WOODTURNING FUNDAMENTALS

American Association of Woodturners
August 2019 • Vol 8 No 3

Surface finishes
8 application data sheets

Symposium special report
Finding and fixing vibration
Walnut pendant
Cantilevered bottle holder

Skew Chisel
...clean, smooth, fast

Magnetic pyramid

AAW | AMERICAN ASSOCIATION OF WOODTURNERS

WE ARE TEACHING THE WORLD TO TURN

WOODTURNING FUNdamentals

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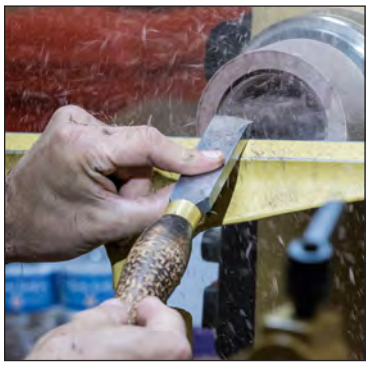


Cover: Benoît Averly cleans up the inside of a box with the skew chisel, page 6. AAW Raleigh symposium Photo by Andi Wolfe.

Andi Wolfe Photography

Trade show overview, left, with slice of vast Instant Gallery.

Big fun summer vacation with the AAW in Raleigh

by John Kelsey

In the middle of July I rode the Amtrak train to Raleigh, NC, to join 1,350 turners for the 2019 AAW symposium. This 3-1/2-day event combines expert demonstrations and panel discussions with an Instant Gallery and trade show, several juried exhibitions and fundraising auctions, and lots of general camaraderie, all in and around a large, modern convention center.

My mission? To look for fundamental gems. And to explain why new turners would find the annual jamboree worthwhile. There's a lot on offer, and not only for experts.

Thursday is to arrive, meet-and-greet, set up the trade show and Instant Gallery, open and enjoy the exhibitions. Friday thru Sunday, the schedule divides into 90-minute blocks for demonstrations, separated by free hours for seeing and doing everything else. Local volunteers work with machinery vendors to set up and run the demonstration rooms, which feature video cameras and large overhead monitors so everyone can see what's going on.

The symposium is a major AAW activity, and it has become the model for about a dozen regional events. The scale and scope of this national event is truly remarkable. With only eleven 90-minute workshop time slots on the schedule, attendees choose among 60 different topics, most repeated twice, by 27 demonstrators. It's impossible to attend everything, so everyone's experience is different. But here's a snapshot:

- bowls and platters, 8 demos
- boxes, 6 demos
- embellishing, 13 classes
- hollowing, 8 demos
- multi-axis turning, 4 demos
- pens, 3 demos
- specialties and projects, 6 demos
- spindles and finials, 5 demos
- tools and techniques, 7 demos
- panel discussions, 12 demos
- special interest lunches, 9
- exhibitions, 3, plus the Instant Gallery
- trade show, 70 vendors

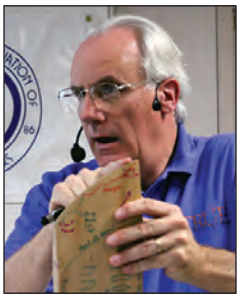
A great vacation menu! Here are highlights.

Jim Echter rolls a bead *with the skew's short point, overhead view, as seen in a large monitor in a Raleigh convention center demo room.*

Phone-camera photo of the video monitor shows how well the setup works. There's a camera on a maneuverable boom over the demonstrator and his lathe. You can see both hands and the cutting edge, almost from the turner's eye view. Volunteer camera operators alternate closeup and medium shots — you can see everything from almost anywhere in the room.

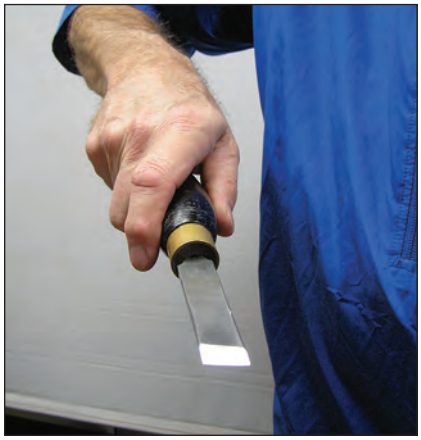
Sensational skew

The symposium schedule featured two different skew demonstrators, Jim Echter and Colwin Way. Jim's presentation, "The Sensational Skew," drew a full house and no wonder — Jim is a clear and entertaining teacher with a strong "you can do this" message (page **12).**



Jim Echter *makes his point with a giant wooden skew.*

Video monitor shows room full of standing turners learning to roll beads by shaking hands with the skew. Left, wooden skews Jim gave to everyone.



Bead rolling. *To form the right side of a bead, the turner's hand rotates clockwise...*

... ending with the tool edge vertical and the hand positioned as if to shake with someone.

To form the left side of the bead, the hand starts horizontal, then rotates counterclockwise as if to shake at vertical.

Benoît Averly *favors the skew when shaping his turned-and-carved hut boxes and, as shown on page 1, to clean up the inside walls and bottom.*

Andi Wolfe Photography

Colwin Way *demonstrates roughing to round using a German-style skew chisel that's thin and tapered like a fishtail.*

More skew surprises

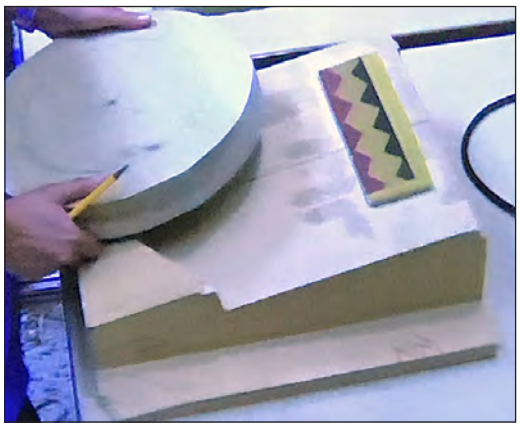
Benoît Averly's hut-shaped boxes are turned, carved, and dyed. Averly uses the skew to cut a clean, flat-bottomed inside corner. He excavates with a gouge, then shapes and cleans up the inside corner with the long point of a sharp skew chisel held flat on the toolrest at center height. For this to work, the skew needs to be honed on its long edges.

Colwin Way, from England, demonstrated a German-style skew with a long tapered blade and a short, highly maneuverable handle. The fish-tail shaped blade was about 1/8"(3mm) thick, half that of standard English skews. He explained that the key to a smoothly planed surface is pressing down on the toolrest, so the skew's bevel just glides across the wood. You get ripples, he said, by pressing the tool too hard on the workpiece. Colwin suggests planing with the toolrest 1/4" (6mm) above center, so you're working almost on top of the spindle. He favors an overhand grip with the fingers of his left hand wrapped around the workpiece to bear against the toolrest, while his left thumb guides the tool itself. The right hand powers the cut, angling the skew in the direction of travel.

Simple drill-press jig helps bore leg mortises in stool seat

Kimberly Winkle *makes painted poplar stools. It's tricky to drill leg mortises at the right angle, but she has a slick jig, right.*

Wide base helps center and clamp the jig. Side wedges tilt the platform to 15°; taped shim with black triangles adds 2°. Two lateral wedges make a shallow vee that anchors the blank.



Carol passed around samples of poplar sealed two ways, labeled with a pen burner.

Carol's sample shows paint on raw wood is opaque, left; paint over shellac, right, is translucent and the grain shows through.

Carol Hall, *with finish-setting heat lamp, takes questions about painting and pyrography.*

Getting started with color

Early Friday I join a packed room for Carol Hall's presentation, "Beyond Brown and Round." Carol lives in Downingtown, PA, and belongs to the Keystone woodturners club.

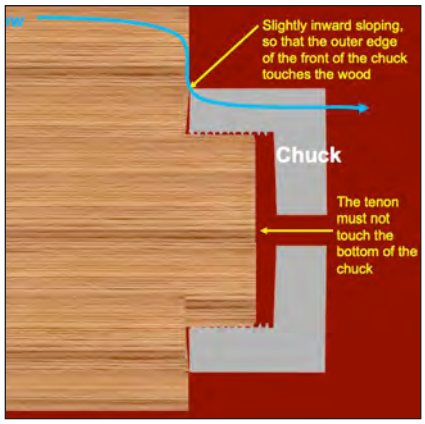
For any kind of painted surface, Carol emphasizes surface preparation, which you can't rush. Four steps:

- Raise the wood grain by wetting and drying the entire surface before final sanding.
- Use "wet water" for everything, that is, a solution of 1% Dawn dishwashing liquid. It's a surfactant that breaks surface tension and helps the paint flow, and stick.
- Seal the surface with a thin, 1-pound cut of wax-free blonde shellac or similar proprietary sealer, and degloss the surface with an acetone wipe before applying paint.
- Use a heat lamp to set wet coats and speed up drying.

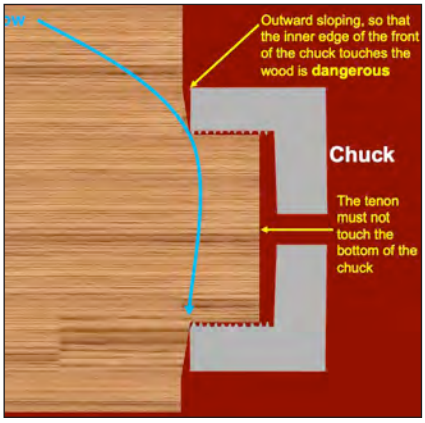
Carol dropped another great tip for transferring line art onto turned surfaces if you want to try pyrography, or wood burning. "Crumple the paper to break down the fibers until it feels like soft suede," she explained. "It'll lie flat so you can tape it down and burn right through it."

Carol Hall photo

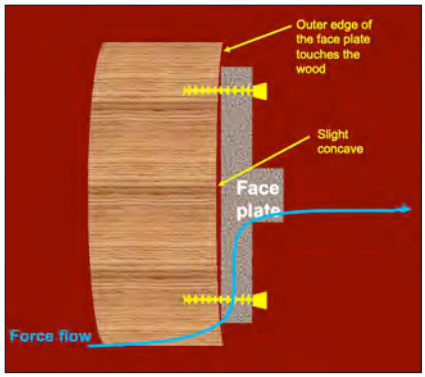
Carol decorates and embellishes, working with other turners. Her colorful work is expressive and fanciful.



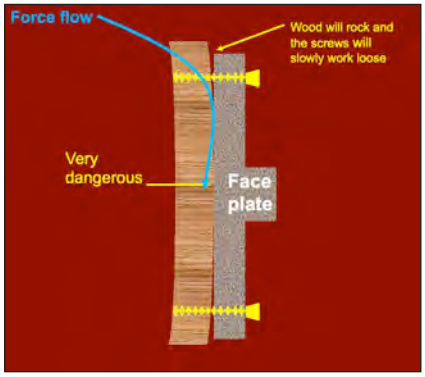
Dennis' diagrams show how to securely seat the workpiece in scroll-chuck jaws. Be sure the tenon does not bottom out.



For full contact, make the wood a bit concave. If it's convex, the chuck jaws can't grip properly.



On a faceplate the logic is the same: make sure its outer edge bears on the wood.



A faceplate mounting with gaps like this is not safe.

