Central New England Woodturners

The CNEW Skew

Volume 20 Issue 3 March 2007

Guest Editorial
Steve Reznek

How many times have you lost a great piece of wood because it split as it dried? Or how many times have you made a segmented bowl and had the joint move? This last is bad enough when you can only feel the lack of alignment. It is disastrous when the joint actually comes apart.

We live in New England. It can get pretty hot and muggy in the summer; and it gets cold in the winter – or at least it used to. When we heat up the air in the house the relative humidity drops to zilch. This of course is bad for the turnings. If their diameter is small, not much happens. However if they are large, two things can happen and neither is all that great. They may distort and worse luck, they check. (I wonder why wood turners call it checking when what it is doing is splitting!!)

Of course we all know the reason. But this article will first try to put a few numbers on what is going on and then suggest some things that you can do that might help. Of course if you haven't had problems or already have a preferred cure, you can skip the rest.

Let's start by talking about cells, drying and shrinkage. (I don't mean in the Seinfeld sense.) Think of a log from the trunk. The cells in wood are generally very elongated cylinders. For most cells, the long axis is up and down. However, a minority of the cell point from the center out. These are in the "medullary rays". These rays can give rise to some of the more interesting patterns in turned objects. I am not sure if they are the cause of the tiger stripes in maple, but I am sure they are the light "cross grain" streaks you often see in oak. When the cells dry they shrink, of course. But for all practical purposes, they don't shrink in the long direction. The cylinders get skinnier, not shorter.

Call the direction along the trunk "longitudinal". Call

ctd. on p. 5

President's Message

Hello members,

Are you having fun, I would like to thank Reid for the wonderful demo last month. I thought it was very informative as I had seen Cindy's demo at Totally Turning, but when Reid showed us it made more sense. I would like to thank Charlie Crouteau for the thank you card that he sent me for the little I did for his Project Goodwill, and we should remember that this is an ongoing project, as our Freedom Pen Project is. We are very fortunate to have such talented people in our club that we can call upon to give us enjoyable demonstrations at our meetings. I hope this news letter gets to Graeme as the last two have gone to email never-never land. If anybody has anything that they want brought up then send me an email or speak to me at the meeting. Remember this is your club and you have a right to voice your opinions. Life should be enjoyable and have fun turning.

AL

Contents

Club Officers and Contact Info for 2007

President, Al Faul	president@cnew.org
VP, Internal, Reid Gilmore	internal_vp@cnew.org
VP, External, Mary Maguire	external_vp@cnew.org
Secretary, Tim Elliott	secretary@cnew.org
Treasurer, Norma Hogan	treasurer@cnew.org
Newsletter, Graeme Young	newsletter_editor@cnew.org
Video Librarian, Al Faul	video_librarian@cnew.org
Book Librarian, Ray Boutotte	librarian@cnew.org
Webmaster, Dave Eaton	webmaster@cnew.org
Photography, Henry Fairlie	photography@cnew.org

Minutes of March Meeting

Tim Elliott

Visitors: Zoltan Bardossy, Russ Ellis

Reid Gilmore reported that our April program will be presented by Norm Mancuso. If you would like to do a meeting demo, please contact Reid; the schedule is currently empty from June onwards. Sometime this Fall, he may organize a panel discussion on issues of design.

Norma Hogan gave a treasurer's report for the past month

Starting balance: $1226

Ending balance: $1372

Ray Boutotte is planning to clean up the book library inventory and get it posted on our website.

Gene Spadi has a number of pens for the Freedom Pen project, but he will wait a month or two before sending them in - if you would like to contribute, please see Gene.

Charlie Croteau gave an update on Project Goodwill. Sales were strong at Springfield, and our club total now stands at around 112 chairs donated. Charlie collected several items from show & tell for future sale, and distributed a large pile of wood to members wishing to make future contributions.

Frank White had promotional flyers for the Yankee Woodturning Symposium to be held this June. Details are firming up. The CNEW website provides a link with more details.

Visitors and hosts of the Open Shop visits last month all had a good time. Some details were printed in the last newsletter.

Joe Harbey will work with the center to schedule another open shop prior to our April meeting. Look for details in the newsletter or website.

Russ Ellis showed some tools from his collection - these few items are distinctive in that the original owners have left behind their "fingerprints" on the handles.

