Using Staves (Straight and Tilted) in Segmented Woodturning

TURNINGS WITH STAVES

Segmented Turnings – Some Types

- Various types
  - Closed Segments in a ring
  - Open Segments in a ring
  - Straight Staves
  - Tilted Staves (Where we're going with this!)

- Many ways to go about each.
  - Not in this presentation though ☺

Closed Segment Turnings

- Generally rings of segments made of trapezoids
  - Cut to specific length and angles
    - Length of segments and angle of cut must be precise
    - Form a closed ring without voids between segments
  - The Math is in one plane


QUICK-GRIP
MINI BAR CLAMP
QUICK-GRIP
MINI BAR CLAMP
6" 150 mm

Open Segmented Turnings

- Generally rings of segments
  - Cut to affect designer's ideas
    - Form an open ring with voids between Segments
  - Usually mixed with closed rings or staves

Straight Stave Turnings

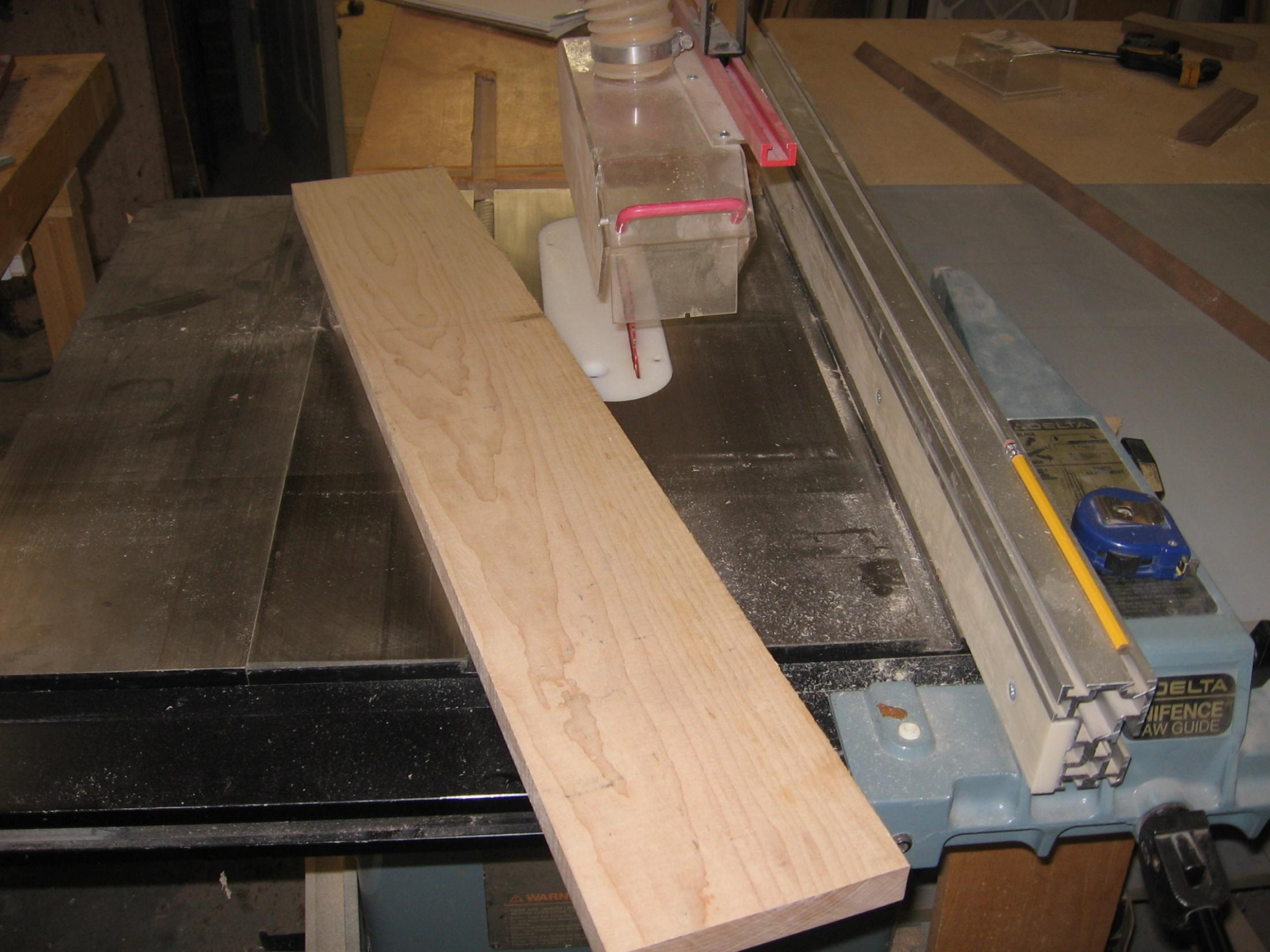
Stave Vessel (Canister)

