Bowl From a Board

Presented to Detroit Area Woodturners

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Stacked Ring Bowl Basics

- Earliest form of segmented woodturning
- Rings are cut out of a single board
- Objects can be from one board or many.
  - Rings from different boards can be exchanged
- Circular cuts are made at an angle
- The angle allows for one ring to be stacked on another ring

Machinery Used To Cut Rings

Ring Master developed by Porta-Nails

Bandsaw

Scroll Saw

Lathe

Setting Up to Cut the Rings

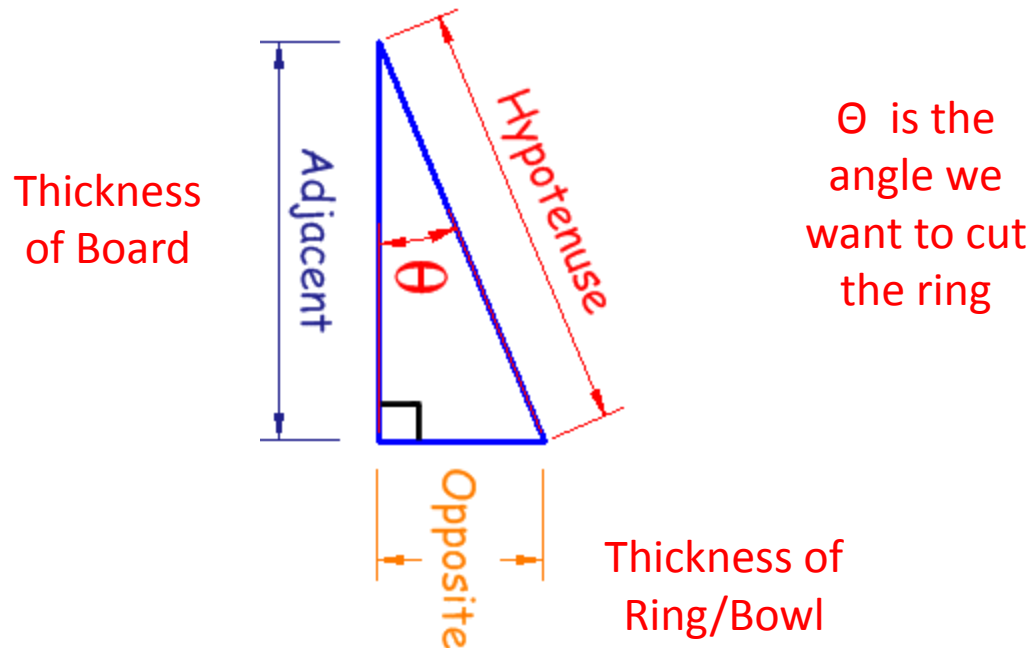- The ANGLE of the cut is the Most Important

Rings cut with improper angle set

Determining the Angle

- It is back to High School and . . .

•Triganometry

Remember
SOH CAH TOA

- SOH **Sine**=**O**pposite / **H**ypotenuse
- CAH **Cosine**=**A**djacent / **H**ypotenuse
- TOA **Tangent**= **O**pposite / **A**djacent

Thickness of Board

Adjacent

Hypotenuse

Θ

Opposite

Θ is the angle we want to cut the ring

Thickness of Ring/Bowl

What do we know?

- We are working with a Right Triangle
- We know the thickness of the wood (Adjacent Side)
- The **Opposite** side is the desired **width** of the ring/bowl
  - This is also the ring-to-ring overlap

Formula

- Tan Θ = Opposite ÷ Adjacent
- Adjacent is equal to the wood thickness
- Opposite is the chosen ring/bowl thickness

Using the Tangent Function

For a board that is ¾ of an inch thick (adjacent)

And a desired ring thickness of ½ inch (opposite)

Tan Θ=

Opsposite divided by Adjacent ~~length~~

Tan Θ = .5 ÷ .75 = .6666

Calculating Tan Θ

- At this point, you either need to find an old Tangent table or a scientific calculator/smart phone.

