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- Minimum stock thickness: 3/16"
- Minimum stock length: 8"
- Maximum cutting depth: ⅛"
- Feed rate: 16 FPM and 20 FPM
- Cutterhead diameter: 3⅛"
- Number of knives: 4 HSS
- Cutterhead speed: 4800 RPM
- Feed rolls: solid serrated steel
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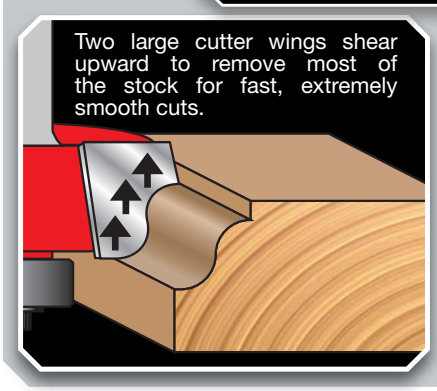

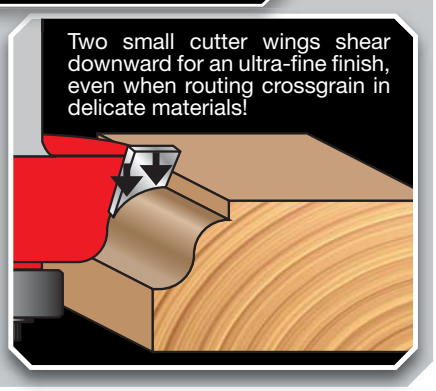

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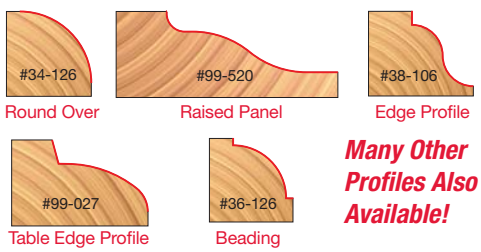

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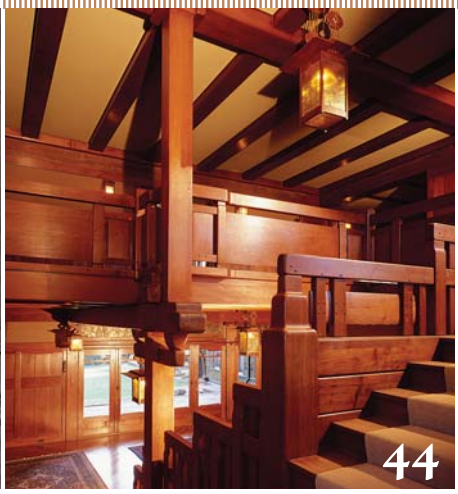

FEATURES

6-BOARD CHEST & FOLLANSBEE PHOTOS BY CHRISTOPHER SCHWARZ;
GREENE & GREENE INTERIOR PHOTO BY THOMAS A. HEINZ; JIGS PHOTO BY CHUCK BENDER

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NOVEMBER 2013

REGULARS

POPULAR WOODWORKING MAGAZINE

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SKETCHES & ROUTER TABLE PHOTOS BY AL PARRISH;
FINISHING PHOTO BY BOB FLEXNER; DRAFTING TABLE PHOTO BY GEORGE R. WALKER

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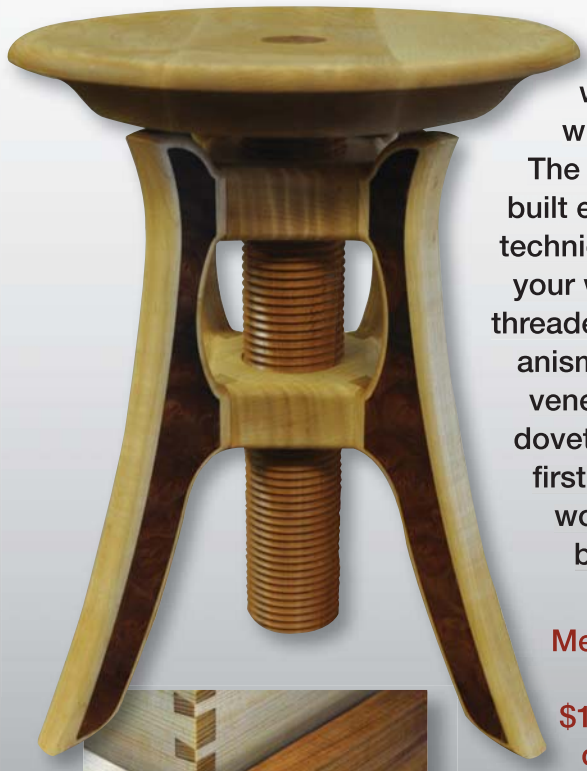

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Boredom, Hatred, Necessity & Panic

My inspiration for projects typically comes from one of four things: boredom, hatred, necessity or panic.

The first, boredom, is easily explained – and should perhaps be coupled with "avoidance"; that is, when I find myself at loose ends or with time on my hands, I should be cracking open early modern drama books and working on my dissertation. And I do, but in at best what my advisor would likely describe as a desultory fashion.

I'm easily distracted from Jonson and Shakespeare by sketching various dovetailed silverware drawer dividers with extra-high sides to better contain my overflowing collection of teaspoons. Because half the spoons are usually in the dishwasher, I don't really need to build this – but I would like to, so best to plan for it. (Yes, I realize this is a two-hour project at best…but non-essential ideas should steep. For months.)

"Hatred" is a little less obvious; that emotion typically is for me the forerunner to a carpentry project. For three years, I simmered with antipathy for the Kelly green carpets and cheap parquet on my first floor. One night, antipathy tipped into abject animosity, and I started ripping out the floor coverings at 2 a.m. By dawn, the carpet was cut, rolled and tied for the weekly garbage pickup. It took several weeks thereafter to remove the 1/8" hardboard underneath and patch the heart pine as needed before I could have the floors refinished. Just getting rid of the carpet and parquet was a massive relief (though I didn't settle on "well pleased" until the poly was dry).

"Necessity" is perhaps self-evident; "I need X to hold X." But sometimes I change the equation to, "I want X, so I'm going to build X to house it." Take, as an example, my Shaker stepback from the February 2009 issue (#174). I wanted a flat-screen television to replace the 1980s television I'd been hauling around since my undergraduate days. So I convinced the other editors that we "needed" an entertainment center build for the magazine. And my old TV, with its massive and bulbous back, wouldn't fit inside. Darn the luck...I'd simply have to get a new television (which to this day is the only state-of-the-art piece of A/V equipment I've ever bought…and it's now quite dated). In other words, "necessity" is my code word for simply wanting to build something – as either the end or the means.

And then there's panic, which is usually engendered by something "falling out" of an issue (an article wasn't ready in time for publication, we couldn't get a good opening photo or what have you), or an article ran short and we had to populate some empty pages.

I'm happy to say I rarely have to build and write in panic mode (though I joke a lot about getting the finish applied in time) – but it's happened. I'm not, however, going to reveal to you when – and if we do our jobs well, you'll never know. **PWM**

PHOTO BY AL PARRISH

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Cut Slots Using a Handheld Router

I want to purchase a three-wing slot-cutting bit for use in my handheld router – but is this safe, or should this bit be used in a table-mounter router?

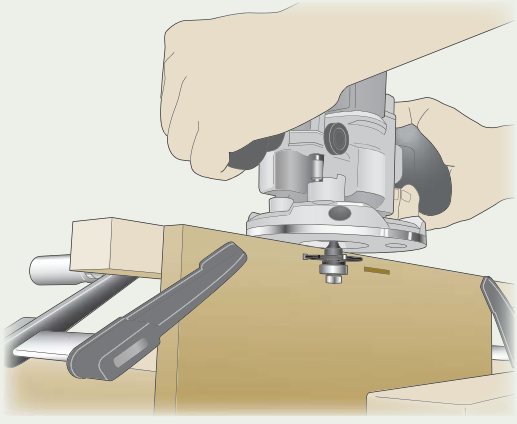
My guess is that if used in a handheld router, I would have to sneak up on the full depth of cut in order to maintain control.

Normally I table-mount my bits if practical, however, the panel I need to rout is too big for me to manhandle onto my router table. I've done very little handheld routing and would appreciate your perspective. I'd rather not do something inherently dangerous if I can avoid it.

John Moll
Great Falls, Virginia

John,
You can use slot cutters in your handheld router as long as you pay attention to how you handle your router in use, and how and where you position the tool when you've completed your cut.

A great setup to help control the tool as you rout freehand when using a slotting cutter is to clamp a support fence flush with the end or edge of your board, as shown in the drawing below. If you attempt to simply balance the router setup on the narrow 3/4"-thick edge, you are asking for trouble. If your router tips, your slot will be irregular.



Another good idea (if you have a variable-speed switch on your motor) is to dial down the router's speed. This also improves control as you work.

With these pointers in mind, go to it. And yes, sneak up on the full depth of cut – although I believe you'll find that it's easy to do so with everything properly set and positioned.

Glen D. Huey, managing editor

'No One Right Way'

I loved Megan Fitzpatrick's article in the June 2013 issue (#204) of *Popular Woodworking Magazine*. I tell people who I mentor in my shop that there are at least six ways to do anything. I explain that there are generally two considered the best, two that you can do if you don't have the necessary tools or skills needed for the better ways and the remaining two are most often poor ideas that could be dangerous.

Alan Bakke
Forest Lake, Minnesota

Joinery: It's Your Choice

I have been slowly making progress on my version of the "21st-century Workbench" from October 2008 (issue #171). As I study the plans, I'm unsure as to why you chose to connect the lower rails of the workbench differently than you did the upper rails. The lower rails appear to be set back a bit from the edge of the top (not flush) and are wedged in place; the upper rails are single dovetails that are lag screwed to the legs.

Is there a reason not to install the lower rails in the same way as the upper rails? Also, would it be an advantage if both rails were flush to the workbench front?

Dave Tesar
Pittsburgh, Pennsylvania

Dave,
The outer faces of the lower rails are flush with the outer faces of the legs – the bare-faced tenon is half the thickness of the rail, and held to the rail's back face. The dovetail on the upper rail is also half the rail's thickness with the back half cut away. I copied the joinery from an old illustration of a Nicholson-style bench.

You could use any reasonably strong joint to connect the lower rail to the legs, but the wedged through-tenon I used has a couple of advantages. If you ever have to take the bench apart to move, it takes only a few seconds to knock out the wedges before removing the rails. The structure can also be tightened up by tapping in the wedges. I do this once or twice a year when the humidity swings from summer to winter.

Robert W. Lang, executive editor

Extend Rasp Life

Thank you for the great article on rasps (June 2013, #204). I would, however, like to add one point. Handling of the working end of a rasp, or file for that matter, leads to corrosion of the teeth's cutting edges. You should avoid gripping the blade with your bare fingers. Perspiration and acids on your skin begin the deterioration immediately. This is especially true if you end up gripping the blade for long periods of work. I've read that merely touching the edge of the blade when checking its sharpness results in the immediate formation of rust at the point of contact.

In gripping the blade when using a rasp, use something intermediary such

CONTINUED ON PAGE 10

ILLUSTRATION BY MARY JANE FAVORITE

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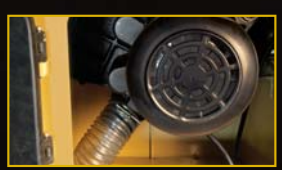

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CONTINUED FROM PAGE 8

as a leather glove. I cut 3" squares of lightweight leather and keep them in my file drawer. Using leather to grip the rasp not only saves the rasp, but it saves wear and tear on your fingers, too.

Scott Wynn
San Francisco, California

Benchtop Connections

I picked up a copy "The Workbench Design Book" (*Popular Woodworking Books*) and I am starting my first workbench build. My plan is a hybrid design combining the "24-hour Workbench" with the dimensions from the "$280 Workbench." Last night I laminated the birch plywood top pieces together.

I've decided that I don't care to attach my top using 5" metal braces as suggested in the book. My objection is that I will see them whenever I look at the bench.

On another Christopher Schwarz bench, 3/4" dowels were glued into the legs and the slab simply sat on top of the dowels. I thought this might be an option until I read the comment about the top's weight and assumed a plywood top would not be heavy enough.

Another method I like is the mortise-and-tenon joint used on the "Holtzapffel Bench." I am not sure, however, if I could adapt this joint because I'm using plywood.

The "$280 Workbench" uses cleats to attach the top, but that method, I feel, was not well documented in the book.

I would appreciate your advice on the different methods I could use to attach a plywood top.

Mark
Kaneohe, Hawaii

Mark,

The top of the "24-hour Workbench" is attached with metal L-brackets. They are screwed to the legs and to the underside of the top. If you don't like the metal brackets, I recommend that you use cleats.

In the "$280 Workbench," the cleats are screwed to the top stretcher and the underside of the top. You have to make the screw holes slightly oval to allow wood movement if you use a solid-wood top. Because your top is plywood, you don't have that worry. The cleats are about 1½" x 1½" and as long as the space between the legs. Screw the cleats to the stretchers and then to the underside of the top. Use beefy screws – #10 x 2½" screws would be ideal.

I'm not a big fan of leaving a top loose and letting it sit on a dowel. If you ever add a leg vise to your bench, it will push the top off its base.

Yes, you can tenon a solid-wood leg into a plywood top. I've done it many times. The mortise-and-tenon option is my favorite, but if you are unsure of your skills, any of the above methods are fine.

Christopher Schwarz, contributing editor

Shellac Over Tung Oil

I built a nice jewelry box to which I applied four coats of Minwax Tung Oil Finish. I cannot get a high gloss, which I would prefer. Can I apply shellac over the tung oil?

Earl Purcell
Uniontown, Pennsylvania

Earl,

If you allow any oil to dry completely, including tung oil, any topcoat can be used. Minwax Tung Oil Finish is technically a wiping varnish and not an oil; it's a mixture of varnish, thinner and metal driers. So yes, shellac can be used and is an excellent topcoat choice. **PWM**

Glen D. Huey, managing editor

ONLINE EXTRAS

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PHOTO BY AL PARRISH

Highly Recommended

I purchased the 1/8"-thick carbide-tipped Benchcrafted Skraper with the intent of using it to scrape glue off panels, particularly in corners, where its eight sharp corners excel at the task. But the tool has proven far more versatile than a mere shop tool. I've used it for paint and mastic removal on many surfaces, to scrape hard-water deposits off the bottom of my glass shower door, and to remove small areas of rust from a table saw top. At $35, it's more than paid for itself in the four years I've owned it (benchcrafted.com).

—Megan Fitzpatrick

POPULAR WOODWORKING MAGAZINE

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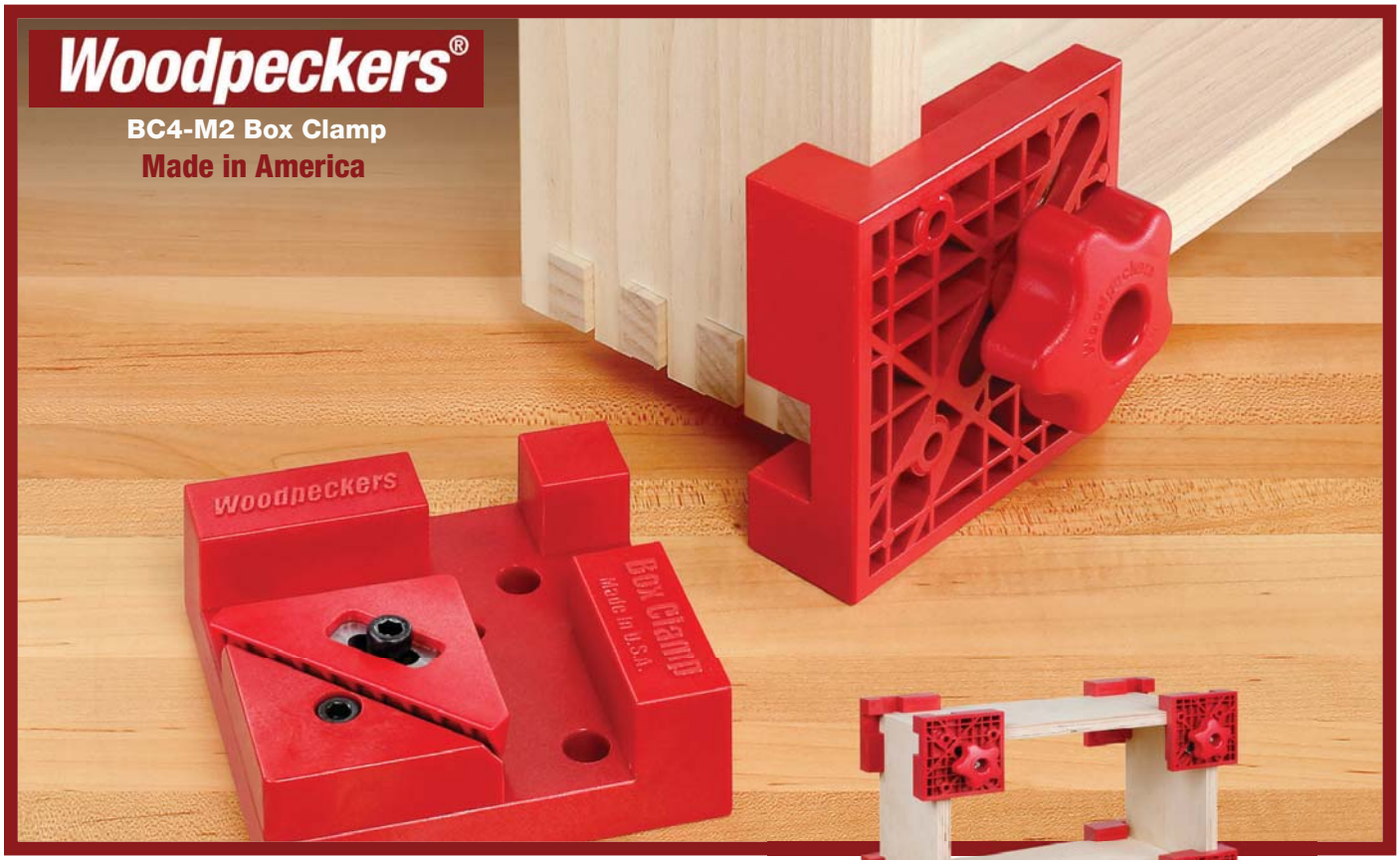
Safety Note

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.

Assemble Projects the Easy Way

Our Box Clamps Streamline Glue-ups, Gaurantee Square Assembly Every Time



Like Having an Extra Pair of Hands. With our new M2 Box Clamps you can glue-up or dry-fit any 90° joint quickly and easily and know your joint is square. Just position the clamp in the corner of the joint, give the knob a twist and equal pressure is applied while instantly squaring the joint. It's that simple.

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When you want square corners you just can't beat Woodpeckers M2 Box Clamps. Watch how simple and handy they are to use at www.woodpeck.com/boxclampm2.

