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FEBRUARY 2007  
ISSUE #160

# POPULAR WOODWORKING

Learn How. Discover Why. Build Better.

COMPLETE PLANS INSIDE

## Greene & Greene Side Table

Simple Joinery,  
Solid Results

## Tool Storage Solutions

21 Great Ideas  
From 16 Shops

## Sharper Scrapers

We Test 14 Ways  
And Find the Best

## Better Biscuit Joints

27 Tricks to Fix Your Frustrations



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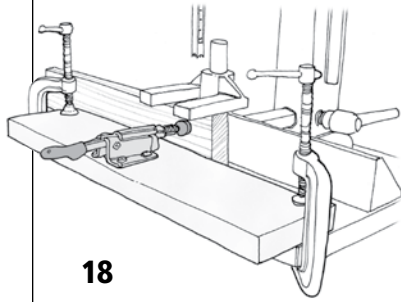
Learn How • Discover Why • Build Better

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*This little mahogany table is a classic example of Greene & Greene design, complete with subtle cloudlifts and ebony pegs.*

Cover photo by Al Parrish

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## Get a Behind-the-scenes Tour Of Popular Woodworking

Editing a woodworking magazine seems like it would be a dream job. You build projects, use the latest equipment and meet famous woodworkers. If you've ever wondered about what it's like here inside *Popular Woodworking*, check out our blog at popularwoodworking.com. The newest member of our staff, Senior Editor Glen Huey, has been writing short essays about what it's really like to work here (versus what his expectations were when he was hired). To find all his entries on this topic, simply search on "Glen Huey" when you get to the blog.

Also new this month is our Arts & Mysteries blog, penned by Contributing Editor Adam Cherubini (artsandmysteries.com). Adam is building an 18th-century standing



desk for his shop this year and you can follow his progress in the shop and ask questions at his blog. **PW**



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### Magazine Extras & Editor Blogs

Here, you'll find article corrections (yes, it's true – once in a while we make a mistake), expanded project plans, 18th-century shop inventories and other curious items. You also can read about what our editors are doing in the shop right now on our blogs.

Visit [popularwoodworking.com](http://popularwoodworking.com) today – and explore.

### Tool Reviews

From miter saws to metal-bodied spokeshaves, you'll find a selection of tool reviews you need to outfit your shop with the machines and hand tools that best fit your needs and price range.

### Writer's Guidelines

Got a great idea for an article? Here's how to submit your proposal.

### Contact the Staff

If you have a question about *Popular Woodworking*, about woodworking in general ... or even a complaint about the magazine, we want to hear it. You can contact us directly through our web site – and we even give you our direct phone numbers.

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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*, 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.

# Please Welcome a Most Familiar Face

As I was combing through the résumés of the woodworkers who applied for our open senior editor position I had a disturbing thought: I was glad that my résumé wasn't in that pile because I'm not so sure that it would merit a second look.

We had some remarkably talented woodworkers and writers apply for the job. And I was struggling to decide which ones to interview when one more résumé came in.

It was from Glen Huey, a professional woodworker, long-time contributing editor to *Popular Woodworking*, teacher, book author and DVD host.

At that moment I was certain of two things: We had found our next senior editor and that it was a very good thing that I already had this job.

Most readers of our magazine know Glen through his work in these pages—he's written more than 25 pieces over the years for us. But you might not be aware of everything else this busy man and accomplished woodworker has done.

Since 1994, he and his father, Malcolm L. Huey, have run a successful furniture-making business in Middletown, Ohio, called Malcolm L. Huey & Son ([hueyfurniture.com](http://hueyfurniture.com)). From their shops, Glen and his father have turned out a remarkable number of high-end early-American pieces—everything from simple Shaker-style candlestands to inlaid spice boxes to a Federal side table with completely over-the-top inlay and banding. We have been able to feature only a small number of his pieces in our pages.

So Glen wrote three books: "Fine Furniture for a Lifetime," "Building Fine Furniture" and "Glen Huey's Illustrated Guide to Building Period Furniture" (all from *Popular Woodworking Books*). In those three books,

you can see a wider range of his work, including some more contemporary pieces. Glen, as you will soon find out, is not afraid to stretch himself. And so he started making DVDs about furniture building.

So far, he and a business partner have produced three DVDs that they filmed in his shop and edited themselves (typical woodworker, no?). These DVDs are more than just video instruction. They include plans for the

project being featured on the DVD, plus pages and pages of still photos that you can print out and take to the shop. It's a great way to package information on a DVD—and I'm sure DVDs like this will become the standard. Check out his DVDs at his other web site: [woodworkersedge.com](http://woodworkersedge.com).

And if that's not enough, Glen also has been teaching extensively at the American Sycamore Woodworkers'

Retreat, at Woodcraft stores, at the WoodWorks shows and even privately. Whew.

So what do we have planned for Glen here at *Popular Woodworking*? Good question. With our recent addition of Robert W. Lang as senior editor (who has a résumé much like Glen's), we are in the catbird seat with a well-seasoned staff that is more than a bunch of word-herding desk-jockeys. We're already making some big plans that you are going to start to see in future issues—changes in the way we test tools, build projects and present techniques. You also are going to see some big changes in our web site. So stay tuned. **PW**



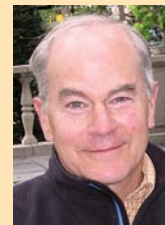
Christopher Schwarz  
Editor



## CONTRIBUTORS

### SCOTT GIBSON

Scott Gibson and his family recently moved to a new home in southern Maine, where he's making use of his casework construction, trimming and stair-building skills.



His tools currently share space with a generator, a snowblower, two motorcycles, gardening equipment and myriad recycling bins. Although he misses the capacious shop at

his former home, Scott says a lack of space helps to remind him that it's not the workshop that really counts, but the pleasure he takes in making something ... such as the shop he's planning to build come spring.

Scott is a former editor for several magazines, including *Fine Woodworking* and *Fine Homebuilding*. For this issue, he wrote *Woodworking Essentials*.

### DAVID MATHIAS

David Mathias is a hobbyist woodworker with a particular love of Greene & Greene furniture. Self-taught, he came to woodworking when he and his wife couldn't



find the kitchen table they wanted. Today he's unsure what made him think that making furniture was possible without tools, a workshop or skills. Nonetheless, David was hooked,

and immersed himself in the craft. Nine years later he has a shop, serious skills and a fine collection of tools.

David's shop time is interrupted by his day job on the faculty of the Ohio State University. His first article for *Popular Woodworking* appears on page 61.

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# Achieve Flat Tops With a Sander Frame

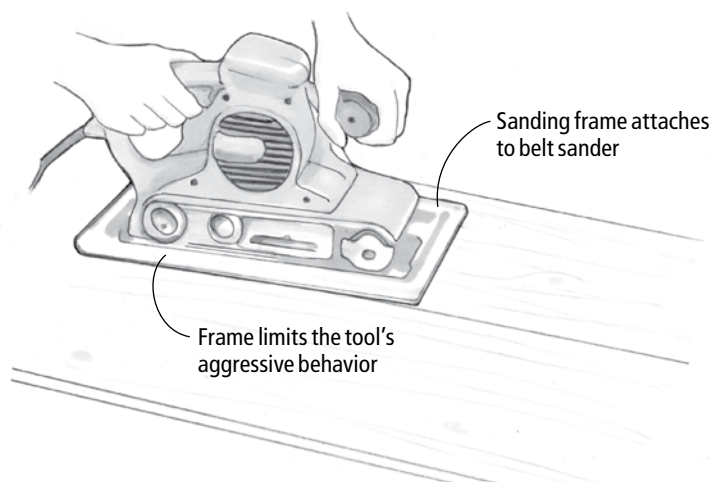


Illustration by Hayes Shaney

## A Belt-sander Frame to the Rescue

It was with interest that I read the question by Tim Souder from Arma, Kan. regarding “Leveling Uneven Joints After Gluing Up a Panel” (August 2006, issue #155). I was surprised at the answer given by Christopher Schwarz. Maybe the method that is used by us in this end of the woods would be helpful:

Always plane the timber slightly thicker than the final finished size (3-5mm). Glue the panel in multiples of your thickness width. Always ensure that the timber is in contact with your clamps. Use a C-clamp to force it if necessary. Once it’s dry, plane the sections to the correct thickness. Now you have only half the joints to contend with. Again, ensure that the timber is in contact with your clamps to ensure a flat surface.

The final flattening is done contrary to the editor’s comments, with a tool for which no skill is required. That is a belt sander with a ski (Bosch makes one). Sand cross grain until the whole surface is sanded. Then remove marks by sanding with the grain. Another trick is to make pencil marks across the grain and sand until they are all removed.

I can assure you that you require no skill to use a belt sander with a ski.

Jurie Richards  
Pietermaritzburg, South Africa

*First, a language difference of the accessory you are discussing: It’s called a sanding frame here. Mounted to a belt sander, it limits the tool’s aggressiveness.*

*My response was based on a couple of assumptions about the reader, his shop and his situation. Of course, in our shop we always aim to line up our panel joints so they are perfectly in line. And with the help of a mallet, handscrews and pinch dogs, I almost never have to engage in that radical approach.*

*However, my experience is that readers struggle with this mightily and – no matter what they do – end up with joints that are out of alignment. And because most tops are wider than 12” or even 15”, running it through the planer isn’t an option (and few non-professionals have drum sanders).*

*So when they experience this problem, what should they do? That’s what my response was predicated on. Sanding frames aren’t in the toolkit of every home woodworker here (I don’t own one), but many woodworkers have an inexpensive jack plane.*

*You’re completely right that a sanding frame reduces the skill needed to operate the tool, but you might not be giving yourself enough credit – it’s still a tool that requires skill, probably as much as a bench plane.*

— Christopher Schwarz, editor  
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### Unwanted Lasting Impressions on Projects a Perplexing Problem

When using shellac to finish a project, I notice that on tabletops I continue to get impression marks when something heavy is placed on the top – for example a lamp or a telephone, even when felt pads are placed at the points of contact on that item.

I've used both pre-mixed shellac, such as Zinsser at a 3-pound cut. I've also mixed my own shellac using freshly bought shellac flakes mixed with the correct alcohol. These were thinned and applied at about a 1- to 1½- pound cut. Each coat was sanded after drying. The piece was then wiped using a tack cloth. When sanded there was no gumming on the sandpaper, just fine dust from the shellac, so I know that it cured OK before the next application. Anywhere from five to seven coats of shellac were applied depending on the item being finished. The last coats are even thinned a little more. After the final coat is applied I usually wait 24 hours before doing a final rub, either with steel wool or pumice and oil, and then the piece is waxed.

I've also noticed that the same problem will occur when I French polish a piece. In time, however, sometimes months and sometimes up to a year, the finish is OK.

Am I placing items too soon on the top, before the final finish really cures to accept a heavy item?

The only thing that occurred to me is that maybe there's a problem in my final finishing phases. When I rub out a piece, either using steel wool or pumice and oil, maybe I'm not waiting long enough for the finish to cure before applying wax to the item. And maybe by applying wax to the finish too soon, I'm in essence sort of sealing the finish and preventing air to get in to enable the finish to cure properly. It's still curing but it's taking a lot longer to do so. Any suggestions would be greatly appreciated.

Mike  
via the Internet

*The thinner you use won't make any difference after it has had time to evaporate out of the finish.*

*The most likely cause of your problem is that the shellac you're using is too old. Shellac begins deteriorating when it is dissolved in alcohol. The deterioration is slow; it takes six months to a year before you will really notice any difference in how hard the finish gets. But the conditions in which the shellac is stored could accelerate this. Heat destroys the shellac more quickly.*

*It's also possible that you rubbed or waxed the surface too quickly. Stick your nose up against the dried shellac and take a whiff. If you can smell any of the alcohol, wait longer. If you can't, meaning all the alcohol has evaporated, go ahead and rub or wax.*

*You're not sealing in the solvent, however. If rubbing or waxing too quickly is the cause of your problem, it's because some of the oil or wax was able to penetrate into the shellac. Not very likely, but possible.*

*If the conditions are hot when you make the impressions, then the heat would be a factor. Shellac is an evaporative finish so it's not very resistant to heat. It loses some of its hardness*

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## LETTERS

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in hot temperatures. Also, a hot coffee cup will indent no matter how hard the shellac gets.

Beyond this, you need to remember that because shellac is an evaporative finish, it scratches more easily than varnish, for example, which is a reactive finish.

—Bob Flexner, contributing editor

### Veneer is Useful, but has Limitations

I want to start experimenting with veneer. First, could you recommend some books or articles? I am especially concerned about being able to make the end grain and edge of the board look convincing. And, is the veneer thin enough and flexible enough to make it conform to basic shaped edges?

Obviously, I could face a piece of hard or soft maple with tiger maple veneer and then put the edge of the board through my shaper, but would that produce convincing results? Further, is that doable without chipping out and destroying the veneer? And finally, are veneered boards capable of enduring the rigor of hand-cut dovetailing? Am I con-

finied to using veneered panels inside rails and stiles?

Bill Wiese  
Melbourne, Florida

One of the best sources for veneering information I've come across is online at [joewoodworker.com/catalog](http://joewoodworker.com/catalog) – if you scroll down to the bottom of the page, there are a lot of articles under the heading “Learn More About Veneering.” I also recently posted a short article on our blog ([popularwoodworking.com/blog](http://popularwoodworking.com/blog)).

I'm afraid you won't have any luck trying to mold veneer over a shaped edge. The material is too brittle, and the radii are too tight. As long as you have a good bond between the veneer and the substrate, you should be able to apply the veneer and then machine the edge. My guess is that you would be able to dovetail also, with the same caution about a good glue bond. I've never tried it, but it seems like it should work. Try it and see on some scraps before committing to this on a large project. **PW**

—Robert W. Lang, senior editor

## QUESTION? COMPLAINT? WRITE TO US

*Popular Woodworking* welcomes comments from readers about the magazine or woodworking in general, as well as questions on all areas of woodworking. We are more than happy to share our woodworking experience with you by answering your questions or adding some clarity to whatever aspect of the craft you are unsure about, and if you have a complaint, we want to address it whenever possible.

Though we receive a good deal of mail, we try to respond to all correspondence in a prompt manner. Published correspondence may be edited for length or style. All correspondence becomes the property of *Popular Woodworking*.

Send your questions and comments via e-mail to [popwood@fwpubs.com](mailto:popwood@fwpubs.com), via fax to 513-891-7196, or by mail to:

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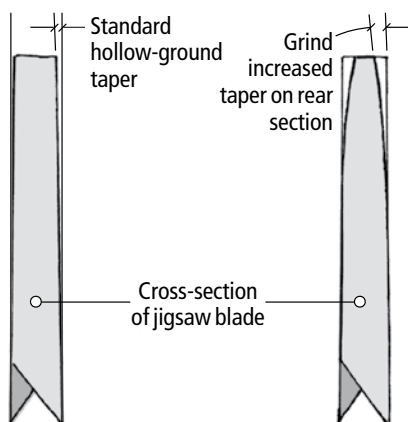


# Taper Jigsaw Blades For Tighter Turns

## THE WINNER:

What do you do when you need to make a sharply curved scroll cut with a jigsaw, but the width of the blade causes it to bind and burn in the kerf? (On a test piece of course!) The problem is resolved simply by a quick but carefully executed taper grind on the trailing edge of the blade. A typical hollow-ground jigsaw blade is tapered slightly from front to back, but increasing the taper at the rear allows for significantly tighter turns.

A 1" belt sander is perfect for this job. Be sure to hold on to the top end of the blade's shank securely with a pair of locking pliers. I hold the blade with its teeth up and tilted slightly as I press it against one side of the wheel, then the other, to create the desired taper at the rear of the blade. Remove material symmetrically from the full length of the blade, then smooth it up with some #400-grit silicon carbide paper wrapped around a small hardwood block.



I've found that a  $\frac{3}{4}$ "-diameter circle is about the minimum achievable with an unmodified  $\frac{3}{16}$ " scrolling blade. However, after tapering, I could cut a  $\frac{9}{16}$ "-diameter circle. This technique also works on the wider  $\frac{5}{16}$ " blades when I need a smaller turning radius than the factory grind will allow.

Ric Hanisch  
Quakertown, Pennsylvania  
*continued on page 20*

## CASH AND PRIZES FOR YOUR TRICKS AND TIPS!

Each issue we publish useful woodworking tips from our readers. Next issue's winner receives a \$250 gift certificate from Lee Valley Tools, good for any item in the catalog or on the web site ([leevalley.com](http://leevalley.com)). (The tools pictured below are for illustration only, and are not part of the prize.)

Runners-up each receive a check for \$25 to \$100. When submitting a trick (either by mail or e-mail) you must include your complete mailing address and a daytime phone number. If your trick is selected for publication, an editor will need to contact you. All entries become the property of *Popular Woodworking*. You can send your trick by e-mail to [popwoodtricks@fwpubs.com](mailto:popwoodtricks@fwpubs.com), or mail it to Tricks of the Trade, *Popular Woodworking*, 4700 E. Galbraith Road, Cincinnati, OH 45236.



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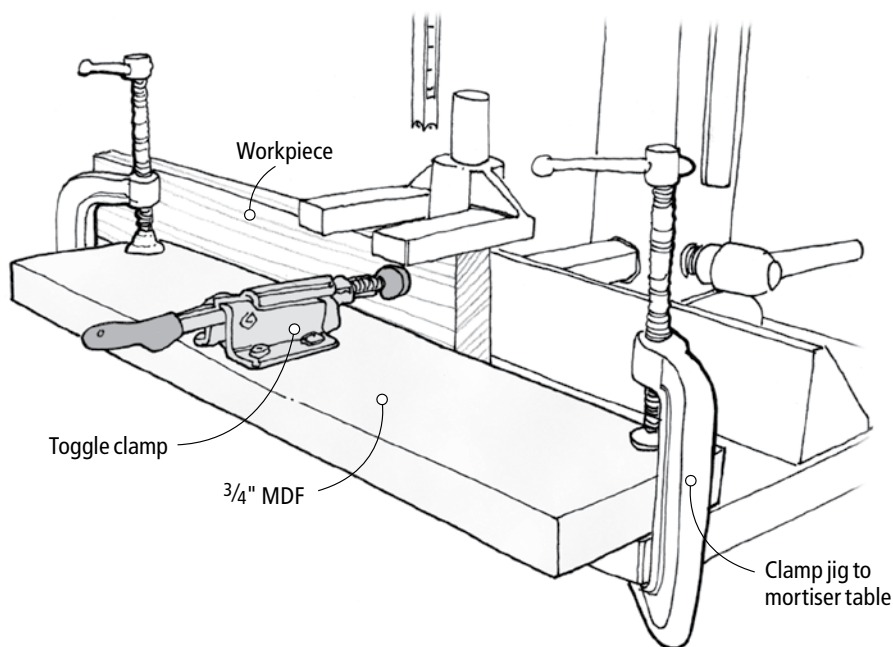
## Mortiser Fence Clamp Improves Your Grip

My hollow-chisel mortiser works great for quickly boring mortises, but I find that my hand gets tired holding workpieces in place against the table and fence while cutting multiple mortises. This jig, which quickly clamps on the mortiser table, takes care of the problem. It firmly clamps the workpiece against the mortiser fence, alleviating hand strain and ensuring accurate boring. The jig is nothing more than a toggle clamp screwed to a piece of  $\frac{3}{4}$ "-thick Medium-density Fiberboard the same length as the mortiser's table. After placing the workpiece against the

mortiser fence, I back off the toggle clamp so that its pad is  $\frac{1}{8}$ " short of its full extension, then I place the pad against the workpiece and clamp the jig to the mortiser table. This creates just the right amount of clamping pressure while allowing for easy clamp release.

When boring mortises, it's a simple matter to throw the clamp, bore the mortise, release the clamp, reposition and repeat. Because the clamp only costs a few bucks, the jig is a cheap investment in accuracy and muscle relief.

Serge Duclos  
Québec, Canada



## Wood Preparation For Painted Finishes

As with clear finishes, the adage “the finish is only as good as the surface it is put on” is appropriate to painted finishes also. When I apply an oil-based (alkyd) paint or a latex paint, I always apply a primer first. I have found that tinting the primer to match the topcoat is a good idea. That way, if the topcoat is chipped, at least the exposed primer won't be as noticeable.

I take this one step further and stain the wood before I prime. This is especially important if the paint is a darker color and the wood to be painted is a light-colored wood such as

pine, poplar or soft maple. I use a water-based aniline dye such as Lockwood's powdered stain or Transtint's liquid stain. I usually use a dark walnut color in a fairly concentrated mixture. I apply the color heavily and really let it soak in. After it dries, I lightly sand the raised grain. I then apply my primer coat of paint and finish coats.

Now if the painted finish is chipped or abraded, the exposed wood does not jump out at you like stark white wood does.

Craig Bentzley  
Chalfont, Pennsylvania

continued on page 22

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## Routing Spline Miter Slots Without Complex Jigs

One of the cleanest, most attractive ways to join a case corner is with a miter. But a miter joint alone is inherently weak and must be reinforced with a spline or biscuits. Although biscuits are fine in many cases, a plywood or solid-wood spline makes for a stronger joint.

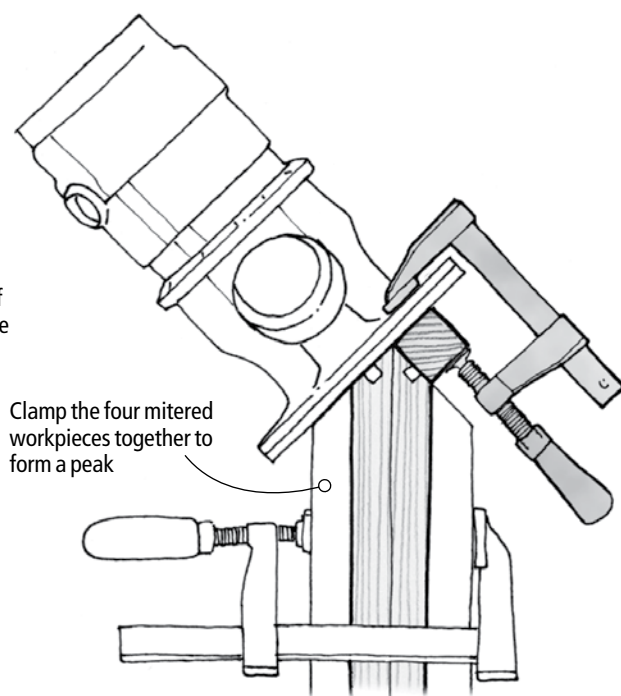
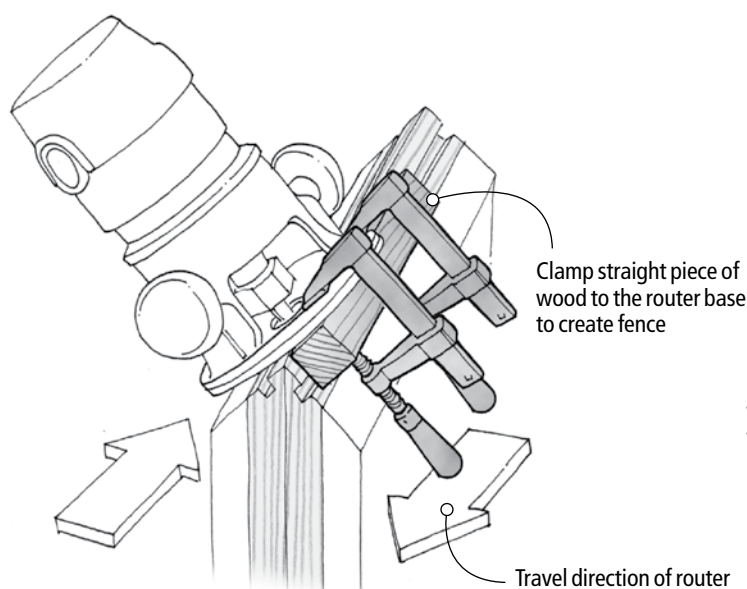
The difficulty with making a spline miter joint is cutting the slots for the splines. The face of the miter is narrow and doesn't provide much bearing surface for a router base. A router edge guide also needs a surface to bear

against. My approach solves both problems, and provides a safe and easy way to rout the slots for the splines.

Begin by clamping the four case pieces together to form a peak. This provides a wider bearing surface for the router base, as well as a square shoulder for the router edge guide to ride against. Position the clamps as close to the ends of the pieces as possible without obstructing router travel. Then clamp everything in a vise or to the edge of your bench.

The fence can be as simple as a straight piece of wood clamped to the router base. Position the fence so that the slot will be located near the inner edge of the miter. Then rout in the direction shown. After routing the first two slots on the inner pieces, establish the peak on the opposite ends of the case pieces and rout this set of inner miters. Next, reverse the sandwich and repeat the entire process.

*Paul Anthony  
PW contributor*



## Quick-cut Tenons: Two Cheeks in One Pass

When using a tenoning jig on the table saw, most woodworkers saw tenons one cheek at a time. This can be time-consuming and can lead to inaccuracies in tenon thickness, especially if the workpieces vary even a bit in thickness. I find it much quicker and more accurate to use two blades at once, with a spacer in between. This works great as long as your mortises are consistent in width, which they will be if cut with a router or hollow-chisel mortiser.

You can buy thick metal shims for spacers, but I simply use a 4"-diameter disk of hard-

wood cut from a strip of wood planed to the exact thickness needed. Use a dense, straight-grained wood such as maple (plywood works, too), and make sure the spacer is consistent in thickness to prevent any blade wobble. The initial planing, test-cutting and replanning to arrive at the perfect thickness may take a bit of time, but it's well worth the joint-cutting time saved in the future. I keep spacers for cutting tenons of various thickness, which work fine for repeated use as long as I always employ the same blades. If necessary, you can fine-tune the spacing using paper or metal shims.

To make the cuts, I use the inner and outer blades from my dado set, but you could also use a pair of standard table saw blades. For safety, use a zero-clearance throat plate on your saw, and make sure to clamp the workpiece securely to the tenoning jig to make the cut. After cutting the tenon cheeks, I cut the shoulders on my sliding compound miter saw, although you could do this on the table saw after removing your tenoning setup.

*Bill Paine  
Lakeline, Ohio  
continued on page 24*

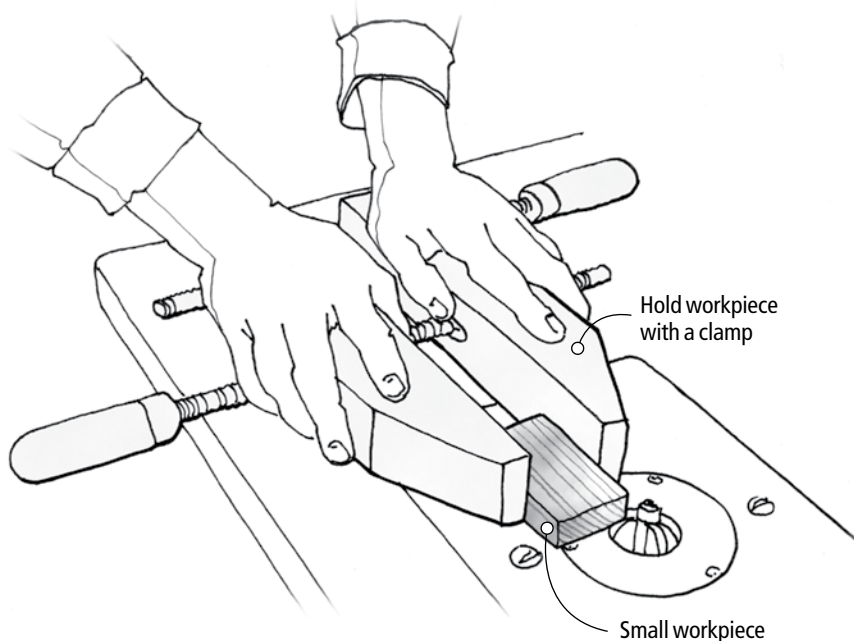
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## Routing Small Pieces

Whenever creating small pieces that include a routed detail of some sort, it's best to do the routing on the larger "parent" board, and then separate the small piece from the larger. However, this isn't always possible, and you may find yourself needing to rout a small piece. The question, of course, is how to safely hold the piece without endangering your fingers.

With any luck, you already have the answer at hand: a large handscrew. It's the perfect tool for securely grasping small pieces because it's big enough to keep your hands at a safe distance; it's wood, so you won't damage your expensive bits should something slip; and the jaws can be adjusted to hold even wedge-shaped workpieces. If you don't already own a large handscrew, it's worth investing in one for this, as well as all sorts of other shop tasks.