Dennis Fuge *showed how to make tall, lightweight bottles by hollowing from both bottom and top, with a clever plug to conceal the excavation.*

Illustrations and photo by Dennis Fuge

Safe, secure chucking

Dennis Fuge turns tall hollow bottles. He needs to be certain the long-grain workpiece stays in the chuck while he works from the end. Dennis trues up the workpiece cylinder between centers. To form a precise chucking tenon:

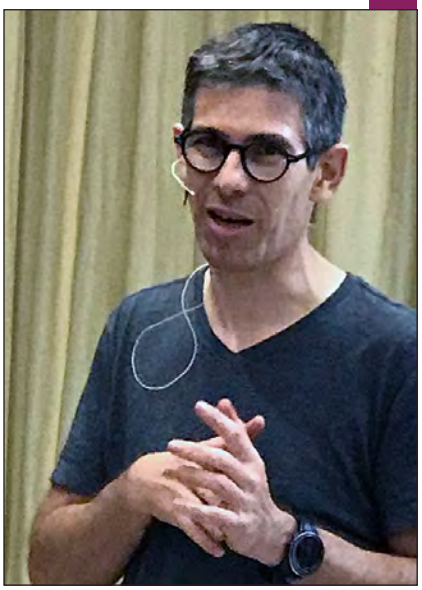
- find the tenon diameter by fully opening the chuck jaws, then closing it by two turns of the wrench, and caliper that.
- make the tenon shorter than the depth of the chuck jaws, so the workpiece sits on the top face of the jaws and the tenon doesn't bottom out.
- trim the bottom of the workpiece a bit concave, so the outer part of the chuck jaws makes firm contact.

The same logic applies when flattening the workpiece for a faceplate: turn it slightly concave to ensure solid contact at the plate's full diameter.

Dennis' demo, "Deep Hollowing from the Bottom Up," was packed with information. He showed slides of jar shapes and styles, and surveyed the six or seven known methods of hollowing on the lathe. Then he demonstrated his own approach, down through the neck and up from the bottom, through an artfully concealed plug and following a complex turning sequence. Very clever.

Teapot with integral spout by John Jordan of Tennessee.

Two-spout teapot by Pascal Oudet of France. Oudet turns ash so that after hollowing he can sandblast the soft earlywood to create a lacy effect.



Pascal Oudet *explains how he will create a wooden teapot with integral spout.*

Amazing one-piece teapot

At the Instant Gallery I was amazed by a one-piece teapot turned and carved by John Jordan. His tools left no trace of how it was done, so I was keen to attend Pascal Oudet's teapot demo.

Oudet turns a broad collar on the teapot body. Then after hollowing he carves most of it away, leaving only the spigot(s) and perhaps a stud for mounting the handle.

What's fundamental about this is learning to see the turning as a solid of rotation that can be radically altered by carving. Oudet power-carves on the lathe, using the chuck and spindle lock to position the workpiece. John Jordan told me he prefers to turn teapots green, easier to carve.

To create a teapot, the turner first makes its body with a broad collar or flange. Then hollow the body before shaping the spout.

Oudet power-carves most of the collar away, leaving just enough wood for the spout. He uses the lathe to hold the workpiece.

Finial pots by **Richard Wiersma** *display the eternally fascinating figure of wood. Blackwood finials, in the style of Cindy Drozda, respond elegantly to the flowing shapes. Decorative pots invite the question, does it matter whether they are hollow? What about weight, and heft in the hand?*

Everyone liked the velvety surface of these painted double-opening pots by **David Bushman**. *The carved details owe much to the Irish turner Liam Flynn, enhanced here by strong color. The jurors declared them "terribly tactile" and irresistible to touch, "like glass."*

Instant Gallery critique

Long tables at the Instant Gallery invite all symposium attendees to display three pieces of their own work, and many do. A panel of three jurors selects a dozen works for discussion Sunday morning at the Instant Gallery critique. I went looking for fundamental clues about what is "good" woodturning.

The jurors were museum curators Charlotte Wainwright and Michael McMillan, led by the noted wood artist Betty Scarpino, formerly editor of *American Woodturner*.

Wainwright

Scarpino

The wide-ranging discussion was challenging, and left me with three fundamental takeaways:

• It's OK to imitate work that you admire, use it as a place to begin, jump off, and push onward.

• Turnings can be round and brown, featuring outrageous wood color and figure. And, turnings can be carved, cut up, painted, burned, and reassembled.

• "Function" is a slippery devil — filling space and being pretty are perfectly functional.

Of course there is no answer to what is "good," there are only considerations and questions, often with very personal answers. ❐

Andi Wolfe Photography

It takes incredible skill and care to make a large segmented pot like this, by **Brett Olsson**. *The pattern includes empty cells, inviting how'd-he-do-that amazement. The motif comes from native American baskets, leading the jurors to discuss design originality and technical complexity.*

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Skew chisel pares wood precisely

by Jim Echter

The skew chisel is a finesse tool that can remove wood precisely while leaving a very clean surface. It has a bad reputation but it is not difficult to learn.

There are only two types of cuts with the skew:
- **edge-slicing** (such as bevel-gliding with a planing cut, and peeling)
- **point-cutting** (used for forming V-grooves, paring tenons or box joints, rolling beads, and cutting pommels)

The skew cuts only three profiles, or shapes:
- **straight line** (cylinders or tapers)
- **shallow concave** (long coves)
- **convex** (beads)

Move and glide

You *must* move your body when using the skew chisel. Beginners tend to move the skew with just their arms. But the skew needs to be locked into position with your body so you can move both together, as in a dance.

For a high quality cut, the skew's bevel should glide over the wood surface and not rub it. Gliding the bevel requires a light touch. Beginners press too hard on the turning blank; the pressure should be on the tool shank down onto the toolrest (**1**). With the bevel positioned just above the wood surface, anchor the tool to the toolrest, raise the handle to engage the heel and start slicing, lock into position, and then glide the tool in the direction of the cut.

Andi Wolfe Photography

1. Planing cut *with the skew. The bevel glides lightly across the wood with downward hand pressure on the toolrest.*

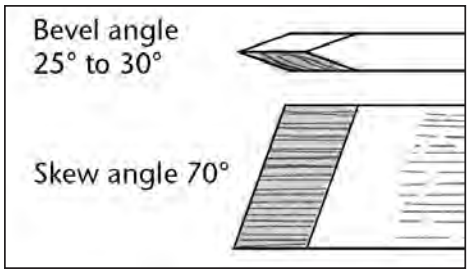
Basic skew rules

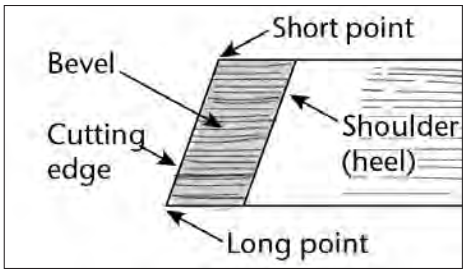
- ***The skew is a finesse tool.*** It is a finishing tool which, when used gently, provides a wonderfully smooth surface.

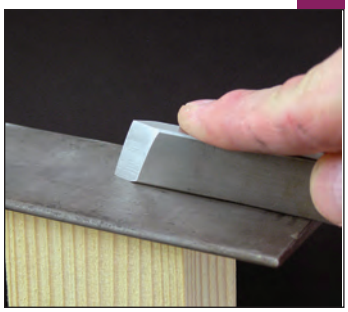
- ***The toolrest must be absolutely smooth*** so the tool can glide over it without catching. File to remove nicks, then wax to reduce friction.

- ***Concentrate on the cutting edge, bevel, and point positions.*** Let the tool handle go where it must go to put the point and edge into proper position. To swing the handle far enough, you'll sometimes need to move your body out of the way of the tool handle.

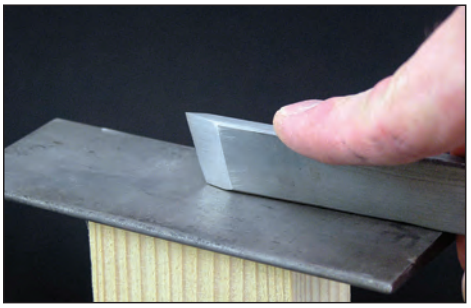
- ***The skew edge must be razor sharp*** and have very sharp points at the ends (long and short points). True points (with no radii) help to reduce catches. Hone all four surfaces: two bevels, the top, and bottom. Carbon steel and HSS tools can be honed with an oil stone (**3**), but skews containing exotic metals need a 600-grit diamond or CBN slip.







2. Rectangular skew, *3/4" wide, has a 30° bevel, flat top edge, and rounded bottom edge.*



3. Hone *all four surfaces to achieve sharp points at the ends of the cutting edge.*

Skew terms and angles

A regular rectangular-shanked ¾" (19mm) or ½" (13mm) wide tool (**2**) will be perfect for turning pens, tops, pepper mills, chair legs, and balusters.

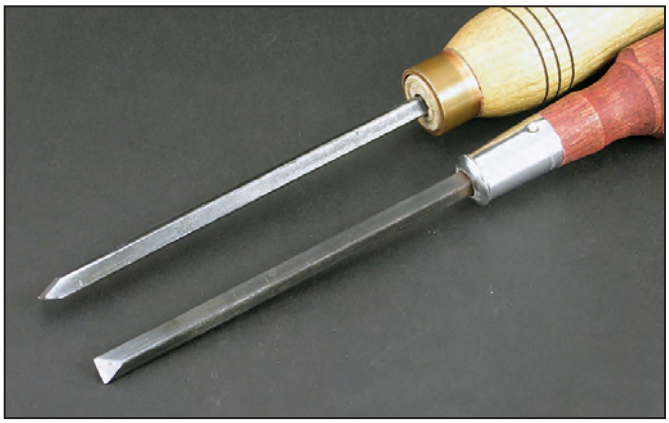
Start with a straight skew edge angle of 70° and a bevel included angle of 30°. You can eyeball the bevel length to be 1-1/2 times the thickness of the tool shank to approximate 30°.

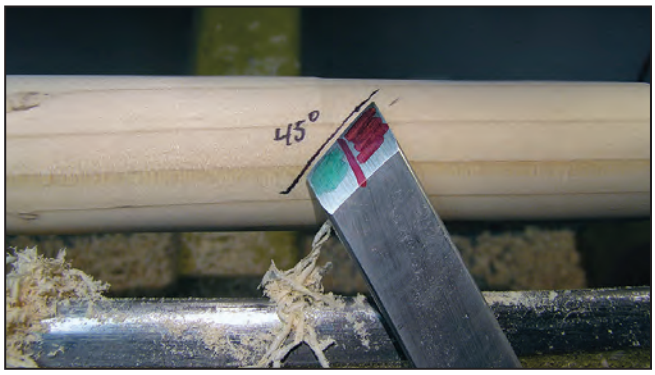
Rectangular skews have a rounded bottom edge that glides easily over the toolrest, to roll beads smoothly. A skew with a flat top surface and no sharp edges, (**2**), is easy to control when cutting V-grooves and pommels. Some turners prefer a rounded top surface.

An inexpensive skew may have sharp top edges that you'll need to grind over; you might also grind a radius on the bottom edge. The factory grind may be too blunt. A skew angle of 70° with a 25° bevel (included angle) is great for softwoods like pine and poplar, while a 30° bevel is good for exotics and hardwoods.

Making small skews

Square-shanked skews, also known as beading and parting tools, are good for performing the tasks the names suggest. You can purchase them or make them yourself—I made mine out of old square-shanked screwdrivers purchased for 50 cents at a thrift store They are ground straight across with a 45° to 50° bevel. As these tools are used for small details and light cuts, I don't see the need for exotic metal or even HSS. The steel in a screwdriver will win over the wood.