Program: Reid Gilmore on multi-axis spindle turning

Upcoming Events

Demo for **CNEW April 5th** meeting will be turning a Green wood bowl, by Norm Mancuso.

The **Yankee Woodturning Symposium** to be held June 1-3 at Wesleyan College in Middletown, CT, is coming up fast and plans are being finalized. As previously announced we have lined up ten featured demonstrators with national and international reputations as well as some very good local talent. The featured demonstrators include Jimmy Clewes from England, Graeme Priddle from New Zealand, Jean-Francois Escoulen from France, and from the U.S., Johannes Michelsen, Mark St. Leger, Michael Hosaluk, Mark Sfirri, Angelo Iafrate, Beth Ireland, and Bob Rosand. Register early as the fee increases from $135 to $150 on May 1st and will be $165 at the door. For details see our website www.yankeewoodturningsymposium.org; email garybashian@hotmail.com or call 401-829-8293. Hope to see many of you there!

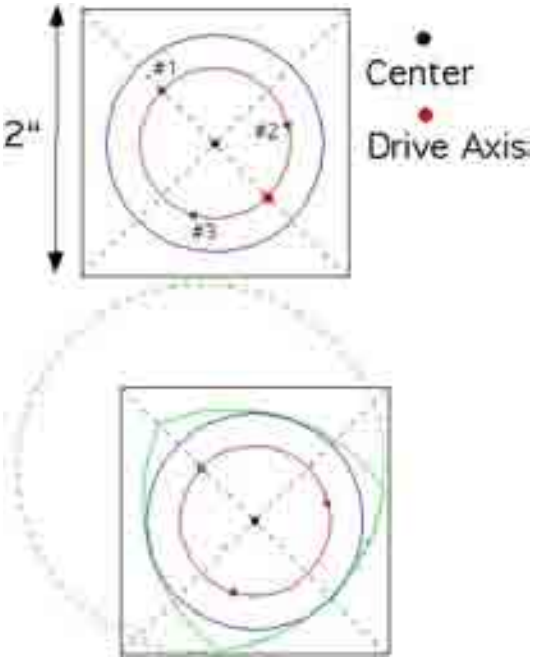
Coming of Age: Emerging and Established Wood Artists, at the Woodturning Center in Philadelphia until May 19th. Exhibition marking the Center's 21st year promoting and serving the wood art community. More details at www.woodturningcenter.org or 215-923-8000.

Multi-Axis Spindle Turning

Reid Gilmore

Applications: ornaments, bottle stoppers, boxes, pepper mills, etc. (woodgrain aligned with lathe axis.)

Equipment: ⅞″ diameter Revolving Stebcenter and ⅞″ diameter Stebcenter drive center. Stebcenters are available from several different wordturning vendors. Check around for best price.



Laying out a 3-axis turning

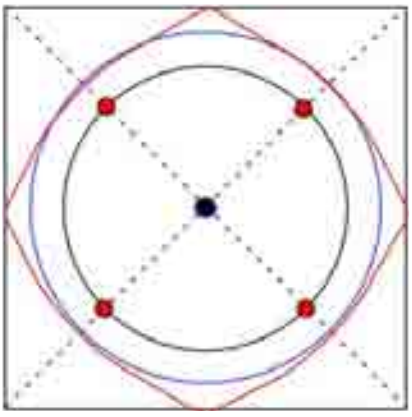
1. Measure the stock (example is 2″ x 2″). Carefully locate the center (black dot) by drawing diagonals from the corners.
3. Using the 3-axis turning chart (see below) look up the stock size to find the drive circle radius (for 2″ stock this is 9/16″).
4. Draw the drive circle (red line) using a compass.
5. Mark the drive axis (red dots) with an awl. Drive axis #1 is the intersection of the diagonal and the drive circle. Place the compass on the opposite diagonal (square red dot) and mark drive axis #2 and #3. (the radius is 1/6th of the circumference, near enough).
6. Using the chart look up the solid circle radius (13⁄16 for 2″ stock), and draw the blue circle using the compass. Solid circle radius = drive circle radius + ¼″.
7. Repeat the layout on the opposite. Use the same measurements if you don't want tapered sides.
8. Number the 3 drive axes. For straight sides, #1 is on the diagonal on both ends. The numbers rotate clockwise on one end and counter-clockwise on the other. For swirled sides, axis #1 on the other end is rotated by 120°.
9. The bottom diagram shows the final shape in green. When the piece is turned using axis #1 (green dot), the green dashed line shows the turned circle radius, which cuts the stock at the solid green line.