- Tan Θ = .6666
  - Solving for Θ

- Θ = $\tan^{-1}$ (.6666) – called Inverse Tangent or Arc Tangent

- Using a Scientific Calculator in Degrees Mode

$$\Theta = 33.69°$$

Other Examples

Tan Θ = Ring Thickness/Board Thickness

- If the board was ½" thick with 3/8" ring
- Θ = $\tan^{-1}$ (.375 ÷ .5) = $\tan^{-1}$ (.75) = 36.8°
- If the board was 3/4" thick with 3/4" ring
- Θ = $\tan^{-1}$ (. 75 ÷ .75) = $\tan^{-1}$ (1) = 45°

Help Available

- You can search for the Tangent tables
  - http://www.mathwarehouse.com/trigonometry/sine-cosine-tangent-chart.php
  - http://www.mathsisfun.com/algebra/trig-finding-side-right-triangle.html

Or this website has an interactive calculator For Inverse Tangent calculations

- http://www.rapidtables.com/calc/math/Tan_Calculator.htm

Using the ShopSmith Ring Master
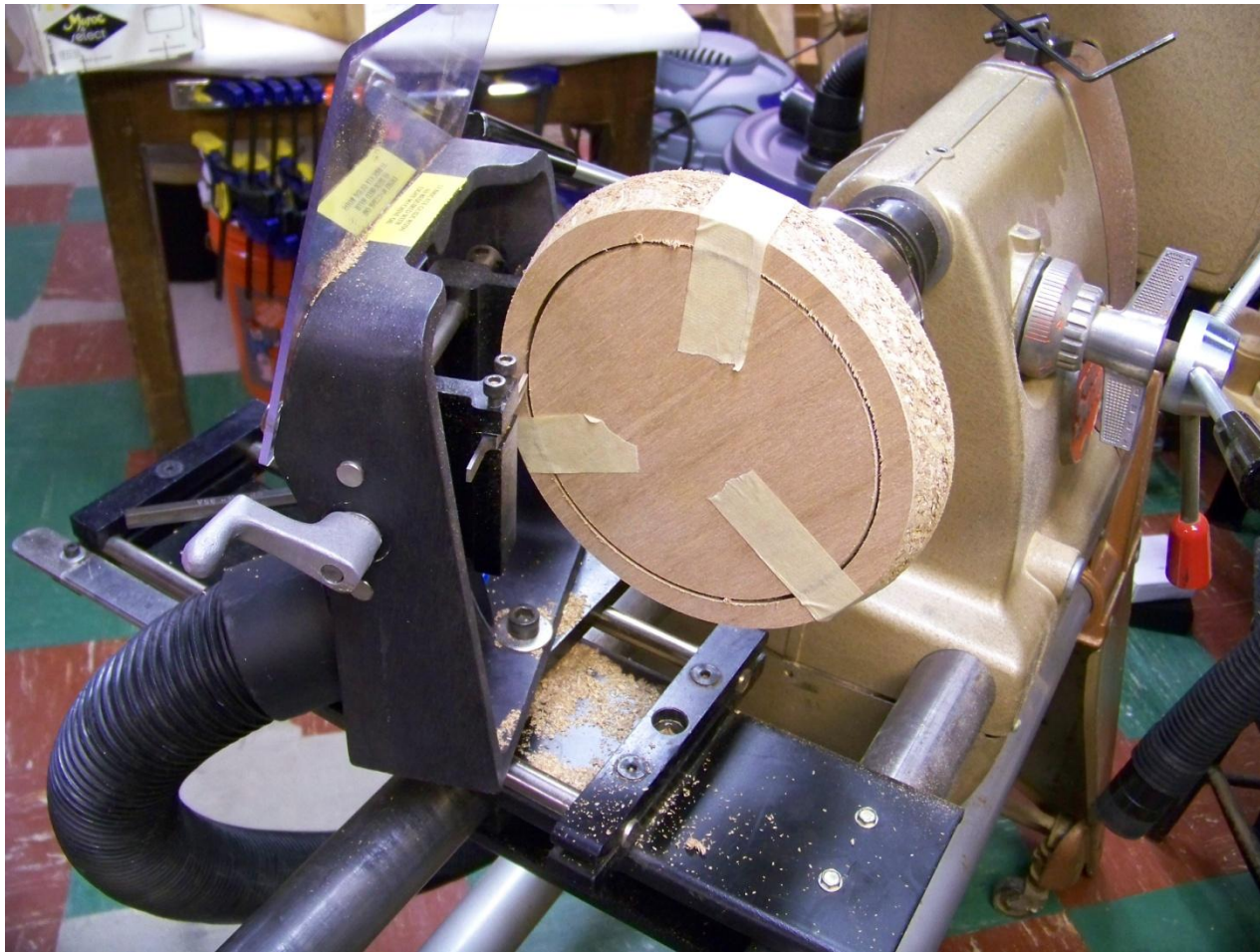
Using the Ring Master

