WOODTURNING FUNDAMENTALS

American Association of Woodturners
May 2020 • Vol 9 No 2

Coves and beads—practice makes perfect

- *Avoiding finish failures*
- *Tune your lathe*
- *Turn a simple bowl*
- *Hot-mod your bandsaw*

AAW | AMERICAN ASSOCIATION OF WOODTURNERS
WE ARE TEACHING THE WORLD TO TURN

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May 2020 Vol. 9 No. 2

Mike Peace

Glenn Lucas

Cover: Turning a coves and beads stick builds skills for both spindle and facegrain projects. Mike Peace, photo.
*See page **5** for more on this topic.*

A Note About Safety

An accident at the lathe can happen with blinding speed, while respiratory and other problems can build over years.

Take appropriate precautions when you turn. Safety guidelines are published online at tiny.cc/turnsafe. Following them will help you continue to enjoy woodturning.

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Woodturning FUNdamentals
is published by the
American Association of Woodturners
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75 5th Street W.
St. Paul, MN 55102-7704
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Toll free: 877-595-9094
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The AAW strives to cultivate an organization built on mentorship, encouragement, tolerance, and mutual respect, thereby engendering a welcoming environment for all. For more, tiny.cc/AAWDiversity.

The World is Still Turning

It is hard to believe how much can change between issues of a quarterly journal, and the situation continues to evolve daily. We hope this issue finds you in good health.

An early version of this volume promoted the 2020 Louisville Symposium and encouraged you to introduce yourself to the editorial staff at the event. But the AAW alerted members in late March that the Symposium had to be canceled due to advisories and mandates regarding COVID-19. The AAW is maintaining a webpage to provide updates.

tiny.cc/AAWCOVID-19

Many chapters are finding innovative ways to adapt to the need for social distancing, yet still encourage member interactions and learning opportunities. A Chapter Officers Tool Kit webpage supports these efforts and facilitates the exchange of ideas around this challenge.

tiny.cc/AAWRemote

The good news is that wood still grows on trees and can still be delivered to your door. I hope this issue of *Woodturning FUNdamentals* brings you inspiration to make the shavings fly.

Don McIvor, Editor
Woodturning FUNdamentals

Use Caution With Magnets & CBN Wheels

I read articles recently in *American Woodturner* and *Woodturning FUNdamentals* recommending the use of strong magnets to capture metal particles generated by tool grinders.

I had an experience where a grinder had been set up for me at a demo and the organizer had placed a magnet near the wheel. I didn't know about this placement and what followed could have caused a serious injury to me or others.

I was working with two of my 12-year-old youth students at the local state fair. I was sharpening two gouges for them to use in their demonstration. I placed one gouge beside the Wolverine jig while sharpening the other. When I finished sharpening the first gouge and picked up the second gouge to sharpen, a resoundingly loud bang rang out as soon as the gouge touched the CBN wheel.

I discovered that the magnet was attached only magnetically to the Wolverine base, and when I laid the second gouge down near it, the magnet transferred its allegiance from the jig platform to the gouge. Not noticing this, when I put the gouge onto the CBN wheel, the magnet again transferred allegiance, this time jumping to the spinning CBN wheel. The loud bang occurred when the CBN wheel threw the magnet several feet across the room where it hit the wall. Had it come at me instead of the other way, or had there been people in front of it, a serious injury could have occurred.

Some CBN wheels are aluminum, which does not pose a problem with magnetic transference. However, a magnet attached to the grinding platform could still jump to the tool where the rotational force of the wheel could dislodge the magnet and turn it into a projectile. A small, loose item like a magnet should be secured to a fixed surface with screws so that it cannot be picked up by accident by either a tool or the CBN metal wheel.

--Larry Miller, Chair
AAW Youth Program

Bead-and-Cove Sticks– Effective Practice Makes Perfect

By Mike Peace

Like any motor skill—walking, riding a bike, playing an instrument—turning requires practice to develop skills and muscle memory. Repetition develops tool control. Practice leads to experience and lets us recognize when we need to sharpen a tool for a better cut. It takes practice to recognize the difference between a scraping cut and a slicing cut.

I see so many new turners who want to start turning bowls immediately. But many foundational skills are best learned through spindle turning. Tool control, riding (or perhaps more appropriately floating) the bevel, the importance of sharp tools, and the understanding of cutting with the grain will make all future turning projects, including bowl turning, easier and safer. Learning these skills on small, easily acquired wood blanks for spindles is more cost-effective than working with bowl blanks.

After you have mastered the three basic cuts in woodturning, bead (convex cut), cove (concave cut) and the flat or filet (straight cut), you will easily transfer these skills to turning a bowl!

Spindle blanks

Start with spindle blanks about 1-1/2"- (4cm-) square and 10" (25cm) long (**1**). You can use most any wood available to you, green or dry, preferably with relatively straight grain and free of knots and figure. I prefer a relatively soft wood like pine or poplar. Construction-grade pine works well and may be available to you as the common 2" x 4" in your local home center, depending on your region of the country. Eight quarter poplar from a lumber yard may be another relatively inexpensive alternative. Rip your lumber to size with a table saw, hand saw, or bandsaw.

1. *Prepare a stack of 1-1/2" × 10" practice blanks from pine or poplar.*

2. *Use a four-prong drive center (left) in the headstock and live center (right) in the tailstock.*

3. *Center finding jigs are inexpensive and quickly locate mounting points.*

4. *An awl or center punch creates a registration mark to ensure the lathe centers seat in the correct location.*

5. *Seat the drive center prongs with a wood, plastic, or hard rubber mallet. The prongs need only dent the endgrain—in soft wood, this requires little effort.*

6. *Mount the stock on the lathe, capturing the blank with snug pressure from the tailstock quill. Resist the temptation to over-tightening the quill.*

Turn between centers

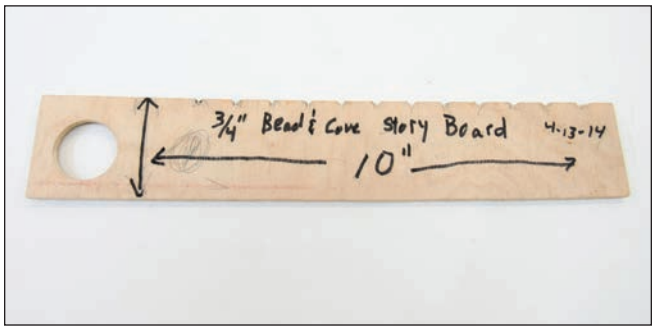
Mount a blank on the lathe between centers using a drive center and a live center. Mounting between centers provides a secure hold and is less complicated than mounting a bowl blank. New lathes typically come with a four-prong drive center and a live center (**2**). Use a pencil to mark the center on each end of the blank using a center finder or by drawing lines from corner-to-corner (**3**). Mark the center with an awl or a spring-loaded center punch (**4**).

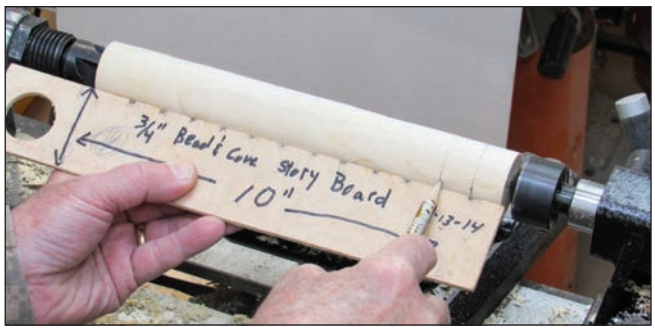
Stand the blank on its end on a solid surface and use a mallet to seat the drive center, registering the prongs in the endgrain (**5**). Do not use a metal hammer or you will damage your Morse taper and possibly your lathe spindle. Hammering the blank onto the drive while the spindle is mounted in the headstock risks damaging the spindle bearings, especially on mini and midi lathes.

With the drive center's location established, mount the practice blank between centers, bringing the tailstock up and snugging the live center against the end of the blank with the quill (**6**).

Adjust your toolrest so the gap will be no more than about 1/4" (6mm) and at a height that will put the cutting edge of your gouge at or slightly above center. The end of the toolrest should extend at least 3/4" (19mm) beyond the end

7, 8. *Use a spindle roughing gouge to knock off the corners of the blank and bring it to round. Stop the lathe and move the toolrest as necessary. When the back of the gouge can ride on the revolving blank without bouncing, the blank will be trued and round.*





9, 10. *A storyboard introduces speed and consistency to the repetitive task of marking features. Rigid cardboard will do, but thin plywood will better resist wear.*

of the blank to prevent your cutting tool from sliding off the end of the rest during a cut.

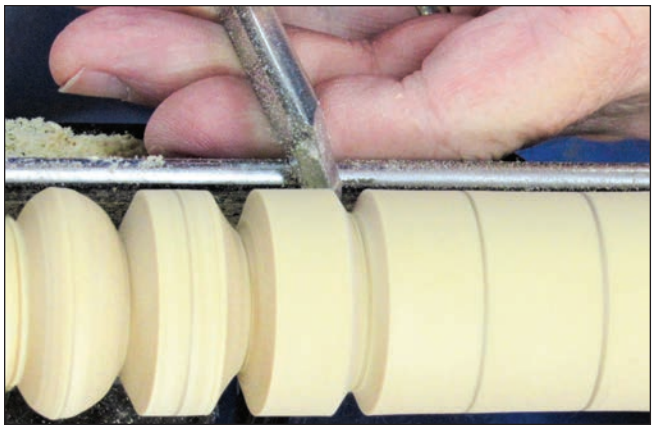
Rough the blank

A lathe speed in the range of 1,500 – 1,800 rpm is about right for roughing a cylinder out of a blank of this size. If your lathe vibrates excessively, reduce the speed until the lathe runs smoothly. Use a spindle roughing gouge (SRG) to round the blank (**7**). You can round small cylinders with a skew, a bowl gouge, or a spindle gouge, but an SRG is the most efficient tool for this task. You can test for roundness by touching the back of the tool against the spinning wood. The tool will bounce if there are still flat surfaces on the blank, and will ride smoothly when the blank is round (**8**).