Construction

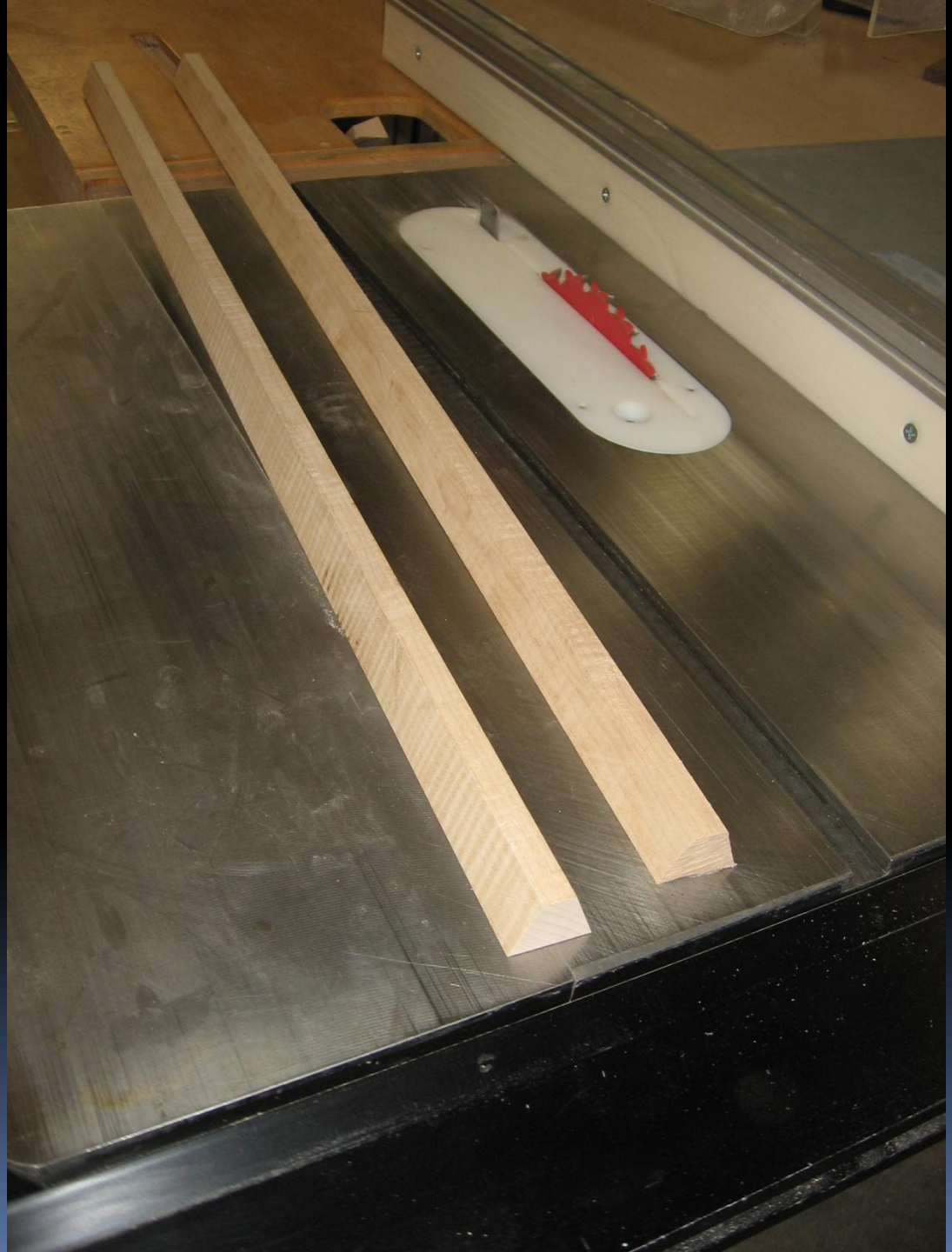
- Made of a ring of staves
  - Staves cut by ripping boards with blade set to bevel both edges
    - Angles and widths must be precise
  - Glued in a ring
    - Fillers may be added to affect desired look
  - Grain runs vertically in this example