Three axis Chart

Stock (in.) Diam. (in.)	**Drive radius** (in.)	**Solid radius** (in.)
1	3⁄16	7⁄16
1 3⁄16	¼	½
1 3⁄8	5⁄16	9⁄16
1 ½	3⁄8	5⁄8
1 11⁄16	7⁄16	11⁄16
1 27/32	½	¾
2	9⁄16	13⁄16
2 ⅛	5⁄8	⅞
2 5⁄16	11⁄16	15⁄16
2 ½	¾	1
2 5⁄8	13⁄16	1 1⁄16
2 13⁄16	⅞	1 ⅛
3	15⁄16	1 3⁄16
3 ¼	1 1⁄16	1 5⁄16
3 ½	1 ⅛	1 3⁄8
3 ¾	1 ¼	1 ½

Four axis chart

Stock **(in.)** diameter (in.)	**Drive radius**	**Solid radius**
1	¼	½
1 ¼	5⁄16	9⁄16
1 3⁄8	3⁄8	5⁄8
1 ½	7⁄16	11⁄16
1 11⁄16	½	¾
1 27/32	9⁄16	13⁄16
2	5⁄8	⅞



Multi-Axis Ornaments

Reid Gilmore

Multi-axis ornaments are variations on the standard "globe and icicle" Christmas ornament that was pioneered by Bob Rosand. Instead of a round or oval-shaped globe that is turned using a single axis, the multi-axis ornaments are turned with three or four axes (not something you chop wood with, the plural of axis). The multi-axis turning method used on these ornaments was demonstrated by Cindy Drozda at Totally Turning in her 3-sided box demonstration. Step-by-step descriptions for laying out three-sided multi-axis turnings are included as part of this article. I have made three sided and four sided multi-axis ornaments. As you increase the number of sides, the shape of the turned object starts to approximate a circle. For that reason, I have not tried a six-sided turning.

The drive centers for a 3-sided multi-axis turning can be viewed as being at the 4, 8 and 12 o'clock positions on the drive circle. Please note that the three drive centers (#1, #2 and #3) rotate clockwise on one end of the stock, and counter-clockwise on the other end. If the stock is mounted on the lathe so that the Stebcenter drive and the revolving tailcenter are both at the 12 o'clock position, the turned object will have straight sides that are parallel to the lathe bed. If the drive center is in the 12 o'clock position and the revolving tailcenter is at 4 o'clock, the turned surface will "swirl" 120° around the stock. Three and four sided "swirls" are an interesting variation on the standard round globe ornaments. Because the multi-axis ornaments are not round, the hollowing step can open "windows" in the sides of these 3 and 4 sided objects. I haven't tried making windows in the 3-sided or 4-sided swirls yet, because the swirls I have made aren't quite symmetrical, so the windows would vary in size.

As stock for these ornaments I use 2″x2″ turning stock cut to 1.5″ - 1.75″ in length. The grain of the wood needs to be parallel to the lathe bed. After finding the centers on each end, lay out the drive circles and solid circles (see instructions). Mount the stock between centers and use a roughing gouge to remove the corners of the stock. Use a skew chisel to cut a ⅛″ wide rabbet down to the diameter of the solid circle radius on each end of the stock. Mount the stock in a chuck and use a ⅜″ drill mounted in the tailstock to drill a ¼″ deep hole in one end of the blank. This will be used to center the piece on a waste block when the ornament is hollowed.

The stock is now mounted so that the drive center and revolving center are both at drive center #1. A lathe speed of ~1000rpm is good for these "off center" turnings and the roughing gouge is the tool of choice. Since relatively little wood needs to be removed, stop the lathe frequently if you can't see the solid circle rabbet. After the first side is completed, repeat the process using centers #2 and #3. You probably won't get a perfectly smooth surface using a roughing gouge, but with a soft touch, sanding will be minimal. The easiest way to sand the sides of these ornaments is to start with a belt sander (100 grit) before moving on to hand sanding.