- The Ring Master is easy and quick
- Not easily available and expensive
- Easy to operate
- Can easily make duplicate rings
- Videos available on-line and YouTube
- Tool must be aligned correctly with the board
- Cut front side first, then start the back side, stop the machine, and tape the ring so it will not be damaged when cut free
- There is a link on our website to an Angle Calculator Developed by ShopSmith. This could also be used for the other methods. (under How To Tab)

Cutting from both sides

Setting Ring Width - Ruler
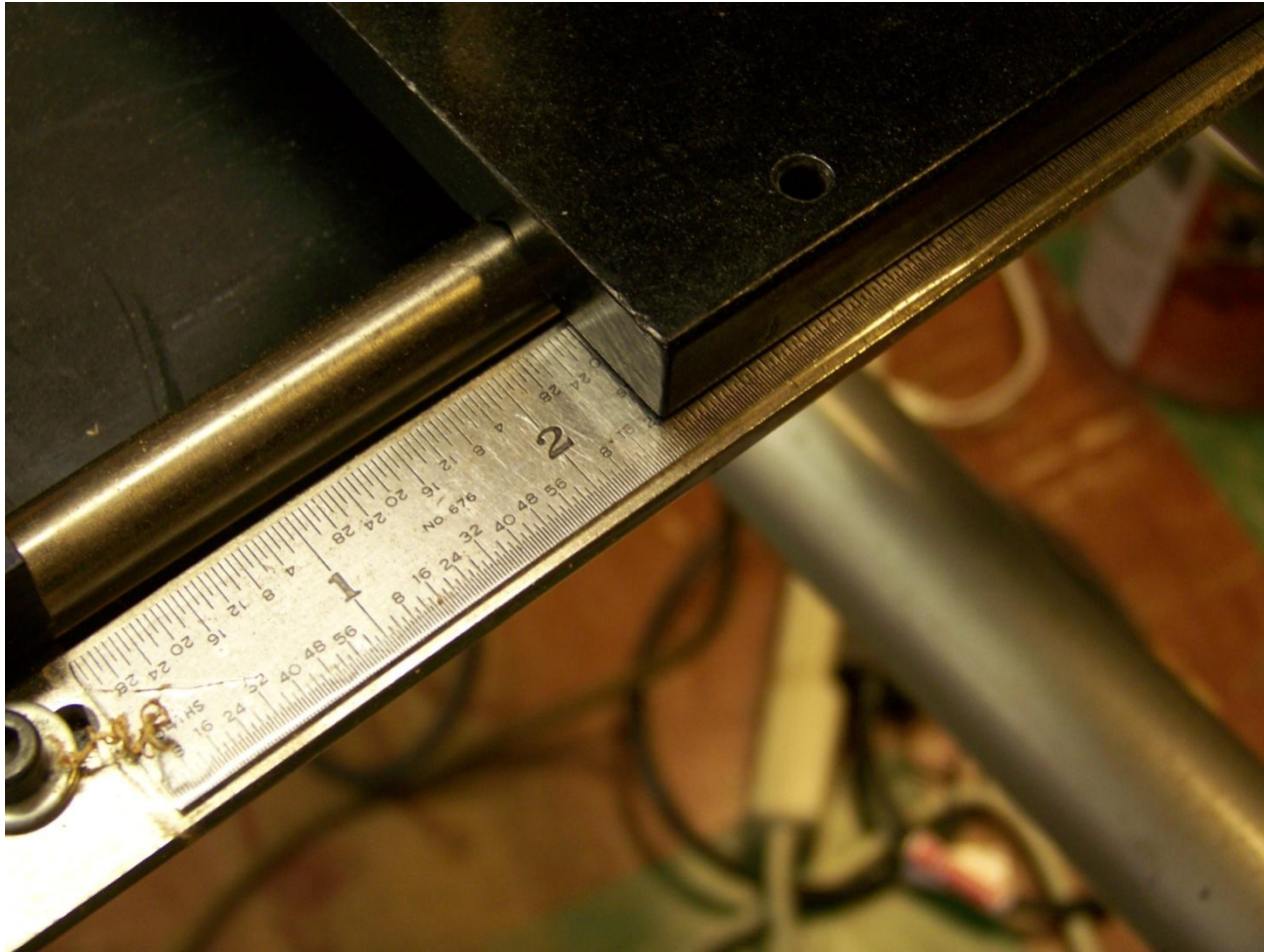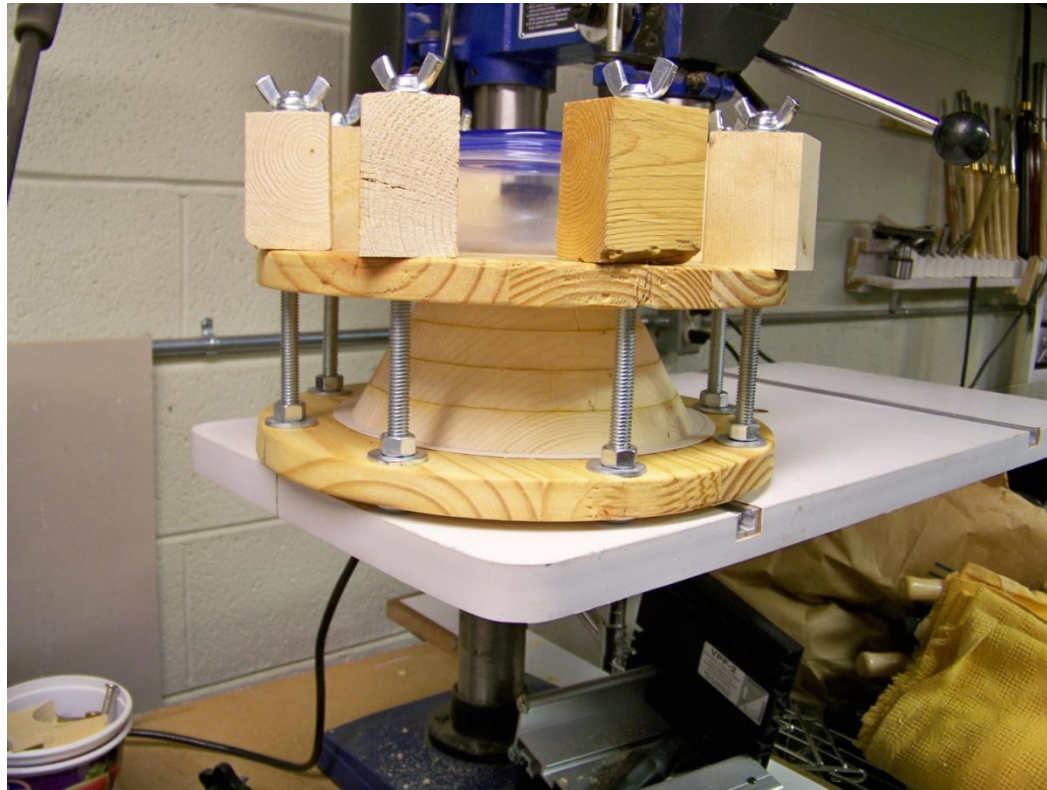
Problem with alignment
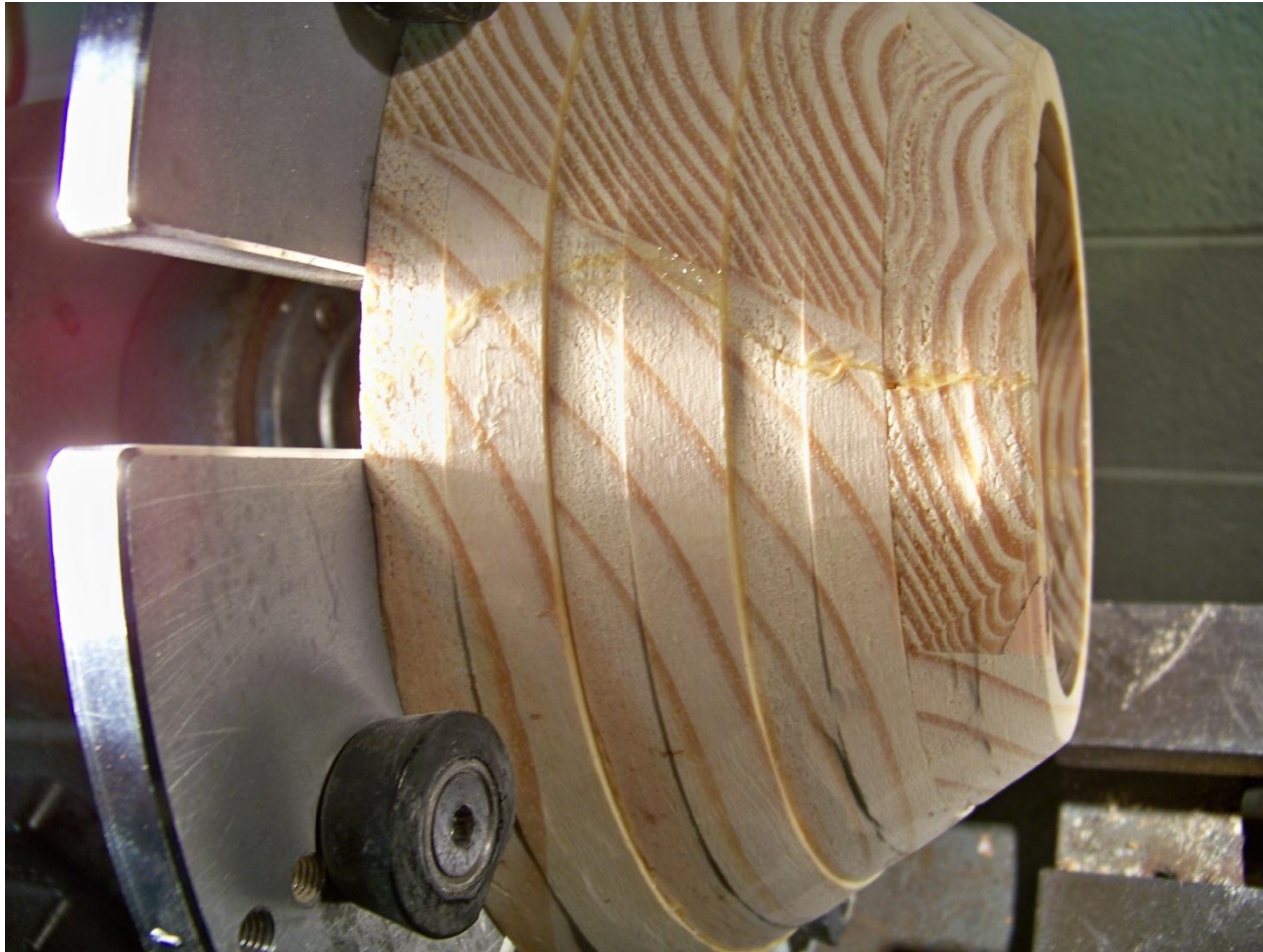
Not an angle problem

