N-Loop Celtic Knot

Alan Stratton
As Wood Turns

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Who Am I?

- First turning as a newly married graduate student needing furniture.
- Found a duplicating lathe in the BYU hobby shop.
- Turned spindles for sofa, love seat, chair, end tables, dining table.
- Duplicating lathe left very rough surface – required lots of 60 & 80 grit sandpaper.
- Purchased first lathe a year later in Peabody, Massachusetts.
  - Used
  - Thrust bearing shot.
  - No chuck.

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Who Am I?

- Weekly video published on www.AsWoodTurns.com
- Host Christmas Ornament Challenge for over 12 years.
  - Next challenge coming up November 2023

Prizes For Everyone

Please join with us for the Christmas Ornament Challenge November 2023.

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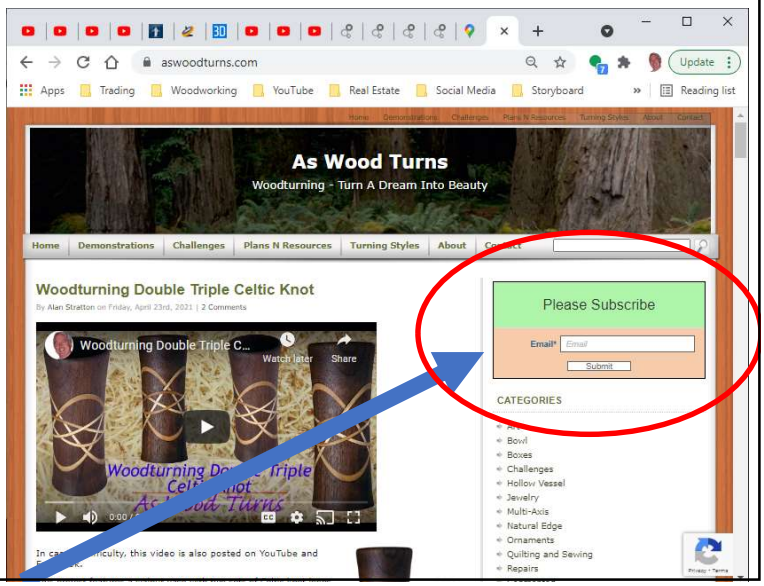
Please subscribe on www.AsWoodTurns.com

- Notification of new video
- Special Challenges
- …



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Traditional Celtic Knots

- 4 loops on square stock (2 pair)
- Why?
- Square stock is:
  - Easily milled square and 90 degrees
  - Easily aligned to flat
  - Wood Removal & Replacement ??

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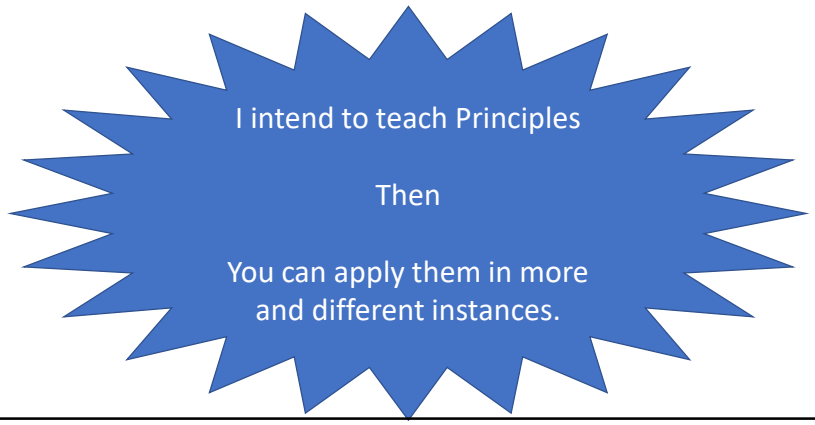
Celtic Knots Requirements

1. Accurate repeatable cutting
2. Stock removal = Stock replacement
3. Stock alignment
   1. Angle (Indexing)
   2. Distance (Offset)



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Why Not 3 Loops?

1. Accurate repeatable cutting
2. Stock removal = Stock replacement
3. Stock alignment

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Why Not 5 Loops?

1. Accurate repeatable cutting
2. Stock removal = Stock replacement
3. Stock alignment

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Why Not N Loops?

