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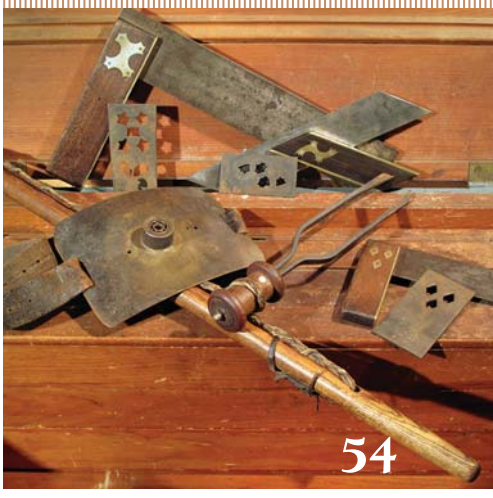

FEATURES

COVER PHOTO BY AL PARRISH ; PLANE PHOTO BY CHARLES BENDER; FRAME PHOTO BY MARK ARNOLD; PASSER DRILL PHOTO BY ROY UNDERHILL; HANDLE PHOTO BY AL PARRISH

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POPULAR Woodworking MAGAZINE

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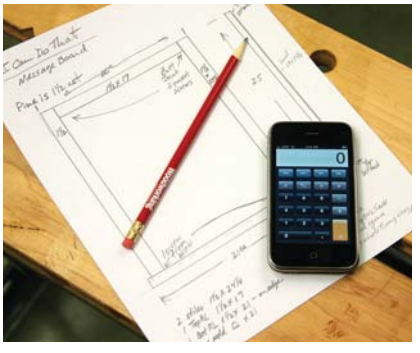
Planning for Success

Managing Editor Megan Fitzpatrick really stirred things up recently when she posed a question online about the usefulness of the project cut lists we provide in the magazine. Readers voted resoundingly to keep them, and I'm not surprised. Most people don't like to give up something they've become accustomed to – whether they found a use for it or not.

What I found intriguing were the comments people left about their reasons for either keeping or eliminating the cut lists. Most comments fell into a few camps. One major reason cited for keeping them had to do with making it easier to determine the amount of lumber needed for the project. Another group said cut lists were mostly used by novice woodworkers (I recall the word "crutch" was used). Then there were those who dismissed cut lists as useless because too many things change during the building process.



Oddly, I found myself disagreeing with just about everyone – regardless of whether they said cut lists should stay or be cast out from the magazine's pages. It made me wonder about what you, our readers, do to plan your projects before cutting wood. My "take away" is that not enough planning is going on out there.

I don't honestly know what I enjoy more about woodworking: planning a project or building it. Planning is about problem solving. Building is the execution and confirmation of your plan.

Planning is the process of moving through a number of steps to take a project from a concept to the point at which you start to build. Maybe you make some sketches. You consider the special challenges the project presents, such as tricky joinery or finding special material. Perhaps the project needs to support a lot of weight – or be light as a feather.

Planning was drilled into me at the trade school I attended. We spent weeks of classroom time learning the planning process. We were not permitted to start building a project before presenting our drawings and cut lists to our instructor and getting approval. We'd be questioned on our plans and would have to defend them. If we took shortcuts or made errors, we were sent back to the drawing board. Literally.

To this day I draw a project plan and write out a cut list before I start any project, no matter how simple. It may be a crude sketch, but it has dimension lines and calls out part sizes. The cut list is taken from the sketch. If need be, I'll make a separate sketch of the joinery to determine allowances for the additional length required, say, for a tenon. Over the past 30 years there have been a few times when I quickly, and wrongly, concluded that such a simple box didn't need a plan or list. I usually paid a price for this bit of hubris.

So what's the point of all the planning? Ultimately, a successful project build. And I start every build with the confidence to cut most, if not all, my project parts before I assemble anything. Why not? I've already built it in my head at least once and the planning verified my cut list was correct. My task at this stage is to follow the list and cut parts to accurate dimensions. **PWM**

Steve Shanesy

POPULAR WOODWORKING MAGAZINE

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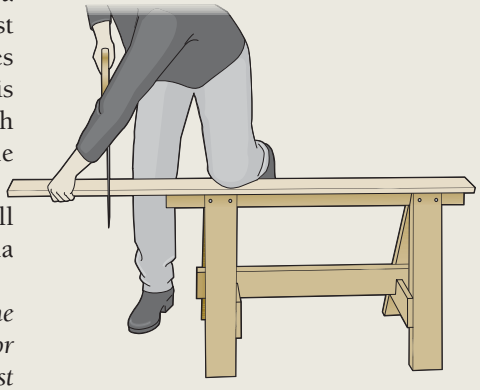
How to Handle Handsaw Offcuts

I have a basic handsaw technique question: When crosscutting a board on a traditional sawbench, how is the piece that will become the offcut managed? In other words, how do you keep the piece of the board that will fall to the floor from tearing out a hunk of wood at the end of the cut, just before it twists off as the saw finishes the cut? It would seem like the offcut is totally unsupported. Is another bench (box, whatever) used to prop up the offcut?

John Moll
Great Falls, Virginia

John,
There are two techniques you can use. One is, as you surmise, a second sawbench (or some other support). But the one I use most often (which works only for pieces lightweight enough for me to support with my off-hand), is to reach across my body with my left hand and hold the offcut as I complete the cut.

Megan Fitzpatrick, managing editor



How to Plane End Grain

I'm fairly new to handwork and just purchased my first real planes, a No. 4 and a No. 5 (plus I have a good block plane).

I cambered the irons and filed their corners, then honed them razor sharp. I planed and chamfered a couple boards smooth to the point that I didn't need to do any sanding; that's my ultimate goal and one of the reasons I like handplanes.

But I ran into a problem when it came to the end grain. Even with my razor-sharp jack plane and my just-as-sharp block plane, I couldn't get the end grain "finish" smooth. I realize on period furniture that end grain is rarely seen, but on some of my designs there really is no way to hide it.

Am I doing something wrong? Or do I just have to live with the fact that I have to have sandpaper in the shop?

Bill Lattanzio
Spring City, Pennsylvania

Bill,
End grain is structurally different than face grain or edge grain, and that makes planing it a challenge. Instead of shaving off the long surfaces of the wood cells, you have to slice off the ends. Low-angle block planes are one method of dealing with this. Get the blade really, really sharp and close up the mouth. In some woods, your No. 4 and No. 5 may work if you take an extremely fine shaving and your blade is super sharp.

One trick that will help with either plane configuration is to soak down the wood with mineral spirits or denatured alcohol before you plane. That softens the wood fibers and makes them easier to cut.

Robert W. Lang, executive editor

Next Handplane Purchase

I haven't been a woodworker for very long, so I'm still putting together my hand-tool inventory and struggling to discern my next purchases.

I've read numerous articles and books that offer great advice on the first few handplanes to purchase, but I cannot find much that helps me move to the next step (I have the basics: smoother, shoulder, jointer and block planes).

Do I base my next handplane purchases on the project I plan to make next and just hope that I'll need that tool on a regular basis? Or is there a continuation on the order of handplanes that one should purchase as one becomes a more experienced woodworker?

Kevin Veldhuisen
Chipley, Florida

Kevin,
I would spend a year or two using the planes you have. Learn how to sharpen and tune them, and build some projects. When you find yourself in a situation where the tools you have won't do the job, or have some serious shortcomings, then consider what plane to get next. At that point, the answer will be obvious.

With the exception of a plow plane for making grooves, I can't think of any common tasks you wouldn't be able to do with the tools you currently have.

Robert W. Lang, executive editor

Flat Chisel Backs are Sometimes Necessary

In Adam Cherubini's October 2011 "Arts and Mysteries" column (issue #192), he declares that no tool needs a flat back to be sharp, and that the wood doesn't care if the back of your tool is flat.

All true, but in my experience there are times when the back of a tool needs to be flat to work well, and times when the user should care if the back is flat. I'm thinking in particular of paring chisels.

I am a hand-tool-only woodworker, and I use chisels a lot. There are many times when using a paring chisel (for example in cleaning up dovetails or finishing off a mortise) that I want to be able to fix the back of my chisel to a register surface, or square it to an adjoining surface, and trim the rest of the cut in a fixed relation to that surface. A deep through-

CONTINUED ON PAGE 10

ILLUSTRATION BY MARY JANE FAVORITE

Introducing Quadra-Cut™ Sets

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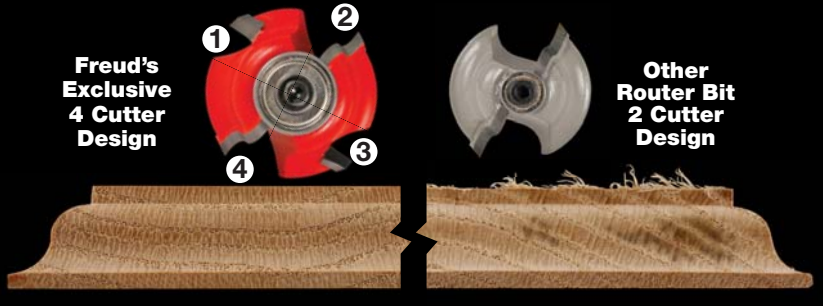

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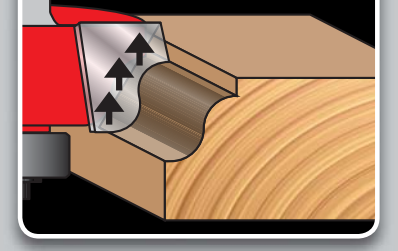
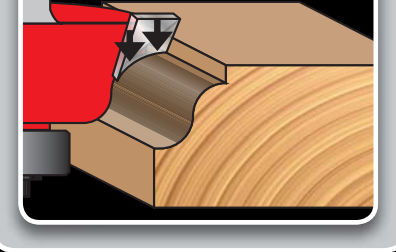
Two large cutter wings shear upward to remove most of the stock for fast, extremely smooth cuts.



Two small cutter wings shear downward for an ultra-fine finish, even when routing crossgrain in delicate materials!



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CONTINUED FROM PAGE 8

mortise needs to be at a consistent angle, and it needs to be the same dimensions all the way through, to avoid gaps at the end that shows.

Such operations are best achieved with a chisel that has a flat back. I don't want to have to guess if there is a 1° or 2° back bevel on the chisel, and then lean it away from the work to get it to cut.

Tom Holloway
Portland, Oregon

What Finish was Used on the Shaker Hanging Cabinet?

Can you tell me what was used for the red wash on the Shaker hanging cabinet Christopher Schwarz built for the February 2011 issue (#188) of *Popular Woodworking Magazine*?

Jack Wart
Columbus, Indiana

Jack,
The color was achieved with a thinned coat of "Barn Red" from the Old Fashioned Milk Paint company (milkpaint.com). Kelly Mehler applied the finish (Chris built the piece while teaching at his school), and Kelly says, "I sealed the milk paint with a couple of coats of oil/varnish – likely Watco Wipe-On Poly."

Milk paint alone has a flat, chalky finish, so the top coat adds not only protection, but sheen.

Megan Fitzpatrick, managing editor

Video Streaming Service

I just watched "Handplane Basics – A Better Way to Use Bench Planes" via your video streaming service (shopclass.popularwoodworking.com). At the end, Christopher Schwarz refers to a file that describes the differences when using bevel up vs. traditional planes. Could you help me locate that file or PDF?

Dan Hein,
via e-mail

Dan,
At shopclass.popularwoodworking.com, we offer every DVD we produce as streaming video (along with woodworking videos from other publishers) – but we haven't yet figured out an elegant way to provide the "DVD Extras" we often include, such as the file you mention. Until we do, please don't hesitate to send an e-mail to me (megan.fitzpatrick@fwmedia.com) or to one of the other editors – we're happy to send the PDFs to those who subscribe to our streaming service.

Megan Fitzpatrick, managing editor

Drawbored Morris Mortises?

I'm almost finished making the Stickley Morris chair from the April 2011 issue (#189); I'm ready to glue it up. But first, I want to know your thoughts on drawboring the tenons.

Ken Graeff,
via e-mail

Ken,
I often reinforce through-tenons with a pin, but I rarely drawbore. That's a great technique if you're working with wet wood that is likely to shrink, as when timber-framing, but it's not much of a benefit if you're building furniture from seasoned and acclimated material. PWM

Robert W. Lang, executive editor

ONLINE EXTRAS

Letters & Comments

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Send your questions and comments via e-mail to popwood@fwmedia.com, or by mail to 8469 Blue Ash Road, Suite 100, Cincinnati, OH 45236.

Highly Recommended

A saddle square allows me to quickly wrap a marked line around a corner at 90° on adjacent faces – there's no having to move the tool to the second face and line up your mark, as you must do when using a combination square or try square.

While there are several saddle squares on the market, I never work without the milled aluminum Veritas version close at hand ($14.50 at leevalley.com). I use it to quickly mark adjacent faces for just about every cut I make at the table saw, and I'll often use it to mark down the face of my pin board when cutting dovetails.

— Megan Fitzpatrick

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Safety Note

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

CABINET PHOTO BY KELLY MEHLER;
SADDLE SQUARE PHOTO BY MEGAN FITZPATRICK

THE WINNER:

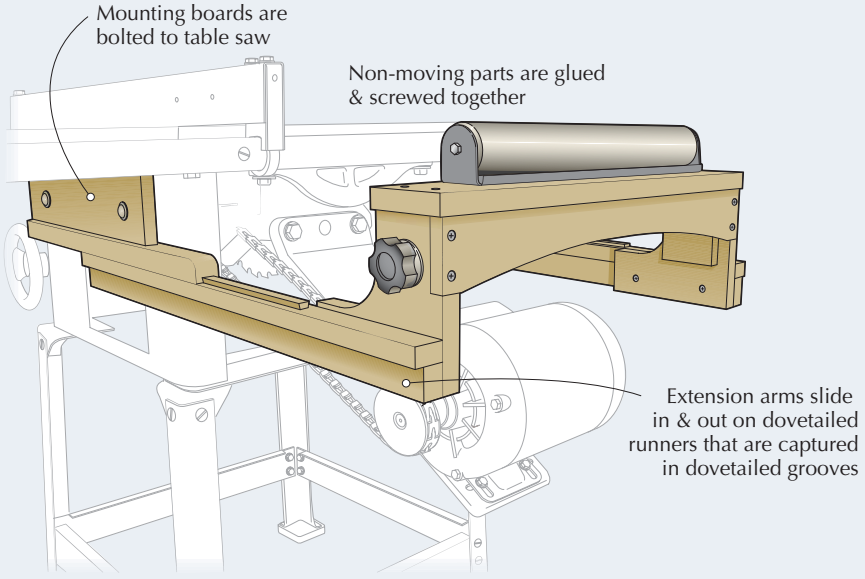
Table Saw Extension

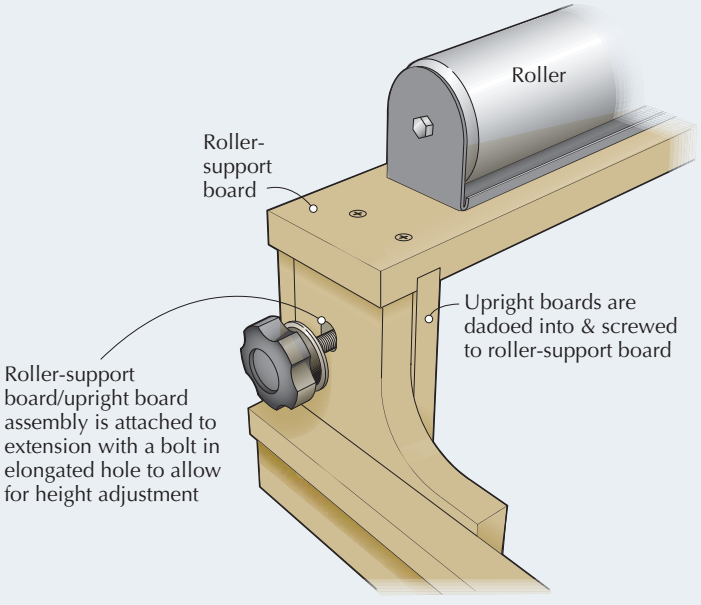
I designed an outfeed support for my table saw that doesn't take up any floor space. It's made of plywood, hardwood and a store-bought roller.

Three main design features enable it to work well. The runners are made of hard maple that resists wear and tear. The sliding mechanism is a dovetail that allows the roller to move closer to the table for short pieces and farther from the table for longer boards. The roller can be made level with the top of the table saw because of an elongated hole for the bolt that connects the roller assembly to the extension assembly.

When necessary, I can completely remove the device very easily.

Jim Whetstone
New Cumberland, Pennsylvania

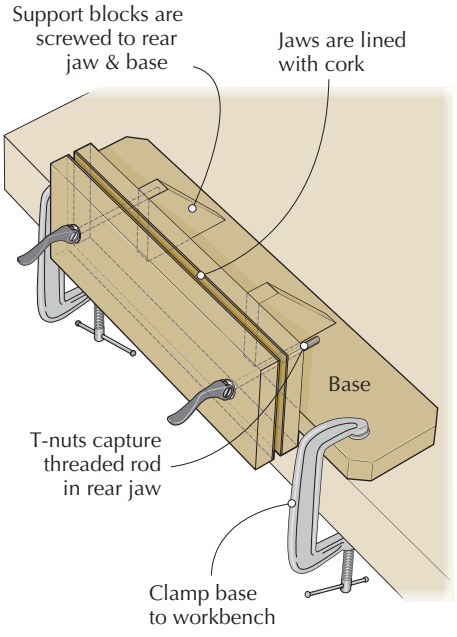




Moxon Vise Alternative

The day the December 2010 issue of *Popular Woodworking Magazine* (#187) arrived in the mail and I saw the Moxon bench vise article, I knew I had to build the vise.

Wooden screws are beautiful but I had no way to make them. So, I decided to use a pair of Cam Clamp Mechanisms with 5/16" threaded rods from Lee Valley (#05J51.05); I used T-nuts in the rear jaw.



To build the vise, I cut three boards from a piece of birch measuring 1" x 6" x 60". The two jaws are 18" long and the base is 24" long. The jaws are covered with 1/8"-thick cork, which provides a non-marring and grippy surface.

I wanted the cam clamp to be fixed to the threaded rod so that the clamp lever could be used to spin the jaws open and closed. So, I cross-drilled through the threaded part of the clamp and the rod, and pinned it with a cut-off 4*d* finishing nail. Then, I peened and filed the nail so it would not interfere with the cam action.

The cam action is terrific for quick release when repositioning a workpiece.

John Hill
Santa Clara, California

ILLUSTRATIONS BY MARY JANE FAVORITE

Wonder Dog Tail Vise

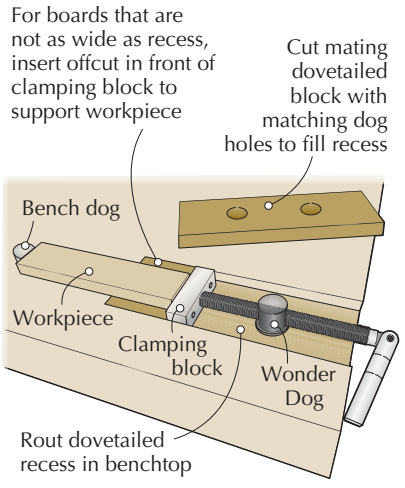
My workbench does not have a tail or end vise. To secure a workpiece to my bench, I put a regular bench dog at one end of the board and use a Wonder Dog (Lee Valley #05G10.01) to apply pressure.

A regular bench dog can be adjusted low enough to hold thin material. Wonder Dogs, however, do not work well with thin stock because the clamping block is 5/8" thick and the anchoring post is taller than the clamping block. It's impossible to plane boards that are thinner than 3/4" unless you employ shims or tapered blocks.

I've come up with an alternative: Create a shallow, dovetailed recess in your benchtop so the Wonder Dog's block and post have lower profiles.

Cut the recess slightly wider than the clamping block. The total length of the recess is about 7" so that two dog holes can be used. Adjust this length to suit your needs.

I used a router, shop-made template, straight bits and dovetail bits to cut the channel. The recess is 1/2" deep, so the clamping block is 1/8" above the benchtop, enabling the Wonder Dog to clamp thin stock like a champ.



When the recess isn't being used, I slide a mating hardwood filler block in place. I beveled its sides on a table saw and used a handplane and scraper to create a friction fit.

I put the filler block in place and used a Forstner bit to mark the locations of the dog holes from beneath the bench. Then, I drilled the dog holes in the block and chamfered the edges of the holes. With the filler block inserted, the Wonder Dog works with 3/4" or thicker material.

To plane a thin board that is less than the width of the recess, I slide an offcut from the filler block in front of the clamping block to support the workpiece.

Aaron Marshall
Atlanta, Georgia

Spacers Made From Caulking

When using a solid-wood panel in a frame-and-panel door, it's critical to leave room in the frame's grooves to allow the panel to expand and contract. However, this can lead to a panel that isn't centered perfectly or rattles when opened or closed.

There are commercial spacers on the market but they offer a one-size-fits-all solution. Instead, I prefer to make my own spacers. I use vinyl adhesive caulk to squeeze beads of various widths onto a sheet of waxed paper.