Use a storyboard

You are going to turn a lot of these bead-and-cove sticks, so I recommend a storyboard (**9**). The storyboard should have notches at 3/4" intervals. This will make consistently marking your blanks for 3/4"-wide beads fast and easy (**10**). Once you have the blank turned round, use a pencil and the storyboard to mark off a series of 3/4" beads.

Using a skew, make a vee cut at each pencil mark to locate the side of each bead. Use the long point, starting the cut with the skew in a vertical position. Then take small alternating cuts to enlarge the vee on each side (**11**). Start the cut and move the handle away from the cut ever-so-slightly so the bevel will follow the vee. Do not try and cut more than 1/16" (2mm) at a time or you risk stalling your cut. Make the finished vees about 3/8"- (10mm-) deep. Now take your pencil and mark the center between the vees; this will be the bead tops and the lines will help you maintain the symmetry of the bead.



11. *Cut a vee groove on each line to about 1/4" – 3/8" deep using a skew. Alternatively, you could mark with a parting tool.*

Turning beads

A 3/8″ spindle gouge works best for turning these beads, but a 1/2″ gouge will work. A fingernail profile will make help you reach into the narrow space between beads. Avoid the flatter profile spindle gouges—typically called Continental gouges—that come with some woodturning sets; those gouges make this exercise difficult.

You are learning cuts without the pressure of completing a project, so enjoy the activity! With the blank round, and the lathe off, adjust the toolrest to reduce the gap with the wood to about 1/4". With the blank trued and spinning smoothly, increasing the lathe speed to about 2,400 rpm will produce a cleaner cut, but keep the speed lower if your comfort level lies below that threshold.

A bead of this size should not be attempted in a single cut. Instead, cut a series of increasingly wider convex curves until your last cut starts at the center peak and ends in the valley. Start cutting at the edge of the bead—adjacent to one of the vees you made in the earlier step—starting each cut progressively closer to the center with each successive cut.

Hold your spindle gouge with the tool horizontal, flute up, so that the tip of the gouge just contacts the top of the bead (**12**). As you push forward with the cut, you will gradually

12. *Start shaping your bead by cutting near the bead edge with the bevel rubbing the wood.*

13. *The bead cut ends with the gouge on its side in the bottom of the vee and the handle at about a 45 degree angle to your body. This keeps the bevel in contact with the side of the bead all the way to its base.*

lift, twist, and swing the handle. With deeper cuts, you will be swinging your handle through the arc toward the vee cut at an increasing rate, as the tip of the gouge gets closer to the bottom of the vee, ending with the flute facing away from the bead (**13**). If you are cutting the left side of a bead, the tool handle will start at 90 degrees to the lathe bed but finish at almost a 45 degree angle across your body.

Failure to keep the bevel on the curve by swinging the handle will result in flat sided beads. This is why a relatively short handle on a spindle gouge is desirable, as it will move across the front of your body. The cutting edge is not far off the toolrest, so you do not need much leverage. My spindle gouge handles vary in length from 7″ to 10″ (18cm – 25cm).

Coves

Use the SRG to flatten every other bead in preparation for turning coves. Presenting the SRG on its side offers a cutting edge that will easily create a flat surface (**14**). Use a pencil to mark a line about 1/8″ in from each end of the flat to designate sides of the cove (**15**).

Switch to the spindle gouge and make starting cuts just inside the lines, widening the cove with successive cuts on each side. Think of a cove as an inverted bead. The tool presentation you used to end the cut on a bead is the same you will use to start your cut on a cove. Your tool will be parallel to the floor with the flute rolled over on its side pointing to the cove. The tool will be at about 45 degrees to the work at the start (**16**). Push into the cut and rotate the tool as it approaches the bottom of the cove. Take the cut with a scooping motion as you twist. Riding the bevel, lower the handle and push through the cut, ending in the center. The flute will always be facing the center of the bead (**17**). Repeat the cut from the other side.

Conclusion

Turn about twenty bead-and-cove sticks out of that 2" x 4" and you will develop the tool control and skills to confidently cut these features. Put a date on each spindle and toss it in a box. After a week, note your progress! For experienced turners who teach, try turning a bead-and-cove stick using your non-dominant hand. It will help you teach the nuances that you know but overlook! It can make you a better turning instructor, as well as a better turner.

Mike Peace is active in three woodturning chapters in the Atlanta area. He is a frequent demonstrator and regularly uploads woodturning educational videos to his YouTube channel, Mike Peace Woodturning. Before retirement, Mike worked as a software project manager. After serving on active duty in the U.S. Army, he continued service in the reserves, retiring with the rank of Lieutenant Colonel. For more, visit mikepeacewoodturning.com.

14. *Presented on its side, the SRG quickly flattens beads in preparation for cutting coves.*

15. *Mark the edge of the coves about 1/8" in from the beads.*

16. *The cove cut starts with the gouge on its side, flute pointed towards the cove interior.*

17. *At the cove bottom, the flute points up.*

Bandsaw Tips, Tricks, and Mods

by Kurt Hertzog

Whether you buy a bandsaw new or used, you probably have a good idea of its strengths and weaknesses, and possibly some of the aftermarket solutions. There are companies whose entire focus is repairing, replacing, and hot-modding bandsaws. We'll look at a few of the more useful upgrades and repairs that can enhance your bandsaw's functionality.

Throughout the article I refer to some specific name brands. These are offered as examples because they are products I have on hand. The marketplace is crowded, so shop around, and make sure that the solution you choose fits your specific saw model.

Blade guides

Your saw will have either roller bearings or guide blocks to support the blade in the cut. My article in the May 2019 issue of *Woodturning FUNdamentals* addressed adjusting roller bearings.

Metal guide blocks, which many manufacturers install as standard equipment, generate friction and heat that can quickly degrade a blade and can also cause green wood to swell and pinch the blade.

As a solution, a number of companies offer replacement guides made of ceramics or high-tech composites. A commonly available example is Cool Blocks. Most of these options fit into your machine's existing guide holders and generate less friction than your saw's original guides.

A blade stabilizer will improve blade tracking and the quality of your cut, particularly for narrow blades cutting tight turns. The aftermarket stabilizers slide onto the existing saw mechanics. They provide a back-up roller with a guiding slot cut into the roller. I've only seen them used on 14" saws with 1/4" (6mm) or smaller blades.

Non-metallic guide blocks, guide fitting insertable roller bearings (both left), or blade stabilizer (right) can improve the quality of your cuts and the lifespan of your bandsaw blades.

Tires

Rubber tires are standard on all but the most upscale models. They generally function well but they do have a limited lifespan. They can get polished or chewed up, depending on your use and blade tracking alignment.

Even with proper alignment, rubber tires age, lose their gripping ability, or crack. As tires lose their gripping capability, our tendency is to increase the tension on the blade to compensate. This works temporarily, but it doesn't do the tracking or blade life much good. A better solution is to periodically check the tires for aging or wear and replace them as needed.

Unless you run a professional shop with extensive saw use, tire replacements will be few and far between. You can buy tires with the original composition or opt for urethane tires. Urethane tires cost more but have a significantly extended lifespan.

There are many online videos covering new tire installation. Watch a few carefully before undertaking the task. While not terribly difficult, following their recommendations will improve your success rate while avoiding the agonies suffered by the under-informed.

Tire cleaner brush

Keeping your tires clean of debris may seem trivial, but doing so will extend their life and enhance their performance. A cleaning brush placed on the lower roller removes debris from the tire as it rotates, and this usually prevents sawdust buildup on both tires. Less common is a second brush installed on the upper roller. Check and clean the brush itself when you perform your periodic maintenance. Replace it should the bristles become tattered or missing. If your saw didn't come equipped with one, aftermarket tire cleaning brushes are available to fit most machines. They are modestly priced but well worth installing.

The installed wheel brush (top right) came with the machine. The brush in the package is an aftermarket add-on.

Blade lubricant is quick to apply and is designed to discourage sawdust, sap, grit, and moisture from adhering to the blade.

Blade lubricant

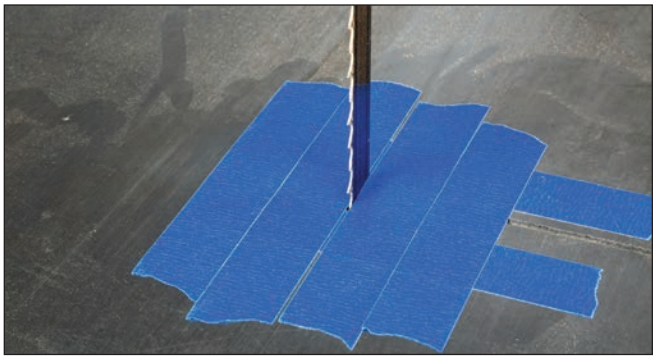
I have not used blade lubricant, but the theory behind it seems sound. Blade lubricant has little effect on the movement of the blade across wheels or through guides, and that isn't its purpose. Blade lube helps the blade shed material from the tooth gullets. This is especially helpful for wet, gummy, or oily woods, where sawdust and debris tend to clog the blade gullets and reduce their cutting ability. Most of us react by pushing harder on the stock to force the cut when this occurs, a practice that is dangerous and can cause the blade to bind, bend, or break.

Throat plates

As delivered with the saw, throat plates have a wide opening designed for blade passage when the table is tilted to its limit. Most saws tilt to 45 degrees, requiring wide clearance on either side of the blade.

