Coring with the Oneway System: Hints and Imperatives

Late Follow-up to SCW's February, 2020, Demo

Wells Shoemaker, September, 2020

Turners can choose from two deservedly dominant coring systems: The **Oneway** and the **McNaughton**. They have different virtues and demands...and disciples.

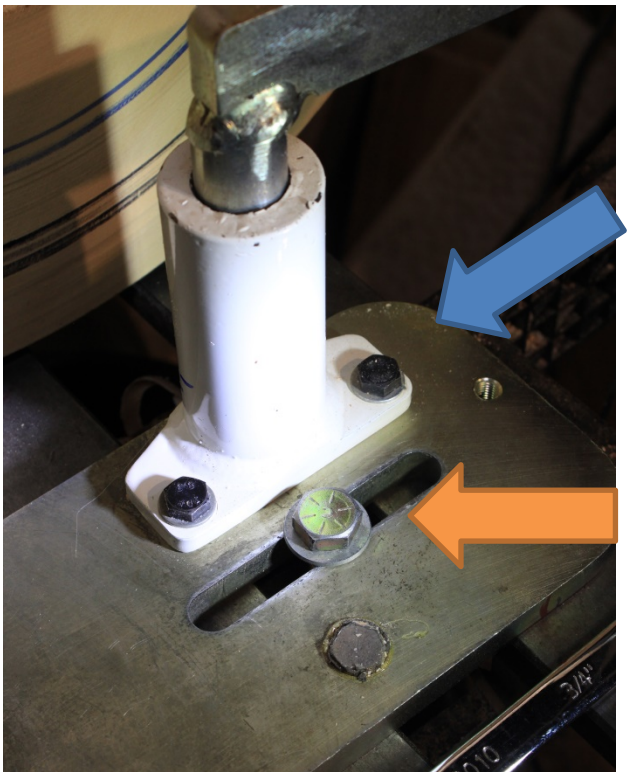
The Oneway system uses a rigidly mounted platform on the lathe ways with (a) a cutter on a pivoting steel arm and (b) a support post with a short arm that inserts into the cut to support the cutter once deep in the blank. It cuts what a geometry teacher would describe as segments of a sphere. Imagine using a sword to slice a medicine ball horizontally at different heights from the floor to form a shallow dish, a medium bowl, or a full hemisphere. It's generally easy to modify that roughed out starting point to the catenary shapes or other forms favored by aesthetes. Oneway enthusiasts note that it's quite safe, not too scary, and it can crank out a lot of cores efficiently. Cutters can be sharpened and replaced...and they're available in carbide for busy turners. The cutter arms come in 4 sizes, conveniently numbered 1,2,3,4—intended to cut cores with a diameter of 6-7", 9-11", 13-15", and 18-20". For a 16" lathe, the first two are the only ones turners can use, and those are heavy favorites for online ordering sources.

The McNaughton system uses a stationary post with a patented guide through which the turner can cautiously advance a stout, curved steel arm with a cutter welded to the end. The cutter can be sharpened but not replaced. The advantage of the McNaughton is that the turner is not limited to a spherical cut. In skilled hands, it can cut wide, shallow cores, even platters, and some novel shapes favored by advanced turners.

I learned to use the Oneway system from Kirk deHeer in one of his 5 day courses at Craft Supply. Kirk is a master of both tools, obviously, but in his side business of harvesting, coring, and drying nested rough blanks, he uses the Oneway for volume and efficiency.

In the 3 years since learning the basics, I've cut well over 100 cored sets, which has been enough to learn the basics, dodge most of the beginner mistakes, and start learning some subtleties. The following notes represent a list of those secondary hints.

Plate mounted with cylinders in place



Cutter arm cylinder permanently bolted (blue)
Cutter arm slide adjustment bolt (orange)

1. **Set Up**
    a. Your vendor will want to know the make and model of your lathe, as Oneway has designed a support structure for lathes of different swing radius, as well as different clearance between your ways. They are *not* interchangeable, which is a real issue if you are buying this unit second hand.
    b. When you open the heavy box, you'll find
        i. a massive steel plate with several machined slots (see above)
        ii. two heavy walled vertical cylinders bored to different diameters to avoid confusion. These bolt to the plate.
        iii. a swinging arm with an integral pivot post and cutter tip and a sturdy lever/handle to advance it along a circular path. You can make your own hardwood handle if you're good with spindles and boring.
        iv. a shorter, engineered, curved steel arm attached to a pivoting post
        v. a ¾" box end wrench and custom fittings to grip your ways.

