Intro to Segmented Woodturning

By Mike Lanahan

What is Segmented Woodturning?

- Gluing 2 or more pieces of wood together and turning on a lathe.

Why?

- Originally, probably because a larger piece of wood was needed than was available.

Advantages

- Readily available material: flat dry boards.
- No logs, chain saws, bandsaws, Anchor seal, wet wood drying time/storage/cracking issues.
- Artistic Control: Color and pattern design at artist's command vs. luck of the wood.
- Shape and size constraints not limited by the piece of wood.
- Turning side grain.

Disadvantages

- It is not instant gratification.
- Planning required.
- Flat wood working equipment and precise woodworking skills generally required.
  - Table saw or compound miter saw, planer, jointer, drum sander, disk sander, jigs, glue, clamps, …
- Requires attention to wood grain orientation and species properties)expansion, hardness, color, glue-ability, …).

Selecting Wood

- Smaller quantities are required
- Can afford exotics
- Mix of colors for contrast or complementing characteristics.
- Try to match expansion and hardness characteristics.

Types of Construction

- Laminated

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- Ring

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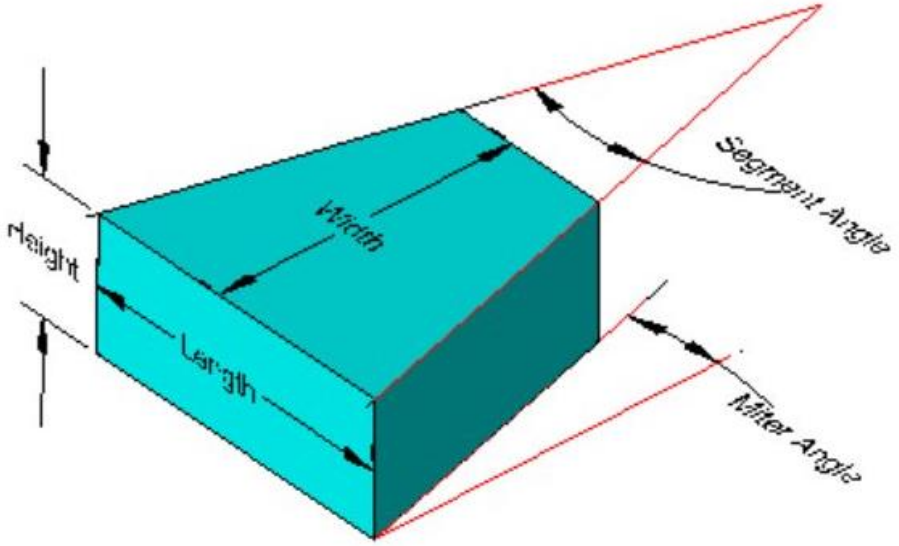
- Most of the following details will be on Ring construction.

Ring Segment Terminology

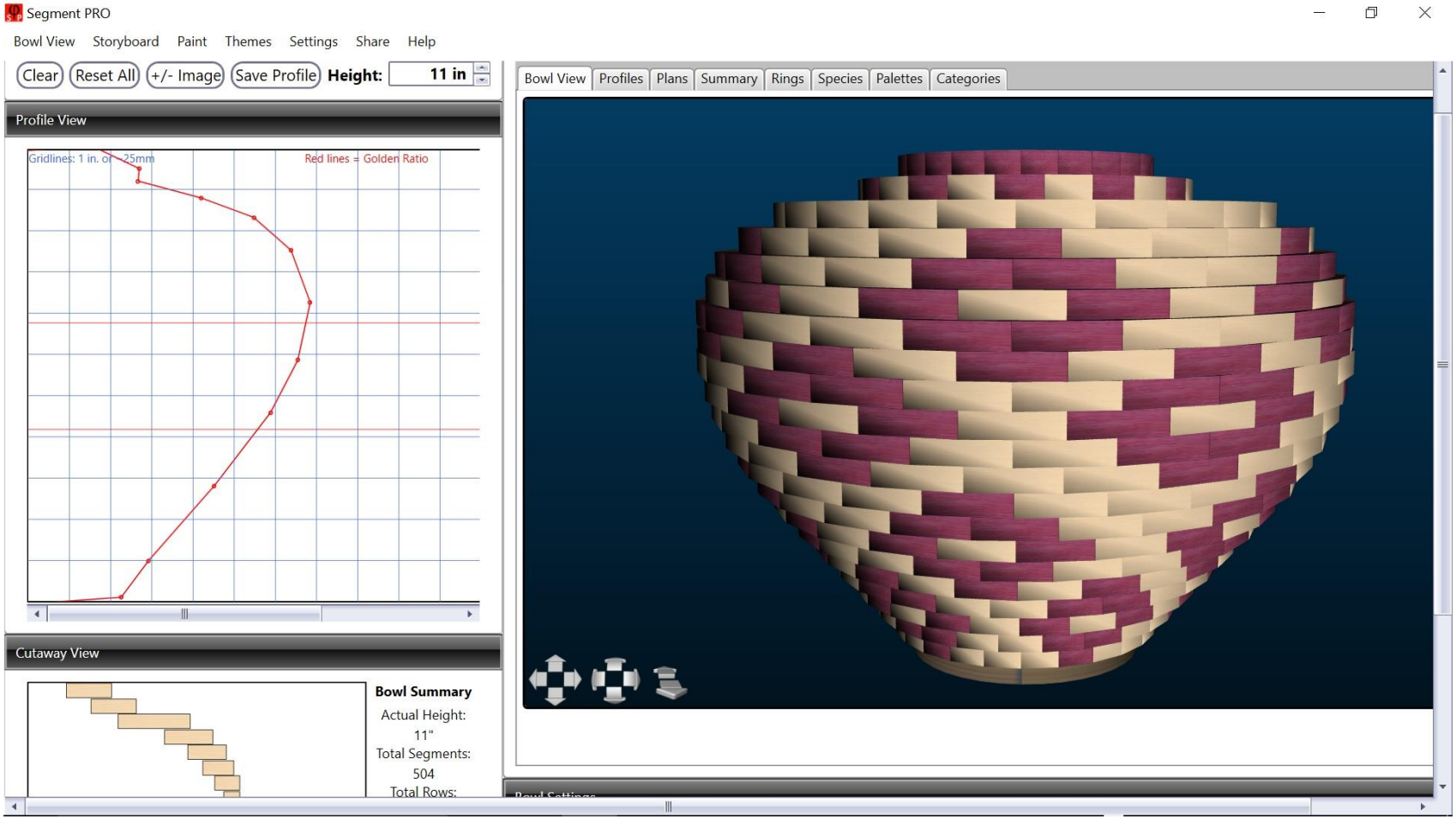
- Segment Angle = 360 / # of segments
- Miter Angle = Segment Angle / 2
- Width = Board Width
- Height = Board Thickness
- Length = length of outside edge



Make a Plan

- Can use graph paper or computer program:
  - Woodturner PRO, 3D Design PRO, Segment PRO
- Width for each layer is what is required for wall profile through top and bottom of that layer, plus working margin.
- Length
  - approximately (pi * diameter)/ # segs. 1.15% +
  - Computer program calculates more precisely. L = diameter * sin (miter angle)