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THE WINNER:

Compound Angles The Easy Way

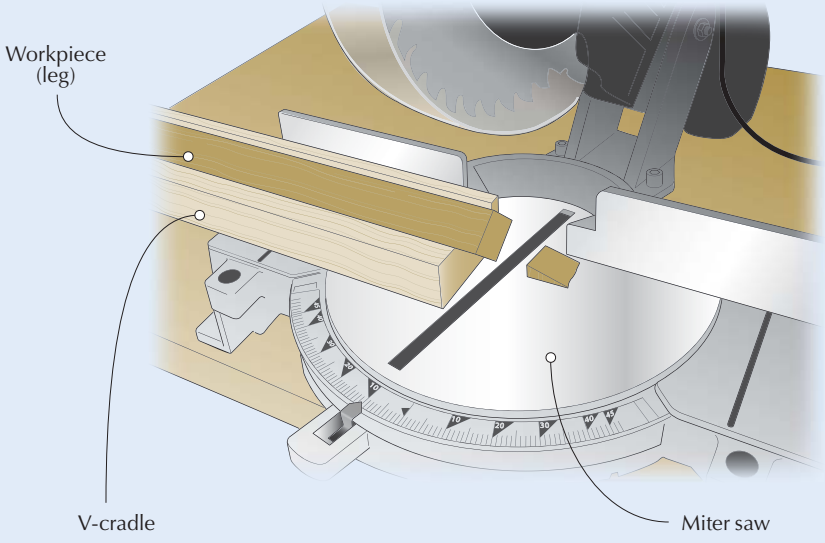
I don't have a compound miter saw, but I figured out how to cut the compound bevel needed at the top and bottom of splayed legs. My answer is to use my basic miter saw and a piece of scrap.

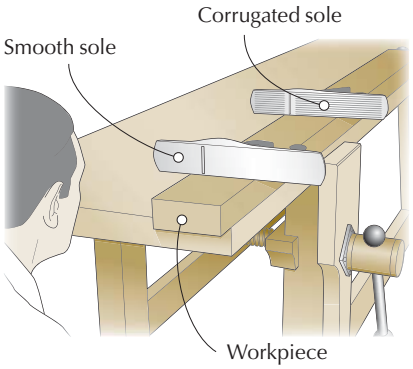
I imagined the leg being held at an angle while cutting to the required miters, so I dropped the workpiece on a V-cradle I made years ago from a 2x4 for drilling round stock, particularly dowels.

With my miter saw set at 10° – it works at any angle – I cut the piece while it was resting in the cradle.

Bingo. Great success without a compound miter saw.

Serge Duclos,
Delson, Quebec





Handplanes as Winding Sticks

The first time I prepped rough stock using handplanes, I didn't have winding sticks. I looked around my shop for something to use in a pinch, but the only straight and flat objects in sight were my planes.

I positioned my plane with a corrugated sole at the far end of the board with its bottom facing me. I placed a second plane, with a smooth and shiny sole, at the near end of my workpiece.

The dark corrugations contrasted well against the bright sole of the near plane.

Four years later I'm still using my jack and jointer as winding sticks. The 15"-long jack plane is a little short to use as a winding stick in some situations, but it works for me because I rarely have stock wider than 10".

Ryan Erisman
Madison, Wisconsin

Sharpen Your Jointer & Planer Blades in the Shop

Power jointer and planer blades become dull, and it's expensive to purchase replacement blades or special-purpose sharpening jigs. I needed a better solution, so I designed an easy-to-make sharpening jig from scraps found in most any woodshop.

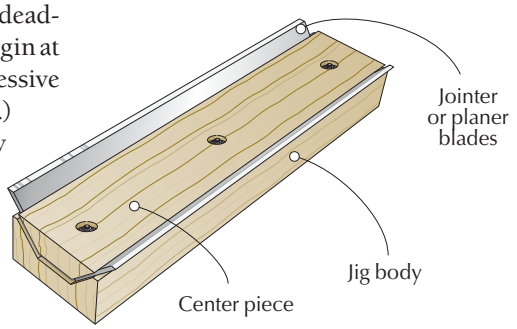
The sharpening jig has two sides cut at the appropriate honing angle for the jointer and planer blades, with a center piece to match the recesses. When that center piece is screwed down in position, the blades are locked between the sides and the center piece as shown in the drawing.

To use the jig, lock your blades in place, flip the assembly and begin honing by rubbing the two blades on a sheet of sandpaper affixed to a dead-flat surface. (For large nicks, I begin at #120 grit and work through successive sanding grits until I reach #400.)

This jig can be made to fit any length. And if you have a three-knife setup, as you complete the sanding on the first pair, swap in the third blade.

With all your blades sharp, re-install them in your machine and you're ready to go.

Tyler Stokes,
El Cajon, California



ILLUSTRATIONS BY MARY JANE FAVORITE

No More Messy Glue Tips: A Solution for the Lazy

My shop floor has sawdust scattered about, and I don't wipe down my tools before I put them to bed at the end of the day. I'm OK with some things being messy, but there are other areas where mess drives me over the edge.

The tip of my glue bottle is one of those. I hate when dried glue accumulates on the tip, or when a glue stream as wide as a river runs down the sides, only to harden and impede a properly closed tip. I like a clean glue tip.

I used to crimp the tip of my glue bottles with pliers, scratch around the inside with a 6*d* finish nail or take out my aggression on the tip using my small shop hammer.

I'm a little smarter today. I keep an extra glue bottle tip on hand to swap for the messy, crusted tip. When one top becomes icky and sticky, I screw on a replacement. I then toss the loaded tip into a cup of water to let the glue soften and dissolve so it's ready for use the next time.

Glen D. Huey,
managing editor

Slick Surface Extension Table Doubles as a Place for Notes

I was looking to add an extension table to my table saw, but I didn't want the expense or bother of using laminate. I wanted a quick solution.

I found a 2' x 4' sheet of Dry Erase board at my local home center for $10. I had no scrap of plywood large enough for a base, so I cobbled together a torsion box made from scraps. (You could use any substrate.)

Now I have a super-slick extension table on which I can make notes and keeps sizes close by.

William Hall,
West Chester, Pennsylvania

Flossing Fix for a Split Board

On occasion I get a split in a board when I knock together too-tight dovetails – that's when I reach for the dental floss.

Spread glue along the split atop the board, then use a piece of dental floss to work it into the break before clamping.

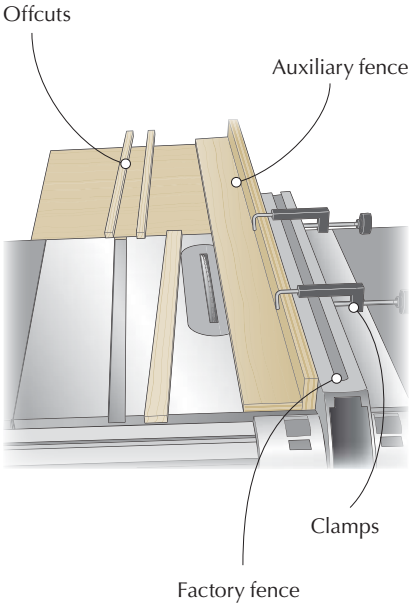
Christopher Schwarz,
contributing editor

'Follow Along' Outfeed Support for Your Table Saw

For years, I needed an outfeed table for my saw. Aside from being a necessary safety feature, an outfeed table would save me from crawling around and under my table saw to retrieve both useful pieces and offcuts.

I finally came up with a removable outfeed design that attaches to and follows the rip fence. I often clamp an L-shaped auxiliary fence to the factory rip fence, so I decided to lengthen the add-on fence and use it to support a small outfeed table. This works perfectly. And when I'm not using the rip fence, the entire auxiliary fence stands in a corner of my shop, tucked neatly out of harm's way. **PWM**

Bill Wells,
Olympia, Washington



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Excalibur Deluxe Router Table Kit

Four corner-positioned lift screws raise this design above the competition.

The Excalibur Deluxe Router Table Kit (#40-200) from General International is a complete shop setup that was introduced in late 2012. In adding the kit to our shop, we were reminded of its outstanding features.

The major components are a 32" x 24" tabletop that stands 36½" tall (choose from cast iron, MDF or phenolic), and a router lift that takes stability and smooth operation to a new level. Also included is a steel enclosure that houses your router and a fence with an integral 2¼" dust port to provide optimal dust collection. A tubular-steel frame supports the top and lift. And yes, it's mobile to make it far more convenient around your shop.

The heart of any productive router table setup is the router lift. Excalibur has taken a cue from one of the most robust machines found in the woodshop, the thickness planer.

Unlike the traditional two-post design of most lifts (where a single lift screw carries the router up and down), on the Excalibur unit, lift screws are positioned at all four corners. A chain drives the lifts to raise and lower the router. It's a smooth operation.

Bit changes above the table, which this setup easily allows, have become the standard. It's quick and easy. Height adjustments are made using a crank handle that slips through the lift's heavy-duty, aluminum top plate. The only drawback is that it's possible to cover the crank location if you're using an oversized jig.

Stout & strong. *The cast iron top on the Excalibur router table kit (#40-200C) is plenty strong, but what's most impressive are the four chain-driven post screws at the corners.*

Almost any size router motor can be used with this lift, however, it's designed for today's largest motors. To install other motors you need to use one of two available reducer collars; these are optional accessories.

Another top-shelf feature is the 3¾"-diameter insert rings and how they fit to the lift's top plate. Excalibur uses rings that twist-lock to the plate – there are no small set screws to lose. A 1½"-diameter opening is included with the lift; other opening sizes are optional. (A ring that fits well around your router bit increases dust-collection effectiveness and safety.)

Excellent Dust Collection

If you're a regular router user, you know shavings and wood dust can quickly pile up as you profile mouldings or plow grooves. Dust collection is important and is often overlooked, or it's a secondary thought during the design phase. Not with this setup.

The fence system has sliding faces that fit tight to your router bit; that's for minimal air access to improve dust collection. Once set, the faces are easily locked into position.

The fence's dust port is ducted into a 4" port located on the back of the steel enclosure. Through one side of the enclosure you squeeze your power cord; on the other there is an adjustable air vent. With the vent properly dialed in, there is no place for dust to go other than into your collector.

The adjustable vent allows you to coordinate extraction and maximize efficiencies based on the power of your dust collector – the smaller your collector, the more wide open the vent.

After making many feet of moulding, I found only a trace amount of dust left in the enclosure.

I did quickly discover, however, that there is no on-board bit storage as there is in our other router cabinet. Even so, I think this router table would be a great addition to any woodworker's shop.

— Glen D. Huey

CONTINUED ON PAGE 16

Deluxe Router Table Kit

Excalibur ▪ general.ca or 888-949-1161

Street price ▪ from $1,115 to $1,380

▪ VIDEO *See how easy it is to change bits with the Deluxe Router Table Kit.*

Prices correct at time of publication.

ROUTER KIT & SPRAY SYSTEM PHOTOS BY AL PARRISH; SHOOTING PLANE PHOTO BY CHUCK BENDER

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CONTINUED FROM PAGE 14

Veritas Shooting Plane

Just as with all the planes Veritas produces, its shooting plane is sleek, well thought-out and ready to tackle the toughest jobs.

With a weight of 7.7 pounds, the Veritas shooting plane gathers momentum quickly and slices through the end grain of even the most rock-hard exotics. But despite its heft, it's easy to use for extended periods of time because it runs on a shooting board – there is no lifting.

To put the plane through its paces, I decided to use it as it came from the box. The tool I tested had a PM-V11 blade (it's also available with an O1 blade). It was sharp and ready to work – though a quick honing would have made it even better (which is typical for any new edge tool). The cutting edge has held up well, even after extensive use.

The plane can be used with any shooting board design. The skewed iron helps keep the plane tight against the bed and fence of your shooting board, and the result is increased accuracy and less tear-out.

One thing I appreciate about this tool are the many adjustable features – you can dial it in to suit your work. The throat is fully adjustable, the lock is easy to use and the Norris-style adjuster makes it a breeze to set the iron parallel to the mouth. Well-placed set screws keep the iron in proper adjustment relative to the plane body.

The handle is also adjustable, so you can use the plane both in a chute or as a jointer plane. That's a great feature – though I would prefer the handle to be a little less blocky; I like to grip curves.

The Veritas shooting plane is available in both left- and right-handed versions. If you need a tool that can shoot your saw cuts to perfection, it's an excellent choice.

— Chuck Bender

Veritas Shooting Plane

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

Street price ▪ from $329 to $345

▪ VIDEO *Watch the author take the Veritas Shooting Plane for a test drive.*

Prices correct at time of publication.

ASI-HVLP & the Eco Series Spray Systems

The name ASI-HVLP may be new to you, but when you discover that the company behind this new brand is, in fact, Apollo Sprayers (which is credited with bringing HVLP to the amateur woodworker market) all questions are answered.

The Eco series – designed specifically for small shops and do-it-yourselfers – is a range of portable turbine spray systems that provide premium finishing performance at an affordable price.

The new Eco series includes a three-, four- or five-stage turbine option. Each has "Quiet Technology" for lower decibels in the shop, two reusable filters, 20' of hose (with a quick disconnect at the gun end) and a 6' power cord. The units are housed in a sleek, all-metal body with black powder-coat paint.

Each system is supplied with one of two different spray guns: The E5011 gun is a bleeder gun (air flows all the time) and the E7000 spray gun is a non-bleed gun (when you let off the trigger, the air stops). The non-bleed gun adds about $50 to the retail price.

We tested an Eco-5 system with a non-bleed spray gun. It's the first five-stage turbine spray system available for less than $900. The five-stage turbine has plenty of power to easily atomize finishing materials for a smooth and consistent finished surface.

If you work primarily with conventional wood-finishing products, it's entirely possible you'll get by with a three-stage unit. I, however, would be hesitant to use a three-stage to spray thick-bodied, water-based products, including latex paint.

The Eco series is manufactured in the Apollo warehouse in California. It's a great setup to allow woodworkers to explore and use HVLP technology at a reasonable price. **PWM**

— GDH

Eco Series Spray Systems

ASI-HVLP ▪ asi-hvlp.com or 888-900-4857

Street price ▪ from $599 to $899

▪ ARTICLE *Read how HVLP began with simple vacuum cleaners.*

Prices correct at time of publication.

Portable Drafting Table

Move beyond a measured drawing and let your imagination reign.

My 6-year-old nephew, Ryan, loves to eat cheese puffs and play with Legos. For his birthday, I bought him a set of the colorful plastic bricks to build a Lego attack helicopter, then watched as he meticulously assembled each piece exactly as depicted on the box. For now, Ryan insists that each Lego project be kept separate and put back into its own box so he can reassemble the exact same toy.

Someday he'll get the idea that he can combine all the sets and build whatever comes into his head, perhaps a giant intergalactic space station. Until then Ryan is confined by his small boxes and limited possibilities. It's not always easy to trust your gut and let intuition be your guide. Sometimes you have to throw away your box.

On the road. *This portable drafting table travels with me wherever I go.*

Overcome Dependence

I have to admit that I spent many years stuck in a box – creatively speaking – when it came to woodworking. I felt most comfortable working to someone else's plans, trusting design decisions to another's judgment and, sadly, short-changing myself of much of the real fun in the process.

I knew I needed to push beyond my comfort zone and break free of a dependence on printed plans and even – gasp – break free of my heavy dependence on the tape measure.

I want to be clear: This is not a tirade against blueprints or measuring tools. It's just that for me (and I suspect many of you) they are obstacles to pushing forward. In fact, I use drawings now more than ever – except now they are largely sketches and concept drawings sprouting from my own imagination.

Here's an example of a portable drafting table I made recently and some of the thoughts behind how the design came together. In this case, I chose to let the function dictate the plan and to force myself to think beyond a measured drawing. I built the entire project without picking up a tape measure or ruler. I find this pushes my imagination and forces me to think about proportions instead of dimensions.

Functional Needs

The list of my needs was simple: I wanted a self-contained drafting kit that I could take to the back patio with a cup of coffee in hand. It needed to have enough space to store my favorite sketch pad and my assortment of drawing tools. I wanted it as light as possible, but still able to take a bump if tossed behind the seat of my truck.

It's essentially a wooden briefcase with a lid that tilts up to provide a drawing surface. I settled on some dry 2/4 walnut to construct the top and sides and some thin, clear pine nailed to the box bottom to provide a floor.

Determine Dimensions

Every furniture project starts out with a reference dimension that's usually tied to one of three things: the human frame, interior room space or specific objects the piece will contain. In this case, the project is sized to my drawing tools.

The human frame is used when a piece of furniture needs to mesh with our anatomy – the height of a dining table, for example.

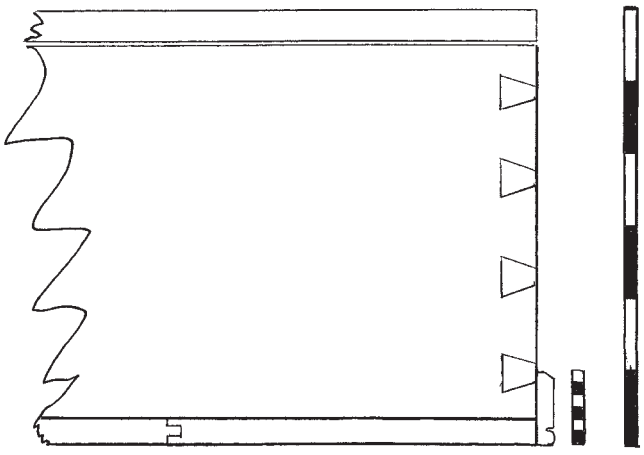
Large architectural case pieces, on the other hand, might take their cue from the ceiling height of the in-

CONTINUED ON PAGE 20

PHOTOS & ILLUSTRATION BY THE AUTHOR

CONTINUED FROM PAGE 18

Two fingers, please. *The overall size of the drawing surface was dictated by my largest sketch pad, plus a two-finger margin (my two fingers) all around.*



Base six. *I sized the small base moulding by stepping off the overall height into six parts with dividers; the small bead at the bottom of the moulding mirrors this.*

terior space they will occupy; a grand room with a tall ceiling dictates that the overall scale of the piece take that into consideration.

Finally, a small specialty item such as a drafting kit might be governed by something as simple as your favorite sketch pad.

To determine the size of this piece, I glued up the top oversized then used the sketch pad itself to dictate the overall height and breadth, allowing a margin of two fingers wide all around.

This top then dictates the boundary dimensions of the box sides. I ripped the sides to the width of one handsbreadth, figuring this would allow enough depth to store my drafting tools. The construction is similar to that of a cabinetmaker's chest, with the sides dovetailed together for strength and two thin pine boards for a bottom, joined with a tongue and groove to allow for shrinkage. Like on many tool chests, these were simply nailed to the bottom of the walnut frame.

To hide the pine bottom and add a decorative touch, I tacked a small beaded base moulding around the bottom edge. To size the height of that moulding, I used dividers to step off the overall height into six parts and used the bottom sixth as my moulding height.

Just the essentials. *A couple of black artist's pens (fine and medium), two or three colored markers in earth tones, a pencil, masking tape and some standard drafting tools are what I carry with me.*

I then mirrored that little proportional sequence in the moulding itself, dividing its overall height into six parts and let the bottom sixth dictate the height of the bead.

Finally, I attached a couple of thin battens to stiffen the top and cut a couple of notches along their length to accept a pair of props to keep the lid tilted at a comfortable angle.

The finish is simply two coats of shellac.

The next time you have a simple project to build, set aside your tape measure and force yourself to work without it. You'll find it a liberating experience. **PWM**

George is the author of two design DVDs (Lie-Nielsen Toolworks) and co-author (with Jim Tolpin) of "By Hand & Eye" (Lost Art Press).

