Don’t Crack that Bowl, Make Wood Soup Instead

Bill Noble

- If you turn green wood, it will distort as it dries
- To reduce this you can do several things:
  - Put the rough turned item in a paper bag and wait a few months
  - Use a chemical like ethylene glycol or Pentacryl
  - Freeze dry it
  - Microwave it
  - Boil it
- Steven Russell (a Texas woodturner) has done quite a bit of testing, some information from him is attached
- Slow drying (in a bag) helps by keeping the moisture in the wood more uniform (rather than dry in spots, wet in others). Cracking is still a problem (particularly with fruit woods)
- Freezing seems to help, but it is slow – many weeks in a freezer
  - No doubt freezing in a vacuum would be better, but…
  - And who wants a freezer full of wood?
- Microwaving is exciting, but not fruitful (in my experiments)
  - Others report having the interior of the wood catch fire (messy AND frightening)
    - Use short bursts (15 sec max ON, 1 to 2 minutes OFF)
  - Unless you have a separate microwave for this, you will smell up the house with a wood steam smell which may not be to everyone’s taste
  - The rapid drying causes major distortions and cracking
- Boiling is fast and easy and seems to work pretty well
  - Rough turn the object
  - Boil it for about an hour
  - Let it dry slowly
  - Finish turn
- With small turnings on my mini-lathe:
  - I turn to about ¼ to 3/8 inch wall thickness
  - Boil for an hour
  - Dry for a day or a week (depending on if I boil it on Saturday or Sunday)
  - Finish turn
- Observations
  - Boiled wood dries much faster
  - Boiled wood seems as strong as unboiled wood
  - Boil only wood that distorts a lot, no need on stable wood
  - Loss of color is not a problem – it’s the outer 1/16 or less
  - Consider adding food coloring for an interesting effect

Excerpts from newsgroup discussions related to boiling, etc

The vast majority of the work in this subject area is reported by Steven Russell. Relevant material is provided below:

Sent: Tuesday, November 07, 2000 7:48 AM
Subject: Additional boiling questions...
Steve,
I have followed your "boil and bag" tests and discussion on rec.crafts.woodturning with much fascination. I started "boil and bagging" a couple of weeks ago and a few questions have arisen which I wonder if you have answered, at least in your mind. BTW, if you want to post this to the newsgroup, along with your answers, I think it would be great.

1. Does boiling for MORE THAN an hour have any detrimental effect? I sometimes put several pieces in the boil and then continue roughing. I'm not as fast as you so it might be 2-3 hours before I'm ready to remove the first batch from the boil and put in the second batch.

Answer: No, not in my experience. It does use more fuel though, so I try to keep an eye on the time so I can complete several cycles in a day. I have boiled bowls as long as two and a half hours, but that was an unusual circumstance... I had just put some bowls in the soup and I had to run a couple of errands

These took longer than I thought and the result was the previous batch of bowls was in the soup for more than two hours. When these bowls were turned, I saw no differences in turning, cutting, sanding or finishing. Therefore, I do not think that longer boil times will cause any detrimental effect on anything but your pocketbook.

2. I have been wrapping the pieces with two layers of newsprint, instead of kraft paper bags. I've got lotsa newspaper but no brown paper bags. I reason two layers of newsprint because the newsprint paper seems thinner and more porous than kraft paper.

Answer: If using newsprint, I would double or triple the wrap to come close to the thickness of the Kraft grocery bags. BTW, I get my paper bags at the grocery store... They always ask "Paper or plastic?" I ALWAYS get paper! Some chaps do not bag their boiled bowls at all and just leave them in the air to dry. Being ever cautious, I prefer to bag those puppies.

3. Could the 10% wall thickness rule be broken to speed up drying? By this I mean if you normally leave the wall of a 10" vessel at 1" thickness, could you now make it, say 3/4" or 5/8", knowing that there will be less warpage using the boiling method. Thinner walls would obviously speed up the drying process.

Answer: Humm... Yes and no! Although there is a little less warpage with boiled bowls, they still warp. I routinely violate the 1" wall thickness rule, BUT only on timbers that I KNOW will let me get away with it. The problem you may have is, the piece may warp more than your reduced walls can accommodate. This will leave you with a shorter bowl, or a piece of firewood.

If you really want to speed up the after-boil drying, you can try microwaving, solar kilns or dehydrators. It is always better to have a little more thickness than less. One reason I still turn thick walled roughcuts, is the options is gives me when finish turning. I can make a dramatic rim, or change to profile slightly and still have enough meat to do it.

