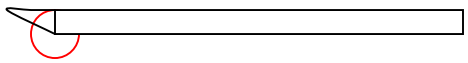
Inside the Bowl

The ease of a finishing the inside of a bowl begins with the shape of the outside. The interior of a shallow bowl is much easier to finish properly than is a steep-walled bowl. As the wall angle becomes sharper, it becomes increasingly difficult to achieve a parallel interior wall with no tear out and a smooth, even flow.

A portion of this difficulty with steeply angled walls is that the bevel of the bowl gouge begins to be restricted by the angle of the wall. As an example, a typical fingernail grind is at a 60-65^{o} angle. As soon as the wall angle exceeds 65 ^{o}, one can't both rub the bevel and have the cutting edge in contact with the wood. A sign of this occurring is bruised and burned wood at the point when the turner "pushes" hard to finish the sweep to the bottom. Generally this isn't evident until after the finish is applied – leading to great frustration.

This issue can be addressed in a number of ways:

1. Design you bowls with a shallow wall angle.
2. "Ease" the back of the gouge. Since the back of the gouge is the part that is hitting the wall, this allows a cut angle greater than the angle of the gouge.



3. Use a gouge ground to a steeper angle than the normal bowl gouge. Trent Bosch sells a finish gouge with a stepper angle that can be used on the interior as well as exterior finishing cuts. There is also a Hout finishing bowel gouge made especially to solve this problem. Some turners appear to keep a fingernail grind bowl gouge as well as a gouge with a grind angle of +- 45 degrees. The 45-degree ground gouge becomes the finishing gouge of steep walled bowels.
4. Use of scrappers also can solve this problem – but the problems with tear out increase with this solution.

As the interior wall approaches final thickness one has to face the four great challenges of the interior of a bowl. First is it parallel to the exterior surface. Second is the tear-out factor. Third does the wall thickness "feel" right and finally is the "sweep" of the surface satisfactory.

Parallel Surfaces

On the inside of the bowel - remember to have the line of the chisel follow the outside form from the very beginning. It is easier to follow the outside form on the way to the finished thickness than it is to try to clean up the parallel walls at the very end when the bowel wall is thin.

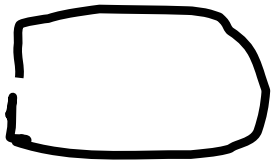
Creep up on final inside wall shape from the very beginning. If you have followed the outside form from the very beginning, the walls with easily end up parallel and of the same thickness.

This approach is at odds with the school who believe one should completely finish the first two inches, then start on the next two inches, etc. I suspect that when turning dried wood of moderate size, the "creep up" approach works well. When turning green wood to a finished form, or turning bowels over 12 inches, the two-inch at a time may be more appropriate.

Several methods are available to test if the inside and outside walls are parallel. First test is the eyeball methods – do they look parallel and have the same thickness. Second test is the feel of the walls. It is amazing how accurate the sense of touch can be. Trust your fingers.

With increasing bowl depth, the length of the fingers becomes a limiting factor in gauge wall thickness and parallelism. At this point one can begin to use any one of the numerous commercial thickness gauges. In using them be careful of leaving tracks in the bowl walls caused by increasing thickness of the walls forcing the end of the thickness gauge further apart. Better to set the gauge to about a ½ inch, and eyeball the variations in wall thickness, than to allow the gauge to be forced open by the variation in wall thickness. This is another of those errors that doesn't show up until the finish is applied and it is too late the correct the problem.

In lieu of the commercial thickness gauges, one can make your own at minimal cost use 3/8-inch cold rolled steel from the local hardware store and bending them into ovals of different sizes.



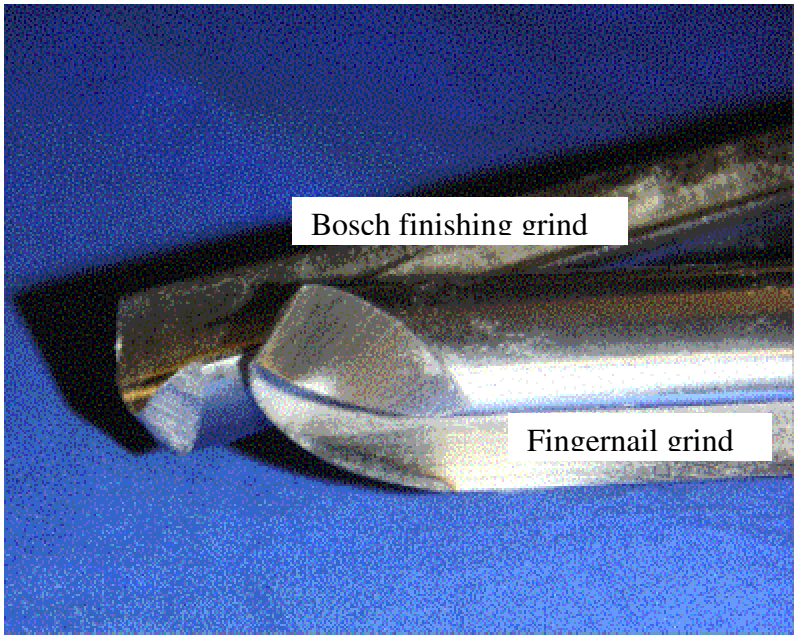
The gauge is used by riding one end against the wall and eyeballing variations in thickness at the other end. Care must be taken to keep the two ends tangential from each other. In other words, the reading won't be true if the two ends are not at right angle to the wall being measure. Best way to understand this problem is to do a test read on a curve where you can see both the inside and outside of the curve.