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About This Column

Design Matters

Design Matters dives into the basics of proportions, forms, contrast and composition to give you the skill to tackle furniture design challenges with confidence.

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Fixed-width Panel Raiser

BY WILLARD ANDERSON

Build a plane that cuts smooth and crisp raised panels with, against or across the grain – the magic is in the spring and skew.

Panel-raising planes are used to shape the raised panels in doors, paneling and lids. The profile has a fillet that defines the field of the panel, a sloped bevel to act as a frame for the field and a flat tongue that fits into the groove of the door or lid frame.

I've studied panel-raising planes made circa the late 18th and early 19th centuries, including one made by Aaron Smith, who was active in Rehoboth, Mass., from 1790 to 1823 (Smith may have apprenticed with Joseph Fuller who was one of the most prolific of the early planemakers), and another similar example that has no maker's mark.

Both are single-iron planes with almost identical dimensions, profiles and handles. They differ only in the spring angles (the tilt of the plane off vertical) and skew of the iron (which creates a slicing cut across the grain to reduce tear-out).

The bed angle of the Smith plane is 46°, and the iron is skewed at 32°. Combined, these improve the quality of cut without changing the tool's cutting angle – which is what happens if you skew

Gauges & guides. *It's best to make each of these gauges before you start your plane build. In the long run, they save you time and keep you on track.*

Shaping tools. *The tools required to build this plane are few, but a couple of them – the firmer chisel and floats – are modified to fit this design. The keyhole saw, or pad saw, is the perfect choice to define and saw the angles of the abutment.*

PHOTOS BY THE AUTHOR;
ILLUSTRATIONS BY ROBERT W. LANG FROM THE AUTHOR'S MODELS

a standard bench plane.

The two planes have a fixed integral fence and no nicker. The right edge of the profile is non-cutting and acts as a depth stop. The left edge (also non-cutting) acts as the fence.

This panel-raising plane is designed to be held at a spring angle of 19° and is well suited to work with material that is 5/8" to 3/4" thick. The heel of the Smith plane is stamped "9/8 * 1/16"," which corresponds to a profile width of 1 3/16".

Specialized Gauges & Tools

In building panel raisers, there are a number of gauges I use to lay out the angles of the skew, bed and abutment, spring and breast (see the drawings on page 26). And there's another gauge that straddles the cheeks of the throat to track the progress of leveling out the bed; it looks like a two-pronged fork.

I also make a set of three testing wedges for the abutment (10°, 11° and 12°), and a pair of mock plane irons from quartersawn beech. These help to gauge the flatness of the bed at various stages.

It's also useful to have a 5/8"-wide firmer chisel and it's a necessity to have a set of floats – push and pull side floats, an edge float and a bed float. All should to be ground so that the edges match the angle of the throat between the bed and the abutment, and the cheeks.

Each abutment requires two saw cuts to define the limits of the angle.

Vintage planes. *My panel-raising plane (below) is based on two vintage examples (right). The plane in front was made by Aaron Smith (circa 1790-1823); the one in back is from Roy Underhill's collection and has no maker's mark.*

Vintage keyhole saws, or pad saws, have blades that are thick enough to make this long, unsupported crosscut (I file the teeth with plenty of fleam, but with no particular set).

Throat Mock-up

The best advice I can give you before you begin work on your plane is to take the time to build a mock-up of the plane's throat. Make your model wider than the actual plane so it's easier to check angles and fit parts.

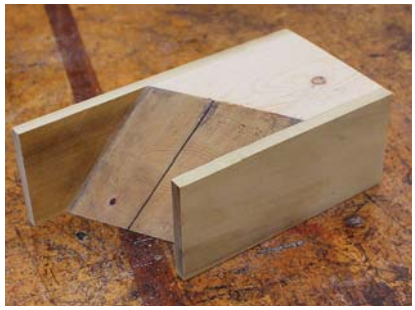
In this plane, the skew angle of the throat is 32° and the angle to which the sides of the wedge are planed is only 23°. This is because the wedge goes in at 45°, and is cut at a 15° angle across its width.

The mock-up also allows you to gauge the modification of your firmer chisel and floats as you grind and file them to match the corners of the throat.

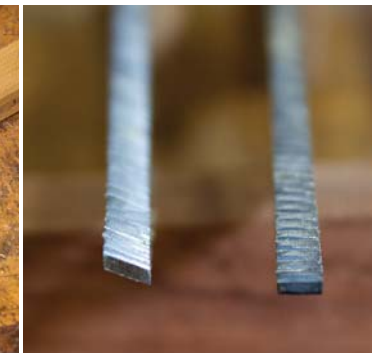
Wedges

A test wedge is necessary to gauge that the abutment slots are shaped to the correct angle and depth, and that the shapes of the two abutments are exactly the same. The abutment slot has an included angled of 10°. Depending on how carefully it's shaped, the angle may vary. (Note that a tapered iron, such as the one I'm using here, adds approximately 1°, so the wedge will have at least an 11° or 12° taper.)

The test wedges – shown with the other gauges on the opening page – are skewed just like the floats. Again, the throat mock-up is invaluable for testing the fit.



Larger view. *A throat mock-up makes tool modification easier and helps to establish and confirm the angles needed during construction. It also makes it easy to shape your wedge.*



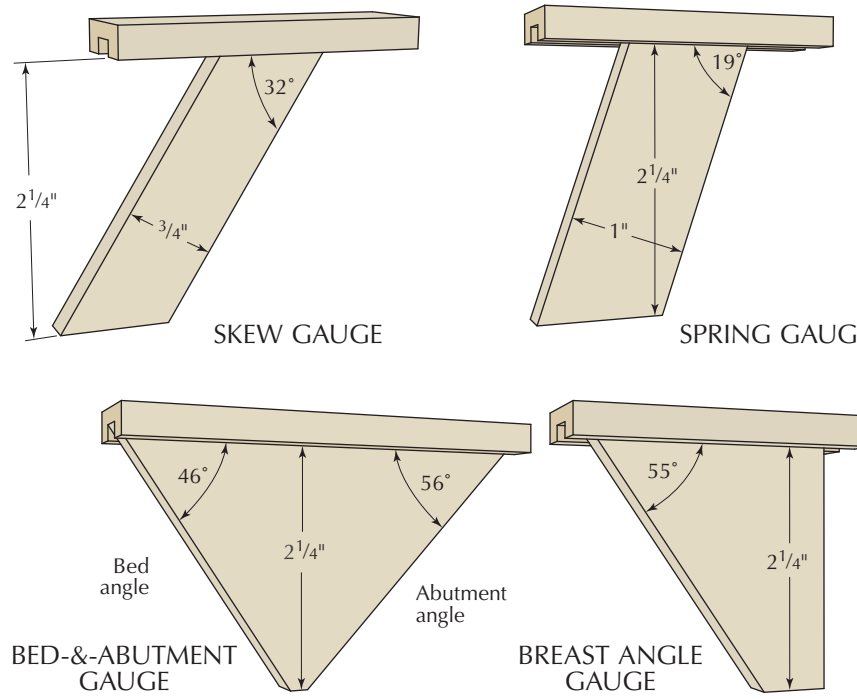
Customized. *Grind and file a set of floats to 23° along the long edges to mate with the corners of the throat. The edge float requires special attention because the teeth need to be recut. Gauge the results against your throat mock-up.*

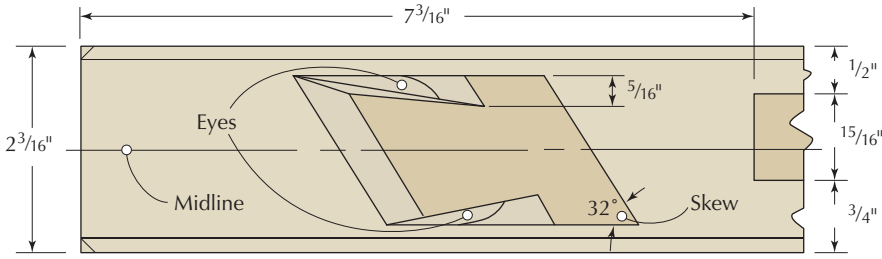
About the Body

The stock is quartersawn beech with the outside of the tree oriented to the sole of the plane. If the grain is not parallel to the sole, orient the blank so the grain rises toward the toe. Mark the toe end with an upward-pointing triangle.

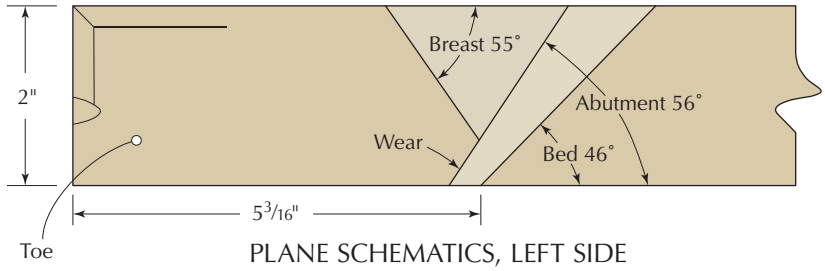
The Smith plane is $2\frac{3}{16}$" wide, 2" thick and $14\frac{1}{4}$" long. On my blank I left an extra $\frac{1}{2}$" at each end for waste. In practice, the stock should be at least $\frac{1}{2}$" wider than the width of the plane iron to give sufficient material for the cheeks. The iron I used begins at $1\frac{3}{4}$" wide, but after creating the 32° skew on the long edges, it's closer to $1\frac{5}{8}$".

I work off of a midline – a single plane of symmetry for future layout – to reduce measurement errors. To establish the midline, divide the toe and heel of the blank with pencil marks, then connect these two points along the top of the blank. Square these lines

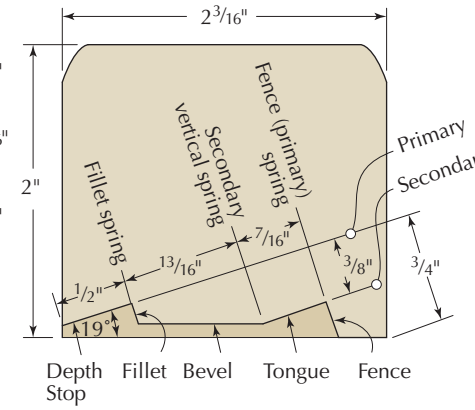




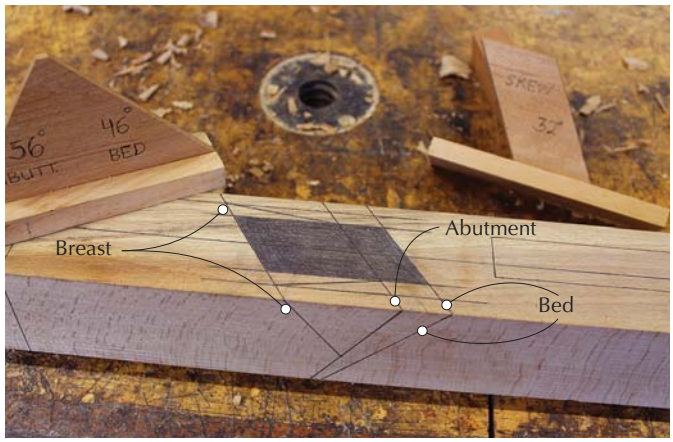
PLANE SCHEMATICS, TOP



PLANE SCHEMATICS, LEFT SIDE



TOE PROFILE



Match this. *Mouth layout and the position of your iron are most critical. Take your time as you establish these lines.*

to the bottom then connect the lines along the sole.

Mark the Throat & Mouth

Layout measurements are taken from the left cheek of the plane (toe pointed forward), as well as from the midline. Critical lines are scribed in with a knife and others are penciled.

To begin, mark the two waste ends of the plane stock, then locate the rear mouth line on the left cheek (5 3/16" from the front edge of the stock). Use the bed-and-abutment gauge to draw in the 46° bed line, then from that line, knife in the 32° skew angle on the top and bottom of the stock.

On the sole, knife in a second skew line 3/16" in front of the mouth line to define the front edge of the mouth. Use the bed-and-abutment gauge to draw in the abutment line on the left cheek, then use the breast angle gauge to lay out the breast line so it intersects the abutment line about 3/4" up from the sole. (This establishes the wear.)

The initial mouth width needs to be as narrow as possible, because the final width is not generated until the profile is cut.

Using the skew gauge, carry the abutment and breast lines across the top of the blank and then use the appropriate gauge to carry the three lines down the right cheek so the marks are on both sides and the top.

Because the throat is skewed, the width of the throat in the plan view is less than the actual width of the iron. To find this measurement, set the iron in your throat mock-up and measure the width of the iron square across the mock-up. (Another option is to lay out a line angled at 32°, position your modified blade on the line then measure the width of the iron square across.)

This measurement is critical. It defines the final width of the mouth and throat, and it locates the fence that's cut into the sole of the plane.

Center this measurement across the midline both on the top and the sole of the stock. Set your marking gauge to this point based off the left cheek, then scribe a line along the entire sole, making sure that you place tick marks at the front and rear of the stock.

Move in 5/16" from those layout lines and mark the top of the plane between the bed and breast lines, then mark the sole of the plane between the two mouth lines. This defines the initial excavation of the mouth and the throat inside the abutments.

Mark the Profile

The profile is defined by two horizontal spring lines that reference off the left cheek, and three vertical spring lines that reference off the sole.

Begin at the left cheek corner of the sole. Use the spring gauge as your guide to knife in two lines: The first is 3/8" up from the corner; the second is at 3/4". These are the secondary and the primary horizontal spring lines, respectively.

To lay out the vertical spring line locations, start with the toe tick mark registered with your marking gauge during the mouth layout. Position the spring gauge on the sole and align the

Laid out. *The five spring lines are what guides the remaining work. You can also see the midline and how the spring lines relate.*

gauge with that tick mark. Knife in that line; it's the fence spring line.

Measure $^{7}/_{16}$" along the primary spring line and knife in the secondary vertical spring line, then in another $^{13}/_{16}$" to knife in the fillet spring line.

To establish the bevel spring line, make a tick mark $^{1}/_{8}$" up the fillet spring line. Referencing a square off the left cheek, strike a square line across the toe to hit this point and the secondary vertical spring line. This defines the bottom corner of the fillet and the angle of the bevel of the profile.

Once the profile is marked on the toe, reproduce a matching set of lines on the heel. I set my marking gauge to each point that a spring line intersects the left cheek or the sole, then scribe these points on the heel of the plane body. Use the spring gauge and knife in your lines, then connect the three vertical spring lines along the sole. These are used to define the rabbet cuts that block out the profile.

Shape the Throat & Mouth

The throat is chopped out down to the bottom of the breast line. Work back close to the bed line, but don't cut right at either line just yet – these lines must be preserved for now in order to get a flat and straight bed. It's also important to stay inside the two scribed lines that define the inside width of the abutment. (After the throat is cut, the abutments are sawn to take the mouth to full width in the wedge slot.) This work requires concentration. Chop straight along the length of the sole as you hold the cutting tools at the skewed angle.

On the sole, use a narrow chisel to chop a shallow mortise to define the limits of the mouth, then drill $^{5}/_{32}$" holes at each end of the mouth mortise and between to waste out the mouth. Angle your brace (or drill) using the layout lines on the cheeks; split the difference between the wear and bed lines.

Excavate the center region of the mortise until a saw or a thin edge float can be inserted. With the plane body on its side, saw the mortise from top to bottom using the bed layout line as a guide. Rasp or pare the mouth opening smooth and even, working to the wear line.

With the mouth open, the throat can be finished. As you work, use the bed gauge to check your progress and visually check that the slope of the developing bed and breast lines align with the knifed-in skew lines.

As you get closer to the final lines, switch to your modified firmer chisel, to pare down to the final surface. (Tools with angles that match the work will make it easier, and the resulting surface is nicer.) A bed float is also useful here. Because the plane's profile has not yet been cut, tear-out at the sole is not a problem at this point.

When the breast and bed are at their final dimensions, begin testing and tuning the angle and the flatness. Hold the plane up to eye level and tilt it to sight down each bed, and check for twist relative to the skew scribe lines on the surface of the plane. Smooth any high spots with a firmer chisel or a combination of bed float and fine rasp.

Cut the Abutment

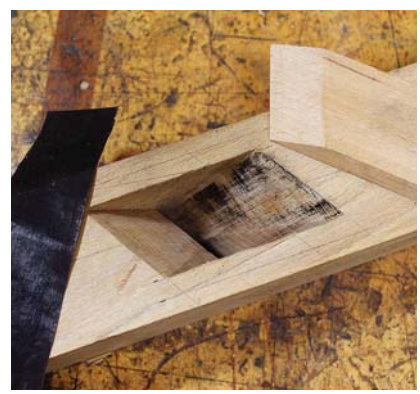
The abutment is what gives the wedge leverage to hold the iron tight to the bed. Because the iron is skewed, the abutment is a series of acute and obtuse angles. In addition, the abutment slot has a slight taper from the mouth to the top of the plane body. Use your 10° testing wedge to gauge the shape of each abutment slot; try to make the two have the same taper. Once the slots are made, the 11° test wedge is used to determine the final shape of the plane's wedge.

Use a keyhole saw to carefully cut to the bottom of the abutment gauge line, checking frequently at the sole and top to make sure you don't cross the layout lines. (Note that the left cheek cut will be at an obtuse angle and the right cheek cut will be at an acute angle.) Make the second cut with the saw just proud of the bed face. Excavate the material between the kerfs using a narrow mortise chisel, paring chisels and side floats.

Test the extended bed using a wider mock iron and carbon paper to ensure that the bed and the abutments are coplanar.

Use the test wedge to gauge the two abutments. Work the wider abutment with edge and side floats so the wedge fits snugly along its length. Mark where the wedge exits the top of the plane

Don't open wide. *The mouth must be tight, so drill within the lines. I use a brace and shell bit because a shell is simple to adjust within the cut as needed.*



Flat & smooth. *It's useful to use the narrow mock-iron against a piece of carbon paper to rub the bed; that helps to indicate high spots.*

Tight quarters. *The small opening in the mouth requires a small saw. This is where the keyhole saw shines.*

Bed as reference. *To fair the bed to the abutments, place a paring chisel flat on the bed at an angle and skew cut into the abutments.*

body, then pare the other abutment until the wedge fits to the same depth.

Bring the Profile to Life

The profile is cut in three steps using rabbet and shoulder planes. First the bevel line is cut; it's a square rabbet cut. The second cut is to the fence, and finally the fillet cut is made (both are rabbets angled at 19°).

To make the square rabbet, set your marking gauge to the intersection of the fence spring line and the secondary horizontal spring line at the toe end of the plane. Mark the length along the sole. Next, set a marking gauge to the rabbet depth and mark along the length of the right cheek. Remove the waste to form the rabbet, cutting to the scribe lines on the heel, toe and right cheek.

The rabbet for the fence begins where the secondary vertical spring line intersects the rabbeted sole. Set a marking gauge to that width then scribe

> "There is a great satisfaction in building good tools for other people to use."
>
> *—Freeman Dyson (1923-), theoretical physicist and mathematician*

along the length of the sole. Use a narrow shoulder plane tilted at about 19° to cut the bed of the rabbet down to the horizontal spring line. Stay well shy of the scribe line on the sole of the plane as you work to the lines established on the toe and heel.

