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November 2014 ■ #214

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- Max. cutting height: 12⅛"
- Blade size: 131½" L (⅛"–1" W)
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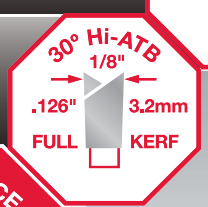

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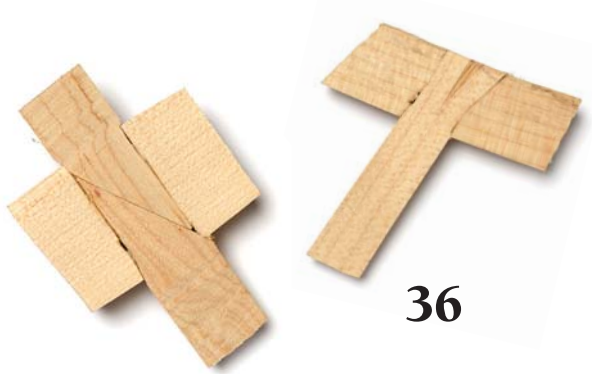
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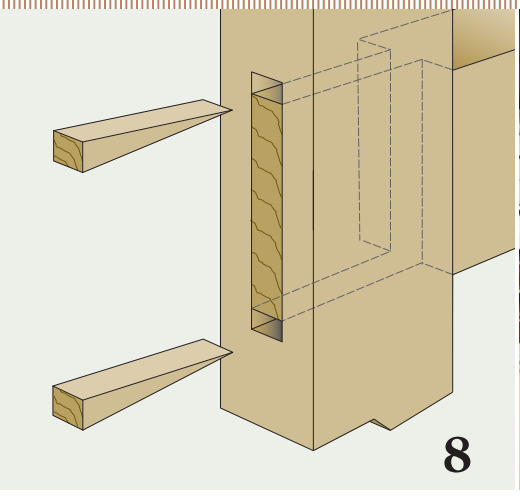
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We are all Custodians

We had a quite special giveaway at the Woodworking in America conference a few weeks ago: The 2014 Fred West Memorial Tool Chest.

Many of us reading this have been grateful recipients of Fred's generosity through the years, and all of us, whether consciously or not, have been the beneficiaries of his enthusiasm for the craft.

I don't think it's a stretch to state that many of today's best toolmakers are in business in large part thanks to Fred. If he saw a tool or toolmaker worth supporting, he placed an order – and often a large order.

But Fred was the opposite of a collector (OK...maybe he was a bit of a collector – but also so much more). You see, he didn't keep most of the tools he bought. He gave them away – no strings attached.

Fred was, in the best Renaissance sense of the word, a patron of the handtool woodworking community, supporting both toolmakers, craftsmen and craftswomen.

Last January, we said goodbye to Fred, through letters, blog posts and through the friends and family who were gathered around his bed at home.

In Fred's memory, those he generously supported throughout his life put together an assortment of tools and collected them in a toolbox custommade by Andrew Gore: the 2014 Fred West Commemorative Tool Chest. It was given away, free – no strings attached – in a random drawing. And there are plans now in the works for a 2015 memorial chest.

The idea is to foment the generosity that Fred exemplified – to help foster the future of woodworking. And that's something with which we can all help, no matter how deep or shallow our pockets.

I recently heard a lovely story of a man who, knowing that he wouldn't be able to work in the shop much longer, got together his woodworking friends and, one by one, let them choose the tools from among his collection that they wanted – tools they'd use in their own shops after he was gone. With no woodworkers in the family to whom he could leave the collection, he wanted to make sure these implements continued to be used to create.

While most of us don't have the financial wherewithal to purchase multiples of, say, custom-made infill planes then give them away as Fred so often did, I'll bet many of us have a dust-covered tool or two sitting in a box or on a shelf – a tool that could find a good home, perhaps in a small woodworking school or in the hands of someone just starting out in the craft. Plus we all have at least a little bit of knowledge worth passing on – to a neighbor, a neighbor's child or perhaps to children and grandchildren of our own.

And, at the risk of sounding morbid, plan for what will happen to your tools after you're gone (or give them away to grateful recipients while you still have your faculties, if not your dexterity); don't leave it for your non-woodworking heirs to sort – that's how perfectly good tools end their working lives ignominiously nailed to a wall at Cracker Barrel. **PWM**

PHOTO BY ANDREW GORE

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EDITORIAL OFFICES 513-531-2690

GROUP PUBLISHER ■ Jamie Markle
jamie.markle@fwmedia.com, x11452

EDITOR & GROUP EDITORIAL DIRECTOR ■ Megan Fitzpatrick
megan.fitzpatrick@fwmedia.com, x11348

SENIOR ART DIRECTOR ■ Daniel T. Pessell
daniel.pessell@fwmedia.com, x11396

EXECUTIVE MANAGING EDITOR ■ Glen D. Huey
glen.huey@fwmedia.com, x11005

SENIOR MANAGING EDITOR ■ Michael Wallace
mike.wallace@fwmedia.com, x11407

EXECUTIVE EDITOR ■ Robert W. Lang
robert.lang@fwmedia.com, x11327

SENIOR EDITOR ■ Chuck Bender
chuck.bender@fwmedia.com, x11238

CONTRIBUTING EDITORS ■ Adam Cherubini, Bob Flexner, Christopher Schwarz, Steve Shanesy

PHOTOGRAPHER ■ Al Parrish

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331 N. Arch St., Allentown, PA 18104
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ADVERTISING SALES COORDINATOR ■ Connie Kostrzewa
TEL. 715-445-4612 x13883
connie.kostrzewa@fwmedia.com

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Small Wedges Tighten Joints

The article by Catharine Kennedy, "Painted Bucket Bench" (August 2014 , Issue #212), proved to be both informative and applicable, especially because I work almost exclusively with pine.

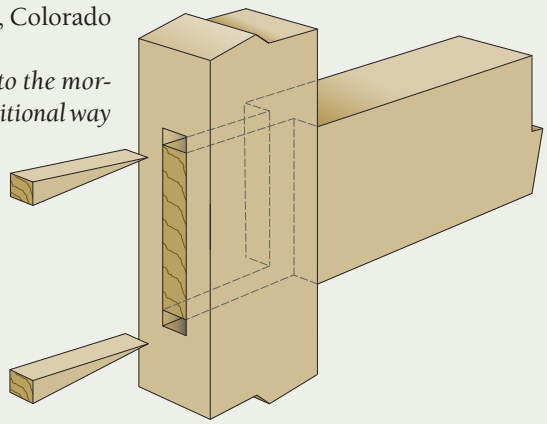
I picked up a lot of great information in the article, but I do wonder exactly what is holding the bench together. Is it simply a tight-fitting mortise-and-tenon joint, is it glue or did she use metal fasteners?

Timothy E. Sanchez
Bayfield, Colorado

Timothy,
The tenons are tightly fit to the mortises…but an easy and traditional way to make sure they fit snug and hold tight is to insert wedges as needed on one or both sides of each tenon. Drive the wedges as deeply as possible, then flush off the ends. And yes, glue the tenons (and wedges) in place.

You could also wedge the tenons in the middle. Cut a kerf or two across the end grain at the center of each tenon before inserting them into their mortises. After the tenons are slipped into the mortises, drive a small wedge into each kerf until the wedge bottoms out, then flush it off. This spreads the tenon apart and fills any gaps between the tenon and its mortise.

Megan Fitzpatrick, editor



Best Way to Drill Stool Legs

Thank you for writing the article on stool design and construction. Chuck Bender's results were elegant.

I want to make sure my understanding is correct: The leg holes in the seat form an isosceles trapezoid (or, if you're non-Greek, regular trapezoid). The "splay angle" is captured with a sliding bevel when the blade is against the trial stick you're holding up as a leg, and the handle is on a line of the "X" joining the four leg holes. Afterward, with the bevel's handle on the centerline of the elevated drill jig, the blade should be vertical, parallel to the Forstner bit.

With that in mind, here's my question: In drilling holes in the legs for stretchers, is it practical to drill them in place? Can I locate the entry points, clamp a parallel stretcher above (or below) for both stability and visual drilling guidance, drill a small pilot hole, then follow with a 5/8" Forstner bit (in a hand drill), entering from both sides to avoid break-out?

John Kahler
Liberty Township, Ohio

John,
I determined the angle of the legs as you describe. Once you have an angle pleasing to your eye, the bevel is set and the blade is made parallel to the Forstner bit.

In your description, the only problem I see is drilling the 5/8" hole. The pilot hole would be simple enough, but the bit will tend to wander because it's only hitting the top or bottom of the hole, depending on the splay of the leg.

The beauty of using a drill press is that the bit is fixed, and you can hold the workpiece in place with clamps. That reduces the tendency for the bit to wander as you drill an angled hole through a cylindrical object.

I'm not saying that the work can't be done in the way you describe – chairmakers have done it for centuries, though they were not using Forstner bits and they weren't drilling all the way through the legs. It does, however, present some challenges for your consideration.

Chuck Bender, senior editor

No Dye for Ebony

I really enjoyed Marc Spagnuolo's "Greene & Greene-style Blanket Chest" in the April 2014 issue (#210). In the article, he installed the ebony plugs before applying the dye. I wonder if he then taped over all the plugs to protect them from the dye, or does the ebony resist the dye? If I dye first, then insert the plugs, I suppose I might damage the dyed surface.

Greg Strasser
Gladstone, Missouri

Greg,
The great thing about ebony is that it is so dark and dense that dye has a negligible impact. Plus, the plugs are sanded to such a high grit that the ebony absorbs little of the liquid. I find it easiest to insert the plugs prior to applying dye and finish.

Marc Spagnuolo, contributor

Shellac Over BLO

After making a set of small drawers out of walnut, I applied one coat of a 50/50 mixture of boiled linseed oil and mineral spirits, then wiped off the excess.

I plan to finish with several coats of shellac, then wax. How long must I wait for the linseed oil to dry before applying shellac?

On the forums, Internet woodwork-

CONTINUED ON PAGE 10

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CONTINUED FROM PAGE 8

ers answer everything from immediately after wiping away the excess, to a month or longer. It would be nice to have a more definitive answer instead of anecdotal personal opinions, especially when those opinions vary so widely. Is waiting for 24 hours sufficient, or would a week be better?

Bill Law
Cincinnati, Ohio

Bill,

The reason you're reading so much variation in time is that there really isn't one all-inclusive answer. You need the boiled linseed oil (BLO) to be dry, or, more accurately, to "cure" before applying a fast-drying film finish such as shellac.

If the BLO is still wet when you apply the shellac, there is a chance of an alligator effect in the finish. In my real-world experience, however, I've yet to see this happen. Shellac is a breathable finish and won't stop the passage of oxygen, which means the linseed oil should continue to cure.

That said, I like to have the BLO as dry as possible before applying a top coat of anything.

There are a lot of factors that can affect drying time. The thinner you use greatly influences drying time, as do temperature and humidity. I've found that working on a warm, dry day and using a faster-drying thinner provides the best results for this finishing method.

I classify mineral spirits as a medium dry rate – it's faster than turpentine, but slower than naphtha. As such, I would let BLO that's thinned 50/50 with mineral spirits dry for a day or two if the weather is warm and dry.

You might find that when it is cool and rainy that you need to give it a week or more before it is dry enough.

My test, which has worked well for me the last few decades, is to check the dryness using the heel of my hand. On the project, I find a spot that's less visible and rub the heel of my hand lightly over the surface. If my hand comes away dull or has an eggshell sheen, I'm good to go. If, however, it's shiny and/or oily, I let the project sit another day and perform the test again.

To get your answer, you'll have to be observant, and adjust your finish schedule to match what's happening rather than follow a strict timetable.

Chuck Bender, senior editor

Wooden Vise Screw Resource

I am planning a workbench for my first shop. Following a recommendation from Megan Fitzpatrick's "LVL Workbench" article in the November 2009 issue (#179), I'm about to order a wooden vise screw.

I've tried numerous times to contact BigWoodVise.com from the resource box in the article, but have been unable to get through. Do you another company to which I can turn?

Lloyd Pierce
Wheaton, Illinois

Lloyd,

I have no idea what's happened to Big Wood Vise, which is a shame; the company made a good product. But, because BWV seems to no longer be in business, I've turned to different makers for wooden screws. Both of these are good companies that make quality products:

Lake Erie Toolworks (lakeerietoolworks.com), and Evans Wood Screw (thetraditionalcarpenter.com).

And of course, you could consider a metal vise screw if you want something with quicker travel, in which case you can't do better than Benchcrafted's "Glide" (benchcrafted.com). **PWM**

Megan Fitzpatrick, editor

ONLINE EXTRAS

Letters & Comments

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PHOTO BY ROBERT W. LANG

Highly Recommended

The Measure Master Pro app from Calculated Industries is a fractional calculator that lives in your smartphone. Unlike a scientific calculator, this uses real-world fractions; you can set it to $^1/_{64}$" if you like. You can also mix fractions, decimals and millimeters and view the results in any format for the price of a cheap lunch ($6).

Checking the numbers on project cutlists (something else I highly recommend) is fast, easy and accurate. It's available for both Android and iPhones.

— Robert W. Lang

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Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in *Popular Woodworking Magazine*, these have been removed to provide clarity. In some cases we'll use an awkward body position so you can better see what's being demonstrated. Don't copy us. Think about each procedure you're going to perform beforehand.

THE WINNER:

Don't Get Foiled by a Broken Chisel Handle

Whether you are into new socket chisels or old, sooner or later you're going to have to replace a handle that is worn out or gets lost. Here's a little trick I came up with to help you get the taper on the handle just right.

When turning a new handle, use aluminum foil to make a model of the socket. Pack the socket with foil and be sure to leave some hanging out to act as a handle to remove the plug. The handle also lets you safely hold it next to the lathe to compare to your turning.

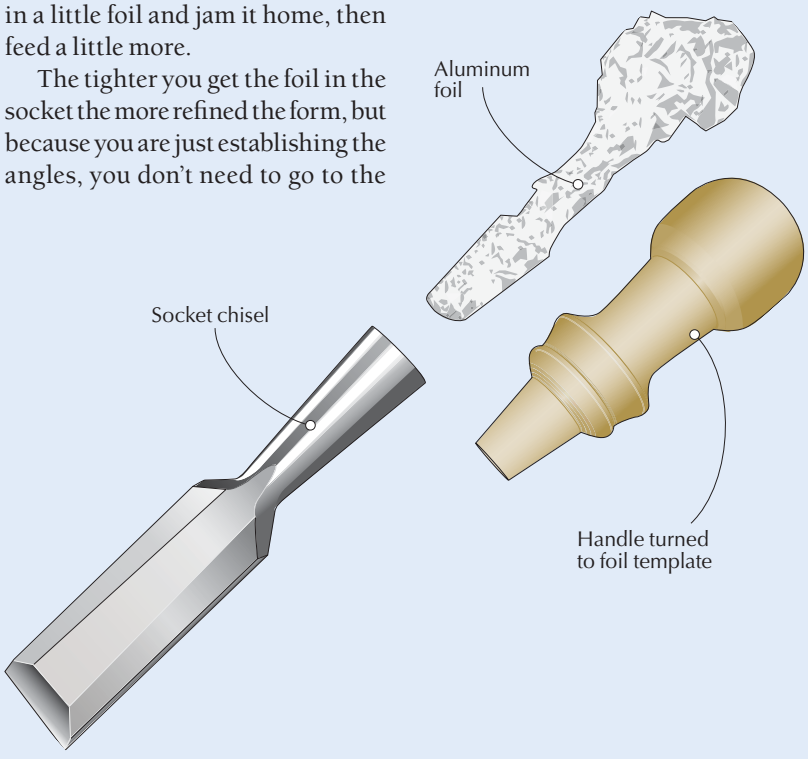
Use one piece of foil. Multiple pieces could result in your template coming apart. Don't start with too much foil or you'll have trouble getting to the bottom of the socket. Feed in a little foil and jam it home, then feed a little more.

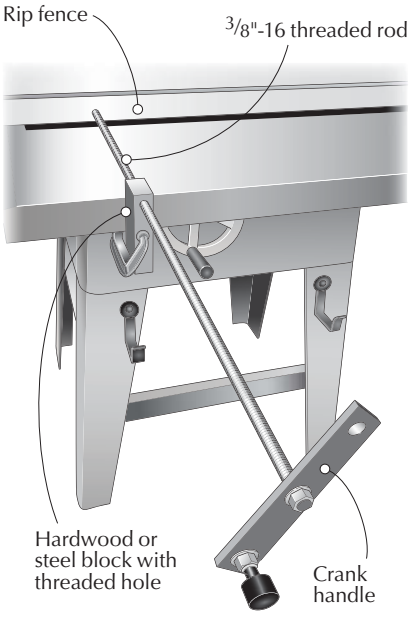
The tighter you get the foil in the socket the more refined the form, but because you are just establishing the angles, you don't need to go to the gym before attempting this project. If the foil does get stuck, a long, coarse screw will extract it.

The turning does not have to match the model exactly. Use the model to get the taper angle. Make the taper a bit short of the actual depth of the socket. You don't want the taper to bottom out in the socket.

Use calipers and a parting tool to establish the large and small diameters, then turn the taper to join the two. I like to use a 1"-square scraper to finish the taper while getting a nice straight edge.

Richard Dooling
Norfolk, Virginia





Threaded Rip Fence Adjuster

When cutting finger joints or anything with repetetive spacing that must be precisely controlled, I find a piece of 3/8"-16 threaded rod empowering.

Conveniently, 16 threads per inch yields 1/16" per revolution. I find this cheap threaded rod to be surprisingly accurate.