White chalk is an excellent way to mark where you have found variations in wall thickness. The chalk is easily removed without residue and is quite visible when the bowl is spinning. Mark the high spots and remove material until the white is gone.

Tear Out

On each revolution of the bowl, one is cutting end grain twice. Invariably this will lead to some degree of tear out. Tear out will occur with scrappers as well as gouges. Tricks to minimize tear out are:

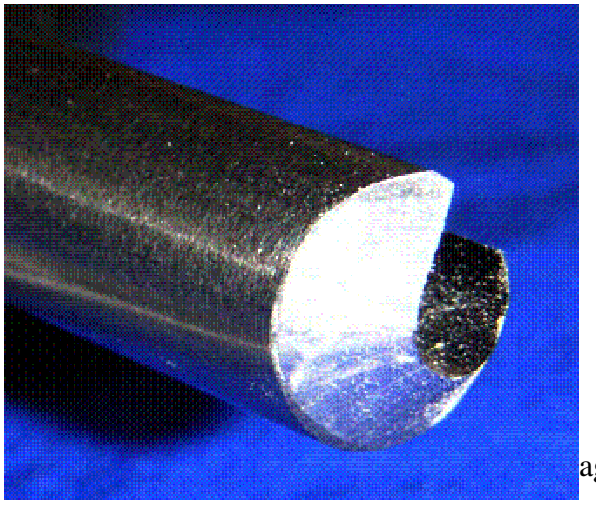
Scrapers – use a freshly sharpened scraper, light cuts with the scraper tilted up at a 45-degree angle. The angle allows the cut to be more of shearing cut with begins to minimize tear out.



Gouges – my experience is that a shearing cut on a sharp gouge is the best way to clean up tearout. This can be a bit difficult to describe, but here goes – the shearing cut inside a bowl is achieved by rubbing the bevel and using the left side of the gouge near the tip as the cutting edge. This works rather easily if the gouge is properly shaped as a classic Ellsworth grind.

The key is the hump on the top of the gouge's cutting tip. If the gouge is sharpened with a straight side, disaster is sure to follow.

An alternative cut to clean up tearout with a gouge is the vertical shaping cut in the same manner as used on the outside of the bowl. Again this can be a disaster if the gouge doesn't have the classic Ellsworth grind. You must use a light hand with this cut. It is rather easy (I know from experience) to have a nasty cut if there is a hook on the edge of the gouge or your hand is a little heavy. This danger is further compounded by the fact that this cut is typically attempted as one is nearing a finished bowl. One runs out of wood to make corrections if there is a catch. A bit of practice on this cut before using it on a good piece is recommended.



Many turners will tackle tear out by changing to a gouge with a steeper angle than the 60 degree Ellsworth grind. They go back to the older angle of 40-45 degrees. This is the principal behind the Hout gouge and the finishing gouge sold by Trent Bosch. I am beginning master the use of the Bosch finish grind and it produce good results.

The Dreaded Bowel Bounce

One of the frustrating things that occur is bowl bounce. This is when the tool begins to leave the wood and then slaps back down onto the wood. There are many causes, but the results are all much the same – chatter marks on the bowl. We will start with the simplest first and progress from there.