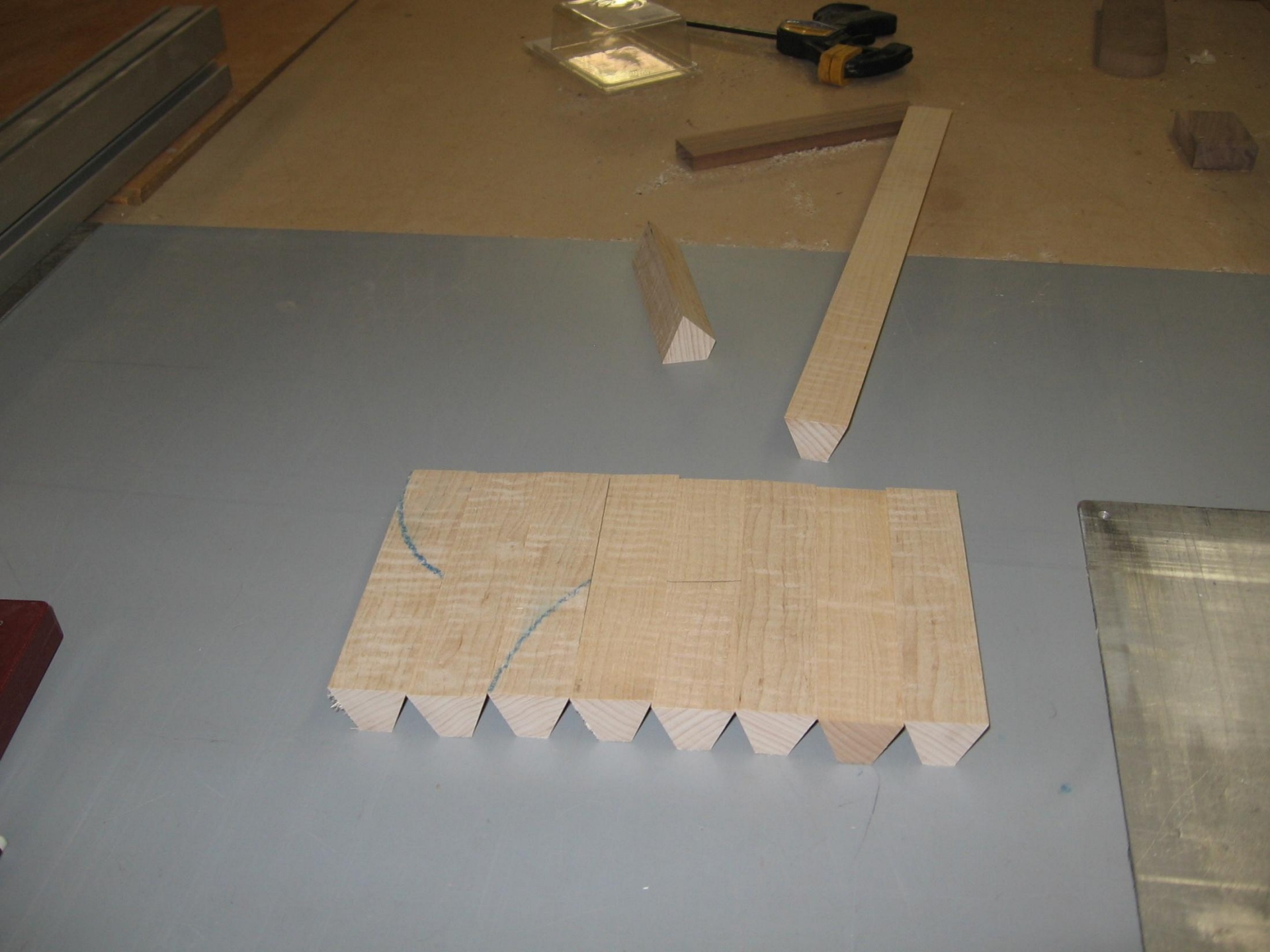
A Picture story

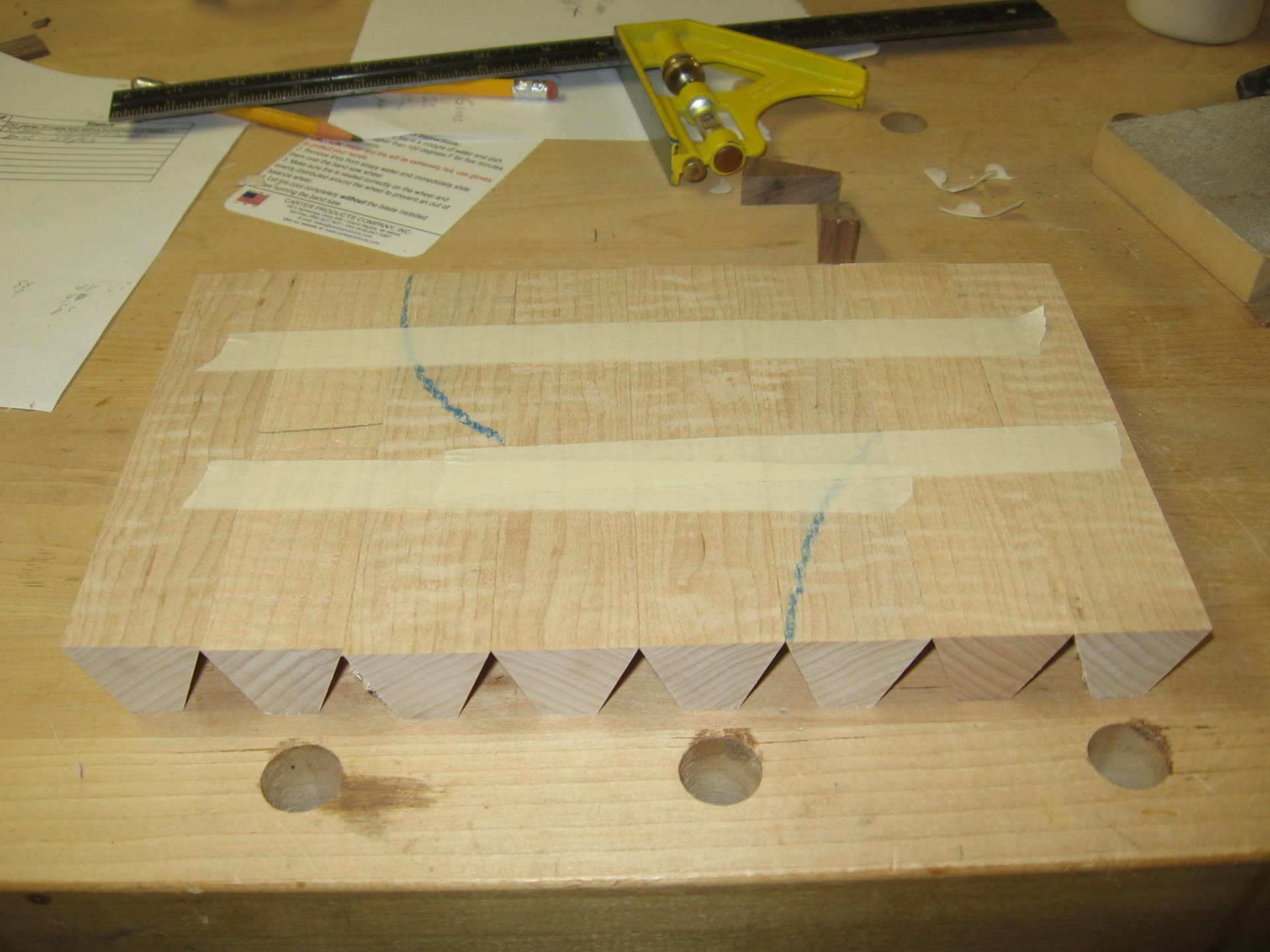
MAKING A STAVE SECTION

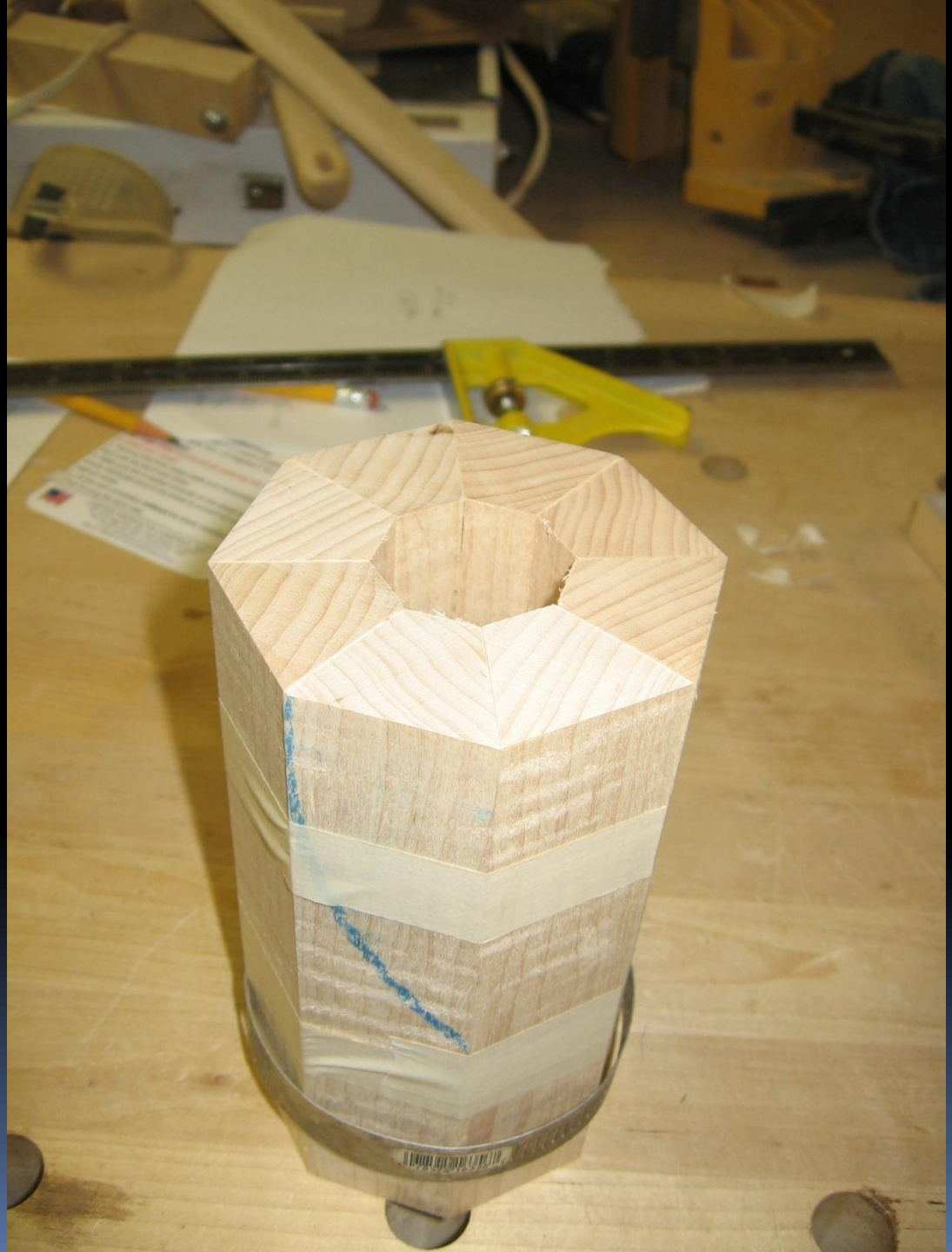

DELTA
IFENCE
AW GUIDE


Wixey DIGITAL ANGLE GAUGE
61.5°
ZERO
ON/OFF










Stave Section

Tilted Staves

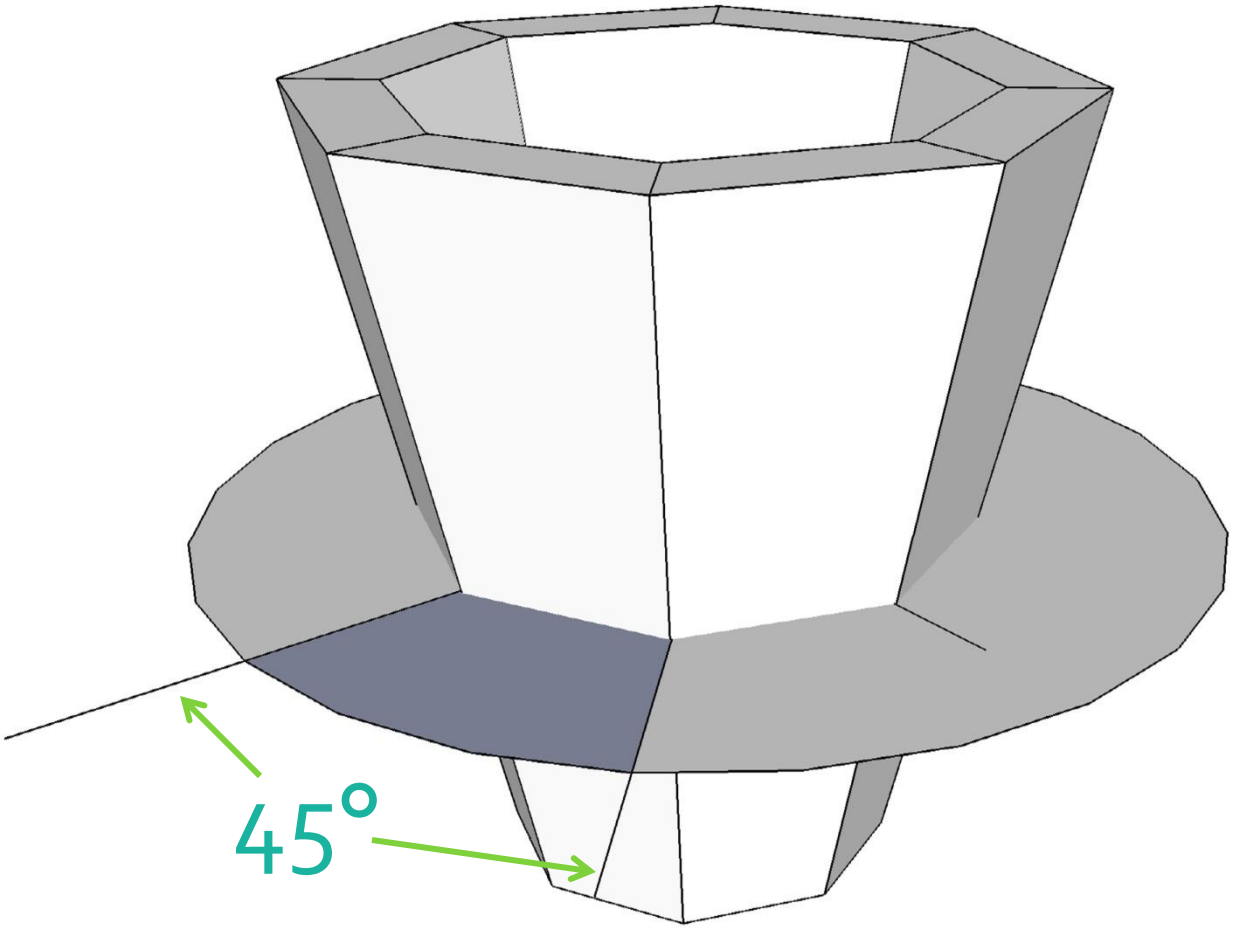
Compound Angle Cuts

- Blade is tilted and miter gauge is angled
  - Precise angles set in both
- Trigonometry in Two planes *
  - The formulae interact
    - If you change the tilt both angles change

Charts available with angle pairs so you don't have to calculate if you don't want to.

Math and Implementation

- Sum of the angles in any plane perpendicular to the axis of rotation anywhere along a stave ring will equal 360°.
-
- But, to accomplish this, the bevel angle and miter angle must be modified to make the ends of the stave different widths.