In a hardwood block or a piece of unhardened steel, drill a hole toward one end and tap it to correspond to the threads on the rod. Clamp this block to the side of the table and set your rip fence to the first position, closest to the blade.

Thread the rod through the block until it just touches the rip fence – make your first cut. Turn the crank the desired amount and move the fence up against the screw, then lock it down and make your next cut. Continue this process until you've completed your operation.

The most important benefit of this method is that small errors are not compounded as you go across a wide joint. And, if you put a crank on the rod, it makes it easy to see where the rod is in rotation.

Arthur Turner
Indianapolis, Indiana

ILLUSTRATIONS BY MARY JANE FAVORITE

T-nuts & Router Bit Holders

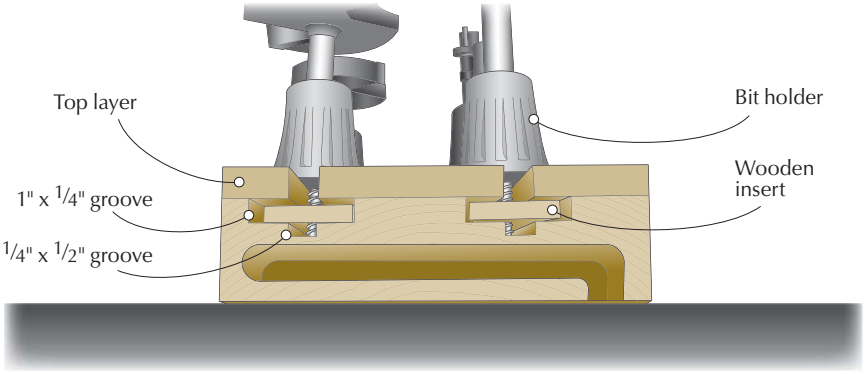
My router bit cabinet uses bit holders from Lee Valley. They were manufactured to be permanently attached, but I came up with a design that allows them to be easily adjusted if I buy larger or smaller bits.

The shelves in my cabinet are a sandwich of materials into which I have cut a series of grooves. In the end, the grooves form a slot into which I slide square wooden inserts. I begin by running a 1/4"-wide groove about 1/2" deep, located along the centerline of my bit location. I then run a wider groove that is about 1/4" deep to receive the wooden inserts: I make mine about 1" wide.

Make the wooden inserts from 1/4" hardwood, cutting them to length so that when they are slip-fit into the groove, the grain is oriented perpendicular to it.

Laminate a 1/4" top layer on the shelf, covering the grooves. Once the glue dries, make a 1/4"-wide cut centered on the existing groove. Slide in your wooden inserts and drive an appropriate-length wood screw through the bit holder into the insert. Loosen the screw and slide the holder over or out of the slot – tighten to lock the bit into place.

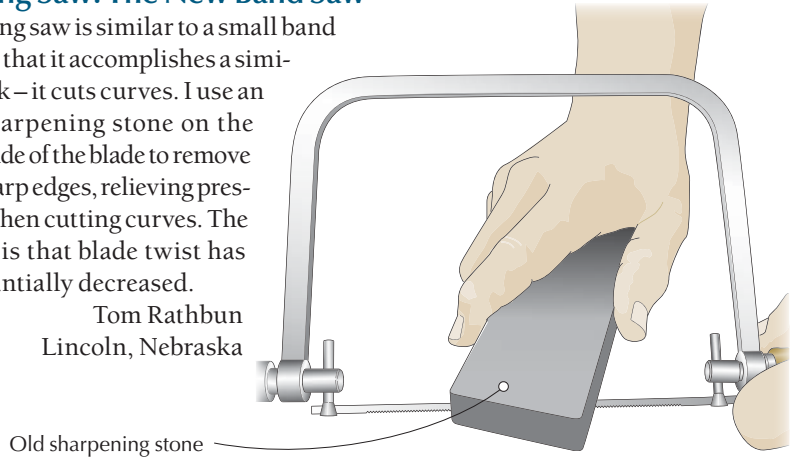
Dennis Cropper
West Chester, Ohio

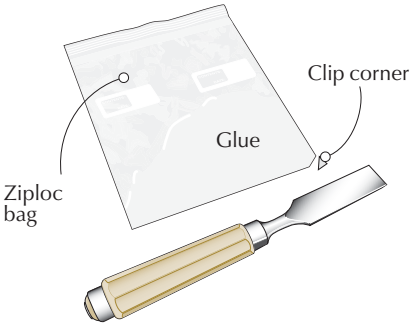


Coping Saw: The New Band Saw

A coping saw is similar to a small band saw in that it accomplishes a similar task – it cuts curves. I use an old sharpening stone on the back side of the blade to remove the sharp edges, relieving pressure when cutting curves. The result is that blade twist has substantially decreased.

Tom Rathbun
Lincoln, Nebraska





Ziploc Bags Keep Glue Fresh

When you reach the bottom of your glue bottle, let it drain into a Ziploc sandwich bag. Squeeze all the air out and close it. To use the glue, snip the corner off and squeeze out what you need. Pinch the corner to seal, then recut to use it next time. **PWM**

Dallas Gookin
Billings, Montana

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Hammer K3 Winner

Get European accuracy and quality at a great price.

Most woodworkers only dream about owning a European sliding table saw. The size and price tend to be limiting factors, particularly for those not making a living from their woodcraft. The Hammer K3 Winner series of table saws breaks new ground on both fronts.

Hammer, a part of the Felder Group, has managed to include all the performance of a high-end sliding table saw for only about 10 percent more than a quality American cabinet saw. But the competitive price and size doesn't mean the company skimped on quality.

Out of the box (technically off the shipping pallet), the K3 Winner comes nearly fully assembled and ready to go to work. I invested little time in putting together the rip and crosscut fences – both came accurately calibrated.

Not only was the 90° stop on the crosscut fence accurate, but the flip-stop scale was dead-on as well. "Assembly" was as simple as sliding the aluminum extrusion along the mounting plates until it hit the positive stop.

I made my first test cut with the stop set at the 16" mark and the board came off the saw exactly 16" long. When it comes to accuracy, there just isn't any more you can ask.

The saw comes loaded with some great features; the sliding table is the most useful. If you build lots of case pieces, the sliding table is far more than a convenience – it speeds work significantly. Plus, its accuracy makes it a joy to use.

Solid. *The K3 Winner offers solid European performance in about the same footprint as an average U.S. cabinet saw. The blade is easily accessible, and dust collection is integrated with the guard and riving knife.*

Another feature I like is the generous access for changing blades. Not only is there a ton of room, it's easy to get to: Move the slider completely out of the way, slide the guard in the opposite direction and you have total access to the retaining bolt and flange. After years of sticking my hands inside American-made saws, it's a pleasure to not bang my knuckles on the edge of a cast iron top.

The Hammer can handle both 10" and 12" blades, but not with your standard 5/8" arbor. The K3 uses a 30mm arbor with twin locating pins. This means added expense for blade purchases, but it also means you'll get cleaner cuts with no blade slippage.

The blade stabilizer is held in place with a socket-cap screw, so changing blades with an Allen wrench seems a bit odd at first.

Dust collection is extremely efficient on this saw and there's virtually no vibration. The machine is solid and, with a single-phase 4-horsepower motor, has enough muscle to tackle the toughest materials.

The one complaint I have is the adjustment handle – and yes, "handle" is singular. There is one mobile adjustment wheel for both height and angle changes. You need to move the wheel from the front of the saw to the side and back to make changes. If you're not paying attention, you could be spinning your wheel without effecting the desired change.

The K3 Winner 31 x 31 saw gives you 31" of crosscut and rip capacity (though custom configurations are available), but it only occupies and inch or two more floor space than a Powermatic 66 saw with a 30" rip fence.

If you're looking to bring European precision to your woodworking, the Hammer K3 Winner gives you all the features you'll want at a reasonable price.

— Chuck Bender

CONTINUED ON PAGE 16

K3 Winner 31 x 31

Hammer ▪ hammerusa.com

Street price ▪ from $3,699

▪ **BLOG** *Learn more about how easy and accurate setup is for the K3 Winner.*

Price correct at time of publication.

PHOTOS BY AL PARRISH

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CONTINUED FROM PAGE 14

Customizable Bevel-down Planes from Veritas

We don't typically include tools in this column that we've not actually tested, but we're making an exception for these five new bevel-down planes from Veritas (Nos. 4, 4½, 5, 5½ and 7 in the Stanley numbering system).

I got a preview of these at Lee Valley Tools in Ottawa in August; they were publicly released Sept. 13 (just days before this issue was printed). So far, I've only taken apart and partially reassembled one of the planes; we'll have a full review when we get them in.

So why are we breaking our own rule? Quite simply, if these planes perform well, they could have a significant impact on the handplane market.

Veritas Bevel-down Planes

Lee Valley ▪ leevalley.com or 800-871-8158

Street price ▪ Not available at press time.

▪ BLOG *Vintage tools in the Lee Valley 'vault.'*

These bench planes will be stocked in three standard frog angles – likely 40°, 45° and 55°. You can, however, order any frog angle from 40° to 65° in ½° increments (the frog and the Norris-style adjuster were redesigned to support the range of 51 available angles) for a $10 upcharge and with just a couple days' wait. And the frogs are easily interchangeable; you can switch them as needed for various planing needs.

In addition, the "torrefied" (roasted) maple totes and knobs can be changed. Totes are offered in two styles: a standard Veritas handle or a traditional Stanley curved style; both are available in small, medium or large. (There will be information online and in stores about how to determine the correct size for the user.) The knobs are available in three styles: low, high and mushroom-shaped (shown in the picture above).

The ductile iron bodies and stainless components feature a streamlined shape, and there are fence-mounting holes on all the bodies. There's an adjustable toe to set the mouth openings and, because a "blade carrier" supports the O1 or PMV-11 iron, the tools can be used with or without a cap iron.

At press time, prices weren't available, but they are expected to be in line with other well-made manufactured bench planes.

— Megan Fitzpatrick

Angle-Ease Router Base from Woodhaven

A router table that tilts opens up vast new worlds when it comes to making mouldings. The one feature that I love about the Angle-Ease (from Woodhaven) is its ability to tilt. This lift gives you the ability to make complex mouldings with a router that are impossible to make without lots of specialized hand tools (and a ton of time to develop the skills to use them).

The Angle-Ease came almost completely disassembled in a flat box, but the instructions and assembly were easy to follow. This is different than other router lifts I've used. While it wasn't difficult work, it wasn't as easy as pulling the thing out of the box and dropping it into a table. It took about 20 minutes to assemble.

Angle-Ease

Woodhaven ▪ www.woodhaven.com or 800-344-6657

Street price ▪ from $255

▪ BLOG *See how easy making a complex moulding can be.*

Prices correct at time of publication.

The plate fits into most standard lift openings, with an ample slot that accommodates bits up to 2" in diameter. Positive locking positions every 5° make adjusting the angle a breeze.

I found the lift mechanism a little difficult to use. Because it functions off a single threaded rod, my router tended to twist and bind as I raised and lowered it. A second rod (a slave rod) would fix the problem. I also found it difficult to change the bits; a large, removable, slotted throat plate would help.

But the fact that this lift tilts makes it an invaluable tool in spite of its shortcomings. I'm a huge fan of the flexibility offered by a router that is tilted and held securely, and this lift gives you that option, which no other commercially made lift does. For standard routing processes, however, I'm still using my favorite non-tilting lift.

If you want to broaden your moulding-making capabilities, the Angle-Ease will tilt your woodworking world. PWM

— CB

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Fair Curves

Dave Fisher designs bowls by touch as well as sight.

The words "fair curve" get tossed around by designers, chairmakers and especially by boatbuilders. It's almost impossible to pin down any of those folks and get a precise definition. About the best you might hear is that a fair curve is sweet to the eye, where lines flow in graceful arcs to make visual music. But for most of us, the world of curves is a bit murky

It's true we may admire a flowing line that seems to carry the eye, but understanding how this works is not easy to put into words and it's even harder to put into practice. Curves represent one of the biggest design challenges to woodworkers. Perhaps it's because straight lines are predictable and lend themselves to building simple boxes and structures. Curves offer more surprises and more possibilities, but also more risk.

For Dave Fisher, a master at sculpting green wood into sumptuous, almost musical wooden bowls, the possibilities that curves offer are worth any risk.

As we stepped into Dave's compact workshop in Greenville, Penn., it felt like a chapel dedicated to craft and creativity. Immediately my eye caught the curved lines of a carved bowl backlit from sunlight through a window. Circling the top of the wall was a long shelf stuffed with books on woodworking, craft, art and history. Below this (within easy reach) are his tools: chisels, gouges, hatchets, bowl adzes and drawknives, all razor-sharp and worn from use.

Peeking out everywhere are bits of inspiration and mileposts of his growth as a craftsman: carved panels on oak boxes, graceful wooden spoons, experiments in carved script and lifelike wooden animals waiting for Noah to finish building the ark.

Graceful arcs. *Each carved wooden bowl by Dave Fisher is an exploration into the possibility of beauty unlocked. The curves are informed and refined more by touch than by eye; they beg to be picked up for a closer look...and feel.*

Oh yes – the carved wooden bowls. A closer look reveals multiple curves and arcs dancing together to create a feast for both the eye and hand.

In Search of the Tactile

Curved shapes elicit our response in more than just a visual sense. Mass-produced bowls are designed so they nest efficiently with one another in a compact stack. Dave's bowls, instead, nest with the human hand.

He uses traditional methods and tools, such as a curved bowl adze and a drawknife, because they are very efficient for shaping, but also because these tools mimic the motion of our hands, he said. They produce a hollow that feels as if it was scooped out with fingers, or a handle that fits our grasp like a handshake.

Dave went on to demonstrate how the contours he sculpts on the outside of a bowl seem organic because he engages his whole body in a natural flowing movement while steering a gouge around a complex curve. As I watched, I was reminded of how a kayak paddler becomes one with the boat while navigating a rapid. These tactile curves send messages to which our fingers react; they are often much

CONTINUED ON PAGE 20

PHOTOS THIS PAGE BY DAVE FISHER; ALL OTHER PHOTOS AND ILLUSTRATION BY THE AUTHOR

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CONTINUED FROM PAGE 18

more powerful than the information our eyes can detect.

Fair Curves Have Purpose

It might seem obvious, but Dave explained how curves have more visual power if they carry the eye to a destination. He clipped a hosta leaf from the flower bed to show this more clearly.

"Each of these curved veins in the leaf are slightly different, yet each are fair," he said.

Tracing the veins from the stem to the outer border, he explained that they each sprung from a source (the stem) and flowed to a destination (the border). He also explained how often the curves in his bowls are interrupted and pick up again on the opposite side. Our eyes seems to take pleasure in following a curve even if part of the path is an imaginary arc in space.

Fair Curves Play Well Together

Dave pulled out a sketchpad and explained how a curve can look too abrupt and harsh, as if it was traced out using a soup can as a template. Instead, he explained, fair curves are usually composed of partial arcs that flow, usually into an arc with a different "speed."

Speed is the relative steepness of an arc. A slow curve has a gradual bend, and a fast curve has a sharper bend. There's an infinite number of curved combinations, but in general they appear more lively and organic when differing arcs are paired together.

Nature knows. *Design intuition can be developed and informed by the curves found in nature.*

Visual continuity. *Without any trouble, our eye follows the trajectory of a curve even when it's cut away; we look for it to resume.*

Geometry Aids Intuition

Dave showed me a freshly split cherry bowl blank harvested from a log to explain his layout process. Some curves are laid out with a compass (or a pencil swung on the end of a string), and some are drawn freehand. His approach is best described as intuition guided by geometry. First he uses a straightedge and square to draw horizontal and vertical centerlines that extend across the top and continue down the sides and across the bottom, encircling the blank. Think of these centerlines like a ribbon crisscrossing a birthday gift that essentially divides the blank into four quadrants.

To draw a curve, Dave makes an arbitrary beginning mark and end point along these centerlines. He then connects those beginning and end points with a straight line to help his eye judge the curve that he then draws freehand. At this point he's just drawing a partial curve on one quadrant. He can erase and adjust until it pleases. Once Dave is satisfied with that freehand curve, it becomes a model that he duplicates on the opposite quadrant.

Duplicating a freehand curve can be problematic but he simplifies the process by using dividers to plot additional reference points along his model curve, then replicates those reference points on the other quadrants. With the help of additional reference points, he is able to duplicate his freehand curve in the other quadrants (no pattern allows him the freedom to adjusts curves at every step along the way). These layout lines act as guides, but the curves are further refined and adjusted as wood is removed and the curves are tested by input from his hands as well as his eye.

Simple geometry. *Note the centerlines on the bowl blank that continue down the bench face, allowing Dave to use a string and pencil to trace a large arc.*

Dave is quick to point out that his early work didn't sing with the same clear voice that it does today. His development as a carver and as a designer sort of leapfrogged as progress in technical skills made design leaps possible, and progress in design pushed him to reach higher levels of technical skill.

He's very much what I'd call a classical artisan in the best sense, taking cues and seeds of inspiration from the best traditional work, nature and art, then building on these streams of ideas to give his work its own voice. **PWM**

George is the author of two design DVDs (Lie-Nielsen Toolworks) and writer of the blog at designmatters.com.

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WEB SITE: *See more of Dave Fisher's work.*

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Pre-anarchist's Tool Chest

'Thixtell?' 'Wymble?' Legal records reveal some curious period tools.

Centuries before we all read Christopher Schwarz's "The Anarchist's Tool Chest" (Lost Art Press), craftsmen compiled lists of what they perceived as a basic set of tools for a young man starting his career in the woodworking trades. They just didn't publish them on blogs or web sites, or in books and other far-reaching media. The documents I'm thinking of are legal records – apprenticeship contracts usually filed in local courts in 16th- and 17th-century England.

