

The Basics of Stave Segmented Turning

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The Basics of Stave Segmented Turning

Requirements

1. Basic equipment requirements
 - a. Graph paper
 - b. Band Saw or Table saw
 - c. Sanding center
2. Tools
 - a. Roughing gouge
 - b. Spindle gouge
 - c. Bedan or large parting tool
 - d. Hollow vessel tools
 - e. Four-jaw chuck
3. Supplies
 - a. Band clamps
 - b. Glue, PVA or PE
 - c. Vernier calipers
 - d. Thickness calipers
 - e. Painter's tape
 - f. Accurate angle measuring gauge
4. Helpful accessories
 - a. Segmented planning software
 - b. Compression chuck (Judy Jig)
 - c. Steady rest
 - d. Stabilized hollowing system

Preparation

1. Design the vessel
 - a. Create a full scale drawing
 - b. Make full scale drawing on graph paper
 - c. Draw both inside and outside profile
 - d. Draw in the number of segment required

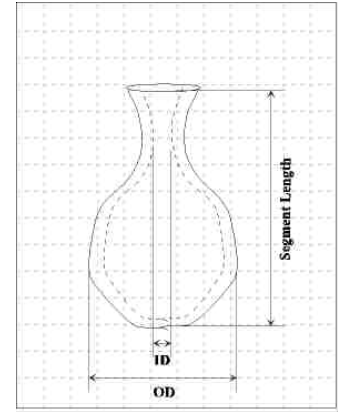
2. Measurements

a. Determine stave segment length

- i. Measure and record vessel height
- ii. Add one inch for required tendons
- iii. This is the segment length

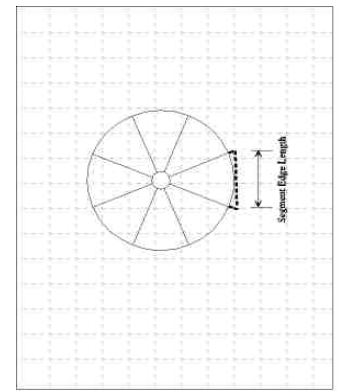
b. Determine Segment thickness

- i. Divide circles into correct number of segments
- ii. Draw maximum OD and minimum ID of the vessel
- iii. In the ID circle draw a line between two adjacent segment lines
- iv. The difference between ID line and OD is the thickness of each segment



c. Determine segment edge length

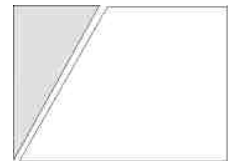
- i. Construct a cord between two segment lines tangent to the OD circle
- ii. Measure length of the cord on the OD circle. This is the required segment edge length



Making the Blank

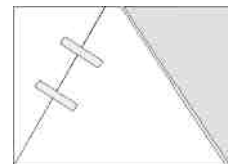
1. Prepare billets of desired wood

- a. Crosscut the determined length
- b. Rip to segment edge length plus
- c. Rip to segment thickness
- d. True and square stock



2. Cut segments

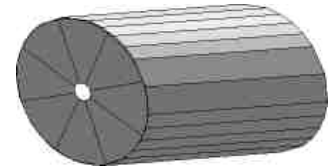
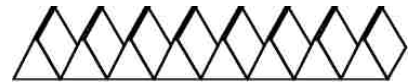
- a. Set bandsaw table accurately to correct angle for the number of segments (see table in appendix)
- b. Cut segments
 - i. Cut one side of each stave
 - ii. Tape cutoff back in place
 - iii. Cut second side
 - iv. Set aside cutoffs for later use



- c. Fit cylinder together
 - i. Sand or joint cut edges
 - ii. Assemble segments and clamp
 - iii. Check for correctness of fit
 - iv. Resend or joint until all segments fit without visible gaps
- d. Prepare veneers as required for design
 - i. Cut veneers to size
 - ii. If multiple pieces of veneer are used, prepare veneer packs

3. Assemble the segments & veneers into a cylinder

- i. Place blue painter's tape face up on glue surface
- ii. Layout segments and veneers on tape – edges tight
- iii. Press down to adhere the tape
- iv. Glue all surfaces
- v. Roll up package and add band clamps
- vi. Adjust all pieces and veneers
- vii. Tighten band clamps
- viii. Set aside to dry



Turning the Vessel

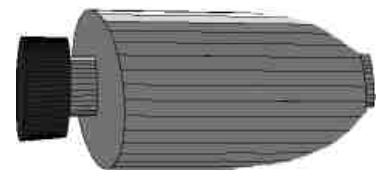
1. Phase I turning - Preparing the cylinder

- a. Action
 - i. Place glued up package between centers
 - ii. Rough turn into a cylinder
 - iii. Add a tendon to each end to fit chuck



2. Phase II turning - Turning the base portion

- a. Turn base exterior
 - i. Chuck one tendon supporting the opposite end with live center
 - ii. Readjust balance if required
 - iii. Using drawing, determine location of maximum final diameter - mark
 - iv. Turn exterior of *base* section from maximum diameter toward tail stock
 - v. Remove tail stock
 - vi. Add steady rest if required