Segment PRO


Segment PRO
Bowl View
Storyboard
Paint
Themes
Settings
Share
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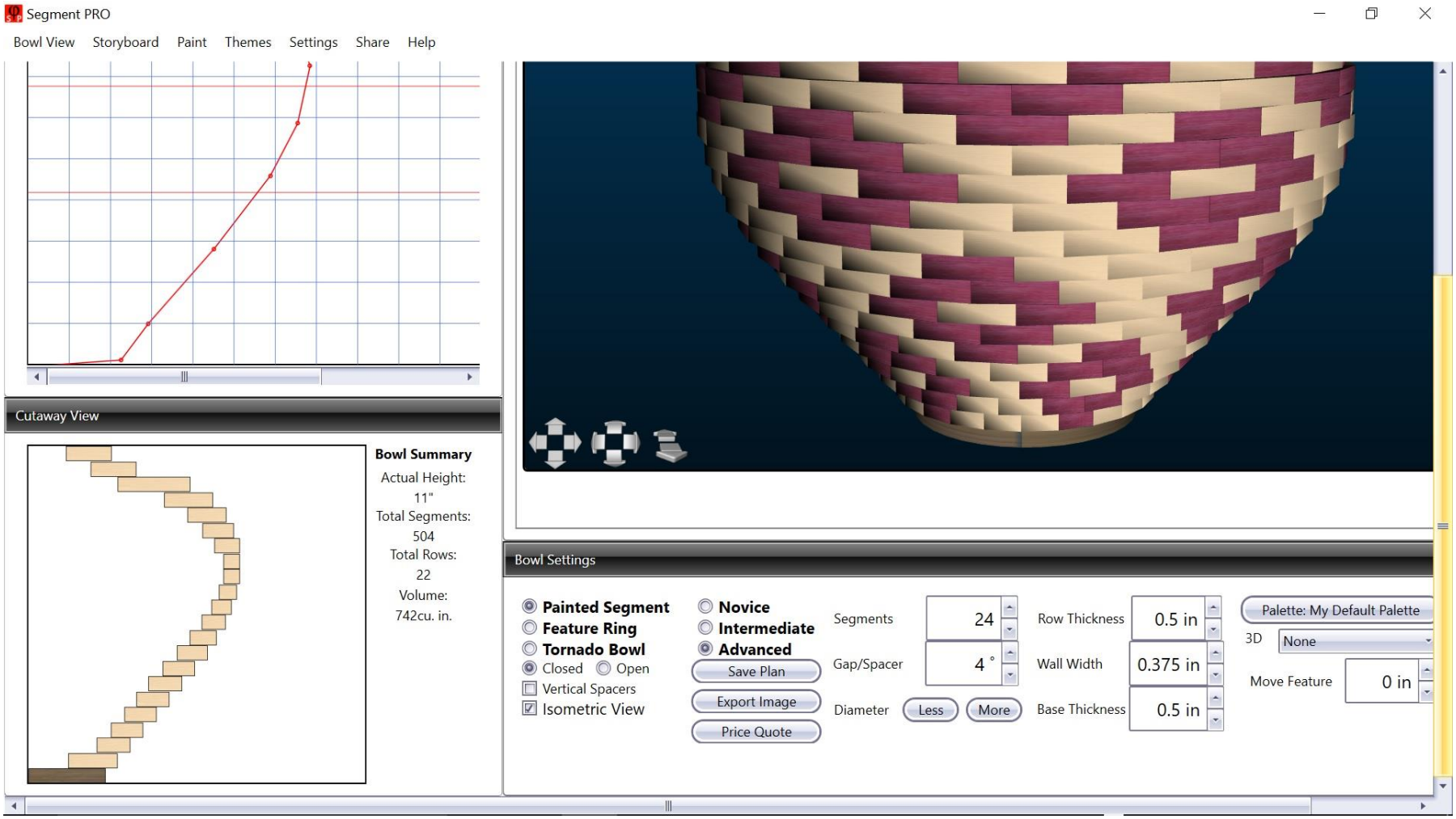
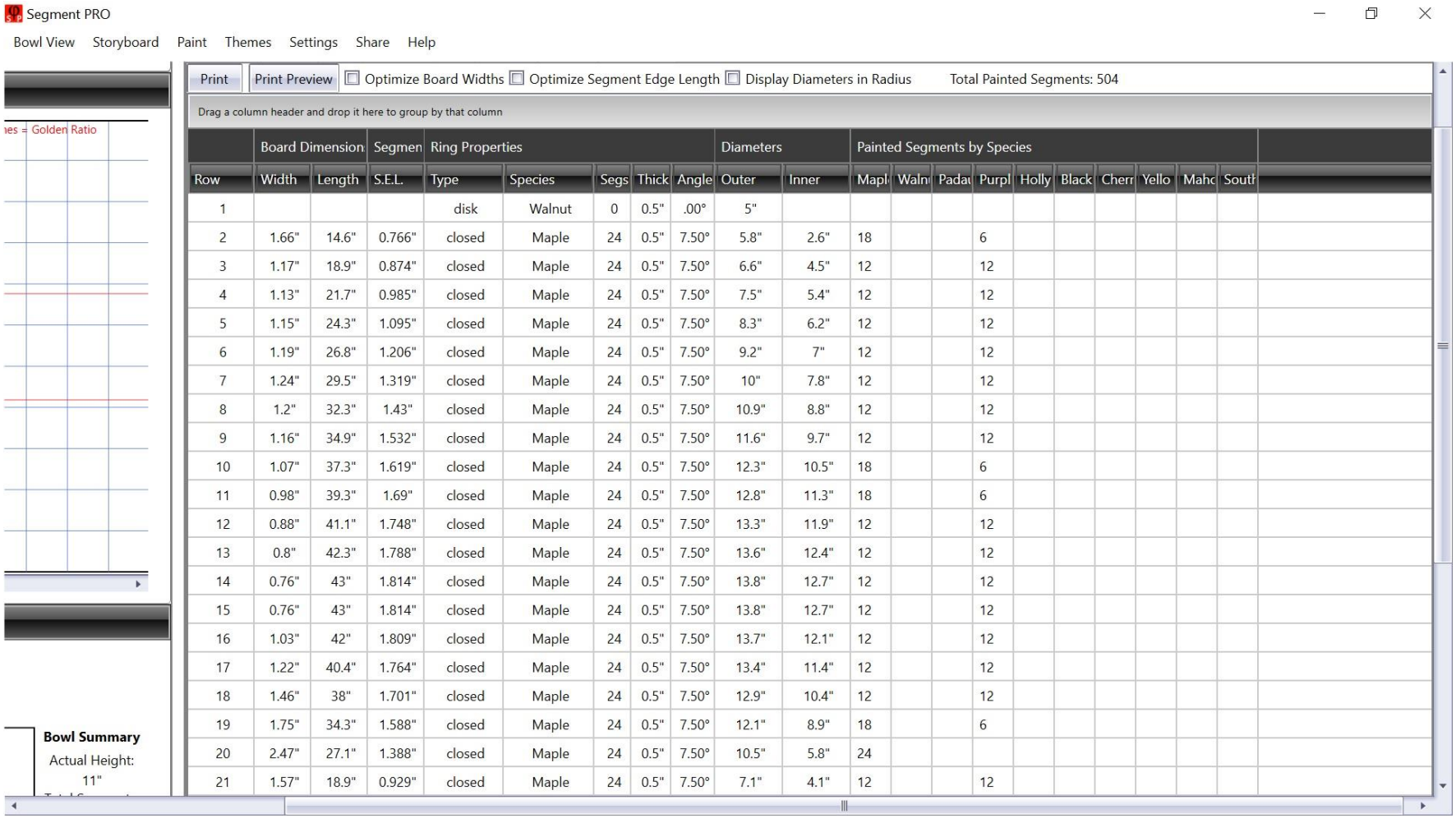
Height:
11 in
Profile View
Red lines = Golden Ratio
Cutaway View
Bowl Summary
Actual Height:
11"
Total Segments:
504
Total Rows:
Bowl View
Profiles
Plans
Summary
Rings
Species
Palettes
Categories