45°

-
- Thus, an 8 stave construction will be made up of 8 staves each occupying 45° in ***that perpendicular plane***.
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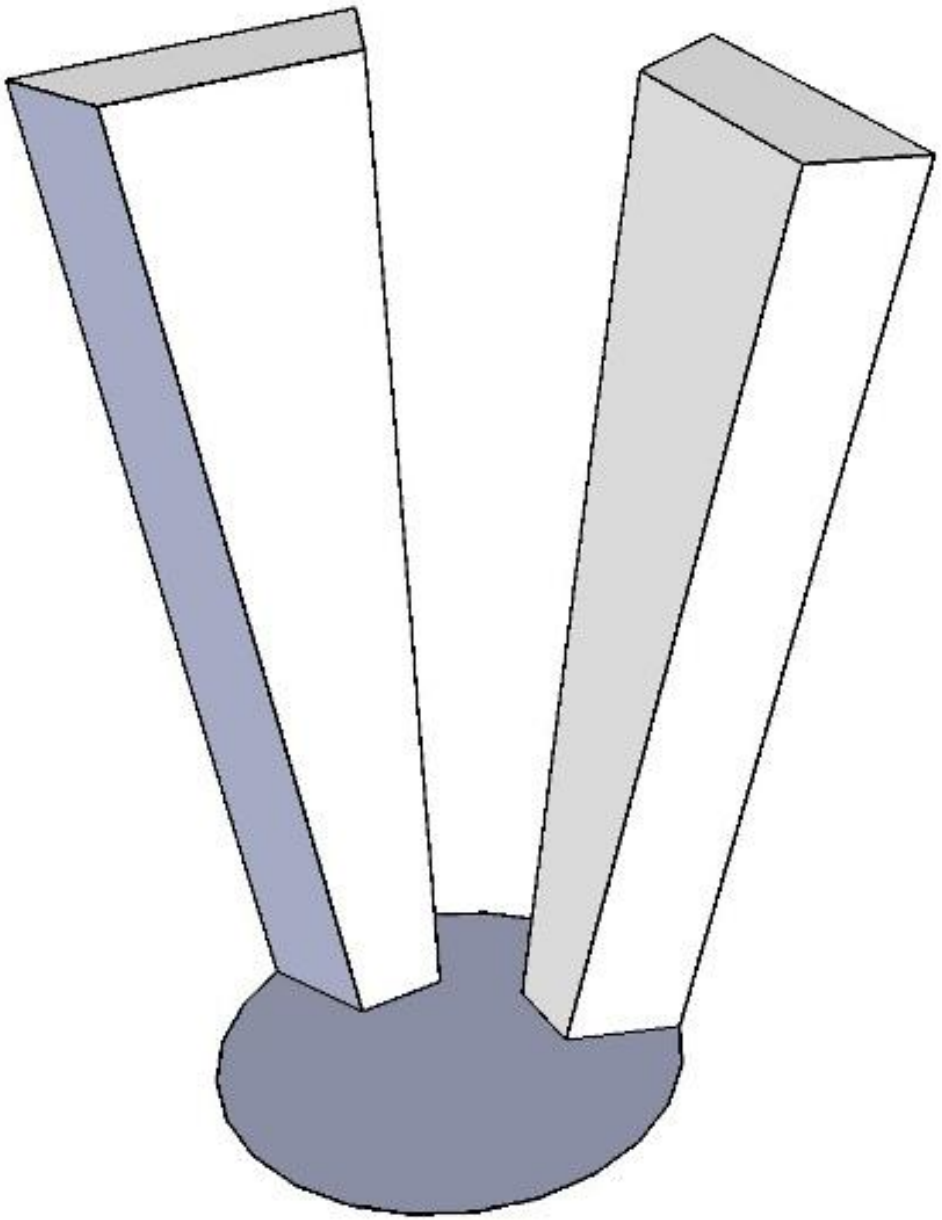
- But, to accomplish this, the bevel angle and miter angle must be modified to make the ends of the stave different widths.




Note: Cutting staves this way results in end grain being on the side of the stave. ==> Weak glue joints.

Hint ☺

- Once set up for a compound cut, make staves for multiple vessels
- Since you flip the board after each cut
  - Adjacent staves off the saw will be from opposite sides of board
  - To get similar faces on adjacent staves take staves from alternate cuts for better figure match
    - i.e., staves 1,3,5,7 . . . For one vessel and stave 2,4,6,8 . . . For a second vessel

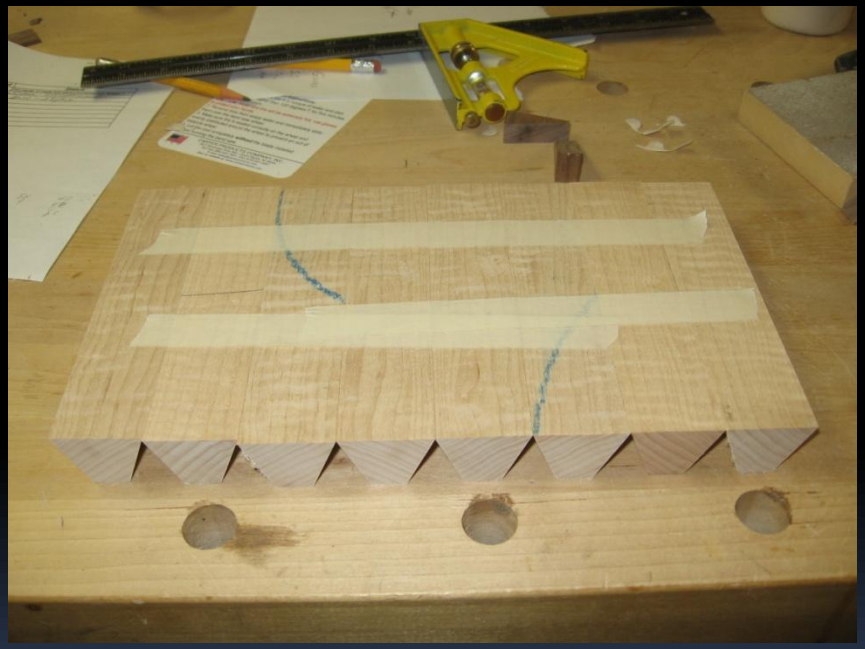
Side grain staves

- End grain joints between staves
  - Just like segments in a ring
  - Weak glue joints between staves
- Adding segment rings adds needed strength
  - The ends of each stave will be side grain
  - Good glue joints between sections.