After the beads dry, I peel them off the paper, tear them into 1/2"pieces, and place them into the frame's grooves before glue-up. Having various widths to choose from ensures the perfect fit for the expansion gaps in the door.

Rob Bois
Newton Centre, Massachusetts

Cleaning Rasps

The cove-like teeth of rasps tend to clog during use, and the handcut types are particularly prone to accumulating stubborn embedded wood. To perform well, they must be kept clean.

I clean the teeth with a small natural hog brush (similar to a file card) from Tools for Working Wood (MS-RBRUSH), angling the bristles toward the coves and using vigorous circular and side-to-side motions. However, this does not completely remove the embedded wood, especially in finer rasps.

So, I follow this step by putting several drops of CMT Formula 2050 Blade & Bit Cleaner on the rasp and spreading it with my finger. Half a minute later, the stubborn wood is easily removed with the brush. After patting the teeth dry (no rinsing is required), they are perfectly clean. PWM

Rob Porcaro
Medfield, Massachusetts

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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). (The tools pictured below are for illustration only, and are not part of the prize.)

Runners-up each receive a check for $50 to $100. When submitting a trick, include your mailing address and phone number. If your trick is selected, an editor will need to contact you. All entries become the property of *Popular Woodworking Magazine*. Send your trick by e-mail to popwoodtricks@fwmedia.com, or mail it to Tricks of the Trade, *Popular Woodworking Magazine*, 8469 Blue Ash Road, Suite 100, Cincinnati, OH 45236.

Festool ZOBO Bits

These Forstner-style drill bits are revolutionary.

Until Colt came out with its aggressiveForstner bits a while back, this was a sleepy tool category.

Now, Festool has introduced its own aggressive bits and taken the tool's capability to another level. ZOBO bits have a unique feature – interchangeable centers in the cutting end.

In addition to the stubby point found on most Forstners, these bits also come with a centerpoint three times longer than the standard, plus they come with an insert twist-drill bit. The longer, pointed center allows the user to start drilling holes at an angle of up to 70°.

The twist-drill center allows another neat trick – blow-out prevention. To obtain a completely clean edge on the exit side of the hole, all you need to do is drill deep enough on the first side so that the twist drill pokes through, flip the work over, insert the twist drill in the small hole then continue drilling until the larger holes meet up.

So how do these interchangeable centers work? The bit center and inserts have matched tapers.

The non-business end of the bits are hex-shaped to fit Festool's Centrotec system or can be used with a standard three-jaw chuck. ZOBO bits come in a set of 15, 20, 25, 30 and 35 millimeters (Imperial sizes aren't available).

I mentioned these bits are aggressive. I chucked the 25mm bit in my drill press and clamped a short length of 2x4 to a fence, end grain up. The bit bored the hole and cleared the chips as fast as I could drive it into the wood.

— Steve Shanesy

ZOBO Forstner-style Bits

Festool ▪ festool.com or 888-337-8600
Street price ▪ $195, set of five

▪ **BLOG:** *See a video of ZOBO bits in action at popularwoodworking.com/feb12.*

Price correct at time of publication.

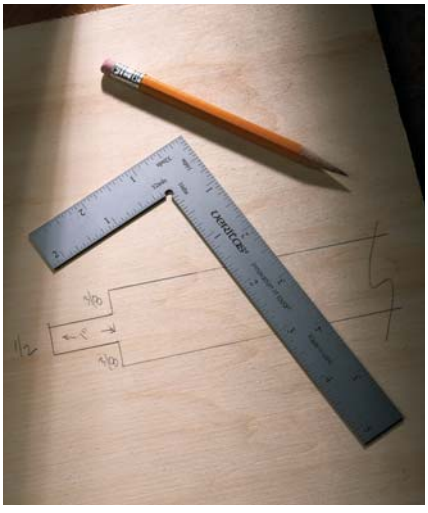
Small & Precise Square

I keep a 6" precision rule in my pocket most of the time when I'm in the shop. It gets used on a regular basis for layout, setup and fussy measuring. Veritas has introduced a small square than does everything the rule does, but the addition of the leg makes it do everything better and more easily than a standard rule.

It provides a built-in zero point; with one edge of the square on the edge of a board, you always know where you're measuring from. That also lets you line up the marks on the edge of your work, eliminating errors of parallax. When setting up tools, you can make an accurate vertical measurement the length of either leg.

The long leg is graduated in 1/16" increments, and the short leg in 1/32". Precise and well-made, this new tool has proven itself essential to me. Best of all, it fits in the same pocket that the old rule did.

— Robert W. Lang



Veritas Precision Square

Lee Valley ▪ leevalley.com or 800-871-8158
Street price ▪ $24.50

▪ **BLOG:** *Practice your layout at popular woodworking.com/feb12.*

Price correct at time of publication.

CONTINUED ON PAGE 16

PHOTOS BY AL PARRISH

CONTINUED FROM PAGE 14

BLOKKZ Universal Clamping Blocks

I've made dozens of clamping cauls over the years to address the wide variety of oddball clamping conditions we run into in the shop. Some were simple and quick to make; others took more time. Some worked perfectly; others just got me through.

Recently, a new product called the BLOKKZ Universal Clamping Block caught my attention. It has attributes of some of the cauls I've made, but the cylindrical-shaped end led to this quick conclusion: "Of course!"

The round shape of the sturdy aluminum BLOKKZ lets the clamp grab in just the right place regardless of the angle of the joint. And, it's easy to position the clamp blocks so that clamp pressure is exerted appropriately perpendicular to the joint.

Don't just think about using these in the standard 45° miter glue up. They work well on both acute and obtuse angled glue-ups. They work well on scarf joints and finger joints. You can even put them to work to clamp standard rabbet joints and bridle joints.

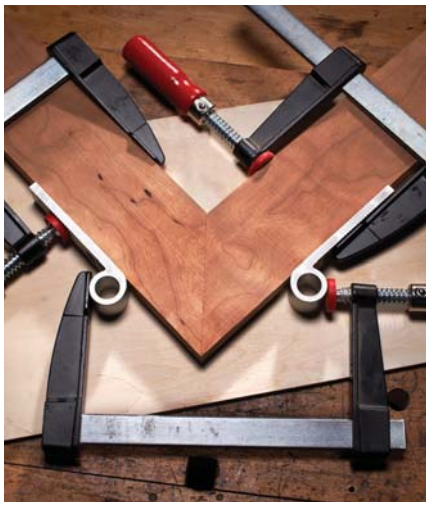
When you want to glue up a frame with 45° miters, you can get the job done a couple ways – one is shown at right. To see more ways to use them, using fewer BLOKKZ and clamps, watch the BLOKKZ video.

In some situations, supplied neoprene pads are taped to the blocks to prevent them from slipping or marring the work when pressure is applied.

The BLOKKZ also can be used as a hold-down when used with T-track, T-bolts and a knob – just slip the bolt through the hole in the BLOKKZ face.

If you are equipped with F-style clamps use them as shown above. A Vise-Grip C-clamp with pivoting pads also works well to hold the block in place.

— *SS*



BLOKKZ Clamping Block

BLOKKZ ▪ blokkz.com or 714-267-8440

Street price ▪ $24.99 per pair

▪ **VIDEO:** *See these clamps in action; link at popularwoodworking.com/feb12.*

Price correct at time of publication.

Earlex Steam Generator for Bending Wood

You probably know Earlex as the British company that a few years back introduced North American woodworkers to an inexpensive but capable HVLP sprayer. Now the company has introduced an inexpensive electric steam generator that makes it ever-so-easy to add steam-bending wood to your arsenal of techniques.

With the Earlex Steam Generator, all you need to do is make a plywood steam box and install the supplied brass fitting to connect the hose, then you're in the bending business. I spent less than an hour making a CDX plywood box that was just shy of 4' long with a 5'-square interior. (Don't forget to include a door and a few holes to allow excess steam and condensation to escape.)

To test the system, I filled the plastic steam generator's tank (the electric heating element is built-in) and plugged the unit in. I was pleasantly surprised to see how quickly steam was made from the 1.3 gallons of water – it was less than 30 minutes. That's enough water to make steam for 130 minutes, or time enough to steam 2"-thick wood.

I placed an oven thermometer inside the box to see just how hot it got. In about 45 minutes, the interior temperature was more than 200° Fahrenheit. That temperature was sustained while I steamed a piece of ¾"-thick material for 45 minutes. I also measured the hose temperature to see how hot it got – slightly more than 100°F in various locations along its 12' length.

The steam generator has 1,500 watts of power and features both a pressure-relief valve and a safety cut-out on the heating element, should the water level get too low. PWM — *SS*

Earlex Steam Generator

Earlex ▪ earlexproducts.com or 800-252-1288
Street price ▪ $70

▪ **BLOG:** *Watch another way to bend wood at popularwoodworking.com/feb12.*

Price correct at time of publication.

Sketching: It's All in Your Mind

Try this exercise to unlock imagination.

In the first century B.C.E., a military architect named Vitruvius captured the distinction between a designer's mind and the minds of the rest of us.

"For all men, not just architects, are capable of appreciating quality; but there is a difference between laymen and architects (designers) in that the former cannot know what a building will be like unless he has seen it completed; while the architect knows perfectly well what it will be like … from the instant he conceives it in his mind, and before he begins it."

Beyond drafting. *There's more to drawing than drafting. Simple sketching cleans the bugs off the windshield in your head.*

Vitruvius nailed it – especially the part about not being able to visualize. For years I struggled with this. In fact, it's embarrassing to admit, but even a good photo or shop drawing couldn't cut through my fog. Often, I'd find myself surprised at the completion of a project. The image in my head and the object were never one and the same, as though I had a mild case of visual amnesia.

Considering that I started from zero, I speak from experience when I say that the ability to visualize is a developed skill. It's not unlike learning to sharpen a plane iron. All it requires is a bit of practice and a willingness to push aside your self doubt. At its simplest, the ability to visualize consists of drawing pictures in your mind. To start that process here's a simple sketching exercise to enhance your ability to imagine forms.

A Different Take on Drawing

This method of sketching is different from mechanical drafting (which seeks a technically precise image), and it's not creative doodling in search of an inspiring idea. Instead, the purpose is to awaken your ability to imagine by encouraging your mind to unpack an object in space. Your actual sketch may look crude on paper, but if the idea transfers clearly in your head, that's all that matters. Don't shortchange yourself by just reading this to get the concept. Pick up a pencil and take your hand and eye through the steps in this dance to rewire the circuits in your head.

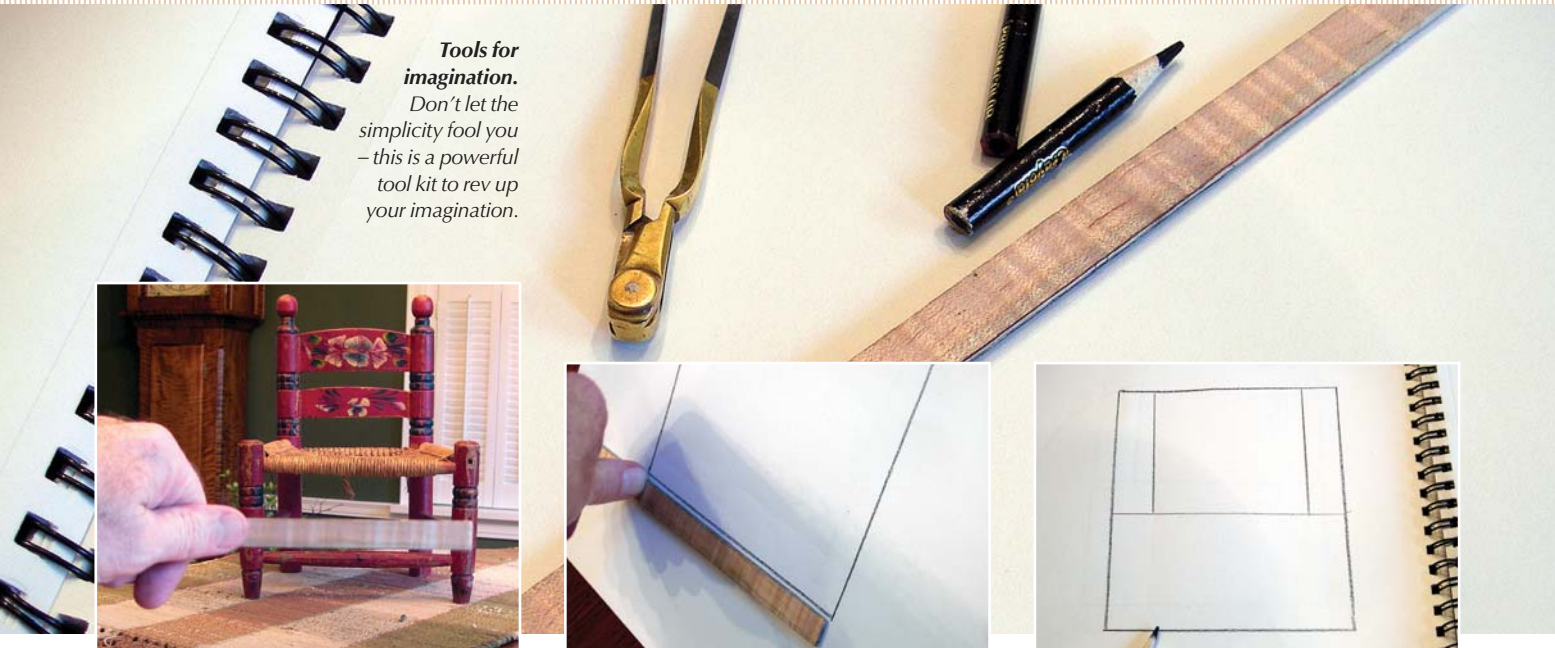
Application

You need a sketchpad, pencil, straightedge and a pair of dividers. Resist the temptation to use graph paper or a ruler with markings on it; the numbers and lines will only fog your thinking. Forget about measurements or grids for now.

CONTINUED ON PAGE 20

PHOTOS BY THE AUTHOR

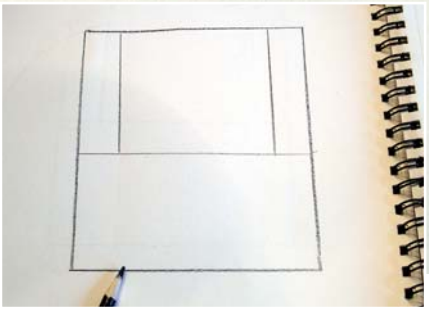
CONTINUED FROM PAGE 18



Tools for imagination. *Don't let the simplicity fool you – this is a powerful tool kit to rev up your imagination.*

Eyeball proportions. *Practice sketching a small object, such as this child's chair. With arm extended you can pluck the proportions using the end of the straightedge and your thumb.*

Simplicity first. *Transfer what you see to a sketch on paper, starting with a simple rectangle.*



Minor additions. *Small additions lead to a major leap – you've captured the form.*

We are focusing on uncovering a form and probing how it's organized visually. Select a small object to draw. The toddler's chair above is simple, but with enough detail to give the mind something to explore spatially. Also, this works better with a pencil than with a mouse. Your senses are a portal into your imagination and you want a clean connection between fingertip, eye and brain.

Let's Get Started

First let's capture the essence of the form that governs this chair. A form is nothing more than a few simple shapes that combine to define an object in space.

We begin by roughing in the simplest shape the eye can detect, in this case a rectangle that governs the overall width and height of the object. Hold your straightedge at arms' length and span the widest part using your thumb to mark the width. Use that to draw the bottom of your rectangle and grab the height using the same method to create the sides. Connect all four sides then stop a moment to look at what you've rendered. You've just sketched a proportionally correct shape that governs the space that your eye perceives.

Now turn to the next level of detail: roughing in the smaller shapes that organize the form. Use your straightedge and thumb to grab the height of the seat and the width of the chair back. The overall form is now subdivided into major parts. Often these larger blocks will use proportions to create a hierarchy between major and minor; but for now, just focus on being able to see the largest shapes and how they are arranged.

Starting from large shapes, move down to small details; sketch every element using your thumb and straightedge to render the parts in proportion to the whole. You may also find it helpful to use dividers to pluck the smaller details. Work that pencil and simultaneously feed the part of your brain that paints objects in space. Think of it as teaching yourself guitar chords – visually rather than aurally. Over the next few weeks, pick a variety of interesting objects to sketch and unpack. This is just scratching the surface of what you can do – but it's surprising how quickly your imagination will respond. In just a short time, you'll forget where you left that mild case of visual amnesia. PWM

George is the author of two design DVDs from Lie-Nielsen Toolworks (lie-nielsen.com).

Add the details. *Your sketch may surprise you on paper, and most importantly in your mind's eye.*

ONLINE EXTRAS

For links to all these online extras, go to:
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BLOG: *Read more from George about design on his Design Matters blog.*

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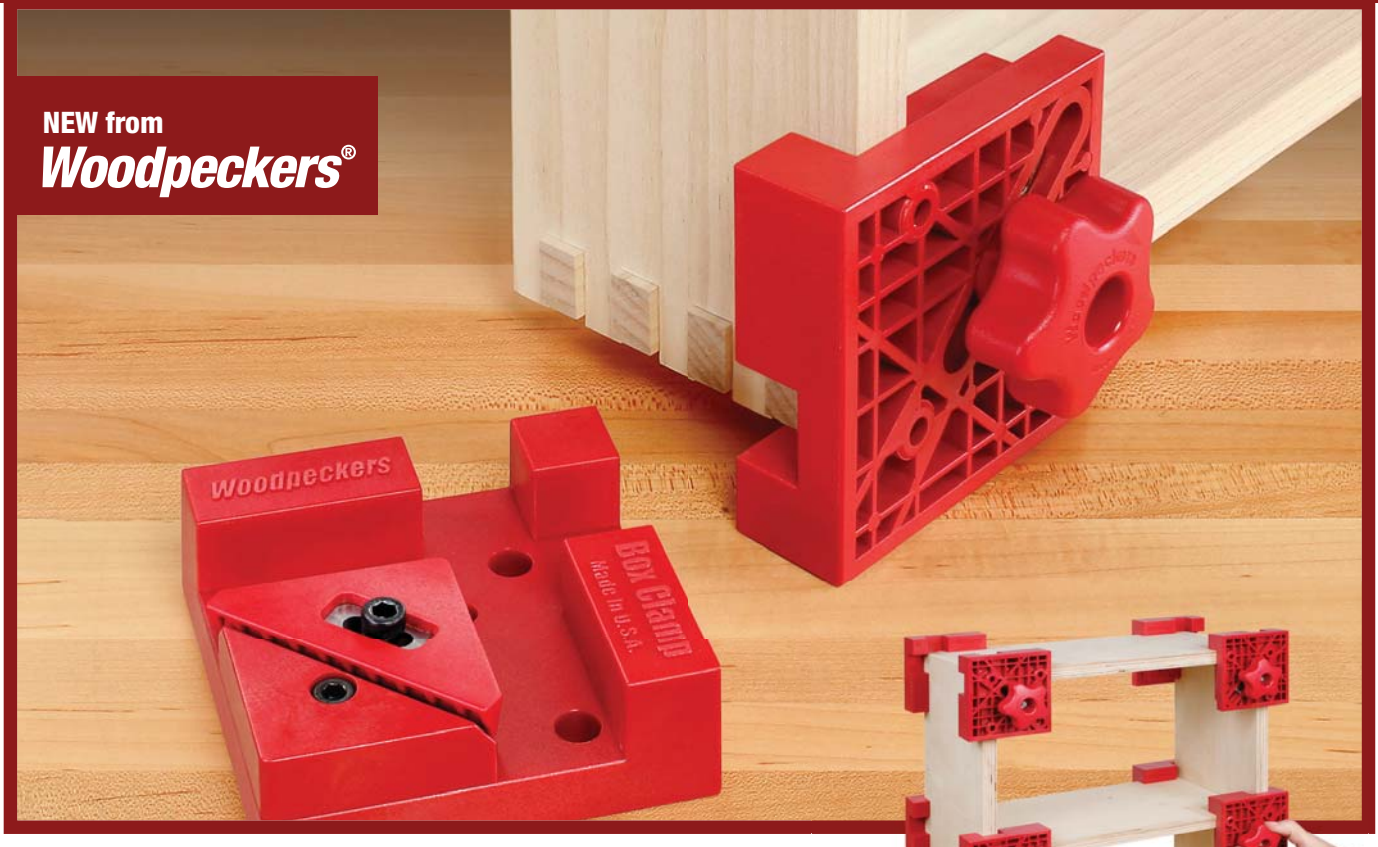
About This Column

Design Matters

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

Square Up Your Projects

Faster Than Ever



The New Woodpeckers Box Clamp™ is just the ticket for your cabinet and box making projects. This simple tool eliminates the hassle of cumbersome bar clamps and eliminates the need to continuously make adjustments to square the corners.

Imagine being able to dry-fit all parts at the same time without any clamps to interfere with the assembly process. You'll know right from the start if your project is square and be able to confirm part placement and dimensions.

Even better, you can to do all that without a second set of hands. Once your project is glued and clamped, you can easily install pocket screws from the inside or any other fasteners from the outside. Both parts will be square and secure from unwanted movement.

Woodpeckers Box Clamps are designed for most 90 degree joints including pocket hole joints, lap joints, dado as well as T-joints. Virtually any joint found in common cabinetry.