1. Accurate repeatable cutting
2. Stock removal = Stock replacement
3. Stock alignment

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Celtic Knot Process – Table Saw

- Table Saw
  - Therefore: limited to capacity of saw.
  - But: Very conducive to jigs and fixtures.
- Sliding Table
  - Keep it “Thin” to not take away saw capacity
- Easy Template

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Table Saw Sled – 12”x20”

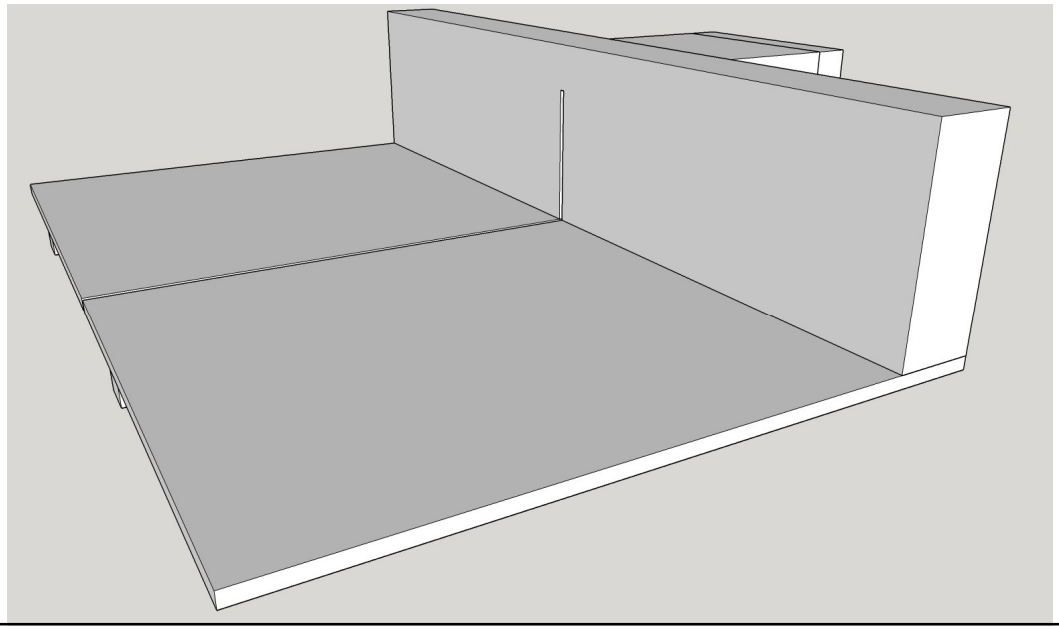

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Table Saw Sled – 12”x20”