*Dick Johnson  
Amarillo, Texas*

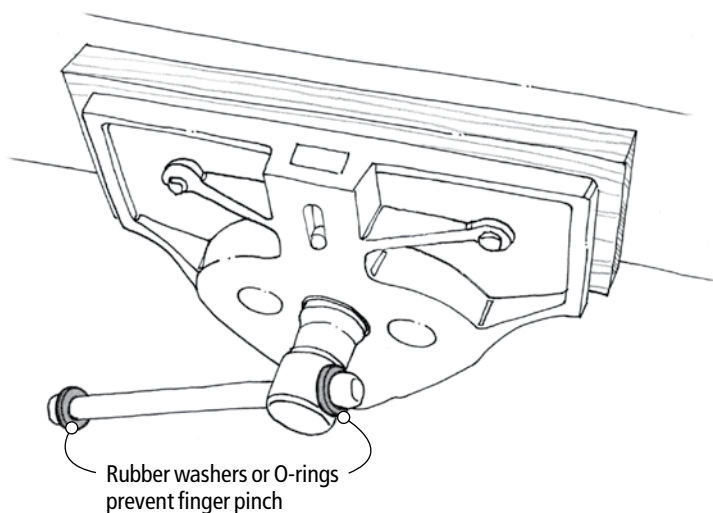


## Vise Handle Bumpers

I'm sure I'm not the only woodworker who has sported the occasional blood blister caused by a fingertip that got slammed between the ball end of a metal bench vise handle and the vise's lead screw post. I found that a cool, low-cost solution to the problem is to slip a couple of rubber O-rings or washers onto each end

of the vise handle. In my case, rubber hose washers – the kind you find inside the female end of a yard hose – did the job perfectly. If you don't have any stashed away in your junk drawer already, you can buy them in almost any hardware department for less than the cost of a box of Band-Aids.

*Albert Moody  
Dublin, California*



## Cleaner Scrollsaw Layout

I do a lot of scrollsaw work that involves attaching patterns to workpieces. In the past, I've simply adhered the patterns using spray adhesive. That's a quick and easy approach, but the glue residue can be a mess to clean up afterward, and impedes sanding of the pieces.

I've found that I can avoid these problems by first covering the workpiece with easily removable blue painter's tape, available at any hardware or paint store. Adhering the pattern to the layer of tape allows me to just peel the tape off the sawn pieces afterward, removing the glue residue at the same time. When applying the tape, slightly overlap the strips, which makes for more efficient removal from the cut pieces. (If two strips straddle a piece, peel them off by grabbing the underlying strip.) **PW**

*Daniel Lynch  
Newport Beach, California*

## Steel City Tool Works Table Saw – the Newest Kid on the Block

Most woodworkers dream of having a large cabinet saw as the main machine in their shop. The reality is that in many shops there isn't the room or the need for that size saw. That is why we decided to look at the smallest saw in the lineup from Steel City Tool Works. We think it is a good choice for a small shop – assuming it lives up to its promise.

The saw arrived in perfect shape, protected by a steel cage and pallet. Assembly was straightforward, and attaching the cast iron wings revealed the first of many nice surprises. Instead of having to shim the wings level with the main top, set screws were provided that made this sometimes-tedious adjustment fast and painless. All of the hardware was packed in individual bags labeled with the contents, and for what step they were needed.

Once the saw was together, I got out the dial indicator to check alignment and runout. I didn't need any tools for adjustment, as everything was within .001" of where it was supposed to be. The 90° and 45° stops for the trunnions are accessible from the top of the saw, but these settings were also right on the money from the factory.

The table was flat, and once the rails were assembled, the T-square type fence went on with the slick plastic faces square to the table top and parallel to the blade and miter gauge slots. The faces are easily removable from the outside of the fence, and the clamping mechanism has a larger-than-average bearing plate that locks the fence down firmly. The scale is



Adjustment screws to level the cast-iron wings are but one of the many user-friendly features of the Steel City table saw.



### SPECIFICATIONS

#### Steel City Tool Works 35601 10" Table Saw

Street price: \$899

Trunnions: mounted to saw cabinet, left-tilt

Motor: 1<sup>3</sup>/<sub>4</sub> hp, 120 volt

Fence capacity: 30" right of blade,

Performance: ●●●●○

Price range: \$\$\$

Steel City: 615-225-9001 or

[steelcitytoolworks.com](http://steelcitytoolworks.com)

easy to read, and the cursor window has two red lines to prevent errors of parallax.

The miter gauge is of decent quality. The bar is not machined, but it does have set screws in the edges to adjust the fit of the bar in the slot. The miter gauge slots in the table are standard size (3/8" x 3/4") with a T-slot.

Inside the cabinet, the trunnions looked larger than I expected, and were attached to the cabinet. If the top ever needs adjustment, this arrangement makes it easier, and this type of construction provides a more solid, more smoothly running machine.

There is a ramp inside the cabinet base that directs dust to the collector outlet, and the motor and switch come prewired. The connection between the two is made on assembly by plugging them together. All in all, getting the saw up and running was smooth and straightforward, made easier by nice little touches along the way that prove the folks at Steel City put some serious effort into not just the basic construction features, but the entire process from crate to shop floor.

With everything assembled, it was time to put the saw through its paces. The motor drives the arbor via a poly V-belt, and it ran smooth and vibration free, easily passing the

nickel test. I was initially concerned that the motor would be underpowered, but it handled rip cuts in 4/4 hardwoods with ease. Included with the saw is a decent quality, carbide-tipped combination blade. Deciding to kick things up a notch, I made some rips in 8/4 white oak. It wasn't effortless, but the saw didn't bog down, either. For those who want more power, this saw is also available with a 3-hp motor for \$100 more.

The guard is the standard basket type, with splitter and anti-kickback pawls. I would prefer to see a riving knife, but this guard does detach and reattach quickly. A single knob behind the saw, together with a clip behind the blade, holds the guard in place, so there are no tools and little time involved in removing or replacing the guard. — Robert W. Lang

For more information, circle # 167 on Free Information Card.

*continued on page 28*

continued from page 26

## Gramercy Rasps

A good rasp is a simple tool that performs a multitude of tasks: tweaking the fit of a mortise and tenon, rounding an edge or shaping a curved form. It's the sort of tool that can change from "never heard of it" to "can't live without it" the first time you use one. The best ones have the teeth formed by hand, leaving a random pattern of scratch marks that can be removed with a stroke or two of a scraper.

A couple of years ago we tried the French-made Auriou rasps and were quickly sold on them. The only drawback we could see was the price. It's justified by the labor-intensive way they are made, but out of reach for many of us. Gramercy Tools has just introduced hand-cut rasps at a more reasonable price.

The set of three rasps I tested had progressively finer teeth as they decreased in size, which makes them a good combination of tools to go from rough shaping to fine work. Compared side by side with the Auriou there was no significant difference in performance. I'll pocket the savings and buy another Gramercy rasp or two. —RL

For more information, circle # 168 on Free Information Card.



### SPECIFICATIONS

**Gramercy Tools Hand-cut Rasps**  
**Street price:** \$53.95-\$72.95 each  
**3-piece set:** 5", 6 1/2" and 9 1/4": \$164.77  
**Material:** surgical-grade stainless steel  
**Teeth per inch:** 25, 18 and 11  
**Performance:** ●●●●○  
**Price range:** \$\$\$  
**Gramercy:** 800-426-4613  
 or [toolsforworkingwood.com](http://toolsforworkingwood.com)

## Veritas Scrapper Shave

One of the things I love about chairmaking is also one of the things I hate about chairmaking: You have to shape curved parts where the grain can change direction in three or four places on the same piece.

The Veritas Scrapper Shave is the solution to this problem. It allows you to take fine finishing cuts like you would with a scraper, but you can bear down on the work with immense control like you can with a spokeshave.

This tool has serious mass (10.1 ounces) and excellent fit and finish. The high-carbon blade sharpens easily and takes a nice hook. Then you just drop the blade into the steel body, tighten the two brass thumbscrews, then go to work.

The shave, which resembles a gunstock scraper, is excellent for flat surfaces, outside curves and any shaped work. It's a clean-up tool more than a shaping tool and is used after you rasp your piece to shape. This style of tool is so useful that many woodworkers



### SPECIFICATIONS

**Veritas Scrapper Shave**  
**Street price:** \$59  
**Blade:** .040" thick, Rc 48-52  
**Toe material:** brass  
**Handles:** African rosewood  
**Performance:** ●●●●○  
**Price range:** \$\$  
**Lee Valley Tools:** 800-871-8158 or  
[leevalley.com](http://leevalley.com)

would make their own. But now you don't have to. **PW**

— Christopher Schwarz

For more information, circle # 169 on Free Information Card.



## INFINITY ROUTER-BIT SET

How do you accurately test a seven-piece professional set of Infinity router bits? Let's face it, you could spend months in the shop trying to accomplish such a feat by using them day in and day out while building several projects and studying their performance along the way.

I didn't have that kind of time, so I applied some standard tests to check the precision of the manufacturing.

I used micrometers to check the various steps in the rabbet combination bit, to check the diameter of the bearing in relation to the cut on the flush trim bit and to the cut of the 3/4" pattern bit.

I moulded a piece of hardwood with the 1/2"-radius roundover bit in a hand-held router, and with the 1/2" cove bit in the router table in order to check for a matching fit and determine if they could be used for a drop-leaf profile. I found that they all worked superbly under shop conditions.

But the true test of a packaged set is: Are these bits the ones most often used in a professional woodworking shop or that most woodworkers would use in their shops? Or, did they select a few usable bits and finish out the set with less-than-desirable contents? No, this is a useful set.

Each of these bit profiles has been a workhorse in my shop during the past 12 years. I've used them all and I find myself using at least one during each of my woodworking projects.

This is a nicely assembled selection of router bits for use in your shop and these bits also have 1/2" shanks for added strength and durability. The set is \$149.90. For more information, call 877-872-2487 or visit [infinitytools.com](http://infinitytools.com). — Glen D. Huey

### TOOL RATINGS

Performance is rated on a one-to-five scale. You won't see a low rating ("one or two") because we don't publicize inferior tools. "Five" indicates the leader in the category. Five dollar signs indicates highest price in the category. Three indicates an average price. If you have tool questions, call me at 513-531-2690 ext. 1255, or e-mail me at [chris.schwarz@fwpubs.com](mailto:chris.schwarz@fwpubs.com). Or visit our web site at [popularwoodworking.com](http://popularwoodworking.com) to sign up for our free e-mail newsletter.

— Christopher Schwarz, editor

# The Soul and Basis of Our Art

How to design furniture like an 18th-century cabinetmaker.

I realize the way I work wood is a bit out of the ordinary. It's also true that the way I write magazine articles is out of the ordinary. Unlike typical articles, the "Arts & Mysteries" column has year-long themes.

This year I intend to explore a simple hand-tool project in never-before-seen depth. Frankly, I've been frustrated by the "Build a Chippendale Highboy in three pages" articles. So I thought it would be helpful if you could peer into my shop as I construct something entirely by hand. For it is my understanding that very few of you have experience building projects entirely by hand, but that almost all of you use hand tools to some degree.

I've long suspected that there's a difference between using hand tools for some things and using hand tools for everything. What I see are woodworkers fitting their hand tools into factory-like paradigms. They seek jigs for their hand saws and measure their planes' shavings with micrometers. I'm not interested in passing judgment or trying to convince anyone that my way is better. Rather, I'm keenly interested in the exploring the difference in the work styles to learn what techniques or methods are the chief contributors to success.

In the article that follows, the first in the series, I'll explain how I design furniture. I don't work from fully dimensioned project plans. Like almost everything else I do, the way I design is linked to the methods I use to



Photos by the author

I design my own furniture here at my workbench with a pair of dividers. I like designing this way, but I really don't like having to clear my workbench to do it. This year's articles will detail the construction of a standing desk for my shop. I'll make this desk entirely by hand using 18th-century techniques.

work wood. I hope you enjoy this article, and the others in this series.

## Designing Furniture for Hand Tools

I design my own furniture because I don't want my woodworking limited by the avail-

ability of someone else's measured drawings. I've spent half my life designing and drafting professionally. But I don't use these skills to design furniture. Frankly, I don't think I could achieve the dimensional accuracy required to build something "to the print." In addition, I think it's easy to get lost in the pursuit of achieving perfect dimensions and lose sight of the beautiful artwork that is period furniture. So instead, I work to proportions. I suspect this is the way most cabinetmakers actually operated in the 18th century.

by Adam Cherubini

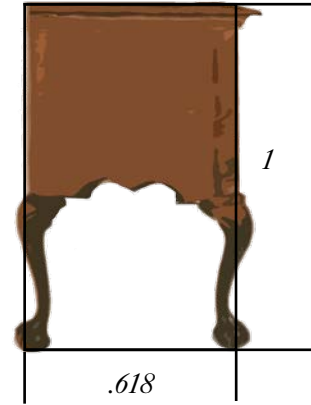
*In addition to woodworking, Adam enjoys drawing and painting. He studied art at the Fleischer Art Memorial in Philadelphia. Visit his blog at [artsandmysteries.com](http://artsandmysteries.com).*

## Major Mass

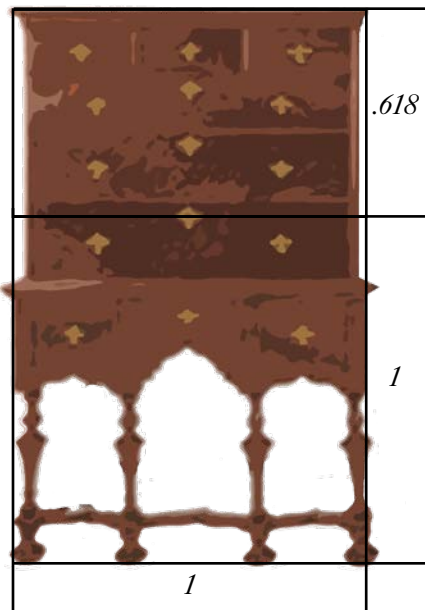
I begin each project by establishing the “major mass” – the height, width and depth – of the piece. These dimensions are critically important as they establish the artistic composition. It is this composition that you will see from across the room – not some really great dovetails or a smoothly planed surface. People will largely form their opinion of your work based on your composition. You can develop your own composition by going to art school as I did, or you can simply copy the composition of 18th-century masters.

Though 18th-century furniture varies dimensionally, the proportions from one piece to the next are often quite similar. For example: If you divide the height by the width of baroque high chests or secretaries, you’ll find most pieces are close to twice as high as they are wide. Though there are only a few in existence, William & Mary high chests are typically one unit high by the golden section (.618) wide. Chamber tables (minus their tops) and many low chests of drawers are square (1:1). I don’t know if this was intentional. It may be one of those “it just looks right” kind

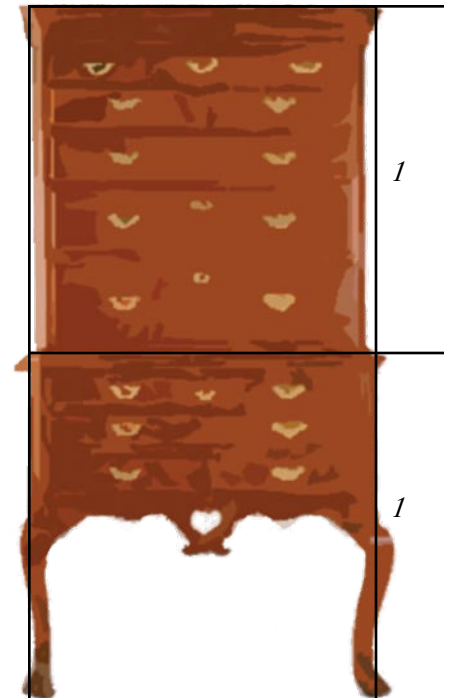
of things. It may be that you can find these relationships where ever you look for them. Frankly, I don’t care. These simple ratios are easy to work with and look great. Departing from these fundamental proportions can work. I have seen Shaker furniture that is taller than 2:1. The result can be an alluringly naïve or quirky piece. Of course there are exceptions to every rule, but you’d be hard pressed to find something built in the 18th century, “off proportion” and made of mahogany.



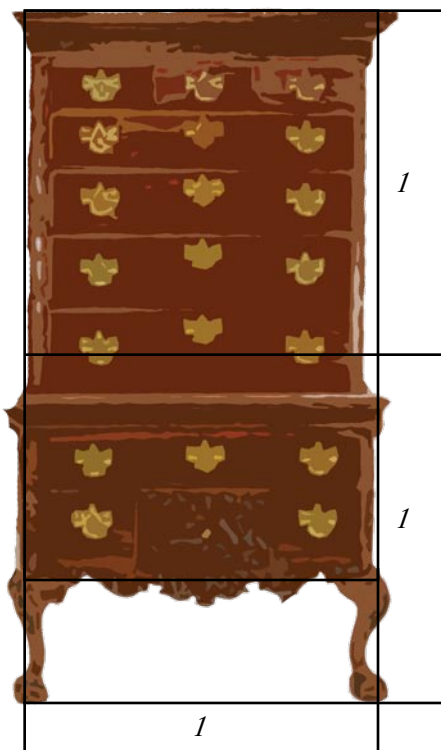
Low chests and dressing tables often have depths of roughly 18" or so. The 18" is roughly a golden section of 30" (the typical height for dressing/chamber tables) so that makes the end a golden section. Deeper dressers may have resulted from making the top a golden rectangle.



This William & Mary-style high chest retains some of the influence of an earlier period with its stouter, squarer shape and it incorporates the golden section into its height.



This Queen Anne-style high chest is divided vertically in half by its upper and lower case. This looks fine for furniture of a man-sized scale. This piece is 76" tall. The Chippendale high chest shown on the far left is divided by the golden section. It is more than 8' tall! That puts its waist mould (the moulding that unites the upper and lower cases) about 3' off the floor. That's roughly the same height as this Queen Anne's waist.



This Chippendale-style high chest has a 2:1 height-to-width ratio. The result is a nice tall piece that doesn't look top-heavy or unstable.



I think the proportions of this little Chippendale-style chamber table are just lovely. It's almost hard to believe the basic shape is a simple square.



**Establishing Depth**

Depth is harder to determine. Carcase depths seem to hover between 18" and 24". This may have been a practical requirement, either for drawer function or because of the availability or stability of wide stock. Still, I generally see depths relating to the height, using some kind of recurring ratio. In fact, you may find it's a good idea to determine the height and width of your piece based on your available stock width.

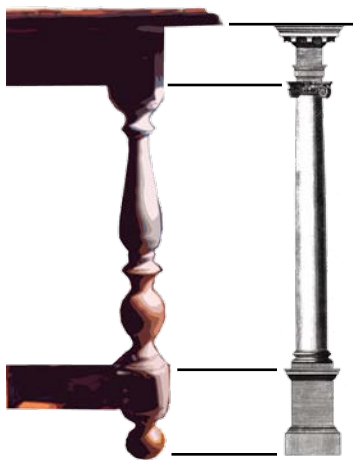
**Divisions of Space**

Once the major mass is established, the next trick is dividing the space pleasingly. I've found 18th-century case furniture is divided vertically in various ways. These divisions are the next most important step after the major mass is established. Though I'm showing you period furniture (this is the "Arts & Mysteries" column after all), you can apply these principles to any style.

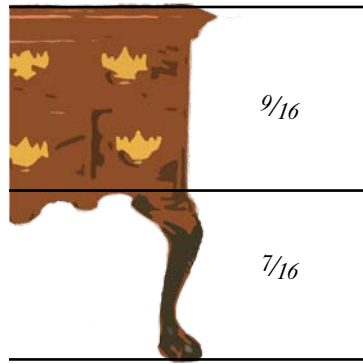
**Drawer Spacing**

Period pieces typically have drawers that are graduated in height, tallest at the bottom to smallest at the top. Known in art circles as "forced perspective," the effect corrects our perception of "near is big; far is small." Without the graduated drawers, case furniture with equally spaced drawers will look top-heavy.

After years of struggling with this issue, I've finally arrived at a way to produce nicely



The Classical column orders can be very helpful for establishing vertical divisions, especially those found on legs. In this instance, this table's stretcher is located in proportion to the base or plinth of an Ionic column. Its apron is sized to the capital of the column.



This little Chippendale-style chamber table is divided by my own "discovery" – the  $\frac{9}{16}$  rule. The  $\frac{9}{16}$  is close to the golden section, but the difference is not subtle. Compare this to the lower case on the William & Mary piece to the right and you'll see what I mean.

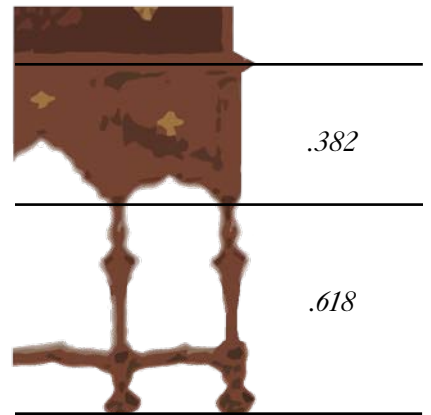
graduated drawers. I can say that no basic arithmetic series works (e.g. make each drawer smaller than the one below by  $\frac{1}{2}$ " or so). These arithmetic series exaggerate the graduation and give pieces a Sears toolbox look.

To see how I space a four-drawer chest, see the drawing at right.

My method for determining five-drawer spacing is a bit more complicated. We should therefore be suspicious of it. Like everything else in this article, I'm going to share it with you for your consideration. Don't think this the only way. I can say I laid this template over several pieces from at least two different regions and it fit well.

**Details**

Mouldings, carvings and hardware affect the composition in different ways. Mouldings explain and punctuate structural transitions. The 18th-century carvings typically draw relations to the natural world, softening a rectilinear design by guiding the eye along acanthus vines to shells or soaring volutes.



The lower case of the William and Mary high chest shown earlier is very clearly divided by the golden section. Its matching chamber table has similar proportions.

Hardware can have a unifying effect, inviting the eye to journey around the piece. In the 18th century, craftsmen clearly used ornamentation to affect composition. I don't feel qualified to comment on baroque carvings, but it appears to me that mouldings were used for specific applications, had specific shapes and were proportioned similarly. Generally, coves hold things up. Ovolos and ogees ease the abruptness of corners, encouraging you to continue upward. Base mouldings are typically convex, stabilizing the mass above them.

**Joinery**

Conspicuously missing from these designs is any sense of how to put the furniture together. I've neither defined nor sized the joints. I'm not saving this portion of the design for a future article. This is it. This is all there is. And this is exactly what I see in period work.

There are standard sorts of joints, typically applied to specific situations. Individual workmen would produce those joints according to their stock and their shop practices. Herein,



I know it's not easy to see here, but graduated drawers trick us into thinking the sides of the case angle in toward the top. The basic pyramid shape is the generally preferred composition. It's settling.

I see a bright line between the “crude” work of a “mechanick” (an 18th-century term for person who worked with his hands) and the elevated artwork of the design.

### Conclusion

I find working to proportions allows me the flexibility to create furniture around the stock I can produce with the least amount of effort, without sacrificing the important aspects of

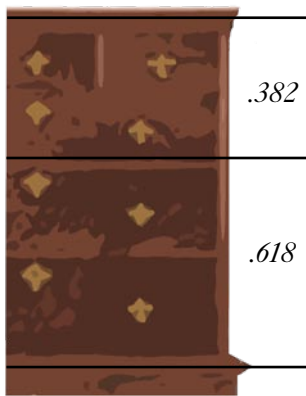
the design. It’s an art-focused approach. So I am free to go fast, maybe a little sloppy, and straight to the point. The proportions define what is truly important.

The greater point I’d like to leave you with is the importance of design, and the relative unimportance of piston-fit drawers or perfect dovetails.

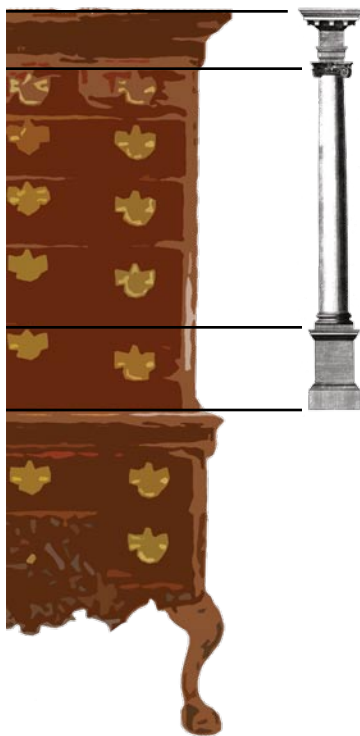
I would never argue that finely planed wood isn’t beautiful. But I wonder at the sense of put-

ting so much time and effort into something that may not be noticed from 3’, while sacrificing that which is easily apparent from 50’. By following proportion rules established 3,000 years ago, we have in our power the ability to evoke a visceral human response.

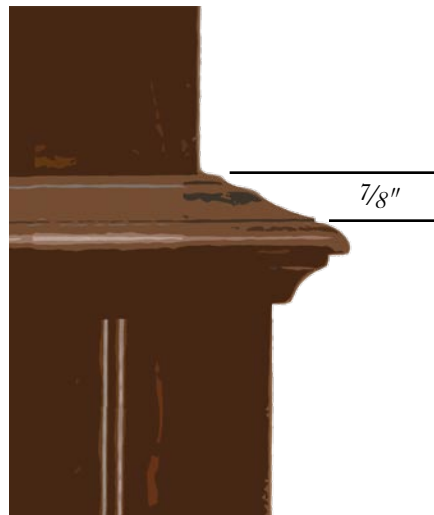
Maybe this is why master cabinetmaker and fashion icon Thomas Chippendale (1718-1779) urged his fellow cabinetmakers to develop “an acquaintance” with the classical column orders and their use in art and architecture. He wrote in 1762, “These [proportion rules], therefore, ought to be carefully studied by every one who would excel in this Branch [cabinetmaking], since they are the very Soul and Basis of his Art.” **PW**



In a four-drawer chest, the position of the middle drawer divider is determined by the golden section. In some regions, this would be the only divider that is dovetailed to the case sides. The top and bottom dividers are then determined by dividing each of the two remaining spaces by  $\frac{9}{16}$ . So, for example, the big drawer at the bottom is  $\frac{9}{16}$  of the .618 space. The larger of the two top drawers is  $\frac{9}{16}$  of the .382 space. This is almost easier and faster to do with dividers than with a tape measure and calculator. The question I’m not answering here is whether the middle divider is a golden section of the entire carcass side, or the space under the moulding. The reason I’m not answering is because I simply don’t know. Realize that these images are all of real masterpieces and not my own designs.



Start the five-drawer design by imposing a column order of your choosing. This is Ionic, a masculine order. The column gives us the crown moulding and lowest drawer. From here, we are left with a four-drawer chest. Those drawers can be determined exactly as the four-drawer chest above.



This William & Mary waist mould is a typical design. The upper half of the waist is sized to cover the thickness of the lower board in the case ( $\frac{7}{8}$ ”). This moulding is beautifully long, making a roughly 30° angle. It is only slightly concave over all, bulging closest to the case, then meeting the bullnosed top of the lower case with a shallow ogee. Under the lower case’s top is a simple cove. I personally do not find mouldings particularly quick and easy to make by hand. But the alternative isn’t good. In my opinion, router bit makers generally make ugly mouldings with shapes based on circles instead of the ellipses typical of period moulding planes.

## MORE ARTS & MYSTERIES ON ADAM CHERUBINI’S NEW BLOG

This year’s Arts & Mysteries column has Contributing Editor Adam Cherubini building a period case piece entirely by hand. As you might imagine, this is a vast and sweeping series, and therefore there’s lots of ground to cover.

So we’ve provided Adam with a blog ([artsandmysteries.com](http://artsandmysteries.com)) where he will expand on many of the details and themes he touches on here, post photos from the shop, provide progress reports on the project and respond to your e-mails.

There are already several blog entries that relate to this first column on design that you should investigate:

- **Form Follows Function, But What Function?** Adam discusses why period furniture was embellished with mouldings or carvings.

- **A Discerning Eye:** Adam discusses how he gets inspiration for his furniture designs and then records them for him to use in the shop.

- **Finding the Golden Section:** Learn more about the golden section and how it is derived.

- **Column Orders:** You might have noticed that Adam mentioned “column orders” in this piece. What are column orders? This is where you base designs off the proportions of different classical styles of columns, such as Doric or Ionic. There’s more on this topic now on the blog.

— Christopher Schwarz, editor

# Country Tool & Toy Chest

Nails, glue and a nice long day in the shop are all it takes.

This rustic hinged-lid box is a design traditionally used as a basic tool chest, but I thought a scaled-down version would make a great chest for stashing toys (with the addition of a safety hinge) or extra grocery bags in the kitchen. It is adapted from a chest shown in John A. and Joyce C. Nelson's "The Big Book of Weekend Woodworking" (Lark Books).