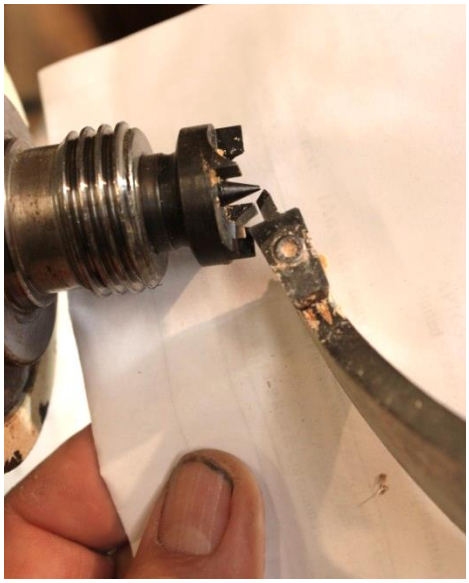
    c. Assembly instructions are good. A lesson or hands-on demo helps more!

    d. Alignment and Adjustments: *Critical!*
        i. Put a drive center into your head stock so you can use the center point to line up the cutter at the right height.

        ii. Insert the cutter assembly into the rear cylinder. Swing the cutter until the cutter point comes around to the point on the drive center. They

need to meet spot on. If the cutter is too high or too low, use the adjustment screw at the bottom of the pivot. (see photo below left)

iii. Adjust it until the points line up perfectly, and then tighten the 11/16" nut that secures the adjustment. (It can vibrate out of adjustment, so you may have to do this again as time goes by. Not a bad idea to recheck it every 3rd or 4th session.)



iv. Next insert the support arm in its cylinder.

v. Swing the cutter arm so that it runs above...just barely touching...the top of the support arm. (photo below right) If the support arm needs to be raised or lowered, adjust the same way as the cutter arm.

Height adustment at bottom of rotating cutter arm and support post

Cutter arm supported by post to start cut in guide groove Arm should glide over the surface barely touching

2. Mounting platform hints

a. Blow out the cylinders for the blade pivot arm and the support bar, since sawdust and debris can creep into those holes and raise the arms out of the perfect adjustment you made above.

b. When repositioning the support bar, which typically you'll do 2-4 times per core, blow the sawdust off the platform each time so that you tighten the plates flat, not tipped out of adjustment.

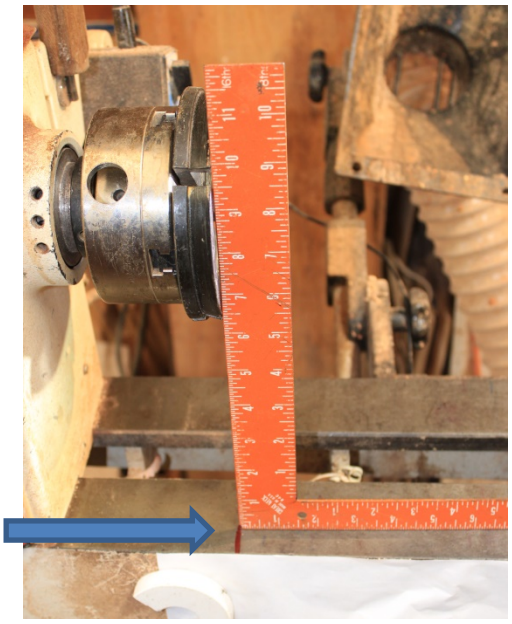
c. Epoxy a magnet to the platform to hold your wrench...really handy.

d. If you are removing the little screws that hold your cutter in place, along with that wee 7/64" Allen wrench, you can use a magnet to keep those invisible pieces of metal from disappearing into the forest of shavings below.

e. Depth of cut—This was a major source of errors, at least for me. The next 4 photos illustrate steps for a #2 cutter placement for a single core.

- The #1 cutter makes its deepest penetration 4" from the mounting plate.
- The #2 cutter, the most frequently used, reaches 5" from the mounting plate.