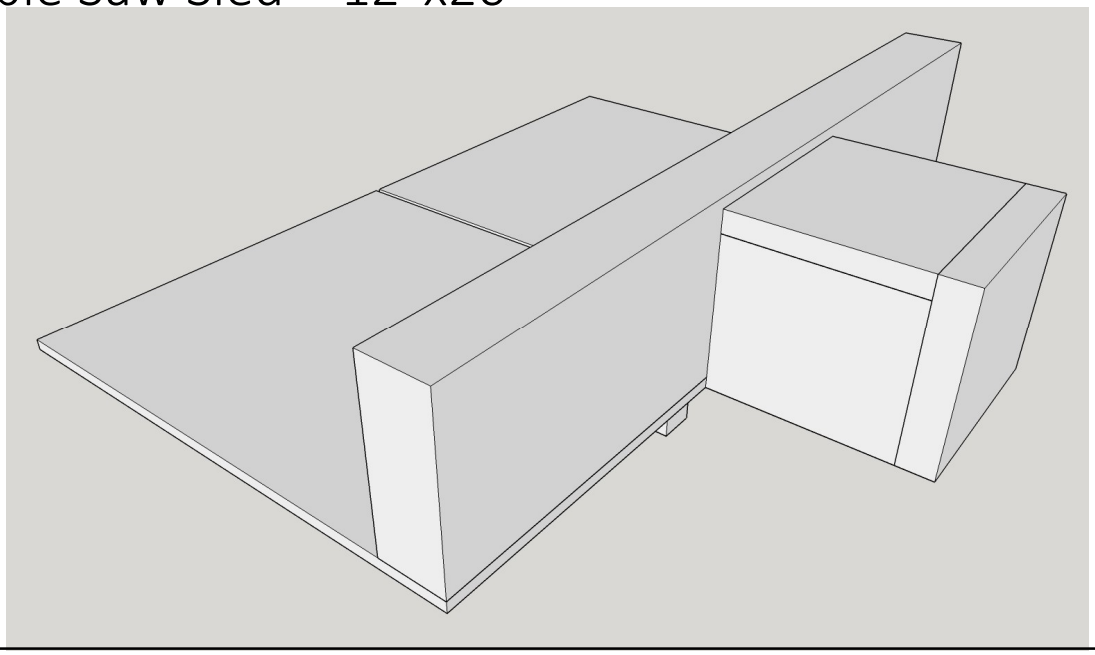

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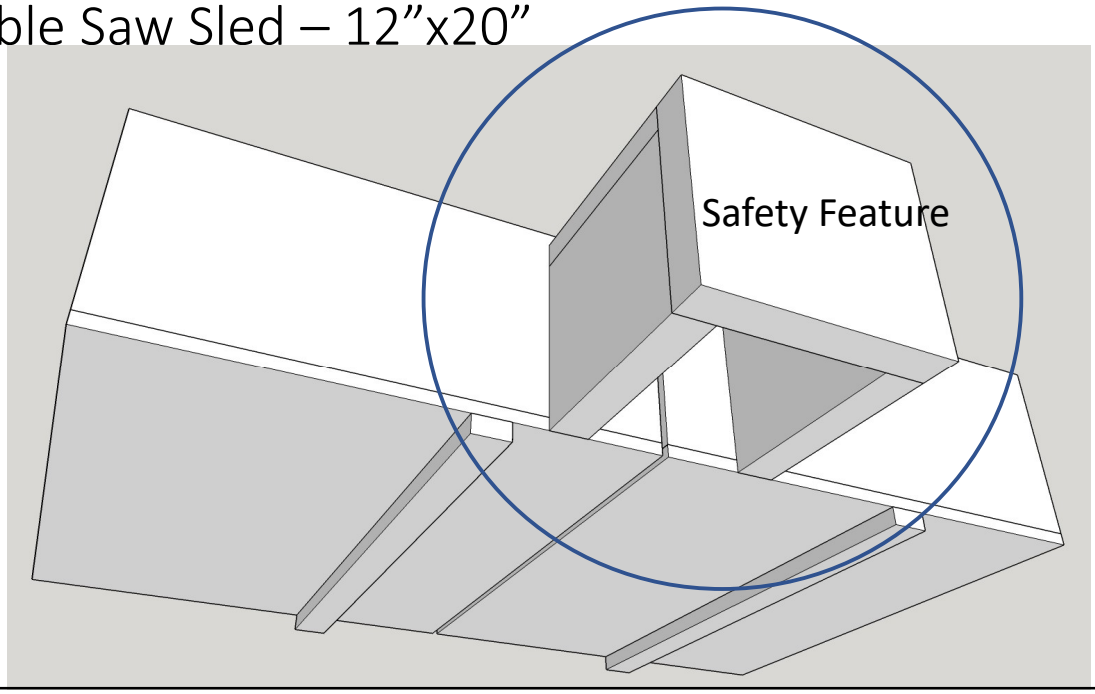
Table Saw Sled – 12”x20”



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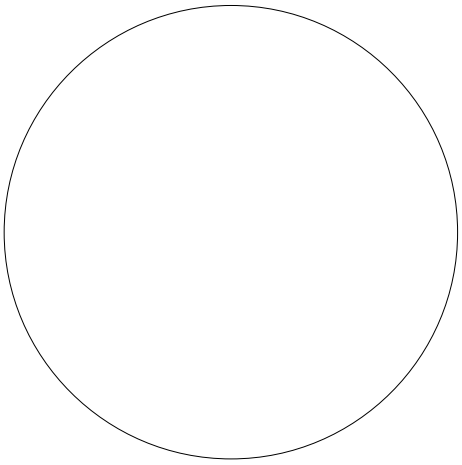
Template Preparation - Bandsaw

1. Using favorite drawing software or graph paper, Draw circle
   - Diameter equals “Net” capacity of saw.
   - My sawblade projects 3.25”
   - Sliding table .25” thick.
   - Therefore – 3” circle.
2. Draw tangent lines
   - Forms Triangle, pentagon, hexagon
3. Glue to thin scrap (plywood).
4. Rough cut outside lines.
5. On Disk Sander, sand to line.