A narrow or zero-clearance throat plate is far more useful for vertical cuts and will keep narrow pieces of material from being carried into the inner workings of the saw. There are aftermarket throat plates available in plastic and aluminum to fit most saws. These plates fit into the table opening for the plate and allow you to cut them at any angle.

The saw's original throat plate (installed) and zero-clearance aftermarket plates.



Blue tape offers a quick, cheap, but short-term solution for zero-clearance cutting.

A thin piece of sheet material secured to the table creates a zero-clearance cutting surface.

For the occasional zero-clearance cutting I do, I use blue painters' tape to mask off the opening. It doesn't get much more low-tech, but this DIY hack reduces the throat plate opening at a moment's notice. The tape wears quickly, but works fine for a few cuts.

Another method of creating a zero-clearance throat plate is to add a new table top over your existing table. You can easily cut a piece of

Masonite or other material to sit on top of your existing table. Thinner materials will often allow your regular fence to function. Your added top can be made to fit precisely, or you can extend the surface area to create a larger working surface. When you create this added surface, you will cut a saw kerf for the angle of use. If it is intended solely for 90 degree use, you make a single saw cut to produce an effective zero-clearance passage integral to the top.

The new table top can be further modified with the addition of a properly sized guide mounted on the underside to ride in the miter slot. For those not needing a sliding table top, you can mount small blocks on the underside to locate and hold your table top in place over the existing cast table.

Resawing

Resawing is common practice for those who do flat woodwork, but a rare need for most woodturners. But if you start to explore segmented turning, or want to add a decorative layer of wood to your turning design, resawing becomes a useful skill for a woodturner.

The fence supplied with your saw may be too short or impossible to adjust for blade drift. Many folks who resaw lumber either make their own fence or buy an add-on fence to guide cutting. Whether you need any of these devices depends on your saw and the material you cut, so make some test cuts before solving a problem that may not exist for you.

My resawing post (also called a drift bar) attaches to my regular fence, extending the height and providing a rounded edge for guiding the stock. The post is adjustable for position relative to the saw blade, allowing the fence to be aligned from front-to-back with respect to the blade to compensate for blade drift.

I own and use the Little Ripper from the folks at Stockroom Supply. This device attaches to my existing table and provides a sliding clamp that secures material to be cut. It excels at cutting round stock, an operation that is otherwise difficult to do safely on a bandsaw. With its precision locating and tracking, I can consistently resaw dried Cherry to .012" (0.3mm).

Quick setting spacers

If you need to set your fence quickly, repeatably, and accurately, you might consider a set of spacing blocks. These are precisely milled metal blocks that allow you to set cut widths at common intervals.

I use the Carter Fence Alignment System. Their blocks attach magnetically to the blade and include a relief slot for the saw blade. I can quickly bring the fence to position and set it for that thickness. While you can certainly make your own spacing gauges, these are convenient, well made, and will never lose accuracy.

Feather boards

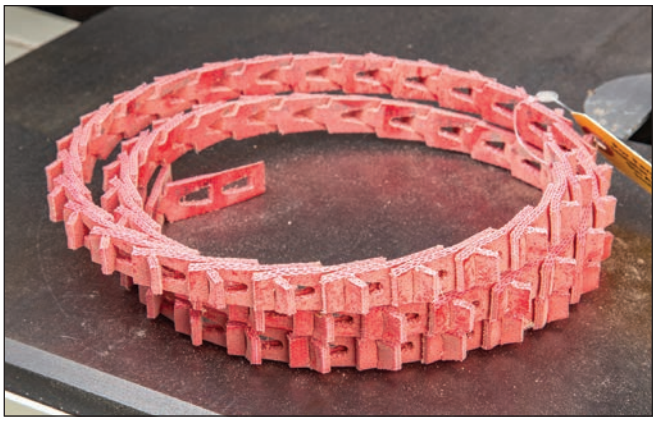
Feather boards can be helpful on the bandsaw in the same way they are on a table saw. The ability to secure material against the fence with spring loaded pressure frees the hands for other tasks.

There are several designs available, with two designs capturing most of the market. The first design uses an adjustable angled comb that anchors in the miter slot. It is adjustable for position, angle of the comb fingers, and distance to the stock to control exerted pressure. Another common design is a magnetic base with slide-out flexible surfaces. These flexible arms are used to press the stock against the fence. By positioning the magnetic base on the table, the angle, force, and position of contact is controlled. The magnetic base has a permanent magnet with a cam arm that allows the user to release the magnetic force and remove the feather board.

Reducing vibration

Vibration is rarely an issue with bandsaws, but it does crop up occasionally. Rather than randomly throwing new parts at the machine, you will need to do a little sleuthing to identify the source of the vibration. Potential sources include the drive belt, wheels, tires, motor (including mounts), or pulleys. Checking the drive belt for wear is a good place to start.

If you trace the problem to a worn drive belt, I recommend replacing the original belt with a twist link belt. I have not had the need to install this upgrade on my own bandsaws, but the improvement on my table saw was so dramatic that I am a firm believer in this design. Twist link belts are expensive, but a worthwhile investment.



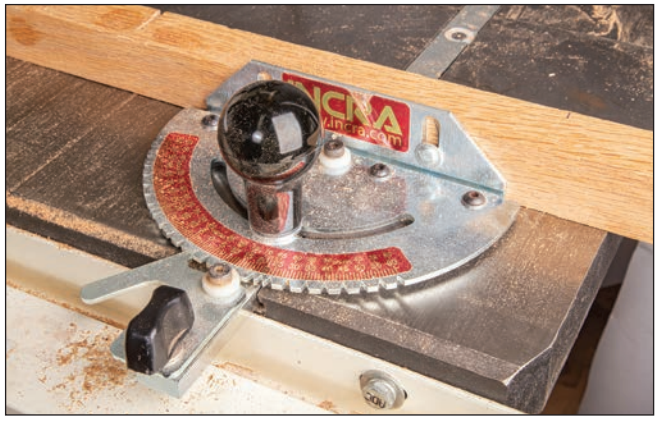
Twist link belts are expensive, but they are easy to install, reduce belt vibration, and have a long life. You will need your original belt length and width to order the correct replacement.

Replacement miter gauge

The miter gauge on most bandsaws is usually a low cost, inaccurate affair that seems to have been included as an afterthought. The miter gauge needs to be accurately adjusted using a square because the markings or lock points are most likely inaccurate (see my May 2019 article in *Woodturning FUNdamentals*, "Bandsaw: choosing, setting up, adjusting").

Mount a sacrificial board to the miter fence to extend its reach and increase the accuracy of your settings. You can cut through your stock into the sacrificial fence and simply replace the fence as it becomes tattered.

If you need a miter gauge that is more accurate by design and has lock points at the commonly used angles, consider one of the aftermarket gauges available from a number of well-known manufacturers. Any of these products will need minor set-up after the miter slot runners are properly tensioned. Once zeroed, you can quickly and accurately set your miter gauge to provide support for angled cuts. I still recommend attaching a sacrificial fence for all the benefits it provides.



There are many aftermarket miter gauges to choose from. Almost any of them will outperform the OEM version.

Bowl blank templates and jigs

Whether from flat stock or logs, bandsaws excel at cutting bowl blanks. A compass works well for marking out flat stock, but split logs present a challenge. To be safely cut, the split log needs to be flat side-down against the table. The curved outer surface resists easy marking. One solution is to make a set of cardboard templates. You can also make them from plywood, plastic, or any other material that is softer than the bandsaw blade, but cardboard is cheap and plentiful. Shipping box cardboard works best because it is thick and durable. Any cardboard lets you cut into it without safety concerns.

A cardboard template pinned to the blank with a nail (left) provides a safe, low-tech, replaceable routine for cutting out blanks. The Round Ripper (right) is the high-tech answer to this task.

Lay out circles on your cardboard stock with a compass and cut to the line with scissors or a razor knife. If the compass pokes a hole at the center—great—you will be inserting a nail through there anyway. Make a stack of templates at various sizes—1" graduated circles serve most needs.

Position your template on the outside of the half log and tack it in place with a finishing nail. Cut around the outer edge of the cardboard to release the blank. Once cut, prominently mark the center point where the nail was driven to indicate the central mounting point. You can also use the template to locate the center point on the flat side, just don't cut the blank on the bandsaw with the flat side-up. These templates are equally handy on slabs.

If you have neither compass nor template at hand, a push pin, string, and a pencil can be used to mark circles. Old fashioned for sure, but there isn't a less expensive, infinitely adjustable, and size-unlimited circle marking system.

Conclusion

If you would like more background about bandsaw design and function, I recommend Mark Duginske's books and the Iturra Design catalog by Louis Iturra. My local Woodcraft has nearly everything I described in this article on the shelf, and everything I describe here should be available at your local woodturning or online retailer.

For turners, a bandsaw is probably the most important piece of equipment after a lathe and a grinder. Whether new or old, large or small, they all basically work the same. Once tuned up and adjusted properly, you'll find it a valuable asset requiring little maintenance. The bandsaw is a versatile machine and the topics I've covered here are only part of the story.

There are many more changes, improvements, and accessories you can make or add, and your approach will be driven by any issues that you need to address, as well as how many roles the saw will play in your shop. Between my May 2019 *Woodturning FUNdamentals* article and this article, you should be in good shape to setup, adjust, maintain, and use your saw effectively, efficiently, and safely.

Kurt Hertzog is past president of the American Association of Woodturners, a Pen Makers Guild council member, and past chairman of the Rochester Woodworkers Society. He has had over 185 woodturning related articles published internationally since 2012. An avid turner in all areas, Kurt is particularly interested in pens and ornaments. You can see his work and published articles at kurthertzog.com.

Ten Steps to a Smooth Lathe

by Dennis Belcher, photos by Roger Young

Your lathe should be a pleasure to use, not something that causes stumbles. The key to a smoothly running lathe is systematic, step-by-step maintenance. You need to concentrate on what you're turning, not on your balky machine.