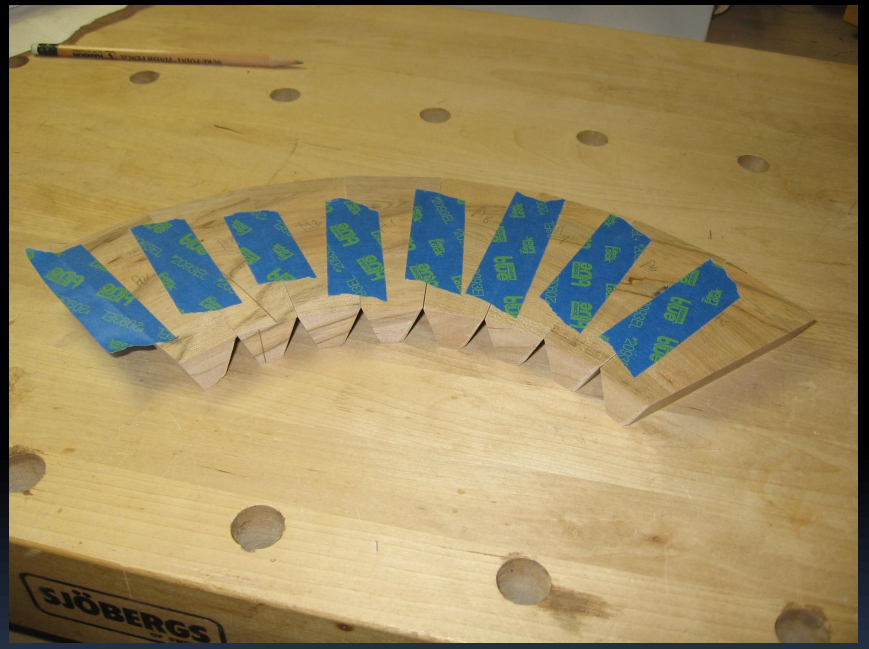

SJÖBERGS

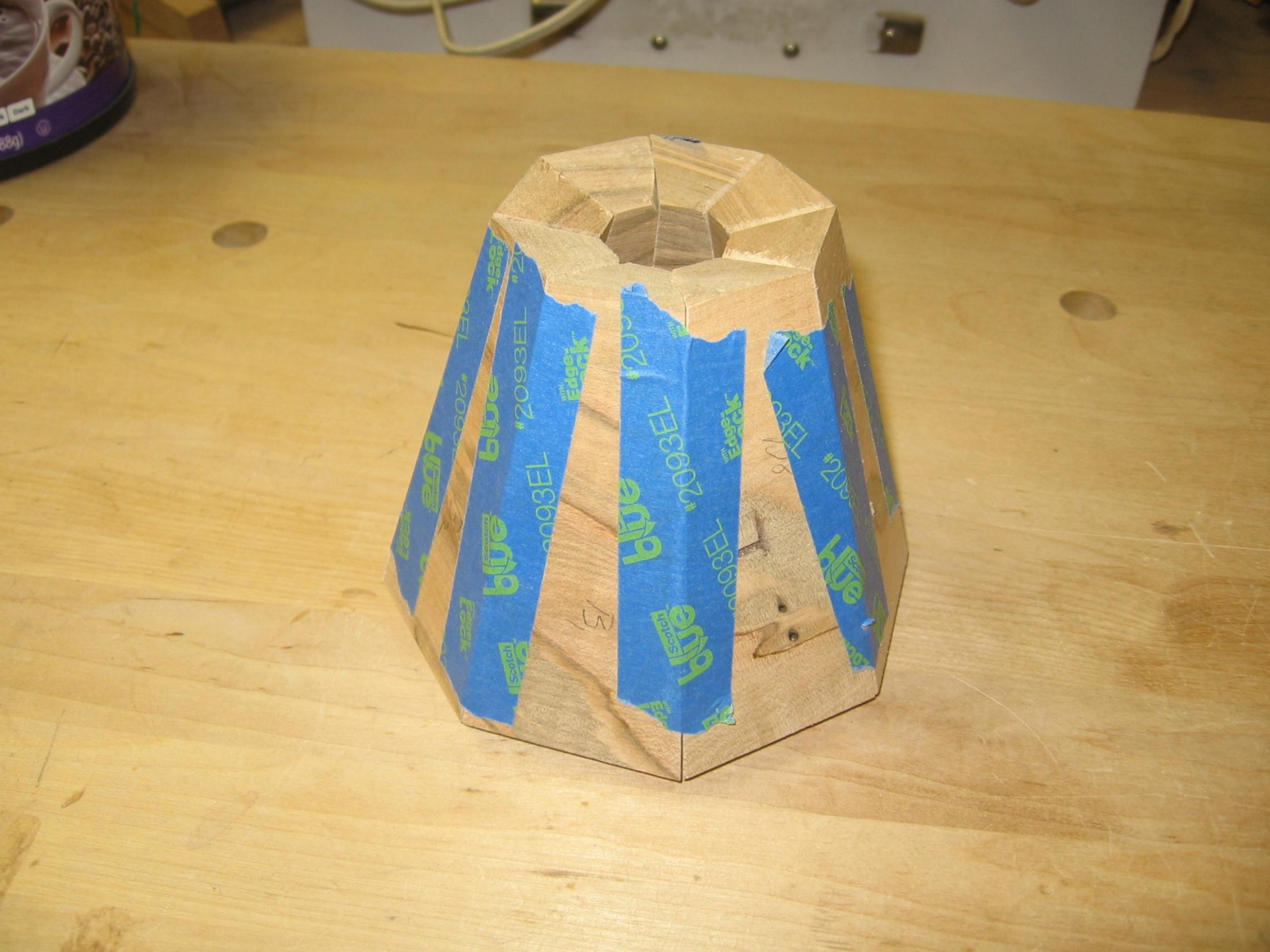
The Difference !!

Straight Staves



Tilted Staves




Scotch
blue
#2093EL
with Edge Lock


QUICK-GRIP
MINI BAR CLAMP
From the makers of VISE-GRIP Tools
6"/150 mm
QUICK-GRIP
MINI BAR CLAMP
From the makers of VISE-GRIP Tools