Tool historian W. L. Goodman published excerpts based on a number of apprenticeship contracts drawn up in England. The full contracts stipulated the terms of the apprenticeship: the duration, the responsibilities of each party, when the arrangement is to begin and end and, for our interests, often what tools the master will provide the boy upon completion of the contract. Goodman read through many records to pull out the good stuff. The earliest ones are in Latin, or a Latin/English/French hybrid, unlike most blogs today.

In 1555 Simon Shorting to James Richeman: "vnum le Joyntor vnum le fore plane vnurn le hammer vnum le hande saw vnum le hatchet vnum le parsour vnum le mortas wymble vnum le framin chesell & vnum duodecima les karving tooles…"

This excerpted record tells us that Simon Shorting agreed to provide his apprentice James Richeman with a set of joiner's tools at the end of his term. The tools are: one jointer, one fore plane, one hammer, one handsaw, one hatchet, one piercer (brace and bit) one mortise wimble, one framing chisel, one dozen carving tools. Perhaps the "mortise wimble" is an auger for boring out large mortises before using the framing chisel – or it's a mistake and should read "mortise chisel." "Wimble" is usually a term for a boring tool, most often a brace. But we know this craftsman calls his brace a piercer. If only these men knew how much we would hang on their every word.

Dutch planes. *The planes mentioned in apprenticeship contracts were all shop-made examples; these 18th-century Dutch planes are probably the work of a dedicated plane-maker, but are still entirely hand-made.*

Scroll plane. *This Dutch-style smooth plane was also an English form; one appears in Randle Holme's "Academie of Armory and Blazon" (1688). Without Holme's depiction, we would not attribute this style of plane to England. (The planes above are on display at Yale University Art Gallery's Furniture Study.)*

In Bristol, in 1594, John Sparke agreed to outfit Humphrey Bryne with:

"A Rule a compass a hatchet a hansawe a fore plane a joynter a smothen plane two moulden planes a groven plane a paren chysell a mortisse chesell a wymble a Rabbet plane and six graven Tooles and a Strykinge plane."

But are Those Enough?

What more could a person need? Some sharpening stones or more saws perhaps?

I wonder about life with just one saw. Either your saw is too coarse for cutting tenon shoulders or too fine to break down rough stock.

The seven planes will cover most any

A hole by many names. *The "piercer" goes by many titles, among them: wimble, brace, bitstock. No matter what you call it, it's for boring holes. This example is courtesy of Pilgrim Hall Museum, Plymouth, Mass.*

CONTINUED ON PAGE 24

CONTINUED FROM PAGE 22

need a joiner would have then, with the grooving plane serving to plow grooves for frame-and-panel work. We have all seen what Matt Bickford can do with just two moulding planes, so while in this case the sky is not the limit, a lot of things were possible.

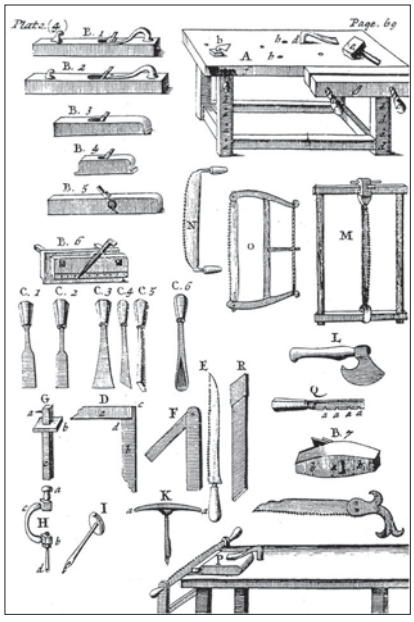
The "wymble," in addition to the aforementioned "brace," goes by various names: wimble, brace, borer, piercer and bitstock.

The "graven" tools are carving gouges, so-called for engraving. The stryking/striking plane is familiar to readers of Joseph Moxon's "Mechanick Exercises, or the Doctrine of Handyworks," where he describes its use in shooting joints (as a "strike-block").

Up Your Scrabble Game

There are many trades represented in court records. Among the other woodworkers are carpenters, shipwrights and coopers. The cooper's tools read like a Scrabble game run amok. Try this on for size:

In 1561 James Hemson to Robert Joyner, Cooper: "a barge axe a Thixtell a Howel a Crowes a passer a payer of compas & a headyng knyfe…."



"Strike-block." *Plate 4 from Joseph Moxon's 17th-century book "Mechanick Exercises" shows a strike-block (B.3) among other period woodworking tools.*

Howell & croze. *These tools, part of the period cooper's arsenal, are used for cutting the groove around the top and bottom of a barrel in which the "heads" (what we might wrongly call the top and bottom) sit. These 19th-century examples are from a private collection.*

Thixtell, howell, crowes – what on earth are these things? The thixtell (or thixell) – like any period term it can show up in a variety of spellings – is an adze. It cuts a bevel around the inside of a barrel in which the cooper cuts the croze, a groove that accepts the heads of the barrel. The tool that cuts the croze is also called a croze. It's like a giant marking gauge with saw teeth for cutting the groove, instead of a pin to scribe a line.

The howell is more confusing. I looked in R.A. Salaman's 1975 "Dictionary of Woodworking Tools" (Scribner); he calls a howell a plane that performs a similar task to that assigned to the thixtell. It cuts a bevel around the inside of the barrel, to prep it for the croze. He also says it's a term used in the U. S. But the early records clearly indicate that a cooper needs both a thixtell and a howell. That tells me that one or the other of these names had a different meaning in earlier records. Or the howell cleans up after the thixtell. Thixtell is absent from Salaman's dictionary, so that word must have fallen out of use by then.

Coopers, carpenters, joiners, shipwrights – all these craftsmen, all these tools. These records are just snippets of course. Who among us has kept to our first kit of tools, with no additions? I imagine earlier tradesmen would amass larger tool kits if and when their work took off.

Cooper. *This engraving of a "tonnellier" (cooper) by Nicolas de Larmessin II (printmaker; French; c.1645 – 1725) shows the cooper clothed in his tools – including a "thixtell," which hangs from his waist.*

Think about Moxon telling his readers to visit the ironmongers in Foster Lane, London, for steel handsaws. Can't you see it now? Moxon drops that name, and prices go through the roof. **PWM**

Peter teaches 17th-century woodworking and is the host of several videos from Lie-Nielsen Toolworks.

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/nov14**

BLOG: *Read Peter Follansbee's blog.*

TO BUY: *"17th Century New England Carving: Carving the S-Scroll" (Lie-Nielsen).*

IN OUR STORE: *"The Arts & Mysteries of Hand Tools" on CD.*

About this Column

ARTS & Mysteries

"Arts & Mysteries" refers to the contract between an apprentice and master – the 18th-century master was contractually obligated to teach apprentices trade secrets of a given craft (and the apprentice was expected to preserve those "mysteries").

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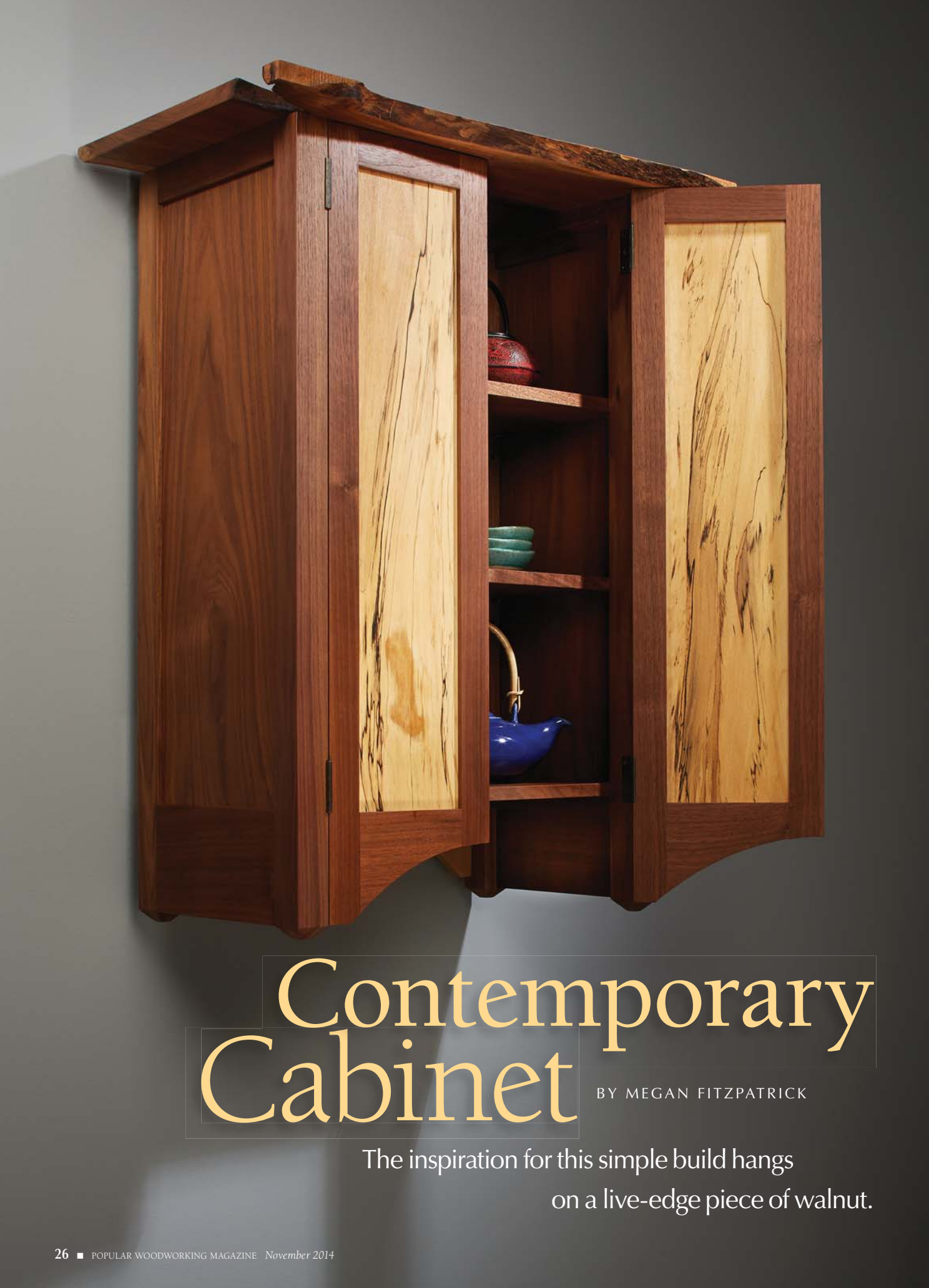


Contemporary Cabinet

BY MEGAN FITZPATRICK

The inspiration for this simple build hangs on a live-edge piece of walnut.

A contemporary look and no dovetails: Those were my self-imposed rules for this cabinet design. I've just completed a remodel on my kitchen, you see, with shop-built Shaker-style cabinets and a passel of hand-dovetailed drawers. I needed a change in design direction.

This walnut and spalted beech hanging cabinet is the result, and while I can certainly see some Shaker (with a touch of Krenov) in its bones, the live-edge top and mix of woods brings it into (or at least closer to) the 21st century.

Rather than relying on the cutlist and illustrations provided, I urge you to let your own eye and the wood you have available guide your build. While I'm pleased with the proportions here, the depth and width were at least in part determined by the width of the walnut and beech I had available, and the place I plan to hang the cabinet.

Start at the Bottom

I began by milling the walnut stock for the posts to 1½" square, leaving all the pieces 8" or so over-long. That's because I wasn't sure of the angle I wanted on the pyramid at the bottom of each, and needed some room to try out a few. I used a backsaw to rough out a variety of angles, but in the end, settled on 45°. That's an easy cut at the table saw.

Mark the pyramid base (where it transitions into the flat of the post) 1" up from the bottom on at least one face, then tilt your table saw blade to 45°. Align the saw blade at the top of the cut with your layout line, then cut all four faces. This leaves you with a ½" flat centered on the bottom of each post.

I recommend making these cuts before cutting your stock to final length (off the top, of course); that way, you have some wiggle room if you experience blow-out or decide to change the angle.

After you have a pleasing pyramid, reset your table saw blade to 0° to cut the posts to final length, then decide how you want them to appear in the finished piece. Arrange them in a bundle in the correct order and draw a cabinetmaker's triangle on the top to help keep you oriented throughout the rest of the build.

Pyramid. *Mark a line 1" from the end of your stock, then align the 45°-angled blade to exit the cut at that line; this results in a flat-topped pyramid. Make sure the stock is straight and square to ensure the flat is centered.*

Cabinetmaker's triangle. *The point that meets on the two front posts helps you to always easily see what goes where as your build progresses.*

Now lay out a ¼"-wide x ¼"-deep groove on the front of the back posts and on the back of the front posts, in which ¼"-thick side panels will float. For a pleasing shadow line, I located my panels ¼" back from the edge, then made the cut with a slot cutter at the router table.

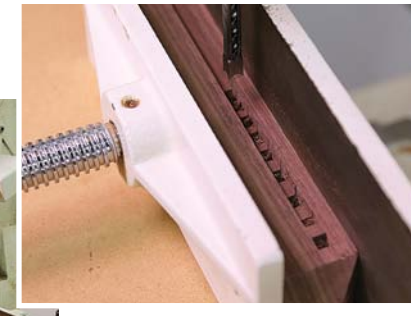
Because it won't show once the top is attached, you can run the groove out the top of the posts. At the bottom, however, set stop blocks or mark the cut termination point on the stock or the router fence and pull the workpiece away from the bit before you cut into your pyramids.

The grooves terminate into ¼"-wide x 1"-deep mortises for the rails, so mark out those mortises and get ready to deepen your grooves.

At the top, the mortises are 1" long and begin ¼" from the top of the post; at the bottom, they are 4" long, and begin ¼" up from the transition line from pyramid to flat.

Test before cutting. *A router with a slot cutter makes quick work of grooves – and it can also make quick mistakes. Test your setup on a piece of scrap sized exactly to your workpiece specs before making your actual cuts.*

I set up the hollow-chisel mortiser to cut the mortises – and the grooves make setting the chisel location simple. (Note: You could reverse these operations. Lay out and cut the mortises first – that would make it easier to set up the slot cutter at the router table and it



Chop, chop. *While using the mortiser, I always keep my left hand on the wheel that moves the work right to left – that way, there's no chance I'll grab the front-to-back adjustment by mistake. And notice how I've skipped a chisel's width on my first series of cuts; leaving waste on either side helps to keep the chisel from deflecting. After making these "skip cuts" down the full length of a mortise, I work my way back to remove the remaining waste.*

LEAD PHOTO BY AL PARRISH, STEP PHOTOS BY THE AUTHOR; ILLUSTRATIONS BY ROBERT W. LANG

would be easy to tell when you reached the end of the groove cut, because the bit would stop cutting.)

After the mortises for the side rails are cut, bring the work back to your bench, check the depth and clean out the trench as necessary. Leave the router setup alone; you'll need it for the doors.

I used a dado stack at the table saw for the next task: the 5/8"-wide x 1/2"-deep rabbet on the back edges of the rear posts. Note that the rabbets terminate 1/2" above the top of the pyramids at the bottom of the posts, so the cut must be finished by hand at the bottom; at the other end, it's a through-cut.

The final work on the posts is to drill shelf-pin holes for two adjustable shelves. I decided on three positions for each shelf, each an inch apart, and located these on the interior post faces. With this layout, the holes and pins won't show at the front when the doors are open (and at the back, they'll be in shadow).

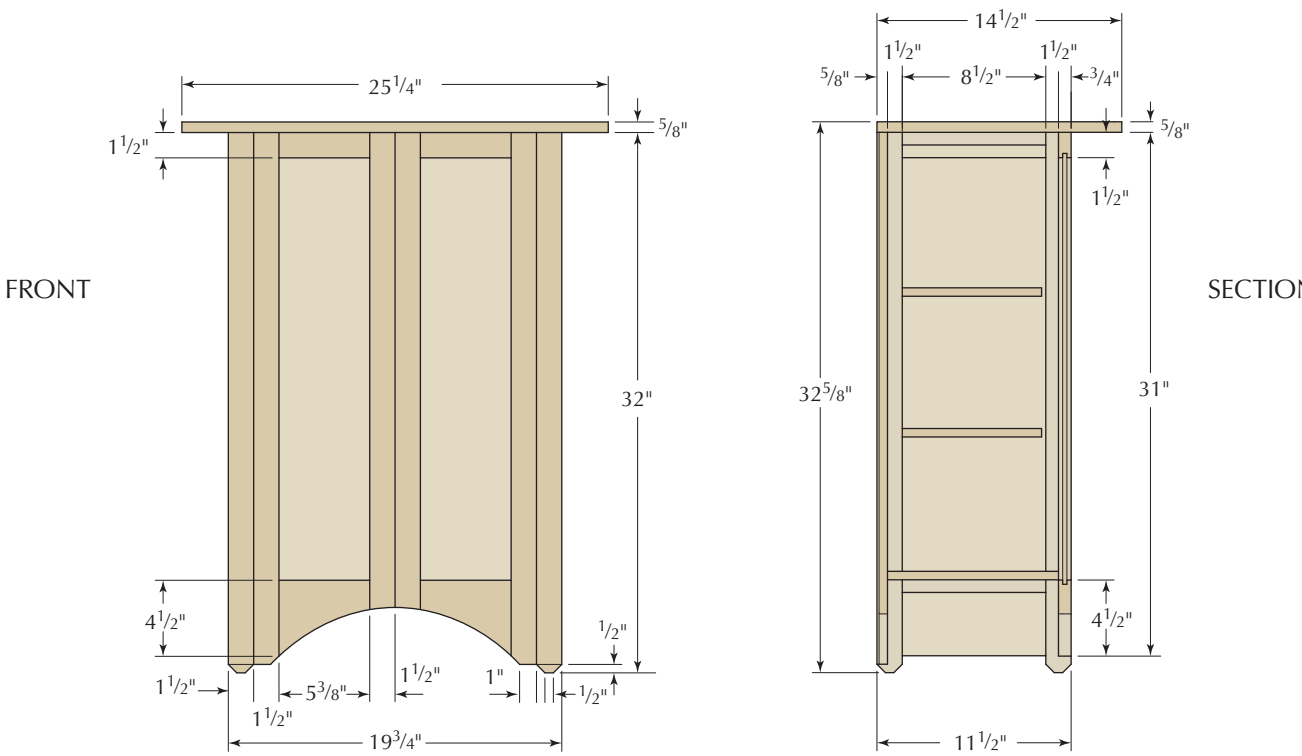
Measuring down from the top of the posts, I marked these at 9", 10" and 11", and 17", 18" and 19", then struck a centerline through the 1"-width of stock behind the groove. I used the drill press to ensure I ended up with perfectly straight 1/4" holes.