A balky lathe can be of any age; new machines need care as much as vintage ones. Details will vary among manufacturers, but the basics are common to all. Methodically working through each part in order will put any lathe right. But first, there are three basic tuning operations that will need to be repeated on nearly every part of the lathe:

— file maintenance,
— cleaning,
— lubrication.

File maintenance

Sometimes called fettling, file maintenance means running a clean bastard-cut mill file across flat surfaces and edges, not to remove metal, but to knock down ridges and burrs. File maintenance needs to be done upon acquiring any new-to-you lathe, though rarely afterward.

File maintenance. *Use a bastard-cut mill file to knock down any burrs on surfaces and edges. Use light pressure.*

Dings and burrs —the result of metal parts hitting each other as the lathe is used—will impede the movement of the tailstock and banjo. Lay the file flat on the ways, the bottom of the tailstock, and the bottom of the banjo and run it lightly across the surfaces to knock down any high points of metal.

Next, address the edges. Angle the file diagonally and run it across the edges as shown. Relieving the edges aids free movement, so all edges should be relieved. Many new lathes will arrive with edges relieved and it is simply a matter of maintaining the edge.

File edges. *For free movement, angle the file to clean up inside edges.*

Cleaning

Wrapping a block of wood with 180- or 220-grit emery cloth and running it across a metal surface removes rust and machining marks, and improves the sliding surfaces. Wetting the emery cloth with mineral spirits helps loosen stubborn debris. Use clean paper towels to remove grit and residue.

Mineral spirits, or naphtha, will dissolve built-up grime. Use mineral spirits with either a green (400-grit) or maroon (600-grit) non-woven abrasive pad. Wipe clean with fresh paper towels, and be sure to remove all the grit from the metal surfaces.

Cleaning. *Wrap emery cloth around a flat surface and run it over the ways to remove spilled finishes, rust, and high spots. Use mineral spirits as a lubricant to soften grime.*

Lubrication

For the ways and the undersides of the tailstock and banjo that slide on them, either paraffin wax or car wax makes an excellent lubricant. Find bars of paraffin wax in the canning section of a hardware store; any can of paste wax for cars will work. Load a fine, non-woven abrasive pad with the wax and apply evenly. The non-woven abrasive will help remove sap, spilled finishes, and excess wax from the ways. Finish by polishing with a fresh paper towel.

Moving parts inside the banjo and tailstock also need lubrication but with something that discourages dust. Oil-based lubricants attract and hold dust, but dry lubricants are formulated to resist dust. Search for "dry lube" and closely inspect the label for language indicating it won't attract dust. Avoid getting any lube—oil or dry—on a workpiece because it will interfere with most finishes.

Lubrication. *Load a non-woven abrasive with wax and apply to sliding surfaces, then polish off the excess with a clean paper towel.*

Removable bed. *Lathes with removable beds should have all edges chamfered with a file and all surface cleaned.*

Inside edges. *Clean the inside and underneath sides of the ways. Finish with a clean paper towel.*

1. Lathe ways

Remove the tailstock and banjo and set them aside. Go through the file maintenance process on the ways and be sure to address the top, inside edge, and bottom surfaces. If any surface needs further refurbishment, work through the emery cleaning process. Your fingertips should feel smooth metal everywhere on the ways and their edges. If your lathe has a removable bed section, clean it up the same way.

Clean all the faces of the ways, and do not neglect the inside edges of the ways that guide the tailstock.

Not all way faces should be lubricated. The underside of the ways need to provide a solid grip for the locking plates of the banjo and tailstock. Clean, bare metal is the goal here, without any lube or wax.

If your lathe has a removable bed or a swing-away tailstock, treat it the same as the ways. Also, be sure to clean, wax, and polish the mating surfaces that guide and hold the removable bed.

Sliding bed. *Thick build-up of grime impedes the movement of this sliding bed.*

When the surfaces are thoroughly smooth and clean, move on to lubrication. Load a non-woven abrasive pad with paraffin wax or car polish and rub it on the ways. The abrasive helps spread the wax across the entire surface of the ways and the inside edges, but not the undersides. Polish with a clean paper towel.

For related content, see Mike Ilkiw's [Lathe Maintenance video. tiny.cc/MaintainLathe](tiny.cc/MaintainLathe)

Locking nut. *You'll need a wrench to remove the banjo locking nut and pressure plate.*

File the banjo. *Place a file flat across the bottom of the banjo and run it over the full length. Use a light touch. Do the edges too, inside and outside.*

2. Banjo

Remove the banjo and place it downside-up to remove the locking nut and locking plate. Work through file maintenance, cleaning, and lubrication.

Clean the eccentric locking rod underneath the banjo so that it rotates freely. Remove any rust with emery cloth and wipe away any residue. Dry-lube the rod to avoid dust buildup. Also clean and lube the ends of the locking rod.

Clean the locking plate but do not lubricate it, because contact under the ways is what holds the banjo in place. It needs a firm grip to resist the forces of turning.

Typically, the banjo lever turns the eccentric rod, drawing the locking plate up against the ways. The position of the locking nut increases or decreases the pressure between the banjo and the ways. If the nut is too loose, the banjo will not hold its position. If the nut is too tight, the banjo is difficult to move. There is a sweet spot where you can apply maximum locking force and yet freely move the unlocked banjo. You may need to adjust the nut to find that sweet spot.

Eccentric rod. *Remove rust and grime from the locking rod with mineral spirits and non-woven abrasive. Do not wax.*

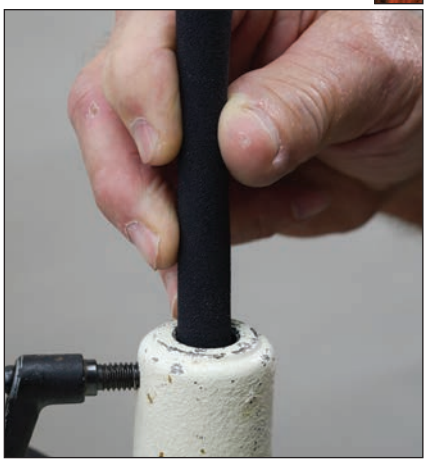
Dry lube. *Apply a dry lubricant that does not attract and hold dust to the locking rod.*

Rod ends. *Clean both ends of the banjo locking rod. Lubricate with a dry lubricant.*

Return the banjo to the ways to inspect and clean the toolrest post hole. Insert a finger to identify ridges. Low spots will not interfere with smooth movement, but high spots will. Wrap emery cloth around a dowel and abrade them away.

Clean any grime inside the post hole with rolled up non-woven abrasive or emery cloth and mineral spirits, and wipe clean. Finally, remove the toolrest clamp handle. Clean the threads and inside and out, and dry-lube.

Locking plate. *Locking plates can be circular or rectangular. They should be cleaned, but not waxed or lubricated.*

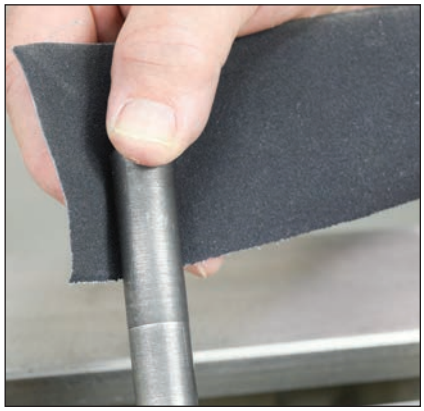


Post hole. *Clean inside the post hole with rolled up non-woven abrasive.*

3. Toolrest

Clean the toolrest post and examine it for marks or scoring. Remove any ridges with emery cloth or a file; low spots are no problem. Remove grime with a clean paper towel and mineral spirits.

The toolrest should not encounter resistance as it enters the banjo. Inspect the end of the toolrest post, its edge should be chamfered. Dry lube aids smooth movement.



Toolrest post. *Remove dings on the toolrest post with emery cloth, or a file.*

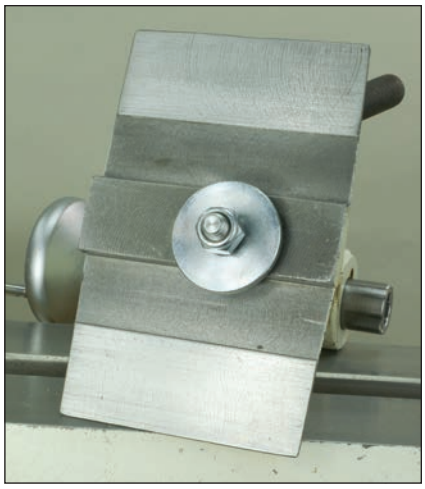
Chamfer. *Relieve the end of the toolrest post so it easily enters the post hole.*

If the toolrest itself is soft steel, remove any dings with a bastard-cut mill file. Here, low spots are as much a concern as high spots -- any variations will be transferred to your turnings.

If the toolrest is hardened steel, remove dings by filing with a diamond honing card or diamond sharpening stone.

It is important that the toolrest is true across its entire length, so draw-file it end to end.