4. Planing cut. *Present the tool so the cutting edge is at a 45° angle to the blank. Keep the cutting action to the lower half of the edge, colored green.*

5. Dance with me. *Hold the skew against your body and cut by moving your body and tool as one unit—the woodturner's dance.*

Planing cut

The skew is known for the sensational finish it can leave on the surface when used to plane a cylinder. You can often start sanding with 220-grit abrasive or higher because anything coarser would damage the surface.

Planing is an edge-slicing cut: the short point does not push into the fibers. Focus your attention on keeping the cutting edge at a 45° angle to the blank, locking the tool to your body and moving your body and tool as a single unit (**4, 5**). The planing cut process:

- **A: Anchor** the tool to the toolrest and press downward, into the toolrest and towards the floor.
- **B: Bevel** — Starting with the tool handle low, raise the handle until the heel of the bevel starts to gently rub against the blank.
- **C: Cut** — Continue slowly raising the handle until the edge engages the wood, keeping the cutting action to the bottom half of the edge (photo **4**).
- **D: Dance** — Start moving in the direction you want to cut, moving your body/tool as a single unit (**5**). Glide the bevel over the surface, and don't rub too hard.

6. Peeling cut. *Begin by presenting only a portion of the cutting edge, and use more of it as your confidence increases.*

Peeling cut

Like a handheld pencil sharpener, a skew efficiently peels away the spinning wood. The peeling cut does not leave nearly as fine a finish as the slicing, or planing, cut. However, it's perfect for fast wood removal and things like chair tenons that will be glued into a mortise.

Start with the tool handle low and align the cutting edge with the lathe axis. Anchor the tool on the toolrest. Raise the handle until the back of the bevel starts to rub. Continue to raise the handle until the edge starts to peel the wood (**6**).

As the cylinder's diameter decreases, continue raising the handle to keep the peel going. When you are learning, use only a quarter to half of the cutting edge; as your skills develop, try using its entire length. This is not a scraping cut; with the tool handle low, you are peeling shavings off the wood.

7. V-groove. *Present the skew with its long point down to form a V-groove, starting with the handle low.*

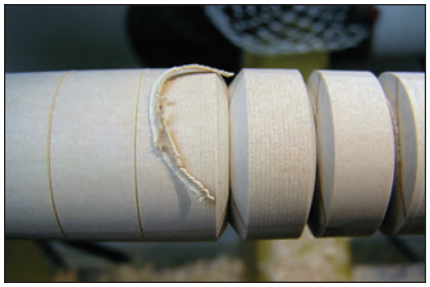
8. Lift *the handle to pivot the long point into the wood.*

V-groove cut

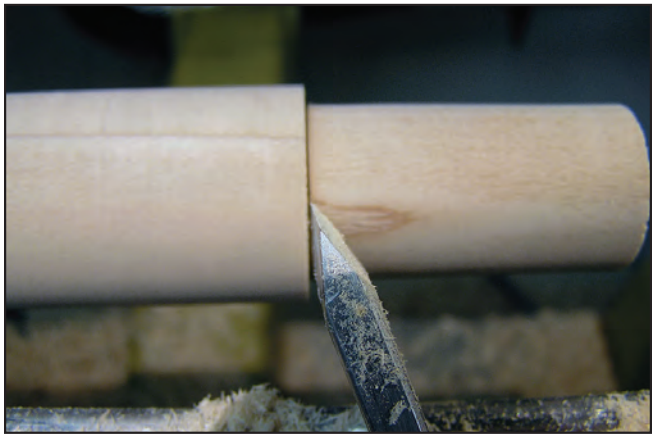
The V-groove is a useful visual detail on spindles. It is also the first step in forming a bead. The V-groove uses only the long point (**2**). The skew's bevel does not contact the wood.

Start with the handle low, position the long point down on the toolrest, aim the bevel in the direction of cut, and enter the wood. As you cut, rotate the tool very slightly to provide clearance between the cutting edge and the just-cut surface. Lift the handle straight up to swing the long point deeper into the wood (**7, 8**).

Beginners tend to push the tool forward into the blank instead of pivoting the point into the wood by lifting the handle. Beginners also want to swing the hand left or right, when the handle just needs to be lifted straight up. It is important to move your body to the left or right before the start of the cut, so you can see where the tool's point is going. When you make a proper V-groove cut with just the long point, you will end up with a circular chip that can pop off the blank straight up into the air (**9**).



9. Circular chip *results from a V-groove cut.*

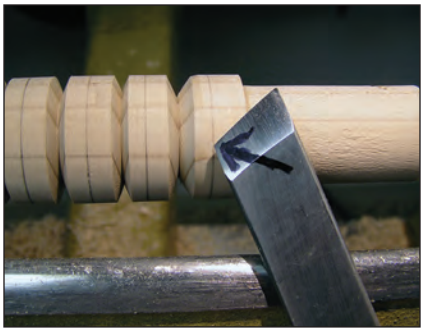


10. Paring cut *faces off endgrain and cleans up tenon shoulders.*

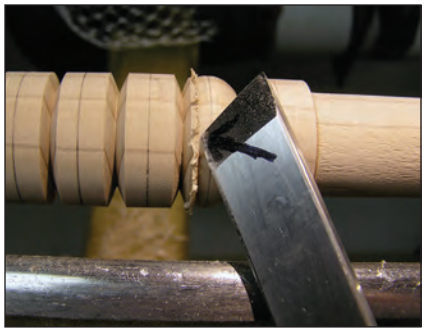
Paring cut

The paring cut is similar to the V-groove, except the direction of the cut is 90° to the wood, or straight into the blank. It is for cleaning up endgrain on spindle work and refining tenon shoulders; on a box, you could use a paring cut to clean up the joint between body and lid.

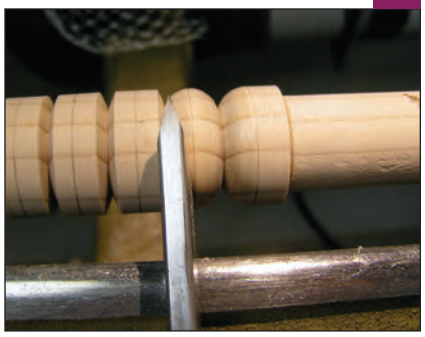
Start with the tool handle low, align the bevel with the surface you want to clean up, lift the handle until the long point enters the wood, and rotate the handle slightly for clearance. Raise the handle straight up to pivot the long point farther into the wood (**10**).



11. Rolling a bead. *Begin by engaging the short point of the skew. Rotate the tool as you lift the handle.*



12. The curl *raised by the point is necessary for maintaining tool support throughout the cut.*



13. The tool edge *has been rotated to vertical at the end of the cut.*

Bead cut

There are two methods for cutting beads with a skew: short point only, and edge slicing. Begin with the point-only method because it's easier to control and less prone to catches.

To cut a nice round bead, move the tool handle to swing the short point through a complete arc. Rotate and lift the handle with coordinated timing and, if the bead is large enough, slide the tool along the toolrest. Think of your hand position when shaking hands. When rolling a bead with a skew, the cut ends in the normal hand-shaking position.

Form beads between two V-grooves. Anchor the tool on the toolrest with the handle low. Swing it to aim the short point in the direction of cut. Raise the handle until the point enters the wood and raises a curl. Sweep the cutting tip through the desired arc while rotating the tool handle. The cutting edge starts horizontal and ends vertical. Make several light cuts to approach the final bead.

To prepare for cutting the left side of a bead, twist your hand clockwise 90° (**11**) and position the tool flat at the top of the bead. With the skew's short point engaged, roll the tool to the left by twisting counterclockwise as you swing, lift and rotate the handle (**12**). The cut ends with your hand in the shaking position and the cutting edge vertical (**13**).

To prepare for cutting the right side of a bead, twist your hand 90° counterclockwise, position the tool at the top of the bead, engage the short point, and roll the tool clockwise to the normal hand-shaking position.

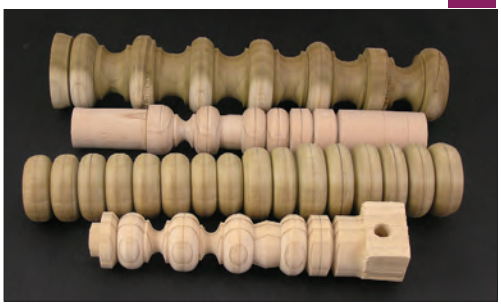
Shallow concave cut

Shallow concave cuts are straightforward with a skew. They are edge-slicing cuts, just like planing cuts except you direct the tool to cut a shallow concave shape (**14**). This is useful when making tool handles or for turning balusters and furniture parts.

14. Cutting a long, shallow cove *with the skew. Notice the smooth surface left on this pine.*

Jim Echter, tcturning.com, specializes in spindle turning. He was founding president of the Finger Lakes Woodturners Association, an AAW chapter. A version of this article appears in American Woodturner *v34n2, April 2019.*

Three skew practice exercises



Practice skew cuts with 2" diameter (5cm) green unseasoned branch wood, or 2" × 2" (5x5cm) pine blanks about 10" (25cm) long. Green wood is ideal because you can probably find plenty at no charge and it cuts more easily than dried wood. Don't try to learn the skew with expensive exotics or hardwoods. Master the tool with green wood and pine, then apply your skills to harder woods, which will necessitate lighter and slower cuts.

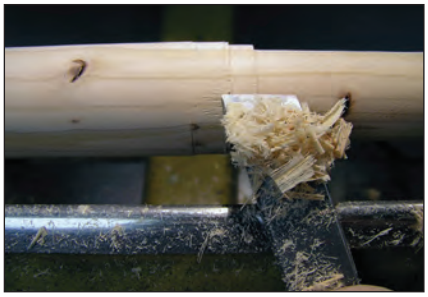
Mount practice blanks between centers using a cup drive or safety drive in the headstock. These allow some slippage when you get a catch, whereas a four-pronged drive center will not. Use a spindle-roughing gouge to prepare a rough cylinder, then proceed to the exercises. If you really want to get somewhere, practice each exercise with a series of twelve blanks each.

— Jim Echter

Planing and peeling

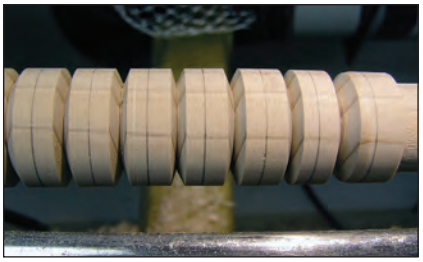
(Left) Plane a cylinder smooth with the skew five to ten times.

(Right) Peel cut the cylinder to 3/4" (19mm) diameter, stepping down the length of the blank.



V-grooves and beads

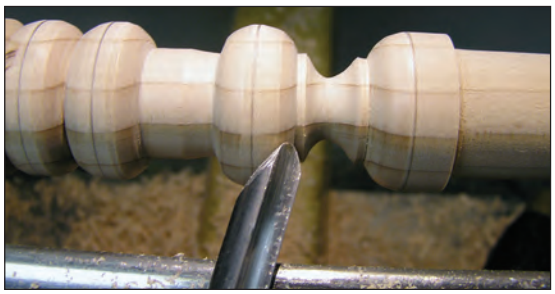
Plane a cylinder smooth with the skew, and mark out 5/8" (16mm) intervals.



Form V-grooves at every mark about 1/4" (6mm) deep, then mark centerlines between all the V-grooves.

Roll beads with the goal of leaving the marked centerline at their peak. End with the skew's cutting edge vertical.

Beads and coves



Plane a cylinder smooth with the skew, and mark out 5/8" (16mm) intervals. Form V-grooves at every mark about 1/4" (6mm) deep, then mark centerlines between all the V-grooves. Roll beads as above, then turn away every other bead with a peeling cut.