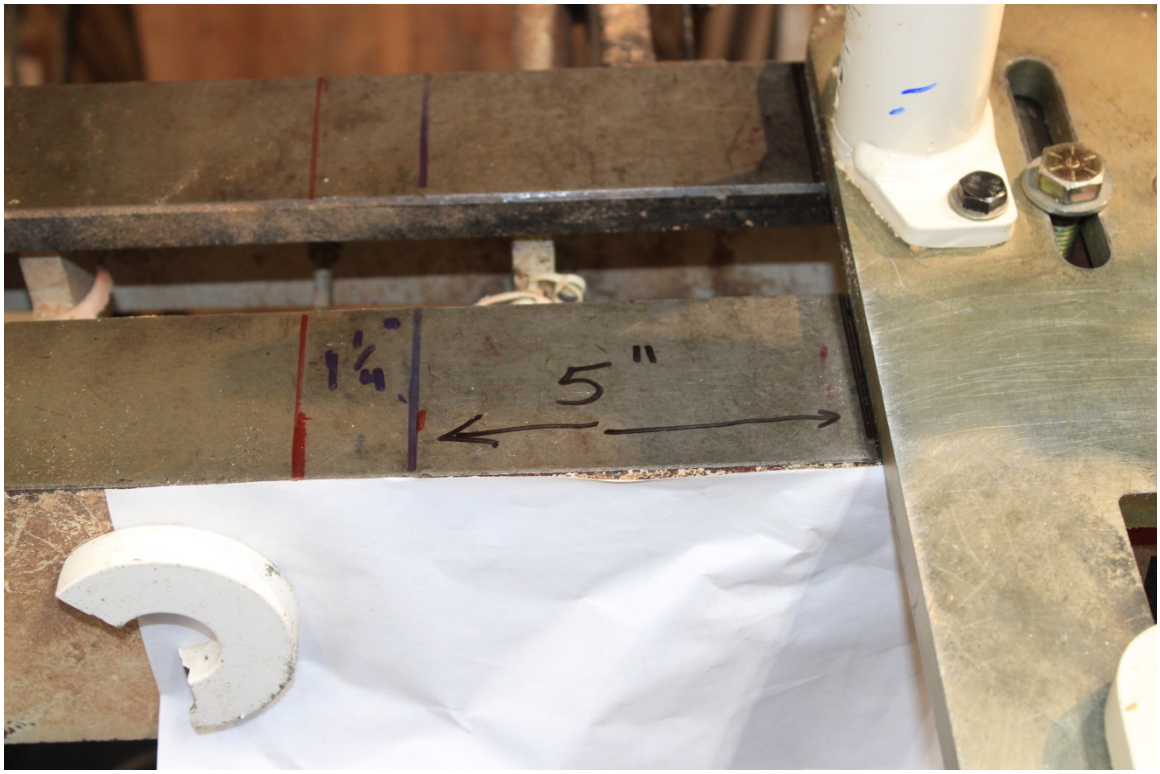
Next step is to mark directly on your ways where to make the line that defines where to tighten down the platform.



1. Use a Sharpie to mark the outermost projection of the chuck jaws on the ways

2. Determine the desired thickness of the base of the bowl...in this case 1 ¼"

3. 5” distance from blue line marking bottom of cut to the line for the platform



4. Mounting plate in proper place. Cutter will bottom out, leaving 1 ¼” thickness bottom of bowl

f. It gets more complicated when you are making multiple cuts or switching from a small arc #1 cutter for an inside bowl to a larger arc cutter for the next one. That's Coring 201.

g. After setting up for the desired depth of cut by lining up the edge of the plate with your Sharpie mark on the ways, the next task is to pin down the entry point of your cutter. Loosen the cutter arm slide adjustment bolt and slide the platform toward or away from you until the cutter lines up with your mark on the blank. Tighten that bolt securely!

You're almost there, but there are some important hints to follow before you turn on your lathe.