- This is what happens if the Ring Master cutting blades do not cut in exactly the same plane. They must be adjusted carefully

- Like the failure to cut at the correct angle, they can be fixed by sanding aggressively or turning on a lathe
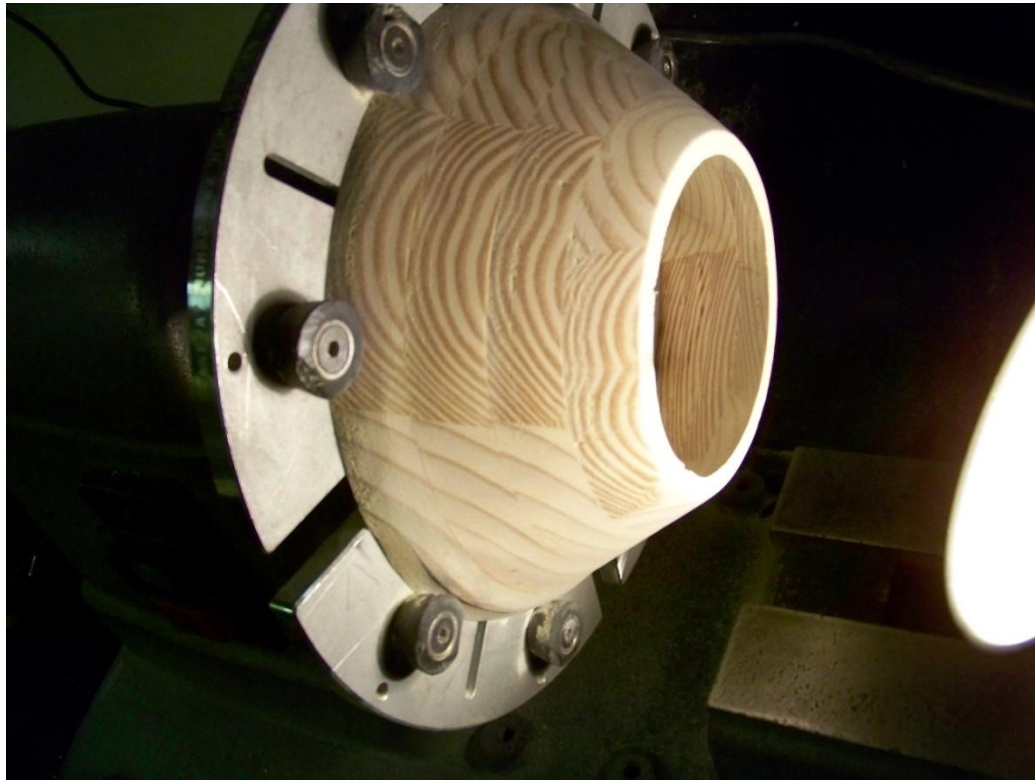
Jig for Gluing Rings Evenly
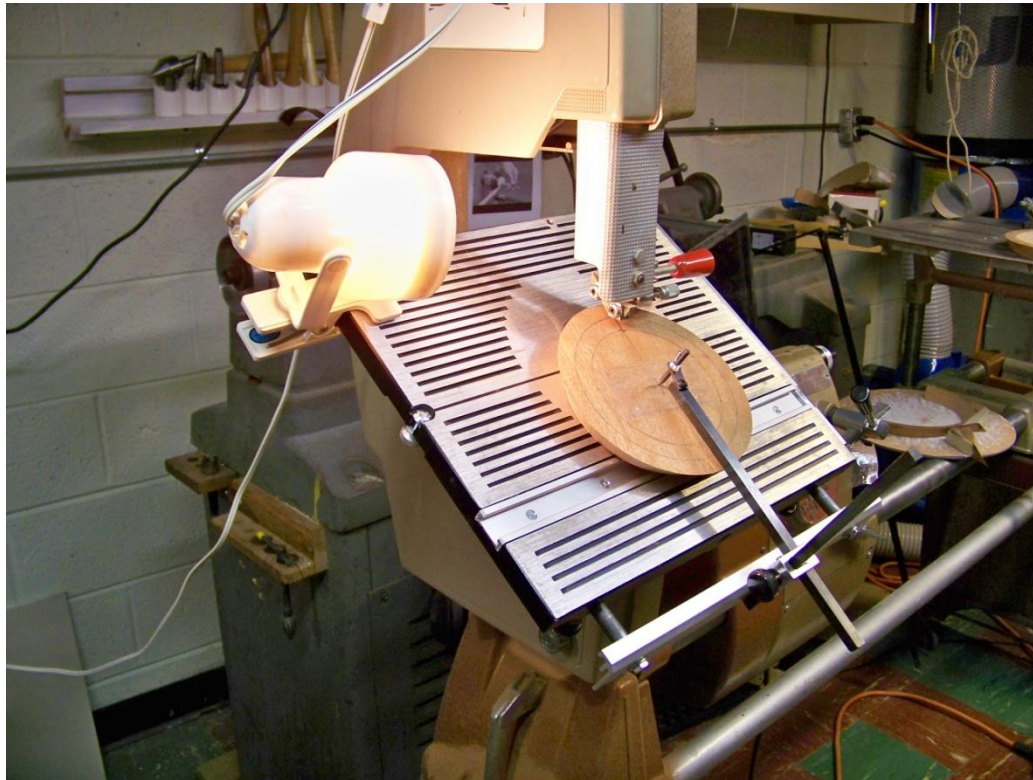from Wooden Bowls from the Scroll Saw
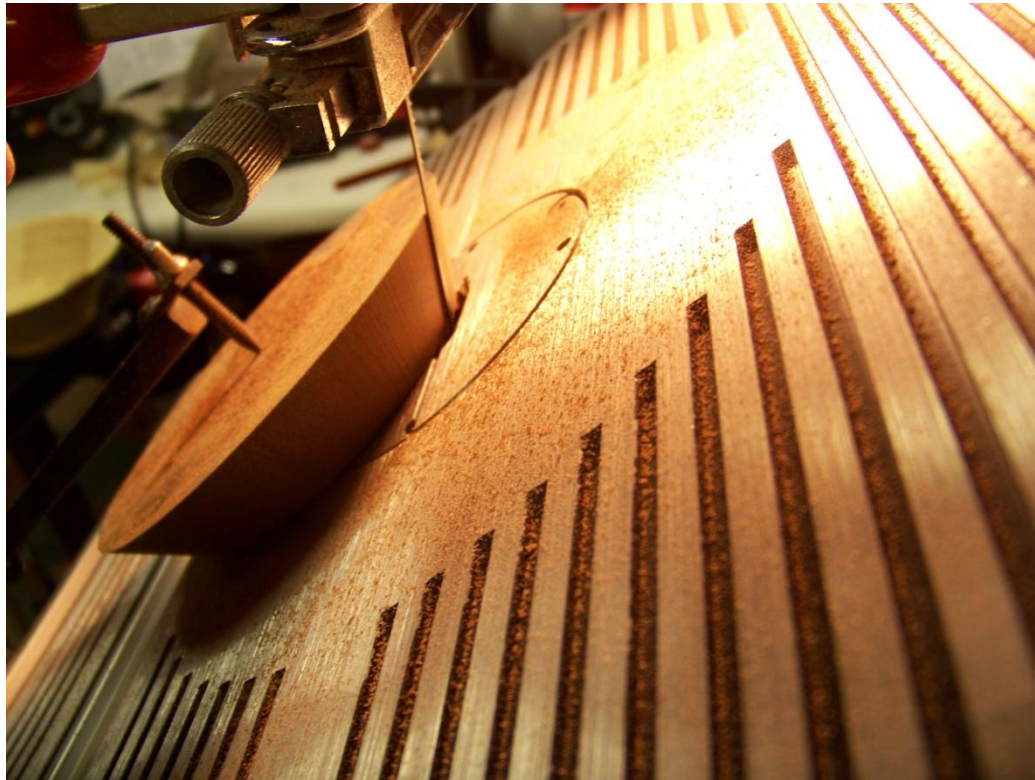by Carole Rothman