The new Box Clamp™ is also perfect for box joints, half-blind and through dovetail joints. Whether the corner is flush or has material extending from the surface, the clearance is there to ensure a square corner.

When you need square corners, you can't beat the Woodpeckers Box Clamp™.

Made in U.S.A. **On sale for only $36^{99} a pair.**

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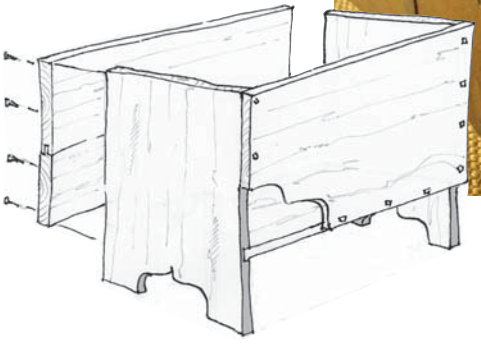
CARD #52 or go to PWFREEINFO.COM

'Boarded' Furniture

London's clever carpenters found a way around the laws.

Quintessential form. *The six-board chest is the most well-known "boarded" furniture form. The basic design is at least 2,000 years old and many medieval chests (such as this one) survive despite the obvious cross-grain joinery.*



"Boarded" is an archaic English term that was used to describe a form of woodwork characterized by the use of fasteners as the principle means of attachment. The iconic six-board chest is probably the most familiar boarded furniture form. In earliest times, the fasteners may have been wooden pegs. In the Middle Ages, nails were used, sometimes decoratively. Metal straps were also sometimes applied to the corners. The basic form of these chests remained unchanged for easily 1,000 years.

Sometime in the 14th century or so, legend tells us a group of carpenters began building furniture and interior woodwork using timber-frame joints. Their work was said to be "joined," the craftsmen were called "joiners" and their craft was called "joinery." The word joinery wasn't meant to loosely describe all manner of wood-to-wood attachments as we use it today. It specifically referred to interlocking wood attachments and mortise-and-tenon construction particularly.

Legal Stipulations

Disputes between London's carpenters, who previously built the houses and all the wooden items within them, and joiners, who sought to reduce competition from the carpenters by restricting their rights to build interiors, were frequent and sometimes violent. By the early 17th century, a London trade guild court handed down a decision separating carpentry from joinery.

The Court of Aldermen ruling of 1632 decided that joiners alone were permitted to make:

- "All sorts of Bedsteads whatsoever (onlie except boarded bedsteads and nailed together).
- "All sorts of chayres and stooles which are made with mortesses and tennants.
- "All tables of wainscotte walnutt or other stuffe glewed with frames mortesses or tennants.
- "All sorts of forms (long joint stools) framed made of boards with the sides pinned or glewed.
- "All sorts of chests being framed dufftailed pynned or glewed.
- "All sorts of Cabinets or Boxes dufftailed pynned or glewed."

London's joiners applied mortise-and-tenon construction to a wide range of products including interior paneling and wainscoting, stools and chairs, paneled chests, doors and, eventually, windows.

But London's carpenters weren't easily discouraged. Working within the court's ruling, they made a similarly wide range of products such as boarded doors, chests, cupboards, stools and tables. Though the guilds weren't as powerful in the countryside and the American colonies, the inherent practicality and simplicity of boarded items remained popular, especially for less-affluent customers. Boarded items could be built quickly and required a smaller set of skills and tools.

Creative Problem-solving

What I love about boarded furniture is the creative way builders solved the essential problems that all woodworkers face. How do we make useful items attractive? Early carpenters' inventories I've seen often include a few moulding planes. But many pieces of boarded furniture I've seen seem to indicate their builders had no moulding planes at all. Pieces are sometimes decorated simply with

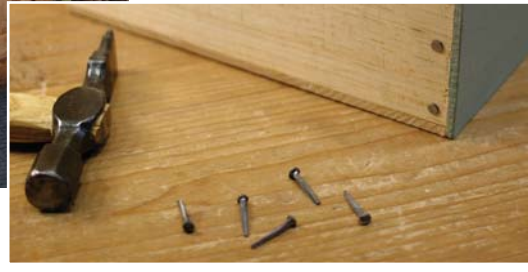
CONTINUED ON PAGE 24

LEAD PHOTO BY REGIS WILL; REMAINDER OF PHOTOS & ILLUSTRATION BY THE AUTHOR

CONTINUED FROM PAGE 22

Blurred lines. *This chest of drawers blurs the distinction between boarded and joined furniture. The bottom two drawers are actual drawers, while the top three are applied fronts below a hinged lid. The top half of the chest is nailed onto the sides like the six-board chest shown in the opening photo.*

Clever panels. *I encountered this boarded cupboard in a gift shop. Judging by the hardware, this piece probably dates to the early 19th century, yet I didn't have to don surgeons' gloves to touch it. Though the doors appear to be "joined" with mortise-and-tenoned frames and floating panels, the carpenter who built this hutch simply nailed thin strips to tongue-and-grooved boards to make it look like a raised-panel door.*



Nails as decoration. *A nailed drawer, carefully made, is perfectly serviceable. These wrought nails could even be considered decorative.*

thumbnail profile mouldings. Edges were planed into series of facets or chamfers, then smoothed by burnishing, scraping or sanding. With such simple design elements, proportions, colors and textures become far more important contributors to the appearance and allure of the piece. Because these elements are so fundamental to the success of any object, a survey of boarded items can be a lot like a day in design school. Can you make an attractive piece of furniture without mouldings, your beautiful hand-cut dovetails or fine hardwood?

Joinery Challenges

Builders of boarded items also had to deal with the challenge of joining boards at right angles. Many of us believe the best way to join boards is either with dovetails or mortise-and-tenon joints. Builders of boarded furniture typically did neither. They generally did what most of us believe to be a terrible mistake: They nailed boards together "cross grain."

Often, this leads to one of the boards cracking or splitting. Wood typically shrinks more perpendicular to the long grain than along it. The result is that one board is shrinking in width more than the adjoining piece is shrinking in length. We even have a fancy name for this: "differential shrinkage." Did the makers of boarded furniture not care?

Some woodworkers believe nails bend slightly, which offers the joint some give. I think it's also possible that the use of softer woods allowed the nail holes to elongate. Regardless of how, so many of these pieces survive that I find it difficult to be too judgmental. Many of us seek the one right answer. You may have picked up this magazine to learn which tool is best, or the correct way to do something. Boarded furniture reminds us that there typically isn't a single right way to do anything in woodworking. It also reminds me of how myopic we can be. Despite the science, builders of boarded furniture broke the rules and got away with it. Their pieces have survived.

I've come to accept that boarded furniture is an equally valid style of construction and not without its own unique challenges. Moreover, and perhaps most important, my wife likes it. And she's not alone. Nearly all of the major lower-end furniture outlets (IKEA, Crate & Barrel, Pottery Barn and Restoration Hardware, to name a few) carry what they often call "cottage-style" furniture. True English or American cottage-style pieces are almost always boarded or rely heavily on boarded construction techniques. It's possible we could offer our own interpretations of authentic period pieces and be left with successful, marketable, charming furniture.

Beyond that, building boarded furniture is a fabulous introduction to hand tools. For more experienced woodworkers, it offers an opportunity to concentrate on basic skills. In my next article, I'll take you step by step through a complicated boarded project. I also invite you to take a look through your past issues or online at the I Can Do That column to see how many of those projects are essentially six-board chest construction. How many other objects can you think to build with this simple approach? PWM

Visit Adam's blog at artsandmysteries.com for more discussion of traditional tools and techniques.

ONLINE EXTRAS

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Message Center

A low-tech solution for a family on the go.

Milk & eggs. *A message center in the kitchen is handy and useful for any family. While you're at it, make one for the shop, too!*

The kitchen is the crossroads for today's busy family. And while we have high-tech gadgets to text messages, take notes and keep a calendar, I've found a kitchen message board has helped to keep my family organized for 30 years. Three decades ago, I made several message centers as gifts and can report that some are still in use – a testament to their utility.

My concession to "high-tech" materials and woodworking methods for this updated version are a dry-erase writing surface instead of chalkboard, and pocket screws instead of dowel joints. Both make an easy project even easier. And as with all I Can Do That projects, the materials come from your local home center and the tools used are all from the modest I Can Do That kit.

Round up Your Materials

I found 1/8"-thick dry-erase board in the paneling section of the store. It was offered in 32" x 48" for just more than $10. That's worth mentioning because you could make two message boards from this one piece of dry-erase board. The other materials needed, an 8' length of 1x2 pine and an 8' length of half-round pine moulding, came to another $7. If you buy one more length of 1x2, you'll have enough material to make two message boards with a total outlay of about $28.

Take your time and select your 1x2 pine carefully. Look for pieces that have few large or loose knots (or better yet, none). If there are knots, you can cut around them and get clear workpieces. Also, check that the wood is reasonably straight and flat.

The Importance of Square

In woodworking, the principle of "square" is fundamental to satisfactory results. Slight deviations, even one degree, can play havoc with your results and leave a twisted mess. Keep this principle in mind while building. Use your combination square to check the setup of your miter saw and circular saw. Check your 1x2 pine. Are the faces and edges square? Make sure your crosscuts are square to both the width and thickness of your workpieces. Get in the habit of "working square" and your projects will have fewer problems.

Cut Parts to Size

Cut the two vertical pieces, called stiles, to length using your miter saw. If you're starting from the end of the board as it came from the store, first trim off the end. Cut the top horizontal piece (the rail). Cut the bottom piece as well. Again, make sure your cuts are square.

You can arrange these pieces and verify that your dimensions are accurate. Then go ahead and cut the dry-erase board. To make this cut, use a circular saw and a straightedge jig to guide the saw (more information on this jig is available in the I Can Do That manual, which is free online at PopularWoodworking.com/ICanDoThat). For support, set up a pair of sawhorses and place a couple plywood strips across the horses to support the dry-erase board. Mark the panel to width and set the jig so the saw cuts to the mark. Now clamp the jig to the plywood strips and check to be sure nothing has moved. Set your depth of cut so you barely cut into the plywood strips, then make your cut. Repeat the process to cut the panel to length.

Square is a must. *In any project, parts must be square or problems will arise. Use a combination square to check all perpendicular faces.*

Assemble the Frame

The upper rail is joined to the stiles using two pocket screws at each joint. Remember, the rail goes between the stiles. After checking the drill depth on your pocket-hole jig, space the pocket holes in about 1/2" from the edge of your 1x2 and drill

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

them. When done, screw the three parts together. Keep the top edge of the stiles flush to the top edge of the rail.

The bottom is screwed on to the ends of the stiles from below, with one #8 x1 5/8" screw at each side. Drill and countersink a hole that's 1 1/4" in from the ends and 5/16" in from the back edge. Now clamp your three-sided frame upside-down in your Workmate. Position the bottom piece and check that it overhangs the outside edge of the stiles 1/2" on each side. Drill a pilot hole in the end grain of the stile so the part doesn't split when screwed. To mark the hole location, push the point of a screw though the bottom holes to make a mark, then drill the hole. Set the bottom in place and screw it to the frame.

Now remove the bottom piece because there's a bit more work on the three-sided frame. Use your router and a 1/4" round-over bit to ease the frame's edges. Rout this profile on all long edges on the face side of the frame. Clamp the work to the bench while routing and move the clamps as needed. On my router setup, the bottom of the bit was above the surface of the benchtop.

The half-round moulding is glued to the top surface of the bottom piece; it keeps your markers and eraser from falling off the ledge. Carefully cut the moulding to the same length as your bottom piece. Apply glue to the moulding and lightly clamp for 45 minutes. Wipe off any glue squeeze-out with a wet rag. After the glue has set, reattach the bottom to the frame.

Before screwing the dry-erase board to the frame, sand and finish the pine. I used a random-orbit sander and #120, then #150-grit sandpaper. Next, I sprayed a clear lacquer finish from an aerosol can. Spray only in a well-ventilated space and away from open flames – think water heater and furnace!

The dry-erase board is easily attached to the back of the frame with countersunk flat-head screws.

When you decide where you want to install your message board, use picture hanging hardware. PWM

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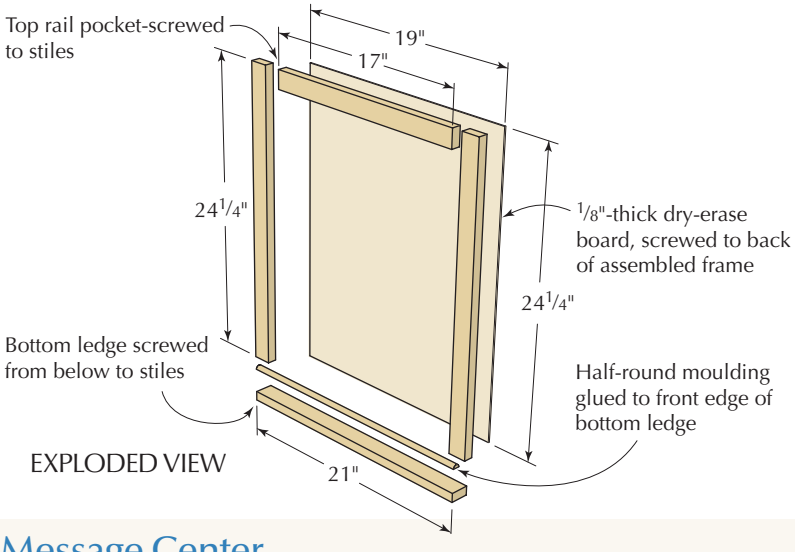
Cut it straight. *Use a straight-edge guide with your circular saw to guarantee an accurate, straight cut. You'll use this jig over and over in future projects.*

Two screws in the corner pocket. *You can fit two pocket screws in each corner of the stile-to-rail joints. Snug the screws tight – but be gentle because pine is soft.*



Message Center

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	1	Top rail	3/4	1 1/2	17	Pine
❑	2	Stiles	3/4	1 1/2	24 1/4	Pine
❑	1	Bottom ledge	3/4	1 1/2	21	Pine
❑	1	Half-round moulding	5/16	5/8	21	Pine
❑	1	Back	1/8	19	24 1/4	Dry-erase board

ONLINE EXTRAS

For links to all these online extras, go to:
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BLOG: *See more step photos of the "Message Center" build.*

ARTICLES: *All the I Can Do That articles are free online.*

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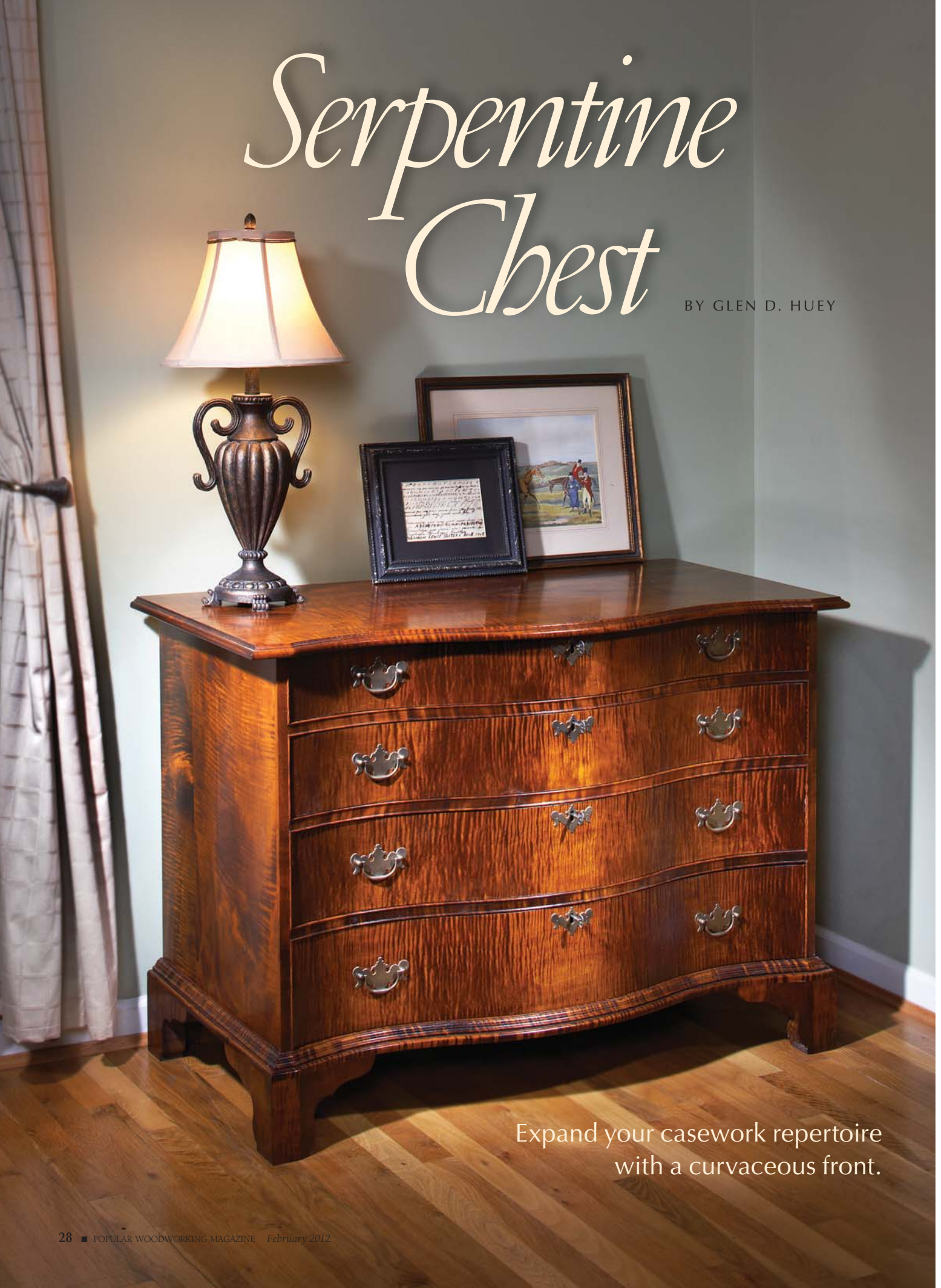
About This Column

I Can Do That

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, using materials from any home center. Our free PDF manual explains how to use all the tools in the kit. Visit PopularWoodworking.com/ICanDoThat to download the free manual.

Serpentine Chest

BY GLEN D. HUEY



Expand your casework repertoire with a curvaceous front.

One of the most interesting aspects of a serpentine chest, with its front concave at the ends and convex in the center, is how the wood grain changes as the curves undulate across the front. A drawer front that begins as a piece of flat stock presents three distinct areas after shaping. The grain in the concave sections displays an "X" pattern, while the grain in the center section forms a circle. The patterns highlight the curved front to give the chest a more distinctive appearance.

Serpentine chests first appeared in the Chippendale era around 1765. These chests could be considered a fraternal twin of the oxbow chest – also known as a reverse serpentine – which is convex at the ends and concave in the middle. These two styles are related to block-front chests in that all have shaped fronts fitted to a basic chest carcase.

Structurally Sound

This chest is based on a mid- to late-18th-century design from Massachusetts. The carcase construction is basic and the joinery is completely hidden. The sides are dovetailed to the bottom with the pins on the sides and the tails on the bottom. Because these structural dovetails will be hidden, you can use large pins and tails.

Begin with the 20¾" pin board, or case side. Set your marking gauge to ⅝", even though the thickness of the bottom is ¾". (The 19⅝"-wide bottom has a rabbet at both ends to hide the joinery and create a shoulder to locate the side panels and help square the case.)

On your sides, draw a line from the back that matches the width of the bottom then square that line to your scribe line. Next, lay out the dovetail sockets. I used only six full pins and a half-tail at the side's rear. Saw to your pin and tail lines.

For this project I removed the socket waste with a router and a small straight bit. For support I clamp a piece of thick stock flush with the case side. Adjust the depth of cut to just reach the scribe line. Remove as much waste as possible without nicking the sides of the pins. Remove the remaining waste with a flush-cut saw.

Waste removal. *Socket waste is quickly removed with a router. I get added support using thick stock clamped to the work. Rout close to your lines then use a flush-cut saw to remove the last slivers of waste.*

The tails are next. Begin by cutting a rabbet at both ends on the interior face of the bottom panel, and along its back edge. The key is to leave slightly less than ⅝" thickness at the rabbets to accommodate the pins and a width to match the thickness of the case side.

Set a side in its rabbet and align it with the case bottom. Hold the rear edges flush – the front edge of the bottom should also be flush with the square cut of the pin board – then transfer the pins to your tail board. Saw and remove the waste to complete the joint.

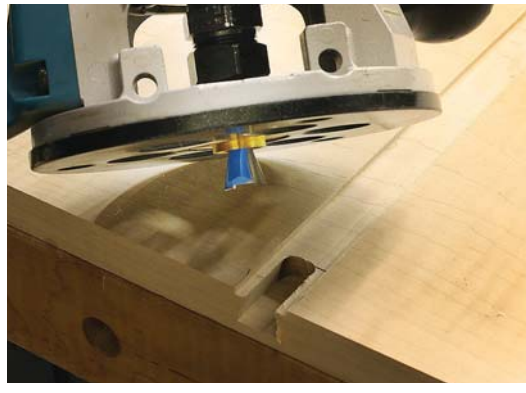
Next, lay out the drawer locations on the front of one of your sides; accuracy is a must. Also, mark a line ½" down from the top of your sides for the joints between the sides and top. When done, transfer your layout lines to the other side to minimize layout deviations.