Segment PRO


Segment PRO
Bowl View
Storyboard
Paint
Themes
Settings
Share
Help
Cutaway View
Bowl Summary
Actual Height:
11"
Total Segments:
504
Total Rows:
22
Volume:
742cu. in.
Bowl Settings
Painted Segment
Feature Ring
Tornado Bowl
Closed
Open
Vertical Spacers
Isometric View
Novice
Intermediate
Advanced
Save Plan
Export Image
Price Quote
Segments
24
Gap/Spacer
4 °
Diameter
Less
More
Row Thickness
0.5 in
Wall Width
0.375 in
Base Thickness
0.5 in
Palette: My Default Palette
3D
None
Move Feature
0 in

Cut List Details



	Board Dimension		Segmen	Ring Properties					Diameters		Painted Segments by Species									
Row	Width	Length	S.E.L.	Type	Species	Segs	Thick	Angle	Outer	Inner	Mapl	Waln	Padau	Purpl	Holly	Black	Cherr	Yello	Mahc	South
1				disk	Walnut	0	0.5"	.00°	5"											
2	1.66"	14.6"	0.766"	closed	Maple	24	0.5"	7.50°	5.8"	2.6"	18			6						
3	1.17"	18.9"	0.874"	closed	Maple	24	0.5"	7.50°	6.6"	4.5"	12			12						
4	1.13"	21.7"	0.985"	closed	Maple	24	0.5"	7.50°	7.5"	5.4"	12			12						
5	1.15"	24.3"	1.095"	closed	Maple	24	0.5"	7.50°	8.3"	6.2"	12			12						
6	1.19"	26.8"	1.206"	closed	Maple	24	0.5"	7.50°	9.2"	7"	12			12						
7	1.24"	29.5"	1.319"	closed	Maple	24	0.5"	7.50°	10"	7.8"	12			12						
8	1.2"	32.3"	1.43"	closed	Maple	24	0.5"	7.50°	10.9"	8.8"	12			12						
9	1.16"	34.9"	1.532"	closed	Maple	24	0.5"	7.50°	11.6"	9.7"	12			12						
10	1.07"	37.3"	1.619"	closed	Maple	24	0.5"	7.50°	12.3"	10.5"	18			6						
11	0.98"	39.3"	1.69"	closed	Maple	24	0.5"	7.50°	12.8"	11.3"	18			6						
12	0.88"	41.1"	1.748"	closed	Maple	24	0.5"	7.50°	13.3"	11.9"	12			12						
13	0.8"	42.3"	1.788"	closed	Maple	24	0.5"	7.50°	13.6"	12.4"	12			12						
14	0.76"	43"	1.814"	closed	Maple	24	0.5"	7.50°	13.8"	12.7"	12			12						
15	0.76"	43"	1.814"	closed	Maple	24	0.5"	7.50°	13.8"	12.7"	12			12						
16	1.03"	42"	1.809"	closed	Maple	24	0.5"	7.50°	13.7"	12.1"	12			12						
17	1.22"	40.4"	1.764"	closed	Maple	24	0.5"	7.50°	13.4"	11.4"	12			12						
18	1.46"	38"	1.701"	closed	Maple	24	0.5"	7.50°	12.9"	10.4"	12			12						
19	1.75"	34.3"	1.588"	closed	Maple	24	0.5"	7.50°	12.1"	8.9"	18			6						
20	2.47"	27.1"	1.388"	closed	Maple	24	0.5"	7.50°	10.5"	5.8"	24									
21	1.57"	18.9"	0.929"	closed	Maple	24	0.5"	7.50°	7.1"	4.1"	12			12						

Design Considerations

- Large solid bottoms will have expansion stress problems. Floating plug is OK.
- Segments coming to a point are a problem. Small glued plugs are OK.

Preparing the Wood

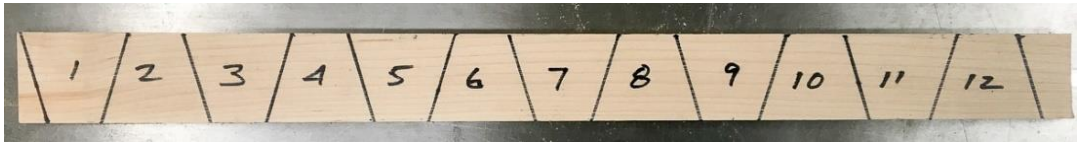
- Let wood acclimatize to your shop T & H.
- Accurately mill the thickness and width of the lumber for each layer.
- Arrange stock so you can cut segments with same grain orientation
  - This includes spacers, or veneered if used.
- Cut segments