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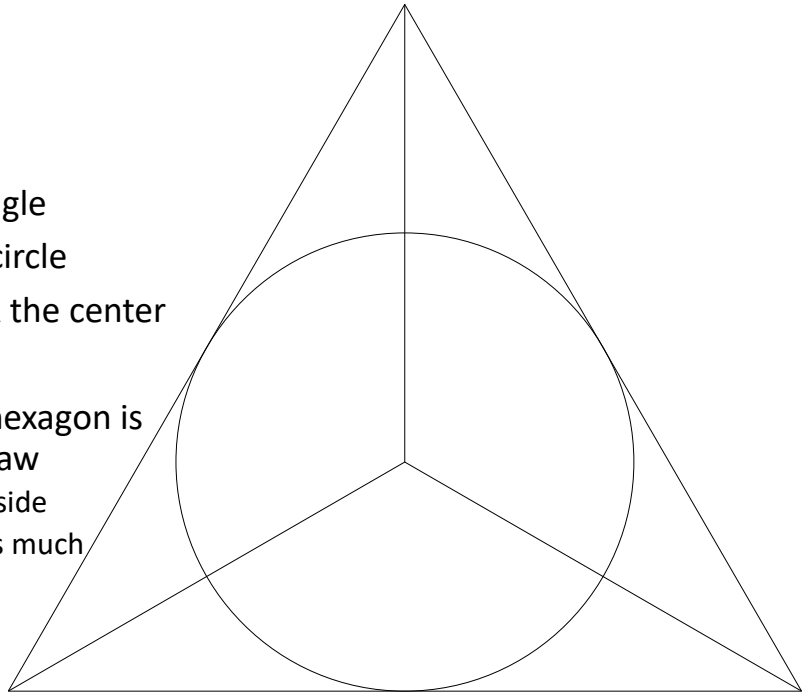
3 Loop

- Draw equilateral triangle
- Each side tangent to circle
- Do not forget to mark the center

- However, I believe a hexagon is easier to use on the saw
  - Skipping every other side
  - Legs do not project as much



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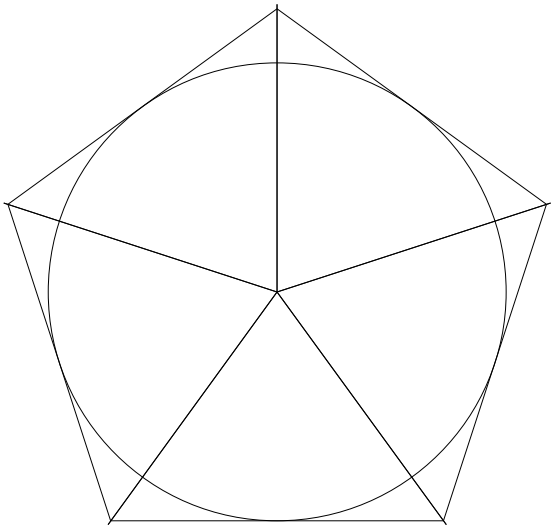
5 Loop

- Draw pentagon
- Each side tangent to circle
- Do not forget to mark the center



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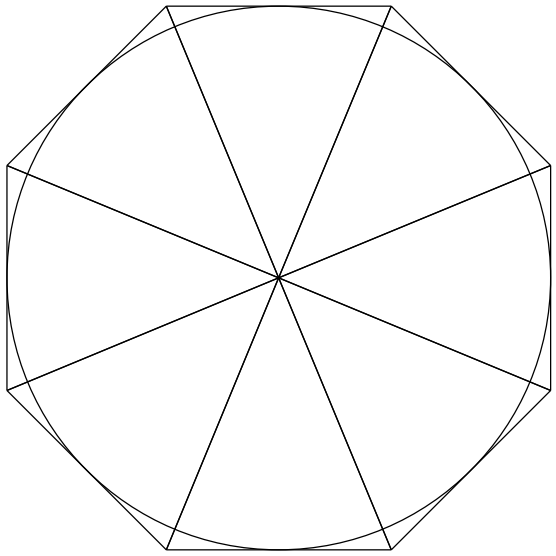
N Loop

- You get the picture



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Variations

- # of Loops
- Skipping Loops
- Varying Angle
- Varying Distance from End
- Doubling Down