3. **Cutters**
    a. The **HSS cutters** dull fairly fast, in as few as 2-4 cores, depending upon the abrasive nature of the wood, how dry it is, and how large your core.
        i. A 12” diameter hemisphere has 4 times greater surface area to cut than a 6” diameter hemisphere, and your edge will dull that much faster. Just like turning with a gouge, if you find you’re pushing with your shoulders, your blade is likely dull.
        ii. I keep a stable of 3-4 cutters and change them out, rather than interrupting everything, setting up the grinder jig, and sharpening them one at a time. HSS cutters cost $25-30 each—cheaper than one hardwood blank ordered online.

    b. **Carbide cutters** last at least 4-5 times longer than HSS. They cost close to $50, but you’ll likely never need to replace one. They can also be sharpened with the same jig on a CBN wheel.

    c. It’s possible to **touch up the edge** of either an HSS or carbide cutter using a flat diamond “stone.” I use the little one that looks like a credit card. Place it flat on your lathe ways, apply a couple drops of lapping fluid, lay the cutter flat and rub it in circles. This freshens the edge, and for carbide, that may be all you need to do.

    d. I keep dull and sharp cutters in separate containers, and then sharpen a bunch of them using the jig.

    e. Can’t tell the carbide from the HSS? They look identical to me, but they’re not. If you have a strong magnet, the HSS one will cling for dear life. The carbide has a rather weak attraction.

    f. The **cutting edges are basically small (clever) scrapers.** When sharp, they make a satisfying raspy noise and a characteristic feel as they peel off thin shavings. If you don’t hear that—and hear rubbing or throbbing instead—don’t keep pushing in vain. Rather, find out why.

        i. Most likely, your cutter is dull.
        ii. Your cutter is clogged with a tangle of moist fibers and the edge can’t reach the fresh wood. (see photo below p.8)
        iii. Cut chips have plugged up the slot, and you can’t advance the cutter because it’s all wedged inside. Your lathe motor may even stall out. Back out, move back in, and get used to doing that often as a routine, especially with moist wood. Sometimes it takes 50 of those moves.

Tangle of stringy moist fibers blocking cutting edge

Wad of shavings packing slot

iv. *Big Hint.* If you can't advance the cutter after it was working fine...don't try to overpower it! Depending upon the diameter of your core, the support post can obstruct the advancing cutter arm once you get in fairly deep. That's not a mechanical fault, but rather a human oversight. You need to advance the support arm deeper into the slot. That pulls the post closer to the blank, makes room for the cutter arm to advance freely... and you're back in business.

4. Wood idiosyncrasies with coring

a. Wet wood cores nicely as a rule, and the moisture may help with overheating. However, some wood species make long, stringy, clumps of fibers that pack onto the cutting edge like a mound of kelp on a winter beach and prevent the tool from cutting. Black acacia, avocado, and willow can be vexing! This can happen with a perfectly sharpened cutter. There's no quickie way around that. Just back out the cutter, flick off that tangle, and go back to work. You may need to back out 20-50 times to finish the core. It's better than going to the dentist or traffic school or a bad baseball game.

b. For wood doing the annoying stunt described above, if you are willing to let the blank dry for a few months, wet sap will no longer glue the fibers to your tool, and you can often core like superman. Difference between 5 and 30 minutes to pop out a core!

c. Dense hard woods, when wet, tend to core cleanly. Examples: holly, walnut, maple, madrone, cherry. When dry, you're in for a longer haul, possibly switching out a dull cutter with a 3 bowl set in the range of 14-16" diameter.

d. Wood with prominent density differences between early and late growth—oak, ash, Osage orange, Doug fir, locust—tend to chatter when dry. Stay sharp, and then clean off the cut surface with a gouge before you seal it.

e. Wood with knots will core fairly easily when wet, but when dry, the knot can be a lot harder than the adjacent wood...and it may have developed cracks which behave erratically or shatter. You'll have to find your way cautiously in that case, because it's nerve-wracking to hit those hard bumps in between soft cuts. Personally, I don't think it's worth it. You decide.

f. Exotic, super dense hardwoods are all expensive (cocobolo, ebony, kingwood, chok te kote, rosewood, lignum vitae). Coring gets more mileage out of your dollars, worth it even for relatively small pieces, but prepare to spend some quality time standing at the lathe. These woods will core with patience, but you'll want the carbide cutter, a mask, and your dust collector. These gorgeous woods are full of nasty irritants and allergens. (We should leave those trees standing in the tropics.)

g. Burl tends to cut into crumbles rather than ribbons. Paradoxically, that makes coring easier, as the crumbles clear out of the slot without much hassle, even when wet.