Toolrest. *Draw a file with both hands over the full length of the toolrest to remove any dings.*



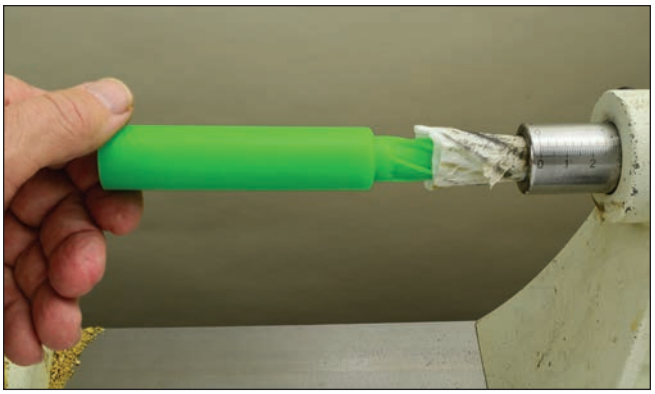
Tailstock. *Run a mill file over the flat bearing surfaces and each edge.*

4. Tailstock

File, clean, and wax the working surfaces of the tailstock. Remove the locking plate, which might be round or rectangular. Both types apply force against the underside of the ways to lock the tailstock in place. For a good grip, clean the plate with mineral spirits and non-woven abrasive but don't lube it. This makes a tremendous difference in how easily your tailstock moves.

Remove grime, rust and residue from the ends of the locking lever in the tailstock with a toothbrush and mineral spirits, then dry-lube. Clean and lube the spring and posts, if the locking plate has them.

Like the banjo, the tailstock mechanism has a sweet spot. If the tailstock slips, or is difficult to move, you'll need to adjust the locking nut to find it.



Quill. *A dirty or damaged quill compromises the tailstock. Clean it with a quill cleaner (green), mineral spirits and a twisted paper towel.*

Quill channel. *Remove dings from the quill channel with a file on edge, clean the outside of the quill, and dry-lube.*

Locking lever. *Use a small stiff brush to clean and lubricate the locking lever on the tailstock.*

5. Quill

Return the tailstock to the ways for easy access to the quill and hand wheel. Use a stiff brush to remove accumulated dust where the hand wheel shaft enters the tailstock and apply a dry lubricant.

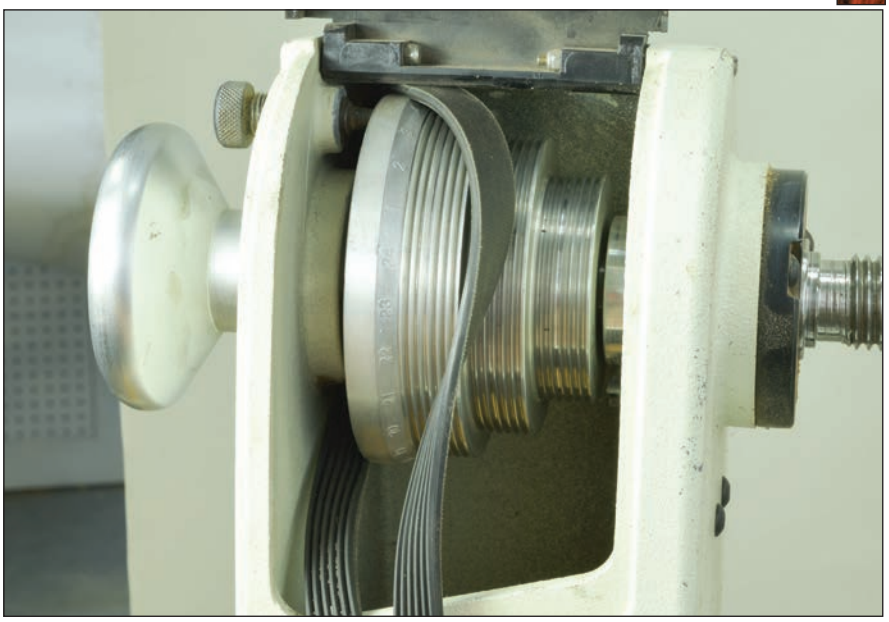
Clean the inside of the quill with mineral spirits and a twisted paper towel, a brush, or a Morse taper cleaner. Its condition is crucial to all tailstock operations.

Insert a finger to feel for any ridges. If ridges are present, you'll need to ream the quill, as discussed in the August 2014 issue of *American Woodturner*. Don't, however, use emery cloth inside any quill. You don't want to damage its taper as that's where the holding power comes from, and you must not leave any grit inside.

Use the hand wheel to advance the quill. If it can be removed, do so. Remove any dings in the walls of the channel that runs the length of the quill with a mill file on edge and wipe away any metal filings. Some tailstocks have a screw that rides in this channel. A burr can develop and interfere with smooth movement. Clean the outside of the quill with mineral spirits, dry-lube, and polish.

Finally, unscrew the tailstock spindle lock to inspect and clean the threads.

Locking pin. *Clean and dry-lube the locking pin and spring.*



Belt and pulleys. *Check the condition of the belt and pulleys, clean everything, and replace any frayed or cracked belts.*

6. Headstock

The headstock spindle should be addressed in the same manner as the tailstock quill. Clean the Morse taper, but do not lubricate it. Grime on the spindle shoulder will make chucks difficult to seat and unscrew. Thoroughly clean the flat.

Inspect and clean the spindle lock pin and spring (if there is one) and dry-lube to improve movement. If the spindle lock spring has weakened over time, replace it.

If the headstock is movable, slide it to the far end of the lathe, clean the ways, wax and polish where it normally sits. Again, do not wax the underside of the ways. Use a wrench to remove the locking plate and clean it in the same way you cleaned the tailstock locking plate. If there are slippage issues with the headstock, address the slippage in the same manner as the tailstock.

7. Bolts

Bolts and nuts on a lathe will loosen and each fastener should be checked periodically. Bolts may be used to fasten the lathe bed to its stand, to lock down the headstock, as a part of the motor mounting, and in a multitude of other functions. Take your time and check each bolt and nut. They should be tight, but not over-tight. Fasteners that have a pattern of loosening can be locked down with a thread-locking compound.

8. Belt and pulleys

On most lathes, a belt transfers power from the motor to the spindle. The belt and pulleys need to be in good condition for efficient and consistent transfer of power. There is a simple test of belt condition. First unplug the lathe and loosen the belts. Use your finger to check the under side of the belt. It should have no fraying, cuts, or cracks. It is best to replace a belt before it breaks when the lathe is running.

If there is any grime on the underside of the belt, or dirt buildup in the pulleys, remove it. Loosen the belt and turn it inside-out to clean the underside with a toothbrush. Thoroughly brush away any buildup. Use a toothbrush, or a brass bristle brush, to clear any debris from the pulleys.

Alignment. *Check the alignment of the centers, looking down and looking in from level.*

Realign. *Loosening then retightening the bolts holding the headstock to the ways may improve alignment.*

9. Motor and electronics

It is a good practice to clear any dust and shavings from the motor and electronics. Electrical components generate heat, which is dissipated with air flow. A buildup of debris inhibits air flow, making the electrical components run hot. High pressure air can damage electrical components, so use low air pressure or a vacuum cleaner.

Inspect the electrical cords and plugs for signs of wear or fraying.

10. Alignment

The final step in tuning up your lathe is to check the alignment of the headstock to the tailstock. Insert centers with points in both and bring up the tailstock so the points almost touch. Lock down the headstock and tailstock, and tighten the quill's locking lever on the tailstock to remove play from the quill. If the two points are off, then the lathe is out of alignment.

The first corrective step is to loosen the tailstock and see if play in the tailstock is the cause of misalignment. If it is, remember to always nudge the tailstock in the direction that trues the centerline.

With a movable headstock, release the locking lever and turn the headstock to improve the alignment of the two points. Then lock it down.

With a fixed headstock, loosen the hex bolts between the headstock and the ways and use the play to adjust the points, then re-tighten.

If still misaligned, the stand may be causing a twist in the lathe bed, which is showing up at the centerline. Verify that the stand is solid to the floor and then loosen any bolts holding the lathe to its stand. Recheck the centerline gap and if the two points are now aligned, shim the lathe bed so that it does not twist while you tighten it down.

Conclusion

Simple things can make big differences. A well-maintained lathe doesn't fight you, it simply supports your efforts. Pay attention to your lathe; it will tell you when it needs care. Time spent tuning up your lathe will reward you many times over.

Dennis Belcher is a member of the Wilmington Area Woodturners Association. He participates in juried art shows and demonstrates throughout the United States. Contact him and see more work at DennisBelcher.com.

Inspiration

People are always asking me how I come up with ideas for things to turn. No one has answered that question more succinctly than John Jordan, who said, "Just look."

Pexels.com (royalty free image)

There are images all around--magazines, antique stores, flea markets, books, and mother nature.

I found some great shapes while watching old *Bonanza* reruns. The *Bonanza* set was full of wonderful Spanish–style furniture, candlesticks, and vessels of various shapes.

An excellent source for spindle shapes is *Victorian Woodturnings and Woodwork* (Dover Architecture, 2006).

Don't forget flea markets and yard sales.

--John Lucas, Tennessee

Chuck cleaning

Sawdust accumulates in the workings of our chucks until the gears begin to balk. About 15 years ago, it occurred to me to clean my scroll chuck like I clean the barrel of my shotgun. I have been using this method on my Oneway chucks ever since, with excellent results.

I use hot water running from the sink tap to flush the debris out of the chuck's inner workings. I turn the gears on the chuck while doing this to help dislodge debris mashed in the gears and to get a complete flush.

After washing, much of the water evaporates from the chuck as it cools. I towel off whatever water remains. I then mount the chuck on the lathe and spin-dry it in both directions.

Hot water will not remove finish from your chuck. In this case, use mineral spirits or acetone.

—Tim Heil, Minnesota

Editor's note: We consulted four chuck manufacturers about this technique. Only Oneway indicated the practice might be acceptable. Other manufacturers expressed concerns about adequately drying the internal works (heightening the potential for rust) and lack of follow-up lubrication.