Make a simple jig to cut the ⅞"-wide dados for the drawer runners. Put ⅞" spacers between two long rails then attach a piece at both ends of the jig to hold the rails in place. Use a router and pattern bit set to cut to ⅛" deep. Align the jig with your layout marks, clamp the jig and cut all the dados.

The drawer blades attach to the sides with sliding dovetails. I use a dovetail bit and a bushing to cut the socket. Use a ⅝"-diameter dovetail bit and a ¾" bushing in the ⅞"-wide dado to keep the dovetail away from the edges. Set the depth of cut to ½" into the dado then cut a 1⅛"-long socket at each drawer location.

> "A figure with curves always offers a lot of interesting angles."
>
> — *Wesley Ruggles (1889-1972)*
> *Hollywood film director*

Shop-made jig. *Make drawer runner dados easily and quickly with a simple jig built out of plywood.*

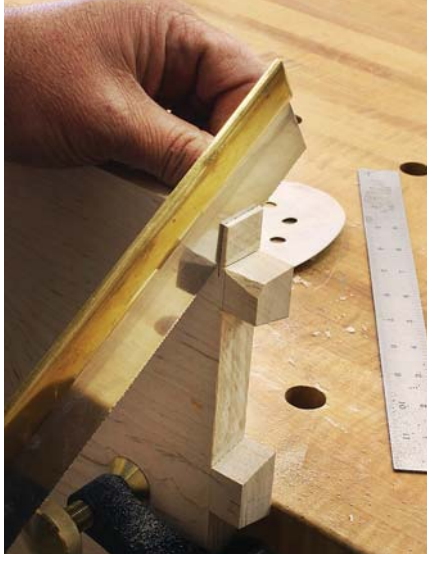


Great combination. *A bushing rubs the walls of the dado as a dovetail bit cuts a sliding socket located within the side walls.*

The top-to-side joinery is a modified sliding dovetail. For this step, you need a slightly tapered dovetail so the joint tightens as it's assembled. I use another simple jig and ¾"-diameter dovetail bit and a like-sized bushing. To make sure your taper is correct, add a spacer between your jig and the front edge of the workpiece (I use a sanding disc). Run one side only, then trim 1" from the dovetail's front edge on each side panel to keep the socket area from showing. The mating joint in the case top is made later in the process.

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

Another simple jig. *To make my sliding dovetail jig, assemble a T shape then trim one arm so the resulting cut from the router setup leaves exactly 3/4" to match the top's groove that will be cut later in the process.*



Watch the thickness. *To allow room for the moulded edge below the bottom drawer, trim 1/8" off the lower front corner of the side panel.*

Work on the sides wraps up with a 7/16" x 3/4" rabbet for the backboards. Also, slice 1/8" off the lower front corner of the side front to allow for the 3/4"-thick curved front piece that will be applied later. Slip the bottom and sides together, clamp them in position, but do not glue.

It's All About Curves

Up until now, this casework uses standard methods. Now, the serpentine or curved work begins. This all starts with a pattern of the curved drawer blade layout. Copy the pattern for the drawer blades from the plan on page 31 to a piece of 1/2"-thick plywood.

Work from a centerline and transfer then cut and shape your pattern. The drawer-blade profile is used to lay out all the other shaped pieces including the top and drawer fronts. If your pattern has a bump or bulge, your finished chest will, too.

Mark the top and center of the overly long drawer-blade parts before attaching the pattern on top of a blank. Secure the patern with screws. With a bottom-bearing pattern bit in your router table, profile the shape after trimming away excess waste material. (Save the offcuts to aid in the setup of the router table to create the sliding dovetails.) Shape the three drawer blades using your prepared stock.

Install a 1/8" bead router bit and set the bit to cut just at the edge of the blade. Run a bead profile on both the top and bottom edge of each blade before switching to a rabbeting bit to cut the recess between the beads.

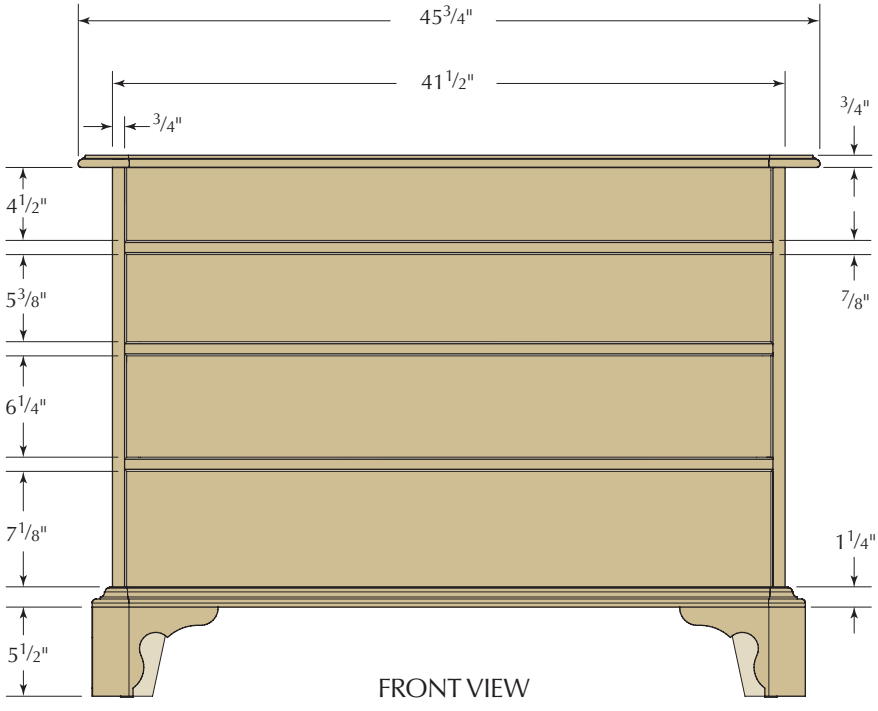
Using the centerline of the now-profiled drawer blade, lay out and mark the finished length by taking exact measurements from the semi-assembled chest. Align each blade to a centerline mark on the chest bottom, then mark the inside edge of the case sides. Add the 5/8" socket depth to each end and cut each blade to length.

At your router table, install the same dovetail router bit you used for the sockets in the case sides. After you have a good fit with a practice sliding dovetail, run both ends on all three blades.

The drawer blades extend beyond the front of the case sides, so trim the sliding dovetail back 1/2" from the front edge, leaving a 1"-long dovetail. Mark and remove the waste flush with the shoulder.

Glue and assemble the sides to the bottom, glue the sliding dovetails and sockets, then slip the joints together. The front edge of the dovetail should sit flush with the case side. Clamp the side-to-bottom joints until the glue dries.

Work on the drawer blades is complete when you pare a 45° bevel at each end of the drawer blades for the 1/8" bead moulding miter.



Dress the Bottom, Outfit the Case

The front edge of the chest bottom is fitted with a curved piece of primary wood; the shape is pulled from the plywood pattern, but this piece extends 3/4" farther out than the drawer blades. I use a small plywood disk or appropriately sized washer to accurately draw the 3/4" cut line for the chest's bottom front. Place a pencil in the center hole then roll the disk along the edge of your pattern, as in the photo on page 32. (This technique is also used to extend the pattern for the front edge of the base frame later on.)

Cut to the layout line then clean and smooth the piece. When done, profile

the front with your favorite router bit profile. While you're routing the front bottom, also add the same profile to the stock for the return moulding that will cover the case's dovetails.

Next, fit the bottom front to the chest by aligning the centerline of the piece with the centerline of the chest bottom. With the pieces aligned, use a 3/8"-thick scrap to accurately mark your miter locations. Your front bottom piece is cut flush with the case side and mitered at the outside corner. Make the flush cut then use a scrap cut at 45° to guide your mitered cut – again, accuracy is key.

With the bottom front complete, glue it to the case bottom. I ventured from tradition and used four pocket screws to hold the pieces together as the glue dried. Clamps could mar the moulded edge.

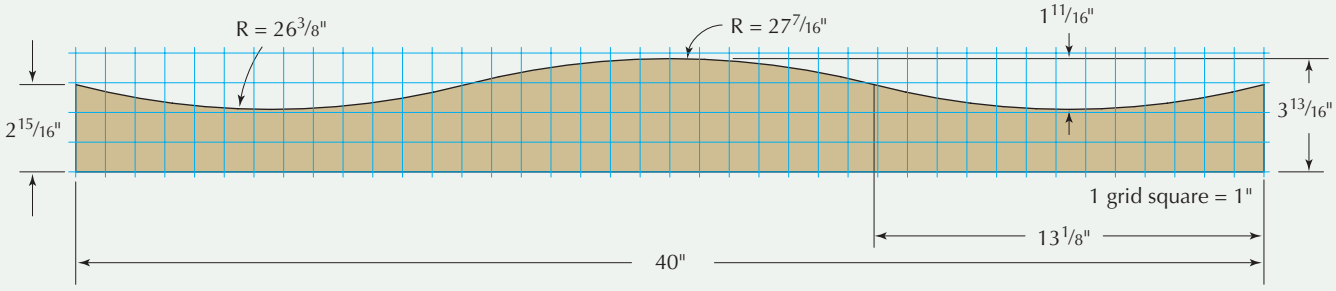
Now install the drawer runners. Add glue to the first 4" then slip the runner in place before nailing. Be sure your nails don't blow through the side.

The size and shape of the U-shaped base frame is taken from the bottom front, but it extends 1/2" out from the front. Again, use a washer or disk to extend the profile. Add straight lines at the ends of the stock to allow for mitering. The sides of the base frame are joined to the front with a mitered half-lap joint.

More Sliding Dovetails

The top joins the chest with sliding dovetails – but there is a twist. These "dovetails" are sloped on one side only and are square at the outer edge; that makes them sliding half-dovetails. The

DRAWER BLADES – FROM PATTERN TO ASSEMBLY

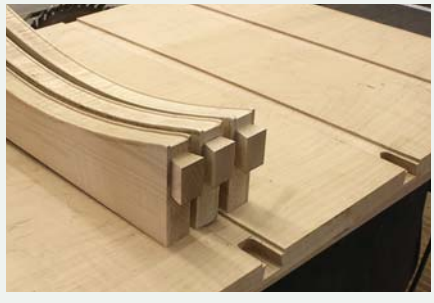


DRAWER BLADE PATTERN

Stand-out detail. *The bead detail is an important part of the drawer blade's edge profile. Router bits are a quick way to both cut the bead and raise it from the surface.*

Sizing the drawer-blades. *Align the centerline of the drawer blade with the centerline of the bottom. Mark the location where the blade meets the inside of the case sides.*

Finger-pressure tight. *To set up the sliding dovetail cut, use drawer-blade offcuts. Set the height of the sliding dovetail before adjusting the width of your cut.*



Don't fret it. *As with the earlier dovetails, the drawer-blade joinery is concealed in later steps, so you could add wedges to tighten any problem spots.*

Miter your bead. *The best way to miter the small ends of the drawer-blade bead is to use a mitered scrap to guide a chisel as you pare.*

Call it a jig? *I use a round plywood disk to mark my pattern offsets. To make the disk, drill a small hole at the center of a 1 1/2" square, then pin it to a sacrificial board 3/4" from the blade and rotate the workpiece through the band saw blade.*

Tricky layout. *A scrap simulates the 3/8"-thick x 3/4"-wide front face that is added to the front edge of the sides to prepare for the vertical 1/8" bead. Also note the notch for the bottom front.*

Miter aid. *The bottom front must be trimmed flush to the case side and have a mitered outside corner. I use a scrap cut at 45° to help guide my saw for the miter cut.*

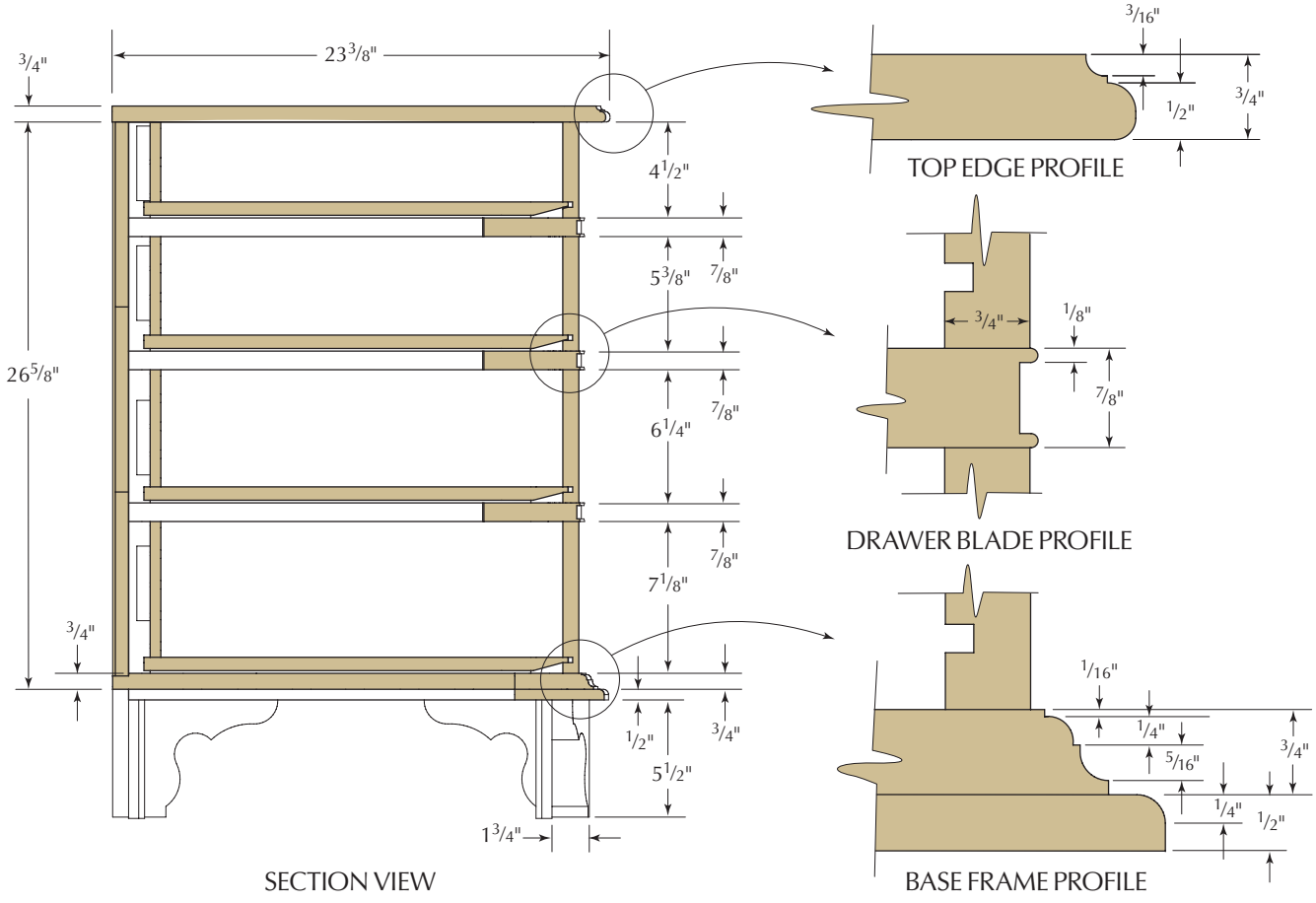
Super-strong joints. *Although it's a break with tradition, mitered half-lap joints add support to the base-frame mouldings and simplify how the return mouldings are attached.*

dovetails are cut using a shop-made jig. Start cutting the sockets using a straight router bit.

Cut your top to length but leave it overly wide for now. The location of the sliding dovetail sockets are taken from the assembled case. Align a straightedge or fence to the layout lines then plow away the waste using a 1/2" pattern bit as shown on the next page. Stop the cut to match the sliding dovetail made at the top of the case sides.

With the fence still clamped in place, make a second pass at the joint with the dovetail bit/bushing setup from before. The 3/4" bushing keeps the 3/4" dovetail bit exactly at the edge of the straight cut. The result is a socket that is square on the outside and sloped on the inside.

The front edge of the top matches the shape of the base frame made earlier. The straight portion at the two ends is cut to the lines then cleaned before profiling the top's edge. Use the frame as a template. Mark the curve and cut it with a



Step one. *A lot of the waste at the sliding dovetail socket in the top is removed using a 1/2" pattern bit. Complete the joint with a bushing/dovetail setup run along the same fence (move the clamps for router base clearance).*

Front face. *Fit then install the two front face pieces to the front edge of the case sides. Use glue and attach with 23-gauge pins.*

Fitting the beads. *Miter one end of bead moulding stock, set it in place then mark the back of stock to easily determine the location of the second miter cut.*

band saw or jigsaw to the waste side of the line. Clamp the frame to the top and flush-cut the front edge with a router and top-mounted bearing pattern bit.

Two router setups complete the edge profile on the top. Use a cove-and-bead bit for the top upper section of the profile then flip the top and run a 3/16" round-over profile along the bottom edge. Do not profile the back edge of your top.

The Fluff & the Feet

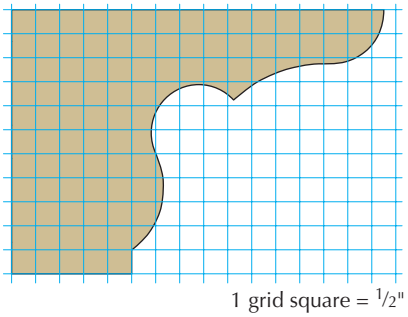
The show portion of the chest begins with two 3/8"-thick x 3/4"-wide front face pieces. Cut the pieces to size, then fit them to the front edge of the sides. This will leave space for the bead. Glue them and use clamps or 23-gauge pins to secure the pieces.

Size the bead stock to fit your case. It should be 1/8"-thick stock, more or less. The goal is that it be flush with the inside after the bead is in place. Because the stock is so thin, it's easier to round over one edge with sandpaper than it is to machine the detail. Use #150-grit sandpaper.

Miter one end using a bench hook and handsaw, then fit the piece to the case to determine the actual length. (If you mark the back face of the bead stock, you can locate the exact cut length.) Miter the second end, then fit the piece between the ends of your drawer opening.

Attach the base frame to your chest before you cut and fit the return mouldings. A few screws and glue along the front, and nails on the two sides, does the job. Nail the returns in place with 18-gauge brad nails.

The front feet are constructed from 8/4 stock due to the curved detail. Cut your material to get both feet from one piece, then lay out the pattern from the drawing at left. Tilt the blade of your table saw to 45° and with your pieces face down, cut both ends of the material for four feet. With the saw still set at 45°, adjust your fence to make a cut into the miter of the previous cut. The grooves of each foot will match up for the splined joint. At your band saw, cut the feet to the pattern, then make splines for the grooves and assemble two pairs – one pair for each front corner.



1 grid square = 1/2"

FOOT PATTERN

Position the feet under the front corners of the chest. Transfer the curved shape to the top edge of the foot, then cut that profile at your band saw. Attach a piece of scrap to the inside of the foot for support.

The back feet have shaped flat faces on the sides, with thinner returns below the back; they are attached with half-blind dovetails. Cut pins in the shaped feet and tails in rear feet.

Now the Drawers

Mill your drawer stock so the individual drawers fit the openings; plan for a 1/16" reveal on all sides of the fronts. Slip a front into position then pull it out even with the drawer blade at its farthest

SUPPLY SOURCES

Horton Brass
horton-brasses.com or 800-754-9127

- 8 ■ Chippendale pulls #H-17L, 3" boring
- 4 ■ Chippendale escutcheon #H-17E
- 4 ■ Half-mortise drawer locks #LK-2

Call for prices.

Play it safe. *Without support of the work, your foot could be ripped from your hands as you make the band saw cut to shape the foot's front curve.*

Plenty to show. *The stubby rear feet fit around the base frame and you can see just how that frame carries other mouldings.*

point of projection while keeping the front square to the case. Using a pencil, transfer the shape of the blade onto the drawer front.

Tune up your band saw before you begin to cut the curved shape on your drawer fronts. Install a new blade if the current one is dull. I like a 1/4" x 6 teeth-per-inch skip-tooth blade. Square your table to the blade.

Saw the drawer front at the cut line. Take your time and carefully follow the line. Any deviations from the line must be worked and smoothed. It can take a lot of work, but if you saw accurately, you'll get by using a scraper and sandpaper.

Serpentine Chest

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑	2	Case sides	7/8	20 3/4	27 1/4	Maple	
❑	1	Case bottom	3/4	19 5/8	41 1/2	Pine	
❑	1	Case top	7/8	23 3/8	45 3/4	Maple	
❑	1	Bottom front	3/4	3 1/2	43	Maple	Leave long
❑	3	Drawer blades	7/8	4 7/8	41	Maple	Leave long
❑	2	Front face	3/8	3/4	26	Maple	
❑	2	Bead pieces	1/2	1/8	30	Maple	
❑	2	Return mouldings	3/4	2 1/2	23	Maple	Makes 2 pieces
❑	1	Base frame front	1/2	4 1/2	43 3/4	Maple	
❑	2	Base frame sides	1/2	3 1/2	22 1/2	Maple	
❑	3	Feet*	1 3/4	5 1/2	12	Maple	2 feet per piece
❑	2	Rear feet	3/4	6	8 1/2	Pine	
❑	6	Drawer runners	7/8	1	16 5/8	Pine	
❑	1	Drawer front**	1 3/4	7 1/8	39 3/4	Maple	
❑	1	Drawer front	1 3/4	6 1/4	39 3/4	Maple	
❑	1	Drawer front	1 3/4	5 3/8	39 3/4	Maple	
❑	1	Drawer front	1 3/4	4 1/2	39 3/4	Maple	

*Foot blocking is 3/4" x 3/4" x 36".