1. Bowl is out of round – this particularly occurs when turning green wood. First cure is to grab a handful of shavings and support the rim with the left hand on the outside of the bowl. Variation of this would be to purchase a bowl steady.
2. Bowl is cracked – if the wood stress is sufficient a crack may develop. Until the crack is stabilized, the bowl will move giving one a bounce every time the tool pressures the cracked area. Cure is to glue the crack with straight CA or sawdust and CA.
3. Tool rest is not solid – check tightness of the tool rest and the banjo.
4. Move the tool rest closer to the bowl.
5. Change the speed – sometimes just changing the lathe speed up, or down, will cure the bounce.
6. Change to a stiffer tool – as the unsupported length past the tool rest increases, so do the flex at the cutting edge. That flex can start the gouge bouncing against the wood. If you are using a 3/8 gouge, try the ½ gouge, it's stiffer and let subject to flex.
7. Retighten the chuck – wood is sometimes compressed by the 4-jaw chuck, allowing it to loosen. An attempt to tighten the jaws further never hurts.
8. Check the tightness of the headstock – I have been known to forget to fully clamp down the headstock after I have moved it. Same goes for the tailstock.
9. Lighten the cut – once the bounce starts, a heavy cut only makes it worse.
10. Make the bowl smaller – 4 jaw chucks have limitations. You may be exceeding the maximum capacity of the chuck you are using. They don't tell you much about this limitation, but each chuck and jaw set has a size limitation that is a function of the diameter of the bowl, depth, green or dry wood, type of wood and many other variables. Once these limits are exceeded, the piece simply is not stable – resulting in the bounce. The alternative to making the bowl smaller is to change the chucking method. Some turners use a faceplate on the bottom of the bowl as a way to turn larger pieces. This changes the overall design, but may allow one to work with larger pieces.

    I emailed Oneway and asked them about the limitations on their chucks. There is there answer:

    Sorry I cannot answer your question, as I don't know the answer. There is indeed a great difference between a 12 x 3 bowl versus a 12 x 10 bowl. Weight is not such a factor but it

is in my experience the type of wood. For example, to me oak is a terrible wood to turn, very prone to chatter. I think it is because oak is a very hard wood, but very porous making it hard to cut but not uniformly stiff. Wet wood versus dry wood is also an issue. People will take bigger cuts in the wood if it is wet than dry. Although wet wood is easier to cut the size of the cuts seems to be greater than the increase in the ease of cutting. More importantly is the tool that is used. I got a call from a person who swore that the best tool for hollowing the inside of a bowl was an old Stanley chisel that he just picked up to try and found that it worked better than anything. He could really make the chips fly. He could hollow a 6-inch ash bowl in only 2 hours. Obviously for him no chuck would work well. Seems like other people can hollow a bowl without any stress on the piece at all.

I posted the same question on the AAW bulletin board and received the following answers:

11. Make sure that the tenon isn't bottoming out in the jaws. Confirm that there is a true surface for the top of the jaws to rest against.
12. Check to make sure that the setscrews on the chuck insert are fully tightened. I just checked and they were loose.

Final Thoughts

Grinds to make a difference. Subtle differences in the grinding of a bowl gouge can make a very **large** difference in the ability to succeed in a cut. Jigs can sufficiently improve the consistency of the sharpening process, but human skill and attention is still needed to have the bowel gouge cut as expected. Examples of this are through these pages. The Ellsworth grind is to 65^{o}, the finish grind is to 45 ^{o}. The finish grind will leave a smooth surface with little tearout, the Ellsworth grind is superb for hogging out material. If you are not achieving what is expected, carefully inspect the profile of your gouge. It's easy for the profile to drift away from ideal. I keep a copy of the Ellsworth grind taped next to my grinder. One club member uses a Oneway doubled ended gouge. One end of the gouge was sharpened by David Ellsworth personally and is kept as a reference for all future sharpening.

Next thought. Lighting is important. You can't tell if you have achieved that clean inside sweep, if you can't clearly see inside the bowl. Use a hand held light as you check inside the bowl.

Many times it helps to take the bowl, still chucked, off the lathe and look closely before proceeding to finishing. Be sure to "look" with your hand when the bowel is off the lathe. I can't explain it, but your hand will "see" things differently on and off the lathe.

Let it rest. It amazes me how much more I can see the day after I have finished a piece. Many times it is wise to let the finished bowel sit until the next day. Look at it again and you will find things you missed the day before.

Some blemishes simply don't show up until the finish coat is applied and the surface is a little glossy. Consider applying the first coat of finish on the lathe and if faults appear, back up, re-cut the bowel and redo the sanding etc. This isn't the time to get in a rush.

Couple of final thoughts on who to achieve a smooth flow of the inside wall; first, don't hesitate to use a rotary sander. The five or six inch size will go a long way towards smoothing out those high / low spots.

Don't be afraid to use the coarser grits sandpaper. Better to start with a 60 or 80 grit sandpaper and move up from there than to over-sand with 220 grit. When you feel a wavy bowl, it frequently is a sign of over-sanding. The softer wood is abraded away more rapidly than the harder growth rings, leaving a waving surface. Using a larger sanding disk with a hard backing helps to minimize this problem.

Another trick borrow from furniture making is to use a curved cabinet scraper to help in the final shaping of the surface. This avoids the wavy problem mentioned above.

Please give me your thoughts/additions/experiences to this topic. Others learn by tales of mistakes and things that don't work as well as those that do.

Email them to:
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