The multi-axis ornament is now ready for end shaping and hollowing. With a waste block mounted on a face plate, turn a flat surface that is roughly ⅝″ to ¾″ in diameter. Using a ⅜″ drill, drill a ¼″ deep hole in the waste block. Use thick CA glue and a ½″ long ⅜″ diameter dowel to make a centering post for your ornament. Glue the ornament onto the centering post and flat end of your waste block. Once the glue has set, use a spindle gouge to shape the ends of the ornament, and remove the marks made by the Stebcenters.

To speed up the hollowing process, I use a ¾″ Forstner bit to make the entry hole and remove a lot of the ornament center. Small hollowing tools (¼″ straight and ¼″ curved scrapers) are used to complete the hollowing process. If you don't want to have "windows" in the ornament, stop the lathe frequently and check the wall thickness. The windows are caused by deliberate "overhollowing". The sides of the windows will have wood splinters, so the shape of the window needs to be refined with an Exacto knife and sandpaper. If the multi-axis steps were done carefully (stopping at the solid circle radius) and you use the centering post method described above, the windows should be the same size on each of the three faces. The target weight for the final ornament, including the icicle, is 1 ounce, so I aim for a ⅛″ thick wall on these ornaments.

After sanding the ornament you can apply finish while it is still on the waste block. To remove the ornament from the waste block, start by using a ⅜″ drill mounted to your tailstock to drill out the dowel centering post. The ornament can then be removed from the waste block using a parting tool.

Editorial, ctd.

the direction from the center out, i.e. across the grain, "radial"; and the direction around the trunk, i.e. within one of the grains around the tree, "circumferential". Some typical numbers for shrinkage are 0.1% in the longitudinal direction, 4% in the radial direction, and 8% in the circumferential. Think of a board. The length of the board is longitudinal, or at least mostly so. If the board has an interesting pattern, the width is circumferential, and the thickness is radial. If the board shows a lot of grain, then the width is radial and the thickness circumferential.

Now a little bit about moisture in wood. There are two types of water in wood. The free water is in the capillaries and the bound water is inside the cells. The free water is what sprays all over you when you turn really green wood. Although there is a heck of a lot of it, this stuff is not the bad actor: trees don't shrink in the winter, when the amount of free water is greatly reduced. The bad actor is the bound water, which is in the cells. There are no cells pointing circumferentially, i.e. around the tree. When the cells lose their water they shrink and therefore the 8%. The medullary rays have cells pointing radially and they reinforce the wood and reduce shrinkage in that direction, hence the 4%.

One final note: The moisture (bound water) content of dry wood of course depends on the relative humidity. It also depends on temperature, but only slightly, and the type of wood. At 20% relative humidity the moisture content is in the single figures, say 5%. At 90% relative humidity it is about 25%. The "standard" content for dry wood is 12%, and shrinkage is measured either between 100% relative humidity and 12%, or between 100% and 0%. Listed below are some shrinkage values for different woods. The values are for drying from 100% to 12% moisture.

Type	Radial (%)	Circum (%)	C/R ratio
Cherry	3.5	6.5	1.9
Beech	3.0	6.0	2.0
Walnut	2.5	3.5	1.4
Oak	3.0	5.5	1.9
Maple	2.5	5.0	2.0
Ash	4.5	7.0	1.6

OK, these numbers are typical for the tree type and vary with a lot of things, like how fast the tree grew, etc. etc. More importantly wood moisture in a dry winter home may not be 12% and in a humid summer home it is not 100%. But they are good guides to the relative importance of shrinkage.

Let's first look at the usual non-segmented, non-end-grain turning. In one horizontal direction it doesn't want to shrink at all, and in the other it wants to shrink somewhere between 3.5% and 7.0%. Ah ha, that is why they go oval! In the vertical direction, they want to shrink between 2.5% and 4.5%.

Now of course what happens depends not only on how much it wants to shrink, but how strong the wood is. Strong woods, with small shrinkage, made into small turnings do little. Strong woods with high shrinkage go oval. And weak woods, with some shrinkage, check. "Strength" does not mean how hard it is to bend the wood, i.e. stiffness. That goes into the shrinkage value. It means how much bending it will take before it breaks. Somewhat contradictorily, strong woods bend and weak woods don't and therefore snap.

How do you minimize the problems? There are a couple of things you can do. The most obvious is to reduce the height of the turning so that you are as far away from the pith as you can be. This minimizes the difference between radial and circumferential. Remember this difference is the same size and the difference between longitudinal and radial. Also the wood is far and away much stronger in the longitudinal direction, so it can take the "oval" shrinkage.