** Drawer sides are 19" long; backs are 3/4" narrower than sides. Drawer bottoms are 5/8" x 19 7/8" x 39 1/4" and shaped at the front edge to match drawer front. Drawer stops (8 pcs) are 5/8" x 5/8" x 3 1/2".

With the fronts shaped on the outside face, slip one into the chest to mark the back cut line. Slide the front out until the rear face is flush with the two concave portions of the drawer blade. Use a pencil to transfer the design onto the top edge of the drawer front.

The acute angles formed at the ends of each front – where the drawer sides dovetail to the drawer fronts – present problems. The fix, however, is quite simple. As shown in the center photo on the next page, use a combination square set to 3/4" to square off the end of the drawer front and mark a line where the rule meets the back cut line. The additional material allows the drawer sides to meet the front at a 90° corner.

The drawer boxes are built using typical 18th-century construction techniques – through-dovetails where the sides meet the back, and half-blind dovetails at the front. The drawer bottoms slip under the back and slide into 1/4" grooves in the drawer sides and front. Two nails hold the bottom to the drawer back.

The serpentine curves of the drawer fronts are different from typical straight-front drawers, in that you cannot use a dado stack or table saw blade to make grooves for the drawer bottom. Due to this, it's best to use your router with a 1/4" slot cutter installed. This is, of course, after you have dovetailed all the parts.

Another difference is in fitting the drawer bottoms. The serpentine front edges need to be cut prior to beveling the bottom so that the 5/8"-thick bottom fits into the 1/4" grooves. Position the drawer box on the bottom panel. Hold the box square and centered, and flush with the bottom front edge. Transfer the serpentine design to the drawer bottom.

Cut to the line before you bevel the underside of the bottom's ends and front. You can work the bevel with hand tools, but I like to use a raised panel router bit for this job. To get the best fit, I had to finesse areas at the front once I was able to slide the bottom into the drawer box. When ready, affix the bottoms to the drawer boxes.

Finish Your Project

With the drawers complete, insert them in the case. Hold the drawers about

Time to trim. *The front face of the drawer begins to appear as you transfer the pattern from the drawer blade.*

Keep it light. *Wandering cuts at the band saw will mean more work to smooth the curved drawer fronts. Use a card scraper, spokeshave, sander or whatever other method you have available to get the job done. Better yet, saw accurately in the first place.*

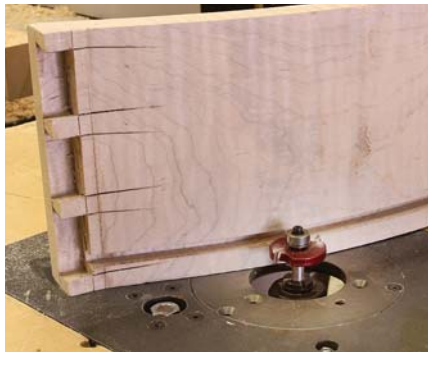
1/8" behind the bead detail and evenly aligned side to side. Hold the drawers firm – small wedges slid into the space around the drawers will help – then install drawer stops against the case sides and flush with the drawer backs. Brads, or pins and glue, are best.

The finish on my serpentine chest starts with Moser's water-based aniline dye; it's a 50-50 mixture of golden amber maple and brown walnut. Next, I apply a couple coats of shellac followed by a coat of Behlen's burnt umber glaze. That is followed by additional coats of shellac. I top-coated the chest with a single application of low luster pre-catalyzed lacquer for greater finish durability.

This project is a clear example of how a basic design is enhanced by a few well-placed curves. Straightforward work at a band saw results in a shapely showpiece that is sure to draw attention. And best of all, you're just a simple pattern change away from building any of the three most noteworthy chest designs from the Chippendale period of American furniture. PWM

Glen is a contributing editor to Popular Woodworking Magazine, *teaches woodworking at several schools around the U.S. and is currently working on a major furniture commission. He can be reached at glen.d.huey@gmail.com.*

Square shoulders. *Curved ends are not conducive to cutting dovetails. Add a straight section at the end to keep the corners at 90°.*



Curved grooves? *A slot cutter in the router table is perfect for these cuts. Set the height of the cut at 3/4" then run your grooves.*

Another transfer. *Drawer bottoms are milled to size and cut to slide into the 1/4" grooves in the drawer boxes, but you need to shape the front edge to match the drawer front before you can slip them into place.*

ONLINE EXTRAS

For links to all these online extras, go to:
■ **popularwoodworking.com/feb12**

VIDEO: *See Glen use a router setup to remove the bulk of the waste from dovetail sockets.*

MORE VIDEO: *Discover the treasures of 42 diplomatic reception rooms at the U.S. Department of State building in Washington, D.C., home to a fabulous collection of American antiques.*

IN OUR STORE: *"Building 18th-Century American Furniture" by Glen D. Huey – an extensive collection of project plans of the author's favorite furniture pieces. Also, Glen's video, "Cheating at Handcut Dovetails."*

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■ **ShopWoodworking.com**

Handle With Care

BY GARY ROGOWSKI

Make your own door and drawer pulls for a custom finishing touch on your work.

It's the grip that counts. A limp handshake is as bad as a poorly designed handle. OK – that's a stretch. But there is something to a well-designed handle that invites you to explore a cabinet or drawer. Handles are usually the first thing that people touch on a cabinet or drawer, and it's a crucial opportunity for a designer to make a good impression. Yet handles are usually the last thing made for a piece.

Prototypes

When I build a cabinet, I stare at it for a few days before deciding what kind of handle makes the most sense. I never design my handles first because I want to get a sense of how the piece feels just sitting on my shop floor.

Handle designs are also subject to the vagaries of my moods and the wood I have – so who can say how they will turn out from one day to the next? One of my favorite handles I made in an hour when I learned of the death of one of our cats that I had renamed Fatboy. He died of overeating of course, but it was sad to see him go nevertheless. That handle, which I made for my tool cabinet, always makes me think of him with fondness.

If a handle is the finishing touch to a piece, doesn't this put some pressure on you as the designer to get it right? Darn tootin' it does – which is why I approach this part of the job carefully. I try out all sorts of possibilities before deciding on the right handle for a piece. To make this job easier I keep all my reject handles, flops, wrong wood choices, good prototypes and extra successes in two boxes. These are all the possibilities that are terrific – but maybe not for my current piece. This gives me two ready boxes of samples for perusal, and allows the chance to start playing with ideas already fleshed out. It's a huge step forward in the design process.

Options. *Keep the discards and prototypes for every handle you make – you never know when one of your previous attempts might be just the thing to help you get a handle on a current project.*

Making prototypes may seem like a waste of time, but this effort will in the end save you time and wasted precious wood. Try out your possibilities in scrap wood and you will see if the elements of design – form, proportion, color and contrast – are working together in your handle design.

Designing Handles

There are, of course, functional considerations to a handle. But I wouldn't start my designing there. Start with ideas, whimsy, cocktail napkin sketches, tracings in the sand at the beach. This is the same sort of approach I take for designing cabinets, so I continue this kind of brainstorming for the handles.

Design starts with a sense of wonder. I wonder what this would look like?

LEAD PHOTO BY AL PARRISH; REMAINDER OF PHOTOS BY THE AUTHOR

Or that? Begin sketching, playing with your mashed potatoes, shaping clay or carving up blocks of cheddar cheese. Whatever medium helps you to generate ideas is the one to use. (You can also eat your failures if you so choose.)

I sketch first just to get a sense of forms and to generate ideas. You never know what may emerge from your doodles. They're important.

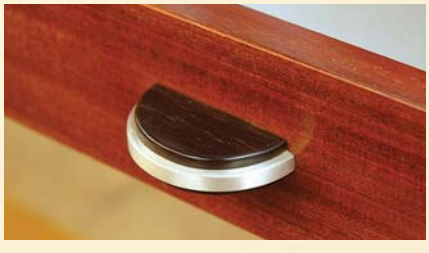
Pay attention to the already existing shape and details of your piece. Make the handle form recall these forms or shapes. It doesn't have to be an exact match to a shape. But is the handle complementary or is it fighting for top billing? Does it have the right proportions for the piece? It can't be too small to see or grip, or so large that it blots out the front of the cabinet.

This is where we get back to function. How big does the handle need to be to grip comfortably? Is it large enough to overcome that new catch you installed? Sometimes a beautiful handle just can't handle the load. Don't despair. Put it in your Box of Handles and save it for another piece.

Finally, consider the intention of your handle design. What are you trying to do with it? Is it friendly, austere or highly decorative? Does it offer a nice spot of light on some dark wood or is it in contrast to a white background? Is a sleek art deco sandwich of ebony and aluminum right for the piece? How about a sweeping Japanese-style handle made from walnut that looks like the roofline from a Buddhist temple? These are the things that will make a handle stand out from the surrounding wood and make it welcoming.

Making Handles

Most of the time, I make my prototype handles out of scrap: poplar, alder, walnut or whatever is lying about. Then it's to my handy felt markers to turn them



Art deco. *This ebony and aluminum pull for a vanity strikes just the right visual chord for the piece to which it's attached.*

Simulate. *Don't use good wood for prototypes – use something inexpensive and color it with a marker to simulate your actual stock (in this case, a black marker makes poplar scrap look like ebony).*

Plan ahead. *Decide how you're going to attach your handles before you shape them – that way, you can drill any necessary screw holes while the blanks are square.*

Sharp tip. *A sharp chisel can work wonders on sharp curves to erase any sawblade marks or sanding scratches.*

Smooth moves. *Angle your spokeshave in the cut to lengthen the amount of blade that touches your work as you smooth curves.*

into either ebony with a black marker or rosewood with a red and then a blue marker. With double-sided tape, I can place the handles anywhere on the piece; that allows me to decide about their size, placement and spacing.

Once I decide on a shape, I have to figure out how I'm going to mount the piece, and I also need an efficient and safe method for handling these small chunks of wood. It is much easier to cut tenons or drill holes for pins into a rectangular chunk of wood instead of into a shaped handle. Plan for this work ahead of time to save yourself some headaches.

Shaping begins for me on the band saw. Using a 1/4" blade I can cut some pretty tight curves and shape close to my layout lines then nibble away wood with the teeth of the blade. I remove the band saw marks either at my spindle sander or at the bench with hand tools. The spindle sander has speed on its side, but it has some limitations, too. You'll need a coarse grit to get started with your shaping. But then you have to get those scratch marks out. There is also only one point of contact of the sanding drum to the wood. Longer, shallower lines are harder to get fair with a spindle sander.

For really tight curves on a handle, a sharp chisel works remarkably well to pull out filing marks or sanding scratches. Clamp the handle into your vise and when it rotates on you – as it will – just clamp a stick down to your benchtop. The handle will hit that and stop moving, so you can shape with confidence. Lever against the top of the curve with your chisel bevel-side up to scrape away the marks. It will work until you get too far from the pivot point, then the chisel will chatter a bit. But try it for tight curves and you'll be pleasantly surprised at the results.

Drill after shaping. *If you neglected to drill holes for your screws or pins before shaping your handle, clamp it tightly between blocks to hold it square.*

Larger handles or gentler curves that I can hand-shape, I prefer to cut with files, rasps, my spokeshave and, finally, my scraper. I prefer the spokeshave for most curved work just because I can easily fair a curve with it. The tool has a fairly short sole on it, but by angling it you can effectively lengthen that sole and it will just ride on the high spots of the wood to trim those off first.

Hand carving is another method for making a pull. Again, I would make my round or square tenon first before whittling away at the wood. Wear a glove to protect your fingertips and use your sharpest tools so you have more control over the cut.

Attaching Handles

Deciding on how you will mount your handle depends on its particular use and wear factors. Is it likely to be struck, abused or man-handled (by which I mean will you or your children be using it? Or is it for the shop?) Can you run a screw into it without splitting the wood? There are few feelings as annoying as splitting an intricately shaped handle. If you are gluing the handle in place with a tenon, what are the odds that it's going to not fully seat and you'll need to put a clamp on it? Because it's woodworking, I'd say the odds are good you'll encounter challenges. Can you make a clamping caul that will put pressure where you

need it – without that pressure splitting the piece? Think about these things when getting ready to fit a handle.

Screws are the simplest method for attachment. Mark out your cabinet door or drawer front for the screw centers but drill a hole big enough for the screw to fit through comfortably. If you have problems with accuracy, drill these holes oversized so you can make adjustments. If you use brass screws for attachment, run a steel screw first to cut the threads into the handle. On all tough woods and especially on hard exotic woods, drill a pilot hole as big as the root diameter of the screw – maybe even one size larger for the tough woods, just to avoid splitting.

Dowels are used with glued-on handles when you need some extra mechanical strength. When using pins, drill your handle before shaping. (If you missed this step or really need to shape a handle first, clamp it between two blocks of scrap the same height and then drill it for holes.) Hold the handle up to the cabinet, mark hole centers then drill for your pins. Glue the pins into the handles then check their fit into the cabinet or drawer front. You can shave a little off a misplaced dowel and still have it hold just fine.

> "If the beautiful were not in us, how would we ever recognize it?"
>
> — *Ernst Haas (1921-1986)*
> *Austrian artist and photograher*

In repair work when fixing shrunken tenons, or perhaps with undersized dowel-pin stock, you may have to go to another method of attachment. Fox wedging or blind wedging works great if you plan it out. Make your tenon or pin shorter than the full depth of the hole. Cut a slot in the tenon about two-thirds of its length. Make a wedge as wide as the diameter of the hole and long enough to fit in the bottom of the hole. The wedge pushes on the bottom of the mortise and into the tenon to wedge it as it enters.

Mortising a handle in place requires some nerves of course. You cut a hole right in the middle of your door or drawer at the end of a long process (but remember that you can always make a bigger handle to cover any errant cuts).

Mark out the position of your mortise and rout or chop it through. A wedged tenon not only looks nicer but it imparts better strength.

For an inlaid handle in the edge of a door, use rubber cement or hold your handle in place to mark out its position on the door or drawer. Mark out its edges carefully with a marking knife. I rout to depth, but you may just want to hand chop to depth. Check your fit before gluing the handle in place.

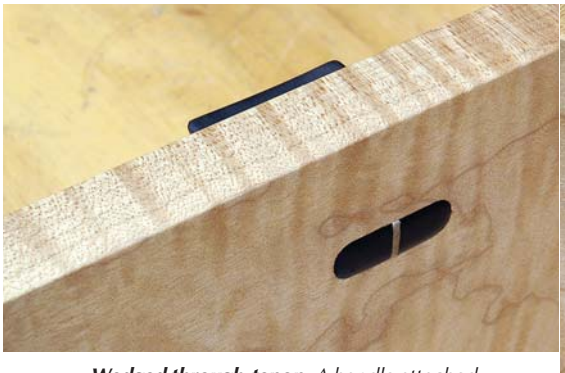
Finishing Touch

It's small wonder that people reach for a handle first. They approach a cabinet in two stages, sizing up the form immediately. This is perhaps unconscious, but people decide fairly quickly if they like a cabinet – or not – first by its form. If they do like it, then they go to touch the piece. This is where you, as the designer, get to direct them. Where do they put their hands? When they touch the handle, do they handle it with care and awareness and a sense of discovery – or are they just grabbing a pull? Are they grabbing something that's been stuck on and there it is, open me up? Where someone puts their hand on a cabinet or drawer is important and the handle is crucial to this meeting. PWM

Gary is director of the Northwest Woodworking Studio in Portland, Ore. (NorthwestWoodworking.com).

Foxed wedge. *If your handle is attached with a dowel, you can wedge it in place by cutting a slot and then insert a wedge loosely in the slot. When the handle fully seats and the dowel bottoms out in the hole, the wedge will be pushed farther into the dowel and spread it for a tight fit.*

Inlaid. *The handle becomes a seamless part of a door or drawer if inlaid.*



Wedged through-tenon. *A handle attached with a wedged through-tenon adds visual interest on the inside – and it will stay in place.*

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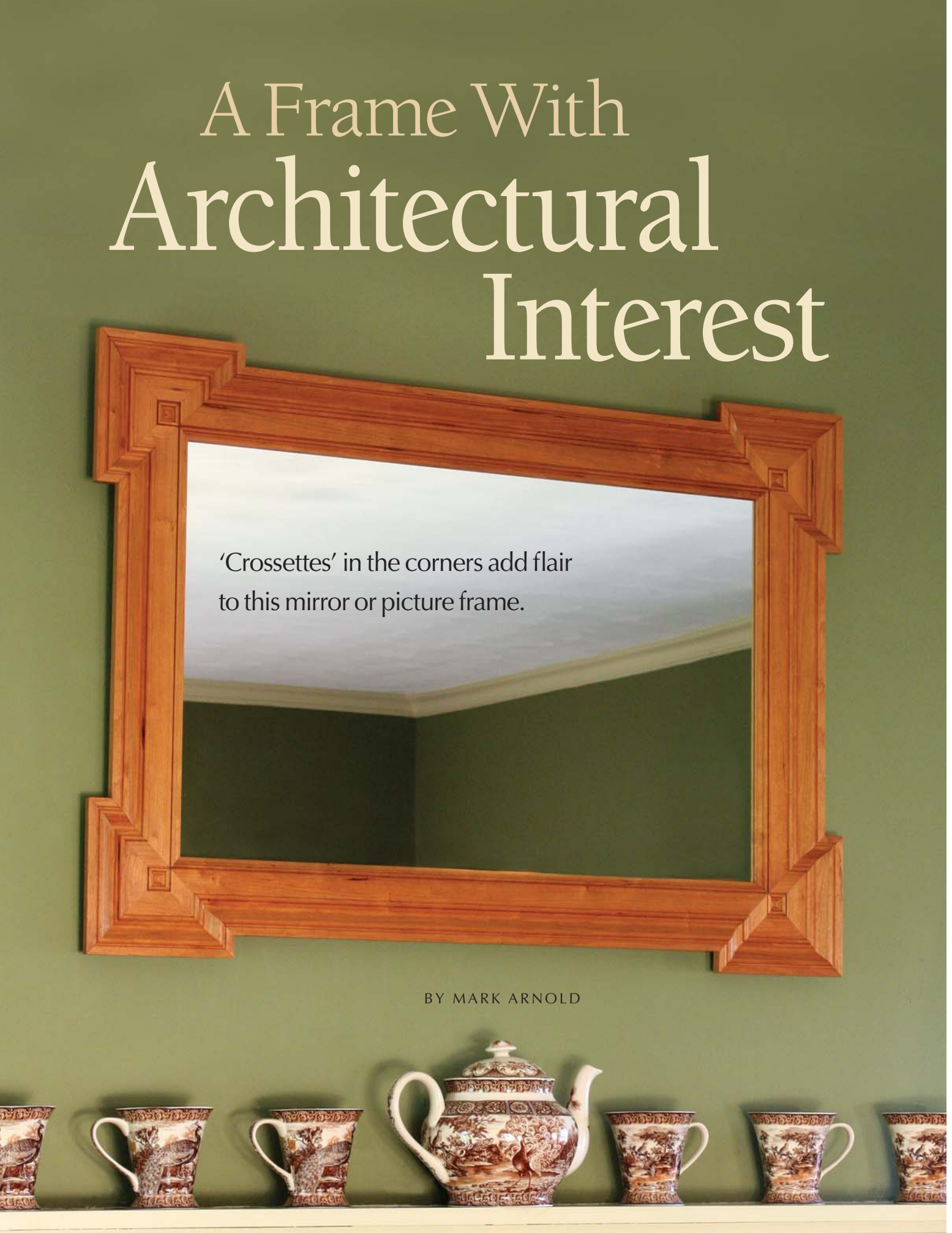
A Frame With Architectural Interest



'Crossettes' in the corners add flair to this mirror or picture frame.

BY MARK ARNOLD

PHOTOS BY CHAUNCEY MONTGOMERY

Architectural elements on which intersecting vertical and horizontal members extend beyond a simple lapped or mitered joint are said to be "crossetted." The term has been used to describe any projecting corner treatment and has been a decorative staple employed by artisans and designers for centuries.

Of classical origin, crossetted elements were widely used in baroque and Georgian interiors, and they can be found on windows, mantels, doorways and other cased openings as well as on mobile pieces of furniture such as picture and mirror frames. Crossettes can even be found on more rustic pieces such as Arts & Crafts frames, for example, whose members simply overlap one another as they extend beyond the outside of the frame.

A crossette can be applied to one or both sides of a corner. When a crossetted frame is topped by a decorative entablature, the projection often occurs only on the vertical elements. Its effects are most striking, however, when the "square" formed by the extended members is completely enclosed by a decorative moulding.