Finish by hand. *No matter what machine or tool you use to cut your backboard rabbets, it's best to finish the cut at the bottom by hand. You want an easily controllable cut to avoid blowing through the pyramid. I used a chisel to score the extents, then chiseled out the waste coming in alternately from the side and top, to work my way down to full depth.*

Shelf-pin locations. *Butt the mating pieces against one another, and make sure all four posts are aligned at the top. Now mark out the hole locations.*

Rails & Stiles

For the rails and stiles, straight grain gives you the most pleasing appearance, particularly if you're using a figured or spalted wood for the door panels – you don't want the panels in a visual fight with their frames. Prep the stock for the stiles and rails for both the sides and



the doors at the same time. And prep a few extra lengths for machine setup.

Once you have the stock milled to 3/4" thick, reassess your wood and choose the best-looking, straightest-grained pieces for the doors. If possible, cut the center door stiles from one piece of wider stock; the grain will then match perfectly in the middle.

The upper rails on both the sides and the doors are 1 1/2" wide; the lower rails on both are 4 1/2" wide (see the cutlist for the length of each piece on my build). It's best to cut all four narrow pieces with the same saw setting, then all four wide pieces with the same setting; that way, you ensure the widths match perfectly as you move around the cabinet.

Now take one of the test pieces (you did prep extra, right?) to the router table and confirm the setup. Theoretically, the cutter should be automatically centered in the 3/4" stock because you raised it to 1/4" when cutting the grooves in the posts. Thus, the centered grooves in the rails and stiles align with the grooves in the posts.

Mark the face side of your test piece, then run a groove on the edge and show the test piece to a post. Do they match? Yes? Carry on. No? Try flipping the test piece; they will now.

If you are off by a little, don't raise or lower the cutter – what matters is not that these grooves are perfectly centered, but that they match the grooves in the posts. So take note of which face should be toward the table, mark those on the rails and stiles, then run a through-groove on the inside edge of the eight rails, and a stopped groove on the four door stiles. (Note that if you're persnickety, you could reset an uncentered cutter for perfection before grooving the door pieces.)

Set the door pieces aside as you complete the sides.

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Contemporary Cabinet

NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑ 4	Posts	1 1/2	1 1/2	32	Walnut	
❑ 2	Top side rails	3/4	1 1/2	10 1/2	Walnut	1" TBE*
❑ 2	Bottom side rails	3/4	4 1/2	10 1/2	Walnut	1" TBE
❑ 2	Side panels	1/4	9	26	Walnut	
❑ 4	Cleats	3/4	3/4	8 1/2	Walnut	
❑ 1	Bottom	1/2	9 3/8	18 3/4	Walnut	
❑ 1	Top	5/8	14 1/2	25 1/4	Walnut	Live edge, use what you have
❑ 2	Shelves	1/2	8 1/4	18 3/4	Walnut	
DOORS						
❑ 4	Stiles	3/4	1 1/2	31 1/2	Walnut	
❑ 2	Upper rails	3/4	1 1/2	7 3/8	Material	1" TBE
❑ 2	Lower rails	3/4	4 1/2	7 3/8	Walnut	1" TBE
❑ 2	Panels	1/4	5 7/8	26	Spalted beech	

*TBE = tenon both ends

On both ends, the upper and lower side rails get 1"-long tenons with 1/4" shoulders. I marked the baselines with my cutting gauge (I find this cuts down on tear-out at the visible shoulder line), then made some of the cheek cuts at the table saw with a dado stack raised to 1/4", and some of them with a handsaw… once I realized that our sliding crosscut fence was slightly out of square. So I then cleaned up the table-saw cuts with a shoulder plane, and the side panels got just a hair narrower. (I know better; one should always double-check setups!)

Test-fit the tenons in their mortises, and make any adjustments necessary. Once everything is closing up tightly and you have a good "press fit" (that is, you have to use a decent amount of hand pressure but no mallet to get the joint closed), pull the pieces apart and prep your panels.

I started with 5/8" stock, and after flattening one side of each walnut panel on the jointer and taking it to 3/8" with the powered planer, I switched to bench planes. We have a chipped planer knife that needs rotating and it's a bear to get rid of that track with just a smooth plane. So my No. 7 (jointer) got me within a few No. 4 (smooth) passes to the final thickness of 1/4". (Plus, hand-planes provide a good workout.)

Test-fit the panels in the grooves. If they slide in fairly easily, you're home free. If they don't, take another pass or three with your smooth plane or random-orbit sander (ROS) and try again.

Once everything fits, cut the pieces to final size (remember to add 1/2" overall to the length and width of what will show). I did this at the table saw (after resetting our crosscut fence to a perfect 90°).

Groove on through. *On the rails, the grooves run all the way through; on the door stiles, stop the cut in the mortise area.*

Give everything a once over with your smooth plane (or ROS). It's easier to do it now than when everything is glued up – though you'll almost certainly have some surface clean-up to perform before finishing.

Now brush glue in the mortises and onto the tenons, slide the panels in place and clamp everything up. (I keep a bucket of water nearby to clean up any glue squeeze-out, and I prefer liquid hide glue.)

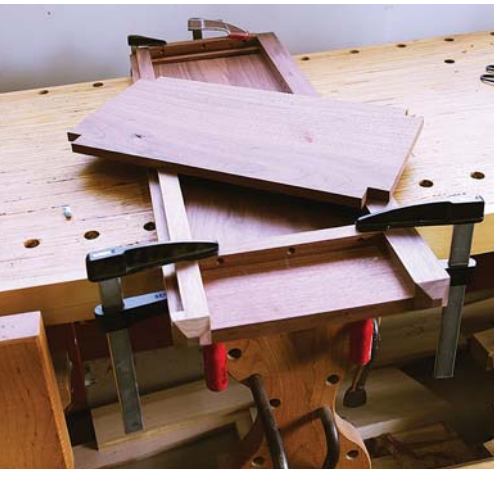
While you're waiting for the glue to dry, cut the cleats to which the top and the bottom will be screwed. These fit between the posts and are glued flush with the interior top edges of the four rails on the side panels. This long-grain to long-grain glue joint is plenty strong enough for this application – promise.

Drill three countersunk clearance holes on the underside of each cleat, elongating them a little to allow for seasonal movement, then glue and clamp the cleats in place.

Get Your Case Together

The sides are now complete, and you're ready to make a case out of this thing. For that, you'll need a nicely made bottom (and you should surface the lumber for the shelves at the same time).

The shelves fit between the posts, but the 1/2"-thick bottom is notched at all four corners to fit around the posts. The front edge acts as a stop for the doors, so it needs to be 3/4" back from the post fronts; the back edge is even with the backboard rabbets. I cut the notches with a handsaw.



Cleats. *After applying glue, clamp the cleats (or secure them with nails) to hold them in place as the glue dries. Either way, just make sure the countersunk holes are facing in the correct direction – toward the floor. (Here, you can also see the case bottom, with the corners notched to fit around the posts.)*

Bottoms up. *Ensure the bottom is well clamped before driving screws through the cleats to secure it in place.*

Topper. *A scrap cut to the exact length of the opening helps you both to hold things in place and keep things square as you attach the top.*

Here's where the workholding is both critical and a little tricky; it doesn't hurt to have a friend help hold things in place as you align the bottom and screw it to the cleats. A thick backer board will also help.

With everything squared up and the bottom aligned exactly where you want it, drill pilot holes through the cleat clearance holes, then insert screws through the cleats and into the bottom.

After you've driven the screws on both ends of the bottom, check to see if things are still square. If they're a little out, don't fret; both the top and the backboards will help to bring things back to where you want them.

To assist, cut a scrap to the exact length of the opening. Flip the case on its top edges, position it as desired on the underside of your top, then place the scrap between the posts. Now screw through the cleats and into the underside of the top.

Note that on my cabinet top, both the front and back edges are "live," so I aligned the case to the top by working off the ends.

I chose sugar pine for my backboards; the color will help reflect light inside the cabinet…plus I had a piece of pine wide enough that I needed only two panels for the backboards. I cut them a little over-wide, then joined them with a tongue and groove, which I dressed up with an 3/16" bead on the tongue panel. Not only does this create a nice shadow line (to help hide the gap between the two pieces), it mirrors the door opening at the front.

If you don't have a wide enough piece of wood for just two backboards, that's OK – you can piece it together from narrower tongue-and-grooved (or shiplapped) stock.

Now cut the backboard panels to final width and fit them in their opening. This piece was built in the high humidity of an Ohio River Valley summer, so I spaced the center gap with two dimes (in winter, I use nickels).

Now comes the fun part – laying out the "perfect" curve (keep in mind that your perfect may differ from my perfect). I used a symmetric drawing bow (mine is from Lee Valley) because it's more precise and repeatable than my usual approach of tacking a thin strip of wood in place. The strap on the drawing bow retains the curve. That's important here; the same arc will be laid out and cut on the bottom of the doors; you need to be able to come back to it.

I marked points 1" in from the corners and tightened the bow until it was tangent to both points. But before settling on that curve, I showed the bow to the lower rails on the side panels. Why? The lower rails on the doors are the same width; I needed to make sure

the same curve would leave a pleasing amount of the rail after waste removal.

Mark the curve, cut it at the band saw then fair it with a spindle sander, spokeshaves, rasps and files – whatever works for you.

Once you're satisfied with the way it looks and feels (touch will give you more feedback than looks, here), secure it in place with screws.

A Nicely Figured Front

Much of the visual impact of this cabinet depends on the doors – specifically, on the door panels. Building the doors is easy – it's grooves, mortises and tenons, just as on the sides. And you should already have the grooves cut.

So cut the rails to length, cut the tenons and fit them to their respective mortises.

Surface the door panel stock to 1/4" thick. If you've chosen a spalted wood such as the beech I've used, take extra precautions with dust collection. Spalting is a result of fungi, and it can be particularly dangerous to your health.

My favorite moulding plane. *In just a few passes, a beading plane produces a lovely and crisp detail. Here, I'm using it to dress up the tongue side of my backboards.*

Re-curve. *A drawing bow allows you to retain a curve for as long as you need it (in this case, for the front and the back). When you're done, simply release the strap, and the bow returns to flat for storing.*

> "A design isn't finished until somebody is using it."
>
> —Brenda Laurel,
> Media designer, teacher & researcher

Use the dry-fit doors as frames to locate the best-looking areas of your panels, then run a pencil around the inside of each to mark out that good-looking rectangle. Mark a line 1/4" out from each edge of the rectangles; that's your cutline.

Cut the first edge of each door panel at the band saw, then use a jointer or jointer plane to true the two edges. The rest of the cuts can then be made at the table saw.

Fit the panels to their doors and glue them up.

Now comes what was for me the most nerve-wracking moment in the entire project: cutting into the completed doors.

Butt the doors together, then trace the curve (I do hope you didn't reset your drawing bow!) on the bottom of the rails, starting 1" in on both edges. Before you make the cuts, check (again) to make sure the curve is below the bottom edge of the case bottom. That is, you need at least 3/4" – more, really – remaining at the top center of the bottom rails. If the bottom shows it will a) look weird and ugly, and b) you won't be able to easily open the doors, because the doors have no handles; you slip your fingers behind the bottom rail to open them. Note that this cut will expose the edge of your tenons at the bottom of the doors; they'll still be plenty strong, and only the cats will notice.

The last task before final surface touch-ups and finishing is to fit the butt hinges. I always fit hinges by hand, using a marking knife to score the extents, then chisels and a small router plane to remove the waste. Typically, I'd say you could use a router and template for this work if you don't like the hand-tool approach – but in this case, you can't. The bottom hinge on each door is even with the bottom of the cabinet; a router simply won't fit.

Careful now. *The doors are the most visible part of the cabinet. Cut carefully to ensure the apex of your curve meets at the middle.*

Remove the hinges before finishing.

The finish is a sprayed coat of garnet shellac to warm up both the walnut and beech, followed by two coats of satin lacquer (with a light sanding between each). After the second coat of lacquer cured, I rubbed out the show surfaces with a brown paper bag, then reattached the hardware.

Because the back edge of the top extends past the backboards, I attached a French cleat that is proud of the back to hang the cabinet, with an offset block of equal thickness at the bottom (both are screwed to the rear posts and to the backboards).

The cabinet appears to float in front of the wall, which creates a nice shadow line at the back. It's also a practical solution to deal with hanging it on my 120-year-old wavy plaster walls – there's no need to scribe the posts to the wall for a flush fit.

Now I just have to design and build a similar table so this contemporary piece has company amidst all the Shaker. PWM

Megan is the editor of this magazine. She can be reached at megan.fitzpatrick@fwmedia.com.

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Bookend Inlay

BY FRANK VUCOLO

Make four variations of Federal inlay with heat and a few simple tools.

While one revolution was winding down, another was gaining force. The Federal period, from about 1780 to 1820, saw both the rise of the nascent United States as well as a uniquely American interpretation of neoclassical design.

This New World take on European design was lighter than the preceding Queen Anne and Chippendale styles, using less imposing elements. It did, however, make extensive use of fine veneers and inlays for depth and richness.

Craftsmen could buy inlays from specialists, but many created their own shop-made inlays. With a few simple tools, you, too can make your own inlays for your Federal (and other) projects and get great results.

Lighter Designs

The American Federal period developed when U.S. cabinetmakers began interpreting the work of British designers such as George Hepplewhite, Thomas Sheraton and the Adams brothers, who exported their ideas from England in the form of design books. Their influences quickly became part of the decorative arts landscape.

Gone were the undulations of blockfront and bombé chests sporting expressive brasses on elaborately shaped and carved mahogany.

Narrow tapered or turned legs, the use of negative space in the design and gently curved or flat surfaces form the core of Federal work. And while many of the high-end Federal pieces were carved, it tended to be more subtle than in preceding styles.

Federal furniture depended more on contrasting colors and accents. Neoclassical pictorial elements such as urns, shells and fans were created in veneer, as was the eagle, which had emerged as a symbol of the United States.

Expert marqueters fashioned complex artistic representations from veneers of different colors. Heated sand was used to gently darken the edges of pieces to create shading that gave designs a three-dimensional appearance.

Much of the elaborate banding and pictorial inlays came from the hands of specialists who created inlays and banding in bulk, inventoried it and sold it from shop to shop.

But cabinetmakers in rural areas didn't always have access to these specialized craftsmen, or didn't have the market for such fancy work. They created their own simple shop-made inlays (as did some urban craftsmen.)

Often, these were little more than ovals or rectangles of a contrasting veneer. Others were two-dimensional renderings of simple objects or simple geometric arrangements of shaded veneers. Frankly, many were quite crude.

Known Shop-made Users

Perhaps the best example of a craftsman employing shop-made inlays is John Townsend. Known primarily for his exquisite Queen Anne and Chippendale work, later in his career Townsend also made Federal furniture.

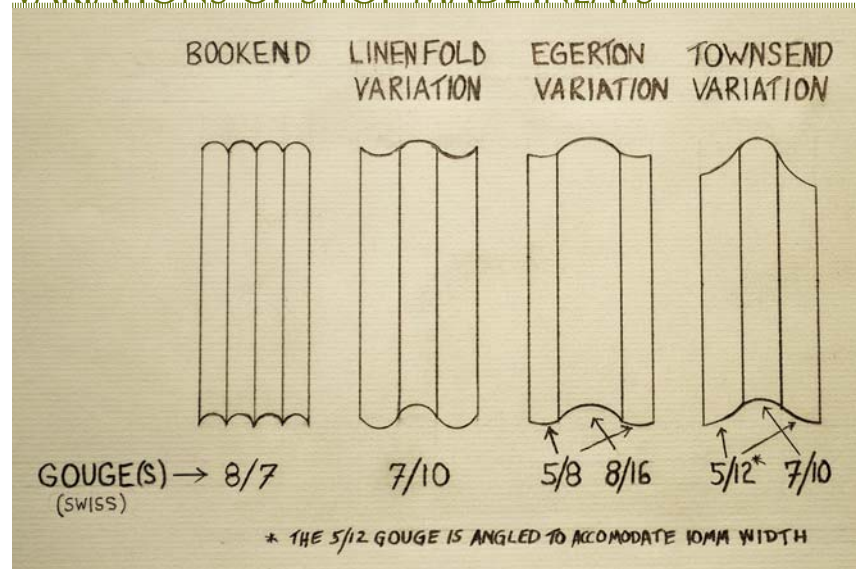
Elaborate banding and pictorial inlay is notably missing from his known Federal work; instead, he used simple stringing and inlays. He was fond of two variations of bookend inlay (three or four matching sections aligned), and what I call the "Townsend variation" (a noticeable change in the sweep of the curves.) New Jersey cabinetmaker Matthew Egerton used another variation with a wider center flanked by two matching narrow pieces. I call a fourth variation a "linenfold" design, in which all three sections are equally wide.