Sanding the Bowl

Partially Sanded

Using the Bandsaw with Circle Cutting Jig *(Centering Pin)*

Bandsaw with Circle Cutting Jig
(Centering Pin)

Method for Bandsaw with Circle Cutting Jig

- Rings are laid out on top of board

- Board is cut in half

- Blade starter slots are cut in one half

- Halves are taped back together for cutting
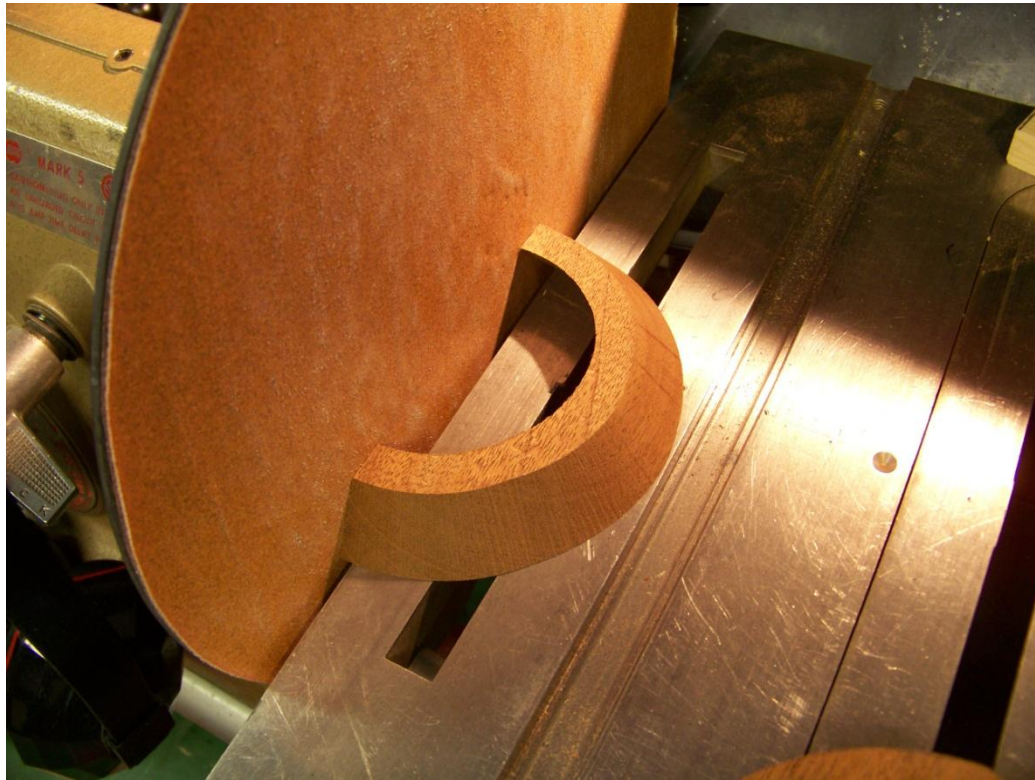 - Packing Tape helps lubricates the saw blade.