The crossetted frame presented here is closely modeled after a cherry frame of Ohio origin made about 1840 that features a particularly ornate moulding. When wrapped around each of the projecting corners, the moulding creates a decorative square detail. In essence, each corner is itself a small square frame that has no aperture because the inside edges all meet at a single point.

An applied rosette can sometimes be found in the center of this square on more sophisticated examples of this type of frame. On this particular example, however, an ersatz rosette is cleverly created by the moulding profile. The inside beaded edge emphasizes the perfect square at each crossetted corner, which is harmoniously juxtaposed to the overall rectilinear shape of the frame.

Hip to be square. *A detail shows how the four parts of the crossette form a makeshift rosette at each corner. Although no finish has been applied here, the chatoyant differences of light reflected from the surfaces are already visible.*

Modern Methods

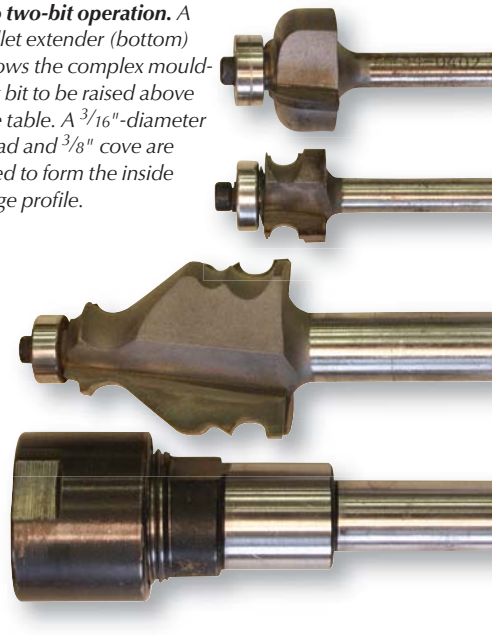
Although the moulding profile on the original was undoubtedly cut with moulding planes, I used stock router bits to create the profile for my frame. I did follow the two-part construction of the original frame, employing a thin subframe onto which the moulding is laid out and adhered. The outer back edge of the finished frame is chamfered to lighten its appearance and to make the "ears" stand out from the wall.

For this reason, I used No. 2 common cherry for the subframe – but any secondary wood can be used because it will likely be hidden in shadows or can be easily masked with stain. The subframe pieces are ripped 1/4" narrower than the moulding, creating an instant rabbet for the mirror when the two are glued face-to-face. On the assembled frame, the inside dimensions of this rabbet determine the size of the glass. I usually subtract at least 1/16" from the width and the height before ordering my glass.

The subframe joinery is quick and dirty. A lap joint was employed on the original, but a biscuit – carefully centered in the 3/8"-thick stock – will provide adequate strength until the decorative moulding can provide additional strength, spanning the seams of the subframe.

Good looks not required. *Because the substrate will not be visible, lesser-grade materials and plain-Jane joinery are perfectly acceptable.*

No two-bit operation. *A collet extender (bottom) allows the complex moulding bit to be raised above the table. A 3/16"-diameter bead and 3/8" cove are used to form the inside edge profile.*



After the four pieces of the subframe have been assembled, two strips of wood are mitered and glued to the outside edge of each corner to give the frame its crossette figure and to provide a backer for the projecting moulding.

Formulaic – Or Not

The width and length of these strips are a function of the moulding profile – specifically the distance of the inside bead and fillet from the inside edge of the moulding. This measurement ultimately determines the width of the crossette returns. If D equals the distance from the moulding edge to the fillet, then the width (W) of each crossette return, according to Pythagoras, is expressed as $W=\sqrt{2}(D^2)$. I found the formula to be unnecessary, however, because the line of cut is predetermined by two points on either side of the return – one at the junction of the inside miter and moulding edge, and the other at the fillet located between the bead and the fascia.

I smoothed both faces of the subframe with a handplane in preparation for the moulding and laid out in pencil the miter lines for the four pieces of moulding that make up the main frame. These pieces have typical inside miters that one expects to find on a picture frame. However, they also have reverse miters where they meet the crossette returns.

A simple layout. *Two intersecting layout lines – one from the center to the outside corner, and another from inside corner to inside corner of each ear – are all that is required.*

There's a moulding in here somewhere. *Laying out the desired profile on the end of one blank allows me to plan the safest and most logical sequence for removing the waste material.*

A bridge to somewhere. *The column of material on the right-hand side of the blank provides a second leg to ride the router fence below the cutter, which ensures a smooth, chatter-free finish.*

Under pressure. *Featherboards, above and in line with the cutter, provide the necessary pressure where it is needed most. They also encase the rather large moulding bit spinning inches above the table. A push stick is used at the end of the cut.*

Outer Frame Construction

I milled and smoothed the stock for the moulding (and prepped some additional stock to cover any contingencies). Each moulding blank is straight-grained cherry, 3¼" wide x 15/16" thick. On the end of one piece, I laid out the desired profile using the router bits shown on page 41. The profile consists of three main parts:

1. The outer complex moulding that is made up of several elements.
2. The inside cove and a bead that is flanked by fillets.
3. A fascia, or flat, sandwiched between the other two.

The exact profiles and their locations on the finished moulding are not critical, save for the inside bead. The center of the bead is 7/16" from the inside edge of the moulding – that yields a 7/8" square inside the crossette. The wide flat area surrounding this square helps to emphasize the center detail.

I removed much of the waste with a 1/4"-wide dado set, especially around the raised moulded edge. Due to the required orientation of the bit used for

SUPPLY SOURCES

Eagle America
eagleamerica.com or 800-872-2511

- 1 ■ 3/8" cove bit
  #154-0402, $25.95
- 1 ■ 1 5/8" moulding bit
  #175-1625, $73.95
- 1 ■ 3/16" beading bit
  #163-0302, $27.95
- 1 ■ router collet extension
  #415-0660, $29.99

Prices correct at time of publication.

the outer 2" of the moulding profile, I used a bit extender designed for router tables to reach across the width of the blank. Because the collet nut of the extension protruded above the table, however, I had to rabbet the inside edge of each moulding blank so it did not interfere with the routing operation.

I left a column of material for support above the collet and below the cutter. Featherboards helped to hold the blank tight to the fence and table while routing the large profile.

Once the outer profile was complete, I ripped off the support column and cleaned up the saw marks with a smoothing plane and card scraper. I then routed the small bead and fillet, followed by a 3/8" cove on the inside edge of each piece of moulding. A 1/16" fillet separates the bead and cove.

Miter Saw Instead of Miter Box

The miters of the original frame were likely cut in a miter box. All of the miters for my frame, however, were cut using a 12" sliding compound miter saw with a fine-toothed finish blade that's calibrated 90° to the table. Although the cuts were fairly clean, the reduced vibration

Sweating the details. *The inside bead and cove are cut using a similar router table setup. The fascia of the moulding contacts a short fence while a featherboard supplies pressure over and slightly above the cutter. The bead is cut first followed by the cove.*

Taking sides. *To index the moulding and hold it tight to the layout lines during glue-up, scraps are clamped at the layout lines.*

Sample layout for cuts. *Before making any cuts, do a sample layout in order to economize on material.*

Lend me your ear. *After all four sides of the frame have been glued to the face frame, each ear is treated as an individual frame.*

Mass miterer? *A stop-block clamped to the fence allows identical parts to be cut with precision.*

of a smaller-diameter blade would have been even better.

The four major lengths of moulding were cut first and glued to the subframe. To avoid wasting material, resist the temptation to cut an entire inside miter across the moulding blank. A few inches of moulding can be spared by carefully laying out the sequence of cuts in advance. Thin scraps of wood clamped to the subframe along the outside miter lines help to index the moulding to the subframe during glue-up.

After all four pieces of the moulding were glued to the subframe, I proceeded with the corner details. Each of the four crossetted corners consists of four pieces: a left-hand and right-hand return and two outside corners. A stop-block clamped to the fence of my miter saw ensured that each mitered return is the same width. To eliminate the propensity of the blade to grab the returns at the end of the cut, I stopped the blade while the teeth were still safely below the table of the miter saw. For efficiency, I cut all of the returns for the frame (and a spare or two) while I had the setup in place. Using the layout lines drawn on the subframe as a guide, I laid out and made the square cuts on the return pieces.

The pieces of each crossette may require some fine-tuning to get the miters to close tightly. Plane a slight back-cut on the miters to ensure that the faces are as tight as possible.The small bevel also avoids squeeze-out at the miter during glue-up.

To trim the miters of very small pieces, I sometimes clamp my plane inverted in the shoulder vise of my bench and treat it as a jointer. For obvious reasons, precautions such as heavy leather or Kevlar gloves should be worn if you decide to use this method. A mitered shooting board is a safer alternative and, with the bed shimmed slightly for the back-cut, yields easily reproducible results.

> "Frame thy mind to mirth and merriment, which bars a thousand harms, and lengthens life."
>
> *— William Shakespeare (1564-1616) English dramatist, playwright and poet*

Balancing act. *A very slight back bevel is planed on the mitered edges. This can be done quickly with a bench plane or block plane, with the workpiece securely clamped in a vise.*

Temporary fix. *A scrap clamped at the miter line provides a secure fence to align small pieces to while they are being clamped. After glue-up, pop the scrap loose.*

Making the Crossettes

The four pieces of each crossette were then glued in place – one return and one outside corner at a time. As when gluing the longer pieces of moulding to the subframe, a scrap clamped along the miter layout line helps to index the first two pieces of each corner during assembly. No adhesive is applied directly to the mitered edges, although some may creep up into the joint.

When clamping these pieces, apply pressure with a caul angled slightly toward the frame interior so they cannot slip. Then apply pressure across the miter and finally, straight down at the outside edges. After the glue has cured, the remaining two pieces of each corner

Crossette icing. *Only the face of the moulding is glued. No adhesive is applied directly to the mitered edges – although some may creep up into the joint.*

are glued in place in a similar manner, although an additional clamp can now span the crossette miter. Clean up any glue squeeze-out at each step and blend uneven miters, if necessary, with scrapers or fine sandpaper.

The 1/8"-thick mirror is held in place with a slightly larger piece of 1/4"-thick stock or sheet goods inserted into a rabbet. A sheet of Kraft paper or posterboard inserted between the mirror and backer protects the back of the mirror from scratches.

An 11/16"-wide rabbet for the backer is created with a 3/4" mortising bit at the router table. The width of the cut is determined by affixing a square scrap that's the width of the rabbet from the arc of the cutter. Several passes may be required to achieve the proper depth for the rabbet. The thickness of the scrap should be just thin enough to allow the moulding to overlap it during the cut, but not so thin that the router bit extends above the top face of the scrap as you reach the final depth of cut. The upper corner of the scrap should ride in the mirror rabbet. After the four inside corners of the rabbet were squared with a chisel, I measured and cut an appropriate backer.

I used a large 45° chamfering bit to relieve the outside back edge of the frame. The 3/4" x 3/4" chamfer was cut in multiple passes. To complete the inside corners, I used mason's miters. To shape these, I put the frame face down on a soft surface and marked the miter lines. I used a dovetail saw to establish the inside mitered corner then a bench chisel to continue the chamfer into the corner. The surfaces were blended with a scraper and fine sandpaper.

The Big Finish

With the frame ready for finish, I applied two coats of Waterlox wiping varnish to achieve a "dry" appearance that closely resembled the slightly dessicated finish of the original frame. With the finish cured, mount your hanger hardware and insert the mirror, Kraft paper and, finally, the backer that is secured with 1/2" screws. The classical lines and subtle details of the finished frame are an attractive addition to any room. PWM

Mark is a graduate of the North Bennet Street School. He works and lives in Sunbury, Ohio.

A nest of clamps. *Clamps are added in a specific sequence to pull the pieces tight to one another.*

Short fence. *A thin scrap is screwed to the router table and acts as a guide for cutting the rabbet for the backer material.*

Rabbets. *The view of the backside of the frame shows the shallow rabbet created during the first pass. The bit will be raised and the frame sent around again, until the final depth is achieved.*

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Just Plane Round

BY CHARLES BENDER

An exercise in dowel-making without a lathe.

During my formative years as a woodworker my instructor, Werner Duerr, taught many lessons both subtle and gross. Sometimes it wasn't until years later that I learned the benefit. Toward the end of the first year, students were required to make a box with different compartments to hold nails. The project was timed and had to be completed using both hand and power tools but the bulk of the work had to be done by hand. The handle, in particular, was allowed to be made only by hand. To make a wooden cylinder without the aid of a lathe was one of the subtler lessons in planecraft Werner taught me.

In my classes, I impart many of the same techniques. One of them, make a dowel at the bench, teaches how to work to close tolerances with a handplane – no lathes allowed.

Getting Started

The first step in making a dowel at the bench is to determine the size of the dowel you'll make. I always begin the exercise with rough-cut blanks that will yield a 1" diameter dowel that is 10" in length – but you can make your dowel any size you desire. With that in mind, my blanks begin as a block that is somewhere around $1\frac{1}{16}$" to $1\frac{1}{8}$" thick and wide, by approximately 10" long.

> "Everything is practice."
>
> — *Pele (1940-)*
> *Brazilian soccer player*

As with any dimensioning exercise, you need to plane a single flat surface to use as a reference for all the other surfaces. So, take out your sharpened, tuned smoothing plane and head to the bench with your blank.

All the planing techniques I teach in my fundamentals classes are freehand planing. In other words, we don't use

PHOTOS BY THE AUTHOR

16 sides. *This dowel blank started as a 1" square. With 16 sides planed, it's almost halfway to round.*

No lathe required. *Here's everything a woodworker needs to make a dowel.*

Reference surface. *Handplane one side of the rough blank perfectly straight and flat. Use a straightedge to check it from side to side, over the length and from corner to corner to ensure your surface is perfectly flat.*

Adjacent flat. *Handplane an adjacent surface flat, straight and square to the first. These two surfaces become your index surfaces from which the other two sides are squared and made parallel.*

shooting boards. In order to learn how to make a plane do what you want, you need to remain jig-and-fixture free as long as possible. This teaches muscle memory and how to apply gentle pressure to different parts of the plane in order to make the plane cut only in certain areas on the board. Planing surfaces flat and square to one another is the perfect exercise for this training.

Once you have your reference surface true, it's time to start truing and squaring the second side of your dowel blank to the first, then move on to the third

An inch square. *To end up with a 1" dowel, you need a 1"-square blank. Set your marking gauge to 1" and, referencing off the two index surfaces, scribe that measurement on the other two faces of the blank. Plane down to those scribe lines. (If you have a great deal of waste to remove, saw the bulk of it off first.)*

Get centered. *Mark the ends of the blank from corner to corner to find the center. Once you have the centers marked, measure out 1/2" in each direction from the centerpoint and place a mark on the blank.*

Bevels. *Use a combination square to mark the 45° bevels that will form a perfect octagon on both ends of the blank.*

and eventually the fourth side of the blank. For this exercise we need to end up with a perfectly square blank that is 1" in width and thickness over its entire length – otherwise you won't end up with a perfect cylinder.

If you've never planed a surface flat, the easiest way to check it for perfection is to use a good straightedge. You'll use that to check from corner to corner in both directions and across the width, and to check the length over the entire surface. If you hold the blank horizontally with a light source behind, you'll be able to see even the slightest variation in the surface.

Every Circle Begins with a Bevel

Once the blank is squared and ready to go, the first thing you need to do to get started making it into a perfect cylinder is to mark the centers on both ends of the blank. This is easily done with a combination square and a pencil or marking knife. Connect the opposing corners on each end to find the center.

Once you've got your center marked divide the thickness of your blank in half; in our case that would be 1/2". Measure along the diagonal lines you used to find the center and mark off this measurement. This will give you four marks along the two diagonal lines that are equidistant from the center. They should also be exactly the same dimension as it is from the center to any of the four faces of your block. In other words, we've laid out radius marks for our dowel. Use a combination square and draw a line at a 45° angle through the radius marks perpendicular to the diagonal centerlines. This will give you a perfect octagon laid out on the end of your blank. Now repeat these layout steps on the other end of your dowel blank.

Set a combination square or marking gauge to where your 45° angle marks meet the faces of your blank. The purpose of this is to extend the lines from end to end on the blank. These will be your guidelines to which you will plane your dowel blank into an octagon. Clamp the block in a vise and begin planing. Each new surface must be flat and square to every other new surface. They must also be exactly 45° degrees to the original flat surfaces of your blank.

The fastest way to reach this is by using a light setting on your handplane. There's a real tendency to set your plane deep and open the throat so you can hog off the waste. Throughout this entire exercise, the best advice I can offer is to keep your plane settings small. It gives you much more control over the tool.

More Angles Means a Better Circle

Once you have a perfect octagon it's time to start getting really small. I don't mean adjust your plane; I mean we need to lay out a hexadecagon. In other words, we need to turn our eight-sided block into a 16-sided block. At this point I don't bother to try to lay out the polygon mathematically. There comes a point there it just isn't practical. If the dowel were 3" in diameter, I'd give it a try – but with my big hands, it simply isn't possible on a 1" piece.

Working on the ends of the dowel blank, I mark off the width of each of the 16 sides. Using my finger as a guide, I connect the marks from end to end of the blank. Time to head back to the vise with the blank.

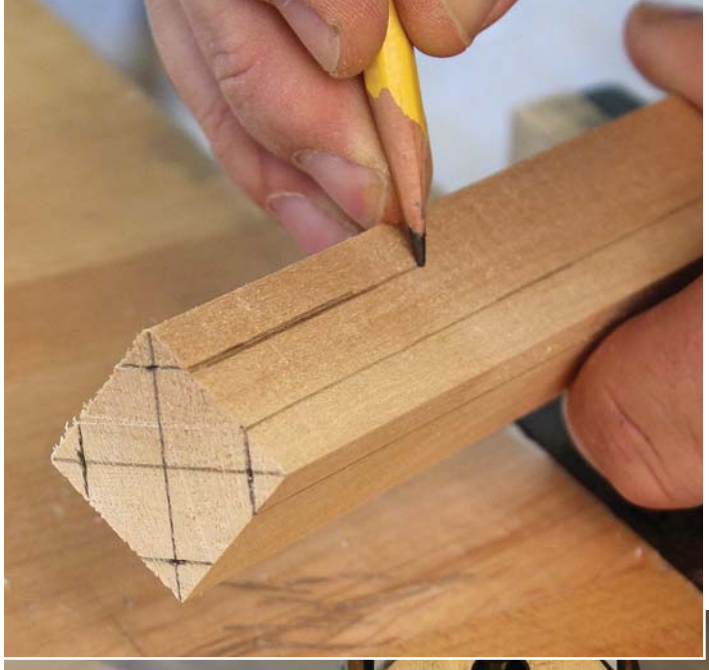
Even though I have guidelines drawn, I take a few strokes with the handplane on each of the eight corners; then I measure each flat surface to make sure they are all equal. If I get a few that are small, I hit them with the plane until I get 16 equal sides. Make sure you adjust the flats by planing only the areas where the eight points of the octagon were. Do not plane the flats of the original square or the flats of the octagon. These surfaces are already at their final dimension.

Now that you are at 16 sides I'll bet you can guess what's next: 32 sides. This step becomes both visually and mentally confusing to lay out so I just take one or two passes on each corner with my plane. If any of the flat surfaces seems way out of whack, adjust it with an extra stroke of your plane.

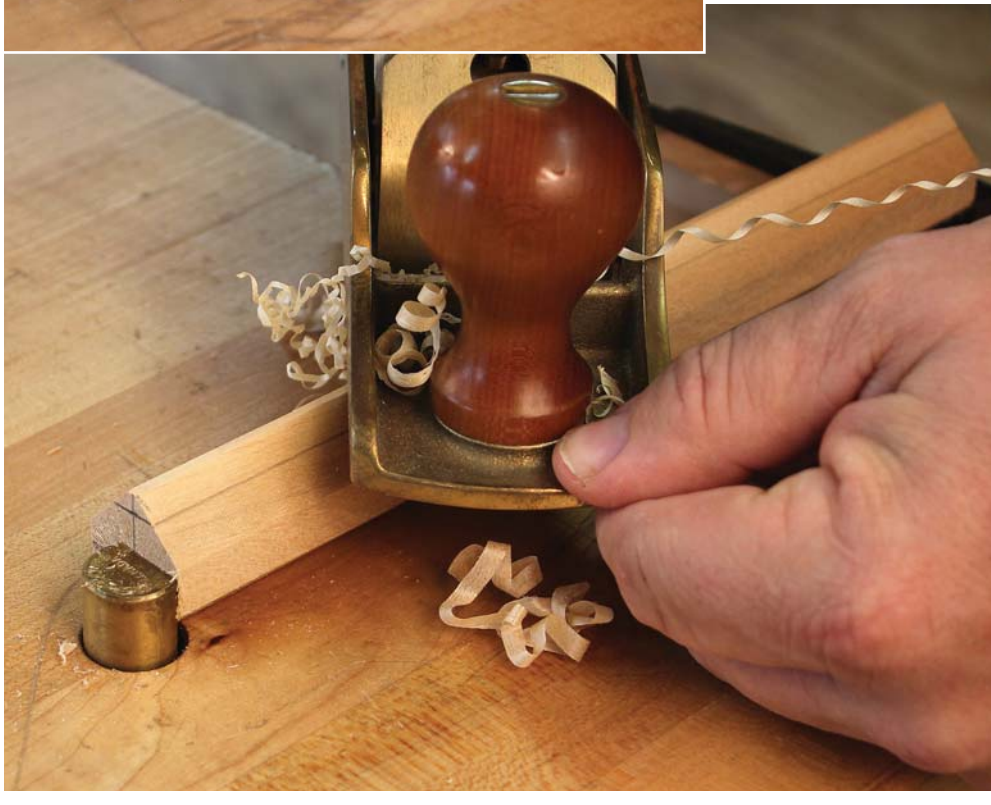
Time to go Round

You can keep going, if you like, continually doubling the number of flats on the blank – but I usually just head to round at this point. One or two strokes with the plane on each corner gets you pretty close. Reset the plane to an even lighter shaving and round off the rest of the cylinder.