Form coves with a spindle gouge between the beads, leaving a narrow fillet (flat) between each.

Finding and fixing the causes of vibration and wobble

by Dennis Belcher
photos by Doug Haas

Vibration, a bane of woodturning, can make a good cut difficult and, in its extreme form, dangerous when the lathe starts walking across the floor. Vibration and wobble can stem from a variety of sources. Sometimes there is a single cause and other times there are multiple sources. Here's what to check.

Stand

Stands must be of solid construction and provide for securely attaching the lathe. The stand needs to be stable on the floor, with no rocking. Make sure all the feet are in full contact with the floor and adjust as needed with adjustable legs (photo **1**), levelers, or shims.

If your lathe has to be moved before you can use it, select a spot, adjust the stand and lathe as needed, and mark the floor for each leg. This makes stability predictable and repeatable.

Adding mass to the stand will help the lathe dampen vibration. My primary lathe and stand weigh 600 pounds, plus 500 pounds of metal plate on the stand shelf, for a total 1,100 pounds of mass, photo **2**. You can use sandbags, second-hand barbell sets, or steel plate from a junkyard, whatever you can get.

More weight is not an end-all. You can still make a lathe walk across a floor regardless of the weight, by some combination of speed and out-

1 - *Adjust legs, or use shims, to make sure your stand sits solidly on the floor.*

2 - *Additional weight helps a lathe absorb vibration. Use steel plate, barbell sets, or sandbags.*

of-balance workpiece. Use common sense. While the lathe needs to be securely attached to its stand, be careful not to stress the lathe bed while fastening it. Lathe beds can be distorted by tightening to a surface that is twisted. Make the stand solid to the floor before you position the lathe on it. Look for any daylight between the lathe legs and the top of the stand. Use washers or thin metal shims, to fill any gaps before tightening the bolts, **3**.

3 - *A washer was inserted between the lathe and the stand to fill the gap, before tightening the mounting bolt.*

Lathe

Lathe vibration can cause key fasteners to loosen. Check to see that all machine screws and Allen bolts are tight, photo **4**.

4 - *Check that all bolts connecting the headstock to the lathe ways are tight.*

Movable headstocks are a frequent source of vibration. Make sure the headstock is firmly fastened to the ways, and that the nut on its locking plate is properly adjusted, photo **5**.

The stability of the headstock can be improved by cleaning the locking plate beneath the ways. The plate's grip can be improved by roughing the contact surfaces with 220-grit emery cloth and then cleaning with mineral spirits; clean the underneath side of the lathe ways with mineral spirits applied with non-woven abrasive. The locking plate and underneath side of the ways should never be waxed.

5 - *Movable headstocks must be securely locked to the ways. Check the locking plate beneath the ways.*

Heavy lathes flex less than light lathes. You can determine how well your lathe handles vibration with a simple test. Mount a slightly off-balance blank on a chuck or faceplate and slowly bring the speed up. When the vibration becomes noticeable, make a note of the RPMs. Leave the piece mounted, but remove the faceplate or chuck from your lathe and try the same test on a different lathe. Comparing the speed at the point of vibration indicates which lathe is better at absorbing vibration.

Inspect the threads on the spindle nose for accumulated grime and/or thread damage, **6**. Remove any residue in the threads with a stiff brush dipped in mineral spirits.

6 - *Clean the headstock threads with a stiff brush and mineral spirits. Use a fine triangular file to repair any damaged threads.*

7 - *Clean the gunk off the spindle shoulder and threads, to make sure your chuck or faceplate seats tightly. Clean the chuck too.*

Damaged threads can be repaired with a small triangular file. Pay particular attention to the spindle shoulder just past the threads, because this surface registers with chucks and faceplates. Any irregularity on the surface of the shoulder will be transmitted to your chuck/faceplate, photo **7**. Clean the shoulder with non-woven abrasive and mineral spirits. Wipe with a clean paper towel to remove any cleaning residue.

Chucks and faceplates

Size your chuck or faceplate to the workpiece – a large workpiece on a small chuck can be the source of wobble and wood movement. Loose Allen bolts on chuck jaws can compromise the grip. Verify that everything is tight.

Confirm that the threads of your chuck are clean of any debris and that the mating surfaces are clean for full contact with the headstock shoulder. Likewise, clean the threads and mating surfaces of the faceplate, and verify that the mounting screws are of appropriate diameter, and tightly installed.

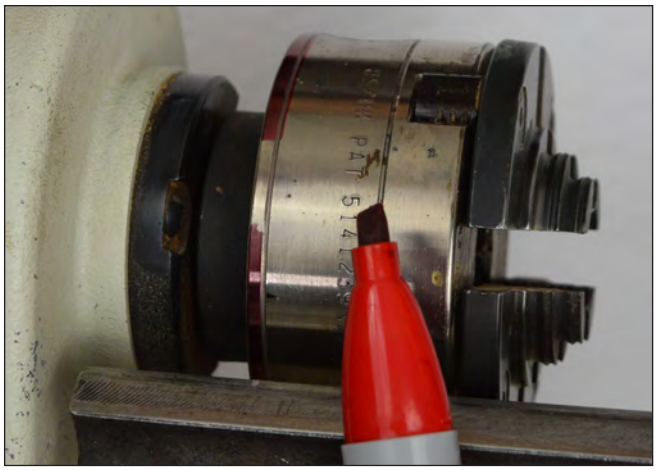
Verify that your chuck/faceplate runs true with a simple test. Mount your chuck and set the lathe to a slow speed. Rest a marker on the toolrest and slowly bring it in contact with the chuck body (**8**). If there are gaps in the marked line on the body, the chuck is not running true. A faceplate can be tested in the same way.

The source of a chuck not running true may be imperfect mating with the spindle shoulder. This can be remedied by adding a large, flat washer to fill any gaps between the chuck or faceplate and the spindle shoulder (**9**).

Mounting

It is a good practice to retighten chuck jaws after making the first cuts. Particularly with green wood, the jaws may dig in and compromise the hold. With a faceplate, look for any gaps between the wood and the metal and retighten or flatten the workpiece as necessary.

Green, soft, and punky wood present special problems when between centers. The drive spur can begin to drill its way into the wood, causing the blank to drift off center and wobble. It is always a good practice to check periodically



8 - *With the lathe turning slowly, the marker makes a dashed line on the scroll chuck, indicating it is not running true.*

9 - *A flat spindle washer can fill a gap between chuck or faceplate and headstock, to improve seating and reduce wobble.*

that the workpiece is securely held at both ends. Wobble may also be caused by a loose banjo or tailstock. Check that both are locked down.

Speed

Speed is a critical factor in vibration and wobble. Always start slow and gradually increase the speed until you experience vibration. Then slow the speed down until the vibration stops and you can begin to true up the workpiece. As you remove wood and the vibrations diminish, gradually increase the speed, find the point of vibration, back off speed again, remove wood again, and repeat until the workpiece comes into balance.

Imbalance

Examine the blank for voids and protrusions that would make it out of balance. There may be a choice between changing the mounting points to a more balanced center line, or focusing on grain balancing while leaving the blank out of balance. If you choose grain balancing, causing an out-of-balance condition, you can remove the blank from the lathe and remove excess wood from the heavy side.

Wood movement

Green wood can move in a short period of time. What was a perfectly balanced workpiece can become dramatically unbalanced in the time it takes to eat dinner. The best course is to complete the project without interruption, and do not allow the green wood to stay on the lathe any longer than necessary. Wrapping a green blank with plastic when you have to step away will retard wood movement.

As walls become thinner, the workpiece may begin to wobble each time you take a cut. Wood wobble and vibration can become pronounced just before you cut through a wall, so check the wall thickness, paying particular attention to the wall thickness at the bottom.

Final Thought

Always remember that not every piece of wood should be turned. The wisest decision is to not turn a blank that exceeds the capabilities of the lathe ... or of the turner.

Dennis Belcher is a member of the Wilmington Area Woodturners Association and a frequent demonstrator. See his work at dennisbelcher.com. ❐

Shopmade gauges nail recesses and tenons for scroll chucks

To save time and trouble in laying out chucking tenons and recesses, I have made a set of 1/4" (6mm) plywood gauges. These match the maximum and minimum diameter for a recess in expansion mode, and tenon size for exterior attachment. This is much quicker, easier, and safer than trying to find the diameter using a caliper or dividers.

I made a set of gauges for each of my three chucks as well as for their the various jaws. I drilled a hole in each to hang them on a nail (clip the head off) on my grinder stand.

It's a judgment call whether to make a recess or a tenon, based on the weight, kind of wood and size of the blank. Sometimes a tenon on a heavy bowl can break off while hollowing.

Recess mounting

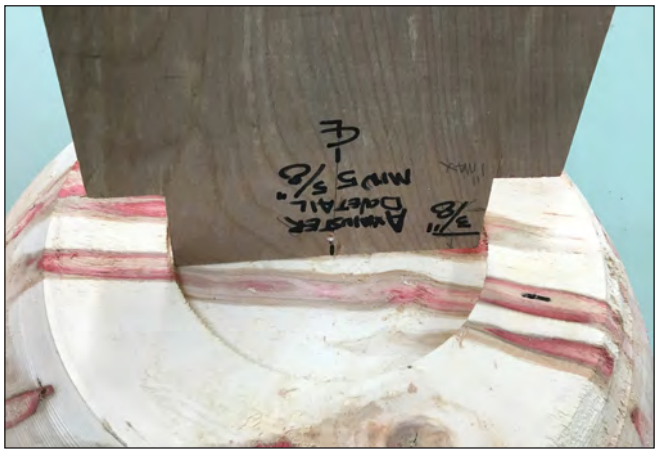
I lay out the bottom of the blank and cut the recess with a shopmade square-end scraper to a depth of 3/8" to 1/2" (10 to 12mm). A small skew creates a slight dovetail for better holding. The depth is marked on the template for testing before dismounting; be sure to let the lathe stop before inserting the template. I mark the center of the blank with a pencil while spinning, and also have marked the center of my template.

Tenon mounting

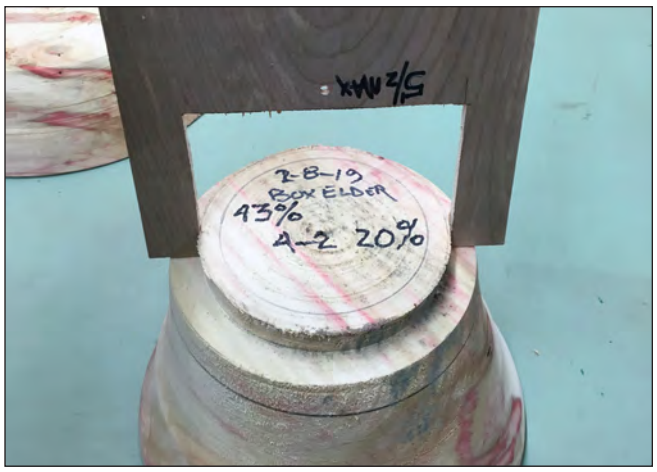
When cutting a chucking tenon, I just make sure the gauge's smallest opening does not drop over the tenon, while the largest opening does. As with the recess gauge, I also mark the tenon length on the gauge, to be sure the tenon doesn't bottom out in the jaws.

— David Zurek, Virginia Beach, VA

Each jaw set *gets a tenon and a recess gauge.*



Recess gauge *includes depth indicator.*



Tenon gauge *nails the diameter.*

Sizing tenons with a carpenter's pencil

Instead of sticking the sharp metal points of a compass or divider into spinning wood to mark the diameter of a chucking tenon, just lay a flat carpenter's pencil on top of the tailstock live center. Then touch it to the spinning wood to mark a circle.