## A Trip to the Home Center

A trip to the home center is the beginning of every "I Can Do That" project, and there I assessed every #2 pine 1x12 in stock. Because I'd decided to paint the chest, I wasn't concerned with the grain as much as getting the straightest, flattest boards. While two 8'-long boards would have been enough to construct the chest, I purchased an extra, just in case. I also bought a quart of red paint, 6" strap hinges and a box of 4d finish nails. Even with the extra wood, the materials cost was but \$50.

## Rough Cut the Pieces

The top and front are the most visible pieces, so I marked these first and rough cut them to length (with a couple inches to spare) using the miter saw. I then selected the next clearest areas for the sides, then two boards for the back, and finally the bottom. Offcuts were set aside for the battens and cleats.

## Lay Out the Arches

Arched cutouts on the sides dress up the piece a bit. To lay them out, first mark a line on each piece  $1\frac{1}{16}$ " up from the bottom, then measure in  $4\frac{1}{16}$ " from each long edge on both pieces and mark the intersections. Then butt the sides against one another (feet to feet), set

by Megan Fitzpatrick

Comments or questions? You can reach Megan at 513-531-2690 ext. 1348 or [megan.fitzpatrick@fwpubs.com](mailto:megan.fitzpatrick@fwpubs.com)

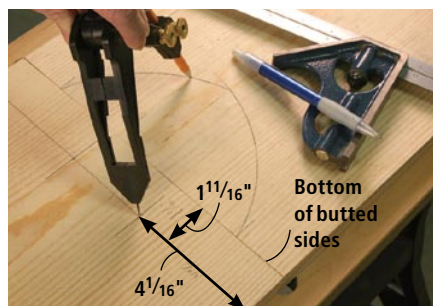


Photo by Al Parrish

the compass to make a  $5\frac{1}{4}$ " radius, then place the point on each mark and draw arcs on the opposite piece. The two arcs on each piece will intersect at the center of your board, forming the arch apex. Cut out each arch with your jigsaw, then clamp the sides together and clean them up using a rasp and sandpaper.

## Chamfered Panels

Because the top, front and back of the chest are 13" wide and a 1x12 is narrower than that, you have to rip two boards to  $6\frac{1}{2}$ " wide to make each panel. It's nigh on impossible to cut a glue-ready edge with a jigsaw, so to help disguise any resulting gaps at the seam, I used my block



Mark a horizontal line  $1\frac{1}{16}$ " from the bottom of each piece, then measure in  $4\frac{1}{16}$ " from each of the four sides and mark the intersecting points. These are the four points on which you'll place the point of your compass to mark the arches.



Clamp the sides together and use a rasp and sandpaper to clean up the arches. Don't worry if they don't match perfectly; because there's  $22$ " between them on the finished chest, minor differences won't be noticeable.

## COUNTRY CHEST

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL
		T	W	L	
4	Front/back	3/4	6 1/2	22	Pine
2	Top	3/4	6 1/2	23 1/2	Pine
2	Sides	3/4	10 3/4	17	Pine
1	Bottom	3/4	20 1/2	10 3/4	Pine
2	Battens	3/4	1	13	Pine
	Cleats*	3/4	1	72	Pine

\* Cut to fit.

plane to chamfer the adjoining edges.

Now you're ready to assemble the box. Glue and clamp the back boards in place on the sides and drill three 1/8" pilot holes in each board. Drive 4d finish nails into the holes, then repeat this process for the front boards. Leave the nails proud of the surface to avoid dinging the boards with your hammer, then use a nail set to drive them 1/16" below the surface.

### Top & Bottom

To make the battens, cut two 1" x 13" pieces from your offcuts, trim the front edge at 45° but leave a 1/4" flat at the top. To make the top, screw the top pieces to the battens. First snug the two top pieces together on your bench, and lay the battens across either end. Drill countersunk clearance and pilot holes, then attach the battens with #8 x 1 1/2" wood screws.

To make the bottom, first cut your cleats to size and nail them around the inside bottom edge of the chest. Now cut the bottom a hair wider than necessary and use your block plane to trim it to fit. Drop the bottom in place, hang the work over the edge of the Workmate



Hold your plane at a 45° angle to the edge of the board, and shave down the length until you're satisfied with the chamfer. The goal is to draw attention to the "seam," so make sure the chamfer is big enough so that paint doesn't overwhelm it.

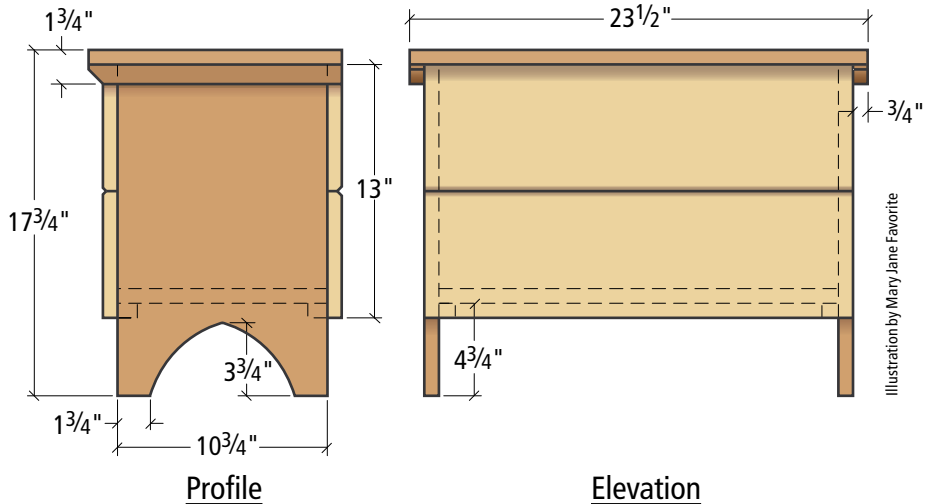


Illustration by Mary Jane Favorite

so the cleats are supported, then nail the bottom to the cleats from the inside.

### Woodworking Therapy

Sand to #120 grit and apply two coats of bright red paint to the outside and a coat of amber shellac to the interior to seal it. After the paint dries, grab a ring of keys and beat the you-know-what out of the box until you get a lot of lovely dings. Take a rasp to the edges, and for good measure, grab your hammer by the head and use the handle end to whomp the top edge a few times. Once the piece looks distressed (and you feel de-stressed) apply a coat of any dark gel stain over the entire thing. Work the stain into the dings, dents and raw edges. Wipe it off, and voilà—a century of age in just minutes. After the stain is completely dry, apply a coat of paste wax.

### The Finishing Touches

To attach the strap hinges, measure in 4" from the battens on the top, mark the holes with an



After drilling pilot holes, drive 4d nails and leave them a little proud of the surface.

awl, and drill pilot holes for the screws. The screws that came with the hinges were too long, so we used some we had on hand. You can color the heads black with a Sharpie if you want everything to match. I also attached a length of chain, leaving a few extra loops so the open angle of the top can be easily adjusted. **PW**



Cut the front and back cleats to size first, then snug the end cleats between them.

## ABOUT THIS COLUMN

Our "I Can Do That" column features projects that can be completed by any woodworker with a modest (but decent) kit of tools in less than two days of shop time, and using raw materials that are available at any home center. We offer a free online manual in PDF format that explains all the tools and shows you how to perform the basic operations in a step-by-step format. You'll learn to rip with a jigsaw, crosscut with a miter saw and drill straight with the help of our manual.

To download the free manual, visit [ICanDoThatExtras.com](http://ICanDoThatExtras.com).

# Thorsen House Side Table

A small project that's big on details.

I've always appreciated the look of furniture designed by architects Charles and Henry Greene. Though often equated with the Arts & Crafts movement at the beginning of the 20th century, their furniture designs reflect an Asian influence that softens the often hard lines of Arts & Crafts furniture. While looking for a piece to build, I was talking with Robert W. Lang, senior editor for *Popular Woodworking* and author of the just-published "Shop Drawings for Greene & Greene Furniture" (Fox Chapel). He suggested adapting a small side table originally made for the Thorsen House in Berkeley, Calif.

The cutouts on the aprons quickly won me over, but I did make a couple modifications that lightened the look of the table. Rather than a full-width shelf captured between two straight stretchers, I opted to make the stretcher with a top-and-bottom cloudlift design and make the shelf only half the width of the original. I also added some  $\frac{1}{16}$ " quirk details to the corners of the legs and the edges of the aprons, stretchers and the shelf. These "rabbets" add a simple shadow line to a very pleasant design.

## Start With the Lumber

Selecting your lumber for this table is an important step. Because it's such a small piece, wild grain will dramatically change the overall appearance. You want to look for mahogany that is as straight grained as possible. This

by David Thiel

*David is the executive editor for Popular Woodworking Books. He can be reached at 513-531-2690 ext. 1255 or david.thiel@fwpubs.com.*

Photo by Al Parrish



A  $\frac{3}{8}$ " mortising chisel makes quick work of the apron mortises on each leg. One of the stretcher mortises is visible on the leg at the bottom of the photo.



The cloudlifts are subtle curves, not radii. Make a template (bottom) of the curve you like, then transfer that curve to your aprons and stretchers.

will become even more critical if you're bookmatching the top piece. And because of the high cost of mahogany, I definitely recommend bookmatching. It allows you to buy  $\frac{8}{4}$  material and resaw for the top, aprons and stretchers, while still allowing enough thickness to yield the legs and breadboards.

Start by selecting the best wood for the top piece. Pay careful attention to the grain orientation as the piece is almost square and it's easy to get the direction reversed, which will yield a funny-looking top. Resaw the top pieces, then surface and join the two boards, trimming to allow the best grain match possible. Now glue the two (hopefully no more) pieces together to form the top.

While the glue is drying, select the next-best sections of your wood for the aprons and stretchers. Resaw the necessary pieces from your  $\frac{8}{4}$  material to yield the balance of your pieces. Then surface, plane and saw the stock to final thickness, width and length.

### Mortise & Tenon Joinery

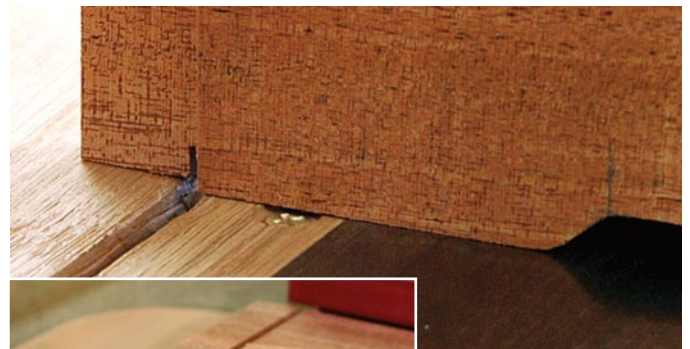
The joinery for the table should start at your mortiser. I chose a  $\frac{3}{8}$ " mortising chisel for all the mortises on this piece. Mark the locations of the mortises on the

legs, paying careful attention to the location for the lower stretchers. There are only two stretchers and they will require mortises on only one inside face of each leg. Orient the legs so those faces are on the inside.

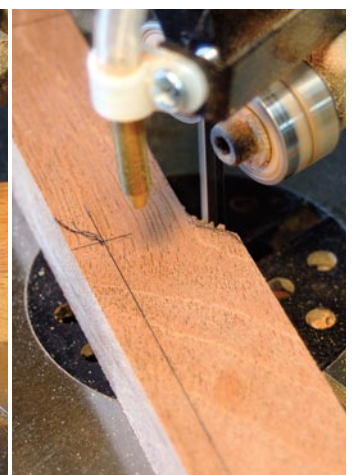
The mortises for the aprons are  $\frac{7}{8}$ " deep and  $4\frac{1}{2}$ " long. They are centered on the legs and start  $\frac{3}{4}$ " down from the top of the legs. The two apron mortises will intersect one another in the leg, so be careful while cutting the second mortise to avoid damaging the rather thin interior corner left by the two mortises. The stretcher mortises are  $\frac{3}{4}$ " long and start  $5\frac{1}{8}$ " up from the bottom of the legs.

While you're at the mortiser, lay out and cut the  $\frac{7}{8}$ "-deep mortises in the breadboard ends. The middle mortise is  $4\frac{3}{4}$ " long and centered on each breadboard. The two outer mortises are  $2\frac{1}{4}$ " long and start  $1\frac{3}{8}$ " in from each end. All the breadboard mortises are centered in the thickness of the breadboards.

Remove the top from the clamps and trim it to finished size. I used the table saw to cut the tenons on all the pieces, but you may choose to use a router. In fact, I was a little lazy on the saw and opted to leave the  $\frac{1}{8}$ " blade in rather than switch to a dado



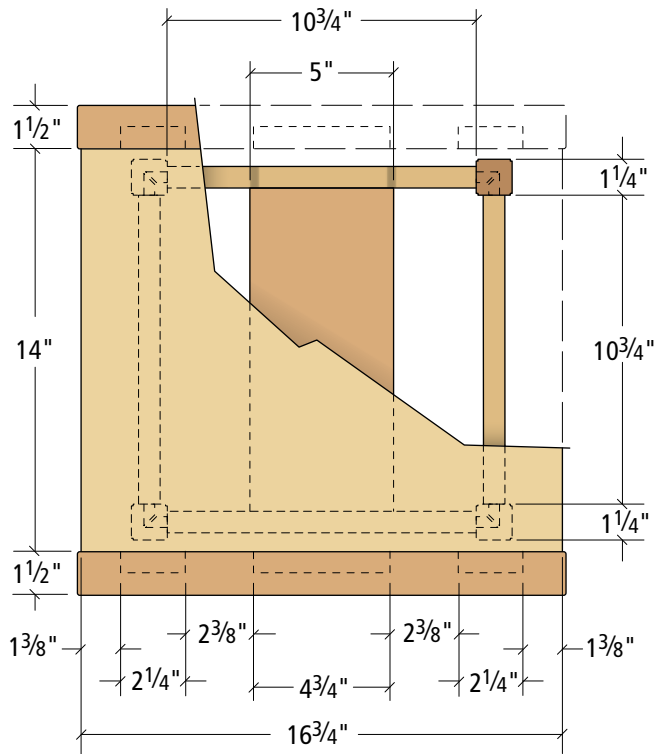
The tenons are created on the saw by first defining the shoulders both on the thickness (top) and then the width (bottom) of each tenon. I then simply made repeat cuts on the tenon, nibbling away the waste.



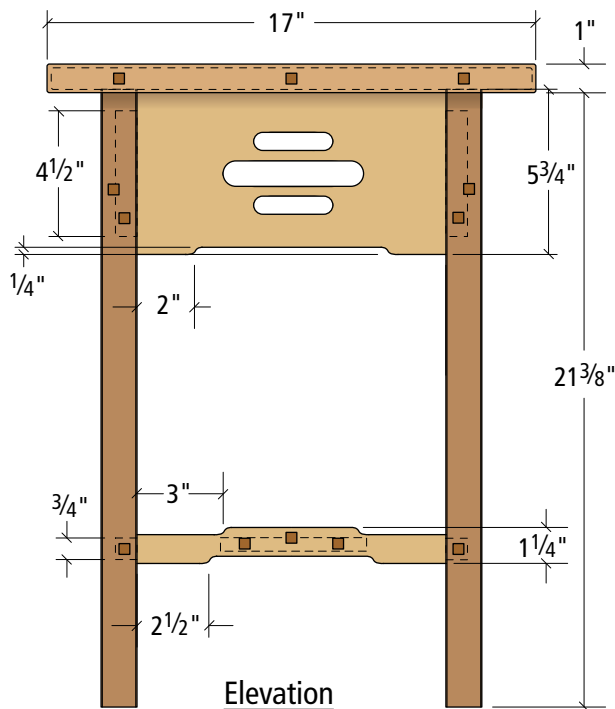
To avoid too much filing and sanding, cut as close as you can on the band saw. I cut in close to the line around the curves first (left), then come back and use the cutting edge of the blade to nibble away the waste up to the line (right).

to run the tenons. There's also a little logic behind my laziness. By making repeat cuts on the cheek of the tenon my blade leaves slight ridges on the surface. If test fitting

my tenon achieves a fit that is too snug, I'm able to come back with a rabbeting plane and trim the tenon to fit. Miter the ends of the tenons to fit the legs.



Plan



Elevation

### Cloudlifts & Quirks

With the tenons cut it's time to add some of the details. Each of the aprons and the two stretchers have what have been coined "cloudlift" designs. This shaped offset is formed on the lower edge of each apron and on both the top and bottom of the two stretchers. The offset is a simple 1/4". The location of the offsets can be determined from the scaled patterns for the aprons and stretchers. The transition itself isn't a simple radius, though you could do it that way if you prefer. Rather, the transition can be drawn using 1/4" radii, but should then be softened to make

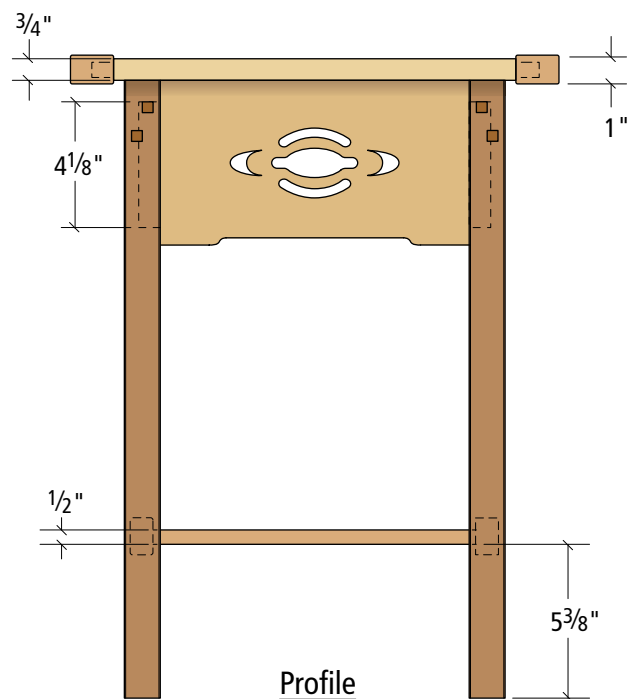
the transition more subtle. I made a few test pieces before I was satisfied with the curve, then used that test piece to mark the cloudlift transitions on the actual pieces. With your pieces marked, head to the band saw and make your cloudlift cuts. Use a file and sandpaper to clean up the shapes on all the pieces.

To add a little trick for the eye I cut a 1/16" rabbet (or quirk) on the long edges of the legs on the table saw (see picture at right), and also on the four long edges of the small shelf. To add the same detail to the lower edge of the aprons and all the edges of the stretchers, I

### THORSEN HOUSE SIDE TABLE

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
1	Top	3/4	16 3/4	15 1/2	Mahogany	3/4" TBE
2	Breadboard ends	1	1 1/2	17	Mahogany	
4	Aprons	3/4	5 3/4	12 1/4	Mahogany	3/4" TBE
4	Legs	1 1/4	1 1/4	21 1/2	Mahogany	
2	Stretchers	3/4	1 1/4	12 1/4	Mahogany	3/4" TBE
1	Shelf	1/2	5	11 1/4	Mahogany	
32	Pegs	3/8	3/8	1/4	Ebony	

TBE = tenon both ends



Profile

Illustrations by Mary Jane Favorite

set up a trim router with a bearing guide and a straight bit. The guide allows the bit to follow the cloudlifts without difficulty.

### Patterns & Ebony

Before assembly, use your scrollsaw or fretsaw to cut out the patterns on the aprons. Enlarge the scaled patterns to full size (or download the full-size patterns from Magazine Extras our web site), then attach them to the aprons using adhesive spray. Cut the patterns and then use sandpaper and small files to clean them up.

One last step is to make the square holes for the ebony accent pegs. I again used my  $\frac{3}{8}$ " mortising chisel to make these  $\frac{3}{8}$ "-deep holes. The locations of the dual pegs on the legs are  $\frac{1}{4}$ " in from either side and the pegs are  $\frac{5}{8}$ " apart from one another. The pegs at the tops of the legs start  $\frac{3}{4}$ " down from the top of the leg. The lower pattern starts  $3\frac{1}{8}$ " down from the top. The pegs on the stretchers and breadboards are evenly spaced as shown.

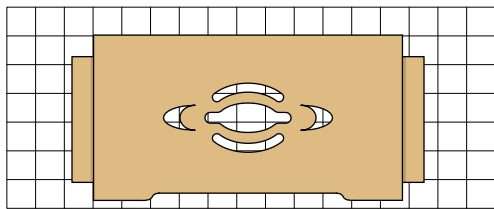
### Assembly

Finish sand all the pieces of the table base and assemble the frame. Start with the sides that have the stretchers. Then glue the last two aprons between the two frames. Before gluing up the top, use a  $\frac{1}{8}$ "-radius router bit to soften the long edges of the top and all the edges of the breadboard pieces. Finally, glue on the breadboards. Screw the shelf in place through two holes in the stretchers that will receive the ebony pegs.

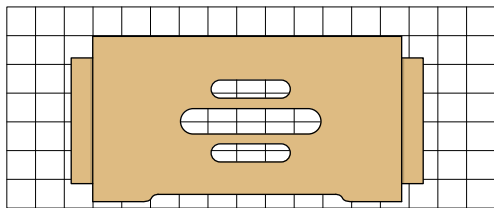
The pegs are next (see photo below). I used ebony, but you could also use walnut.

I attached the top by using my biscuit jointer to cut slots on the inside of the aprons to match the Z-shaped metal mirror fasteners screwed to the top.

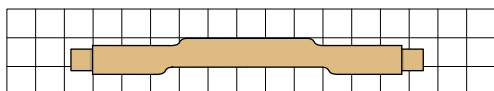
The last step is the finish. A coat of boiled linseed oil will leave a lighter finish, allowing the mahogany to darken with age, or you can speed the process by using a stain. A top coat of lacquer and you've a table with unique details that make it stand out. **PW**



Front apron cutout pattern



Side apron cutout pattern



1 square = 1"

Stretcher pattern



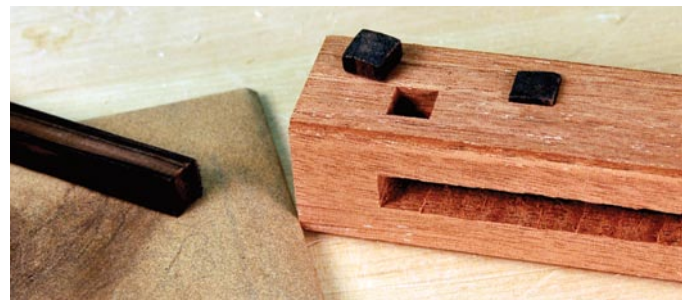
The quirk detail is created on the legs using the table saw. Essentially, you're creating a  $\frac{1}{16}$ " x  $\frac{1}{16}$ " rabbet on each corner of the leg.



The bearing guide shown on this trim router allows the bit to follow the curves of the cloudlifts. You could also install a bearing-guided bit in a router table to make the quirk detail.



Use glue only on the center mortise and tenon of the breadboards. The outer tenons are allowed to move freely to compensate for wood movement.



To make the pegs, carefully rip the accent wood to slightly larger than the mortise size. Round the ends of the "stick" using sandpaper, then carefully trim off the  $\frac{1}{4}$ "-tall pegs on the band saw. Sand the peg sides at a slight angle (smaller at the bottom) and glue in place just proud of the leg surface.



# A Better Way to Sharpen Scrapers

We compared 14 methods to find the fastest way to prepare this useful tool.

Scrapers are one of the most misunderstood but useful tools in a woodshop. A scraper in its basic form is simply a piece of hardened steel with a small hook that is created by pressing on the tool's edge with an even harder rod of steel. This tool is capable of making tear-out free cuts in hardwoods that no plane can manage.

But how to sharpen a scraper is a mysterious or confusing process for many woodworkers. One reason for the confusion is that there are many different published techniques out there, many of them offering conflicting advice.

So I compiled a list of 14 different techniques for sharpening this rectangle of steel that have been published since 1875. All of the 14 techniques basically agree that there are three steps to sharpening a scraper: Filing the edge of the tool, removing the file marks with a sharpening stone and then creating the hook (sometimes called

the burr) with a hardened rod of steel, usually called a burnisher.

But none of the accounts agree on the details. Should you file the edge of the scraper with the file parallel to the edge or at an angle (and if so, what angle)? What kind of file should you use? Should you stone both the edge and faces of the tool? To what grit? And how should this be done?

Do you have to burnish the faces of the tool before turning the burr of the scraper? If you do, what angle do you use? And how should you burnish the edge to create the hook? At what angle? Do you slide the burnisher along the edge as you turn the burr?

So one weekend I tried all these techniques then compared the results. I used high-quality scrapers from Lee Valley, Bahco (formerly Sandvik) and Lie-Nielsen. All of the published techniques basically worked and created a tool that made shavings. Yet some techniques were faster, some required fewer hand skills to master and some made a hook that really grabbed the work.

After trying these techniques, applying my own training and talking to an expert on steel tooling, I think I've found a 15th way to sharpen the tool that doesn't require a lot of equipment, and is fast and is easy for beginners.

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or [chris.schwarz@fwpubs.com](mailto:chris.schwarz@fwpubs.com).

## Like Any Tool's Edge

What's important to understand is that a scraper is like any cutting tool and it responds to your sharpening efforts in the same, predictable way.

A sharp edge is the intersection of two steel surfaces (in a chisel, it's the bevel and the face, which is sometimes called the back of the tool). Any cutting edge is at its sharpest when these two surfaces meet at the smallest point possible.

The edge becomes more durable as it gets more polished by higher grits. Polishing removes tiny scratches in the steel, and scratches are the places where the edge begins to break down and become dull.

A harder steel can also contribute to a more long-lasting edge. However, if it is too hard it can be fragile and susceptible to shock.

All these rules apply to scrapers. The cutting edge of a scraper is two surfaces: the edge and the

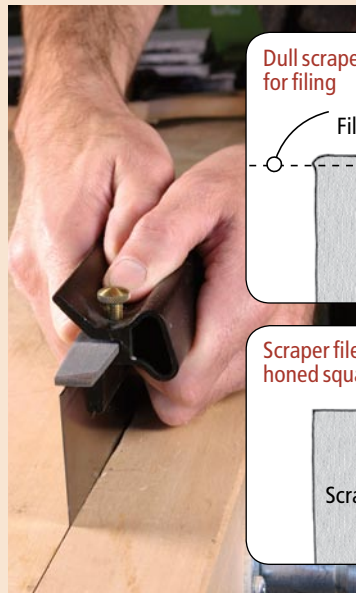


Photo by Al Parrish

## STEP 1: FILING THE EDGE



A permanent marker will help you determine if you have filed the edge sufficiently. Once the color has been removed, you are ready to stone the edge of the scraper.



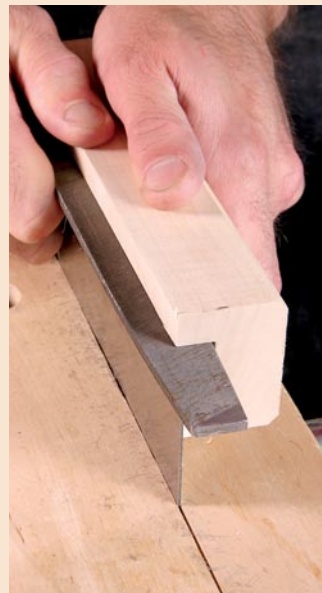
Dull scraper, ready for filing

File line

Scraper filed and honed square

Scraper

Two or three passes with a file is usually all it takes. Use only a push stroke with a file and use the fingers of both hands to keep your filing jig's fence flat against the scraper.



You can make a perfectly good filing jig from a scrap of hardwood as shown here. Cut a kerf in the block that allows the file to be held with a firm friction fit.



After two strokes with the file, the color is almost gone from the edge.

face. The more polished those two surfaces are, the more durable and sharp the edge is. So with that principle in mind, here's the thinking behind my scraper-sharpening technique.

### Step 1: File the Edge

The edge of the card scrapers should be filed square to the tool's faces (all the sources agree on this). You should use a fine file. Look for one with single rows of parallel teeth (this is called a single-cut file) and teeth that are fine, usually labeled "second cut" or "smooth." Scrapers are soft and easy to file, so a coarse file will create deep scratches that are difficult to remove.

Color the edge of the tool with a permanent marker. This will allow you to see where you are cutting. When the color is gone, the filing is done.

How you hold the file in use is in dispute. You can work with the file parallel to the edge, perpendicular to the edge or anywhere in

between. All can result in a square edge, but there is only one technique that gives perfect results every time regardless of your skill with filing: Use a jig, either commercial or shopmade.

Veritas makes an inexpensive jig that I like. You also can purchase a vintage saw jointer, which was used to file handsaw teeth down for reshaping. Or you can cut a kerf in a block of wood to hold your file. Freehand filing is great if you are skilled at it. Most of us are not, so I recommend a jig.