From the description I've just given, this exercise might seem easy. And once you've tried it a few times, it is. Your first few dowels may look perfectly round but the real test comes when you try to roll them across your bench. If they hop and wobble all over the place, you need more practice. PWM



Down the faces. *Use your finger and a pencil (or guide the pencil with a combination square) to extend the lines marked on the ends of the blank the full length of the blank. These will be your guidelines for planing an octagon.*



Chamfers. *Clamp the blank back into your tail vise and plane the chamfers. You can confirm that they are perfectly square to one another with a combination square. I usually measure the blank in all directions to make sure it is 1" across all the faces.*

Charles is a renowned period furniture maker and the lead instructor at Acanthus Workshop in Pottstown, Penn. (acanthus.com). He's also recently started an online subscription series of weekly woodworking videos, "No B.S. Woodworking" (nobsww.com).

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Designing the process can be as challenging as designing the object.

Mirrors

The way something looks is only the first half of a design problem. How to make it and how to make it efficiently are often greater challenges. If you want to make more than one of something, the problem grows exponentially. I designed these hand mirrors as a production item about 30 years ago. They are an example of making good choices from available options for quality and efficiency.

My goal was to appeal to the senses, both visual and tactile. Starting with nice wood helps on both counts. To get the handle right I made a few prototypes. I had to remember that not everybody has hands as big as mine. With the form established, I needed to duplicate the overall shape, with room to adapt each piece to the board it was cut from.

Most of the mirror is shaped by machine, but the handles are carved by hand. After a few runs of making these from a plywood pattern, I began to wish I could see through the pattern to better match the grain to the shape, and to more efficiently nest a batch of mirrors on a single board.

A trip to the local plastic fabricator's shop netted some 3/8"-thick Lexan. I traced the pattern on the sticky paper that covers the plastic, then cut the shape on the band saw. I smoothed out the saw marks on my disc and drum sanders, drilled a 3/16"-diameter hole in the center, then removed the protective paper.

Crystal clear. *A transparent pattern, made from 3/8"-thick Lexan, makes it easy to adjust the position of the wood grain to the shape of the mirror.*

Feathering the Nest

It takes a piece of nice hardwood at least 6 1/2" wide and 13 1/4" long to make one mirror. By reversing the pattern and arranging it handle to head, I can come close to doubling the yield when making several at a time. I put the pointy end of an awl in the hole in the pattern and tap the other end with a hammer.

That holds the pattern in place as I trace around it with a felt-tip marker. I can also rotate the pattern around the awl to adjust the way the grain of the wood follows the shape of the handle. At this point, it's tempting to head to the band saw to cut the blanks to shape, but it's better to put that off.

The mark left by the awl is the center-point of the circular cut out. I intended to make a router jig for the 5"-diameter holes, but that was too small to use a trammel on the router base to make the hole. I bought a fly cutter to make the pattern and a light came on while I was making the cut to make the pattern.

The fly cutter in the drill press is quicker and quieter than the router,

LEAD PHOTO BY AL PARRISH; STEP PHOTOS & ILLUSTRATION BY THE AUTHOR

Fly safely. *A fly cutter works well for making large holes, but watch your hands. Clamp the work to the table securely and use the slowest possible speed.*

Orderly steps. *Mill the rabbets before cutting the blanks to shape. That leaves material to support the router, and to clamp the work to the bench.*

even though it is a little on the scary side. I decided to use it to cut the holes, and here are a few tips to make it work well and safely. First and foremost is to clamp the work down to the drill press table. Second is to use the slowest possible speed on the drill press.

Inattention to either of these details can cause the drill press to perform an imitation of a crashing helicopter. It also helps to touch up the tip of the cutter with a file and sharpening stones. Repeat the sharpening if the cutter begins to burn or stall.

Stepped Rabbets

At this point, the front and back of the mirrors are the same. The difference in the finished product is that the back has a pair of offset rabbets. The first is 3/8" wide by the thickness of the back insert. The second one is 1/4" wide and 1/8" deeper. The mirror fits in the deeper rabbet and is held in place by the insert.

Right-handed people generally prefer to hold a hand mirror in their left hand; so that from the front, the curve of the handle points to the right. I mark which side will be the back, then cut the rabbets with a bearing-guided bit in a router. I set the depth to the material that will become the backs, nominally 5/16". Milling the rabbets before cutting the outside shapes gives the router a solid base to sit on, and plenty of room to clamp the work down.

I make a test cut on the edge of the board, then place a piece of the back material in the rabbet to make sure that the top surfaces are flush. When the first rabbets are done, change the setup to cut the second ones. Most rabbet bits can take different size bearings to cut different widths. Make sure that the second rabbet is deep enough to hold the mirror.

At some point after the rabbets are cut, schedule a break and head to your local glass shop. Take one of the blanks with you to be sure that the mirrors will fit. Glass people have trouble sometimes with esoteric technical terms like "perfect circle" and "5½" diameter."

in Multiples

BY ROBERT W. LANG

Swing it. *The base of this jig pivots, allowing for adjustments to the diameter while in use. The short dowel registers in the hole centered in the back piece.*

Stop on a dime. *A block of wood clamped to the table limits the size of the disc. Slide the jig away from the stop to take a deeper cut.*

Round & Round

The puzzle of how best to make the inserts perfectly round and exactly the right size took a while to solve. Woodworking books and magazines are full of nifty ways to make circles, but most of them didn't work well enough for me. Here are a few of the methods I tried, and the reasons I didn't like them.

A jig for the band saw is hard to get started, leaves a rough edge and takes too long to dial in to the right size. A jig on the router table can leave a clean edge, but the small size puts hands too close to cutters, and there is a danger of tearing out a chunk of wood at some point on the curve. Turning the discs on the lathe makes for a smooth edge and you can sneak up on the exact size, but it takes too long in a production run to take the discs off and on the lathe to check the fit.

One of the surprises to me in making these mirrors was that there would always be some variation in the size and/or the shape of the holes. I wanted the thin discs to pop into the back without showing a gap, but they can't be too big and forced in without the risk of breaking the surrounding wood. I needed a magic device that would give me a perfect circle, and do it quickly. And I needed to get the wood on and off so that I could fit individual discs to individual holes, altering the shape slightly if I needed to.

I came up with a gizmo that works with a 12" disc sander. It's a piece of $\frac{1}{2}$"-thick plywood with a $\frac{1}{2}$"-diameter dowel that sticks up $\frac{1}{8}$" inch. A shallow hole is drilled with a Forstner bit in the back of each disc-to-be, so it can spin on the dowel. My moment of good thinking in this was to make the plywood plate pivot on a screw that connects the plate to a piece of wood that fits snugly in the miter gauge slot of the sander's table.

That allows the jig to pivot toward the disc, letting me reduce the diameter in controlled steps. It also allows me to clamp a stop on the table to limit the travel of the plate. I mark the discs with a compass on both faces of the material, taking care to align the centerpoints.

The compass point on the back side becomes the center for drilling the shallow hole, and the outline on the other side lets me know how close I am as I sand. I rough cut the discs on the band saw, staying as close as I can to the lines while moving at a productive pace. Then it's a stop at the drill press to make the holes before taking the stack to the sander.

At the sander, the early going can be aggressive, but I lighten up as the disc nears the pencil line. I make a test fit to see how much more material needs to be removed. I check the fit all the way around, because the shape of the hole may not be perfectly round due to some movement in the wood.

This happens across the grain, so wood has to be sanded from either both sides, or the top and bottom. As long as there is no obvious gap, no one will know it isn't a perfect circle. When I have a back fit to a blank, I leave it in place as much as possible during the remaining steps. This makes it easy to keep track of what goes where, and it keeps the holes from distorting if the wood decides to move.

SHAPING BY HAND

Rough shave. *Hand work changes the curves from dull to varied, to improve the looks and the fit in the hand.*

Rough to ready. *A series of rasps removes the facets left by the spokeshave, eases the transitions between the curves and refines the shape.*

Get a Handle on it

The overall length of the mirror leaves just enough room to cut all the way around on a 14" band saw. I make an initial rough cut to separate the blanks, then cut to the line. Then saw marks are removed with the disc and spindle sanders. It's important to make a smooth transition where the curve changes direction at the bottom of the radius.

After sanding, I go around the outer edge on both sides with a 3/8"-radius roundover bit at the router table. I mill the blanks as thick as possible from 4/4 stock, and make sure it is at least 13/16" thick. That leaves a flat area for the bearing of the router bit to ride against when routing the second side. I switch to a 1/4"-radius bit to round over the inner circle on the face side.

Shaping the handles by hand is the step that makes these mirrors special, and for me it's the most enjoyable part of the process. The router removes much of the waste, and I use a spokeshave to increase the radius of the curves at the end of the handle, reduce the thickness directly below the mirror and blend the transitions between the machine-shaped and hand-shaped surfaces.

> "It is not enough to do your best; you must know what to do, and then do your best."
>
> *— W. Edwards Deming (1900-1993) statistician and business consultant*

Like magic. *A card scraper is ideal for following the rasp. It slices off the ridges left by the teeth of the rasp, leaving a smooth surface.*

I use the spokeshave as a roughing tool, and skew the blade so that it takes a deep cut on one side and a more refined cut on the other. By shifting the tool laterally I control how much material is removed without changing tools or adjusting the tool. I work with the grain of the wood as I shape the handle. When it feels good and looks good, it's time to move on.

Avoiding the Fuss

There are many options to take a piece of wood from shaped-but-rough to ready-to-finish. This is a simple project, but some surfaces are flat, some have been rounded with a router, and some have been cut with a spokeshave. When the finish goes on, all of these surfaces need to be consistently smooth, and without a discernible transition from one shaping method to another.

My next move is to work on the transitions, and remove the facets left by the spokeshave. A rasp is ideal for this, even though the overall surface quality may look worse for a while. A coarse rasp with a round profile on one side will easily follow the curves, knocking off the high points. A finer rasp comes next, and its job is to remove the marks left in the wake of the coarse rasp.

A third rasp, with an even finer grain follows, to take out the marks left by its predecessor. The key to efficiency is knowing when to stop, when one tool has refined a surface as well as it can. If you start with too fine a tool (or too-fine sandpaper), you spend more time than you need to. The same thing happens if you keep going with a coarse tool, expecting it to leave a nicer surface than it can.

I follow the last rasp with a card scraper. Even the best rasp leaves behind a scratchy surface. The beauty of the scraper is that it only needs to knock off the high points the rasp left behind. It may seem like an unneeded complication to use these different tools, but each step is efficient and doesn't take long.

Some sanding is inevitable, but my goal is to make it as painless as possible. Refining the surfaces beforehand allows me to start with a relatively fine grit. For these mirrors, I start with a #120-grit piece of Abranet, backed up with a flexible pad. The pad makes it easy for the sandpaper to conform to the curves.

Stick with it. *A thin bead of silicone adhesive holds both the mirror and the back in place. Keep the bead small to avoid squeeze-out.*

The first round of sanding is always the slowest, and if I come across an area that won't smooth quickly, I back up a step – to the scraper, a coarser grit of sandpaper or to the finest rasp. I repeat the sanding with a series of finer grits, working up to #240 or #280. As with the rasps, each step takes less time than the one before it.

I like the look and feel of an oil finish on small projects such as this, but oil can take weeks to achieve a decent build. I shortcut the process by applying one coat of Danish oil, rubbed in with a non-woven abrasive pad and then wiped dry. I let that sit overnight, then spray three or four coats of satin lacquer.

I allow the lacquer to dry thoroughly, then assemble the mirrors. I put the wood face down, then drop the round mirror into the recess. A narrow bead of silicone adhesive is applied to the outer edge of the mirror, then the back is put in position. Use a couple spring clamps to hold the back in place until the adhesive dries. PWM

Bob is executive editor of Popular Woodworking Magazine. *He can be reached at robert.lang@fwmedia.com.*

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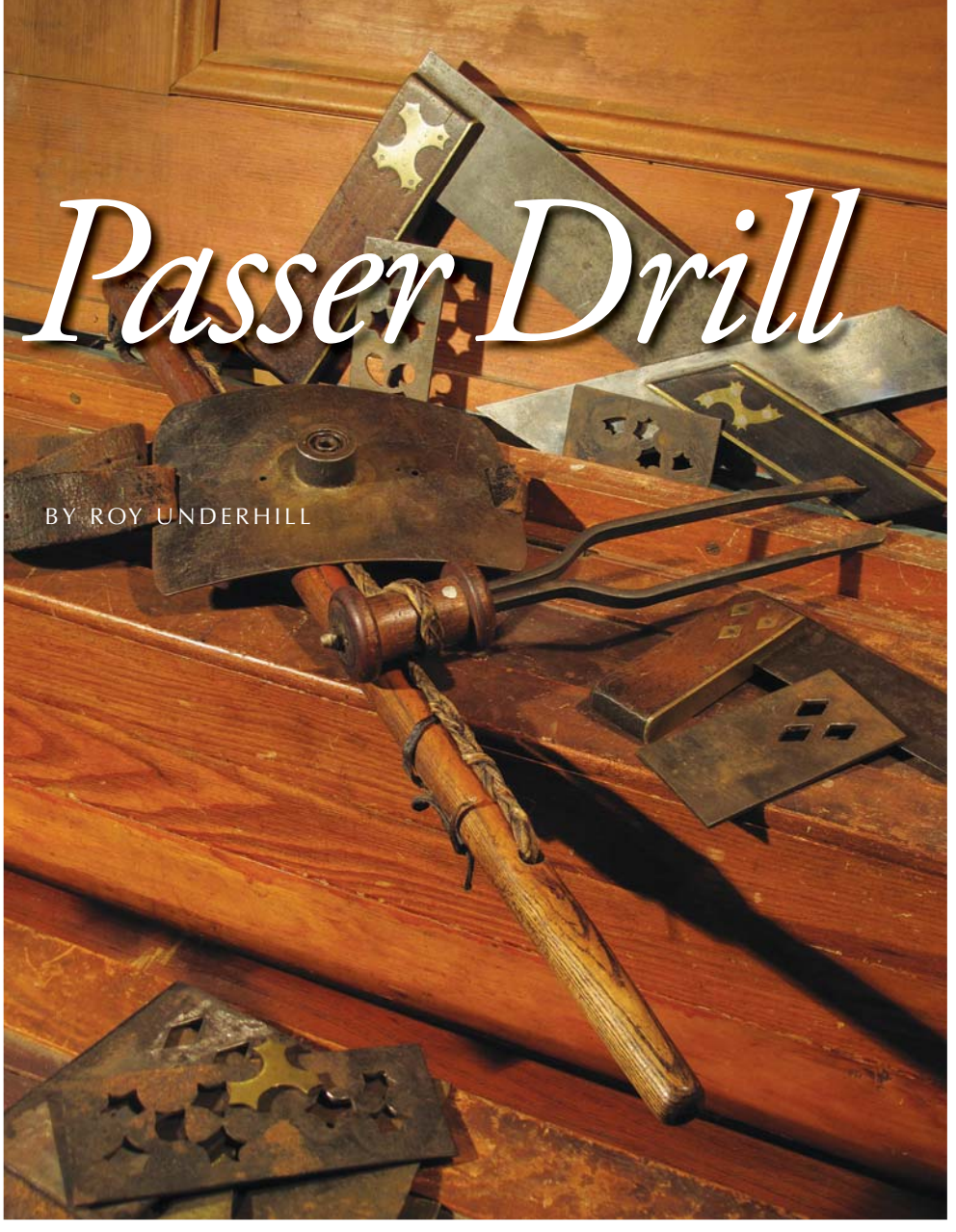
Return of the Passer Drill

A welcome 'voice' from the past.

BY ROY UNDERHILL



Period pattern making. *This passer drill and templates from the Marples workshops (collection of Anne and Don Wing) was used to cut insets in perfect, repeatable patterns. The user first clamps a template to the try-square stock and buckles on the stomach plate. After wrapping the rawhide drive cord around the wooden spool, the user springs the forked end of the drill into the template and the other end into the stomach plate bearing. Pulling the stick back and forth sends the cutters flying about within the confines of the template and routs out the pattern in the wood. The three diamond escutcheons in the square at the right evolved into the unified patterns on the squares at the rear.*

Satellites beep around the globe, kids scream about the band from Liverpool, and after 41 years you're about to hang it up. Before you do, there's one more length of rosewood on your bench, one more steel blade – one more try square to complete.

It's your last day at your bench by the window, and this last try square will use up the last of the old rosewood stock that won't fit the new automated router. William Marples & Sons of Sheffield, England, will continue making try squares for the woodworkers of the world, but your part in it will soon be done.

Still, no reason to make this last one special – were the thousands you fitted up before less than the best? So, it's the classic trifoliate escutcheon you choose. You position the steel template on the rosewood and clamp them together in the waist-high vise. Your gut tightens as you strap the curved brass plate across your belly. Years ago, you could recognize an experienced escutcheon fitter in Sheffield by the hems of his waistcoat, stained a bright green by the brass of the old artillery shell casings used to make these stomach plates. The old ones just had a greased socket for the drill, but back in 1921, it caused a huge fuss in the shop when you brazed a ball bearing race to the center of your stomach plate. "Aye! Roller skater!" the old men taunted you. "Will ye be ridin' that home?" Soon they all copied yours.

Now, you're the last one, and as one of the king's archers might nock an arrow, you swing the bowstick to wrap the braided rawhide cord around the spindle of the drill. Into the first opening of the template you spring the two cutters of the business end and fit the spindle end into the bearing strapped to your stomach.

A deep breath and you're at it, pulling the bowstick back and forth, sending the cutters jittering around inside the template. The rosewood cuttings spray out and shower down on top of the vise. One done, now two more cuts on this face then a quick reset to rout the pattern on the reverse. Swift work with a gouge and chisel finishes the sockets. You press the last of the punched-out brass escutcheons into place with your thumbs, examine the fit and it's over.

The drill and the riveting hammer still need to set the pins through the sandwich of brass, rosewood and steel. The filer and buffer still have work to do, but you and your passer drill are done. You hang the bow on its nail over the window. The drill and stomach plate go on the benchtop beside the box of templates. You sweep the rosewood dust off the vise and benchtop. You're done, and soon to be forgotten.

PHOTOS BY THE AUTHOR

A Forgotten Tool?

But not quite. When the Marples workshops became part of Record Ridgeway Tools, their chief historian, John Sainsbury, thought enough of the old passer drill that he saved one along with a full set of templates. Through a series of lucky breaks, I managed to borrow this last passer drill, make a replica and put it to work.

First though, what about that strange name? A passer drill? The name of this tool is as odd as the way it works. Most scholars consider the name a variant on "piercer." The tool, however, came to woodworking through the cutlery trade. (Think of the shield inset into the side of your jacknife.)

The cutlery trade came to England from the Continent, and that is where we find a likely source for the name. The French for the cutout matte within a picture frame is a *passe-partout*. The passer drill works within such a template or frame, and I suspect that the French *passe-partout* became "passer" in England just as *ciseau fermoir* became a "firmer chisel.'

The tool may have begun in cutlery, but the British tool-making trade took it a step further. The two spring steel cutters can only rout out a space no wider than a dime. This is fine for the cutler setting a silver shield into the side of an ivory knife handle, but how do you cut the sockets for the large brass escutcheons in a sizeable try square? This is the square-maker's innovation. The earliest escutcheons were just three separate diamond shapes, but somewhere along the line someone realized that they could make a larger pattern by breaking it up into components, routing them out individually, then quickly connecting the sections with a gouge and chisel.

Blacksmith to the Rescue

You may not be in the habit of making your own try squares, but the passer drill is a demon any time you need to inset multiple and perfectly consistent shapes into hard wood. You need good spring steel for this tool (a "spring passer" is its alternate name), so that's how blacksmith Peter Ross began our replica. He heated a coil spring until he could unroll a 2' length to make the doubled over, 1'-long, tuning-fork-shaped drill. He then squared the stock to $^{3}/_{16}$" x $^{7}/_{16}$" and drew out the cutting ends until they were $^{1}/_{8}$" thick and splayed out to make the shoulders that stop the cutting at the desired depth. While I turned the bobbin from persimmon, Peter filed the cutters to shape and re-hardened the steel to a springy bronze temper.

