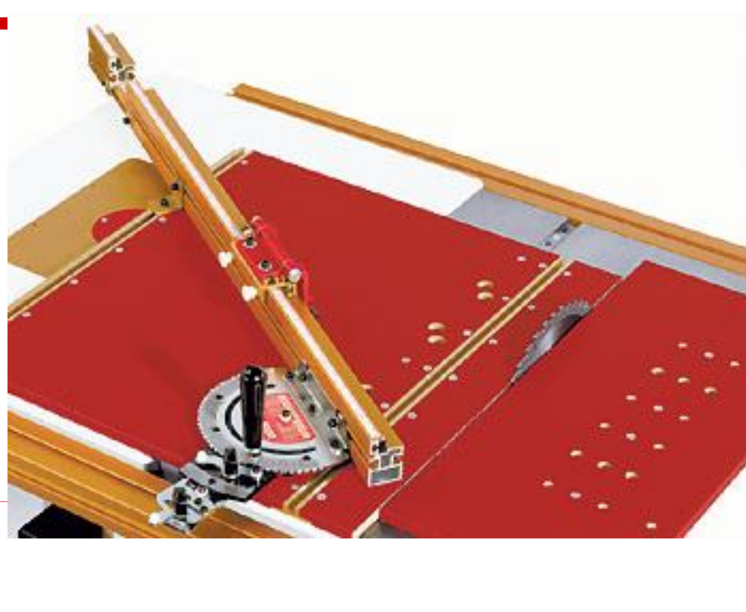
For This example, I used

- Bloodwood for the "blue"
- Maple for the "white"
- The Strips are 1″ high, 1″ wide, and XX″ long

Cutting Segments

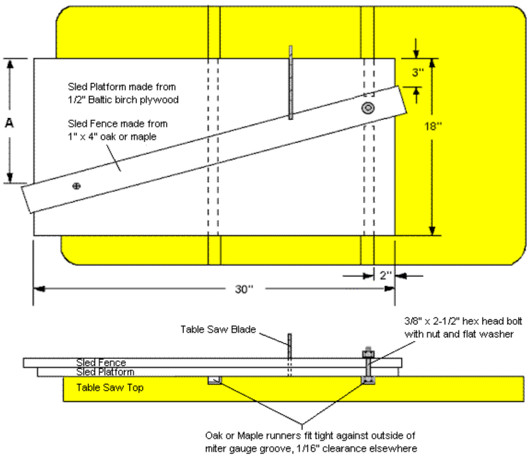
- Table saw with a Sled
- Chop saw
- Any cutting method, followed by using a disc sander

I use an Incra 5000 sled



Making Your Own Sled

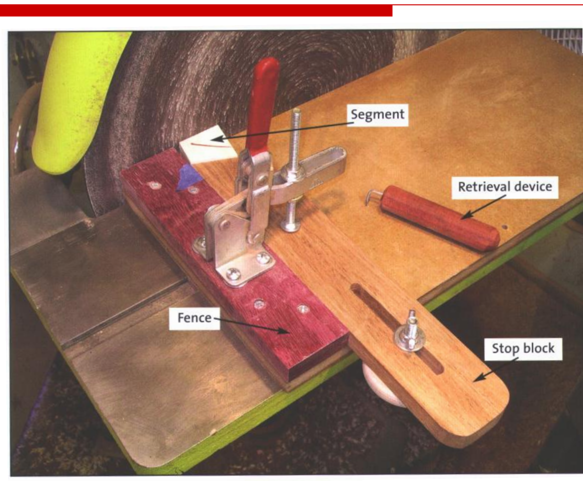
http://www.turnedwood.com/framesled.html



Number of Sides	Miter Gauge Angle Degrees	Sled "A" Dimension 1/1000"	Sled "A" Dimension Nearest 1/32"
8	22.5°	15.426"	15-7/16"
10	18.0°	12.748"	12-3/4"
12	15.0°	11.038"	11-1/32"
14	12.9°	9.847"	9-27/32"
16	11.3°	8.967"	8-31/32"
18	10.0°	8.290"	8-9/32"
20	9.0°	7.752"	7-3/4"
22	8.2°	7.313"	7-5/16"
24	7.5°	6.950"	6-31/32"

Kevin Nelley

Jig for your Disc Sander



The Art of Segmented Woodturning by Malcolm Tibbetts

Dry Fit Every Ring Before Making Changes To Your Setup

- I use hose clamps to hold the segments together
- Don't over tighten the clamps
  - We AREN'T trying to FORCE the wood to fit!
- Hold the ring up to a bright light, checking each joint for light
- Keep things clean!

If They Don't Fit

Either Cut Again

OR

Glue Up partial Rings & clean up before final gluing

OR

Take to the disc sander and make the segments fit

Gluing Up A Perfect Ring

- Apply glue to both sides of every other piece
- Lightly rub joints to spread glue
- As you tighten the clamp, hold down/press down the segments to make sure they are flat
- I use Melamine as a glue surface
  - Wax paper works as well

Gluing a ring that isn't perfect

Option A)

- Glue up in Pairs
- Then pairs of pairs, etc until halves are glued
- Make halves perfect, sander or saw

Option B)

- Use toothpicks to space halves
- Apply glue to all other surfaces & clamp
- Make the halves perfect, sander or saw