Period touch. *Shop-made inlay, such as this bookend design on a table I built, was important in Federal-period furniture; it's a way to decorate using contrasting colors.*

I've always been fond of this inlay in all of its forms. The three-dimensional effect is simple yet elegant and no marquetry skills are required to make it. Using tools you probably already have, you can produce project-ready inlays in short order.

Because of the technique used to make these designs, the process to inlay them into your work is simple and precise. We'll work step-by-step through making the Egerton variation. The same techniques, however, are used to make all of them.

VARIATIONS OF SHOP-MADE INLAYS



LEAD PHOTO BY AL PARRISH; OTHER PHOTOS & CHART BY THE AUTHOR

Squared edges. *If you rough-cut your inlay sections using a knife, you'll need to square the edges prior to assembly.*

> "Everything should be made as simple as possible, but not simpler."
>
> —*Albert Einstein (1879-1955), Theoretical physicist*

The drawing on the previous page shows the variations, plus it notes the gouges I use to develop these inlays for use in small tables, including pembroke, card and bow-front designs.

Veneer for Inlay

Choose a light veneer; holly, satinwood and maple are common Federal-period species. Thickness isn't important. You can buy commercial veneer – usually about 1/40" – or slice your own. If you do slice your own, keep it at 1/16" or thinner to make it easy to work. Here, I'm using holly sliced to 1/32".

You're joining three or four pieces of veneer into a panel to create the inlay. (It's not a lot different than joining a few boards to make a tabletop.) If all your edges are straight, flat and square to the face, you'll have a successful glue-up.

When using short pieces of veneer, you can usually get a good edge to join right off a veneer saw using a straightedge. Keep in mind, however, that one side of the saw blade is beveled. The piece coming off of the beveled side cannot be properly joined without preparation. Shoot that edge with a small plane to get it square to the face. Only the piece coming off the saw's straight edge is square. Keeping track of those edges is something you get used to after a while, but it can be frustrating if you are new to veneer work.

If you cut the pieces with a knife, you should probably shoot the edges to ensure a good joint.

Tricks for Success

The secret to making these inlay designs and installing them precisely is to use a selection of carving gouges to create the pieces; the same gouge rounds the ends of the inlay and scores the edges of the recess into which the inlay fits. For that to work its best, the finished pieces need to be the same width as the gouge.

To get a precise width, purposely cut the rough pieces slightly oversized, then center the gouge cut in the oversized piece when punching the convex end. This leaves a little waste on either side. (The concave cut comes later.)

Trim both edges with a small plane to remove that waste, leaving a piece exactly the width of the gouge. This shooting process also joints the edges of the veneer to provide straight edges perpendicular to the face.

When using a gouge to cut the ends of the veneer (and to score the substrate), mind the bevel direction. When the gouge cuts into the material, its bevel side compresses the wood on one side, leaving a cut that is not perpendicular to the face. To get a perpendicular cut on the bevel side, you must tilt the gouge to compensate for the angle of the grind.

Sized by gouge. *Section widths are best if determined from the chisels used to make the curved cuts.*

Perpendicular. *To achieve a crisp edge on the convex curve, keep the unbeveled face of the gouge at 90° to the work.*

Dead center. *Punch the convex shape on only one end of the sections with your gouge centered in the over-wide section; keep the curve aligned as you work.*

Shoot the edges. *A few wisps off both sides of the rounded-end section keeps the curve in position and establishes the width.*

Toasted edges. *Shading the edges of inlay pieces in hot sand imparts a three-dimensional appearance.*

Sand Shading

For sand shading, I use fine sand (available in most craft stores) but any sand works. Heat it in a cast iron pan on an electric hot plate. You can also use a pie tin on a kitchen stove, wood stove or camp stove, but if you're bitten by the inlay bug and step up to more intricate sand shading, you'll appreciate the benefits of fine sand and a cast iron pan.

Dip each piece in the hot sand until an edge is sufficiently shaded, then use a gouge to cut the concave end. If you cut the concave ends prior to shading, the fine tips would be damaged by the hot sand. Again, the gouge needs to be angled to produce a cut square to the face of the inlay.

Next, arrange the pieces for the most pleasing look. I determine that arrangement by evaluating the shading and color of the each piece. The pieces are then taped in position, and the inlay is ready to be installed.

Special veneer tape is commonly used for this type of work, but in this case, masking tape is fine. We're not going to hammer or cold press this veneer (in which case the almost-zero thickness of veneer tape is important).

Preparation & Installation

Use the actual inlay to mark off the recess needed in your workpiece. I find it best to locate the inlay, then use tape to hold the pieces firmly where I want them.

The most important step is to accurately score the substrate. Remember to angle the bevel of the gouge to make the cuts 90° to the surface. Score each rounded end at both the top and bottom of the inlay. Next, I score one straight edge with a scalpel, cutting right through the tape, then re-tape the scored side and cut the other.

Pare the waste around the outside edges using a sharp chisel, then clear the middle with a small router plane.

Set your inlay into the substrate with hide glue. As it is clamped, the glue will move into the inlay, through all the little cracks and gaps.

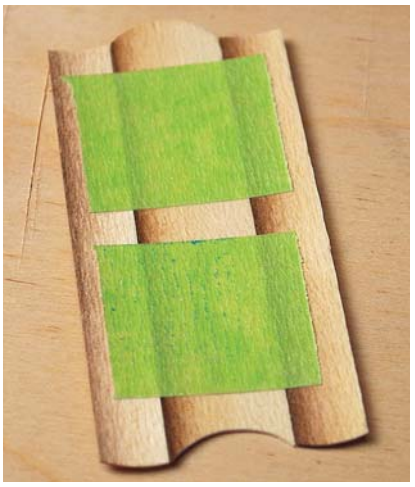
I clamp my inlay under a caul faced with a cork pad so pressure is evenly distributed. It helps to cover the cork with packing tape, which shuns glue and preserves your cork.

When you remove the caul, there will be glue squeeze-out. No worries. After you scrape everything clean, any residual hide glue in the pores of the wood will be invisible to the finish. (I've found that the same is not true of white or yellow glues.)

These are only four variations of book inlay. Of course, any number of additional versions can be created by varying the section width, gouge selection and gouge angle. It's your choice: You can stick with the period-correct designs or get creative. **PWM**

Frank builds furniture from his shop in East Amwell, N.J. A woodworker for more than 25 years, he enjoys designing and building Federal period furniture.

Burnt ends. *Cut the concave curves after sand shading; if you cut before shading, the fragile points could be damaged.*



Stick together. *Regular masking tape is sufficient to hold the sections tight as the workpiece is set into its recess.*

Dressed up. *The Townsend variation is used to, well, bookend the drawer in this veneered and inlaid side table. You'll learn how to build this table in the next issue.*

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/nov14**

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Clever Windsor Joints

BY MICHAEL DUNBAR

Apply the strength of dovetails to round pieces.

Engineering challenge: *The interaction of the human body with a chair makes it critical to use strong joinery that will last indefinitely.*

Windsor chairs are comfortable, handsome and strong. That is why for 250 years they have been America's favorite chair. Windsors were made by hand for more than a century, roughly 1730 to 1840. During that time their designs changed as makers and customers pursued the latest fashion.

The earliest Windsors were large easy chairs. In the classic period (1760 -1800) they became general, everyday seating. This is the era of the designs we all recognize: sack back, bow back, fan back, etc. During the 1790s, Windsors became a popular dining chair and began to be made in sets with matching arms and sides. Around 1800, chairmakers abandoned bent bows and adopted styles such as square back, birdcage, rod back, arrow back, thumb back and step down.

Along with comfort, strength and pleasing design, there is an additional reason for their popularity: These chairs were affordable. Two things account for prices easy on the pocketbook: Windsors are made of turned parts, and they are joined with socket construction—round hole, round tenon.

Both turning and socket construction are fast. You've drilled a hole in a piece of wood and know how quickly that can be done. A round tenon can be turned, made with a tenon maker or even whittled in about the same time it takes to drill a hole. These techniques reduced the number of hours required to make a chair and kept prices low.

Although fast and easy, round-hole, round-tenon construction has a dirty secret: It fails. You know this from experience. The first thing friends ask when they find out you're a woodworker is "Can you glue my kitchen chairs?"

Why does socket construction consistently fail, no matter how strong the adhesive? The inside surface of a drilled hole is almost completely end grain, and end grain does not permit a good glue bond.

To take advantage of the speed and ease of making this joint while avoiding its inherent weakness, Windsor chairmakers did not rely on glue alone. They employed a variety of mechanical

LEAD JOINT PHOTOS BY AL PARRISH; OTHER PHOTOS BY THE AUTHOR

techniques that held the joint together permanently.

Several are well known – locking tapers, compression and the faceted drive fit. Because Windsors were made by hand for more than 100 years and because they spanned so many furniture styles and were made in so many forms (settees, rockers, kids' chairs), the old guys worked out just about every conceivable technique for producing socket joints.

It all came to an end in the mid-1800s when Windsor chair shops were replaced by the chair manufactory. With chairs no longer made by hand, traditional Windsor chair joints became a closed canon. Nothing new was added.

As a younger man I began making Windsor chairs. As an older man I established a school (The Windsor Institute) to advance the craft (and Windsor forms are the only thing we teach). Every year I add a new chair to the curriculum that teaches a different Windsor technique. As a result, I now use three joints unknown to the old guys. All are in keeping with traditional Windsor construction in that each relies on a mechanical feature to overcome the flaws inherent to socket-construction joinery.

No-fail Footrest

The first joint solves a problem the old guys never encountered. While they made youth chairs (tall chairs that allowed a child to dine at a table) they were content for the kids' legs to just hang in space. The footrest is a Victorian-era innovation and those found on many old Windsors are later additions.

Most are poorly conceived and executed. However, today's customer will not accept a youth chair without a footrest, so we have to include them. But how to apply a footrest that is in keeping with early design and construction, and that does not fall off when the glue fails?

My solution is based on the dovetail joint. I drill a 1/2"-inch hole in each front leg. The holes are coplanar, but flare slightly. This means their ends are farther apart than where they are attached to the legs.

I lay the footrest across dowels in these holes and trace the flare on the underside. These lines allow me to duplicate the dowels' angles when I drill corresponding holes in the footrest. I bevel the footrest's rear edge so it pulls up snug to the leg with no gap. To help me form this bevel, I also trace the leg's contour at this time.

After drilling the holes in the footrest and beveling the rear edge, I am ready to attach it to the chair. However, the footrest cannot slide over the ends of the dowels because the holes' openings are closer together. My next step is to compress the legs slightly with a bar clamp until the ends of the dowels align with the holes. Now, I tap the footrest onto the dowels as far as it will go.

When it stops moving, I back off the clamp to release the legs slightly, and tap some more. I repeat this process until the footrest is tight against the legs. While I know the glue will eventually fail, the footrest won't pull loose. Because the dowels are hidden, the footrest does not look like an appendage or afterthought.

Afterthought. *Most footrests on Windsor high chairs are later additions, often poorly executed.*

This to that. *After placing the splayed dowels in the legs, hold the footrest against them and mark the location and the angle on the bottom face.*

Squeeze play. *A clamp across the legs allows the dowels to enter the holes in the footrest.*

Inner strength. *When complete, the hidden footrest attachment is very strong.*

Strong Arm Tactics

In 2011, I introduced the birdcage Windsor class to our curriculum. In that class each student makes a birdcage armchair and matching side chair. Around 1800, the Sheraton style became fashionable and Windsor chairmakers kept up with the times. Sheraton chairs have square backs, so bent-back Windsors fell out of fashion, replaced by designs chairmakers called square backs. Windsors also began to be produced *en suite*. A stylish house would be furnished with dozens of matching armchairs, side chairs, settees and rockers.

To appreciate this second joint, consider the stresses a chair back endures. Most of the weight in a human body is in the torso. A person plopping into or squirming in a chair creates a lot of backward-directed force. In earlier Windsors (the continuous arm, sack back, high back etc.) the arm was an extension of the back and thus quite able to support a sitter.

That is not the case with a square back. The arm is separate from the back and is attached to the stile (one of the pair of uprights that frame the back). The backward stress exerted by the sitter tears at this joint. If a chairmaker chooses to secure the arm to the stile with socket construction, he or she faces the problem of socket construction's inherent weakness. My solution effectively resists the stresses that would otherwise yank this joint apart.

This joint, too, is based on the dovetail. Drill the hole in the stile that will receive the arm tenon. Insert the bit again, but this time from the rear. As the drill turns, raise and lower the bit. This reams the hole, making it oblong without significantly opening the front.

The secret to not opening the front as much as the rear is to avoid using the bit as a lever and the hole's bottom front edge as a fulcrum. Instead, lift (rather than pivot) the drill so the bit reams the hole's upper rear surface.

If you prefer, you can accomplish the same thing with a rattail file; it just takes longer.

When the tenon is wedged from behind, it expands to fit the altered hole, creating a dovetail that cannot be pulled through the smaller front opening.

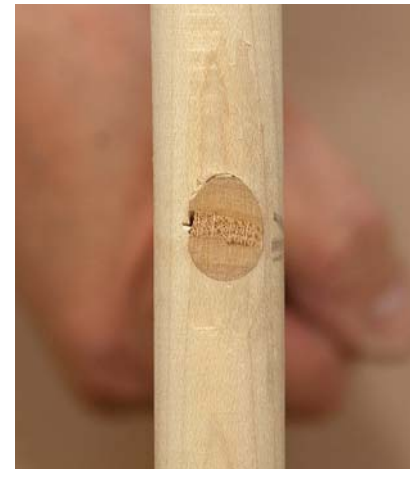
> "I had three chairs in my house; one for solitude, two for friendship, three for society."
>
> —*Henry David Thoreau (1817-1862), American transcendentalist*

Two Tenons, One Mortise

Nineteenth-century Windsor chairmakers made lots of settees to match their square-backed chairs. Settees could sit from two to eight people,

Weak link. *There is a lot of stress at the connection of the arm and back leg. A simple round tenon in a hole will fail.*

From behind. *After drilling, the bit is inserted in the hole from behind, then raised and lowered to taper the hole.*



Force fit. *A wedge driven into the tenon makes it wider on the outer end, similar to a dovetail.*

***Two for one**. Matching angles on the tenons allows both pieces to occupy a single mortise.*

depending on the piece's length. As a settee is lengthened to accommodate a greater number of sitters, the chairmaker has to add pairs of legs to support the increased weight. Additional stiles are also needed to strengthen the back.

More legs and stiles require the chairmaker to add extra stretchers and rails (horizontal members that run between the stiles and legs). These additional parts present both design and construction problems.

To maintain the flow of a settee's lines, stretchers and rails should lie in the same plane. However, keeping them in the same plane requires drilling holes all the way through legs and stiles, and using tenons that butt against each other end to end.

Butted tenons can be no longer than half the part's thickness. A chairmaker could choose durability over appearance and stagger the joints so tenons could be full depth. However, a settee built this way will become a jarring arrangement of unaligned elements, alternately stepped up and down.

Last year, I added as a class a two-seater settee. It was designed *en suite* with our square back side and armchair. With my front and rear stretchers and lower back rails, I faced the same problem as the old guys. My settee is a two-seater, so staggering the joints was not an option. My rails had to be aligned, and this required joining them at the same locations.

To solve that problem, I beveled the tenons so they overlapped. This allows each tenon to extend the entire thickness of the part (leg or stile) to which it is connected. Plus, I glued the two beveled mating surfaces.

***Made to match.** The round tenon is inserted in the hole in this jig. A handsaw is then used to cut the angle precisely.*

However, Windsor stretchers do not hold the legs together. They are slightly over-long so they push the legs apart. The stretcher tenons are in compression and cannot separate.

Something similar occurs in lower back rails. In my design, the crest rail is a single piece that ties the three stiles together so it isn't possible for the outer ones to separate. Because these upright members are secured, the lower rails can't move and apply tension to the joints. The beveled arrangement is protected and is sufficiently strong.

I made a jig to cut the beveled tenons. I drilled a hole lengthwise through a block of wood, then cut the block at the required angle. The problem is to figure out the angle. I'm sure there is a way to do this mathematically, but as all my students know, chairmakers cannot do math. That's why we test everything before assembly.

I made a scaled-up drawing of the tenon and measured the angle with a protractor. The hole in the leg is $\frac{5}{8}$". The leg diameter is $1\frac{1}{4}$". I scaled up the joint five times, drawing a right triangle with one leg $3\frac{1}{8}$" and the other $6\frac{1}{4}$". I measured a 26° angle and cut the block. To use the jig, insert the tenon up to the shoulder and trim it with a saw. A quick strike with a plane creates a smooth surface for gluing. **PWM**

Michael is the author of several books and has been making Windsor chairs since the 1970s.

ONLINE EXTRAS

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Splay-leg Table With a Twist

BY TOM CALISTO

Tweaking a classic table design adds a contemporary feel and challenges traditional building techniques.

My aim was to make something fairly simple and classic with contemporary flair. The cuffs and cock bead are borrowed from the Federal period, but I added splayed legs and an angle on the cuffs to introduce more contemporary elements.

At first glance the splayed legs would appear to complicate the construction of the table, but that's not the case. All of the joinery involves 90° corners – the only time compound angles are introduced is when the legs are cut to length.