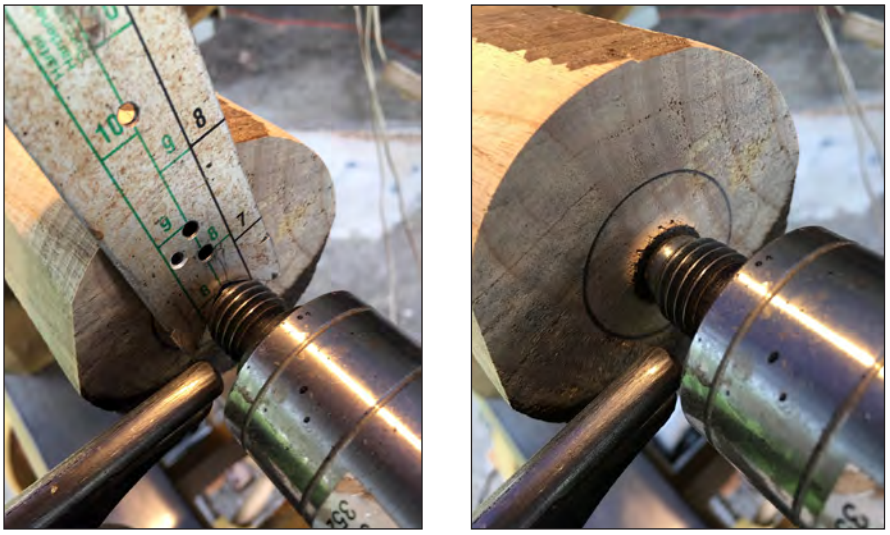
This makes a circle about 2" (5cm) in diameter, the perfect size tenon to fit a scroll chuck equipped with the common #2 (50mm) jaws.
— Bill Karow, Portland OR

Flat pencil *held flat on live center marks a 2" (50mm) circle for the chucking tenon.*

Sizing with ruler gauge

To make tenons the proper diameter for the chuck jaws, I made a gauge from an old aluminum ruler. I cut a vee in one end, and drilled holes to match my four chucks. I attached a magnet on the other end to keep it handy.

To use the gauge, I just place the vee onto the live center, insert a pencil tip into the proper hole to mark the wood, and then cut the tenon to that mark. Works every time.
—Jack Roberts, Gainesville, FL



Ruler gauge *has holes for each size of tenon, and a vee cut in the end that drops over the lathe center.*

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Domestic hardwoods

Have you tried walnut?

by Dave Schell

Walnut is a lovely hardwood to work with. Several varieties exist throughout the world, usually named by country: Japanese, Mexican, Guatemalan, Chinese, to name a few. In the United States, you may come across four main varieties of walnut wood: English (also called common), black (or American black), claro (or California), and butternut (also called white walnut). Walnut wood is dark in color, works well, and takes a beautiful finish, so it's highly prized in furniture making, gunstocks, cabinets, hardwood flooring, and carvings.

Black walnut is somewhat common in Pennsylvania, where I live, although when trees are removed they tend to go to sawmills for planks. When a local tree is coming down, I attempt to be on site to harvest the crotch pieces and major branches. I like to have lots of it around the shop and try to have a few bowls available at each of my shows. English walnut is less common around here, so I save pieces for special projects and commissions. In California, orchardists usually graft English walnut onto claro walnut roots.

Butternut, or white walnut, is a protected species due to damage from the canker virus, but sometimes it is available. Butternut acts much like black walnut with less (or no) dark heartwood, though it is considerably softer and less dense. Its figure and coloring look a lot like honey locust, which is a good substitute.

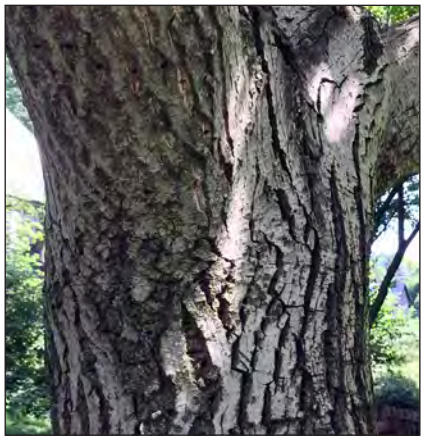
Walk through your neighborhoods, parks and local forests to see which of these varieties are available in your area. You can tell by the nuts the trees drop. English walnuts are the common smooth-shelled walnuts found in grocery stores. Black walnut shells are thicker and much rougher. Butternut shells are oval shaped and smaller than walnuts. Make friends with your neighbors so you can have first choice when trees come down after a storm or due to insect damage.

Walnut log — *Endgrain shows a wide band of creamy white sapwood surrounding dark, multi-colored heartwood.*

If you are sensitive to allergens, try English walnut before you try black walnut. Wear a good dust mask or a respirator and collect the dust at the source to minimize any sensitivity. And keep it out of the garden mulch.

I have a love/hate relationship with walnut. It is beautiful, but I am a bit sensitive to it. I hope you try it and enjoy it!

Varieties of walnut have differing hardness ratings and toxicity concerns; review this website for more info: wood-database.com.



Bark, fruit and nuts — *English walnut bark is white with dark crevices. Commercial varieties are bred not for timber but for their large, rich, thin-shelled nuts, good for eating and baking.*

English walnut

What I like: The wood color and figure can be phenomenal. English walnut usually has a mixture of lighter and darker wood with a blend of colors in random patterns. I enjoy turning shallow bowls or platters out of English walnut to highlight the colors and figure. I have worked with pieces that have cream, gray, light brown, chocolate brown, and black mixed together.

What I don't like: While not strong, there is an odor, which may displease some people. I do not notice the smell when the item has been finished, but I do notice it while turning both green and dry wood.

Workability: I enjoy working with English walnut because it is dense and cuts well. I tend to use drier wood when turning, and do not have problems with tearout as long as my tools are sharp.

What to watch out for: Walnut wood is susceptible to bug damage. If you don't like turning wood with holes in it, inspect the pieces before you turn them. I like those holes, so I look for wood that has some bug damage to add character.

Dave Schell lives in Mount Joy, PA.

English walnut *bowls turned from crotch sections shows unexpected black coloring, top, and intricate feather figure, below. Both bowls about 11" (27cm) in diameter.*

Bark, fruit and nuts — *Black walnut has dark rough bark with deep ridges over highly figured crotch areas. The nut shells are rough and thick, and not easy to crack, but the meat is very tasty.*

Black walnut

What I like: The dark color and figure. In some varieties the sapwood is distinct and wide, while in others it is minimal. My preference will vary based on the piece I am making, though in general I prefer solid dark pieces with little or no sapwood. For a magic wand or a natural-edge bowl, the distinct creamy sapwood is preferable. Black walnut has dark chocolate brown heartwood, sometimes with streaks of tan and red, sometimes with a dark purple hue.

What I don't like: Black walnut is an allergen. I sneeze, cough, and have to take breaks. Some people get a skin rash, too. I need to make sure I ventilate and use dust collection. Although my body hates this wood, I love turning it, it cuts so clean and smooth. The smell of wet, green walnut is strong and distinct — some people find it offensive. The wood contains dark pigments that stain the hands — wear gloves.

Workability: Black walnut is mild and cuts easily, and it takes a superb finish. I usually sand to 600 grit before tung oil, then paste wax for a soft, smooth finish.

What to watch out for: I have had mixed results using green wood and waiting for it to dry. I get better results turning dry walnut. Some black walnut has airy spots in the grain. The fibers are soft in some areas so it looks like tearout, but actually it's empty spaces in the wood. It can be frustrating.

Black walnut *turned from crotch section shows feather, or flame, figure in Dave's wife's favorite bowl, above. Large branch produced straight-grain bowl that sold right away, below.*

King of trees — *Black walnut left to itself on a sunny hillside takes over the earth and sky, and rules what other plants can survive nearby.*

Black and white — *Black walnut alongside butternut, aka white walnut. Top half was finished with brushing lacquer.*

Scrap wood pendant made on glue block

by Dave Schell

I am a wood hoarder and if you are like me, you hate to throw out wood. No matter how small a piece it is ... if there is some figure in it, save it. I have small pieces of wood stashed away in corners of my shop waiting for just that right project where I might need something small and wonderful, and well dried too.

I sell my turnings at many craft shows and needed to develop a low-cost product appealing to children and women. I needed something unique and eye-catching: the wooden pendant necklace was born (**1**).

This project is perfect for small but unique pieces of wood. I save cutoffs from bandsawing bowl blanks if there is distinct coloring, beautiful figure, or just something interesting, a knot or a twist in the grain.

Photo **2** shows some pendant blanks. These are approximately 3" (7.5cm) across and anywhere from 1/2" to 1" (12 to 25mm) thick. The exact sizes aren't important, because you'll turn them down to make the pendants any size you want — my final pendant sizes are approximately 2-½" to 2-¾" (about 7cm) diameter, and less than ½" (12mm) thick.

I save unusual wood cut-offs, like black or red palm, marblewood, or lacewood. I was lucky enough to come across a piece of snakewood donated to me because of a large crack, and it made a beautiful pendant.

1 — *The scraps you've been hoarding can easily be made into pendant jewelry featuring lovely wood figure, like this walnut example.*

2 — *Pendant blanks, about 3"(7.5cm) in diameter, can be rough-cut round on the bandsaw.*

I start by making a glue block out of scrap wood mounted in spindle orientation. This can be any sound wood you have. You will use the glue block for mounting the pendant blanks and you will be able to use the same block for several pendants. I make the diameter of the block about 3/4 the diameter of my final pendant size, that is, a bit larger than 2" (5cm). Tenon one end to fit small jaws in the scroll chuck (**3**).

3 — *Tenon the glue block, mount it in the scroll chuck, and turn a clean cylinder.*

4 — *Skew pares end of glue block. It needs to be flat and smooth.*

After roughing the block to a cylinder, it's important to true up the end with a skew to make it flat (photo **4**). You must make the end as flat as you can, so the blank end is square to the lathe axis. You may need to repeat this step as the glue block gets used.

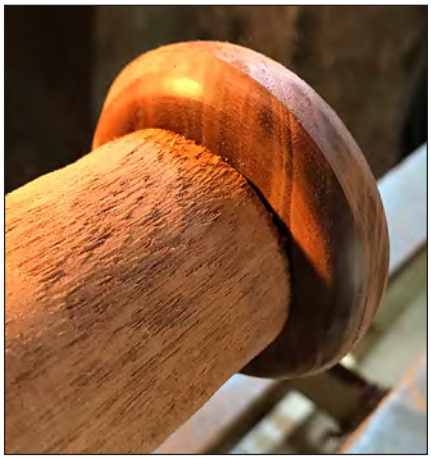
I rough out the pendant blank on the bandsaw. It doesn't need to be perfectly round but it should be flat, and it helps to mark the center, to help center it on the glue chuck.

These items are small enough to mount with a low-temperature hot glue gun and low-temperature glue. This variety of hot glue works best if the wood is room temperature. Cold wood will not bond with this glue (nor with most others). Apply hot glue to the wood, and press it as close to center as possible onto the glue block (**5**).

Attach it as soon as you can, because the hot glue starts to harden immediately. Hold it against the glue block for 10 seconds to adhere and let it sit for another 30 seconds to harden. It may take a few tests to determine the amount of hot glue to withstand the forces of turning. The only way to know is to try it and see if the blank stays on the glue block while turning (**6**). If your blank is smooth and the glue block is smooth and square, you will have good results. If either

5 — *Use hot glue to mount the pendant blank on the glue block.*

6 — *Turn the blank round and make the front flat and smooth, or a little bit concave.*



7 — *Eyeball the workpiece on center when you remount it on the glue block.*

8 — *The reversed workpiece isn't perfectly centered, so reshape the edge.*

9 — *Complete the other face, sand and finish.*

your blank and/or glue block is rough, the blank probably will not adhere.