Put the shoulder plane flat on the bed of the rabbet and carefully plane to the shoulder of the rabbet as defined by the scribe line on the sole. (If necessary, clean the corner of the rabbet using a scraper or chisel.)

Repeat the same steps to cut the fillet rabbet. This time, however, set your marking gauge to where the fillet spring line intersects the sole. Scribe the line along the length of the sole. Keep the cut level with the right cheek as you work.

Cut & Fit the Wedge

Remember that the wedge and the iron are inserted at the bed angle, so the wedge sides are angled to 23°, and with a tapered iron adding an extra degree to the abutment slot, the wedge is cut to a taper of 11°. It is also important that the wedge ears, which extend right up to the profile of the plane, press snugly into the sides of the mouth opening so as not to snag shavings. (One ear is buried in the left-abutment slot; the other is flush with the profile.)

Plane one edge of the wedge stock to 23° along its length. Set a marking gauge to just proud of the actual width of the bed (measured along the skew line, not the planar view). This should be in the range of $2^{1}/_{16}$". Mark the opposite edge of the wedge stock.

With a bevel gauge set to 15°, mark across the end of the wedge stock and saw off the waste. Use the 11° test wedge – aligned with the front corner of each side – to mark the long edges of the wedge stock. Make a tick mark where the angled lines intersect the wedge's upper face, then draw a line connecting the two marks. Cut the taper.

First profile cut. *Use a wide moving fillister plane, shoulder plane or a rabbet plane to cut the square rabbet to the scribe lines on the heel, toe and right cheek.*

Double-check. *There should be a gentle arris between the bevel face and the tongue face. Pencil the line to verify that it's straight and parallel along the length of the sole.*

With the iron in place, test-fit the wedge in the abutment. Pare the wedge as needed.

Trace out the internal profile of the throat on the wedge surface in pencil as shown on page 30. Cut out the wedge ears with a coping saw then pare the ramp. Set the wedge and iron in the plane and tap in the wedge.

Wedge beginnings. *Affix the wedge stock at the bench on top of a waste piece, then chop and pare the taper to your layout lines.*

Ear formation. *Mark where the wedge meets the top of the plane body then divide in half the space between this line and the leading edge of the wedge.*

Pencil in marks where the ears protrude from the mouth of the plane. Pare these as closely as possible then remove the wedge, cut the ears to length and refine their shape.

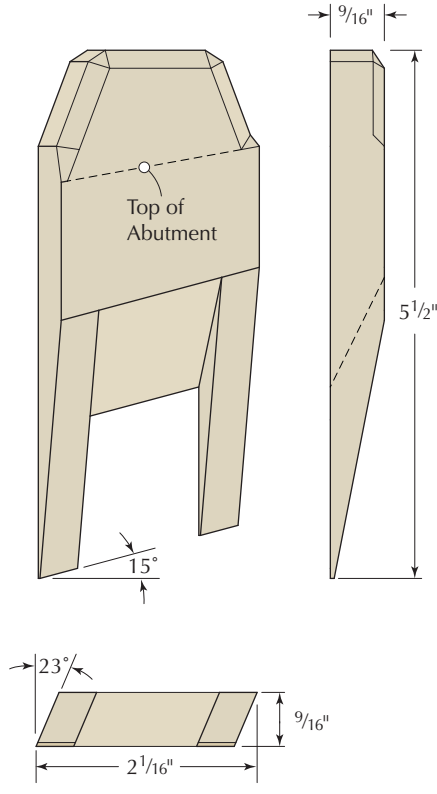
Make a 15° cut at top of the wedge. Knock off the two corners at 35° (off the long edge), and bevel the top edges of the wedge to the top of abutment (see "Wedge" illustration at right.)

Make & Set the Handle

The relatively short handle, which sits 1" deep in the body, is offset toward the right cheek by 1/8". (I believe this is so the handle is as close to the iron as possible without interfering with its adjustment.) The square edge of the handle mortise begins 7 3/16" from the toe.

Draw the handle profile onto your stock, including an extra inch at the base. Cut it to shape with a coping saw, band saw or a bowsaw, then use rasps to make and fair the curved edges.

Once the handle is shaped, cut off the holding waste from the bottom then transfer the rear profile onto the plane body. Chop and pare the mortise cheeks. Use a gouge to shape the rear wall of the mortise and a router plane to take the mortise to final depth. Test-fit the handle and make any needed adjustments, but don't install it until the final shaping of the plane body is completed.



WEDGE

Detail the Plane Body

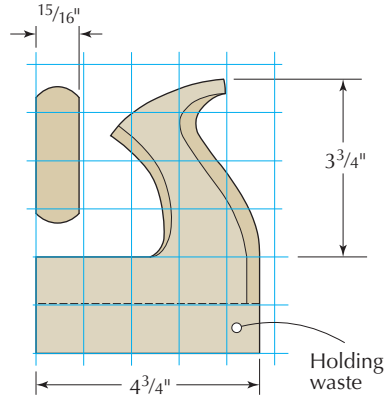
Trim the plane to final length (I recommend a miter box for this step). Use a rasp to round over the heel to a 3/8"-radius. Mark 1" down from the top at all four corners to locate a stopping point for the chamfers, which are 1/4" wide x 3/16" deep. Chisel the end-grain chamfers, then plane the long-grain chamfers so they meet in a miter at the nose. At the rear, the chamfers should fair into each other matching the curvature of the heel.

The cheeks of the throat are tapered to the breast line, beginning at the abutment, then the "eyes" – decorative teardrop-shaped cuts along the cheeks – are cut with a sharp curvature in about 1/2" from the abutment, parallel with the cheeks.

Clean up the surfaces of the plane body with light smoothing plane passes, then apply glue and set the handle into the mortise.

Again scribe the vertical spring line on the toe referencing the bevel gauge off the top of the plane and the primary horizontal spring line referencing off the left check. Make these lines deep and highlight them with a pencil. These two lines are helpful in keeping the plane correctly oriented during use.

The last step is to prepare the iron; see "Shape & Sharpen the Iron" at right.



HANDLE PROFILE

Grid = 1" Squares

Wider is better. *Add 1" to the bottom of the handle profile for an easy and out-of-the-way hold as you fair curves on the grip.*

Mortise to fit. *Drill the mortise just shy of 1" depth using a bit that is slightly smaller than the handle's thickness*

Work around the mouth. *Trim the cheeks by paring along the layout lines, then add "eyes" as a decorative touch.*

The eyes have it. *"Eyes" add a pleasing visual touch to your plane.*

The Panel Raiser at Work

This plane works best on 5/8"-thick stock to leave a tongue that is about 1/4" thick; that allows the panel to fit nicely into a frame composed of 3/4" stock with a 1/4" groove. Select your panel for straight, even grain – quartersawn wood is best.

As always, before you use the plane on prime stock, cut a test panel until the fillet emerges. Set a marking gauge to this width and use this setting to deeply scribe the area of the field on the panel. This helps reduce tear-out on the end grain. Also, you should have a grooved, short piece of the frame stock available to gauge the tongue.

Begin with the end-grain cuts of the panel. Pay close attention to the vertical spring lines so that the fillet has a crisp profile. Follow that with cuts to the long-grain edges of the panel until the corners meet in sharp miters. (You may need to adjust the spring angle of the plane so the fillets are the same depth around the panel.)

If the fillets are not as crisp as you desire, or the bevels have some tear-out, use a shoulder plane to work these areas. Whatever you do to one edge, you will undoubtedly need to do on the adjoining edges as well. The miters need be sharp and precise, however, only for the visual effect.

I realize this panel-raising plane is a challenging build – but as my students who've built it can tell you, it's worth the effort. Not only will the plane allow you to make perfect raised panels, you'll have the satisfaction of using a tool custom-made in your own shop. **PWM**

Willard is a retired research scientist who teaches woodworking at The Woodwright's School and other locations. His web site is edwardsmountainwoodworks.com.

SHAPE & SHARPEN THE IRON

Paint the face of the iron with machinist's fluid and let this dry. Assemble the plane and adjust it so the iron protrudes just enough to evaluate its profile relative to the sole. Scribe the profile onto the iron with an awl, trying to make single marks. Square-grind the edge to the marked profile (there will be three straight bevels).

Grind the two long bevels first, and get the iron shape precise before moving on.

Begin grinding the fillet (the short bevel) back to the profile. This should be a careful test-and-fit approach. If the fillet is ground too aggressively, a good portion of the length of the iron will have to be ground off to get past that area.

Once the iron is blocked out, begin grinding the bevels. The two long edges of the iron are beveled at around 25°. The fillet is beveled at a far more obtuse angle (in the 60° range) to maintain the strength of the cutter.

Work just shy of the edge and be sure to frequently cool the iron so as not to draw the temper. The cutting edges of the iron have a hollow grind at this point. Hone on a combination of diamond and waterstones. — WA

Blade modification. *The blade needs a bit of shaping to work in your plane. Scratch the profile, grind it to shape then sharpen.*

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/nov13**

BLOG: *Take a look inside Bill Anderson's Edwards Mountain Workworks.*

ARTICLE: *Learn three additional ways to make raised panels.*

IN OUR STORE: *Pick up a copy of the new book "Woodworker's Guide to Handplanes."*

TO BUY: *Hock Tools (hocktools.com) sells blade blanks for this plane.*

Our products are available online at:

- **ShopWoodworking.com**

Woodworking Excellence

BY MEGAN FITZPATRICK

Find inspiration in this award-winning work of your fellow readers.

As a mechanism to show off the amazing work done by you, our readers, this year we held our inaugural "PWM Excellence Awards." Via social media, we invited submissions in five categories: Boxes & Smalls, Seating, Tables, Cabinets & Casework and Turnings, Carvings & Objet d'Art. (For 2014, we'll announce the contest in the February issue of the magazine, as well as online.)

The editors chose a winner in each category (each of whom receives a $100 gift certificate to shopwoodworking.com), as well as a grand-prize winner (who receives a gift certificate and a free trip to Woodworking in America 2014).

Plus, all entries were posted online for voting in the Readers' Choice Award, for which the overall vote recipient receives a $100 shopwoodworking.com certificate.

The choices were not easy – each of our four editors selected a different winner in just about every category (and we were sometimes surprised by one another's selections). But the one on which we all agreed was our grand prize, which goes to Autumn Doucet for her Figured Cherry Chest – it seems to us just about perfect in every way.

The Readers' Choice Award goes to Kevin Bird, for his 3D Box Bowl (page 38).

We were particularly glad to see a number of submissions from young woodworkers (Kevin is one of them), many of whom are still high school and a few who are even younger. We feel confident the future of the craft is in good hands.

In the following pages, we feature both the Editors' Choice winner and Readers' Choice winner in each category, along with a bit of information about each project. Our hope is that you'll find inspiration in the work, and consider sharing your own in 2014. **PWM**

FIGURED CHERRY CHEST PHOTOS BY THE MAKER

Megan is the editor of this magazine and can be reached at megan.fitzpatrick@fwmedia.com or 513-531-2690 x11348

"Badness you can get easily, in quantity; the road is smooth, and it lies close by, But in front of excellence the immortal gods have put sweat, and long and steep is the way to it."

—Hesiod (circa 750-650 B.C.), Greek poet

GRAND PRIZE

Figured Cherry Chest
8½" d x 14" w x 10" h

Autumn Doucet,
Wenatchee, Wash.

We found this small chest to be just about perfect in every way – from the bookmatched cherry veneers to the delicate ebony and holly string inlay to the clever hidden brass latch in the mother-of-pearl and abalone flower inlay.

Autumn Doucet made this piece for a disabled veteran who wanted an attractive chest in which to store medications. The recipient cannot grip small items, and that requirement led to the integration of the oversized ebony tray handle with easy-to-grip grooves in the side, as well as mother-of-pearl accent inlay that helps to mitigate what could look bulky without it. The spring-activated lock is easy to open with just the touch of a fingertip or knuckle.

"As a teenager, I whittled a ball in a cage out of a piece of broom handle and have been woodworking ever since," writes Autumn. Because woodworking classes were largely unavailable to women when she first became interested in the craft, Autumn taught herself. She has been a woodworker for 40 years.

EDITORS' CHOICE

Small Box
5 5/16" d x 8 1/4" w x 4 1/2" h
(approximate size, converted from millimeters)

Rob Stoakley
Wilton, Salisbury, U. K.

Chip-carved Bible Box
9" d x 12" w x 3" h

Bill Johnson,
Cullowhee, N.C.

For this category, we had four editors and two strong opinions. So, after many failed attempts at cajoling folks into a majority decision, we decided to award two makers the Editors' Choice in the Boxes & Smalls category.

Rob based his burr-elm veneer and Indian ebony box on a much larger version by Robert Ingham. The project is composed of roughly 100 separate pieces of wood on a plywood substrate, and includes custom brass hinges by Andrew Crawford.

What impressed us about this build – in addition to it's elegant appearance – is the delightful surprise of the perfectly mirrored inlay on both the top and underside of the top, which is revealed when the piece is opened.

Bill prefers to think of his basswood chip-carved piece as a carving in the shape of a box, and while he acknowledges that it can be used to hold any number of things, the Gothic arch design he incorporated made him think of churches, so "Bible Box" seemed appropriate for the title.

The intricate and impressive details of the lovely carving simply made us think it was a winner.

READERS' CHOICE

Rose Jewelry Box
4 d x 9 3/4" w x 4 3/4" h

Nairi Safaryan
Glendale, Calif.

It's no surprise that Nairi's intricately carved boxwood jewelry box won the Readers' Choice award – the unfurling petals of the flower and the leaves and stem are incredibly lifelike. Also incorporated are such delightful details as an inchworm with tiny feet (look closely at the stem).

SMALL BOX & CHIP-CARVED BIBLE BOX PHOTOS BY THE MAKERS; ROSE JEWELRY BOX PHOTO BY LARISA SAFARYAN

EDITOR'S CHOICE

Curvis Sedes II
22 d" x 22" w x 28" h

Jason Bedre
Georgetown, Texas

We thought this cherry and walnut chair was a showstopper when we first saw it – and that was before we realized the back and seat were coopered from solid-wood pieces that taper out to the edges. Also of note are the dovetailed seat stretchers and splined and dovetailed miters.

Jason calls it an exploration of coopered shapes, traditional dovetail joinery and bent laminations.

READERS' CHOICE

Blacker House Arm Chair
20" d x 24" w x 36" h

Jalen Waggoner,
Frankfort, Ind.

What we knew that perhaps many online voters didn't is that Jalen is still in high school (and his other entry, a Maloof-style lowback chair, also garnered a lot of votes).

Jalen calls this mahogany and ebony chair his first "real" project, and it was quite a challenge because he was working only from pictures. He started by making full-size drawings, then built a poplar prototype to work through the details. The mahogany is resawn from one 16/4 board to ensure a good color match.

CURVIS SEDES II PHOTO BY CHRIS KEMLER;
BLACKER HOUSE ARM CHAIR PHOTOS BY RIC DELIANTONI

EDITORS' CHOICE

Lyptus Demilune Table
15¾" d x 37½" w x 30" h

Michael McKee,
Charlotte, N.C.

Michael's lyptus with dyed-pear inlay table was our winner due to his elegant coupling of a classic form with contemporary details. It is instantly recognizable as a Federal table made modern.

The design on the top was inspired by the doodles he used to draw in high school, says Michael, and the black edging was inspired by his love for acoustic guitars, where that detail is commonly used.

READERS' CHOICE

Living Queen Anne
11" d x 37½" w x 29½" h

Tyler Huhn
Morris Plains, N. J.

As in our Editors' Choice, it may have been the marriage of old and new that impressed voters for the Readers' Choice selection. The maple burl live-edge top is a 2"-thick slab and the base features hand-carved ball-and-claw feet on the front legs. The front legs were glued up to achieve the required thickness, which we noted lent to the traditional base form a more contemporary look that helped to marry it with the top.

But, Tyler, who has been learning woodworking as a high school elective for four years, says the lamination decision was out of necessity due to limited wood selection. Serendipity, then.

Both Tyler and Kevin Bird, the Readers' Choice winner in Turnings, Carvings & Objet d'Art, were taught by Michael Campbell at Morristown High School. Job well done sir!

LYPTUS DEMILUNE TABLE PHOTOS BY JIM MCGUIRE; LIVING QUEEN ANNE PHOTOS BY BRIAN KIEVINING

EDITORS' CHOICE

Bell Cabinet
15" d x 26" w x 62" h

Dean Vande Griend
Story City, Iowa

Dean's white oak, padauk and poplar cabinet has echoes of James Krenov in the design – though Dean hadn't studied Krenov's work before making it (we'll chalk that up to collective conscious). We responded to the meticulous joinery details (including the purposely proud dovetails at the case bottom) and small design touches such as the shape at the top of the door frames mirrored in the feet.

Dean tells us he wanted an element of surprise when the cabinet was open, so he designed drawers that appear to be floating, and he used contrasting wood to draw the eye.

READERS' CHOICE

Jewelry Case
13½" d x 24" w x 51" h

Paul S. Ressler,
New Market, Md.

Paul chose curly maple cockbeading to highlight the drawers in this walnut case piece, which began as a design for an AutoCAD course – after which, he built it for his wife.

This jewelry chest was near the top of our list for the Editors' choice, too; we admire the clever integration of side panels for hanging necklaces and the like.

BELL CABINET PHOTOS BY GEORGE ENSLEY;
JEWELRY CASE PHOTOS BY PATRICK FAVALE

EDITORS' CHOICE

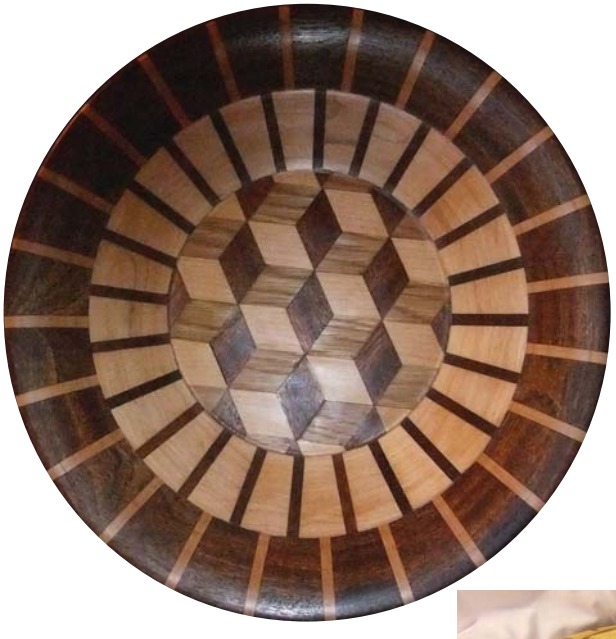
Soft Spring Wind
4⅛" d x 6¾" w x 22¾" h

Nairi Safaryan
Glendale, Calif.

We had a hard time narrowing our choices in this category (and two of Nairi's pieces were among our favorites), but we all agreed that this sculpture in palo santo was a true work of art. The level of detail and meticulous execution – along with the emotion evoked, made this our winner.

Nairi writes that he tries to always incorporate humor into his work, which I think we see here in the slipped shoulder strap – and though the face is blank, there is coquetry captured in the tilt of the head and body position.