Inside Leg Tapers

The first step in building the table is milling the material for the legs and aprons. On most tables with tapered legs, the starting point for the taper begins around 1/4" below the bottom of the apron. However, because the legs splay outward on this table, I chose to simply taper the entire leg on the two inside faces so that the lines of the table aren't interrupted.

I used 8/4 stock for the legs so I could effectively cut the legs blanks

PHOTOS BY KRISTINE CUTILLO; ILLUSTRATIONS BY ROBERT W. LANG FROM THE AUTHOR'S MODEL

Great grain. *With legs that are 1 1/8" square, it's best to align the pieces to get a rift-sawn look; you can do that with 8/4 stock.*

From top to bottom. *Because of the splay design, you can taper the leg over its entire length – it's also a cleaner look.*

from rift-sawn wood. Depending on how the grain is flowing in your stock, you may have to cut the material on the diagonal or some angle in between to get true rift-sawn blanks. Having the grain flow in a straight line down each leg is important to the design.

After laying out the leg on the ends of the stock, use a band saw to make the rough cuts. Be sure to leave each leg a little oversize. True up two adjacent faces with a jointer and thickness the blanks to 1 1/8" square.

The legs start out at 1 1/8" and taper on the two inside faces to 3/4" square at the foot. The taper can be cut many different ways; I chose to cut them on the table saw using a simple shop-made tapering jig. By using the table saw and a dedicated jig, I can ensure that the legs will be consistent.

Now, with a miter saw set for a compound angle (5° bevel and 5° miter), trim the top of the legs. The legs can be left about 1/4" long at this point. They'll be cut to final length after the cuffs are added.

With the legs tapered, cut the mortise for the aprons. I joined the table with loose tenons, but integral tenons can also be used. (If you elect to use integral tenons, be sure to add the tenon lengths to the aprons before cutting them to length.)

Pay attention to the mortise locations. They are cut on the tapered faces of the legs. It would be easy to cut the mortise on the outside faces at this point. The mortises are 1/4" wide by 2 1/2" long and start 1/2" from the top of the leg. They are offset from the outside face of the leg by 3/8".

I cut the mortises on a shop-made, router-based slot mortiser. (Of all the tools that I've made for my shop, this one has saved me the most time.) The work can also easily be done with a plunge router and an edge guide – just be sure the router is fully supported to prevent tipping. Take small bites to produce clean and accurately sized mortises.

Aprons & the Arc

The 3/4"-thick aprons are milled to 3 3/4" x 9 5/8" for the sides and 3 3/4" x 15 3/4" for the front and back. To create the table splay, the ends of the aprons are cut at a 5 3/4° angle (the extra 3/4° accommodates the leg taper). The tops of the aprons need to be beveled to match the splay (5°) so they will be flush to the underside of the top.

I made a router jig to help cut the arcs for the front and side aprons. It's nothing more than a flush-trim template that holds the work at a 5° angle to produce arcs that match the leg splay. This allows the apron's bottom edge to be parallel with the top when the table is complete.

The arcs for the side and front aprons both have the same 1/2" rise. Because the lengths of the aprons are different, the length and radius of the arcs differ as well.

To create the jig, start with a base of 1/4"-thick MDF about 6" wide and 2" to 3" longer than the apron. Lay out the arc so it's centered along the long edge of the base. From the same edge draw a parallel line 3 3/4" away. This line is used to locate a registration block and to align 5° wedges.

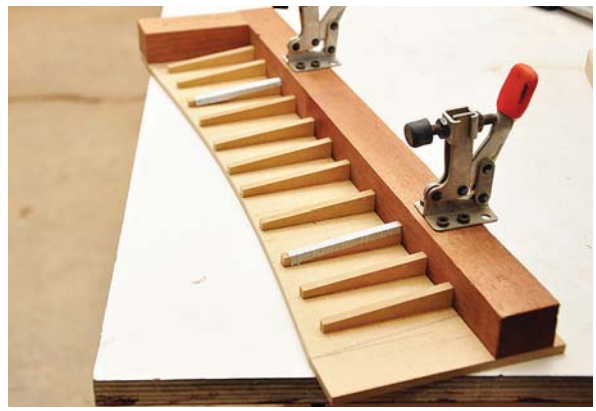
Cut out the arc and clean up the curve so it's smooth and symmetrical. Add a full-length registration block along the 3 3/4" offset line drawn on the base.

To get the apron to rest on the jig at the correct splay angle, glue identical 5° wedges on the base of the jig along with the full-length registration block. The wedges should be 3" long and the small end should be around 1/16" to 1/4" thick – the exact dimensions are not

Plan your work. *With two clamps and a stick, you can lay out a fair curve as your apron pattern.*

important, but the wedges must be the same. Add a registration block to the right side and toggle clamps to hold the apron in the correct position. The jig is now ready for use.

Place the apron on the jig so the top edge of the apron is flush with the registration blocks. Now trace the arc onto the apron. Rough-cut it at a band saw, leaving 1/16" to an 1/8" for clean-up. Put the apron back in the jig and set the clamps.



Apron jig. *The small wedges lift the aprons to position them for the router operation; sandpaper at the clamps increases the hold.*

To trim the apron, I set up a bottom-mount bearing pattern bit in my router table and flushed the remaining waste to the template. (Be aware that it's easy to tear out wood as you trim the uphill portion of the cut. Plus, the ends are fragile and can be easily snapped off.) Trim all four aprons.

Add the Details

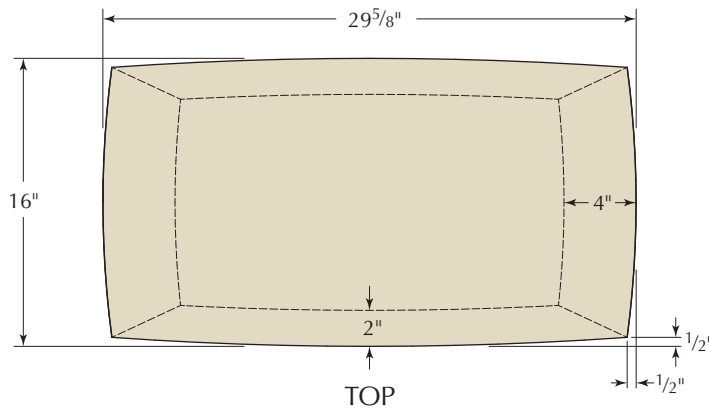
With the joinery and shaping complete, add the details that set this table apart – the cock beading on the aprons and the cuffed feet. I chose Peruvian walnut to accent the sapele of the table because it is easy to work and it's a fairly dark wood when finished.

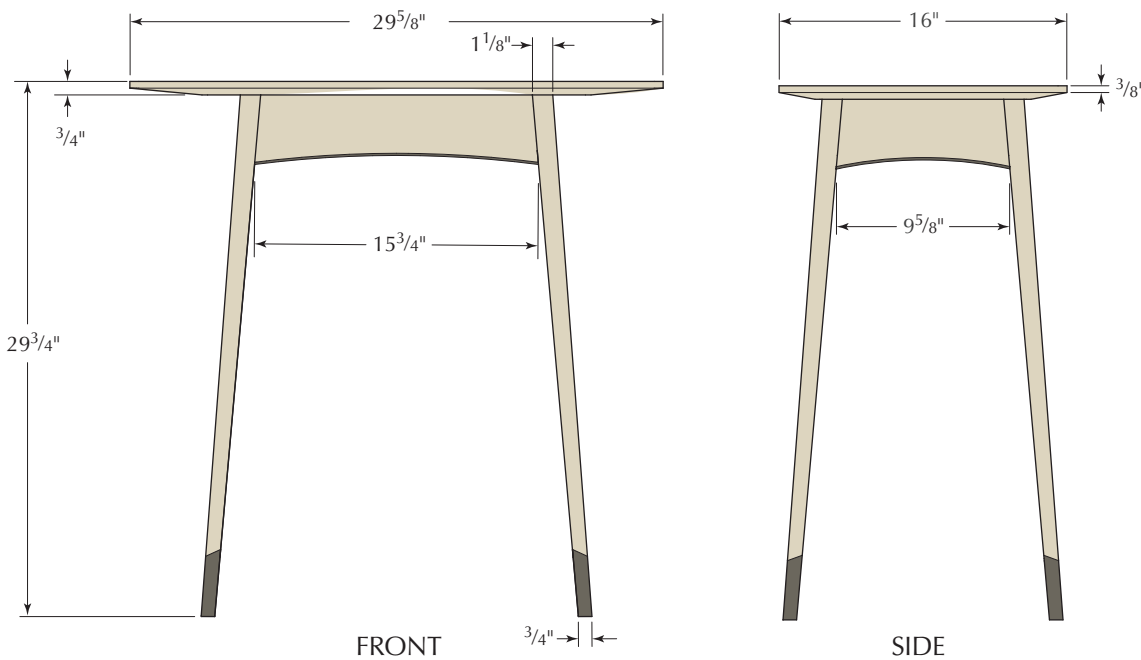
Both the cock beading and cuffs are made from 1/8"-thick stock. To add the cock beading to the aprons, I cut pieces about 1" longer than the apron along its arc, and a little more than 1" wide.

All of the shaping is done after the bead stock is glued to the bottom edge of the apron. Apply glue to the arc on the apron and install the oversized strips. There is a bit of wiggle room, but try to keep everything flush on the backside of the apron.

After the glue dries, flush the bead to the back side of the apron with a block plane.

To get a consistent 1/8" reveal on the front of the apron, I ran the pieces on





Helpful offcuts. *Waste sawn from the aprons prior to any router work makes the best caul when attaching your bead to the aprons.*

Smooth & trim. *The bead is flush with the back face of the apron; on the front, the bead is trimmed to stand 1/8" proud.*

Freehand. *The best way to round the bead is using a simple scratch stock – the profile easily follows the arc of the bead.*

Fast & easy. *My shop-made horizontal mortiser makes quick work of the mortises in the legs and aprons. A plunge router can also do the job.*

edge through the table saw. Another approach is to use a block plane with a scrap piece of the beading material attached with double-sided tape to the sole; the scrap acts as a depth stop.

I rounded the projecting edge with a scratch stock. This was done mostly freehand, holding the scratch stock in my fingers. It may help to rough in the bead with a sanding block, then fine-tune it with the scratch stock. Once the roundover is complete, trim the cock bead flush with the ends of the aprons.

Mill the mortises in the apron so the mortise is offset from the face by 1/4". This creates a 1/8" offset between the leg and apron face. The mortise is 2 1/2" long and centered on the end of the apron.

Lay Out & Recess the Cuffs

The cuffs are my favorite part of the project. The cuffs wrap around the legs in a zigzag pattern, going up on two adjacent faces and flowing back down the other two faces. They mimic the arches in the aprons, rising toward the inside of the table – make sure they flow up toward the faces with the mortises.

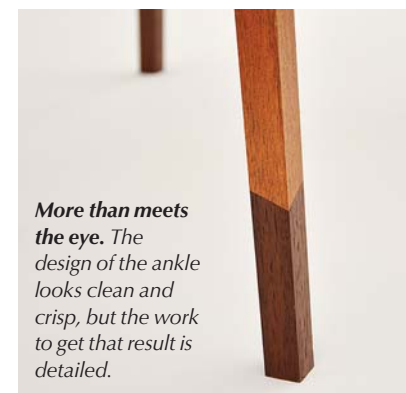
I chose a 25° angle for the pattern. Because of the geometry, the cuff recess does not terminate at 90° to the face of the leg; it terminates at a 25° bevel to match the 25° angle at which the cuffs terminate in the leg. The recess is easy to pare to the required angles by using a guide block with a matching compound angle.

The first step is to mark the location

Splay-leg Table

NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑ 4	Legs	1 1/8	1 1/8	29 1/4	Sapele	
❑ 2	Long aprons*	3/4	3 3/4	15 3/4	Sapele	Loose tenons
❑ 2	Short aprons*	3/4	3 3/4	9 5/8	Sapele	Loose tenons
❑ 1	Top	3/4	16	29 5/8	Sapele	
❑ 16	Ankle cuffs	1/8	1	4	Peruvian walnut	
❑ 2	Long cock beads	1/8	1	17	Peruvian walnut	
❑ 2	Short cock beads	1/8	1	11	Peruvian walnut	

*Ends are cut at a 5 3/4° angle and top edge is beveled at 5°



More than meets the eye. *The design of the ankle looks clean and crisp, but the work to get that result is detailed.*

Close shave. *After cutting away the bulk of the ankle waste with a jointer, I use my router to sneak up to the marked lines.*

Compound angles. *Use a sharp chisel to trim and fine-tune the cuff details.*

No-fail. *With the guide block set in position, paring the 25° angle is too easy.*

of the cuff on the legs. Locate the long point of the cuff (the highest point from the foot) at 25½" from the top of the leg. With a sliding bevel gauge set to 25°, begin at the outside corner (the intersection of the two uncut faces) then transfer the lines around the leg going up one side and down the second. Return to the outside corner and repeat the steps so all the faces are marked.

The next step after layout is to remove the bulk of the material in the cuff recess. A jointer does a great job of hogging it out.

Set the machine for a ⅛"-deep cut and attach a stop block to the fence to limit the length of the cut. Take the cut slowly to keep it safe and produce a smooth surface, then switch to a small trim router and work to within ⅛" of the lines.

The shoulder needs to be pared to finish off the cuff recesses. Because the shoulder tapers down and the line is sloped along the face of the leg, it is easier and more accurate to use a guide block to control the chisel. The guide block should be around 10" long by 1½" square, and have one end cut with a 25° compound miter. Align the cut edge to the layout line as you pare.

Cuff Completion

With the recess complete, the real fun begins – adding the cuffs. The cuffs are made from stock roughly 1" wide, ⅛" thick and slightly longer than the recess. Trim one end to the required compound angle. Glue the first piece in place with both edges projecting equally past the sides of the legs. These will be trimmed later. Make sure the beveled joint remains tight while the joint is clamped up.

After 10 minutes, remove the clamps and any glue squeeze-out. Pay particular attention to the squeeze-out on the "long point" side; the next piece of the cuff butts into this recess so it needs to be clean.

The order of things. *There is a specific path to take as you add the cuff pieces to the leg – the secret is to work to the long-point sides.*

To the bone. *Before adding the last cuff piece, pare the short side of the previous cuff stock flush with the leg's recessed area.*

Fit the second piece of cuff stock to the long point side. This time there are two edges to mate: the long side and the compound-cut edge. Adjust the joint as necessary, then glue in the second piece. After 10 minutes, clean any squeeze-out.

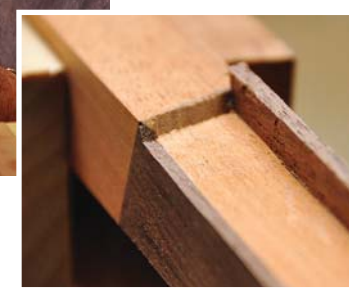
The third piece of the cuff fits to the leg in the same manner.

For the fourth piece of the cuffs, pare back the joint along the short side of the bevel and flush it with the recess, paying attention to the grain direction. There should be a small triangular section remaining from the adjacent cuffs after everything is leveled and pared back to the bevel.

Glue in the remaining cuff. After the glue dries, level the cuff with a smoothing plane and trim the legs to their final length of 29¼". The final cut should be parallel to the compound angle at the top of the legs.

Mill & Bevel the Top

Mill the top to ¾" x 16" x 29⅝". To achieve the boat-shaped design, I marked a centerline along both axes, then made a mark ½" in from the four edges. I sprung a batten from corner to corner, crossing at the ½" offset. I then



Small, but important. *The small triangular section is exposed as the previous cuff piece is trimmed.*

traced the arc created by the batten for each of the four edges.

Band saw the top along the layout lines, then clean up the edges with a block plane. Work downhill from the center of each arc.

The last step is to bevel the underside of the top. The end-grain and the long-grain edges have two different bevels – the end-grain edges get a 4" bevel and the long-grain edges receive a 2" bevel. Both leave a 3/8"thickness to the top. Lay out the lines with a marking gauge, being careful to follow the curves around the edges. Cut the bevels to the lines using handplanes.

Finish & Assembly

I typically apply the finish to the components prior to the glue up. It is much easier to sand flat pieces than to worry about sanding in corners. An additional bonus to pre-finishing the parts is that glue squeeze-out is more easily removed after the finish is dry.

On this sapele table, I started with a lemon-yellow dye stain followed by shellac. On the base, brush on the first few coats of shellac (allowing them to dry fully between each, of course), then level the surface using #320-grit sandpaper wrapped around a cork sanding block. The final shellac coat is padded on.

For the top, I built up the shellac thickness enough so that I could rub it out later to achieve a high-gloss finish.

Now on to the glue up. Due to the splay angles, it's difficult to get clamping pressure at 90° to the joint during assembly. Simple notched cauls, or the offcuts from tapering the legs, come in handy for this application.

Because the components are pre-finished, make sure to protect the surface from the clamps and cauls. Glue up the sides of the table base first. After the glue cures, join the two side assemblies with the front and back aprons.

I glue beveled cleats along the top inside edge of the front and back aprons to attach the top to the base using screws. I made 1/2"-diameter counterbores in the top of the cleats to allow for a small amount of seasonal movement.

This is a fun and enjoyable project that merges classic style with contemporary features. The table can be built in a reasonable amount of time with minimal lumber. **PWM**

"Design works if it's authentic, inspired, and has a clear point of view. It can't be a collection of input."