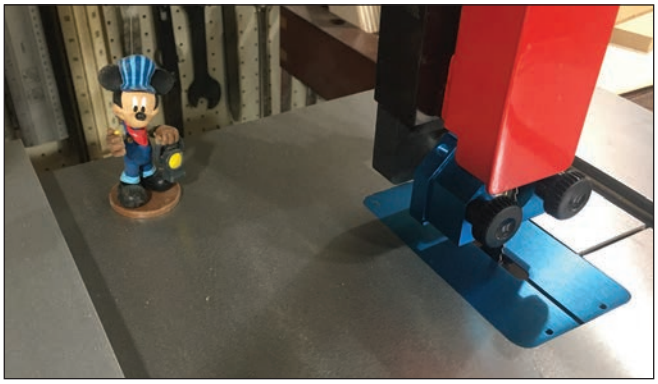
Bandsaw tensioner reminder

It took a while to set up my new Laguna 14BX bandsaw and get everything just right. When all was ready, I was anxious to begin cutting wood. With my project poised at the blade, I hit the start button only to hear horrible noises while the saw appeared to be self-destructing.

My problem immediately revealed itself. I had forgotten to engage the tension lever and the blade decided to go walkabout. My previous saw did not have that feature. I found a rather Mickey Mouse solution.

A rummage through my grandchildren's toy box uncovered a Mickey figure, which I hoped the one-year-old wouldn't miss.

I tied the figure to the tensioning lever with fishing line. Now when I approach the saw, if



Mickey is standing on the table, he reminds me there is something I need to do before hitting the start button. When the lever is properly up and tensioned, Mickey hovers above and out of the way of action.

—Jim Cleary, New York

Save finish under vacuum

I use a vacuum pump for some chucking situations, and I discovered I could use the pump to dramatically extend the shelf life of my finish.

I transfer the finish to a mason jar and use a Foodsaver canning jar lid adapter in conjunction with my pump to draw a vacuum on the canning jar. The stored finish doesn't skim over or thicken, allowing me to make use of the entire container.

I use large-mouth jars and keep a few spare lids on hand. I also screw a band over the lid after drawing the vacuum for added insurance.

I use 1/4" OD poly flow tubing, available at my local home center, and it seals over the vacuum lid adaptor. The adaptor is readily available on the internet, and for a price you'll recoup by rescuing a single can of finish.

By the way, I don't think this process will work with lacquer, which contains solvents that will ruin the rubber seal on the lid.

—Ronald Marcoux, New Hampshire

Turn a Simple Bowl

by Glenn Lucas

I am keen to help new woodturners improve design and basic skills. One of the things I notice is that the newbie turner tends to over-complicate pieces by adding decorative elements, which can prove difficult to cut and finish cleanly.

Shape can also add to the challenge, especially on the interior, so choosing a closed form such a calabash bowl is setting the bar very high.

It's also important to get some early successes under your belt and give your confidence a boost. An open-form bowl with a simple, classic design looks great and is easier to turn and sand. After technique improves, a little extra detail can enhance a bowl, particularly one with an uninteresting grain pattern.

For this project, the blank is 3" × 9" (8cm × 23cm), cut round on the bandsaw.

Mount the bowl blank on the lathe using either a screw chuck or a faceplate. A large faceplate offers a lot of security and less vibration because there is broader support behind the cuts being made. I use sheet metal screws that are about 1-1/4" (30mm) long. I then make the decision as to which side of the blank will receive the faceplate. If the wood has nice figure, I try to make sure it is not turned away. If it has minor defects or bark inclusions, I try to position the blank such that I can remove them while shaping the outside. For this project, I mount the faceplate closest to where the bark had been, leading to pleasing oval growth rings in the bottom of the bowl when the interior is finished. This mounting is an example of facegrain, or sidegrain orientation, with the woodgrain running perpendicular to the lathe bed.

I set the speed of the lathe to about 800 rpm and increase it to a maximum of 1200 rpm as the bowl gets lighter for the finishing cuts.

Use a red marker to draw a line down the flute. This will remind you that red means danger—if you see the red line as you make a cut, then there is a chance of a bad tool catch.

I use a 5/8" (16mm) bowl gouge sharpened with my version of an Irish grind. Truing up the rim, or outer edge, I rotate the tool in the direction of the cut, checking that the red line is not visible from above (see sidebar, below). I then push the tool away from me, riding the bevel on the heel.

Move the toolrest to the bottom of the blank to true up that surface, adjusting its height to assure the tool will be cutting at center height. I pull the gouge towards me, pressing firmly onto the toolrest and not against the wood, as this can lead to vibration from contact with the uneven surface. Standing with my right foot forward, I lean backwards as the tool travels along the toolrest.

From the bottom outside edge, measure 2" (5cm) in on both adjacent surfaces and draw a line.

Adjust the toolrest so it lines up with the two pencil lines, and then remove the wood in this area, cutting from the foot towards the rim. Drop the tool handle to about 45 degrees, allowing for a shear cutting action.

Measuring in 1/4" (6mm) for the depth of the tenon, I then choose a chuck and jaws that will allow the base size to be about one-third of the overall rim diameter. Measure the chuck jaws when they are almost closed. This allows for a secure grip and full contact all around on the tenon. When taking the measurement of the closed jaws with the dividers, allow an extra 1/8" (3mm).

Transfer the chuck jaw size to the bowl, making a light mark with the left point of the dividers. Ensure the right point does not touch the rotating wood, which is moving upwards and could send the dividers flying, causing injury. A little trial-and-error is necessary until the line scribed is the same dimension as the dividers.

Push the gouge in several passes toward the headstock to remove material around the tenon.

Shape the tenon to match the dovetail angle of your jaws. Various tools can achieve this fit, including a scraper, detail gouge, 1/2" spindle gouge, or skew presented on its side. My diamond-point scraper is ground 77 degrees to match the dovetail jaws of my chuck. Dovetail jaws provide a very secure grip if the tenon is shaped correctly. If your chuck jaws lack a dovetail profile, a slightly dovetailed tenon (about 2° – 3°) will improve the chuck's grip.

With the tenon formed, measure and mark the width of the base, approximately one-third the diameter of the rim. Then refine the outside shape of the bowl, leaving the base area intact. I create an ogee at the bottom and a convex shape towards the rim.

Once I am happy with the shape, I make a push cut from the base to the rim using a 1/2" (13mm) bowl gouge sharpened to a 45-degree angle. This cut can prove challenging for many woodturners.

Alternatively, you could use light shearing, or "shear-scraping," cuts to give you a smooth finish. The shearing cut is made with the left wing of the tool, keeping the handle down towards the floor in the 45-degree position. Raising the toolrest will make this cut easier, especially on smaller lathes, where the tool handle may come in contact with the locking levers.

I wet sand using oil, which is efficient and dustless. Work with oil that does not cure quickly, such as heat-treated walnut oil. I use a flexible, cloth-backed abrasive, 120 – 320 grits. I hold the abrasive firmly with my right hand and use my left hand for additional support. Slow the lathe speed, and let the lathe and abrasives do the work.

Remount the blank in the chuck using the tenon turned earlier. True up the face of the bowl, then mark with a pencil about 1/2" in from the edge to indicate the rim thickness. Add more lines to the face, about 1/4" apart; these circles will help guide you through a sequence of cuts. I begin hollowing with the 5/8" bowl gouge. Make a V-groove by facing the flute, or red line, away from you, keeping the handle horizontal, and pushing into the wood.

Rotate the tool towards you, opening up the flute, but stop just before the red is visible from above.

Pull the handle towards your body, while pushing the tool firmly onto the toolrest with your left hand. Repeat this process, working in steps, from the center out towards the rim.

This will leave a series of grooves about 1-1/2" (38mm) deep at center to about 1-1/4" deep at the rim, stepped like stadium seating. Position the toolrest so it angles into the bowl and then repeat the process, which now becomes easier, as the steps are already in place to start the next series of cuts. As the hollowing progresses, it is important to keep a frequent check on the wall thickness using calipers, aiming for about 3/4" (19mm) all around, which leaves enough material to make several light finishing cuts.

Using a 3/8" (10mm) bowl gouge, I refine the rim, which I “roll” inward before softening the outside edge. I then angle the toolrest into the bowl and take several light cuts undercutting the 1/2" rim, reducing the wall thickness below it to about 3/8".

These cuts are very fine, resulting in no tearout when done correctly. I use my 60-degree bowl gouge to cut across the bottom of the bowl. The steeper bevel angle will remain in contact with the wood as you cut toward the center, without the tool’s shaft rubbing against the rim.

The handle of this tool is kept in a horizontal position as my left hand pushes the tool down on the toolrest. Make several light passes, and each time bring the handle close to your side for stability as the cut nears the bottom.

Making light passes with a scraper will also result in a satisfactory finish. Let the wood come to the scraper, rather than forcing the tool into the wood. Frequent visits to your sharpening system will give the best results.

Repeat the wet-sanding process on the interior and then burnish with a small cotton cloth. Do not wrap the cloth around your fingers.

All that remains is to remove the tenon and shape the base. I usually use a vacuum chuck, but most chuck manufacturers produce a bowl-reversing plate (such as Cole jaws or a Longworth chuck) that will hold the bowl while you shape the base. The speed of the lathe needs to be reduced to about 500 rpm. A jam chuck made from a scrap of MDF or a waste turning blank is another option for accessing the base.

After wet sanding the foot, the last step is to sign the piece, and it is ready for its new home.

Glenn Lucas has been a full-time production turner since 1995. With a series of successful educational DVDs and a signature tool range, he teaches technique from his woodturning school in Ireland and around the world at symposia and events. For more, visit glennlucas.com. A version of this article appeared in American Woodturner *(33(1)).*

For related video content, see Turning a wooden salad bowl with Glenn Lucas. tiny.cc/LucasBowl

Why Finishes Fail

by Mark F. Palma

Nothing screams "Call a mortician!" as loudly as a failed finish. What could have been a statement of artistic achievement lies entombed under a lifeless, muddy finish.