### Step 2: Stone the Tool

After filing, you smooth away those scratches with a sharpening stone or two. Some sources say you have to stone only the narrow edge of the scraper. Others say you stone both the edge and the faces. Because we now know that a good edge is the intersection of two polished surfaces, you should stone both the edge and face.

How do you stone the edge?

You can rub the tool on edge on your stone, but this can make it difficult to balance the tool. Some published accounts recommend sandwiching the scraper between two blocks of wood for additional support, but you'll usually end up abrading the wooden blocks more than the tool.

Alternately, you can bow the scraper as you rub it on the stone to spread the edge out over more of the surface. This works well with flexible scrapers but is quite difficult with the thicker ones.

Instead, I like to hone the edge of the scraper on the sharpening stone with a single block of wood supporting it from the side. I'll sharpen on the face of the stone as shown at right. This is foolproof and allows you to spread the wear out across the stone's face by moving the block of wood.

With the edge stoned, how do you stone the two faces of the tool? Here is where the real trickery begins. Every other technique

that discusses this has you rub the face of the tool to and fro on the stone. This works, but it takes a while. The face of a scraper is a lot of steel to deal with. Most woodworkers do what they can on the faces and give up when they get bored. And that doesn't cut it.

Why sharpen a bunch of steel you aren't using? So I took a page from the playbook of David Charlesworth, a British craftsman. He sharpens the unbeveled face of a plane iron by propping up the back of the tool on a thin ruler set on the stone. This technique, called the ruler trick, sharpens only the section of steel up by the cutting edge.

Would this work with card scrapers, I wondered? It does. And brilliantly. You sharpen only the metal up by the edge. It takes far fewer strokes. And the slight change in edge geometry has no discernible effect on the final cutting edge. Thanks David.

The other question is what grit

of stones you should use. This is honestly up to you. The more polished the edge, the more durable it will be in use.

I start by marking the face with a permanent marker. First work the tool with a coarse stone, such as a #1,000-grit waterstone. Then go directly to any fine polishing stone, such as #4,000, #6,000 or #8,000 grit. Oilstones or sandpaper are fine options as well. To improve your grip on the tool, you can affix a strip of 1/4" x 1/4" x 6" scrap to the scraper with double-stick tape. Or spread a thin layer of silicone rubber on the strip of wood and let it cure. The cured silicone makes the wood grippy (as long as it doesn't get wet).

### Step 3: Burnish the Tool

Of the 14 scraper-sharpening techniques I tried, eight recommended burnishing the flat face of the scraper before burnishing the edge to turn the hook/burr. The explanations for why you burnish

the flat face of the tool were varied: To soften the metal, to harden the metal, to consolidate the metal, or to warp the metal over the edge so you can turn it into a burr.

So I did what any mind-muddled journalist does: I called an expert. Ron Hock runs Hock Tools and sells a wide variety of replacement plane irons.

Here's what Hock concluded: Burnishing the flat face of a card scraper does two things: It work-hardens the metal by compressing the crystal structure of the steel. The burnisher is harder than the scraper. Burnishers will typically be of a Rockwell hardness (Rc) of 58 to 60. Modern scrapers are typically Rc 48 to 53. The harder burnisher will compress the steel of the softer scraper, making the steel harder and probably more durable in use. Burnishing the face is especially useful with old scrapers, which have a Rockwell hardness that is lower, more like in the mid-40s, Hock said. (Scrapers

were typically made from old saw blades in the early days.)

The other thing that the burnisher does is to draw the steel off of the face of the scraper. Essentially, it moves the metal so the steel makes a small point where the face meets the edge. Why is this important? It makes the scraper's burr much easier to turn when you burnish the edge of the tool. You can turn the burr in fewer strokes and without much downward pressure on the tool.

Hock's points about steel fit in perfectly with my experience during the 13 years I've sharpened card scrapers. Must you burnish the face to get a burr? No. But if you don't burnish the face, the burr is more difficult to turn, and you must use more pressure or more strokes. Using more strokes or pressure can introduce error and create an irregular burr.

Point two: Burnishing the face creates (in my experience) a burr that lasts longer. Hock suggests

## SUPPLIES

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

- 1 • Veritas variable burnisher #05K37.01, \$27.50
- 1 • Veritas jointer/edger #05M07.01, \$16.95
- 1 • super-hard milled scrapers, set of four tools #05K30.10, \$14.75

Plus other burnishers and styles of scrapers are available.

**Lie-Nielsen Toolworks**  
800-327-2520 or  
lie-nielsen.com

- 1 • set of two scrapers #HSset, \$15
- 1 • Glen-Drake file/burnisher #GD-FB, \$39

**Woodcraft**  
800-225-1153 or  
woodcraft.com

- 1 • Pfeil burnisher #05S02, \$25.99

*Prices correct at time of publication.*

## STEP 2: STONING



There are many ways to stone an edge. This "2" x 2" x 5" block is what I prefer. You can move the block as you rub the scraper against the stone, which spreads the wear out on your stone. Alternately, with thick waterstones you can use the side of the stone and support the scraper with a block of wood.



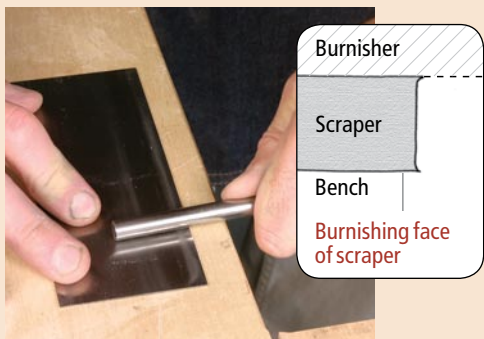
Hold the ruler with one thumb or it will slide. Use your other hand to stroke the edge against the stone. The wood block improves control.



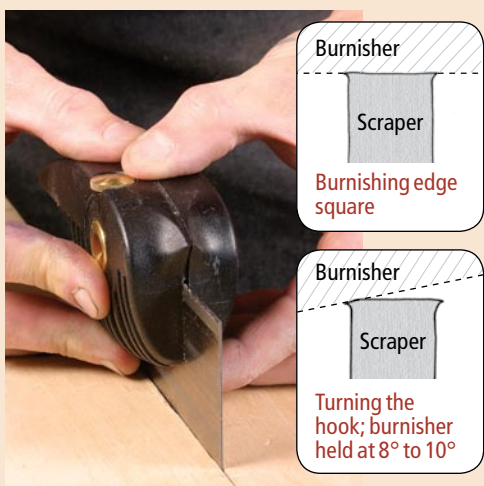
The ruler trick sharpens the scraper only at its cutting edge, saving much time and effort.

## STEP 3: BURNISHING

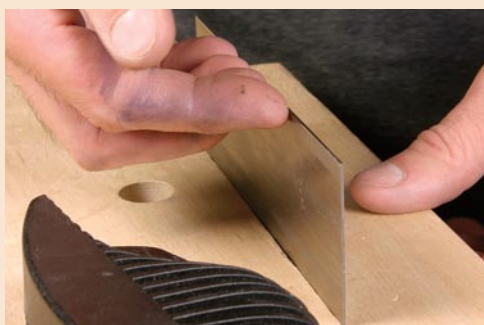
Rub your burnisher flat against the scraper five or six times. This work-hardens and consolidates the material. And it draws out the steel at the edge, making it easy to turn the hook.



A jig such as the Veritas Variable Burnisher allows you to turn a hook with little chance for error. If you are having difficulty with burnishing free-hand, this is an excellent option.



After three passes with the burnisher using mild downward pressure, feel the edge for a hook as shown. It should feel like a tiny lip that your fingernail could almost grab.



Burnishing freehand is tricky for some and a cakewalk for others. Here's a tip: Rest one hand on the bench to control the angle of burnishing. Use the other hand to draw the burnisher along the edge of the scraper. This usually helps increase your control.

that this is because the steel has been work-hardened by the burnisher before turning.

Once you burnish the face, you have to turn the hook with the burnisher by running the burnisher across the edge. Like with all things with card scrapers, there is debate. At what angle should the burnisher be held against the edge: 0°, 5°, 10°, 15°?

Should you use light pressure? Heavy pressure? How many times should you draw the burnisher across the edge? Some accounts say you burnish first at 0° and then burnish again at a slight angle. (I've done it this way for years. It works, but so does skipping the step. See what works for you.)

I have always been stymied by the question of the final hook angle, so I tried a little experiment and prepared a scraper with four different hooks (5°, 7°, 10° and 15°) made using the Veritas Variable Burnisher. Then I gave the scraper to Senior Editor Bob Lang and asked him to use it as I watched, and we then discussed the different working characteristics of the four hooks.

The conventional wisdom is that the steeper the hook, the more aggressive the tool (15° is supposed to be for removing paint; 0° is supposed to be for marquetry). But the truth is, we could get excellent results with all the edges. You could get the wispiest shavings with a 15° hook if you used light pressure. In fact, the only scraper that seemed to perform significantly different is one that I prepared with no hook. That one took only light shavings.

So how much pressure should you use when burnishing? I use pressure that is similar to when you "spread butter on bread," an apt description by woodworking author Graham Blackburn.

Should you use one stroke? Two strokes? More? I stroke the edge

until I can feel a burr. Then I stop. This takes two or three strokes.

I again recommend a jig for the burnishing, especially if you're a beginner or aren't able to stay in practice with your burnishing. I'd never used a jig until a couple years ago, and I'd never had problems with freehand burnishing either (but I sharpen a lot). The jig gives you speed and consistency. You don't have to think about it, you just do it. And errors are rare.

Most sources recommend adding a drop of oil to the edge before burnishing to prevent galling. What's galling? That's when you force metal parts together (screw threads are a common example) and there is so much friction that the high points heat up and cause tiny welds on the high points that then break off, making the corner feel rough. I've done this, but I had to try to do it to make it happen. I oil the edge because it makes the burnisher slide sweetly.

### Using the Scraper

To begin scraping, I flex the card scraper just a bit at the center and hold it at an angle to the work that's usually between 60° to 65° to the surface. I adjust my wrists until the scraper starts to cut shavings. If you are getting dust instead, adjust your angle first. Then check your hook to see if it is still there. A hook feels like a lip on the edge.

Scrapers are great for removing tear-out, but you do have to be careful not to create a depression that will show up after finishing. When you work a small area, it's best to then blend in that low spot with the area around by working the wood around your problem area with the scraper as well.

Scrapers are subtle tools and are capable of a great number of tasks. In fact, there are even more uses for a scraper than there are ways to sharpen it—and that's saying something. **PW**

# WOODWORKING ESSENTIALS

BY SCOTT GIBSON

CHAPTER

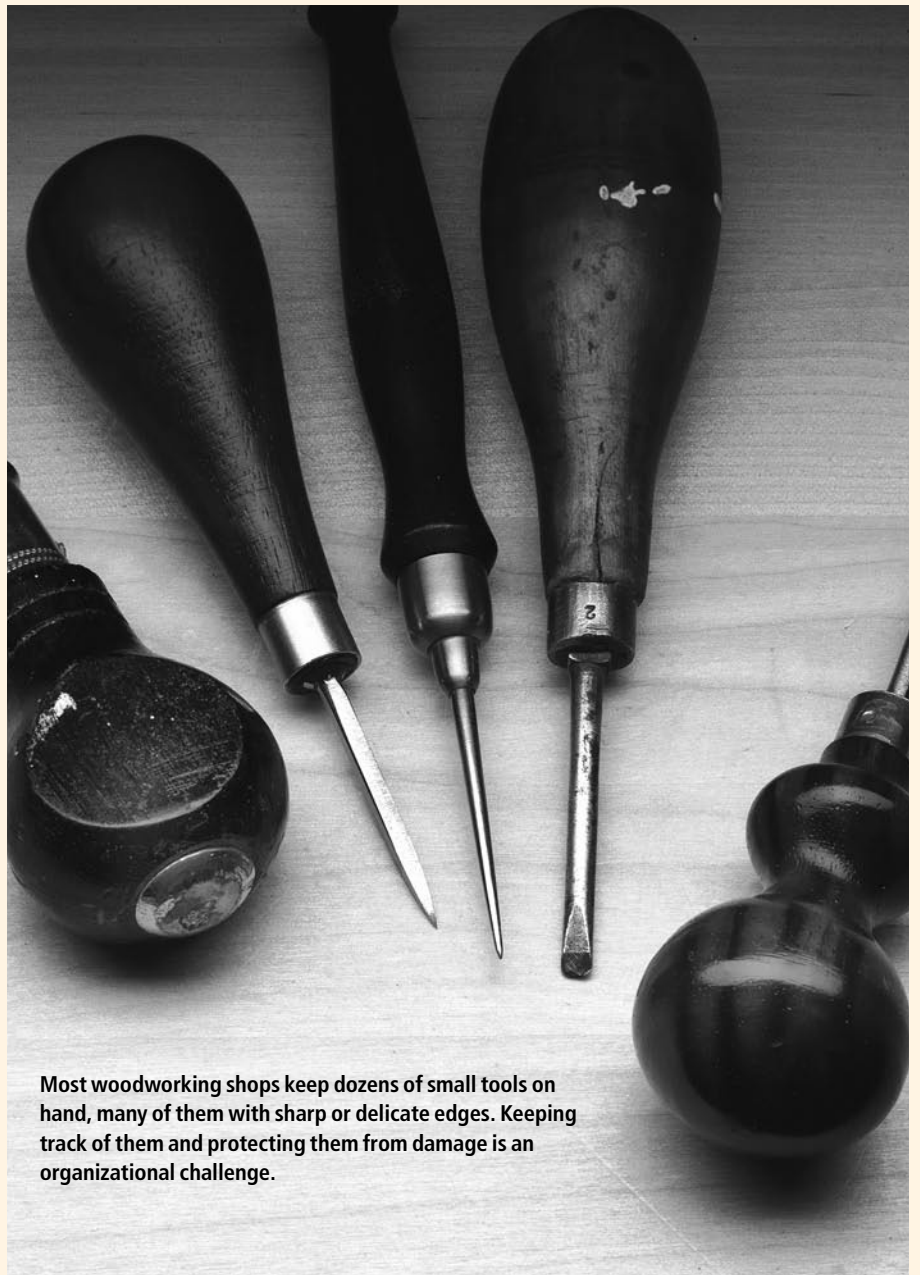
# 4

## Setting Up Shop: Small Tool Organization

**M**any of us plan our workshops around big things – workbenches, table saws, planers and jointers. It's a challenge to arrange these large tools so the shop is efficient and comfortable, especially when space is limited. But as we ponder the best layout for these giants it's the small tools that can catch us by surprise.

It begins innocently enough. We typically have so few tools at the start that it hardly seems to matter where we store them; many woodworkers dive in with only a few used hand tools and a couple basic power tools. They all seem to fit handily in a couple of cardboard boxes. But in time, shops and tool collections have a way of getting bigger and more complicated. Eventually we have to deal with a jumble of small tools that accumulated in our shops while we weren't paying attention.

Cardboard boxes won't work any longer. There are too many tools, and they are too valuable to dump together in a box or a drawer where they can bang against each other. Moreover, some of them are used all the time, some only rarely. And mixing layout tools with router bits, or chisels with sandpaper, will seem a lot less than helpful when you're in a hurry to find the right tool for the job.



Most woodworking shops keep dozens of small tools on hand, many of them with sharp or delicate edges. Keeping track of them and protecting them from damage is an organizational challenge.

## Start by Identifying Tools You Need All the Time

For a lot of furnituremakers, the workbench is the hub of the shop, like a traffic circle through which every major road must pass. Dozens of tasks take place here: joinery is laid out and cut, lumber planed and sanded and furniture parts glued and assembled. We might even eat lunch here.

Given this central role for the workbench, one way to organize small tools is by gathering the ones you use most frequently and keeping them nearby. It's not hard to come up with a good list: chisels, planes, a square or two, a hammer or mallet, a marking knife (or a handful of sharp pencils), rules or measuring tapes, scrapers and more than likely a few other odds and ends.

These tools should be the first ones that are housed at or near the bench, within arm's reach of where you will be using them. Although it may take a little experimentation, when the



**This traditional European workbench has more than a flat, sturdy top; drawers and cabinets provide abundant storage space for hand and portable power tools.**

arrangement works you will know it. You should be able to reach for exactly the tool you need without spending any unnecessary time scouting for it and without moving your feet.

Tool collections can become more specialized as time goes on, forcing you to make decisions about which tools need a front-row seat and which can be relegated to more distant storage. For example, you may routinely need a block plane, a smoothing plane, a small rabbeting plane and a jointer. That's four planes you use frequently. But you use that old moulding plane you picked up at a flea market only once in a blue moon. Why clog up shelves or cabinets near the bench with tools you rarely need?

Virtually any tool category can use the same kind of attention. An adjustable square or try square is something you'll pick up a dozen times a day so keep it close at hand. But a framing square may not be used more than once a month so it can happily live on an overhead rafter or on a nail in the wall some distance away. A little common sense will go a long way in helping you identify what you need close at hand.

No one's list of "must haves" will be exactly the same. Every discipline has its own list of everyday tools, and those needs and habits will become evident with time in your shop as well.

## A Tool Cabinet Keeps Important Tools Close

Thumb through any book about woodworking shops and you're likely to see all kinds of bins, shelves and cabinets that inventive woodworkers have devised to organize their tool collections. Browsing is an excellent way of getting ideas for your own shop. After all, few ideas are really brand-new.

But a common theme in many shops is a large, wall-mounted tool cabinet. Christian Becksvoort, a Maine artisan specializing in Shaker-style furniture, has just such a cabinet mounted on the wall behind his workbench. It's a beautiful piece of furniture in its own right, made from cherry, the wood that Becksvoort uses for virtually all of the furniture he makes.

More important, it holds many if not all of the bench tools he needs to make



**Racking up frequently used tools near the workbench keeps them close to their point of use and cuts down on wasted steps to distant cabinets or drawers.**



**Infrequently used tools may exist happily on a shelf in the corner of the shop, but their haphazard arrangement will make it tough to find the one you want to use and heaping tools together is an invitation to damage.**

a piece of furniture. Everything from files to chisels, augers to mallets, is stored neatly behind a pair of folding doors. Even the space on the inside of the doors is put to use. Neatly labeled drawers house drafting tools, bits, a first-aid kit and other small items. Carved into the drawer housing is "C.H. Becksvoort."

Becksvoort has been at it a long time and his collection of close-at-hand tools accurately reflects the sort of work he does. There's a heavy emphasis on hand tools – chisels, planes, scrapers – rather than portable power tools. This formula works for him but he'd be the last person to argue it's the right arrangement for everyone.

Building a first-rate cabinet to hold personal tools is a long-standing tradition for carpenters and furniture-makers. It's part of the curriculum for furniture-making students at Boston's North Bennet Street School. Building a tool chest gives students a chance to develop their



As cabinetmaking skills increase, so do the possibilities for building beautiful and unique tool chests. Glen and Malcolm Huey, a father/son team in Ohio, built this one when they moved into a new shop. It's designed for both hand and portable power tools.

furnituremaking and design skills and in the end they have something that will serve them for many years.

Tool cabinets can be infinitely variable, made to house only planes, a collection of chisels and carving tools or

an entire suite of hand tools. What may be the most photographed American tool chest ever was made by a Massachusetts piano maker named Henry Studley over a 30-year career. It's a marvel of planning and design, deceptively small, only 39" high, 9" deep and 18" wide. Yet it holds 300 individual tools packed tightly together but still accessible. A more modern version of a grand cabinet is one built by Glen and Malcolm Huey to celebrate their move into a new workshop.



Maine furnituremaker Christian Becksvoort built a large wall-hanging tool chest that's mounted behind his workbench. It neatly holds a variety of hand tools where they can be reached easily.



This 10-drawer chest, 24" high and 15" wide, will hold a variety of small tools and isn't difficult to build. It's small enough to park on or near a workbench.





These very simple, stackable storage boxes are a good example of low-tech ways of organizing tools. Drop-down doors make it easy to find what you need, and the materials list won't break the bank.



A machinist's tool chest includes a tool tray under a hinged top plus a number of drawers that can be protected by a fold-up front piece. Handles make it easy to move.

You might want to leave a tool cabinet of any size and complexity for the future, until individual preferences and needs are a little clearer (to say nothing of developing the skills required to make one). Start with a more modest wall cabinet for tools. It's an excellent project that doesn't have to consume a lot of expensive materials or take a lot of time. Tool chests can be very simple and as your skills improve you can move on to more complex designs.

### Don't Overlook Ready-made Cabinets

Another possible route is to buy inexpensive storage cabinets at used office-supply or furniture stores. Older steel cabinets and open shelving units can handle a lot of weight. Even if they need a fresh coat of paint and have a dent or ding here and there, these cabinets will provide a lot of useful storage at a relatively low cost.

Be more cautious about buying used kitchen cabinets. Some of them will be fine as either wall-mounted or free-standing storage, but inexpensive stock cabinets are often made from thin particleboard or plywood and won't stand much abuse. It's worth checking the classified ads in your local newspaper but look the cabinets over carefully.

As libraries convert from paper to digital files they are getting rid of those classic wood card catalogues. If you can manage to get your hands on one, adopt it right away; the small drawers are ideal for storing everything from nails and screws to router bits and collet wrenches.

### Tool Boards Keep Everything in Sight

If your workbench is against a wall, you can arrange a surprising number of tools directly in front of you on nails or hooks. It doesn't take much time to move a tool if you decide it's in the wrong spot. The down side is that you're not going to squeeze the volume of tools here that you would be able to put in a well-designed cabinet. But they are in plain sight and instantly accessible.

We've all probably been in a garage or two where one wall was devoted to 1/4" perforated hardboard and the outlines of different tools neatly painted in



Tool cabinets can be more than utilitarian cupboards. At their best, they are expressions of personal tastes and skill.

If you have the space, a wall cabinet can grow into more of a tool locker with space for small power tools as well as hand tools. A larger cabinet not only helps keep shop clutter to a minimum but it also can provide security if you live in an area where crime is a worry. With a cabinet bolted to the wall and doors equipped with sturdy locks, tools are a lot safer than they would be if left out in the open.



Chairmaker David Fleming keeps part of his hand-tool arsenal hanging within easy reach on a wall. Tools are close at hand and sharp edges won't get dinged.



**Hanging tools on the wall over a bench is a time-honored approach to keeping things straight. Homemade racks, hooks and magnetic strips all work.**



**Storing tools where they will be needed is usually a good start to staying organized. In simple racks over the lathe in the workshop of Sam Maloof are both turning tools and extra tool rests.**

red or white. A strict arrangement like that probably encourages the owner to put tools back where they came from, and being able to move hooks quickly from one spot to another is an advantage. But driving nails or screws right into the wall works just as well. If your workshop has been clad in drywall, you might want to add a layer of plywood so you can put a nail or screw in wherever you want. T1-11 plywood  $\frac{3}{8}$ " or  $\frac{1}{2}$ " thick is inexpensive and attractive.

For tools that won't hang (chisels, files, carving tools, screwdrivers and the like), you can make simple racks and attach them to the wall. One easy way to make a rack for chisels or files is to cut a series of slots in a board with a dado blade and then glue another board to it. The width and depth of the slots can be made to suit tools of different sizes. A series of holes in graduated sizes bored through the face of a board will handle chisels or screwdrivers. Magnetic strips will accomplish the same thing. Racks don't have to be fancy to be useful.

For the variety of odds and ends that almost always end up on a bench, drill holes in scrap blocks of wood and put them on a low shelf over the back of your bench. Blocks can store drill bits, nail sets, awls and similarly slender tools with points or sharp edges. You won't lose track of them and their delicate edges will be well protected. It's also a great way to preserve and make use

of the especially beautiful offcuts of a prized piece of lumber you just can't seem to throw away.

### **Rolling Cabinets Keep Like Tools Together**

There are two good approaches to making a tool cabinet mobile. One is, in effect, to take the cabinet off the wall and stick a pair of casters underneath it to create a rolling tool garage and workbench. The other is to make one or more rolling workstations dedicated to a single power tool.

Mobile workbenches and tool caddies can be as elaborate or as simple as you want to make them. For example, a design by David Thiel, Popular Woodworking Books executive editor, is actually a modular bench consisting of two  $21\frac{3}{4}$ "-high rolling boxes and a 6'-long bench that spans them. Adjustable support assemblies attached to the sides of the boxes can be raised to support the benchtop at a variety of working heights or hold a tool, such as a drill press, router table or a hollow-chisel mortise machine, when it's needed.

It's a good design for a small shop (Thiel's is in a two-car garage) because the boxes can be used alone or together depending on the need, and parked out of the way when it's time to bring the cars in for the night. Another successful design from Thiel and Michael Rabkin incorporates fold-out lids, roomy storage

compartments and a series of shallow drawer for fasteners and tools.

In this or a similar work cart, drawers can be built to suit your interests and internally divided in whatever manner makes the most sense for the user. Use a power sander a lot? Devote one of the drawers to your collection of random-orbit and block sanders with separate trays for different grades of sandpaper and other accessories. A heavy bottom



**Versatile as well as mobile, this modular cabinet design not only houses a variety of tools but also can serve as workbench or portable workstation for a drill press or other bench-top power tool.**

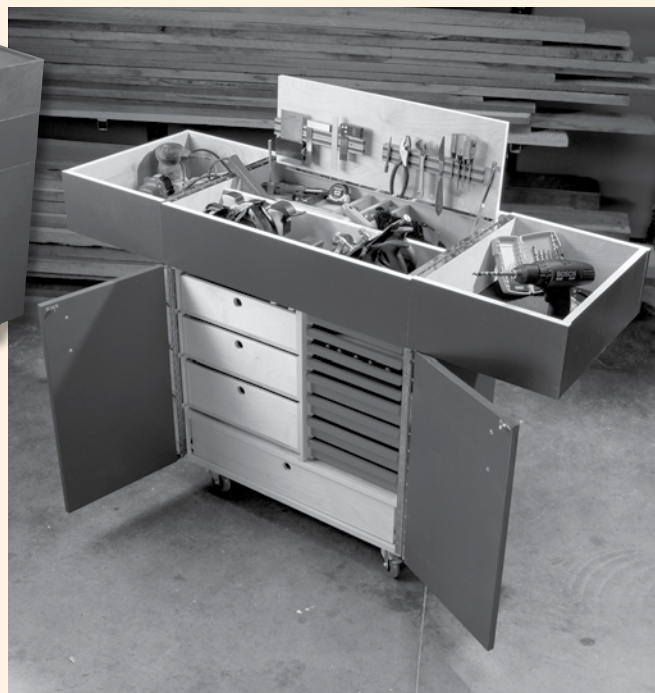
shelf could be used for a belt sander. Repair a lot of chairs? Build a mobile tool station that houses just those supplies and can be rolled to any part of the shop where it might be needed.

A rolling cabinet devoted to a single tool saves space in a small shop because it can be pushed into a corner when it's not needed. More than that, having one or more of these rolling workstations helps parcel tools and their many accessories into dedicated spaces where they won't get lost.

As an example, consider the router. Many woodworkers eventually will own several: A laminate trimmer, a mid-size router and a big plunge router all might be found in a single shop. Each has a collet wrench (or wrenches), one or more bases, edge guides and a tram-mel for cutting circles and curves. Plus there are a lot of bits in one or more shank diameters. It all adds up to a lot of tooling. Building a rolling cart around a router table is a good way of keeping it all straight. Devote a drawer to bits, divided for  $\frac{1}{4}$ " and  $\frac{1}{2}$ " shanks, and another for bases and edge guides. Routers themselves can go in a large enclosure at the base of the cabinet.



**This rolling tool cabinet holds a lot of tools in bins and drawers. When folded up, the cabinet doesn't take up much room and it can be wheeled out of the way.**



### Tools that Travel: Totes & Rolls

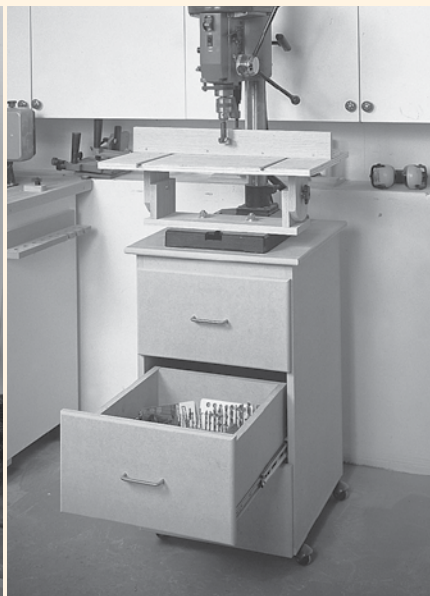
In addition to working at a bench or around the shop, many furniture makers will also find it necessary to leave the shop once in a while with some of their tools. Maybe it's a repair around the house or construction of a shed or outbuilding or even a working stint a good distance from home. Tools that travel need to be organized and protected from damage just as much as those that never leave the shop.