How to Cut Segments

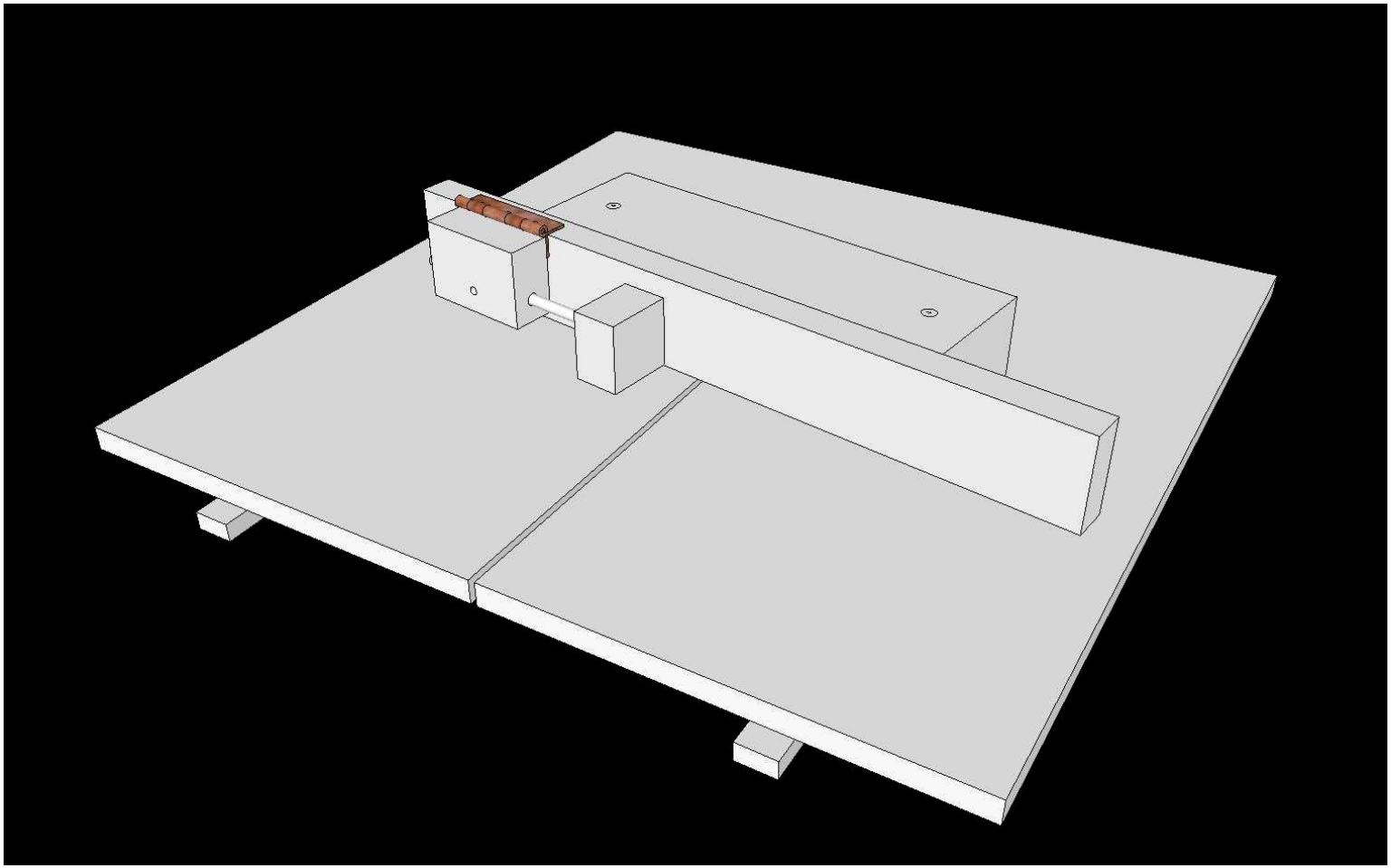
- Bandsaw Not Preferable– Rough surface, requiring sanding and angle jig for disk sander
- Miter Saw
  - Zero-clearance base and back strips
  - Length Stop to set segment length
- Table Saw
  - Make a sled with GOOD fitting bar to miter track
  - Sled to set miter angle
  - Zero-clearance throat plate
  - Ramp on cut side to move segments away from blade
  - Length Stop to set segment length

Traditional Table Saw Sled

- Accurately set blade to 90 degrees
- Set fence for desired miter angle
  - Good angle gauges help
- Cut test segments and adjust angle till good
- Flip board between cuts
- Two methods to cut
  - Conserve wood
  - Grain match

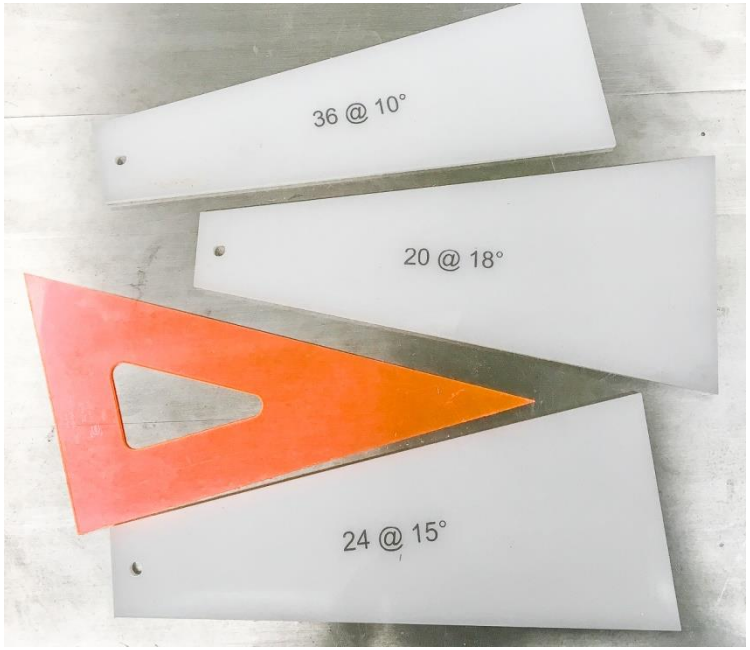


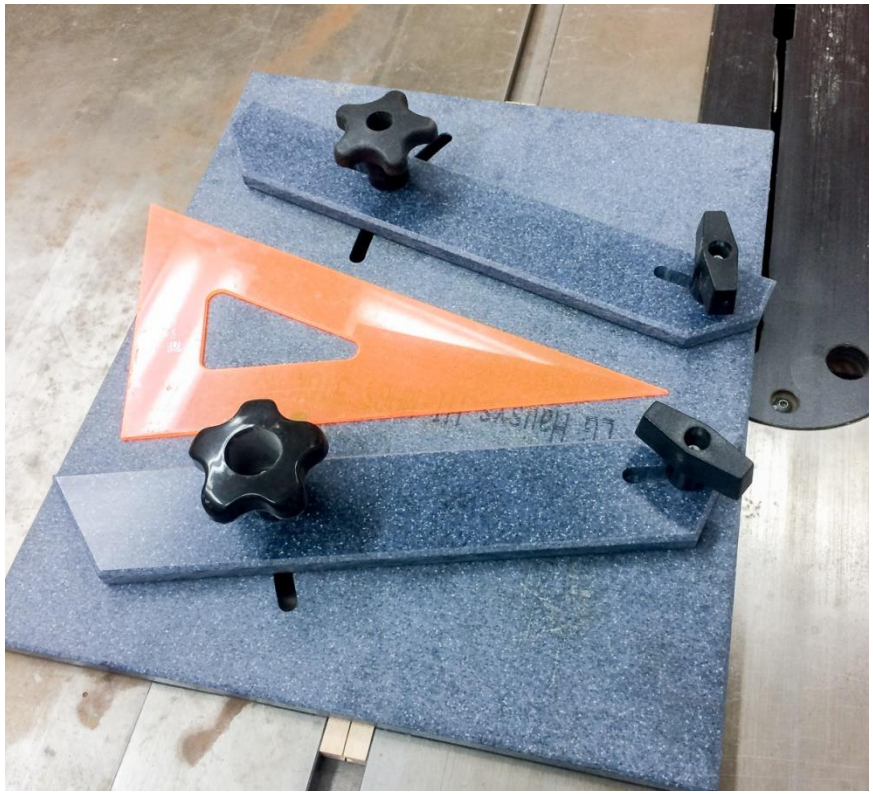
Lloyd Johnson's Sled



Wedgie Sled

- Accuracy built in with reference wedge and top fence being parallel
- Two adjustable fences