READERS' CHOICE



3D Box Bowl
14½" dia. at top, 7" dia. at bottom x 2¼" h

Kevin Bird,
Morris Plains, N.J.

It seems difficult to fathom, but this oak, maple and mahogany segmented turning is Kevin's fourth turned project; he's taking woodworking classes in high school and his first turning lesson was a year ago.

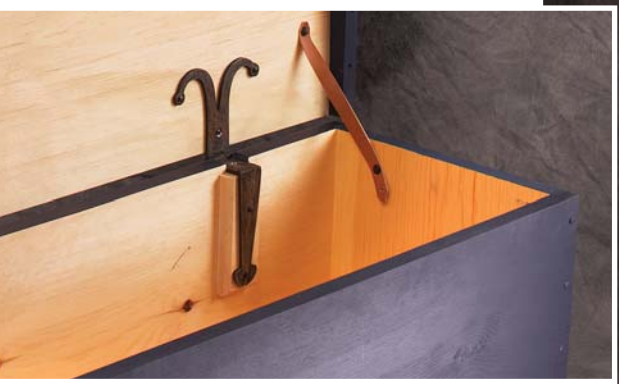
Kevin writes that he was inspired to make this when he saw someone else struggling with a 3D design, and while he had enough woodworking and design experience to design and prepare the turning blank, "It was a colossal task for a novice." We agree.

SOFT SPRING WIND PHOTOS BY LARISA SAFARYAN;
3D BOX BOWL LEAD PHOTOS BY BRIAN KIEVINING & JAMES BOOTHBY, INSET BY ALEX BERTRAND

6-board Chest

BY CHRISTOPHER SCHWARZ

Use two planks, two days and two piles of nails to make this age-old form.



Variations on a form. *The blue chest is the one I built for this article – but let your wood and aesthetics dictate your build. (The yellow chest is by Timothy Henriksen; the green chest is by Ty Black.)*

Six-board chests have been an enduring form of furniture in Western cultures for hundreds of years. And while they differ in their details during different ages, the basic form and the way it is built has been unchanged since the form appeared.

The chest in this article has details I've seen on chests in the 18th and 19th centuries. You can choose different mouldings (or omit them), or add carving or a stenciled design to make the chest suit the time period you prefer.

Design with the Boards

I built my chest using an 8'-long board and a 12'-long board. Both pine boards were 18½" wide. If you don't have access to wide lumber, feel free to glue up panels to the final width. If your chest is painted, no one will notice.

Because my boards were 18½" wide, I used that fact to help design the chest – there's no need to rip 1" off a wide board or glue on 1". The design of these chests is pretty flexible.

I crosscut the 45"-long lid piece from the 8'-long board and set it aside. Why 45"? These chests are typically 32" to 48" long, and 45" was the clearest

Rip then crosscut. *If you rip the moulding piece first before crosscutting the front from the back, you will get a nice long piece of straight-grained stock.*

Twice as accurate. *Ripping the long notches in the ends is easier if you sandwich the two pieces together. Your cut is more likely to remain square.*

length of wood I could get from the board. This piece sets the die for the length and depth of the chest.

With the lid cut, I cut the two ends, which determine the height of the chest. These chests typically range from 18" to 27" tall – a good height for a chest when it comes to lifting the lid and bending over to get something out of storage. It's not too high and not too low.

I cut the ends to 21" long from the remainder of my 8'-long board. This length allowed me to cut around some knots and eliminate some checks on the end of the board. I then set the two ends aside and grabbed my second board.

From this board I cut my front, back, bottom, moulding and battens.

When you cut moulding by hand, the best way to do it is to "stick" one long piece of moulding and then cut your three pieces from that piece. Sticking three pieces of moulding is tricky; it's unlikely that you will be able to create exactly the same moulding profile on all three pieces.

Find a piece for the moulding that is long enough to wrap around the front and two ends. (Moulding on the rear of a chest is unnecessary.) Cut that piece free from your board, then cut the front and back pieces to size. The hard part is done. The remaining stock will be your bottom and lid battens.

> "But when it comes to saying exactly why a design is good it generally becomes a matter of falling back on instinct – which is admitting that we don't know."
>
> — *The Woodworker, January 1955*

Joinery on the Ends

The first step in creating the joinery for this chest is to deal with the end pieces. They have long notches cut into their long edges to receive the front and back. Not all chests had these notches, but they give you a cleaner look – the outside surfaces of the front, back and ends are all flush, even at the feet. They also make assembling the chest easier.

Some woodworkers create this notch by scabbing on a small bit at the floor. It seems like a good idea, but I don't have evidence that this was done on historical chests. Perhaps they didn't do it that way because these chests sat on dirt floors that got wet. And a hide glue joint there would come loose.

Cutting these long notches is easy. Sandwich the boards together and lay out the long notches – each is 5/8" wide and is as long as the front and back pieces are wide.

Pinch the sandwiched boards in your vise and saw the long notches. With the boards still pinched together, use a plane plus a chisel or rasp to true up the notch.

The last task while the ends are sandwiched together is to cut the decorative profile on the bottom of the ends that creates the feet of the chest.

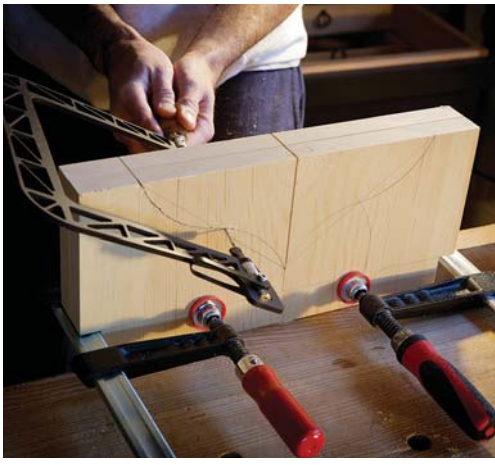
The simplest profile is what antique dealers call the "bootjack" – it's a simple inverted V that resembles the tool used for pulling your boots off your feet. This profile is just two lines, two cuts and done. A fancier profile is a half-circle or an ogee. Both of these are laid out with a compass, cut with a frame saw and smoothed with a rasp.

In the House

The next decision is whether or not to plow dados – housed joints – in the ends that will grasp the bottom board. Here are some pros and cons.

Pros: A dado lets you slide the bottom board in without any battens or

A plane job. *Most of the clean-up of the notches is with a plane. Work to your layout lines and then clean up any excess in the corner.*



Around the bend. *I lay out my ogee on both outside faces of the ends. This helps me make an accurate saw cut because I can peer over the board during the cut to ensure I'm on track.*

LEAD PHOTOS BY AL PARRISH; STEP PHOTOS BY THE AUTHOR; ILLUSTRATIONS BY ROBERT W. LANG FROM THE AUTHOR'S MODEL

The hungry chisel. *A chisel takes a bigger bite than a router plane, so do as much work as possible with the chisel.*

Squaring rabbets. *Cross-grain rabbets help square the carcase and line up the pieces during assembly.*

glue blocks for support. You don't even need to add glue when sliding the bottom in place.

Cons: Cutting these dados requires extra tools and time.

I always opt for cutting the dados because it makes assembly easier. The first time you cut a long dado, you can nail or clamp a fence to your work to guide your saw. After a dado or two you will realize that the stiffness of the saw's plate is enough to keep you straight.

Saw the walls of your dados, then remove most of the waste with a chisel driven by a mallet. Finish the job with a router plane. The dado is 1/4" deep, 7/8" wide and begins 5" from the bottom of the end pieces.

Front & Back

The front and back pieces are a blank canvas – both for decoration and for joinery. Shallow (1/4") rabbets on their ends help make the chest easier to assemble. And you can carve the front, which is typical of 17th-century chests. Or make some simple scratched decoration. Or grain paint it, which was typical in the 19th century.

Let's talk about the joinery first. The reasons to cut the rabbets on the front and back are simple:

1. They help prevent the case from racking after assembly – especially when transporting the chest.

2. They make it easier to assemble the chest yourself. The rabbets lock into the notches in the end pieces. Then you hit a few nails.

3. You can get away with using shorter (and cheaper) nails. If you make this chest using 1"-thick stock, you need 8*d* nails to assemble the carcase. However, if you cut 1/4"-deep rabbets in the front and back pieces, you can use 6*d* nails instead. If you buy handmade nails, the savings add up.

Cut your 1/4"-deep rabbets with a simple rabbet plane or a moving fillister plane. If you are using a simple rabbet plane, first knife a line where you want the shoulder of the rabbet to be. Tilt the plane and put a corner of the tool's sole into the knife line to turn the knife line into a V-shaped trench. Then continue to plane until you complete the rabbet. You'll need to tip the plane a little off vertical at first. Then you'll need to tip it vertical.

Cut the rabbets. They don't need to be deep – 1/4" is perfect – but they need to be consistent in depth so that your carcase is square and everything is flush on the outside. Make the rabbets 7/8" wide to match the thickness of your ends.

With the rabbets complete, clean up the inside surfaces of your ends and the front and back. This is the best time to do this because you are about to nail some things together.

Nail the Back to the Ends

If you've cut rabbets and dados in your parts, here's how to assemble the chest: Nail on the back (add glue if you like). Fit the bottom in the dados. Nail on the front. Then nail the bottom in place all around.

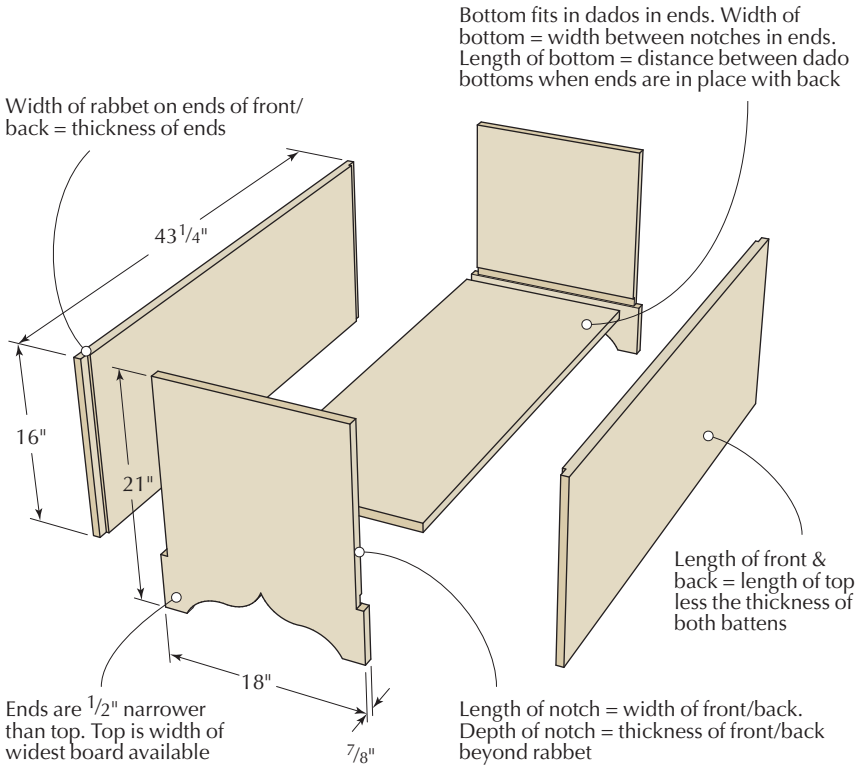
But first, there are some details to consider. The length of your nails should suit the amount of wood that wasn't rabbeted away in the front and the back boards. If you have 1"-thick stock and cut a 1/4" rabbet, then you should use 6*d* nails – 8*d* if you're working in pine. If you have 7/8"-thick stock and cut a 1/4"-deep rabbet, you can use 5*d* nails – 6*d* in pine.

You need a nail with a sizable head for this operation – such as a rosehead. Headless nails or plain brads won't do because they don't have enough holding power. Depending on your stock, you might need to drill a pilot. In some pines and with some nails, you won't. So make a test joint in scrap to find out what holds and what doesn't split. After some experience you will get a feel about what will work.

One last detail: Angle these nails slightly at a small slope – about 5°. And alternate the slopes with every nail. This slope helps keep the front and back wedged onto the ends.

With the back nailed to the ends, cut the bottom board to slide into the dados so the fit is snug and the carcase is square. This is a hand-tool way of approaching the bottom: Create the opening and fit the piece to the opening. If you are machining your bottom, you should be able to hit the length bang-on and nail the bottom onto the ends first.

Usually when I make the bottom with hand tools, it ends up too thick for the dados. Instead of reducing the thickness of the entire bottom, I bevel



EXPLODED VIEW

WHY 6-BOARD CHESTS SURVIVE

When you examine these chests as a builder, they are a bit of a puzzle. The puzzle isn't how they go together, but instead, how they stay that way over time.

These chests disobey many rules of wood movement. The grain on the front and back of the chest is horizontal. The grain on the ends is vertical. The front and back should have split and fallen off. And take a gander at the lid. The grain of the battens that help keep the lid flat and the dust out is 90° to the grain on the lid.

By all rights, the battens should have fallen off, the lid should have split and the whole chest should be a collection of interesting splinters.

Nails – the right nails – allow you to get away with serious crimes of wood movement. Nails are almost always more flexible than screws or dowels. So a nail allows the wood to expand and contract, bending back and forth through the yearly humidity cycles.

Except for hardened masonry nails, I've found that all nails will bend, including wrought nails, cut nails, wire nails and pneumatic ones. The reason I've always preferred cut nails for making furniture is that they hold better than wire or pneumatic nails. Cut nails are a wedge that – when properly driven – bend and crush the wood fibers in a way that holds the nail fast.

Wire and pneumatic nails aren't wedges, and while they do compress some of the surrounding wood fibers, they are just not in the same league as cut nails (or wrought nails).

Another bonus: A good cut nail will have a rough finish, especially compared to a smooth wire nail. That rough finish also gives the nail some extra bite. This is why many pneumatic nails are coated with a glue that helps them stick in the wood – every little bit helps. — CS

Head in. *Cut nails with a broad head are the ideal fastener for attaching the front and back to the ends. You can use nails with a smaller head for attaching the bottom.*

the underside of the ends – like a raised panel – until the bottom slides in.

I glue the bottom in place all around – then nail it in after assembly. The glue helps here because all the expansion and contraction is in your favor. So take advantage of it.

You don't need to use fancy nails to secure the bottom. Just use 6*d* or 8*d* cut finish brads – four through each end and five or six through the front and back. Set these below the surface if they will be covered by moulding.

Sticking it to the Moulding

Skip the moulding if you are going for a plain chest. But the moulding adds the appearance of a classic plinth – the visual separation between the base section and the not-base section. Surviving pieces were made both ways, with and without moulding.

Cut the moulding on an 80"-long piece of stock. Then cut the miters. This ensures that your profiles will match at the miters. I profile the moulding on a sticking board – a long and flat board with a high fence. I used a 3/8"-square ovolo for this profile.

On Mitering

The less you fuss about mitering the better your miters will be. Just cut them with confidence and calm. I wish someone had told me that when I was starting out.

Wrapping moulding around three sides of a carcase is cake compared to

making the full 360°. Focus on getting one corner good and tight. Then clamp those two pieces in place on the chest and mark the other corner for its miter.

With both miters cut on the front piece you can focus on getting the fit tight on the returns (the pieces that "return" down the ends of your chest). I leave the returns long until after everything is glued and nailed in place.

Glue the entire front of the moulding to the case. On the returns, glue only the miters and the front one-third of the moulding to the ends. Press everything in place for a minute or two. Then drive the brads. The moulding should not shift. Set the brads. Then saw the returns flush at the back of the carcase.

About the Lid

The lid has two important components: its moulding profile around the rim and the battens on its underside. The moulding profile makes the lid look like something more sophisticated than leftover siding. The battens keep the lid flat – if you attach them correctly.

First cut the moulding profile on the two ends and the front of the lid. It can be almost any profile you have on hand. I have a larger ovolo plane ($1/2$" wide) that looks like a lot of other lids for chests that I've seen. Cut the profile on the ends first, then on the front edge. This allows you to erase any splintering from working across the grain.

The battens on the ends of the lid keep it flat. Nailing the battens to the lid isn't enough – the battens will fall off when the top moves. Gluing the battens won't do. Nailing and gluing is better, but the lid's movement is still stronger than that joint.

Miter slices. *Here is how you miter your stuck moulding. By sawing close to your line you can make the grain and profile match around the corner perfectly.*

6-board Chest

NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑ 1	Lid	7/8	18 1/2	45	Pine	
❑ 2	Ends	7/8	18	21	Pine	
❑ 2	Front & Back	7/8	16	43 1/4	Pine	1/4 rabbet both ends
❑ 1	Bottom	7/8	16 3/4	42	Pine	in dados in ends
❑ 2	Battens	7/8	7/8	18 1/2	Pine	

You have two choices: old school and modern. The modern approach is to screw the battens to the underside of the lid and ream out the pilot holes for the screws so the lid can move. The other approach is to drive nails through the battens and the lid so that the tips protrude through the moulding, then bend the tips back into the moulding.

Choose nails that protrude about $1/2$" beyond the moulding. Then turn the tip of the nail over like a fishhook and drive it back into the moulding. This secures the batten to the lid and keeps the lid fairly flat.

Hinge & Finish

There are a variety of ways to attach the hinges to the carcase and lid. Snipe hinges are an old solution (you can make your own using 2" cotter pins).

These chests were typically painted on the outside and left bare inside. The paint highlights the form of the chest and obscures the distracting cross-grain aspects of the form.

What paint you choose should be based on:

- Do you hate strong smells? Use latex.
- Does the paint need to be bomb-proof? Consider oil-based.
- Do you want a traditional look? Use commercial milk paint.
- Are you a glutton for punishment? Make your own paint.

I use commercial "milk" paint. I know it's not historically accurate, but it does give me a look I like. Plus it is quite durable and fairly low on the toxicity scale. I apply two coats of paint and sand between the coats with a #320-grit sanding sponge.

Bent over. *Clenching the nails back into the moulding hooks the battens to the underside of the lid.*

After building several of these chests, both by myself and with friends, I found that the process became faster and faster (two days is almost a luxurious amount of time). In fact, it took longer to type this explanation of building the piece than to actually make it. **PWM**

Christopher is the editor at Lost Art Press and the author of the book "Campaign Furniture," which will be published in early 2014.

ONLINE EXTRAS

For links to all online extras, go to:
- **popularwoodworking.com/nov13**

BLOG: *Read more from the author on this historic form.*

BLOG: *Learn how to lay out a simple ogee.*

PLAN: *Download a free SketchUp model of this project.*

IN OUR STORE: *"The Joiner and Cabinet Maker" (Lost Art Press) by Christopher Schwarz, and Joel Moskowitz.*

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Rooms with a view. *The living, dining and breakfast rooms of the Blacker house feature Honduran mahogany walls and floors of quartersawn white oak in a chevron pattern. Jim Ipekjian made the light fixture; the original is in the Los Angeles County Museum of Art.*

A Finishing Passion

BY MARCI CRESTANI

Brian Miller is the 'Go To' guy for Greene & Greene finishes.

Even non-woodworkers instinctively recognize that a handsome creation can be cheapened by inadequate finishing skills. So it was understandable that the new owners of Charles and Henry Greene's famed Blacker House – Harvey and Ellen Knell – were nervous about entrusting the enormous job of restoring the home's architectural millwork to a man they didn't know.