Every woodturner works for that magic moment when finish begins spreading across the newly completed piece and the grain comes to life. A finish failure is the last thing any of us wants to see, not at the magic moment and not weeks after the finish was supposed to have cured. A mishap can ruin the aesthetic we worked so hard to achieve, is usually a mess to clean up or remove, and can be expensive to correct in terms of both money and time.

Most of us will succumb to one of the finishing pitfalls and experience a finish failure. But with a little foresight and experience, these pitfalls can be avoided. Let's look at some common failures, figure out their sources, and identify ways to avoid them.

Almost every finishing failure will fall into one of the following categories:

- old finish
- improper surface preparation
- contaminants in the finish or environment
- environmental problems
- incompatible products
- failure to follow the instructions
- wrong finish for the material at hand.

Old finish

The problem

Manufacturers develop products with specific working characteristics. Applied with the appropriate tool, they should spread evenly, level uniformly (in the case of film finishes), and cure in a predictable fashion.

Old finishes will fail one or more of the criteria listed above. They may remain sticky and never harden, have problems spreading (acting stringy or like honey), may darken and have an off-smell, or leave half-cured finish scattered in globs across the wood surface.

This seems to be the most common problem that woodturners experience. Unlike wine, wood finish does not get better with age. A container of finish may sit in a warehouse for months before reaching store shelves. A can may linger on a store shelf before lingering some more on a workshop shelf. All that time the finish is getting older and slowly degrading. Opening a container introduces air and the aging process accelerates. When the container is about half air, the rate of curing in the can rapidly accelerates.

If a finish develops a skin in the can, it's done. Another obvious clue—a can of finish (particularly an oil-based finish) with the sides collapsing inward indicates the finish is

D. E. McIvor

The solid-to-solvent ratio will be outside of the manufacturer's specifications in this partially cured can of varnish. It will not behave properly and should be disposed of appropriately.

consuming oxygen out of the head space and is curing.

The solution

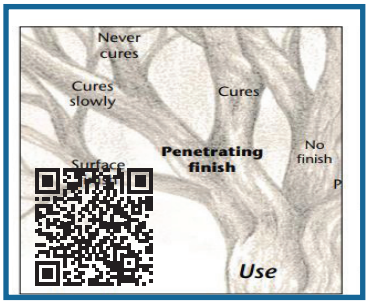
Properly dispose of a container of finish that has skinned over, resisting the temptation to scrape aside the film and dig down into the "good stuff." Mark the purchase date on the can with a marker and try to purchase finish in quantities that you can consume inside of six months. Do not be tempted to stockpile finish if it's on sale; hoarding a product that will spoil before it can be used is false economy. Buying close-out finish or finish with dusty or rusty cans is asking for problems. When in doubt—throw it out! Or, rather, dispose of it properly.

Another solution to this problem is to make your own finishes. Pure oils and solvents have shelf lives years beyond their blended products. Making your own finish by blending components assures a fresher product than any store can provide and allows you to make only as much as you need for the task at hand. See the February 2020 (V9N1) issue of *Woodturning FUNdamentals* for details on shopmade finishes.

There are also products on the market that help extend shelf life, including collapsible storage containers and inert gas to displace oxygen over the finish.

Explore!

Search for other articles in this series using the AAW's Explore! feature. Click the blue box or scan the QR code to find out more.



Improper surface preparation

The problem

The finish isn't behaving like the front of the can says it will. The finish is gummy, won't harden, sags before curing, or begins flaking off shortly after curing.

The solution

Film finishes require careful surface preparation and attention to the moisture content of the wood. Most manufacturers recommend sanding to 220 grit. Sanding beyond 220 grit compromises the mechanical bond between the wood and the finish. In addition, moisture trapped under a film finish can lead to finish failure. With inadequately seasoned wood, temperature fluctuations will encourage moisture to rise to the wood surface, thereby compromising the finish. In short order, the finish will separate from the underlying wood. A cloudy appearance is the first sign of trouble, quickly followed by flaking finish.

Naturally oily wood requires special treatment before finishing because the oil in these timbers inhibits curing of film and oil finishes alike.

Tropical hardwoods are always a challenge, and whatever course you attempt, trying an idea on a scrap of the same species to test your approach is a good idea. Options may include no finish at all, as the oil in these woods offers some natural protection and can be brought to the surface with polishing. Some woodworkers de-oil the surface with a solvent (acetone, for example) immediately before applying a finish (wait too long and oils will find their way back to the surface). The few products marketed for teak and other oily woods are formulated with a higher proportion of solvents to encourage curing—which may or may not happen on your particular species of wood.

While providing a lower level of protection than a film finish, oil finishes are forgiving and will stick to everything from rough wood to a polished surface. Oils penetrate the cells of the wood and are not reliant on the wood surface for adhesion. Dust that may be contaminating the surface is readily removed, along with excess oil, as part of the application process.

Contaminants

The problem

The cured finish feels gritty, bumpy, or shows little opaque circles.

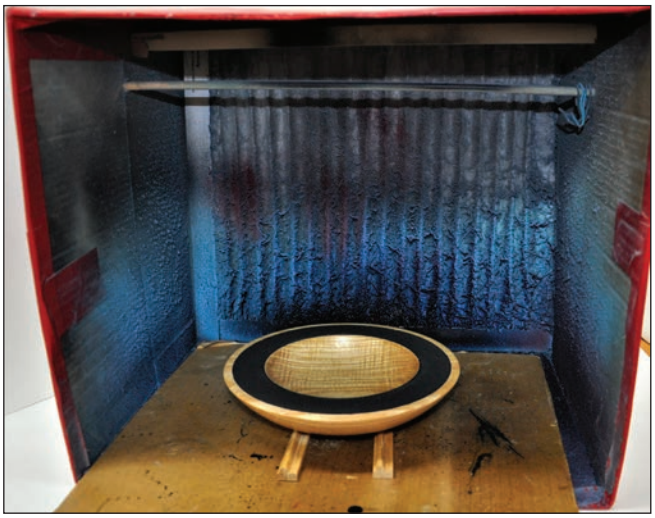
A film finish should, ideally, feel and look perfectly smooth after the final application. A less-than-ideal finish may feel like a piece of abrasive with most of the grit worn off as dust pokes through from underneath the film. Silicone contamination from lubricants or a tack cloth can also lead to an appearance called fish eyes, where much of the finish is clear, but opaque or semi-opaque circles appear randomly over the surface.

Creating a perfect finish in a dirty environment is almost impossible. Surface finishes with long cure times are more susceptible to dust contamination. Polyurethane can remain open to contaminants for over an hour, while lacquers flash cure in seconds-to-minutes. Oil finishes are far more forgiving, but even they can display problems in a particularly dusty setting.

The solution

Repairing silicone contamination requires stripping the piece to bare wood and refinishing. To avoid this problem, I do not use either silicone-based lubricants or tack cloths impregnated with silicone.

The fish eyes have it. Opaque circles, likely caused by silicone beneath the finish, add an undesirable decorative touch.



A cardboard box repurposed as a spray booth helps control over-spray and reduces dust contamination.

A clean shop is the first step to creating a better environment for finishing. Use a clean microfiber cloth, anti-static dusting cloth, or silicone-free tack cloth to wipe off your work before applying finish. Using an air compressor to blow off the work may send the dust into the air, where it floats blissfully before settling back on your freshly applied finish. Finish in the off hours when the shop will be free of activity. Turning creates dust that can remain airborne for long periods of time, so tidying up and then letting the dust settle for a few hours prepares a shop for finishing.

Another option is to use a simple open-sided finishing booth to keep dust from settling on the work. My setup is a cardboard box with a furnace filter in the back to catch overspray. By adding a turntable to the box, along with a dowel and some homemade hooks, I can finish all kinds of items in this set-up.

If you find dust, bugs, or a stray hair in your work, fix it. Light sanding between coats can level nibs in preparation for subsequent coats of finish. Use silicon carbide abrasives, one grit finer than the last one you used to sand your work for oil finishes, or 400-600 grit for surface finishes, to sand between finish coats. For surface finishes, dipping the abrasive sheet in a little water with a single drop of dish soap lets you wet-sand the work. Wipe off the work, let it dry thoroughly, then recoat. Wet-sanding with the finish oil you are using can yield a remarkable finish.

Environmental problems

The problem

The finish cures either too quickly or too slowly relative to the manufacturer's description, or is opaque after it cures.

The solution

Finishes—especially film finishes—are formulated to work within specific temperature and humidity ranges. Most also have a limited range in which they can be stored and still work properly after coming out of temperature extremes. Water-based finishes (including acrylic paint) are ruined by freezing. If your shop is susceptible to wide temperature swings, you will need to find another location to store finish, or switch to oil finishes that are more forgiving of environmental conditions.

Outside of a product's working temperature range, the chemical reaction that causes the finish to cure either cannot happen, will proceed too quickly, or will stall in mid-reaction. Above the temperature range, the surface of the finish may skim-over too quickly and trap solvents below this layer. Open time declines and curing time may be extended. Some lacquer finishes can have retarders added to slow down the curing time if you work in a warm climate.

Plan to finish work during the time of day when the environment in which you are finishing, and the finish itself, is within the operating range suggested by the manufacturer. Read the labels and go to the manufacturer's website to read the material data sheets to identify the finish with a temperature range that best suits conditions in your shop. Note that temperature and humidity guidelines apply both to the application and initial curing period.

Humidity can be a problem with surface finishes, even if you are working with well-seasoned wood. Surface finishes cure from the outside-in and can trap humidity beneath the finish. This shows up as cloudiness in the finish. Lacquer is particularly susceptible to this phenomenon. In the case of lacquer, a product called blush remover can save the day. It reactivates the lacquer finish and seems to allow some of the trapped humidity to escape. If you get blushing with polyurethane, your only choice is to remove the finish and start over.