Start taking very light cuts to ensure the blank is attached well. Start off on slow speed. High speed is not required for this type of turning, light cuts and sharp tools work best. Pick any tool you prefer! I alternate between round scrapers, bowl gouges, and roundnose side scrapers to get the effect I like; carbide tools also work well.

Start working the front side into a shape you like (**6**), there is no right or wrong. Making both sides concave, with different curves into the concavity, gives the customer two different ways to wear the pendant. Convex pendants would not work for both sides, at least not with this chucking method, you'll see why in the next few steps.

Sand the first side to at least 320 grit. I may go as high as 800 grit, depending on the wood species.

Pull the blank from the glue block and clean off the hot glue. Usually, it can be pulled off or lightly scraped with a chisel. Apply hot glue to the second side and attach to the glue block (**7**).

Finish the second side using any tools you want. When you flip and attach the blank the second time, you will not get it lined up exactly in the center of the glue block, and it is OK. Just make sure you touch up the edge to make it round again (**8**). These items are very flexible and hand-crafted, so every pendant does not need to be the same size or shape.

Sand the second side, **9**, and pull off the glue block. Clean off the hot glue and you'll have a wooden pendant.

Finish it with any method you prefer. I use tung oil and paste wax, or just dip into lacquer. The last step is deciding how to hang the pendant as jewelry. One method is to drill a small hole in the top and attach an eye hook with a necklace, or drill a hole in the face to thread through a necklace.

These pendants have been a great discussion piece at craft shows. I use them to start conversations with people about my wooden bowls, and sometimes I give them away to small kids to stir up interest in my booth. They make great birthday presents, too.

Dave Schell lives in Mount Joy, PA, and is a member of Lancaster Area Woodturners. ❐

Magnets connect spindle pyramid

by John Kelsey

This three-sided pyramid or tetrahedron offers a quick and fun project that will sharpen your spindle-turning skills. You'll be making six "identical" rods, bored at both ends for small rare-earth magnets, which grab onto four steel balls.

Turning a set of anything is a great way to build skill. The first one takes a while, the last one goes by in a blur, and it's always wise to have sawn extra blanks. Thin rods tend to flex, so you'll need to try work-steadying grips (**12**, **13**). After making a couple of sets, I could leave a very clean surface using just a spindle-roughing gouge and a small spindle gouge. The teacher Richard Raffan does rods like these entirely with a sharp skew chisel, so I tried that too; I was grateful for those extra blanks.

In this context "identical" means "similar." The beads on these slender rods were turned right on center, measured end to end, but a close look at photo **2** reveals my learning. In the assembly, the eye doesn't see those differences. In a row of "identical" handrail balusters, if the major turned elements are all the same height, variations in diameter and contour are hardly noticeable.

Order of events

While holes for magnets could be bored on the lathe, the rods do need to be all the same length, so maybe saw and bore them first? I tried both ways, finding fewer steps and more accuracy in sawing the blanks to finished length (**3, 4**), and boring the ends on the drill press (**5, 6**), before turning. As a bonus, the bored ends mounted perfectly on a spring-loaded drive spur and conical tailstock live center (**7, 8**).

1. Tetrahedron — *Hardwood rods 7" (18cm) long have 3/16" dia. x 1/4" long (4.5 x 6mm) cylindrical magnets set into both ends. Steel balls are 1/2" (12mm) dia.*

2. Identical, or similar? — *A close look reveals lots of differences in diameter and shape, but not in position along the spindle. So they look the same.*

Sawing, boring, and mounting the wood

3. Layout — *The marking gauge, set to 3/4" (2cm), lays out blanks on bandsawn and crosscut-to-length billet of air-dried Bradford pear.*

4. Bandsaw — *Push and guide the blank by its sides and corners, so your hands never cross the blade's path.*

5. Marking — *Eyeball the center of the blank, mark it, and make a dimple with an awl or centerpunch.*

6. Boring — *Stand the rod on end to bore for cylindrical magnets; the shopmade fixture centers it. Bore the exact length of the magnet plus a smidge.*

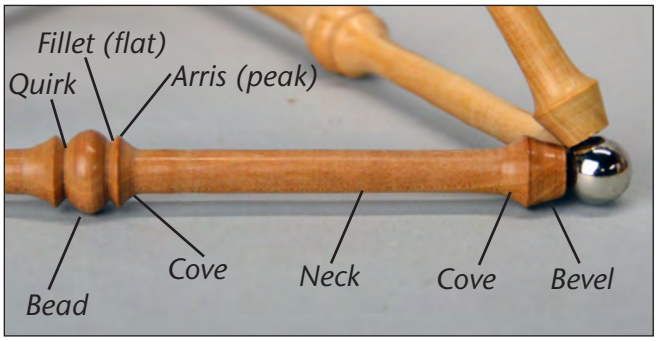
7. Centering — *A small, spring-loaded four-prong drive center is perfect for this job.*

8. Mounting — *The live center in the tailstock presses the blank onto the spring-loaded drive center. Sight the toolrest against the lathe bed, so it's parallel to the axis. The curve sawn into this blank (oops) will be cut away in the rough-turning to round.*

Turning thin spindles

9. Roughing — *The spindle roughing gouge makes short work of the stick's squareness. Anchor the tool on the rest before starting the cut, brace the tool handle against your hip and rotate the flute in the direction you want to go. Lift the handle to cut, and drive by swaying from your ankles.*

10. Measure — *Mark the center of the spindle and other key elements of your own design.*

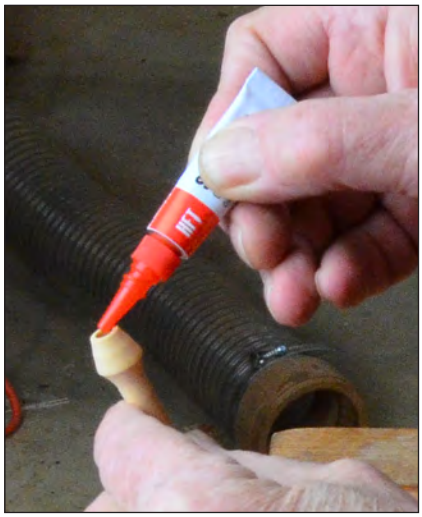


11. Details — *Though a miniature, this project has the same elements as a full-size baluster.*

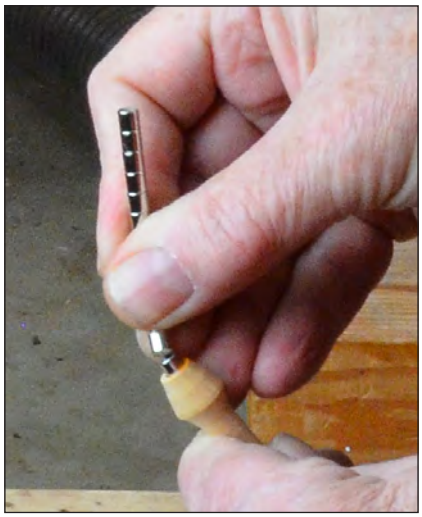
12. Overhand grip— *Hold the gouge handle in one hand, guide it and steady the spindle with the other. An overhand grip allows you to brace the rotating spindle with your fingers and drive by sliding your thumb along the toolrest.*

13. Underhand grip — *The underhand grip lets you see the action. Wrap one or two fingers under the toolrest to steady the spindle, while guiding the tool with your thumb. The other hand aims and rotates the tool handle.*

Magnet management



14. Glue — *A drop of cyanoacrylate glue in the bored hole will secure the magnet.*



15. Magnet — *Insert one end of the magnet stack into the bored hole. Swipe sideways to separate, don't pull.*

16. Mallet — *Tap the magnet flush using a non-ferrous mallet on a wooden bench. Note the magnet stack parked on the mallet shaft.*

Tricky devils

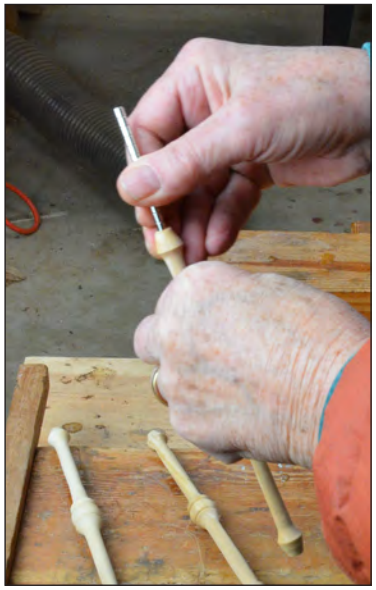
Strong rare-earth magnets are easy to find on the Internet. This project requires 12 cylinder magnets 3/16" dia x 1/4" long (4.5 x 6mm), with four non-magnetized 1/2" (12mm) steel balls.

Cylindrical magnets are axially magnetized, that is, one end is North pole and the other is South. Like poles repel, opposite poles attract.

These tricky little devils will hop around and stick to anything ferrous. Manage 12 by sticking them all together end to end, and parking them on a steel tool, **15-16**. Separate them not by pulling, but by swiping sideways.

The sequence shown on this page makes rods of opposite polarity, **17-18;** either end sticks to a steel ball. Spherical magnets make a stronger tetrahedron than steel balls, when assembled with all poles alike at each vertex. To make that work, you'd need four regular N-S rods plus one S-S and one N-N.

17. Manage — *Stick the stack to the installed magnet and turn the rod end for end so the empty hole is at the top. Put a drop of CA glue in the hole.*



18. Polarity — *For opposite polarity, slide the stack off the installed magnet and without changing its orientation, put the bottom magnet into the bored hole. For a rod of same polarity, invert the stack of magnets first.*

Cantilevered bottle holder introduces shopmade ring tool

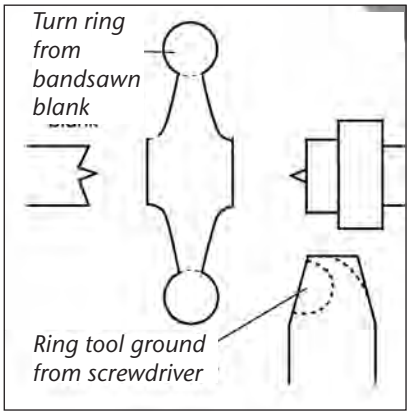
Photo by Rick Mastelli

by S. Gary Roberts

I had made some cantilevered wine-bottle holders from dimensional lumber and was intrigued with people's reaction to the balanced bottle. I decided to try the same principle on the lathe. To make this project work, pay close attention to the dimensions.