Cored maple burl shallow bowls

5. **Heat**

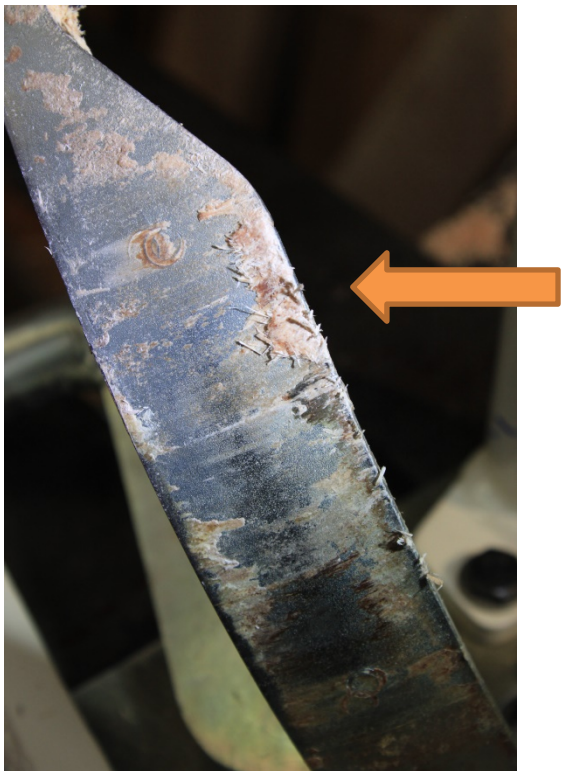
   a. **Steel edges don't like to get hot**, although HSS was metallurgically designed to endure high temperatures better than carbon steel.

   b. More to the point, **wood *really* doesn't like to get hot**. A large difference in temperature between a cut edge and the cooler, perhaps moist wood underneath can lead to heat checks, and your piece may actually start to warp while you're coring, leading to binding tools, wobbles, & squeaks.

   c. The cutting edge, especially if dull, is going to get hot with friction. Freshen your edge, maybe run a little slower RPM.

   d. The Oneway support arm, which inserts into the slot you are cutting, can rub on the wood if it is adjusted poorly...or if the wood is warping as you work. Also, the sugar in the sap of wet wood can heat up and form a glaze on the cutter arm.

      That makes it effectively thicker, and then it will rub, make a bad noise, and get really hot. I branded my left hand with a perfect imprint of Oneway steel when I touched a hot one without a glove.



   e. So wear that glove, at least on your left hand! Whether you're flicking a tangle of fibers off the cutter, or tipping off a pack of shavings, or rubbing up against the support arm...better to let the glove feel the heat.

   f. *No smoking.* If your core is smoking, something is rubbing badly, and you need to find out what's wrong. After all, you can start fires with friction heat.

      i. Take the piece off the lathe, pour water into the slot to cool off the wood (won't hurt anything), verify all your original set-up calibrations in case they have vibrated out of adjustment, sharpen the cutter, and try again, perhaps at a slower RPM. (I usually start out around 300-350).

ii. If you conclude that the wood has warped as internal tension was relieved—not rare—your adjustments are OK but your blank is unhappy. It's not a difficult fix. Loosen the main bolt and slide the platform so the cutter makes contact with the wood 1/16" to 1/8" closer to the center. That will cut a wider swath for clearance, and your rubbing and all that unpleasant noise should be solved.

6. Chucks: Safety and Practicality

a. The torque on a blank in the coring process can be a lot higher than any hand held gouge or scraper creates. You need a lathe that runs on 220V (2 hp minimum), and you need a stout 1.25" spindle, or you risk breaking or bending something expensive.

b. All of the energy of that rotating blank...which "wants" to twist off or shear the tenon...goes through the chuck. This is not a delicate operation for either the tool or the tenon.

c. You need the heaviest duty chuck you have, with closed gripping diameter of 4-6". The larger the diameter, the stronger the tenon, the greater the contact of steel to wood, and the happier the turner.

- The Oneway Stronghold or a Vicmarc 120 or 150 chuck with 4-6" jaws are adequate.