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Applications

- Handles
  - Kitchen Implements
  - Tools
- Goblets
- Vases
- Boxes
- Spindles
- Pens
- Art
- Your Imagination…

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Final Consideration

- Wood Selection
  - Similar density will improve surface
  - Contrast
  - If possible, similar response to humidity
- Glue
  - Epoxy with sufficient pot life – 20-30 minute
    - Gap filling
  - Do ***not*** use regular wood glue
    - Could prematurely bind
    - No gap filling properties

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Celtic Knot Process

1) Prepare template
2) Rough turn stock
3) Prepare wood to insert
4) Prepare template & Fasten to stock
   a. Screw to center
   b. Anchor with Hot Melt Glue (please do not allow to rotate)
5) Prepare Sled
   a. Fasten scrap to position stock (hot melt glue works GREAT!
   b. Do NOT change or adjust until project is complete.
6) Add temporary scrap to top of stock. (long side of cylinder that is opposite the saw blade for 1st cut)
   a. Maximizes potential diameter without the cut separating the stock
   b. Maintains alignment
7) Saw slot
8) Glue (30 minute epoxy) insert wood
9) Remove temporary support strips and trim insert
10) Repeat #6 - #9 for each insert
11) Finish turning project.

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Let's Do It!

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Why Not N Loops on Band Saw?

1. Accurate repeatable cutting
2. Stock removal = Stock replacement
3. Stock alignment

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Celtic Knot Process – Band Saw

- Band Saw
  - Still: limited to capacity of saw. (Mine is 10”)
  - Also: conducive to jigs and fixtures.
- Sliding Table
- Stock Holder
- Modify Template Approach

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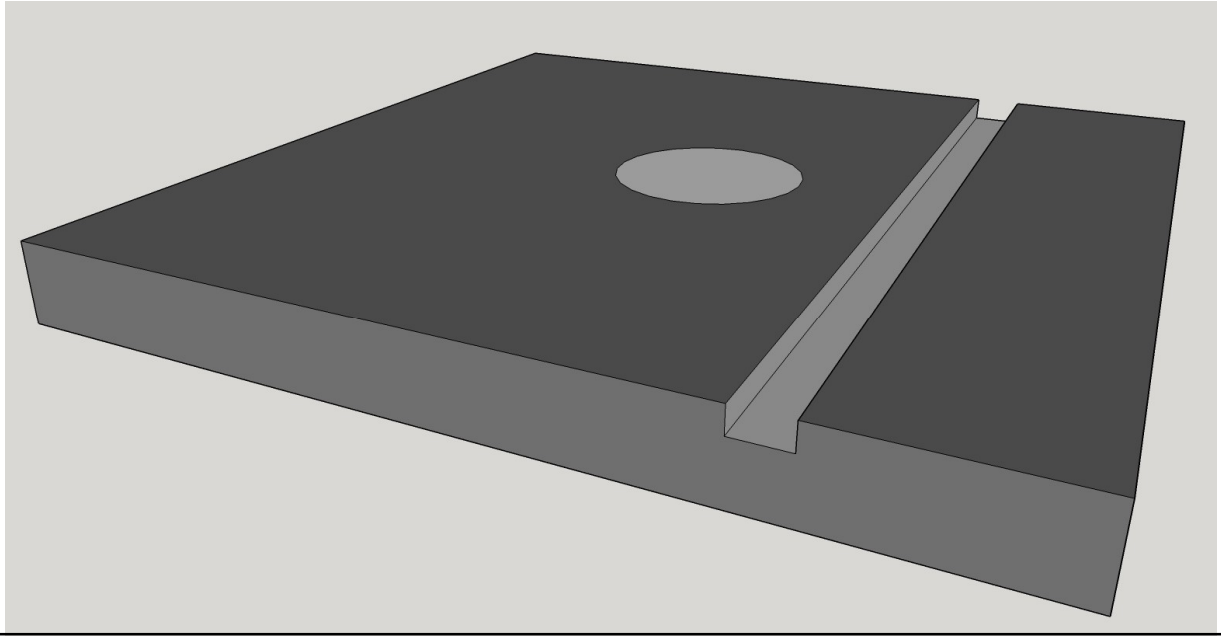
Band Saw – Table Surface