"I told Mr. Knell he didn't have to worry because I had just completed a six-week correspondence class and was ready to work!" Brian Miller recalls. "Fortunately for me, Mr. Knell got the joke." That was back in 1995 and Brian still regularly maintains the house for the couple.

Throughout his 38-year career as a wood finisher, Brian has become an expert in restoring Greene & Greene homes, having also worked on the Robinson, Freeman-Ford, Culbertson and Crocker-Crow homes, as well as Charles Greene's personal residence. Yet despite his obviously impressive talent, an endearingly modest Brian credits his success to Jim Ipekjian – a woodworker who is widely regarded as the master of reproducing Greene & Greene furniture. "I owe it all to Jim," Brian says.

The two men met through a mutual client, and each admired the other's work. Consequently, when Jim was hired to recreate the dining room of the Robinson house as a permanent exhibit for the Huntington Library in San Marino, Calif., he asked Brian to finish the room's architectural millwork and cabinetry.

Work at the Blacker House

Years later, when Jim was making reproductions of the missing original light fixtures and furniture for the new owners of the Blacker House, he recommended Brian to the Knells. He knew he was the right man for the grueling restoration job.

Brian's work on the Blacker House began with the exterior rafters. New tails had been scarfed on as repairs to previous repairs and Brian had to seamlessly marry the 88-year-old Douglas

PHOTO OF BRIAN MILLER BY AUTHOR; OTHER PHOTOS BY THOMAS A. HEINZ

fir with the new wood, which he accomplished using a ferrous-sulfate formula. (The rafters were then sealed with Cabot's clear oil solution.)

A more complicated problem awaited him inside. The home's living room, dining room and breakfast room visually flowed into one another, yet noticeable light-colored spots polka-dotted the bottom of the Honduran mahogany walls in all three rooms. "My guess was that in the past the floors had been cleaned – perhaps with ammonia – and it had splashed onto the walls, bleaching out the color," Brian says. Someone had then apparently tried to fix the damage by coloring the wood and varnishing the walls.

"The effect of the varnish was way too shiny – not an appropriate look at all for Greene & Greene," Brian says, still mildly aghast at the perpetrator's choice of a sealer coat.

Brian's restoration process in these three rooms was intensive. Under his direction, a labor team stripped the varnish using methylene chloride, which left intact the original color and patina of the wood. The walls were then gently sanded to a uniform color – that of the lightest color, which was the spots. To remove what remained of the methylene chloride's slight waxy residue, the walls were then washed with trisodium phosphate (TSP). Once again, the walls were lightly sanded to remove the whiskers raised by the TSP washing. Finally, they were vacuumed to remove the dust.

Original Color Discovery

To figure out the originally intended color, Brian removed the bottom shelf inside a built-in china cabinet in the dining room and flipped it over to examine its underside. "There it was," he says. "Being on the bottom of the bottom shelf, this wood had never been exposed to sunlight, so we all knew we were looking at the same color that the Greenes saw back in 1907."

Brian developed a formula using alcohol-based aniline dyes until he achieved an identical color as the shelf's bottom. "The aniline dyes are less toxic than chemicals, but you get the same results because both dyes and chemicals will color the wood without leaving behind a residue of pigments like stains do," Brian explains. "You achieve a much greater clarity of the grain pattern with dyes and chemicals."

> "The understanding eye sees the maker's fingerprints. They are evident in every detail….Leave Fingerprints."
>
> —*James Krenov (1920-2009), Woodworker & teacher*

Because there was such a huge expanse of wood on the walls, the color was sprayed on rather than brushed to avoid lap marks. Several thin coats of amber shellac were then sprayed on as a sealant. Because shellac only has one sheen level, however, it had to be rubbed out using colored paste wax and #0000 steel wool to achieve the true characteristic Greene & Greene luster.

"You want to use a colored wax on open-grained wood like mahogany," Brian says, "because a natural-colored wax would have dried to a milky color inside the open pores."

When the rooms' walls were finished, Brian was proud that "this was the best representation of what the Greenes' color looked like back in 1907."

A potentially toxic problem awaited Brian in the basement. "The billiard room was phenomenal," Brian says. Its ceiling and walls were covered with old-growth redwood that had been wire-brushed, chemically colored, sealed with a thin coat of shellac then glazed to highlight the wire-brushing effect in the deep valleys of the redwood.

The Knells had a legitimate concern. "The glaze was probably done with a lead ingredient, and they didn't want their grandkids exposed to it," Brian says. His solution was to apply a low-sheen, acrylic-based clear coat.

The only room that did not require major work was the entry hall, which was covered in Burmese teak. "All we did there was clean it, wax it and buff it out," Brian says. The rest of the interior restoration was rather straightforward, but owing to the house's square footage and the exacting standards of both Brian and the Knells, it took about two years for Brian and a crew of two men working full time to complete the job.

Experimentation at Charles Greene's Home

Although the Charles Greene residence is much smaller, it was in worse shape than the Blacker house. Much of the wood had been painted or heavily glazed and therefore needed to be

Busy man. *Here, Brian Miller is at work on a 1920s Wallace Neff home in San Marino, Calif.*

Simple solution. *Unlike the redwood in the billiard room, the wire-brushed frieze in the upstairs foyer of the Blacker house had to be gently cleaned and waxed.*

Original finish. *"Fortunately, the entry hall of the Blacker house had not been painted over," said Brian. The Burmese teak did, however, need to be restored to the original Greene & Greene sheen.*

Original ideas. *Brian noticed that many details in Charles Greene's house – such as the stair railing pattern shown here – hinted at what would become signature statements in the brothers later masterpieces.*

stripped. What Brian found interesting, though, was evidence throughout the house of Charles' initial experimentations with glazes, chemical treatments and architectural details that turned up in the brothers' subsequent masterpieces.

Built in 1902 with several additions as Charles' family grew, the house featured mostly Port Orford cedar. "It's a light-colored wood that was readily available back then," Brian says, "and it has a very pleasing, simple grain pattern that can be manipulated to look like a lot of different things."

He knew the Greenes were fans of ferrous sulfate, but that still didn't explain the color of the wood he found. There seemed to be a missing ingredient.

Detective Brian took drag-scraping samples of the wood, put them in sealed plastic bags and sent them to a nearby chemical-analysis facility. He knew the lab would find ferrous sulfate – which it did – but Brian remembers vividly the moment he saw chromium listed in the report. "That was their second trick!" he says with amazement, as if it had just happened yesterday. "Potassium dichromate."

By constituting various formulas of the two chemicals, Brian determined that the Greenes first applied ferrous sulfate and let it dry, which imparted a gray-green background tone. Then they applied potassium dichromate, which has a yellow-orange cast to it. "Together the two chemicals create a distinctive warm-brown color, and the Greenes could create variations on that tone by changing the formulas," Brian says.

Charles and Henry Greene, despite their surname, were not very "green" by today's environmental standards. Replicating those color variances via dyes, however, is Brian's specialty. "Matching colors has always been my edge," he says.

Where to Find Knowledge

After graduating from college, Brian worked for a few years at a family-owned paint store that also sold finishing supplies, and it was there he honed his color-matching skills. Additionally, quite a few of the store's regular customers had been trained in Europe, and they passed their knowledge along to Brian. "This was back in the seventies and these guys were already in their 70s – so they had learned from the really old masters," Brian says.

Back to the basics. *The Port Orford cedar throughout Charles Greene's house had either been painted or covered with a glaze so heavy that you could hardly see the grain. All the wood was stripped back to its original patina and restored to its characteristic luster.*

An oil/varnish blend. *The original plans for Charles Greene's house included a pergola over the garage, but it had never been built – a substantial missing detail that the new owners rectified. Brian finished it with a solution of one part oil-based gloss spar varnish, one part boiled linseed oil and one part mineral spirits.*

Even though he has vast experience working with chemicals that have been used for hundreds of years to color wood – nitric acid, ferrous sulfate and potassium dichromate, to name a few – he prefers working with dyes these days. "Since chemicals color wood by reacting to the tannic acid, it's hit and miss how the color will turn out because there are varying amounts of tannic acid in a piece of wood. You get a more consistent color with dyes," he explains, adding, "And of course dyes are less toxic."

Brian's color skills were again put to the test when he was called in to restore the Greenes' magnificent Robinson House. Previous owners had modernized (many would say ruined) the Honduran mahogany walls in the living room and solarium by chemically bleaching them to remove all the color, and then whitewashing them.

To determine the Greenes' color intentions, Brian removed a piece of moulding that abutted the ceiling beams. "The wood had been bleached in place so the original color of the walls was underneath," Brian says. This is because it was easier for the Greenes to color the walls in their entirety and later apply moulding that had been finished prior to installation.

Brian's stunning work on Greene & Greene homes has led to calls over the years to undo the ravages of time and home-decorating trends on other Los Angeles-area historic homes – including Frank Lloyd Wright's La Miniatura, Wright's Taggert House and, most recently, Charles and Ray Eames' home, where Brian worked in association with the esteemed J. Paul Getty Museum.

Just as he learned from "the old guys," Brian feels a responsibility to pass along his knowledge to the next generation. For 10 years, he has been an adjunct professor in the Woodworking Manufacturing Technology department at Cerritos College in Norwalk, Calif., where he teaches a skills-based class on wood-finishing techniques. "In one semester, I teach them everything that took me 38 years to learn," he says. "Either I'm a great teacher or I'm a really slow learner."

A perfect match? *The dining room of Charles Greene's residence features redwood instead of the more typical Port Orford cedar. Brian wonders if this deviation reflected Charles' desire to paint the walls cobalt blue – which beautifully complements the redwood.*

What endears Brian to those who know him is his unflagging enthusiasm for his craft, whether it's refinishing a simple jewelry box for a neighbor or working on museum-quality homes.

"I don't want people to think I only do the big jobs. I'll do anything," says Brian. "I just want to work." **PWM**

Marci is a Los Angeles-based freelance writer and a former columnist for the Los Angeles Times *(writing as Marci Slade). She is also an avid woodworker.*

Uncovered treasures. *The fireplace in Charles Greene's living room had been covered with a skim coat. With the paint removed, Brian discovered valuable Pewabic tiles.*

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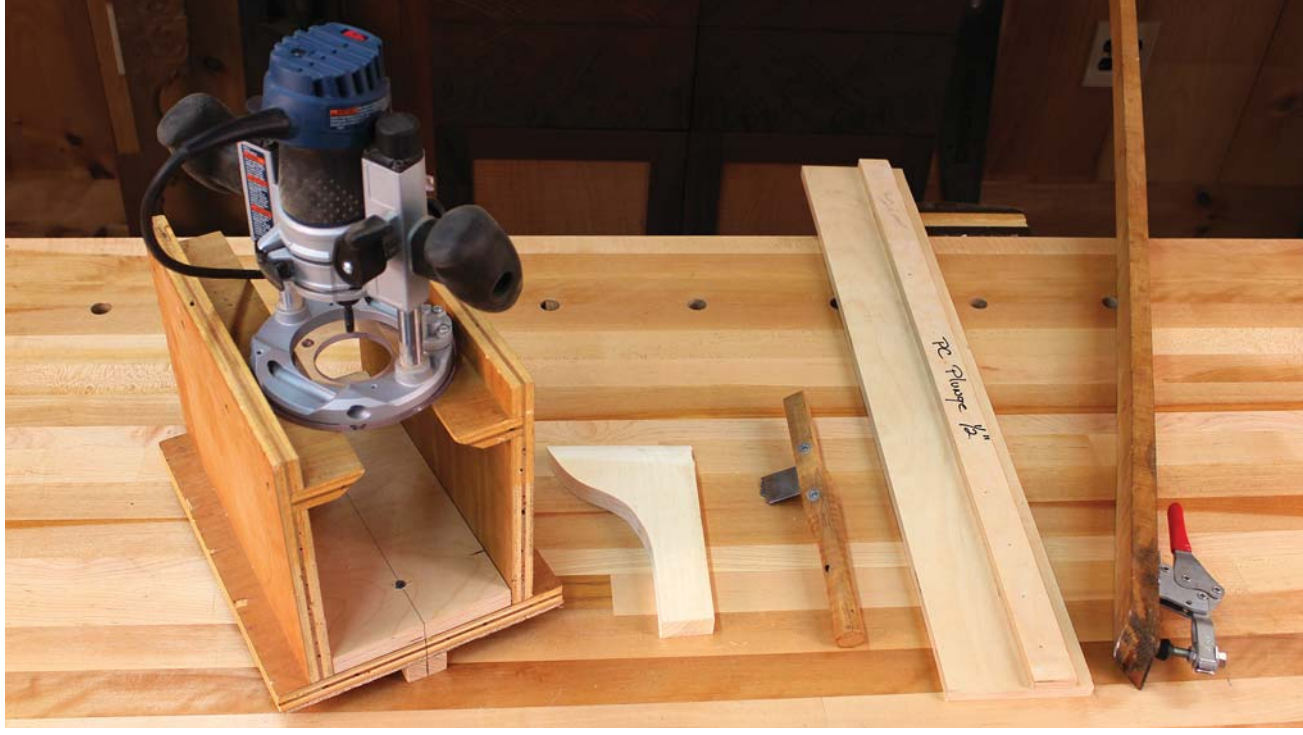


From scraps & great ideas. *Simple jigs make woodworking more fun and improve accuracy and safety. From left: Sliding dovetail jig, single-point resaw fence, scratch beader, edge-routing jig and sharpening stick.*

5 Favorite JIGS

BY CHUCK BENDER

These five simple shop aids help you work more effectively & efficiently.

Every woodworker eventually runs into problems that just cannot be easily solved using hand tools or power tools with the stock accessories. That's when jigs and fixtures such as shooting boards and table saw sleds bridge the gap.

But these are only a couple of the endless possibilities. I know woodworkers who build jigs for nearly every conceivable step of a project. While I don't usually go that far, I have been known to create jigs to overcome the problems of repeatability in hand work and the limitations of a machine.

Jigs make difficult tasks easier, repetitive tasks more accurate and speed up tasks that might otherwise be drawn-out and time-consuming. Jigs save our fingers, hands and other body parts from injury and stop us from wrecking a special piece of wood. Essentially, jigs are essential.

The basic premise of good jigs and fixtures is simple: They hold the work or the tool to allow you to accurately perform an operation that would otherwise be difficult, dangerous or impossible. To me the best jigs are the simplest.

Sharpening Stick

One task I do regularly (I hope you do, too) is sharpen. For my bench planes, chisels and spokeshaves, I like a hollow grind. This gives me the sharpest tool possible while making freehand honing an easy task.

For my plane and spokeshave irons I use a jig I like to call a sharpening stick – I said I like simple jigs the best and you can't get much simpler than a stick – but this is no ordinary stick. This stick has an angle cut on each end.

The width of the stick is a personal choice. My stick is as wide as my widest plane iron, but it really needs only to be wide enough to support an iron. The length of the stick is determined by the height of the grinder above the floor and how far from the grinder I can comfortably place my foot as I grind – I use my foot as a stop and pivot point. The longer the stick, the less camber you can put on the iron.

The ends of the stick are cut on any angle you like that will keep the stick from touching the grinding wheel at the active end, and doesn't impede the pivoting action at the other.

I've alluded to how the jig works, but let me describe it in full. Clamp your iron to one end of the stick. For years I used a small C-clamp, but about 12 years ago an employee got fancy and attached a toggle clamp to one end. Although more complicated, the toggle clamp has remained.

With the iron clamped to the stick, I bring it to rest against the surface of my grinding wheel and eye the angle. Because I hone freehand, I'm not entirely

PHOTOS BY AUTHOR

Plane iron sharpening jig. *Used to hollow grind a plane or spokeshave iron, this jig makes grinding fast and repeatable.*

concerned about accurately producing a specific angle. For me, somewhere around 25° works. I sight the angle from one side until I see the grinding wheel centered on the bevel of the iron. At that point, I place my foot at the other end of the stick. With the grinder still turned off, I pivot the stick back and forth as I apply slight pressure against the wheel. This leaves scratch marks on my iron that are in the center of my bevel. After any minor adjustments to get the scratches centered, I grind away.

If necessary I can remove the iron from the wheel and, as long as I don't move my foot, replace the jig without fear of changing the angle of the grind. If you don't like the foot method, a properly placed screw in a wooden floor will do the trick.

Edge-routing Jig

Since my days on staff at Irion Furniture, I've used a simple jig to accurately square up wide case sides and tabletops. It's as easy to build as it is to understand and use. And the best part is that this jig is a multi-tasker. Without modification the jig is also great for creating dados, tenons and rabbets. With slight modifications I've been able to tenon mitered breadboard ends for slant-front desk lids, trim multiple curved pieces accurately to the same radius and create curved joints. I have dozens of these jigs in my shop of various sizes and shapes. It is simply one of the most versatile jigs I've ever seen.

Setting the angle. *When setting up to grind an iron, sight in from the side to keep the grinding centered on the existing bevel of the blade.*

To square or trim a wide board to length, you need do little more than draw square lines on either end then rough-cut 1/16" or so away from your line. The jig clamps directly at those lines to allow a router to trim the stock perfectly every time.

You won't believe how easy it is to build this jig. You need two pieces of plywood or solid-wood scrap, a few screws or nails, a router and an appropriate router bit. That's about it. Make this jig any length you need. (I have one 8' long for trimming dining tables, with all the leaves in place.)

To determine the width and thickness of the two pieces that make up the jig, you need to know a few measurements. The first is how deep into your board you want to rout. If you're trimming the end completely off the board, the router bit needs to reach all the way through. If, however, you're making a rabbet, tenon, dado or groove, you can use a shorter bit, or thicker jig material. In either case, measure the thickness of both the board being routed and the material for the base of the jig, then make sure your router bit is able to reach the depth you need after it's chucked into your router.

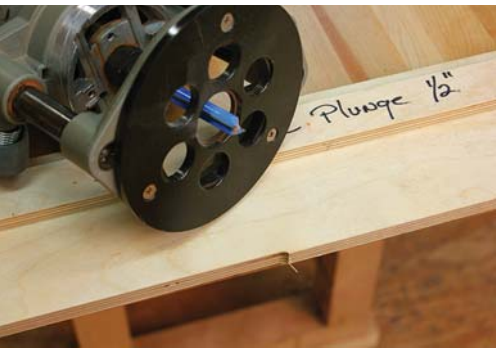
What diameter router bit should you use? For trimming wide boards straight and to length, I use a 3/4"-diameter bit with a 1/2" shank. Measure from the edge of your router's base plate to the edge of the router bit. If you make the fence (top piece) of the jig 2" wide, then the base (bottom piece) will be 2" plus the distance from the edge of your base plate to the bit – add another 1/16" to 1/8" (depending on the diameter of your router bit) to allow for trimming the jig to proper size. If you are making a straight trimming jig, the fence needs to have a straight edge.

Nail or screw the fence to the base making sure you have a slightly greater distance than the measurement from the edge of the base plate to the bit (that's the extra 1/16" or 1/8"). Clamp the jig down with its edge hanging off your bench, and with your bit installed in the router, trim the jig to size.

There's no guesswork or measurement necessary to know where this jig

Edge-routing jig. *Used for trimming boards to length, cutting dados in case sides and tenons on tabletops, this jig makes routing accurate and safe.*

Depth of cut*. In order to determine how thick the base of the jig can be, place your router on the base then measure to ensure the bit reaches through the cut.*



Trim the jig. *With the fence in place, clamp the jig securely then cut off the extra material.*

cuts – the edge of the jig is where the bit will shoulder the cut.