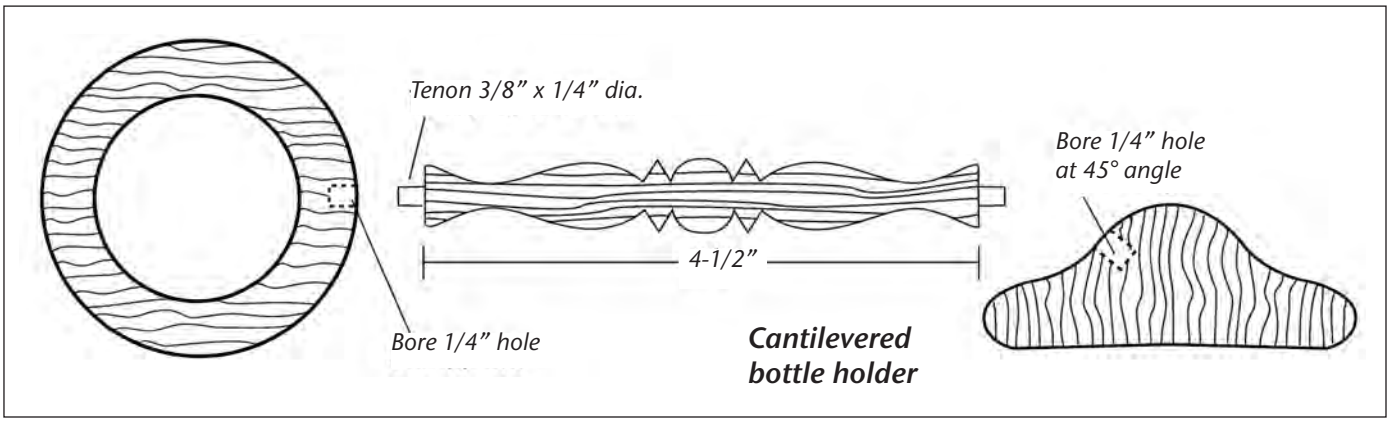
The ring

The inside diameter of the ring needs to be 1-3/8" (3.5cm). I made mine from mesquite, which has excellent grain strength. If your wood of choice has less strength, increase the thickness of the ring, but leave the inside diameter 1-3/8". Remember also to keep the center of the hole the same distance from the center of the base: if you increase the ring thickness, shorten the support turning.



The easiest way to turn the ring was to bandsaw the blank and mount it between a spur center and a live center, using a ring tool ground from a screwdriver. You could do well enough with a small spindle gouge and parting tool.

Bore a 1/4" (6mm) hole in the center of the edge of the ring. To position the bit, add a skew line to the ring while it is still on the lathe.



Cantilevered bottle holder

Support spindle

Turn the spindle to a 3/4" (2cm) cylinder, and mark the end shoulders 4-1/2" (11.5cm) apart. Outside these lines, turn the tenon at each end. The spindle gives you a chance to be creative and practice your skew techniques.

Base

Turn the base about 3" (7.5cm) in diameter with an area thick enough to bore a 1/4" (6mm) hole 3/8" (9mm) deep at a 45° angle. The angle of the bored hole is critical and needs to be accurate. But beyond that, you can be creative and diverse when turning the base. Sometimes I've also added a finial to the base, as in the opening photo, just for looks.

Align the grain, and with a square make sure the ring is parallel to the table surface. I use cyanoacrylate gap-filling glue, which sets quickly and holds well.

Finish

I use clear satin brushing lacquer thinned about 30%. This dries quickly, seals the wood well, and a few coats give a nice finish. Let set overnight, and buff with a muslin wheel.

Gary Roberts turns in Austin, TX. A version of this project appears in American Woodturner, *v11n4.* ❐

Data sheets - print 'em out!

Exploring 8 surface finishes

by Mark F. Palma

I remember coming back to middle school one fall and staring in amazement at the gym floor. During the summer when we miscreants were banned from the building the custodians had sanded and refinished the floor with multiple coats of varnish. It was a glorious sight to behold. A properly applied surface finish on turned objects holds some of that same beauty.

A surface or film finish has minimal penetration into the wood. It resides on the turned object as a barrier between the wood and the environment. Surface finishes usually are used on objects intended for display, however they may also be applied to objects for use. Surface finishes are versatile.

Types of surface finishes

Turners will commonly find eight good choices of surface finishes:

- polyurethane
- shellac
- lacquer
- water-based finishes
- clear acrylic coatings
- hybrid finishes
- cyanoacrylate glue
- wax

All surface finishes consist of two parts — the vehicle, which thins the liquid and allows it to flow onto the work, and the solids, which are left behind after the vehicle evaporates. It is the vehicle that you smell when you apply a surface finish. The slower the vehicle evaporates, the longer you can work the finish (and the longer it can attract dust and contaminants); this is called the "open time."

Different vehicles have different traits and problems. For example lacquer uses lacquer thinner, which can evaporate within minutes. Polyurethane uses mineral spirits, which can take hours. When choosing a surface finish, take into account how the vehicle behaves, but also how your body reacts to it.

Polyurethane varnish

When introduced, polyurethane was a revolutionary finish that has largely replaced alkyd (oil) varnish in the marketplace. Most woodworkers have used polyurethane, which has several traits that make it very popular:

- readily available
- very predictable
- flows well
- many levels of gloss
- mineral spirits based
- a relatively mild odor
- extremely durable and tough

Polyurethane on turned work also has problematic traits to consider:

- It's formulated to be applied in a thick coat, but can sag and pool if applied too heavily.
- long open time allows brushing onto large flat surfaces such as tabletops.
- It may or may not contain UV inhibitors.
- It's difficult to repair and finish failure usually ruins the work.
- It forms a physical barrier over the wood, which people might not like.

Polyurethane — *This popular and durable varnish comes in brushing and wipe-on forms.*

Polyurethane application notes

Stir polyurethane slowly to not introduce air bubbles, but stir it thoroughly. Shake aerosols for the full time recommended on the label, to mix the materials within the can.

Every level of polyurethane, except gloss, contains flattening agents that appear milky and settle in the can. They are a form of silica to muddy the finish so it doesn't refract light completely. The more flatteners, the less shine.

Apply polyurethane in thin, uniform coats. Thick coats will sag. It is far easier to add additional coats than it is to repair a huge sag. With an aerosol can, practice because it is easy to apply too much finish.

Finish the outside of a bowl first and place something under the inverted bowl to keep the rim from touching anything while it dries. If you do get a run it will be at the rim, which is easy to get at and remove. Place the wet piece in a box set on its side so dust in the air doesn't settle on the wet finish.

Read the label for drying time and pay attention to any second-coat instructions. Since polyurethane dries from the surface in, the finish will skin over before it thoroughly dries. Many turners have planted a fingerprint by touching polyurethane that was dry on the top but still wet underneath.

Carefully inspect the work between coats, and be very critical. Look for sags, dust particles and flaws. Use 220 grit silicon carbide abrasives (auto body paper) with a dish of water. Wet-sand the finish to remove flaws, and thoroughly dry it before the next coat. The goal is not to build up thick coats, but to create a thin layer with no noticeable flaws. Thick polyurethane looks dipped in plastic and rarely comes out great.

Although some turners apply polyurethane to work spinning on the lathe, this is not the best practice. Not only do you need to have the lathe run for hours at a very slow speed (which can overheat the motor), but excess finish is likely either to drip onto the lathe bed and harden, or to migrate to the largest diameter and pool there.

Test board

With any new finish, and perhaps with each new species of wood, it will pay to make a test board rather than ruin the almost-done workpiece. A test board also offers a chance to practice brush and aerosol technique.

Be sure to use the same materials and follow the same sequence you plan for your project. And be sure to write or burn identifying info into the test board. You'll soon build an invaluable reference collection.

Wiping varnish

You can create the approximate formula of commercially available "wiping varnishes" for less cost. Because mineral spirits is the vehicle, you can use it to thin regular polyurethane by around 50%. Do this by putting a small quantity of finish in a clean disposable container (yogurt cups work well) and add the same amount of mineral spirits. Only mix an ounce or so, and do not return any unused mixture to the can so that you do not contaminate the whole can.

Shellac — *This natural, alcohol-soluble material comes in many forms and a range of colors.*

Shellac

Shellac can be a finish and a problem solver but it is often misunderstood, plus it has been around for so long it's easily overlooked. Furniture finishers use dewaxed and thinned shellac as a sealer between coatings that may not stick to each other. It can be built up in thin layers using the traditional french polishing technique. If you are new to shellac or are reacquainting yourself with its properties, a test board is worth the extra step.

Shellac comes premixed in cans and aerosols, as dry flakes or beads in various grades, and colors from clear to orange to amber. Shellac:

- dries quickly with a very short open time so it's less likely to attract surface contaminants
- can be mixed and thinned with alcohol
- can be applied with a brush or cloth, either while the lathe is running or off-lathe
- is food safe — it is used in candy corn, jelly beans, and some yogurts
- is very repairable and easy to maintain
- can be used as a sealer, stand-alone finish, or a barrier between two finishes.

Shellac also poses some issues:

- Alcohol dissolves shellac, so do not use it for any food that contains alcohol.
- The alcohol odor can be quite strong.
- Limited shelf life — flakes last only a few days once mixed, cans two years from date of manufacture.
- It does not contain UV inhibitors.
- It only comes in one gloss level, is somewhat soft and can be scratched.
- Because it dries quickly, you must keep moving or you will get uneven coats.

Shellac formulas

Shellac is dissolved in methyl (wood) alcohol and alcohol can be used as a thinner and a cleanup agent. The ratio of alcohol added to shellac is stated as "X-pound cut". This reference originates from dry shellac flakes and refers to the number of pounds of shellac added to a gallon of alcohol. A 4-pound cut is a thick mixture; the thin mixture used as a sealer is a 1-pound cut.

In the typical paint-store can, shellac is around a 4-pound cut. You can remove a small amount from the can and mix it with equal parts alcohol to make a nice wiping finish. This 2-pound cut is close to what furniture finishers would use for french polishing.

If you can find "seal coat" shellac, buy it. It is a versatile product that allows you to seal work, create a barrier between layers of finish, apply some finishes that will not stick to each other, harden punky wood fibers while turning, and apply as a base layer for friction polishing.

Alcohol will reactivate shellac, even years later, so it is easily reparable and can be removed without damaging the underlying work, though the color may change.

Sealers — *Shellac is the base for many sealer products used as undercoats and in between coats of otherwise incompatible materials.*

Shellac application notes

Never brush shellac straight from the can, but pour a small quantity into a container so you do not contaminate the rest. Wipe the rim and close the can to keep a tight seal. Shellac's shelf life is only two years after manufacture, and it likely has spent warehouse time en route to you, so date the can and discard after 18 months.

If you intend to brush shellac, dedicate the brush. After use, rinse it in alcohol and do not worry if the brush dries hard. Next use, put the brush back into alcohol for a minute and it will be good as new. However, do not use foam brushes because they disintegrate.

Have really good ventilation, maybe work outdoors, because the alcohol fumes from shellac can be overpowering. Thin the first coat 50% with alcohol regardless of application; thin coats are always better than thick coats. Since shellac dries quickly, you can build layers in no time.

Control gloss level by cutting back the surface with a mild abrasive such as 0000 steel wool, a ScotchBrite or Mirlon pad, or a powdered abrasive such as pumice or rottenstone.

Lacquer

Lacquer was the standard finish of the furniture industry from 1923 when nitrocellulose was adopted by General Motors, through the end of the 20th century. Many health issues have been traced to the volatile chemicals released when lacquer thinner evaporates. At the same time, there are many traits about lacquer that made it so popular for almost 100 years. It is:

- very clear with many levels of sheen
- very durable yet repairable
- very quick drying with little open time to attract contaminants, allowing several quick coats to be applied
- self-etching, each coat bonds strongly to the level below, building into a deep finish
- sands well with stearate-coated abrasives and buffs out well too
- desirable and attractive to touch, especially compared to polyurethanes
- available in brushing lacquer (can) or aerosol formulations.

Lacquer has problematic traits that need to be carefully considered:

- Many environmental issues and health risks have been traced to lacquer volatiles.
- The product is banned in some areas, and regulated in others.
- It must be used only in very well ventilated areas and then only with an approved respirator with proper new cartridges.
- Brushing requires quick action due to the fast drying time.
- Quick drying causes it to trap moisture, so do not use in times of high humidity or it may blush and become cloudy.