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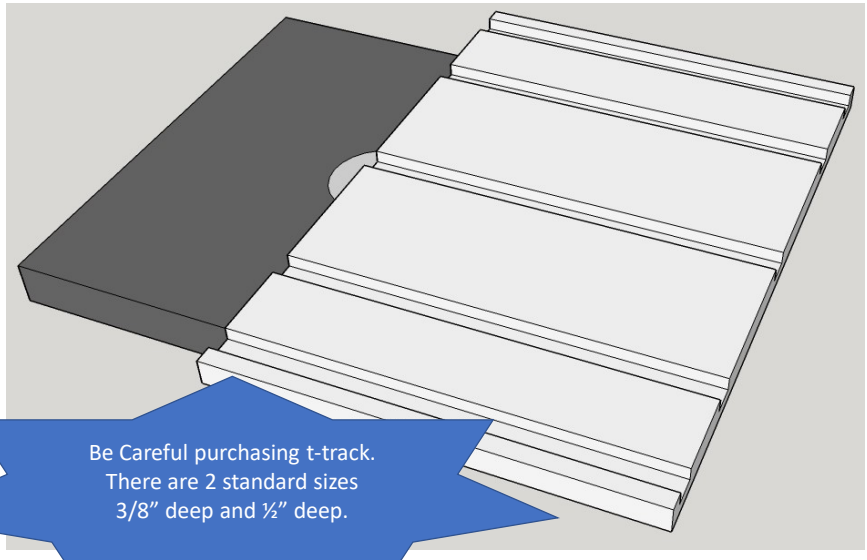
Band Saw – Sliding Table

Bottom guide to ride miter slot
Top slots for T-Track 3/8" deep for ¼" Hex Bolts
Or 5/16" T-Bolts



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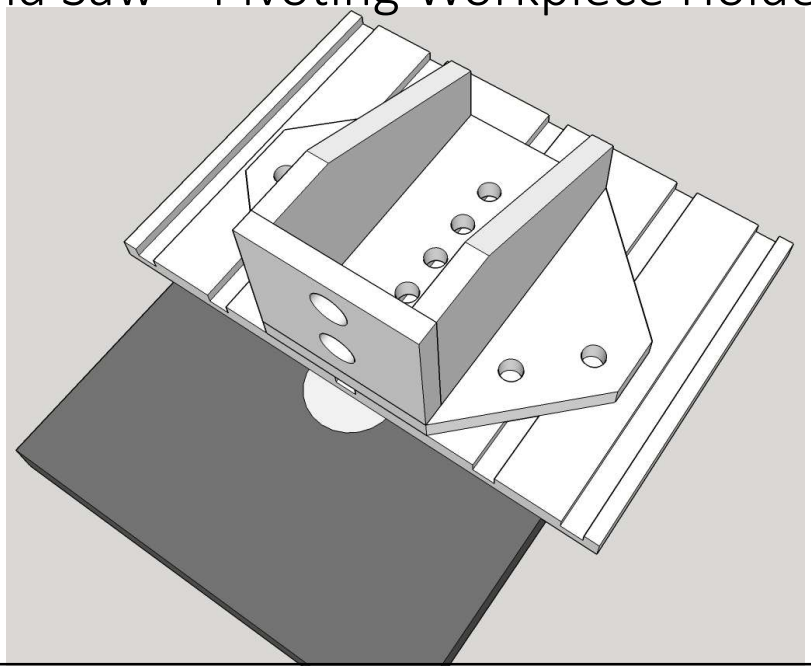
Band Saw – Pivoting Workpiece Holder



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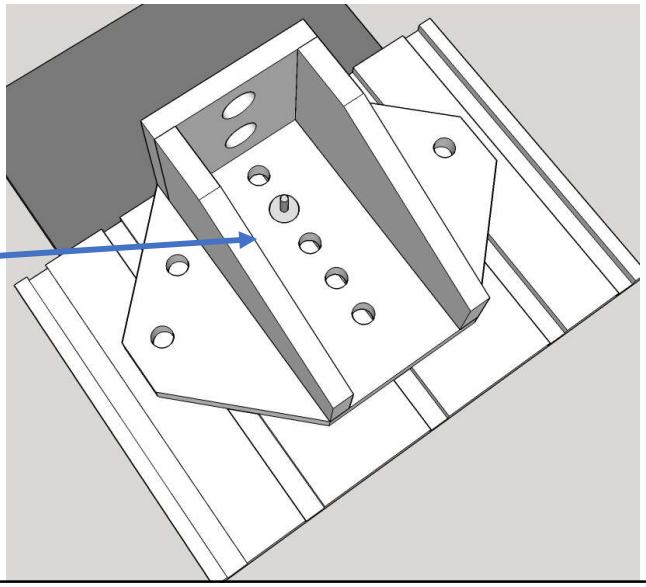
Band Saw – Pivot