With the rings glued, flatten one surface

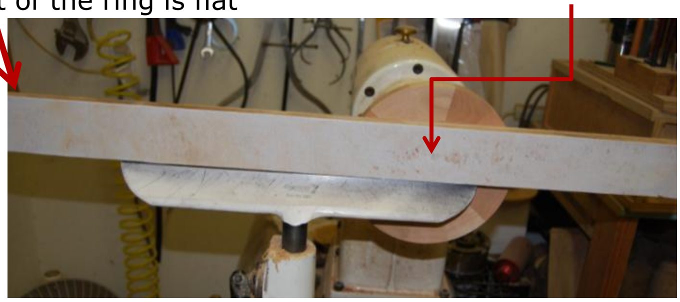
1. Use Hot Melt Glue to Tack the ring to a large faceplate
2. Turn the top surface flat
3. Use a "sanding stick" to clean up and make sure it is flat

- Cole Jaws can be used for step 1
- Drum sanders can be used, but watch out for "snipe"

Using The Flattening Stick

Will Wobble Until At Least Part of the ring is flat

Lightly Press Here

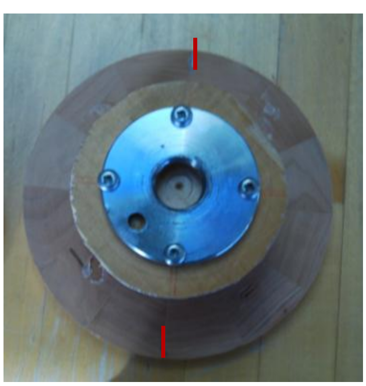


<u>Warning</u>: If you press to the right of center, the board will lift and snap back down against the tool rest. You can pinch you hand badly!

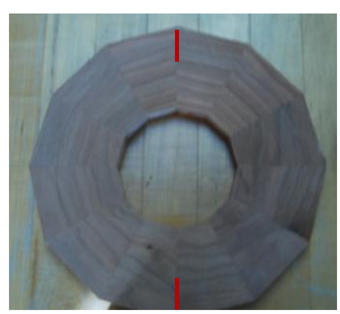
Adding the Ring to the stack Alignment is Critical

- Start by turning the pieces already glued round. Not to shape, just round.
- Pick a seam on both rings and align these seams
- Now align the seams on the other side, 180 degrees
- Keeping these two seams aligned, slide the rings back an forth to align seams at 90 degrees
- Clamp in place

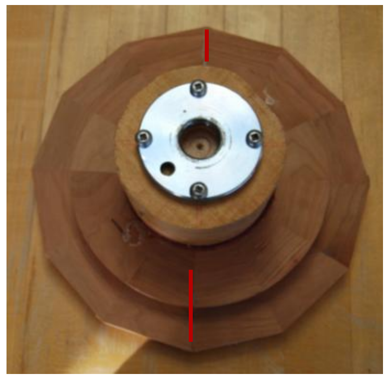
Step 1: Mark joints 180 degrees apart



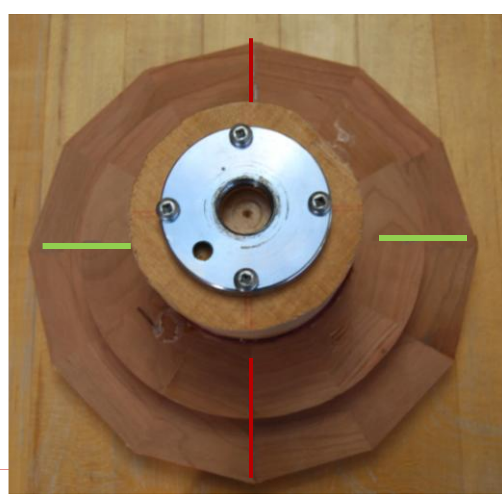
Ring to be added



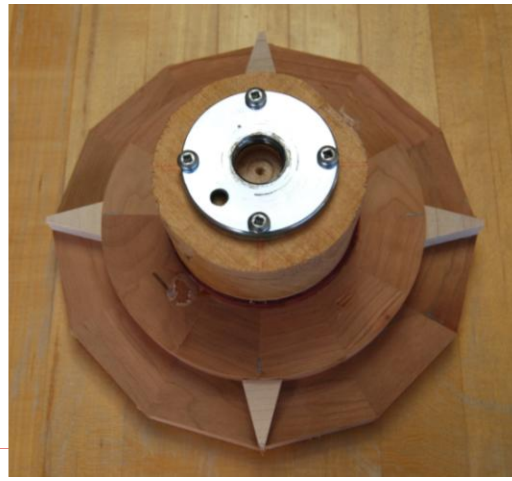
Step 2: Align these marks



Step 3: Mark & Align at 90 degrees



Step 4: Tack blocks to keep rings from slipping



Clamping can be done with

- Lathe
- Drill press
- Clamps
- Jig

Continue process until you have two halves

- Pin the two halves together on the lathe
  - I use the Oneway tailstock with a hub
- Turn the outside to shape
- Separate and turn the insides of the two halves
- Glue two halves together
- Part top faceplate off

Finish turning & sanding inside and out

- Only leaves the bottom
- I use a "donut chuck" to hold the vessel while I complete this
  - http://azwoodturners.org/DoughnutChuck.pdf by Art Liestman
- Warren turns and finishes the bottom first, eliminating the need to do this step

As a minimum you need

- To Make a Sanding stick
- Make a large "face plate" to flatten rings
- Band clamps
- At least 2 face plates
- Table saw & sled or chop saw or band saw and disc sander with jig
- Dry & square wood stock

Reference Books & Web Sites

- http://www.turnedwood.com – Kevin Nelley
- WoodTurning with Ray Allen by Dale Nish
- The Art of Segmented Wood Turning by Malcolm's Tibbetts