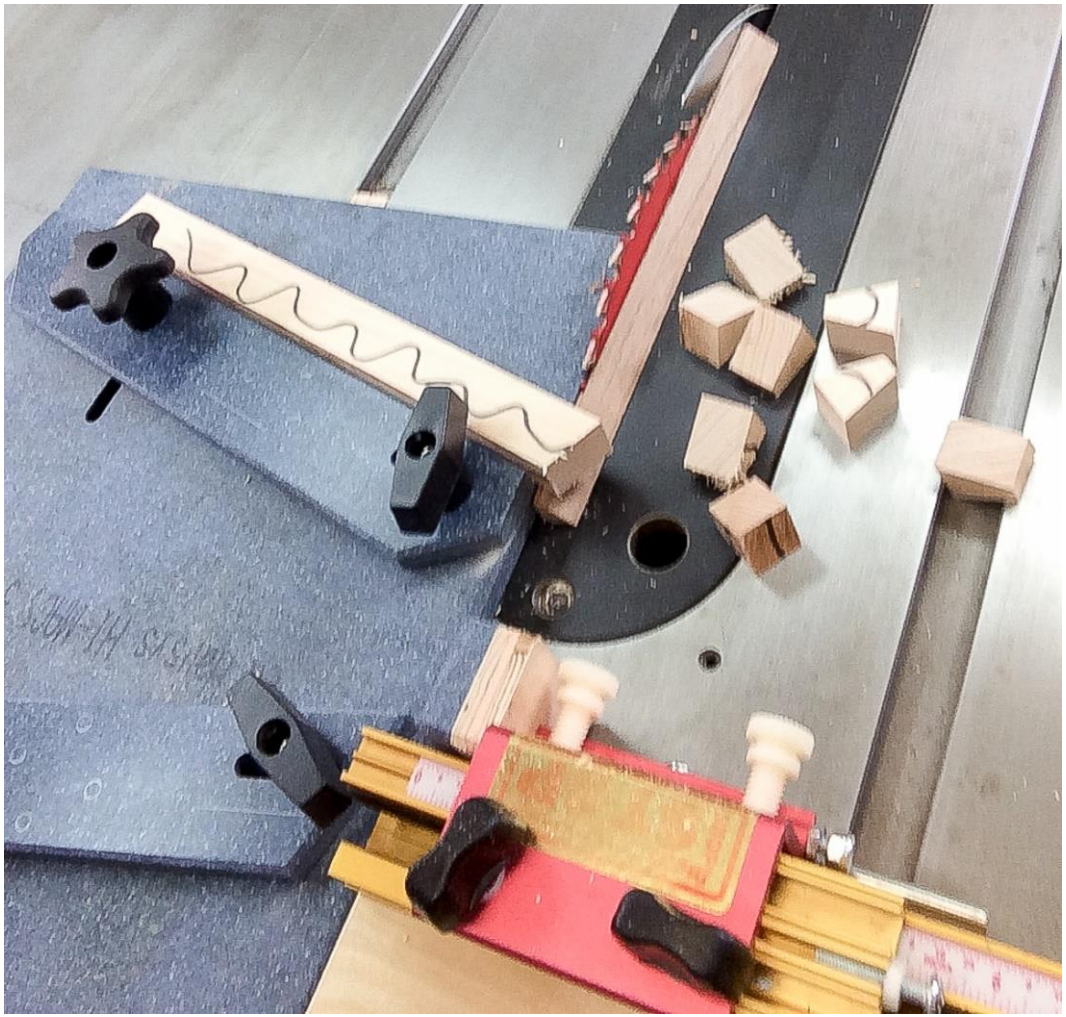




Wedgie Sled

- Accuracy built in with reference wedge and top fence being parallel
- Two adjustable fences
- Set segment angle with calibration wedges
- Quicker and easier to set-up
- Easy to go between different angles
- Faster to use (no flipping)

Wedgie Sled



Using Wedgie Sled

- Mark top (wavy line) and fence (straight line) edges of board.
- Cut first angle Using either fence
- Move without flipping to other fence and slide to length stop for next cut. And repeat.
- Dry fit the first set of segments to check fit, no light between segments.
  - Top side wavy line up and alternating fence straight line mark segments out and in. Saw blade angle cancels.

Clean up Fuzzies

- Remove any rough wood fibers from the edges of the segments.
- A sharp saw blade helps reduce them.
- Don’t disturb gluing surfaces.

What Glue to Use

- I generally use Titebond Original, or 2 or 3 if it needs to be water resistant.
- Medium CA for Corian. Joints have to be perfect!
- Epoxy can be brittle, and fail if the wood moves with humidity.
- Polyeuratheane (Gorilla Glue types) can be good for oily woods, but messy and hard to clean up.

Glue Rings (pairs)

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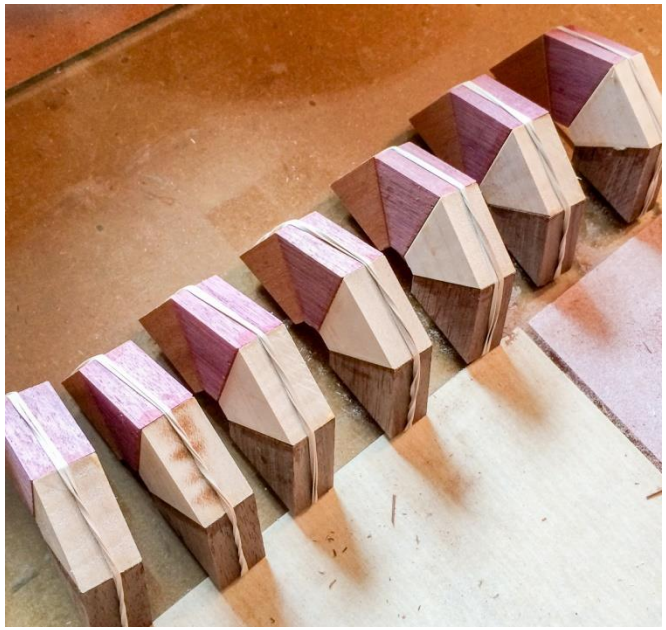