My pivot:
¼" Hex bolt
¾" Steel standoff
¼" ID; ½" OD
¾" Steel standoff
½" ID; ¾" OD
Knob



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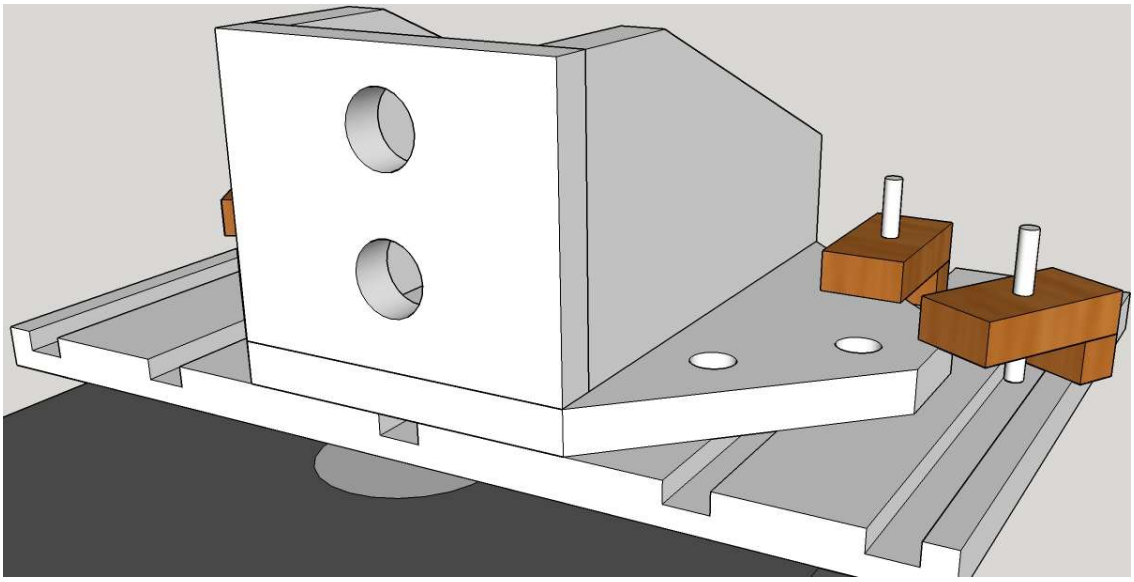
Band Saw – Hold Downs



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Etsy: https://www.etsy.com/shop/AsWoodTurnsTools

Band Saw - Securing Stock

- Keep project in chuck or on faceplate
- Secure the chuck
- Safety
- Repeat cuts

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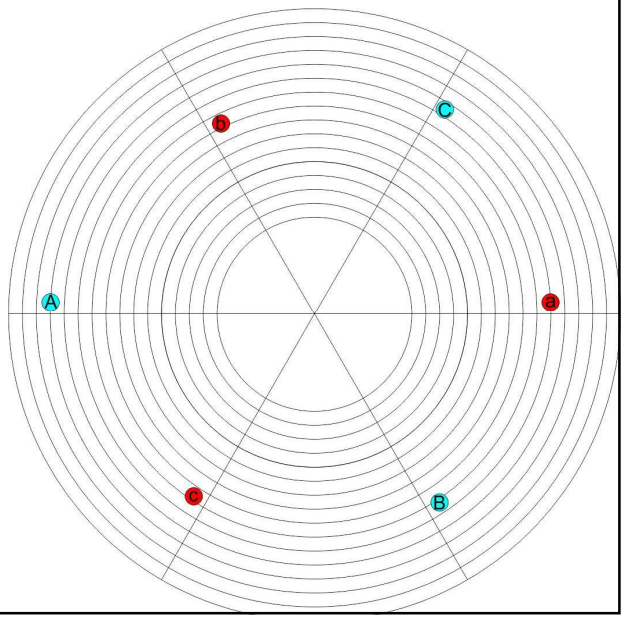
Band Saw - Templates

- Bigger
- Rays marking loops
- Mark opposite ray.
- Transfer to face of project stock

- If segmented, consider the joints
- If solid, indexing or template.