TAPE

Starter Slots
for Bandsaw
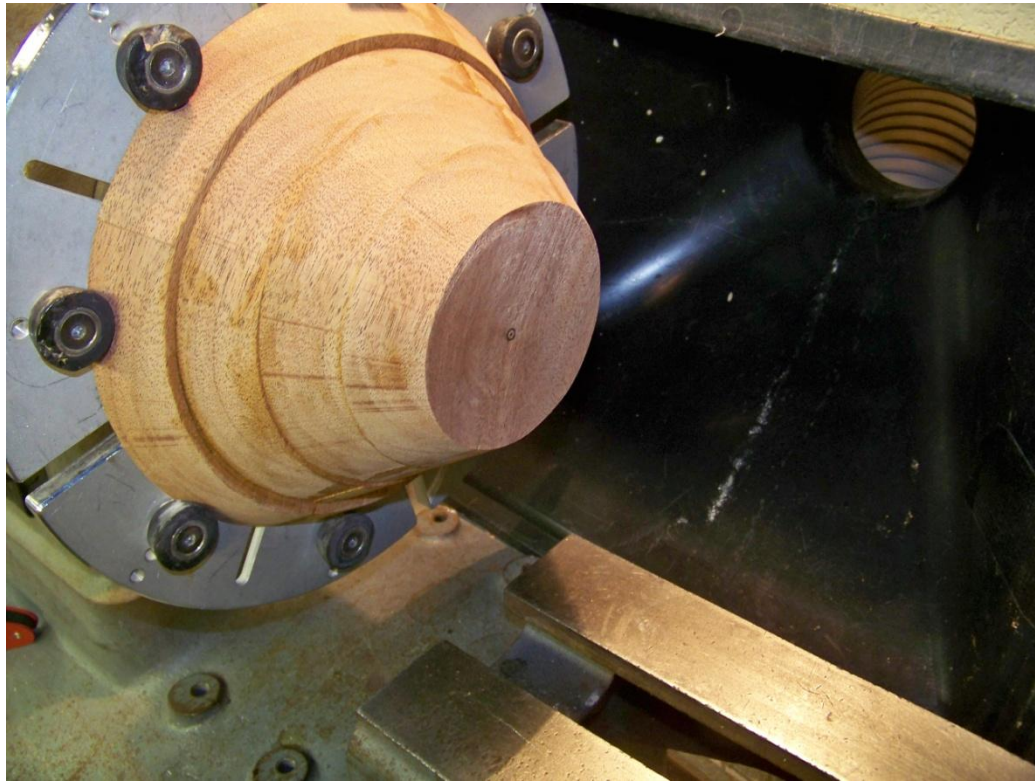Blade

The Result before Gluing

Preparing Rings for Gluing

Mahogany Bowl from a board

Preparing the bowl for turning

Summary

- The bandsaw method was the easiest because of the circle cutting jig *(centering pin)*.
  - Downside is that the bowl is cut in half and glued back together
  - It has a smaller kerf and a smoother surface than the Ring Master.
- The Ring Master is the easiest to control and set the angle.

Thanks

- To President Phil for the Challenge!
- "Wooden Bowls from the Scroll Saw" by Carol Rothman, "Scrollergirl" on YouTube. She has also authored "Wooden Boxes from the Scroll Saw." I highly recommend her videos and books. She has lots of tips to adjust for angles that are slightly off.

In a future handout I will show the use of the scroll saw following Carole Rothman's books for a bowl from a board.

Roger La Rose