Having said that, you can try reducing the wall thickness, but go slowly in incremental steps until you reach a level that is optimum. On some timbers and burrs, I can turn a rough wall to 3/8" and still get a 1'4" or so finished wall out of it. Most timbers will not allow this. You have to know your timbers drying characteristics very well.

4. Would this method work for small pieces of UNTURNED timber. What I mean is that I turn a lot of boxes and generally make these from green wood, roughing them and then letting them dry, and re-turn. I've had pretty good success doing them this way but I would like to speed the process up a little. I'm wondering if I took a piece of green timber, say 3" square by 5" long, and boiled it, let it dry overnight and then end coated it, if this would reduce the splitting that occurs in a lot of the pieces. In this fashion, I would not have to rough out so many boxes when I get a piece of unusual timber. I would simply cut the timber into suitable sizes, boil, hot wax end-coat, and store for later use.

Answer: Yes, boiling will work for solid pieces of timber as well. I commonly boil some of my resawn spindle turning stock (up to 4" x 4" x 18") with great success. There is a chap in Australia who boils dimensional lumber to reduce drying defects and speed up the overall drying process. He reports very good success with the process. As I have little need for traditional dimensional lumber, I have not researched this aspect much.

However, as a box maker you know that you will still have to rough out these boxes and wait a bit before returning, if you want the best fit possible. I like to let non-boiled roughed out boxes wait a year before finish turning them, if possible. Also, after I begin to make the finish cuts, I let the box sit for two hours before completing the final fitting of the lid.

BTW, I have actually "fried" several test pieces in hot wax for 5 minutes or so but cannot find them in my shop to see how they have done :(One of these days I'll find them and probably experiment with larger pieces.

This is a common practice with instrument makers who season their own timber. The "frying" removes all water near the surface (replacing it with wax) and insures even SLOW drying.

5. Have you tried removing the roughouts from the bag, say in a month, to speed the drying up a little. Difficult timbers or particular bowl circumstances might dictate leaving the roughout in the bag but a lot of timbers, like Magnolia, might be able to be removed earlier from the bag.
   Bill Brachhold
   Gainesville, Florida

Answer: Yes, I have... You would not believe the number of drying permutations I have gone through! :-0 This is another highly variable area, but it can be done. Some timbers can be successfully removed after a fortnight's stay in the bag. Others need longer, some can get by with even less than a fortnight in the bag, but it really depends on the timber and the post-bag ambient drying conditions. I have removed some timbers from the bag in as little as a week. This is rare though.

I live along the Texas Gulf Coast (high heat and humidity) therefore, all of my preliminary drying is done indoors. Stage one and two are done in climate controlled conditions, stage three and four are in exterior ambient conditions. If you have any additional questions, please feel free to contact me. Take care and all the best to you and yours!

Letting the chips fly...
Steven D. Russell
Eurowood Werks Woodturning Studio
The Woodlands, Texas

From: "Steven D. Russell" benzer@flash.net Subject: Re: boiling blanks, pt.2

Date: Wednesday, October 11, 2000 9:20 PM

Hello Buddy,

I have pasted a follow-up article to this email that should answer your questions. This article appeared recently in "More Woodturning". Although this article mentions 2-3 months drying time, some of my boiled bowls are ready to go in as little as 3-4 weeks. It really depends on the timber and the physical characteristics of the drying room's environment. If you have any additional questions, please do not hesitate to contact me. Take care and all the best to you and yours!

Reducing Timber Drying Defects by Boiling - Part 2

By: Steven D. Russell
Eurowood Werks Woodturning Studio, The Woodlands, Texas

Many woodturners who read my initial report on "Reducing Timber Drying Defects by Boiling", have requested more information on how long it took for the various timbers in the test to reach equilibrium moisture content (EMC). In addition, many have asked for guidelines on how long it will take for other boiled timbers to reach EMC, after they are bagged.

Nearly all of my rough outs are dried indoors, in a controlled environment that is heated and air-conditioned year round. When the blanks have reached EMC, they are moved outside and stored in a part of the studio that is not temperature controlled. The dried rough outs remain in the post-drying staging area of the studio, until they are selected for final turning.

Most of the four hundred and fifty pieces in the boiled vs. bagged test, reached EMC in approximately two to three months. Some took a bit longer, depending on the species. On average, boiled rough outs will reach EMC approximately 25% faster than traditionally air-dried and bagged pieces. Timbers included in the boiled vs. bagged test included: Maple, Walnut, Mulberry, Sycamore, Pecan, Winged Elm, White Ash, Flowering Plum, Bodark, Sweet Gum, Black Ash, Cottonwood and a few others.