The original stomach plate was brass, but lacking an old artillery shell, we used $^{1}/_{16}$" steel. Peter brazed a short section of pipe to the face, within which the ball bearing race would just fit. Long strips of rawhide in a flat braid and a broomstick-sized pole made the bow. We first tried it on a diamond-pattern template of mild steel and were delighted to see it rout a perfect, sharp-cornered hollow in seconds. The wear within the template is considerable, so the subsequent templates underwent treatment with a casehardening compound in the forge. A bit of grease on the walls of the template also helps to reduce wear. Still, nothing can diminish the noise of the passer drill at work. As it flounders about within the template it rattles like a medieval fire alarm. Welcome back passer drill – good to hear your voice again! PWM

Roy is the host of the PBS show "The Woodwright's Shop," and the founder of The Woodwright's School, in Pittsboro, N.C.

A rattling blur! *The two prongs of the passer drill ride tightly within the walls of the template, routing out the pattern in seconds. To cut with square walls all around, the user keeps tilting the drill by shifting about in a circular manner – a process that looks as strange as it sounds!*

Connect the dots. *Quick work with a gouge and you're ready to pop out the core between the foliated elements of the pattern. The shoulders on the business end of the passer drill stop the routing at the precise depth for the brass escutcheon.*

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Advertiser's Index

Designs of Note

A former musician brings an improvisational skill to the craft.

All kinds of music. *Jeff Miller embraces street music and chamber music. Traditional design and modern curves. Hand tools and modern machinery. The results speak for themselves, as shown here in this walnut rocker he recently designed and built.*

Somewhere between street musician and the symphony orchestra, between an 18th-century hand woodworker and a contemporary designer, is Jeff Miller, a Chicago furniture maker, teacher and author who defies every pigeonhole. In fact, if given the chance, he might just redesign that hole to better fit the pigeon.

Miller's shop and showroom on West Lunt Avenue says a lot about the craftsman that's difficult to define. The space is a former post office in a neighborhood with deep roots in the migratory history of the city. After fulfilling its traditional federal role, the post office became a bowling alley, and now Miller glues up his chairs, tables and casework while always being conscious as to whether he is working in the lane or in the gutter.

"You see that red line?" he asks, peering through the countless glue drips on the floor. "That's a gutter. I'm not so sure about the floor there. The lanes, however, are solid."

This balancing act – between solid and ephemeral, old and new, traditional and funky – is the best way to describe Miller's work.

In fact, it's something that strikes you as you walk into his showroom. Right beyond the front door is what looks like a drop-leaf handkerchief table – a traditional 18th-century form. Yet Miller has tweaked its cabriole legs by adding some hard angles so the table looks like it might leap up and devour you. He calls it the "Spider" table.

"There is something about the old stuff that compels me," Miller says. "There's a reason those designs endure."

Yet Miller has never been satisfied to simply copy traditional designs and call it done. Every one of his designs seems to change a bit with each iteration. Though Miller was trained first as a classical musician, his designs seem at times more like jazz, which evolves through both constant practice and performance.

New tradition. *Miller's "spider" handkerchief table has traditional lines that have been altered for modern homes. Note the cabriole legs with their hard arrises.*

Musical Roots

Miller was born in the Bronx in New York City in 1956, and his family soon moved to Westchester County, N.Y. He attended Yale University with vague ideas of studying biology, but he soon became immersed in studying music.

He got his master's degree at the Eastman School of Music in Rochester, N.Y., then immediately took a one-year job as a trumpet player with Singapore's newly founded symphony orchestra.

When he returned to New York, Miller started life as a freelance musician, which could mean anything from filling in with a chamber group to playing as a street musician in front of the Metropolitan Museum of Art.

All the while he was working as a musician, however, Miller was also building furniture. During a semester off from college he had gotten a taste of woodworking while working in the shop of a luthier.

Then Miller landed a chamber orchestra job in Chicago. The job didn't work

"SPIDER TABLE" PHOTO BY STUART BLOCK; REMAINDER OF PHOTOS BY THE AUTHOR

Tweaked machinery. *An SCMI table saw is at the heart of Miller's shop. Note the shop-made blade guard (which he never removes) and the sliding fence, which Miller modified to satisfy himself.*

Massive iron. *Tipping the scales at 1,275 pounds, this Jones Superior band saw has wooden wheels that Miller trued up using a router jig.*

out, and so Miller hung out his shingle as a furniture maker.

"For no sensible reason I started a furniture business," Miller says. "There was very little skill but a whole lot of gall."

Miller was about 26 years old at the time and was firmly grounded in both Mission and Shaker styles. Yet he always tried to make each piece his own. He's continued that for more than 20 years.

"I've always tried to keep growing, to keep pushing and refining ideas," he says. "Some of the stuff I am working at now I was just beginning to work with years ago."

In fact, though Miller calls upon traditional forms, they are sometimes tricky to see under the layers of changes he has made year after year.

His refinements come from observing the human form and from watching how people sit in his chairs – a point that he emphasizes several times in one conversation. In fact, as he mocked up his latest rocking chair he assaulted anyone who came into his shop to sit in his prototype and tell him how it felt.

And even after he finished that chair (which was comfortable and gorgeous), he lived with it for a while then had it apart on the day I visited his shop. He wanted to change the slope of the seat.

Teacher & Writer, Too

In addition to constantly growing his design skills, Miller decided to take on writing and teaching, too. He's written some wildly successful books, including "Beds" (Taunton Press). And he's written the book that is considered the standard when it comes to contemporary chair design: "Chairmaking & Design" (Linden). And he's been teaching classes in his shop since 1996. Now, he's also now embarking on his most ambitious book ever.

The book, which doesn't yet have a title, takes a musician's approach to learning woodworking. It will focus on teaching the basic body motions that are then assembled into skills that lead to good craftsmanship.

"The crucial thing is you need to understand about how to use your body," he says. "You need to understand how the tools work, plus how the wood works and behaves to make a mental model. You work your way from the ground up. That's the way it is done in music. In woodworking, nobody wants to do that."

Hand Plus Power

When it comes to tools, Miller embraces all the options, from vintage to new and from electric to hand-powered. In his shop he has some fancy Incra jointer/planers next to an early 20th-century Jones Superior Machinery 36" band saw with wooden wheels that he restored.

He is a devotee of bent laminations, yet he prefers planing to sanding. He usually chooses spokeshaves over belt sanders.

"So there has always been a mix of tools," he says. "What I find more and more is that some of these designs are not possible without hand tools. There are little things that you cannot do by machine."

And that's what makes Miller's work special and enduring. It's contemporary, but it has roots in tradition. It is guided by Miller's hand, yet he developed the designs after observing how others used his furniture over the years. And it is built using power tools to save time and hand tools to make it perfect and unique. He's a full-time furniture maker who also insists on writing and teaching, which then influences his work in the shop.

Like everything that happens in Miller's shop, every action helps him tweak or improve everything else, from his designs to his teaching style.

"You have to be able to make the stuff," he says. "When you have students, you understand what needs to be said and what people need to hear. That enables the writing – you have to be clear and to know some things in immense depth. And all these things feed back into the work.

"Everything reinforces everything else," he says. PWM

Chris is the editor of Lost Art Press and the author of "The Anarchist's Tool Chest."

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These environmentally friendly products are surprisingly effective.

The three primary solvents we use in wood finishing are paint thinner (mineral spirits), lacquer thinner and denatured alcohol. Paint thinner thins and cleans up oils, oil stains and varnishes, including oil-based polyurethane. Lacquer thinner thins and cleans up lacquers and lacquer stains. Denatured alcohol dissolves, thins and cleans up shellac.

We can’t do finishing without these solvents, but paint thinner and lacquer thinner participate in causing pollution, and are irritating and even harmful (in the case of lacquer thinner) to breathe. Methanol is poisonous; ethanol isn’t.

Partly because of environmental laws in some areas and partly because it’s just good policy, finish manufacturers are trying to reduce harmful solvents in their products. You may have noticed recently an entirely new category of solvents in home centers and paint stores, called “green.”

I have to admit that I was very skeptical when I first came across these solvents. “Green” has become too big of a marketing tool. I was fully expecting to be my usual critical self.

To my surprise, these products are not only significantly more environmentally and health friendly, but they work quite well. Let’s look at each in turn.

Paint Thinner

The green paint thinners are the most unique of the three solvents. They are emulsions, which means that the oily petroleum distillate is combined with water so that only about 30 to 40 percent of the product is actually petroleum distillate. And it is even “greener” than regular paint thinner because some of the bad stuff, such as sulfur and aromatic hydrocarbons, has been removed.

As with all emulsions (for example, milk and water-based finish), green paint thinners are white in liquid form, but the whiteness disappears from the thinner as it dries. Unlike many other emulsions, however, green paint thinners separate if left standing, so you have to shake or stir them before each use. You also have to shake or stir any varnishes or oils you may have thinned because these will also separate.

This is a critical difference from regular paint thinner, which doesn’t separate.

Another difference to be aware of is the water content. It will cause the first coat of any product you thin to raise the grain of the wood. It’s a lot like using a water-based stain or finish. You have to sand off the raised grain, and this risks sanding through to the wood and maybe removing some color if it’s been stained.

There are two ways to deal with this: The obvious one is to use regular paint thinner instead of green paint thinner to thin the first coat. You can use green paint thinner thereafter, and for cleaning.

The other is to “bury” the raised grain just as you might do with water-based products. Don’t sand the raised grain until you have applied a full coat or two of finish so you don’t sand through.

On the positive side, cleaning brushes is actually easier with green paint thinners because of the emulsion. Normally, I rinse my brushes in lacquer thinner after a couple of rinses in paint thinner to remove the oiliness of the thinner. This reduces the number of soap-and-water washings needed.

Common “green” solvents. *There are two widely distributed brands of green solvents: Klean Strip “Green” and Crown “NEXT.” Both brands work effectively, but Crown’s lacquer thinner dries more slowly than I would like.*

CONTINUED ON PAGE 62

PHOTOS BY THE AUTHOR

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CONTINUED FROM PAGE 60

But green paint thinners are not as oily so there's no need for the lacquer-thinner rinse. Moreover, the emulsion aids in removing the oiliness so only one or two soap-and-water washings are needed.

Lacquer Thinner

Regular lacquer thinner contains half-a-dozen or so solvents that evaporate at different rates so the sprayed lacquer starts drying quickly and doesn't run on vertical surfaces, but still remains liquid enough to level out. Most of the solvents used are classified as volatile organic compounds (VOCs) and hazardous air pollutants (HAPs), which means that they are bad for the environment and bad for your health if you breathe excessive amounts.

Acetone is neither a VOC nor a HAP, so manufacturers of lacquers and lacquer thinners use lots of acetone when they want to make a greener product.

The problem with acetone is that it evaporates extremely rapidly – more quickly than any other solvent we have access to. Thinning lacquer with acetone causes lacquer to dry so fast that you can't avoid dry spray at the edges of sprayed patterns and you can't avoid blushing (turning milky white) on humid days.

Green lacquer thinners contain mostly acetone and a little very slow-evaporating solvent to allow the lacquer to level and resist dry spray and blushing.

Brushing wiping varnish. *Green paint thinner works well for making your own wiping varnish. Here, I'm brushing a homemade wiping varnish (half polyurethane and half green paint thinner) onto a panel. As explained in the November 2011 issue (#193), I can leave the wiping varnish as brushed. I can wipe it off. Or I can "dry brush" it.*

Paint thinner separates. *Green paint thinners are emulsions. They are white in liquid form (but disappear upon drying). They also separate fairly quickly, as shown here, so you have to shake or stir the container before each use.*

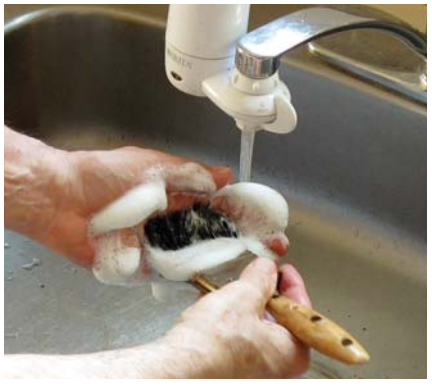
It may take a few trials to get used to the evaporation rate of a green lacquer thinner so you avoid orange peel, but this isn't different than just switching brands (all evaporate a little differently).

If I have one complaint about the green lacquer thinners, it is that the slow "tail" solvent in the Crown "NEXT" thinner is too slow. The sprayed film remains tacky and soft much longer than with regular lacquer thinner. You will have to adjust, which means waiting longer between coats if you intend to sand, and longer to attain print resistance.

Clean-up is just as effective as it is with regular lacquer thinner.

Denatured Alcohol

The two primary alcohols used to dissolve and thin shellac are methanol and ethanol. Methanol is poisonous and therefore a HAP. Ethanol is the alcohol in beer and wine; it is taxed like liquor.



Washing brushes. *Green paint thinners seem better for cleaning brushes than standard paint thinners because of reduced oiliness and the emulsification. After a rinsing or two in clean paint thinner, it's easy to achieve a good sudsing (which indicates the bristles are clean), sometimes after only one soap-and-water wash.*

Thinned varnish separates. *Oils, varnishes and oil-based polyurethanes separate when they have been thinned with green paint thinner. You have to shake or stir before using any of these finishes if you have thinned them with green paint thinner.*

Typical denatured alcohols are a mixture of the two. Methanol is more aggressive at dissolving shellac flakes, and ethanol is safer to breathe.

To make a HAPs-free, denatured alcohol, manufacturers use only ethanol with a little of something else to make the product poisonous so it isn't taxed. Therefore, green denatured alcohols vary little from regular denatured alcohols. They may take a little longer to dissolve shellac flakes, but they are no different for thinning already dissolved shellac.

You can speed the dissolving by grinding the flakes into a powder or by heating the flakes and alcohol in a double boiler.

Bottom Line

Choose a "green" solvent whenever you want to reduce your exposure to unhealthy-to-breathe solvents, or you want to reduce your VOC impact on the environment. PWM

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

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Full Circle

Paddling through a woodworking past.

A young apprentice. *The author's son – who is better behaved than was the author at his age – was invited to help build this kayak paddle.*

I was 3 years old and I was in toddler heaven – the dirty, dangerous, totally awesome garage. My dad had actually invited me out to the garage to help him make … something. I didn't know what and I didn't care. Having already broken the rear window of my dad's pickup truck while playing with a wrench, I wasn't usually a welcome guest in the garage.

But today was different. Today I was dad's helper. My dad started shaping a piece of wood. Saw, then drill press, then sander. I "helped" mostly by staying out of the way, hammering on some nails my dad had started in a board. I felt like we were in there for hours, but in retrospect it couldn't have been more than 30 minutes. I don't think I made any progress on the nails – plastic hammers aren't very effective – before my dad told me he was finished and to come take a look.

Hmmm. Didn't look familiar. "What is it?"

WHACK!!!

It was a paddle … a perfect fraternity hazing paddle, scaled down for my little butt.

I remember the build process so fondly, but I do not recall the fact that just moments before being invited out to the garage, I had been misbehaving. Quite badly, I have since been told. So my parents decided to have me help make the paddle for my punishment.

I learned my lesson. So well, in fact, that the paddle was never used again. From that day forward, it just hung on the wall. Either parent merely asking, "Should I get the paddle?" always elicited my best behavior. I even tried to gift it to my younger brother once when he misbehaved. "Can Danny have the paddle now?" No dice; the paddle remained mine. Brilliant parenting, in my humble opinion.

After that experience, it should come as no surprise that I avoided woodworking for many years. Fast forward three decades. I now have children of my own. My dad has since passed away, and I have inherited his woodworking tools. I've gotten over my fear of the paddle, and because I can't bear to let all those woodworking tools sit idle, I've started dabbling.

One day, I invited my 4-year-old son to help with a woodworking project for the first time. A paddle.

Not nearly as destructive as I had been as a child, he really is a welcome guest in the garage. And he's much smarter and more informed than I was. He already knew about my paddle story, so he wasn't falling for anything. He kept his distance and only took an interest when the power tools were running. (He's a man-in-training, so that was a given.)

Well, this paddle really did take a few hours. My son completely lost interest and disappeared into the house well before I finished. When it was done and I called him out to see, he asked hesitantly, "Is that my paddle?"

"Nope. It's mine. I need it for my kayak. Pretty cool, huh? Thanks for helping me."

You see, my son is a good kid, and so far, he hasn't earned the right to help build a paddle to hang on the wall. But just in case, I've got the perfect piece of oak tucked away in a back corner … . **PWM**

Eric is a happily married father of two who lives in Fountain Valley, Calif. To date, a garage-wall workbench and bathroom remodel are his biggest projects.

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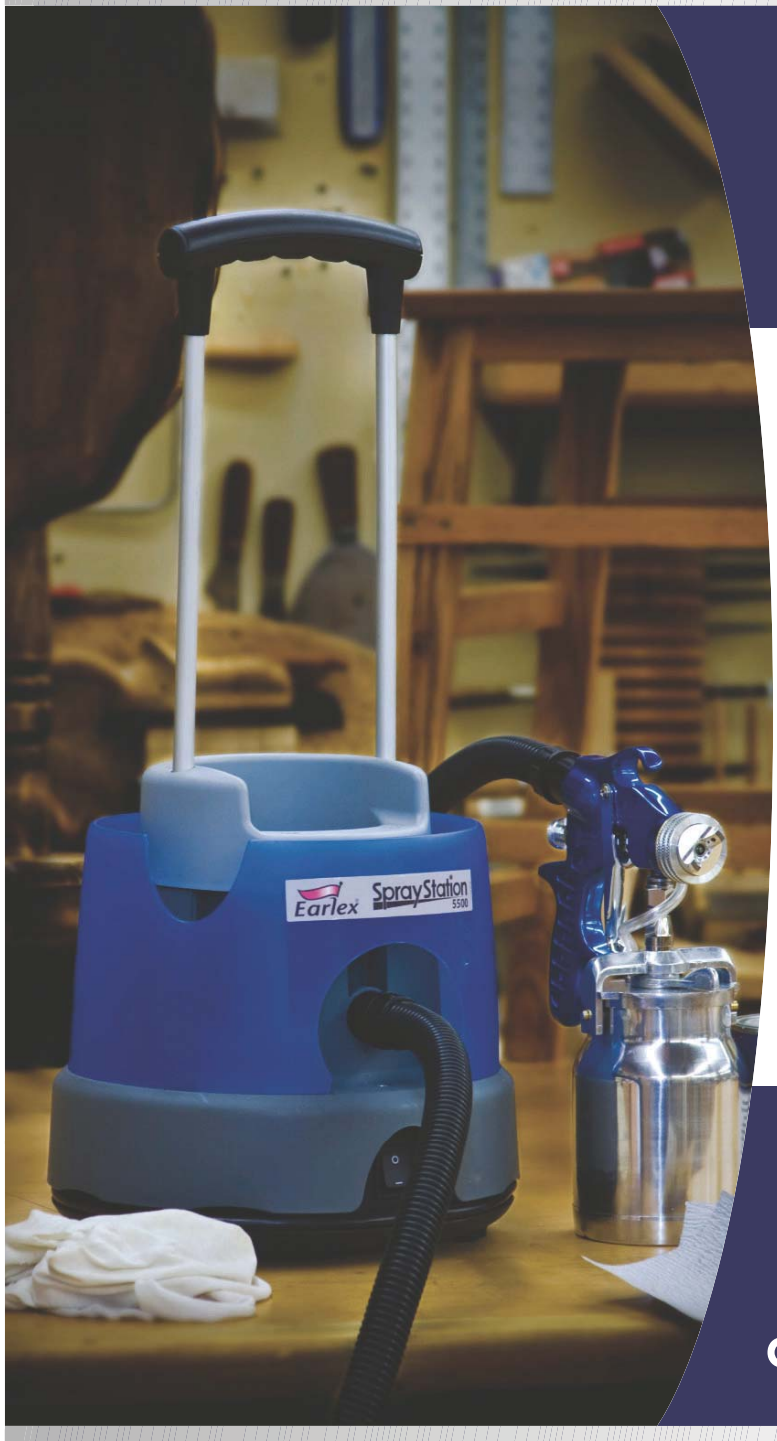

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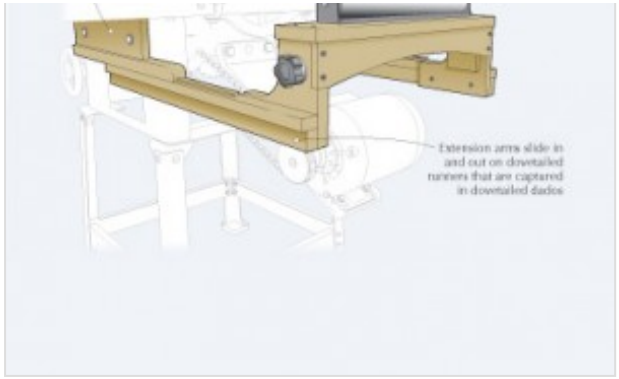
Tricks of the Trade: Table Saw Extension

Categories:: Article Index • February 2012 #195 | | **Tags**: Kari Hultman • Tricks of the Trade

Article Index | Dec 27, 2011 | Comments 0

Edited by Kari Hultman

Pages: 12-13



From the February 2012 issue #195.

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I designed an outfeed support for my table saw that doesn't take up any floor space. It's made of plywood, hardwood and a store-bought roller.

Three main design features enable it to work well. The runners are made of hard maple that resists wear and tear. The sliding mechanism is a dovetail that allows the roller to move closer to the table for short pieces and farther from the table for longer boards. The roller can be made level with the top of the table saw because of an elongated hole for the bolt that connects the roller

assembly to the extension assembly.

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