Finishing in a room that is either air conditioned or heated may seem like a logical alternative, but it is difficult to maintain

adequate ventilation in those settings unless you have installed a finishing booth and spark proof exhaust fan. The better choice may be a finish with low toxicity that doesn't have stringent ventilation requirements.

Incompatible products

The problem

Different finish types are applied in succession, with a less-than-satisfactory appearance.

With the dizzying array of finishing products in the marketplace, it is inevitable that some will either have chemical or physical properties that prevent them from working together. Failures here can come in the form of a top layer that will not adhere to the underlying surface finish, or to a surface coat that causes an undesirable color shift in the piece's appearance.

Hybrid finishes can be especially problematic. For example, if wax is present in a finish, you probably will have surface finish compatibility problems because wax inhibits adhesion. Using shellac that has not been dewaxed creates similar problems. This can be particularly frustrating because dewaxed shellac fixes most finish compatibility problems, while shellac with wax makes these problems worse.

The solution

Incompatibility problems seem to fall into two categories: finishes that are fundamentally incompatible with each other, and those that require complete curing (roughly 30 days) before they can share a surface in harmony. You can get a tip (but not absolute certainty) about compatibility from reading the ingredients on the can. If the same type of thinners are in two products they are likely to be compatible. Note that using the same brand does not guarantee compatibility—many manufacturers market a diverse line of products to fill a range of needs. Oil finishes should cure completely before top-coating with a surface finish. Not all oils cure, so be sure to choose one that will, such as tung, heat-treated walnut, or boiled linseed oil.

An incompatibility problem can often be cured by applying a barrier between the two finishes. Dewaxed shellac is the best known barrier and is widely available from hardware and home center stores. Shellac is easily applied, adheres to almost any surface, and cures to form a bonding layer between the otherwise incompatible finish types. A two-part epoxy finishing resin can also be used as barrier coat and bonding layer. However, epoxy is pricey and challenging to apply to a curved surface, so this is a measure of last resort for many of us.

One of the fundamental rules of finishing is to never place a hard layer over a soft layer. Gloss varnish is harder than low-sheen varnish, so it should always be the bottom layer if you choose to apply varnishes with differing sheens. Any varnish (hard) is likely to fail if applied over an uncured oil finish (soft).

Advanced planning is your friend. Identify a strategy for finishing before the first shavings fly. This can give you an opportunity to test different finishes, including their compatibility and appearance, on the surface of a blank that will soon be turned away. Alternatively, find a scrap of the same species and try out some ideas, keeping notes or labeling your test pieces. The time you skip this step—especially when trying a new finish--is the time you will have a problem, guaranteed.

Failure to follow the manufacturer's instructions

The problem

You slathered on the finish and then decided to read the directions in a free moment between applications.

The solution

Many finishing failures can be traced to operator error, and many of those failures can be avoided by reading and following directions. Be different, read the directions on the can, and then read the manufacturer's FAQs on their website before using any new finish. Besides avoiding disaster, you may learn a tip or two that saves time and money and yields a better finish.

Not everything on a can is written by lawyers to avoid liability. Guidance on the product container will help you avoid any number of pitfalls, from failing to sufficiently mix the contents, to using the wrong solvent to dilute the product, to using the correct type of applicator. Most critical of all, the container will also alert you to the type of Personal Protective Equipment you should wear to avoid health hazards linked to the product.

Using the wrong finish

The problem

Problems under this heading are either linked to aesthetics or function. Selecting the wrong finish for the task can result in a turning whose visual appearance does not meet our expectations. Perhaps it is too glossy, fails to highlight the grain patterns you hoped to show-off, or the finish altered the color of the wood in an undesirable fashion.

In the arena of function, a finish needs to be compatible with the turning's anticipated use. For example, a glossy finish may look great on a shelf under gallery lighting, but if the piece is meant to be functional, it will soon show fingerprints from handling. A film finish shows off life's accidents in the form of chips in the finish, a feature that is hard to repair and usually gets the object banished to the back of a little-used closet.

The solution

If a piece is to be handled and used, the finish should be compatible with the intended use, and it should be easy to renew. This makes penetrating hardening oils, alone or with a wax, a compelling finish. If you are using a surface finish, consider one with low sheen, as this type of surface does a better job of hiding scratches.

If a turned object is intended for display and a film finish is desired, consider the level of gloss that will invoke the reaction you desire. Does a technically perfect, high gloss finish make sense on an organic, earthy, natural edge bowl, or are you sending mixed messages to the viewer?

Consider, too, that precious few finishes are neutral in color--most change the underlying color of the wood in some fashion. Some finishes darken the wood, some add a yellow or amber hue, water-based finishes over dark timber create a bluish cast. You can use these color shifts to your advantage if you know how the wood is going to react. But unplanned surprises after the finish is applied are usually unpleasant surprises. With colored elements this can be a particular issue.

Conclusion

There are times when a finish failure can't be traced to anything except bad luck. With a little forethought and good preparation, preventable mistakes are avoided and the bad luck failures are few and far between. If you do have a finish failure, try to diagnose the source of the problem and learn from the experience. Most of the problems I see are due to using an expired product and failing to follow instructions.

We all make mistakes. Smart turners learn from their mistakes. The really smart turners learn from other people's mistakes.

Mark Palma is a cook, woodturner, educator, prolific writer, and reformed attorney in Cameron, WI.

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Ten (+4) Tips From a Pro

by Pat Miller

1) **Take lots of pictures.** Wood, preparation, in-process, tools—pictures of all of these can help down the road, track my history, and provide a valuable image library if I end up demonstrating, teaching, or authoring an article. For photos of finished work, use a photo booth, or at least an environment in which you can control light and shadows. Neutral, non-distracting backgrounds are a must to showcase my finished pieces in the best possible light. I have never had a second chance to make a good first impression.

2) **Clean the shop regularly.** I have a relatively small work space and a lot of tools, so space is at a premium. A clean shop keeps fire hazards to a minimum and there is less chance of losing small parts.

3) **Use abrasives like someone else is buying them,** but be frugal with their money. I've made a tearing jig that allows me to easily and repeatedly turn a standard abrasive sheet into twelve smaller sheets. Then I made a marked storage unit to keep the pieces handy. I always write the grit number on the back of each small piece.

4) **Make a small finishing booth.** Ours is a large plastic tote suspended from the ceiling with a flexible duct and spark-proof fan vented to the outside. It helps keep fumes out of the confined shop and the inevitable dust out of the drying finish.

5) **Keep frequently used "other" tools close to the lathe.** I have a micro motor rotary tool, hot melt glue gun, and a flexible shaft carver on a moveable tower mounted to the lathe. I also have a small platform mounted to the back of the lathe where I can keep a couple of tools, live center, drill chuck, or other items specific to the turning task at hand. Over time I have turned an assortment of plastic "ends" that screw on to the tailstock live center. They occupy a rack within arm's reach behind me along with all of the hex wrenches and measuring tools that I regularly use.

6) **Make your own scrapers and handles** specific to the tasks your work demands.

7) **Keep your tools sharp.** There is no shame in using a jig. I still use one for sharpening some of my gouges. Over time, I've become better at freehand sharpening but early on all I did was make shorter and shorter catchy tools.

8) **Hot melt glue is amazing stuff.** It's hard to beat for making strong, temporary fixtures and jigs. I find it especially useful for mounting irregularly shaped work and burl surfaces to a chuck mounted piece of MDF. I try to use it in conjunction with a few screw-held blocks of scrap, but I've turned a number of pieces held only by glue. Using hot melt glue demands sharp tools, light cuts, and caution with lathe speed.

9) **Keep the liquids close.** I have a few spray bottles with various elixirs hanging close by, including diluted shellac for CA stain prevention, water with a little soap to help scraping cuts on troublesome wood, and denatured alcohol for removing hot melt glue.

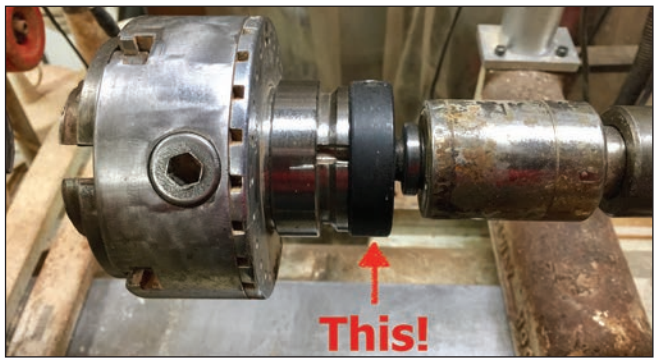
10) **Remember—wood does grow on trees.** Always turn the best stuff first.

11) **Every rule has exceptions.**

12) **I have time.** What I need to work on is time management...

13) **Switched outlets are super handy.** We all have an assortment of devices—vacuum pumps, fans, glue guns to name a few—that seem to either not have a switch or if they do, it's inconvenient to use. A familiar switch right where the device plugs in simplifies my life.

14) **A tailstock chuck adapter is a great investment.** It makes all forms of reverse chucking—whether using a vacuum chuck or jam chuck—simpler, faster, and more accurate.



Pat and Karen Miller bring their divergent talents and skills together as a "couple" of artists. You can see more of their work or contact them via their website www.patandkarenmiller.com, or through Instagram [pat_karen_miller](#).

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Woodturning FUNdamentals

is an informative digital publication and online learning portal aimed at new turners. Whether you're starting a new hobby or plan to become a pro, the projects, techniques, tips, videos, and resources in Woodturning FUNdamentals *will help you build essential knowledge and skills. The AAW publishes* Woodturning FUNdamentals *digitally, four times each year and free to members.*

Glenn Lucas uses a double–ended caliper to check his simple bowl's wall thickness. Despite all the turning wizardry one might see, few objects are more eloquent, or better at gracing a table, than a perfectly executed, simple bowl. To learn more about this foundational project, see Glenn's article beginning on page 27.

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