Tilted Stave Vessel

Staves and Segments

Mixed construction

- Natural combination
  - Wood Movement
  - Grain Alignment

Tilted Staves and Segments

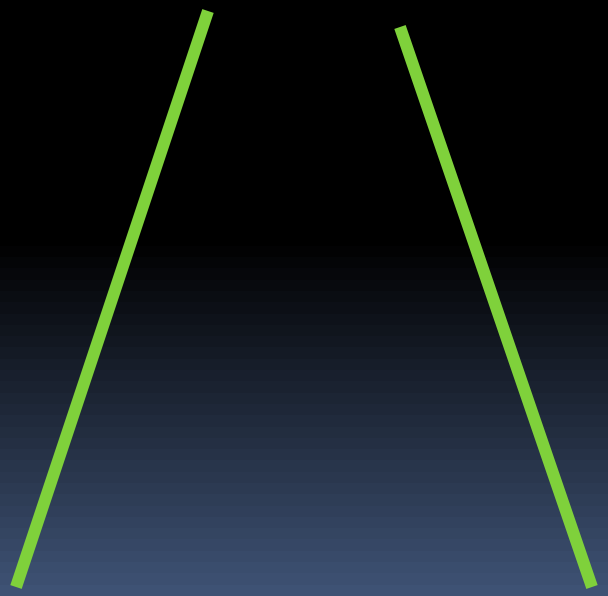
Staves/Staves – and Segments

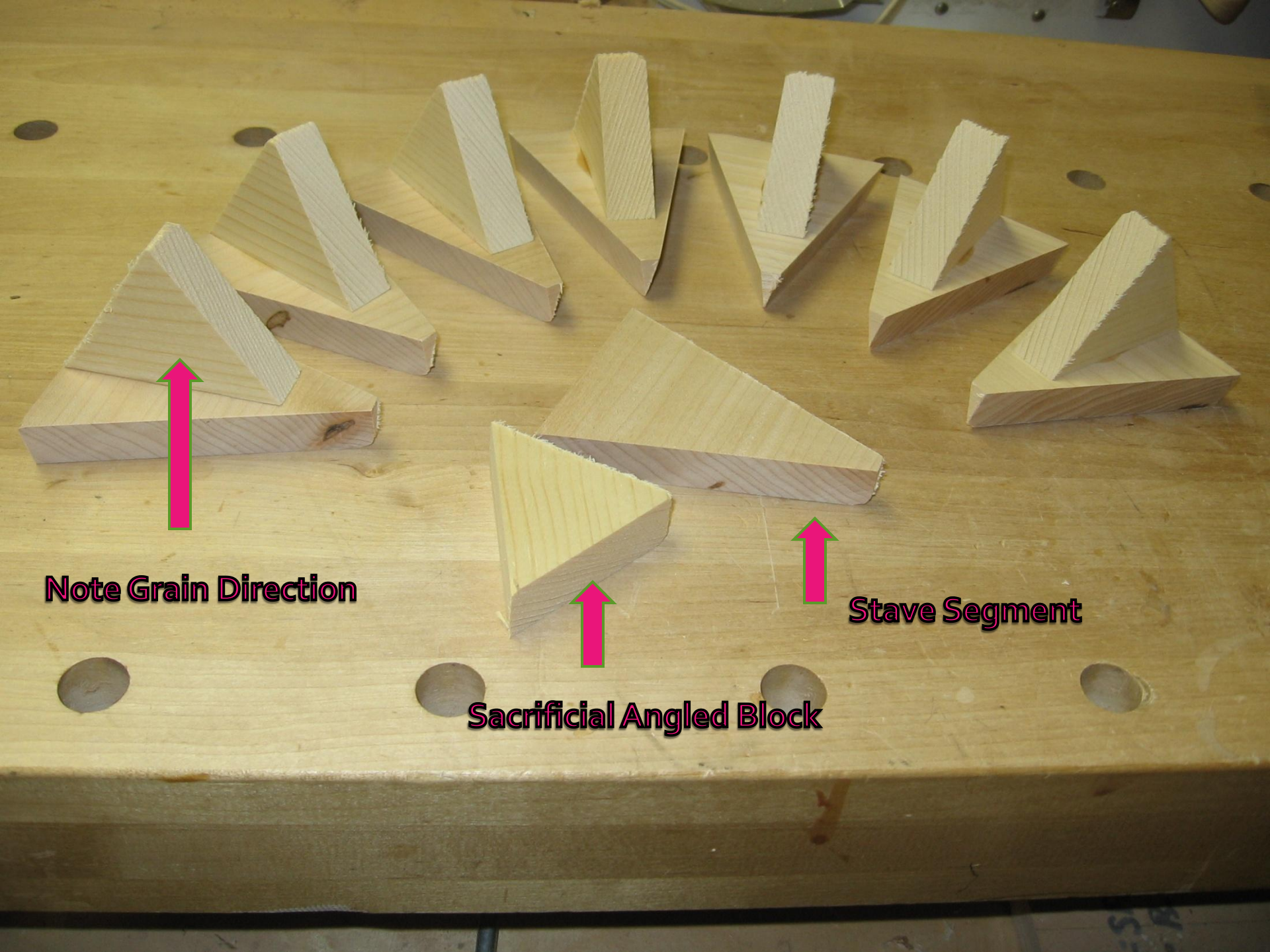
Staves and Segments

Tilt Angle Issues

More Vertical

More Horizontal

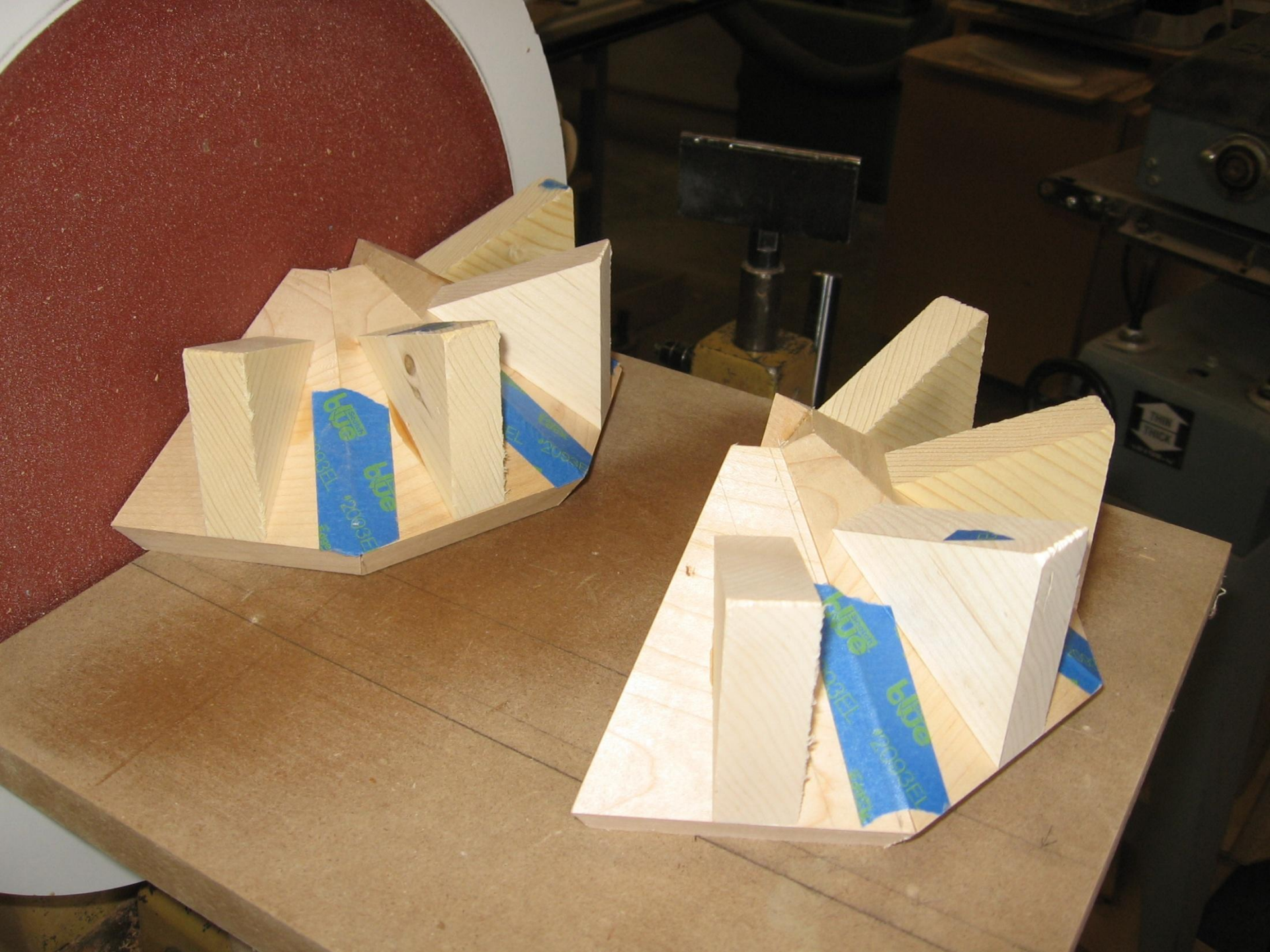



Note Grain Direction
Sacrificial Angled Block
Stave Segment

Hint! ☺

- Consider half section glue ups for shallow angle stave construction.
  - Difficult to glue and hold whole
  - Difficult to get good segment closure


First Clamping is dry fit
Second Clamping is glue up in halves



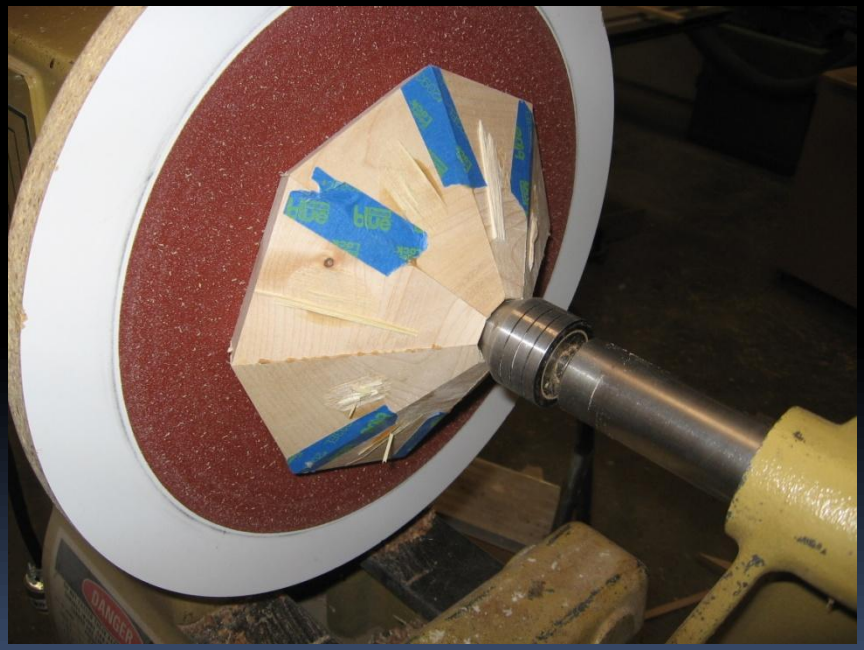
Sanding Disk for Lathe