Unfortunately, there is no "rule of thumb" I can give you for determining when various boiled rough outs will be ready for finish turning. There are just too many variables to give a hard and fast rule. I can tell you, that your boiled rough outs WILL dry 20-25% faster, than non-boiled timber. I have heard from turners who indicate a reduction in drying time even greater than 25% on their boiled pieces. However, I can only personally attest to a reduction of up to 25%.

Many variables influence the length of time required for boiled timbers to reach (EMC). These include, but are not limited to the particular species, the wall thickness/uniformity of the piece and the percentage of post-boil free/bound water contained in

the subject piece. In addition, the length of time the blank is allowed to air dry before it is placed in the paper bag, can impact the time required to reach EMC.

Other variables include the average EMC for the area where you live, the ambient humidity of the drying room, the amount and velocity of any cross-ventilation (either a/c or heat) in the drying room and the average ambient temperature of the drying room.

In my studio, I do not use a moisture meter to determine when the blanks are ready for final turning. I rely on close visual observation in the shape of the tennon boss. When the boss is sufficiently oval, it is ready to give it a go. In four years of turning, this system has never let me down. It does however, require a substantial knowledge of the particular timbers drying characteristics.

Currently, I have over 1,500 rough outs that have reached EMC and are ready for finish turning. Having a constant supply of dried bowls coming out of drying production is invaluable for a production turner. Obviously, not every turner can maintain such a large store of dried rough outs. We all want to have bowls dried on demand! Few of us care to wait the several months necessary, for nature to take its course.

Therefore, last summer I decided to embark on a comprehensive series of timber drying tests. My goals are: 1.) To find the fastest and most efficient way to dry timber for woodturning and 2.) To reduce drying degrade to an absolute minimum. A significant challenge, but one that will hopefully illuminate this subject and uncover new ways to dry timber efficiently and successfully.

In my next phase of timber drying tests, I will cover Pentacryl treated timbers and timbers that are dried from the green state in a microwave oven. Microwaving can significantly speed up the drying process and yield excellent results, if proper care is taken. Over the last three years, I have had excellent results with microwaving various timbers. Using my proven process as a starting point, I intend to "push it to the limit" to discover how fast I can dry a bowl, without any drying induced degrade.

Pentacryl is a liquid compound of siliconized polymers that can help to reduce drying degrade and speed up the drying process. I will test several methods of applying the Pentacryl including, soaking, brush on, spray on and vacuum assisted infusion. The results of Phase-2 timber drying testing (Pentacryl treated and microwave drying) will be published in a future issue of "More Woodturning". Phase-3 testing is scheduled to cover freeze drying and live flame curing.

As always, I remain available for any questions you may have concerning this or any other turning related topic. You may reach me via E-mail at benzer@flash.net or snail mail at Eurowood Werks Woodturning Studio, 22 Thornbush Place, The Woodlands, Texas 77381-6250.

Can you boil several blanks at a time? (I don't pressure cook much > because of the size of the cooker limits)

Yes, absolutely. However, although I have a pressure cooker, I prefer to use an open pot. Pressure cookers save time and fuel, but they cost quite a bit and are limited in size. Also, my pressure cooker is quite small and will not hold anything over 10" or so. That is way to small, as most of my market is 9-18" bowls.

Open pots can be had for little money or even cobbled from scrap or old 55-gallon drums that contained food safe materials. When boiling, I load as many bowls or platters in the pot as it will hold. Since I have already paid to heat the water, I want to process as many blanks as possible in each boil. Usually, I boil when I am roughing out lots of bowls. Then, every hour I will remove the boiled bowls and reload a new batch of bowls into the (now) boiling water.

It becomes a production line sort of thing. Rough turn as many bowls as possible in an hour, stop and unload the boiled bowls from the pot, reload with the just turned bowls and set the timer, return to roughing out bowls. Over and over again, till I drop at the end of the day. Such is the life of a production turner, lots of repetition.

Sometimes, the design will limit the amount of pieces you can put in the pot. For example, semi enclosed hollow forms, hollow forms or tall roughed vases etc. But I load as many as I can fit in the pot at all times. You can really load lots of platters into the pot because they stack so well. :-)

Hello,

In the last couple of days, I have removed about 450 bowls and platters from drying production. These bowls/platters were dried by various methods in paper bags. Some of the rough outs were boiled (1-2 hours - no end grain sealer and placed in bags), the rest were just placed into the bag straight off the lathe (no end grain sealer). The species included in this latest analysis: Maple, Walnut, Mulberry, Sycamore, Pecan-crete, Winged Elm, White Ash, Flowering Plum, Bodark, Sweet Gum, Black Ash, Cottonwood and several others.