Dovetail Jig

That's right, I use a dovetail jig. Not for case and drawer construction but for sliding dovetails on turned columns. They can be cut by hand but the whole point of a jig is to make repetitive cuts quick, easy and accurate. This jig works in conjunction with the indexing head on a lathe and my router. And it can be built in about 20 minutes.

You need a few dimensions and scrap plywood to make this versatile jig. This is my jig for sliding dovetails, but if you use a reeding bit or core box (round-nose) bit, you could easily adapt it to make fluted or reeded columns.

The most important dimensions required are the diameter of the base plate on your router, the diameter of the column you've turned and the height from the lathe's bed to the center of your drive spur. The base-plate dimension helps determine the distance between the guides. The radius of the column combined with the height of the center of the spur determines the overall height of the jig.

The bottom plate for the jig needs to be a couple of inches wider than the largest diameter of the column on which you'll work. On the bottom side of the plate, centered on the board, attach guide blocks that exactly fit the space between the lathe ways. This centers the jig front to back on the lathe.

The sides of the jig should be an inch or two taller than the top of the workpiece (once it's installed on your lathe). Make a spacer block that is slightly wider than the largest diameter of the column. Strike a centerline on the spacer and attach it directly to the bottom plate, centered on the top face. This also keeps the jig centered on your lathe. (Note that the spacer cannot be smaller than the diameter of your router base.)

Measure from the top of the jig's bottom plate to the top-most point on your turning. This is the underside of the runners on which your router sits. Attach the runners to the sides and the sides to the bottom and spacer. All that's left are a couple of coped end caps to ensure the jig sides remain square to the base plate.

Clamp the assembly to your lathe and you're ready to cut sliding dovetails, flutes or reeds (with the addition of a couple of end stops of course). The jig keeps your router centered on your turning and parallel to the bed of the lathe. You can make it long or short depending on your needs. If your turning is larger in diameter than your router base, make the runners wider then add guides to keep the router properly placed.

Dovetail jig. *When attaching legs to turned columns, this jig proves invaluable.*

Jig assembly. *With the guide blocks attached below the base plate and the spacer above, attach the sides of the jig with the router runners in place.*

Single-point Resaw Fence

Depending on how you have your band saw set up, your blade might have drift (the tendency for the blade to not run parallel to the edge of the saw table). For me, over the past few years of having so many people operate my band saws, the drift changed daily (hourly when class was in session). Sure, there are adjustable fences available for band saws, but a shop-made, single-point resaw fence can be adjusted on the fly. And you can make one in minutes.

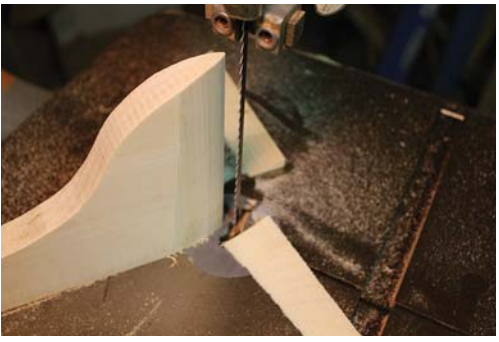
The premise is simple: Use a single point against which you guide your material to adjust for drift as you saw through the piece. If you hit a particularly hard spot in the wood and the cut starts to drift left, you can compensate by moving the board to the right. It's just that easy.

And as easy as a single-point resaw fence is to use, it's just as easy to make. I have single-point fences in my shop that range from ½" high to 12" high (the maximum depth of cut for my current band saw). I can resaw smaller edgebanding material as well as full-width boards.

To make a single-point resaw fence all you need is a piece of scrap material about the width of the stock you want to cut. If you are resawing 7"-wide material, find a scrap that is approximately the same size and cut one end to a point, leaving a flat of about 1/16" to 1/8" wide. I usually cut down the back of the material to allow for easy clamping to my band saw table.

Setup of a single-point resaw fence is a breeze. Clamp the fence to the band saw table at the desired distance from the blade – make sure the blade and the fence's flat are parallel – and you're ready to go. For ease of starting the cut, set the point of the fence just ahead of the blade (1/32" to 1/16"). This allows you to guide the cut prior to engaging the material with the band saw blade. If you strike or scribe a line on the top edge of your material, it makes resawing to a uniform thickness a snap.

Single-point resaw fence. *A single-point fence for your band saw is a simple, quick-to-make jig that provides all the resawing accuracy you need.*



Get to the point. *On the band saw, shape the leading edge of the stock to a point. I like to leave it blunt with a flat of about 1/16" wide.*

Shop-made Beader

You can use hollows and rounds in combination with snipes-bill planes to run a bead or quirk, but the simplest way is to scratch it. A scratch beader (also known as a scratch stock) – the most fun to build and use of my five favorite jigs – is really more of a tool. I use mine to run beads and to create custom mouldings. There are some beads on period furniture that you cannot create with moulding planes – the beaded edge of the back legs of Queen Anne balloon-seat chairs for example. There's no way to bend the planes around the cyma curve of the rear leg. A scratch beader makes short work of it.

To make a scratch beader you need a scrap of your favorite wood, a couple of small bolts and an old card scraper. The size and shape of the scratch beader depends on the moulding you're making and how you need to use the tool.

Lay out where you want the fence on the beader. (This is the part of the tool that keeps the beader on track whether you're scratching a long, straight bead or one that's curved.) The size of the fence is determined by how long or how tight a radius you need to follow – straighter means a longer fence, while a tight radius might need little more than a single point. Make sure you allow enough room on either side of the fence for comfortable hand placement. (The exception would be if you're beading in a tight space that allows for only a one-handed operation.)

Once you've determined the fence placement, you need to plan your moulding. A simple scratch bead might be 1/8" or 1/4" wide, which means the cutter is usually close to the fence. A different moulding design or placement of the moulding requires a different cutter position. Drill holes for bolts just to either side of where the cutter is to clamp it firmly in place.

Using a band saw (or a handsaw) cut a single kerf into the end of the beader stock. Be sure to cut beyond both bolt holes for solid clamping. Afterward, shape one or both ends of the beader so it feels comfortable in your hands.

To make the cutter, score, snap or cut a piece of the card scraper slightly larger than the profile you want to make, then grind and file the design. Insert the newly made cutter into the beader and start scratching. It takes a little practice to get it right but it's definitely worth the effort.

The best part of making jigs in your shop is that you can customize them to fit your work, your work habits and the job at hand. Just remember: Keep the jigs simple. When you find yourself trying to create a mega-jig that does the next 10 operations in a project, you've probably overcomplicated it. Break the processes down to the smallest possible step and make simple jigs for each. They don't take much time to build and you'll get great results. **PWM**

Bead the edge. *On Queen Anne dining chairs the rear legs and crest were often beaded. This decorative treatment could not be accomplished with moulding planes.*

Cut the beader. *Saw a kerf through the end of the beader that will hold the cutter. Make sure it passes both bolt holes to ensure adequate clamping pressure.*

Scraper shapes. *The most common moulding created with a beader is a bead, but other profiles can easily be created as well.*

Chuck is Popular Woodworking Magazine*'s senior editor and can be reached at chuck.bender@fwmedia.com*

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A 17th-century Joiner's Life

BY CHRISTOPHER SCHWARZ

Peter Follansbee has devoted his career to early American furniture.

Peter Follansbee, the joiner at Plimoth Plantation, gets peppered with questions from museum visitors all day long as he builds 17th-century boxes, stools, chests and chairs at the re-created colony of the early English settlement in Plymouth, Mass.

"What wood is that?" (Almost always the answer is "oak.")

"How do you do these carvings?" ("Like this," he says as he starts carving.)

"Don't you wish you had a table saw?" (The answer is unprintable.)

But when things get really interesting is when Peter starts asking questions of the visitors. One common exchange goes something like this:

Peter: "How long do you think this chair took to make?" Peter gestures to a carved, turned and painted chair.

Visitor: "About 5,000 hours."

"I can't even conceive of what 5,000 hours is," Peter says. "Is it a year? No. Not 5,000 hours. Try 70 hours."

For Peter, that ignorance about how long it takes to build handmade furniture has become far more common during the last 20 years he's worked at Plimoth.

"People just don't make anything anymore," he says. "They have no concept whatsoever of how things are made or how long it takes."

And that's one of the things that keeps him at his bench at Plimoth as an ambassador from the 17th century, cranking out carved chests, chairs,

A joiner's life. *Peter Follansbee has given his life over to studying and understanding 17th-century joinery. Unlike academics, Peter understands it in his head and in his fingers.*

PHOTOS BY CHRISTOPHER SCHWARZ

Did it take 5,000 hours? *This carved chair amazes visitors to Plimoth Plantation. They think it is much more work than it really is.*

Take that. *Peter breaks down logs for his joinery behind the Plimoth shop. Using simple tools and ingenious leverage, he can quickly turn a bolt into usable planks.*

More piles of oak. *The amount of oak shavings that Peter produces in a day (or an hour) is almost overwhelming – thanks to the fore plane.*

boxes and joint stools that fill the reproduction homes at Plimoth, or end up in the hands of customers.

Peter never seems to tire of showing people that making furniture with a comparatively small set of simple tools is not only do-able, but it is also an efficient and brilliantly realized process that begins not at the home center, but in the forest.

Straight From the Tree

Most of Peter's projects start with him splitting logs behind his Plimoth shop and rapidly converting them into billets that can be hewn into all sorts of furniture parts. The process is shockingly fast from the tree to the finishing brush, thanks to years of research and experimentation performed by Peter and his colleagues.

By exploiting the weaknesses and strengths of green wood, Peter can rive furniture parts – legs, panels, stretchers, whatever – from the oak and get them to a semi-dry shape so they can be worked further with planes, chisels and carving tools. It is nothing at all like contemporary woodworking done with sawn stock that is consistently dry through its thickness.

Almost as remarkable as the work itself is that Peter can carry on a detailed conversation as he splits planks in a brake, hews a leg with a hatchet or turns spindles on his spring pole lathe. This separate skill – talking and joking while working intensely with his hands – is the result of working in full view of crowds of people for 20 years.

And it is all the more remarkable because Peter started about as far away from this point as one can get; he was an intensely shy art school student who owned a shop full of power equipment used to turn out household goods made from plywood and Formica.

A Fateful Drive & Magazine

Peter's father worked at A.J. Wilkinson & Co., the famous Boston hardware store, from the day after he graduated high school until the day he died in 1975, and he had a shop full of power equipment.

"He had a table saw, jointer, lathe – Delta crap and all that stuff. He built stuff for our home out of plywood and Formica. I have an older brother, and he would wreak havoc down there. Then I got older and it was my turn to press GI Joe heads in the vise and stuff."

At the time, Peter's inclination was to be an artist and paint, not build furniture. And so he was attending a school where they groomed you to become an artist when his father died.

Pole lathe. *Peter turns a spindle for visitors to the Craft Center of Plimoth Plantation. His turning demonstrations are always a highlight.*

"Suddenly, it was my shop," he said. "And I had to figure out what to do with it. I thought maybe I could stretch frames for my pictures."

As all this was getting sorted out, Peter went with his mother to Doylestown, Penn., to visit a family friend in 1976. Someone in Doylestown showed Peter an early copy of *Fine Woodworking* magazine, and when he returned home, he subscribed.

The September 1978 issue (No. 12) is what pushed him in his current direction. The inside front cover featured an advertisement for the book "Make a Chair from a Tree" by John Alexander, and the issue featured an article by Alexander on shaving horses and an article by Drew Langsner on cleaving wood.

"I ordered the book," Peter says. "And while I waited for it, I built the shaving horse from that issue."

South to North Carolina

Langsner's Country Workshops school in North Carolina was then (and still is) the epicenter of the green woodworking world in North America, so Peter began taking classes down there. Usually he would go for two weeks every year, one week to take a class and a second week to help expand and improve the school.

> "A stair not worn hollow by footsteps is, regarded from its own point of view, only a boring something made of wood."
>
> —*Franz Kafka (1883-1924)*
> *Novelist*

And while he and Alexander were bending flashing, they hit it off.

"We had met before," Peter says, "but that was when we became close friends. We had the same sense of humor. I was a 25 year old who liked James Thurber."

During one of those visits to Langsner's school, Alexander gave a slideshow on 17th-century joinery about an old door that Benno Forman at Wintherthur had taken apart.

"Alexander never showed us the entire door," Peter says. "It was all macro. Real tight on this pin hole. I was engrossed by it. The theory was, the way we had busted out the chair parts was also the way they busted out furniture parts.

"That got me intrigued."

At the time Peter was living with his mom and was single. So he had to work only part time. His shop was 14' square in the second floor of a chicken coop, and Peter made and sold chairs, baskets and pitchforks.

While he had sold all his power equipment, Peter kept the Delta lathe. He sold the motor and converted the cast-iron lathe into a pole lathe.

"I had the coolest lathe in town," Peter says.

More importantly, Peter was falling into the orbit of Alexander and Robert Trent, a knowledgeable furniture historian who taught the fellows at Winterthur. Trent began teaching Peter to do academic and archaeological research. And the three men exchanged long letters, drawings and photos about their findings.

"Being so far away from Alexander and Trent forced me to write it down. I had to think about it differently and write it down. We'd write a letter. Photocopy it. Mail it. Get the slides duplicated. Pack it all off. It was funny. I used to get great sh*t in the mail."

That correspondence with John (now Jennie) Alexander was the foundation of their 2012 book together, "Make a Joint Stool from a Tree" (Lost Art Press). And their correspondence continues today, though it is through the Internet and not the mail.

The Unknowing Interview

During this period of informal (but intense) instruction, Peter lived near Plimoth Plantation and was an occasional visitor there. During a lecture there, he was introduced to Joel Pontz, one of the house carpenters at Plimoth.

One thing led to another, and soon Peter, Pontz and a mutual friend began working on building three-legged chairs at the Plimoth shop while the museum was closed for the winter months.

"We went down to get together on Tuesday nights and work on one of the three-legged chairs," Peter says. "Unbeknownst to me, Joel was planning on leaving (Plimoth). So I guess I was auditioning, and I didn't know it."

Carving everywhere. *To the modern eye, 17th-century furniture looks busy. But once you tune your eye to the patterns, the carvings are both understandable and soothing.*

For rare things. *Books were far more rare in the 17th century than they are today. So bookstands were a common way to display and protect them.*

See this? *When Peter engages the public at Plimoth, he often has a piece of furniture or a tool in his hand. He encourages visitors to touch and see the details of this hard-wearing furniture.*

Joint stool. *One of the typical pieces of the day was the joint stool, a "movable" piece of furniture that could be pressed into doing lots of tasks.*

A tap here. *Peter uses tools that are as authentic as possible. Sometimes he makes them himself, such as this smoothing plane.*

Peter was hired to work weekends. Within a couple months, it was a full-time job.

A 17th-century Shop

Unlike the interpreters at Plimoth, Peter doesn't dress in period garb and talk to visitors from the perspective of a 17th-century Pilgrim. Instead, he works in Plimoth's Craft Center, where his shop is set up next to other artisans and the gift shop.

Peter is typically dressed in a sleeveless T-shirt and works vigorously at his bench or lathe as visitors snake their way through the craft room. Almost everyone stops to watch Peter in action, and within moments he'll catch their eye and start up a conversation on the work before him.

Everything in his shop is a prop for the conversation – the carving gouges, the partially finished furniture and even the shavings, which are thick, slightly wet and redolent of the barnyard-y smell of oak.

Almost every visitor comments that they had a relative who once did woodworking. But very few of the visitors to the Craft Center have ever put their hands to work with woodworking tools.

"It has been interesting to see how far we've moved away from making things," he says.

It must be bewildering for Peter, because he is always making stuff (when he isn't doing a bit of bird watching). The front screen door to his house is covered in the low-relief carvings typical of the 17th century. Ditto with his kitchen cabinets. The cabinet doors – plus the rails and stiles of the face frames – are all carved in what looks like a riot of shapes to the modern eye.

The furniture in the living room? Yup, 17th century and built by Peter's hand. The dining furniture is the same. He makes baskets in the backyard. In fact, the only period thing missing from Peter's house is a workshop. So he carves spoons in the kitchen.

But after 20 years of this life, doesn't he ever get tired of working in the 17th century?

Peter says he has become interested in other objects and modes of work. He quite likes the bowls made by Robin Wood, a turner in England. There are some Pennsylvania chests he's fond of. And some wild Romanian chests he recently spotted in the book "Der Henndorfer Truhenfund" (Anton Siegl).

But he's not going too far afield. When I recently met up with him in Boston, one of the first questions out of his mouth was: "Are you still building those ugly campaign chests?" So don't expect Peter to start making molded plywood chairs anytime soon.

"We'll see what happens," he says. "I don't want to give up on the 17th century – that's a gas." **PWM**

Christopher is the editor of Lost Art Press (lostartpress.com) and the author of "The Anarchist's Tool Chest."

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Hollow-chisel Mortiser

The machine where 'get it done' meets 'right on the money.'

The hollow-chisel mortiser is one of my favorite woodworking machines. I can take a few steps from my bench, set the fence and depth of cut without any fuss and in a matter of minutes create half of one of the best and most-often used joints in woodworking.

In the past several years, benchtop mortisers have become widely available, but these low-priced machines lack what makes a good mortiser efficient. At the other end of the spectrum, top-of-the-line machines have features that drive up the price with little or no added benefit.

The machine in our shop is a barebones floor model that isn't made anymore. If you can find a used one similar to it, get it. If you're on a budget or unsure how one of these machines will fit in your shop, most of the benchtop machines available have the power and capacity to make mortises in most projects likely to cross your bench.

The advantage most floor-model machines have is a sliding table that clamps the work tight to the fence and repositions the work with a slight turn of the wrist. Today's upper-end machines have a similar table, but the table or the head of the machine also tilts.

Big difference. *The sliding table on floor-model machines dramatically increases efficiency over benchtop models.*

Best sequence. *Leave a space between each plunge to keep the chisel from wandering into empty space and rubbing the bit.*

That tilting feature naturally pushes up the cost, but the need for it seldom arises. On the rare occasion we need to make a mortise at an angle, we can place an angled block of scrap below the work and get on with things. The high and low ends of the market have squeezed out the middle.

Lateral Motion Matters

Drilling a square hole is a neat trick and to make a mortise you simply make a series of square holes in a row. Make a cut on one end, then the other. After those end cuts are made, excavate the middle area leaving a space between each hole that's a little smaller than the width of the chisel. Then come back to remove the remaining material.

That procedure keeps the bit and chisel straight as they cut. The chisel can deflect to one side if used to cut three sides instead of two or four. It also means a lot of up and down and back and forth. The clamp on the sliding table keeps the stock tight against the fence, making sure that all those square holes line up. It also holds on to the work as the chisel is withdrawn.

This is where using a benchtop mortiser becomes slow and frustrating. The operator has to push the work tight to the fence both on the down stroke and the upstroke. The holddowns on benchtop machines have to be set close to the work to function, and when set that close, they get in the way of moving the work laterally.