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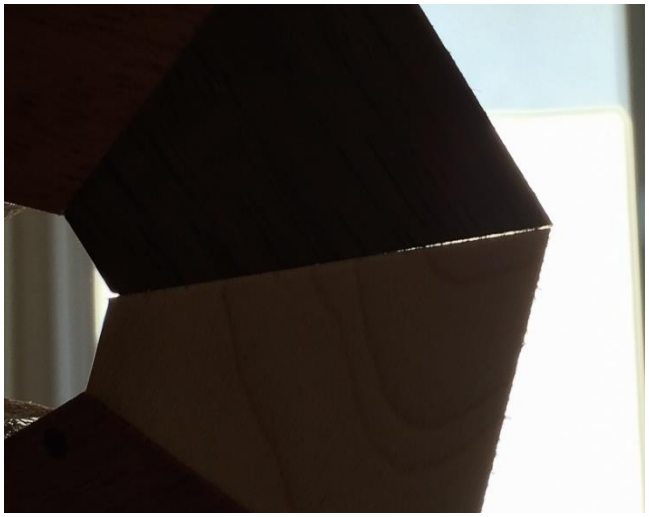
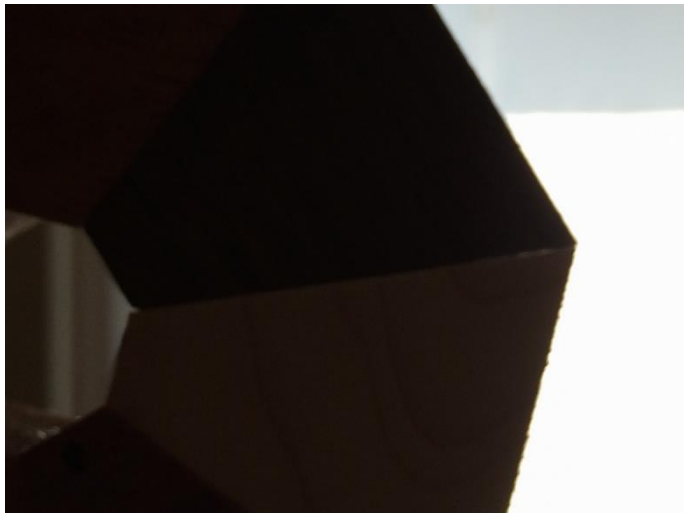
- Sand mating surfaces of ½ rings flat, till no light shows between mated surfaces, and glue.





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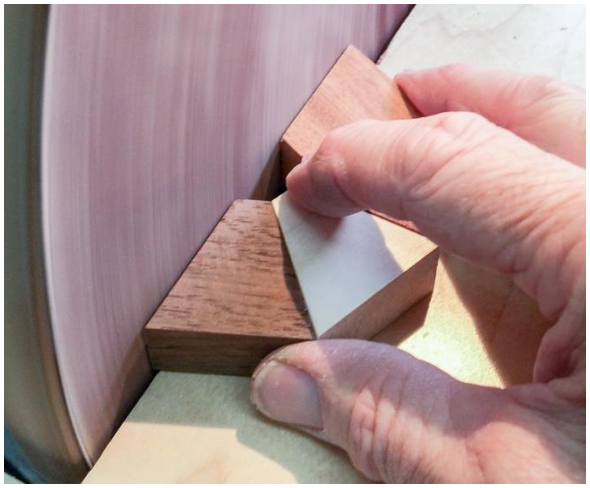
  - Disk sander
  - Sandpaper mounted to flat surface (glass, etc.)



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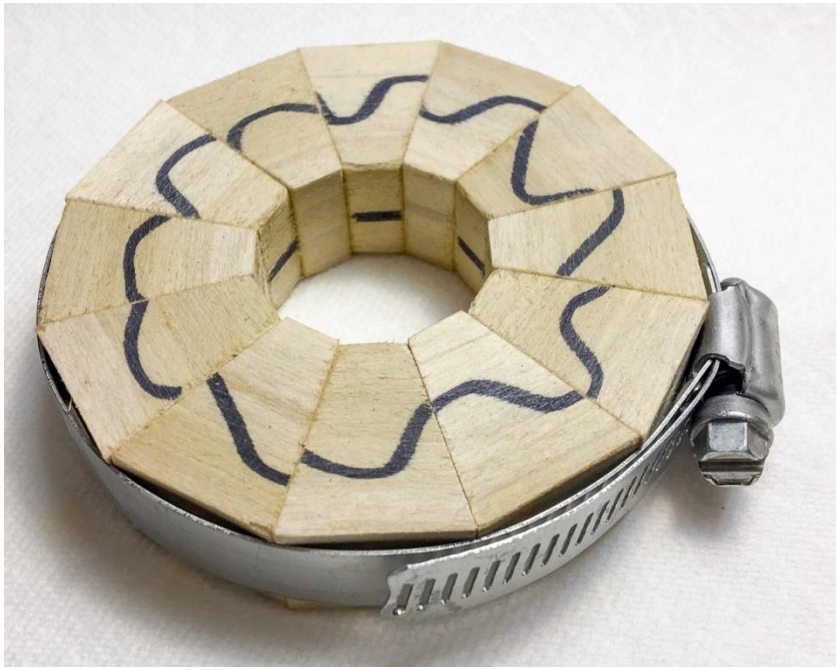
  - Disk sander
  - Sandpaper mounted to flat surface (glass, etc.)
- Almost guarantees perfectly fitting segments.
- Halves almost never fit perfectly without sanding, even with perfect dry fit before gluing.

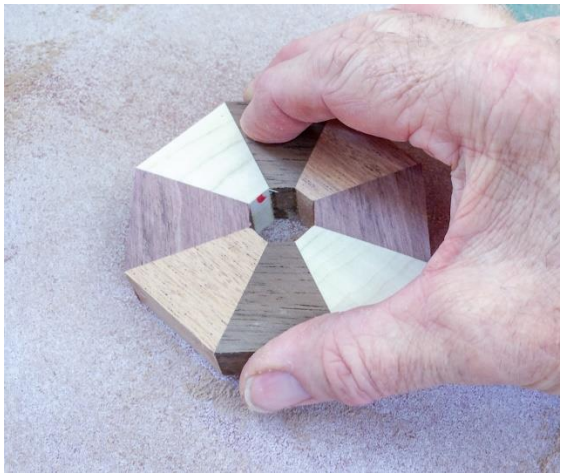
Glue All at Once

- Arrange segments in order & check dry fit.
- Requires more clamping force than one joint at a time.
- Quickly apply glue to each joint and clamp with band clamps.
- Faster overall.