Depending on how often you need them, carpentry tools can be kept in a separate, out-of-the-way cabinet or segregated on their own shelf. These tools are just as specialized as woodworking and cabinetmaking tools – just a little different. They aren't generally used for woodworking so there's no sense in mixing the two together.

One way of keeping them straight is to build a wooden tote with a handle and keep it in a corner of the shop where it won't get in the way. When you need to fix something in the house – trim a sticky door, for instance, or patch a hole in a drywall ceiling – the tools are ready and waiting.

Totes can be very simple and still very useful; even a box with rope handles made from scraps of plywood or rough lumber and nailed together at the corners will prove practical. Make it long enough to house at least a 2' level and a handsaw. Adding a row of shallow drawers in the bottom of the tote is a good way of organizing small things – drill bits, a compass, drivers and the like – as well as protecting tools with sharp edges that would be dulled if they were thrown in with everything else. Or you can build internal trays and dividers to make it easier to find things as well as protect sharp edges.

Tool rolls are another way of keeping sharp-edged tools safe when you travel.



**A storage cabinet dedicated to a single tool is one way of ensuring that tool accessories are always close at hand. Making the base mobile is an advantage, too.**



**Kentucky craftsman Don Weber with a sturdy traveling tool chest that he designed and built. Keeping tools organized on the road presents its own challenges.**

These are simply pieces of leather or canvas with a series of pockets sewn into them. Tools are tucked into a protective sleeve and the whole thing rolled up and tied. They are equally as useful for housing tools that aren't used all the time and must be stored in a drawer. For example, a set of augers isn't an everyday item in many shops but you may have an old set you use from time to time. Investing in an inexpensive canvas roll is a good way of protecting sharp edges when the bits have to share drawer space with other tools.

## Power Tools Deserve A Space of Their Own

Portable power tools represent a different kind of organizational challenge; they are not as delicate and easily damaged as many hand tools, but they are generally heavier and bulkier and they often come with a number of accessories of which you have to keep track.

Although they can be kept in cabinets or drawers, heavy power tools will be easier to get if they are stored on a shelf about waist high or in a simple plywood cubby. An open-faced cabinet or set of shelves a couple of feet square and divided into individual compartments is a good way of housing power tools. They can be kept in the same general part of the shop but all given their own space.



**A canvas or leather tool roll is a simple way of protecting and organizing tools whether you're in the shop or traveling.**

The surprising number of accessories, ranging from wrenches for changing blades to replacement motor brushes, should be kept nearby. Devoting one drawer or part of one cabinet to repair and replacement parts for power tools helps to keep these important bits of hardware from getting lost.

In the same general area, keep all parts lists and operating manuals for the tools in the shop. When you need to replace a part or adjust the tool the manual will be invaluable. An expanding plastic organizer, available at any office supply store, makes a good library for tool manuals. A separate organizer can be used for small replacement parts, such as O-rings, gaskets and drive belts.

Accessories for larger power tools are easy to find when they are kept as close to the tool as possible rather than in some distant cabinet across the shop. The space beneath a table saw extension is a good place to tuck a small cabinet that can house saw blades, dado blades, wrenches and other supplies. A separate drawer in the same cabinet can also be used for router bits or drill bits.

Grouping tool parts in this way makes them a lot easier to find and will protect them from damage.

If you can, try housing cordless tools in the same general area and mount your chargers on a nearby wall. Having all of the tools and batteries in a single location is a plus.

## Finding Room For All Those Clamps

Most of us apparently believe that old chestnut about woodworking: there is no such thing as too many clamps. We do, in fact, need a lot of clamps and they come in a variety of sizes and styles.

If you have a large collection of bar and pipe clamps (and assuming you have the space for it) consider making a rolling or stationary clamp rack. Building in a series of crossbars at different heights makes it convenient to hang clamps of different lengths. The rack should be tapered top to bottom, and in the shape of an "A" when viewed from the side, so the clamps are not easily jounced off as the cart is moved.



**Devoting a cabinet to power tools is a good way of making even a large collection easily accessible. This cabinet is at Cerritos College in Norwalk, Calif.**

Racks can provide two separate sides for storage so they can hold a large number of clamps conveniently. A wall-mounted or freestanding storage rack also keeps long clamps available and out of the way, but when you need a lot of clamps for a big glue-up it's a lot easier to wheel a rack over than it is to make a half-dozen trips across the shop.

If you work in a basement shop, or in any shop with a low, unfinished ceiling, you'll find an ideal storage area for spring clamps and handscrews by looking up; the bottom edge of a joist or rafter will hold many clamps and keep them within easy reach. To store a row of spring clamps beneath a shelf, string a length of heavy wire between two eye-screws so it hangs an inch or two below the shelf. Compress the clamp, pop it over the wire and release it.

### Keeping Up with the Clutter

Providing specialized storage cabinets, shelving and rolling racks is certainly a big part of winning the war against shop clutter and keeping small tools organized. These fixtures can represent a significant investment of time and materials, but you don't have to build a shop full of them right away. Let your ideas percolate for a while, take a look at what other woodworkers have done to



Many shops have sizeable numbers of clamps, although few will rival the collection of Sam Maloof. A tapered rack keeps them organized. Adding casters would make the rack portable, an advantage in any shop.

solve the same problems you have and then set about to fix one storage problem at a time.

The other side of it, of course, is taking the time to keep tools organized once you've made room for everything. Few people return a tool to its proper place the instant they've finished using it. We're more likely to put it aside and get the next tool we need. In the end, though, shops with plans for managing that mountain of small tools will be more efficient, safer and happier places to work. **PW**



Don't overlook the space beneath a table saw extension table. This cabinet holds extra saw blades and other accessories.

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# Greene & Greene Drawers

One test of a design is how well it ages. Great designs are timeless and visually stunning: the Chrysler building, the 1962 Ferrari 250 GT, and any number of pieces of furniture created by Charles and Henry Greene.

The Gamble House, the best-known example of their work, was built in 1908 in Pasadena, Calif., and contains a rain forest's yield of teak and Port Orford cedar. The exposed structural elements and interior woodwork are magnificent. And so is the furniture.

Reproducing this furniture requires some detective work. The Greene & Greene Virtual Archives ([usc.edu/dept/architecture/greene-andgreene](http://usc.edu/dept/architecture/greene-andgreene)) has made it possible for hobbyists to study original drawings and documents. Also available online is a Greene & Greene discussion group on Yahoo that is another incredible source of information.

by David Mathias

*David teaches computer science at the Ohio State University and is an amateur woodworker.*



How to build the  
exquisite finger joints  
from a Gamble House classic.

Many original Greene & Greene pieces were quite large to fit their settings. I scaled this reproduction down to fit in my home.

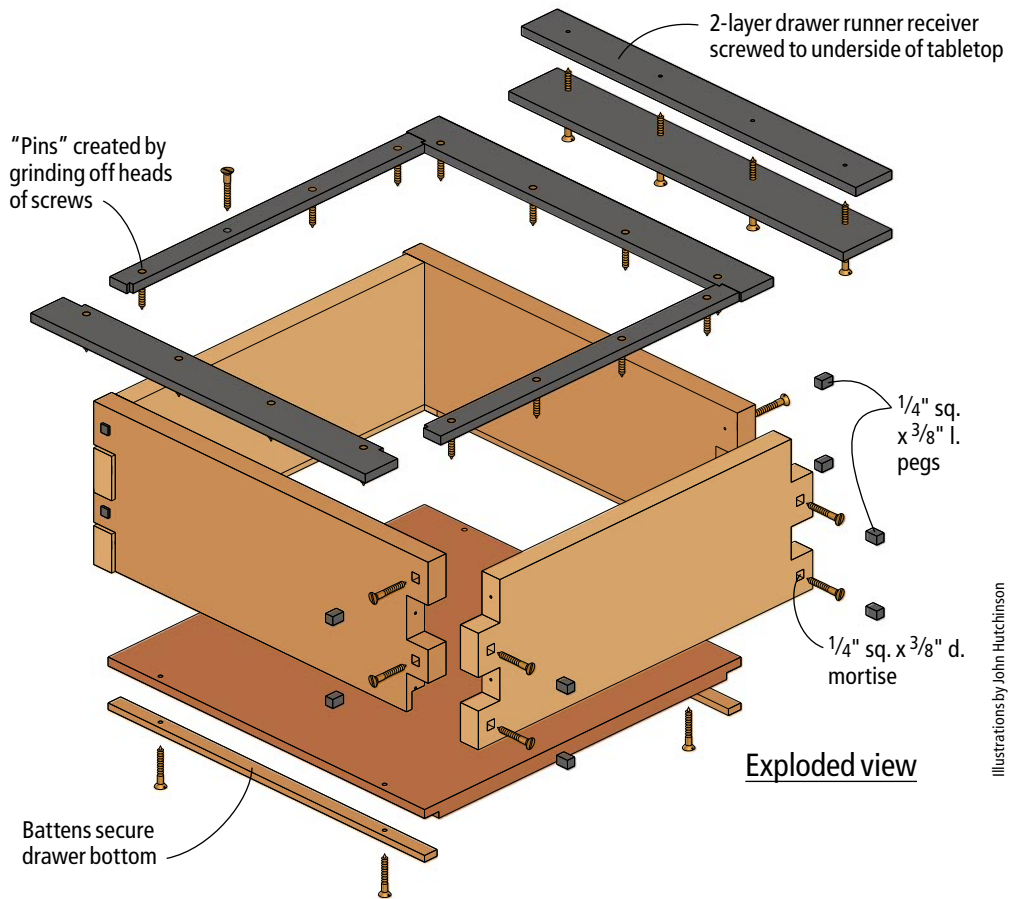
In the interest of full disclosure, the table for which I built these drawers is not a true reproduction. The Gamble entry hall is as big as many modern family rooms and the table is 78" long. To fit it in my home I scaled it down while retaining the look and feel of the original.

This table is constructed primarily of mahogany. I had two bookmatched 13"-wide boards that were perfect for the top. Their 60" length dictated the new size of the table and most other dimensions were reverse-engineered from that. The scaled drawers are 16<sup>3</sup>/<sub>4</sub>" wide by 20" deep. Original dimensions were determined by measuring photos.

Without plans it is easy to miss subtle details. I made some changes during construction when I learned of features that weren't visible in photographs. No picture I had seen prior to beginning construction showed all the details of this table, particularly the drawers.

The dominant feature of this table is the finger-jointed drawers, as shown at the beginning of the story. Greene & Greene finger joints share little more than the name with more common versions. There are two major differences: First, the fingers are quite large. Where fingers in a typical joint are about 1/4", here they are variable in size ranging from 15/16" to 1 1/4". More important, the fingers stand proud of the adjoining surface and are decorated with ebony pegs. The result is beautiful, unusual and challenging joinery.

The table is symmetric front to back, with the backs of the drawers exposed. The drawers hang from ebony runners attached to the tops of the drawer sides with mating receivers attached to the underside of the tabletop. The top edges of the drawer fronts are also capped with solid ebony.



Illustrations by John Hutchinson

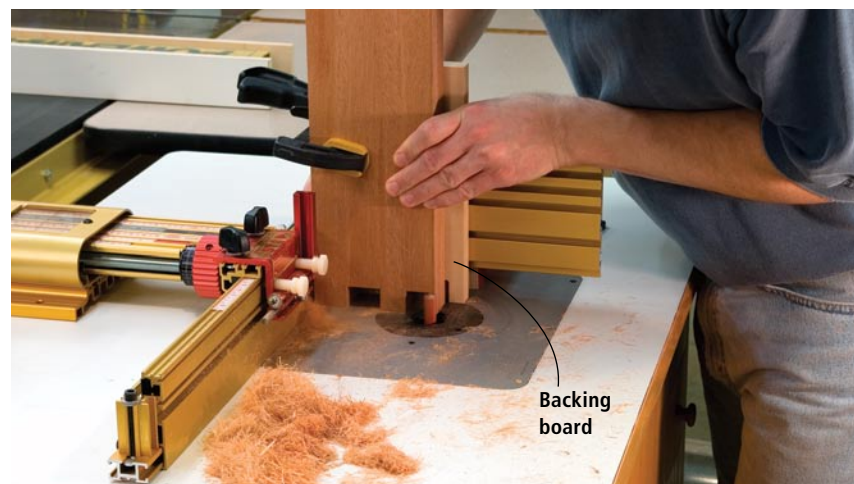
### Fingers With Finesse

Due to the variation of finger sizes on the drawers, it wasn't obvious how to best cut the joints. I considered a table saw jig but couldn't think of a design that would give accurate, repeatable results for fingers with sizes 17/32", 1 1/4", 15/16" and 1 3/32" from top to bottom. Ultimately, I settled on using the router table.

My shop-made router table fence was sturdy and straight but the precision and repeatability I needed were a problem. I found a commercial fence from Incra that offered repeatable adjustments of .001". Overkill? Probably, but I know an opportunity to buy a new tool when I see it (incra.com).

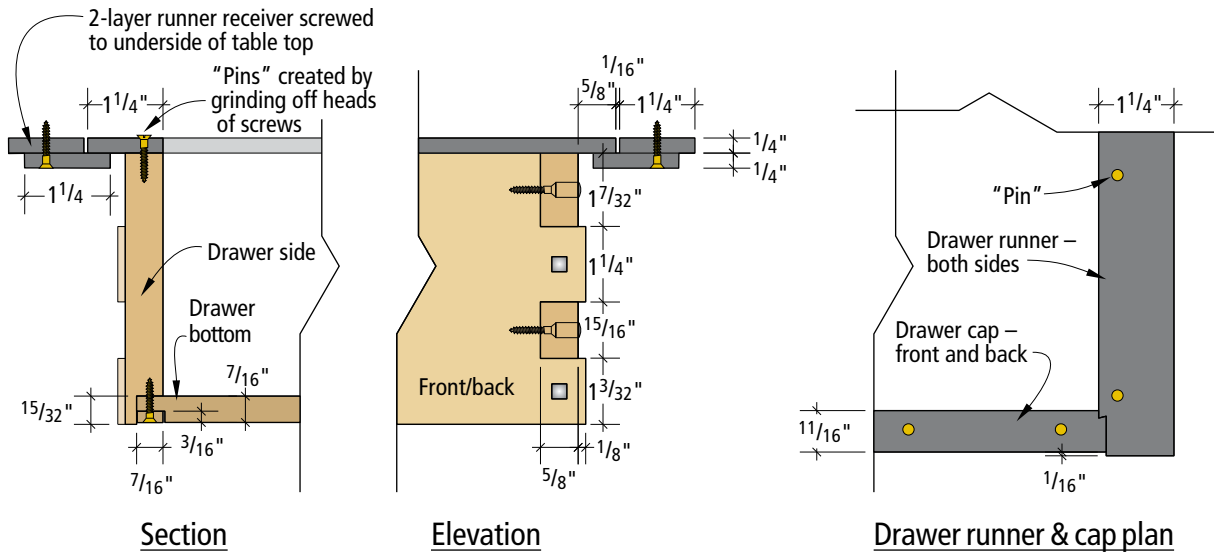
To make the joints, zero the fence as described in the manual.

Determine the movements necessary to make each finger on the drawer sides and record these figures, allowing for the bit diameter in the calculations. For example, to cut the negative space for the 1 1/4" finger, the first cut should be 17/32" from the top of the drawer side. Subtracting the bit diameter from the finger size indicates 3/4" of fence movement is required.



The finger joints aren't just visible, they are an important design feature. The decorative effect begins with precise cutting.

Step photos by the author



After the initial cut, make two additional cuts, moving the fence 3/8" each time. Make similar calculations for the fronts.

Mark the top edge of each drawer front and side, and always place the marked edge on the fence. The key to achieving the right look is setting the bit height correctly. For flush fingers, you would set the height equal to the wood's thickness.

For fingers that stand proud, set the bit 1/8" higher than the thickness. Make a test cut on scrap using a 1/2" bit and test the joint. My test joint was too tight because the bit was slightly undersized. With a new 1/2" bit the fit was much better.

Cut the pieces two at a time backed with a piece of scrap to prevent tear-out, as shown on the previous page. While the fence system was not inexpensive, the result, due to repeatability and ease of use made the investment worthwhile.

### Many, Many Mortises

Ebony pegs are synonymous with Greene & Greene designs. In some cases the pegs are functional—hiding a screw or pin that reinforces a joint. In other instances they

are purely decorative. While this table includes both types, the pegs in the drawers are functional; each conceals a screw that strengthens the joint.

Screws are placed through the mortise in the face of each finger and into the end grain of the adjoining piece. Therefore, the peg mortises are centered in the thickness of the mating piece. Vertically, the pegs are centered on the fingers.

On past projects I made peg mortises by hogging material at the drill press and cleaning up with a chisel. Having recently purchased a hollow chisel mortiser, I put it to work on this project. It really speeds the process. The big advantage is the consistent size of the mortises. There is no need to individually fit pegs, as there can be when using a traditional mortise chisel.

Set up the mortiser with a 1/4" chisel and bit for a mortise depth of 3/8". This allows room for the screw head and the peg. After marking the mortise positions on the fingers, plan the machining sequence to cut all of the mortises at one fence position before moving the fence.

With the cutting completed,

clamp the drawer and check for square. Drill through each mortise for a 1" x #6 screw. The mortises aren't much larger than the screw heads so take care to center the holes to avoid damaging the edges of the mortises. I used square-drive screws and a driver with a small-diameter shaft. Before assembling the drawer permanently, the edges of the fingers need to be rounded.

Virtually all edges on Greene & Greene furniture are rounded, sometimes heavily. To round the drawer fingers I needed to work

the edges without affecting the fit of mating surfaces.

Where a rounded edge fits against a square inside corner, it requires careful sanding. I didn't want to inadvertently round an edge that should be left square, so I rounded the edges and did some minor sanding with the drawers dry fit to ensure that I didn't remove too much material.

The final glue-up is straightforward, but nerve wracking. Use very little glue to avoid squeeze-out. Place a dab of glue on the back of each finger and in the inside



Mark the fingers where they mate. When rounding the edges, staying clear of the lines will ensure gap-free joinery.



corners. Slide the pieces together carefully to avoid getting glue on any of the visible surfaces.

### Polishing Pillowed Pegs

To make the ebony pegs plane stock to about  $\frac{5}{16}$ " thick for  $\frac{1}{4}$ " pegs. After planing, set the table saw fence to a strong  $\frac{1}{4}$ " and rip the ebony into strips. Then turn each strip 90° and rip again. Each of the 32 pegs is about  $\frac{3}{8}$ " long so you will need about 14" of strips. This allows for a few extra pegs and for waste from cutting.

The pegs are slightly rounded, or pillowed, on the exposed end.

This effect is critical to achieving the right look. Gaps will result from rounding too much at the corners. In addition to pillowing it is important to polish the face of the peg to a warm glow.

Sand the end grain starting with #150 grit and progress through #180, #220, #320, #400 and #1,000 as shown below. Sand in a circular motion holding the ebony strip like a pencil. After polishing with #1,000 grit, use the band saw to cut each peg from the strip, then slightly bevel the bottom edges to ease installation.

To prevent squeeze-out, brush

a small amount of glue in the mortise but none on the peg. Tap the peg in place leaving it a shy  $\frac{1}{8}$ " proud of the surface. I use a small deadblow mallet and tap gently to avoid seating the peg too deeply. For easy and consistent results, make a small jig by making a  $\frac{3}{32}$ "-deep hollow in a wood scrap. The scrap has to be small enough to fit on the fingers of the joinery. Place this over a peg and tap until the jig is flush with the surface of the drawer.

### Bottoms Without Backs

The bottom of a typical drawer is screwed to the drawer back. But these drawers don't have a true back. If placed in a groove in the sides and fronts, the bottom would not be removable. Any future problem would be difficult to repair. I seated the bottom in a rabbet along the bottom edge and secured it with screws.

To allow for expansion the screw holes were elongated. For a finished look, I used small battens to hold the bottom in place. Solid brass screws countersunk in the battens pass through elongated holes in the drawer bottom and into the drawer. Predrill the holes to avoid breaking the soft brass screws.

I used a rabbeting bit on the router table after assembly to cut the rabbets. This eliminated the need to make precisely stopped rabbet cuts. To accommodate the  $\frac{7}{16}$ "-thick bottom, set the bit height to  $\frac{15}{32}$ " and width to  $\frac{7}{16}$ ". Run all four sides of the assembled drawer around the bit. This leaves a rounded corner that must be squared with a chisel.

Now cut rabbets on the underside of the drawer bottoms along the long edges (across the grain) to receive the battens. The rabbets' width and height should be slightly larger than the battens. Finish the parts before installing the bottom.

### Runners as an Art Form

Charles and Henry Greene turned exposed drawer runners into a decorative element. Ebony caps on the sides of the drawer overhang the drawer and serve to hang the drawers from above. The runners meet ebony caps on the fronts with a half dovetail. Caps and runners are attached with brass "pins" giving a striking contrast in materials.

Prepare the runner stock to about  $\frac{1}{4}$ " thick and cut to dimension. As ebony is prone to splintering, crosscut to length before



Polished ebony has a beautiful sheen. Sanding also serves to give the pegs their pillowed shape.



An unusual design dictates unconventional methods. The bottom is seated in a rabbet, cut after assembly. Square the corners to accommodate the panel.



Mahogany, ebony and brass create an elegant contrast in materials, while the proud finger joints and plugs create a contrast in textures.

Photo by Al Parrish



Solid brass screws will require pilot holes made with a tapered drill bit. Use tape on the bit to ensure that the holes are of a uniform depth.

ripping to width. With a dovetail bit in the router table, set the height to about  $\frac{1}{8}$ ", then set the fence to expose  $\frac{1}{8}$ " of the bit. Using a sled, hold the caps for the fronts vertically, with the inside edges against the fence.

After cutting both ends of each cap, move the fence back to expose more of the bit to cut the side runners. Make test cuts on scrap before committing a piece of expensive ebony. Once the fit is right, cut the dovetail on the inside edge of each end of the runners.

The caps and runners are attached to the drawers with 1" x #6 solid-brass screws. Part of each screw head is removed giving the appearance of a brass pin. Mark the screw positions on the caps and runners, centered on the thickness of the fronts and sides. It is important that all countersinks are the same depth so that the "pins" have a consistent diameter. At the drill press, set the depth of the countersink so that the entire slot in the screw head is above the surface of the runner.

Start with the cap on one drawer front, holding it in place with double-sided tape, then add both runners and, finally, the opposite cap. With the pieces positioned properly, drill through the holes in the countersinks with a tapered bit as shown above. This will predrill the drawer and enlarge the hole in the runner

to avoid splitting. Lightly lubricate the screws and drive them by hand.

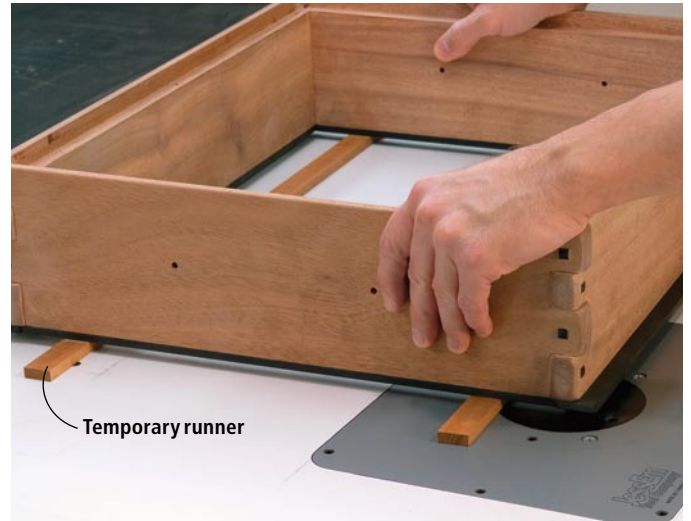
I considered several options for trimming the screw heads – nervous work since correcting any mistakes would be difficult – and I settled on the router table. I used double-sided tape to mount temporary runners to the top of each drawer. With the drawer inverted, the screw heads were above the router table surface. Use a solid carbide downcut spiral bit and set the height just shy of the caps and runners. Set the router at its lowest speed.

Move a screw head slowly into the bit taking light cuts to remove the head. Repeat this for all the screws. Though brass is not likely to spark I didn't use dust collection to avoid sucking hot metal into a pile of dust. You could also use a fine, flat file to make the screw heads flush. Some minor sanding is necessary. Ease all exposed edges and corners and touch up the screw heads with #320- and #400-grit sandpaper giving the brass a warm satin sheen.

### Drawer Pulls

The drawer pulls are all that remain. Nearly all Greene & Greene furniture used shop-made handles. My pulls differ from the original design but have a look similar to pulls used by the Greenses on other pieces.

Cut the pulls to shape on the



To turn screws into pins, trim the heads at the router table. Remove enough of the screwhead to eliminate the slot but leave enough so that the screw will provide hold.



These drawers are heavy, so attach the pulls securely to ensure that they can handle the load.

band saw, then use a drum sander to touch up the band-sawn surface. The back of each pull must be relieved to create a finger grip. Use a  $\frac{1}{2}$ " roundnose bit at the router table to create 4" long hollows top and bottom.

With the basic shape established, use a fine-grain rasp to round and taper the pull to an organic form, as shown. With the final shape achieved, switch to a finer rasp and a file to clean up tool marks and then sand the pulls silky smooth.

I made a simple jig to ensure that the mounting holes in the drawer fronts were consistently positioned. I was concerned that a wood screw into the pulls wouldn't

hold, so I placed small threaded inserts in the pulls. I used inserts  $\frac{3}{8}$ " long that require only a  $\frac{1}{4}$ " diameter hole and are threaded for an #8-32 screw. Use the same jig to mark the hole locations on the pulls and a  $\frac{1}{4}$ " Forstner bit to drill the holes. After installing the inserts use brass screws, to match the brass on top of the drawers, to attach the pulls. Or, you could glue and screw the pull in place.

As an amateur woodworker I have a rule I follow when choosing a project: The piece must challenge me to do something I've never done before. Some projects require doing many things for the first time. This project was one of those. **PW**



# Creole Table

Born on a bayou,  
this sought-after American table  
is spiced with both French and  
Canadian influences.

by Christopher Schwarz

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*Chris is the editor of Popular Woodworking magazine and the host of two DVDs on using hand tools in a modern shop. Both are available through Lie-Nielsen Toolworks (800-327-2520). Contact Chris at 513-531-2690 ext. 1407 or [chris.schwarz@fwpubs.com](mailto:chris.schwarz@fwpubs.com).*

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Until recently, Creole-style furniture was a bit obscure, known mostly to a handful of furniture collectors who specialized in pieces made in the Mississippi valley.

But that's changing.

The original version of this 18th-century walnut table sold for \$54,625 at a 2003 auction. And other Creole pieces, such as armoires, are commanding prices up to \$140,000.

So what is the Creole style? Essentially, Creole encompasses furniture made in the Mississippi valley by furniture makers who were usually French-Canadian. The pieces have lots of French touches, such as cabriole legs, but also have the unmistakable restraint of early American furniture that collectors seek.

This table, for example, looks quite a bit like drawings of 18th-century French furniture from Denis Diderot's "L'Encyclopedie ou Dictionnaire Raisonne" (1751-1780) – but without the banding, inlay, carving and marquetry.

I first saw this table in the magazine *Early American Life* and was completely enamored. Our project illustrator, John Hutchinson, took a photograph and produced the construction drawings. And 37 hours of shop-time later, this is the result.

## How the Carcase Works

At its heart, the Creole table is a typical apron table, with only a few surprises in its construction: The four aprons are secured to the legs with mortise-and-tenon joints, and reinforced with triangular corner blocks.

The dovetailed drawer slides in and out on a classic web frame. The top is attached to the base with screws driven up through the corner blocks.

Hanging on those classic bones are a few shapely French curves. The sinuous legs and the scalloped aprons make the table appear difficult to build, but it's not the curves that will trip you up. If you prepare your patterns with care, the curves will come easily; the real challenge is the overall fit of the parts – but isn't that always true?

## Making Patterns

When conquering any complex shape, such as the scalloped aprons, making a template for pattern-routing is a good idea.

There are two patterns for the aprons: One for the side aprons and one for both the front and back. The pattern for the front and back aprons is a mirror image of the left and right sides of the apron. After marking, cutting and routing one end of the apron, you flip the pattern over to do the same to the other end of the apron.

Make your patterns using the drawings or downloadable plans from our website (click on Magazine Extras to find them).

## Putting the Patterns to Work

Begin construction by shaping the legs. This style of cabriole legs has good points and bad. Good: The shape is simple and easy to cut and smooth. Bad: The legs curve toward the inside of the table. This means that you will have to cut the mortises in the legs after you roughly shape things.

I tried different ways to go about this and the following is the least awkward method. Begin by taking the stock for your legs and cutting one long edge so it parallels the grain of the board. Rip out your four leg pieces.