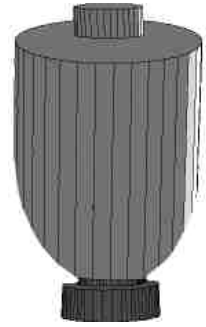


b. Turn base interior

- i. Drill out maximum amount of material to location of maximum diameter
- ii. Hollow out interior
 1. Sand and finish interior of base section
 2. Shorten tendon to ½ inch and assure it is smooth
 3. Remove vessel from chuck

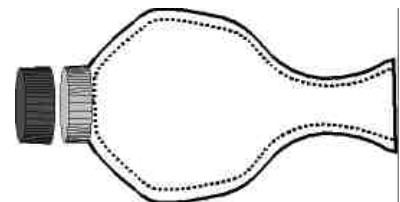
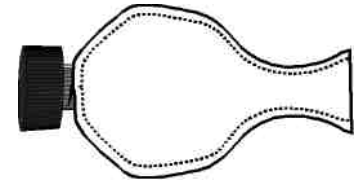
c. Adding the Foot

- i. Prepare base material
 1. Chuck a disk of material to be used for vessel base
 2. Measure exact dimension of base tendon
 3. Hollow out disk of base material to exactly fit vessel base tendon
 4. Check fit carefully
- ii. Mount vessel to base
 1. Remove vessel from chuck and glue to chucked base
 2. Do not remove assembly from chuck as this is the new hold for completing the turning



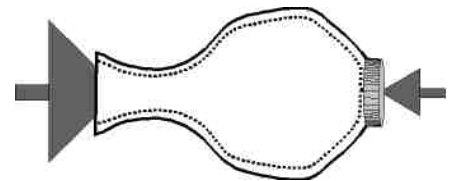
3. Phase III Turning - Turning the top portion

- a. Turn top exterior
 - a. Mount base assembly, supporting with tail stock
 - b. Readjust balance as required
 - c. Turn exterior of top portion from maximum diameter
 - d. Remove tail stock
 - e. Add steady rest if required
- b. Turn top interior
 - a. Drill out maximum amount of material to location of maximum diameter (smaller drill)
 - b. Hollow out interior
 - c. Sand and finish interior of top section
- c. Finish neck
 - a. Remove neck tendon
 - b. Add top design ring is desired similar to the process for adding a foot.
 - c. Turn neck to final shape
 - d. Sand and finish
- d. Part off foot from chuck



Completing the Foot

1. Prepare a soft-wood cone to fit curvature of vessel neck
 - a. Chuck soft-wood cone and true
 - b. Place vessel between soft-wood cone and live center; use anti-abrasion material to protect the vessel
2. Complete base shape
 - a. Reduce and undercut bottom leaving a small live center support
 - b. *(A compression chuck or vacuum chuck may be used as an alternate to the above step)*
 - c. Complete base



- i. Remove vessel from the lathe
- ii. Part off small protrusion on base
- iii. Sand

Finishing

1. Resand vessel with the grain to 400
2. Apply appropriate finish – let dry
3. Resand and refinish to your satisfaction
4. Buff and wax

Sources for supplies and equipment

- Craft Supplies USA, 800-551-8876, www.woodturnerscatalog.com
 - Most complete suppliers to wood turners in the USA
- Direct Safety, 800-528-7405, www.directsafety.com
 - Safety supplies, dust masks, etc.
- Hastings Saws, 707-584-8541, www.hastingsaws.com
 - Thin kerf band saw blades with no set to the teeth
- Klingspor's Woodworking Shop, 800-228-0000, www.woodworkingshop.com
 - Sanding and finishing product, importer of German sandpapers
- OneWay Manufacturing, 800-565-7288, www.oneway.ca
 - Manufacturers of lathes and lathe accessories
- Packard Woodworks, 800-683-8876, www.packardwoodworks.com
 - Woodturning supplies tools, equipment, supplies
- Rockler Woodworking, 925-521-1800, www.rockler.com
 - General woodturning supplies, lumber, tools, equipment
- The Cutting Edge, 800-790-7980, www.cuttingedgetools.com
 - Turning and Carving tools
- Tool Crib (Amazon), 800-635-5140, www.amazon.com
 - Tools, equipment mail order
- Treeline, 800-598-2743, www.treelineusa.com
 - Carving tools
- Woodcraft of Dublin, 925-875-9988, www.woodcraft.com
 - General woodturning supplies, lumber, tools, equipment

Books

Segmented Turning, A Complete Guide, Ron Hampton, Guild of Master Craftsmen, 2003