Sand Rings

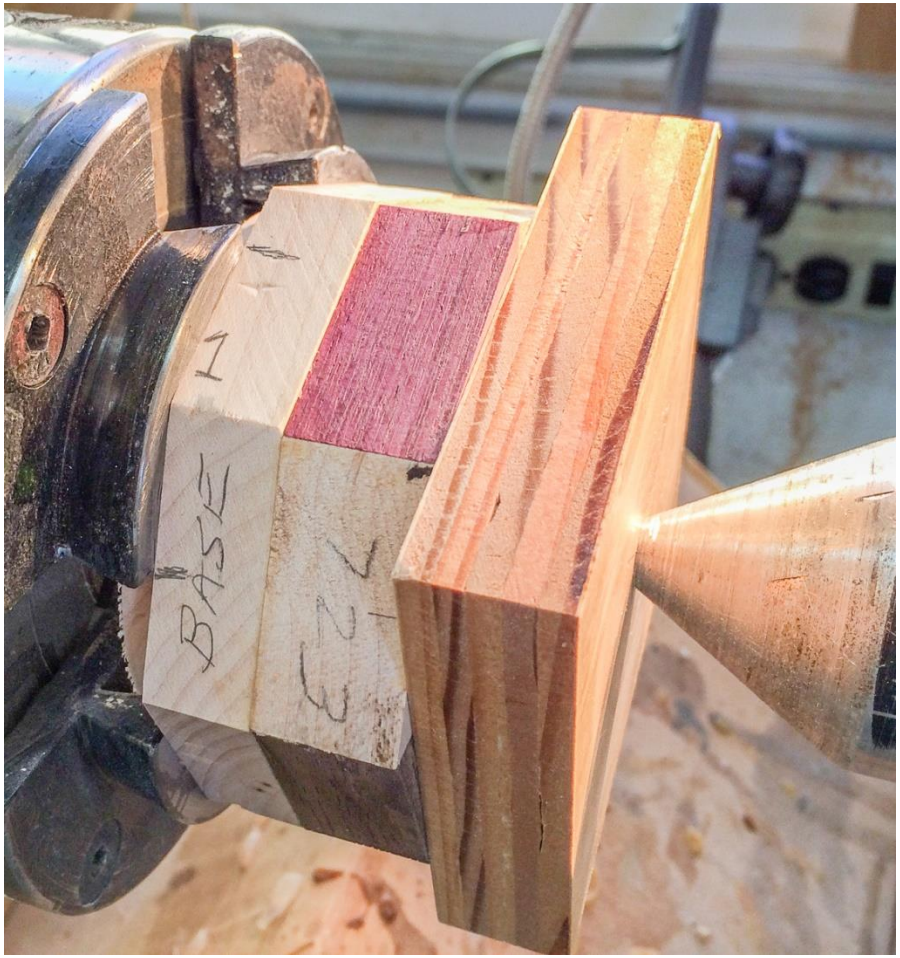
- Sand at least one side of the rings flat (disk sander, drum sander, hand, …).
  - Check flatness by marking with pencil and hand sanding on FLAT surface till all lines gone.



Build turning Blank

- Mount a glue block on a faceplate or chuck.
- True the waste block surface on the lathe.
  - Use a straight edge against the surface, with backlight to confirm.
  - Sand with flat sanding block
- Mount flat ring side to trued surface, centering and clamping with tailstock, or measuring side-to-side.

Glue block & 1st Ring

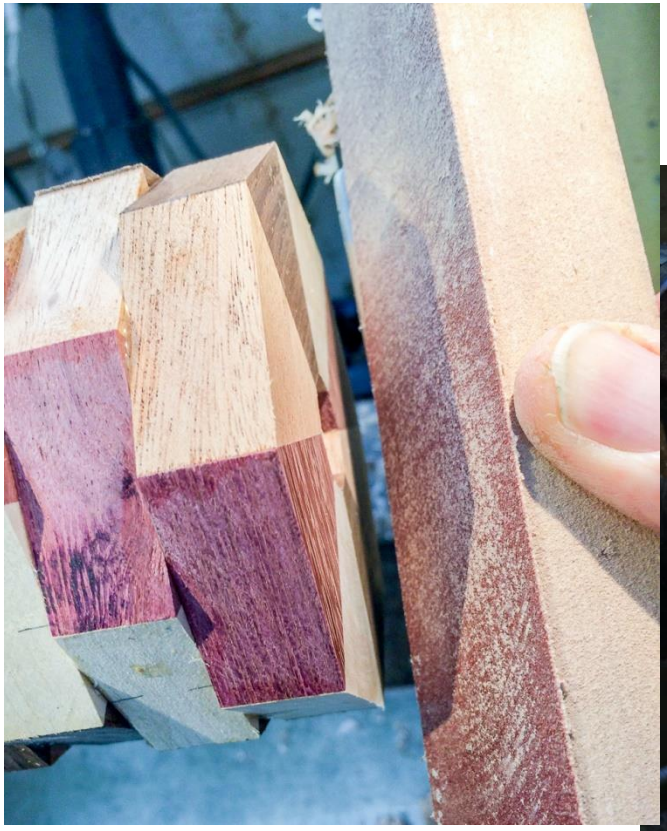


Building Blank, continued

- Gluing, centering and clamping can be done off the lathe if a jig is made.
- Let glue (Titebond Original) dry at least 20 minutes, then true the gluing surface of the ring, just like the glue block.
- Align the flat side of the next ring to the preceding one as the design dictates, and glue together. Alignment marks in center of segment may help. Brick stacking good for strength.
- Repeat, repeat, repeat, …

True Glue Surface

Sand, Glue & Build



Turning

- Turning the inside or outside of previously glued layers is possible as the glue-up proceeds. This can have advantages in the bottom of bowls or making hollow forms (even ½ at a time and gluing together before finish turning).
- Or turn after blank is completed, you have the option you otherwise would not.