Lacquer risks, application notes

People vary in their tolerance for lacquer fumes, so each turner must consider the health and safety risks and take appropriate precautions. I use it for artistic turnings which demand an extraordinary finish.

Lacquer — *Thin coats of lacquer make a superb finish but the volatiles are risky, making it difficult to apply.*

If you have access to a filtered spray booth, use it. I don't, so I spray lacquer outdoors, using a cardboard box "paint booth." The box has a furnace filter on the inside to trap overspray. I wear a respirator and safety glasses and make sure the wind is behind me to disperse the fumes.

Lacquer isn't as fussy about temperature as it is about humidity. I have successfully sprayed lacquer at 10°F and immediately carried the piece back into my warm shop, and also at 90°F.

As with other finishes, a build of thin coats is best. Spray two or three light coats of lacquer, then let it dry for two days before wet-sanding with 400-grit silicon carbide paper. Wipe off the piece and examine it closely, looking for a uniform dull surface. Repeat this process until no shiny spots (representing low areas) are visible after wet sanding. Then spray one last thin coat and let the piece sit for a week.

Finally, I wax and buff my pieces to make them shine like a 1963 Corvette.

Water-based varnish

The health and safety issues of lacquer and similar materials led to the development of modern water-based finishes. They clean up with water and use water as a vehicle, so they are environmentally friendly. Their crystal clarity, fast drying, and toughness may surpass polyurethane. Some professional turners only use water-based finishes and I recommend them, particularly to anyone who has been using polyurethane. Water-based acrylic and urethane finishes seem to do everything polyurethane can, with many benefits, including better durability. It is:

- the most environmentally and health friendly finishes
- a very tough coating
- crystal clear or amber colored, and available in any sheen ranging from dead flat to very high gloss
- readily available and moderately priced
- almost odor free with water cleanup
- very quick drying, but you must follow label instructions for second coats
- available in cans and aerosols.

Some other traits to consider with water-based finishes include:

- Water will raise grain, so either pretreat work with a damp sponge to raise the grain and sand it off, or plan on a light sanding after the first coat.
- Mix cans slowly to avoid introducing air bubbles.
- In any sheen other than gloss, thoroughly mix to disperse flattening agents throughout the product.
- Manufacturer's instructions vary from brand to brand, so read carefully and do not assume you know how to use the product.
- Use a nylon brush because natural bristle will soften and go limp in water, and foam is liable to introduce unwanted air bubbles.
- Water-based finishes evaporate from the top down, so the skin may seem dry when the finish is not. Dry for the time recommended by the manufacturer.
- It's very difficult to repair a damaged finish, so a finish failure probably is the end of the piece.

Water-based varnish — *These finishes thin and clean up with water, but harden by polymer cross-linking as the water evaporates off.*

Water-based application notes

Stir slowly and carefully, and pour the finish you intend to apply into a separate container. Wipe the lid carefully to get a good seal and avoid rust on the can. Most water based finishes are not intended to be thinned, but that doesn't seem to be a problem in practical use. Let each coat dry thoroughly, before additional coats or any handling.

Water based finishes can be wet sanded once dry although they seem to self-level well and do not seem to sag as much as polyurethane. Drying quickly makes it less susceptible to dust and debris settling in the finish. One manufacturer makes a special woodturners finish that is meant to be applied to slowly spinning work, with a reapplication time of 30 minutes. In the real world, it is more like 15 minutes in a shop at 70°F and moderate humidity.

Clear acrylic coatings

Spray cans containing clear acrylic coatings can be found at paint and art-supply stores. Chemically they are an acrylic like most water-based finishes, but with a volatile solvent such as lacquer thinner, toluene, or xylene. They can be a freestanding finish or a topcoat over something else, such as a color layer.

Not all acrylic topcoats are comparable with all base finishes, or topcoats. Read the label carefully for the active ingredients and as with lacquer, take appropriate precautions. Also note that various product categories may not be compatible, even within the same brand. So test on similar material before hitting your project.

Some traits that make acrylic coatings desirable for turners include:

- Many are absolutely clear and will not impart a tint onto the work.
- Some include UV stabilizers and may be of archival quality.
- Sheens range from dead flat through very high gloss.
- High quality spray nozzles on the can will help achieve better finish quality.
- It's very quick drying with recoating times as short as 10 minutes.
- Short open time makes it less susceptible to dust and debris.
- It's not susceptible to humidity.
- It does not raise grain.
- It's very tough and durable.

However, spray acrylics do have problematic traits to consider:

- They may not be environmentally friendly.
- Must be used with proper ventilation and personal protection equipment depending on active ingredients.
- They're not readily repairable and a finish failure is probably fatal to the work.
- Some acrylics sand well while others do not.

Clear acrylics — *These spray finishes, which may contain exotic volatile solvents, can produce a hard, clear coating. The matte version is almost invisible.*

- Gloss finishes may not feel user friendly, while matte finishes seem to be invisible, maybe exactly what's wanted.

Clear acrylic application notes

Matte acrylic finishes are my go-to finish when I want the wood (or color) to speak for itself and not seem encapsulated in plastic. Acrylics can be tricky and you usually get what you pay for. I use a higher-priced brand of UV-stabilized acrylics from the art-supply store. Here are some real world tips:

- Spray like lacquer, in the cardboard box spray booth.
- Apply thin coats and let dry the recommended time between coats.
- If your finish has harmful ingredients, use proper personal protection equipment.
- Keep extra spray tips and replace if you see an uneven spray pattern developing.
- If you see a run, wipe off immediately (10 seconds), or let it fully cure and use a small. sharp knife to cut if off the work.

Hybrid mixtures — *These finishes combine various finish materials, to produce the best qualities of each.*

Hybrid finishes

If the world of finishes wasn't complicated enough, some manufacturers try to create perfection by combining traits of penetrating finishes with those of surface finishes. Or they combine two different types of surface finishes that can share a common solvent, such as a blend of shellac and wax. Hybrid finishes often claim "unique" ingredients and use other tells in their marketing materials, such as:

- varnish and oil blend (or oil and varnish)
- polyurethane and oil
- poly blend
- resin and oil
- salad bowl finish
- blended with wax.

Some tung and Danish oil finishes, though not all, are hybrids, as are some wipe-on products.

Decoding the real contents in the can is difficult and picking the one that will work "best" is impossible. Most of the time you can mimic the performance of a manufacturer's blend by starting with a base finish and adding your own ingredients, though sometimes all you get is a gooey mess. Always make test boards.

Finish manufacturers post data sheets on their websites. By comparing the ingredients by volume, it's possible to infer a hybrid's rough ingredients. A classic blend, often called 1-2-3, has been documented by numerous authors:

- 1/3 by volume polyurethane varnish
- 1/3 boiled linseed oil, pure tung oil, or Danish oil
- 1/3 mineral spirits or turpentine.

Hybrid application notes

I usually use this 1-2-3 mix as the first coat of any blend. Because the polyurethane will close off the wood pores, there's little benefit in adding oil in subsequent coats. So after the first coat I use a mix of 50% polyurethane – 50% mineral spirits for subsequent coats.

Price may not equate to product quality and some blended products are nothing more than diluted polyurethane with a small percentage of oil, for twice the price. I have also found that the manufacturer's choice in how thick or thin the product was coming out of the can didn't work as well as when I controlled my mix.

You may find a hybrid finish that you love. In researching this article one that caught my eye was $42.99 for a quart and I decided not to buy it to see if I might like it.

Cyanoacrylate glue

In 1942 a chemist named Harry Coover, Jr., while looking for a wartime glue, discovered cyanoacrylate. It was rejected as a glue for the war effort. In 1951, after Coover moved to Kodak, the first commercial application of CA glue was created.

CA glue is in general use as an adhesive, but woodturners seem to be the only ones using it as a finish. No surprise, because it has a very short open time, often mere seconds. Many pen turners favor CA as a finish, and some also use it for larger works. Some traits that favor CA as a finish include:

- it's extremely tough and strong,
- it can support weak wood fibers or fill voids if enough coats are built up,
- it's very fast drying,
- it sands very well as long as lathe speed is low and sharp abrasives are used,
- it can achieve incredibly high levels of gloss, and it is very clear.

On the other hand, CA has some traits to be weighed carefully before use, including:

- Both CA and its accelerator can be very toxic, and some people have been permanently injured by exposure to the product or its fumes. You do not want it near your eyes.
- CA dries so fast that many users have glued their fingers to something.
- Short shelf life (most brands say 12 months from manufacture).
- Most accelerators can cause "blushing" or white spots in the finish.
- CA may or may not be repairable.
- It's the most expensive finish per ounce.
- It does not hold up well if exposed to sunlight (can turn milky), and its long-term durability is unknown.
- Although some flexible CA formulas exist, most are quite brittle.

CA glue — *It can make a hard, clear finish on small objects.*

- CA can cause an exothermic reaction, with heat, white smoke, and possibly burns.

CA application notes

Wear gloves and eye protection when using CA, and work in a well ventilated area. If possible, apply a thin finish coat while the lathe is turning slowly and walk away, leaving the lathe running while the CA dries. Do not stand above the work to apply CA as the fumes seem to rise straight up. After 5-10 minutes the product dries without an accelerator. If you do use accelerator, respect the instructions that usually ask you to stay back 12" or more and give it a whiff, not a bath.

Not all CAs are the same, higher quality (and more expensive) products are more refined and seem to perform better. Avoid thick or gel CA for finishes, and accept that multiple thin coats are better than thick coats — some pens sport 10 coats, sometimes even more.

Specialty CA products include a flexible formula that might move with the wood, and extended open times that might allow a more uniform coat before they start to flash over. A new accelerator claims it will not blush. Note that accelerators are not universally compatible, so it's best to stay within a brand.

Wax

Wax is often used as a topcoat over another finish (either surface finishes or penetrating finishes), yet wax is also a viable stand alone finish. Wax can act as an effective light duty, renewable, repairable, food-safe finish. Wax provides a soft-feeling matte finish that seems invisible but does provide some protection from dust and fingerprints.

Wax has its limits. It wears away, it isn't very tough, and it cannot protect against chemicals. However, since it is easy to reapply, kitchenware can be freshened up quickly.

Wax application notes

Wax is easy to apply, however, there are some small tips that may help you have better results:

- Keep a small flannel cloth in the can of wax. This keeps the wax cloth charged and ready to apply a quick coat with less wax wasted.
- It only takes a small uniform coat of wax, not a heavy layer. Your goal is to let the vehicle evaporate and then buff off the work to end up with a single, even layer of wax.
- If the wax builds up or is too thick, apply a little more and then immediately wipe it off. The vehicle in the new wax will reactivate the old wax.
- Wax can reduce the sheen of another surface finish. Steel wool will contaminate the whole can with the steel fragments. Reserve that can for cutting back a shiny finish with the wax.
- Instead of steel wool, use a non-woven pad (for example a white ScotchBrite pad). It will dull the finish without contaminating the tin of wax.

Wax — *Wax is most often used as a topcoat over other finishes but it can also stand alone as a thin, light-duty coating. For best results apply, wait until the solvents flash off, then buff.*

- When using hard wax sticks on spinning work, run the wax across the work, but do not worry about completely covering the work. Then use a paper towel to push the wax across the work, and you will see the wax flow.

Wax also helps your lathe work more smoothly and can add a layer of protection to tools.

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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 digital publication free to members four times each year.

Hey, what could go wrong?

Remove tailstock centers after you finish with them, lest you jam your elbow on the sharp point, yeeoww! And maybe get that coffee mug off the lathe bed before you bump it off?

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