Setup Begins at the End

The auger bit and chisel are a team, with the auger leading the way. The chips created by the spinning bit have only

LEAD PHOTO BY AL PARRISH; OTHER PHOTOS BY AUTHOR

WHAT ABOUT THE BITS?

Several years ago we reviewed a variety of hollow-chisel and bit sets for *Woodworking Magazine*. That article is available online, but the bottom line is that there isn't much difference between the low-priced bits and the most expensive. Most bits arrive in a functional conditional but can benefit from some tweaking. Sharpening bits occasionally is a good idea, but keep in mind that replacements are only about $20, and because these tools are used in a machine operation, super sharp edges won't stay that way beyond the first mortise or two.

The bit in the photos below is a few years old and still functional. It's a bit beat-up however, and one of the points is bent. That's easy to correct; set the chisel in the machine with the auger bit removed. Lower the chisel to make contact with a flat block with something abrasive on the surface. This can be a coarse sharpening stone, or a flat scrap with #180-grit sandpaper attached. Rub the block back and forth a few times until all four points make contact. This blunts the tips, but that will be fixed shortly. One bad corner won't keep the chisel from working, but it can cause the chisel to deflect in use, which can make the bit rub the inside of the chisel, narrowing the escape route for the chips and increasing heat.

Step two (or step one in most cases, because you don't normally need to dress the points) is to rub the sides of the chisel on the abrasive block. If the chisel is new, there may be grinding marks on the outside. Removing them makes the chisel move in (and out) of the wood with less resistance. Use a coarse enough abrasive so that this doesn't take more than a few minutes. On a used chisel you should be able to raise a burr on the inside with only a few strokes. Step three is to remove the burr with an abrasive cone. If you evened out the points, you have work harder to get all four corners sharp.

The simplest method is to hold the cone in one hand, the chisel in the other and spin the cone a few times until the burr is gone. If you're fussier than that, you can chuck the cone in the drill press to make sure it is held vertically and put the end of the chisel between the jaws of a wooden handscrew. Make sure the end of the chisel is flat on the drill press table as you tighten the clamp and that the chisel is vertical. This ensures good geometry. You don't need to turn on the drill press unless you have a significant amount of metal to remove. If you do turn on the machine, set it to run at the slowest possible speed, make sure the chisel is secure in the clamp and gently lower the quill. The job will be done in a few seconds.

In our earlier testing, this simple sharpening lowered operating temperatures significantly. You can keep going with finer cones and finer honing on the outside, but you won't make a noticeable difference in how the tool performs, although it will look nicer. Don't worry about changing the size of the bit by honing the outside of the chisel; you won't live long enough to make a measurable difference. The auger bits hold up much better than the chisels and rarely need attention. If you must, take a few swipes with a fine file on the flat cutting surfaces only and get back to work. — RWL

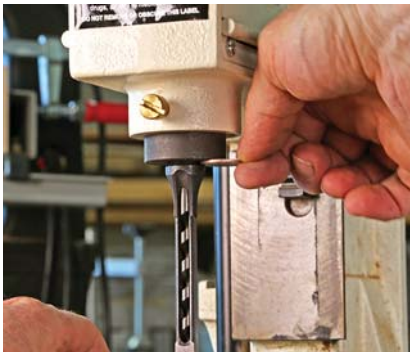
Only if you have to. *If one of the points is damaged, you can grind the others down to match. If they are of equal length, skip ahead to the next step.*

Don't overdo it. *Chisels will benefit from removing grinding marks and a light honing. Polishing them to a perfect edge is a waste of time.*

Alignment only. *The sharpening cone can be placed in the drill press to keep it in line with the chisel. A few twists by hand are all it takes to hone the inner surfaces.*

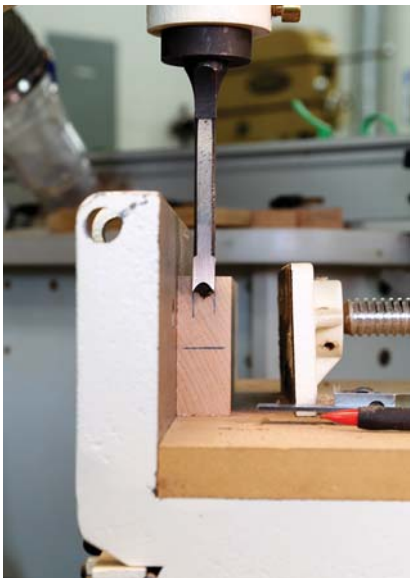
one escape route: up and through the chisel. If the bit tip is too close to the chisel, the chips get caught in the gap and friction can make them smoke. Things don't get hot enough to damage the metal, but the residue sticks and that gums things up to create more friction and an even narrower path.

Many owner's manuals and instructions suggest a gap that is too small. The machine works more effectively and efficiently if the gap is at least the thickness of a quarter. Insert the bit in the chisel and put both in the machine. Place a quarter or other spacer between the shoulder of the chisel and the housing. Tighten the chuck on the bit. Remove the spacer and shove the



Big gap. *Clearance between the end of the bit and the chisel is critical in making clean cuts without burning, smoking or choking.*

Easy alignment. *Use the surface of the fence to position the chisel square. Make sure to push the chisel up, then tighten the locking screw.*



Look here. *Mark the mortise location on the end of the board and use that to precisely set the space between the fence and the chisel.*

chisel up as far as it will go, then tighten the chisel.

Now set the chisel parallel to the fence. Bring the chisel down to the level of the fence, loosen the chisel and move the fence forward to meet the chisel. Gently move the fence and rotate the chisel until the two flat surfaces meet. Push the chisel up and tighten it in this position, then set the fence distance.

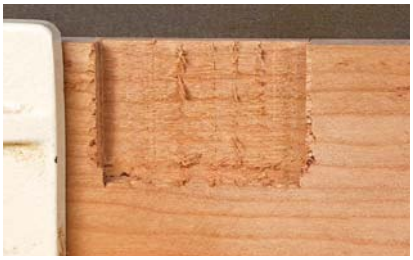
Get in Line

The location of the mortise depends on the position of the bit in relation to the fence. Most of the time you want to match the mortise to the width of the chisel. If you want to make an odd-sized cut, or a cut wider than 1/2", make cuts from one side then flip the work and repeat the cuts from the other side.

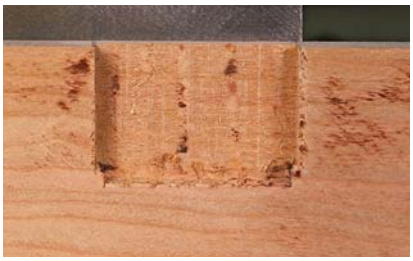
If you try to align the four chisel points to layout lines on top of the workpiece, the point of the auger bit (which hangs below the end of the chisel) gets in the way. Mark the end instead, and you can put the edge of the chisel right on your lines to set the fence (shown below).

Setting the depth of cut is also simple if you use a mark on the end of the work. Slide the piece against the fence, lower the chisel until the points are slightly past your line, then set your depth stop.

A bit more. *Set the depth of the chisel slightly beyond the intended depth of the mortise. Don't worry about what the bottom looks like; it doesn't matter.*



The difference. *The mortise above was cut with a freshly sharpened chisel. It doesn't look much better than the one below (cut before sharpening) but it required less effort to make.*



Hollow-chisel mortisers leave a ragged bottom, but that doesn't matter. A little extra space at the bottom of the mortise won't affect the strength of the joint, so most of the time the only clean out to do is to turn the piece over and tap it lightly to let the loose chips fall out. The walls also won't look perfect, even with the sharpest of chisels and the most precise setups. That, too, is perfectly acceptable as long as the chisel is parallel to the fence. **PWM**

Bob is the executive editor and project illustrator of Popular Woodworking Magazine.

ONLINE EXTRAS

For links to all online extras, go to:

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VIDEO: *In a mortise, here does the glue go?*

BLOG: *Read step-by-step instructions on how to tune-up a hollow-mortise chisel.*

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Fine Sanding Myths

Why are you working harder than you need to?

Sanding is boring. It's boring to watch, it's boring to do, and I find it boring to write about. But myths are fun to write about, and there are some big ones suggesting that sanding to a very fine-grit sandpaper produces better finish results.

So here goes on sanding.

Basic Rules for Sanding

Unless you are solely planing or scraping, sanding is necessary to remove flaws in the wood and mill marks left by machining. The basic procedures for sanding are pretty straightforward and logical.

Whether you're using a handheld sander, stationary machine or sanding by hand, you should begin with a grit of sandpaper that cuts through the flaws efficiently without creating unnecessarily large scratches that will then have to be sanded out. Because mill marks and other flaws can vary greatly in depth, the grit sandpaper you begin with will also vary. But in most cases with newly machined wood, grits between #80 and #120 are usually best.

Once you've removed the machine marks and other flaws, you need to sand up through the grits to #150 or #180, with your final grit going with the grain to line up the sanding scratches. The goal is to sand fine enough so the scratches don't show when you apply stain or finish.

The Myths

So what's the problem? Sanding isn't all that complicated. The problem is that instructions to sand to very fine grits – #400, #600 or even finer – are commonplace. For years I've run tests whenever I've come across these instructions, but I've never been able to confirm any desirable difference.

Rules for sanding. *Begin with a grit of sandpaper that removes the problems efficiently, then work up through the grits until you get the scratches fine enough so they don't show when a stain or finish is applied. Finish up sanding by hand with the grain.*

The tests I do are to take solid or veneered panels of various wood species and sand the entire surface to the lower grit, usually #150, then half the panel to the finest grit. Then I apply the stain, finish or whatever I'm testing over the entire surface.

Here are the common claims I've tested and found to be false:

Sanding to a very fine grit reduces blotching.

Blotching doesn't have anything to do with how fine you sand the wood. The cause is uneven densities and resinous areas in the wood, which allow the stain to color darker in some parts than in others.

Sanding to a fine grit creates very shallow scratches so less pigment lodges, and this may make the wood appear lighter in color if you wipe off all the excess stain. But it doesn't keep the stain from penetrating into the less dense parts of the wood. The fine-sanded wood still blotches just as much as the coarse-sanded wood.

To reduce blotching, use a gel stain if you're working on pine, or apply a washcoat (highly thinned coat of finish or glue) on blotch-prone hardwoods. Do this often enough and you'll to learn by experience just how much washcoat

Blotching. *Sanding to a very fine grit does not reduce blotching. I sanded the left side of this cherry panel to #400 grit and the right side to just #150 grit. The picture was difficult to take because of chatoyance, the reversal of the darker blotchy areas when you change your viewing angle. But the angle I used here shows an equivalent darkness on both sides.*

PHOTOS BY THE AUTHOR

Lighter coloring. *Sanding to a finer grit can have an effect on how dark a pigment stain colors the wood because more pigment will lodge in larger scratches and less in smaller scratches. I sanded the left side to #400 grit and the right side to just #150 grit, then applied the stain.*

to apply to get the results you want.

Sanding to a very fine grit makes the end result (with the finish applied) look richer and deeper and feel smoother.

Sanding to a very fine grit has no impact on the look or feel if you apply at least two coats of a film-building finish such as lacquer, shellac, varnish or water-based finish and sand smooth after the first – the standard procedure.

Sanding to a very fine grit does make the surface feel smoother if you apply an oil finish, which has no build. With no build, the texture you end up with is very close to the texture you created sanding.

But sanding through many grits is a lot of work, and you can achieve the same smooth feel much easier by simply sanding between coats with #400- or #600-grit sandpaper, or wet sand the second and subsequent coats with #400- or #600-grit sandpaper before wiping off the excess.

Sanding to a very fine grit burnishes or closes the pores of the wood so the finish doesn't penetrate and color as much (the opposite of the myth above).

The word "burnish" is often used incorrectly when describing sanding with very fine-grit sandpaper. "Burnish" means to press with a hard, smooth object like metal or stone to compact, or compress, or polish a material. For example, to sharpen a soft-metal card scraper, you burnish the flat side using a hard-metal "burnishing" tool before rolling the edge with the same tool.

Compression is not what's happening when you rub wood with sandpaper, no matter how fine the grit. Sandpaper cuts and makes sanding dust; it doesn't compress. Very fine-grit sandpaper cuts finer and leaves a more polished-looking surface, but this is still not burnishing.

As for closing the pores, you can't do this with sandpaper. You are always cutting, no matter how fine the grit you use. And cutting with a finer grit doesn't impede the penetration of a liquid finish (though a stain may color less because the shallower scratches retain less pigment).

Sanding to a very fine grit reduces grain raising from water-based stains and finishes.

This is not the same as wetting a sanded surface, letting it dry, then sanding again to remove most of the swelling. This claim, made by a number of suppliers, suggests a straightforward procedure of sanding to #320 or #400 grit, then applying the stain or finish. It involves a considerable amount of extra work.

Sanding to a very fine grit reduces the roughness of the surface so it feels smoother and looks shinier before anything is applied to it. But the roughness caused by water or a water-based stain or finish is the result of the swelling of the cellulose fibers, and they're still there no matter how fine you sand.

I've never been able to feel any difference in grain raise by sanding to a finer grit.

Wet sanding. *My preferred method of applying an oil finish is to sand the second and any subsequent coats with #600-grit sandpaper while the oil or oil/varnish blend is still wet. Then I wipe off the excess. This produces smooth-feeling results just as if I had sanded up through the grits to #600 before applying the finish.*

Grain raising. *I sanded the left side of this panel to #400 grit and the right side to just #150. Then I applied a coat of water-based finish. I can't feel any difference in the roughness, which is the grain raising caused by the water, despite some manufacturers' claims that I should be able to.*

Conclusion

One of the biggest obstacles we have in learning finishing is getting past all the misinformation we read in magazines and books and hear from suppliers. To overcome this difficulty put the instructions to a test on scrap wood. If you can't validate what you're being told, chances are you're dealing with myth. **PWM**

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

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The Myth of the Self-taught Craftsman

The best source for learning is right there on your bench.

At a seminar I found myself saying that I mostly taught myself woodworking. It was an easy way to get the idea across that I did not go to woodworking school or take seminars. Later, I regretted not responding more thoughtfully. What a pity I didn't tell the truth. How can I be "self taught" when I have had so many teachers that I can't count them all, and I'm not sure I even knew when I was given a lesson.

Learning happens all the time and comes from sources we don't always recognize. In 1985, I spent time with Dave Sawyer in Vermont. I had heard rave reviews about his mastery with ladderback chairs. Hearing that he had moved on to Windsors did not sway my interest, so I signed on. It was a wonderful time of intensive learning. After hearing me talk about my work and techniques, Dave said, "I can certainly teach you something about efficiency."

Every day I waited for the efficiency lesson but he never talked about it. As I started back to work, I set aside the Windsor dreams and got back to my designs. I found that something had shifted. Chairs took about half the time they took me before. I was mystified. How could I be faster at ladderbacks having been away for three weeks! What did he teach me?

Years later it remains a mystery. I was not consciously doing anything different, but something had changed.

Years later I had a different learning experience. I was frustrated with my spokeshaves, planes and drawknives. I believed I should be getting better finishes off the tool. I wanted the kind of finishes James Krenov writes about in his books. I had never seen such plane work, but he made me a believer and I wanted that experience.

I took a week off my production work to explore what was going on with my tools. For years I referred to that as "teaching myself," but I was not the teacher – I was the student. Now I see that the wood and the tools were my teachers, and if I paid attention to them the lessons would take hold.

I've met skilled woodworkers who inspired me to think about why we do things certain ways. Students have also opened my eyes in areas where I had become complacent. I've made breakthroughs that I can't explain. I have also "figured things out" in solitude. I was being taught, but I wasn't teaching myself.

This isn't a matter of perspective or semantics. In looking at experience as teaching yourself, you focus on mental activity that gets in the way of paying attention to what is happening on the bench. If you think of the wood you work with or the tool you're using as a teacher, you take in the lesson and tap the source of knowledge from which all your human teachers draw.

I now start my classes by telling students not to believe anything I tell them. I do this because I have seen students take what an instructor says as gospel, then not explore the questions that arise around why a technique works, or why wood behaves a certain way. I prefer now to direct students to the sources from which I learn.

When others tell me how to do something I try it – and I learn. I don't know it because they told me; I know it because I experienced it. Then I try variations, letting the material and the tool teach me what they will.

This is what I want you to learn: Not to just listen and believe, but to use what is said in conjunction with the source available – pick up that piece of wood and pay attention.

I write this to honor those who have helped me, but also to point to the richest source of understanding about woodworking any of us has. It's right there on your bench. **PWM**

Brian is the founder of the Brian Boggs Chairmakers (brianboggschairmakers.com) in Asheville, N.C. Beautiful ergonomic seating is his specialty.

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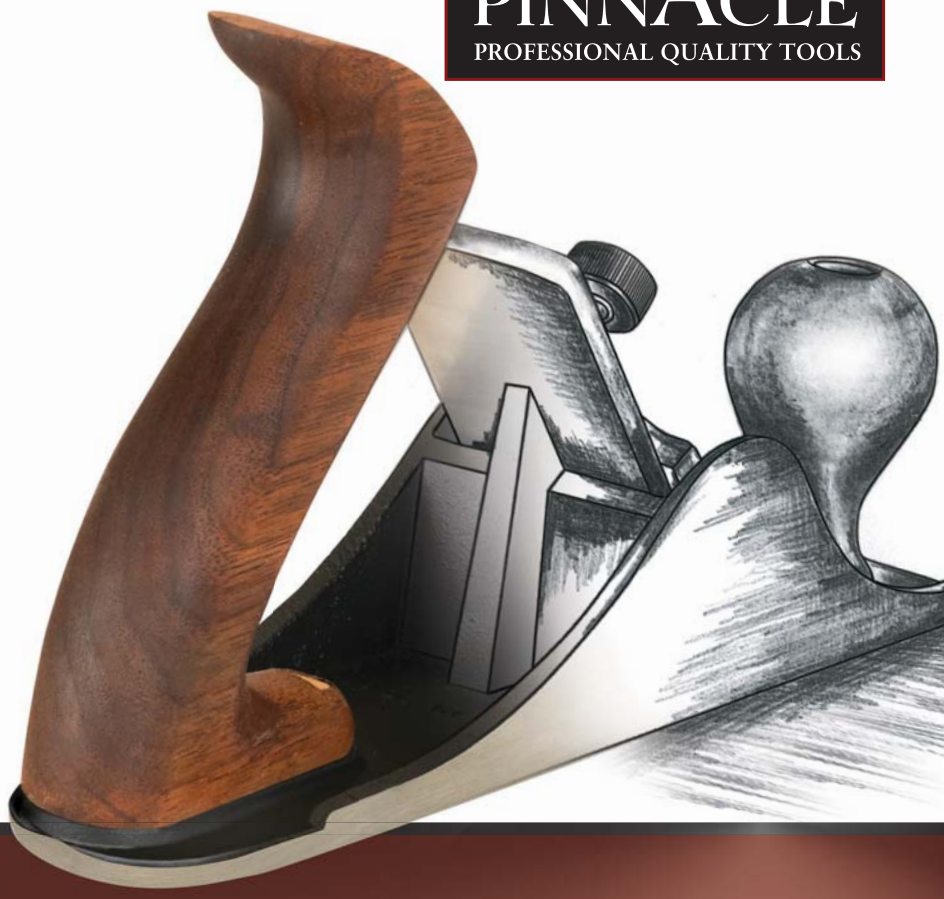

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