—Ron Johnson (1966-), Canadian politician

Easy on the eyes. *Brightly colored masking tape makes it easy to see and cut the layout lines for the boat-shaped top.*

Around the bend. *Working the taper around the curves in the top requires hand tools. I find that a plane is the fastest and most accurate method.*

A good bite. *Stepped cauls allow the best opportunity for accurate clamping.*

Tom has been building custom furniture and handcrafted tools for more than 25 years. He is an instructor at The Woodwright's School in Pittsboro, N.C.

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/nov14**

WEB SITE: *Learn more about Tom Calisto and his work at Windward Woodworks.*

BLOG: *Read how Robert W. Lang makes tenons for splay-leg tables.*

ARTICLE: *Get a designer's perspective about what constitutes a successful table design.*

IN OUR STORE: *Download plans for a Gustav Stickley splay-leg taboret.*

TO BUY: *Learn about Federal tables in "Building a Pembroke Table with Rob Millard."*

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- **ShopWoodworking.com**

Must-have Router Bits

BY CHUCK BENDER

Here are four profiles that will change your woodworking life.

Every woodworking shop has a few vital tools that are absolute necessities. And whether you have a strict power-only tool policy or you take a blended approach, I would argue that a router is one of the tools essential to nearly any powered shop.

The problem many beginning (and some advanced) woodworkers have is that they don't know which bits they need. This leads to buying too many, or not enough.

First, look at what you intend to make to determine the bits you really need. Cutting large mortises into heavy, hard material obviously requires different bits than making a delicate line-and-berry inlay.

That said, I have a core set of bits I've been recommending for years. These are the workhorses that get you through the vast majority of all the operations you'll ever do.

I've broken down my core bits into four categories based on use and profile, and I suggest you buy multiple sizes of each. (You don't need to buy them all at once, but having them all on hand gives you the most flexibility.)

The categories are: grooving, edging and plowing bits; moulding and profile bits; joinery bits; and trimming bits. There's lots of crossover in each category, so don't get hung up on why a bit that could be used for joinery happens to be in the grooving category. I divided the bits by the way I primarily use them.

Carbide vs. steel. *Carbide bits cost more than high-speed steel bits, but last longer. Also, guide bearings are better than fixed pilots; the fixed end of the bit on the right isn't colored that way intentionally, it's burnt.*

Bit Basics

Before we get too far, let's talk about carbide cutting edges versus high-speed steel (HSS) cutters. Unless you want to sharpen your router bits frequently, go for carbide.

What is carbide? It's an alloy made up of tungsten, carbon and usually cobalt or other metal. The result is a bit that stays sharp longer and doesn't cost a great deal more.

Router bits most commonly come in two shank sizes: 1/4" and 1/2" diameter. The shank is the part of the bit that inserts into the router collet. While there are bits made with 1/8" and 3/8" shanks, they tend to be special-use cutters and are not part of my core list.

Flutes are slots machined into the bit that cut the wood. If you're using carbide bits, the flutes are the slots into which the carbide tips are brazed.

The number of flutes has a direct effect on how a bit cuts. Single-flute cutters tend to grab more, but you can usually take a bigger cut. Double-fluted bits take a smaller bite, but tend to grab less when you hit a squirrely spot on a board. You'll get a cleaner, smoother cut from a double-fluted bit than from one with a single flute.

Grooving Bits

This first group is composed of straight bits because they can be used to make rabbets, grooves and dados. They can also, with the addition of a few shop-made jigs, be used to trim boards to length and cut mortises and tenons. For me, straight bits are the center of the core group around which all other router bits revolve: They can be used to create relief cuts for mouldings, dish out a tabletop or cut a hinge gain.

With that in mind, think about what you'll do the most and buy the appropriate sizes first. I recommend having at least one each of the following diameters: 1/4", 5/16", 3/8", 1/2", 5/8" and 3/4".

I don't much care what shank size you use except on larger bits – I like 1/2" shanks on bits 1/2" diameter and larger.

A couple of specialized straight cutters I suggest you include in your core set are a flush-trim bit and a pattern bit. Both look like standard straight cutters, but have guide bearings above or below the cutting edges. Both bits allow the use of templates and patterns for making parts in multiples. The two different bearing locations give flexibility for operations that might be unsafe if limited to a single orientation.

Round it Out

If you think of a router and bits in relation to a set of hollow and round moulding planes, the roundover bits would be the hollows.

Roundover bits do exactly what the name implies – put a radius on the edge of a board, thus rounding it over. They can also cut fillets along one or both edges of the quarter-round, creating either a thumbnail or a bead (ovolo).

I tend to buy roundover bits that have bearings flush with the carbide tips; this way if I only need a quarter-round profile, the bit can be used straight out of the box. (If a bearing

ROUTER BIT SUPPLIERS

Amana Tool
amanatool.com or 800-445-0077

Bosch
boschtools.com or 877-267-2499

CMT
cmtusa.com or 888-268-2487

Freud
freudtools.com or 800-334-4107

Grizzly Industrial
grizzly.com or 800-523-4777

Infinity Cutting Tools
infinitytools.com or 877-872-2487

Lee Valley Tools
leevalley.com or 800-871-8158

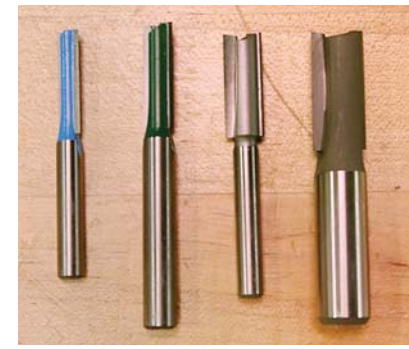
MLCS
mlcswoodworking.com or 800-533-9298

Rockler
rockler.com or 800-279-4441

Whiteside
whitesiderouterbits.com or 800-225-3982

Woodcraft
woodcraft.com or 800-535-4482

Woodline
woodline.com or 800-472-6950



Walking the straight & narrow. *Straight bits are the workhorses in the shop. A variety of diameters and shank sizes give you plenty of flexibility.*

Single or double? *If a bit has a single slot milled into its body, it's called a single-flute bit; two slots is a double-fluted bit. Double-flute bits cut more cleanly than single flute bits; single-flute bits can take a bigger cut.*

Top or bottom. *Pattern bits have bearings on the shank side of the carbide, which means your pattern sits on top of your work when using the bits freehand in a router. Conversely, trim bits have bearings on the cutting end of the router bit, requiring you to put the work on top of the pattern.*

Roundover roundup. *Most every moulding you make will contain a combination of convex and concave shapes. Round-over bits are essential for making the convex portions of the mouldings.*

Hollow it out. *Core-box bits are versatile and can make everything from a slight cove to just short of a complete hole. A variety of sizes gives you nearly unlimited potential.*

Tails first. *A couple of sizes of dovetail bits, with a couple of different degree angles, gives you options for cleaning out and making joints.*

has a diameter smaller than the tip, it would create a fillet every time I used the bit.) If I need to make a bead (a quarter-round with two fillets) I can simply remove the bearing and run my stock using a fence.

I've even been known to remove the bearing (and the bearing post if there is one) from a bit and use it as a bottom cutter. So, if I needed a dished area on a board with a quarter-round, I can achieve it with a bit that is already part of my core set. (If you're going to grind away bearing posts from your roundover bits, I suggest buying multiples of the same profile to keep the option of using the bearing open.)

For the core set, I suggest 1/4", 5/16", 3/8" and 1/2" roundover bits. Those four sizes cover most of your regular needs. If you do lots of quarter columns using the method I described in the April 2013 issue of *Popular Woodworking Magazine* (#203), you might want a few larger sizes.

In the Cove

Core-box, or round-nose, bits make coves and hollows. This group relates to the rounds in a set of hollow and round moulding planes. Use them to make any portion of the concave part of a circle, short of a complete circle (for that I suggest a drill bit).

The reason I choose core-box cutters over coving bits is one of versatility. Not limiting the cut of the router bit to one-quarter of a circle means far more can be accomplished with a single bit. When in doubt, go with bearingless bits; they'll provide greater flexibility.

The number of core-box bits I suggest is greater than the number of roundover bits. The reason is simple: You'll likely need a greater variety of coves than beads. You can combine smaller coves and larger beads to create more variety in your mouldings, and you can use coves as stand-alone decoration. So variety is a good thing.

I suggest six core-box radii: 1/8", 3/16", 1/4", 5/16", 3/8" and 1/2". (These sizes are the radius of the curve, which makes the bit double that in size.) To run a 1/4" plate groove in a shelf, grab your 1/8" radius core-box bit and have at it.

Yes, I Said Dovetails

The final profile group in my core set are the dovetail bits. Before you have a fit that I'm suggesting you start cutting dovetails with a router and jig, hear me out.

While I don't use a router and jig to dovetail carcases, I don't condemn the practice. I do, however, use dovetail bits to make sliding dovetail joints, as well as to help clean out the waste material on my pin boards when I cut half-blind dovetails.

Having (at least) two sizes of dovetail bits in your set gives you options. I have one larger and one smaller dovetail bit in my set (1/2" and 11/16" diameters at any angle you like). This way, if I need a small sliding dovetail in a piece, I have it. Conversely, if I am chopping out some huge half-blind dovetails for a workbench, I have a large bit to help hog out the waste.

> "Men admire the man who can organize their wishes and thoughts in stone and wood and steel and brass."
>
> *—Ralph Waldo Emerson (1803-1882), American essayist, lecturer & poet*

Buy For Your Needs

Even though I've broken my core set of bits down to four profiles, I've given you a list of 20 potential bits for inclusion – but you truly don't need all of them.

If you're doing lots of period furniture, you might get away with several of the smaller straight bits, a 1/4" roundover and core-box bit and a couple of dovetail bits for years before you need to expand your set.

The roundover bit can be used to make the thumbnails for drawer lips and be used in combination with the core-box bit to make ogee mouldings. Throw in the straight bits and you've got the makings of some pretty complex traditional mouldings.

If you have all 20, however, you'll be able to motor through most any task with ease. Adapt and adjust your set to the type of work you do and don't be afraid to add the occasional specialty bit as needed.

Keep your options open and you'll have more fun. Plus, you'll be able to make a wider variety of projects. **PWM**

Chuck is senior editor of this magazine and has been doing more with fewer router bits for more than 30 years because he keeps his options open.

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/nov14**

BLOG: *Glen D. Huey shows some woodworkers' solutions to bit storage.*

BLOG: *Read about the difference between straight and spiral bits.*

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Woodworking Excellence

Get inspired by the 2014 winners.

For our second annual PWM Excellence Awards, we solicited submissions in five categories: Boxes and Smalls; Seating; Tables; Cabinets and Casework; and Turnings, Carvings and Objet d'Art. Featured here are the Editors' Choice and Readers' Choice winners in each (Bruce Chaffin was the overall Readers' Choice award recipient, for his Tansu-inspired Room Divider (page 53). It was a difficult decision, but the one we all agreed on was our grand-prize recipient, featured below. (Look for information on the 2015 PWM Excellence Awards in February 2015.) — Megan Fitzpatrick

GRAND PRIZE

Cherry Blossom Tea Case
12" d x 20" w x 53" h

Gary Staple
Halifax County, Nova Scotia

This curved-front tea case, which draws on elements of Japanese design, is constructed from two layers of bending plywood then veneered with rosewood. The cherry-tree marquetry is of walnut, ebony, olive, ash and dyed sycamore. The legs are three layers of cherry, laminated together for strength and stability, that are stained using a solution of iron buff and black shellac polish. (The entire piece was then finished in shellac and wax.)

Gary Staple graduated in June 2014 from the Chippendale School of Furniture in East Lothian, Scotland, where he attended after six years as a carpenter in his native Halifax, Nova Scotia. He left not only with new skills and a couple of pieces of fine furniture and hand-made instruments, but also a business plan for establishing a custom furniture shop in Dartmouth, Nova Scotia. He also received the student-of-the-year award from the school.

"The inspiration for this cabinet came from observing the amazing cherry blossoms in bloom during the springtime in East Lothian," writes Gary. (He's also influenced by the work of legendary craftsman James Krenov.) "The theme was derived from traditional Japanese furniture. It seemed fitting to work in this style, as the species of cherry trees I admire here in Scotland originated from Japan."

FIGURED CHERRY CHEST PHOTOS BY THE MAKER

EDITORS' CHOICE

Sapele Suite
7" d x 25" w x 6¾" h

Robert Janousek
Tarpon Springs, Fla.

This two-drawer jewelry box by Robert Janousek is part of a matching three-piece set that also includes a desk clock and small table lamp.

Robert has been a full-time cabinetmaker for more than 20 years (following a two-decade career as an illustrator and art director in advertising). But in his small home shop, he enjoys building boxes that are, he writes, small pieces of furniture with drawers, pulls and legs. Most of his design inspiration comes from Greene & Greene, Shaker and Craftsman pieces.

"I prefer to use power tools over hand tools," writes Robert. "For me, they are faster and easier – and I'm no good at sharpening."

READERS' CHOICE

Butterknot Box
5" d x 11" w x 4½" h

Peter Marcucci
Woodbridge, Ontario

Peter Marcucci shows up a couple of times in these pages – which, given his eye-catching work, is no surprise. The piece of butternut used for this box was an offcut from a chair project (Peter's primary woodworking area of interest).

"Rather than thinking of the knot as a defect, I came to see it as a feature and decided to highlight the knot hole and use it as the lift for the box," he writes.

The splines are walnut, a wood that repeats in the trim around the opening, and there is a small removable oak tray inside.

PHOTOS BY THE MAKERS

EDITORS' CHOICE

Continuous-arm Rocker
33" d (inc. rockers) x 22" w x 36" h

Luke Barnett
Adrian, Mich.

Finished in aged-mustard milk paint and shellac, Luke Barnett's rocker of Eastern white pine and sugar maple is his interpretation of an American classic.

Luke has been woodworking since he was very young, when he helped his uncles fix up a Victorian house. But, he writes, "About five years ago, I was inspired by Roy Underhill to start making furniture….I was just absolutely amazed about how he could do so much with so few tools." A few years later, Luke saw a Windsor chair and just had to try it. "I made one and it wasn't very good – so I had to make another." Now with several chairs under his belt, Luke still loves the challenge that every chair brings. "I just think it is amazing that I can start with a log and turn it into a chair," he writes.

READERS' CHOICE

Modigliani's Jeanne Hebuterne Easel Chair
24" d x 16" w x 47" h

Peter Marcucci
Woodbridge, Ontario

"To me, as a chair builder, the back of a chair is like an artist's canvas. It's the chairmaker's opportunity to transform the chair from a functional work to a piece of decorative art," writes Peter Marcucci. And he says that Modigliani's portraiture typifies the art he most enjoys.

This mahogany chair is made from repurposed baseboards that are bent-laminated, and the seat is from repurposed mahogany door jambs.

"The diagonal leg design of the chair evokes an image of an artist's easel," writes Peter. "The seat becomes the paint palette, with inlays of walnut, cherry, butternut and basswood used to create the intarsia relief carving image of Jeanne Hebuterne wearing a large hat. Jeanne is carved from basswood. Cherry was used for her hair, walnut for her bodice and the hat is butternut."

PHOTOS BY THE MAKERS

EDITORS' CHOICE

Federal Dining Table
116" l x 42" w x 30" h

Brian Laws
Bluffton, S.C.

This large mahogany dining table by Brian Laws is actually two demilune tables with a center drop-leaf table. The demilune veneers are matched both to one another, and to the center of the drop-leaf table – so no matter how the three are arranged, they look made for one another...because they are. Very clever.

The bellflower inlay is shop-made, sand-shaded holly, and the paterae and bandings are from Dover Designs. The entire suite is finished with boiled linseed oil, gel varnish and wipe-on polyurethane.

"This piece is not a replica of any one piece, but something suitable to the size and proportions of my needs," writes Brian. He's been working wood seriously since around 1974, when he met James Krenov, and has taken classes from a number of well-known instructors throughout the years. Right now, Brian is working on a set of Chippendale chairs to go with his dining table.

READERS' CHOICE

Glass Ball Coffee Table
24" l x 18" w x 16" h

Peter Marcucci
Woodbridge, Ontario

Peter Marcucci is not the only craftsman in his family – for several years, his brother, David Marcucci, has been taking courses in glass blowing, during which he created a large ball for use as a garden decoration. Peter saw it and wanted to incorporate the idea into a table.

"After a number of different sketches, I settled on an asymmetrical three-leg table design with a bit of a mid-century modern look," Peter writes.

The coffee table's top is lacewood with a polyurethane finish; the base is African mahogany with a shellac finish.

PHOTOS BY THE MAKERS

EDITORS' CHOICE

New England Secretary
20" d x 44" w x 83" h

Alf Sharp
Woodbury, Tenn.

This traditional, French-polished walnut desk and bookcase with brass hardware was built by renowned maker Alf Sharp, and takes design cues and elements from a number of mid-18th-century New England pieces.

We were honored to see this piece, as well as Alf's "Elk Table," entered into this year's awards. Alf is the 2008 Cartouche Award recipient from the Society of American Period Furniture Makers, and he has been making museum-quality pieces for more than two decades. You'll find his work in The Hermitage (President Andrew Jackson's home outside Nashville, Tenn.) and the Tennessee State Museum, among other places. He's taught woodworking all around the country, and has been featured in many design and woodworking magazines.

READERS' CHOICE

Tansu-inspired Room Divider
12" d x 24" w x 24" h (each)

Bruce Chaffin
Philadelphia, Penn.