Note that table is below center , square, and parallel to ways so that edges of segments are easier to control and square when sanded. Low speed works best.

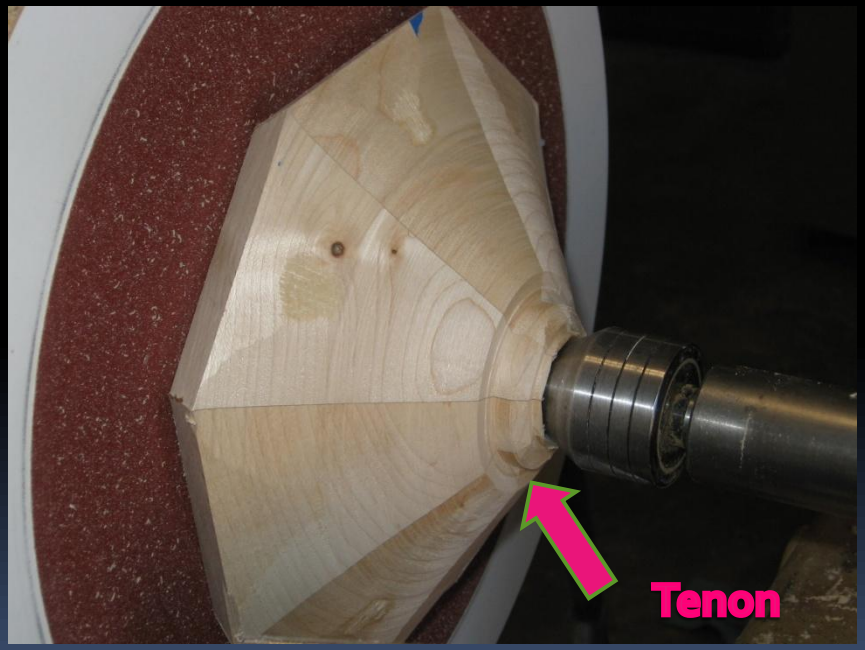

Third Clamping glues halves together

Prepare the Stave Section

Knock off blocks



Turn a tenon at small end



Mount small end

Turn Outside & Mating Face


Vessel with Flat Stave Section

Flat Stave Vessel

- Remember that glue joints are on side grain
  - Not a strong glue joint
  - Joint only secure after attached to segment rings

Consider using Staves in Segmented Vessels

- Advantages
  - Attractive alternatives
  - Less lumber
  - Less cutting and gluing
- Drawbacks
  - Math a little more difficult
  - Setups a bit more challenging

By the Way

Check out your finish by turning off your flash and look for the highlights.