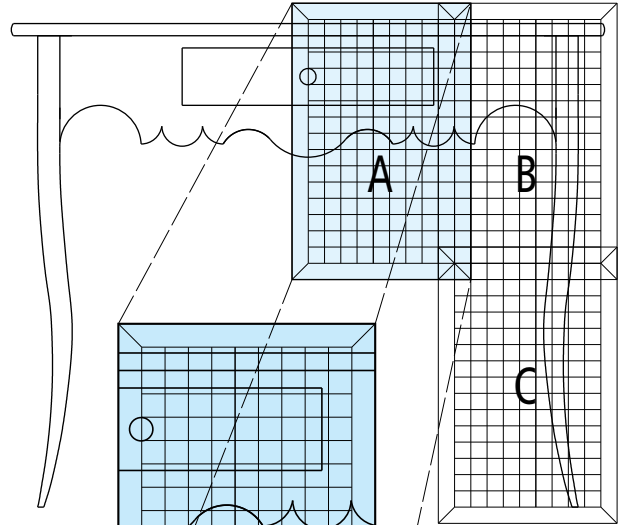
Mark the shape of the cabriole on two faces of each leg. It helps to bundle the four legs as you make these marks, slashing your chance for a disastrous error.



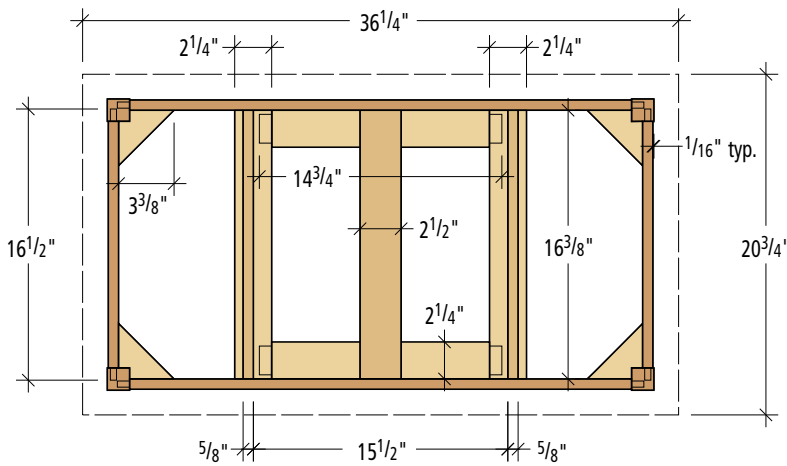
# CREOLE TABLE

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
4	Legs	2 1/4*	2 1/4*	29	Walnut	
2	Long aprons	5/8	8*	32	Walnut	3/4" TBE**
2	Short aprons	5/8	7*	16 1/2	Walnut	3/4" TBE**
1	Top	3/4	20 3/4	36 1/4	Walnut	
4	Corner blocks	5/8	3 3/8	3 3/8	Walnut	
2	Web frame stiles	5/8	2 1/4	16 3/8	Secondary wood	
2	Web frame rails	5/8	2 1/4	14 3/4	Secondary wood	3/4" TBE**
2	Web frame cleats	5/8	5/8	13 1/4	Secondary wood	
1	Drawer kick	3/4	2 1/2	16 3/8	Secondary wood	
2	Drawer runners	5/8	5/8	16 3/8	Secondary wood	
1	Drawer	3 1/4	15 1/2	17	Walnut/Poplar	

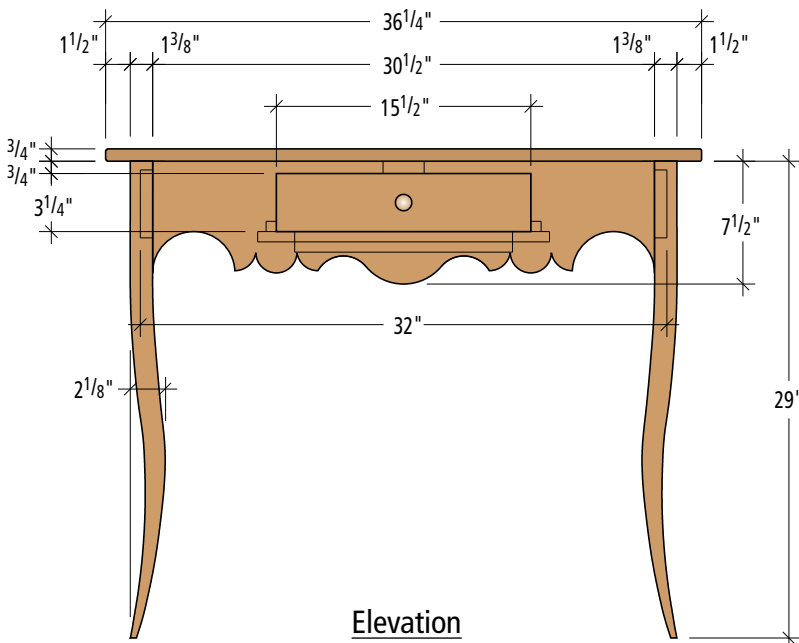
\* Slightly oversized to allow for trimming. \*\* Tenon Both Ends



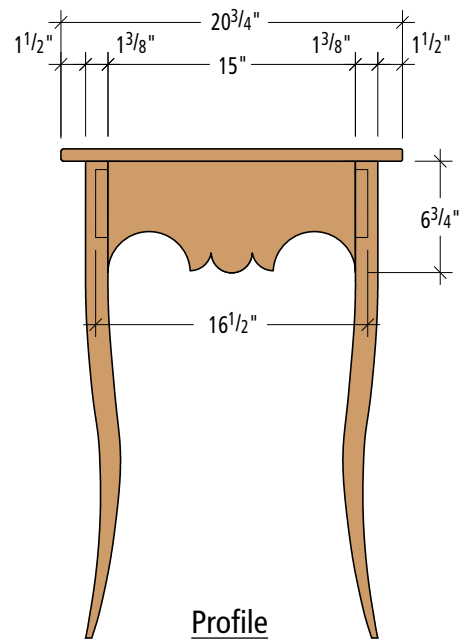
On the *Popular Woodworking* web site, you'll find a series of 11"x17" gridded, overlapping patterns. Print them, tape them together as shown and the secrets of the Creole Table are yours.



Plan, top removed



Elevation



Profile

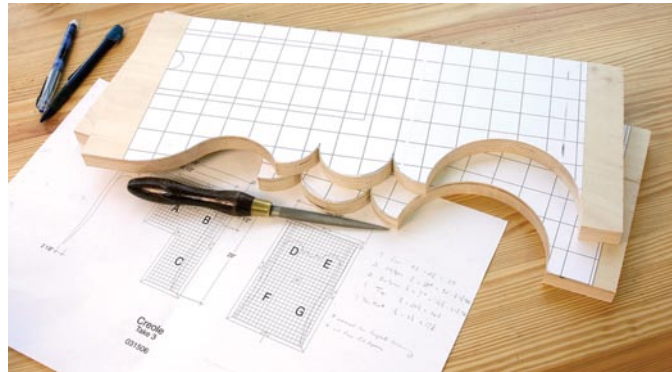
You could band saw out these leg shapes directly, but you would be in for a bit of fussing when you joined the aprons to the legs. That's because the straight surfaces of the legs where the aprons attach are now buried inside your leg blanks. Band saw them out and you'll have a difficult time truing up that surface for joinery.

Don't get me wrong, it's doable. I made two practice legs this way to try it. A block plane and a try square are all you need, but it's a fussy job. So I made another pair of legs by cutting the straight sections with a table saw. This involves stop cuts: You rip the leg to a certain point and then turn the saw off.

This works quite well.

With the stop cuts complete, remove the rest of the waste with a hand saw or your band saw.

Now cut your mortises on the legs because they are still easy to manage with their long straight edges and faces. I used a



You can use the scaled drawings to create your own paper patterns, or you can download the patterns from our web site.

$\frac{1}{4}$ " hollow-chisel mortising bit in a mortiser, which is appropriate for the  $\frac{5}{8}$ "-thick aprons. The aprons' tenons are  $\frac{1}{4}$ " thick,  $\frac{3}{4}$ " long and 3" wide. So start making your mortises 1" from the top of the leg. Set the fence so the apron will set back  $\frac{1}{16}$ " from the legs.

### More Nerve Than Skill

Many woodworkers are spooked by cabriole legs. Cabrioles appear daunting because of the curves and the compound shape. Here's the truth: Cutting cabriole legs is easy. Designing a nice-looking leg is hard.

If your band saw blade is sharp and well-tensioned (we like a  $\frac{1}{4}$ " skip-tooth blade), the work is easy. Cut the pattern on one face of your

leg. Tape the fall-off pieces back in place. Rotate the leg 90° and cut that pattern. Remove the tape and voilà – you're halfway home.

The second half of a cabriole leg – shaping the sawn surface into something sinuous – is easy with the right tool. Recently I was turned onto a simple and inexpensive tool that is ideal for the job.

Glen Huey, senior editor, convinced me to try out the Shinto Saw-Rasp. It is, in essence, a bunch of hacksaw blades riveted together into a boat-shaped tool. One side is coarse and the other is fine. You can buy this tool with or without a handle. It is a nimble tool and is easy to master, much like a high-quality rasp.

I removed the saw marks from



Marking walnut is a challenge. After trying a variety of pens, the best was a white ink pen available from an art supply store. The Sakura Pen-touch (gellyroll.com), costs about \$2.50. Here's a tip about its tip: A light touch will give you a fine line.

the legs with the Shinto's coarse side and then smoothed things up with the smooth side. After some work with a card scraper, the legs were ready to finish. I had planned on spending an entire day shaping these legs. The Shinto turned it into a two-hour job.

### Speaking of Japanese ...

Before you cut the tenons and the curves on the aprons, you need to decide what you are going to do about the drawer front. On the original, the drawer front appears to be cut directly from the apron, instead of using a different piece of wood for the drawer front. If you want to do this, too, you're going to need a couple thin-bladed saws – I like Japanese saws for this.

Here's how I did it: First rip  $\frac{3}{4}$ " off the top of your front apron piece using your table saw. Once you cut the drawer front free on its remaining three sides, you'll glue this  $\frac{3}{4}$ " strip back to the top of the apron.

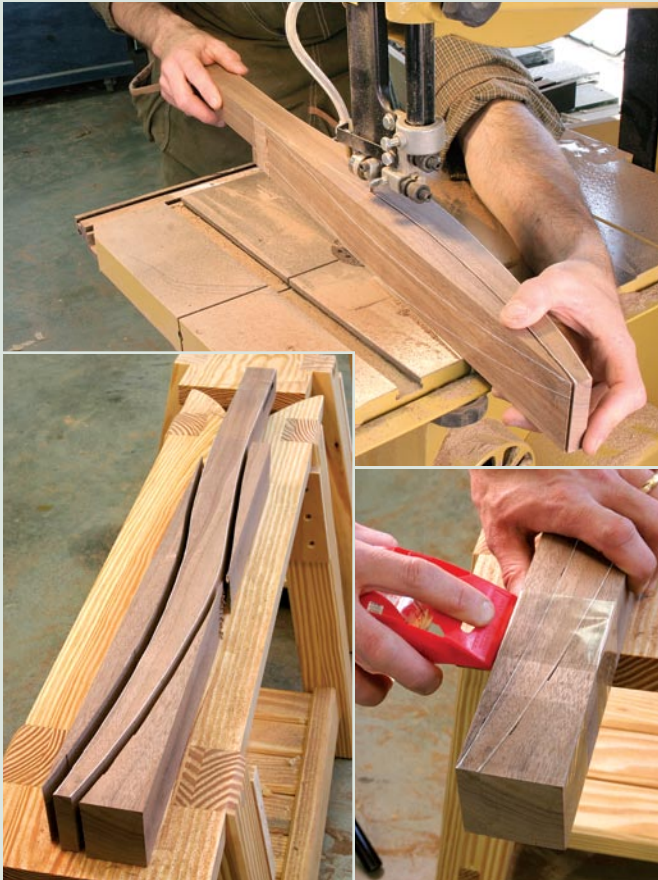


Stop-cuts on the table saw are not my favorite thing. You have to raise the blade all the way to get a cut that ends close to vertical. I have our basket guard raised up here and the saw turned off to show my setup. Use a mark on your fence and the work to indicate when to stop cutting. And don't pull the work back out of a running saw. Turn off the saw.



Make your mortises a little deeper than the tenons are long. The two mortises in the legs may end up meeting a bit at one corner, but that's OK. You're not removing material that will ultimately assist in strengthening this joint.

## CUTTING CABRIOLE LEGS



**STEP ONE:** Cut the pattern on one face of the leg (top photo). Save the fall-off pieces (left) and tape them back together (right). Note how I split the white line. Luckily, this is simple because the white line left by the paint pen I used is fairly wide.



**STEP TWO:** Turn the leg 90° and cut the same pattern on an adjacent face of the leg. The pieces will begin to fall away as you work, revealing the shape within. It's a bit like sculpture.



Here you can see the Shinto Saw-Rasp with a handle. Remove the handle and use the tool with two hands – though some cuts are made one-handed. The Shinto is available from a number of catalog companies, including Rockler ([rockler.com](http://rockler.com)) and Highland Hardware ([tools-for-woodworking.com](http://tools-for-woodworking.com)).

Though you could cut out the drawer front freehand, I recommend you clamp a block of wood to the apron as a guide.

With the drawer front cut free you can then tweak the apron to tighten things up if you had problems with your rip cut. You can reduce the width a bit by running the top edge of the apron over your jointer. This is a good idea anyway as you'll be gluing the strip back in place shortly and want a clean joint.

Now true up all the surfaces that will be your drawer opening. Chisel out the junk in the corners. Smooth the end grain with a file. Now glue the  $\frac{3}{4}$ " strip back onto the front apron.

### Fussy but Worth It

Joining the aprons to the legs requires concentration. This joint is highly visible, so gaps are particularly ugly.

Begin by marking the shape of the aprons on all four pieces. This will keep your parts straight as you proceed. Now cut your tenons on your aprons. I use a stack dado set in my table saw for this operation. I guide the work past the blades using a fence on my miter gauge (or the fence on a sliding table). A stop on the fence keeps my cut positioned. This technique is quick – one blade setup cuts both

the cheeks and the shoulders of the tenon. And it is safe.

Once you have cut the face shoulders and face cheeks, you can cut the edge shoulders on a band saw.

### And Heading Into the Curve

The scalloped shapes on the aprons are a cinch if your templates are made well. The only wrinkle to the process is leaving a little bit of material behind on the aprons to make them robust enough to survive assembly.

The weak spots on the aprons are where they curve dramatically to meet the legs. By leaving an extra  $1\frac{1}{4}$ " of the apron behind you create a place where this weak spot can be clamped without snapping it off (see photo on page 73).

Mark out your strategy for cutting the apron, then cut the scallop shapes. With the rough shapes cut out, I then clamp the pattern to the workpiece and use a router with a bearing-guided pattern bit to smooth out the arcs on the aprons. A laminate trimmer has all the guts you need. However, the tight transition points must be cleaned up by hand.

Cleaning up the corners is easy if you've cut out your aprons carefully on your band saw. A few quick cuts with a sharp chisel will bring the tight corners into line.

## Fit for a Fit

Now settle in and fit each joint. Your best friends during this process are a small square, a sharp eye and an old joiner's trick. The square can show you where things are amiss. And your sharp eye? Every time you try the joint, scrutinize the area between the leg and apron. If you can't close this joint with hand pressure, find out what is preventing it from closing. Don't count on the clamps to fix it.

In the end, your best bet is to slightly undercut the tenon shoulders on all the inside surfaces. This "cheat" was handed down to us by 17th-century joiners, who would undercut a shoulder for a tight fit. This approach doesn't weaken the joint much. Most of a tenon's strength is in its length, according to studies of the joint by the U.S. Forest Products Laboratories. I undercut my interior shoulder with just a pass or two of a shoulder plane.

Before you assemble the table's base, prepare all the exterior surfaces for finishing.

Glue up your base and reinforce it in two ways. One: Add corner blocks that tie together the aprons. My corner blocks are in the shape of triangles and cut from pieces that are  $\frac{3}{4}$ " x  $3\frac{3}{8}$ " x  $3\frac{3}{8}$ ". I notched the corner blocks around the legs and then glued and screwed them to the aprons.

The second reinforcement is at the point where the aprons meet the legs. I was worried that the weak short grain here would pop off as I sawed or chiseled it.

So I glued a  $\frac{1}{4}$ "-thick backing block behind each curve. The grain of these runs  $90^\circ$  to that of the apron, so they glued well to both the leg and the apron. And because they are so small, wood movement won't (realistically) ever be a problem.

## Making the Cut (and Guts)

As with all things in woodworking, if you do enough preparation work, then actual execution is smooth and quick. Such was the case as I cut the ends of aprons to their final shape with a coping saw.



Once you've cut the ends of what will become your drawer front, connect the two crosscuts with a rip. A Japanese saw with a curved blade (such as the Azehiki shown here) is ideal. Score your cutline with a sharp chisel, which will make it easier for the saw to follow the kerf. Once you've plunged through the board, switch to a Ryoba saw, which is faster because its blade is longer.

Once you make the saw cut, clean up your work with a chisel, rasp and sandpaper.

The inside guts of the table are conventional. The drawer rides on a web frame that is attached to the front and back aprons with glue, screws and two cleats. I made the web frame using mortise-and-tenon joints. After I glued up the web frame's joints and allowed them to dry, I glued the frame between the front and back aprons. Then I glued and screwed cleats underneath the web frame to strengthen the assembly.

You also should install what is sometimes called a "drawer kick." The kick is a single stick of wood between the front and back aprons that is above the drawer. It keeps the drawer from drooping when it is pulled out of the case. I attached the kick to the table base with glue and pocket screws.

## My Style of Drawers

When most woodworking magazines describe how to build a drawer for a project, it's usually something like: Build the drawers using the techniques you prefer.

Glue the  $\frac{3}{4}$ " strip back to the apron. Make sure you line up the grain as best you can. On my apron, I positioned my cutline so it would run through some straight quarter-sawn grain on the apron. That helped conceal the joint line on the finished piece.



A fair amount of downward pressure ensures accuracy with this technique. If you don't keep the board pressed down flat, it will try to rise up on you. Even a bit of this will result in a too-thick tenon. If you are not sure that you are holding the piece down firmly, make a second pass over the blades.



While that sounds like the author ran out of steam, I think it's actually a fair statement.

I've seen a lot of drawers made by a lot of craftsmen. Each one is a little surprise when I pull it out and a reflection of that woodworker's personality.

Here is how I go about it and why. Drawers have a hard life. So if I want a drawer to last 200 years instead of 20, I prefer the dovetail joint for the corners.

I build most of my drawers using 1/2"-thick poplar for the sides, back and bottom. I use 1/2"-thick wood for the front that matches the species of the carcass. I join all the corners with through-dovetail joints and then glue a piece of

1/4"-thick veneer (resawn from the piece cut from the apron) on the drawer front and trim it to the size of the drawer opening.

This strategy allows me to stretch my supply of well-figured wood for drawer fronts.

The other detail is how I fit the bottom into the drawer. I plow a 1/4" x 1/4" groove in the sides and front to hold the bottom. The groove is located 1/4" up from the bottom edge of the sides and front. I make the back of the drawer 1/2" narrower than the sides and front, which allows me to slip the bottom in place.

Here are a couple other details about the bottom: I cut the bottom so the grain runs from left to

right in the drawer, so the seasonal expansion and contraction occurs at the rear of the drawer. I also cut a 1/4" x 3/8"-wide rabbet on three sides of the bottom that allows the bottom to slide in the grooves cut in the sides and front.

The bottom is secured to the back with a single nail. Be sure to cut the bottom so there's a little expansion room – I make the bottom 1/4" narrower overall.

Once I assemble the drawer with dovetails, I glue the drawer front on and trim it to fit the

assembled drawer. Then I fit the drawer in the carcass so there is an even gap (about 1/32") all the way around the drawer front. Finally, I clamp the drawer in the table's base and then glue the drawer runners to the web frame so they are snug against the drawer.

### Assembling the Top

Tabletops are a bit of a blend of art and science. A bit of effort can result in a top that looks right and is easy to plane or scrape to get it ready for finishing. So choose your boards wisely.

I eased all the edges of the top with a small roundover bit in a trim router. Then I screwed the table's base to the top. I made the clearance holes at the rear corner blocks oval-shaped to allow the top to expand a bit.

### Finishing and Hardware

The original table looks redder than I expect natural walnut to. Perhaps it was originally stained or has acquired a patina during the last 200 years. My finish consists of a couple coats of amber shellac, which I applied with a



Trim the edge cheeks of your aprons with a band saw. Then cut the edge shoulders. Cut close. But not too close.



I place relief cuts at some of the tighter curves. This is efficient because the waste falls away at the same time I need to turn the piece around to cut from the other direction. Note how I've left some extra waste near the tenons to strengthen the apron's curve at that point.



A wide paring chisel makes short work of the waste left from cutting the edge shoulders. Work carefully here and avoid cutting past the shoulder line. If you are skittish, use a 3/8"-wide chisel, which will keep you clear of the shoulders, but it will be a bit harder to steer in the cut.



Because I cut right on my line, there is little material to remove with the router and pattern bit. I clamped the work on top of the pattern and used a bit that has the guide bearing at the bottom of the bit. This allows me to work on top of my bench and prevents me from exposing more of the bit than necessary.

small natural-bristle brush and a rag.

After the shellac dried, I applied two coats of spray lacquer that has a satin sheen. After the finish cured, I rubbed it out with a plain brown paper bag.

The knob is a simple 25mm knob from Lee Valley Tools (item #01A0525, \$1.75. 800-871-8158 or leevalley.com).

When complete, the table is quite a spicy charmer. If you want the complete effect in your home, send me an e-mail for a recipe for duck étouffée (or check out the *Popular Woodworking* blog). **PW**



When you glue up the base, the extra waste you left on the aprons comes in handy. Though most authorities on joinery will tell you not to bother gluing the end-grain shoulder area at the bottom of the apron, I think it's essential here. You want all the help you can get when you cut the waste away, and modern PVAs do a better job of gluing end grain than most people realize.



I glued in the backing blocks with spring clamps. One clamp pressed the block to the apron; the other clamp pulled the block against the leg. Here I'm removing the clamps after the glue has dried. With the clamps off, mark the final shape of the apron on the inside as shown.



Having the shape of the apron marked on both the inside and outside of the work helps keep the blade square through the cut.



Here you can see how the inside of the table works: corner blocks reinforce the aprons, a web frame supports the drawer and a drawer kick stops the drawer from drooping. The only thing missing is the drawer runners to guide the sides of the drawer. Those come later.



I cut my dovetails by hand. Generally, I have always struggled with the router jigs used to cut dovetails. For me, the hand cutting is something I've done for a long time and am comfortable with. I like to cut my tails so they have a tight opening. I think it lends an old-school look. These tails have  $\frac{3}{16}$ " between them.



The two quick-release clamps hold the drawer in position as I glue and clamp the drawer runners to the web frame. Just be careful not to use too much glue. It would be unfortunate to glue the drawer into the case by accident.

# A New Manual for BISCUIT JOINERS

The 27 time-tested techniques to tame this often-tricky tool.

**T**he biscuit joiner is one of those tools that promises to make life so much easier. The ability to make relatively strong joints quickly and easily makes this a tool you really must have. Yet many woodworkers find it frustrating; for some reason the joints never quite line up and in the end it doesn't seem to save that much time.

It isn't the fault of the tool. The truth is that most woodworkers don't know the right techniques to make the most of their biscuit joiners, and there are some common attitudes and assumptions that hurt more than help, and don't speed things up.

Some joints in woodworking are for show and some are for utility. Biscuit joints won't make your friends and family ooh and aah over your skills, but they will help you locate and connect parts without much fuss so you can get on to more important things.

Fifty years ago, Swiss woodworker Hermann Steiner had a great idea and formed a company called Lamello to market the oval-shaped joining plates

and the tools to cut the slots. I first saw one in 1981 when the German-born foreman of the cabinetshop I was working in brought out a new toy he called a cookie cutter.

We were all impressed with what it could do, and every one of us wanted one of our own. What stopped us in our tracks was the \$600 price of the machine. The Lamello model is undoubtedly the best in the field. It's made like, well, a Swiss watch.

The Lamello is still the highest-priced machine in the category, selling for four to five times the price of other machines. In a production environment the investment is worthwhile, but if you're not using it on a daily basis, the lower-priced models will likely meet your needs. But if you drive to the tool

by Robert W. Lang

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store in a Mercedes or BMW, you won't regret buying the Lamello.

## Make the Machine Perform

To make the average biscuit joiner perform at its peak, there are a few things to check and possibly adjust. First you want to minimize any sloppiness in the tool's plunge mechanism.

Every model is a little different, but generally you want to check that all the screws are tight and the motor slides freely on the base. Spraying a dry lubricant on the tool's ways will help. Check the fence. It too should move freely; the stop may need to be adjusted to 90°.

The last adjustment to make is to set the depth stop. This is done by making a test cut for a #20 biscuit, with the tool on the correct setting. You want the resulting cut to be a bit beyond half the width of the wooden plate. This allows the two parts to join snugly while giving you a bit of room for lateral adjustment during assembly.

Make a cut in some scrap, put a plate in the slot, then draw a pencil line where





Photo by Al Parrish

the plate meets the edge of the slot, as seen in the photos at right. Then turn the plate around, reinsert it, and draw a second pencil line. When the gap between the two lines is between  $\frac{3}{32}$ " and  $\frac{1}{8}$ ", you have the depth setting adjusted correctly.

### The Nut Behind the Wheel

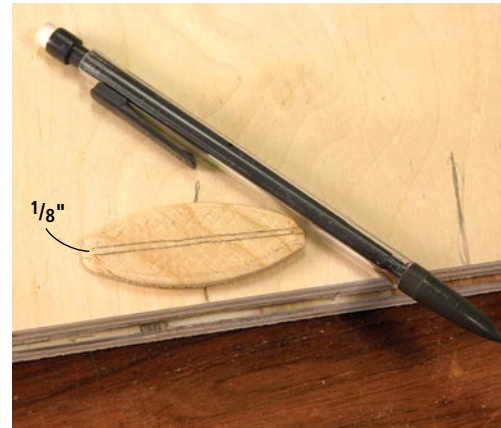
With the machine ready to go, it's time to make sure you understand how the tool works and what it's good for. In some applications it's ideal, but it's not a panacea. If you're joining two pieces of solid wood edge to edge to make a panel, the main benefit of the biscuit is to align the parts. The joint is strong enough as it is, and adding biscuits may introduce additional problems as well as make extra work.

Turning a corner is a different story; with biscuits, you can make a simple butt joint in a case or box into a much stronger joint. You also get the benefit of having the parts line up at assembly – if your technique is sound.

Using biscuits in miter joints can be an iffy proposition. Biscuits work well if you have the machine perfectly aligned when you make



Use a biscuit to help set the depth of cut. Insert it in a slot and mark a pencil line at the intersection of the plate and the edge of the material.



Adjust the depth setting on the tool so the gap between the two lines is about  $\frac{1}{8}$ ". This will allow some room for glue within the joint and some lateral movement for fitting.

the slots. If you're off by even a tiny amount however, the error will be doubled, and you'll likely do more harm than good.

In any type of joint, small errors in aligning the tool to the work as you set it in place, and as you make the cut, account for nearly all the problems you may encounter (as seen in the photos below). It's common to think that the machine is so easy to use that you can't go wrong, but like any other joint, the care you take setting it up and cutting it make all the difference.

### Two Total Time Wasters

People tend to concentrate on two things that don't matter and then ignore the most important part of the process. Centering the tool's cutter in the thickness of the material isn't necessary. You're far better off to set the fence by placing the tool on a flat surface, putting a piece of the material you plan to use next to it, and lowering the fence until it touches the top face of the material, as shown in the photo below.

Now you have the tool set so that the cut is indexed both from

the fence and from the base of the machine. That is far more important than having the slot centered. There is in fact a big advantage to having the slot offset; it ensures that the face you want to show won't be hidden by accident.

It is also much easier to keep the machine flat by working from the base for as many cuts as you can. I only use the fence as a last resort. The jig shown above right will hold the work flat for you and provide a flat surface for the base of the machine.

To make this jig, all you need



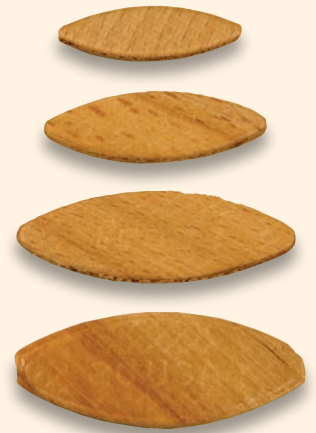
The most common mistake is allowing the machine to tilt as you cut the slot, preventing the parts from lining up properly.