Turn

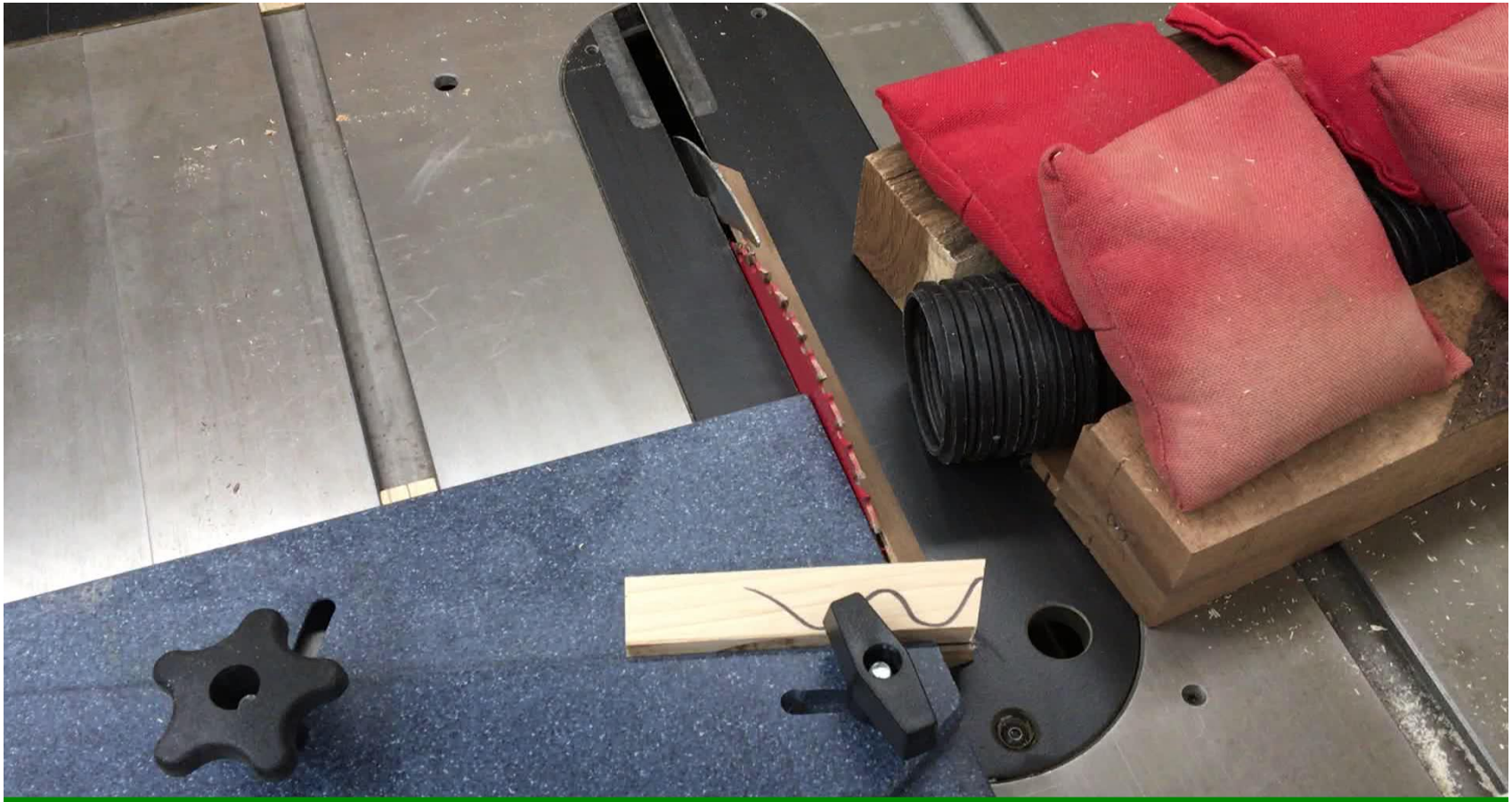
Just an Intro

- This is just an introduction and some methods for making segmented turnings.
- It’s an incredibly less limited turning discipline that is open to your imagination, even if more tedious.
- Have fun, and ask questions of any of the segmented turners in the club, if you have them.

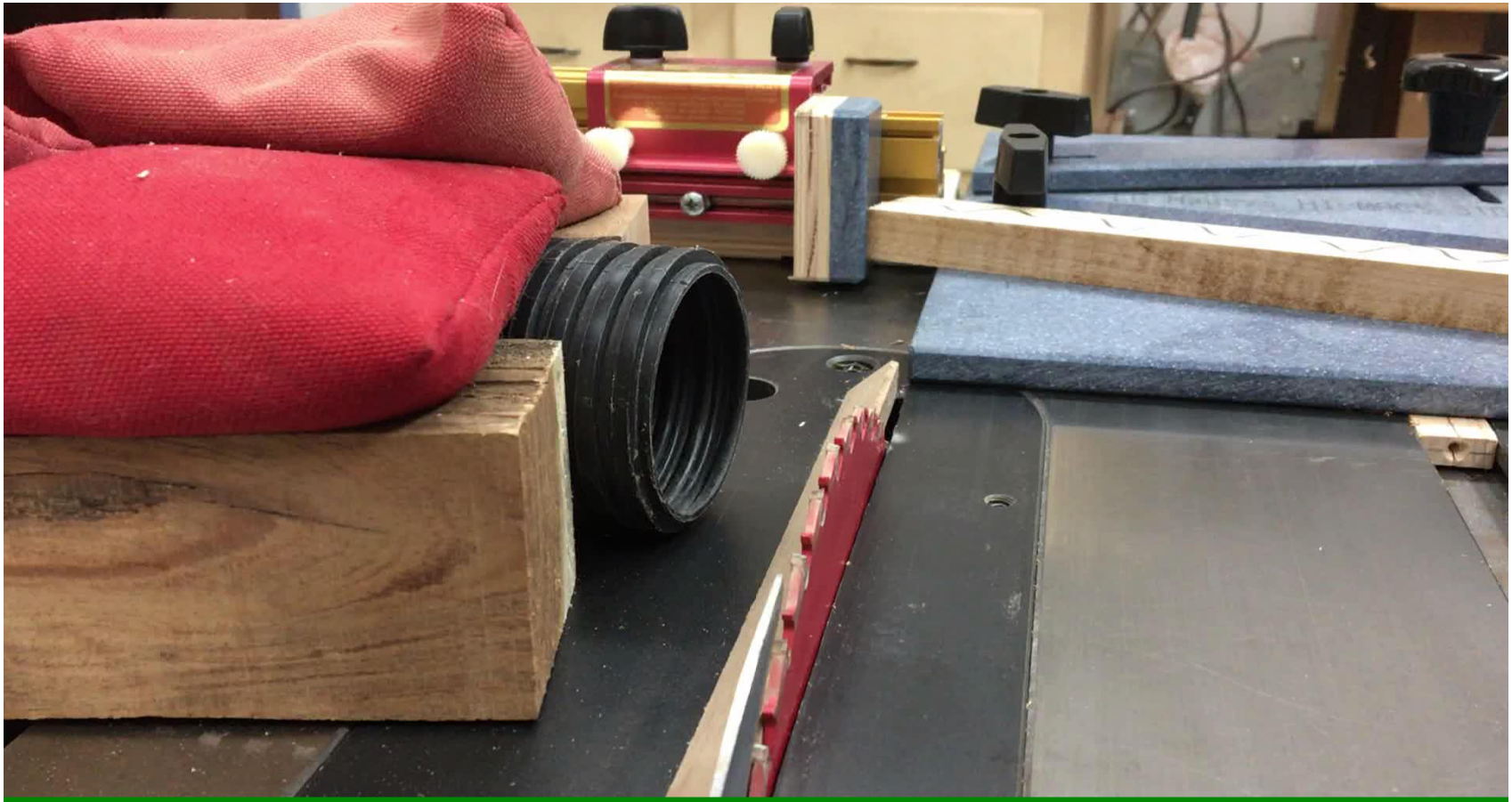
Seg Sucker

- One small step in cutting segments is clearing the pile of segments away from the blade as they accumulate.
- It takes time, interrupting the cutting process, and requires care or a tool to keep pink fleshy parts far away from the spinning blade.
- In similar logic to a dust separator before a dust collector, segments can be safely removed from the blade area and stored in a container as they are cut, with a little dyi assembly.

Seg Sucker



Seg Sucker in Action



References

- The Art of Segmented Wood Turning, A step-by-step Guide, by Malcolm Tibbetts, 2003
- SegEasy Wedgie Sled plans: http://www.segeasy.com/wedgies.htm
- http://woodturnerpro.com/ Lloyd Johnson
- Segmented Wood Turning by William Smith, 2002
- Segmented Woodturners AAW Chapter http://www.segmentedwoodturners.org/
- The Fundamentals of Segmented Wood Turning, by James Rodgers 2016

Segment PRO

- Lloyd Johnson's new software is Segment PRO.
- It's a first or even Beta release, but is a simpler version of Woodturner PRO with some basic assumptions thrown in. It may not have all the flexibility of Woodturner PRO, but probably handles 80% or better of what most of us will want to do. It has some good vessel design shape capability as well. Looks like he showed it at the Segmented Symposium, and is just making it available.
- There are some good tutorials for it that show the capability:
- http://woodturnerpro.com/community/index.php?threads/719/
- http://woodturnerpro.com/community/index.php?threads/779/
- http://woodturnerpro.com/community/index.php?threads/722/
- http://woodturnerpro.com/downloads.htm