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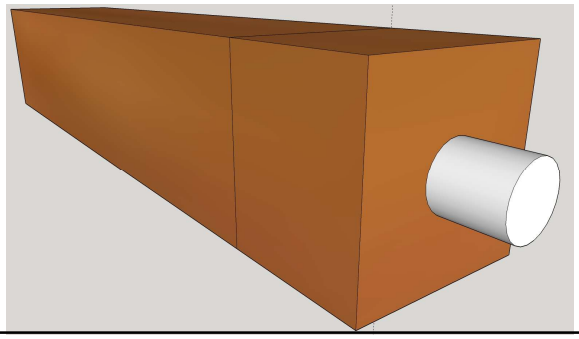
Band Saw – Sawing Process

Indexing

Scrap wood with dowels

1. ~¾” x ~¾” x project depth + ¾” –4 each.
2. Drill for ~ ¼” dowel.
3. Wax dowel and hole.
4. Glue (hot melt) to project.
5. Insert dowel.



If you do not use these, chances are you will rotate the two pieces ever so slightly => Misaligned

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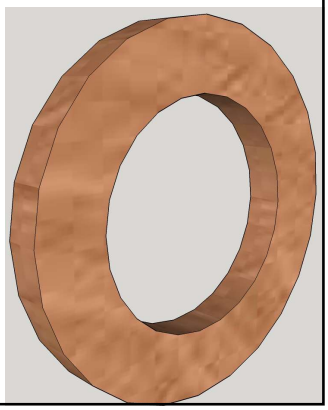
Band Saw – Spacer

1. Hole diameter equal to spindle diameter
2. Outer Diameter ~ 2” – Sufficient for chuck/faceplate to bottom on
3. Thickness equal to replacement wood minus allowance for saw kerfs

Purpose – to assure repeatable wood removal.

Either

- Measure gap & plane wood or
- Plane wood & make spacer.



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Band Saw – Setup

1. Alignment
   a) Mark desired cut top & bottom at 180 degrees apart (as desired)
      1. Attach template, or
      2. Mark on project stock
      3. Segmented project have automatic markings but label them.
   b) Position jig table and lock down – Do NOT release until all cuts complete.
      a) Allow for spacer offset
      b) Cut angle
   c) Mark alignment blocks with lines X distance apart. (see Step 3 below)
   d) Label alignment blocks. (e.g. A,B,C,D… or lines)
2. Indexing
   a) Ensure spacer is removed
   b) Ensure horizontal alignment to first ray
   c) Remove alignment dowels – Please do NOT accidentally cut them.
   d) Saw outer cut – Be careful – Watch hand placement
   e) Move spacer to between faceplate or chuck and jig. (Do not change any angle)
   f) Replace top cutoff and alignment dowels
   g) Ensure horizontal alignment to target ray
   h) Remove top portion and alignment dowels
   i) Saw inner cut
3. Check size of replacement wood
4. Check for straight cut

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Band Saw – Glue Insert Wood

- Epoxy
  - With enough time for thorough mixing and extensive spreading
  - For me, 30 minute epoxy is comfortable.
  - Epoxy does well at gap filling
- Trim insert wood as necessary
- Keep alignment dowel with dowels ready
  - Consider waxing dowel to preclude accidental glue contact.
- Spread epoxy on all four surfaces
- Put together with alignment dowels
  - BTW the replacement wood is now oval
  - Avoid glue on dowels. If glued in, you will have to replace them.
- Allow time to harden

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Band Saw – Next Loop

1. Indexing
   a) Ensure spacer is removed
   b) Ensure horizontal alignment to correct ray
   c) Remove alignment dowels with caps – Please do NOT accidentally cut them.
   d) Saw outer cut – Be careful – Watch hand placement
   e) Move spacer to between faceplate or chuck and jig.
   f) Replace top cutoff and alignment dowels
   g) Ensure horizontal alignment to target ray
   h) Remove top portion and alignment dowels
   i) Saw inner cut
2. Glue in replacement wood
3. Repeat until finished

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Band Saw – Finishing Up

- Complete shaping.
- Be aware now of weird grain alignment -> Turning is more difficult
  - Shear cutting with gouge
  - Coarse sanding with hard block
  - Do not use a soft pad with coarse grits

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Send me pictures

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