Don't worry about centering the slot on the thickness of the material. Set the fence so that the slots will register from the base of the tool.



Problems arise if you don't hold the work steady and you don't keep the tool flat. This simple jig will let you keep both hands on the tool and the workpiece from moving.



## WHAT'S IN A NAME?

There are several sizes of biscuits available, but the #20 (at the bottom) is by far the most commonly used. I've often wondered why we in America call these thin wood joining plates biscuits. To me, a biscuit is thick and fluffy, not thin and hard, and I was introduced to the tool as a cookie cutter. The answer is in what happens in translation.

The inventor coined the term "holzlamelle," a combination of the German word for wood, and the French word for thin strip or plate. Nothing to do with baked goods, but a mouthful. One of the many German words for cookie was adopted in Europe.

When we go from German to English, this is one of the places where there is a difference between American English and British English. "Cookie" is a Dutch derivation and was used in America long before it was used in England. What we call a cookie, the English call a biscuit.

The English now use the term cookie, but limit its use to soft and chewy baked goods. A British tax case defined biscuits and cookies based on if they get hard or soft when they go stale. (The British court is silent on the subtle differences between wafers and crackers.)

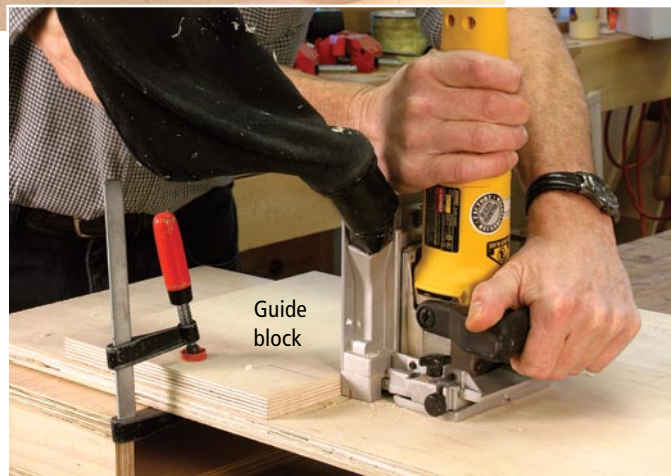
When first imported to the United States, the name was translated with the British usage, and we adopted the term biscuit. The translation may be fuzzy, but we like the machine so well, we don't care what we call it.

—RL

is a flat piece of Medium-density Fiberboard (MDF) or plywood, a smaller piece screwed down to one corner, and a third piece below the front edge to act as a hook to your bench. Attach the jig firmly to your bench with a clamp or a few screws, and mount a hold-down toggle clamp as shown above. This will hold your work safely, letting you keep both hands on the machine and it gives you a flat reference surface for the base of the tool.

If you need to make a joint in the middle of a piece, such as a fixed shelf in a cabinet, clamp a guide block in line with the location of the bottom of the shelf and make the cut by plunging vertically. The guide registers the cut, and lets you use the broad face of the tool to hold it steady while you make the cut. Mark your registration lines on this block if you will be making repetitive cuts.

The other useless, obsessive activity people engage in is measuring the exact location of each slot. Just make a series of pencil marks by eye (as shown in the photo at right) to locate the cuts. It won't make any difference in the finished joint if there is some variation in the distance from plate to plate. And again, the variation in the locations will prevent you from putting parts together in a way you don't want them.



A guide block will locate the position of a shelf, and provide layout marks.

### Get a Grip

To get a good cut, the piece that gets the slot needs to be firmly clamped to the bench. If you try to hold the work with one hand and plunge the tool with the other, you're giving away half the control you have. Put both hands on the machine, and put them in the right place. The handle on the top is there for a reason.

Most people ignore the handle and hold the fence down on the work with one hand. This tends to be self-defeating as you're still likely to tilt the tool as you make the plunge. It also introduces some risk; you're putting your hand in the path of a spinning saw blade. Accidents with biscuit joiners are rare, but if you put your hand on the handle you gain better control and you eliminate the risk of injuring yourself entirely.



Don't waste your time measuring and marking the exact locations of the plates. Hold the parts together and make your marks by eye.



Lock your arms in position before turning on the machine. Make the cut by shifting your weight with your legs, not by pushing with your arms. This will keep you from tilting the machine as you make the cut.

With both hands on the tool, you have more control. When you place the tool on the work, push down with the hand on the handle before pushing in with the hand on the barrel.

Most biscuit joiners have pins or some other device to prevent the machine from shifting sideways as the saw blade moves into the work. When you put the tool in position, put it down, then move it in. This will keep the pins from engaging before you have the fence or base of the tool all the way down.

When you're ready, with the work firmly clamped and your hands on the tool, lock your arms before you pull the trigger. Make the cut by shifting your weight forward from one leg to the other as seen in the photos above. If you keep your arms immobilized while plunging, you won't tilt the tool as you make the cut.

Apply downward pressure with the hand that's on the handle, and forward pressure with the other hand. Take a moment to make sure the fence is flat on the work and the face of the tool is against the edge you want to cut before you turn on the motor.

Another effective way to make a cut without putting your hand at

risk is to hook your thumb over the top of the handle, with your fingers at the top of the fence. From this position, you can plunge the cutter into the work by squeezing

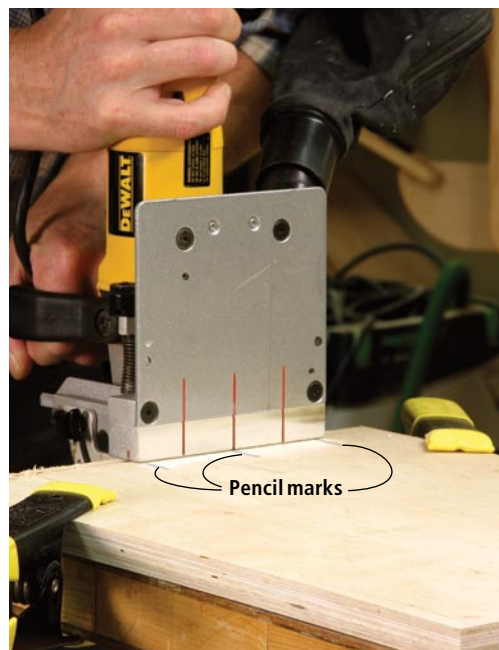
the fence and handle together.

When you make a cut vertically at the edge of a board, only a portion of the tool is in contact with the wood, and the weight of the machine is almost all beyond where the cut will be made.

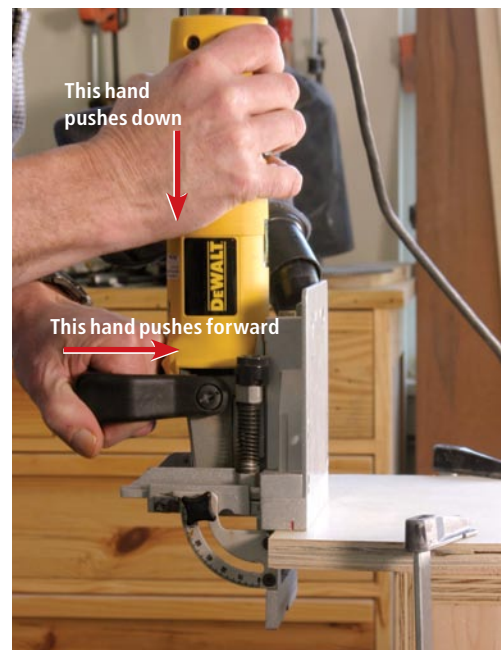
I extend any registration marks so that I'm lining up the cut with the base of the machine, not the front. This keeps my head and shoulders above the tool. I push

down with the hand on the barrel of the tool, and in with the hand on the handle as seen below.

The action of the saw blade plunging into the wood creates a lot of dust and wood chips. Most machines have a dust bag, but these tend to clog in the narrow chute between the blade and the bag. It's still a good idea to use the bag, even though you'll need to stop and clean it periodically.



To keep from tilting the machine when making a vertical cut, extend your pencil marks so you're lining up with the center mark on the base, not on the fence.



Most of the weight of the tool is off the work, so it's easy to tilt it in that direction as you plunge. Push in with your handle hand and down with the other hand.

If you're plunging horizontally you might want to remove the bag, but going vertically the exhaust chute will be aimed at your face. Be mindful of the spinning blade as you put the machine down. Loose tools on the bench can be struck by the blade if you're not careful setting it down.

### Putting It All Together

One of the truly clever elements of biscuit joinery is the plates themselves. The textured surface is the result of the biscuit being compressed during manufacturing. When the plate gets wet, the wood swells up, resulting in a tighter joint, as seen above right.

Since most common wood-working glues are water based, this swelling occurs right after assembly. If you're using a glue that doesn't contain water, such as polyurethane, there won't be any water present to swell the biscuit. A light mist of water sprayed on the plate, or a swipe with a damp rag just before inserting the biscuit in the slot will ensure that the plate swells.

The downside to this is that the plates can swell enough when exposed to damp humid air to make insertion difficult or impossible. Keep them in an airtight container or Ziploc bag and they won't get fat on you.

If you're just getting used to biscuit joining, or haven't used your machine in a while, it pays to make a dry-run assembly to make certain that everything fits together the way you want it to. If you need to make a correction, you don't want to try to do it with your glue drying and biscuit plates swelling.

If you have a miscut slot, you won't be able to make an adjustment without making the slot too wide. Glue a biscuit in the slot; after the glue dries, trim it back to a flush surface. I look at the way



The joining plates are usually compressed by machine when they are made, and swell up as water from the yellow or white glue enters the biscuit. This is a dry plate.



This plate was soaked in water, and after an hour it ended up at its pre-compressed thickness. It's not a lot of movement, but it helps lock the parts together.

the grain runs on the plate, and use a chisel pointed "uphill" to split it off just above the surface, then I trim it back to flush with a paring cut with the chisel. Once the hole is filled, the slot can be recut properly.

I'm careful about how much glue I use, and where I put it, as shown in the photos below. I put a bead of glue at the top of each side of the slot, staying about 1/2" away from the ends. I put glue in all of the slots before inserting any of the plates. This lets the glue run down the sides of the slots, coating the sides of the slots.

When the biscuit goes in, I'm looking for the glue to coat the sides of the plate without squeezing out all over the place. If you put a plate in a glued slot and immediately

pull it back out, you'll be able to see if you are applying the right amount of glue.

I put the bead of glue for the other slot of the joint on the biscuit plate, as seen below right instead of in the empty slot. This keeps the glue from running out of the slots when the piece is turned over for assembly.

In addition to being messy, there is another negative consequence to using too much glue on the biscuits. The moisture in the glue has to go somewhere, and as the plate swells this moisture migrates into the surrounding wood. If it's solid wood, and the slot is near the surface, the surface of the wood can swell directly above the biscuit. Because of the swelling of the plate, the joint will

stay together after a short time in the clamps. Many people will proceed without waiting for the glue to dry.

This swelling will disappear when the moisture evaporates. If you plane, sand or scrape the surface above the biscuit without waiting for the glue to thoroughly dry and the excess moisture to evaporate, you can end up with biscuit-shaped depressions in a day or so. You can prevent this by avoiding excess glue and waiting at least overnight for any assembly to dry before further processing.

The biscuit joiner may not be the best choice for every situation, but it does deserve a place in almost any woodshop. When you know the secrets of using it, that place won't be on a shelf, gather-



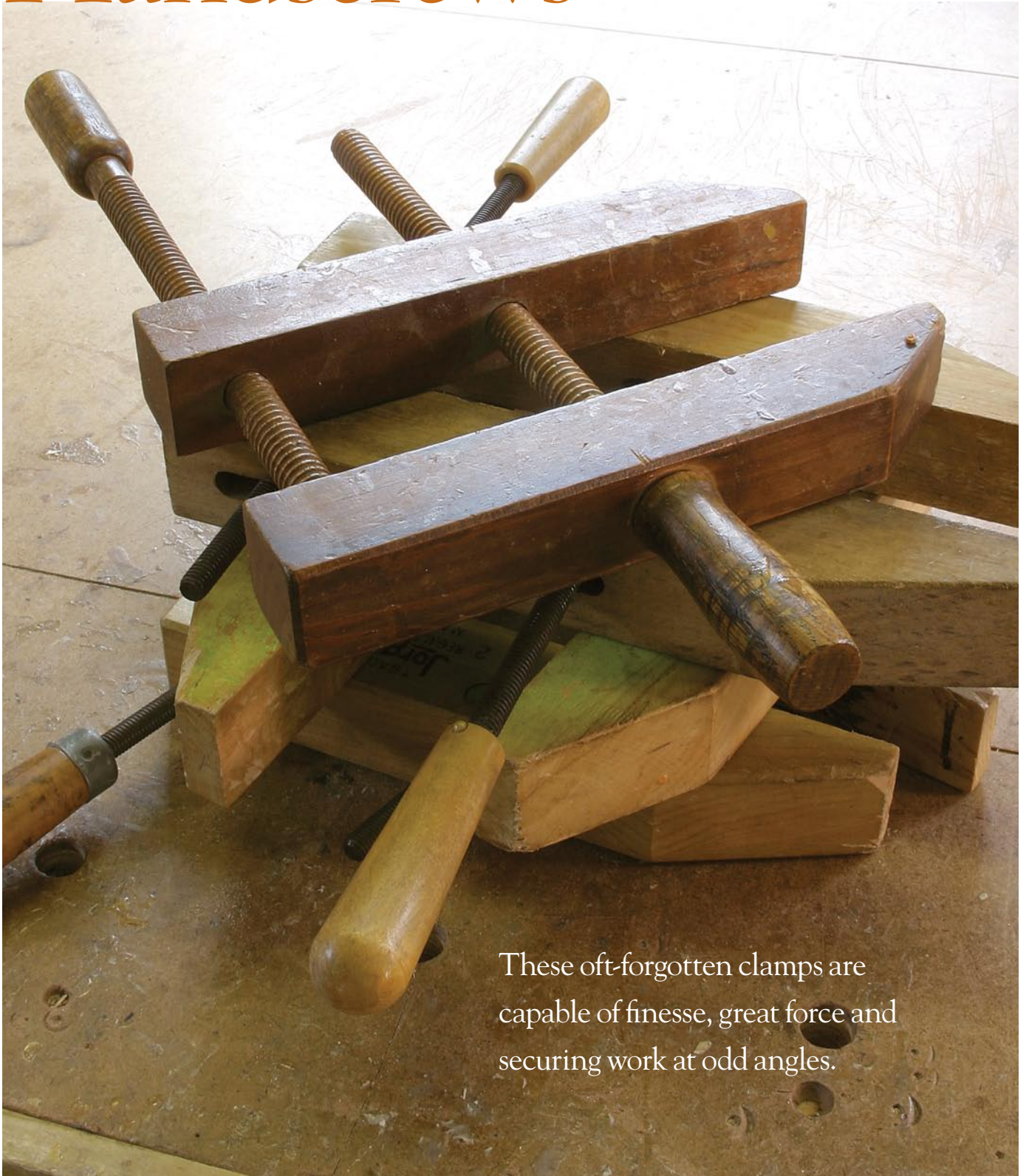
Practice getting the right amount of glue in the slot. You want to coat the surface of the plate without having excessive glue squeeze-out, or introducing too much moisture in the interior of the joint.



After inserting the plate in the slot, apply the glue for the second half of the joint on the biscuit. This will keep glue from running out of the slots as you put the second piece in place and apply the clamp.



# Understanding Handscrews



These oft-forgotten clamps are capable of finesse, great force and securing work at odd angles.

Woodworkers use clamps for all sorts of purposes – to create pressure when gluing, to secure parts during assembly, to hold parts while working on them. There are many types of clamps available, but one of the most versatile and powerful of all is the wooden-jawed handscrew.

A typical handscrew consists of two hardwood (usually maple) jaws with beveled ends. The clamps are adjusted and pressure is created with a pair of parallel screws (also called spindles) that pierce the jaws. Wood handles on the screws allow a better grip for creating torque.

Handscrews are made in graduated sizes. They are typically measured in three ways, the first being jaw length. Handscrews with jaws as short as 4", to as long as 24", are available. The second measurement is the maximum amount the jaws can be opened or separated. This distance is a function of the screw length, and its measurement is called the clamp's capacity. Some larger handscrews have a capacity of 17". The third measurement is the handscrew's reach. This is the distance from the front of the jaw to the center screw. The reach on larger handscrews can be as much as 12".

Handscrews with 10" to 12" jaws, with 6" to 8" capacity, and 5" to 6" reach will meet most of your woodworking needs.

Compared to some woodworking tools, the handscrew is a relatively new innovation. It was first produced in the form we recognize in the late 19th century, even though woodworkers used similar but cruder, wooden clamps for many centuries previous.

## Wood v. Metal Threads

There are two versions of handscrews. The older 19th-century

type is the more simple. It has four parts, all made of wood. These are two wooden jaws with two wooden screws. The handles are integral parts of the screws. This type of clamp is no longer commercially made. Although these older handscrews are frequently sold on the antique tool market, I do not recommend them (though they deserve to be preserved). The old, brittle wood does not hold up to the wear and tear of shop use. Woodworkers who prefer all-wood handscrews should make their own.

The second and more widely recognized handscrew was developed during the 20th century and is still being made today. While retaining the two wooden jaws, its screws are threaded steel rods and the wooden handles are applied to these rods. Within the last decade or so, large numbers of these handscrews have been imported from China and other developing countries. The quality of these imported clamps varies considerably. You usually get what you pay for.

Each type of handscrew – the all-wood, or the steel thread – is used similarly. However, each also has advantages over the other. Your own needs should guide your decision to either buy handscrews or make your own.

## Wooden Handscrews: Flexible but Fragile

Making an all-wood handscrew is not a complicated woodworking project (see the story on page 82). However, you will need a thread-box and tap, and a lathe. The holes in the lower jaw (as shown in the illustration) are both threaded.



Handscrews come in two principal varieties: all-wooden clamps and those with metal threads. Both have advantages and limitations, so I think it's handy to have both in the shop.

The center hole in the upper jaw is through, while the other hole in that jaw is blind. The most desirable feature of this older version of handscrew is provided by the wooden screws. When the clamp is tightened the rear screw bows slightly. This flex allows the screw to function as a spring. If the clamp is loosened slightly or the work shifts, the clamp adjusts and does not immediately fall out of position. This makes the all-wood handscrew superior for assembly or for fitting, or for work where shifting or adjustment is going to happen. It is a pain to have your work shift and all the handscrews fall off, which can happen with metal-threaded handscrews.

The disadvantage of the all-wood handscrew is that the jaws do not pivot nearly as much as the steel-spindle variety and so it is not the best choice for irregular shapes. Also, the wood threads have very short grain and are prone to damage from the everyday bumps and bangs that occur on a workbench.

If an all-wood handscrew is over tightened, the threads can



With a wooden handscrew, the rear screw flexes under pressure, allowing the clamp a springy grip. The bowing is almost imperceptible to the unaided eye, but it allows the clamp to keep a tenacious grip. Note the chipped threads on the screws, a result of 10 years of use.

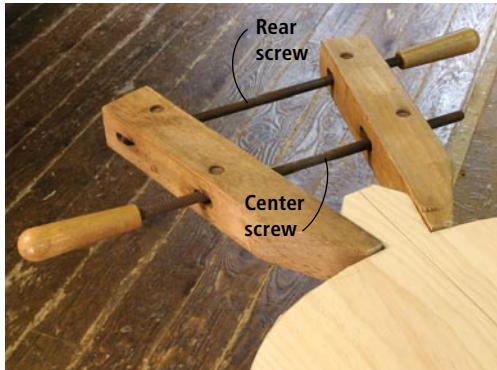
strip and break away. Another concern about over tightening is that the rear screw will break. Fortunately, it really takes some inattention and muscle to cause this type of damage. As these handscrews are shop-made, you can always make a replacement screw. But because these clamps

by Michael Dunbar

*A chairmaker since 1971, Michael is the founder of The Windsor Institute in Hampton, N.H., where he teaches hundreds of students each year to build Windsor chairs. For more information, visit [thewindsorinstitute.com](http://thewindsorinstitute.com).*

## MAKE A WOODEN HANDSCREW

Thanks to the rotating metal nuts in the jaws, handscrews with metal threads can pivot dramatically. This allows you to easily clamp odd shapes.



can be damaged by an inexperienced user, I reserve my all-wood clamps for my personal use.

### Metal Screws Allow Pivoting

The modern handscrew is slightly more complicated than the older all-wood version, and it has more parts. The threaded steel rod has right-hand threads on one half of its length and left-hand threads on the other half. Instead of threaded through and blind holes, all four points in the wooden jaws have round metal nuts that also function as pivots.

The nuts are fit into, and the screws pass through, holes in the jaws that are both elongated and tapered like a flattened cone. These unusually shaped holes allow the jaws to spread or to pinch to almost 45°. An all-wood clamp can only manage about 6°. This ability makes the modern handscrew more versatile when clamping an irregular shape.

Wooden handles are threaded onto the projecting ends of the threaded metal rods. The handles are protected from splitting or chipping by a ferrule. Small metal pins secure both the handles and ferrules to the steel spindles so they do not loosen or separate.

Barring a fire or running the jaws through a table saw, a modern handscrew is virtually indestructible. Buy one, and if you don't lend it to your brother-in-law, you will have it for life. However, due

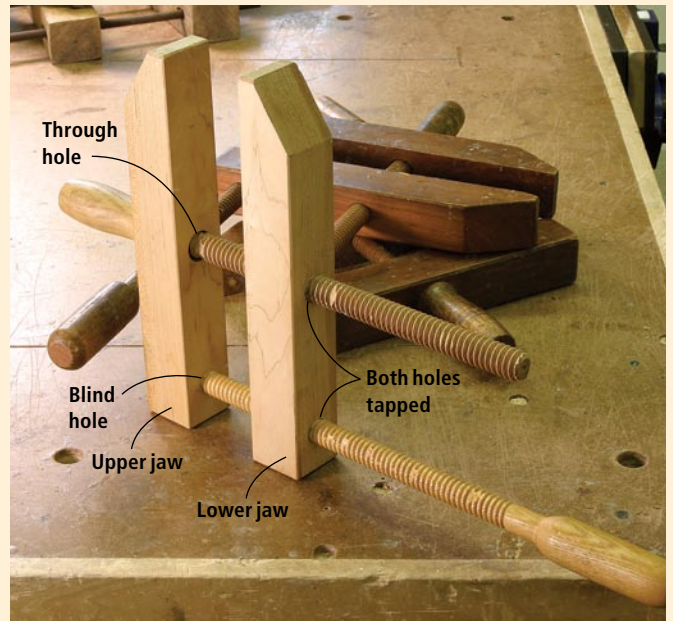
to the clamp's weight and its tendency to fall away as soon as work shifts, be aware that it can cause damage to tools or delicate work. It will hurt if it lands on your foot and pivoting spindles are always eager to pinch your fingers.

### Using a Handscrew

To adjust a handscrew for most applications you must first make the jaws parallel. Do this by turning just one screw in whichever direction is needed to bring the jaws to parallel. Now, hold the clamp in front of you by two handles. The center handle remains stationary and you make the adjustment by cranking the lower handle. If you turn your hand counterclockwise (overhand toward you) the jaws will separate and remain parallel. Turn clockwise (underhand toward you) and the jaws will close. As you crank with your hand the jaws will spin with it. So, hold the clamp far enough away from your face to avoid a split lip.

When the jaws appear to be at the desired opening, I test the setting by placing the gap between the ends of the jaws to the work. This measurement tells me how much more adjustment is required, and in which direction.

In most applications (especially when gluing or securing a piece of work to the benchtop) you want even pressure. Achieve this by turning the center handle



Wooden handscrews are easy to make with shop scraps and common equipment.

The great thing about making your own handscrews is that they can be done quickly and cost little. The most expensive item is the tap and thread box. The clamps themselves can be made out of scrap. You will need 1<sup>3</sup>/<sub>4</sub>" square hardwood blocks about 12" long. The ones I made in the photos were yellow birch left over from some table legs. Straight-grained oak, ash and hickory make the best screws. You can even split the turning blanks out of firewood, as I did.

Taper the ends of the jaws on a table saw or miter saw. Locate the holes by scribing a centerline along both surfaces. Measure the centers from the square ends and drill according to the drawing. Note that the lower jaw has two 5/8" through-holes that will be tapped. The upper jaw has a 7/8" through-hole and a blind one that is 1/2". For accuracy, it is best to drill these holes on a drill press.

The two handles are slightly different. Because it bears on the jaw, the center screw handle has a square shoulder. The rear screw has a 1/2" tip that fits into the same-sized hole in the upper jaw.

All the dimensions in making a handscrew are flexible, as the clamp only has to do its job. The diameter of the screws to be threaded however, is critical. If it is too thick, it will bind in the thread box. If it is too slender the resulting threads will not have enough working depth to hold and will slip when you tighten the clamp. To ensure a correct and uniform diameter, I tested the diameter with a 3/4" open-ended wrench.

When starting the threadbox or tap be sure to keep them square to the stock. It helps to lubricate them with boiled linseed oil.

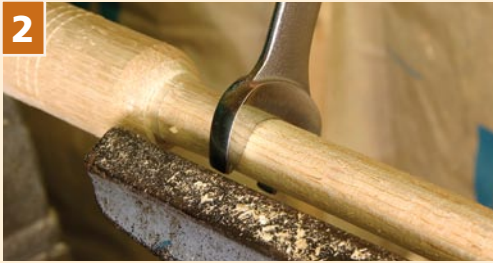
Before assembly, handplane the jaws and chamfer the edges with a block plane. A thin application of boiled linseed oil will eventually turn the clamps a pleasant nut brown.

— MD



**1** Turn the screws. The Sorby sizing tool attached to my parting tool allows me to turn accurate diameters.

The screws need to be closely sized to work in the thread box. A open-ended wrench does the job.



**2**



**3** The holes for the screws are best made on a drill press. The lower jaw has 5/8"-diameter through-holes that will be tapped.

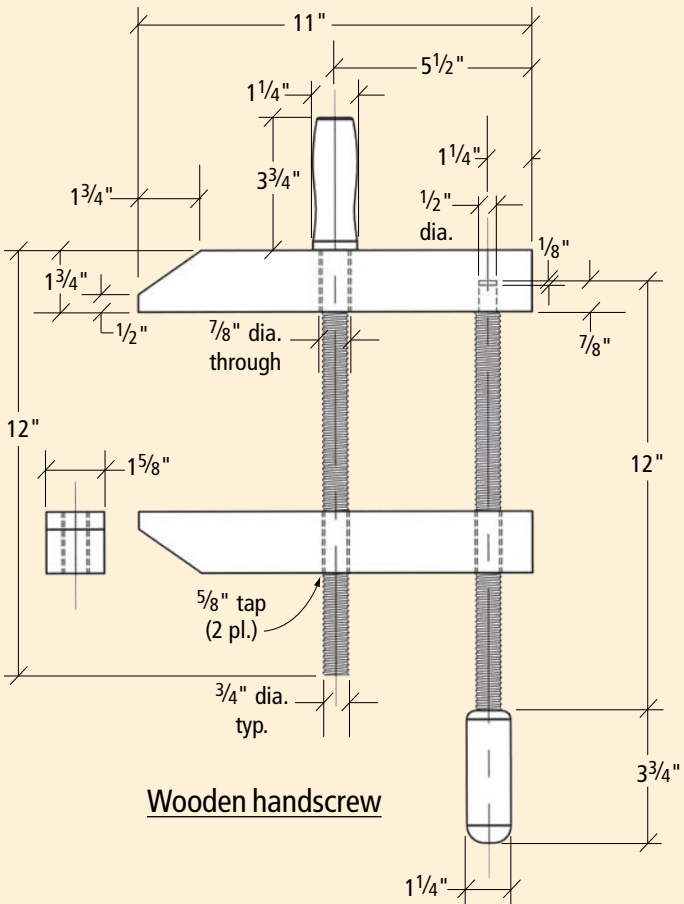


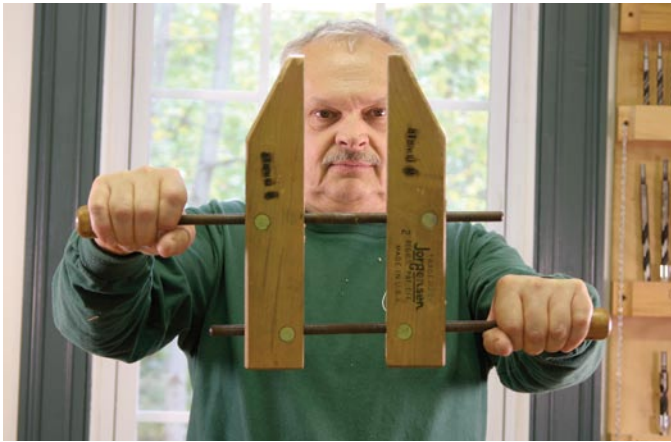
Illustration by Louis Bois



**4** A threadbox cuts threads onto your turned screws.



**5** A 5/8" tap cuts the mating threads in the lower jaw of the handscrew.



Adjusting a handscrew: The hand that holds the center handle remains stationary. You move the jaws by cranking the lower handle over the center handle. Clockwise opens the jaws. Counterclockwise closes them.

until only the adjacent surfaces of the jaws begin to tighten on the work. Then, turn the rear handle, bringing the jaws back into parallel and evening out the pressure along the jaw's entire length.