As many of you know, I have become quite fond of the "plain paper bag" drying method. :-) It is a significant time saver after a long day roughing out bowls. It's quick, cheap and works very well indeed. However, there are certain times when other methods would work better. It really depends on the characteristics of the piece at hand.

Does the piece include "branchlets" in the sides/bottom? Is there wild grain on one side and straight grain on the other? Is the rim/bottom of the bowl near the smaller growth rings (closest to the pith)? Is the species well known for gross distortion or cellular collapse during drying? Does the species exhibit "honeycomb" degrade or severe corrugation when dried?

If so, then I would suggest you augment your "plain paper bag" method (rough out placed in the bag without alteration of any kind) with a boiling cycle. Here's why...

Of the 450 bowls/platters included in the analysis, the largest percentage of drying defects were noted in the "plain paper bag" group. The least drying defects were noted in the "boiled, then bagged" group. The "boiled, then bagged" group had little to no drying defects (splits, fissures etc.) and exhibited significantly less gross distortion (warp, twist or other undulations) in the samples.

Species with the largest amount of defects present when turned were Sycamore and Pecan-crete, followed by Sweet Gum. For example: Several of the Sycamore and Pecan-crete pieces had "branchlets" (immature/overgrown branches) in the sides or bottoms of the test pieces.

Of the (20 bowls) in the "plain paper bag" group that contained these "branchlet" defects, (16 bowls) showed splits through these branchlets. Most of the splits were limited to the diameter of the "branchlet" (12 bowls), other splits extended well past the branchlet boundaries (4 bowls). All of the branchlets were treated on both sides with thin CA glue before going in the bag.

Those in the "boiled, then bagged" group containing this "branchlet" defect (21 bowls, 5 platters), revealed NO splits in any of the "branchlets". Gross distortion on the rims of the bowls and platters was significantly less on the boiled pieces as well. They still warped a bit, but the overall rate was significantly less than the "plain paper bag" group.

Other comparisons demonstrated similar results. Black Ash bowls that were "boiled, then bagged" (12 pieces) containing heartwood (wild grain) and sapwood in the same piece, showed significantly less gross distortion than the "plain paper bag" pieces. All of the Black Ash test pieces that were "boiled, then bagged" had zero splits. Those in the "plain paper bag" group (10 pieces) revealed (2) minor splits.

Bowls that were intentionally turned with rims/tops very close to the pith also exhibited similar results. Of those in the "boiled, then bagged" group (45 bowls, 12 platters), only (1) bowl contained a split. Those in the "plain paper bag" group (40 bowls, 15 Platters) contained numerous split defects (31 bowls, 12 Platters) in the rims at/near the pith zone.

This clearly demonstrates that the addition of the boiling cycle helps to prevent/eliminate many common drying defects. So for me, I plan to "boil, then bag" much more often! The "plain paper bag" method will be reserved for pieces whose grain character and overall defects are within the demonstrated success profile. Other pieces that exhibit defects or possible grain/growth ring compromises will get a "bath". :-)

I have also found that boiled pieces dry much faster than non-boiled pieces. Another advantage of "boiling, then bagging" comes when you sand the piece. Species that tend to clog the sandpaper when traditionally air dried, offer little to no clogging when they are boiled. Also, most if not all unwanted guests are eliminated in the boil cycle. This is especially important if you dry your bowls inside your home and you want to stay out of divorce court. :-0 Boiled bowls, platters and hollow forms allow you to "push the envelope" with the least amount of drying degrade.

Some turners say that the reason they do not like to boil is the inherent color loss. In my experience, the outer 1/16" or so WILL loose color, but below that the color is unaffected. I have carefully compared the color in air dried and boiled pieces many times. IMHO, there is no detectable difference between the color, shading or tone values in boiled timber and that of traditionally air-dried timber. If your rough out is only 1/8" or less in thickness, you have a valid point. However, on a 12" bowl with a wall thickness of 1", the point is mute IMHO.

Obviously, nothing works in every situation, with every timber. Steaming offers yet another drying degrade reduction method. Items can be suspended above the boiling water on racks, further reducing color loss on the exterior of the piece. This is especially valuable on thinner rough outs or larger hollow forms that may be prone to splitting during traditional air drying. Boiling and steaming offers many advantages and can allow you to "push the envelope" just a bit further. Good luck to you and best wishes in all of your turning endeavors!

Letting the chips fly... Steven D. Russell Eurowood Werks Woodturning Studio The Woodlands, Texas

Useful URLs

http://bh.kyungpook.ac.kr/~sjpark/st3-2-1.htm - lots of information on kiln drying and drying in general