Segmented Turning, A Good Start, Bill Kandler, Verified Software, 2004

Segmented Turning, William Smith, Schiffer Publishing Ltd., 2002

The Art of Segmented Wood Turning, Malcolm Tibbetts, Linden Publishing, 2005

Woodturning with Ray Allen, Ray Allen & Dale Nish, Fox Chapel Publishing, 2004

Laminated Designs in Wood, Clarence Rannefeld, Lark Books, 1998

Southwest Pottery – Anasazi to Zuni, Allen Hayes & John Blom, Northland Publishing, 1996

Fine Woodworking on Faceplate Turning, Taunton Press, 1987

Videos

Introduction to Segmented Turning, Curt Theobald, 307-245-3310, www.curttheobald.com

Segmented patterns, Curt Theobald, 307-245-3310, www.curttheobald.com

Software suppliers

Stave calculations

<http://stavecalc.logiztix.net/>

Simple segment calculations and lots of help on the processes

<http://turnedwood.com/>

Calculations for open segment work

<http://texasgadgets.com/>

The most complete program & difficult to manipulate

<http://verifiedsoftware.com/goodturns/>

This is the one I use, mates with 3d design ware

<http://woodturnerpro.com/>

General woodworking software including layout

<http://www.woodbin.com/>

Veneer Sources

Wood cost comparisons
Constantine's
Certainly Wood
Hearn Hardwoods
Woodworkers Resource

<http://www.verifiedsoftware.com/goodturns/woodcosts.htm>
<http://www.constantines.com/>
www.certainlywood.com
<http://www.hearnehardwoods.com/>
<http://www.woodworkerssource.net/index.html>

Untested sites

World panels
Dodge Veneers
Exotic Wood *
Form Wood Industries
West Penn Hardwoods
Source for inlays
Saurers & Company

www.worldpanel.com/WoodVeneers.htm
<http://www.doogethereneers.com/>
<http://www.exotic-wood-online.com/>
<http://www.formwood.com/index.htm>
<http://www.westpennhardwoods.com/>
<http://www.inlays.com/>
<http://www.sveneers.com/>

Segment Edge Length Estimation Table

Ring Diameter	Number of segments				
	6	8	12	16	24
1	9/16	7/16	¼	3/16	1/8
1.5	7/8	5/8	3/8	5/16	3/16
2	1 1/8	13/16	5/16	3/8	¼
2.5	1 7/16	1 1/16	11/16	½	5/16
3	1 ¾	1 ¼	13/16	5/8	3/8
3.5	2	1 7/16	15/16	11/16	7/16
4	2 5/16	1 11/16	1 1/16	13/16	½
4.5	2 5/8	1 7/8	1 3/16	7/8	9/16
5	2 7/8	2 1/16	1 5/16	1	11/16
5.5	3 3/16	2 ¼	1 ½	1 1/8	¾
6	3 7/16	2 ½	1 5/8	1 3/16	13/16
6.5	3 ¾	2 11/16	1 ¾	1 5/16	7/8
7	4 1/16	2 7/8	1 7/8	1 3/8	15/16
7.5	4 5/16	3 1/8	2	1 ½	1
8	4 5/8	3 5/16	2 1/8	1 9/16	1 1/16
8.5	4 15/16	3 ½	2 ¼	1 11/16	1 1/8
9	5 3/16	3 ¾	2 7/16	1 13/16	1 3/16
9.5	5 ½	3 15/16	2 9/16	1 7/8	1 ¼
10	5 ¾	4 1/8	2 11/16	2	1 5/16
10.5	6 1/16	4 3/8	2 13/16	2 1/16	1 3/8
11	6 3/8	4 9/16	2 15/16	2 3/16	1 7/16
11.5	6 5/8	4 ¾	3 1/16	2 5/16	1 ½
12	6 15/16	5	3 3/16	2 3/8	1 9/16
12.5	7 3/16	5 3/16	3 3/8	2 ½	1 5/8
13	7 ½	5 3/8	3 ½	2 9/16	1 11/16
13.5	7 13/16	5 9/16	3 5/8	2 11/16	1 ¾
14	8 1/16	5 13/16	3 ¾	2 13/16	1 13/16
14.5	8 3/8	6	3 7/8	2 7/8	1 15/16
15	8 11/16	6 3/16	4	3	2
15.5	8 15/16	8 7/16	4 1/8	3 1/16	2 1/16
16	9 ¼	6 5/8	4 5/16	3 3/16	2 1/8
16.5	9 ½	6 13/16	4 7/16	3 5/16	2 3/16
17	9 13/16	7 1/16	4 9/16	3 3/8	2 ¼
17.5	10 1/8	7 ¼	4 11/16	3 ½	2 5/16
18	10 3/8	7 7/16	4 13/16	3 9/16	2 3/8
18.5	10 11/16	7 11/16	4 15/16	3 11/16	2 7/16
19	11	7 7/8	5 1/16	3 ¾	2 ½
19.5	11 ¼	8 1/16	5 ¼	3 7/8	2 9/16
20	11 9/16	8 5/16	5 3/8	4	2 5/8