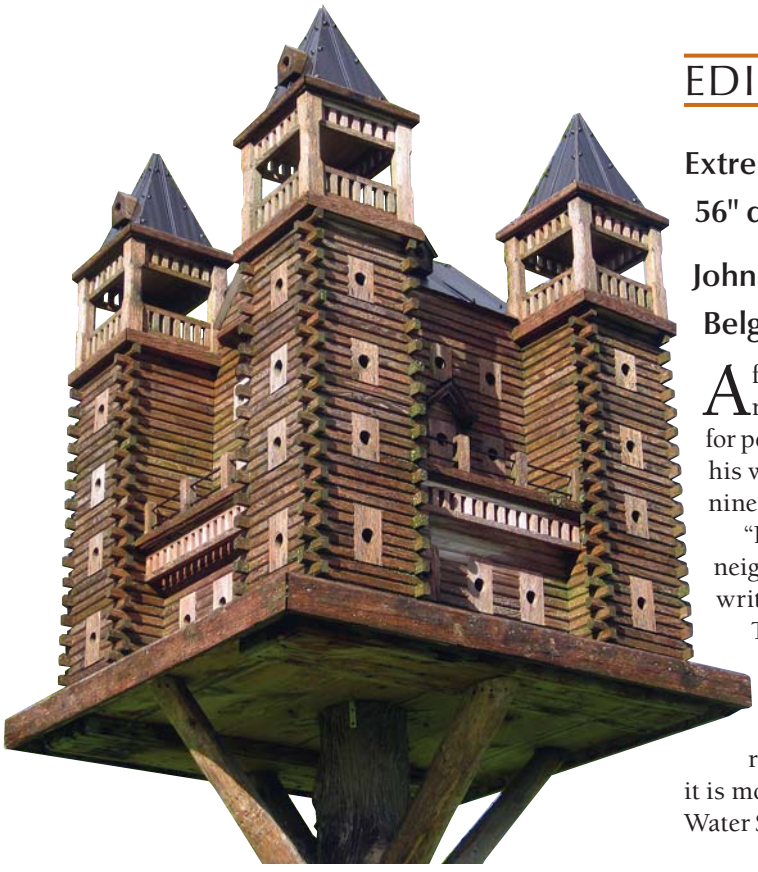
Bruce Chaffin's room divider (which was designed for his wife, a prolific knitter, for yarn storage) is a flexible design of three cases, so they can also be stacked or separated.

The tops, side panels and drawer faces are salvaged construction-grade hinoki (Japanese cypress) that Bruce acquired years ago while assisting Japanese carpenters in Philadelphia. "With careful resawing and handplaning the hinoki, plus using Alaskan cedar for the cabinet frames, I got the most out of an extremely limited amount of wood," writes Bruce, who is inspired by mid-century modern and Japanese design.

The drawer boxes are clear hinoki joined with bamboo nails, and the interior web frames allow for drawer access from both sides. "That meant 72 drawer faces, but who's counting?" he writes.

Bruce is the overall Readers' Choice award winner.

PHOTOS BY THE MAKERS



EDITORS' CHOICE

Extreme Birdhouse

56" d x 56" w x 72" h

John Looser

Belgrave, Ontario

After 20 years of building new homes and doing major renovations, John Looser retired from making houses for people; he decided houses were for the birds. He calls his work "Extreme Birdhouses," and since his first one nine years ago, he's made more than 500.

"I get a lot of my inspiration from driving around older neighborhoods, looking at old Victorian-style homes," writes John.

The largest house he's made (so far) is 9' wide x 9' tall, and has 103 rooms (and weighs just more than 500 pounds). The birdhouse shown here is made from 120-year-old reclaimed hemlock, and features 76 rooms, balconies and a lookout tower on each corner; it is mounted 9' in the air and finished with Thompson's Water Seal.

READERS' CHOICE

Turtle Island

21½" d x 23½" w x 11" h

Bill Johnson

Cullowhee, N.C.

"The origin of this piece was the promising maple burl slab I happened across in a local woodworking store. After the rough chainsaw marks were removed and the piece was flattened and smoothed, I knew it needed to serve as an island-like base for multiple soaring sea turtles," writes Bill Johnson.

Each basswood turtle is unique in size and attitude, and in the chip-carved designs and patterns on their surfaces. The "leader" bears a compass rose on its back. Small driftwood "knees" provide the appearance of an underwater dead forest while supporting the turtles in their flight.

The finish on the turtles is gel stain, lacquer and wax, and on the burl, boiled linseed oil, lacquer and wax. **PWM**

"Inspiration exists, but it has to find us working."

—Pablo Picasso (1881-1973), Spanish artist

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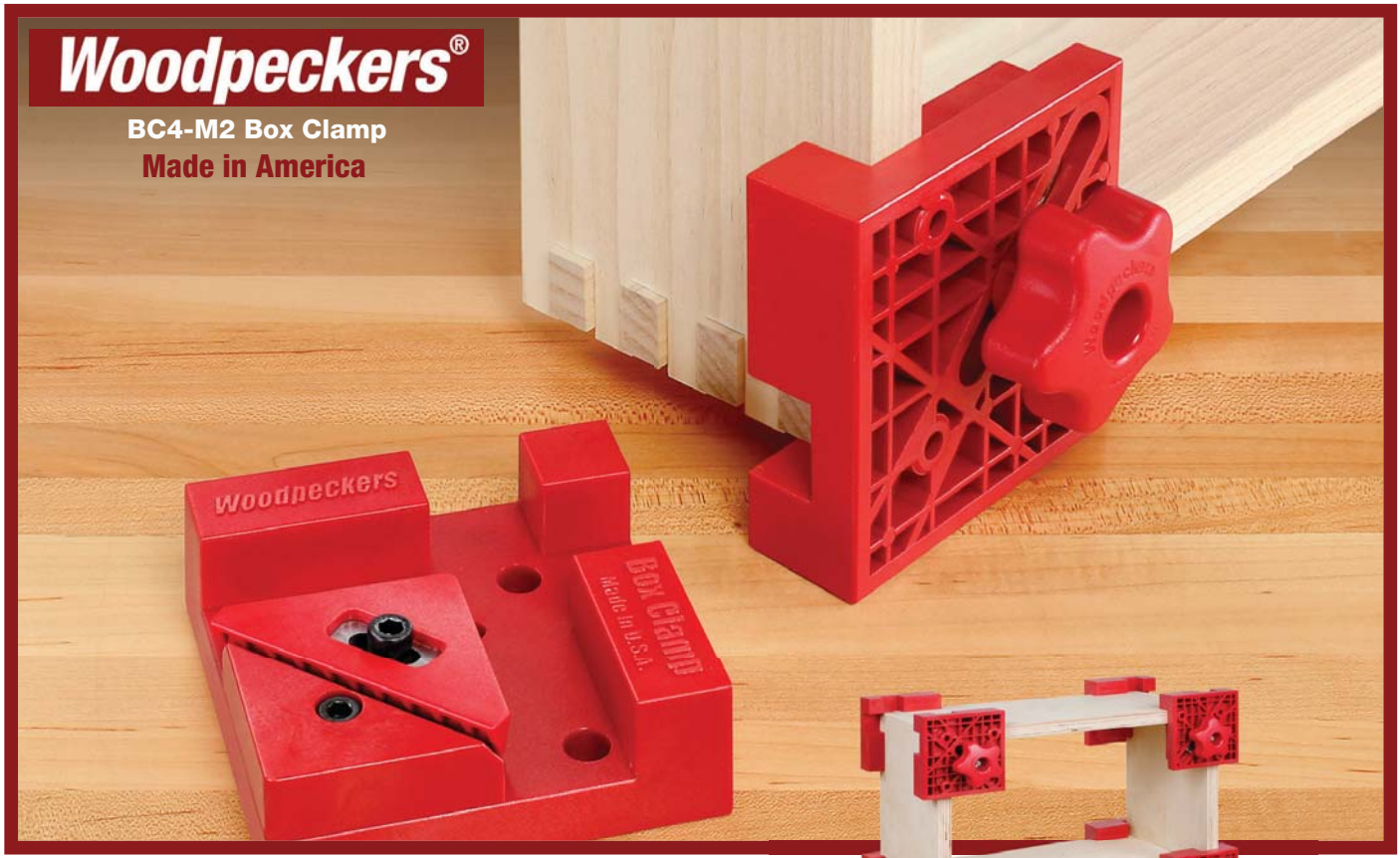

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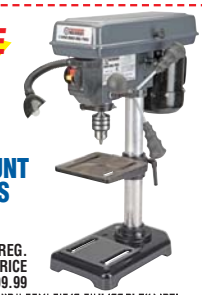

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Furniture Deterioration

Cracking, crazing and physical wear have specific causes and remedies.

Everyone who buys, sells, works on or collects old furniture, or who has some in their house, has to be concerned with deterioration. It's staring them in the face every time they look at the furniture.

Totally stopping the deterioration isn't possible, but it can be slowed. To do this you need to understand its causes.

Wood Deterioration

Though indoor furniture isn't exposed to rain or direct sunlight (the elements that destroy exterior wood), indoor wood still warps, splits and separates one board from another. The primary cause is wood movement – the shrinking and swelling of wood brought on by changes in relative humidity.

In most parts of the country, relative humidity inside a house is usually fairly high in spring and summer and low in winter when the house is closed up and the heat is on. Heating lowers relative humidity because it increases the amount of moisture air can hold. The absolute amount remains the same, but the relative amount declines.

The most obvious example of the problem occurs in wood windows and doors. In the spring and summer they jam because the wood has swollen to reach equilibrium with the moisture in the air. In the winter they open and close easily. Those with an exterior exposure let in cold air.

Because wood shrinks and swells far more across the grain than along the grain, joint failure and veneer separation are almost inevitable when the glue ages and becomes brittle. Stresses caused by leaning back in chairs, for example, speed the failure.

Contrary wood movement is also responsible for much of the splitting that occurs. For example, the grain direction in table rails, drawer runners and baseboards typically runs perpendicular to the grain direction of the tabletops or cabinet sides they're attached to.

Veneer separation. *All the light-colored areas between the drawers (and some on the drawers) of this Empire piece show places where veneer has peeled. It was glued vertically to the horizontal rails. As the glue aged and became brittle, it couldn't keep up with the contrary wood movement.*

Long term, wood in old furniture usually has shrunk because buildings are heated better today than they were in the past. The wood that had adjusted to the average humidity conditions in poorly heated buildings has had to readjust to much drier conditions in modern buildings.

Furniture brought here from Europe and Asia also suffers because of the greater prevalence of central heating here. Damage also occurs when furniture is moved within the U.S. from humid climates in the South to dry areas in the West, or vice versa.

Split. *The solid mahogany side of this mid-19th-century desk shrank in the drier air of a modern building. Because the side was attached to a perpendicular baseboard, shrinking was retarded so the side split.*

What You Can Do

There are two procedures you can follow to keep your furniture's wood movement, and the problems that come with it, to a minimum: Maintain a con-

PHOTOS BY THE AUTHOR

Warp. *The finish on the top of this 100-year-old oak chest of drawers was clearly in such bad condition that water was able to penetrate and cause the wood to warp. Excessive wetting and drying out on just one side of wood causes that side to shrink, as typically happens with boards laid on exterior decks.*

stant humidity in the surrounding air, and keep the furniture coated with paint or finish in good condition.

The first procedure is the best, but it is also much more difficult to achieve. You would have to live in a building with no functioning windows and invest in a high-quality heating and cooling system with the capability of controlling the humidity within a very tight range, usually about 50 percent. Better museums do this, at great expense.

The second procedure is not as effective but more practical. Paints and finishes in good shape slow the exchange of moisture into and out of the wood, so by the time the wood has moved enough to cause a problem, the season has changed and the movement has started back in the other direction.

Slower movement also allows glue more time to adjust so that separation of glue bonds is less likely even in extreme and rapid humidity changes.

Though thicker coatings (achieved with four or more individual coats) protect better, thinner coatings usually last longer because they are less likely to crack or craze. Finishes on very old furniture that has survived

Hardware protects. *The finish on this 100-year-old drawer front has crazed badly everywhere except behind the hardware, which protected the finish partially from oxidation and totally from ultraviolet light.*

in good shape for a century or longer are usually very thin.

Unfortunately, the current marketplace for antique furniture is working against furniture's long-term survival because refinishing is discouraged, most notably by the "Antiques Roadshow."

The rule of thumb should be that furniture valuable or historically important enough to warrant being preserved with a very deteriorated finish should be kept in a museum or in museum-like conditions where the humidity is held constant. Otherwise, the furniture should be refinished if the existing finish is no longer serving its purpose.

Finish Deterioration

Even though finishes still allow moisture in vapor form (humidity) to pass through at a slow rate, they make excellent coatings for furniture because of their see-through and depth-enhancing qualities. But they lose these qualities because of exposure to oxygen, ultraviolet (UV) light and physical abuse.

Deterioration from oxidation is very slow, but UV light accelerates it and can dull and craze a finish within a few years if the exposure if severe. Glass windows block some of the UV light but not enough to be solely relied on.

Physical abuse in the form of scratches, water and heat damage, and undisciplined children and pets is also responsible for causing finishes to deteriorate.

Sun damage. *The back of this walnut chest was exposed to sunlight through a window for several years. The ultraviolet light faded the wood and broke down the finish. Where there was no exposure below the window, the color and finish remained in good shape.*

What You Can Do

You can't do anything to slow the oxidation of a finish and still live with it. But you can slow the deterioration from light and physical abuse.

To reduce light exposure, place your furniture away from windows, or cover the windows with curtains or shades. You can also coat the windows with a transparent, UV-resistant material that will retard the penetration of UV light.

Also, use tablecloths when tables aren't in use and teach children and pets to be nice to the furniture. When moving furniture from one house to another, use blankets or moving pads to protect the furniture from scratches. **PWM**

Bob is the author of "Flexner on Finishing," "Wood Finishing 101" and "Understanding Wood Finishing."

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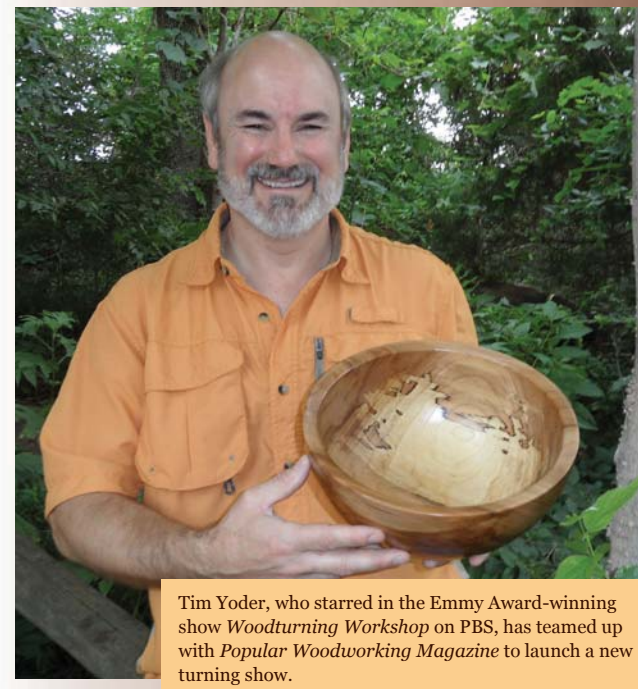

Tim Yoder, who starred in the Emmy Award-winning show *Woodturning Workshop* on PBS, has teamed up with *Popular Woodworking Magazine* to launch a new turning show.

Losing the Love of My Life

With great pain comes great amounts of casserole.

The Bride wanted to start with one, but I wanted a dozen. Then one warm summer day, the Warden whispered in my ear those magical words: "Which would it be?" I spent the next eternity, silently ticking the days off, scraping and saving every penny, for I knew that the expenses would be great. And then the great day arrived. It was love at first sight. It was a love that would last a lifetime. I bought my first handplane. It took months of saving and of course, the OK from the Warden.

Those were the good days. Along the way a few kids arrived. We raised them, sent them off to school and such. But the tools, ah, the tools. They grew and grew in number and quality. I was the envy of all my friends, until doom week.

It started like any other week. Then without a warning, "POOF" my computer gave me the blue screen of death. I figured I'd drown my sorrow in a bratwurst and beer. After grilling some sausages on my faithful 12-year-young grill, I heard the Warden screaming "Fire! Fire! The porch is on fire!"

I wasn't worried. I would just get up in the morning, order another computer and a new grill. Life would go on. About a week later, the Visa bill arrived along with some tuition nonsense regarding those kids I spoke of earlier. Not wanting to bother with trifles, I left the bills on the counter. I figured that when the Warden got home from work, she could handle the trivial matters. A few hours later her broom landed and she read the mail. Then those fatal words were spoken: "We have to talk."

I couldn't return the computer or the grill. The kids refused to quit school. The Warden and I decided to sell some tools. After I got out of the emergency room, which is where I usually end up after SWMBO and I reach a mutual decision, I listed some tools on the Internet.

The tools went online and I started getting strange calls asking about my health. One fellow wanted to know "How much longer"? I don't know, but I hope they sell soon. Another asked about the "Pain?" Sure it hurts, but she doesn't know about the tools I hid in the garage loft so I would still have my cache.

Neighbors arrived at the door with ham casseroles, string-bean salads and pies. My priest showed up wanting to help with the "arrangements." I told him I was just going to use a lot of bubble wrap and Priority Mail, as it would be a lot cheaper. Father O'Shaunnessy fainted.

And that, ladies and gentlemen, is how I came to lose the love of my life, my first moving fillister plane. I hope SWMBO doesn't figure out that I just pawned it and am going to retrieve it. I'll get it back just as soon as I can sell some of that useless jewelry she stores in the safety deposit box. I mean, you use an engagement ring until you are married. Then you aren't engaged anymore, so it is totally unnecessary, right? **PWM**

Joe is a lifelong resident of Chicago who retired from the city's police force after more than three decades. He enjoys using primarily hand tools.

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