A handscrew is a powerful clamp. How much you tighten the jaws will control the pressure. If the work is delicate, an over-tightened handscrew can damage it. I have found that over tightening can also starve a glue joint by squeezing out all the adhesive.

If the job requires multiple handscrews, put them in place one at a time, applying enough pressure to hold the clamps in place. When they are all secure, go back and tighten them uniformly.

Sometimes you do not want even pressure, but instead need to apply force to a precise point. In that case, adjust the handscrew to the approximate setting. Then, placing the ends of the jaws where you want to apply the pressure, turn the rear screw. This will close the jaws out of parallel so that all the force is applied to the tips of the jaws.

To clamp an irregular shape such as a taper, open or close the jaws to the approximate shape. Then, you will have to fit the jaws to the work by changing their angle as required. This is trial and error. Increase or decrease the

angle with the rear screw and use the center screw to change the distance between the jaws.

Handscrews are very versatile and as you become more acquainted with them you find countless ways to use them around the shop. Held in a bench vise, a handscrew can work as an upright vise for carving or close work. A handscrew applied to a piece of thin stock will reduce the danger of splitting. I do this when mortising by hand. However, I clamp a second handscrew to the first to hold the setup securely on the benchtop. You can use a similar arrangement to create a make-do bench vise. Handscrews are also good for holding jigs, fixtures and stop blocks.

A well-equipped shop will have numerous handscrews. I have about three dozen, mostly 12", and they take up a lot of space. I store mine in three ways. Some I hang on a wall. I drilled holes into a 2 x 4 cleat that is lagged to the shop wall. The holes are angled slightly upward and receive lengths of  $\frac{3}{4}$ " dowel. Each dowel will hold three clamps. I have another cleat to which I simply clamp a row of handscrews. I also have a clamp stand. This is a wooden column on an X base. I pile the handscrews on it by passing the post between the metal spindles. **PW**



When you want a handscrew to apply pressure evenly along the jaws, adjust the jaws so they are slightly out of parallel with the tips more open. Tighten the center spindle until the jaws just begin to pinch adjacent to the center spindle. Then, bring the jaws into parallel by tightening the rear spindle. This will create even pressure along the jaws' reach.



Handscrews can apply significant force at their tips. First get the jaws to slightly pinch the work (above). Then, when the handscrew is in position, turn the rear handle to apply force at the tips alone.



Handscrews can be used in tandem to hold work for planing or chiseling. They can, in a pinch, even substitute for a bench vise.



# Pens for Peacekeepers

The gift of a handwritten letter shows appreciation for Canadian forces.

About two years ago I was selling some of my woodworking and pens at a craft show. After the show, I had several pens left and remembered reading about a project started by Keith Outten, wood forum host for Sawmill Creek ([sawmillcreek.com](http://sawmillcreek.com)) called Freedom Pens ([freedompens.org](http://freedompens.org)), which sends handcrafted pens to American servicemen and women who serve in dangerous areas of the world.

I was inspired by the project

and I spoke with Outten about how he was able to organize his project and establish public support. I sent Freedom Pens a few of my remaining pens and included a handwritten letter with each one. It's then when the gears started to turn for me; I began to wonder

how I could start something similar for the Canadian Armed Forces. I wanted a project that said thank you to the men and women of the Canadian Forces, one person at a time. I know that we seldom celebrate what our Canadian soldiers do, and that Canadians

by Jim Shaver

*Jim is a 13th-generation Canadian (and yes, he plays hockey). A self-taught woodworker, he now demonstrates woodworking at a Lee Valley store and for his woodworking clubs. He's a founding member of the Halton Furniture Makers Society and has recently been named a forum host at [woodcentral.com](http://woodcentral.com).*

Dear Canadian Peacekeeper,  
My name is Jim Shaver and I made this pen that I want you to have. Woodworking is one of my hobbies and I thought that I would reach out and tell you as a fellow Canadian how **PROUD** I am of the work you do and what your commitment and courage mean to us.



Photo by Al Parrish

are a patriotic people, but we don't usually show it in an outward fashion. I want to change that.

I soon found just the right person to help with the project: Shirley Penny of the Canadian Armed Forces.

## A Gift of a Letter

I made 12 pens and sent them to Shirley, who sent them to the peacekeeping forces located in Afghanistan, in December 2004. Within a few weeks I was receiving letters and e-mails from the recipients. It was a very moving moment when the first one came in, and it affirmed the idea that I needed to develop and engage other people in the project. It also became clear



Photos courtesy of Canadian Armed Forces

to me from the responses in the letters that the significance of the pen was deeply appreciated but that the accompanying letter was the real gift. In my letters, I tell members of the Canadian Armed Forces how much I appreciate their efforts in keeping the peace and fostering relations in difficult parts of the world, and that I realize the sacrifices they are making by being away from friends and family.

The letters were being passed around among the soldiers; some of those I received were coming from soldiers who did not receive a pen but who wanted to pass along their thoughts after reading the letters. My next thought was how

to grow this project and so I gave it a name: Pens for Canadian Peacekeepers (to reflect the best-known global role of our forces).

As many of you know, the woodworking community on the Internet is a very diverse and supportive group. If you have frequented any of the woodworking forums then you also know there is a plethora of information and expertise out there in many areas of interest. I sought some support for logistical help with web site creation from one such person, Mark Goodall in Peachtree, Ga. Together, we created PensForCanadianPeacekeepers.com, so others could more easily read about and get involved in the project.

One feature on the site is the publication of some of the letters that come back. The words are very moving and often express deep appreciation and support of the project's effects on the troops. Letters from privates to brigadier generals have been received and posted.

"Nothing touches the heart like a personal gift such as yours," wrote a peacekeeper in Sierra Leone. "The pen will remain in my pocket each and every day as a reminder that not only am I proud to be a peacekeeper, but that there are Canadians out there who are proud of what we do as well."

One sergeant wrote about the reactions of his soldiers when they received the gift: "The softening of their faces and for some, the tears that welled in their eyes when they read your letter, gave me a real sense of pride for the job these young soldiers were doing over here," he wrote. "To know someone out there, besides our families, are so proud of the Canadian soldiers and appreciate what we do, makes us walk taller and prouder ourselves."

To date, more than 30 people from across Canada and the

United States have donated hand-made pens; more than 350 have been sent. There is no timeline or target number of pens to send. The project has no end, so as time passes along so does the path and events that guide the project.

This project has also developed many positive stories. One involves some special walnut I was given last fall. This wood was originally destined to become rifle stocks in a factory in Toronto during World War II. At the end of the war, some of the leftover wood was salvaged by a factory worker who was also a woodworker. Through a series of events and time, some of the remaining wood was donated to me to support the project. I have since turned many pens from this walnut and I have included its story in each accompanying pen letter so the soldiers receiving them know that they have become pens rather than gun stock from days gone by. (The pictured pen is from this storied stock.)

Shirley Penny continues to be the eyes and ears for the project within the forces. With each batch of pens and letters, Shirley and I discuss where we might direct each shipment. Pens have been sent to many places where the Canadian Armed Forces are on duty, including Afghanistan, the Sudan, Sierra Leone, Haiti and Egypt.

This project was inspired to say thank you to the many Canadian Armed Forces men and women around the world who wear the Maple Leaf not only on their shoulders, but also in their hearts. What I was not prepared for was the incredible level of gratitude and positive feelings that this project has given back to so many people; it truly is wide reaching. It is proof positive that to give is to receive!

To find out more and learn how you can help, visit [PensForCanadianPeacekeepers.com](http://PensForCanadianPeacekeepers.com). **PW**

# Turn a Natural-edge Bowl

Get clean cuts and a nice finish from a challenging piece of material.

A natural-edge bowl is one of the iconic forms of modern woodturning, and it is still a great way to show off a beautiful piece of wood. It's also a good test of your developing turning skills. Good tool control is crucial for getting a clean cut and a smooth curve, especially on the wings of the bowl, where it will be difficult or impossible to adequately sand out any major defects.

The procedure is similar regardless of the size or other aspects of the piece. A limb or log is cut down the center. The outside curve of the limb or log will become the rim of the bowl. This half-section is mounted either

between centers (as in this article), or on a faceplate or screw chuck, to turn the outside and to prepare the foot for re-mounting. It is then re-mounted on a waste block (as here), faceplate or chuck to turn the inside. A final mounting either between centers (for a simple foot like the one shown here), or in some kind of jig, allows the foot to be neatly finished.

by Judy Ditmer

*Judy, author of two turning books and many articles, has been turning since 1985. She teaches and demonstrates her skills throughout the United States and Canada.*

Although the basic format is simple, small variations in shape and detail can have a considerable impact on the overall appearance of the piece, so making these bowls can be a good exercise in design as well. The bowl can be almost any size; you're limited only by the size of limbs or logs available and almost any species will work. The bark may be left on or removed, the rim may curve in or out, the piece may be deep or shallow. The bowl may have a plain or fancy foot, or no foot at all. There are many possible variations within this ostensibly limited form. Exploring them can sharpen your eye as well as your turning skills.



Photos by Al Parrish





**1**

To set up to turn a natural-edge bowl, the workpiece is mounted between centers with a spur drive in the headstock and a live center in the tailstock.



**2**

Begin cutting the outside shape with a bowl gouge. You should cut from the base (the center of the limb) toward the rim, or top, of the bowl (the bark side of the blank). The flute of the tool should be pointing in the direction you are cutting, and you should be using the low side of the gouge to cut (that is, the part of the edge most directly supported by the toolrest).



**3**

As the piece spins, you can see the shape of the outside curve of the limb (this will be the rim of the piece), surrounded by a ghost image of the entire limb section.



**4**

Getting a clean cut and a smooth curve when alternately cutting wood and air can be difficult. You must slice across the irregularity, rather than bouncing along on it. Instead of moving the whole tool forward, try using your left hand to hold the tool firmly down against the toolrest in one spot. Then ...



**5**

... lever the tool across the cut. Use the leverage the handle affords by holding it toward the end with your right hand (my right hand is close in only so both hands can be seen in the photo). Swing smoothly through the cut. ...



**6**

... until the tool exits the cut. Then move your left (fulcrum) hand, and repeat. Keep the toolrest close to the workpiece, and keep your gouge very sharp. Faster lathe speed will also help, but be careful not to exceed a safe speed for your lathe and for the size of the workpiece. Remember, this kind of turning tends to be more out of balance than regular bowls, even when the rounding has been completed.



**7**

Continue shaping the outside of the bowl. Keep the tool sharp and pay attention to controlling it. Push up the side of the bowl (into the cut), not toward the axis (into the workpiece).



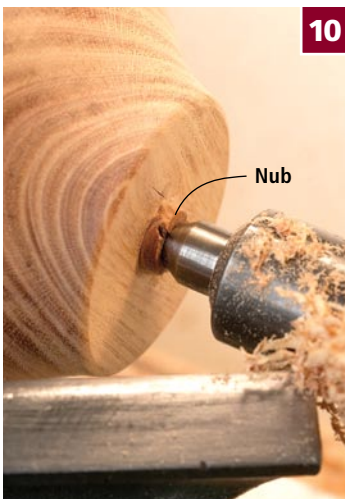
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With the lathe stopped, you can see whether you have turned away all of the flat ends of the section. With the flat ends gone, continue to refine the shape and the surface until you have a bowl you like.



9

With a fingernail-grind spindle (detail) gouge, even up the foot and turn it flat.



10

Leave a clean, slightly tapered nub in the center of the foot. This will be used to center the bowl for the glue mount. I find this a convenient, quick and safe way to mount a smaller bowl such as this one. If the piece were larger, I might mount it on a faceplate (using a nub the same diameter as the opening in the faceplate to facilitate centering) or a chuck (which would necessitate mounting the piece on a faceplate or screw chuck in order to turn a recess in the foot for the chuck jaws).

Nub



11

Mount a piece of waste wood (don't use very soft wood, or easily split wood such as oak) on a faceplate, turn it round and flatten the surface. Measure the nub you left on the bottom of the bowl, transfer this to the waste block, then cut a slightly tapered recess. I test the fit by pushing the bowl into the waste block with the lathe on (leaving the burn marks seen here), but if you aren't comfortable with this, just try the fit with the lathe stopped. Adjust, test, and repeat until you have a good fit. Put thick cyanoacrylate glue on the bowl bottom, spray accelerator on the waste piece, then mount the bowl.



12

You may be able to bring up the tailstock for support as you begin to excavate the bowl. But be careful to cut only on the right side of the gouge, as cutting with the left (high) side is much more likely to cause a bad catch.



13

Continue removing wood from the interior. Cut from the rim toward the center/bottom. Stop each cut before you reach the waste left from the previous cut. If you run the gouge into the waste, it will catch.

*continued on page 90*

continued from page 88



14

You can cut from the center down on the waste left in the middle. This uses different muscles, giving you a rest, and uses the other side of the gouge, meaning fewer trips to the grinder. It also applies force primarily toward the headstock rather than laterally, lessening the chances of pulling the piece off the mount. Cut top to bottom, right to left (downhill) and use the left (low) side of the gouge. (This is a smaller bowl, which I quickly mounted and turned to just this point after blowing apart the previous one. Oops.)



15

When you have completed the excavation of the inside of the bowl and sanded it to your satisfaction, remove the piece from the glue block. Put a towel on the lathe bed so the piece doesn't get damaged if you don't catch it. Place a flat chisel along the glue joint and tap sharply with a mallet. It should pop right off.



16

The piece is mounted to finish the foot. Turn a rounded edge on a waste block (you may want to use a larger waste block for this), place some foam between the block and the bowl to protect it, and bring it up the tailstock (with live center in place) to hold the piece. Slow the lathe speed down, and trim the glue off of the edge.



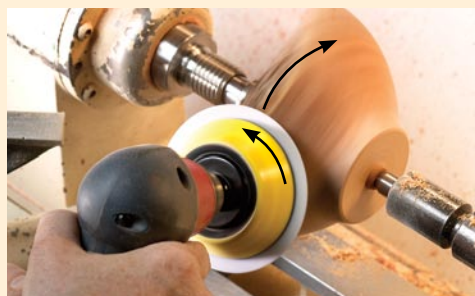
17

Turn a clean, slightly concave surface on the foot. After the piece is removed from the lathe, you can carve off the little nub (left in the center) with a small carving gouge and sand it smooth. **PW**

## POWER SANDING NATURAL EDGES



The sanding disc is mounted in a reversible drill. The disc surface at the point of contact should be going in the opposite direction from the bowl surface at that point. Here, the disc is contacting the wood at approximately 2 o'clock; the arrows show direction of rotation.



Here the disc is contacting the wood at 11 to 12 o'clock; this means the disc surface is traveling off of and away from the edge, not into it. It's very important to hold the disc in the correct position. Keep it at the level of the surface of the wings and let the sanding grit do the work. Don't push the disc toward the bowl, or it will tend to be caught as the voids come around in between the wings of the bowl. At best this will round over the leading edges of the wings; at worst it could grab and damage the disc or even pull it into the gaps.



It still may be necessary to do some power sanding with the lathe stopped. This tends to leave heavier scratches that are more difficult to remove, so use a soft foam disc, and pay particular attention to eliminating all marks from the previous grit before moving on to the next. —JD

# Test to Find a Durable Finish

A few sample boards can save you from future finishing headaches.

Finish manufacturers targeting the furniture industry and large professional finish shops provide a lot of information about their products. Unfortunately, the manufacturers who target amateur woodworkers and small shop professionals aren't as helpful.

In the end, we are often left to our own devices to figure out the characteristics of the finishes we are buying.

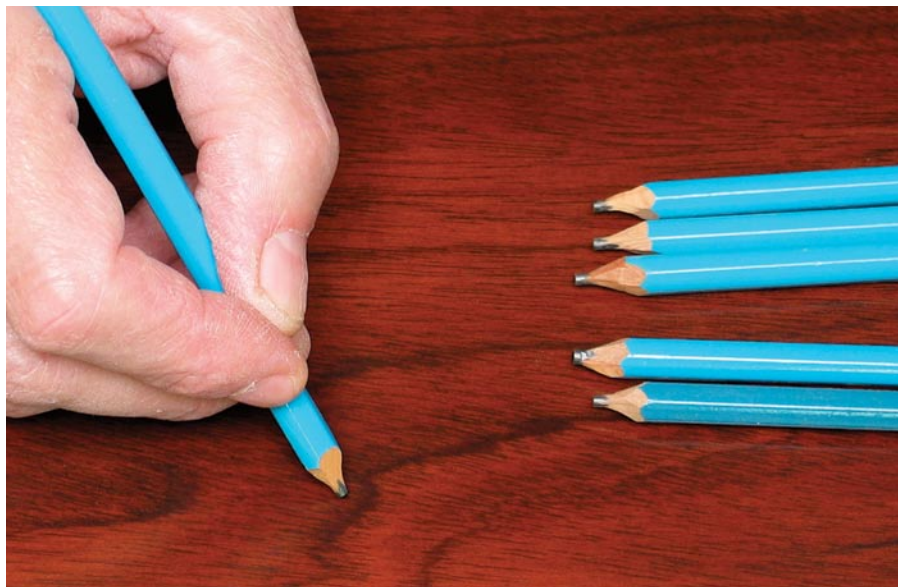
Here are some easy tests you can perform in your shop to determine the qualities of the finishes you're using. In most cases you'll want to do the tests on scrap wood. For the most accurate results, let the finish cure at least a couple weeks in a warm room before performing the tests.

## Scratch Resistance

The ability of a finish to resist damage from coarse or sharp objects is likely one of the most important qualities about which you're concerned.

To a large extent you can know the comparative scratch resistance simply from the type of product. For example, oil-based varnishes (including polyurethane varnish) and catalyzed lacquers are much more scratch resistant than shellac and nitrocellulose lacquer, and a little more scratch resistant than acrylic and polyurethane water-based finishes.

But what about differences among brands within each finish type? Or what about the comparative difference between a water-based polyurethane and an oil-based polyurethane



Photos by the author

To determine the relative scratch resistance of a finish, push the sharp edge of the cylindrical lead in various "B" and "H" architect's pencils forward on a finish. There's no need to use pressure. The next-to-hardest pencil that doesn't scratch the finish is the rating for that finish.

— that is, how much scratch resistance are you actually giving up by using a water-based polyurethane?

To determine a finish's scratch resistance, purchase a set of architect's drawing pencils ranging in hardness from about 2B (soft) to 5H (hard). Sharpen each pencil using a knife so you leave the sharp cylindrical edge of the lead intact. If you damage this edge, or if it becomes worn, sand it flat, holding the pencil 90° to the sandpaper.

Beginning with one of the softer pencils, hold it as you would for writing and push it forward across the cured finish. Maintaining equal pressure, follow with pencils of increasing hardness until you find one that cuts into the finish. The hardness rating for that finish is the rating of the previous pencil — the hardest lead that doesn't cut.

## Water Resistance

Another quality you may be looking for in a finish is water resistance. As I explained in my article "The Thick and Thin of Wood Finishing" (December 2006, Issue #159), a thickly applied finish of any type is very water

resistant. So testing won't be very revealing except on thin finishes such as oil or wax, or any film-building finish applied with just one or two coats.

To test for water resistance, make up a sample board with the same number of coats applied in the same manner as on your project. Then place a small puddle of water on the surface and cover it with a small metal or glass cup or jar to prevent evaporation. Check



The relative water resistance of a thin finish can be determined by placing a small puddle of water on the finish and covering it to prevent evaporation. Check at regular intervals for damage.

by Bob Flexner

*Bob is the author of "Understanding Wood Finishing" and a contributing editor to Popular Woodworking.*



Whether or not a finish is resistant to dry heat can be determined by placing a pot of hot water on a finished scrap board. Heat the water to just short of boiling and leave it for an hour. See if it causes any damage.

every 10 minutes or so until you notice cracks or discoloration in the finish. Rate the finish at the most recent previous time before the damage occurred.

The most vulnerable surface to water damage is the top edge of cabinet doors just below a sink. To test this surface, stand a finished sample door on a sponge lying in a pan of water. Check the finish around the edge every so often until cracks appear in the finish, the finish delaminates, or there is some discoloration that you can observe.

### Heat Resistance

Resistance to damage from hot objects is a very important quality for table and counter surfaces in kitchen and dining areas. Again, finish types tell you something. For example, oil-based polyurethane and catalyzed lacquer should pass almost any test. But shellac, lacquer and water-based finish will likely be vulnerable. There are two tests for heat resistance you can do at home.

To test for dry heat resistance, place a metal cup or pan containing water heated to just below boiling on a cured finish. Remove the cooled container after one hour and look for splits, indentations or discoloration in the finish.

To test a type of finish for wet heat resistance, do the same as above but this time place a cotton cloth or cheesecloth wetted with the same hot water under the cup or pan. After an hour, check the surface for splits in the finish or discoloration.



Many household substances can cause damage to a finish. To check the resistance of the finish you're using, place a number of drops of the substance, in this case ketchup, on the finish and sponge them off one at a time several minutes apart.

### Chemical Resistance

Eating surfaces are also vulnerable to staining from a number of household liquids independent of the thickness of the finish. In other words, the finish itself may become stained. Common products that can cause a problem include vinegar, orange juice, lemon juice, grape juice, ketchup, mustard, coffee, tea, wine and 100-proof alcohol. (You can use denatured alcohol mixed half with water instead of liquor for the alcohol test.)

To test a finish for resistance to each of these liquids, place a number of drops on the finish and sponge them off one at a time at short intervals (generally several minutes apart) until the finish under the drops becomes dull, discolored, shows cracks or the wood underneath becomes stained.

The resistance of the finish to damage from these liquids is rated at the last time before the damage appeared.

To determine the color of a finish, and thus the relative amount of color change it will add to the wood, pour a little of several finishes into jars and place them next to each other against a white background. Here I'm comparing two wiping varnishes. Waterlox is much darker and will make wood significantly darker than Minwax's Wipe-On Poly.



### Yellowing

Yellowing can be a good or bad quality depending on the situation. Generally, darker woods and darker-stained woods look good under a finish that yellows because the yellowing makes the wood appear warmer. But yellowing often detracts from lighter woods or from woods that have been stained or "pickled" white or near white.

Acrylic water-based finishes don't yellow at all. Polyurethane water-based finishes yellow a tiny bit. Varnishes and oil/varnish blends yellow significantly, but the degree of yellowing will vary greatly among brands. Lacquers also vary among types and brands.

There are two tests you can perform in your home to determine the yellowing characteristics of various finishes. The first is for the color of the finish in liquid form and the second is for how much the finish continues to yellow as it ages.

To test for the color of a liquid finish, pour some into a glass jar or onto a glass plate and hold the glass against something white such as a piece of paper. It's easy to compare finishes when you place the test jars or plates next to each other.

To test for the amount a finish yellows as it ages, apply a coat or two to a piece of white plastic. After the finish has cured, cover part of it with paper or masking tape and leave the plastic in a normal room setting or in a window for several weeks.

Every few days remove the paper or masking tape and compare the color of the covered and uncovered parts.

Keep in mind that most woods darken with age, so some of the "yellowing" you may see after application to wood could be associated with it rather than the finish. **PW**

# A Dovetail a Day

The 30-day workout program that promises you tight tails and no split ends.

I was on our local swim team as a child, and I was an embarrassment to my pool, my parents and mammals in general. Perhaps the coach kept me around to make the youngest swimmers (Team Minnow) feel better about their dog-paddling. Or perhaps my artless splashing lulled competing teams into complacency before a swim meet.

One summer day my mother dropped me off at the pool, and as she drove off I discovered that none of my friends was there. I had the entire day alone before me.

I got in the pool and messed around a bit. As boredom set in I swam a couple laps of breaststroke. After a few laps I wondered if I could stretch my hands forward more. I then wondered if I could tuck my legs in tighter after a kick. Three hours later my mom called me from the pool side to go home.

The next day was a swim meet, and I was in the 50-yard breaststroke against kids who beat me every summer. The starting gun fired, and 50 yards later I looked around. I was alone. I had won by an enormous margin. It was my first and last victory.

You know where this story is going.

Now I've always been a fair dovetailer. I cut my first set by hand 13 years ago and made decent joints. But I was slow. One day the memory of that swim meet returned, and I decided to try the same approach with my dovetailing. I vowed to cut a dovetail every day for a month.

That night I prepped a few boards of cherry and poplar. I laid out my tools on the bench and cut my first set – three tails into three pins. It took more than an hour. I then cut the joint free of the two boards, marked the date on the corner and put the joint on the windowsill. I left all my tools out on the bench, set and ready for day two.

The next day, before I cut the second set, I picked up the joint from the night before. Under scrutiny, it wasn't as nice as I'd

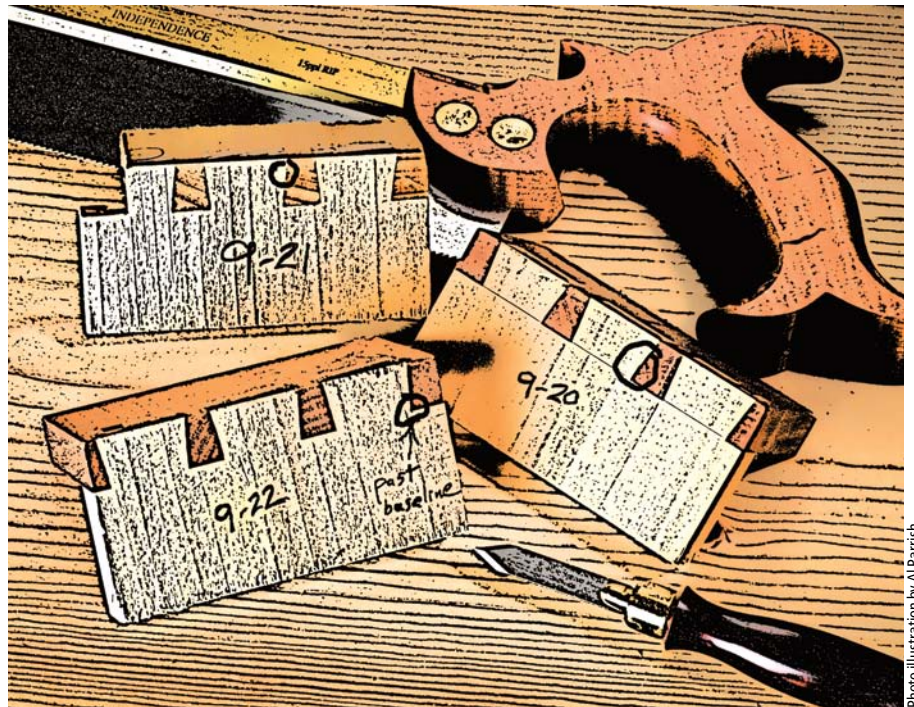


Photo illustration by Al Parrish

remembered. My saw had crossed the baseline here. I had split one pin slightly there.

I cut my next set and tried to avoid crossing the joint's baseline. I tried to ensure the pins on the ends were cut straight. And I made the half pins on the ends a bit wider.

I cut that joint free, dated it and sat it on the sill. After a few more nights I realized that I was just repeating my blunders. Split pins were plaguing me.

So I sawed even closer to my knife lines on the end pins. The next day, no splits.

After two weeks, my dovetails looked tighter. Then I changed their spacing. Then I started to pick up speed and arrange my tools so I wasn't fumbling for the chisel.

After 30 days, I was 10 times the dove-

tailer I was when I began. The operation felt natural. When the 30 days was up, I was worried about stopping my experiment. Would I regress? That had happened when I was on the swim team. I had stopped swimming practice laps and never won another race.

But this story has a happy ending. Once I conquered the dovetail, I used the joint more often in my work. I also began sawing and chiseling more in general, which then reinforced my dovetailing.

So many times we learn woodworking on the fly as we build something. We get our skills just good enough to accomplish that project and then we move on. It's rare to get out a board and just saw it. Or plane it. Or mortise it with our router.

This method might seem like wasting time but it has resulted in some of my most enjoyable shop time. And now I'm thinking that "Inlay a Day" has a nice ring to it. **PW**

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext.1407 or [chris.schwarz@fwpubs.com](mailto:chris.schwarz@fwpubs.com).