- Cut a precise dovetail tenon, a full 7/16 deep, with a diameter 1/8" larger than the closed chuck jaws. This way you maximize steel-to-wood grip, as opposed to holding the blank on the points of the jaws (8 points, as opposed to 12-18" of solid gripping contact...no brainer).

- **If your tenon is cut from spalted or punky wood, center pith, or soft new growth...**it's likely to fail. Sacrifice some depth and grip with more reliable wood...or don't try to core it in the first place. You really don't want to be in the way if it comes undone.

- Before coring, verify that all 8 of the screws holding the jaws to the chuck are tight...they occasionally vibrate loose and impair the grip.

- Tighten the chuck with 2 passes at each of the two key holes.

- Expansion (mortise) grip is weaker than a wide tenon. Use the tenon.

- Categorically do not try to core with any of the lighter weight chucks. Those are convenient on smaller lathes for small scale work, but they are not designed for the ardors of coring.

7. Blank Slate

a. Your blank should be recently turned true with an exterior contour that's close to what you want. Remember that this outside bowl is the real prize.

b. Core the smallest one first and work out. The internal ones are great...much nicer than a pile of shavings... but don't compromise the biggest one!

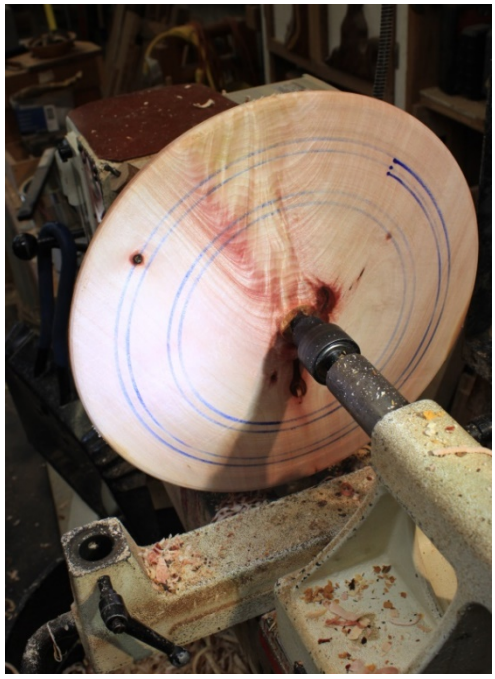
c. See the comments above on the tenon dimensions and your chuck.

d. Face off the flat "top" of your bowls so that the surface is smooth. The coring cutter doesn't want to bounce around, and a bad catch can bend the arm.

e. Figure that you will leave a wall thickness about 10% of the diameter of each core. Really mobile woods with a large coefficient of shrinkage (e.g. live oak, madrone, sycamore) may benefit from a more generous wall thickness to allow you to refine the deformed ellipse) to a circle and still have wood.

f. Mark those bowls, starting from the outside. The cutter makes a swath of about 1 cm (3/8"), so include that space as you mark the wood.

Faced off blank



Marked with allowance for width of cut

g. Using a small gouge, cut a guide groove where you want the cutter to penetrate...a timesaver.

h. For bowls 4-5" deep and 12-13" diameter, you can get one really reliable core of 10-11" diameter using the #2 cutter, but that's about all.

i. Larger diameters and deeper bowls allow experienced corers to get 3 or 4 bowls out of a 14"-18" blank, using a #1 and #2 cutter (see photo page 13).

j. The coring cutter leaves a small “nub” in the center of the larger cored bowl (blue arrow). Leave that in place if you are using a PVA sealer such as Tree-Saver. It keeps stacked bowls from gluing themselves together.

Three avocado bowls, 15” largest, instead of one in about 30 minutes work
Note glaze on cutter arm from hot sap (orange arrow)

8. **Bottom Line:** Honestly, if you haven’t had a lesson, or at least had a detailed hands-on demonstration, I don’t think it’s smart do try coring, and I doubt that a video will be comparable in information transfer. If that’s not obvious from the length of this paper, I’ve let you down.

Black acacia nest, 19” diameter

Black Locust, 14+”

Good luck!

Wells Shoemaker
September, 2020

Cored nest, Black Walnut stump, Santa Cruz