Remember thin walls can bend more easily than thick ones. So again somewhat contradictorily, thin bowls are strong, i.e. don't check, while thick bowls do.

The other common thing that is done is to dry very slowly. This lets the cells of the wood "creep" and distributes the stress of shrinkage; but it does not eliminate it. Finally there are a number of tricks that are reported to work, but how they work is usually not explained. The first is to boil the boil the wood. We all have heard of steam bending, well boiling does the same thing. I think what it does is to give the dry cells some ability to slide past each other and relieve the stress of shrinkage. The other thing that is in the literature is to soak the wood in dish detergent before you dry it. I guess it does the same thing, i.e. lubricates the cells and allows them to slip past each other. (Creepy, no?)

Editorial, ctd.

OK, finally segmented bowls. There are two no no's. The worst is to have the circumferential direction glued to the longitudinal. This is a "cross grain" joint. Almost as bad is side grain to end grain, i.e. radial to either circumferential or longitudinal.

If you make the standard multi layered "ring" designs, you can have more or less longitudinal to longitudinal joints and the larger the number of segments, the more closely aligned the grains will be. This is why many people do it – no expansion except through the (thin) wall. There are three problems of course. What do you do with the bottom? Making eight, twelve or sixteen pieces come together at a single point is really tough. Second, the "brick work" structure strikes some people as not too attractive. And third, you cannot make the bottom out of a single piece of really cool wood.

An approach that I use to get around some of these problems is to make all my segments align in the same direction, so I have radial to radial, or longitudinal to longitudinal or circum. to circum. joints. In a simple case I make the bottom piece out of a single (square) piece of wood. I cut strips (cross grain and with grain) and glue up the top so it looks like a tic-tac-toe board. Of course the center square is large. A large number of designs are possible and some quite neat patterns can be made. Of course I still have the problem that the different woods shrink a little differently. But you can't have everything.

Some guiding rules for segmented turnings:

1) Keep your diameters small
2) Use really good glues (super glue is terrible)
3) Choose your woods carefully for small shrinkage and the ability to bend
4) Make the walls thin
5) Don't do the no no's and most importantly
6) Only sell your bowls to people who promise to keep the humidity up in their houses in the winter!

There are many good books on wood drying and shrinkage. One quick one is the introductory chapter of of "Turning Green Wood" by Michael O'Donnell.

Show and Tell

Photographs by Henry Fairlie

From the top: Funeral urn by Dave Hopkins for his not-yet-deceased brother.
Quilted maple box by Mike Stone.
One of Tim Elliott's very tall thin miniature vases.
Hickory saucer, burned and dyed by Graeme Young.

Lots of segmented work this month. Clockwise from top left: ***Joe Harbey*** made the cutting board, then made the bowl from the cutoffs.
Zebrawood and wenge bowl by ***Norm Mancuso.***
A plywood box and maple & bloodwood bowl by ***Phil Bowman. Reid Gilmore*** made the ambrosia maple form.
Frank White did "Tee Time" for a competition but missed the deadline.
A walnut bowl by ***Mike Stone***. Lots of boxes with segmented bits by ***Phil Bowman***. A maple and walnut container by ***John McAtee***.

The CNEW SKEW

CENTRAL NEW ENGLAND WOODTURNERS

Central New England
Woodturners
c/o Worcester Center for Crafts
25 Sagamore Road
Worcester, MA 01605

Phone: 508-753-8183
Fax: 508-797-5626
Email: treasurer@cnew.org

Central New England Woodturners
A Chapter of the American Association of Woodturners

On the web: www.cnew.org

To join or renew your membership, print this form and either bring it to the next meeting with cash or check for $20 made payable to CNEW, or mail the form along with a check to:

Treasurer
Central New England Woodturners
c/o Worcester Center For Crafts
25 Sagamore Road
Worcester, MA 01650

Name _____
Address _____
City _____ State ____ Zip _____
Telephone _____
E-mail _____

If you wish, please let us know more about you and your interests.

Old member New member Turning how many years? _____
Selling your work? Yes No Where? _____
_____
What programs would you like to see at our meetings?
_____
Would you be interested in demonstrating at one of our meetings? Yes No